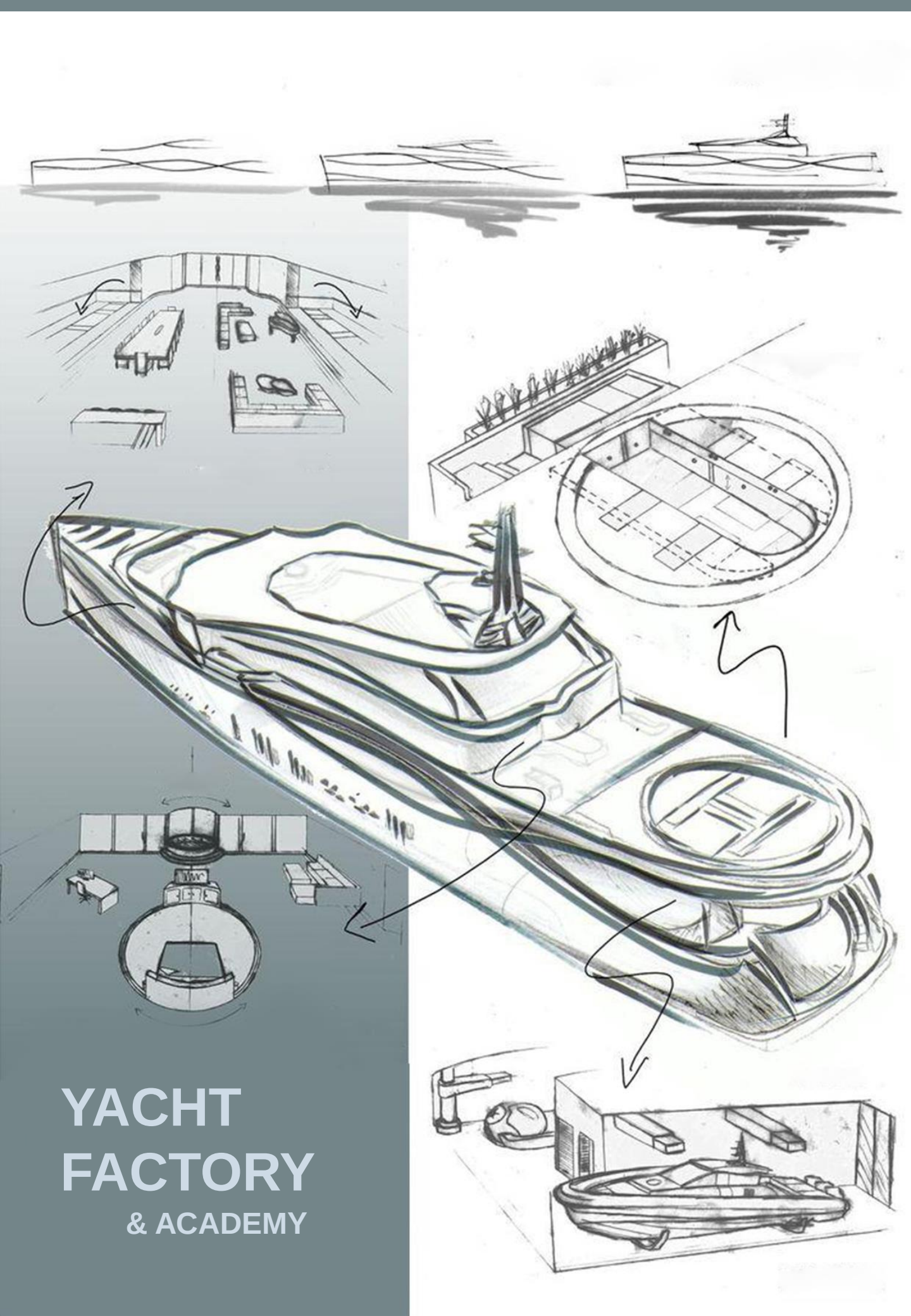

YACHT FACTORY

& ACADEMY

Philadelphia University

Faculty of Engineering

Department of Architecture

First Semester 2020 | 2021

Engineering project 1

“Yacht Building Factory & Academy ”

A Thesis Presented By
Mohammad Jaber
In cooperation with Ahmed Sherif

Supervised by
Dr. Afnan Saleh

DEDICATIONS

I dedicate this work to my beloved parents Khaled and Taghreed for their unconditional love and support. They gave me the strength and support I needed to chase my dreams and the realize my potential. They have always been the driving force in my life and for my career. Without them, none of this achievement would matter.

To my sister Layleem and Brother Ahmad.

To my sister Toam who taught me that it is never too late to change major and pursue true passion. And that context is everything.

To my aunt and cousins who deserve my sincere thanks.

To the memory of my grandfather who supported and encouraged me on my journey.

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To all my friends, whose names cannot fit in one page, thank you for your constant encouragement.

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Special thanks to all my teachers. I have deep gratitude for their guidance and support. I believe that I have learned from the best.

Thank you so much!

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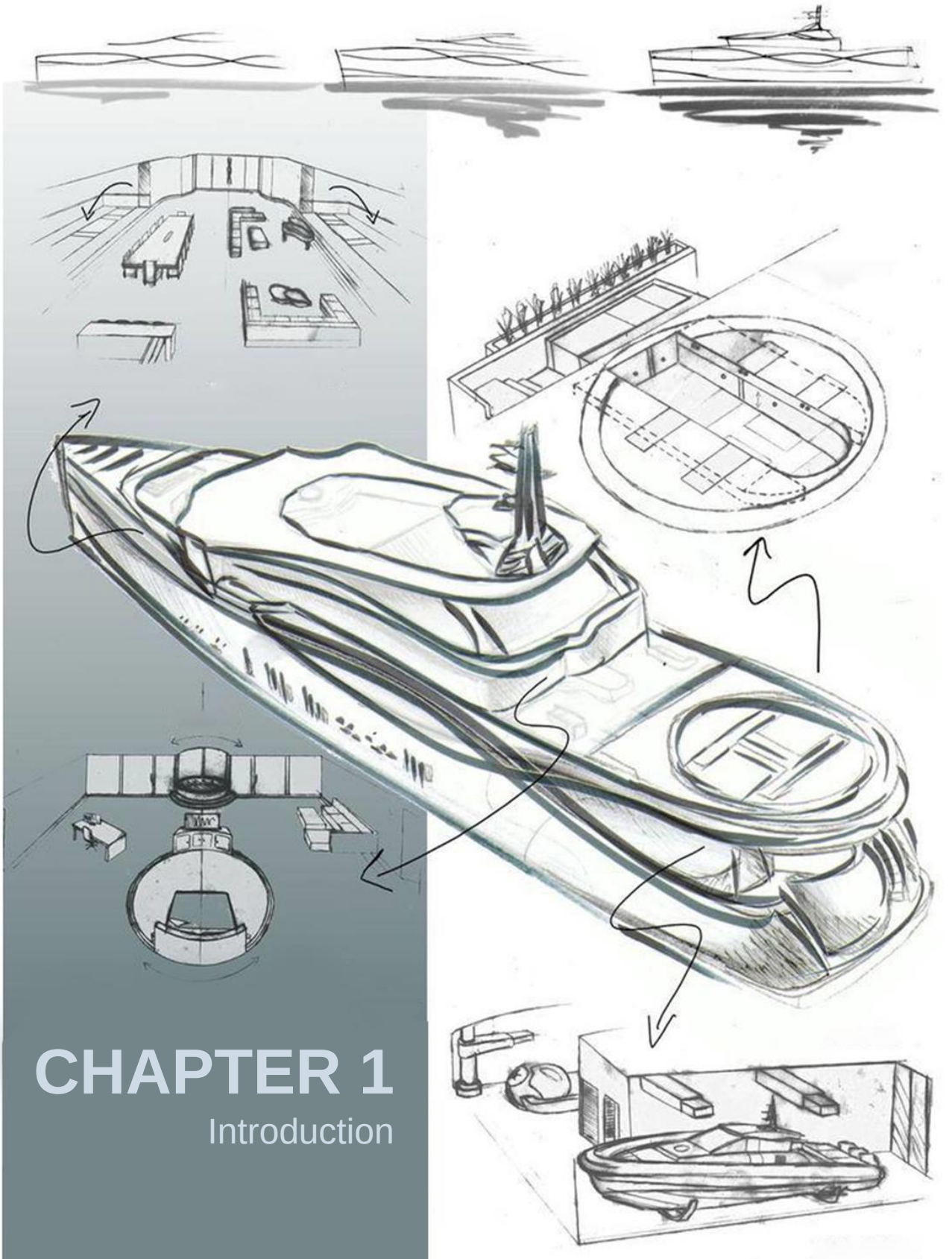


CHAPTER 1

Introduction

Ahmed Sherif

Mohammad Jaber

1.1 Vision

Industrial Architecture is a blend of technology and art that has also evolved to combine functionality and design and reveal impressive construction worthy of admiration and recognition. Buildings from around the world are focusing not only on its primary goal of housing a production line also garnered attention because of their design.

Egypt is one of the oldest countries that manufactured ships and boats.
The ancient Egyptians had a long history of building boats over a long time spanning from the pre-dynastic era to the era of the modern Egyptian state .

It is believed that shipbuilding during the Old Kingdom was influenced by shipbuilding in the eastern Mediterranean region beginning in the reign of King Akhenaten. This is indicated by drawings in the Temple of Ramses III in the city of Hapo, of joint boats in a sea battle with the so-called Sea Peoples. The ancient Egyptians used to make ships from the timber of acacia and sycamore trees. They also imported cedar and cypress trees in particular to make ships, and the ropes were made from palm hair, papyrus plants, and other plant fibers.

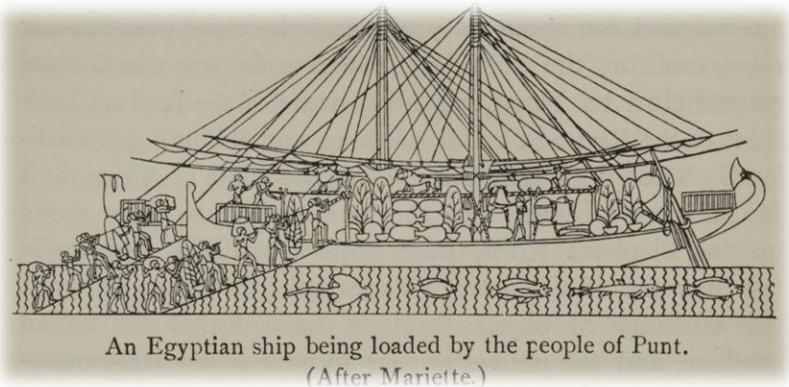


Figure 1: Egyptian Old Ship

SO Egypt has a history in the manufacture and use of ships, and till this day Egypt is one of the countries that produce and consume this type of industry, due to the presence of the Nile River, the Red Sea and the Mediterranean Sea .

The uses of ships of all kinds in Egypt vary in tourism, whether public or private, and transportation Hunting and wars .

But Egypt is facing problems in the field of ship and boat manufacturing, and till now it does not have a huge and known factories for building and constructing ships and yachts other than the Arsenal in Alexandria, and it is especially for the manufacture of warships for the Egyptian army.

other than that, all of them are small activities such as Al-Anfoushi workshops in Alexandria and Al-Zafarana workshops in Suez, and they are specialized in manufacturing fishing boats and small boats, so there is no huge industrial commercial activity in this field.
And since it is a country that consumes all kinds of ships, it imports many of them and this materially affects them .

Figure 2: Zafarana Work Shops

Nevertheless, Egypt is clearly heading towards industry, modern technology and energy, such as the establishment of many industrial projects and energy fields that are exported abroad, exploration for natural gas, and many other projects, despite all this, Egypt has no specialization in This field of heavy manufacturing of ships, it is possible to advance this industry as a development of the old industry to the manufacture of yachts of all kinds .

This will be done through the establishment of a factory to manufacture ships using the finest raw materials and using modern technology that is available in Egypt, in a deeper way in the yachting industry, and an educational academy consisting of a teaching staff at the highest level to teach students and prepare them for this field, due to the tourist nature experienced of the region .

1.2 The Proposed Project

The vision was different in the beginning, We were thinking more in the tourism direction, so it was suggested to do Medical Park and its idea was to revive medical and archaeological tourism in Egypt, but this type of project has existed before in the past years because of Egypt's trend towards industry and energy more Recently, So the vision has directed more towered industry and science.

The First Proposal

- Project Name :

Medical Park

- Project importance:

• The project aims to revive medical tourism

• Attracting capital to invest in Egypt.

• Providing job opportunities

- Stakeholders:

Ministry of Tourism

Ministry of Medicine

- Similar projects global and local:

Local: Medical park premiere
Global: Park City Hospital US

- Main functions of the project:

Clinics building

Convention Hall

Mall & plaza

The Second Proposal

- Project Name :

Science city

- Project importance:

• Educating and directing new prospects

• Scientific exchange between countries

• Help in developing the scientific shift

- Stakeholders:

Department of Energy

Ministry of education

- Similar projects global and local:

Local: Zewail city of science and technology

Global: Beijing university in china

- Main functions of the project:

Scientific exhibitions

An educational and practical research center

Convention Hall

The Third Proposal

- Project Name :

Yacht building factory & academy

- Project importance:

• Reducing the percentage of ships and yachts import to Egypt

• Assists in exporting these boats, ships and yachts outside Egypt

• Increase national income

- Stakeholders:

Ministry of Transportation

Public Authority for Sea Transport

Suez Canal Authority

- Similar projects global and local:

Local: -

Global: Amels for yacht building in Netherlands

- Main functions of the project:

Yacht building factory

Educational academy

Yacht show room

SWOT Analysis:

Comparison of proposals made through a SWOT analysis as follows:

	Medical Park	Science city	Yacht building factory & academy
Strength	The project aims to revive medical tourism	Keeping up with scientific and industrial progress and energy use	A pioneering idea that was not applied before in Egypt
Weakness	Project size area	There is a relatively similar project in the same area	A pioneering idea in the region, we will face little difficulty in building specifications to some extent.
Opportunities	Providing job opportunities for youth and the unemployed, whether workers, employees, or doctors	Develop the project to the best possible level	Available scarcely and it is possible to have to seek the assistance of external technical services and expertise for a small period
Threat	Scientific and practical competition for similar projects in Egypt	Very high cost of the project	Method of dealing with marine currents

Table 1 | Comparison of proposals project

After discussing the proposed projects with jury, the **Yacht building factory & academy** project was approved.

1.3 The Project

The project is an educational industrial project that aims for this type of industry to promote economic, ethical and entertainment values in Egypt, but it lacks buildings and appropriate services for such an industry.

Yacht building Factory and Academy

- Yacht building factory
- educational academy
- Yacht show room

1.3.1 Why this project ?

The need for this project in the area, And the project offers a solution to several problems:

1- Lack of experience in Yacht maintenance and construction.

Skilled labor is the most important element of the shipbuilding industry in Egypt, and in other industries, where the productivity of a shipbuilding worker is measured by the average number of hours needed to manufacture one ton of steel in the hull of the ship. In Japan it reached 9 hours, Spain 12 hours, South Korea 18 hours and China 55 hours. In Egypt, it reached 400 hours, which is considered the lowest in the world compared to the Egyptian or Turkish worker.

solution:

We will provide workers with the most modern equipment and industrial machinery in this field. They will also be trained and prepared to deal with these modern equipment and give them new experiences in this field.

Figure 3: Anfoshi Work Shop

1.3.1 Why this project ?

2- Lack of educational and academic resources for this field.

Study has been made in the past under the title (The future of shipbuilding in Egypt) and indicates that for about half a century and until now, the engineering capabilities for designing shipbuilding have been lacking in Egypt, knowing that the use of computer programs in shipbuilding design has become sophisticated.

solution:

And the solution to this problem is to do academic educational work to build ships and provide students with experiences from abroad from a high faculty.

1.3.2 The need of the project

Shipbuilding workshops in the Anfoushi species are facing extinction, the specter of closure, the rise, licenses of ships and boats, and the increase in the prices of wood and raw materials. On the shore of Al-Anfoushi area, it is located in an area of ship manufacturing workshops, which used to burn with movement, but now there are only a few professionals in it, after the industrialists abandoned it and went to other professions to earn a living, and they left their profession and inherited it from their ancestors.

Because of the almost gradual collapse of this industry in Egypt, knowing that it is one of the small industries, whether in Alexandria or in Zafarana, but this type of manufacturing has great importance in Egypt, whether in the field of entertainment or tourism.

This project will provide a large percentage of experience for workers in terms of modern equipment and technology Quality, this industry will grow stronger again.

Figure 4: Yacht On Nile River

1.3.3 Project relation with context

The project is linked to the surrounding nature and is very strong as a tourist area, due to the presence of large tourist villages on the coast of the Red Sea, either in terms of industry and trade and the presence of the port of Ain Sokhna, and there is the biggest yacht Marina in the area.

1.3.4 Value Definition

A fair return in goods, services, or money for something / exchanged / worth in money / worth, usefulness, or importance on comparison with something else the letter is of great historical value / a principle or quality that is valuable or desirable they shared many goals and values

Investment value

•The investment value will be calculated so that the size of the investment in terms of investors, businessmen or state projects according to the area, activity and size of the project, and it will be sustainable in a non-profitable manner in educational projects, and the result of this value will increase the national income of the country and the return to investors.

moral values

•The value of the project may be in the social, which is the provision of job opportunities and educational training by establishing an educational and practical academy

entertainment value

•Industry field: The Entertainment that may accrue to the user, which is to go through a successful new experience with strategic, logistical and economic goals, and to add new experiences that may help develop the workforce in Egypt in terms of education and training and add new cultures to this field by adding advanced equipment in yacht building such as automatic devices and Robots.

1.3.5 A Timeline Of Ships, Boats & Yachts

Ships and boats are two of the oldest types of transportation and were first built thousands of years ago. Not only have ships and boats been used for transportation throughout history, but they have also been used for several other reasons including to transport cargo, fishing, as a type of defense from armed forces, sports, leisure, and relaxation. Today, ships, boats, and yachts are built using advanced technology and materials, differing greatly from those that have been used throughout history.

Timeline of Ships, Boats, and Yachts
4000 BC: The ancient Egyptians used reeds to build what are thought to be the first sailing boats in the world. The reed boats had sails and a mast and were used on the Nile River
2500 BC: Around this time, the ancient Egyptians began to build wooden boats that were able to withstand sailing across oceans.
1550 BC: Around this time until about 300 BC, the Phoenicians of the ancient Canaan civilization (the area that is now Syria and Lebanon), used something called a galley. The galley was a sailing vessel that was powered by man and was used to both fight and trade with neighbors.
1000 AD: The Vikings started to build longboats. These were larger ships that had sails and up to sixty men whose job it was to row the ship. The boats were large but were narrow and long, allowed them to travel along rivers as well as the open sea.
1100 AD: The Chinese began to use boats that they called junks. Junks were boats that featured a rudder for steering in addition to watertight compartments and battens located on the sails that served to make them much stronger. The Chinese junks were used as transport and fighting ships and were in use long before western ships that included such features.
1450: Starting around 1450 and for several centuries, wooden ships with three or four masts were in use by several different countries. These masted sailing ships were used as trade vessels, by explorers, to transport cargo, and as battleships.
1660: Charles II of England chose to use a yacht to carry him to the Netherlands from England for his restoration. Previously, yachts had been used by the Dutch navy. After Charles II used a yacht, they became vessels that were known to transport important persons.
1800s: Clipper ships were built in the 1800s and were fast sailing ships, that featured tall masts, and slim, long hulls.1818: The Black Ball Line was a shipping company that began offering passenger service from the United States to England.
1819: The first ships that were built using steam power began to cross the Atlantic Ocean. Steamships used a combination of wind and steam power to move.1845: It was in the mid-1800s that the first ocean liners built from iron began to appear. The ocean-going liners were also driven by a propeller instead of sails like many earlier ships.

1880: River boats that were driven by steam were called stern wheelers. Other similar boats featured paddle wheels on each side and were called paddle steamers. Paddle steamers were mainly used for transport on rivers.1910: Ships that were previously powered by burning coal started to be converted to diesel power and started to use oil as opposed to steam.
1955: Hovercraft boats were created by a man named Christopher Cockerel. The boats were designed to float on cushions of air and the engine was designed to blow air into these cushions providing both propulsion and lift.
1980: In the 1980s, container ships began to be more widely used to transport cargo. The ship was designed to carry the containers stacked on the deck. Modern cargo ships can normally hold up to one thousand containers at a time.
1990: The 1990s saw the rise of passenger cruise ships that were used to take people on holidays. Cruise ships featured shops, restaurants, and other types of recreation.

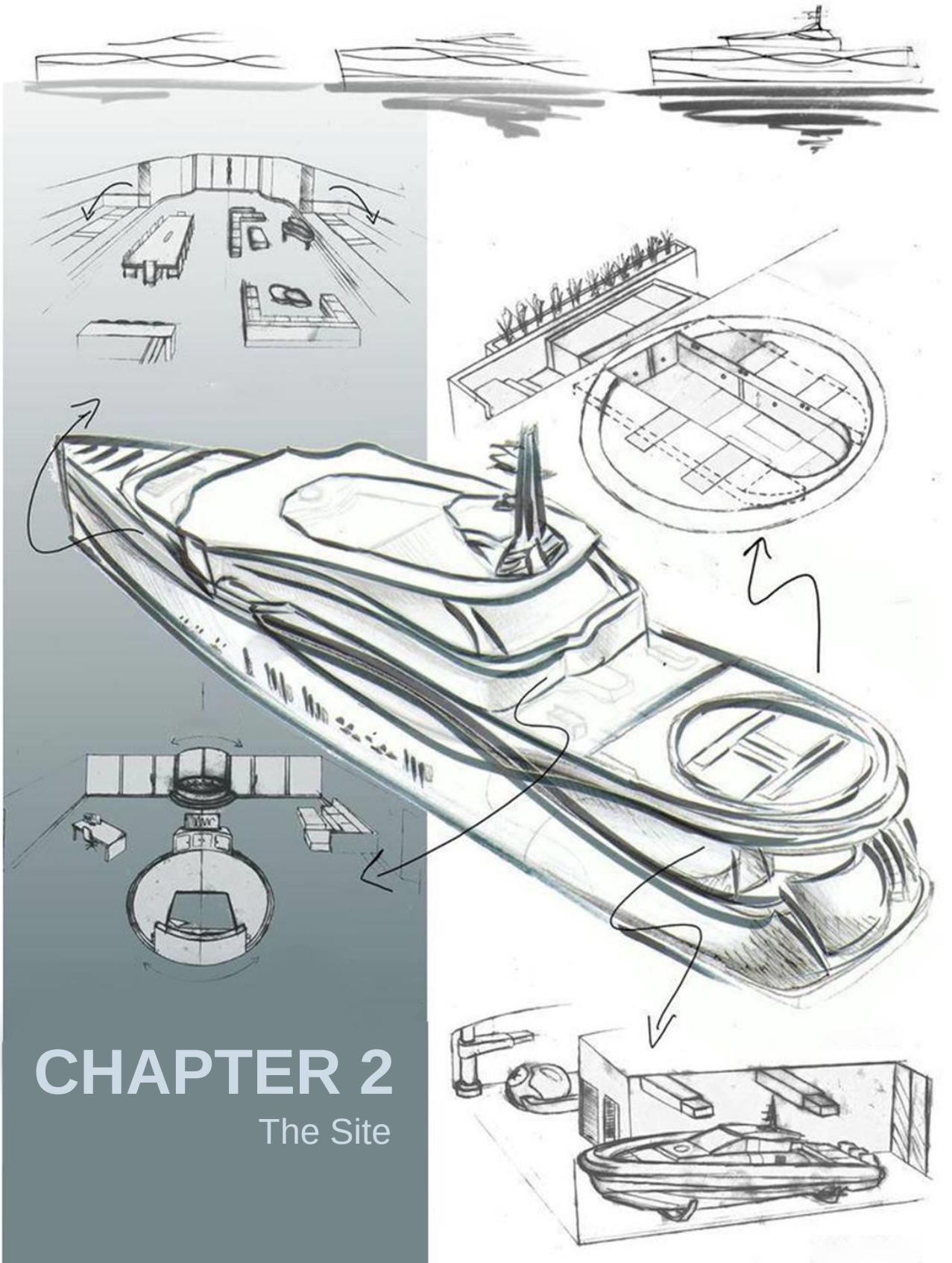
1.3.6 Yacht Background

The term, yacht, originated from the Dutch word jacht (pl. Jachten, meaning "fishing"), and originally referred to the light and fast sailing ships used by the Dutch Navy to pursue pirates and other offenders around and in the shallow waters of the Low Countries.

The history of pleasure boats begins with rowing boats in the Egyptian Pharaonic era, which is one of the oldest countries that used boats in maritime transport. Today, boats are of great importance in Egypt in terms of transportation, trade, tourism, entertainment and personal purposes.
Pleasure ships in the waters of Burma, Egypt, India, Mindanao and Japan. Writings from the 8th century AD describe Anglo-Saxons (toy ships) that featured decorative arches and carvings, and which had the ability to cook on board a ship.

Figure 5: Old Ship

A yacht is a sailboat or electric craft used for fun, sailing or racing. There is no standard definition, so the term applies to these cabin vessels with amenities that accommodate all-night use. To be called a yacht, unlike a boat, a pleasure ship would likely have a length of 33 feet (10 m) and it may have been judged to have good aesthetic qualities.



CHAPTER 2

The Site

Ahmed Sherif

Mohammad Jaber

2.1.1 Where is the Location ?

Egypt is an Arab country located in the northeast corner of the continent of **Africa**, and it has an Asian extension, where the Sinai Peninsula is located within the continent of Asia, it is **a transcontinental country**, topped by the **Mediterranean Sea** **to the north** and the **Red Sea** **to the east** .

Figure 6: River Nile Giza

Figure 7: Egypt Map

2.1.2 Why this country ?

Because of Egypt's clear trend towards **industry**, **modern technology** and the **availability of the necessary energy**.
Because of its location on the coasts of **the Red Sea** and **the Mediterranean Sea** and the presence of **the Nile River**.
It is considered a strategic location in relation to the surrounding countries, so there is a potential mutual benefit .

2.1.3 Context around the country

Figure 8: Mediterranean Sea

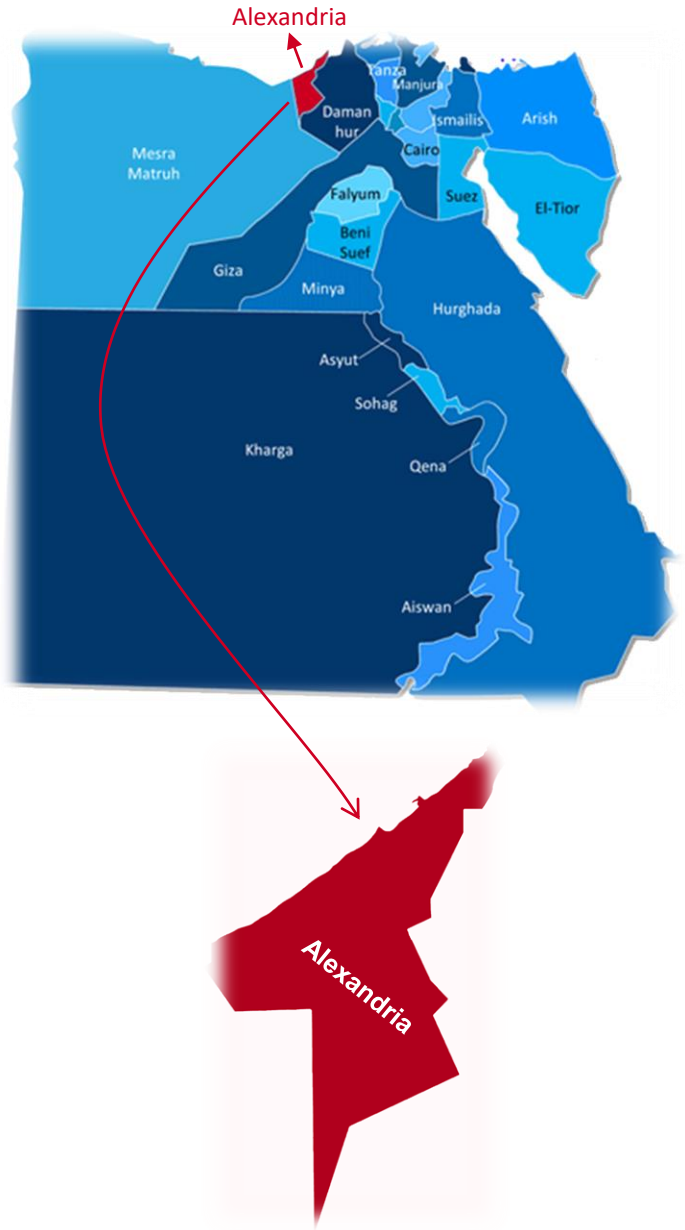
- Around Mediterranean Sea:
Italy, Greece, Turkey, Syria, Lebanon, Palestine.

- Around Red Sea:
Suez, Al-Sokhna, Al-Zafarana, Al-Galala, Hurghada, Sharm El-Sheikh and St. Catherine.

Figure 9: Red Sea

- Since all the surrounding areas in this part of the Red Sea Basin are all Egyptian on both sides, and the whole area is touristic par excellence, the idea of yachting towards the Middle Class was confirmed and better for this project .

2.2.1 Proposal Sites



Alexandria

The investment value of the port of Alexandria: Alexandria port and the port of Dekheila are considered among the most important ports in Egypt in terms of their locational value and logistical as well .
The presidential palace of Egypt is there and also there is an arsenal for building and constructing ships belonging to the Alexandria Ports Authority and the Egyptian Army .

Therefore, after studying this, it proved that the Alexandria Ports Authority, with its current location and services, does not need any new addition in the field of building, constructing and manufacturing ships due to the lack of space needed for this and for severe security reasons Besides the Egyptian public security, and that is also due to the presence of a large service area in the port, so we decided to invest in our project in a more distinguished place and in need of these services in a greater form than the one currently in the port of Alexandria .

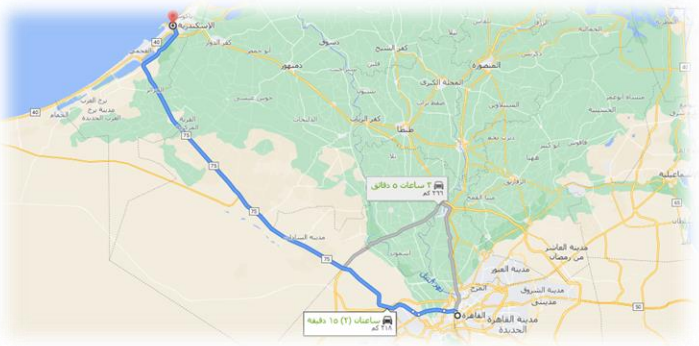


Figure 10: Road Map

From the Capital Cairo to **Alexandria**, Direct one way
Distance | 218km
Time on the road | 2 Hours & 15 Minutes

Ain Sokhna

The investment value of Ain Sokhna Port in Suez: The Sokhna Ports Authority is one of the largest container ports in Egypt and its location is more logistical on the Red Sea. Associated with it and many activities too. Here the addition comes through our project, which will be located near the port of Sokhna, which will add many advantages such as building yachts, which is the first of its kind in the region, and an educational academy that aims to educate and provide students with great experiences in this field. This will make it more distinguished due to the distinction of the area in tourism, it will help in the advancement of this type of industry.

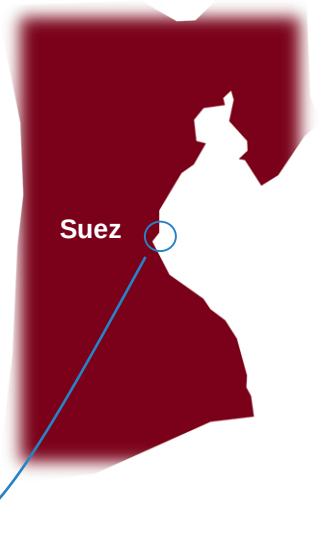
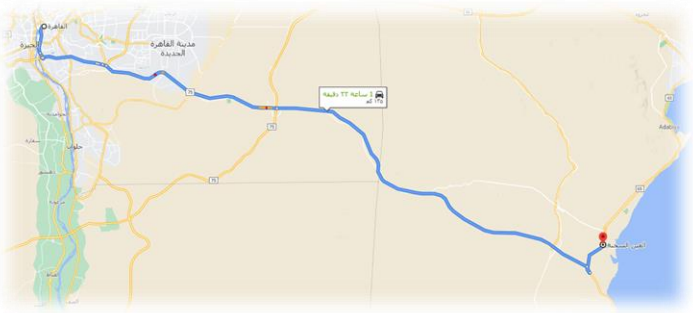


Figure 11: Porto Al Sokhna



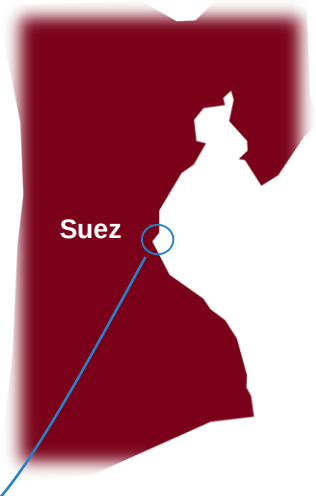
From the Capital Cairo to **Ain Sokhna**,
Direct one way Distance | 135km
Time on the road | 1 Hours & 33 Minutes

Figure 12: Road Map

AL-Galala city

The New Galala area is considered one of the largest new tourist attractions extending to Ain Sokhna, which is also under the Suez Line and has one of the largest yacht port in Egypt.
The distance between Ain Al Sokhna and Al Galala is 28.5 km.
We have seen that it is Maybe better to go towards Al-Galalah city because the yacht activity in it will be extensively greater than Ain Al Sokhna and that it has one of the largest yacht Arena in Egypt, and it is possible that there is a yacht club in it and these factors will be positive for our project .

From the Capital Cairo to **Al Galala**,
Direct one way
Distance | 153km
Time on the road |
1 Hours & 48 Minutes



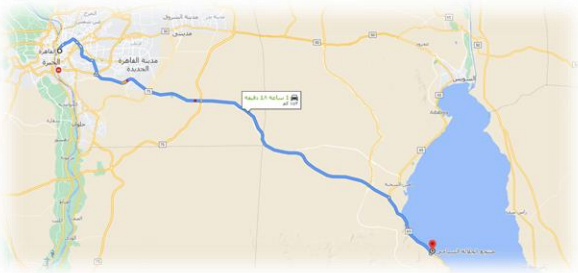


Figure 13: Road Map

Figure 14: Al Galala Resort

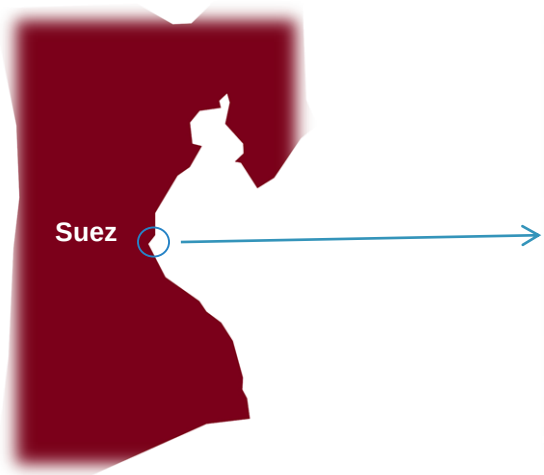
2.3.1 AL-Galala City

Suez : is one of the governorates of Egypt. It is located in the north-eastern part of the country and is known as the city of Suez . It is situated north of the Gulf of Suez .

-The governorate of Suez includes the city of AL - Galala, affiliated to Ain Sokhna .

AL-Galala mountain :
is a mountain located in Suez Governorate, Egypt with an elevation of 3,300 ft above sea level, containing many species of plants. It once had sources of water that have since dried up. Galala Mountain was called the Gallayat Plateaus until renamed in the 1920s decade. Galala Mountain is famous for its marble, which is quarried for export. Its color varies from creamy to creamy white .

It is also known as the city of clouds .



2.3.2 Formation Of The Area

"**AL-Galala Mountain**" ... part of the mountain range west of the Red Sea, which corresponds to it on the eastern side and within Saudi territory the Hijaz Mountains, which descend steeply towards the sea and gradually inward, as it represents the western edge jumps of the Red Sea valley.

-The area located in an area between Ain Sokhna and Zaafarana consists of the Jurassic and Cretan ranges.

-The shape of mountain of Al-Galalah from ancient and metamorphic rocks, with many mineral veins and fire embankments, and the only exception to this is the northern al-Galalah plateau (1223 meters), and the southern al-Galalah plateau (1472 meters), and between them is Wadi Ghriba, because they are of Eocene limestone.

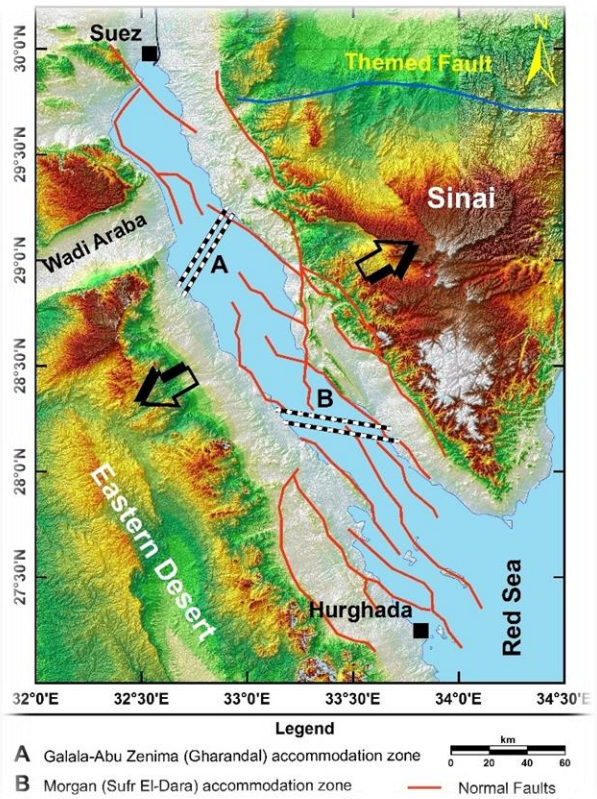


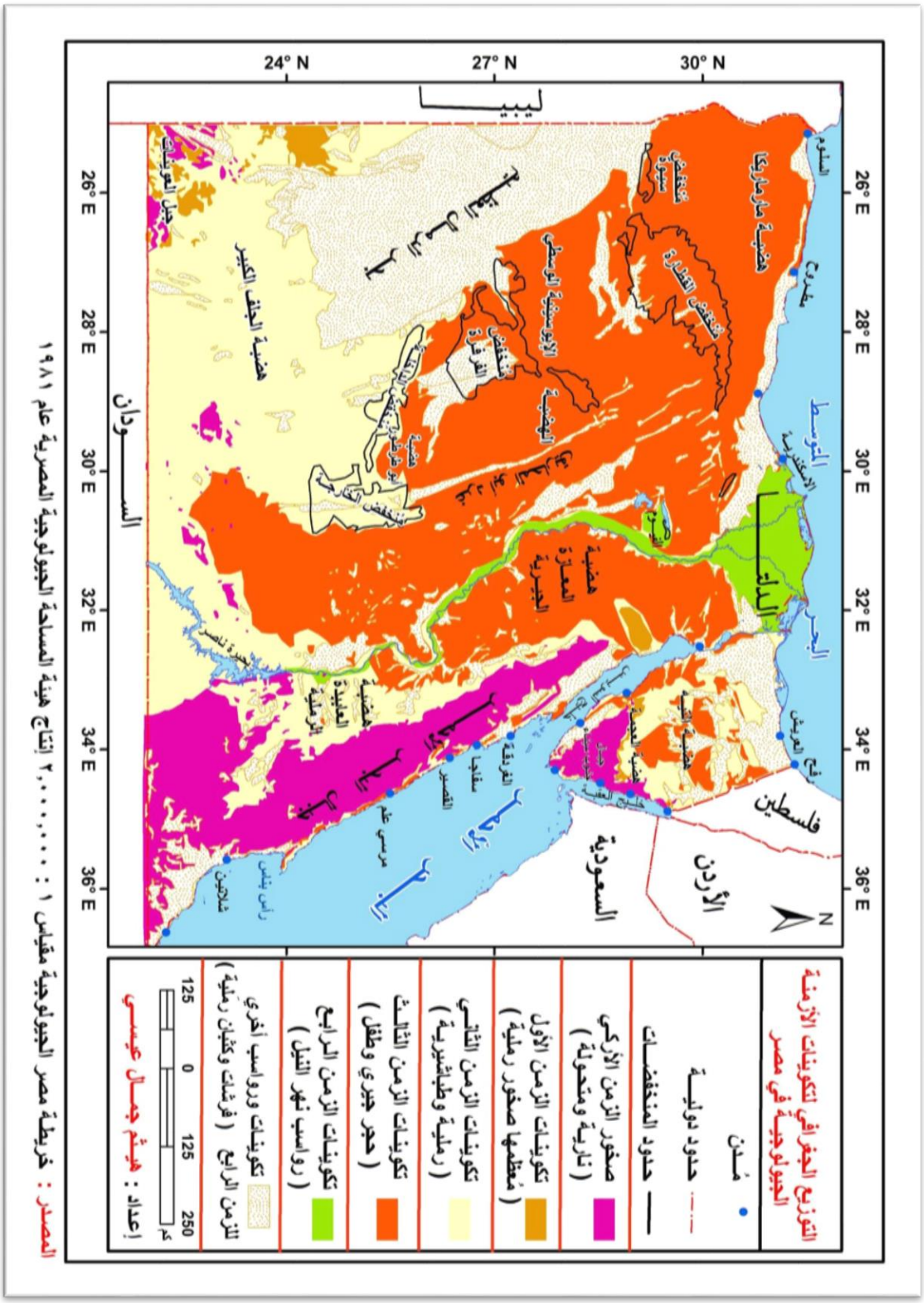
Figure 15: Formation Of The Area

-For 20 million years the floor of the Red Sea has been spreading apart and the Arabian plate has been pivoting northward with respect to the Sinai subplate and its parent, the African plate. By 2 million to 3 million years ago the movement along the fault had created a deep, lush, navigable valley.

Figure 16: African Plate

Figure 17: Al Galala Mountain

2.3.2 Formation Of The Area



2.3.3 Religious History

-It is said that Moses crossed the Gulf of Suez to Bar Sinai via the city of Ras Ghareb in the Mountain of Galala, and that Pharaoh sank off the coast of the city, but without specifying the exact location and this place became a tourist.

Figure 18: City of Ras Ghareb

-The Monastery of Saint Anthonius is one of the most important tourist places in Ain Sokhna, as it is located in the Spring Oasis, which was established after the death of this saint to commemorate his memory as he was one of the most important people who founded the idea of Christian monasticism in the desert of Egypt, and this monastery is considered one of the most important tourist attractions that Intended by foreign tourists from all countries of the world.

Figure 19: Monastery of saint Anthonius

-The Monastery of St. Anba Paul is located on Al-Karimat Road in some valleys called “The Valley of the Monastery”, and the Monastery of Saint Pauls contains the “Church of the Bulls” that was built inside the cave in which the tomb of “Saint Paul” is located.

Figure 20: Monastery of Saint Paul

-This church includes some rare manuscripts that attract large numbers of Christian tourists every year, as many religious rituals are held and monks live there until now, and it is considered one of the most important tourist attractions in Ain Sokhna.

2.3.4 Topography

The Northern Galala Plateau extends for about 80 km from east to west and reaches the highest point of 1200m above sea level. It is bounded by the narrow coast of the Gulf of Suez and extends west ward to join Mokattam mountain, near the Nile Valley.
Ghewibba valley and Araba valley border the plateau from the north and south, respectively.

"Al-Jalalah Mountain" ... part of the mountain range located in the eastern Red Sea.

Al-Galalah mountain consists of ancient fiery and metamorphic rocks, with many mineral veins and fiery dams.

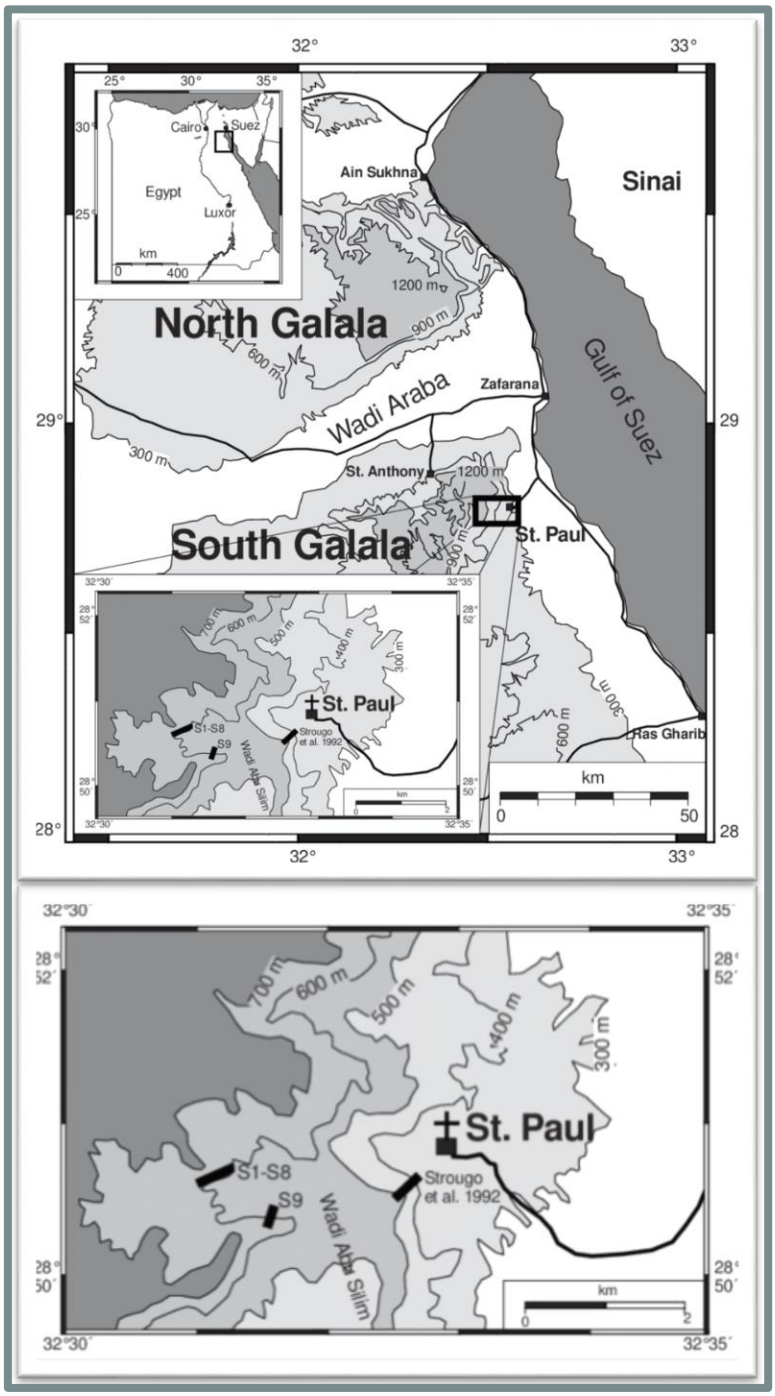


Figure 22: Galala Mountain Topography

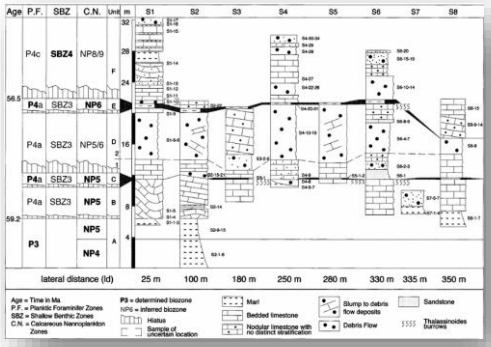
The only exception to this is the Northern Galalah Plateau (1200 meters), and the Southern Galalah Plateau (1472 meters), and between them is Wadi Ghraba, as they are composed of Eocene limestone, as well as a mountain Ataqa (371 meters) overlooking the city of Suez, the average height of the Red Sea Mountains ranges between 300 - 1000 meters, although many of its peaks are more than 1500 meters high.

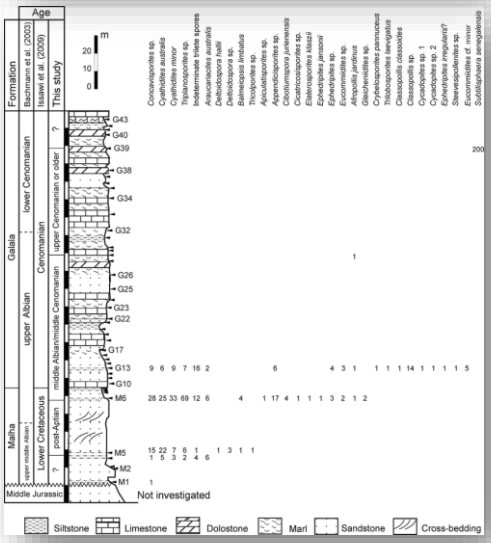
2.3.5 Soil

-The mountainous region that lies between Ain Sukhna and Zaafarana consists of the chains of al-Galalah m. al-Bahariya and al-Galalah al-Qibli, and is separated by Araba valley, and the mountainous soil in the al-Jalalah area consists of alternating layers of hard clay and limestone, and its formation dates back to the Jurassic and Cretan periods.

- Al-Galalah mountain consists of ancient, fiery and metamorphic Arak rocks, which abound in mineral veins and fiery dams, and they are composed of Eocene limestone.

-Because the soil of the city of Galala is one of the hard rock types, it needs heavy machinery and equipment, whether in cutting or filling.





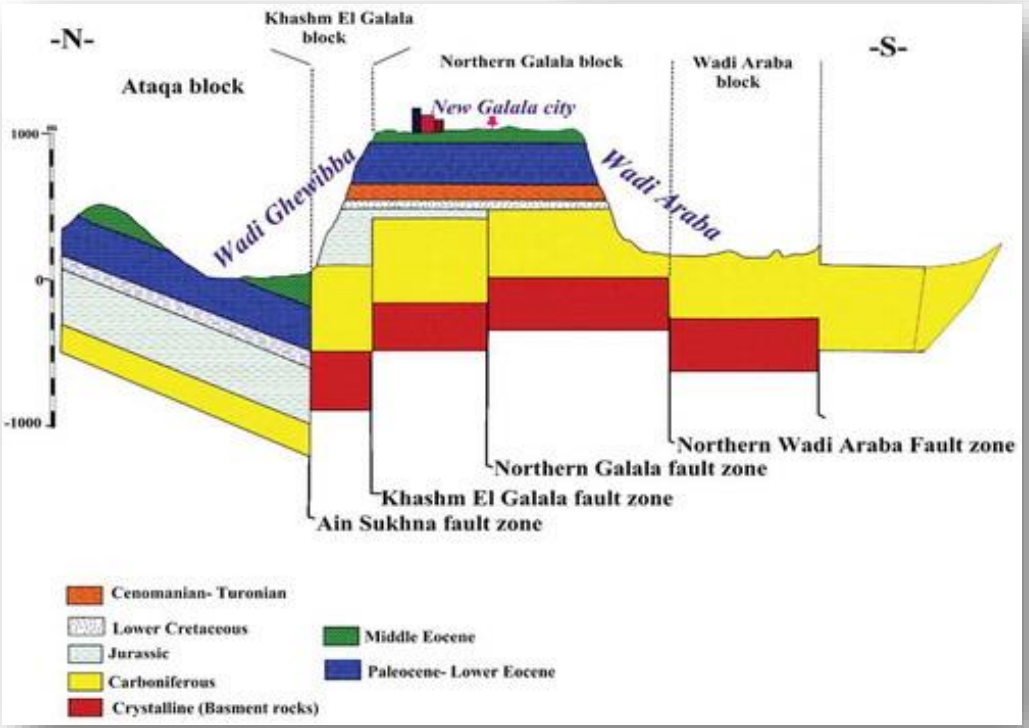


Figure 23: Soil

2.3.6 Climatic Condition

Egypt's climate is generally hot and dry in summer warm and rainy in winter.

Average daily maximum temperature (solid red line) shows the average maximum temperature for each month for the city of Galala and Al Sokhna. Likewise, the “mean daily minimum” (solid blue line) shows the mean minimum temperature.
Hot days and cold nights (dashed red and blue lines) show the average for the warmest day and coldest night of each month for the past 30 years.

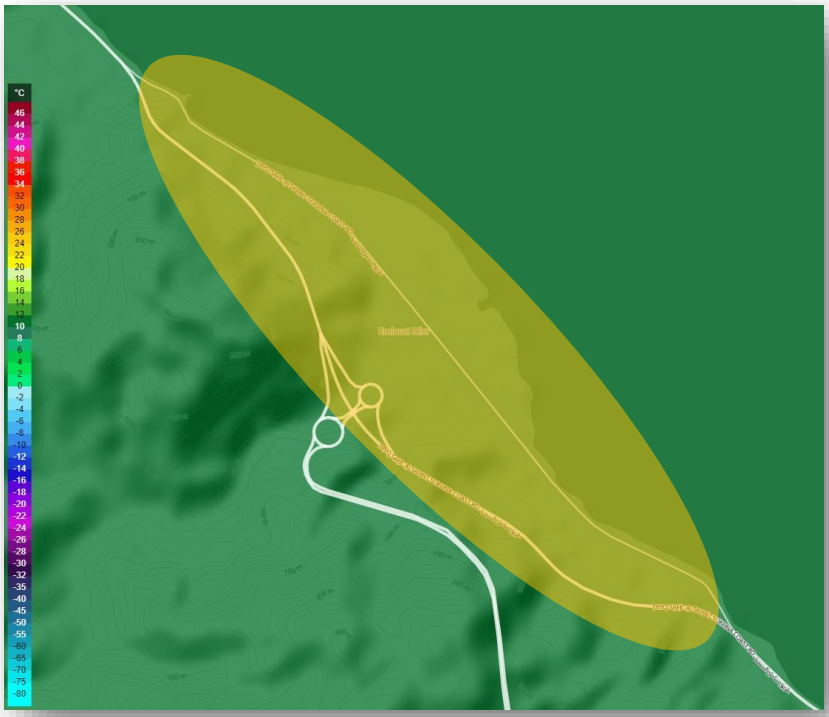
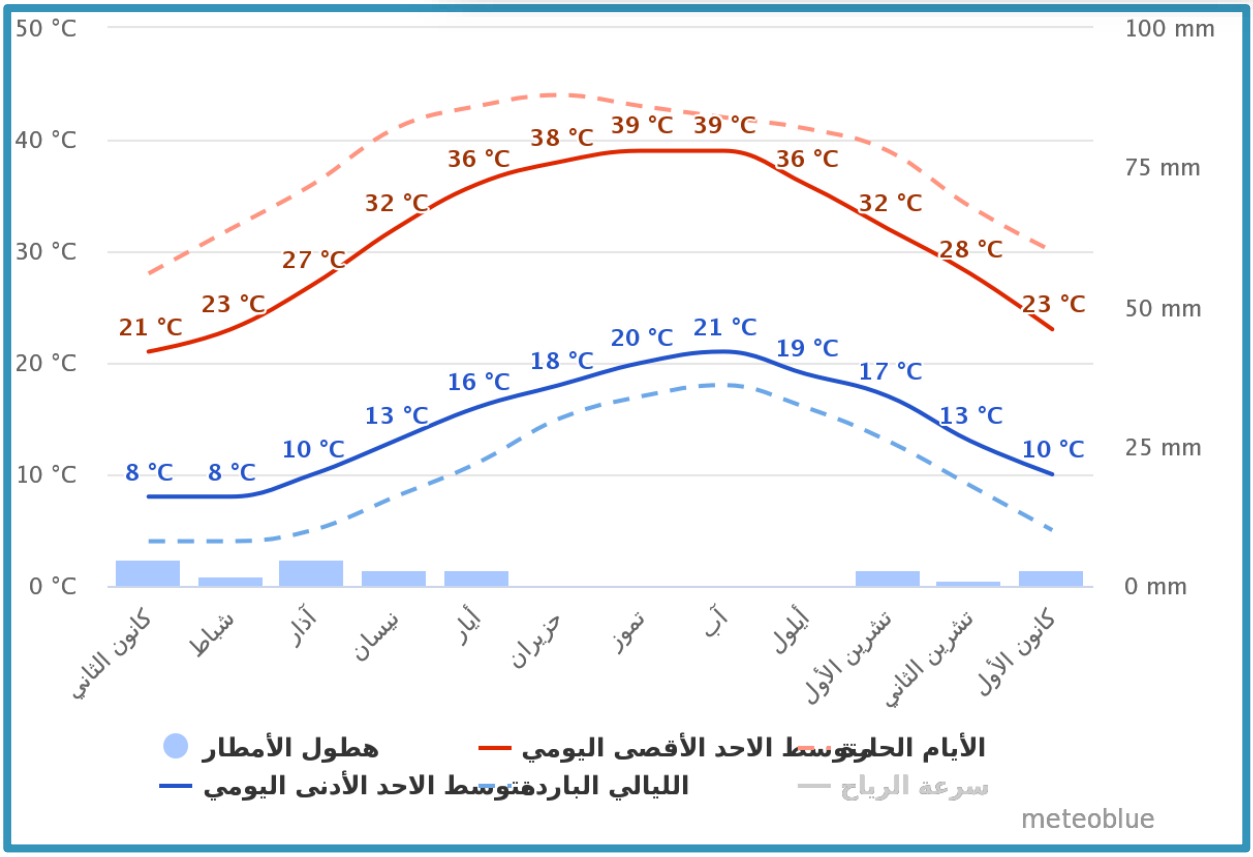


Figure 24: Climate Condition on Site

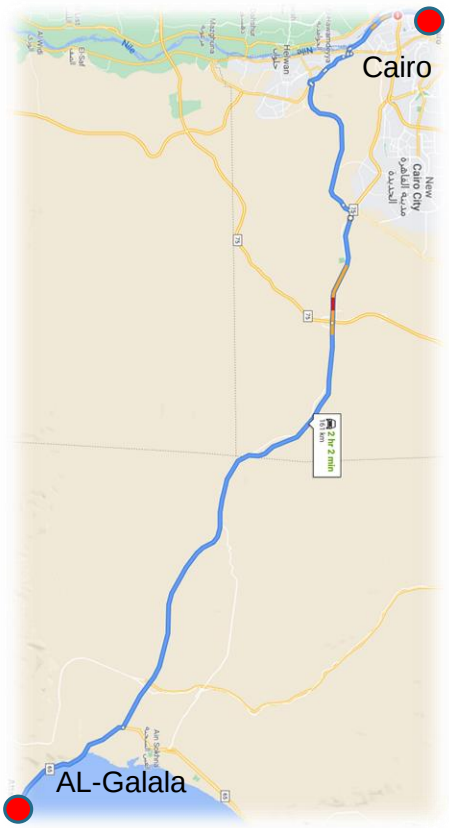


2.3.7 Transportation

There is a safe and fast transportation network linking Cairo with the new city of Galala through the desert Ain Sokhna road, and the length of this road is 106 km, and then from the Ain Sokhna road to the coastal Galala, a distance of 23 km and this distance from the Dirir road in Cairo to the city of Galala.
The Galalah Road has also been renewed to be safer, and its characteristics are ...

The path of the new Galala Road :

-It starts from the South Port Said area to the 92nd kilometer Ismailia Desert Road, then confirms the Suez and Ain Sokhna Road in the Wadi Hajoul region.
-Then it will travel south until it reaches Kilo 10 in the Beni Suef governorate on the Beni Suef - Zafarana road.
-To be completed from the south side until it reaches west of Hurghada and west of Safaga, then "Abu Ramad".
-Then Halayeb and Shalateen up to the "Perfect" area on the international border with Sudan, at latitude 22 .



Advantages of AL-Galala road :

The road is expected to cancel the old road, which consists of one lane, to become an internal road between the tourist villages. And that is when the new Galala Road opens.
The new Galala Road is distinguished by that each direction consists of 3 lanes, and is fully insured against torrents.

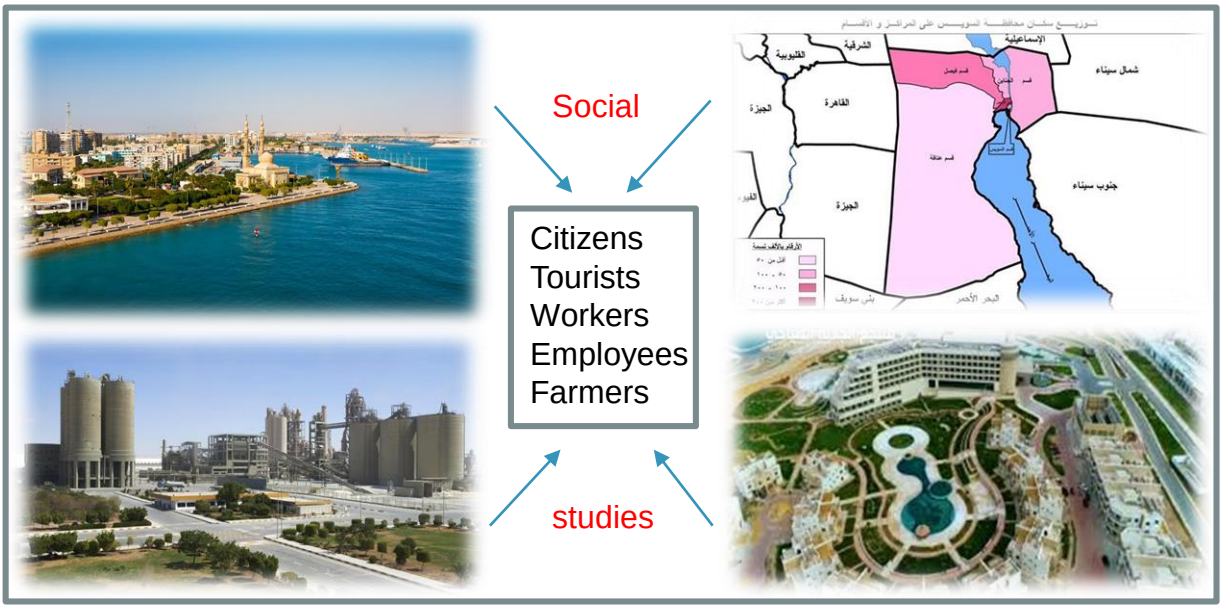
Where it was provided with giant concrete pipes, which collect flood water.
And it is equipped with evaporators and spacers to make use of flood water in industrial and agricultural projects.
In the middle of the road, there is a concrete pouring to prevent deviating cars from falling on both sides of the mountain road, and the road is designed with a slope of 4%.
This is in order for the speed specified on it to be 120 km / h, so that motorists do not feel any obstacles, difficulty or discomfort due to its height.

2.3.8 Social Studies

About 744,198 people live in the Suez Governorate, most of whom are concentrated in the city of Suez. In addition to the thousands of people working in industry and tourism in Ain Sokhna and its associated tourist villages, such as New Galala and others, and the large industrial areas belonging to the region. Suez benefits from its population, as everyone is productive and creative in his work. With the diversity of economic activities in that governorate, the remarkable production was, and it is said that the rate of increase of the population of the Suez Governorate is proceeding normally, so there is no inflation in the population of this governorate and the number of deaths is of a reasonable rate. Suez Governorate alone has many characteristics that distinguish it from the rest of the governorates of Egypt, which makes it attractive to many residents, whether for work or stability.

Also, the presence of more than one port in it is a matter that requires many manpower, and Suez still maintains the importance of its location and the presence of the Suez Canal in it, making it brilliant commercially and economically and has great tourism importance. Tourism activity is concentrated in Ain Sokhna and the new city of Galala, in addition to the many factories affiliated to it, around which industrial activity and workers' housing areas are concentrated. It is characterized by an annual increase in the population equal to 4.25%, and this is an official rate that was calculated based on the reports of the Central Bureau of Statistics, which is the agency concerned with this matter.

Suez has a historical significance represented in being the place that used to receive all the goods coming in the form of imported from abroad. Recently, in our time, Suez derives its importance from the fact that it has three well-known ports, namely the port of Sokhna, the port of Adabiya and the port of Port Tawfiq, and it also has an entire area dedicated to industries where Giant factories.



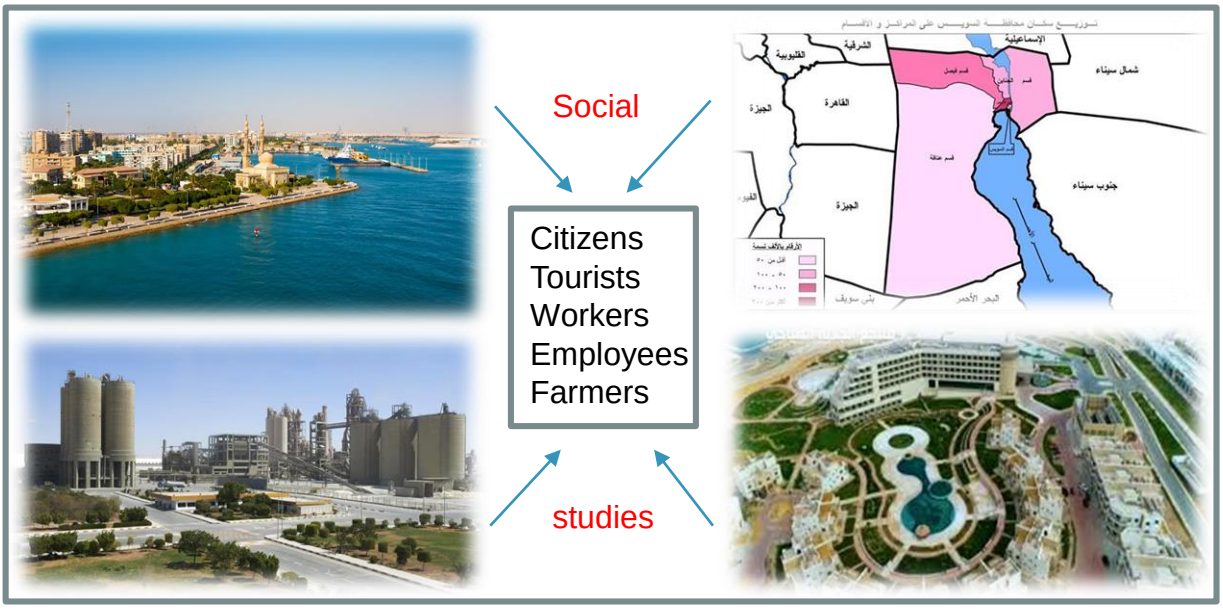
2.3.8 Social Studies

Suez Governorate is one of the governorates of Egypt and its capital is the city of Suez. Its coasts are located at the northern end of the Gulf of Suez, and there is the southern entrance to the Suez Canal, with an area of 9002 km2. It is an urban governorate with one city. Its unique location distinguishes it, as it is considered a gateway to Africa and the countries of Southwest and East Asia, making it a meeting point for global trade and a fortress for industry and industrial investment.

The city includes five neighborhoods :
Suez District: an urban neighborhood, in which most of the government agencies and interests are located.
Arbaeen neighborhood: It is mostly popular.
Ataqa neighborhood: It includes most of the residential areas, factories and companies. This neighborhood has been separated into two (Faisal neighborhood, Al-Sabah and Ataqa neighborhood).
Faisal neighborhood: contains residential areas up to Cairo Road and Ataqa district, which includes residential areas from far from the road, as well as the literary industrial areas, Sokhna and Zaafarana, including the tourist areas.
Al-Ganayen neighborhood: It is predominantly rural.

location is in the Ataqa neighborhood, which is a first-class industrial neighborhood where most of the industrial companies and giant factories are located, as well as the North Gulf of Suez Development Project, which includes Ain Sokhna and its affiliated villages and the new city of Galala.

Ataqa neighborhood represents 89% of the governorate's area, with an area of 8,827,878 km2, which is inversely proportional to the population of 27,340 people.



2.3.9 Ocean and Sea Currents

ocean current is a continuous, directed movement of sea water generated by a number of forces acting upon the water, including wind, the Coriolis effect, breaking waves, cabling, and temperature and salinity differences. Depth contours, shoreline configurations, and interactions with other currents influence a current's direction and strength and Ocean currents are primarily horizontal water movements.

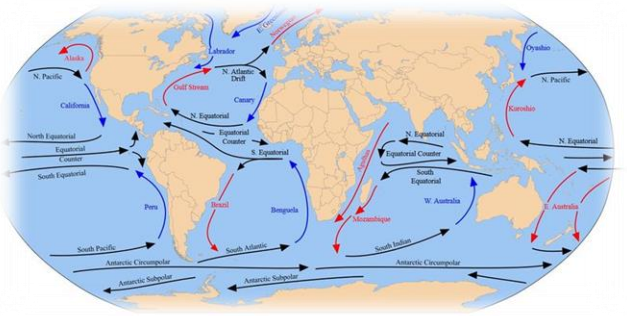


Figure 25: Ocean currents

An ocean current flows for great distances and together they create the global conveyor belt, which plays a dominant with determining the climate of many of Earth's regions.
More specifically, ocean currents influence the temperature of the regions through which they travel.
For example, warm currents traveling along more temperate coasts increase the temperature of the area by warming the sea breezes that blow over them.
Ocean currents are patterns of water movement that influence climate zones and weather patterns around the world. They're primarily driven by winds and by seawater density, although many other factors – including the shape and configuration of the ocean basin they flow through – influence them.

The currents generally decrease with increasing depth, but with regard to vertical or vertical movements, it is usually referred to as exacerbation or lower subsidence, and its speed is very low, as it does not exceed a few meters per month due to the fact that sea water is almost incompressible, and marine currents are divided based on two main factors :

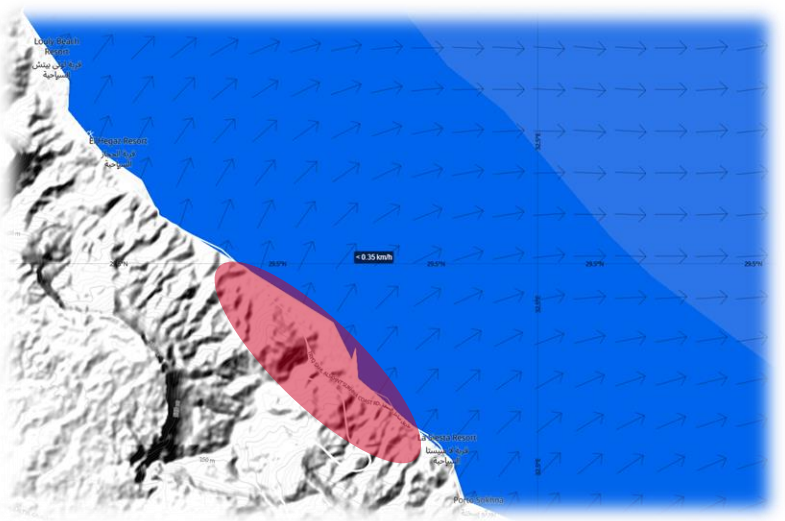


Figure 26: Sea currents on location

1- Based on the source of origin, as this type depends on the wind and the density.
2- Based on the current movement, as it is divided into two types which are warm currents which generally flow towards the pole, and cold currents as they generally flow towards the equator.

2.3.9 Ocean and Sea Currents

Break waters (Structure)

They are structures constructed near the coasts as part of coastal management or to protect the anchorage from the effects of weather, long beach erosion, and sea currents.

Figure 27: Break Water

Purpose

Breakwaters reduce the intensity of wave action in inshore waters and thereby provide safe harborage. Breakwaters may also be small structures designed to protect a gently sloping beach to reduce coastal erosion; they are placed 100–300 feet (30–90 m) offshore in relatively shallow water.

An anchorage is only safe if ships anchored there are protected from the force of powerful waves by some large structure which they can shelter behind.
Natural harbors are formed by such barriers as headlands or reefs. Artificial harbors can be created with the help of breakwaters.
Mobile harbors, such as the D-Day Mulberry harbors, were floated into position and acted as breakwaters.
Some natural harbors, such as those in Plymouth Sound, Portland Harbor, and Cherbourg, have been enhanced or extended by breakwaters made of rock.

Types of break waters

1- vertical wall breakwater
2- mound breakwater
3- mound with superstructure or composite breakwater

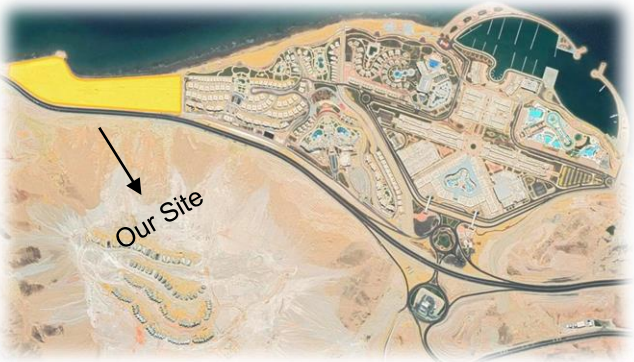
In coastal engineering, a revetment is a land-backed structure whilst a breakwater is a sea-backed structure (i.e., water on both sides).

2.4.1 Site and Location

1- The project is located in Egypt.

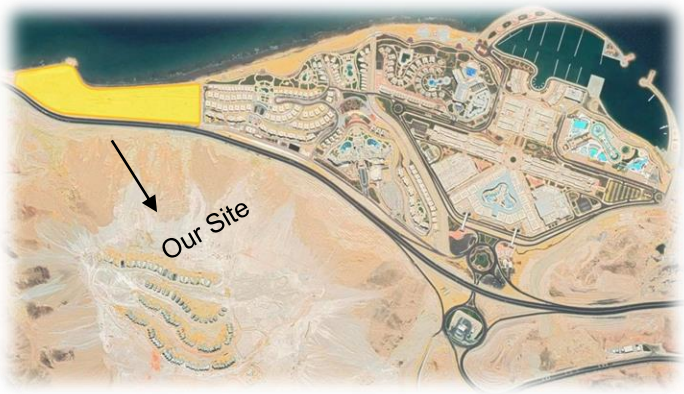
2- located in Suez government which has 3 important ports in it and is famous for it's industry and tourism.

3-Located at Ataqa neighborhood which is a first-class industrial neighborhood where most of the industrial companies .. large factories and touristic cities.

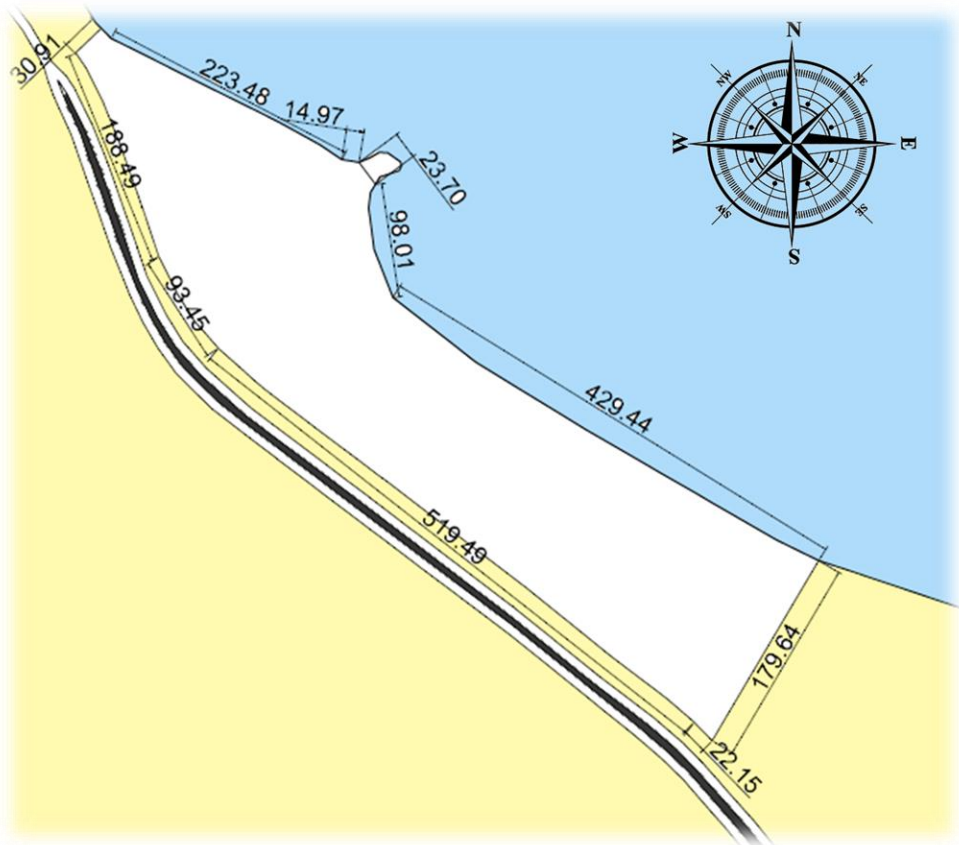


4- The site is near to Galala Resort-Ain Sokhna which has one of the biggest yacht marina in Egypt and located at the new city of AL-Galala.

2.4.2 Shape



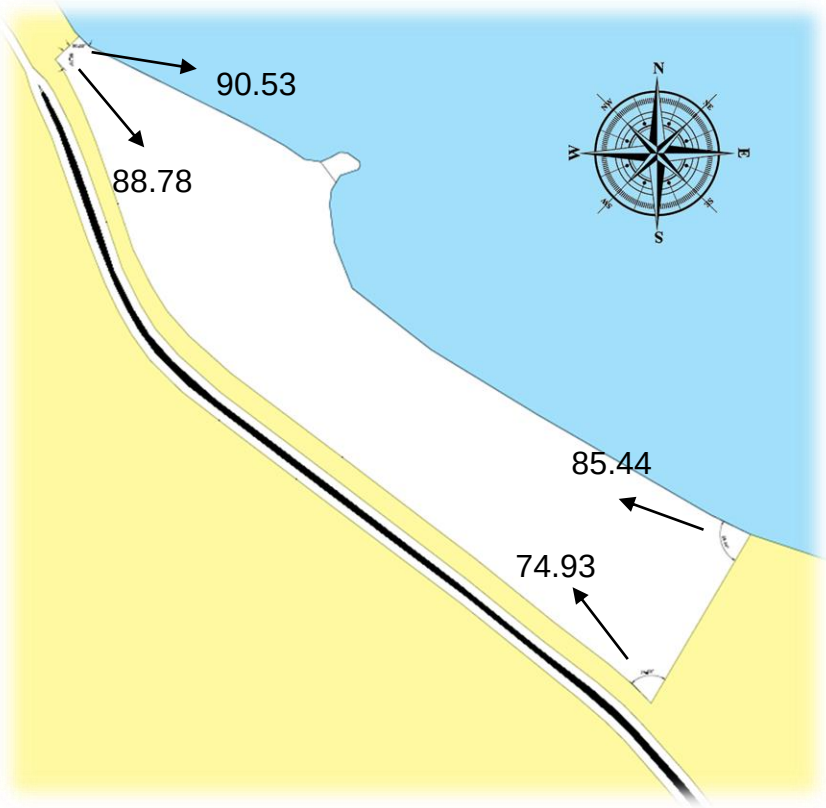
2.4.3 Area and Dimensions



The total area of the land is 111000 m2.

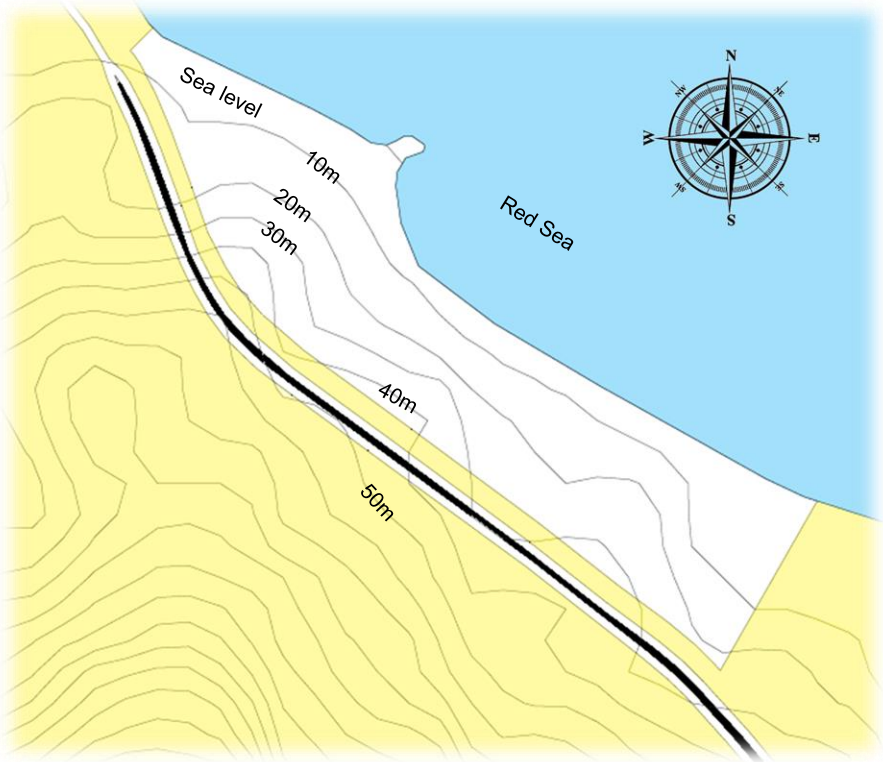
The shape of the land will change after that, part of it will be excavated to divide and separate the blocks of the project for more privacy.

2.4.4 The Angels of The Edges of The Land



From google earth
3D view of the Land

2.4.5 Morphology



Geological

Part of the land is rocky soil because of the mountain, and the bottom part is sandy soil because it's near to the red sea.

The lowest contour on the land is 0.. Sea level.

2.4.6 Built Environment

Road Networks :

Ain Sokhna - Zaafarana Road

-Two way width 12m for both sides with 3 lanes.

New Galala Road

-Two way width 12m for both sides with 3 lanes.

New Galala Road

-Two way width 12m for both sides with 3 lanes connects Ain Sokhna Road and New Galala Road.

Road Networks : Secondary Roads.

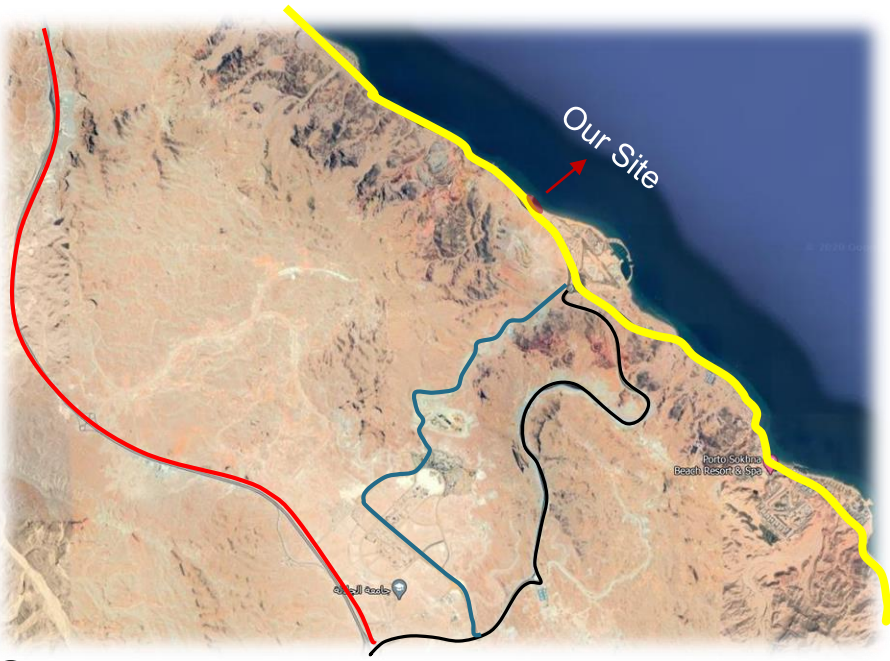


Figure 28: New Galala Road

New Galala Road

-Two way width 12m for both sides with 3 lanes connects Ain Sokhna Road and New Galala Road.

New Galala Road

-under construction Road for Algalala university.

2.4.6 Built Environment

Close Roads to The Project :

Main Road
Ain Sokhna – Zafarana Road .

Width : 24m

Roads near to the project with 12m width for each side.

2.4.7 Neighborhood Analysis

1- Galala Resort Ain Sokhna

2- Porto Sokhna Resort

3- Movenpick Resort Sokhna and Al-Hijaz Resort

4- Porto South Beach and La Vista Topaz

5- Monte Al-Galala

6- Al-Galala University

7- Workers Houses

2.4.7 Neighborhood Analysis

- 1- Palm Beach Ain Sokhna
- 2- Stella De Mari Gulf Sokhna
- 3- Industrial Zone that includes …
- 4- Movenpick Resort Sokhna and Al-Hijaz
- 5- Galala Resort Ain Sokhna
- 6- Ain Sokhna Port and Dubai Port

Factories near the project :

Ezz Steel Factory, Emac Factory for Paper and Raw Materials Manufacturing, Arab Steel Industry Company, Gucci Fiberglass Factory, Nile Valley Phosphate Factory, Wadi Degla Factory for Pipes Industry, Ceramica Cleopatra Factory, National Steel Fabrication, Orascom CBD, Decom Redemex Concrete, A power generation plant, a water desalination plant, Sumed Petroleum Company and many other factories.

Figure 29: Ezz Steel Factory

-The destination from Ezz steel to Al Galala site is 30 km.

-Ezz Steel company is one of the biggest companies in Egypt in this industry and The duration of the company is twenty five years from the date of its registration in the commercial registry

2.4.7 Neighborhood Analysis (near the site)

2.4.8 Noise Analysis

Noises comes from 3 sources :

East : a little noise from the resort.
South : probably the biggest noise cause of the digging works of the Roads.
West : the smallest noise from the near resort.

2.4.9 Good and Bad View

-View from inside

Good view :
To the east towards the resort
To the north towards the red sea.

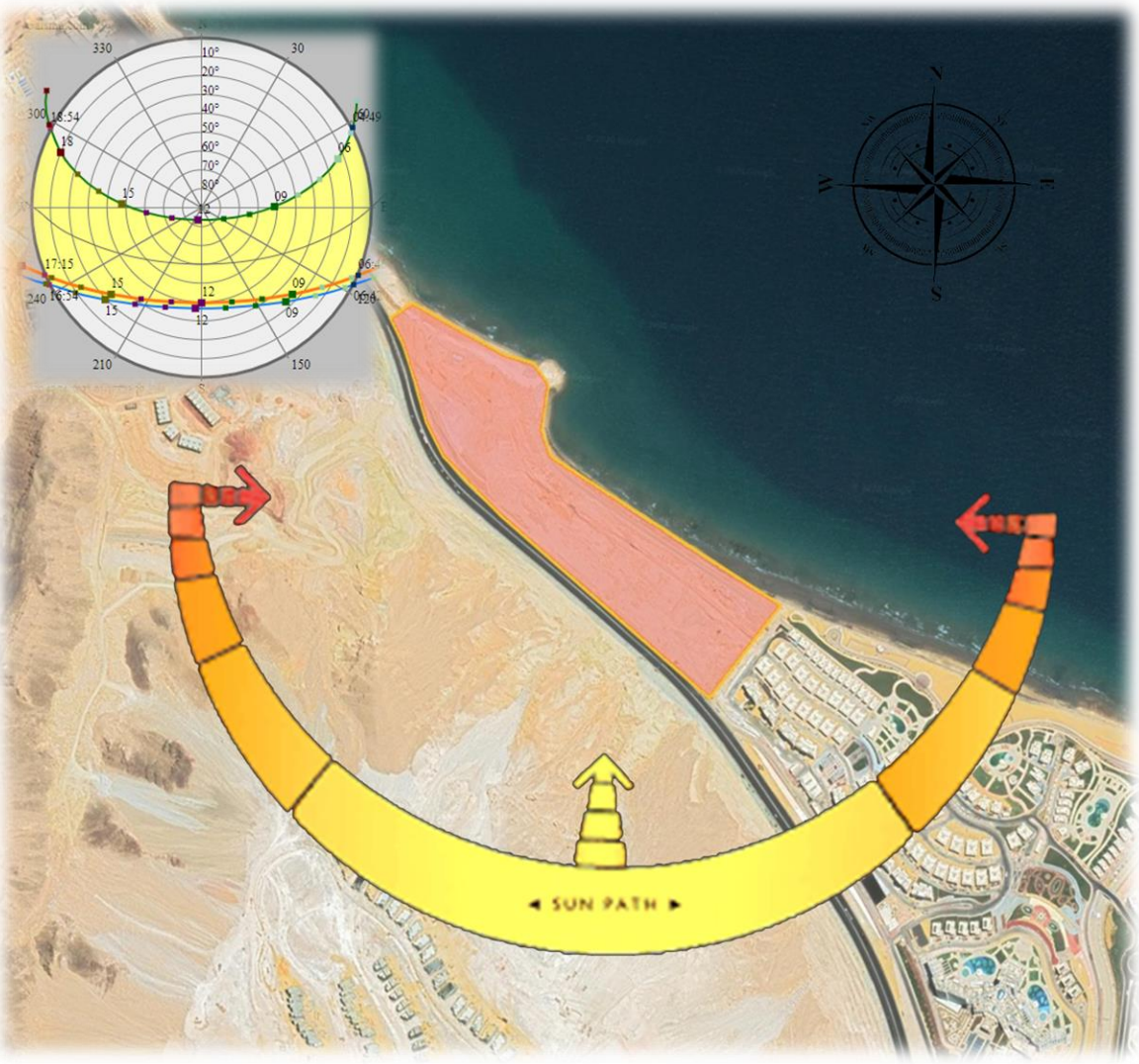
Bad view :
To the west cause of the empty land and the north cause of the mountain.

2.4.10 Site Access

Car access from road.

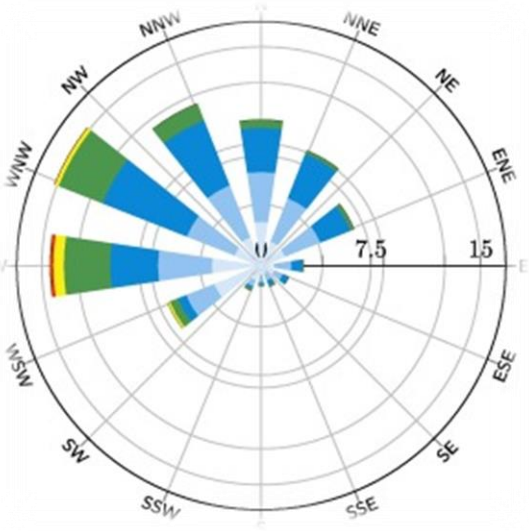
Yacht access from the sea and from the site.

2.4.11 Climate Analysis (Sun path)

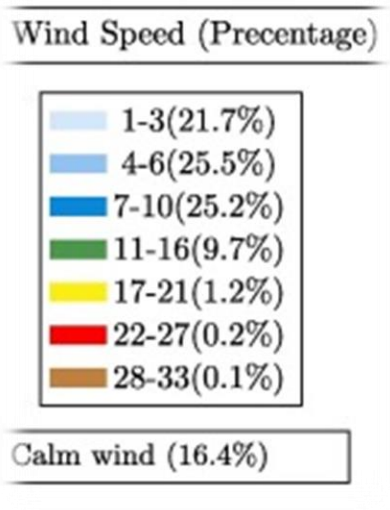


Temperature, °C	11.90	12.44	14.98	19.10	22.07	24.39	26.16	26.27	24.59	21.41	17.72	13.39

2.4.11 Climate Analysis (wind situation)



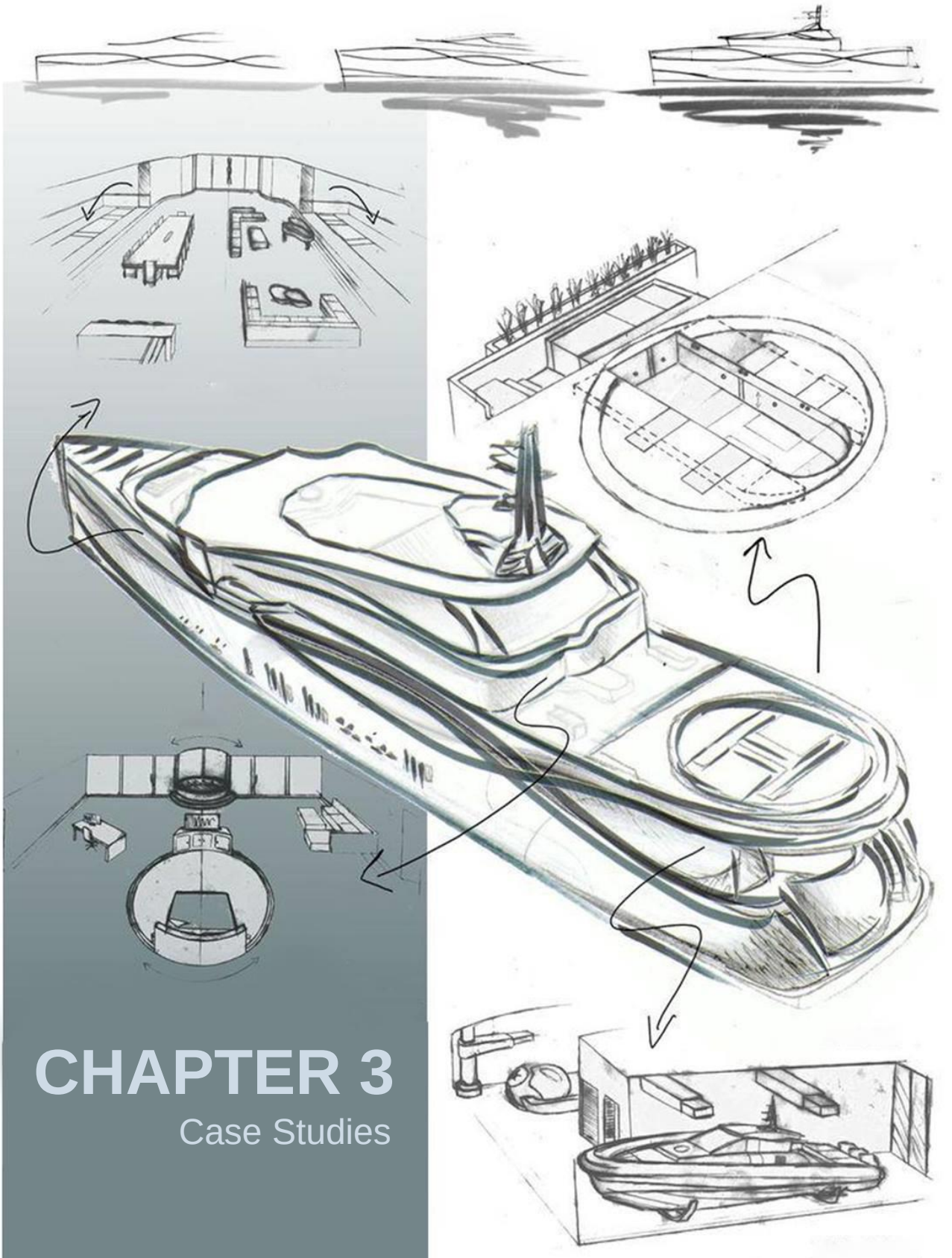
Wind Rose



2.4.12 Summary

2.4.13 3D views

Some realistic views for the area around the site .



CHAPTER 3

Case Studies

Ahmed Sherif

Mohammad Jaber

3.1 Case Studies

1- Meyer Werft Shipyard

2- Damen Yachting

3- Sunset Park Material Recovery Facility / Academy

4- BMW Plant

5- BMW Showroom

6- Ohlone College Academic Core Buildings

3.1.1 Meyer Werft Shipyard

Figure 30: Meyer Werft Shipyard

Location:	Babenberg, Germany
Use:	Shipyard
Client:	Meyer Werft
Status:	2004
Area:	725,500 sqm
Executive Architect:	-

3.1.1.1 Project Information

Meyer is one of the largest and most modern shipyards in the world with about 3300 employees, and home to the largest roofed dry docks in the world. The first covered dock was inaugurated in 1987 and was 370 meters long, 101,5 meters wide and 60 meters high. In 1990/91 the dock was extended by an additional 100 meters.
In 2004, a second covered dock was built, which is announced to be extended to a full length of 504 meters, a width of 125 meters and height of 75 meters in order to compete with Asian shipyards.
Meyer Werft will as a result of this be able to build three cruise ships a year.
Due to its upstream location on the river Ems, the giant ships to be delivered have to make a 36 km voyage to the Dollart bay and which each time attracts thousands of spectators. Up until the completion of the Ems river barrier ("Emssperrwerk") in 2002, the journey was only possible at high tides.

3.1.1 Meyer Werft Shipyard

3.1.1.2 Industrial field

With two covered building docks and state-of-the-art manufacturing facilities, we are one of the most productive shipbuilding companies in the world. The efficiency of our compact shipyard is reflected by our short production and logistics routes. Our efficient workflows are built upon our IT infrastructure and digital technology like virtual reality applications.

Our ship designers are already taking a stroll around the vessels of the future.
We use our virtual reality system to inspect engine rooms, theatre halls, navigating bridges and staterooms, allowing us to review and discuss the design of the new facilities long before the keel is laid at the dock.
Virtual reality is improving the quality of our construction processes, and we can also use the technology to show our customers how their new luxury liners will look in the future.

This saves time and money – and lets us constantly deliver new innovations.

3.1.1 Meyer Werft Shipyard

3.1.1.2 Industrial field

JUST LIKE LEGO: TURNING SMALL PIECES INTO SOMETHING BIG

Modern shipbuilding uses modular construction processes.
Our engineers use computer programs to break the ship down into small, Lego-like pieces.
Each module is pre-assembled – including all the necessary fittings, such as cable shafts, air conditioning ducts and even balconies.
The individual building blocks – up to 80 per ship – are only joined, welded together and wired at the dry docks right at the end.
This means different groups of specialists can work simultaneously on one ship to drastically reduce the construction time.

The development and construction of cruise ships is a highly complex and challenging operation.
That's why computer-aided technology is integrated at every stage, from planning to completion.
How many kilometers of cables must be laid on the ship and how much do they cost? How does the weight have to be distributed to ensure the ship remains stable in the wind and waves? When does each production stage have to begin to ensure the timely delivery to the shipping company? Which materials must be used to ensure fire safety and soundproofing?
All these questions – and many, many more – must be considered by our designers, That's why we first design and construct our ships using virtual 3D models and moving visualizations.
Each new ship must be recalculated to ensure a unique and tailored design.

3.1.1 Meyer Werft Shipyard

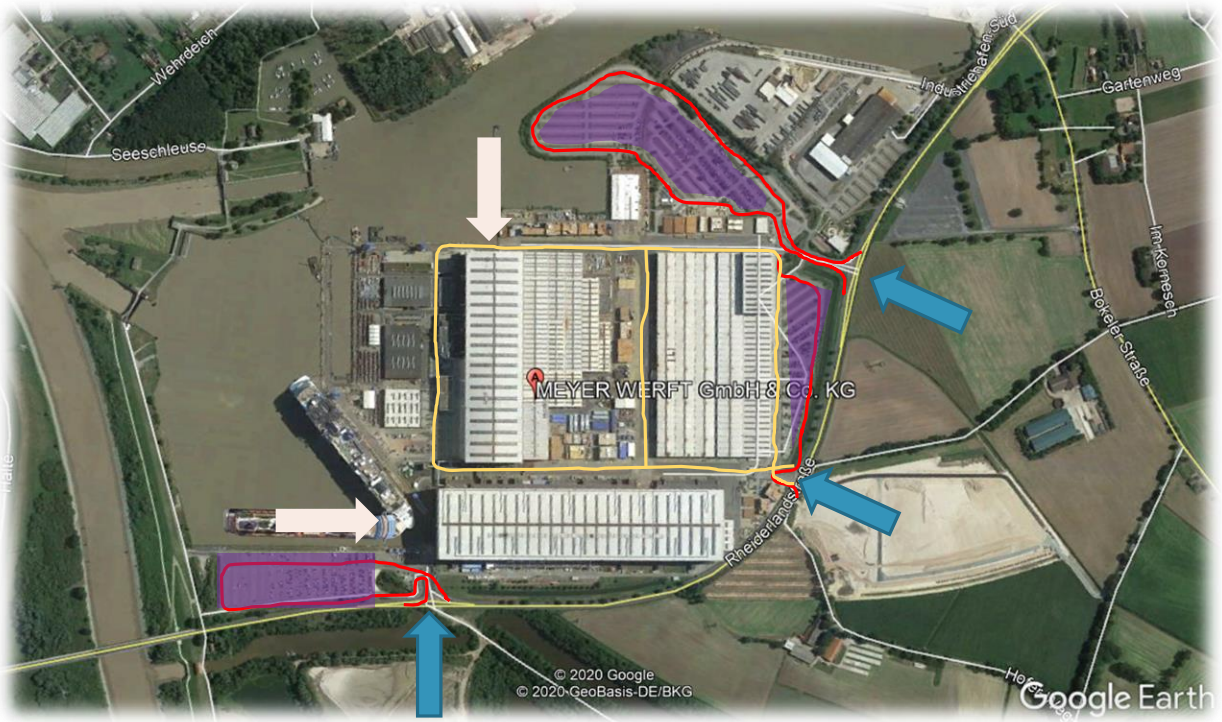
3.1.1.2 Industrial field

HIGH-PRECISION LASER WELDING:
MEYER WERFT uses 3 x 10 m steel sheets to build its impressive ocean liners. The sheets are processed at the MEYER WERFT laser center, where they are welded together to create interior and exterior walls in a fully automated process. The openings for windows, doors and passages are cut out with the latest plasma technology – the entire process is controlled by computers. The lasers operate at a lower temperature to protect the material and prevent the steel from becoming stretched or deformed during the welding process. This also means we can work with relatively thin sheets to save material and money during construction and reduce fuel consumption during the ship's operation. A cruise ship has around 1,000 kilometers of welded joints – 800 kilometers are welded by lasers, and the rest is done by hand. Our high-tech steelwork is performed by seven different systems at the largest laser center in Europe.

MODERN PIPING CENTRE:
Modern cruise ships require around 400 kilometers of piping – for water supplies, air conditioning units, extraction channels and even sprinkler systems. Our employees manufacture tens of thousands of pipes for each ship, delivering them to exactly the right place at the right time. This process is managed by the central service providers at our piping center. The essential stages of the manufacturing process are performed by processing machines and welding robots, which receive all the necessary data directly from our design offices. A large part of the demand is covered by our fully automated systems to save time and money. The piping center is also where the units are made. These are the complex, sometimes multi-storey modules that form the basis of our engine rooms. We will continue to develop our methodology in the future to make our production process even more efficient. After all, innovation is our standard.

3.1.1 Meyer Werft Shipyard

3.1.1.3 Circulation



1-main road

2-entrance

3-staff and visitors car circulation

4-parking

5-truck circulation

6-ship circulation

3.1.1 Meyer Werft Shipyard

3.1.1.4 Site Analysis

1-steel store

2-part manufacturing

3-part production

4-block assembly

5-painting

6-ship yard final assembly

7-rest area

8-management

3.1.1 Meyer Werft Shipyard

TURNING SMALL PIECES INTO SOMETHING BIG

3.1.2 Damen Yachting

Figure 31: Damen Yachting

Location:	South Holland, Netherlands
Use:	Yacht Yard
Client:	Damen
Status:	1991
Area:	120,000 sqm
Executive Architect:	-

3.1.2.1 Project Information

Amels has been part of Damen Shipyards since 1991. Damen Shipyards Group is a globally operating company with more than 50 shipyards, repair yards and related companies as well as numerous partner yards that can build Damen vessels locally.
Since 1969, Damen has designed and built more than 5,000 vessels and delivers up to 150 vessels annually.

3.1.2 Damen Yachting

3.1.2.2 Circulation

1-main road

2-entrance

3-staff and visitors car circulation

4-parking

5-truck circulation

6-ship circulation

3.1.2 Damen Yachting

3.1.2.3 Site Analysis

1-manager

2-Store

3-fabrication 1

4-fabrication 2

5- Final assembly

3.1.3 Sunset Park Material Recovery Facility

Figure 32: Sunset Factory & Academy

Location:	New York, USA
Use:	Recycling center
Client:	Sims Municipal Recycling
Status:	Completed 2013
Area:	50.000 sqm
Executive Architect:	Selldorf Architects

3.1.3.1 Project Information

The Sunset Park Material Recovery Facility is a processing center for New York City's curbside metal, glass, and impressible recyclables which is existence undertaken by Sims Municipal Recycling and the City of New York. Located on 125,500 sqf waterfront pier in Sunset Park, the organization was influenced by its programmatic use as a recycling center which inspired reuse throughout.

3.1.3 Sunset Park Material Recovery Facility

3.1.3.2 Industrial field

Themasterplan organizes buildings tohold functionality, creates distinct circulation systems to **safely removed visitors from operations**, and adds digit acres of native plantings. Buildings are also organized to create the sites possess cityfied context. The 140,000-sfartefactincludesaTippingBuilding,whererecyclables arriveby hoyandtruck;ProcessingBuildingthathousesmorethan $25,000,000 in Byzantine operation equipment, as well as **electrical compressor**, **blast pump**, and supervisor rooms; Bale Storage Building served by octad weight docks; and an antiquity for organization (**lunchroom, compartment rooms, offices)** and an Education Center.

3.1.3.3 Educational field

The Education Center is one of the project's most unique features. Thestructurecontainsprograms for **edifice children and the public including classrooms, exhibitions, and mutual demonstration displays.Akey surroundingsof the organization is a poise bridge which connects the Education Center to a watch platform inside the ProcessingFacility.** The watch platform allows students and visitors to wager the recycling process in action.

3.1.3 Sunset Park Material Recovery Facility

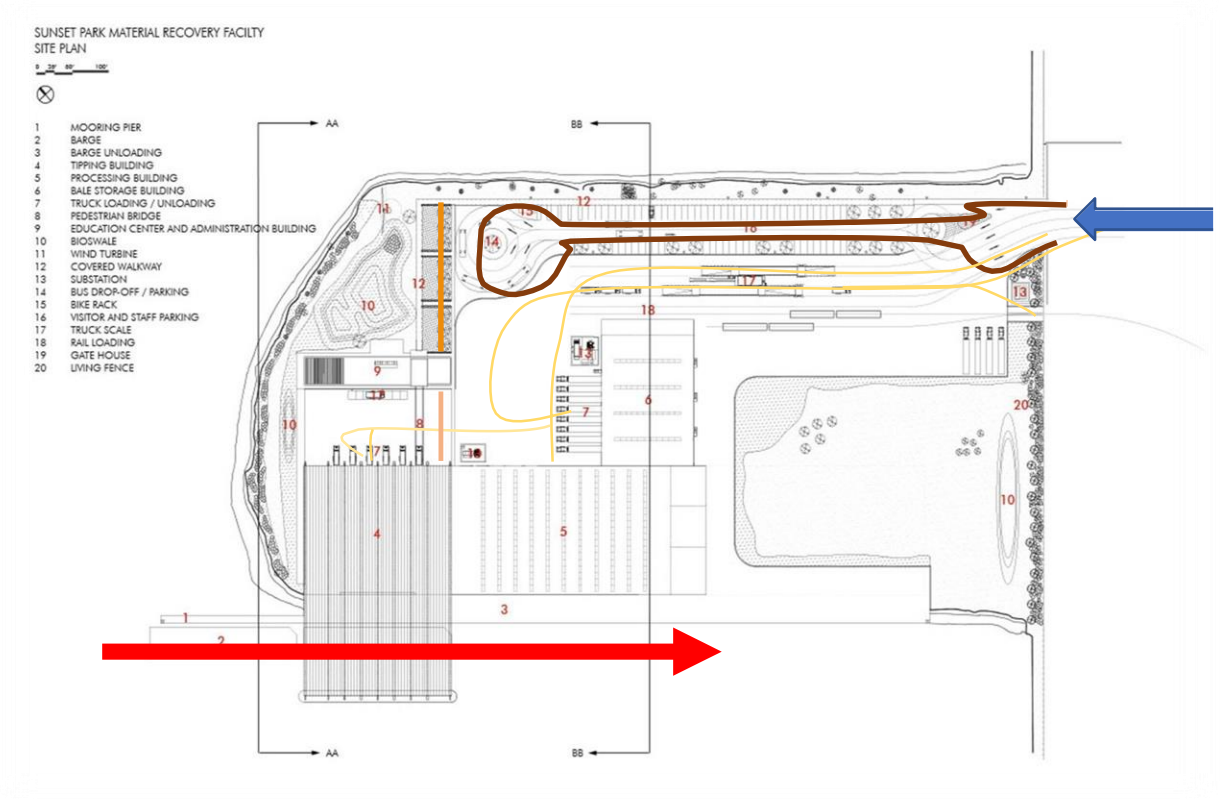
3.1.3.4 Administration field

The visitors' center and administration building includes an **exhibition space, classrooms, cafeteria, offices and locker rooms, and is linked to observation areas in the recycling building via a pedestrian bridge.**

Figure 33: Sunset Park Academy

3.1.3 Sunset Park Material Recovery Facility

3.1.3.5 Circulation



1-entrance

2-staff and visitors car circulation

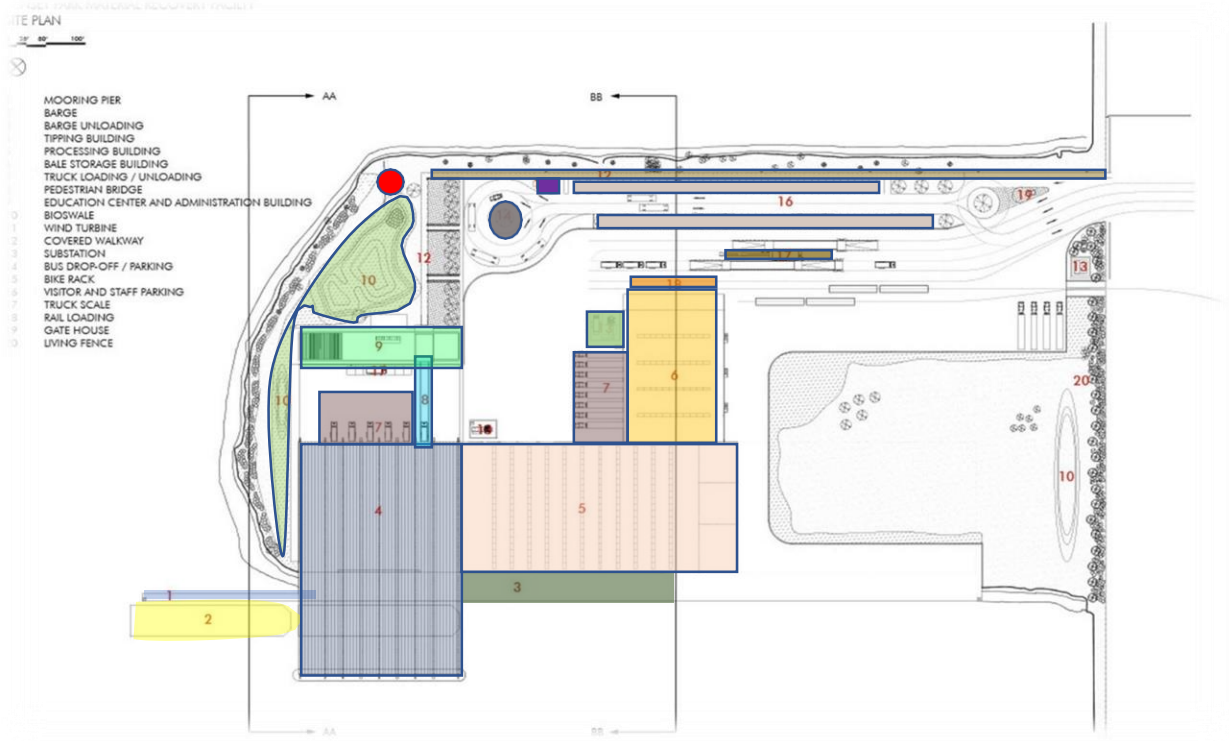
3-truck circulation

4-barrage circulation

5-walkway

3.1.3 Sunset Park Material Recovery Facility

3.1.3.6 Site Analysis



1-mooring bier

2-barage

3-barrage unloading

4-tipping building

5-processing building

6-bale building

7-truck (loading-unloading)area

8-pedestrian bridge

9-education building and administration

10-bioswale

11-wind turbine

12-walkway

13-substation

14-bus drop off parking

15-bike rack

16-visitor and staff parking

17-rail loading

3.1.3 Sunset Park Material Recovery Facility

3.1.3.7 Plan Analysis

Figure 15

1-lobby
2-cafeteria
3-open office
4-conference room
5-private office
6-restroom
7-mechanical
8-stairs
9-lift room
10-locker room
Corridor

3.1.3 Sunset Park Material Recovery Facility

3.1.3.7 Plan Analysis

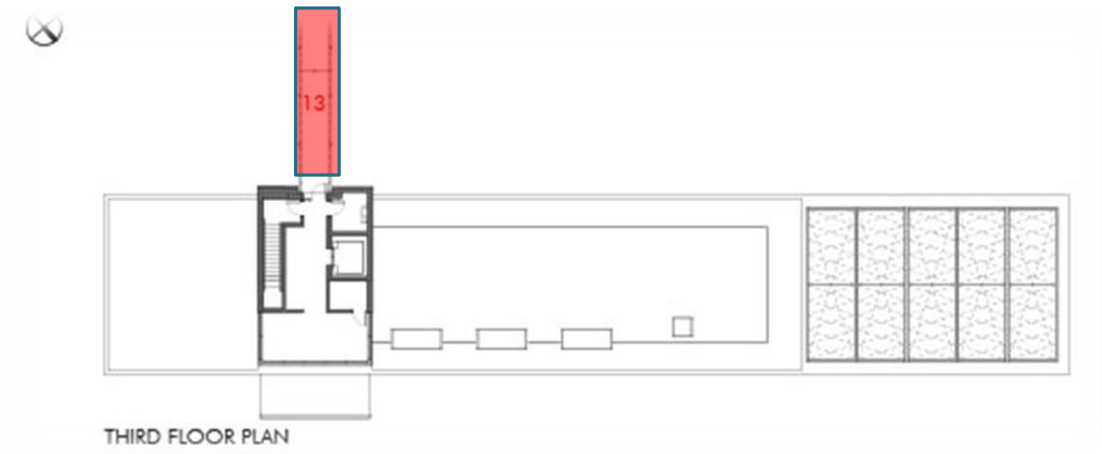
8-Mechanical

11-Terrace

9-Exhibition

12-Theatre

10-Classroom



13-Corridor to factory: 2 m width

3.1.4 BMW Plant

Figure 34: BMW Plant

Location:	Leipzig, Germany
Use:	BMW Plant
Client:	BMW AG.
Status:	Opened 2005
Area:	184,300 sqm
Executive Architect:	Zaha Hadid

3.1.4.1 Project Information

The BMW factory prior to the construction of the central building existed as three disconnected buildings, each playing an integral part in the production of BMW 3 Series vehicles. These three production buildings were designed in-house by BMW's real estate and facility management group, housing separately the fabrication of raw auto bodies (645,000 square feet (59,900 m2)), the paint shop (270,000 square feet (25,000 m2)), and the final assembly hall (1,075,000 square feet (99,900 m2)). A competition was held for the design of a central building to function as the physical connection of the three units. It also needed to house the administrative and employee needs spaces. Hadid's design took this idea of connectivity and used it to inform every aspect of the new building. It serves as a connection for the assembly process steps and the employees. Designed as a series of overlapping and interconnecting levels and spaces, it blurs the separation between parts of the complex and creates a level ground for both blue- and white-collar employees, visitors, and the cars.

3.1.4 BMW Plant

3.1.4.2 Industrial field

HOW A BMW AUTOMOBILE IS CREATED.

More than 1,000 premium standard BMW vehicles are produced at the Leipzig plant with the aid of highly qualified employees and innovative production technology. Each BMW automobile is individually produced and tailor-made to the client's wishes and preferences. Several thousand parts in many different colors and sizes and thousands of production stages are necessary before the vehicle is ready to start what is often a long journey to the client.

Every traditional BMW vehicle built in Leipzig passes through pressing plant, body shop, paint shop and assembly. A sophisticated logistics is vital for the whole production system. It takes less than 40 hours to build a BMW in Leipzig, including many rigorous quality checks, because quality is the key focus of all associates and processes at the BMW Leipzig Plant.

Traditional and innovative production of vehicles with electric drive and CFRP (carbon fiber reinforced plastics/carbon) lightweight bodies are both part of the corporate strategy. During the production process, a BMW i3 Series passes through the following sections: CFRP production, exterior components (production of automotive body shell plastic components), BMW i body shop and assembly.

Rigorous quality checks are applied to both traditional and electric vehicles, because quality is the key focus of all associates and processes at the BMW Leipzig Plant

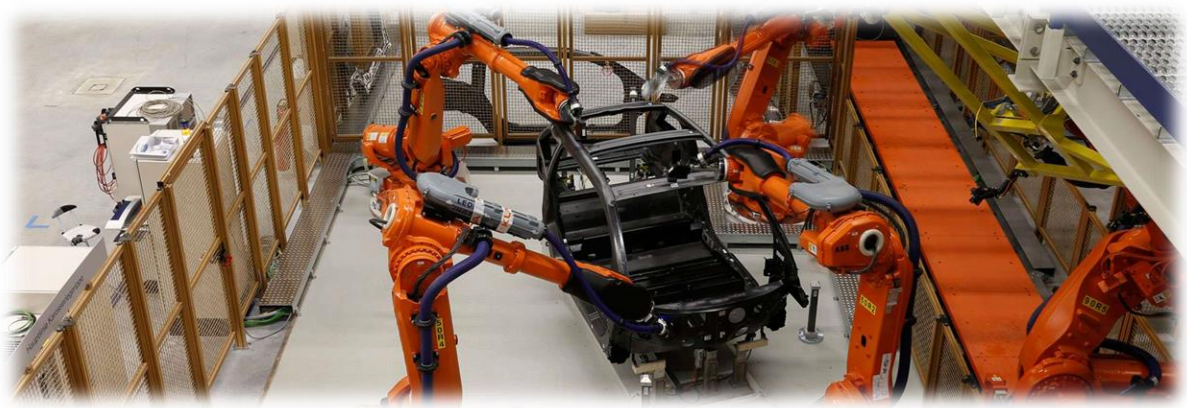


Figure 35: Robotic Arms

3.1.4 BMW Plant

3.1.4.3 Architectural field

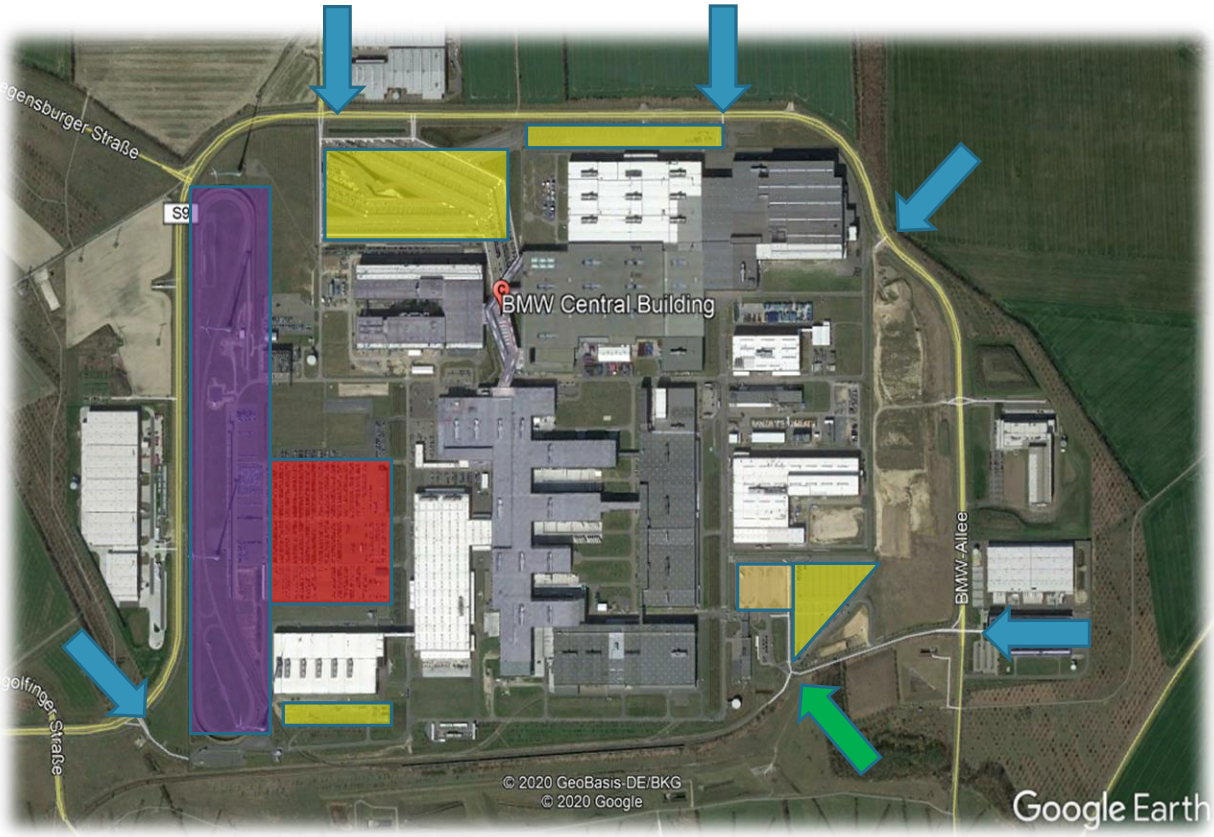
Is it possible that a certain kind of architecture can positively influence teamwork and productivity within a plant? The Central Building of the BMW Leipzig Plant, designed by the famous architect Zaha Hadid, is the implementation of this idea. This unique building is the center of communication and it connects all production areas.

The building is the center of the plant and of all processes. It accommodates large parts of the administration and quality functions and it also connects the production areas. Form and function are combined here. The car bodies are visible from the entrance hall while they are being transported from on production area to the next. The bodies are transported past the desks of managers, designers and specialists and high above the heads of the visitors.

Everything is open and in constant movement. The office area is easily accessible which promotes the exchange of ideas. These transparent structures facilitate quick responses and coordination – a decisive advantage for BMW quality and efficient processes.

3.1.4 BMW Plant

3.1.4.4 Circulation



1-entrance

2-staff and visitors car parking

3-Truck parking

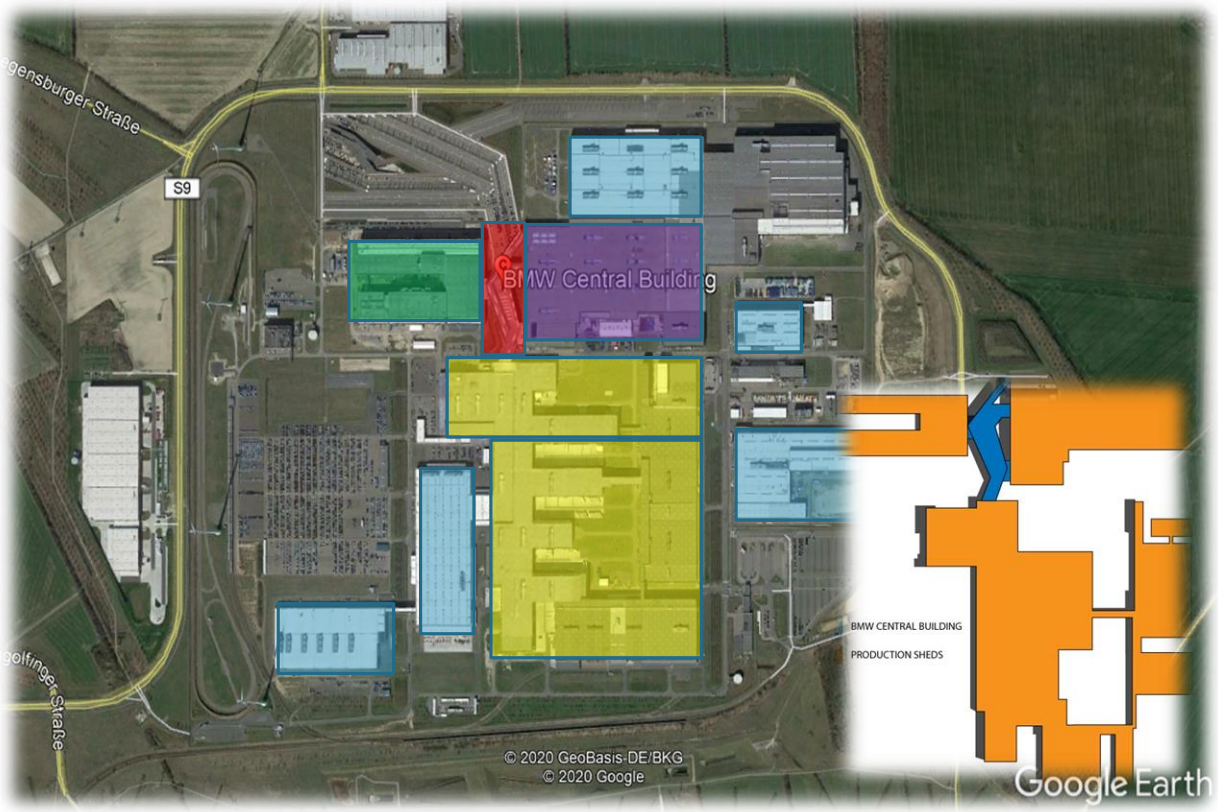
4-Track parking

5-Track entrance

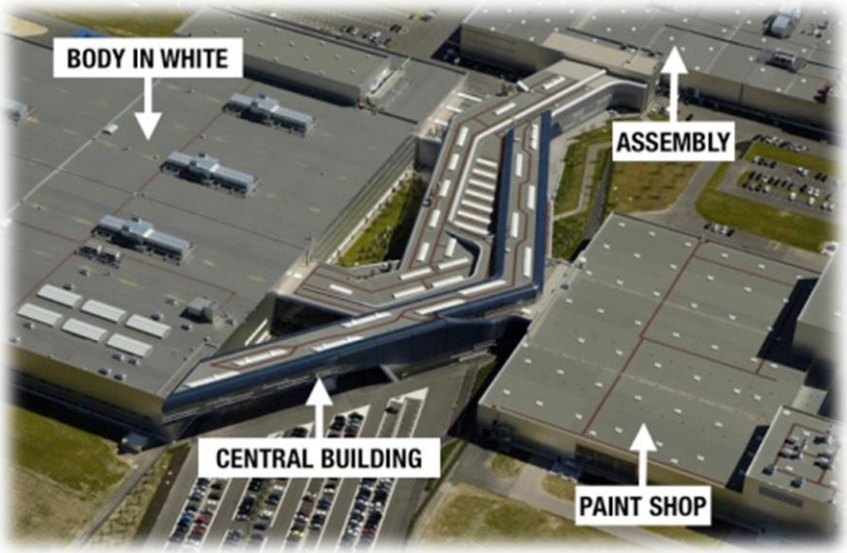
6-Track

3.1.4 BMW Plant

3.1.4.5 Site Analysis

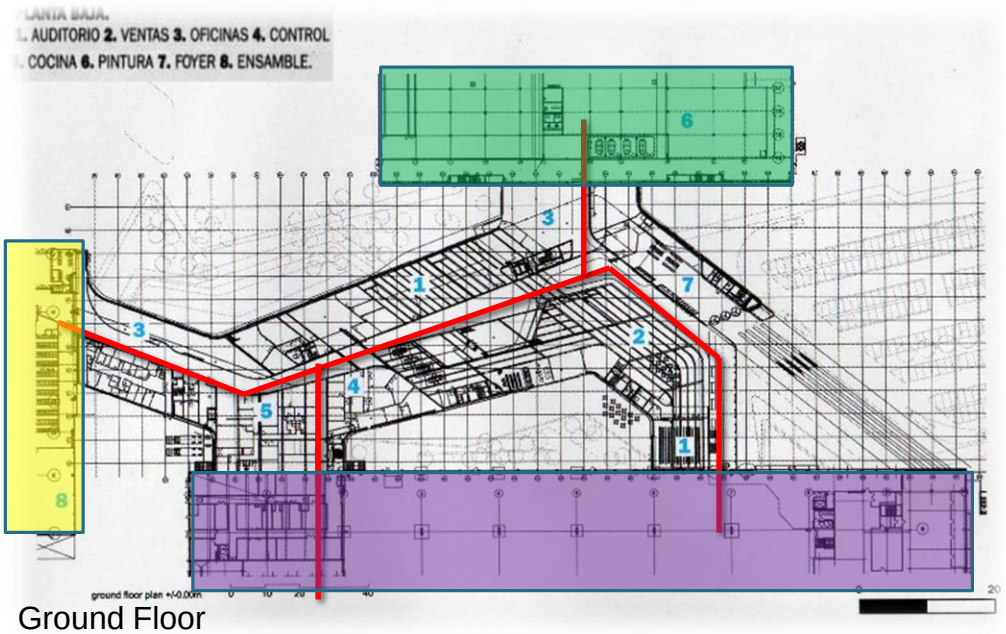


1-stores 2- assembly 3- preparing 4-painting 5- central building



3.1.4 BMW Plant

3.1.4.6 Plan Analysis

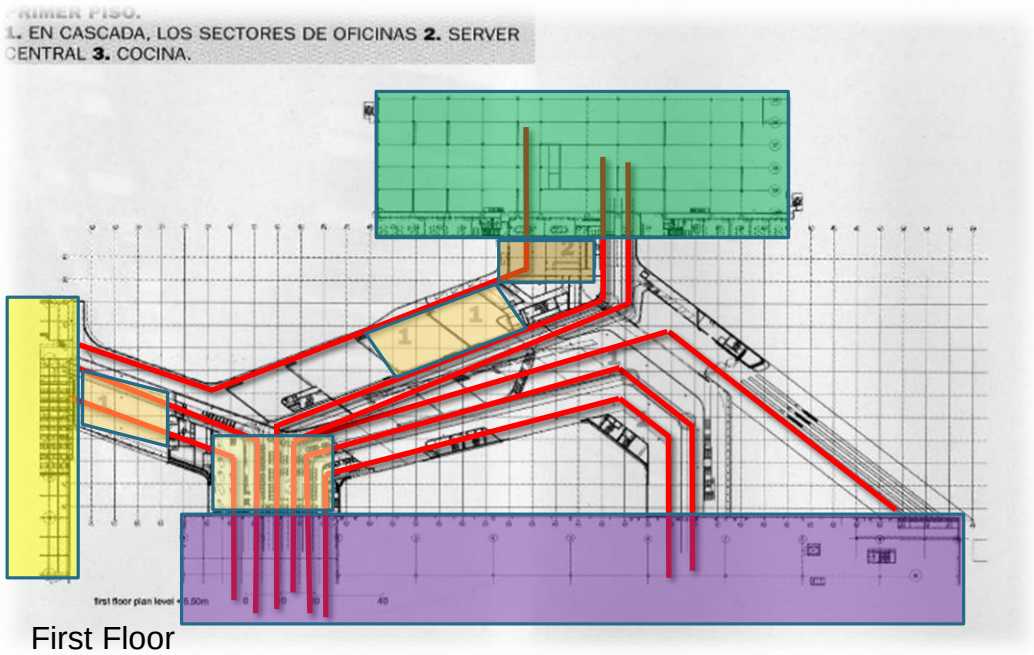


Ground Floor

1-audience		6-painting	
2-sales		7-hall	
3-offices		8-assembly	
4-control		9-preparing	
5-kitchen		10-car path	

3.1.4 BMW Plant

3.1.4.6 Plan Analysis

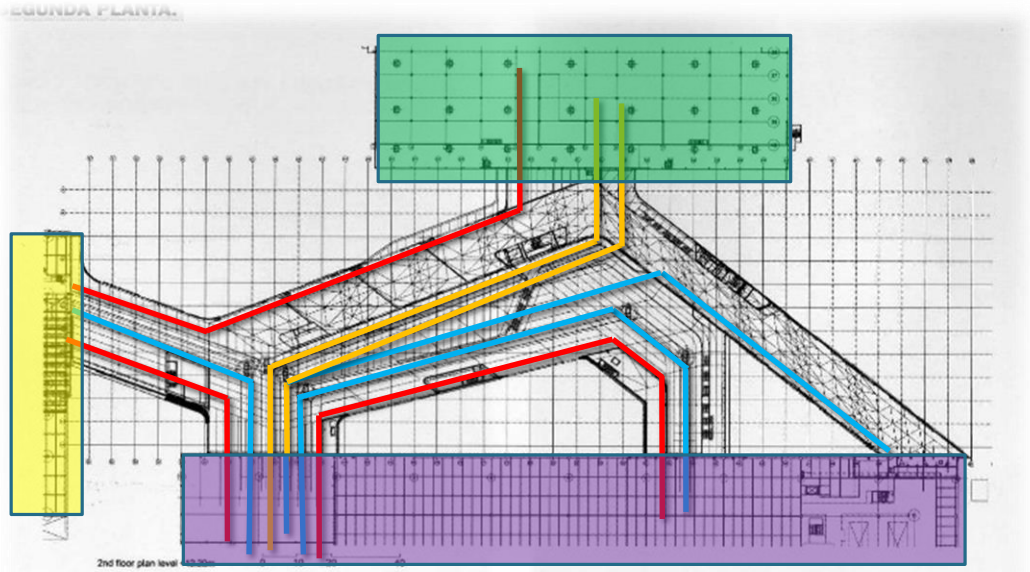


First Floor

1-offices
2-server central
3-kitchen
4-Car path
5-painting
6-assembly
7-preparing

3.1.4 BMW Plant

3.1.4.6 Plan Analysis



Third Floor

1-Car path

2-Car path

3-Car path

4-painting

5-assembly

6-preparing

3.1.5 BMW Group Pavilion / Serie Architects

Figure 36: BMW Group Pavilion

Location:	London, UK
Use:	Pavilion
Client:	BMW (AG)
Status:	Completed summer 2012
Area:	1,500 sqm
Executive Architect:	Franken Architekten

3.1.5.1 Project Information

The British have a particular fondness for the Victorian bandstand. Not much more than a lightweight roof supported on slender columns the idea of the bandstand is to get close to nature by stripping back the architecture to a minimum. There is no role for exotic form and shape-making: the architecture's beauty comes not from itself but rather from its open attitude to its natural surroundings.

With the Victorian bandstand as a point of departure, the BMW Group Pavilion seeks a similar relationship to its setting. In practice, this has involved addressing questions of spectacle and presence, of the relationship to BMW's product and service offering, and of sustainability.

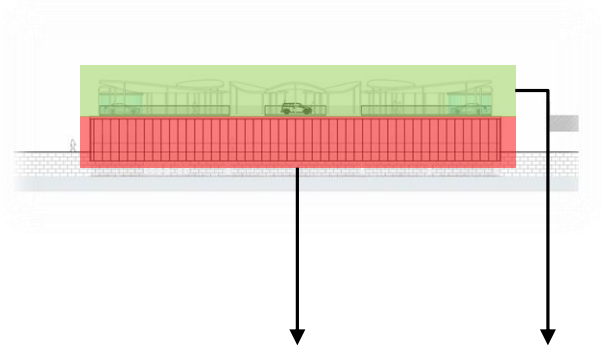
3.1.5 BMW Welt / Coop Himmelb(l)au

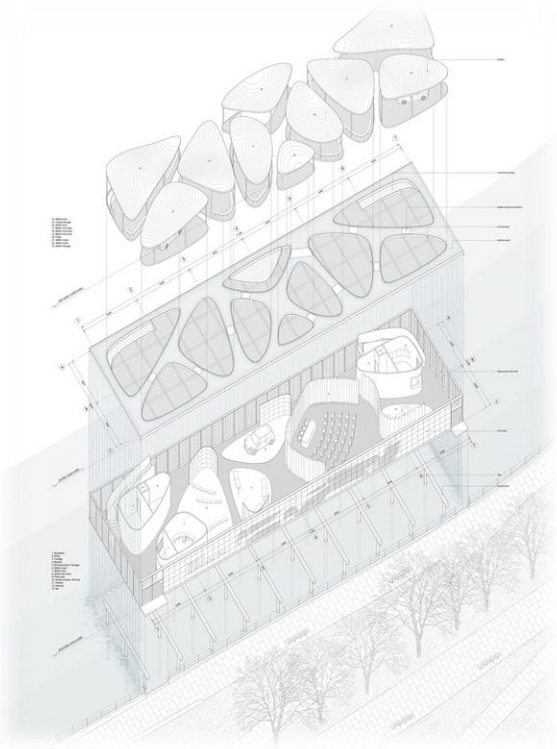
3.1.5.2 Showcase Analysis

The Showcase provides information on the relationship between sport, new technologies and sustainability and features BMW's electronic and hybrid concept cars. Located between the main Olympic Stadium and the Aquatic Centre the building is positioned directly above the Waterworks River. The architecture is designed to be light and ephemeral and to reference the unusual site condition through the inventive use of the river water.

The ground floor, which is used for information display and entertainment, is internally oriented and is therefore expressed as a simple rectangular box placed on piles above the river.

The upper floor, in contrast, is open to its surroundings with products that are on display not only to the visitors to the Showcase but also to the spectators in the surrounding area. Therefore, this part of the building is conceived as a series of small rooftop pavilions.

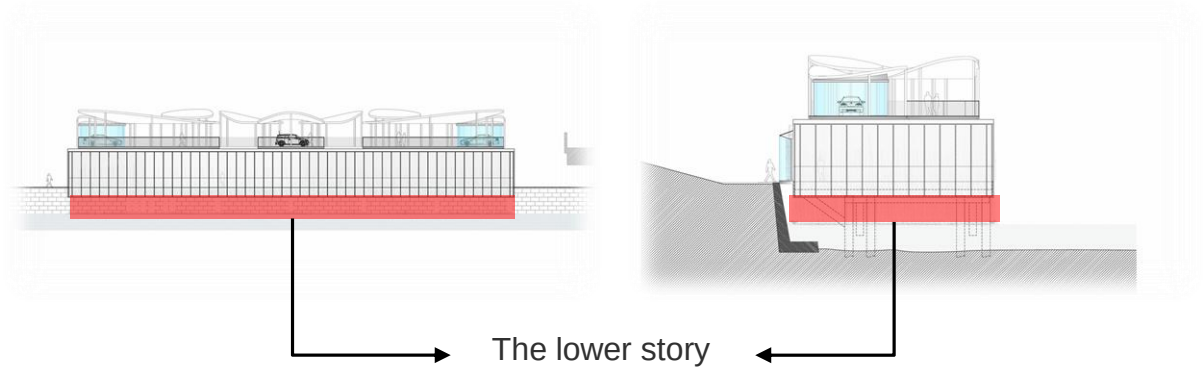




3.1.5 BMW Welt / Coop Himmelb(l)au

3.1.5.2 Showcase Analysis

The lower story is covered with a waterfall that flows from a reflecting pool. This waterfall disguises the supporting platform under the building and cools the building by evaporation, convection and reduction of solar gain. The GRP-lined reflecting pool is supplied through a series of sumps fitted with cover gratings. The water for the waterfall is drawn from the river by submersible pumps set on platforms above the riverbed. Each pump is separately controllable and delivers water to the reflecting pool sumps via a matrix of pipe work and diffuser inlets. The water circulates to all areas of the pool before spilling over building perimeter via an adjustable perforated weir edge detail designed to create a white-water effect. The water is treated using a series of strainers, filters and sterilizers — no chemicals are added to the water. The pump sets incorporate 150mm pre-filters to remove suspended solids drawn in by the pumps.. The main pressure pipelines are fitted with in-line three-lamp UVC sterilizers providing a UV dose greater than 30mj/cm². Such a dose relates to a 99.99% kill rate assuming 80% UV transmission per cm.

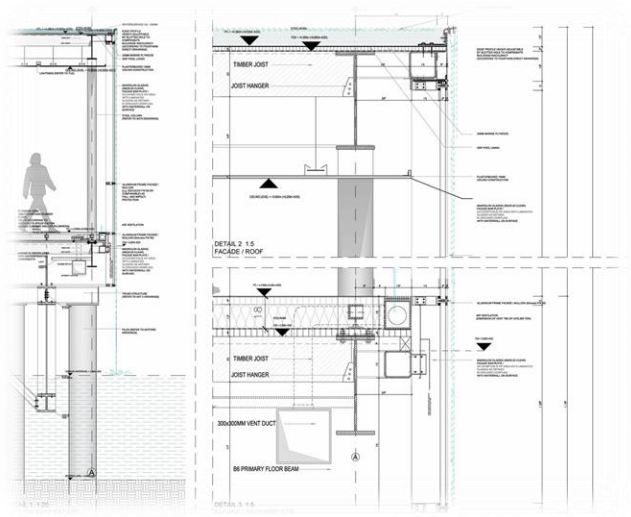


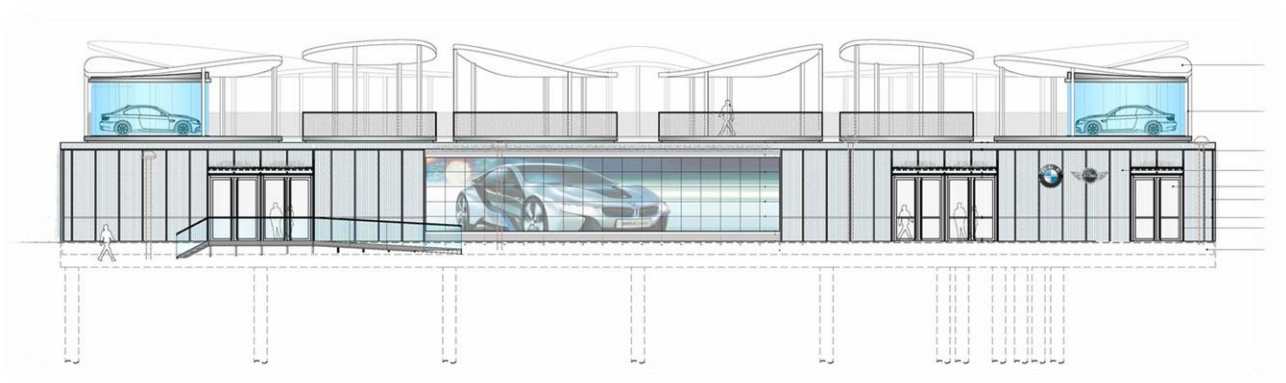
3.1.5 BMW Welt / Coop Himmelb(l)au

3.1.5.3 Materials

The reflecting pool on the upper story surrounds the nine rooftop pavilions.
These pavilions feature curved semi-monocoque timber shell roofs supported by steel columns.
The timber shells incorporate curved 147x47mm timber joists on 600mm centers laid out in the direction of the roof curvature with noggings set between the joists at irregular intervals.
The stress-skin, using the principles of boat building technology, is made from three layers of 9mm cold formed cross laminated ply sheets glued and screwed into place.
The engineers used a parametric digital-to-fabrication process to convert the complex curved forms into complete sets of cutting profiles for the fabrication of the joists and ply sheets.

The 150x150x10 RHS steel columns are placed at irregular intervals to facilitate visitor movement and viewing site lines. The columns bolt to a timber edge beam in the timber roof and a curved RHS steel edge beam running around the base of the pavilion.
The timber shell roofs were fabricated off-site in 3m lengths, craned into position, and bolted together. The rooftop pavilions are designed to be demountable so that they can potentially be installed in different locations after the Games.





3.1.5 BMW Welt / Coop Himmelb(l)au

3.1.5.4 Circulation

The ground floor:

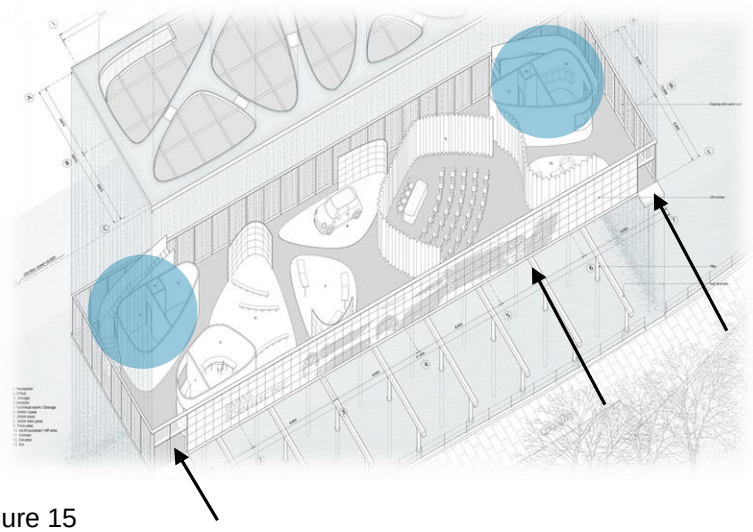


Figure 15

Entrance Stairs + Elevator

The internal division of the ground floor is flexible and easy to change, and the same for doors

The upper floor:

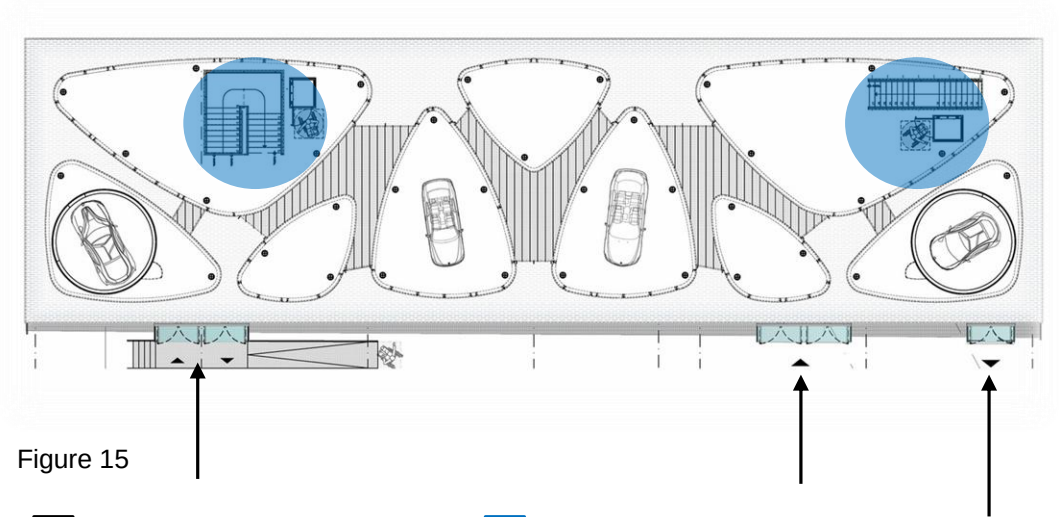


Figure 15

Entrance From Ground Stairs + Elevator

3.1.5 BMW Welt / Coop Himmelb(l)au

3.1.5.5 Plan Analysis

The ground floor:

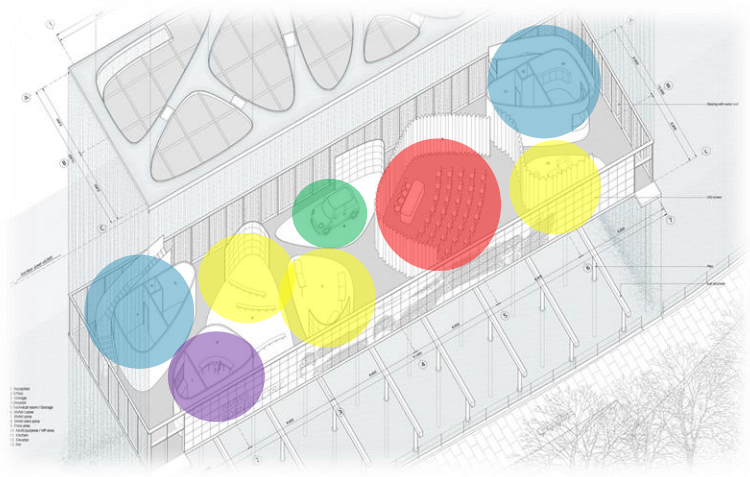


Figure 15

Entertainment display
Reception
Manager
Information display
Product display

The upper floor:

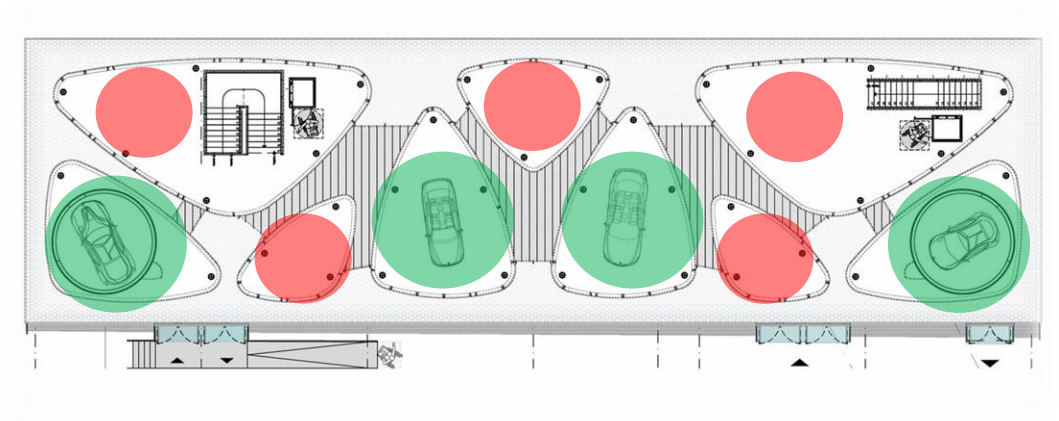


Figure 15

Watch Area
Product display

3.1.6 Ohlone College Academic Core Buildings

Figure 37:Ohlone Academy

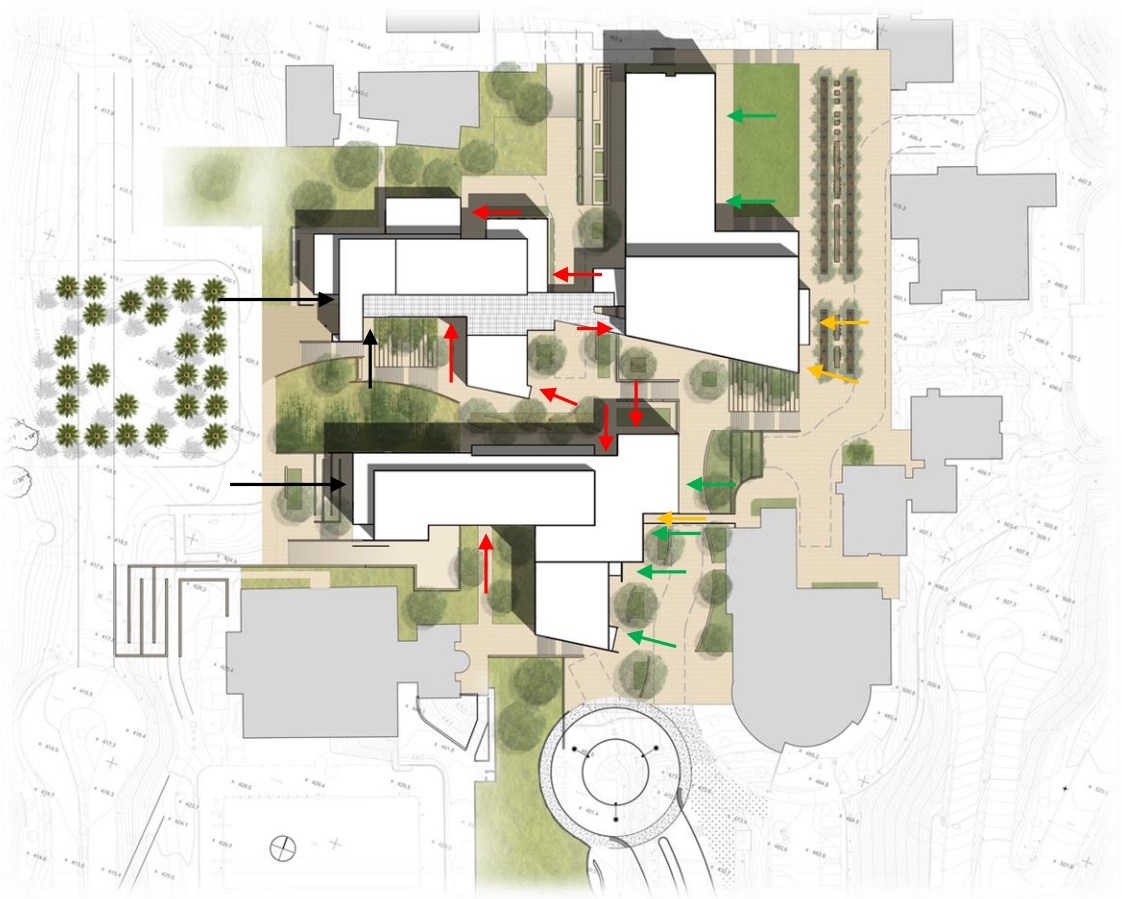
Location:	Fremont, USA
Use:	University
Client:	The State
Status:	Completed 2020
Area:	19000 sqm
Executive Architect:	Anderson Brule Architects, CannonDesign

3.1.6.1 Project Information

The project includes three new buildings designed to transform the student experience: a science center, music, and visual arts center, and a learning commons housing study rooms and a library. Prior to these new buildings, the campus was very much a commuter campus, meaning students went to class and then went home. Now, students have access to new indoor and outdoor environments where they can socialize, build friendships, access technology, and focus on academics in a setting more akin to a university.

3.1.6 Ohlone College Academic Core Buildings

3.1.6.2 Circulation



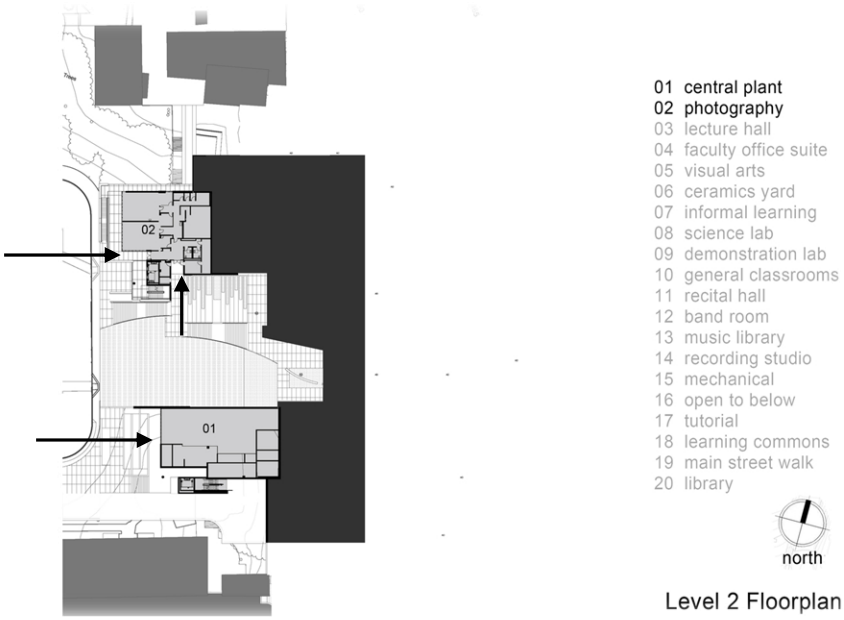
The campus grounds consist of Four levels of different heights, and each level has different entrances

- Level 2 Entrances
- Level 4 Entrances
- Level 3 Entrances
- Level 5 Entrances

The project replaces three older facilities built in the 1970s that resembled daunting “castles.”
The new buildings are the complete opposite: open, airy, and welcoming. Located on a very challenging, hillside site, the buildings seamlessly link lower campus to upper campus with a single elevator run and numerous stairs, ramps, and bridges with clear wayfinding.

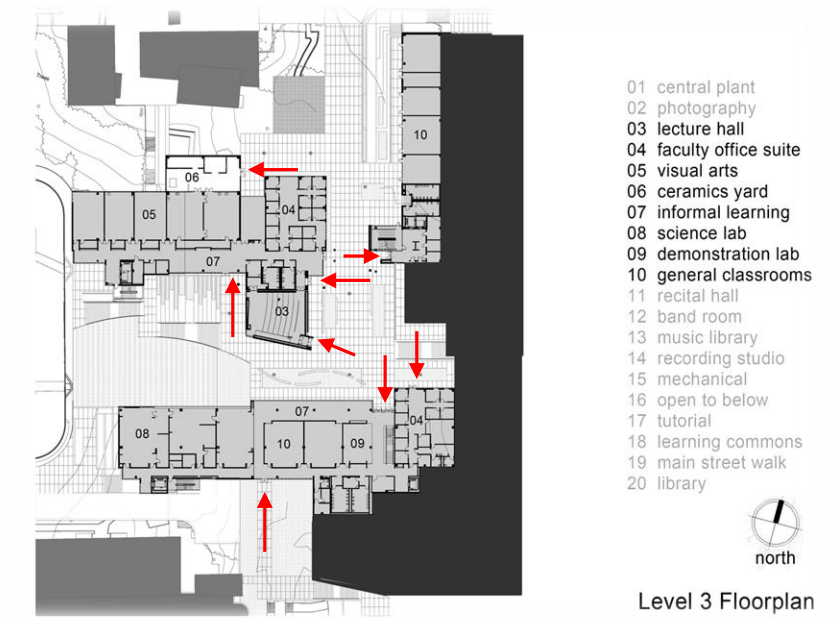
3.1.6 Ohlone College Academic Core Buildings

3.1.6.3 Plan Analysis



Level 2 Floorplan

Level 2 Entrances

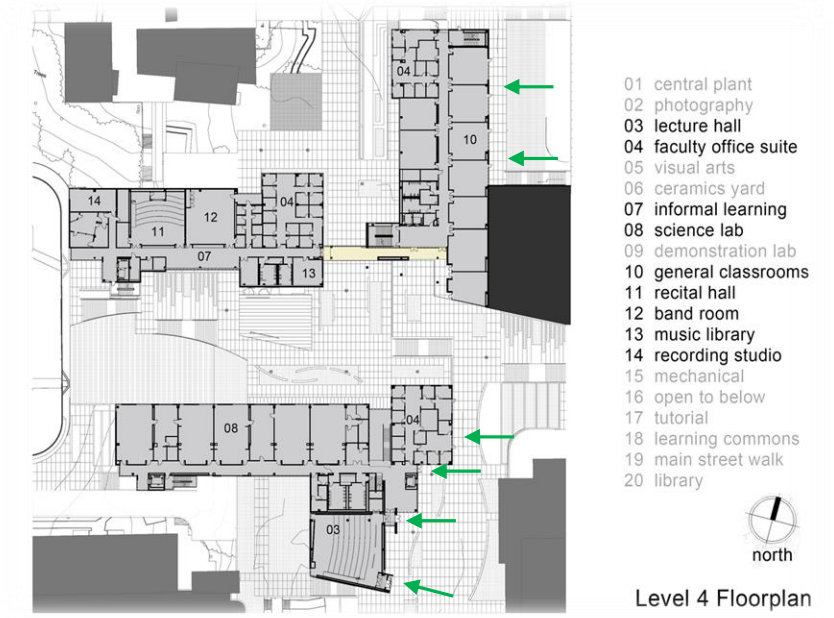


Level 3 Floorplan

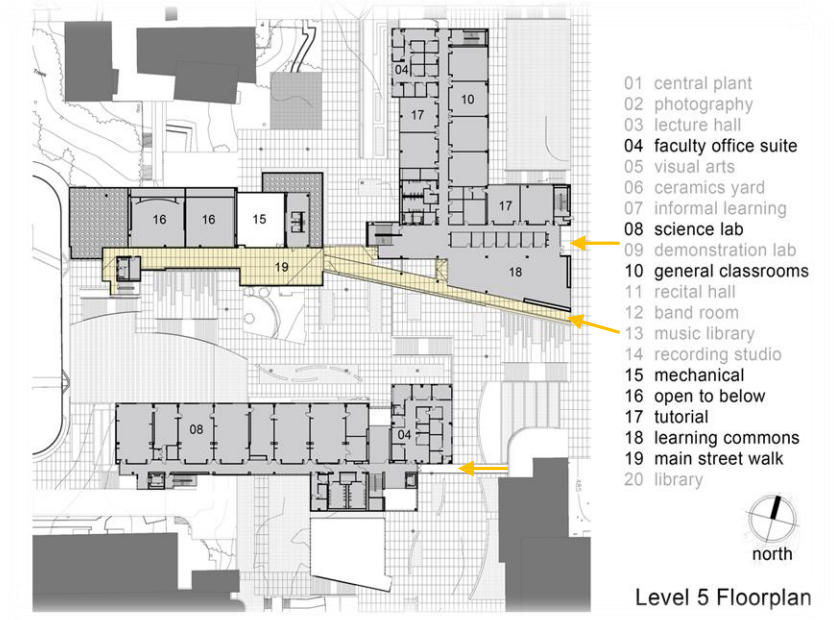
Level 3 Entrances

3.1.6 Ohlone College Academic Core Buildings

3.1.6.3 Plan Analysis



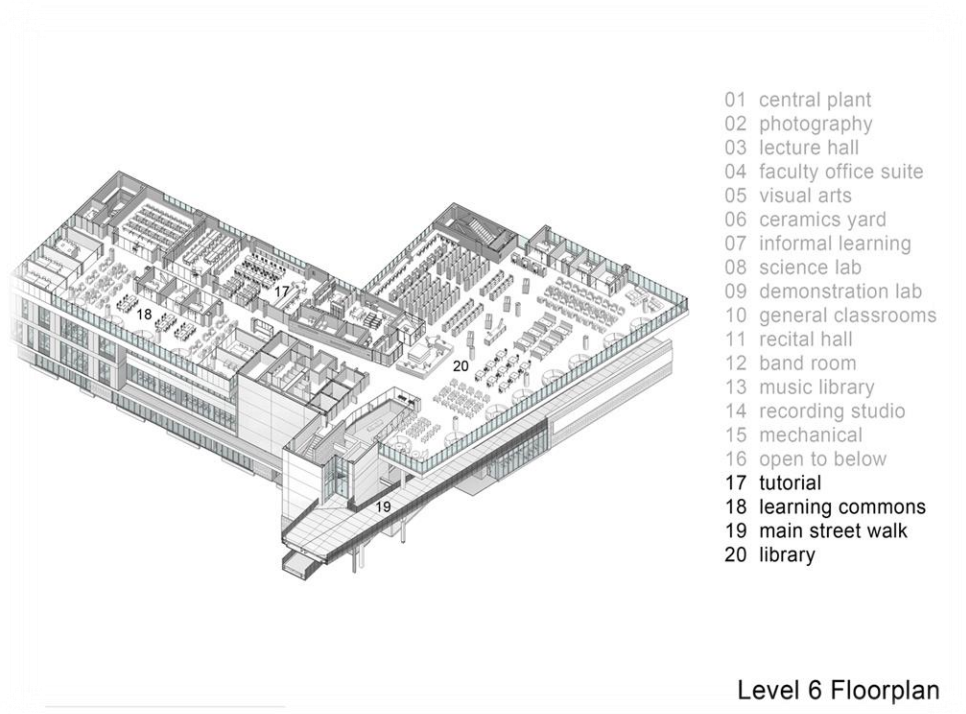
Level 4 Entrances



Level 5 Entrances

3.1.6 Ohlone College Academic Core Buildings

3.1.6.3 Plan Analysis

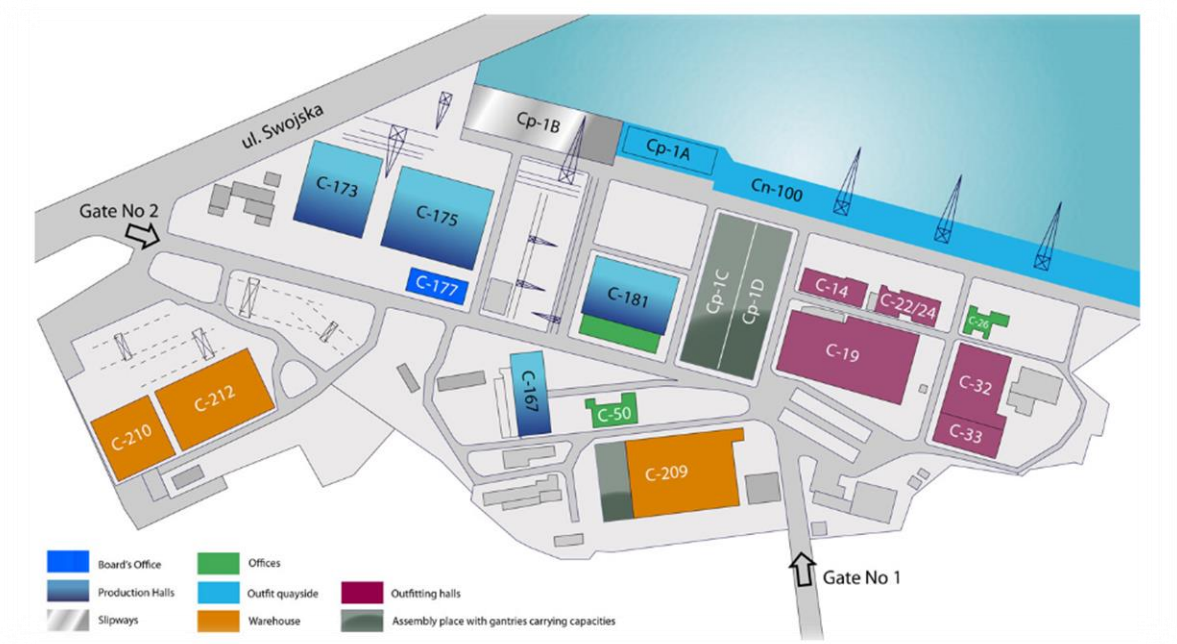


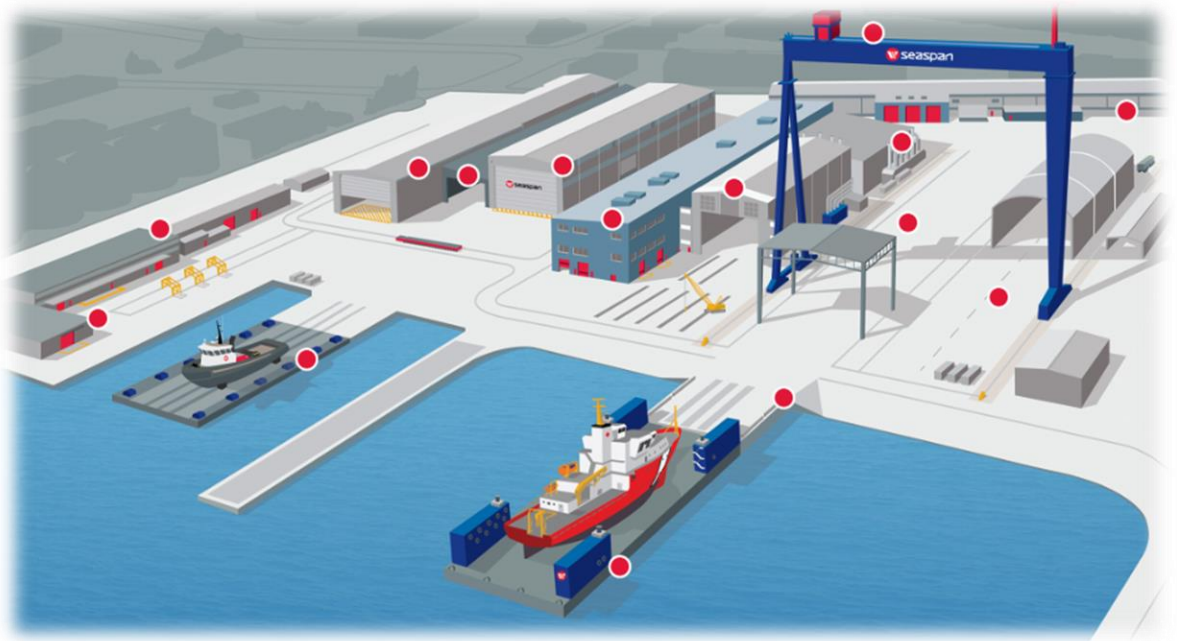
Level 6 Floorplan

3.2.1 Yard Layout

3.2.1.1 Ships

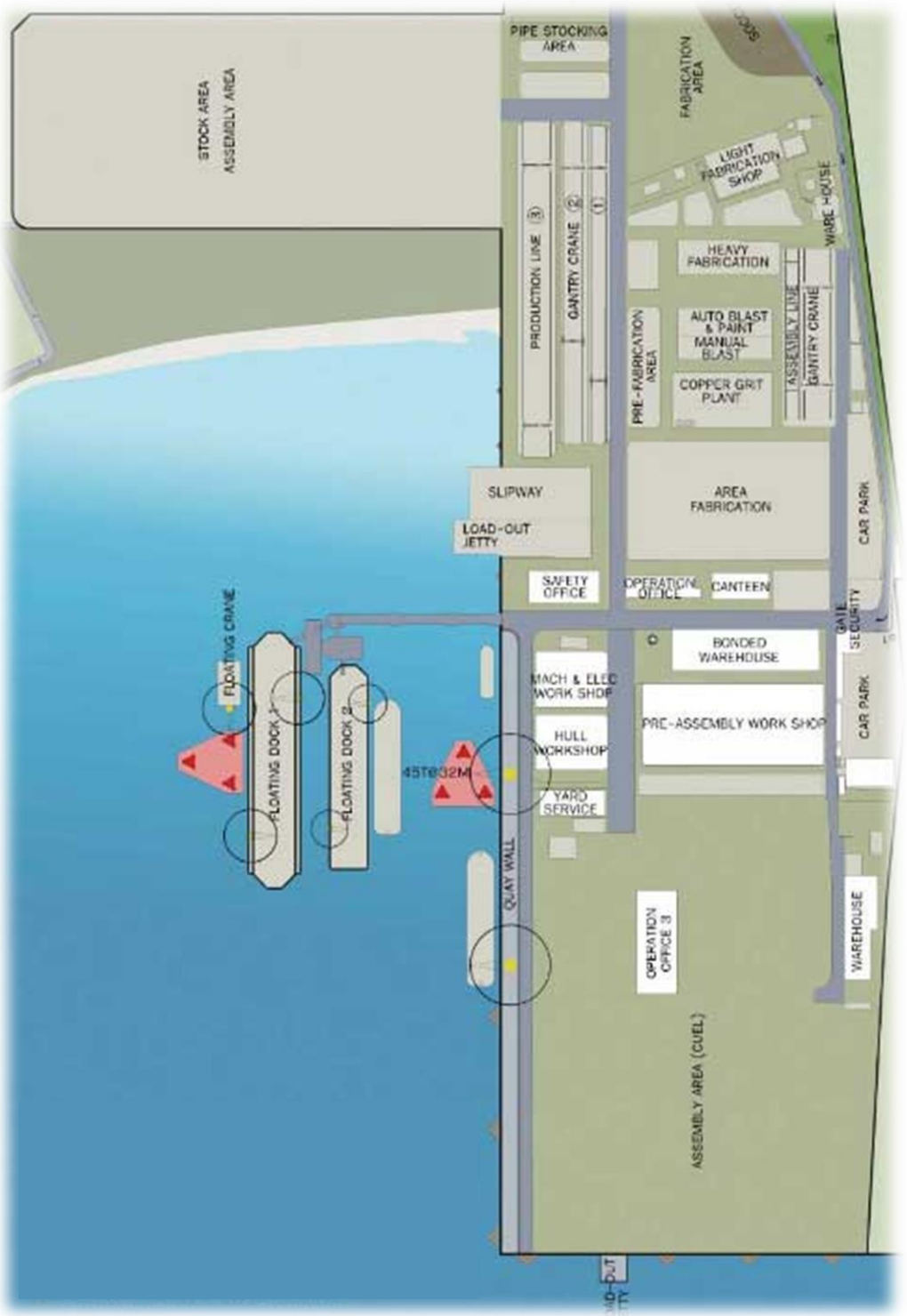
Shipbuilding equipment is much larger than yachts and therefore requires very large buildings and a much greater range of ease of handling





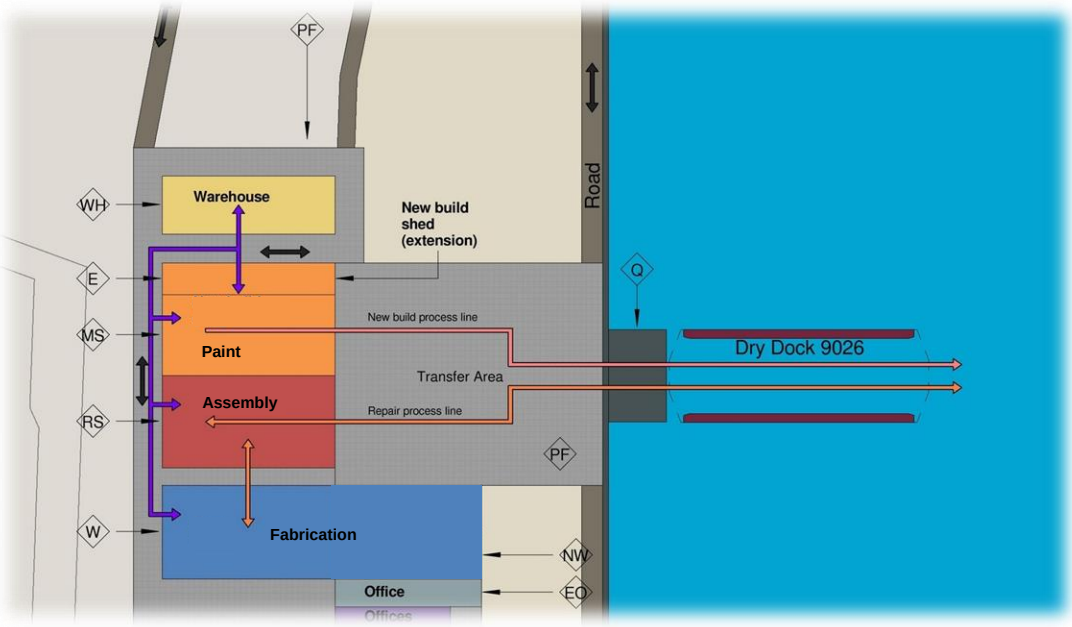
3.2.1 Layout Examples

3.2.1.1 Ships

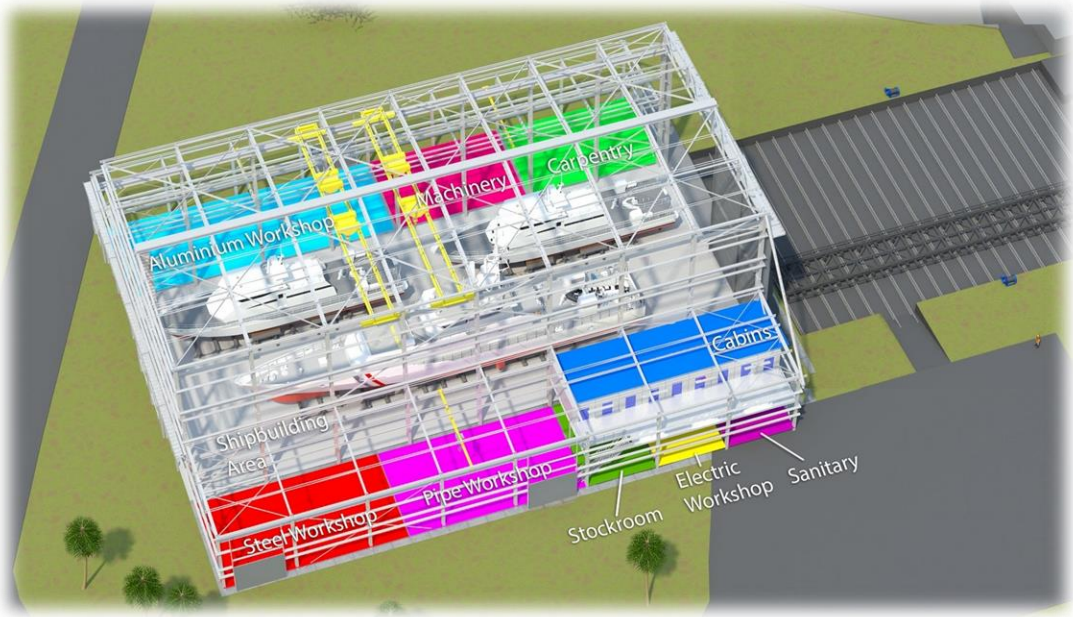


3.2.1 Layout Examples

3.2.2 Yacht



The stages of Yacht construction can be separate in different buildings and it can be in one building depends on the design and the production line.



3.2.1 Layout Examples

3.2.1.2 Yacht

Minimum layout for Wearhouse, Fabrication, Assembly and painting.

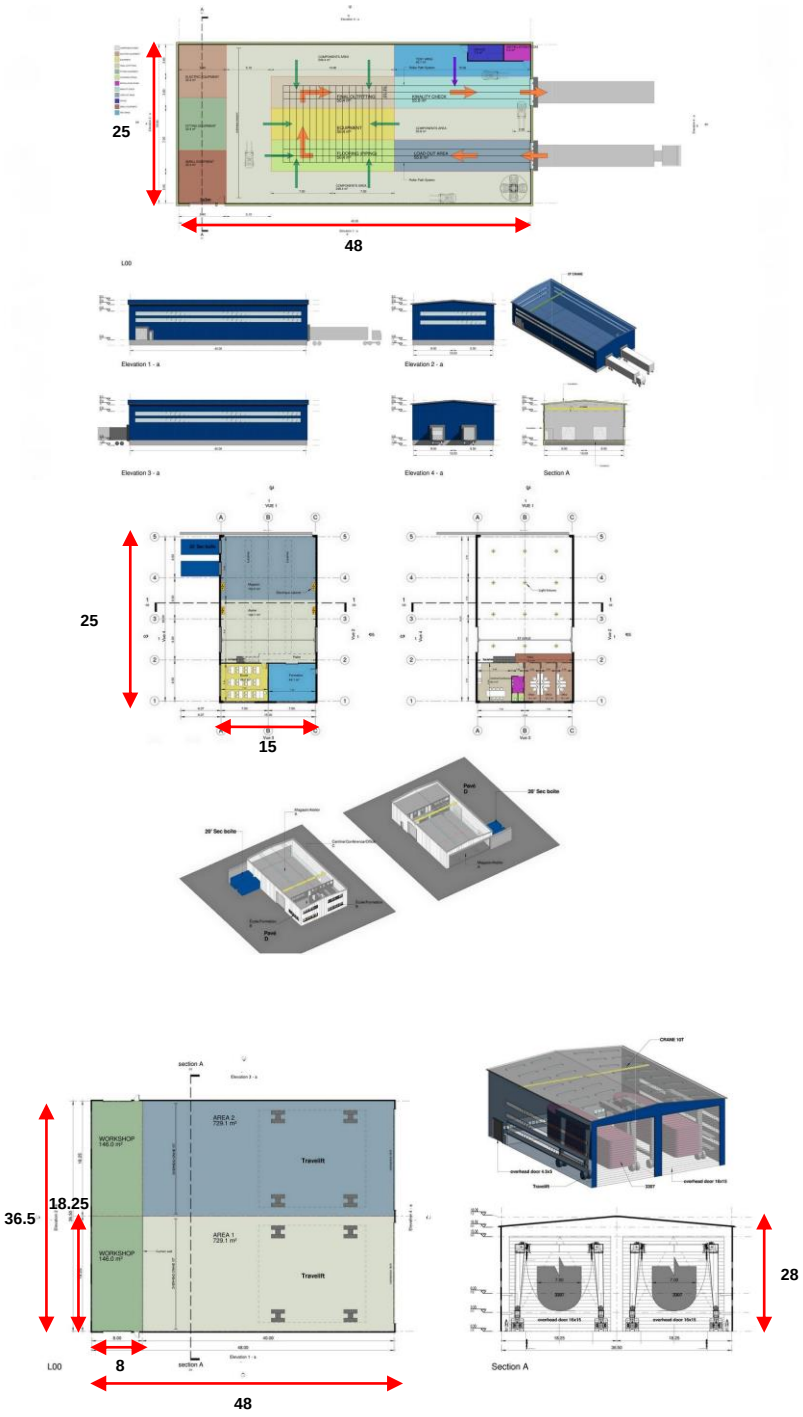
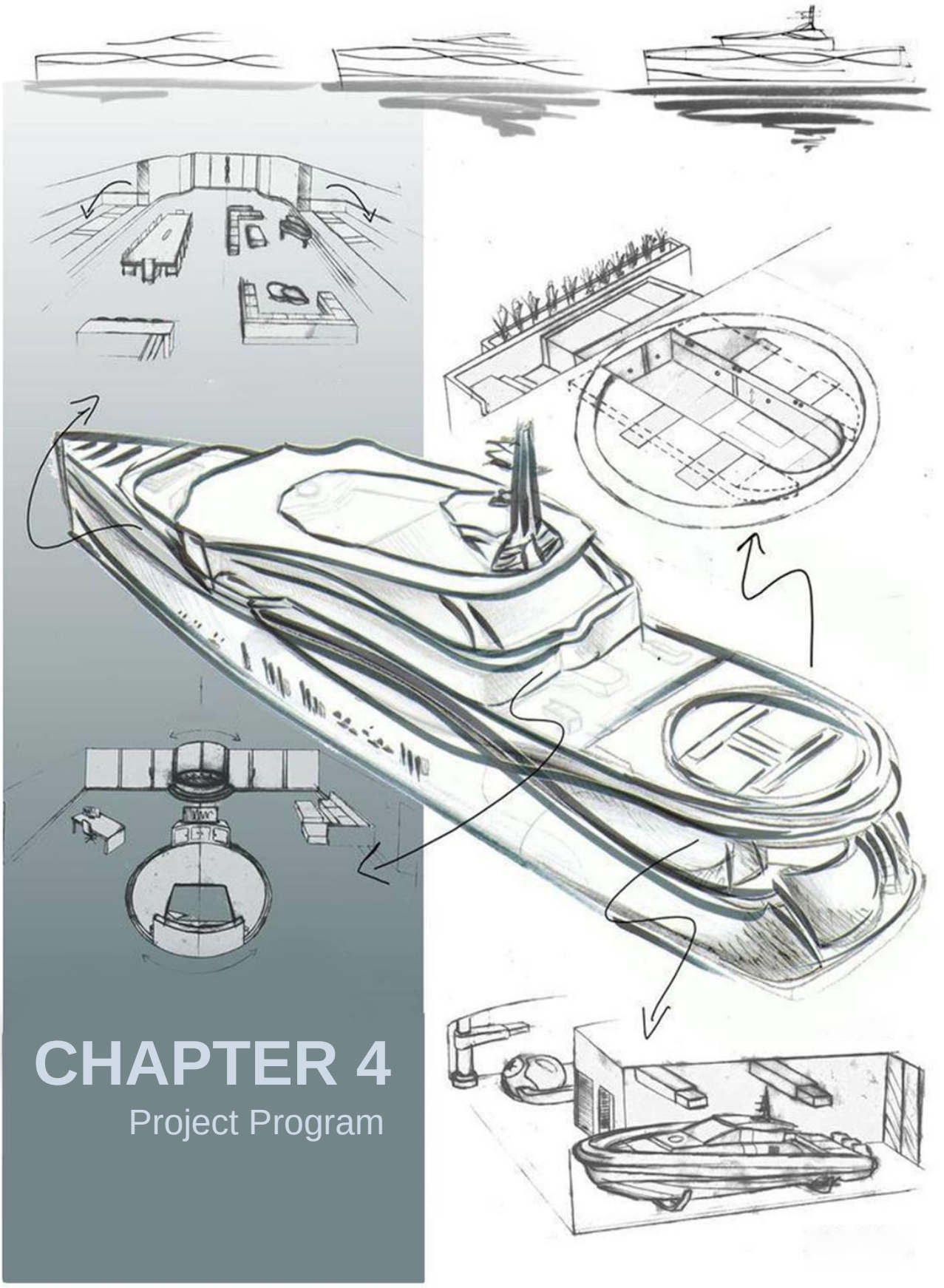


Figure 38: Minimum Yacht Layout

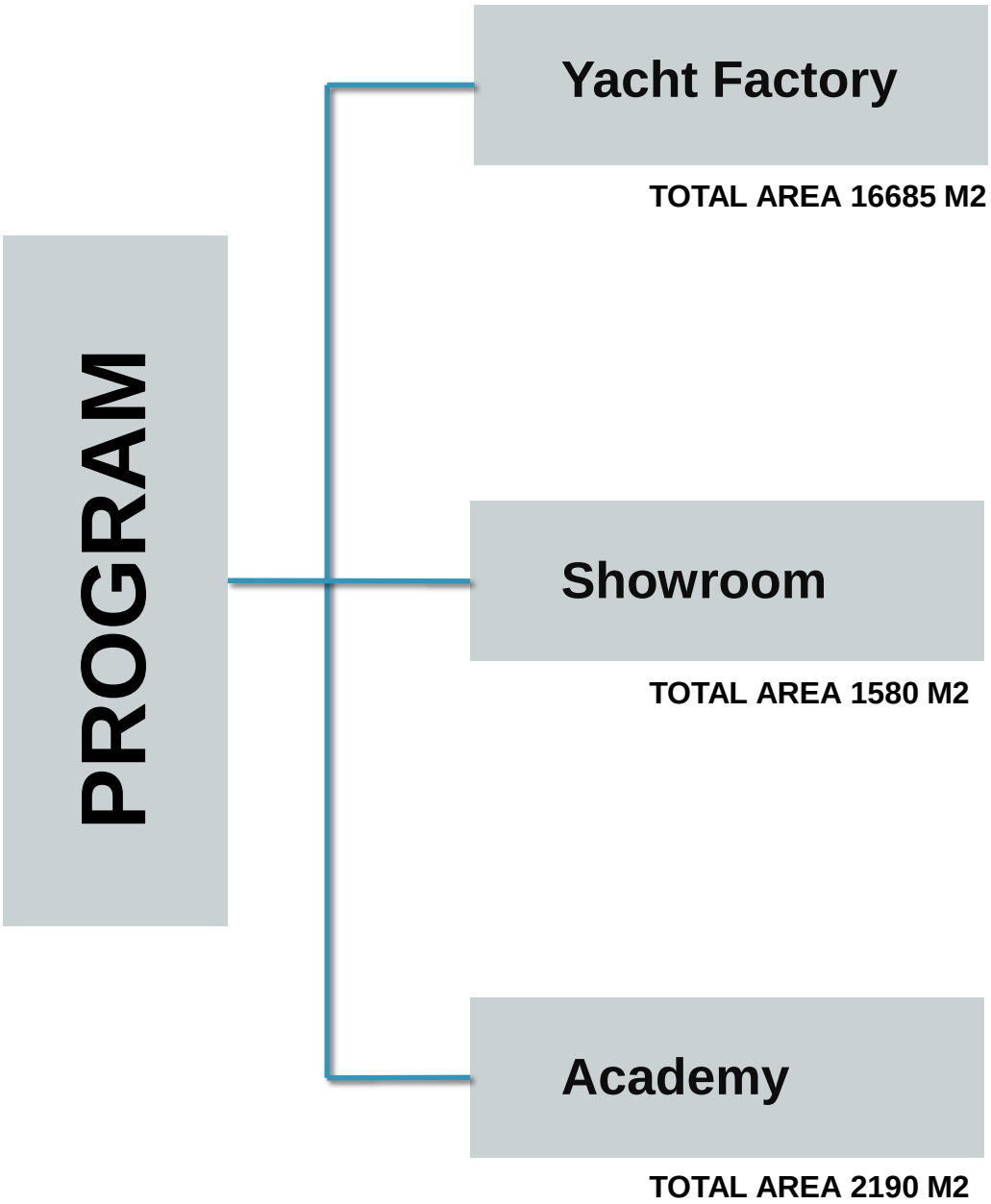


CHAPTER 4

Project Program

Ahmed Sherif

Mohammad Jaber



PS: Total areas were calculated with out the circulations

4.2.1 Factory Components

Factory management Area:

1- Lobby
2- Reception
3- Waiting Area
4- W.C
5- President Office
6- Managers Offices
7- Supervisors Offices
8- Production Manager
9- Health safety Executive (H.S.E)
10- Designers Offices
11- Sea Captain Office
12- Conference Room
13- Supply Chain manager
14- Warehouse
15- Finance manager
16- Clinic
17- Prayer Room
18- Cafeteria
19- Data Show Room
20- Security Office

Factory Area:

21- Drop Area
22- Main Store
23- Fabrication Area
24- Assembly Area
25- Painting Area
26- Manager offices
27- Supervisor Offices
28- Engineers Offices
29- Control Room
30- Mechanical Room
31- Electrical Room
32- Labors Room
33- W.C
34- Storage
35- Damaged Row Store
36- Row Recycling Store

4.2.1.1 Factory Components Area

	NO.	Area M2	Total Area
1- Lobby	1	80	80
2- Reception	1	30	30
3- Waiting Area	1	50	50
4- W.C for entrance	1	25	25
5- President Office	1	50	50
6- Managers Offices	3	25	75
7- Supervisors Offices	3	15	45
8- Production Manager	1	15	15
9- Health safety Executive	1	25	25
10- Design Offices	1	50	50
11- Sea Captain Office	1	25	25
12- Conference Room	1	50	50
13- Supply Chain manager	1	15	15
14- Warehouse	1	15	15
15- Finance manager	1	20	20
16- Clinic	1	50	50
17- Prayer Room	2	50	100
18- Cafeteria	2	100	200
19- Data Show Room	1	50	50
20- Security Office	1	15	15
21- W.C	2	25	50
21- Drop Area	1	1200	1200
22- Main Store	1	2300	2300
23- Fabrication Area	1	3600	3600
24- Assembly Area	1	5000	5000

4.2.1.1 Factory Components Area

	NO.	Area M2	Total Area
25- Painting Area	1	2000	2000
26- Manager offices	3	25	75
27- Supervisor Offices	3	15	45
28- Eng. Offices	3	50	150
29- Control Room	6	10	60
30- Mechanical Room	3	50	150
31- Electrical Room	3	50	150
32- Labors Room	3	25	75
33- W.C	3	25	75
34- Storage	3	100	300
35- Damaged Row Store	1	150	150
36- Row Recycling Store	1	250	250
37- W.C for workers	2	25	50

Total Area = 16685 M2

Total Area With Circulation = 19685 M2

4.2.2 Showroom Components

1- Lobby

2- Reception

3- Waiting Area

4- W.C

5- Manager

6- Sales man Office

7- Samples Gallery

8- Data show Room

9- Café

10- Gift Shop

11- Prayer Room

12- Product Display (Yacht)

4.2.2.1 Showroom Components Area

	NO.	Area M2	Total Area
1- Lobby	1	20	20
2- Reception	1	10	10
3- Waiting Area	1	15	15
4- W.C	2	15	30
5- Manager	1	20	20
6- Sales man Office	3	10	30
7- Samples Gallery	1	50	50
8- Data show Room	1	50	50
9- Café	1	100	100
10- Gift Shop	1	15	15
11- Prayer Room	2	20	40
12- Product Display (Yacht)	1	1200	1200

Total Area = 1580 M2

Total Area With Circulation = 2580 M2

4.2.3 Academy Components

1- Lobby
2- Reception
3- Waiting Area
4- W.C
5- Administration
6- Cafeteria
7- Academic President
8- Major of the academy
9- Doctors Offices
10- Eng. Offices
11- Simulation Room
12- Classes
13- Computer lap
14- Library & Study area
15- Samples Gallery
16- Store
17- Clinic
18- Theater
19- Cafeteria
20- W.C For Classes
21- Meeting room
22- W.C For Staff

4.2.3.1 Academy Components Area

	NO.	Area M2	Total Area
1- Lobby	1	40	40
2- Reception	1	20	20
3- Waiting Area	1	15	15
4- W.C For Entrance	2	15	30
5- Administration	1	30	30
6- Cafeteria	1	50	50
7- Academic President	1	50	50
8- Major of the academy	1	30	30
9- Doctors Offices	5	15	75
10- Eng. Offices	3	25	75
11- Simulation Room	2	70	140
12- Classes	10	60	600
13- Computer lap	2	80	160
14- Library & Study area	1	200	200
15- Samples Gallery	1	50	50
16- Store	1	50	50
17- Clinic	1	50	50
18- Theater	1	300	300
19- Cafeteria	1	100	100
20- W.C For classes	2	25	50
21- Meeting room	1	50	50
22- W.C For Staff	1	25	25

Total Area = 2190 M2

Total Area With Circulation = 2790 M2

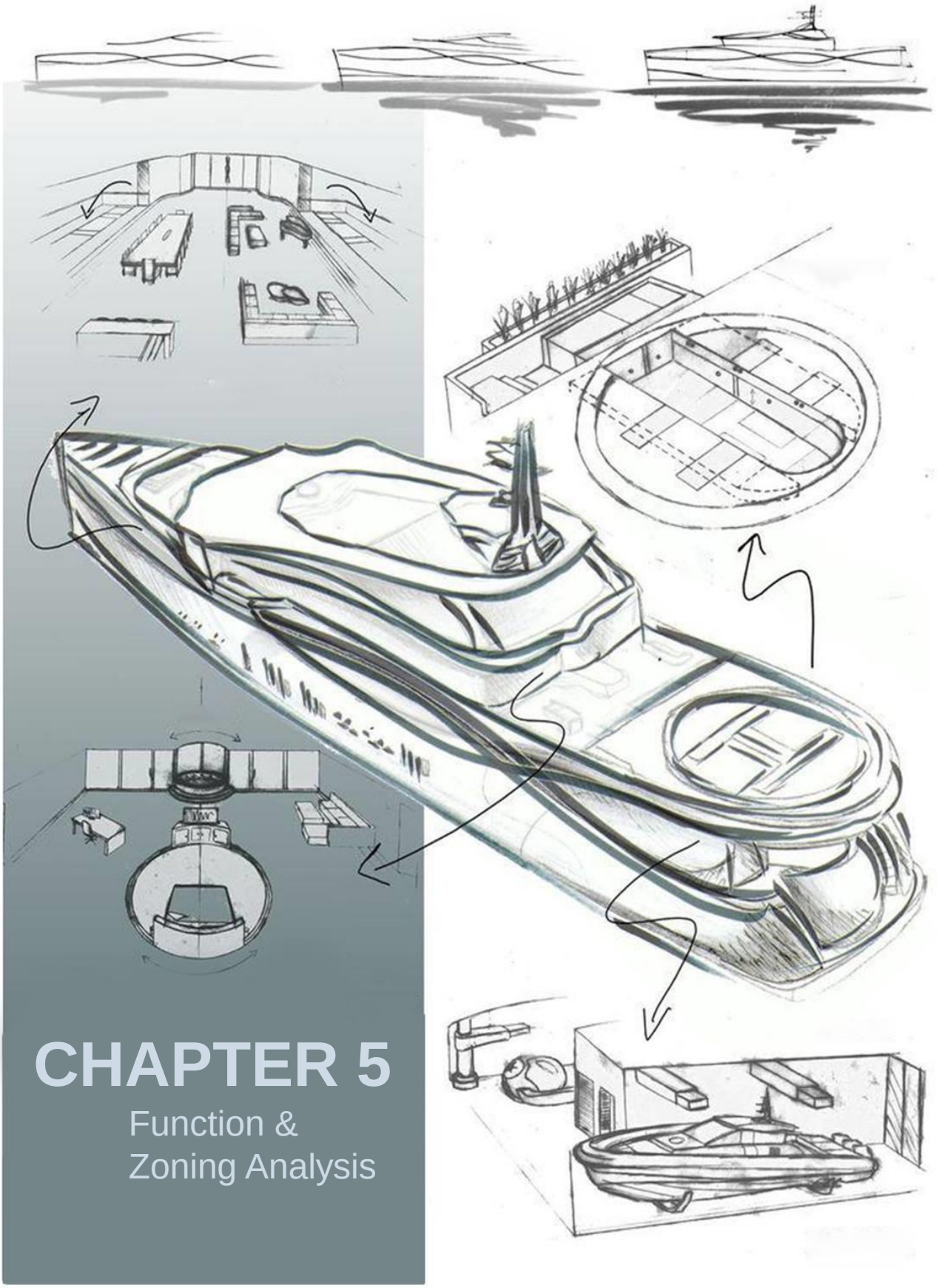
Project Total Area

Field	Total Area
Industrial	19685
Scientific	2580
Social	2790
Total	**25055**

Parking Area: 150 slot * 3 * 5 = 2250 M2

Parking Area For Trucks: 10 slots * 15 * 5 = 750 M2

Landscape Area = 56732 M2



CHAPTER 5

Function & Zoning Analysis

Ahmed Sherif

Mohammad Jaber

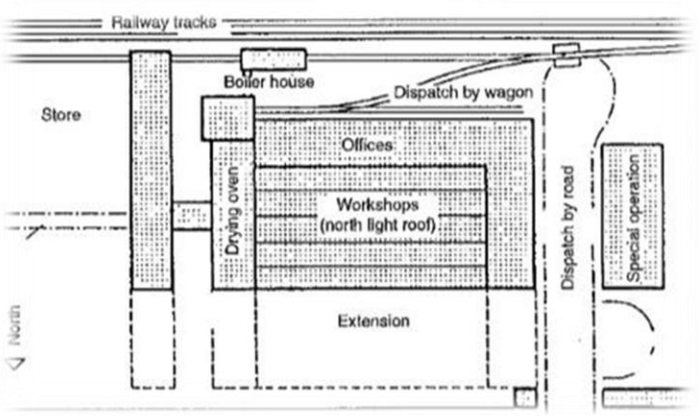
5.1.1 Introduction

Industrial buildings, directly or indirectly, are designed to produce goods. In addition to the actual production buildings (preparation, manufacture, consignment, packaging) these are also warehousing (raw materials, finished products), technical and administration buildings and transport systems. The spectrum of production ranges from labor-intensive heavy industry to 'smart' low-emission and highly automated light industry.

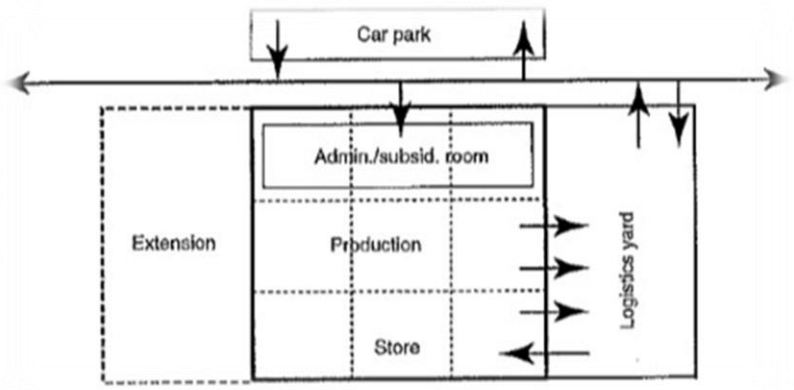
5.1.2 Typologies

The basic types of industrial building can be split into **additive** and **integrative plants**.

In **additive plants**, the individual functional units are shaped according to their purpose and added to planar or linear structures (often along a production line). The units can be extended, developed and exchanged separately .

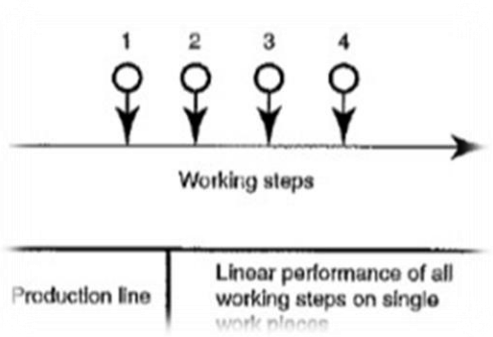


In **integrative plants**, the functional units are assembled to form a neutral structure. The advantages here are the minimization of access areas and reusability. Possibilities for extension must be planned into the building structure.



5.1.3 Production

Human and machine collaborate in the production cycle. This comprises various forms of production and can be planned using flow charts Human performance is not constant but is subject to numerous individual and collaborative factors (strain - tiredness - recovery, age, sex, health).



5.1.4 Construction in general

Floors, walls, ceilings

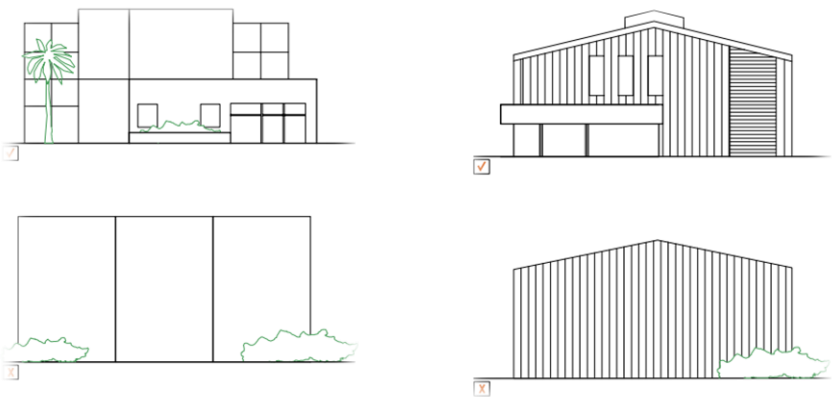
surfaces must be formed according to the requirements of the business and be easy to clean, with sufficient insulation against heat, cold and damp at the workplace
floor without unevenness, tripping hazards, dangerous slopes; must be load-bearing, safe for walking, not slippery
glass walls near workplaces must be clearly marked, non- breakable or shielded

Windows, fanlights

Must be safe to open, close, adjust and fix, must pose no danger in the opened position, and be safe to clean.

Escape routes

Equipment and size of workplace and number of people present, shortest possible route into the open air/into a safe area, permanent marking in suitable form, if necessary,safety lighting, escape doors easily operable at any time, open outward, revolving and sliding doors are not permissible as emergency exits.

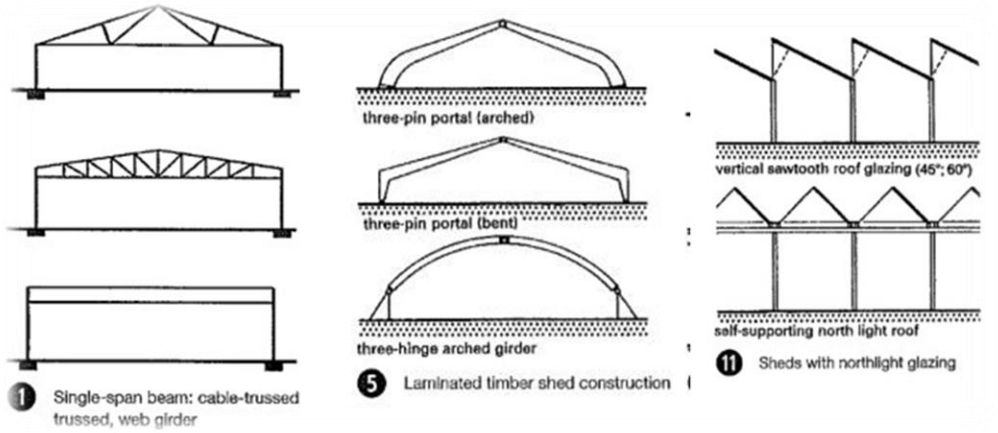


5.1.5 Shed construction

Production and warehouse buildings are often built as industrial sheds without internal floors but withlarge spans and room heights.

Construction, spans and heights

Timber, steel or reinforced concrete construction with spans of 5-50 m according to client requirements (arrangement of machines, access routes and turning circles of vehicles) and room heights of 3-6 m. Built as solid, trussed or cable-trussed structures with fixed-end columns -t 1, frames 5- 6 or as a framed construction stiffened with bracing, often as added or staggered buildings.



1 Single-span beam: cable-trussed trussed, web girder

5 Laminated timber shed construction

11 Sheds with northlight glazing

- Standard of the factory's roof slope based on their material: Depending on the roof's material, standards set for the slope of the workshop's roof:

- For roof made from asbestos cement sheets: Slope is from 30% to 40%;

- For iron roof (corrugated iron sheets): Slope of 15% to 20%;

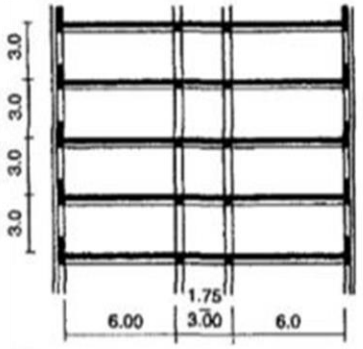
- For tile roof: Slope from 50% to 60%;

- For a **production factory** with a roof made from reinforced concrete slabs: Slope from 5% to 8%.

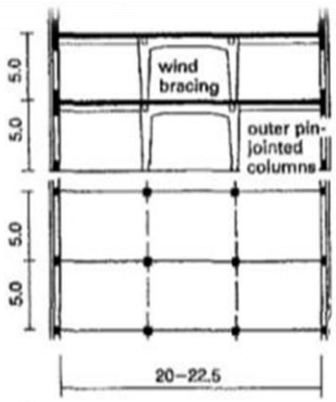
5.1.6 Multi-Stories Industrial Buildings

Room heights should be determined depending on building depth and working room height (guideline 3.00 m for working rooms larger than 1 00 m2).

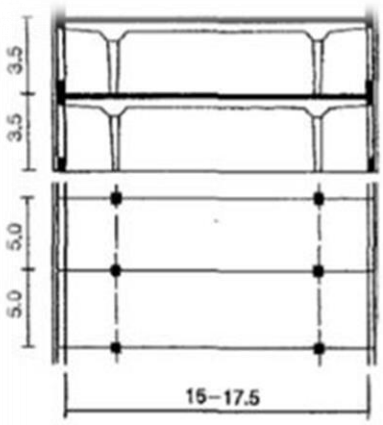
A good ratio is 2:1 (plan depth : room height)



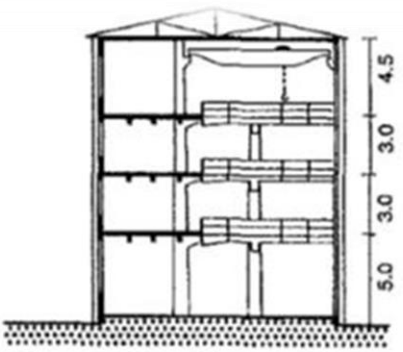
3 Building depths for given storey heights



6 Cantilever beams offer structural advantages, but the columns



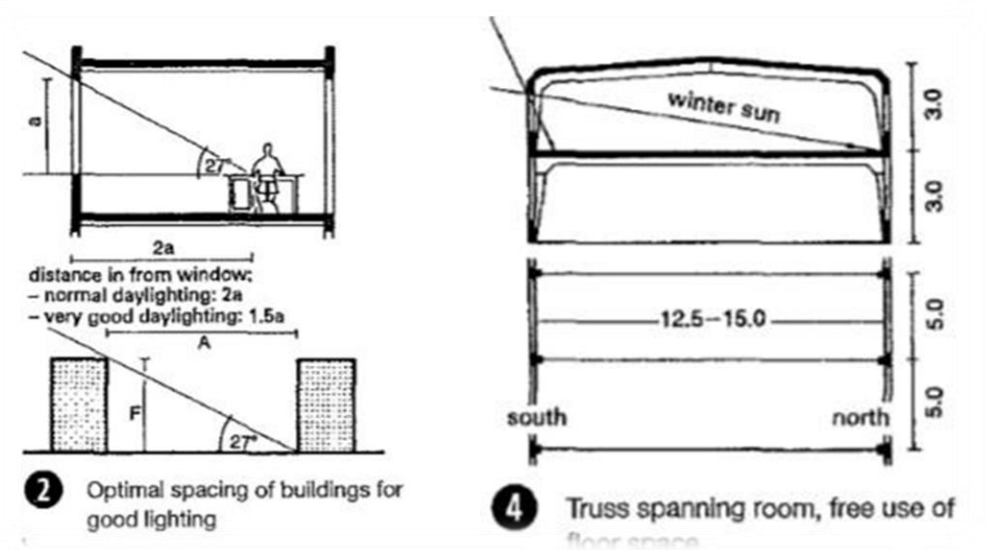
7 Deepest space with two internal columns providing bracing. External pin-ended columns



8 Multi-storey building with crane shed, also acting as lifting shaft for transporting work items to the offset balconies projecting on the upper floors

5.1.7 Lighting

Multi-stories buildings with windows on one side should face northeast, and, with windows on both sides facing north and south, they should be oriented east-west. The summer sun thus onlyshines into the interior to a limited extent and is easy to shade with blinds but in winter the room is pleasantly sunlit (no disturbing shadows in the working area) 4. The distance of the working area from the window should be twice if the clear window height 2 e.
Stairs and toilets (cool) can be located on the north side.
The best lighting is provided by free-standing buildings which are twice as far from each other as they are high (ground floor angle of light = 27°) 2 single-stories buildings with roof lights can be located between these.
Approx.



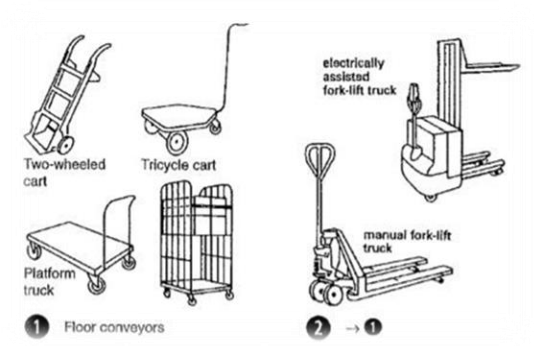
2 Optimal spacing of buildings for good lighting

4 Truss spanning room, free use of floor space

5.1.8 Transport

Are manually or mechanically driven, mostly without being on tracks, for stacking heights up to 6 m, in special cases up to 1 0 m.

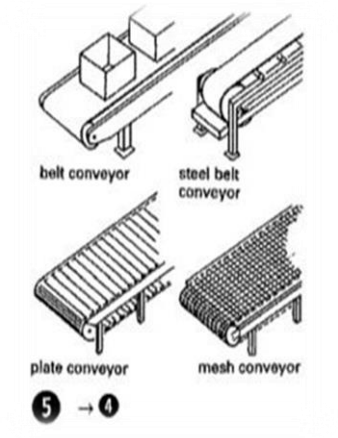
The advantages are the low plant costs.

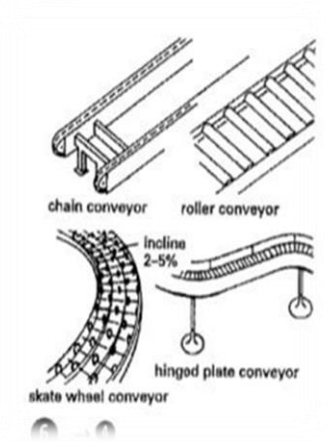


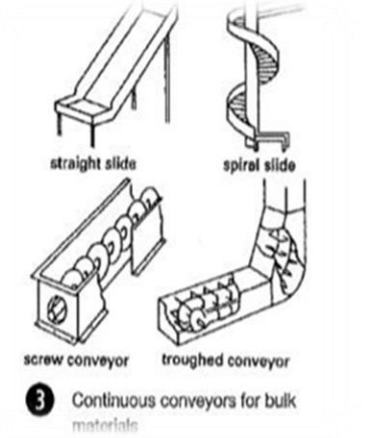
Means of transport can be divided into continuous and Discontinuous conveyors:

Continuous conveyors Continuous conveyors are mechanical, hydraulic or pneumatic systems with a defined transport route (permanent or mobile), along which the transported goods are continuously (regularly, in cycles or with variable speed) moved between loading and unloading locations.

Continuous conveyors include:
Conveyor belts -> 5, track and chain conveyors -> 6, screw conveyors, slides 3, endless overhead chain and rope conveyors, moving tables 4, pneumatic (pressure and suction) conveyors (bulk goods and liquids), centrifugal conveyors and bucket chain conveyors.





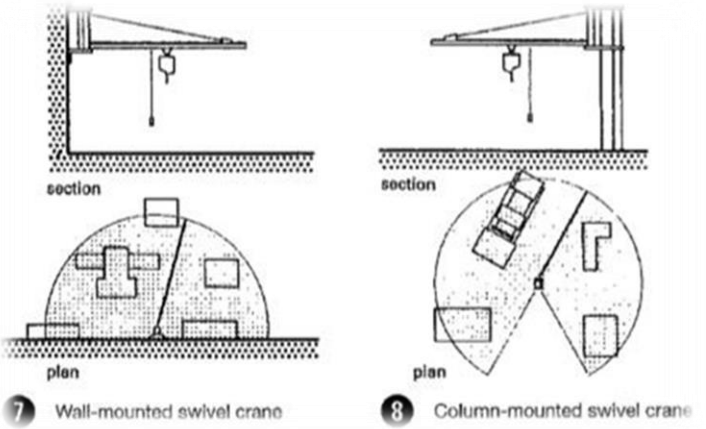


5.1.9 Discontinuous Conveyors

Conveyors work discontinuously. They can be differentiated into industrial trucks (running on wheels on a floor) andlifting devices (mostly cranes).

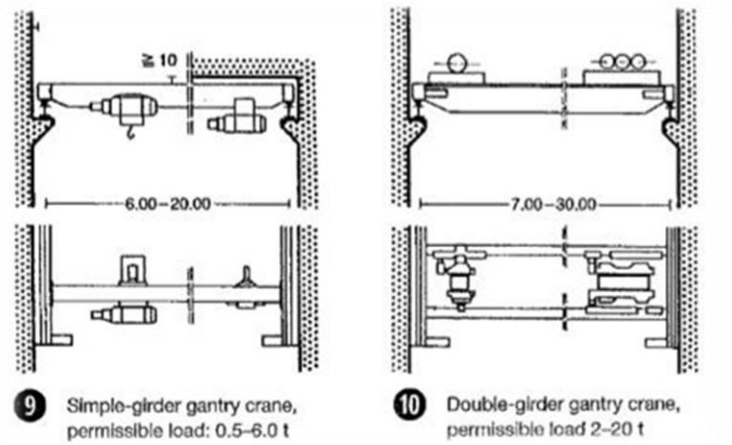
Cranes

Cranes are machines for the vertical lifting of large andheavy goods. Horizontal mobility can also be provided through wheeled trolleys or winch trolleys 9.12 Swivel cranes 7.8 enable the lifting of objects from any point in their radius of operation.



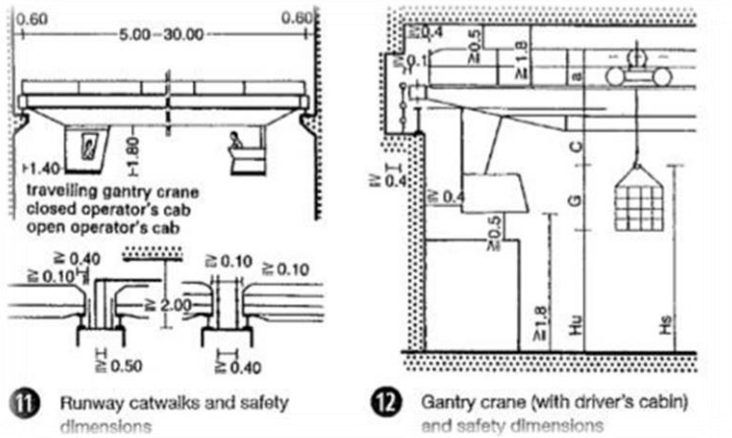
7 Wall-mounted swivel crane

8 Column-mounted swivel crane



9 Simple-girder gantry crane, permissible load: 0.5–6.0 t

10 Double-girder gantry crane, permissible load 2–20 t

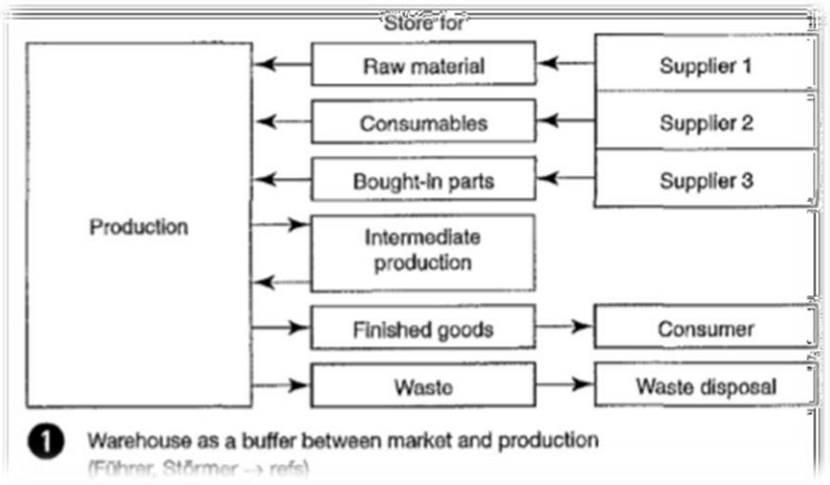


11 Runway catwalks and safety dimensions

12 Gantry crane (with driver's cabin) and safety dimensions

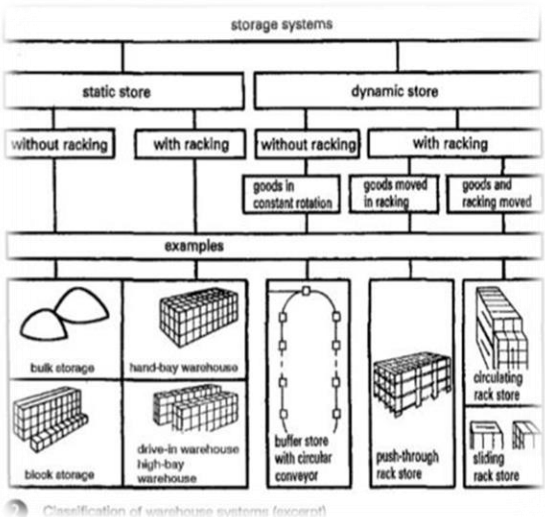
5.1.10 Storing

Storage is part of the material flow process and logistically forms the connection between production and marketing 1. Storage is cost- intensive and does not create economic value, leading to attempts to minimize the storage quantities and times or effectively combine the storage and transport of materials and goods through flexible 'just-in- time production'

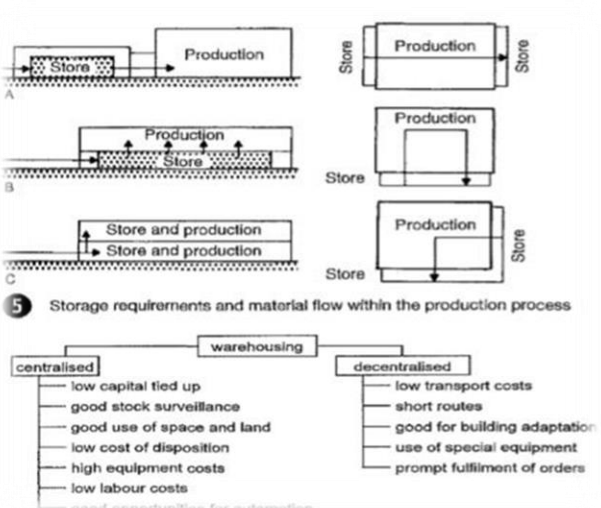


1 Warehouse as a buffer between market and production

There is a wide range of different static and dynamic storage systems available for each storage situation and the goods needing storage --2The spatial arrangement of the different warehouses in the production process can also be dealt with in various ways --5



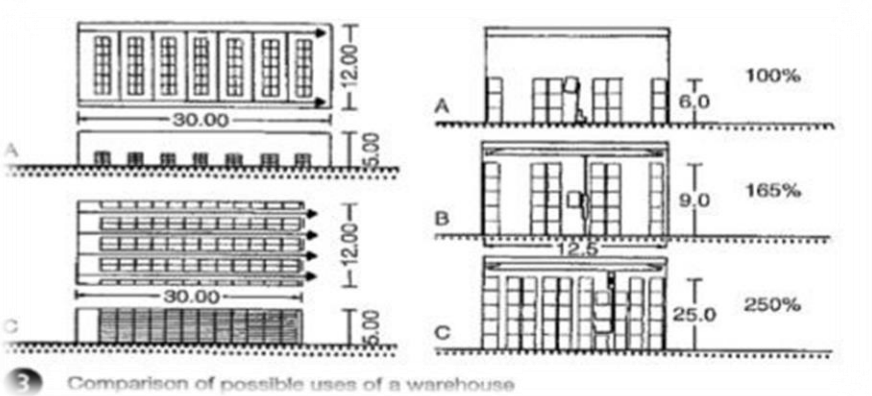
2 Classification of warehouse systems (excerpt)



5 Storage requirements and material flow within the production process

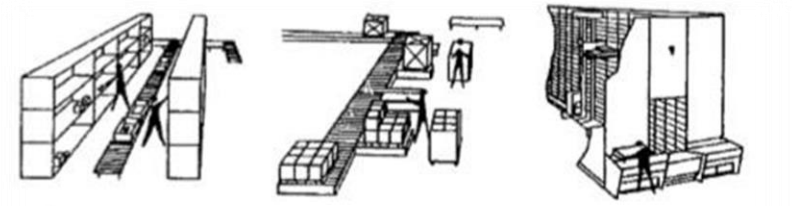
traffic routes inside warehouses	
pedestrians	min. **1.25 m**
pedestrians and powered stackers	**vehicle width + 2 x 0.50 m**
passage widths between racks	
with manual operation	min. **0.75 m**
with forklift operation (swivelling forks)	**forklift width + 2 × 0.50 m**
with forklift operation (rigid forks)	**forklift + fork + 0.50 m**
rack heights (depending on equipment)	
hand shelves single-storey (two-storey)	up to **3.0 m** (up to 6.0 m)
pallet warehouse with forklift operation	up to **6.0 m**
high-bay warehouse with high-bay forklifts	up to **9.0 m**
high-bay warehouse with stacking crane	up to **25.0 m**

7 Basic dimensions in warehouses (MBO, Workplace Regulations, Industrial Building Guidelines, ZH, Health and Safety Regulations)



3 Comparison of possible uses of a warehouse

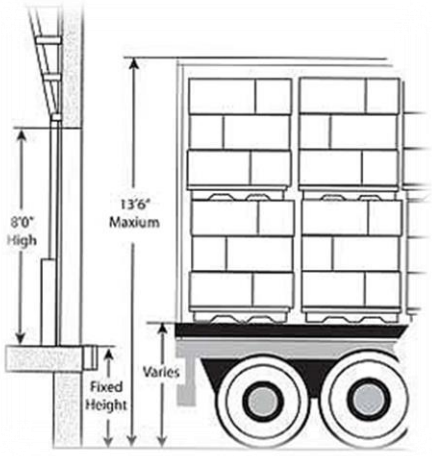
Picking, or order assembly, denotes collecting articles out of the warehouse and making them ready for dispatch in accordance with an order.
This can be single-stage picking (specific to one order) or two-stage picking, with an intermediate picking zone for temporary storage and assignment of the articles to several orders.
The work is performed flexibly and with no technical support, or very little, as a 'man to goods' system (4), left, or for more capacity with partly or fully automated transport vehicles and complex infrastructure as a 'goods to man' system (4), center and right.



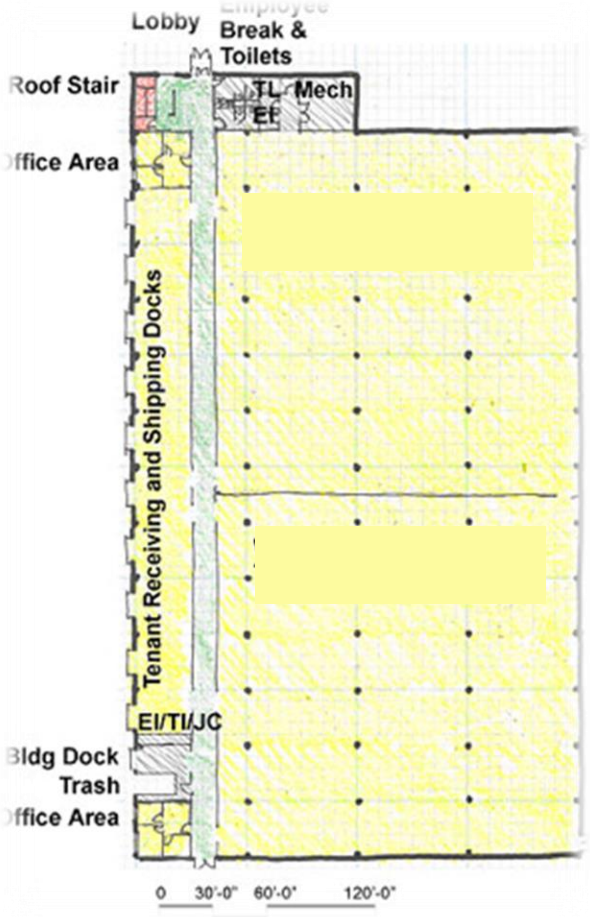
4 Alternative systems of picking

Example Plan

The following diagrams are representative of typical tenant plans.



Typical loading dock heights to consider for different vehicle types.

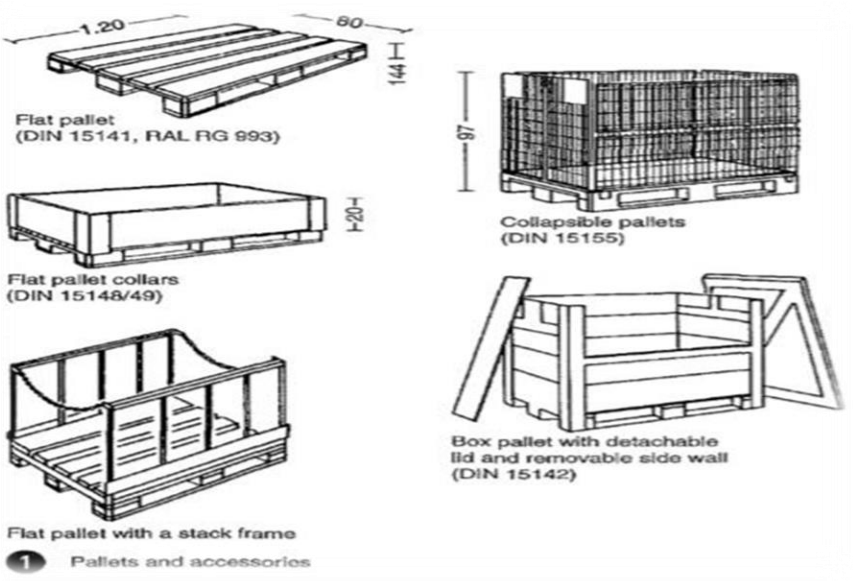


This loading dock incorporates a safety gate which reduces the danger of falls from docks, bays, or exposed edges when closed.

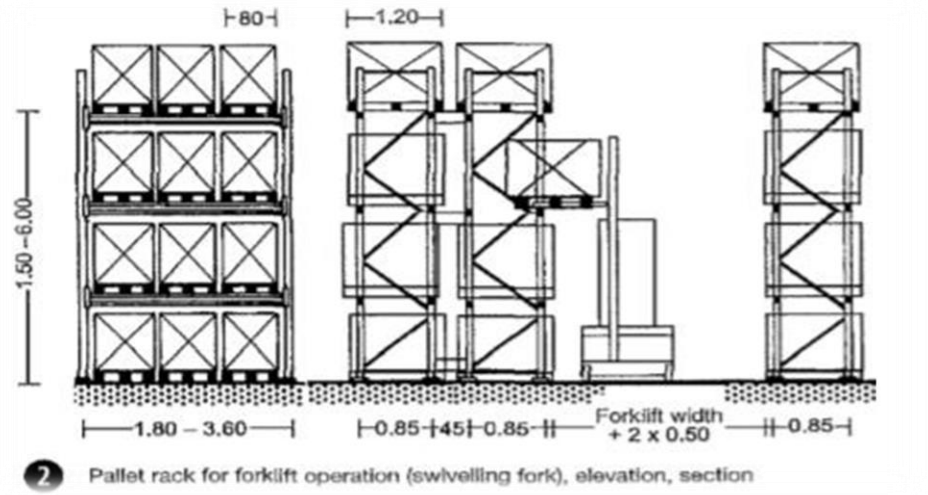
5.1.11 Shipping Containers

Storage and shipping containers Storage containers serve to
Combine the goods into loading units with the purpose of maximizing the exploitation of space and transport capacity and the avoidance of handling.
The most common storage containers for unit goods are stackable crates made of timber or plastic, pallets (flat pallets, pallets with side rails and additional equipment) and increasingly containers.

Standardized transport pallet (Euro pallet, Pool pallet, 800 X 1200 X 144 mm) with various stacking attachments.



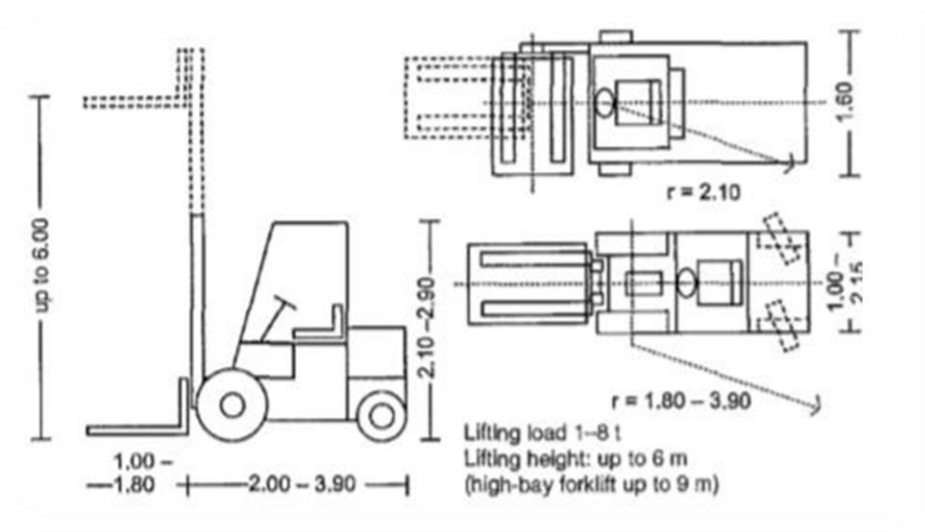
1 Pallets and accessories



2 Pallet rack for forklift operation (swivelling fork), elevation, section

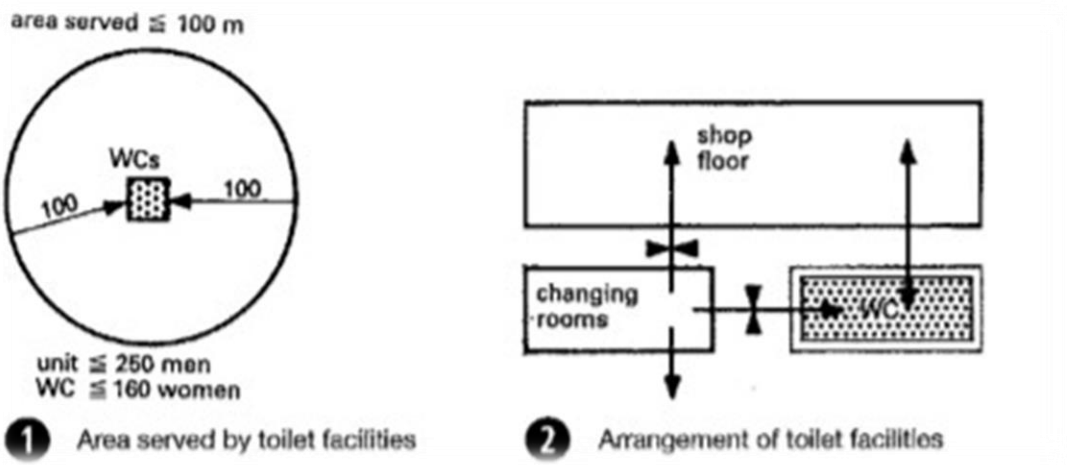
5.1.12 Warehouse Equipment

Using forklift trucks, **heights of up to 6.00** The passage width between the racks depends on the size and type of the forklift truck to be used (rigid forks, swiveling forks) and the requirements of Health and Safety Regulations I ZH 1 **(vehicle width 2 X 50 m).**

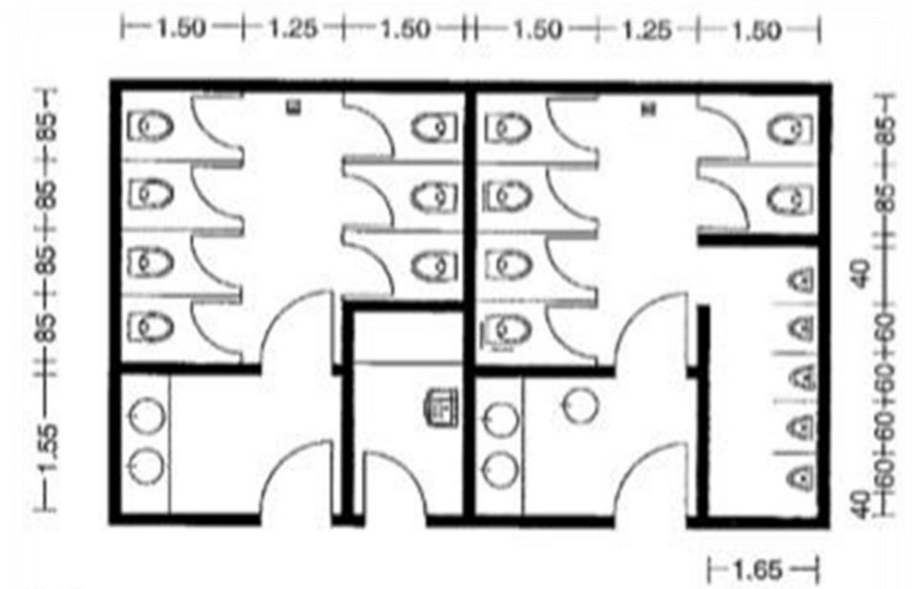


5.1.13 Toilets

These are to be provided at a distance from each workstation of not more than 1 00 m or, at the farthest, one stories height (if no escalator is available}. Toilets should also be provided near social, readiness, washing and changing rooms.



Chosen plan for toilet for 100 men

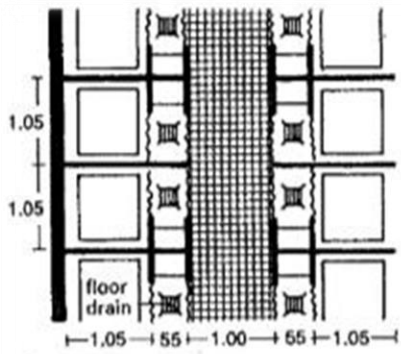


9 Toilet facilities for 100 women and men (example)

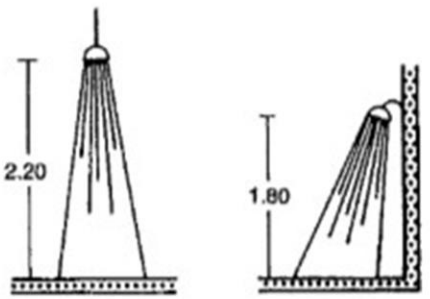
Men							Women					
number of employees	flushing WCs	urinals	gutter (m)	washbasins	additional flushing WCs	additional urinals	number of employees	flushing WCs	washbasins	additional flushing WCs	waste bins	bucket sink
10	1	1	0.6	1	1	1	10	1	1	1	1	1
25	2	2	1.2	1	1	1	20	2	1	1	1	1
50	3	3	1.8	1	1	1	35	3	1	1	1	1
75	4	4	2.4	1	1	2	50	4	2	2	1	1
100	5	5	3.0	2	1	2	65	5	2	2	1	1
130	6	6	3.6	2	2	2	80	6	2	2	1	1
160	7	7	4.2	2	2	2	100	7	2	3	1	1
190	8	8	4.8	2	2	3	120	8	3	3	1	1
220	9	9	5.4	3	3	3	140	9	3	4	1	1
250	10	10	6.0	3	3	4	160	10	3	4	1	1

Washrooms

Washrooms are to be provided for employees engaged in activities dangerous to health or with strongly odorous substances, or who are subjected to the effects of heat or damp. Washing and changing rooms ---7 must be easily accessible from each other



14 Single showers with changing booth



7 Clear height of shower heads

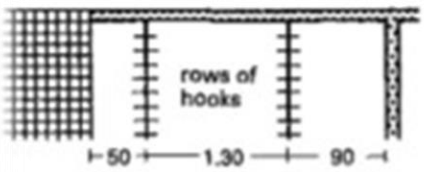
Changing Rooms

Changing rooms should be **on the direct route between entrance to the site and the working area. Separate washing and changing** rooms should be easily accessible from each other: there must be room for unobstructed changing considering the number of users at the same time. If changing rooms are not required**, clothes storage must be provided for each employee.**

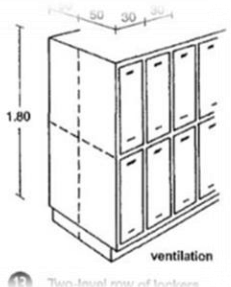
No. people		Width a_p [1]
1	up to 5	0.88
2	up to 20	1.00
3	up to 100	1.25
4	up to 250	1.75
5	up to 400	2.25

building guideline

3 Width of passages

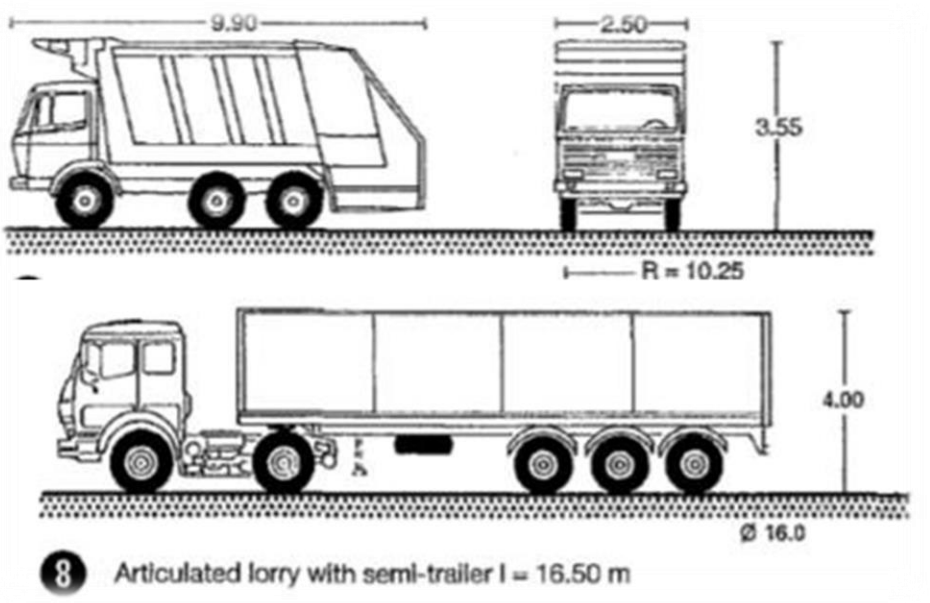


1 Changing room with simple rows of hooks



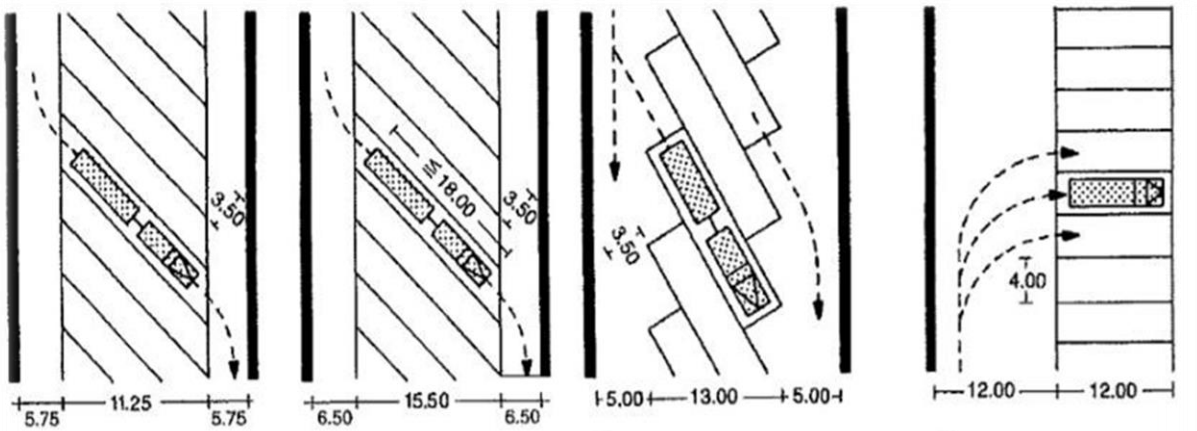
13 Two-level row of lockers

5.1.14 Dimensions of trucks



8 Articulated lorry with semi-trailer l = 16.50 m

5.1.15 Parking

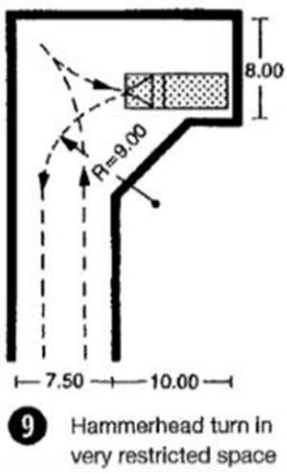


1 45° parking, HGVs and buses
45° parking, articulated buses and lorries

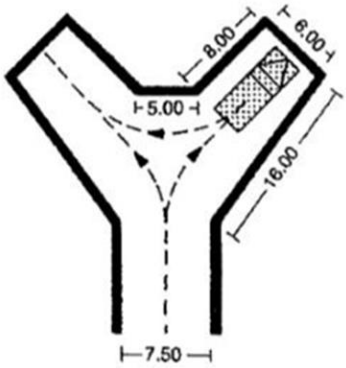
2 30° parking, truck with trailer

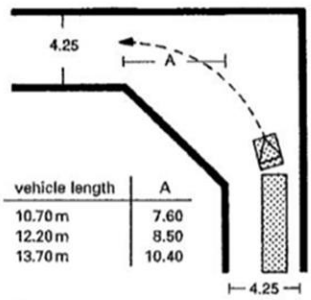
3 90° parking, 12 m bus

5.1.16 Drop - Off



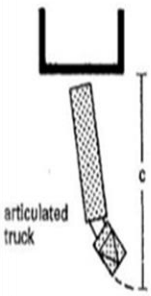
9 Hammerhead turn in very restricted space



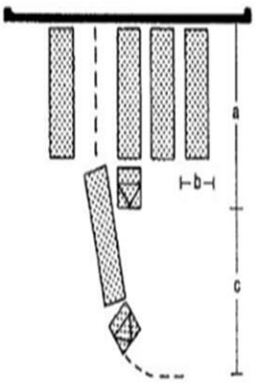


7 Space needed at street corners

5.1.17 Free Space For Entry & Exit



12 Single parking



13 Parking in a row

Free zone for entry and exit of:	Vehicle length a	Parking space width b	Keep free zone c
HGV 22 t	10.00	3.00	14.00
		3.65	13.10
		4.25	11.90
HGV single vehicle	12.00	3.00	14.65
		3.65	13.50
		4.25	12.80
articulated lorry	15.00	3.00	17.35
		3.65	15.00
		4.25	14.65

14 Table for 12 and 13

5.1.18 Introduction to (Robotic Arms)

The world of robotics is changing rapidly, and the future of automation is only set to be more innovative and ground-breaking in the coming years. Robots are becoming part of our daily lives, and in the world of manufacturing, industrial robots have become the essential component to drive efficiencies; the epitome of a modern factory.

5.1.19 The History of Robotics

Robotics has its roots way back in ancient mythology, when the first ‘metal man’, Talos, was gifted by Zeus to Europa in ancient Greece, and gear-driven mechanisms were created. But it has come a long way since then. Pre-18th-century inventions and advancements in automation included appliances and musical instruments powered by water, wind and steam. In the 1700s toys and novelties were created that moved by themselves using systems of weights and gears.

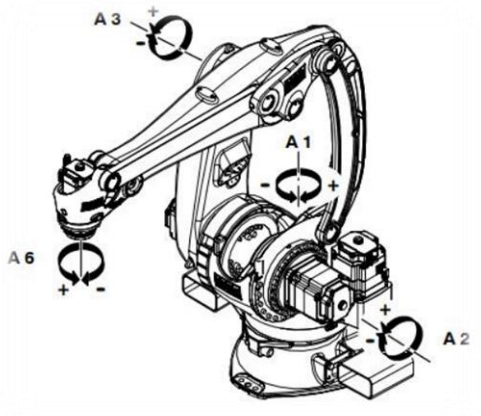
5.1.20 Robotic arms standards

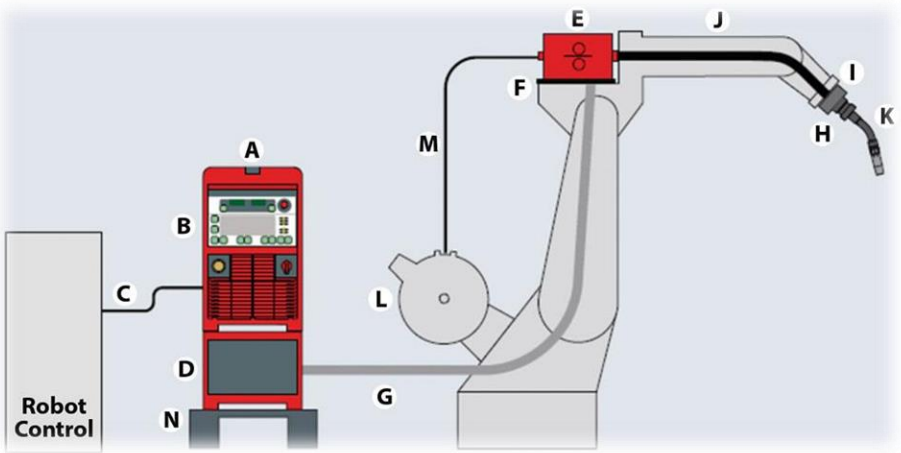
KUKA & ABB Robotic Arm

KUKA KR 40 PA

KR 40 PA is a four-axis industrial robot developed by KUKA especially for tasks such as palletizing, handling, depalletizing and welding.
The maximum payload on the wrist of the robot is 40 kg, plus a maximum supplementary load of 20 kg. All main bodies of the robotic arm are made of cast light alloy and designed to optimize cost-effective and high torsional and flexural rigidity.

The robot consists of a fixed base frame, along with a rotating column, link arm and wrist. The wrist is provided with a mounting flange for attaching the end of arm tooling. The possible movements the robotic arm can perform can be seen in the Figure. Moreover, the positions of A1, A3 and A6 axis are sensed by an absolute position sensing system with sensors on each axis. Each axis is powered by a transistor-controlled low-inertia AC servomotor. The range of A1 axis is from positive 155 degrees to negative 155 degree, which is 310 degrees in total while the maximum range of the arm is 2091 mm. The repeatability is around 0.05 mm. It weighs 695 kg alone, excluding the controller cabinet, end of arm tooling and any other attachments on the arm.





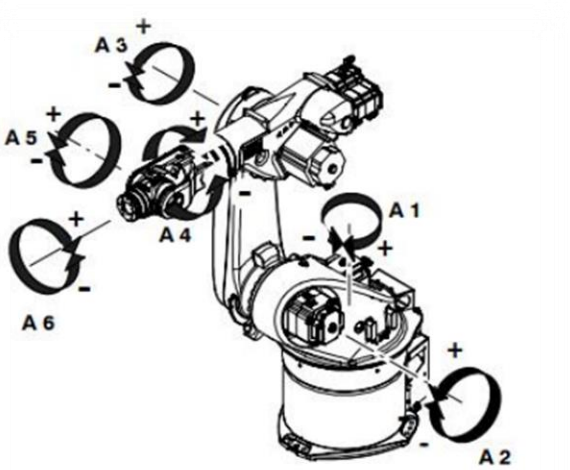
5.1.20 Robotic arms standards

KUKA KR 30-3

KUKA KR 30-3 is a six-axis industrial robot manufactured by KUKA with the main applications of handling, assembling, machining, etc. The rated maximum payload of this robot is 30 kg. Like KR 40 PA, the main bodies of the robot are made of cast light alloy specially designed to optimize dynamic performance and resistance to vibration. All axes are powered by AC servomotors that don't require maintenance and offer reliable protection against overload. All the components are designed to be simple and straightforward. The numbers of components are minimized as well. The whole unit can be quickly replaced by another robot without any major programming

The major axes are lifetime-lubricated as well, requiring a necessary oil change after 20,000 operation hours by the earliest. The robot is designed to occupy minimum space on its base and being able to reach objects that are close to itself. In comparison to KR 40 PA, it can also realize overhead movement and movement in two more axis. Each robot is equipped with controller cabinet that integrates control and power electronics. The robot meets the safety requirements specified in EU machinery directive and relevant standards. The power supply and communication wires were integrated into the cables that connect the robot and the controller.

The maximum total load of the robot is 65 kg while the maximum payload is only 30 kg. The weight of the robot itself is approximately 665 kg and the mounting of the robot can be variable, not only limited to the floor. The possible moving angle range for A1, which is the base, is from positive 185 degrees to negative 185 degrees. Because of its special structural design, it can achieve about 27.2 cubic meter of working envelope volume. Its protection level is IP 64. By the definition from International Electronics Committee, IP 64 means dust tight and protection against water splash. Its protection level is one of the lowest among the candidates.

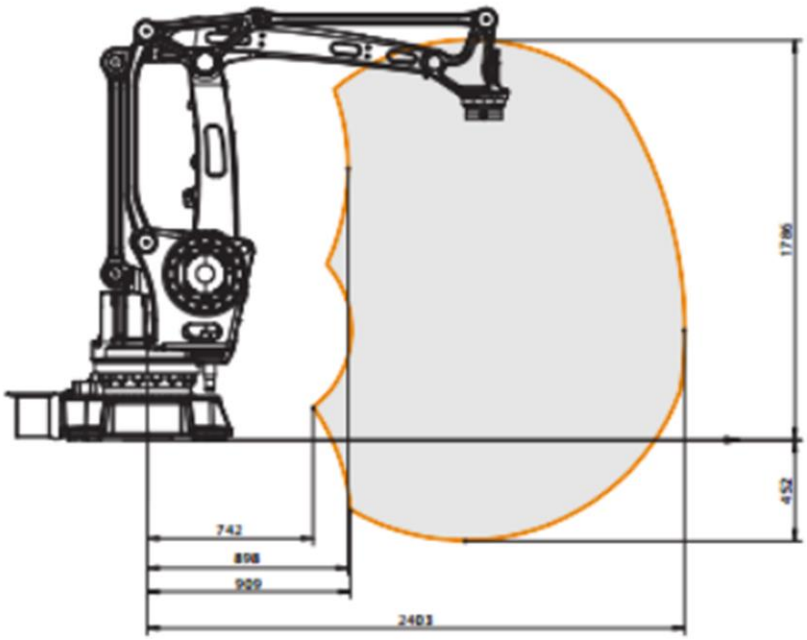


5.1.20 Robotic arms standards

ABB IRB 460

ABB IRB 460 is a 4-axis compact industrial robot specially optimized for palletizing operations in the factory. The common industrial robots have 6 axis, giving them more flexibility over 4 axis ones.

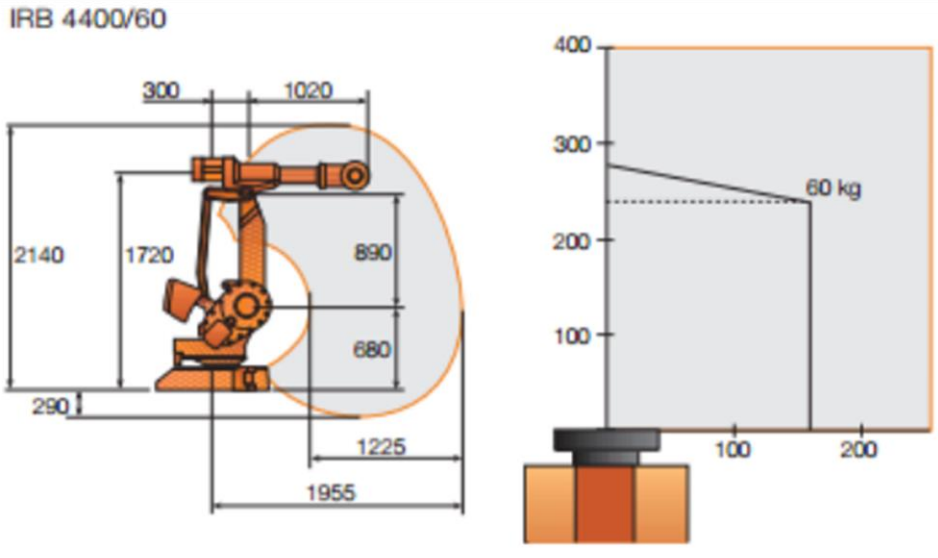
According to ABB, as one of the fastest palletizing robot, IRB 460 can complete 2190 well defined cycles within one hour with 60 kg of load and 2040 same cycles within one hour with 110 kg of load on it. By the calculation, the longest cycle time of the robot is only approximately 1.76 seconds, which is way faster than the production rate of the blocks. The arm itself weighs 925 kg and has 110 kg of maximum payload. The reach range of the robot is 2400mm while the repeatability is 0.2mm (See Figure 2.3.4.F). It can only be mounted to the floor. Its base takes about 1007mm x 720mm of space, which totally satisfies the requirement of 38 the team's room layout print



5.1.20 Robotic arms standards

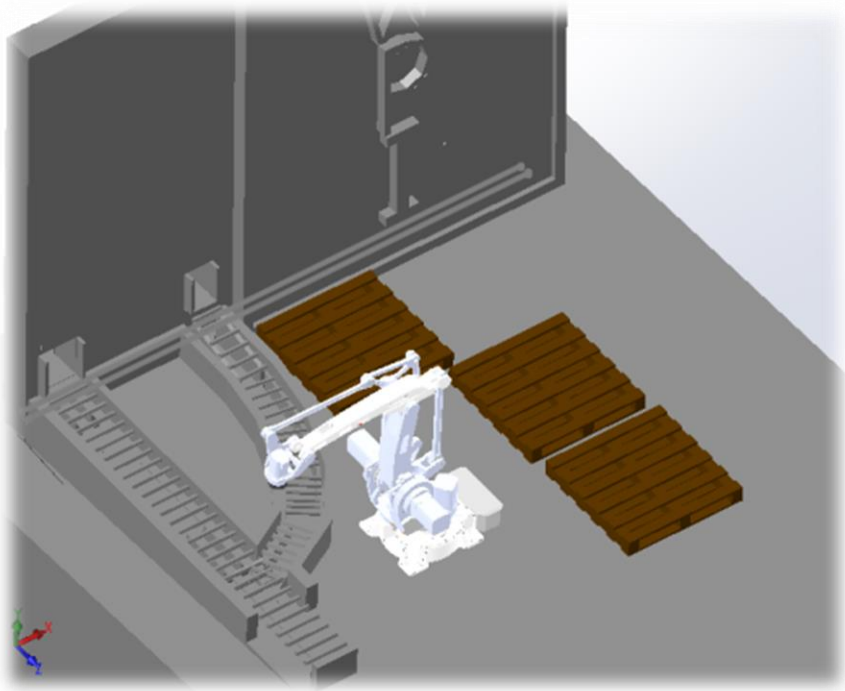
ABB IRB 4400

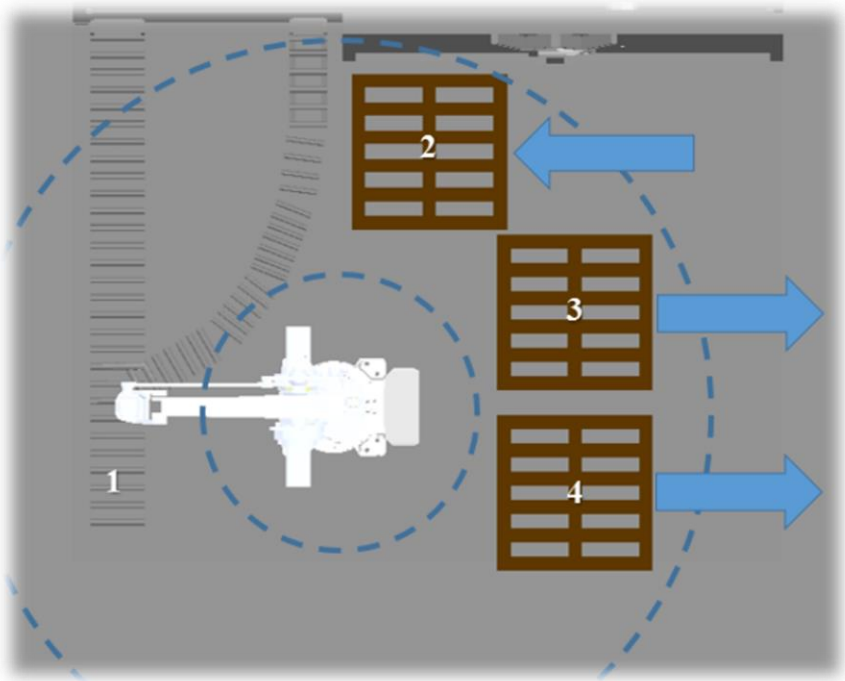
ABB IRB 4400 is a compact, fast conventional robot for medium to heavy handling. It has 6-axis and capability to realize versatile applications using different end of arm tooling and programming. It can be installed for applications such as cutting and drubbing, grinding and polishing, material handling etc. Its rigid, robust built makes it very reliable and needs minimum numbers of routine maintenance. Another feature of the arm is its extensive communication capability. It can communicate with external hardware with serial links, network interfaces, PLC, remote I/O and field bus interfaces. According to the data sheet provided by ABB, its reach is 1.96m while its maximum payload is up to 60kg. Its position repeatability is 0.19mm while its path repeatability is about 0.56mm, which is less accurate than the IRB 4600. The weight of the arm is 1040 kg, making it the heaviest one among the three ABB candidates. Its base size is medium, which is 920 x 640 mm. it can only be fixed on the floor.



5.1.21 Work Area

Once the robotic arms maximum and minimum reach were taken into consideration, The main requirement for the conveyer design and robot positioning is the robot's ability to reach everything that it needs to work with





5.2.1 Design

After the customer reaches a point where he has a good idea of this individual desires and requirements, the designer offers the customer with a preliminary design.

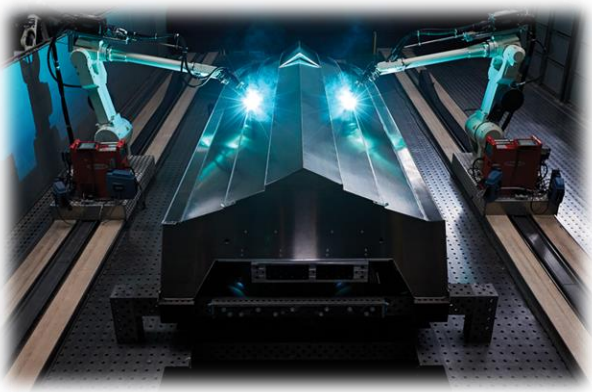
5.2.2 Procurement of material

•The basic component of ship building is steel plate, and they use Aluminum Alloys & wood for the inside, Steel panels are stored in warehouses, which are usually divided into two vertical and horizontal storage locations, and they are stored according to their thickness an grades and that helps keeping them in order.

•We will not manufacture raw materials in the factory because they will need a single production line, and since these materials are available in Egypt in abundance, we will purchase them and store them.

5.2.3 Fabrication

The plates are cut, shaped, bent or otherwise manufactured to the desired configuration specified by the design.
Typically, the plates are cut by an automatic flame cutting process to various shapes. These shapes may be then welded together to form I and T beams and other structural and all these processes controlled by a **robotic arms**.



- Numerical Control Cutting

Based on a model made by lofting, NC cutting is the work to cut out the form of the parts from steel plates. Craftsmen have cut it with a cutting machine before, but now it is mechanized and is able to cut out the complicated form automatically, when we input the data of the lofted drawing into a NC cutting machine. It does the marking to fill in the name or the installation place of the parts at the same time.

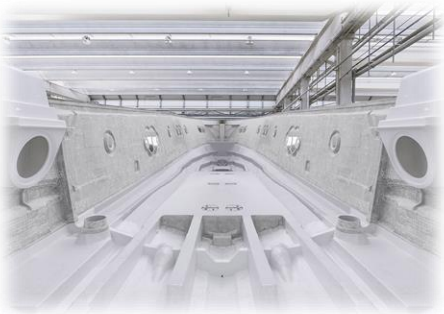
- Bending & Rolling

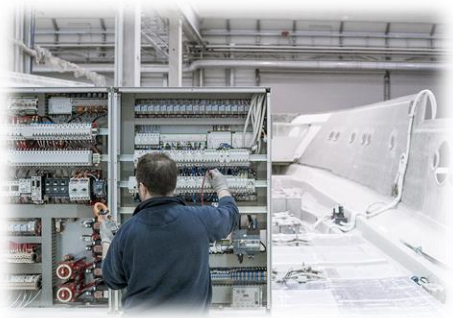
first thing before start bending the steel surfaces, they must make sure the surface is straight which will make it smooth and easy to handle while bending it to final shape.
A ship consists of complicated curved surface, so we need to bend the steel plate because it is a plane. Pushing it with a press machine or heating the surface by a gas burner, we bend it carefully little by little to match the model. As for the work to bend the smooth curved surface by thermal processing, most are done by hand by the skilled craftsmen, and for the irregular shapes they can use some robotic 3D design machines. (KUKA Smart productions)

5.2.4 Assembly & Welding:

Yachts are made of three modules: Hull, interior module, and deck, Which are built simultaneously until last detailing stage then join during final assembly.

After we finish building the hull, All electric and hydraulic systems that are strictly linked to it such as fuel tanks and engine room equipment are the first thing to assemble, Then comes the isolation is the last process in this assembly phase.

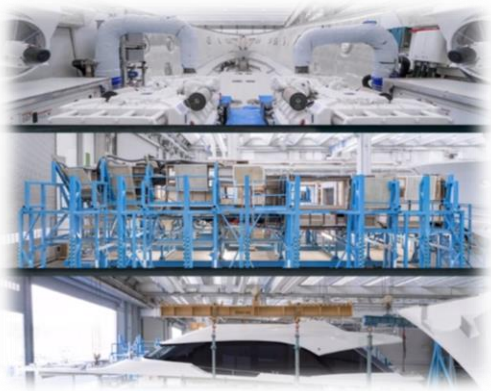


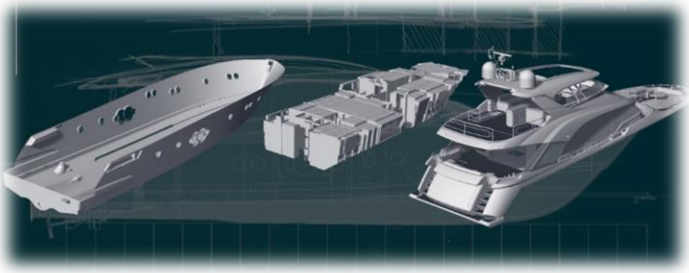


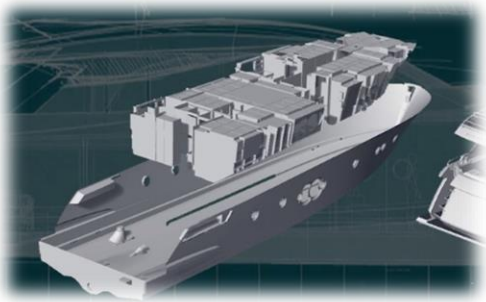
While the hull is in process the interior is built in its entirety as a single piece outside the hull which is attached to the structure of the hull before putting it inside it and wire everything we need when attaching it to the hull and that gives more details for the interior finishing.

Now comes the deck which is the third module and built separately from the other elements and before the assembly they make sure they wire everything and assemble the electric systems and devices they need it in.

Now When the three elements are fully completed and equipped its time for the final assembly which comes in:







1- The interior module assembled to the hull

2- The joining of the hull and the deck

5.2.5 Painting:

When the assembly is over, the painting begins. The painting plays a big role not only to improve the appearance of the ship, but also in the safety to prevent from corrosion. Furthermore, a painting standard is strengthened for complying with environmental problems, so the painting is a very important process on shipbuilding.

5.2.6 Launching & Trials:

After finished the outfitting, we apply performance tests such as a vessel speed and the turning by running a ship actually and confirm to be satisfied with the contracted specifications between the owner and our shipyard. At the same time, we do the operation check and the function test so that the apparatus which we put on a ship shows original performance.

5.2.7 Yacht Engines:

Yacht engines are an important topic whether you are buying, selling or maintaining a yacht. Like the type of the yacht and the amenities it offers, yacht engines are an important consideration when thinking through your various yachting use cases.

Different Types of Boat Engines

Figure 39: Outboard engine

Out Board Engine are mounted on the transom of the boat, outside of the boat's hull, which is why they're called "outboards".
Outboard engines are used to both power and steer the boat. To steer an outboard you need to move the entire engine. On smaller boats, this is often done using a hand tiller, while on larger outboards a steering wheel adjusts the direction of the engine.

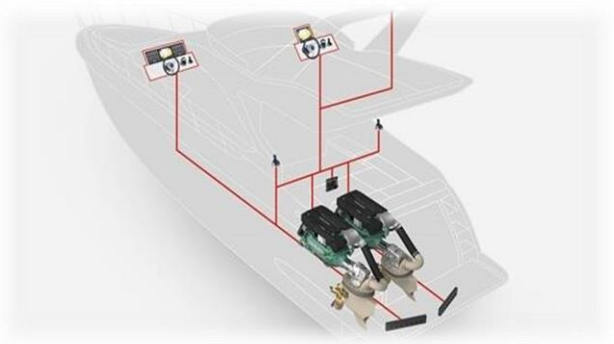


Figure 40: Inboard engine

Inboard engines are located inside the boat's hull. Inboard engines are four-stroke automotive engines that have been modified for use on the water. These engines power a drive shaft that is connected to a propeller. Unlike an outboard, an inboard engine does not also steer the boat. Instead, inboards have a rudder or rudders that are located behind the propeller and controlled by a steering wheel.

Figure 41: Jet drive engine

Jet Drive engine uses water to propel and steer the boat. Water enters in through an intake on the bottom of the boat and is accelerated through the jet drive unit at the transom, thrusting the boat forward.
Steering is achieved by changing the direction of the stream of water as it leaves the jet unit. REMINDER – Because steering is dependent on the water jet, Jet Drive engines will lose some steering control at low speeds.

5.2.7 Yacht Engines:

Top 5 of the Engine Manufacturers :

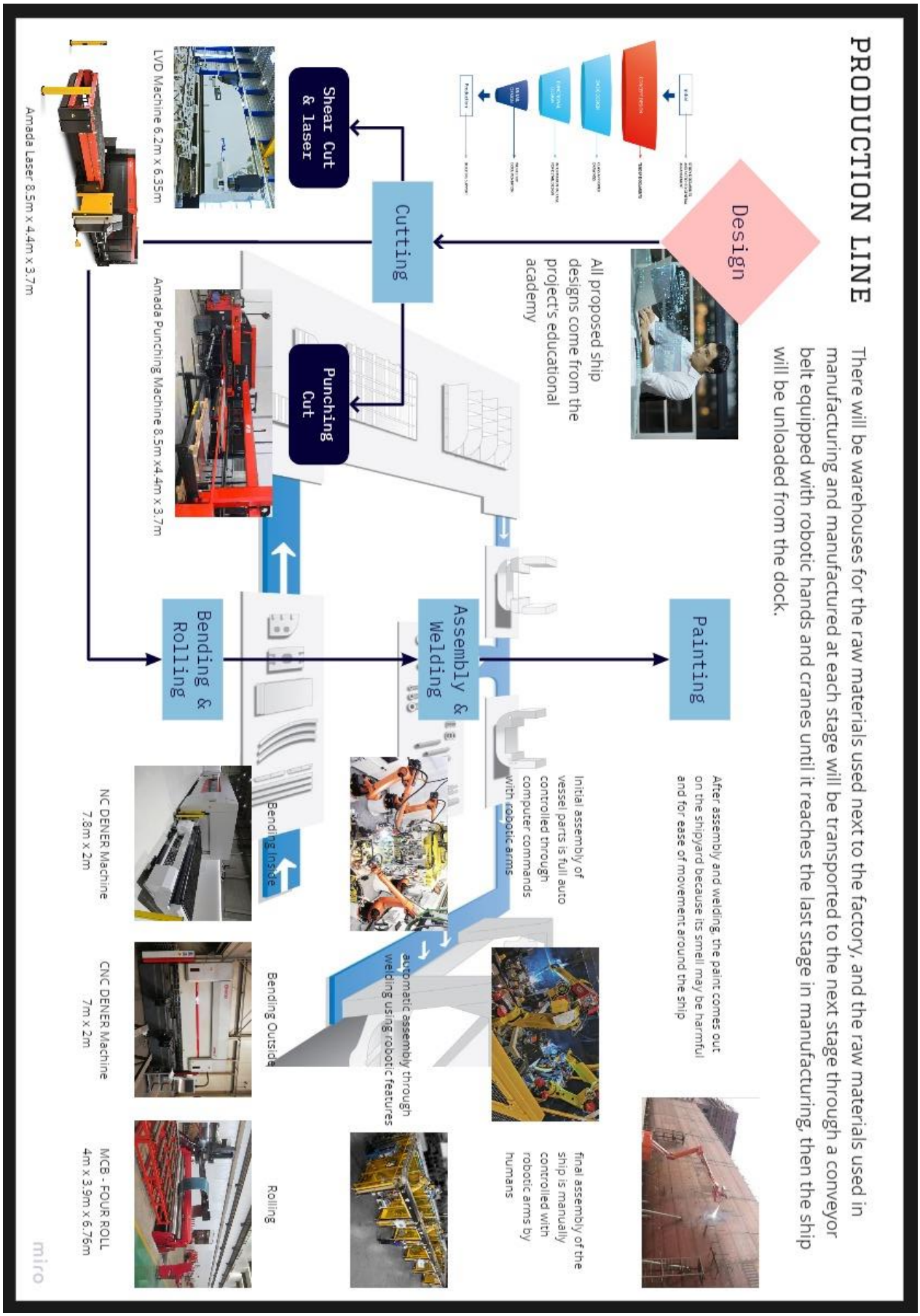
1- CATERPILLAR (CAT)
2- MTU
3- MAN
4- VOLVO PENTA
5- CUMMINS

The main rule is to look beyond the initial cost of the engine and take the long view about the cost of spares, the ease of access and maintenance, and – if you intend to voyage – the service regime and the global network of dealers.

It’s unlikely that you will ever recoup the cost of a new engine installation in the resale value of a second-hand yacht. Instead, you are investing in your enjoyment and safety for many years to come.

How will the engine be selected for the type of yacht?

Different types of engines from different companies that match the type of yacht to be manufactured will be displayed, and the specifications of the engines in terms of performance, power and cost will be displayed to be imported from the manufacturers


PRODUCTION LINE
There will be warehouses for the raw materials used next to the factory, and the raw materials used in manufacturing and manufactured at each stage will be transported to the next stage through a conveyor belt equipped with robotic hands and cranes until it reaches the last stage in manufacturing, then the ship will be unloaded from the dock.
Design
All proposed ship designs come from the project's educational academy
Cutting
Shear Cut & laser
LVD Machine 6.2m x 6.35m
Amada Laser 8.5m x 4.4m x 3.7m
Punching Cut
Amada Punching Machine 8.5m x4.4m x 3.7m
Bending & Rolling
Bending Inside
NC DENER Machine 7.8m x 2m
Bending Outside
CNC DENER Machine 7m x 2m
Rolling
MCB - FOUR ROLL 4m x 3.9m x 6.76m
Assembly & Welding
Initial assembly of vessel parts is full auto controlled through computer commands with robotic arms
automatic assembly through welding using robotic features
Painting
After assembly and welding, the paint comes out on the shipyard because its smell may be harmful and for ease of movement around the ship
final assembly of the ship is manually controlled with robotic arms by humans
miro

5.4.1 Types Of Cranes

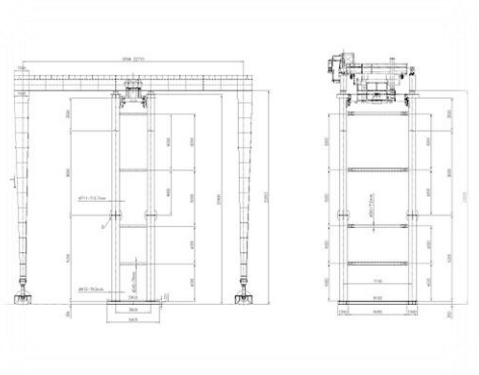
To transport and load the equipment, machinery and raw materials used in manufacturing and move on a railway inside the site and be also on the ship dock.

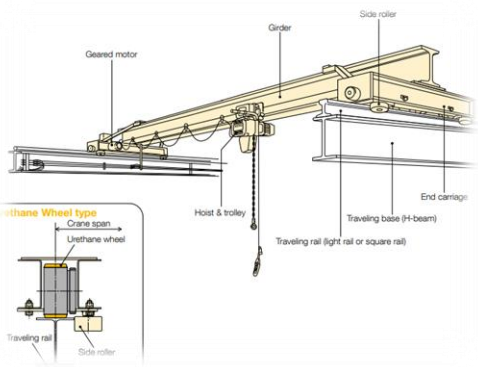
Outside fixed **RTG Crane**

Outside Moving **RTG Crane**

Figure 42:

Moves horizontally and vertically





Inside Factory **KITO Cranes**
Moves horizontally and vertically

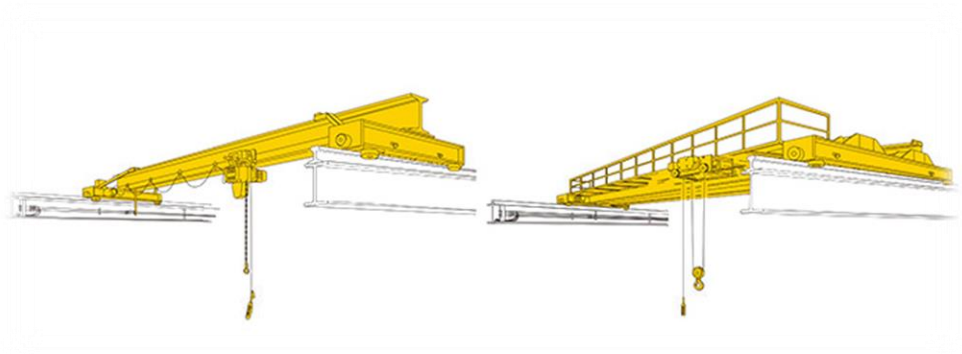
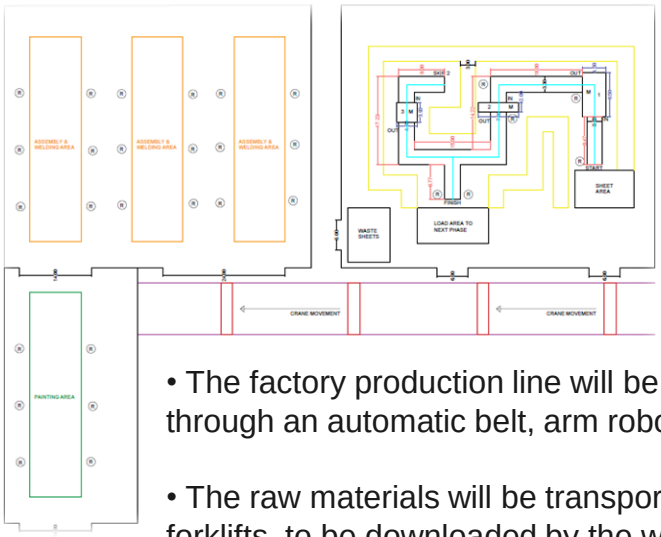


Figure 43:



The factory will be divided into three hangers :

1- includes cutting , rolling and bending.
2- includes assembly and welding.
3- includes painting.

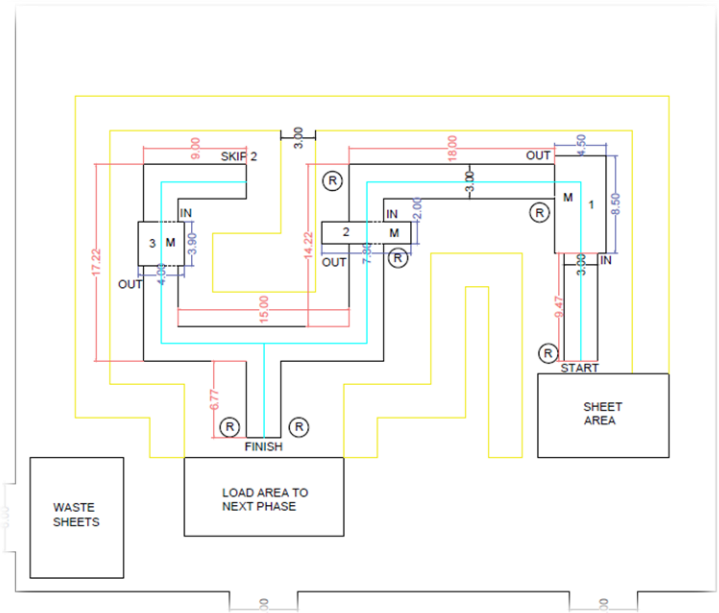
• The factory production line will be moved from stage to the next one through an automatic belt, arm robots and cranes .

• The raw materials will be transported from its storage to the factory by forklifts, to be downloaded by the workers manually or by the robot arms in an automatic way and then placed in their designated place in a horizontal or horizontal way and divided according to the thickness of each sheet.

• The gelatin sheets placed around them will be unloaded and then placed in baskets to be transported to the factory waste store.

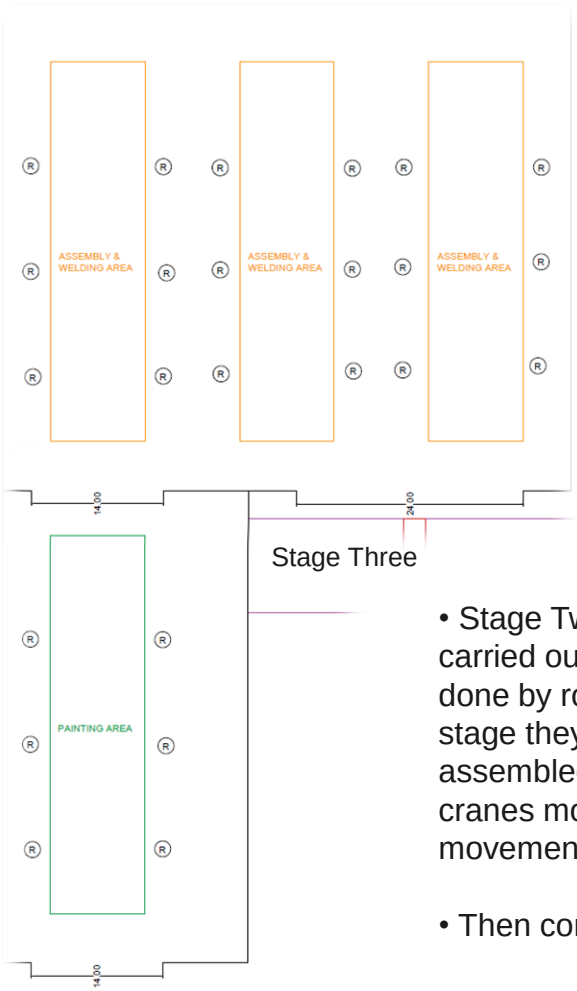
• The Perished raw materials in phase one of manufacturing will be transported and placed in their designated place to be transferred after that to its store and the company that manufactures them will be contracted to take them and re-manufacture (recycling) them again.

Stage One



5.5 Process Layout

Stage Two



In the second stage, the yacht will be divided into 3 sections:

1- hull
2- interior module
3- deck

This stage is the welding and assembly

• Stage Two, the welding and assembly process is carried out to form the hull of the ship, and this is done by robotic arms, and upon completion of each stage they are placed on each other and assembled, and this transport is carried out by high cranes moving in a horizontal and vertical movement like the grid.

• Then comes stage three painting

•If a malfunction occurs in the machines and arm robots or a break in the electricity of the factory, the devices will be fully prepared to work manually by the workers in the factory, dispensing with the services of belts and arm robots, and the movement of transport will be through them as well, and there will be a generator to operate all the machines .

•The lighting will be natural and industrial according to the function , and industrial ventilation will be through large hoods distributed over the entire factory and have filters to reduce air pollution and the surrounding environment .

5.6 Who Works At The Shipyard ?

Building ships is a complex engineering process; the process of shipbuilding is an accumulation of ideas and inputs from professionals spanning a wide range of specializations.

Welders: are welding metal structures such as the ship's hull plates, frames, girders, tanks, foundations, and pipes. They perform all types of welding that is required in the shipyard.

Structural Fabricators: read the engineering drawings and do the fabrication of metal jobs. They also install the fabrication on the hull.

Plumbers: Piping in ships involves being able to read and understand isometric piping layout drawings and Piping and Instrumentation drawings (P&IDs). Not only are these plumbers specialized in the installation of all pipelines inside a ship, but also all kinds of pipe fittings like valves, and flanges.

Electricians: There are many electric cables on board the ship, and the electrician needs to be able to read the cable routing plans to know what to put where. Their work includes installing all the electrical and electronic equipment, the navigational equipment in the bridge and radar, lighting, control panels, main electrical control room panels, and even more. A necessary skill for electricians is the ability to identify colors, so naturally this is not a job for those with color blindness.

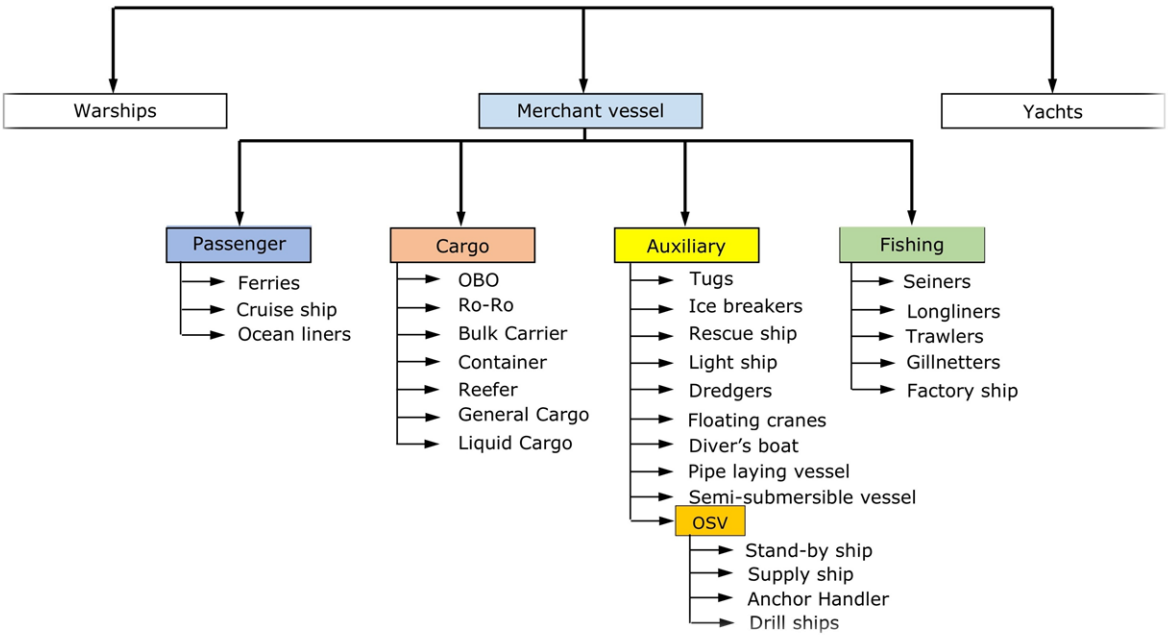
Carpenters: Wooden ships are not often built these days, but carpenters are still required at a shipyard. The carpentry department prepares the wooden templates for the ship's hull, which are used for bending the straight metal plates to the required shape. They also prepare templates for sea pipes and build dock blocks and keel blocks required for dry docking and ship launches.

Riggers: have a variety of jobs at a shipyard- everything from lifting and shifting heavy structures, scaffolding to moving moderate weight structures within the shipyard and operating various types of cranes. They are trained to use hand signals to communicate among themselves and the crane operator during lifting and shifting operations that create loud noise.

Quality Control Inspectors: A QC Inspector is one of the most skilled among the workforce in a shipyard. They are responsible for tests on weld joints, dimensional control inspections of major structures, and much more. The design drawings are used as a reference for checking dimensions, and record keeping is critical for the inspector. The records must be compiled and maintained as the hull is built, in order to document that required testing and inspections were successfully accomplished. The true "final inspection" is during the sea trial period where the ship is put through planned tests while underway to confirm operation and safety of the crew during actual conditions, including hard turns and emergency stop demonstrations.

Supervisors: Often, workshop level departments have their own supervisors. For example, a hull supervisor typically looks after all the aspects of structural outfitting on the ship. Similarly, there are supervisors for each department, for example, Piping supervisor, Electrical supervisor, Rigging supervisor, Maintenance supervisor, Drydock supervisor, etc. Usually, the most skilled and experienced among fabricators, fitters, electricians, plumbers, etc. are promoted to supervisor.

5.7 Types Of Yachts



Yachts, why we choose yachts over container ships in our factory?

1- Design:
The **sizes** of container ships are very large, and the sizes of machinery and manufacturing equipment are large, it will affect the **design** of the factory and the general shape of it.

2- Location:
The proposed site in Ain Sokhna is a tourist site, it would be desirable to have More yachts factory than gigantic ships and tourists and residents there need for this type of ship.

5.7 Types Of Yachts

The displacement motor yachts have the range to be able to take passengers on longer trips.

Sizes: From 26.25m x 6.36m To 110.00m x 20.00m

Boasting many of the same qualities of an explorer yacht – robust performance, stability, long range and generous storage – a sport fishing boat is designed to tackle all conditions when in pursuit of a catch.

Size: 18.29m x 5.28m

This type of yacht will traditionally only have two decks, with smaller on-board spaces when compared to a larger displacement style yacht, a trade-off for the high speeds you will be able to enjoy.

Sizes: From 7.86m x 2.47m To 40m x 7.82m

Perfect for those who love the idea of travelling across the water, powered only by the wind, sailing yachts are a natural choice.

Sizes: From 20.00m x 5.38m To 47.42m x 9.56m

Luxurious yacht as operationally green as possible, with minimal impact on the environments.

Sizes: From 26.25m x 6.36m To 110.00m x 20.00m

expedition yachts combine stability and performance with high luxury styling and comfort, making them the ultimate platform for the adventurous at heart.

Sizes: From 25.65m x 6.00m To 81.40m x 14.60m

5.8.1 Introduction

The process of planning a research center which will respond to the real needs of learning, teaching philosophies and community objectives and which will really meet the basic uncommon denominator, its complex and challenging.

It demands a nice balance of:

1- experience.

2- wisdom.

3- professional skills.

4- Only part of the objective should be a well conceived, efficient.

5- practical, soundly constructed, quality building.

6- It must be changeable and compatible with researcher and its own community of users.

7- efficient response to the needs of today's researching technologies.

5.8.2 Environment of Academy

The architect's efforts must be put into the creation of an educational academy which actively and attractively suits the functions of the education it serves, and which not only accommodates but also contributes a very special environment for learning. **"Environment for learning"** connotes a broad range of special qualities, evidenced by many characteristics of a building's design.
The physical aspects of environment-those relating to **the bodily senses of temperature, vision, and hearing-may be relatively well controlled by known engineering methods.**

5.8.3 Flexibility and Change

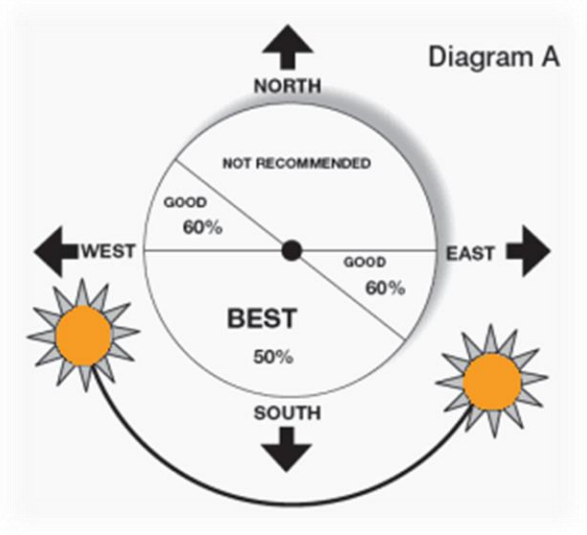
must be as flexible as possible in terms of space. The spaces in them must be easily adaptable to new uses and arrangements **The types end division of spaces given in the program should not imply structures that cannot be easily modified for changing needs in the future.**

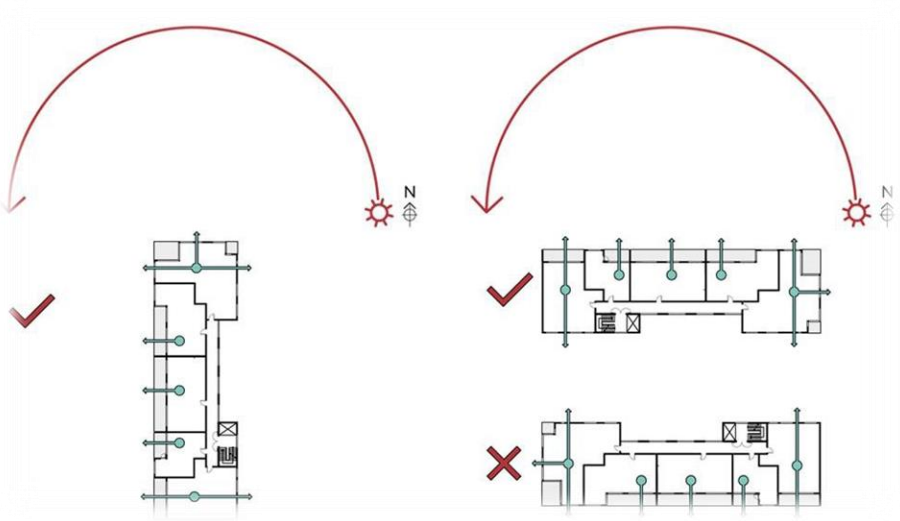
5.8.4 Architectural Functions

The mechanical elements are the basic, but not the only, considerations for the entire job of climate control. The orientation, the plan arrangement, the design of the building, and the materials used can contribute **to the quality of comfort achieved such:**

1- Orientation.

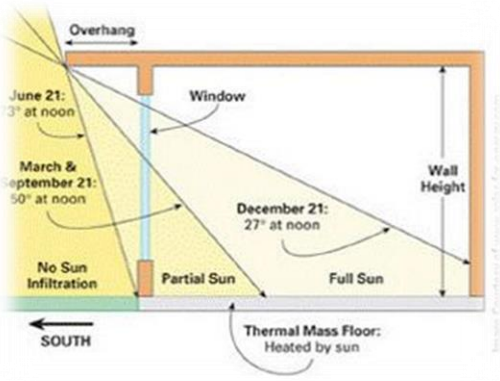
Classroom windows facing east or west receive excessive heat from the sun. Although this fact assists heating in cold weather, the cooling problem is generally greater. As a rule, it is preferable to face most rooms north or south.





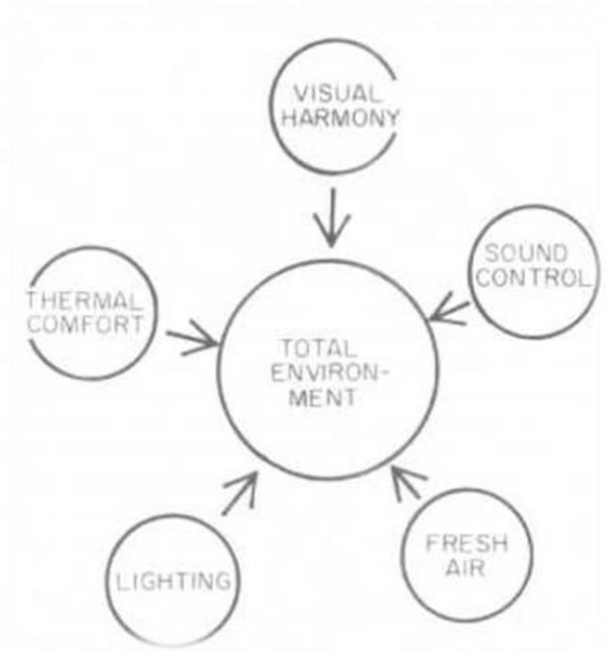
2- Solar controls.

Wide roof overhangs, solar screens, glass block, and similar devices to control sunlight are no longer as essential. The use of heat-absorbing glass reduces glare and light transmission and produces economies in the HVAC system design. Cleaner, simpler, far less expensive designs.



3- Space conditioning

Skillful use of lighting, acoustic materials, and color and form in school designate essential ingredients of conditioning space in the learning environment and, properly applied, act upon our senses of sight and hearing to cause reactions conducive to better learning and teaching.



4- Form.

The physical shapes of our surroundings also have psychological effects which can favorably influence learning. Large rooms, such as the library, cafeteria, or auditorium require higher ceilings, for a sense of airy freedom, than do small offices and conference rooms; corridors should be offset, widened occasionally, and given a view in **order to avoid the feeling**

5.8.5 Site requirements & Services

Vehicular
Employee
Visitor

Parking requirements
Maintenance equipment
Public transportation
Pedestrian

Circulation
Recreation

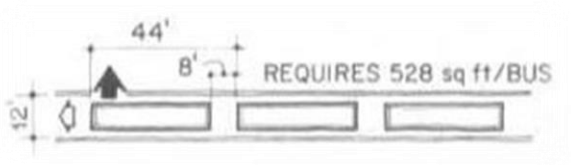
5.8.6 Space requirement for parking

For higher education we suppose to **have 16 spaces per classroom**

per classroom + 16

5.8.7 Bus parking

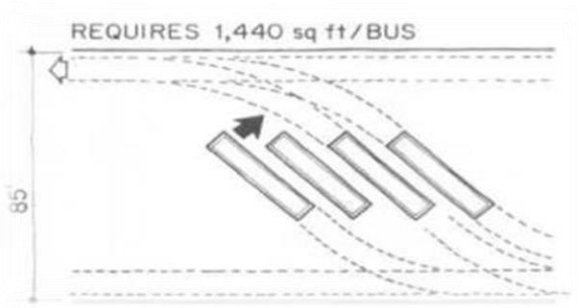
Solution 1
First bus in line must go to end system and leave first.



Space of bus is 13*4 m

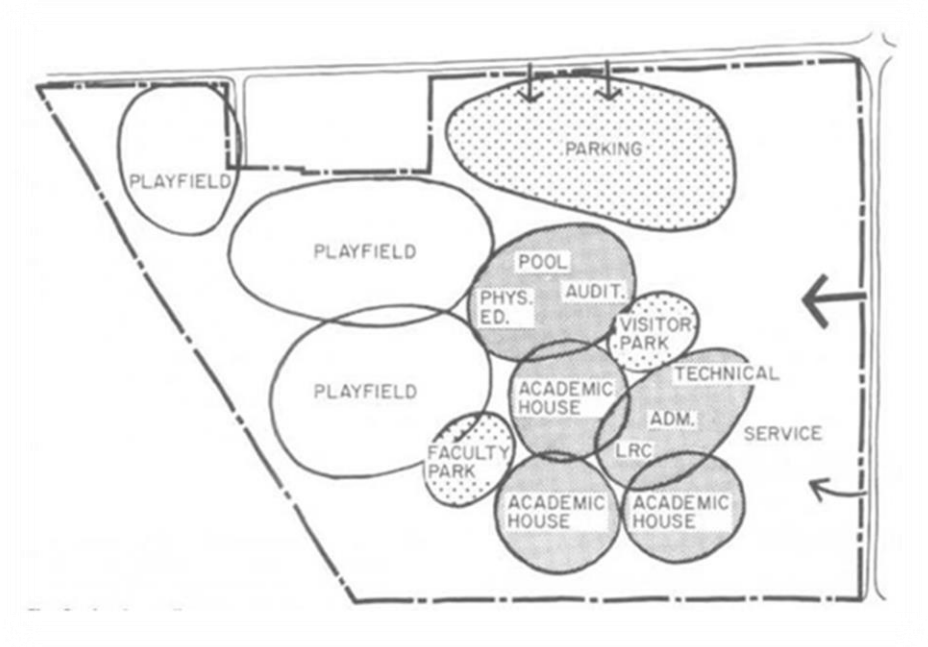
Solution 2
Free- access system
45-degree bus parking system

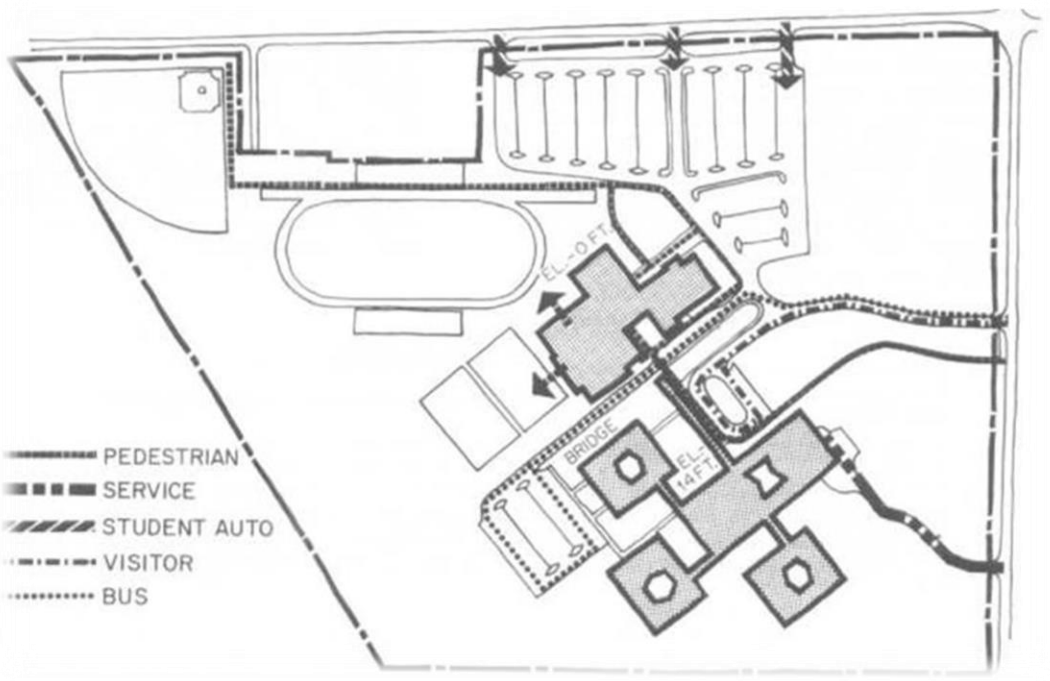
Requires 133 m2 for one bus



	Minimum width required	Lineal feet required (for 36 buses)	Area required per bus (includes circulation), sq ft*
Parallel single file	12 ft 0 in.	1,584	528
Parallel free access	25 ft 0 in.	2,736	1,900
30° peel-off	55 ft 0 in	860	1,320
30° free access	65 ft 0 in.	860	1,572
45° peel-off	65 ft 0 in.	620	1,100
45° free access	85 ft 0 in.	620	1,440
60° peel-off	85 ft 0 in.	510	1,164
60° free access	115 ft 0 in.	510	1,584

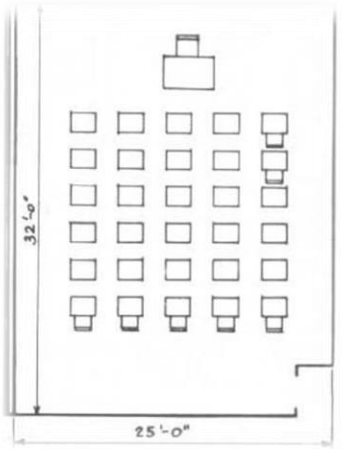
5.8.8 Example of land use diagram



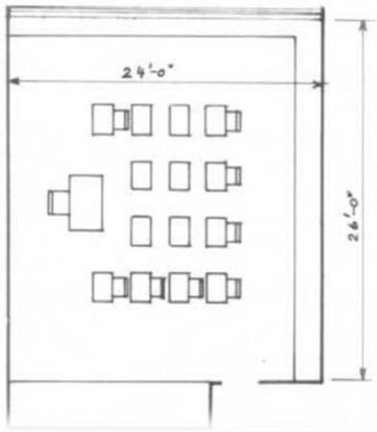


5.8.9 Standard Of Classroom

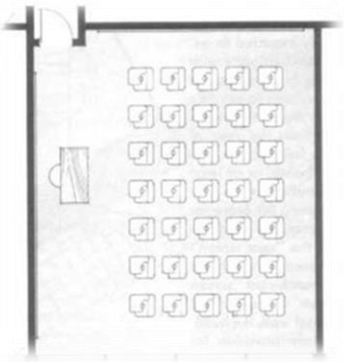
The dimension of space is 10 m *7.5 m
It can contain 30 students



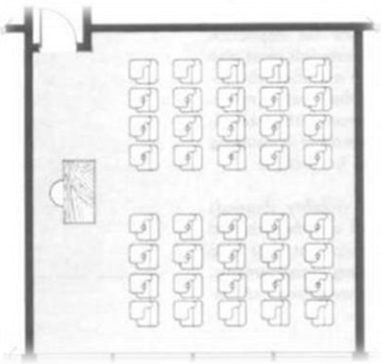
The dimension of space is 7.3m * 8 m
It can contain 13 students



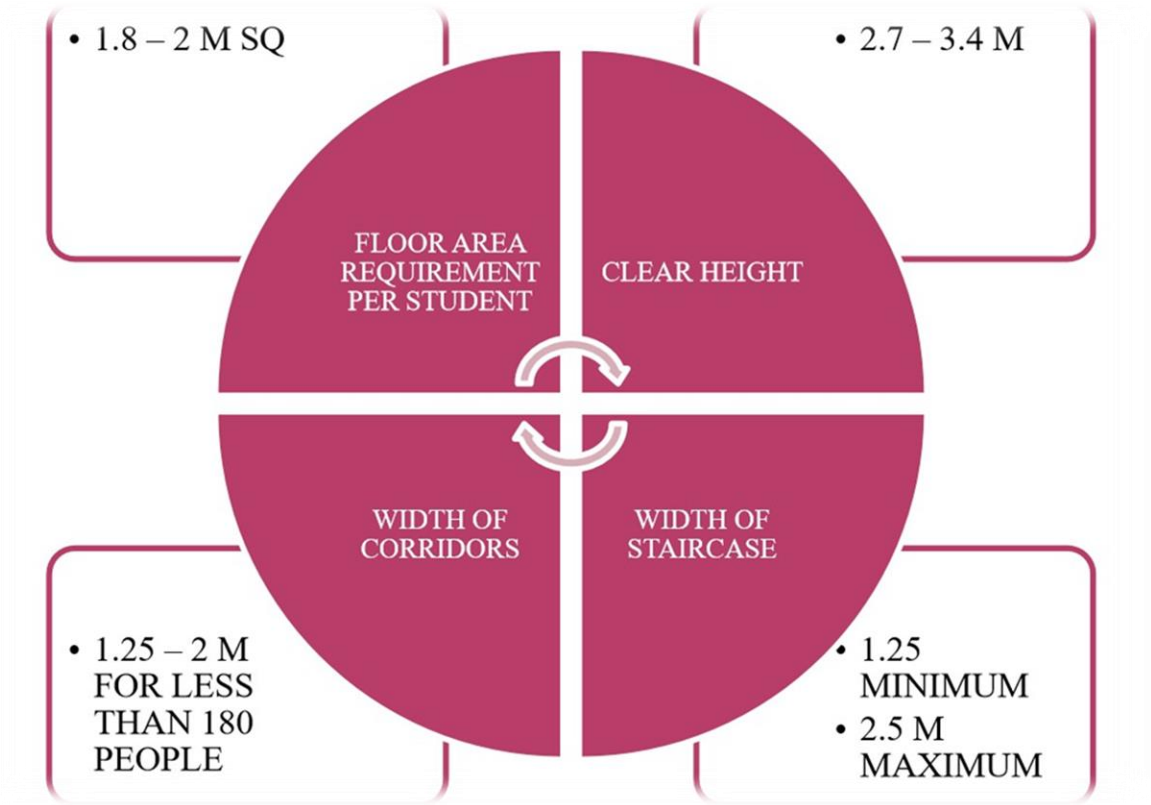
The dimension of space is 9m * 8 m
It can contain 35 students



The dimension of space is 9m * 9 m
It can contain 40 students



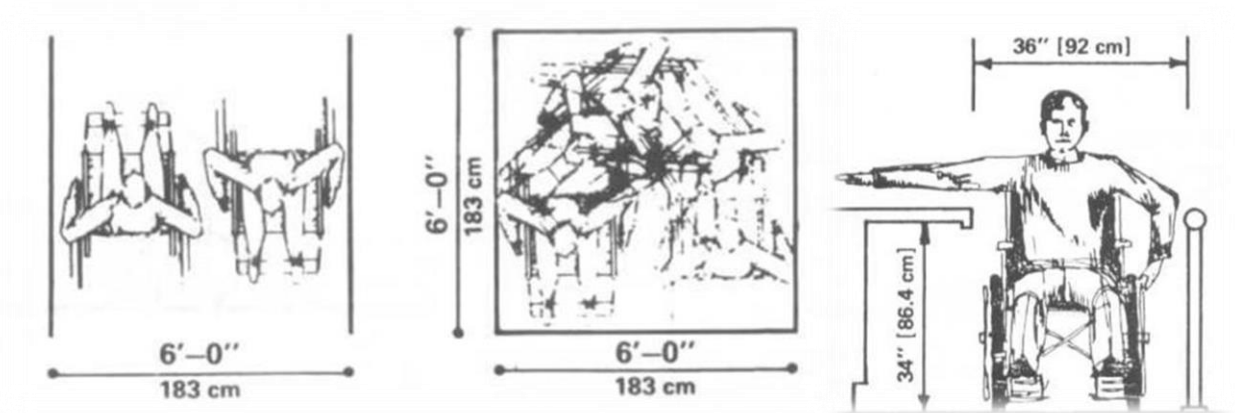
Teaching area includes	
Standard classroom	**65-70sqm**
Extra large room	**85 sqm**
Extra large room	**40-45 sqm**
Student requirement	2 sqm per head
Shape requirement	Rectangle or square



5.8.10 Standard for handicaps

The path of handicap chair is **92 cm width**

The height of the table is **86.4 cm**



5.8.11 Fundamental of center space

laboratory space

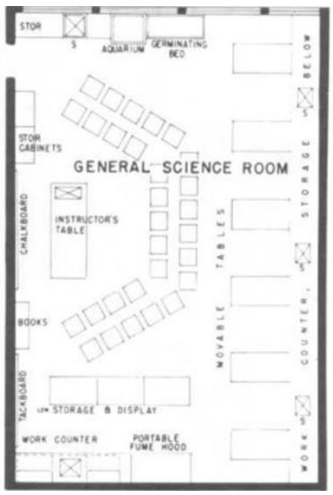
science rooms laboratories should be located on the first floor, with windows facing south or southwest, The dimensions of space is 6m*10m It can contain 40 student.

Storges for laboratory

Storage and preparation rooms should be adjacent to general science and biology. These rooms are used for researcher preparation,

It should be made for equipment used in general science and biology

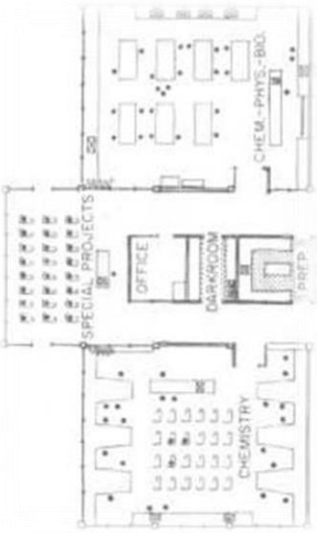
The dimension of space is 3*1.5 m



Individual Research and ProjectRooms

Research and project rooms should be adjacent laboratories and separated from them by half-glass partitions. They are used for individual and small group.

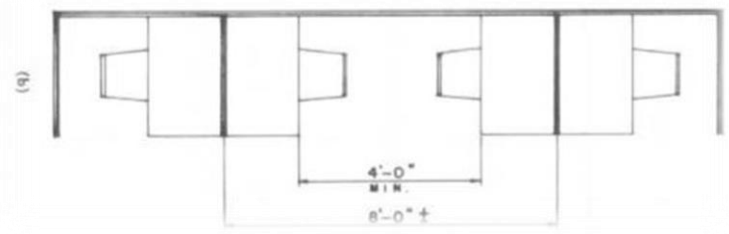
The dimensions of space is 4*6m
It can contain 10 student



Library

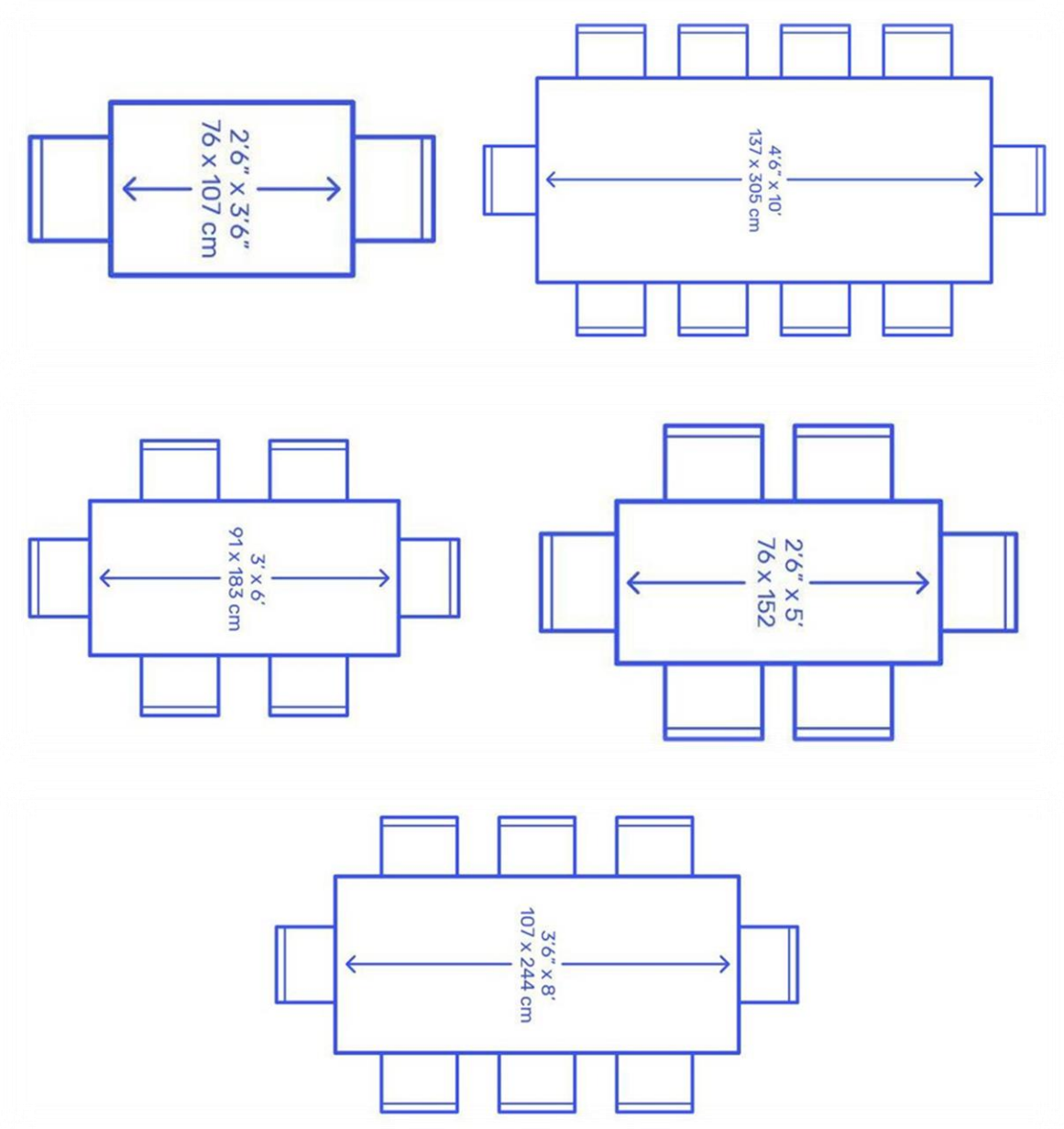
Tables dimensions and area for library

Type of accommodation	Minimum size	Adequate size
Table for multiple seating . . . . . Individual table or open	33 in. by 21 in.*	36 in. by 24 in.



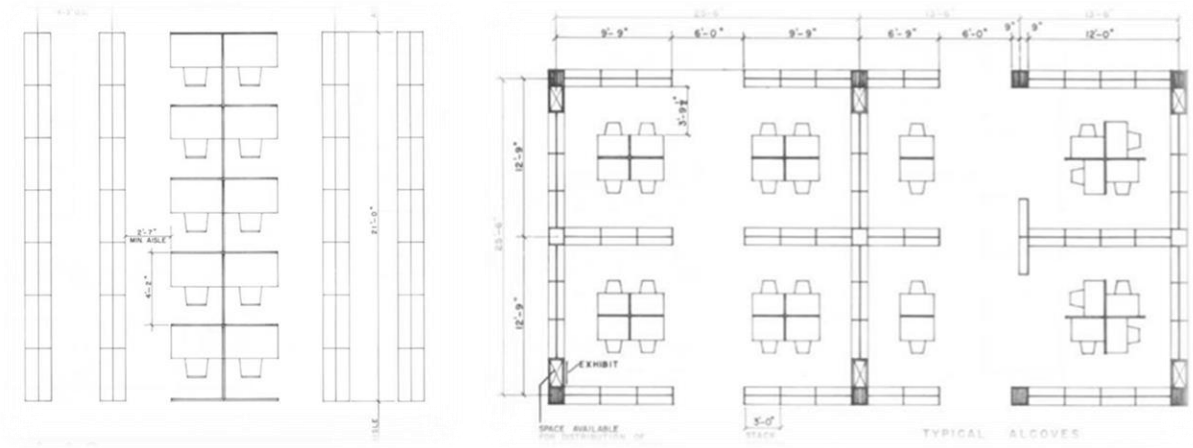
5.8.12 Standard dimensions

Tables



Library contents and dimensions

The dimensions of library is 10*10, It can contain 10 student
The space between tables is 1.2 m
The space between book rows is 1.3 m
The dimensions of library is 15*20, It can contain 28 student

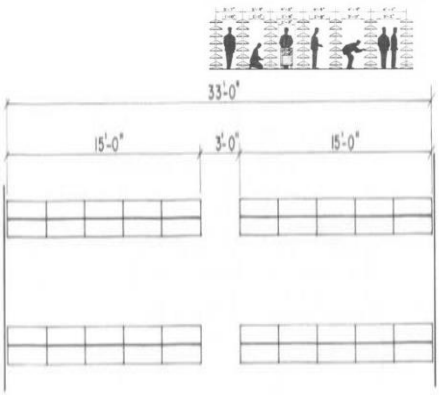


Book row

The dimension of book row is 4.5m It can contain 10 student

The space between rows is 1m

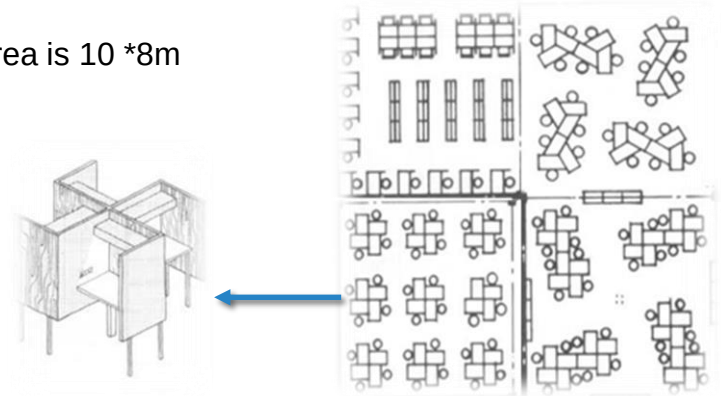
The space between book rows is 1.3m



Study area

The dimension of study area is 10 *8m

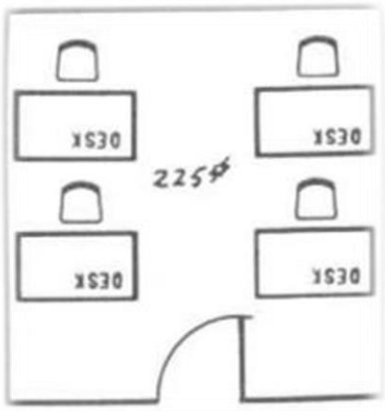
It can contain 10 student



5.8.13 Fundamentals for staff room

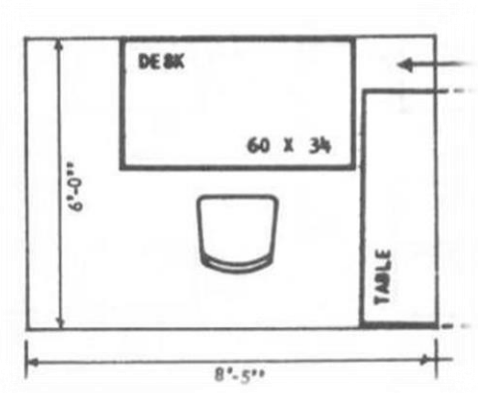
The dimension of Staff room is 6 * 5 m,
It can contain 4 workers

The space between office desk is 1m



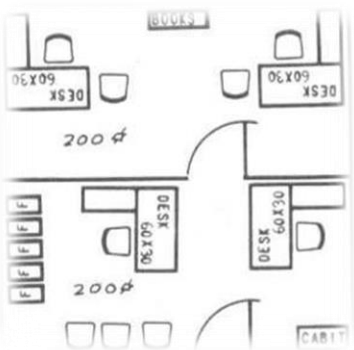
The area of an office desk is 2.4m *1.8 m

Table dimension 1.8 * 0.80 m

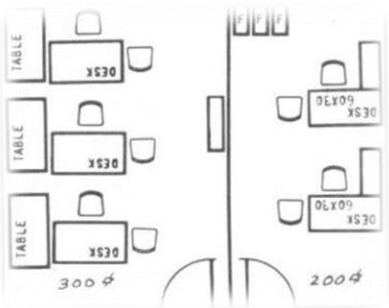


Different types of staff room

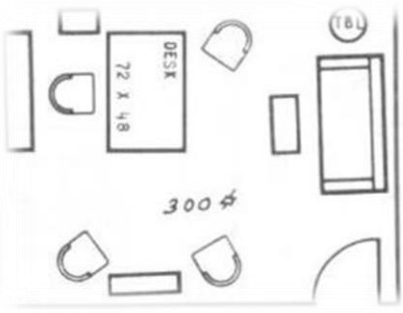
40m2 for 4 p



50m2 for 5 p



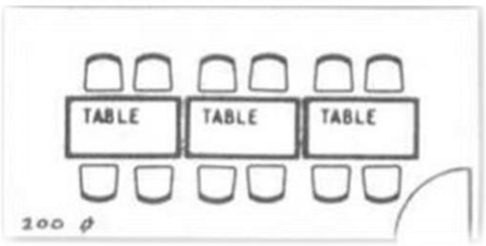
30m2 for 1 p



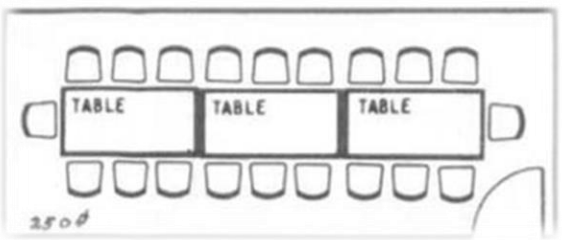
5.8.14 Conference rooms & Offices

Conference rooms

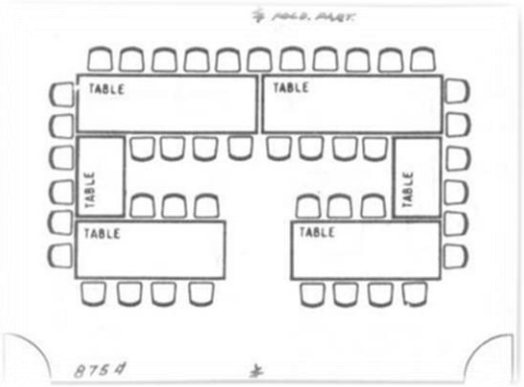
The dimension of room is 6*4 m
It can contain 12 person



The dimension of room is 6*5 m
It can contain 19 person

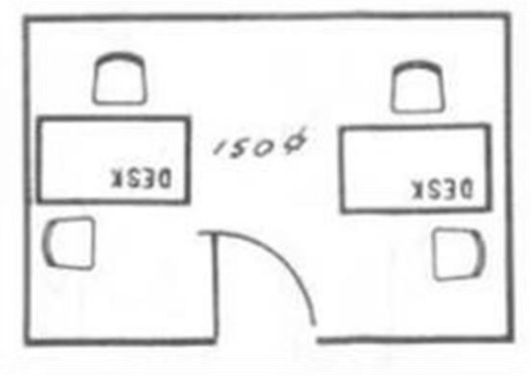


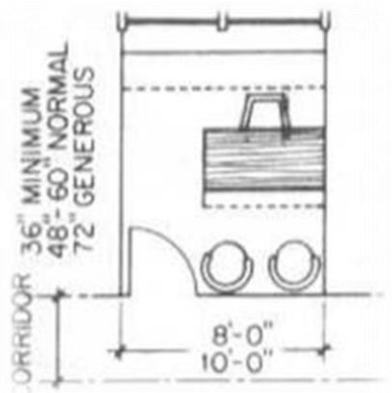
The dimension of room is 9*9 m
It can contain 38 person



Offices

The dimension of room is 2*5 m It can contain 1 person



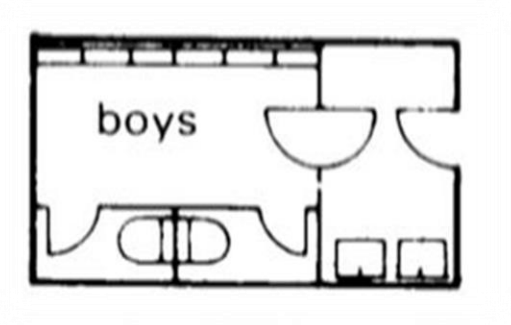


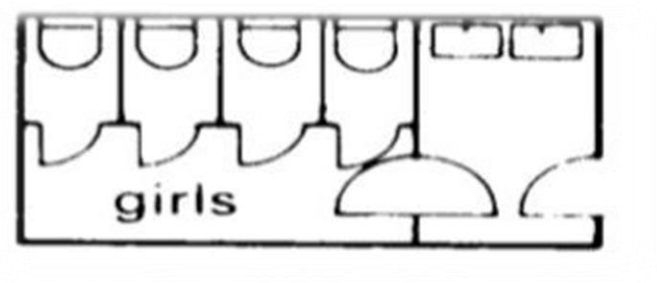
5.8.15 Restroom & Corridor width

Restroom

Number of lavatories – 1 for every 50 pupils.

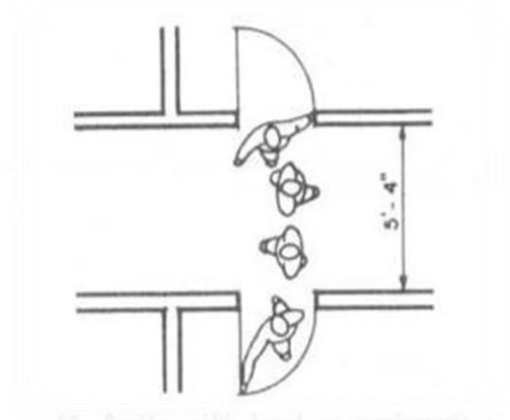
for more than 300 students – 1 lavatory for every 100 pupil.





Corridor width

The dimension of corridor is 1.5 m width



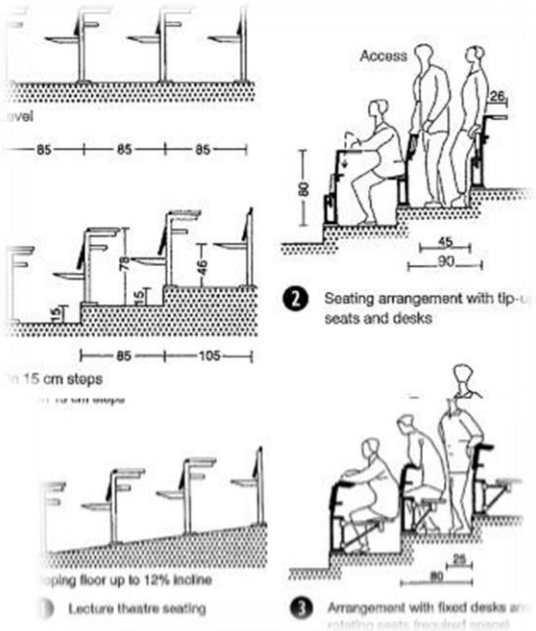
5.8.16 Fundamentals of lecture theatre

Lecture theatre seating Combined units with tip-up or slewing seat, backrest and desk (with shelf or hook for case or bag), mostly fixed mounting

Arrangement is according to subject, number of students and type of tuition: from light (slide shows, electro-acoustic facilities) to heavy.

Some lecture theatres (surgery, internal medicine, physics) have raked (rising) rows of seating.

The space requirement per student depends on type of seating, desk depth and floor pitch. Per student (including all walking areas in larger lecture theatres in a cramped situation), the space requirement is 1.10 m2, in smaller lecture theatres and in a normal situation 0.80-0.95 m2.



Projection, boards, acoustics, lighting

Projection screens and black-/whiteboards can be designed as segmented surfaces or fixed to a straight back wall. Wall boards in many sections, mostly vertically sliding, manual or mechanical, can be dropped down below the projection area.
Wheeled boards or screens are also possible. Speech should reach the listener as uniformly as possible, with no disturbing echo. Suspended ceilings will aid reflection and absorption. Rear walls should be clad with sound-absorbing material, other walls flat. Light intensity in windowless lecture theatres: 600 lx

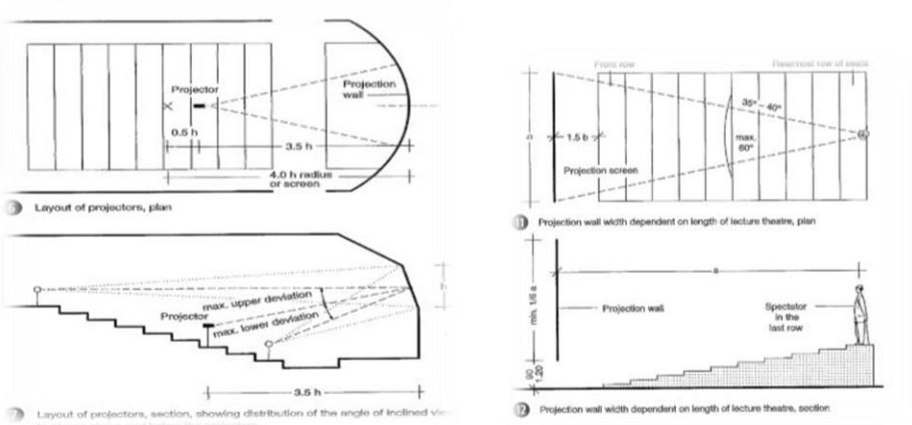
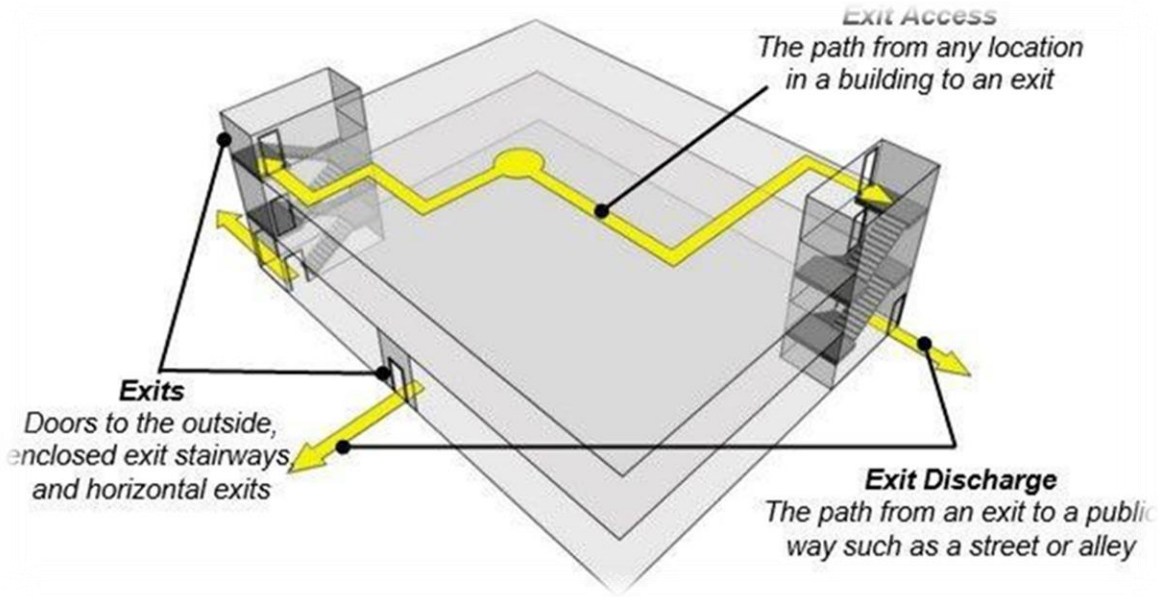


Figure 15

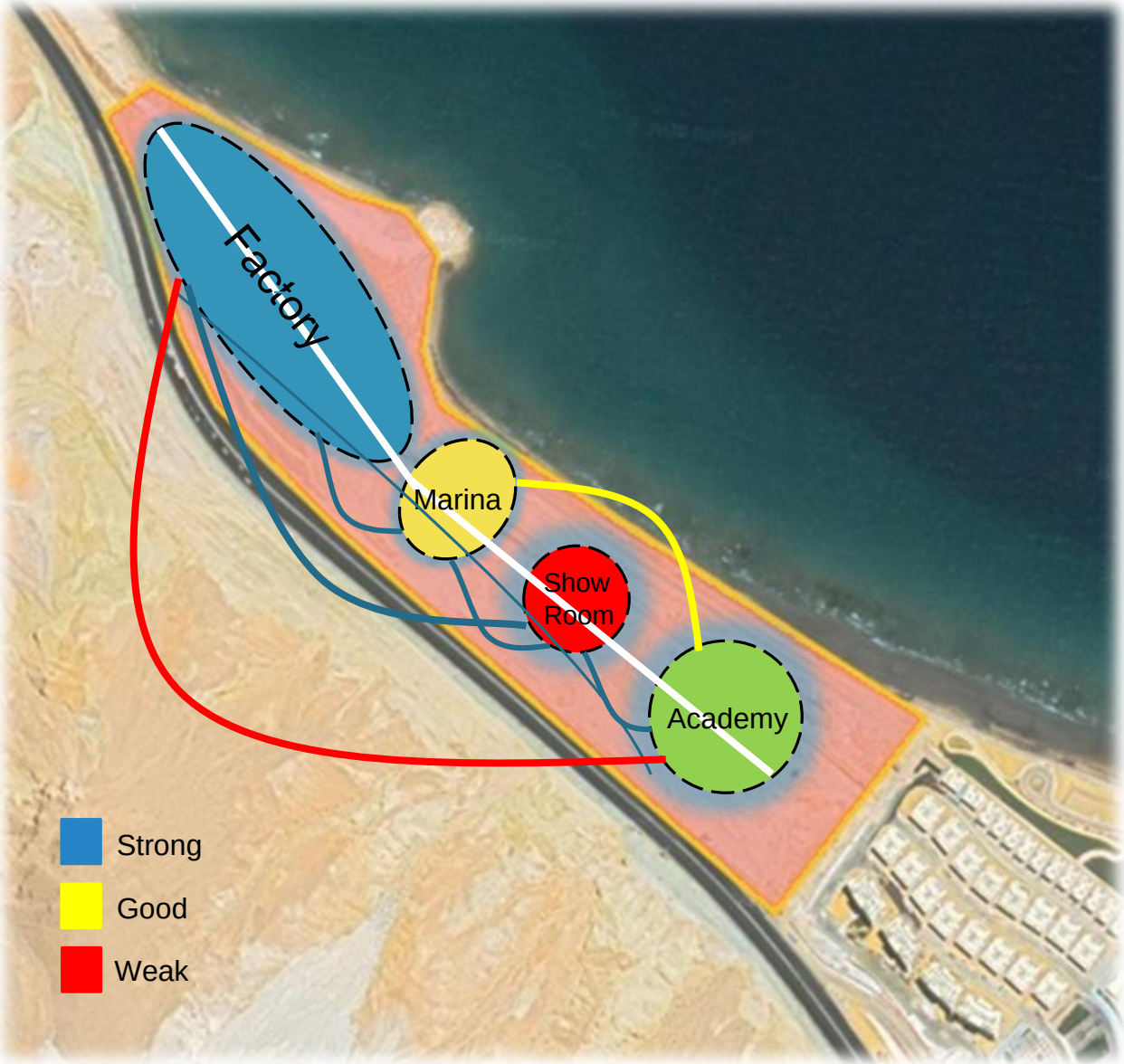
5.8.17 Safety

Horizontal and vertical circulations usually doubles as an emergency escape routes.

Escape routes must have a clear width of minimum 1m/150 people

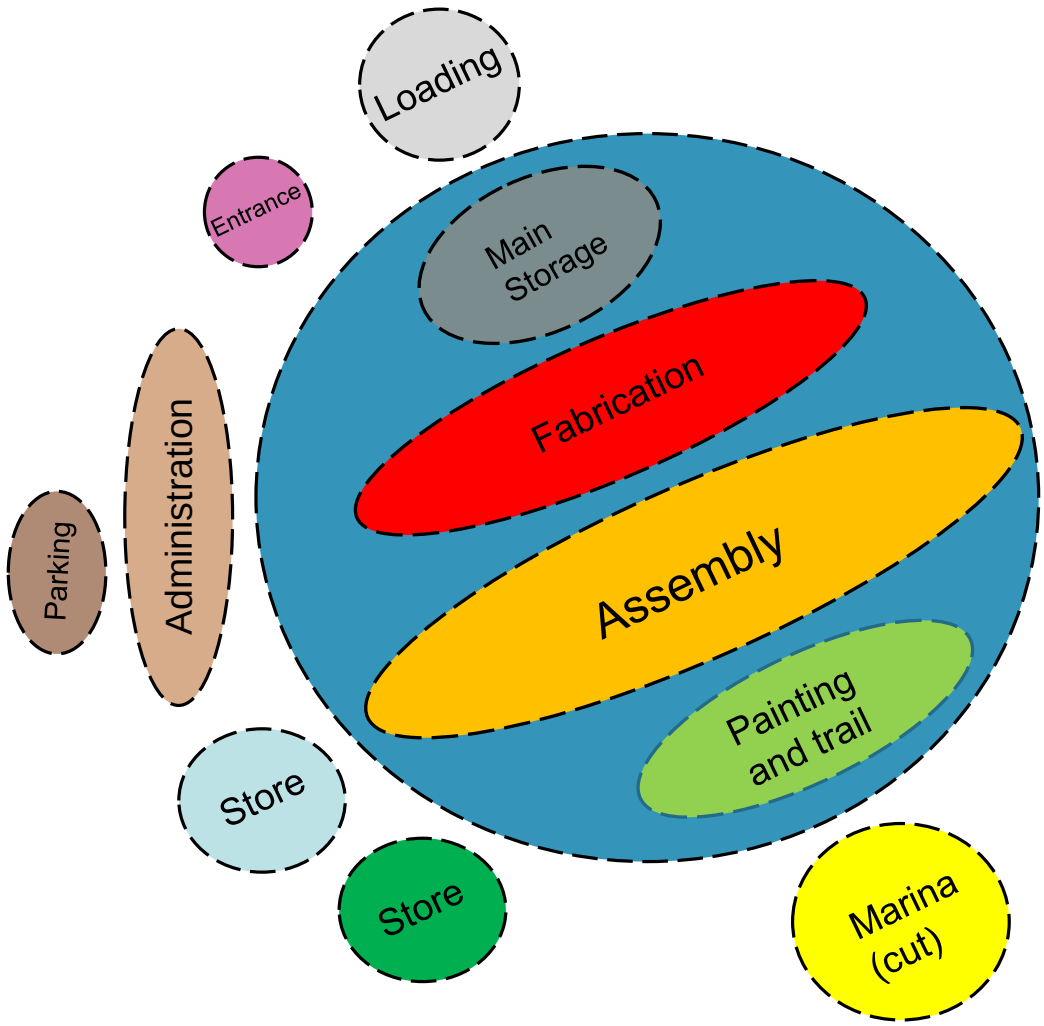


5.9.1 Zoning On Site

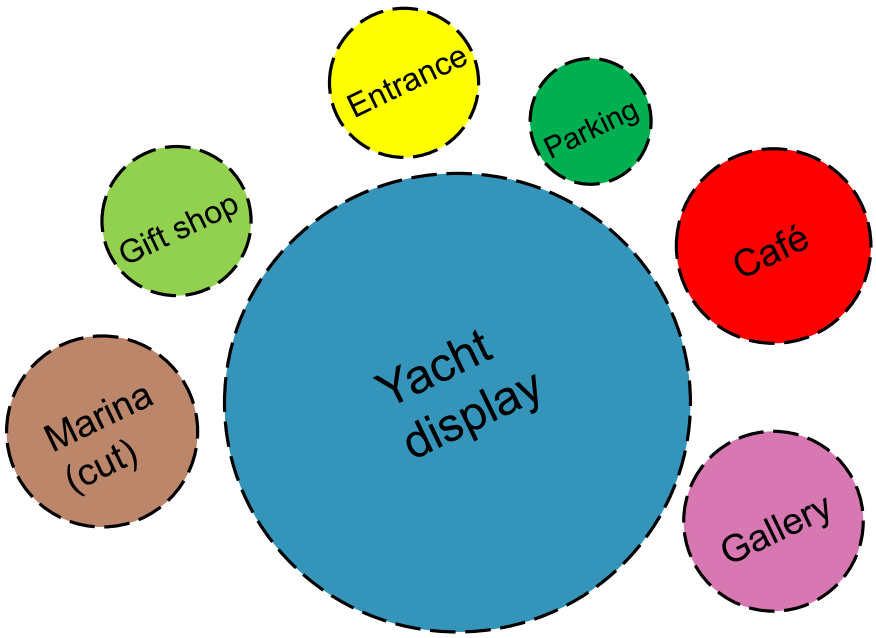


The zoning shows the strong access between Factory, marina (cut), Show room and Academy.

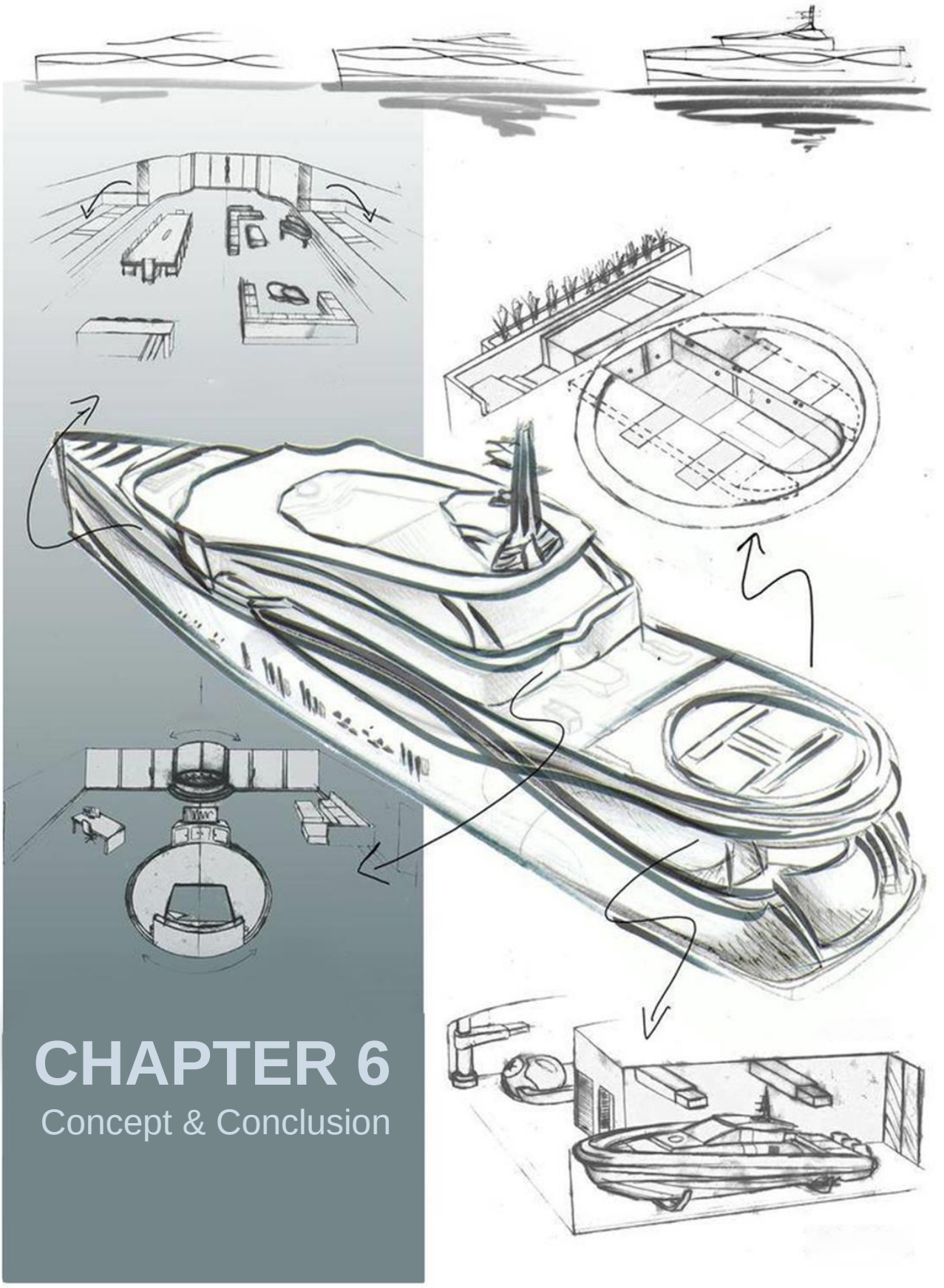
5.9.2 Zoning Of Factory



5.9.3 Zoning Of Show Room



5.9.4 Zoning Of Academy



CHAPTER 6

Concept & Conclusion

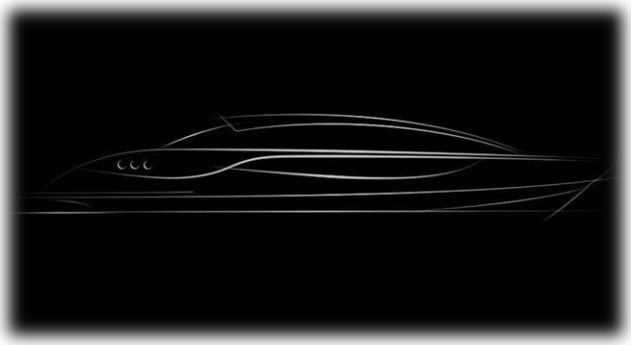
Ahmed Sherif

Mohammad Jaber

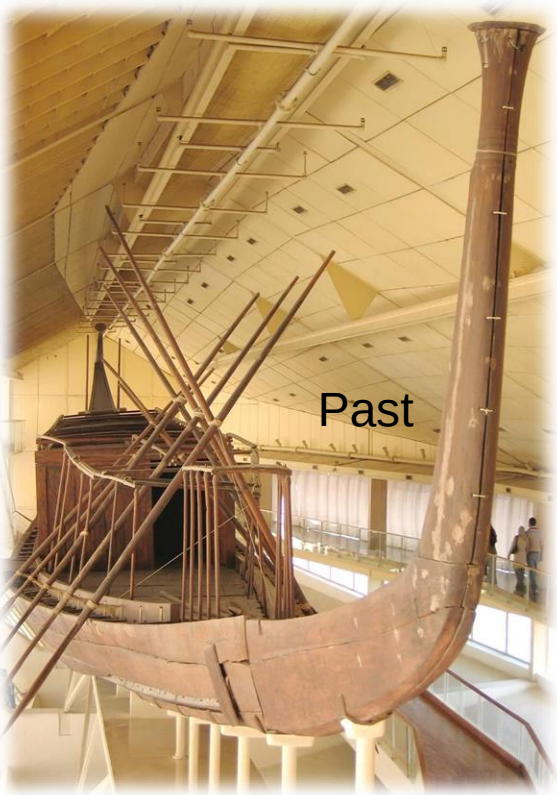
6.1.1 Concept

Upgrading → From the past to keep pace with the present and the future.

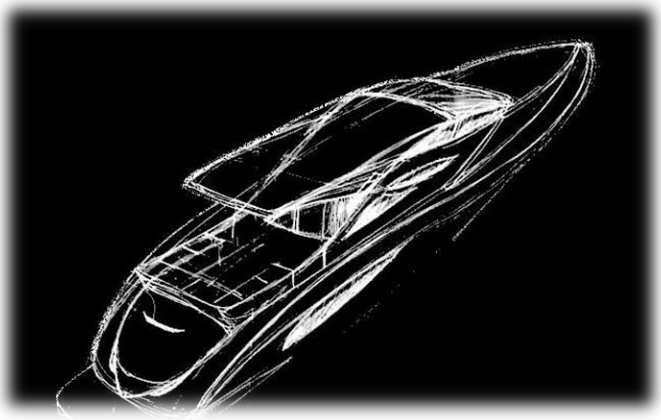
“As an architect, you design for the present with an awareness of the past for a future which is essentially unknown.“ (Norman Foster)
so its important to take the past as a source and develop it in a new way that fits the present and flexible for the coming future with the developments of technology.



The design idea of this project is the link between the past and the present to reach a brilliant future in this field and this is because of the existence of this manufacturing since ancient times where the Pharaohs were the first in using ships of all kinds and these ships developed to our time, but not to the desired degree, and this is due to confrontation Many obstacles and because of the country's trend towards technology and industry in many fields, why not develop this type of manufacturing by linking industry, technology and architecture to obtain an excellent product that will be a pioneer in Egypt (Historical).



6.1.2 Concept and Philosophy



The idea of the project will be accomplished by establishing an integrated technological factory for the yachting industry and an exhibition to display this type of manufacturing as a kind of sale, tourism and development in the type of manufacturing from old and small industries to a modern and sophisticated industry that is directly proportional to technology and modernity and In order for this project to be complete, an academy will be established to teach design and construction of yachts with the highest technology

6.1.3 Conclusion and Targets

1- Targets.

- Because education is very important in keeping pace with civilization and development, the academy will be of great importance in this project in terms of education, giving experiences to students and bringing them to the highest level of thought and learning.

- When the educational institution is strong and at its highest competence, it is certain that there is a project in which we can invest these experiences and capabilities, and here comes the importance of the factory which has great importance in the project that will enable us to establish and develop yachts in Egypt to the highest level possible with the presence of technology and development in the country Like other large projects, why not have we developed in this area as well?

- Also, the show room is important, whether in selling or displaying the product, as well as in tourism, because of the pioneering of this manufacturing, there will be a demand for the project not only for workers and students, but also for tourists

6.1.3 Conclusion and Targets

1- Targets.

- Certainly, there is great importance in choosing workers in this project, starting from workers, engineers, designers, specialists, technicians and others, due to the presence of modern equipment and the required development that needs a great effort in education and dealing with this technology in an easy and simplified way, there are many modern equipment from the beginning Manufacturing to its end, the transition will take place through automatic belts and robotic arms, so education and preparation for this equipment is of great importance.

2- site Recommendations.

- The chosen site has many advantages and also many difficulties
  Among these features is the presence of the project land in the Suez Governorate, which has the largest and most important presence of factories in Egypt, and there are many of these factories of great importance for the project and also its presence in the Galala and Ain Sokhna areas, which have a distinct tourist character, which will have great importance after that In the sale of the presence of one of the largest yacht marina in Egypt in the resort of Galala and also the presence of people who love yachts in abundance.

- Among these difficulties that we will face is the longitudinal shape of the land, but it will be easy to deal with because of the separation of the parts of the project and also the difference in the levels of the land, but it has importance in the movement of the winds, for example, because the factory is in the direction of the wind, this will affect the rest of the parts of the project although the factory will be equipped with high technologies to preserve the environment The ocean from pollution and also the movement of the sun in the area is very good, as the sea currents in it are not high because of the depth of the Red Sea and also because of the shore of the earth, which can all be easily transformed into a pier, and also the indirect separation between the project and the product next to it must be prevented To bother.

6.1.3 Conclusion and Targets (3 - case studies)

1- Meyer Werft Shipyard

- Because of the identification of the large voids in this factory and how to deal with them, it became easy for us to deal with smaller spaces such as the yacht factory and understand how production takes place inside the factory building despite the large size of the product.

2- Damen Yachting

- Knowing the distribution of spaces in the yacht factory and how to deal with the modern equipment and machinery in this area like the robotic arms and cranes placed (kito cranes) in the ceilings that help in transportation in a manner vertically and horizontally.

3- Sunset Park factory / Academy

- How to connect between the factory and the academy and the functions between them.

4- BMW Plant

- The design of the factory cause its smaller than shipbuilding factory.
- How to link between the factory and others with its link block.
- The technology present and used inside the factory in the manufacturing process, such as that provided by Kuka from a robotic arms and others.

5- BMW Showroom

- The presence of the project on the sea and how to deal with that and with the shape of the building and the internal spaces and design and function.

6- Ohlone College Academic

- How to deal with the academy spaces and the function inside it.

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Thank You