MUSEUM AND RESEARCH CENTER OF **ANATOMY**

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CHAPTER 01: Background of the project

This is the first chapter where a brief of the project is given along with a general impression about site and surroundings. A rudimentary program obtained for the type of the project is also presented and formal introduction to the project and its aims and objectives are elucidated in this section of the writing.

1.1 Project brief

Project Title: Museum and Research Center of Anatomy
Project Type: Cultural and Research Facility
Client: Government
Location: Purbachal
Area: 1,20,000 sqft

1.2 Project introduction

Human body is a marvelous biomechanics of functionality which is believed to be the vessel for soul and spirit of a being but in time the body stops functioning. In history fascinations about function and death of a human body aroused men for many centuries. But in today's world death and physicality is repressed in our mind to such extent that the idea and concept of death has been banished from our consciousness. Human body is a shear marvel and has been evolved and maneuvered itself to assist greater and complex functions.

The process called "Plastination"is such a unique method of preserving human or animal cadavers and pose them in such abstract way that those installations reveals the inner work of the body and their highly sophisticated functionality. This method was invented by a German anatomist **Gunther von Hagens**. The purpose of this distinctive art form is to help and educate physicians and medical laypersons for better understanding of human body and its nature. This project tends to showcase this kind of art and present those to people to appreciate the intricacy of human body and provide a moving experience at the same time delivering knowledge and facilities for improving civic health.

1.3 Aims and objectives

The aim of the project will be letting people encounter with authentic human anatomy and help to realize how transitory life is. Museum of Anatomy will not only be a space for anatomical exhibitions but also a platform for the public to gain knowledge about human body. This project aims to deliver resources and knowledge about inner works of human body as well as physical training to the civilians for betterment of civic health conditions. This kind of project is recently proposed in many other countries to replenish awareness about human body and physics for the improvement of civic health. This project tends to provide resources and inspection data about anatomy for general public to raise awareness about own bodies. This project will also provide facility to train physicians, anatomist and surgeons to gain in depth information about diverse and unique conditioning of different bodies.

1.4 Proposed programs

Administration

Manager's room
Office space
Meeting room
Lobby/ Waiting area
Storage
Restrooms

Public

Reception Hall
Permanent Exhibition
Temporary Exhibition
Specimen Archive
Library
Resources & Animation for interactive learning for children
Restaurant
Multipurpose Hall (for seminars, lectures and functions)
Civic Physical Training Area

Aerobics & Gym Area

Massage & Therapy room

Parking

PLASTINATION FACILITY

Specimen prep area

Dissection Hall (for training purpose)

Acetone chamber area

Refrigerated vacuum impregnation chamber

Laser & Ultra-violet room

Posing hall (airtight chamber area)

Chapter 2: Site Appraisal

2.1 Site Location

The site is located in Sector 21, Block E-3 of the new model town of Purbachal. The site can be accessed by a 100ft wide road branching in from the 160ft wide road, which cuts across Purbachal on the Eastern side. This 160ft road is a part of the Dhaka city bypass stretching North-west towards Tongi, and South East towards the N105 Highway.

Fig 01: Location of Purbachal in comparison to Dhaka Metropolitan Development Plan

Fig 02: Satellite Image of Purbachal (with site marked)

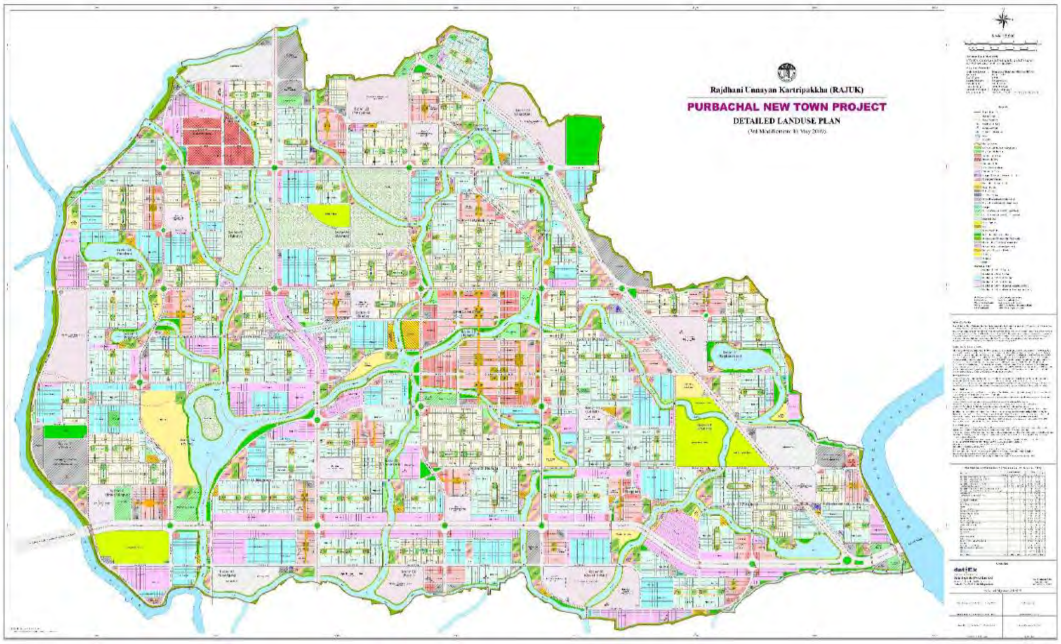


Fig 03: Detail Plan of Purbachal New Town Project

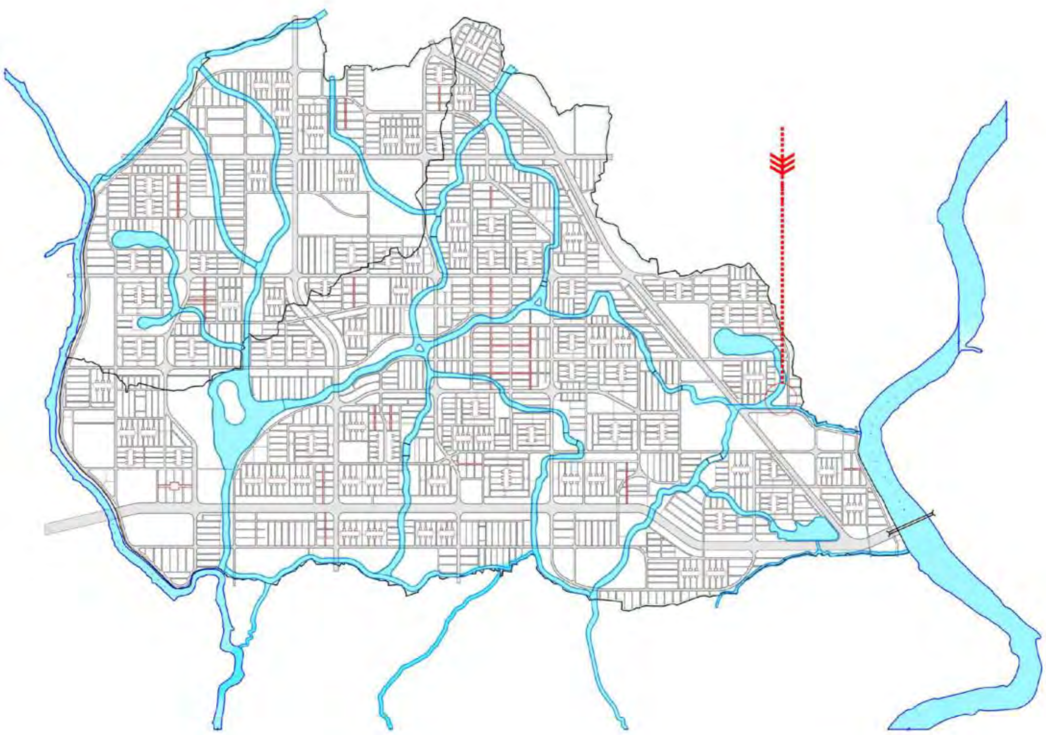


Fig 04: Road Network Layout and Water bodies of Purbachal New Town Project

2.2 Site surrounding

The site is an approximately 1, 20, 000 sqft of land, surrounded on the North, East and South by a water body. Beyond that, on the western side, the site faces residential plots, while on the eastern side, it faces some commercial plots. A 100ft wide road runs along the southern side of the site.

Fig 05: Satellite image of site


Fig 06: Proposed Road Network Layout surrounding the site

Fig 07: Proposed Urban Green, Green Belt and Vegetation surrounding the site.

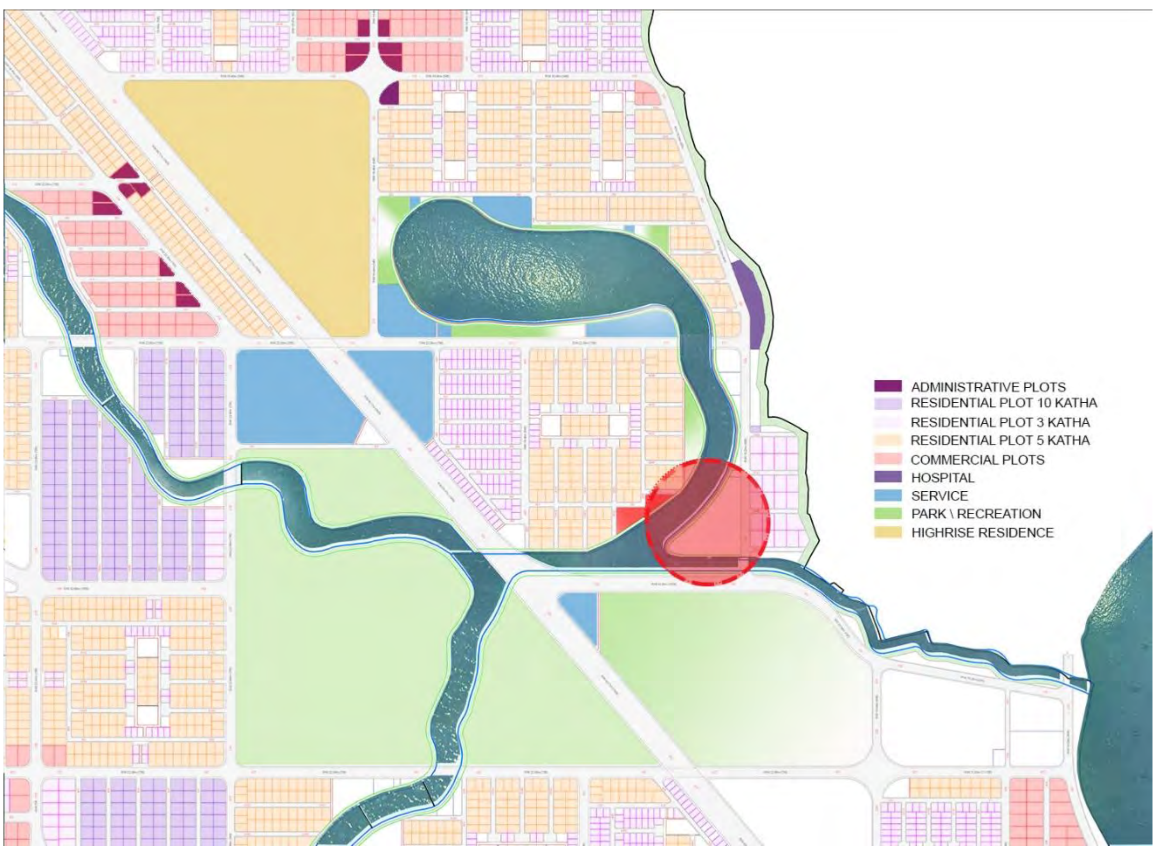


Fig 08: Proposed Landuse pattern around the site.

2.3 Background and current condition of the site

Purbachal is the biggest planned township in the country. The Project area comprises of about 6150 acres land located in between the Shitalakhya and the Balu River at Rupgonj thana of Narayanganj district and at Kaligonj Thana of Gazipur district, in the north-eastern side of Dhaka. The township will be linked with 8 lane wide express way from the Airport Road/Progati swarani crossing.

The site lies in Sector 21, on the absolute eastern side of Purbachal and is currently used as agricultural land by local residents. The site is currently being developed by land filling with sand and soil. Road network development is still in its rudimentary levels.

Fig 09: Site panorama.

Fig 09a: Site panorama.

2.4 Landuse and Topography

Topographically speaking, the site land is flat land, whereas there are a few mild contours in the surrounding. Having an extensively connected water-body right beside, gives the site a much substantial advantage.
The site falls under the allocated landuse of Higher Research Institute. The site falls in a bordering state between a complete residential zone, and a more industrial and urban amenity oriented zone.

Fig 09b: Site image.

Fig 09c: Site image.

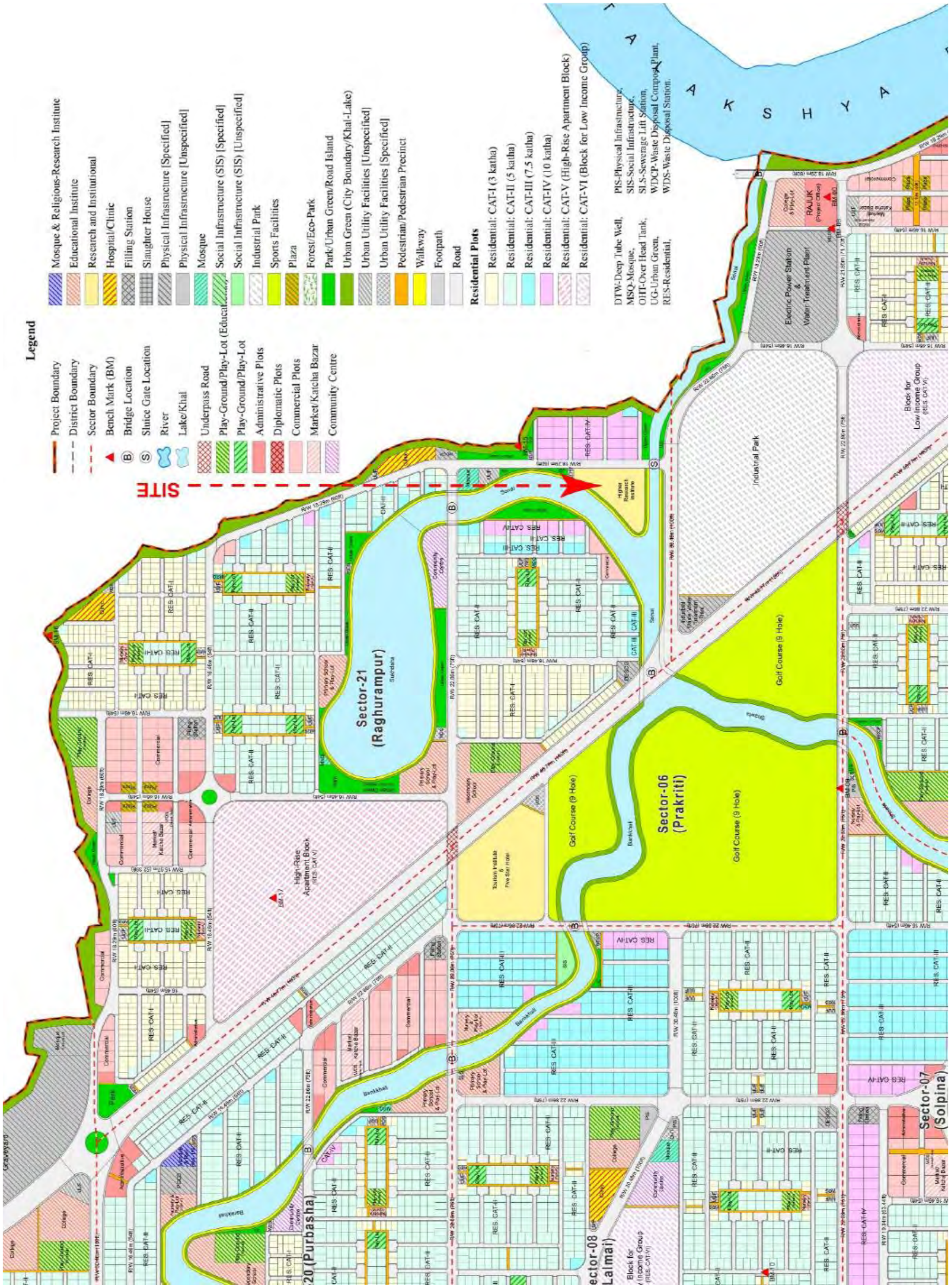


Fig 10: Planned landuse pattern adjacent the site.

2.5 SWOT Analysis

Strength

 The site is located very close to the Dhaka City Bypass, thus having an easy access from areas focused primarily on traditional handloom production such as Narayanganj, Demra, Tangail, Pathrail etc.

 The site is located right beside a water body which can act as a strong platform for positive activities and functional uses can be generated with the development of the project and its surroundings.

 The site is located on the eastern most side of the township and in one way can be seen as an isolated island, not hampering or being a nuisance to surrounding activities.

Weakness

 Being part of a proposed township, the site has got no existing urban life or features to analyze and predict accordingly.

 The site is still empty and will take much time to develop as per desired design goals.

Opportunity

 The site is located in a very strategic position, and can provide an interesting platform for the convergence of artisans and weavers from all over the country as well as designers and enthusiasts from the city and abroad.

 The site is located in a new and barren development, and holds the strength in controlling the urban sprawl that shall direct to a new visualization of the township.

Threat

 The site and its surrounding land can turn into a dense and busy city like Dhaka.

 The urban development shall disrupt the present green landscape and cause environmental harm if not addressed at with proper design.

Chapter 3: Literature review

In this chapter the contents are briefly described about the establishment, logical and rational effects of the project in the context of the state of anatomical education and condition of public health of our country and how it connects and functions to social, psychological, physiological essentials of public and course the way in summation.

3.1 What is Anatomy?

Anatomy is the identification and description of the structures of living things. Anatomy is a branch of biology and medicine which can be divided into three broad areas: **human anatomy**, **zootomy** (animal anatomy), and **phytotomy** (plant anatomy).

The word ‘anatomy’ comes from the Greek ***Ana***- meaning "up", and ***Tome***- meaning "a cutting". Anatomy, especially in the past, has depended heavily on dissection. In Greek and Latin the words "anatomy" and "dissection" have virtually the same meanings. Although both words have similar origins, anatomy has evolved to become a broad discipline of its own, while dissection remains a technique of anatomical science. Anatomy can be divided into **Gross Anatomy (macroscopic anatomy)** and **Microscopic Anatomy**.

In medicine, **Gross anatomy**, also known as **topographical anatomy** or **Macro anatomy**, refers to the study of the biological structures that may be seen with the naked eye. Gross anatomy may involve dissection or noninvasive methods. The aim is to acquire data about the larger structures of organs and organ systems. In dissection, the human or animal cadaver is cut open and its organs are studied. Endoscopy, inserting a tube with a camera at the end, might be used to study structures within living animals. There is non-invasive way of studying, for example, the blood vessels of living animals or humans; an opaque dye may be inserted into the animal to observe the circulatory system (angiography). Live beings may also be studied using MRI (magnetic resonance imaging) or X-ray. In many cases, the students dissect human corpses (cadavers).

Microscopic anatomy, also known as **Histology**, is the study of cells and tissues of animals, humans and plants that are too small to been seen with the naked eye. Microscopic anatomy commonly involves studying tissues and cells by sectioning and staining (histological techniques), and then looking at them under an electron or light microscope. **Sectioning** is cutting tissue into very thin slices so they can be examined. Histological stains are added to biological structures (such as tissues) to add colors or to enhance their colors so they can be more easily distinguished when they are examined, especially if different structures are next to each other. This process of coloration of tissue or cell is known as **Staining**. Histology is a discipline that is vital for the understanding and advancement of medicine, veterinary medicine, biology, and some other sub-disciplines of the life sciences.

3.2.1 History and evolution of anatomy

As far as we know, anatomy is the oldest medical science. The history of anatomy extends at least from the earliest examinations of sacrificial victims to the sophisticated analyses of the body performed by modern scientists. It has been characterized over time, by a continually developing understanding of the functions of organs and structures in the body. The thirst for anatomical knowledge to human can be traced back to the prehistoric era of human evolution. Bodily functions of animals and human have mesmerized mankind for a long span of time. Through this time span those basic anatomical learning took shape into modern medical science and the methodologies have also amended histrionically with time.

3.2.2 Primal sense and idea of anatomy to human

There is a lot of evidence that proves humans got the sense of body and bodily functions at the very beginning of primal age. Cave paintings of the early Stone Age, about 30,000 years ago, show a simple knowledge of the anatomy of animals and it is assumed that these cave dwellers applied some of their anatomical knowledge to their own bodies. These early human beings of Stone Age tried to learn the anatomy of animals to study how they moved and isolate the weakness to hunt or capture them easily. This notion of study the body was the very foundation of the elementary anatomical knowledge blueprinted in human mind.

3.2.3 Ancient anatomy (1600-250 BC)

Most of the civilizations of the ancient world as Babylonians, Syrians, Egyptians, Chinese, and Hindus made no serious attempt to learn anatomy because they were more interested in the supernatural world, not the natural one, and their cultures placed strong religious restrictions against debasing the body. Any anatomical dissections that were performed on animals were basically made to study organs in an effort to predict the future and to tell fortunes or envisage proper time for harvesting.

3.2.3.1 Egyptian period

Around 1600 BC Egyptians tried to unravel the inner work of the organs of human body during the process of mummification. The date of the Edwin Smith Surgical Papyrus is the evidence to support the timeline. This treatise shows that the heart, its vessels, liver, spleen, kidneys, hypothalamus, uterus and bladder were recognized, and that the blood vessels were known to emanate from the heart. Other vessels are described, some carrying air, some mucus and two to the right ear are said to carry the "breath of life" while two to the left ear the "breath of death" The Eber's Papyrus (1550 BC) features another treatise on the heart. It notes that the heart is the center of blood supply, and attached to it are vessels for every member of the body. The Egyptians seem to have known little about the function of the kidneys and made the heart the meeting point of a number of vessels which carried all the fluids of the body – blood, tears, urine and semen. However, they did not have a theory as to where saliva and sweat came from.

3.2.3.2 Greek advances in anatomy (birth of Biology)

The intellectual development of anatomy began in the golden age of Greece (Phillips 1973). The Greeks demonstrated unrelenting efforts to understand the workings of the living body and to build a coherent system of the workings. Hippocrates II was the first to write about human anatomy. The Greeks' pursuance was targeted at animal anatomy because dissection was forbidden on religious grounds then. This was largely out of respect for the dead and the then popular belief that dead human bodies still have some awareness of things that happen to it and therefore still had an absolute right to be buried intact and undisturbed. After the fall of the Roman Empire, there was minimal progress in the development of anatomy. Its development was significantly slowed down by the doctrine, philosophy and practice of the authoritarian era. The advent of the renaissance about 1000 years later witnessed a resurrection of its development. The development of Neuroanatomy from the beginning to the renaissance has revolved around great men like Hippocrates, Aristotle, Herophilus, Galen and Vesalius.

Alcmaeon and Empedocles: The scientific dissection and vivisection of animals may have begun with the work of Alcmaeon (500 B.C.) of Crotona in Italy and Empedocles (490-430 B.C.) in Sicily. Alcmaeon was both a great physician and anatomist. He published a treatise entitled “On Nature”(Durant 1939b). In preparation for this book, he dissected many animals and described his findings in detail. This great anatomist was the first to describe and locate the optic nerve and the auditive tube (Eustachian tube), and he is also given the credit for proposing that the brain is the seat of consciousness, intelligence and emotions. Empedocles, who believed that the heart distributed life-giving heat to the body, initiated the idea that an ethereal substance called pneuma, which was both life and soul, flowed through the blood vessels. Although such early anatomists were often incorrect, their work was essential to the development of later scientists. Hippocrates II. Anatomical inferences without dissection continued in Greece with Hippocrates II (460-370 B.C.), who is known as the Father of Medicine. Hippocrates of Cos was born to Heraclides and Phaenarete. His father and mother were descendants of Asclepius and Hercules respectively. He was a 17th-generation ancient Greek physician and the first to write about human anatomy even though he did not restrict himself in stricto sensu to anatomy. He might also be called the Father of Holistic Medicine, since he advocated the importance of the relationship between patient, physician, and disease in title diagnosis and treatment of illness. This philosophy was rejected at a time when diseases were still thought to be punishments from the gods. To him should go the credit for partially freeing medicine from mysticism and magic. In spite of the mythical milieu in which he lived and practised with other physicians, Hippocratic books contained anatomical factual passages that were based on the inspection of skeletons as well as from observations of living bodies injured and uninjured. Seizing every opportunity to investigate his assumptions and develop his opinions he had some accurate observations on osteology. He demonstrated the sutures of the cranium, shape of the bones and their mutual connections. With respect to soft tissues, his ideas were largely erroneous. This error from inadequate observations and unconfirmed opinions is a pitfall from which we can all still learn today. In this respect, he relied on initial observations and formulation of ideas. We could say that in spite of his precocious empiricism, he was essentially an idealist. The concepts of hypothesis and experimentations for positive proofs were to come centuries later. He called the brain a gland, from which exudes a viscid fluid. He seems to be unaware of the central nervous system. He used the term nerve, to signify a sinew or a tendon. Many agrarian languages still use the same term for ‘nerves’ and ‘tendons’ today. Even then morphology, nomenclature and taxonomy were not concepts that occurred or were clear to any minds at that time. His believe was that the arteries were filled with air, an idea gained from their emptiness in dead animals (Durant 1939b), that the lungs consist of five ashcoloured lobes, the substance of which is cellular (honeycomb-like) and spongy, naturally dry, but refreshed by the air; and that the kidneys were glands, but possess an attractive faculty, by virtue of which the moisture of the drink is separated and descends into the bladder. Conceptually, and in arrears noteworthy were his genius to move from descriptive work in to essential questions as well as his efforts to relate structure and form to function, in spite of the residual anthropomorphism in his paradigm. Anthropomorphism and personification were common in natural sciences in those days and are yet to completely vanish even today.

Aristotle: Aristotle (384 - 322 BC) known as Aristoteles in most languages other than English, is one of the towering intellects of all times and considered by Charles Darwin as the world’s greatest natural scientist. Along with Plato who was his teacher, he is often considered to be one of the two most influential and greatest natural philosophers in Western thought.

Maximizing what was culturally available to him, Aristotle studied animals which he dissected and based his opinions of the human body on his findings in animals. He however merely speculated about the internal organs in humans based on the internal parts of animals most nearly allied to humans. Aristotle laid the foundation of comparative anatomy and established embryology on a scientific foundation by his direct studies of the chick embryo. His preformation theory of embryonic development survived in one form or the other until the 17th century. The first three books of “Historia Animalium”, a treatise consisting of ten books, and the four books on “The Parts of Animals”, constitute the great monument of the Aristotelian Anatomy. In human anatomy Herophilus outclassed him, largely because Herophilus had human cadavers for study (Durant 1939a).

Aristotle was the first who corrected the erroneous statements of Polybus, Syennesis and Diogenes regarding the blood vessels, which they thought arose from the head and brain. He distinguished the thick, firm and more tendinous structure of the aorta from the thin and membranous structure of vein; he however mistook the ureters for branches of the aorta. Of the nerves he thought they arose from the heart and that they connect all articulated bones; in these, this great authority certainly made his conclusions more certain than his factual premises allowed. With the liver and spleen, and the whole alimentary canal, he was well acquainted. A lot of credit however must go to this indisputable father of comparative anatomy. His venturing into embryology is contextually mind-boggling. The total effect of Aristotle on learning in arrears has been a mixed blessing. Prevailing idealism in philosophy and science kept the world merely speculating on his profound works, waiting for the renaissance to let in the fresh air and sunlight of empiricism.

Alexandrian Medical School: In the 3rd century B.C., the modern idea of basing medicine on anatomy and physiology flourished in Alexandria, Egypt. The young Macedonian King later known as Alexander the Great founded Alexandria in 322B.C. The first two Ptolemies after the death of Alexander the Great devoted themselves to making Alexander the Literary and scientific center of the Western world. The Alexandria Library was the largest and most complete library of antiquity. It was in the temple of Zeus and founded at the time that Greece was losing some of its intellectual vigor (Gordon 1949). Ancient anatomy, except for the school of Alexandra in the time of Herophilus and Erasistratus, was largely animal anatomy.

Herophilus: From the region of Bosporus came Herophilus of Chalcedon, a pupil of Praxagoras (Edelstein 1967 and Gillespie 1980). Chalcedon is in present-day Turkey. Herophilus was a physician and an able surgeon and founded the science of Anatomy (he is often called the “father of anatomy”). He was thought to have lived between 325 and 255 B. C. (Von Staden 1989). Herophilus was a true follower f Hippocratic thought. He broke only slightly from the doctrine of humors (the four biles: red bile, yellow bile, black bile and phlegm). Courage, patience and painstakingness are necessary for good science: he engaged in the arduous task of developing anatomy register by determining anatomic nomenclature and forming the language of anatomy. The first documented human dissection was by him. This led to many anatomical discoveries through dissection of more than 600 cadavers of condemned criminals. Herophilus described the delicate arachnoid membranes, the cerebral ventricles, the venous sinuses especially the confluence of venous sinuses near the internal occipital protuberance (torcular Herophili), origin of nerves (he divided them into motor and sensory tracts) and differentiation of tendons from nerves (which were confusing at that time), the lacteals, coverings of the eye, liver, uterus, epididymis, amidst many other structures. The name “duodenum” is attributed to him. He knew that damage of the motor nerves led to paralysis. Herophilus is also given the credit for stating that pulse does not result from a mysterious power within the arteries themselves but that this power is communicated to it through the action of the heart (Von Staden 1989). The seat of consciousness, intelligence and emotions, which Aristotle ascribed to the heart, was proved to be a function of the brain by Herophilus (Peck 1965).

Science is no respecter of opinions, and is merciless towards those who jump to conclusions. Herophilus first formulated the concept of the “rete mirabile”, a vascular plexus or network of blood vessels at the base of the human brain surrounding the pituitary gland. This occurs only in lower animals but not in man. Jacob Berengario da Carpi (1470-1550) later corrected the erroneous notion of the “rete mirabile” (Garrison 1969).

Erasistratus: The younger Erasistratus (310-250 B.C) was more of a physiologist. He came from the Greek island of Chios. Erasistratus is reported to have taught at the medical school that Herophilus founded (Von Staden 1992). Cecelia Mettler in her History of Medicine reports that Herophilus and Erasistratus disliked each other very much (Mettler 1947). Although there is no corroborating evidence to reinforce her report of dislike between these two. He formulated a “pneumatic theory” and regarded the heart as a pump. Erasistratus described the auricles of the heart, cardiac valves, blood vessels, including the aorta, pulmonary artery and veins, hepatic arteries and veins, renal vessels, superior and inferior vena cava, and the azygous vein. He also differentiated the cerebrum from the cerebellum and described the cerebral convolutions, ventricles, and meninges. Erasistratus recognized the function of the trachea. Those who ignore the interdependence of science and politics need a rethink. Alexandria began its decline with the Roman invasion lead by Julius Caesar in 47 BC. This was climaxed by the burning of its famous Alexandrian library. At that time the library housed most of the learning of the ancient World. Egypt subsequently became part of the Roman Empire.

3.2.4 Medieval anatomy

In medial the even growth of anatomical science was halted or slowed due to religious restrictions. In this era Galen contributed a lot to this science though he had done some faulty assumptions. On the other end of the world in the medieval Muslim world physiology, anatomy and medicine science was flourishing on the basis of the knowledge provided by ancient Greek anatomist and Galen’s findings. Muslims not only studied and recorded those findings they also corrected some of the assumptions and translated them into Latin to preserve the knowledge or the progress could be lost with the demolition of Roman Empire.

3.2.4.1 Roman era

Under the Roman rule, the Alexandrian library and Museum library gradually fell into decay and in 391 A. D., the main library was destroyed totally by Theodosius I, who was razing all pagan temples (Durant 1939b). Medicine was still nurtured by Greek and other scholars but was culturally in a Roman environment. Human dissection was either forbidden or not encouraged - a situation that lasted until the late middle Ages. Like in some medical schools today, it was declared unnecessary in the training of physicians. The greatest figure of this time was the physician Claudius Galen.

Claudius Galenus: Claudius Galenus (AD 131-192) was born in Pergamon in Asia Minor, a flowering center of Hellenistic culture located near the western coast of what is now Turkey. His father, Nikon of Pergamum was a renowned architect. He was a celebrated anatomist and a leading advocate of the doctrines of Hippocrates. After Hippocrates, Galen is the most famous physician in history (Nuland 1988). Galen's work was recorded into numerous complex treatises covering all conceivable aspects of man's knowledge. He even published a guide to his writings, entitled "On his own Books." Galen wrote more than 130 medical treatises, of which 80 have survived. These classic works became the unquestionable repository of medical knowledge for more than a thousand year after his death. As a physician to the gladiators of Pergamus he had access to many human subjects, particularly those who were injured. Many of his human anatomical descriptions were wrong because of his reliance on animal dissection. According to Galen, "The dissection of the animal will teach the seat, the number, the peculiar matter, the size, the shape, and the composition of every part of the body". The principal subject of his investigation was the monkey, probably the macaque because anthropomorphous monkeys were hardly available and possibly unknown in Rome at that time (Garofalo 1991). In Galen's opinion, the most suitable animals for dissection were those "with a round face", on the assumption of a close similarity of their nervous systems to that of the humans. The majority of his dissections were performed on ox brains, which he simply bought from the butcher; for in vivo dissection, pigs and goats were used to avoid the horror of the sight of a monkey being dissected alive, even though pigs and goats shout at top of their lungs. The dissection of humans played a minor role, if any, in the anatomic work of Galen. Claudius showed that in addition to the diaphragm other muscles were involved in respiration. He left a detailed description of the origin and course of the phrenic nerve, and his discovery of the recurrent laryngeal nerve led him to comprehend voice production by the larynx. He proved that arteries as well as veins carry blood, differentiated between pia and dura mater, and described the ventricular system, pineal gland and pituitary gland. Galen described the Tela choroidea and its relation to the 3rd ventricle. His most notable work was "Áuatomia goceirsei V" (Anatomical Procedures). This was initially written in the years after AD 177, in Rome as a mature work and was partially rewritten after AD 192, because of the nearly total destruction of the original work by fire in the Temple of Peace (Garofalo). The “rete mirabile” (a marvellous network) at the base of hoofed animal’s brains was erroneously believed to be present in human brains. According to him, this was the seat of man’s “animal spirit” which later became transformed into “vital spirit.” He also misrepresented the shape of the human heart, branches from the aortic arch, the location of the kidneys, the shape of the liver, as well as other anatomical structures. Notable among his errors were that of just seven cranial nerves and that air enters the blood via the left ventricle (Badoe 1994). Presumptive authoritarianism did not allow Galen’s ideas to be criticized; thus many of his erroneous ideas were perpetuated and major progress in the field of anatomy was halted until the sixteenth century. It was a crime to differ from Galen. Vesalius, one of the most famous anatomists of all time was very fearful of differing with Galen (Adams 1939). It is tempting to believe that Galen ushered a long and dark period in the history of medicine, including anatomy. However, these were era in which tradition and authority outweighed positive facts in science. Indeed, Galen himself practised Medicine based on the four humoral paradigms of Hippocrates. After the death of Galen, the tempo of anatomical and physiological inquiry sank. This accounted for the many erroneous belief that lasted even after his death. The Galenic concepts, both accurate and inaccurate, became canonized as the theoretical basis of medicine and surgery for 15 centuries.

3.2.4.2 Muslims’ contribution in physiology and anatomy

It is claimed that an important advance in the knowledge of human anatomy and physiology was made by Ibn al-Nafis, but whether this was discovered via human dissection is doubtful because "al-Nafis tells us that he avoided the practice of dissection because of the shari'a and his own 'compassion' for the human body".

The movement of blood through the human body was thought to be known due to the work of the Greek physicians. However, there was the question of how the blood flowed from the right ventricle of the heart to the left ventricle, before the blood is pumped to the rest of the body. According to Galen in the 2nd century, blood reached the left ventricle through invisible passages in the septum. By some means, Ibn al-Nafis, a 13th-century Syrian physician, found the previous statement on blood flow from the right ventricle to the left to be false. Ibn al-Nafis discovered that the ventricular septum was impenetrable, lacking any type of invisible passages, showing Galen’s assumptions to be false. Ibn al-Nafis discovered that the blood in the right ventricle of the heart is instead carried to the left by way of the lungs. This discovery was one of the first descriptions of the pulmonary circulation, although his writings on the subject were only rediscovered in the 20th century and it was William Harvey's later independent discovery which brought it to general attention.

According the Ancient Greeks, vision was thought to a visual spirit emanating from the eyes that allowed an object to be perceived.The 11th century Iraqi scientist Ibn al-Haytham, also known as Al-hazen in Latin, developed a radically new concept of human vision. Ibn al-Haytham took a straight forward approach towards vision by explaining that the eye was an optical instrument. The description on the anatomy of the eye led him to form the basis for his theory of image formation, which is explained through the refraction of light rays passing between 2 media of different densities. Ibn al-Haytham developed this new theory on vision from experimental investigations. In the 12th century, his *Book of Optics* was translated into Latin and continued to be studied both in the Islamic world and in Europe until the 17th century.

Ahmad ibn Abi al-Ash'ath, a famous physician from Mosul, Iraq, described the physiology of the stomach in a live lion in his book *al-Quadi wa al-muqtadi*. He wrote:

"When food enters the stomach, especially when it is plentiful, the stomach dilates and its layers get stretched...onlookers thought the stomach was rather small, so I proceeded to pour jug after jug in its throat…the inner layer of the distended stomach became as smooth as the external peritoneal layer. I then cut open the stomach and let the water out. The stomach shrank and I could see the pylorus…"

Ahmad ibn Abi al-Ash'ath observed the physiology of the stomach in a live lion in 959. This description preceded William Beaumont by almost 900 years, making Ahmad ibn al-Ash'ath the first person to initiate experimental events in gastric physiology.

According to Galen, in his work entitled *De ossibus ad tirones*, the lower jaw consists of two parts and it can be proven by the fact that it disintegrates in the middle when cooked. Al-Baghdadi, while on a visit to Egypt, encountered many skeletal remains of those "who had died from starvation or had been eaten by their fellows" near Cairo. He examined the skeletons and established that the mandible consists of one piece, not two as Galen had taught. He wrote in his work *Al-Ifada w-al-Itibar fi al_Umar al Mushahadah w-al-Hawadith al-Muayanah bi Ard Misr*, or "Book of Instruction and Admonition on the Things Seen and Events Recorded in the Land of Egypt".

"What I saw of this part of the corpses convinced me that the bone of the lower jaw is all one, with no joint nor suture. I have repeated the observation a great number of times, in over two thousand heads…I have been assisted by various different people, who have repeated the same examination, both in my absence and under my eyes."

Unfortunately, Al-Baghdadi's discovery was ignored by any medical superiors or literature after his time. This was probably because the information was published in a book about the geography of Egypt. The ignorance of this discovery could also have been because the medical establishment was not yet ready to give prominence to observation over the word of ancient authority.

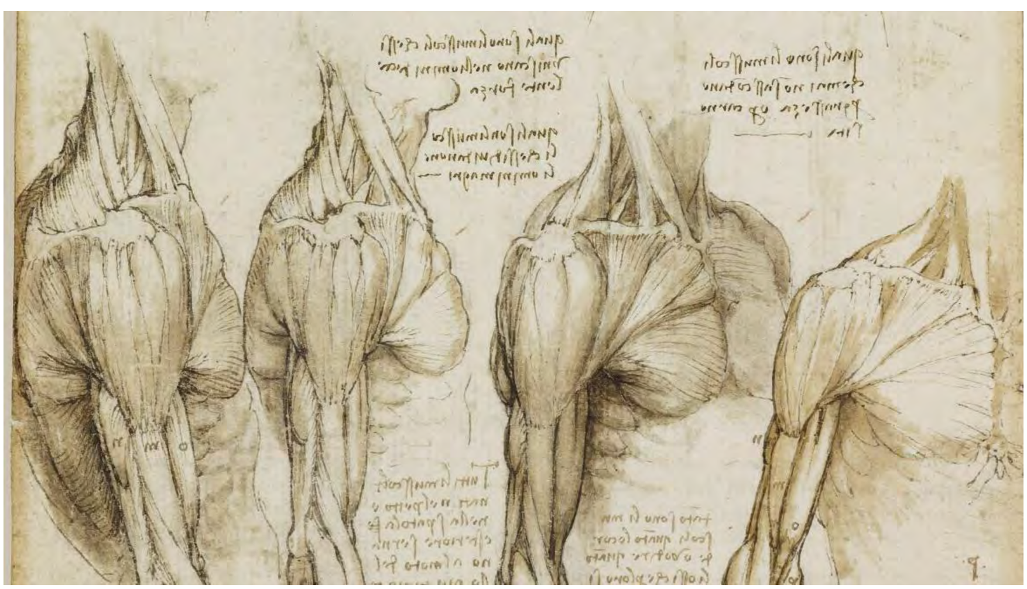
3.2.5 Renaissance in anatomy (Early modern anatomy)

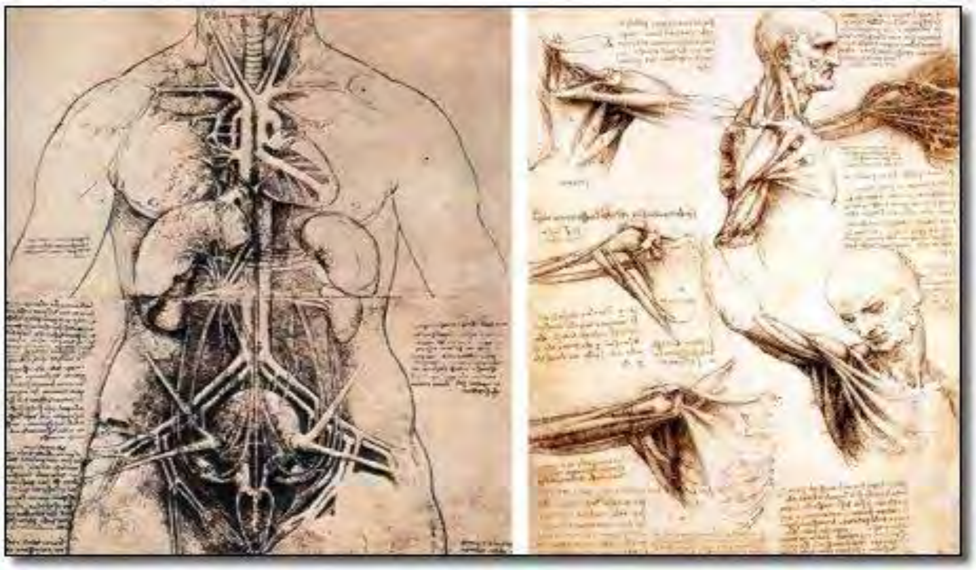
Fresh air and light fell upon human learning again as the renaissance broke undue bounds. The Renaissance was a period during which there was a revival in the ideas of ancient Rome and Greece. Ideas flourished and the newly invented printing press allowed books to be produced quickly. Before this, books were slowly and painstakingly copied by hand. Although very few people could read and write, the printing press was a revolution in information technology and resulted in ideas spreading around Europe like never before.

Mondino de Luzzi: By the end of the thirteenth century, the demand for accurate information was so great that the medical dissection of human corpses began in earnest. The freedom from the restriction imposed by presumptive authoritarianism on human dissection had its origin in Italy. Anatomists at this time were still conditioned to revere the outdated notions of Aristotle and Galen, and if an autopsy revealed a deviation from prior teachings, the anatomists concluded that the body was abnormal. Towards the end of the 13th century Mondino de Luzzi a surgeon-anatomist, revived anatomical dissection in Bologna; although dissections were still often confined to the bodies of animals and sometimes they were really autopsies performed to ascertain the cause of demise especially if foul play was a possibility. These were usually the responsibility of Surgeons. Mondino also dissected the bodies of executed criminals. He produced the first manual for dissection in 1316.

Leonardo da Vinci - The artists: The fourteenth century brought a more scientific attitude to the study of the human body. To some extent, artists, rather than scientists, set the pace in revealing new aspects on human anatomy. Leonardo da Vinci (1452- 1519) was undoubtedly the most industrious artist, producing hundreds of anatomical drawings made from dissections During the 200 years or so of the renaissance there was profound changes in anatomical development. The renaissance witnessed the revival of the scientific study of anatomy initially by the great artists, notably the genius Leonardo da Vinci, Johannes de Ketham and Berengario da Carpi. It was in Italy that artists such as Donatello, Michelangelo, Raphael and Leonardo da Vinci were among the first to take up the scientific study of human anatomy, due to their interest in human form. This was a key advancement necessary for the progression of surgery; likewise the invention of printing, making books readily available was of great help. Illustrations so necessary to anatomy could at that time be more easily reproduced and distributed. All these artists, especially Leonardo da Vinci (1452-1519), engaged in dissection of the human body, a practice that had been non-existent since the ancient dissections of a thousand years earlier. He pictured median sagittal sections of the brain. Berengario da Capri's "Commentaria…super anatomica mundis" and Johannes de Ketham's "Fasiculus medicinae" published in Venice (1491) are two of the most known illustrated medical works by woodcuts with pictures. The best and most lasting was that by Vesalius (1514-1564), "De humani corporis fabrica" (On the Structure of the Human Body), in which he carefully integrated text and drawings made from dissections, setting anatomy on a new course toward the scientific method. Jan Calcar, a student of Titian made the drawings. The era of growth was the era of collaboration between Arts, Technology and Science. Although there had been sporadic anatomical demonstrations in Italian medical schools since the early 14th century, their main purpose was to help memorise the writings of a thousand years earlier. The professor sat in a raised chair and read from an inaccurate manuscript while a demonstrator pointed out the organ to the audience. When there were discrepancies between text and demonstration the professor explained that the human body had changed since Galen's time (DeBroe 1997). Authoritarianism and good science do not often go together. Five years before the death of Leonardo, the true "Father of Anatomy" was born. This was Andreas Vesalius.

Andreas Vesalius: Andreas Vesalius was born in Brussels on December 31, 1514 into a family of physicians (Simeone 1984). His ancestors were intellectuals, well versed in the natural sciences, music, ancient languages and philosophy. For at least four generations they serve in the imperial medical services (O'Malley 1954). Vesalius was educated in Brussels and Paris and he went to Padua to finish his medical study. He broke the then established rigid and fabricated way of teaching anatomy and introduced the modern concept of learning based on observations using illustrations combined with a critical spirit and sense of experiment (Jackson 1992). He was a surgeon-anatomist and the founder of modern anatomy; the illustrations of Vesalius' dissections were rendered with remarkable clarity by an extraordinary artist, Jan Stephan Kalkar, and were reproduced both as woodcuts and copper plates. A transformation occurred in the precise anatomy of humans with the publication in August 1543 of "De humani corporis fabrica" (the 7th and last of his fabrica) by Vesalius who was then just 28years of age (O'Malley). This folio-sized book is the foundation of modern topographic human anatomy and one of the most important books in the history of medicine. It included plates of osteology and myology series. Vesalius spoke of the "Divinus opifex" i.e. the Divine designer and constructor of the universe and of man or of the "Divinus artifex", the divine artisan who organized minute details and fastened together the various parts. Vesalius' description of the cerebral vessels is generally adequate but he overlooked the hexagonal ring of communicating arteries at the base of the brain. Like da Carpi, he disputed Galen on existence of the rete mirabile, stating that it is almost non-existent in humans. Authority has a fragile confidence, because it rightly suspects though it could be wrong. The demonstrations of the many errors in the anatomic publications of Galen were initially met with mixed reactions. Especially vehement was the reaction from his former teacher of Vesalius few years earlier, Jacob Sylvius who called his work filth and sewage17. Impulsively and not entirely rational, Vesalius burned all his manuscripts. This ended his 5years of academic work; the next 20 years were to be boring and barren. Sylvius was wrong while Vesalius was right; but the right course was under erroneous authority and progress suffered. There is such a thing as an atmosphere conducive to intellectual growth and burst. The “De humani corporis fabrica” coincided with the publication of another great book in the history of science the “De revolutionibus orbium coelestium” of Nicolaus Copernicus. Thus in a single year, the modern understanding of both the microcosm and macrocosm was set under way, and man’s place in the world took a new dimension. The “De humani corporis fabrica” is one of the greatest medical books ever written because it introduced and established a new mode of thought for anatomy as a medical science. Its significance lay in the fact that for the first time anatomy became based on objective observation, accurate recording and presentation of data and pursuit of concepts to logical conclusions19. From his careful observations he challenged the many centuries old dogma of Galen and transformed anatomy to a highly developed science and the foundation of modern medicine, leaving durable imprints with respect to the development of anatomy.






© Lucy Ray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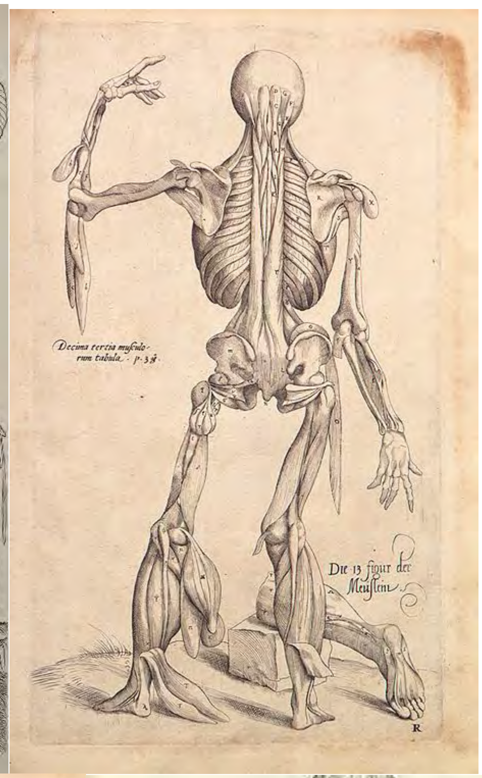
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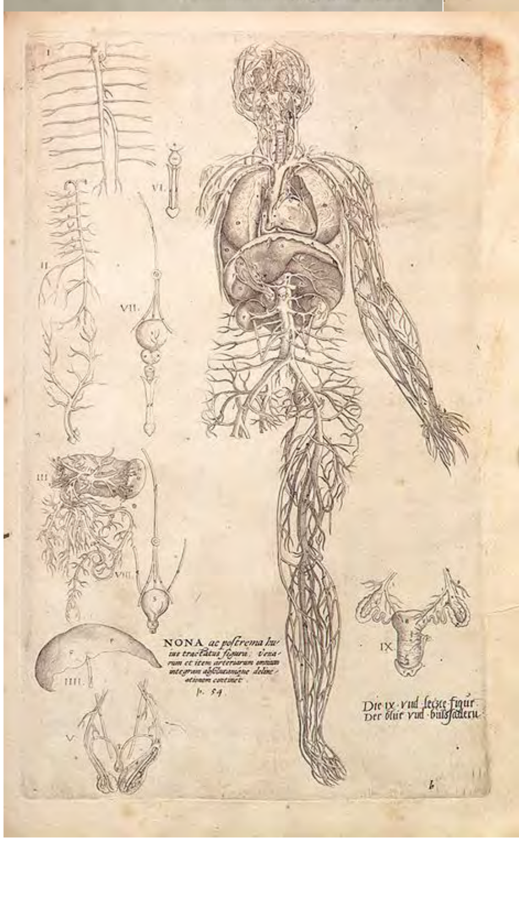
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3.2.6 Embellishment period of anatomy science

The study of anatomy thrived in the 17th and 18th centuries. The advent of the printing press facilitated the exchange of ideas. Because the study of anatomy concerned observation and drawings, the popularity of the anatomist was equal to the quality of his drawing talents, and one need not be an expert in Latin to take part. Many famous artists studied anatomy, attended dissections, and published drawings for money, from Michelangelo to Rembrandt. For the first time, prominent universities could teach something about anatomy through drawings, rather than relying on knowledge of Latin. Contrary to popular belief, the Church neither objected to nor obstructed anatomical research.

Only certified anatomists were allowed to perform dissections, and sometimes then only yearly. These dissections were sponsored by the city councilors and often charged an admission fee, rather like a circus act for scholars. Many European cities, such as Amsterdam, London, Copenhagen, Padua, and Paris, all had Royal anatomists (or some such office) tied to local government. Indeed, Nicolas Tulp was Mayor of Amsterdam for three terms. Though it was a risky business to perform dissections, and unpredictable depending on the availability of fresh bodies, *attending* dissections was legal.

In this time period the English physician and anatomist William Harvey *(1578-1657)* studied at the University of Padua (the newly established center of medical research) several years after Vesalius taught there. In *1628,* Harvey published An Anatomi*cal Treatise on* the Motion of the Heart *and Blood in Animals,* in which he described for the first time how blood is pumped by the contractions of the heart, circulates throughout the body, and returns to the heart. Both the accurate plan of the circulation and the idea that the heart is a pump were enormous breakthroughs that helped overcome the primitive ideas of Aristotle and Galen once and for all. Although Harvey's discovery was attacked by Galen's steadfast followers, it was difficult to argue against Harvey's methods of first-hand observation and experimentation. Harvey had not only made a most important anatomical discovery, he had also demonstrated a logical and scientific approach that set the standard for future anatomical research. From then on, physicians and anatomists considered structure *and* function when investigating the human body. Such research was aided by microscopes, beginning with those produced by the Dutch microscopist, Antonie Van Leewenhoek *(1632-1723),* which enabled scientists to examine the cells, tissues, and fluids of the body.

To cope with shortages of cadavers and the rise in medical students during the 17th and 18th centuries, body-snatching and even anatomy murder were practiced to obtain cadavers. 'Body snatching' was the act of sneaking into a graveyard, digging up a corpse and using it for study. Men known as 'resurrectionists' emerged as outside parties, who would steal corpses for a living and sell the bodies to anatomy schools. The leading London anatomist John Hunter paid for a regular supply of corpses for his anatomy school. The British Parliament passed the Anatomy Act 1832, which finally provided for an adequate and legitimate supply of corpses by allowing legal dissection of executed murderers. The view of anatomist at the time, however, became similar to that of an executioner. Having one's body dissected was seen as a punishment worse than death, "if you stole a pig, you were hung. If you killed a man, you were hung and then dissected." Demand grew so great that some anatomist resorted to dissecting their own family members (William Harvey dissected his own father and sister) as well as robbing bodies from their graves.

Many Europeans interested in the study of anatomy traveled to Italy, then the center of anatomy. Only in Italy could certain important research methods be used, such as dissections on women. Realdo Colombo (also known as Realdus Columbus) and Gabriele Falloppio were pupils of Vesalius. Columbus, as Vesalius's immediate successor in Padua, and afterwards professor at Rome, distinguished himself by describing the shape and cavities of the heart, the structure of the pulmonary artery and aorta and their valves, and tracing the course of the blood from the right to the left side of the heart.

Anatomical theatres became a popular form for anatomical teaching in the early 16th century. The University of Padua was the first and most widely known theatre, founded in 1594. As a result, Italy became the center for human vivisection. People came from all over to watch as professors taught lectures on the human physiology and anatomy, as anyone was welcome to witness the spectacle. Participants were fascinated by corporeal display, by the body undergoing dissection. Most professors did not do the dissections themselves. Instead they sat in seats above the bodies while hired hands did the cutting. Students and observers would be placed around the table in a circular, stadium like arena and listen as professors explained the various anatomical parts. The 19th century eventually saw a move from anatomical theatres to classrooms, reducing the number of people who could benefit from each cadaver.

During the 19th century, anatomical research was extended with histology and evolving biology of both humans and animals. Women, who were not allowed to attend medical school, could attend the anatomy theatres. From 1822 the Royal College of Surgeons forced unregulated schools to close. Medical museums provided examples in relative anatomy, and were often used in teaching.

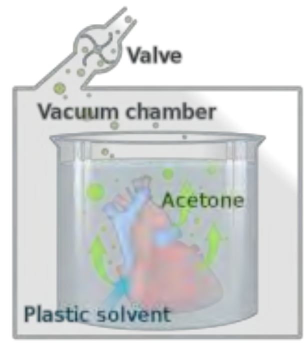
3.2.7 Modern anatomy

Anatomical research in the past hundred years has taken advantage of technological developments and growing understanding of sciences such as evolutionary and molecular biology to create a thorough understanding of the body's organs and structures. Disciplines such as endocrinology have explained the purpose of glands that anatomists previously could not explain; medical devices such as MRI machines and CAT scanners have enabled researchers to study organs, living or dead, in unprecedented detail. Progress today in anatomy is centered in the development, evolution, and function of anatomical features, as the macroscopic aspects of human anatomy have largely been catalogued. Non-human anatomy is particularly active as researchers use techniques ranging from finite element analysis to molecular biology.

To save time, some medical schools such as Birmingham, England have adopted pro-section, where a demonstrator dissects and explains to an audience, in place of dissection by students. This enables students to observe more than one body. Improvements in color images and photography mean that an anatomy text is no longer an aid to dissection but rather a central material to learn from. Plastic models are regularly used in anatomy teaching, offering a good substitute to the real thing. Use of living models for anatomy demonstration is once again becoming popular within teaching of anatomy. Surface landmarks that can be palpated on another individual provide practice for future clinical situations. It is possible to do this on oneself; in the Integrated Biology course at the University of Berkeley, students are encouraged to "introspect" on themselves and link what they are being taught to their own body.

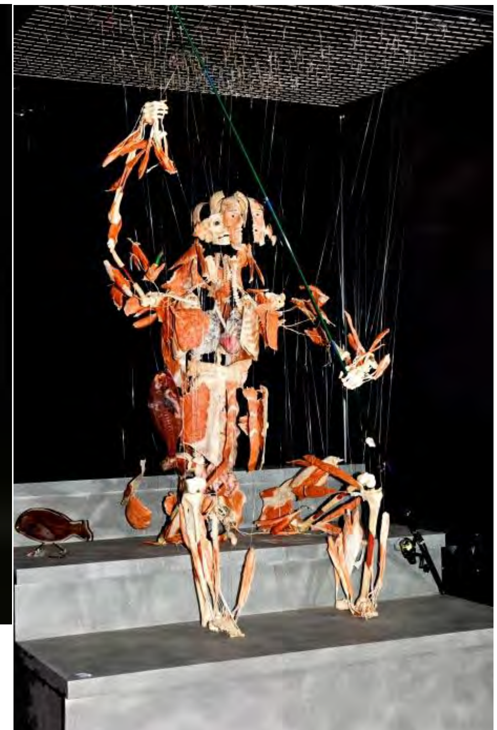
Donations of bodies have declined with public confidence in the medical profession. In Britain, the Human Tissue Act 2004 has tightened up the availability of resources to anatomy departments. The outbreaks of Bovine Spongiform Encephalitis (BSE) in the late 80s and early 90s further restricted the handling of brain tissue.

The up to the minute technique of exhibiting anatomy is Gunther von Hagens' public displays of dissections, preserved in different movement and poses by plastination. This is the most abstract yet accurate way to represent human anatomy.



Forced Impregnation






3.3 Anatomy is all about devising senses alongside knowledge

With time and situation anatomy is shaped into a complex branch of scientific knowledge now. So there is a common misconception about acquiring this knowledge is that it is only designated to the professionals. Anatomy is not only about doctors or patients, it is about body. If you have a body then anatomy science is for you. The root perception of anatomy started from the plain instinct of knowing about your own body. In primitive ages this instinct or sense kept our race safe from predators. This sense sharpened through evolution and we got enthusiastic about the details of bodily functions. But the main concept of anatomy is to develop senses about one's own body.

If I asked at what age we started to learn anatomy? The answer would be when we were about 18 months old. At initial phase we learned, 'nose, mouth, eyes, arm, leg, toes…' as our studies developed we went further and added knees, elbows, shoulders and 'tummy'… and while we may not have yet learned about different types of joints or the digestive organs yet we may have realized that limbs move differently and that food and toilet visits were intimately connected. Naming and understanding what the 'bits' are for is useful to us from a young age; and the depth of our understanding naturally reflects both our level of interest as well as our need for applying it. This elementary learning was not about getting vast information but to develop a sense of our own form. Anatomy is a complex scientific knowledge but alongside it is a preliminary sense.

3.4 Misconceptions about anatomy learning

As mentioned earlier most of the people label anatomical science for professional doctors, surgeons, physicians or anatomists. This is a conjoint misconception about this science. With enormous improvement of medical science and technology we got less intent about our body. We try to banish the concept of death or decaying until we face some deleterious effect to our own body. In past anatomy science was popular to general public because then mass was curious and careful of their bodies. Now we are less observant and curious about human body. The basic knowledge of our body can lead us to live a healthy life, so anatomy or body science is eligible for all form of people. It is a mass science for all.

3.5 Anatomical knowledge in contexts

In our country, in most of the cases general people faces problem to properly communicate with their doctor or physicians. This problem ensues due to lack of basic knowledge of anatomy in the general mass. To understand what is wrong with your own body you must have a minimum idea how your body functions. From the point of views of broad spectrum people this kind of interactive project can be a source of information about body. In that context it can function as a foundation of civic edutainment and body awareness media.

On other context this kind of project can be a detailed preserved specimen archive for students or trainees in the field of medicine and anatomy to get proper and comprehensive experience of intricate arrangements of human body.

Chapter 4: Case study

In this chapter some projects has been explored in order to originate essential references and guidelines which could be used to determine functions and events for the project development. These projects for case study also have been chosen for to get an impression about the three dimensional spatial feature.

4.1 Elevating Islands: Museum of the Human Body in Montpellier by BIG

The Museum of the Human Body, which will be part of the newly developed area Parc Marianne, is rooted in the humanist and medical tradition of Montpellier and its world renowned medical school, which dates back to the 10th century. The new museum will explore the human body from an artistic, scientific and societal approach through cultural activities, interactive exhibitions, performances and workshops.
The 7,800 m² (ca. 84,000 sqf) museum is conceived as a confluence of the park and the city – nature and architecture – bookending the Charpak Park along with the Montpellier city hall. The building's program consists of eight major spaces on one level, organically shaped and lifted to form an underlying continuous space. Multiple interfaces between all functions create views to the park, access to daylight, and optimizing internal connections.

'Like the mixture of two incompatible substances – oil and vinegar – the urban pavement and the parks turf flow together in a mutual embrace forming terraced pockets overlooking the park and elevating islands of nature above the city. A series of seemingly singular pavilions that weave together to form a unified institution – like individual fingers united together in a mutual grip', explains Bjarke Ingels.

The museum's roof functions as an ergonomic garden: A dynamic landscape of vegetal and mineral surfaces that allow the park's visitors to explore and express their bodies in various ways – from contemplation to the performance, from relaxing to exercising, from the soothing to the challenging.The façades of the Museum of the Human Body are transparent, maximizing the visual and physical connection to the surroundings. On the sinuous façade that oscillates between facing North and South, East and West, the optimum louver orientation varies constantly, protecting sunlight, while also resembling the patterns of a human fingerprint – both unique and universal in nature. The new Museum will contribute to Montpellier's rich scientific and cultural heritage, attracting tourists, families, as well as school classes, academics and art lovers.

Concept diagram

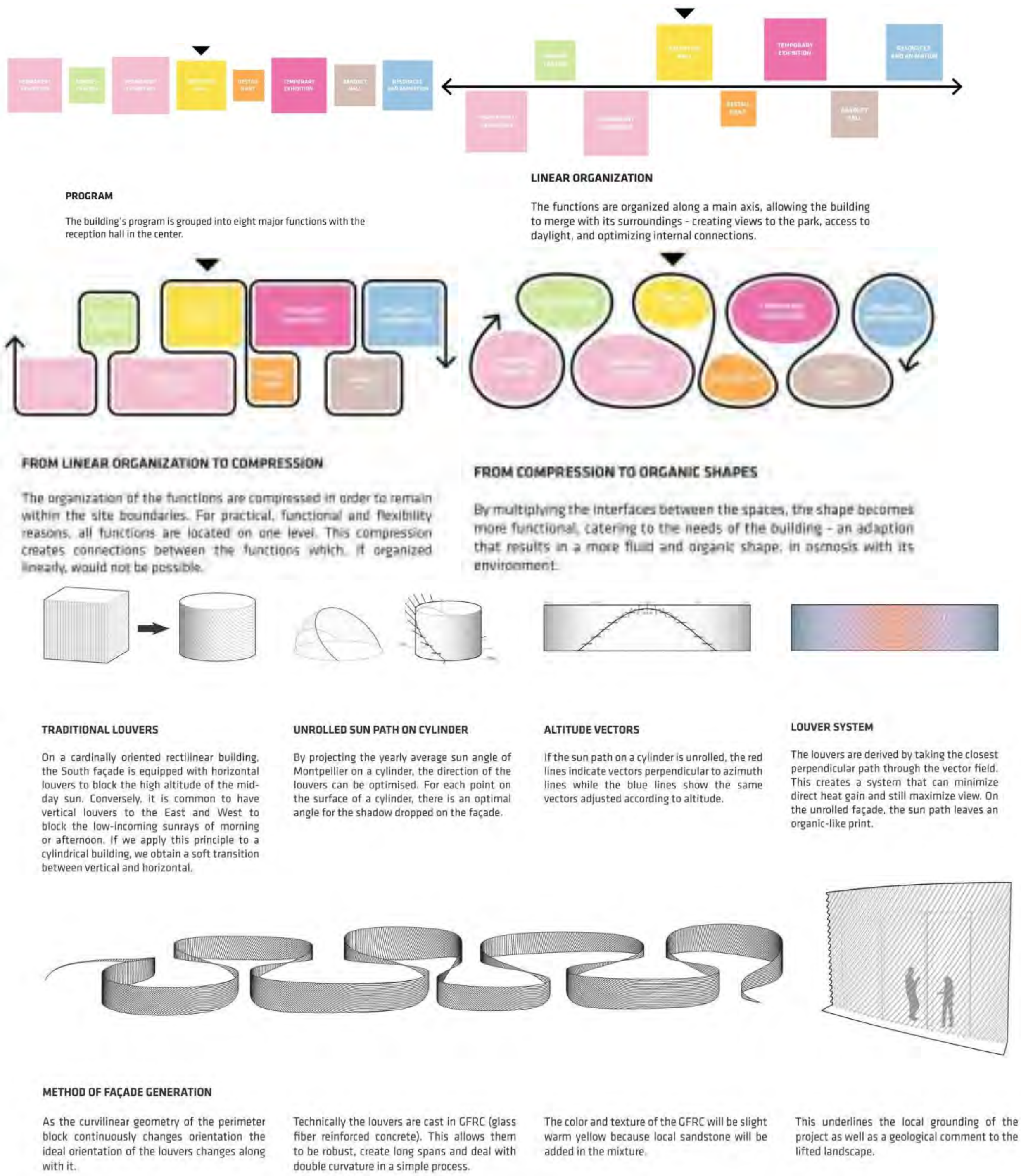


Fig: Master plan

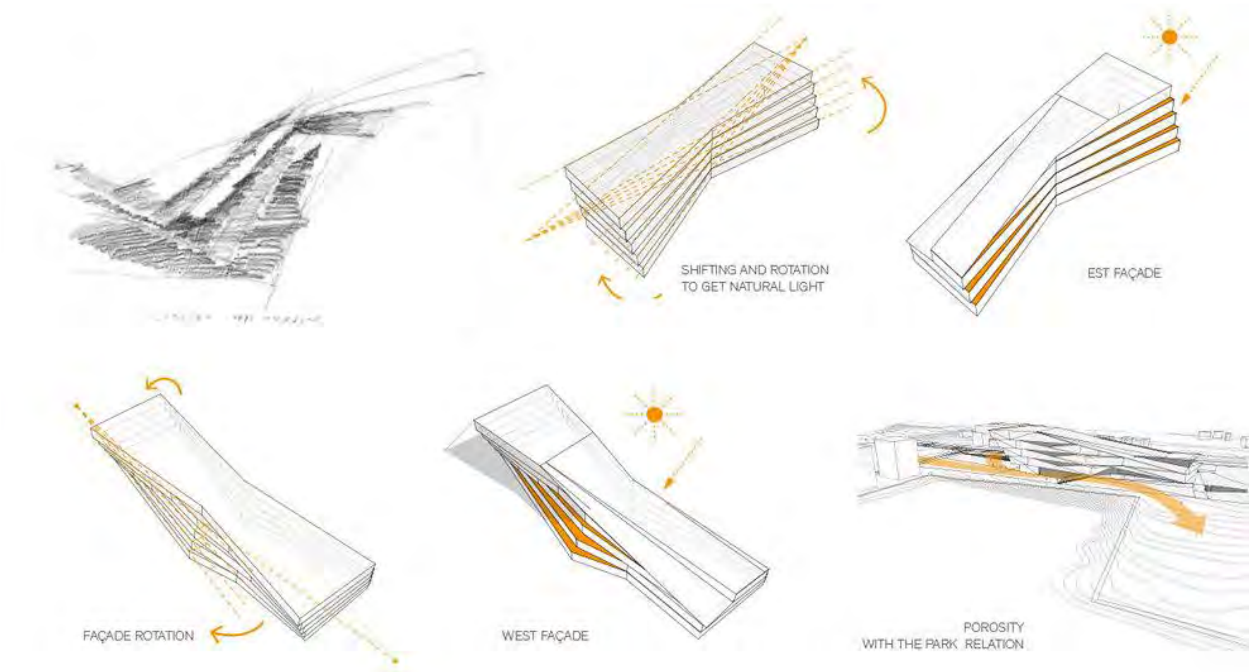
4.2 Museum of Human Body by Kengo Kuma & associates

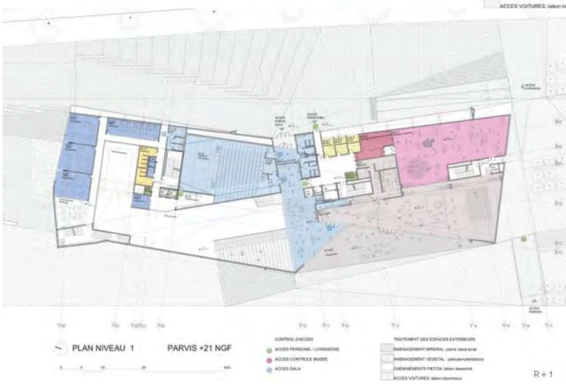
The Museum of the Human Body takes shape in urban development that aims to become a major focus of the city of Montpellier. Opposite to the Georges Charpak Park and also to the monumental new town-hall, the project tries to link the site development that surrounds it. Indeed, the proposal has to find porosity with the park and makes this place a pivot point that combines the urban density with the tranquility of the park.

Based on the site force line, the project is articulated with the park by flexible forms that guide a flow along its strong lines. A flow as a continuous movement, a gradual discovery of the museum and its collections. In its urban insertion, the project proposes a re-oriented forecourt to direct visitors arriving from the north of the plot to a main access directly related to the park. It takes place as a connector between the city and the park, between urban landscaped forecourt of the north façade and the south slope. In this way, the building stretches generating a cross-flow to create a path in front of the park. The 'parvis' along the street Joan Miro offers an access a level higher than the level of the park. It serves the event spaces – room gala / reception and auditorium – and can be related to the museum or detached, depending on activities. Extending on two levels, the surface of the lobby is more generous than expected in order to celebrate the opening between the square and the park and to organize the program elements around this large atrium.

The lines that trace the landscape define the movement of the building. The facade is developed in a successive slip of land lines to expose each level with an opening to the sky. By an open and obstruent rhythm, alternately vertical and horizontal, the facade aims to control the light direction and its quality. It also allows a flexibility to accommodate the diverse needs of the museum project: from the luminous hall, welcoming and open, until the fully opaque exhibition spaces. Between the city and the park, the facade, like a skin, defines and regulates relationships from the interior spaces to the exterior environment. On the ground floor, by the continuity of the site topography, the facade leaves the space slip into the main entrance. In the atrium and galleries, the facade envelops the museum to protect it from the sun as a filter, the sought light passing through its pores. This is the skin of the building that defines a breathing interior, with opening views and light slits to create specific atmospheres. The program of museum offers a varied choice of activities and uses. The museum project and the events center are organized to optimize the reception and circulation spaces. For the flexibility of uses, independent accesses are set up to the museum, between the main hall, restaurant and administrative offices. To release a large reception area, the program is arranged in order to optimize its functionality. All rooms can be delivered by a single logistics hub. Each element is serviced by single core that allows the circulation for wheelchair people and that is a structural support to release the trays in search of flexibility through the building.

Concept diagram



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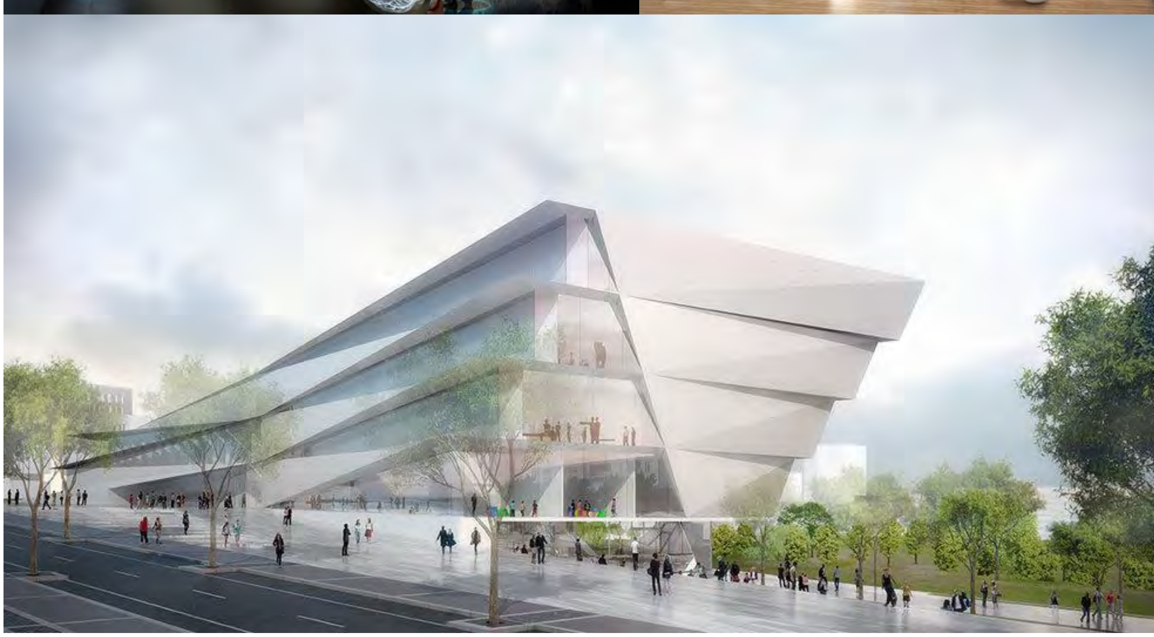


Chapter 5: Program and development

5.1 Administration

Manager’s room + toilet - 800 sqft

Assistant’s room+ toilet - 600 sqft

Office space – 500 sqft

Waiting / Lobby – 300 sqft

Washroom – 300 sqft

Kitchen + pantry – 300 sqft

Storage – 200 sqft

Security and supervision – 1000 sqft

Subtotal = 4800 sqft

Circulation 25% = 1200 sqft

Total area = 6000 sqft

5.2 Museum and Edutainment

Reception - 400 sqft

Washroom - 500 sqft

Permanent exhibit - 30000 sqft

Temporary exhibit - 8000 sqft

Specimen archive - 3000 sqft

Resources & Animation for

Interactive learning for children - 3500 sqft

Library - 6000 sqft

Washroom - 250 sqft

Subtotal = 51650 sqft

Circulation 25% = 13000 sqft

Total area = 64650 sqft

5.3 Multipurpose and Physical activities

Auditorium – Hall - 4000 sqft

Lobby - 500 sqft

Washroom - 300 sqft

Greenroom - 400 sqft

Restaurant - 3500 sqft

Aerobics & Gym - 3000 sqft

Therapy - 2000 sqft

Civic physical activity space (outdoor) - 2500 sqft

Subtotal = 16200 sqft

Circulation 25% = 4050 sqft

Total area = 20250 sqft

5.4 Plastination Research zone

Specimen prep/ Posing hall (airtight) – 2500 sqft

Dissection theater hall – 4000 sqft

Acetone chamber- 500 sqft

Refrigerated vacuum impregnation chamber – 2000 sqft

Laser/ UV ray room – 300 sqft

Machine room – 250 sqft

Washroom - 200 sqft

Subtotal = 9750 sqft

Circulation 25% = 2400 sqft

Total area = 12150 sqft

5.5 Others

Parking (80 cars) - 10240 sqft

Generator / Mechanical room - 2500 sqft

Maintenance - 1000 sqft

Total area = 13740 sqft

5.6 Grand total area

Total project area = 116800 sqft (approx.)

Chapter 6: Conceptual Stage and Design Development

6.1 Introduction

After carrying out a relatively thorough study, one of the main aspect that was noted is the lack of sense and knowledge about anatomy to the general mass public. In addition to that lack of proper infrastructure to guide and train anatomists and medical laypersons was also evident. This specific finding supports the need of a research center and museum to train professionals and at the same time exhibiting scientific anatomical knowledge to the common mass. It is a necessary decision to engage the wider spectators to this for the sake of educational purpose of the project.

6.2 Concept Development

The initial idea of this project was to engage maximum public interaction with the site to develop a civic space and treat the site in such manner that people could interact with the site and surroundings. The key point of this design was the word 'Anatomy' which means dissection. In anatomical procedures dissection is the way to unveil inner functions and status of the body. While designing many ideas and design decisions were influenced from the cellular organization in tissues, circulatory system around the tissue and muscle tissues. These anatomical patterns and organization were used as a guideline to derive circulation, public spaces and the structural form.

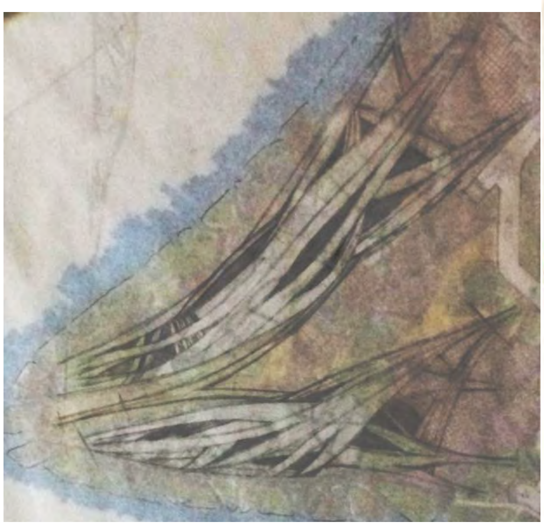


Fig 11: Conceptual sketch influenced by muscle fibers

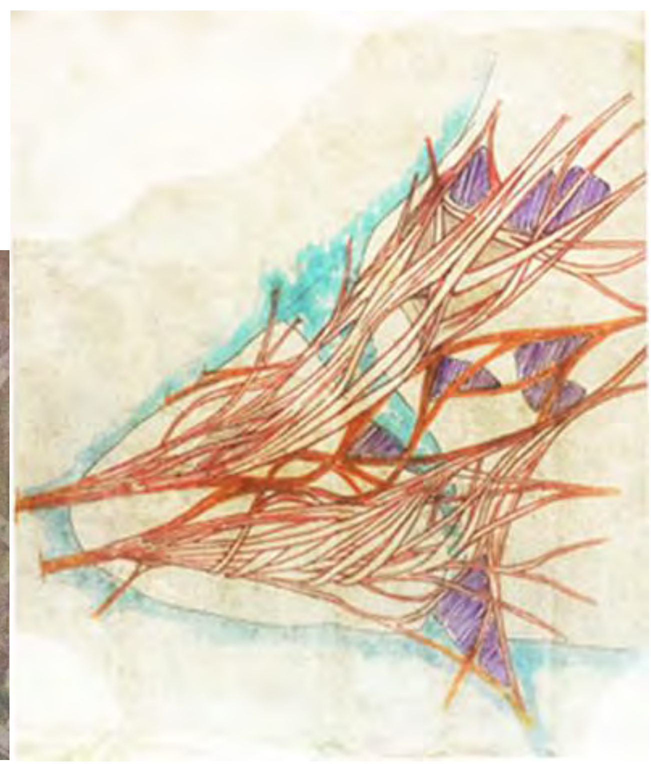
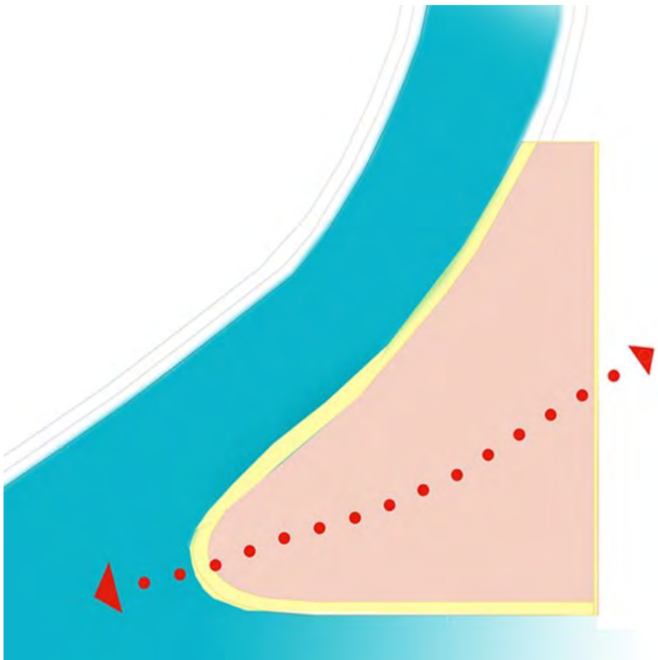


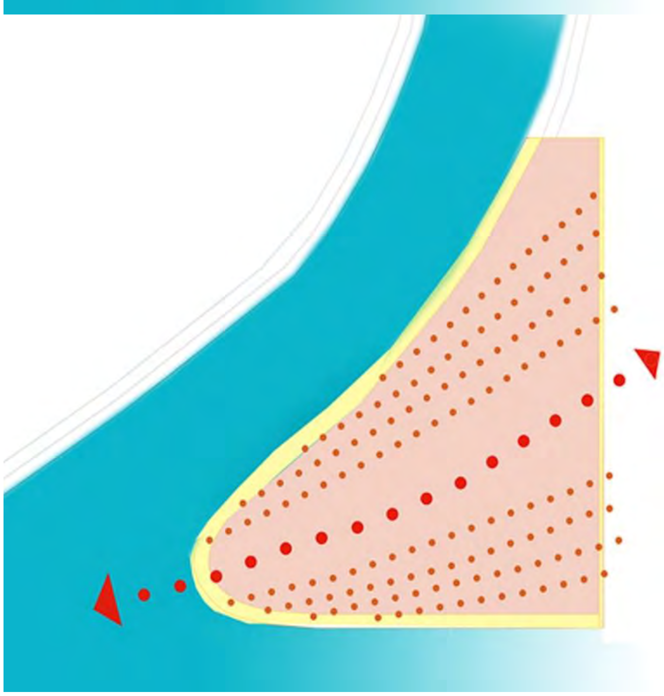
Fig 11a: Conceptual sketch of circulatory veins around muscle tissue

6.3 Form Development & Programmatic Layout

To derive a form using the conceptual ideology, the first thing that was done was to understand the site and its surrounding nature and amenities. Thereafter, the site was hypothetically split into segments reference of a primary axis line connecting site entrance to adjacent waterbody. The concept was to dissect the site in such way that the form could erect from the site and blend in with the waterbody at the edge of the site.

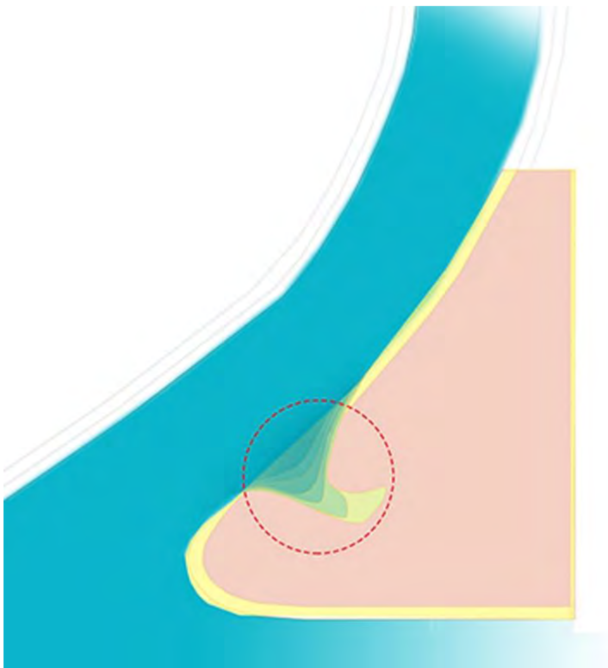


The main axis reference line connecting pedestrian entrance with the waterbody

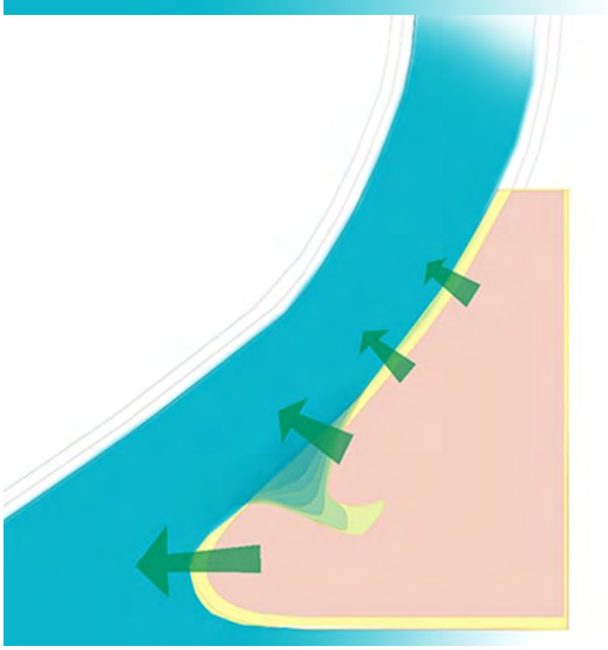


Creating dissection lines along main axis line to slit up the site and erect the

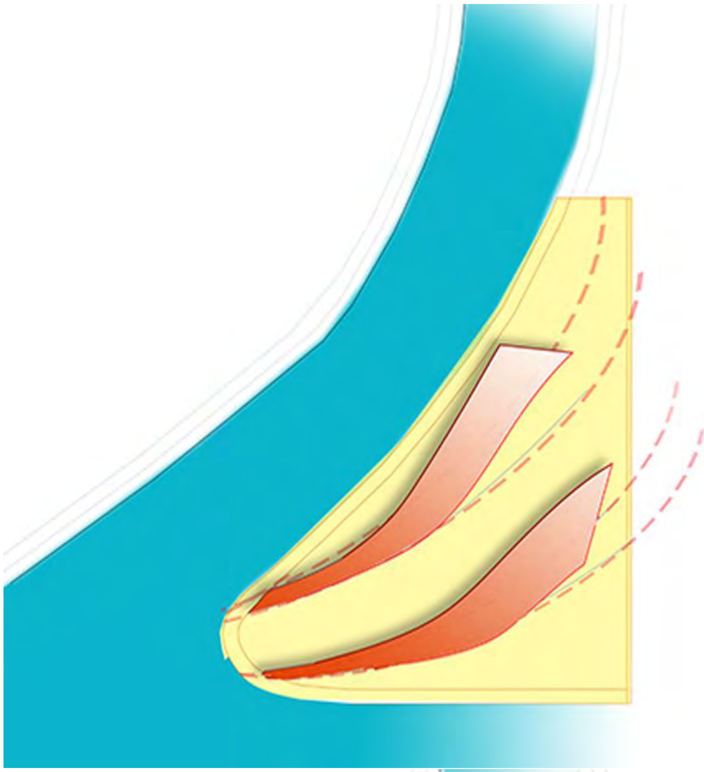
The site was partially scooped out to bring the water in the site as a shallow waterbody to encourage more public interaction with the site. This particular decision was taken in reference of the potential vista points from the site.



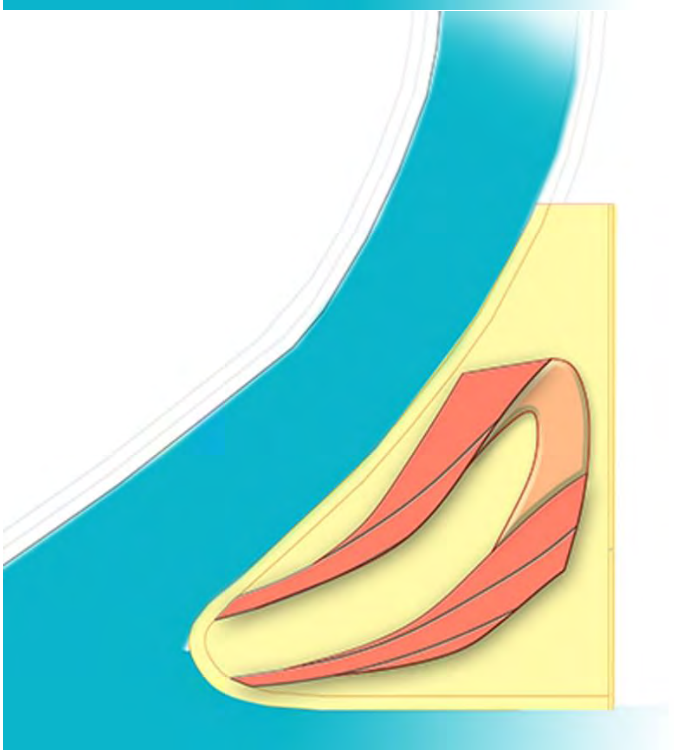
Scooping the site from an edge to create a shallow waterbody



Potential vista points from the site

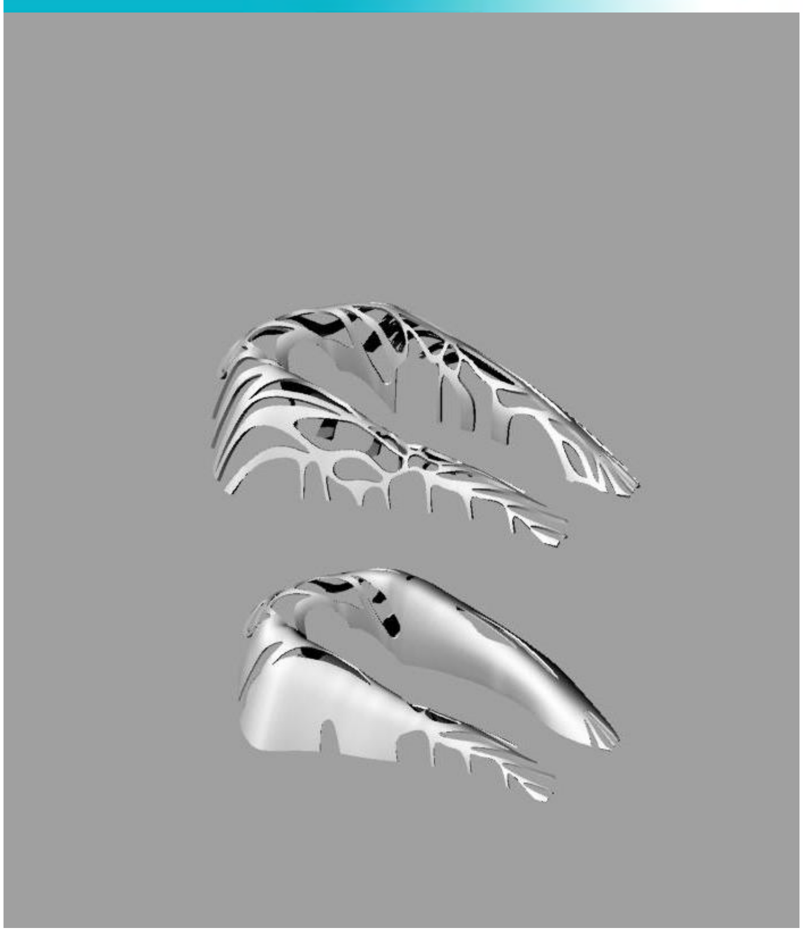


Pulling out the form from the dissected site line

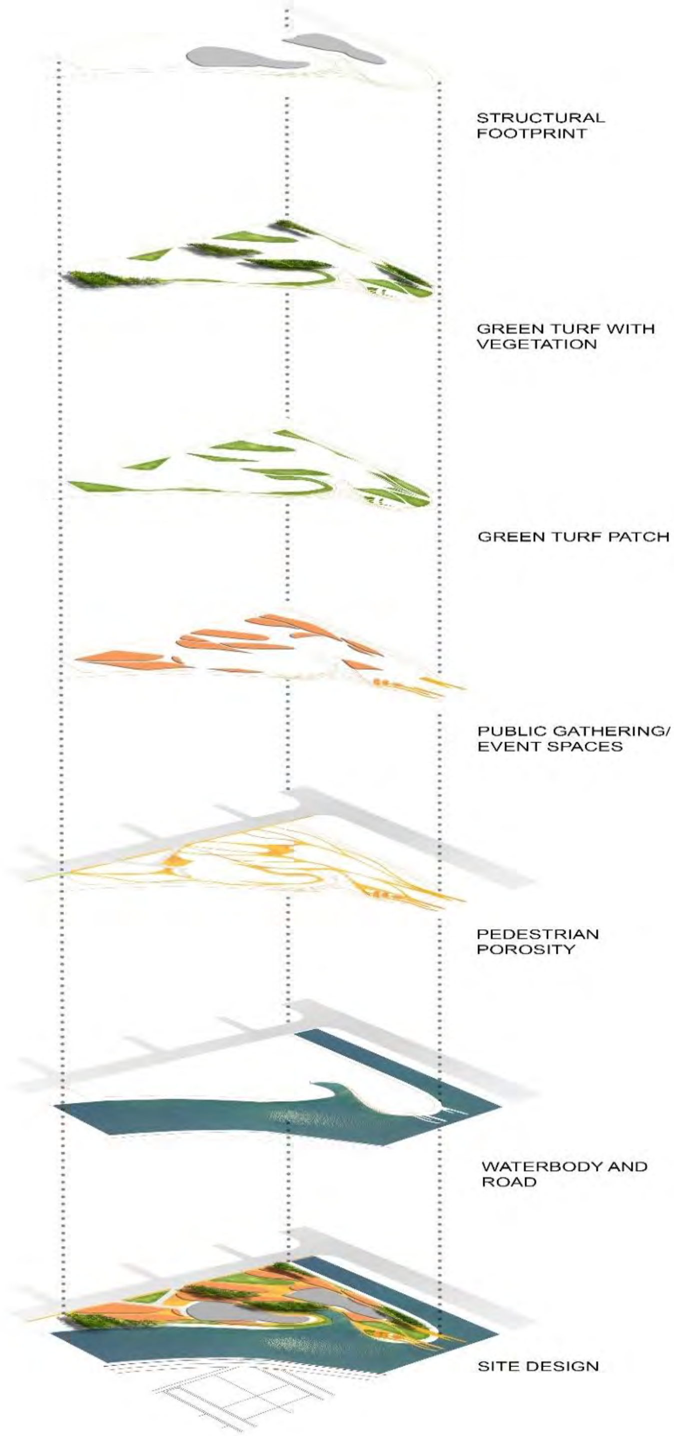


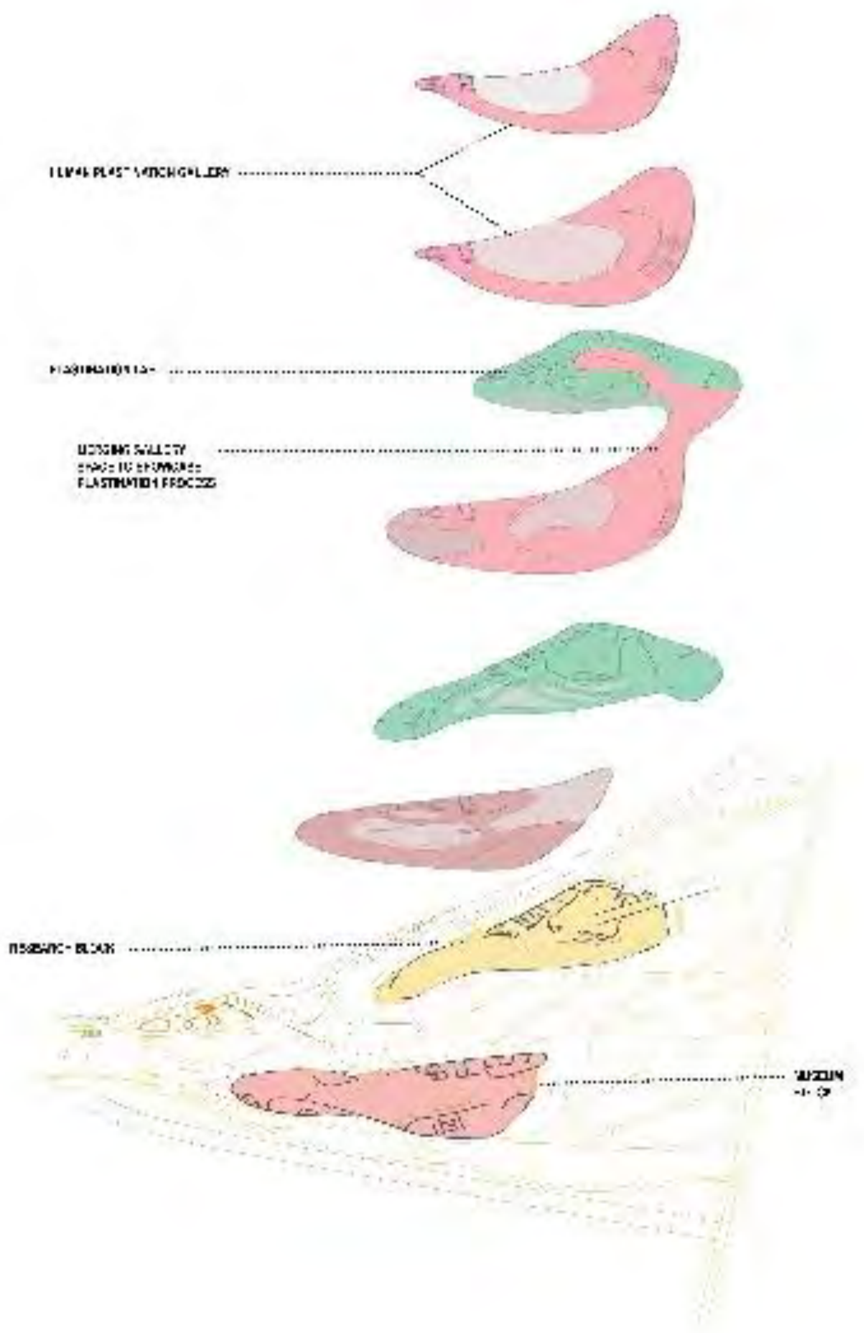
Connecting separate blocks into a unified form

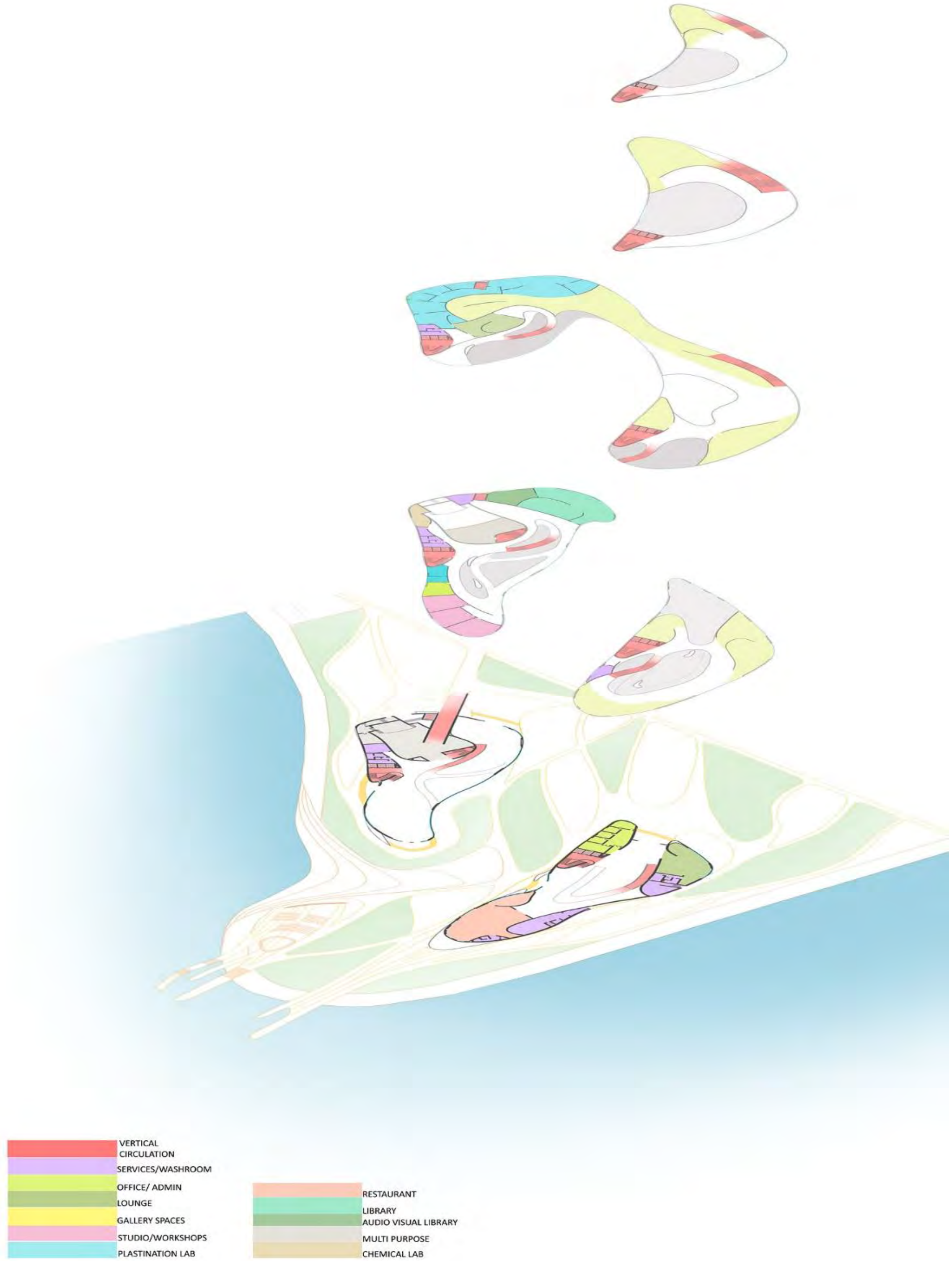
Shell structure pattern derived from muscle fibers formation



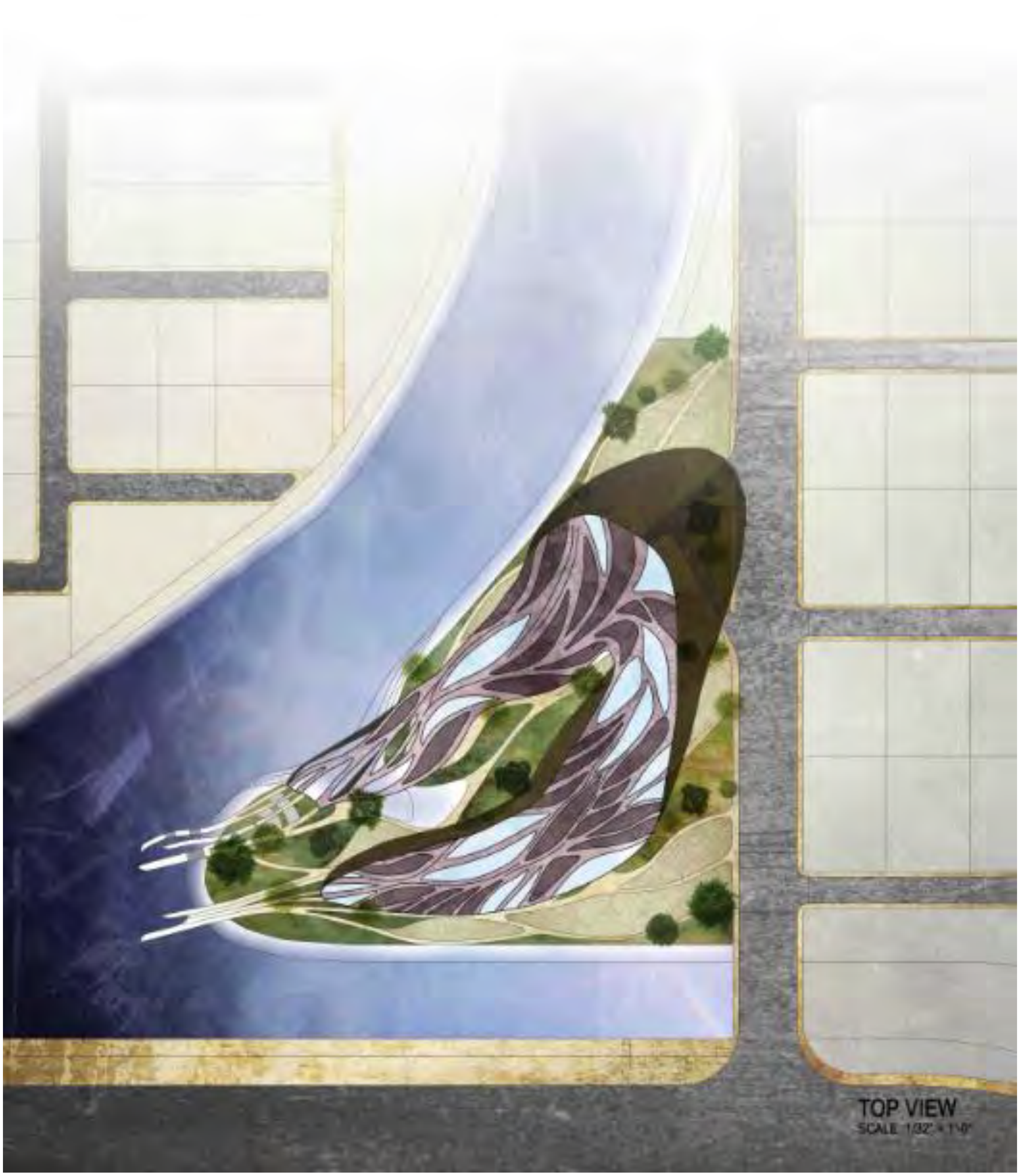
3d shell structure and cladding surface model blow up


STRUCTURAL
FOOTPRINT
GREEN TURF WITH
VEGETATION
GREEN TURF PATCH
PUBLIC GATHERING/
EVENT SPACES
PEDESTRIAN
POROSITY
WATERBODY AND
ROAD
SITE DESIGN


PLASTINATION PROCESS

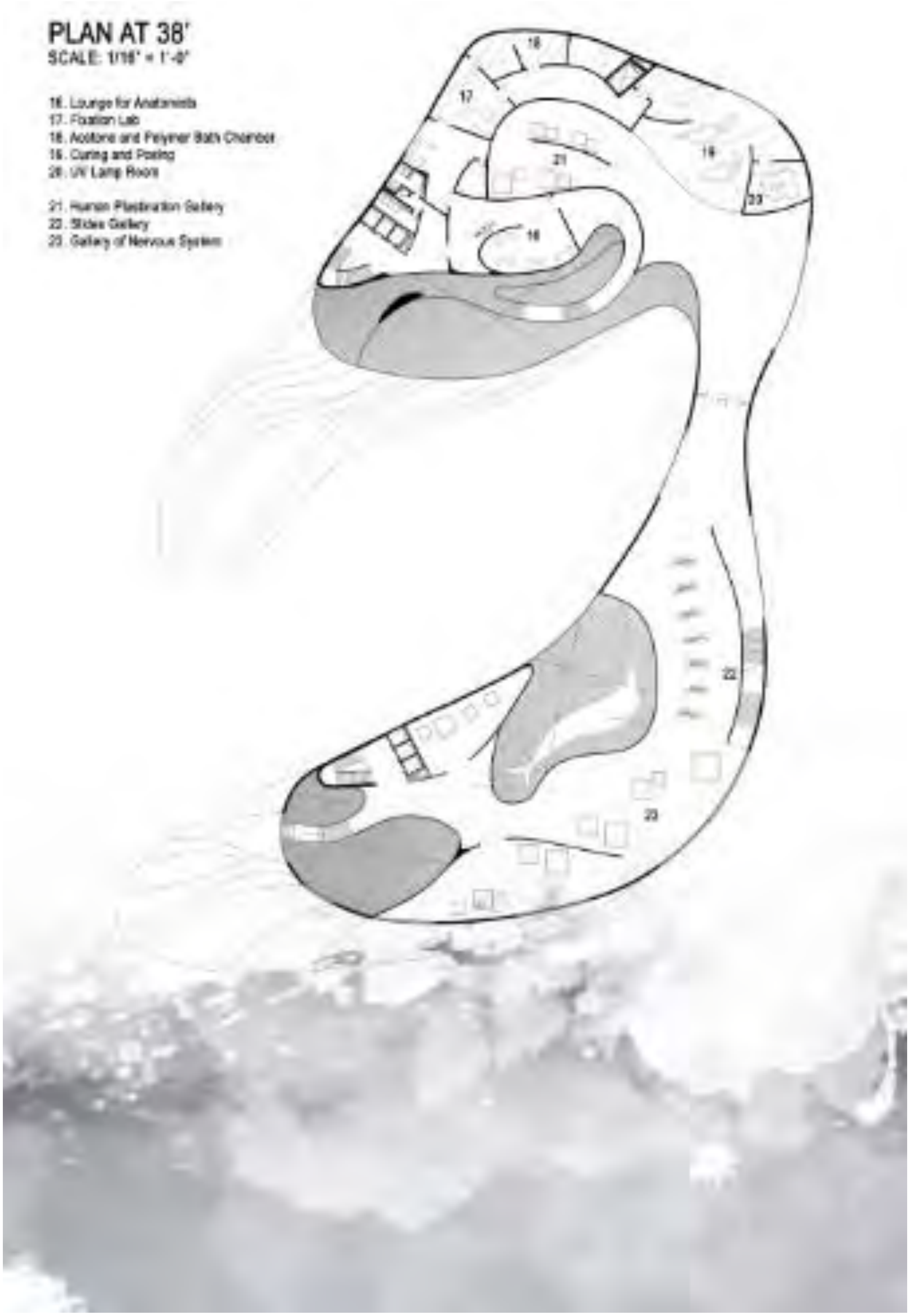

VERTICAL CIRCULATION
SERVICES/WASHROOM
OFFICE/ ADMIN
LOUNGE
GALLERY SPACES
STUDIO/WORKSHOPS
PLASTINATION LAB
RESTAURANT
LIBRARY
AUDIO VISUAL LIBRARY
MULTI PURPOSE
CHEMICAL LAB

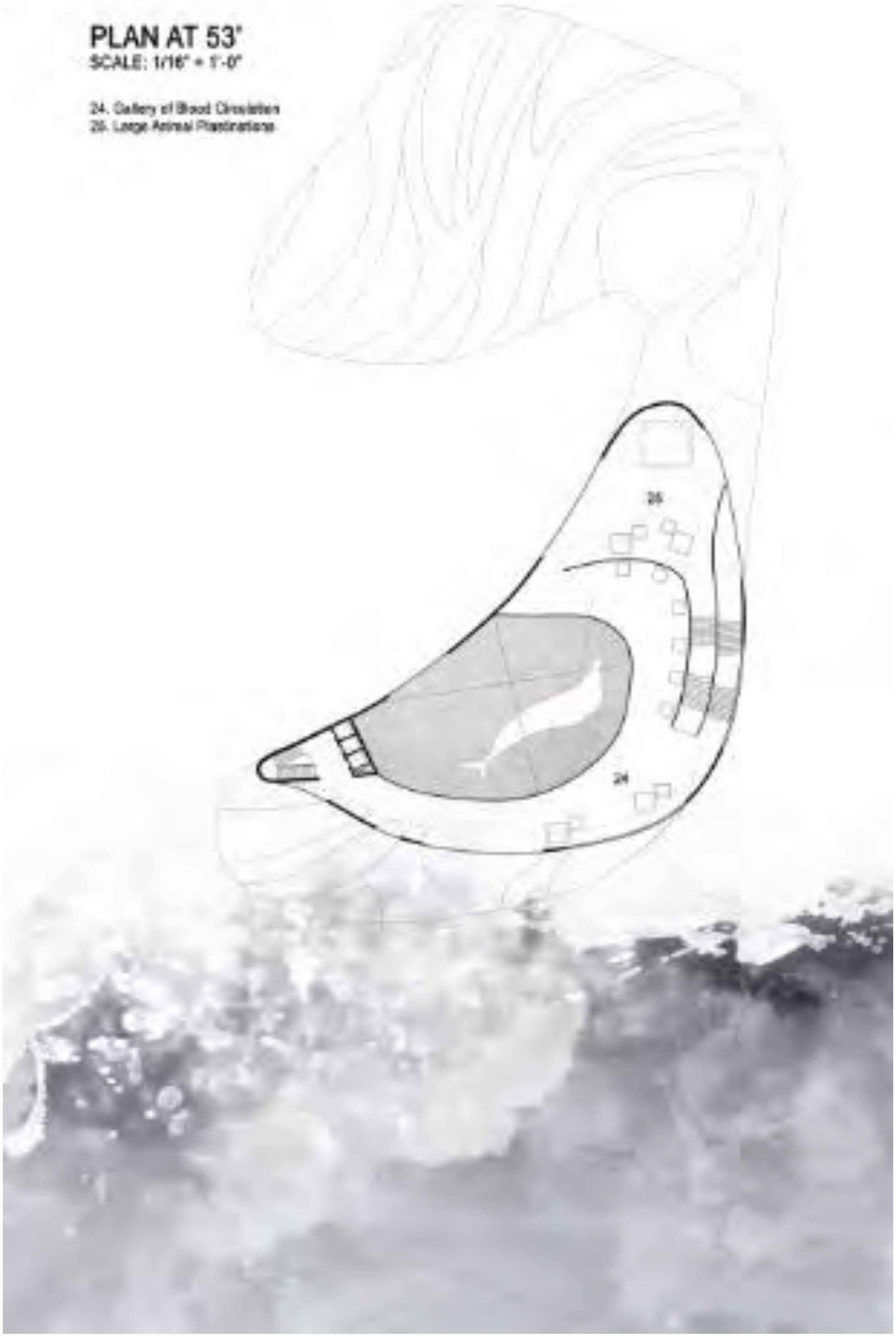
6.4 Final Design Drawings

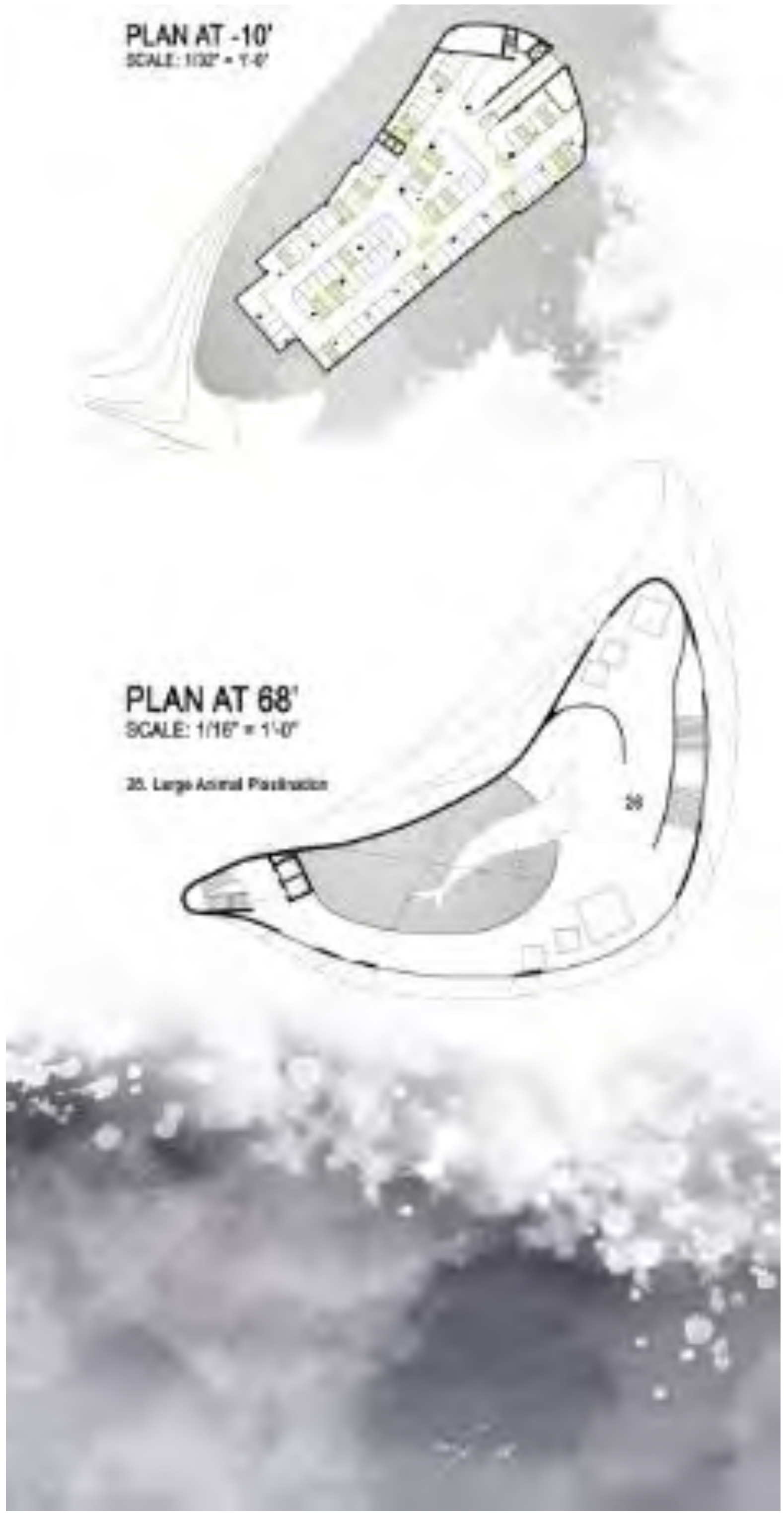


Ground Floor Plan


PLAN AT 23'
SCALE: 1/16" = 1'-0"
6. Multipurpose Hall
7. Computer lab
8. Media Room
9. Office
10. Specimen Studio
11. Library
12. Audio/Visual
13. Open Gallery
14. Gallery of Animals
15. Interactive Gallery Space


PLAN AT 38'
SCALE: 1/16" = 1'-0"
16. Lounge for Anatomists
17. Fixation Lab
18. Acetone and Polymer Bath Chamber
19. Curing and Posing
20. UV Lamp Room
21. Human Plastination Gallery
22. Slides Gallery
23. Gallery of Nervous System


PLAN AT 53'
SCALE: 1/16" = 1'-0"
24. Gallery of Blood Circulation
25. Large Animal Plastinations
25
24

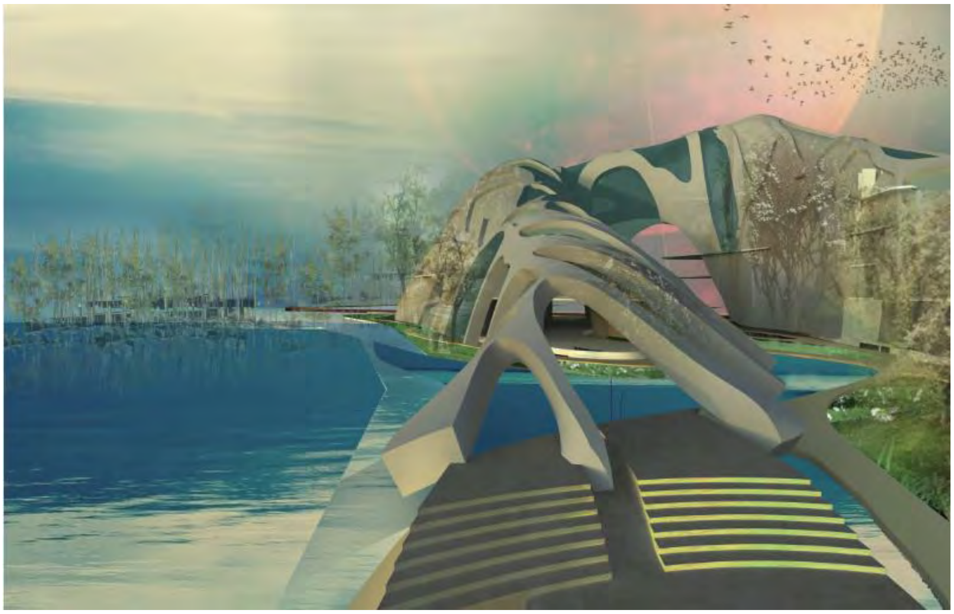

PLAN AT -10'
PLAN AT 68'
SCALE: 1/16" = 1'-0"

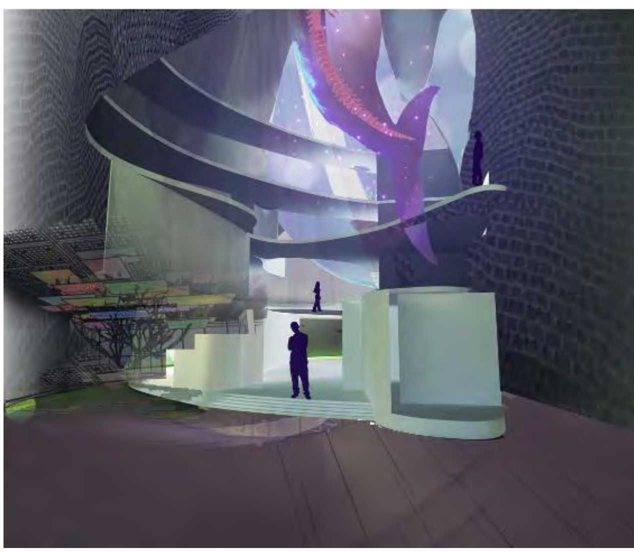

SECTION AA

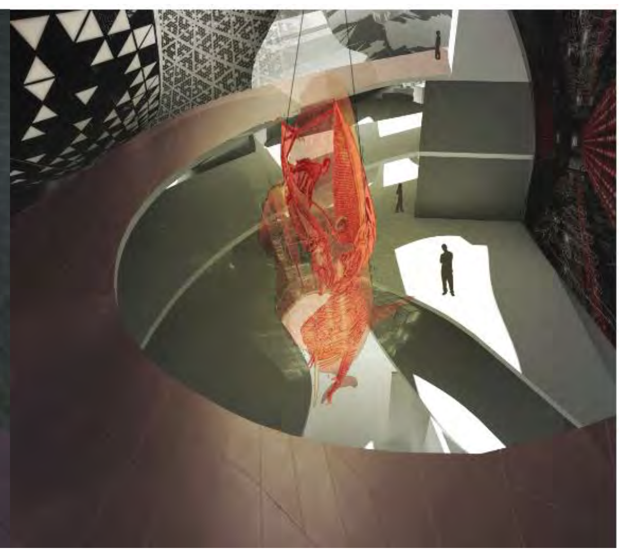

SECTION BB


SOUTH ELEVATION

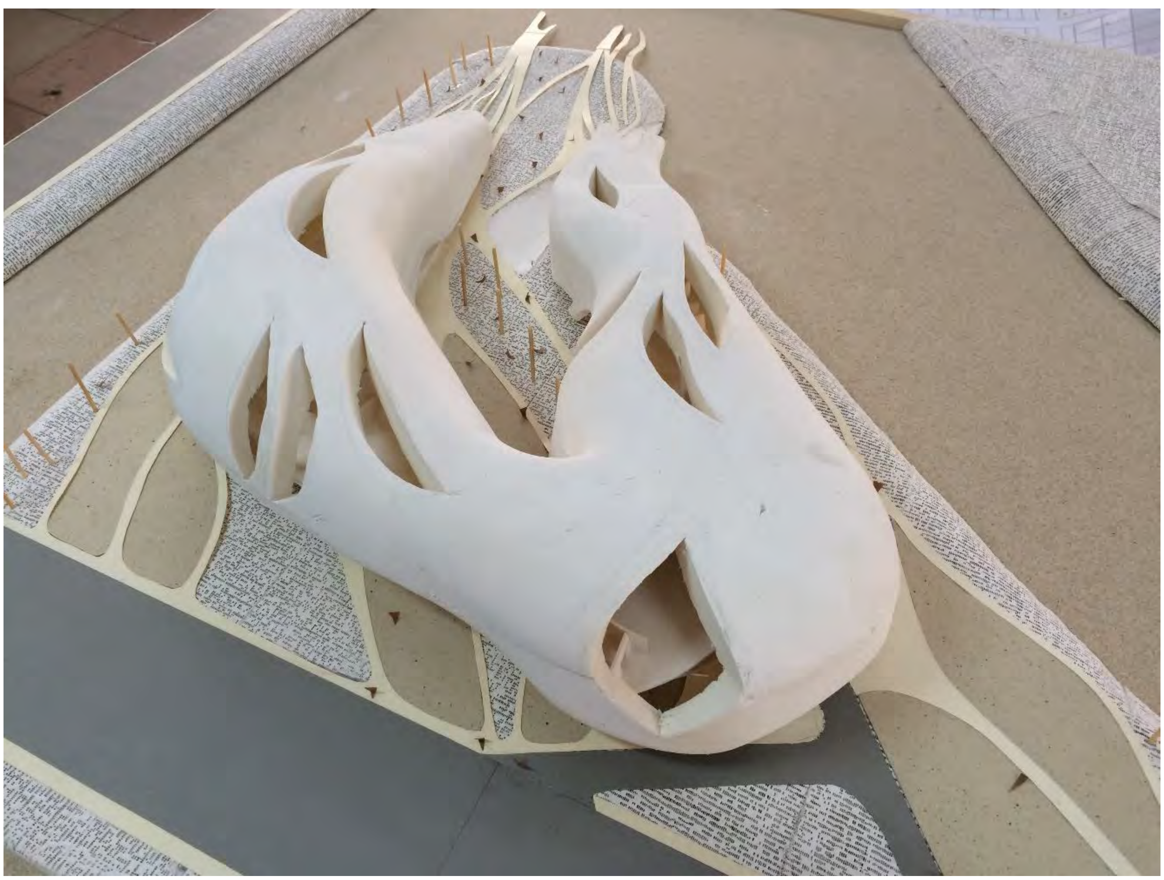
Rendered images

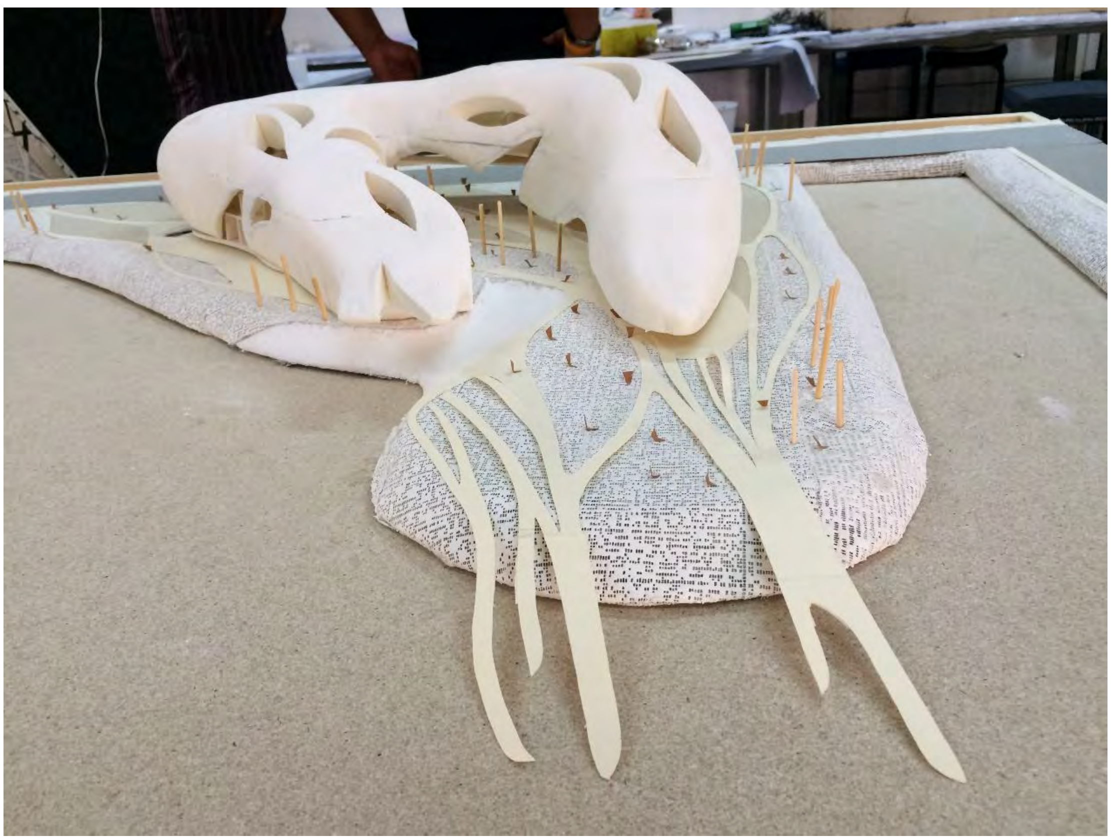






Model Images





Chapter 07: Conclusion

The erodution earned throughout the making of this project is to make people understand the complexity and authenticity of the anatomical existence of every living creature, specially the human anatomy and erect a sense of our transatory life cycle. The design is a contemporary and abtract construal which is heavily influenced by anatomical intricasies of organisms which is quite unique in its own way. The core function of the project is to bring proper attention to the intricate study like anatomical science and showcase the artistic specimens for the sake of a unique kind of knowledge.