



“A JOURNEY FROM THE MIND TO THE SOUL”
MUSEUM OF THE HUMAN BODY - ANATOMY OF MOVEMENT”

key words: museum, human body, da-Vinci, anatomy

TITLE: “A JOURNEY FROM THE MIND TO THE SOUL”

NAME: MARTIN PEREZ-CESPEDES

**THESIS SUBMITTED TO THE GRADUATE FACULTY OF
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
IN PARTIAL FULFILLMENT OF THE DEGREE OF MASTER OF ARCHITECTURE II**

COMMITTEE CHAIR

PAUL EMMONS

COMMITTEE MEMBERS

MARCIA FEUERSTEIN

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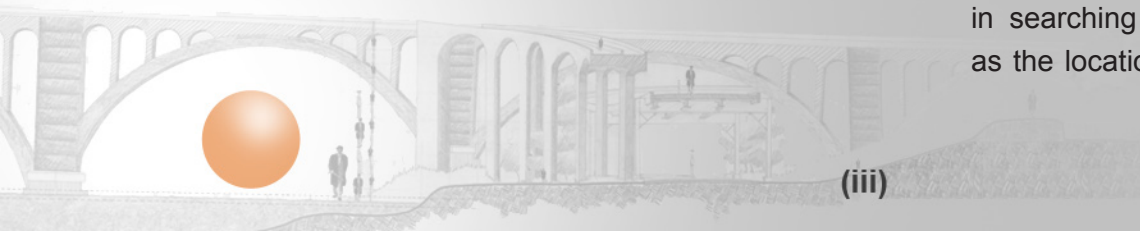
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TITLE: “A JOURNEY FROM THE MIND TO THE SOUL”

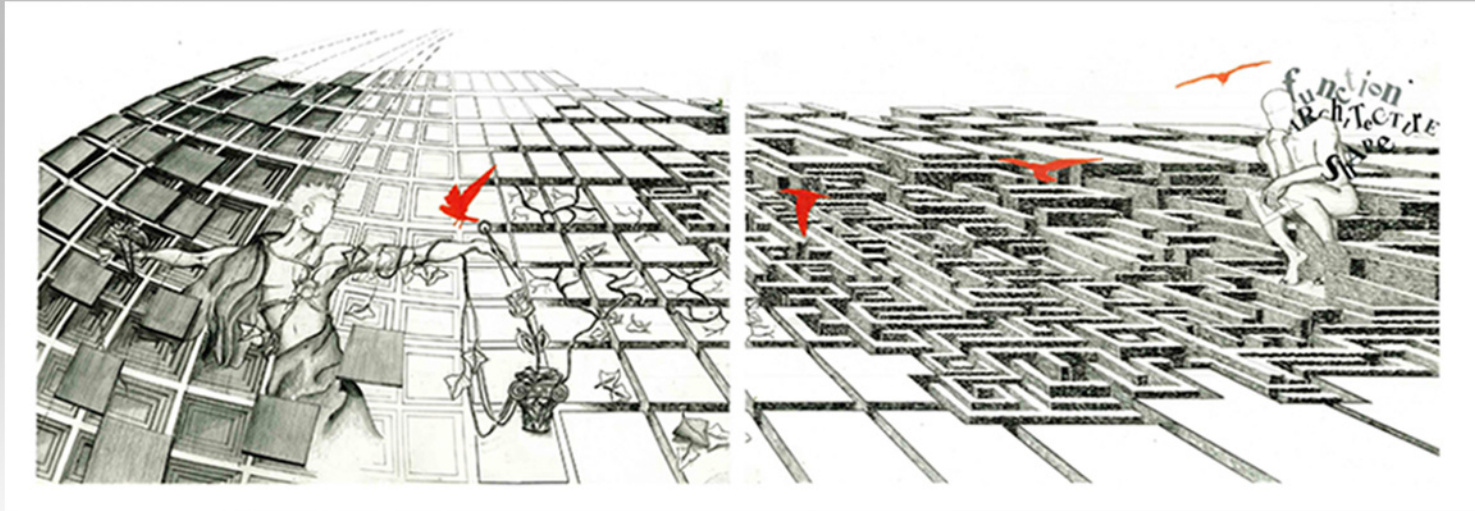
NAME: MARTIN PEREZ-CESPEDES

ABSTRACT

The inspiration for the development of this project - The Museum for the Human Body in Georgetown, Washington D.C. - was based on a study of the anatomy of movement and its Relationship to space. “A Journey from the mind to the soul” is the connective experience linking the spaces of the project (body, mind and soul). This study is inspired by ideas from the early Chinese, Egyptian and Aristotelian philosophies as well as the drawings of Leonardo da Vinci in searching for the “sensus communis” as the location of the soul within the body.



THE PROCESS OF DESIGN



This drawing, the process of design, shows the opposites of creation in the relation of a human being with the environment (nature), in this case the architect. The difference relies on the bases that move ourselves to create and generate spaces. On the right, Auguste Rodin's Thinking Man struggles with concepts and is trapped in a maze of his own creation. On the left, the Creator Man discovers himself connected with nature, where his heart feeds the flower and the flower feeds his heart. He is the equilibrium between reason and experience, and in this way he has achieved his Being, his Soul. This drawing describes the thesis approach.

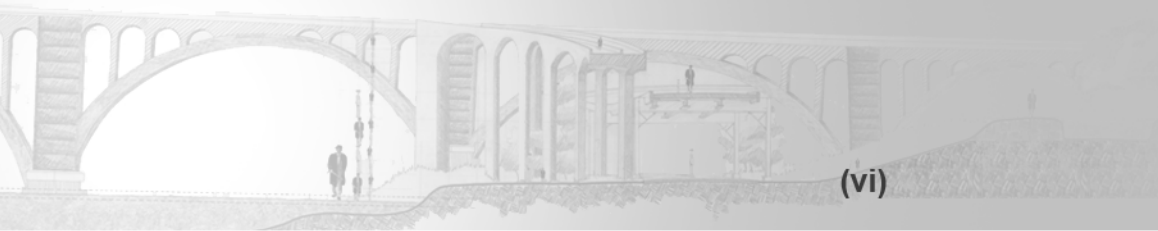


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Aristotle



Galen



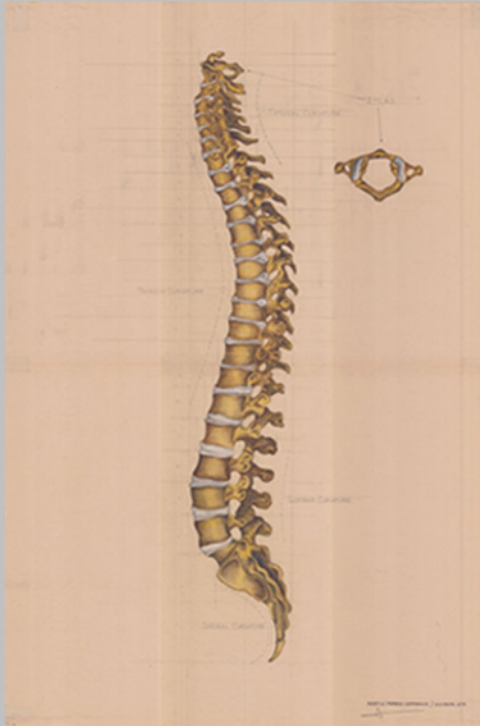
Da-Vinci

A. MIND

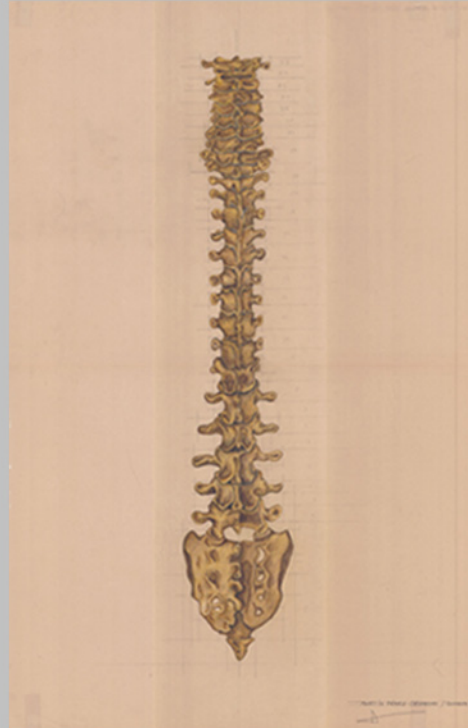
The Mundus Imaginalis is the world of the creative imagination that is an intermediary between the realm of the senses and the intellect. In chapter 10 of “Villa Eolia as hygenico-pneumatic machine and temple of ascelpius”: “The etymological ‘Mundus imaginalis’, the world of imagination, is an intermediary between the realm of senses and that of intellect.” The place of imagination is the equilibrium between the intellect and the senses, which guides humans in the search of “Anima”, the Soul, the real truth of anatomy of movement. In the Mind is where the acceptance and rejection of concepts and ideas happen. It is where “the question” relies. It is the question that lead Galen, Aristotle, Da Vinci and many more: the concept of Anima and the relation with anatomy of movement.

B. BODY

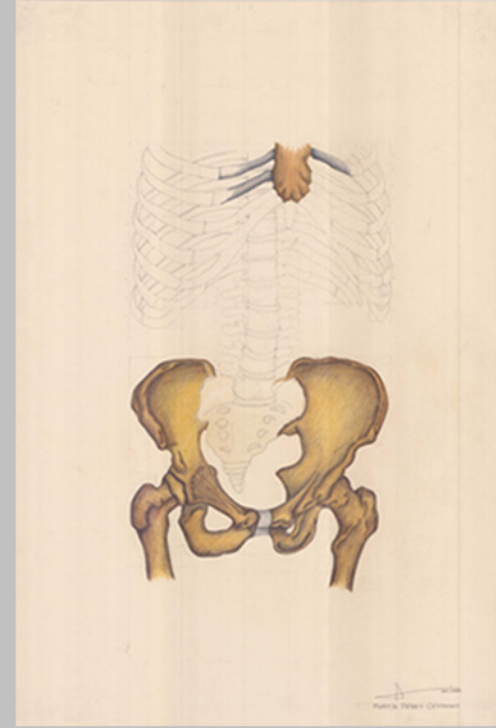
The Body is the medium that allows us to move in space. Our body allows us to experience the world as it is in constant transformation and motion within itself. It has fluids as water (blood) and air (oxygen) that bring the “world” in and out and it is through this process that the body lives. Humans are Beings between heaven and earth.



Human Spine - Side View



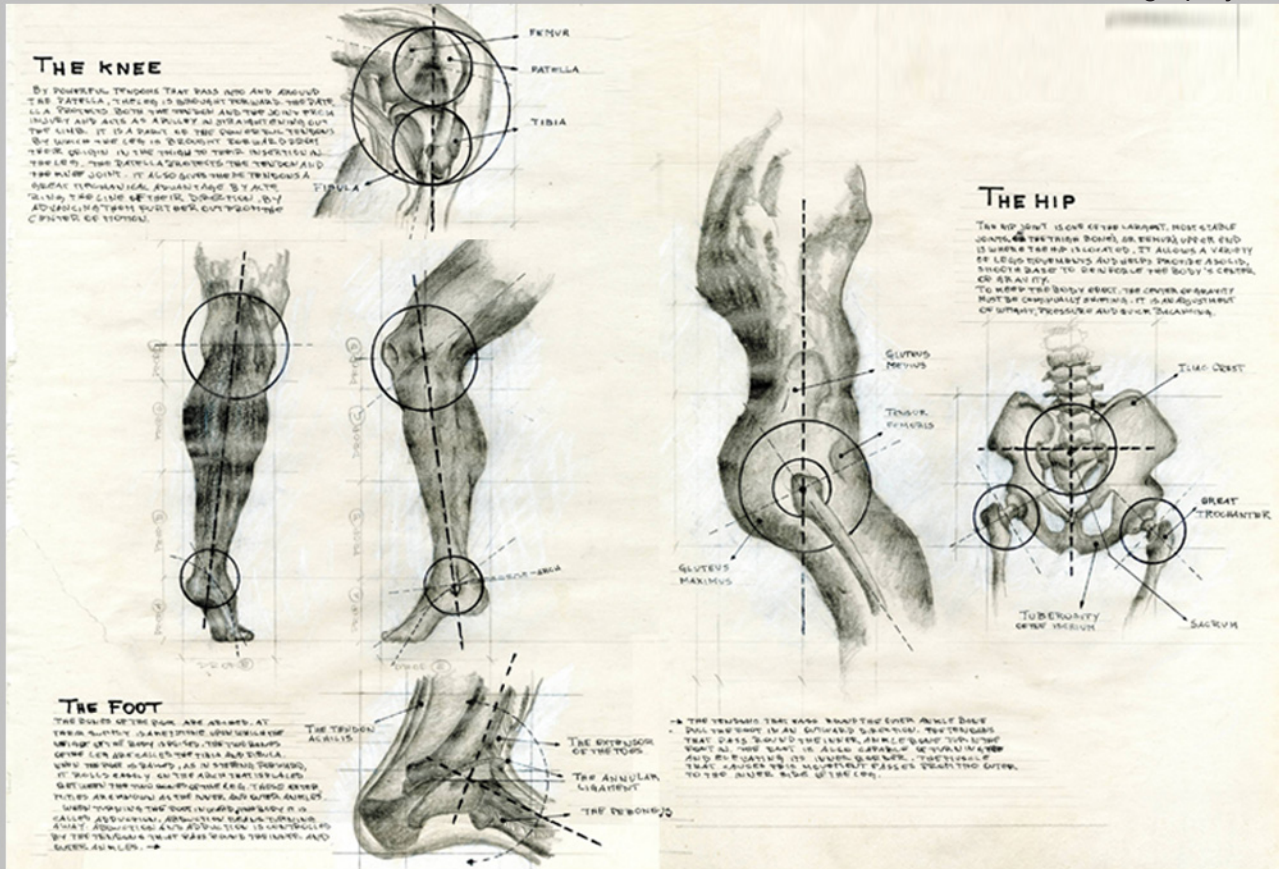
Human Spine - Front View



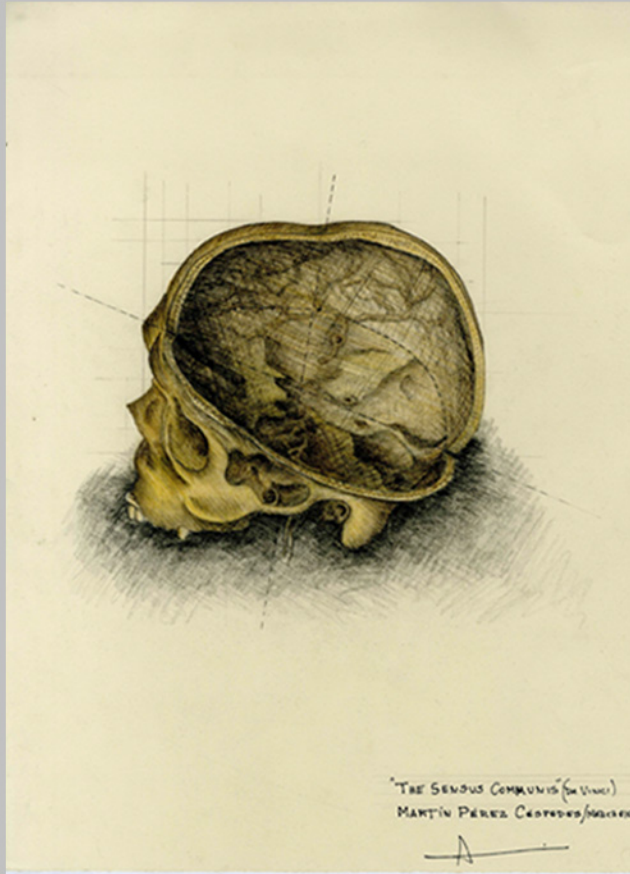
Human Spine - Perspective View

Original drawings made in full scale

In structures, weaknesses are always in the joints. The study of joints in the human body allows understanding of the connection of architectural structural elements. Later, these can be translated into the design project.



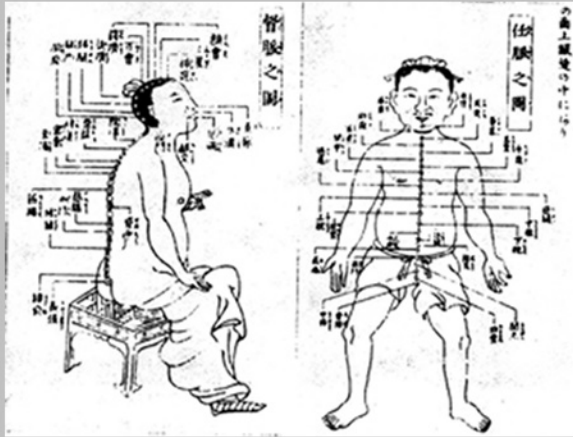
Drawing: Study of the Human joints.



C. THE SOUL / THE ANIMA

The Soul or Anima is where all the senses converge; according to Aristotle and Leonardo it is the place where the Sensus Communis is located. The Soul is the objective point and the concrete fact in the human body. It is beside any point of view. It is when the object of perception is communicated to the brain through more than one sense. Aristotle, in relation to the object of perception, talked about a place where all the senses might converge in one “common sense”. The Sensus Communis is called an internal sense because its organ is not directly affected by that external to the organism (body) but rather by the influences that come from the peripheral sensorial organs.

2- THE SEARCH FOR “SENSUS COMMUNIS” THROUGH HISTORY



Concept of Energy “chi”



Martial Arts

A. Chinese:

Chinese Anatomy - Based on the concept of Energy (Chi), which flows through the body allowing movement to happen. These studies helped them to develop what we know nowadays as Martial Arts.



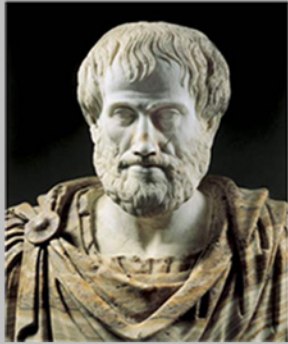
Earliest references of surgery



Surgical Tools

B. Egyptians:

The earliest references to surgery (brain) are found on Egyptian papyrus (17th Century BC). They developed tools for surgery, and some of them are still used nowadays, as knives, drills, saws, and many others.



Aristotle



Galen

C. GREEKS

The ancient Greeks had a special interest in the nature of the world in relation to human powers of perception. Socrates said that we cannot begin to understand the world that surrounds us until we understand our own nature. As I said before, Aristotle talked about a place where all the senses might converge in one “common sense” in relation to the object of perception. The Aristotelian view says that Sensus Communis is the faculty of the psyche that perceives those aspects of the external world which are not the province of one of the particular five senses. The common things are motion, rest, number, shape and size. Things that are proper to none of them, but common to them all. It is impossible to have a particular sense for each of these, as for motion. Aristotle also stated that the place for the sentient Soul and intelligence might be located in the heart, where the Sensus Communis resides. In the Galenic view, the principle of life in physiology was pneuma, which took three forms and had three types of action: 1- an animal (animated) spirit in the brain, center of sensory perceptions and movement. 2- a vital spirit centering on the heart regulated flow of blood and body temperature. 3- a natural spirit residing in the liver, center of nutrition and metabolism. Years later A. Vesalius would discover some errors made by Galen.



Human Anatomy



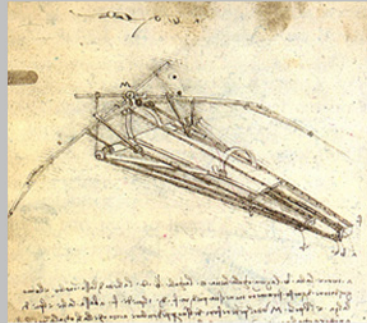
Animal Anatomy



Comparison



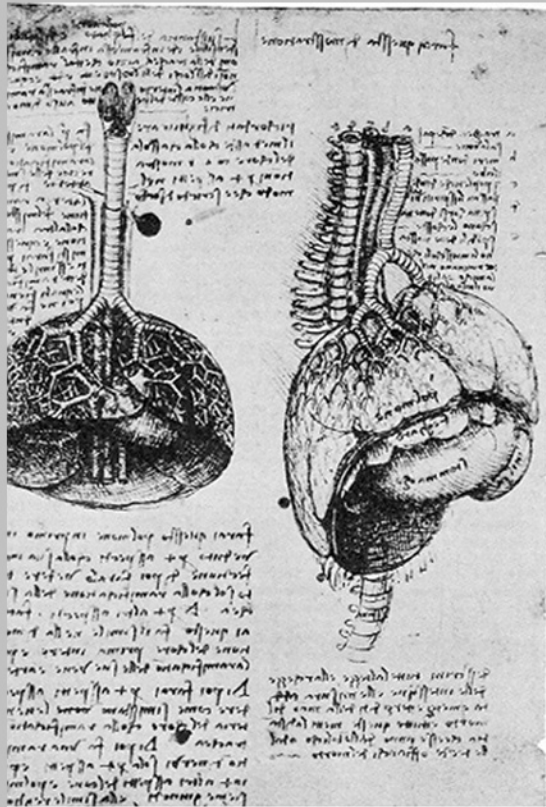
The Flying Machine



D. RENAISSANCE

Leonardo Da-Vinci. He was multitalented and left many contributions to both science and the arts. His curiosities lead him to search and discover many bodily functions unknown at that time; such as the discovery of body movement, where nerves activate muscles. He was very interested in the Human and animal anatomy of movement, which lead him to do many studies. His studies were applied to the design of tools and many objects. His inventions are used still nowadays, such as the helicopter, the umbrella, and many more.

3- PNEUMA

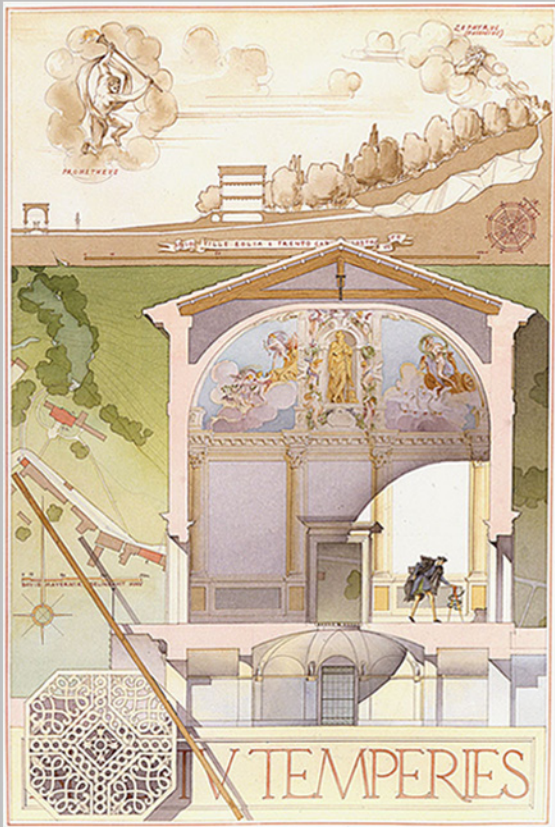


Leonardo Da-Vinci: Study of the Lungs

The Mind, the Body and the Soul need a connector common to all of them that allow their unity. They need a connector that relaxes the mind, puts it in contact with the body, and lets the soul arise. This connector is called Pneuma, which (in Renaissance times) means air, breath, spirit, soul. In Galenical physiology the basic principle of life was the Pneuma, Anima or Spirit drawn into the lungs by the act of respiration. By the act of breathing, Pneuma utilizes the orientation both in space and time. It is a rhythmical process that gives the human being the sense of being in the space. Breath is the only vital process in the body that can be both sympathetic¹ and parasympathetic². Air (oxygen) and blood (water) are the fluids that bring something inside and take something outside the body. By this process they purify the body and keep it alive and healthy.

1- Sympathetic: is part of the autonomic nervous system, its general action is to mobilize the body's resources under stress.

2- Parasympathetic: is one of the divisions of the autonomic nervous system, responsible for regulation of internal organs and glands, which occurs unconsciously.



David Mayernik: Villa Aeolia - Analytique

In Galen's scheme, the vital spirit is carried from the left ventricle of the heart to the brain (through the aorta) where it transforms into the "animal" (animated) spirit, which activates the nervous system through the nerves. The body breathes not just by the lungs, but also through the skin "Cutaneous", from the Latin cutis, which means "from the skin". This is the largest organ in the human body, and is composed by a different series of layers. The general functions of the skin are:

- Protection to the inner organs.
- Temperature.
- Dehydration.
- Assimilation
- Haptic

Sample: Villa Eolia, (located in Italy and built on top of a cave, where this runs air in and out the villa) brief description where this analogy of the Body and Architecture is joined by Pneuma In chapter 10 of "Villa Eolia as hygienico-pneumatic machine and temple of ascelpius" Renaissance edifices were built not only to provide a place for dwelling and a place to display the harmony of its forms, but also to make us experience spiritual inwardness within its physical construction. They provide an ideal for the art of well-being.

4- PROJECT SITE



The site is located in Georgetown, DC at the intersection of the Key bridge with “M” street and the Whitehurst Freeway. The Site was chosen after the studies of “comfort” and “discomfort”, looking at the human body’s ability to adapt to the surrounding environment in order to create the best situation for itself. Adaptability to the context to generate the best situation for itself was the conclusion of this investigation. The discomfort of the site is created by several conditions that give it these characteristics:

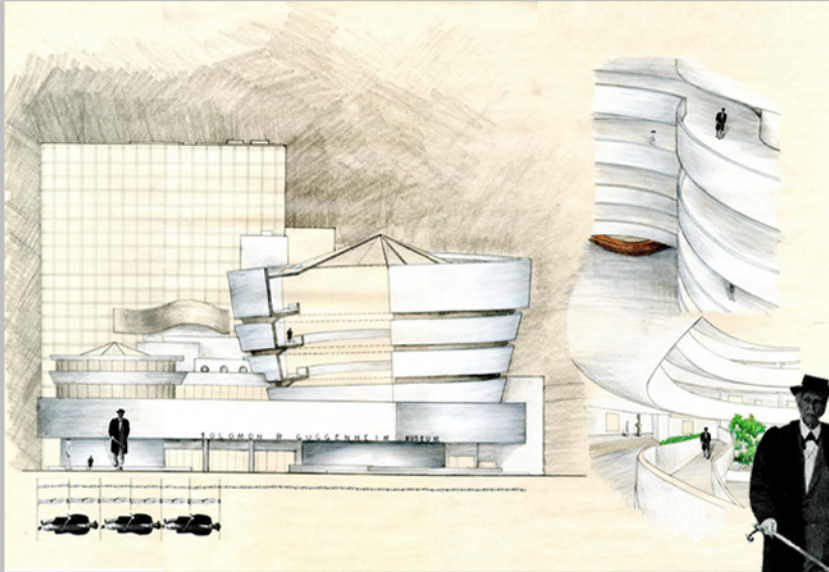
-Historical: the Key bridge and the Chesapeake canal, where the key bridge is the most influential factor in the context. The canal was used centuries ago to take water to further towns, such as Alexandria.

-Natural: The Potomac river, which is the south boundary of the site.

-Geographical: the height difference from “M” street to the Potomac River, which is about 75’-00”. - Manmade: the Whitehurst Freeway, which as the Chesapeake canal, it generates another division on the site.

In terms of the master-plan, these factors divide the site into three parts, making it complex and challenging to design: (1) at M Street, (2) Between the canal and the overhead freeway, and (3) between the freeway and the river. I decided to take this apparent disadvantage as a source of inspiration to approach the design of the project.





Drawing: Study of the Guggenheim Museum. (size: 18" x 36")

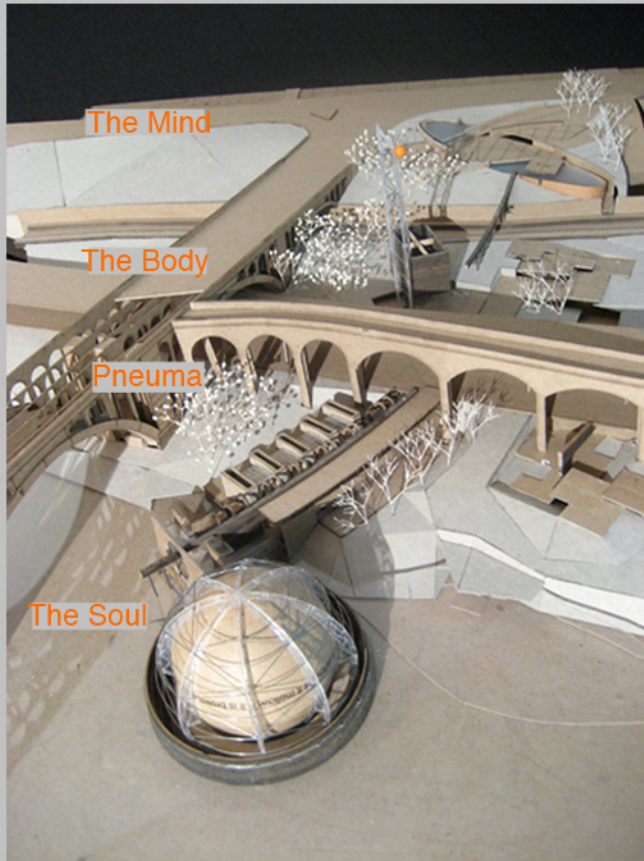
The Guggenheim Museum in New York was one of my case studies for the understanding of a museum composition. This museum is a good sample of interaction and adaptation to the context. It also contains a careful study of the interior space in relation to body movement throughout the project. In this case my analysis was made following the proportions of the building in relation to the proportions of the human body (Frank Lloyd Wright in this case). I translated this study onto the site in order to have a reference of the appropriate size of the museum that I was going to design.



Drawing: Section of the Site. (size: 11" x 52")



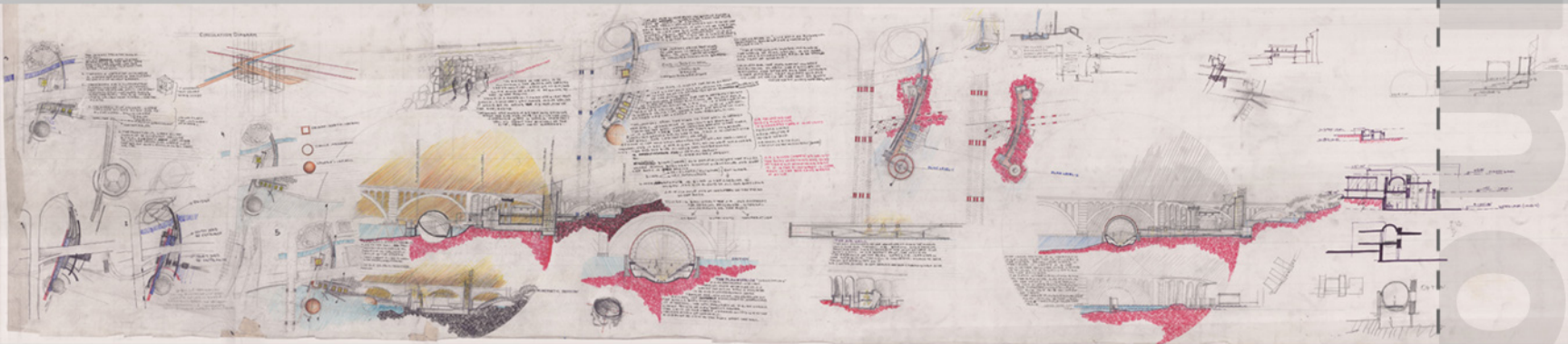
5- “A JOURNEY FROM THE MIND TO THE SOUL”



As already noted, the site was chosen after the studies of “comfort” and “discomfort”, looking at the human body’s ability to adapt to the surrounding environment to create the best situation for itself. So, the division of the project, following the changes of the site, consists in three parts, one dedicated to the mind, another to the body, and the last one to the Soul. Each part of the project corresponds to one of the three parts of the site, being connected by underground circulations and exposed circulations, based on the studies about Pneuma.



Early sketches: The biggest architectural challenge of the project was to achieve the best possible connection of the three divisions of the site, the Mind, the Body and the Soul. This series of sketches searched for the balance of the three parts. In the section I mainly studied the crossings from one part to the next one: from the Mind to the Body, through a bridge which crosses; the Chesapeake Canal; and through the body to the Soul, through a series of two corridors/tunnels which crosses underneath the Freeway.



Original drawing: 7 feet long by 1,5 foot wide



Model: scale: 1"=32'

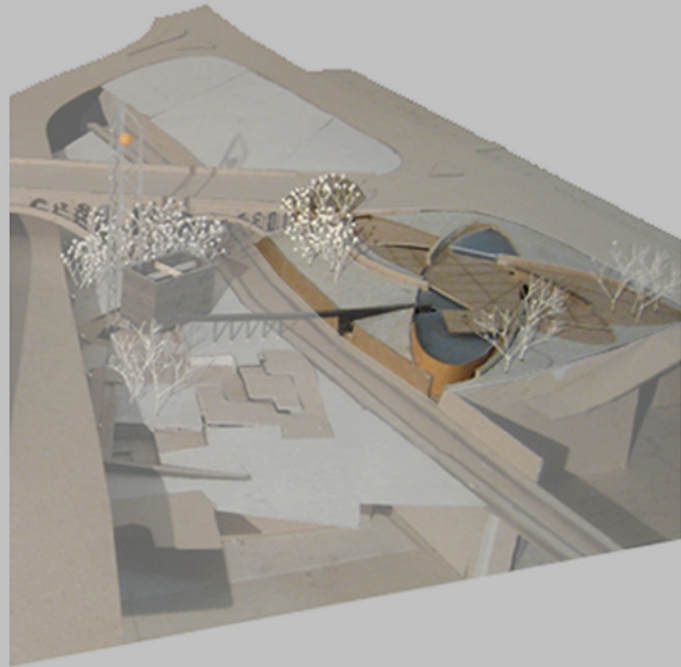
A. THE MIND / THE PLAZA

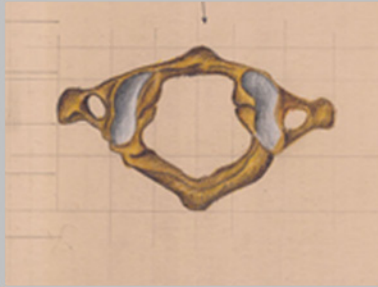
As I said before, "it is in the Mind where the acceptance and rejection of concepts and ideas happens. It is where "the question relies." So I decided to use an ellipse because it is an oblique and a perspective view of a circle; as a theory it is a perspective view of the soul. It includes two or more centers, and two perpendicular and different forces where one is bigger than the other one. By this description an ellipse is a constant movement and search after a unique center. It represents the search through history after the concept of Anima and the relation to the Anatomy of Movement. The water cycle begins in the plaza.





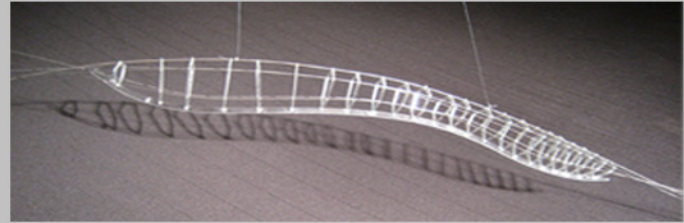
It highlights the beginning of the journey, the place to access the body-the museum, and traveling through the “spinal wall”, it finally returns to its source, the river, the place where the Soul sits. This process represents the fluids of the human body, making the building alive.

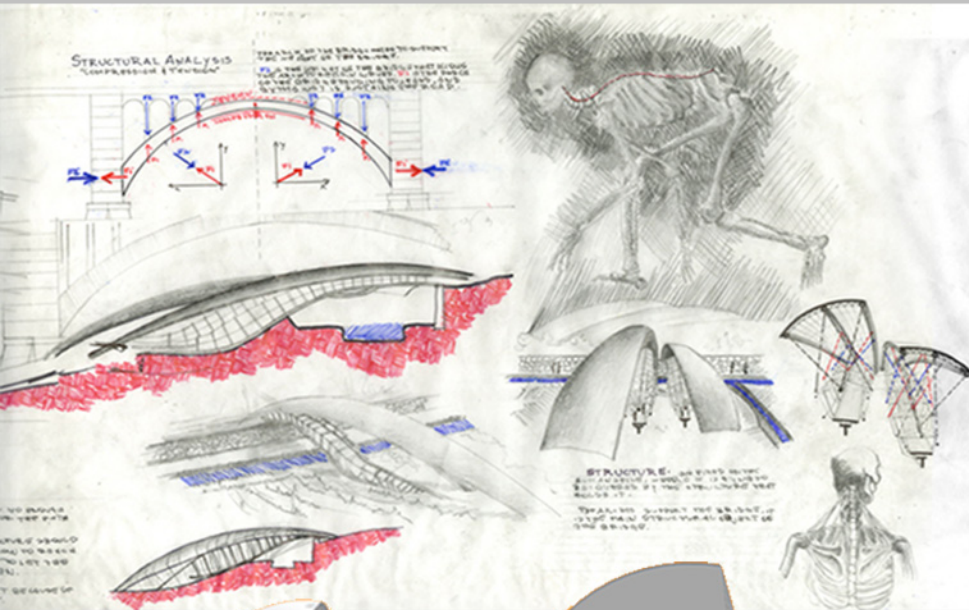




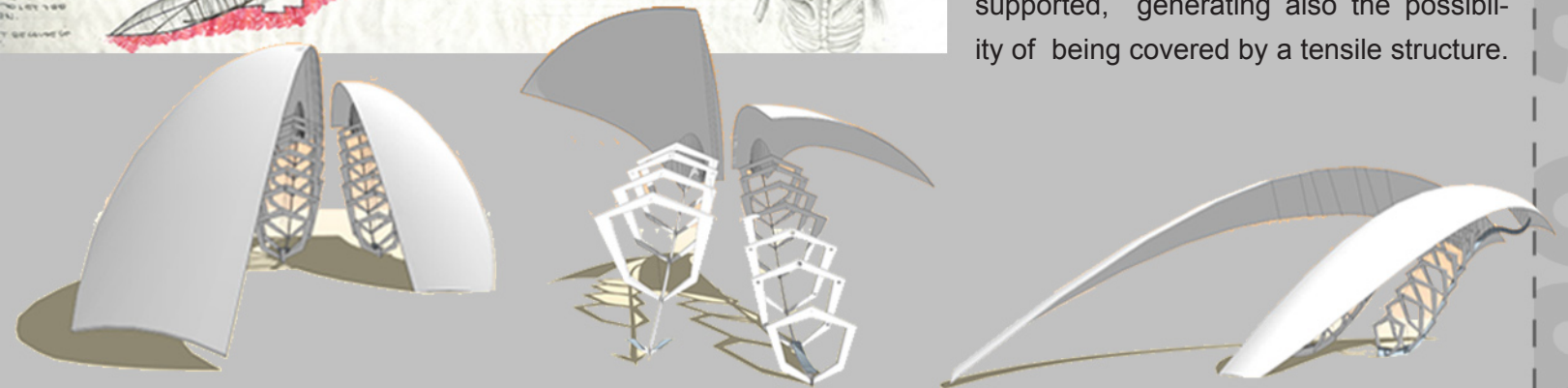
B. THE BODY / THE ACCESS HALL

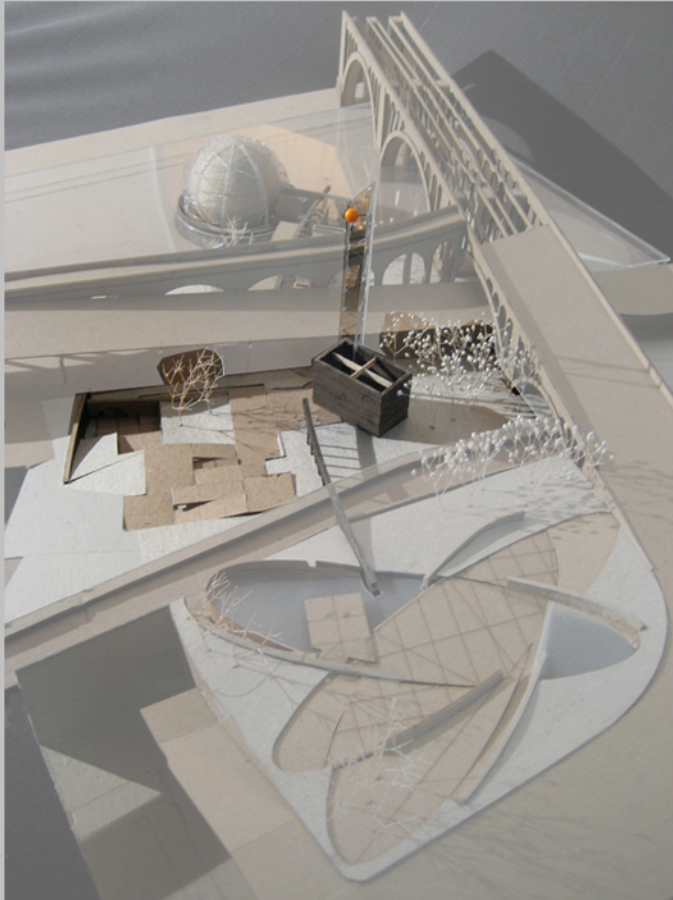
The transition from the mind to the body is through the experience of the site. The bridge inspired on the curvature and composition of the human spine, follows the curvature of the terrain. For the structure of the bridge, I decided to base myself on the studies of the first vertebra called “Atlas”. Atlas was a Greek semi-god condemned to carry the world on his shoulders. So, this vertebra is the one that sustains our world of imagination (our mind).





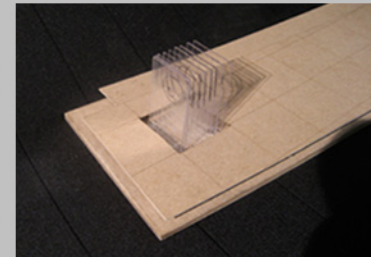
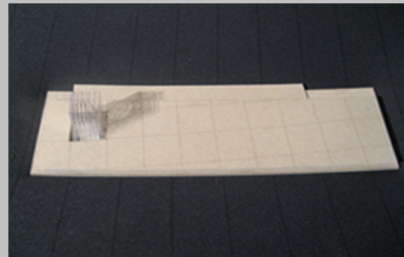
The structure of the bridge was inspired not only on the studies of the human spine, but also on the analysis of the arches that support the Key Bridge as well as the early studies of Leonardo Da Vinci about the movement of the head and the structure of the neck. The arches of the Key bridge are maintained by a series of punctuated vertical forces, in the bridge I designed I used a similar concept, but instead of generating a compression, the forces produce a tension. By this way, the spine bridge is supported, generating also the possibility of being covered by a tensile structure.

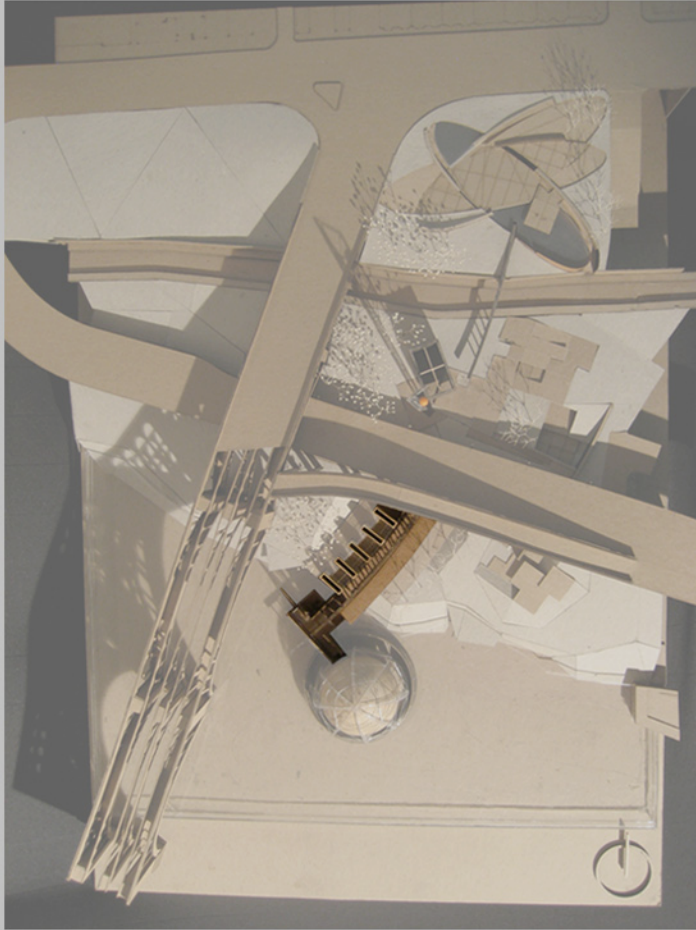




The access:

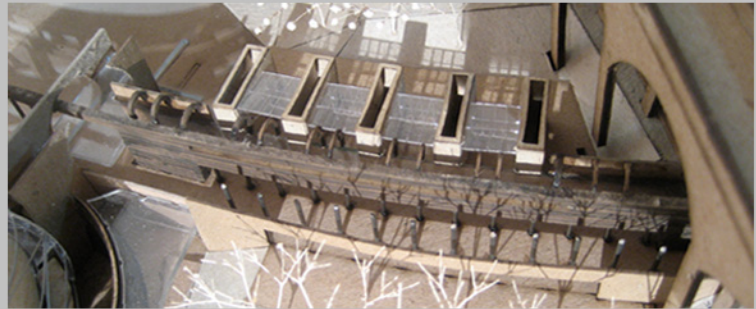
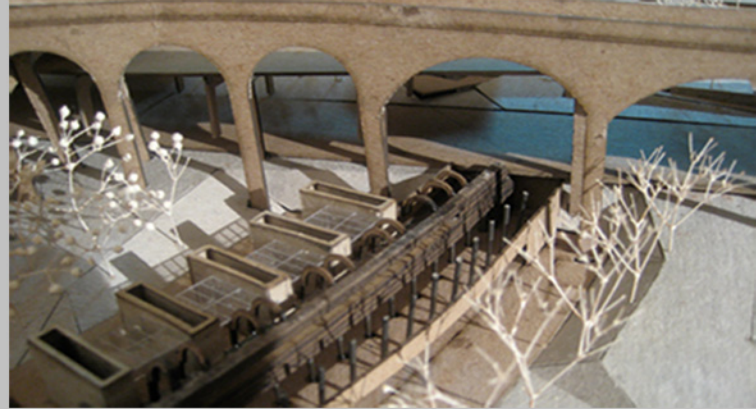
The square represents the earth, the measurable. The towers represent the physical existence of the human body on earth, present in all directions in the space. The cube is the place for the access hall, from where the observer, through a platform, enters the museum. The observer follows the search of the Anima through the act of digging into the human body. There is a small sculpture in the courtyard before entering the museum, which represents the subtle presence of the Soul. It is the equilibrium between imagination (where an object is not real) and perception (where the object is real).





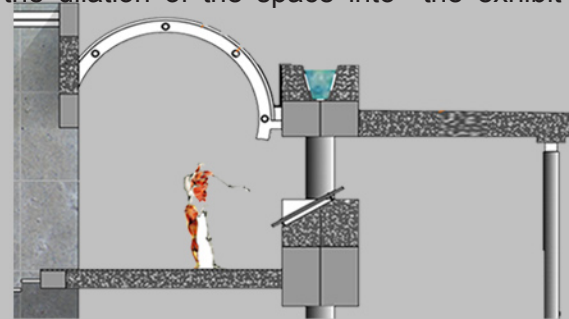
C. PNEUMA

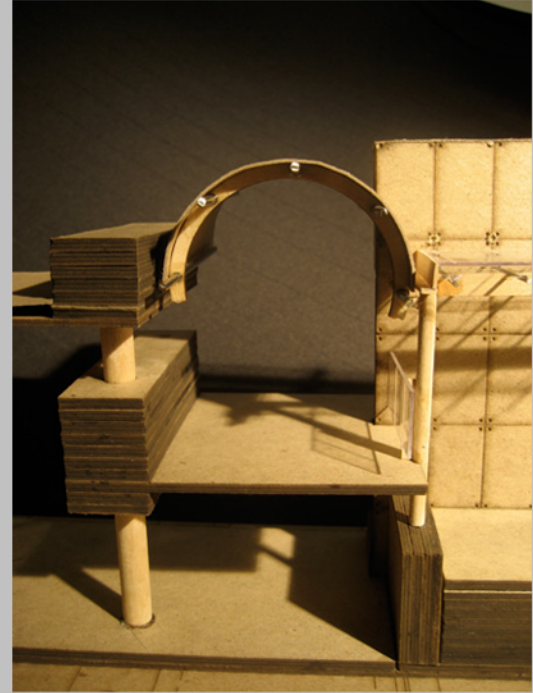
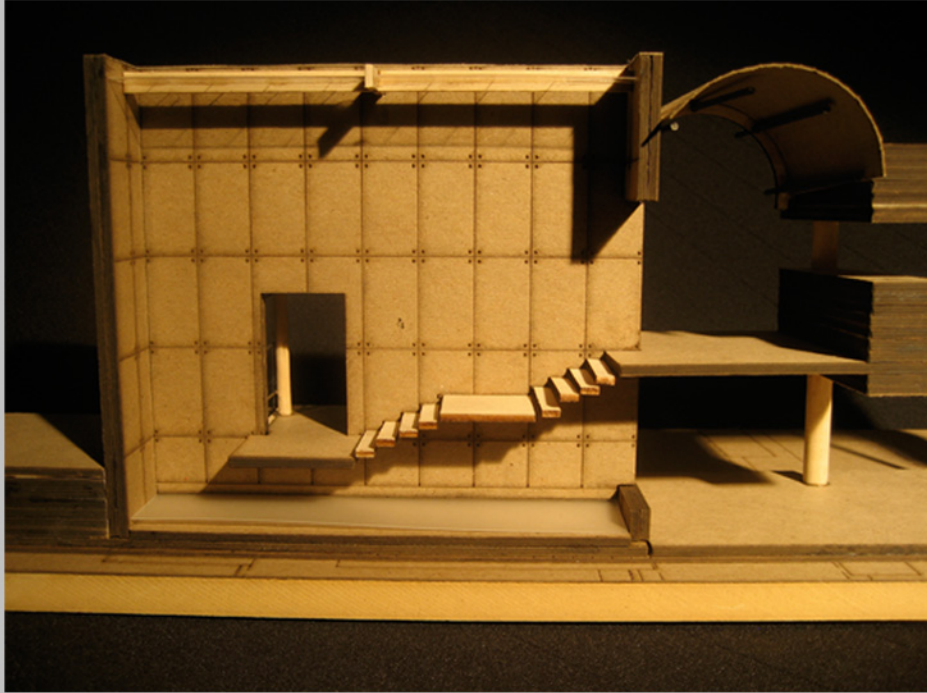
As I explained before, the Mind, the Body and the Soul need a connector common to all of them that allows their unity. This connector has to be able to relax the mind, put it in contact with the body, and let the soul arise.





a) The Circulation: Air, breath, soul... The act of breathing is the connector in the project. The Soul enters the Body by the act of breathing – Pneuma. The decision of making a corridor for the museum comes after the idea of the air cycle in the body, where the “cavities” have a series of arches that, as in air going to the lungs, gets purified; they accompany the observer, in a rhythmical journey to the soul. The vaulted corridor has a circular section, which centre points to the observer, who is the carrier of the Soul in himself. By the act of breathing, Pneuma utilizes the orientation both in space and time by the expansion and contraction of the lungs. This process is represented by the dilation of the space into the exhibit rooms.

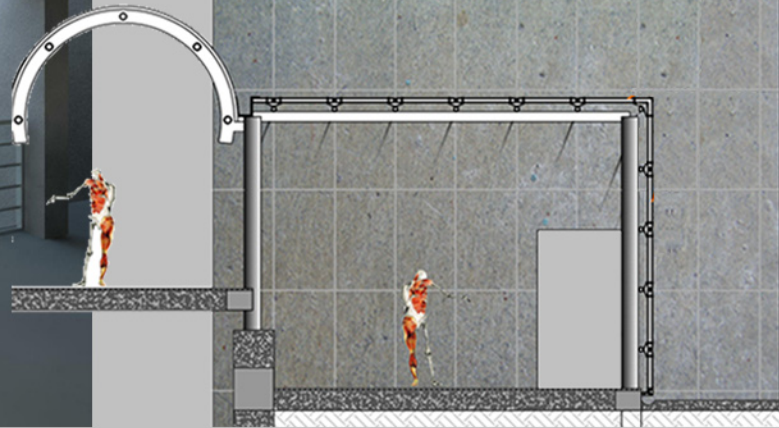


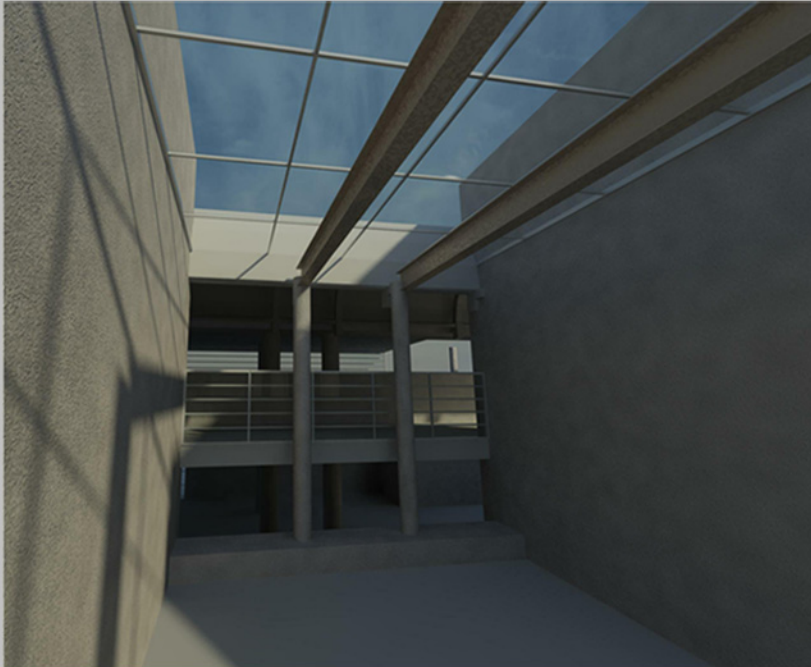


Original model made in $1/8"=1'$ scale

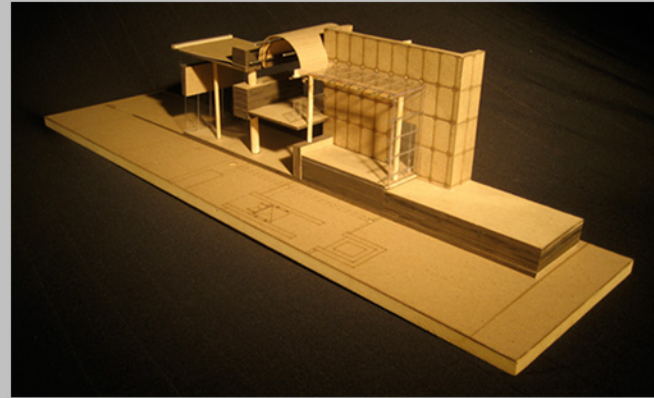


b) The Exhibit Rooms: the term “to give air” or “to let something breath” is usually used to express that something occupy its own place in space. By this way, Pneuma is allowed to flow and make the room “breath”.

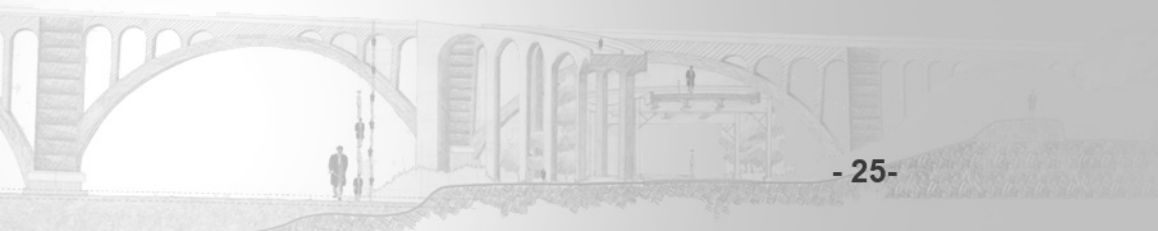




The glazed rooms permit the observers to experience the “skin of the building” where it makes them have an imaginary haptic experience of the context. The body breathes not just by the lungs, but also through the skin. “Cutaneous”, from the Latin *cutis*, which means “from the skin”.



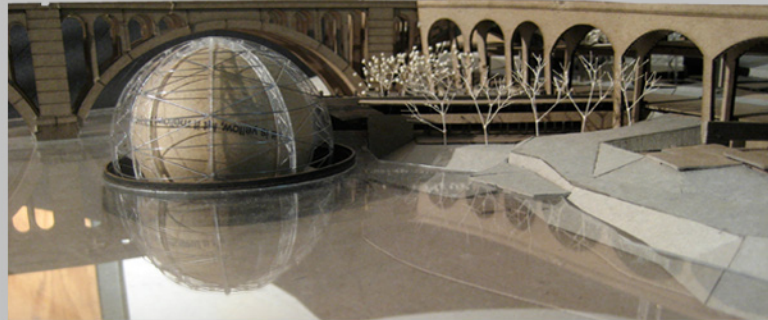
All this process prepares the observer for the last state of the museum, to the actual purpose of it...



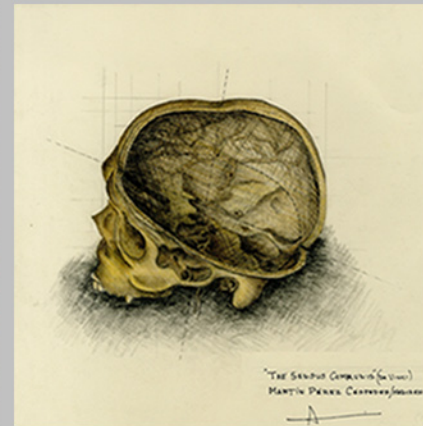
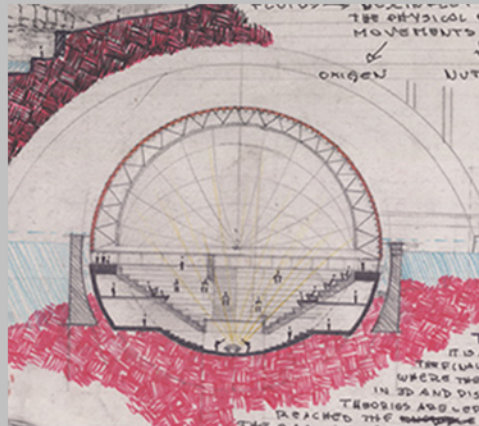
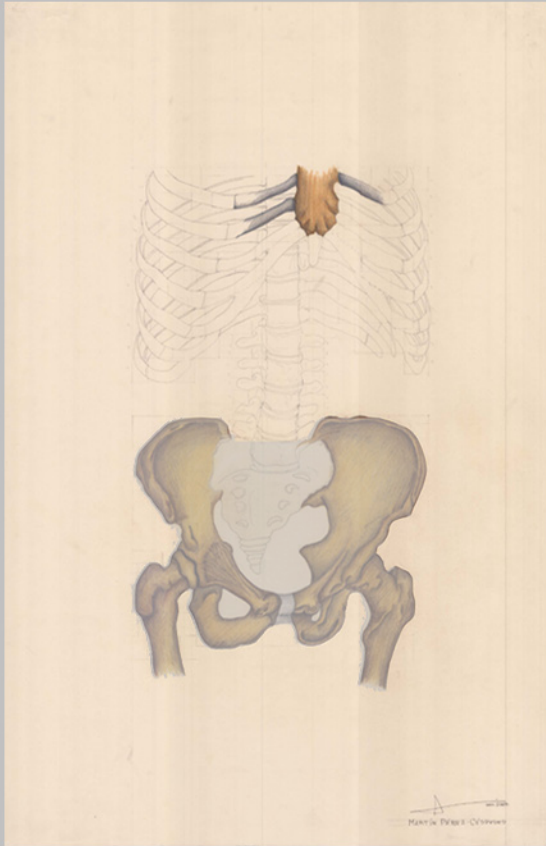


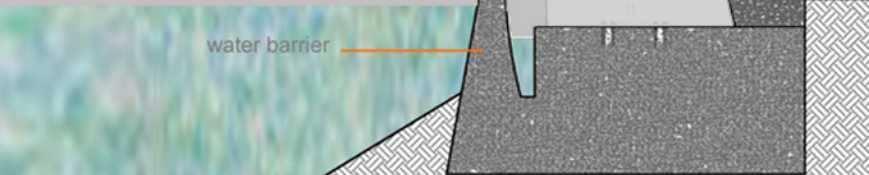
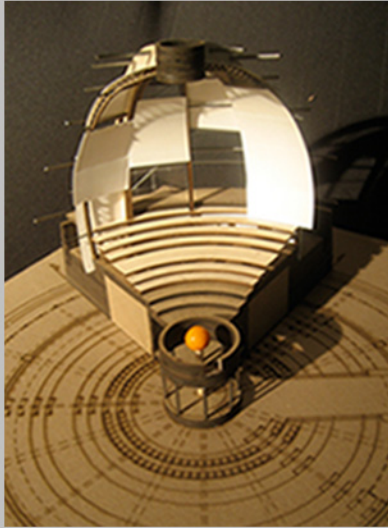
D. THE SOUL-ANIMA / THE OMNITHEATRE

It is where the observer reaches the answer for which he was looking. The 3d I-Max theatre gives the observer an inner view of the body's anatomy of movement. The Soul is the objective point and the concrete fact in the human body, in opposition to the mind; it IS beside any point of view. The sphere only admits one figure from any perspective: a circle. It is a homogeneous figure, which has been always related to the heavens, to purity, etc. The Key Bridge acts as a womb that protects the Soul. The Site interacts with the project and vice versa. I decided to use the Potomac River as a mirror of the Soul, where it reflects the other half, completing the perfect sphere by the equilibrium between perception and imagination.

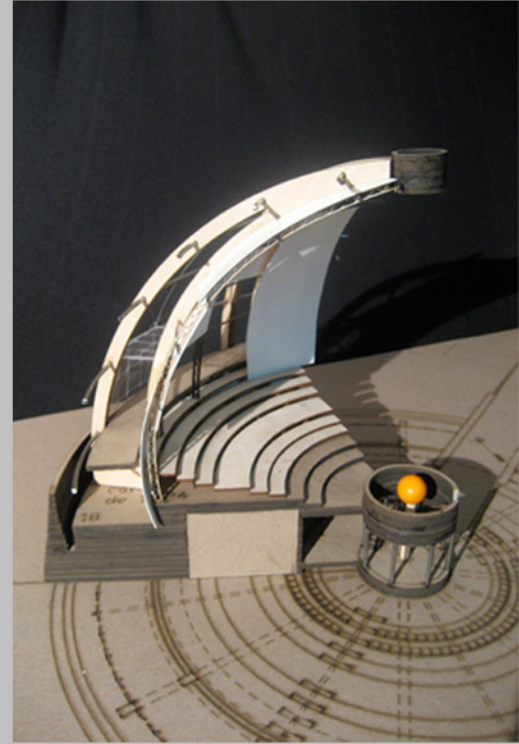
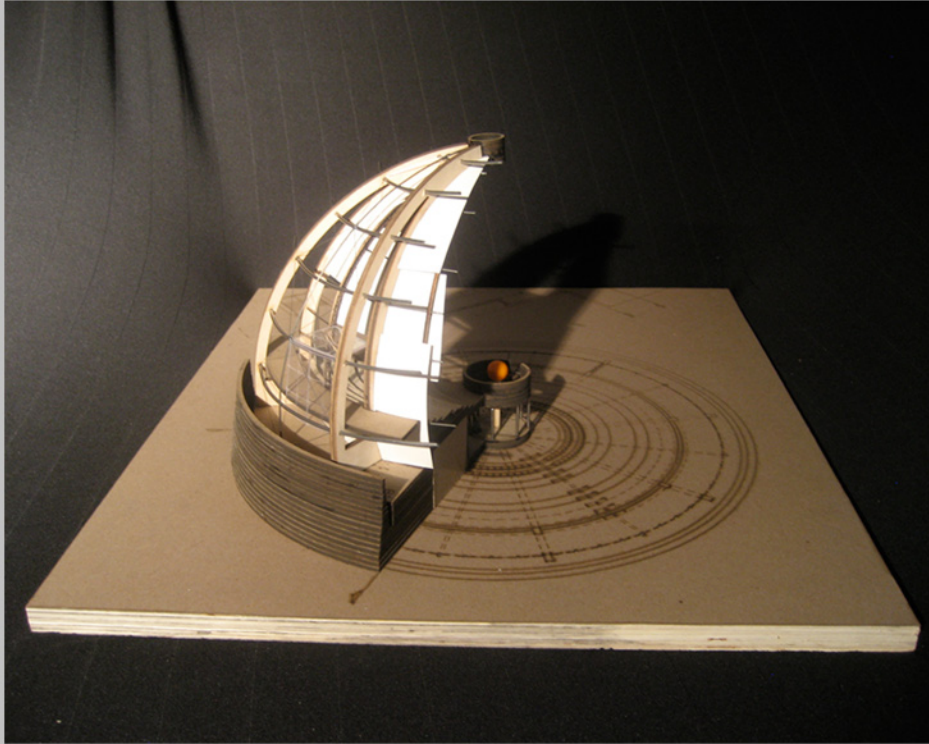


The omnitheatre is inspired on Da Vinci's skull studies searching for the location of Anima. It is where the Sensus Communis perceives the world and projects it in the mind. The body can die by two ways, a cardiac or respiratory arrest. These two vital organs, the lungs and the heart, are especially protected by a structure: the rib cage. According to Aristotle, the place for the Soul might be in the human heart. So, it is not a coincidence that the Soul resides in this "protector cage". The structure of the Omnithatre is inspired by this analogy.





I decided to do the spacial study of the Omnitheatre through a section model. This process allowed me to figure out more carefully the different conditions to be considered. The most relevant aspect to study was the presence of the water. I had to isolate the structure through a concrete wall that had to resist the periodic river flooding along the year.



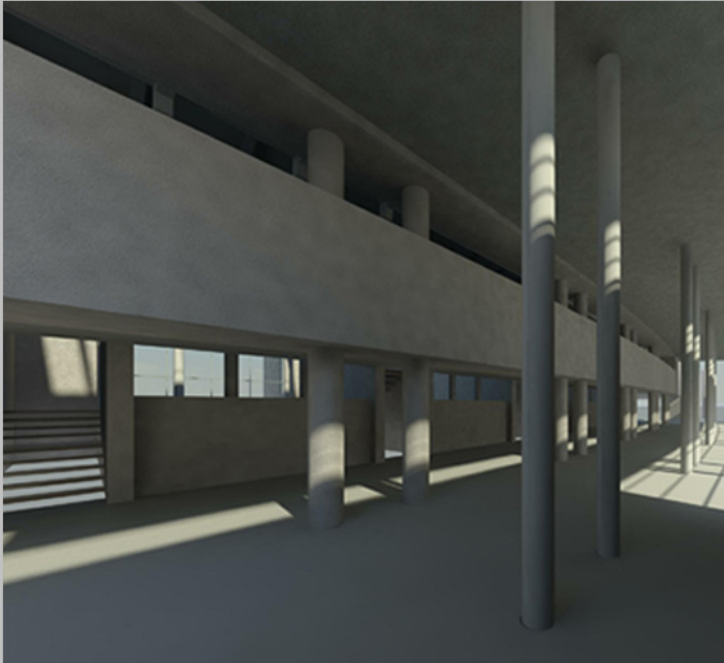
Original model made in $1/8"=1'$ scale



E. "SENSUS COMMUNIS" / THE END

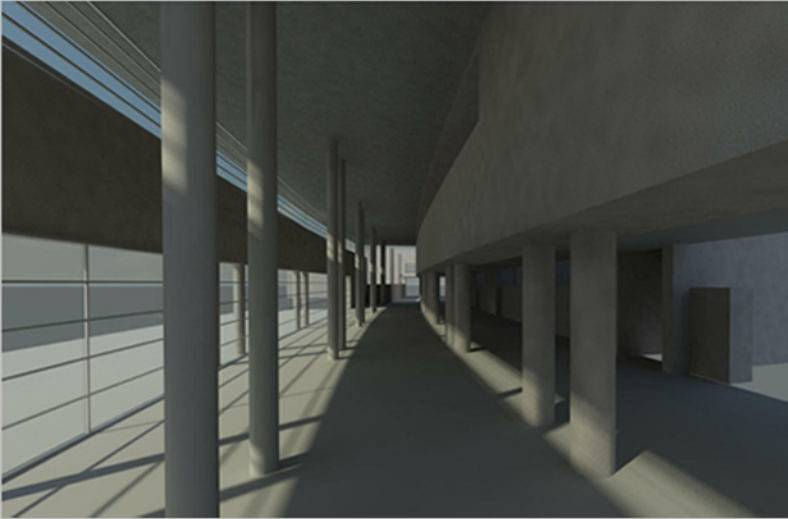
The Sensus Communis is when the object of perception is communicated to the brain through more than one sense. It is called an internal sense because its organ is not directly affected by that external to the organism (body) but by the influences that come from the peripheral sensorial organs. It is the place from where we can have a more subtle and integrated perception of the world, meaning of the mind, the body, and the Soul.



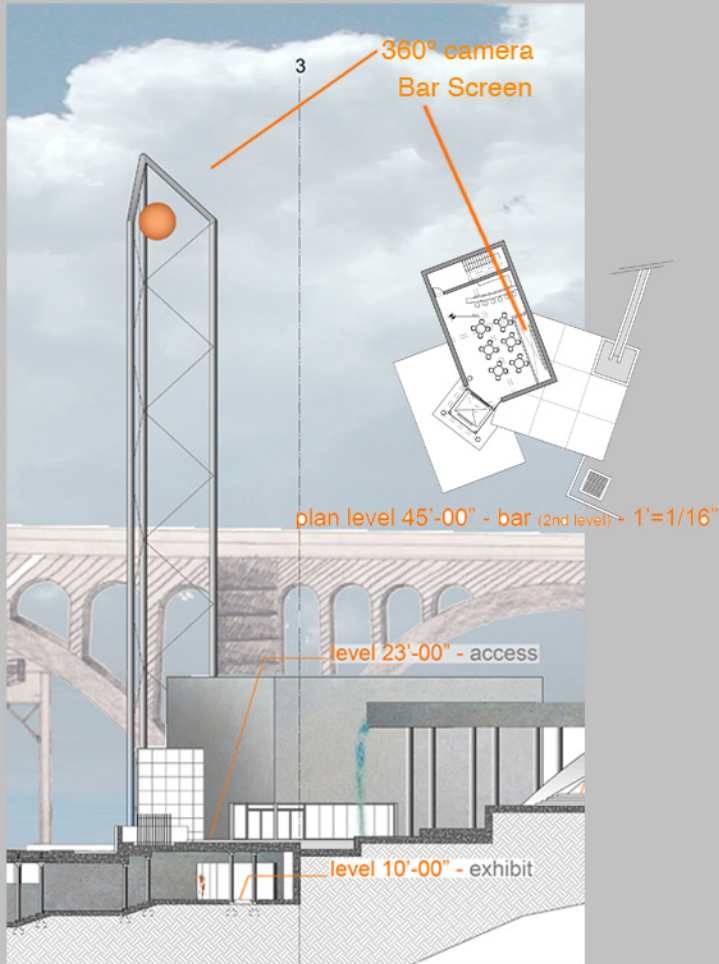


After the experience of the Soul (the omnitheatre), the observer is lead to the place for the Sensus Communis by a wide and high corridor where itinerant exhibits take place. This path from the Soul to the Sensus Communis is based on the studies of two different theories:

1- Galen's theory about anatomy of movement: "In Galen's scheme, (...) the vital spirit was carried from the aorta arteria (of the heart) to the brain where it was transformed into the animal spirit which brought the nervous system into action through the supposedly hollow nerves."¹



2- Leonardo Da-Vinci's theory sustained that the organ of taste (the mouth) the heart, and the nasal lachrymal duct, meaning nose and eyes are all connected. Perceptions cause emotions, which are then carried from the heart to the eyes and transformed into tears. This process is possible because all the senses would bear upon the Sensus Communis.



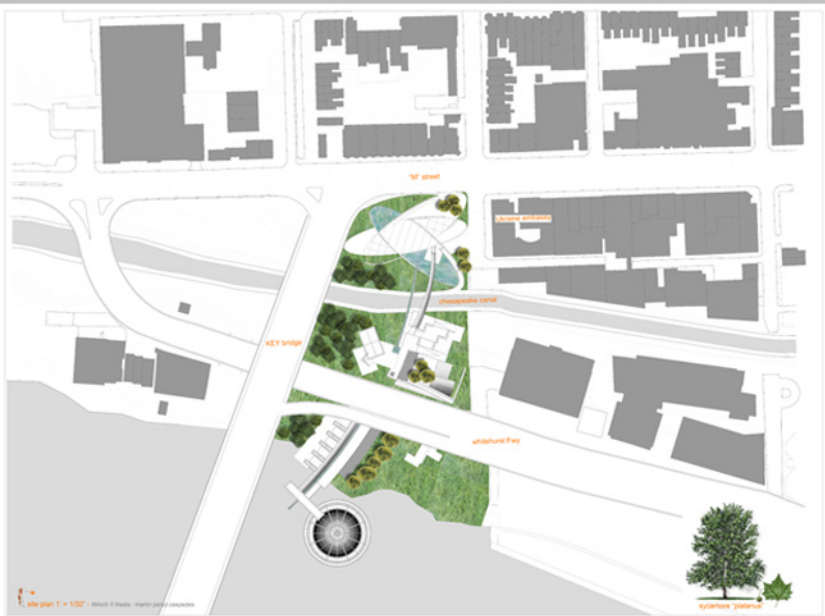
Partial Elevation. Not to scale

Synthesizing both theories, I would say that we cannot separate movement from perception. It is a very diffuse boundary, since we need movement to perceive the space, and our perceptions (emotions) alter the way we move in the world. So, the observer is taken to the last state of the museum to make his/her own experience of the Sensus Communis. This place is a café-bar and it is the endpoint of the museum. It is connected to the highest tower (which acts as a landmark), which captures by a camera the peripheral situation of the project. And, as the Sensus Communis projects to the mind the conjunction of the peripheral senses, the camera projects the “Journey from the mind to the Soul” on a big screen for the observer. It is where he/she can relax and have a different and more integrated point of view of the journey just completed. It is where they can be aware of the conjunction between Mind – Body – Soul.

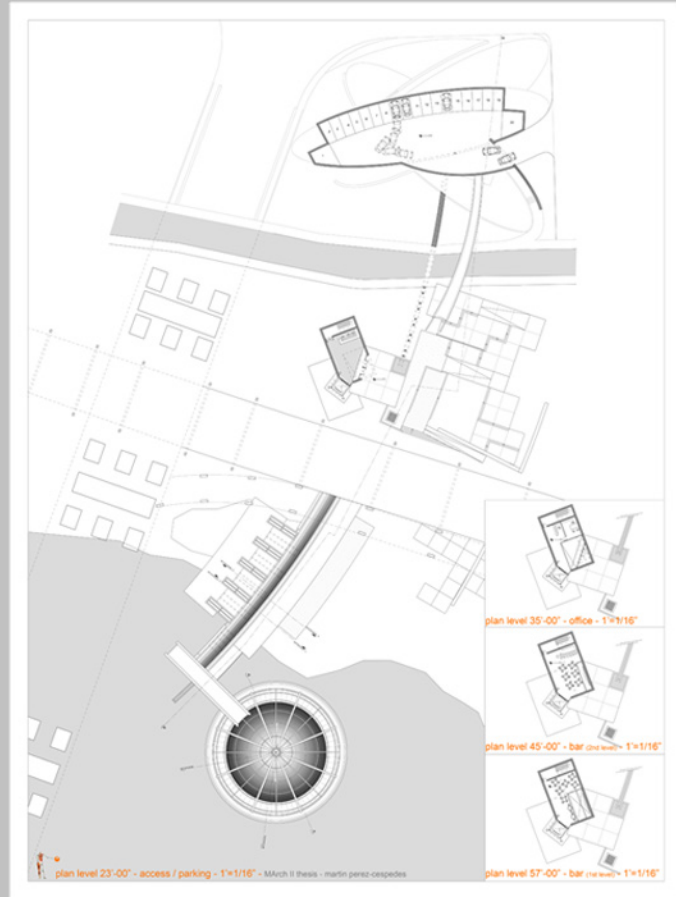
6- PLANS

The site plan shows the landscape design of the project and its interaction with the context. The museum itself consists in three major levels:

- 1- the access level,
- 2- the permanent exhibits level, and
- 3- the “travelling exhibitions” and the omnitheatre.



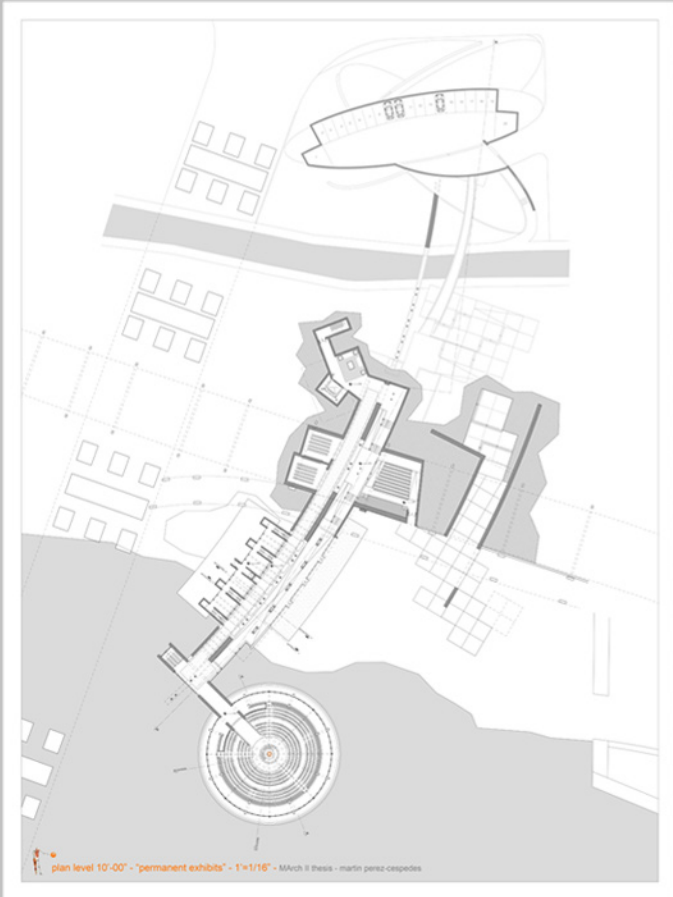
Site plan



Planlevel 23'-00" - Access / Tower / Parking

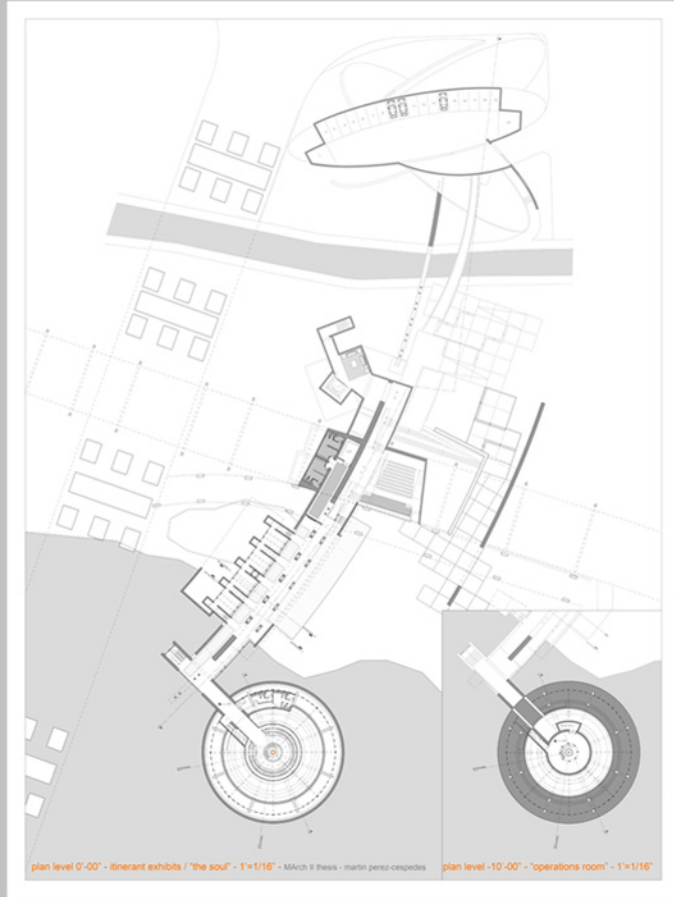
0 100' 200' 400'

0 50' 100' 200'



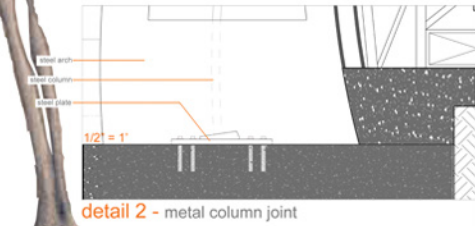
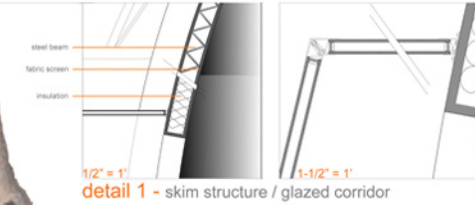
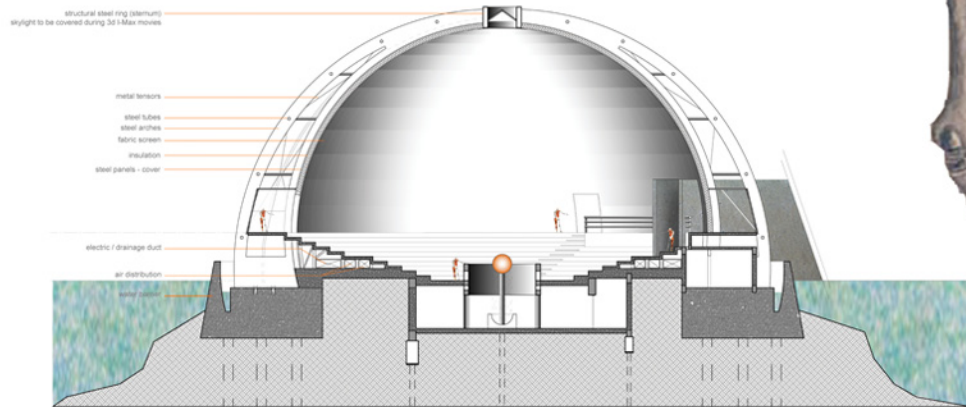
Planlevel 10'-00" - Permanent Exhibits

Plan's real scale: 1/16"=1'



Planlevel 0'-00" - Travelling Exhibitions / Omnitheatre

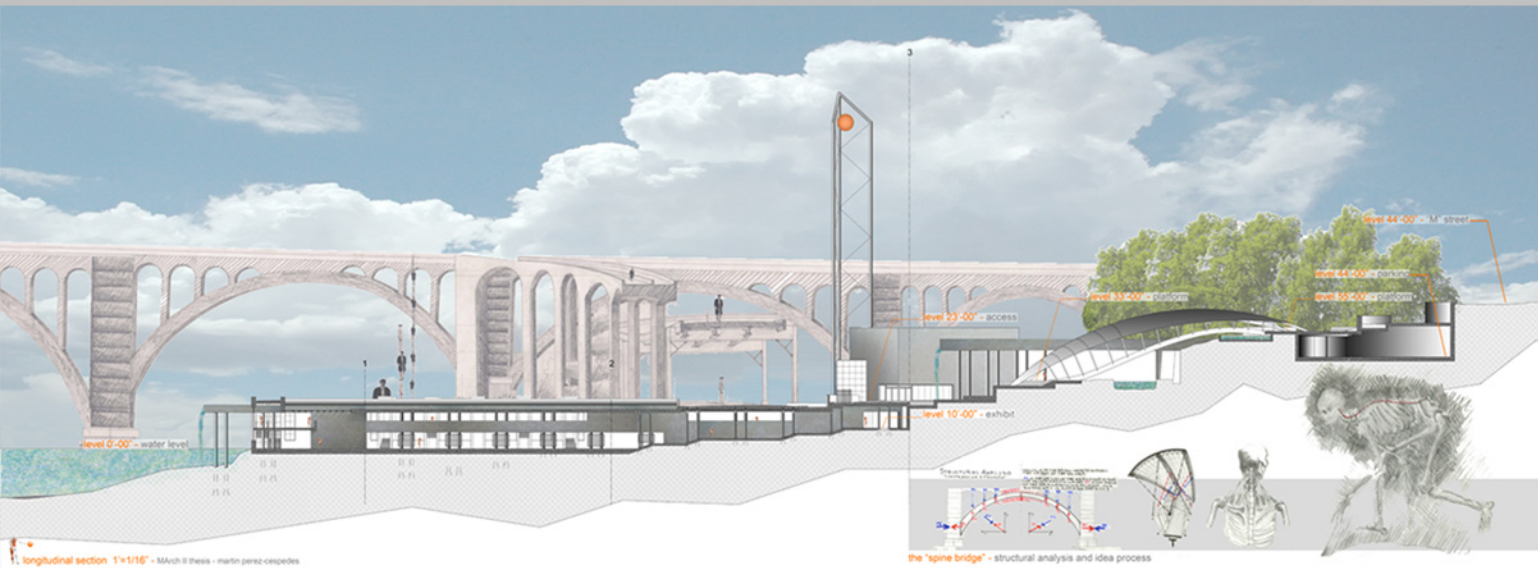
0 50' 100' 200'



section model 1' = 1/8" - MArch II thesis - martin perez-cespedes

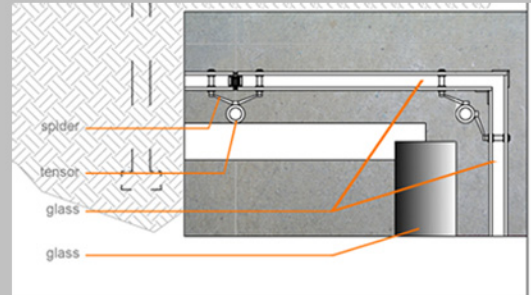
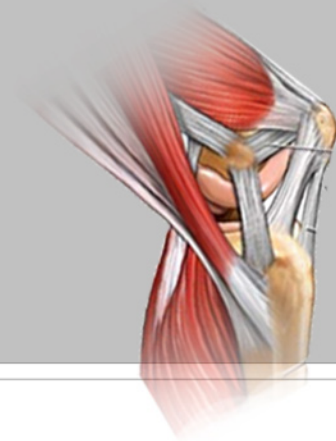
Section - Omnitheatre, "The soul"

Section's real scale: 1/8"=1'

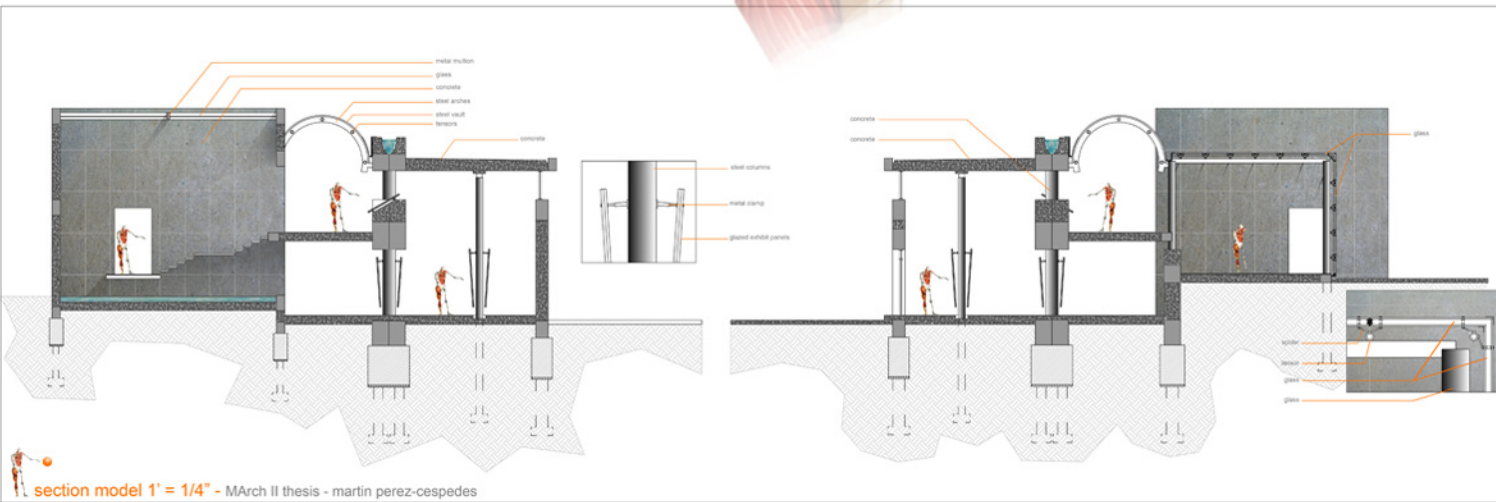


Section - Longitudinal

Section's real scale: 1/16"=1'



Section - Detail

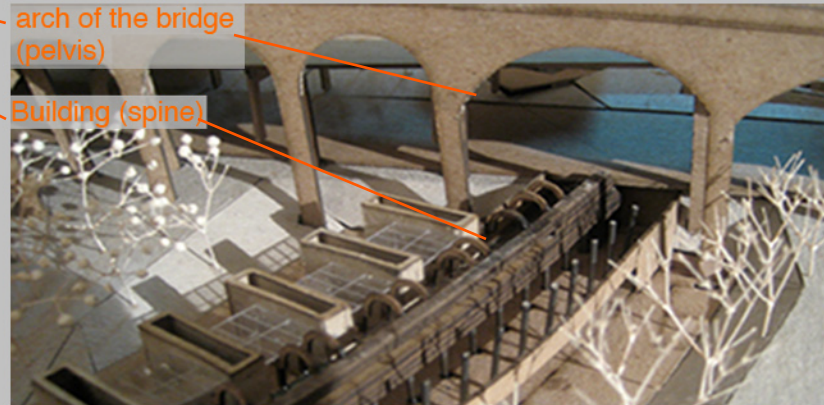
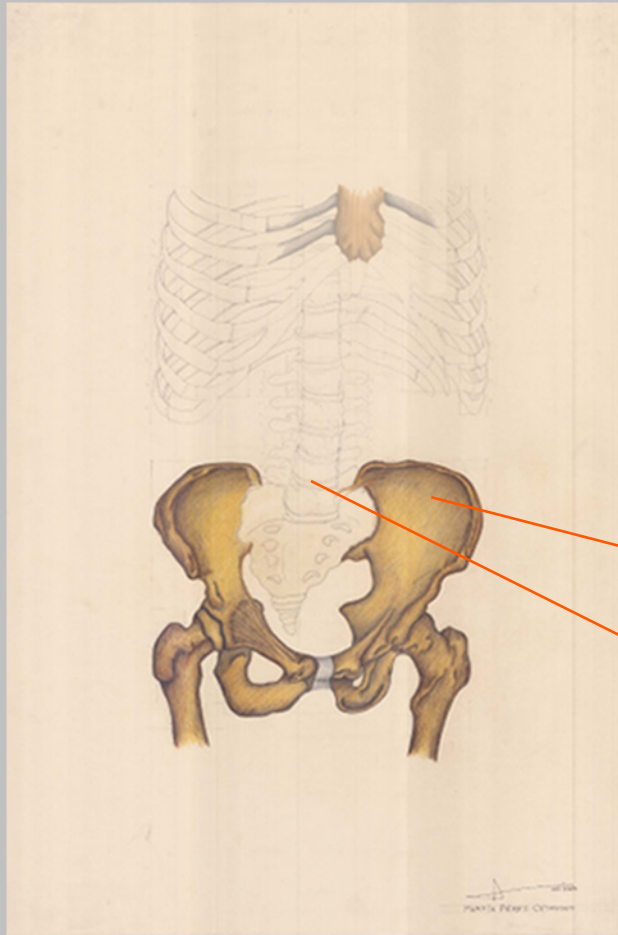


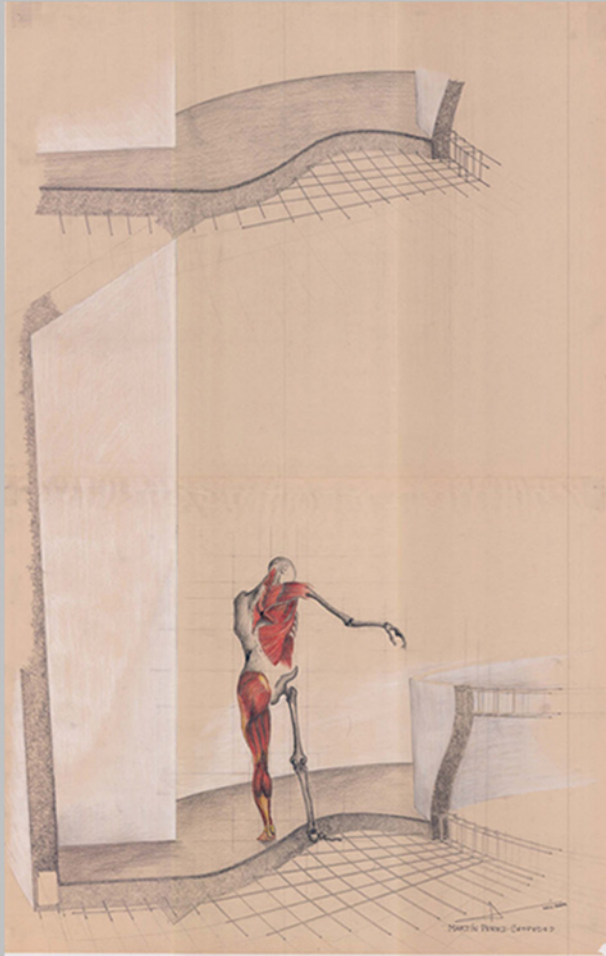
Section - Cross

Section's real scale: 1/4"=1'

8- STRUCTURE

The study of the human body was used as source of inspiration, not just for the design of the spaces, but also for the study of the structure of the building. When I say “structure” I refer not only to the micro scale of the construction details but also to the macro scale. The interaction of the building with the element of the site, creating “joints” that allow the articulation of both elements. This was one of the biggest challenges of the project. The Whitehurst Freeway crosses the site generating a considerable division of the terrain. So, to study the articulation of the building with the bridge that connects to the Key Bridge, I based the creation of the structure on the analysis of the human skeleton. The joint of the pelvis with the spine was the best analogy of this equilibrium.





In buildings' structures the weaknesses are always in the joints. So studied the joints of the human body to find the best solutions for these situations. The structural materials that I chose for the building are based on the relation that exists between them and the composition of the human body. On the drawing on the left, this man is penetrating a cut plane in the space and by this way he discovers his composition related to the one of the building. The main materials I decided to use were concrete, metal and glass.

Concrete: because of its straight relationship to the structure of the human body, where tension and compression (in conjunction with metal) happens during movement, impeding the body to be fractured. A building, as well as the human body, is in a constant internal movement, although we don't perceive it.



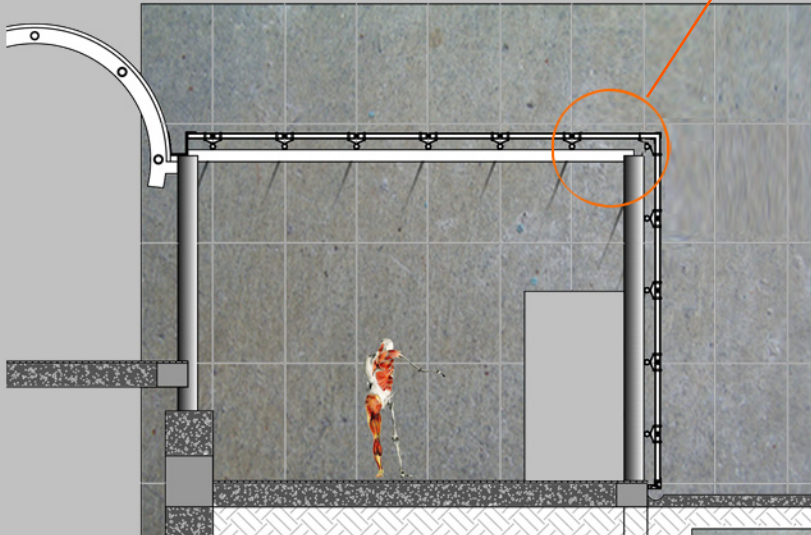
Concrete (compression) and metal (tension) working together in a beam



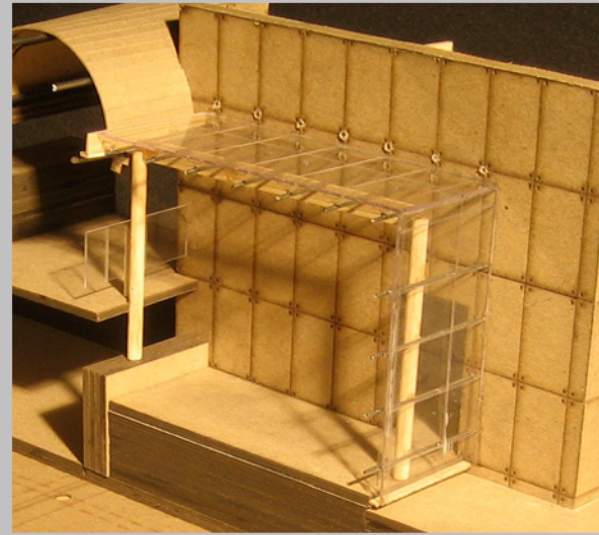
Bones (compression & tension) and tendons (tension)



Structural Detail



Section - Glazed Box / Permanent Expositions



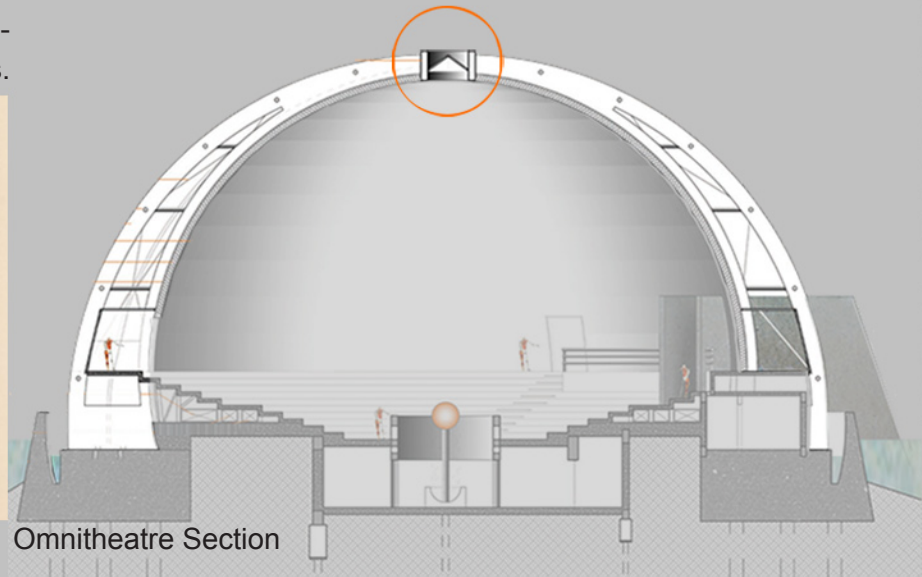
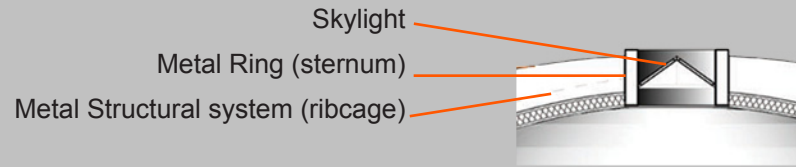
Section Model - Glazed Box / Permanent Expositions

Glass is used in the areas where the observer can experience the haptic sense of the building, as he/she where “touching” the context. The balance of opposites, wholeness and emptiness, allows him/her to have this experience.

Metal works as the tendons and cartilages of the building, allowing it to resist its own weight and external weight (people). In case of the Omnitheatre, a metal ring supports a set of arches built with this same material. The central ring acts as the sternum for the case-ribs, system that allows the process of breathing to happen in the human body. Washington DC experiences a wide range of temperatures during the year, so, in the Omnitheatre, this metal “sternum” allows the arches to contract and expand as a response of the material to the weather changes.



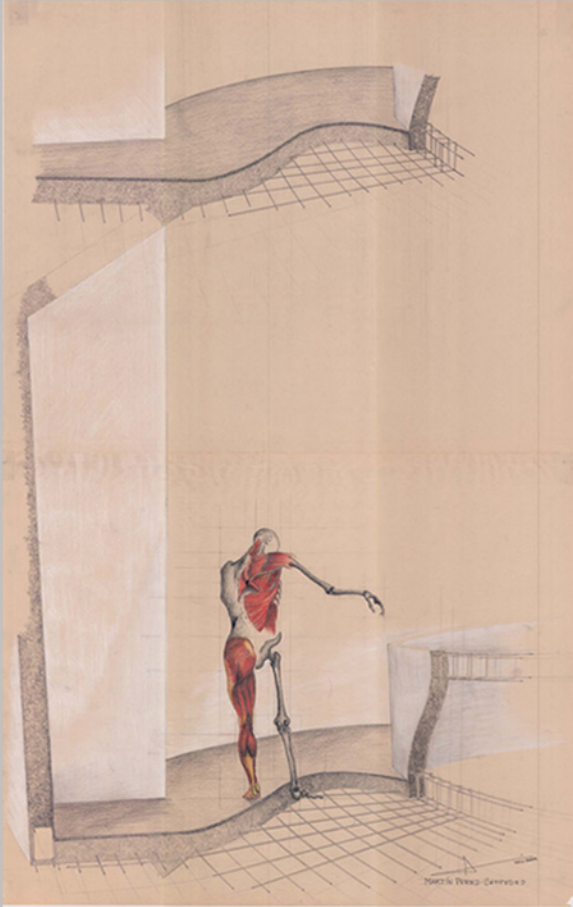
Ribcage & Sternum



Omnitheatre Section

9- CONCLUSION

Before finishing I am going to tell you the other story behind the drawing, the one that I discovered after drawing it. I said before that this man is penetrating a section plane in the space and by this way he is discovering his anatomy and the relation with the structure of the building. But the other story is different. When I finished the drawing I wondered, “what is this man trying to achieve?” The closer he gets to that, the more deeper he sees himself, allowing the Truth of what he really IS to penetrate to his bones. So, later on, I realized that what he is trying to achieve was his Soul, his Being. He is becoming the creator man. He is co-creator with Life. He is becoming the person of the left side of the very first drawing shown previously. So, why would I be saying all this? Well, I think that mistakenly society assumes “creativity” just to artists, architects, etc. But I think creativity is the power of creating the best situations for our own good and for the others. Always moving ourselves with a sincere and full of courage heart. This is the way I think we, as architects, can improve the life quality of society. This might be the objective of my Thesis. Thank you



10- ACKNOWLEDGEMENTS

To my Master, Alfredo Offidani.

To my love, Shakti.

To my family: Papa, Mama, Agus, Dardito, Seba, my godson Cristobal and my uncle Fernando, for all their support.

To my committee:

Paul Emmons, thank you for leading me through this grate process and share all your knowledge with me.

Marcia, thank you for transmitting to me all the love you have for the study of the human body and its relation with architecture.

Paul Kelsch, thank you very much for all your advises on looking for a site, its analysis and design.

Thanks to Jaan Holt and Henry Hollander, for believing in me and give me all the opportunities to make my experience in WAAC unforgettable.

Thanks to my friend Marco Santello for all the information about the anatomy of body movemet that you shared with me.

Thanks to Pato, Goyi, Rulo, Caterina and Jon for your help.

Thanks to all my friends, who accompanied me through this marvelous process.

Thanks to all the WAAC faculty.