



**SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY  
COLLEGE OF ARCHITECTURE AND PLANNING  
5<sup>TH</sup> GRADE  
BACHELOR DEGREE**

**PROJECT TITLE/ UNIVERSITY OF ARTS**

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## ABSTRACT:

Art is a diverse range of human activities in creating visual, auditory or performing artifacts (artwork), expressing the author's imaginative or technical skill, intended to be appreciated for their beauty or emotional power.

This research contains the design of "university of arts", which is located in Sudan - Khartoum – soba. With a total area of "4.5 hectare".

University of arts is an educational cultural project the serves the high education in Sudan specially the art field to graduate generations capable of using their talent in reflecting a fine image of Sudan's cultural diversity.

This project can be considered a cultural destination and a solid academic artistic landmark to the arts in Sudan.

The project can also provide a solid base to all the different talents in Sudan in a safe academic environment and allow it to grow to present a good front of Sudan's culture, and also demonstrate the knowledge and skills with a highly prepared and sufficient environment that's necessary to succeed as professional artists.

The main concept of planning based on circulation axes and the connection between the different function in the project.

The first chapter contains project definition and its objectives. The second chapter contains project data collection and similar samples study.

The third chapter contains data analysis (project component, spaces schedule, spaces study, circulation diagrams, matrix diagram, and bubble diagram and site analysis).

The fourth chapter contains planning and design philosophy and design stages development.

The fifth chapter contains technical solutions (structure system and services (electricity supply, water supply, air conditioning system and fire fitting systems)) and project finishes.

## ملخص البحث:

الفن هو نطاق متنوع من الانشطة البشرية لخلق اعمال بصرية ، و سمعية ، و ادائية، للتعبير عن مخيلة الفنان او مهارة تقنية , مقصودة لان تكون مقدره لجمالها و قوتها العاطفية.

هذا البحث يحتوي على تصميم "جامعة الفنون" ، المقترح تواجدها في ولاية الخرطوم\_سوبا بمساحة 4.5 هكتار.

جامعة الفنون هي مؤسسة تعليمية ثقافية تخدم التعليم العالي في السودان تحديدا في مجال الفنون، لتخريج اجيال قادمة قادرة على تسخير مواهبها في عكس صورة طيبة عن التنوع الثقافي للسودان .

هذا المشروع يمكن ان يعتبر وجهة ثقافية و صرح اكاديمي فني لجميع الفنون في السودان.

هذا المشروع كذلك يمكن ان يوفر قاعدة صلبة لمختلف المواهب في السودان تحت سف بيئة اكاديمية امنة لتنمية هذه المواهب لعكس واجهة جيدة لثقافة السودان ، و ابراز المعرفة و الحرفية في بيئة مجهزة بالكامل بصورة ضرورية لنجاح فنانيين محترفين.

المبدأ الاساسي للتخطيط يعتمد على محاور الحركة الربط بين مختلف الوظائف للمشروع.

الباب الاول يحتوي على تعريف المشروع ، اهداف المشروع ، اهمية المشروع ، ابعاد المشروع.

الباب الثاني يحتوي على جمع المعلومات و دراسة النماذج المشابهة .

الباب الثالث يحتوي على تحليل البيانات ( مكونات المشروع ، جدول المساحات ، دراسة الفراغات ، مخطط الحركة ، مخطط لمصفوفة ، مخطط التطبيق و دراسة تحليل الموقع).

الباب الرابع يحتوي على الفلسفة التخطيطية و التصميمية ، و مراحل تطور المشروع.

الباب الخامس يحتوي على الحلول التقنية ( النظام الانشائي و الخدمات " الامداد بالكهرباء ، الامداد بالمياه ، نظام التكيف ، نظام مكافحة الحريق " و التشطيبات).

# CHAPTER ONE

## 1-1 Project's Definition:

An educational facility that aims to support higher education of art by providing a highly efficient, productive and creative environment for both students and teachers and to develop youth's abilities and potentials artistically, and to present the students' achievements within the university.

## 1-2 Project's Objectives:

- 1-Arts education helps build academic skills and increase academic performance, while also providing alternative opportunities to reward the skills of youth who learn differently.
- 2- Raise the standards of high education of art in Sudan.
- 3- Prepare an efficient and creative environment for the students and the teachers.
- 4- Provide all the art students needs in one campus.
- 5- Develop the social cultural relationships between the students.
- 6- Prepare specialized spaces to encourage talents within a safe academic environment.

## 1-3 Project's Importance:

- 1- the project (University of Arts) represents an addition to the art education in Sudan and supports the high education process.
- 2- The project helps preserving Sudan's heritage when it comes to different types of art.
- 3- Serving the community by producing a highly educated artists who would help representing the unique identity of Sudan.

## 1-4 Reasons for Choosing This Particular Project:

### **GENERAL REASONS:**

1-manifest the role of the arts in shaping the community and giving it identity.

2-create an environment that's prepared enough to embrace social and cultural events.

3-attract youth towards art in a safe academic environment.

4-preserve the beautiful different types of art in Sudan and mix it up in a modern and unique way.

### **PERSONAL REASONS:**

1-my passion towards art made an impact on me choosing this project.

2-I wish to see art becomes an essential part of our community.

# CHAPTER TWO



## 2-1 WHAT IS ART:

Art is a diverse range of human activities in creating visual, auditory or performing artifacts (artworks), expressing the author's imaginative or technical skill, intended to be appreciated for their beauty or emotional power. In their most general form these activities include the production of works of art, the criticism of art, the study of the history of art, and the aesthetic dissemination of art.

### **Definition of art:**

-Universally there is no accepted or acknowledgeable definition of art, but it is commonly used to describe something of beauty or a skill which produces an esthetic result.

-The expression or application of human creative skill and imagination, typically in a visual form.

## 2-2 CLASSIFICATIONS OF ART:

Traditional and contemporary arts are known to be very diverse, it contains:

Architecture, music, opera, theatre, dance, painting, drawing, sculpture, fashion, cartoon, printmaking, photography and many other.

Those activities are commonly referred to as “the arts” and are classified into many overlapping categories, and the following are the generally classified categories:

### **2-2-1 Fine Arts:**

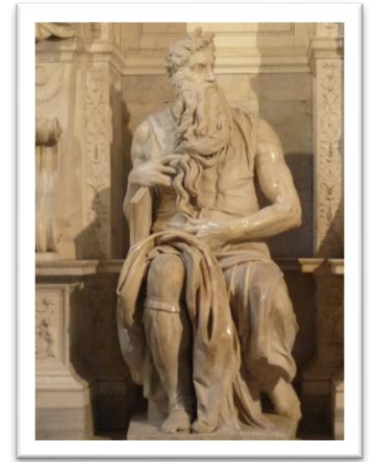
This category includes those artworks that are created primarily for aesthetic reasons ('art for art's sake') rather than for commercial or functional use. Designed for its uplifting, life-enhancing qualities, fine art typically denotes the traditional, Western European 'high arts', such as:

- **Drawing:** Using charcoal, chalk, crayon, pastel or with pencil or pen and ink.
- **Painting:** Using oils, watercolor, gouache, acrylics, ink and wash, or the more old-



fashioned tempera or encaustic paints.

- **Printmaking:** Using simple methods like woodcuts or stencils, the more demanding techniques of engraving, etching and lithography, or the more modern forms like screen-printing, foil imaging or giclee prints.
- **Sculpture:** In bronze, stone, marble, wood, or clay.
- **Calligraphy art.**



## 2-2-2 Visual Arts:

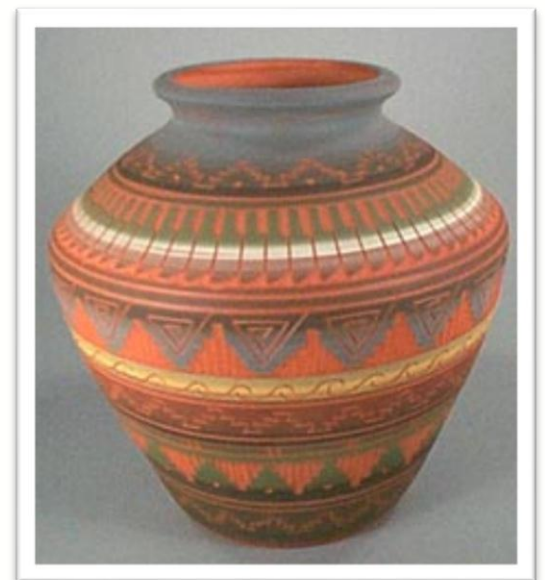
Visual art includes all the fine arts as well as new media and contemporary forms of expression such as **Assemblage**, **Collage**, **Conceptual**, **Installation** and **Performance art**, as well as **Photography**, and film-based forms like **Video Art** and **Animation**, or any combination thereof. Another type, often created on a monumental scale is the new **environmental land art**.

## 2-2-3 Plastic Arts:

The term plastic art typically denotes three-dimensional works employing materials that can be molded, shaped or manipulated (plasticized) in some way: such as, clay, plaster, stone, metals, wood (**sculpture**), paper (**origami**) and so on. For three-dimensional artworks made from everyday materials and "found objects", also can be called **Junk art**.

## 2-2-4 Decorative Arts:

This category traditionally denotes functional but ornamental art forms, such as works in glass, clay, wood, metal, or textile fabric. This includes all forms of **jewelry** and **mosaic art**, as well as ceramics, (exemplified by beautifully decorated styles of **ancient pottery** notably Chinese and Greek Pottery) **furniture**, **furnishings**, **stained glass** and **tapestry art**.



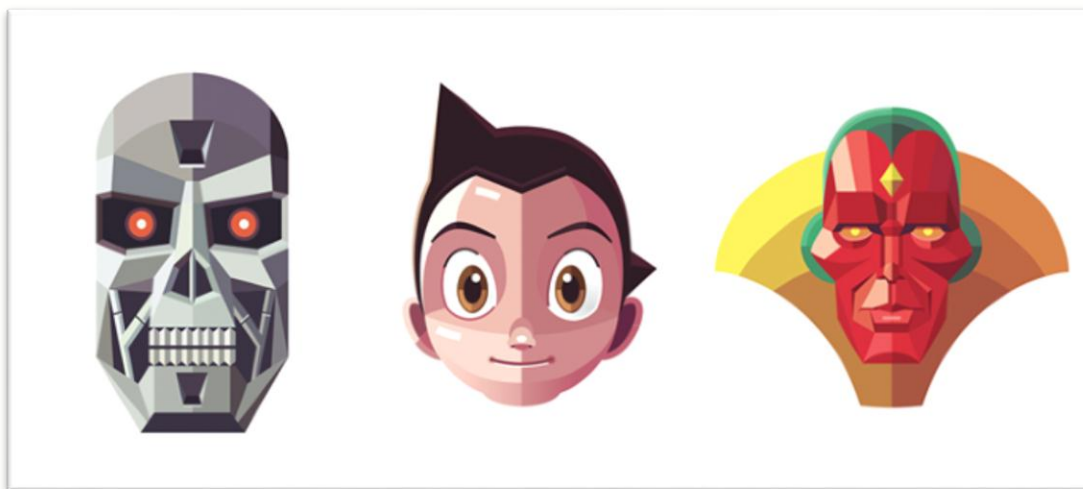
## 2-2-5 Performance Arts:

This type refers to public performance events. Traditional varieties include, **theatre, opera, music, and ballet**. Contemporary performance art also includes any activity in which the artist's physical presence acts as the medium. Thus it encompasses, mime, face or body painting, and the like. A hyper-modern type of performance art is known as **Happenings**.



## 2-2-6 Applied Arts:

This category encompasses all activities involving the application of aesthetic designs to everyday functional objects. While fine art provides intellectual stimulation to the viewer, applied art creates utilitarian items (a cup, a couch or sofa, a clock, a chair or table) using aesthetic principles in their design. **Folk art** is predominantly involved with this type of creative activity. Applied art includes **architecture, computer art, photography, industrial design, graphic design, fashion design, interior design**, as well as all decorative arts.



## **2-3 HISTORY OF ART:**

The history of art is the history of any activity or product made by humans in a visual form for aesthetical or communicative purposes, expressing ideas, emotions or, in general, a worldview.

### **ART HISTORY TIMELINE:**

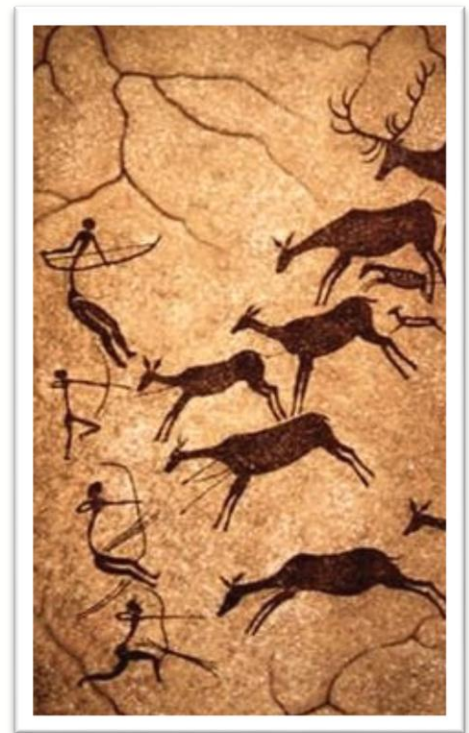
#### **2-3-1 Prehistoric art:**

##### **The stone age:**

it's when the first tangible artifacts of human art that have been found ,and the first demonstrations that can be considered to be art by humans appeared. Humans practiced hunting and gathering and lived in caves, where cave painting was developed, and the first traces are generally worked stone, wood or bone tools. Then humans engaged in agriculture and built increasingly complex societies, religion became more important and the production of handicrafts commenced.

##### **The metal age:**

it's the last prehistoric phase, as the use of elements such as copper, bronze and iron proved to be a great material transformation for these ancient societies. When humans could smelt metal and forge metal implements, this enabled them to make new tools and weapons.



#### **2-3-2 Ancient art:**

In the first period of recorded history, art began alongside the invention of writing. Which was generated primarily by the need to keep tax and commercial records.

**Mesopotamian art:** (modern day Syria and Iraq). Mesopotamian architecture was characterized by the use of brick, lintel and the introduction of construction elements like arc and vault, large temples with the form of a terraced step pyramid. There were also palaces walled

with a terrace in the form of a ziggurat, where gardens were an important feature. The Hanging Gardens of Babylon was one of the Seven Wonders of the Ancient World.

Music was developed in this region between 4th and 3rd millennium BCE for use in Sumerian temples, where priests sang hymns and psalms to the gods.

**Ancient Egyptian art:** Egypt had an elaborate and complex works of art which were produced by professional artists and craftspeople, who developed specialized skills. Egypt's art was religious and symbolic. The architecture is characterized by its monumental structures, Painting of the Egyptian era used a juxtaposition of overlapping planes. The images were represented hierarchically, applied arts were developed in particular woodwork and metalwork.



**Greece and Etruria:** Greek and Etruscan artists built on the artistic foundations of Egypt, further developing the arts of sculpture, painting, architecture, and ceramics. The body became represented in a more representational manner.

**Rome:** Roman sculpture is often less idealized than the Greek precedents. Roman architecture often used concrete, and features such as the round arch and dome were invented.

### 2-3-3 Medieval to contemporary eras:

**Early Christian art:** the dominance of the church insisted on the expression of biblical truths and the denial of the material world.

**Renaissance and Baroque:** it is the return yet again to valuation of the material world, and this paradigm shift is reflected in art forms, which show the corporeality of the human body, and the three-dimensional reality of landscape.

**Neoclassicism to Realism:** The 18th and 19th centuries included Neoclassicism, Romantic art, Academic art, and Realism in art.



## 2-3-4 Modern and Contemporary “postmodern art”:

**Modernism:** is a philosophical movement that arose from wide-scale and far-reaching transformations in Western society in the late 19th and early 20th centuries. Among the factors that shaped modernism were the development of modern industrial societies “industrial revolution” and the rapid growth of cities, followed then by the horror of World War I. Modernism also rejected the certainty of Enlightenment thinking, and many modernists rejected religious belief.

**Postmodern art:** is a body of art movements that sought to contradict some aspects of modernism or some aspects that emerged or developed in its aftermath. In general, movements such as intermedia, installation art, conceptual art and multimedia, particularly involving video are described as postmodern.

## 2-4 HISTORY OF ART EDUCATION WORLDWIDE:

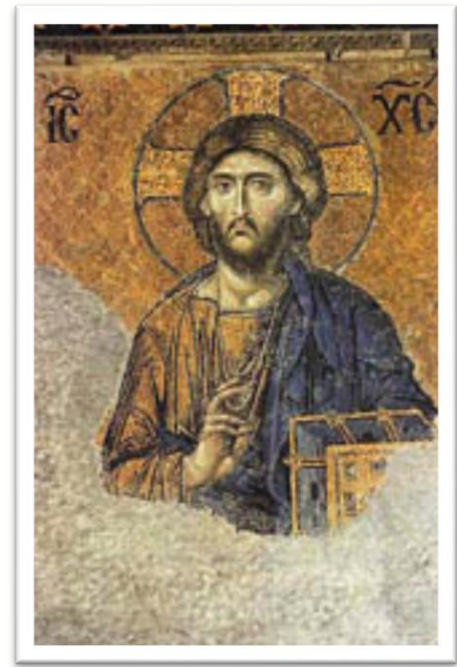
### **The Greco/Roman period:**

The arts were valued as an important part of culture but are not seen as a major component in the education of young aristocrats. Instead, artists were trained in family workshops through an apprenticeship system.

During the Classical era, collecting art was an established practice. Drawing classes were a major component in education; however, when the Romans took charge, art became less important.

## **The middle Ages:**

Most early art of this time period was created by monks and nuns of medieval monasteries. The development of monastery workshops, craft guilds, apprenticeships, and workshop treatises offer some of the earliest methods of art instruction in the western world.



## **The modern world:**

The Italian Renaissance marks a major turning point in the history of art education. The artist, now viewed as a genius causes a key transformation in the structure of education. Students are taught to value the beauty in poetry, drama, and music and aesthetics becomes a major component to the schooling of the artist. Classical ideologies about education came to full circle during the Renaissance.

Academies, which are not too different from today's art institutes, begin to spread throughout Italy.

By the seventeenth century the empirical sciences begin to take precedence over the arts, and art education transforms once again.

## **1800's:**

Public schools emphasized drawings skills to keep pace with other countries during the industrial revolution.

This early art curriculum was named free "hand drawing".

## **1900's:**

The turn of the century brought the study of great pictures, usually historic or sentimental. Moral ways were taught in this way. These were the seeds of art history and art criticism in the public schools.

Manual arts or the production of useful practical home items was also emphasized at this time.

## **1980's-1990's:**

At this time, began a comprehensive approach to the art, this program included four areas of academic studies “art history, art criticism, aesthetic and studio”.

The national standards were created at this time, and are used today as the base for creating art lessons in classrooms.

### **Art education today:**

Today, national standards and discipline art based education are followed to create art curriculum.

**Art history** gives the student valuable insights by placing the artwork in a historical context.

**Art criticism** is actually art evaluation here the student assesses the merits of an artwork based on set criteria.

**Aesthetic** is the area that investigates all of the questions surrounding art, it is the philosophical branch of art.

**Studio** is another name for **art production**.

## **2-5 ART IN SUDAN:**

### **Art and Arts education in Sudan:**

#### HISTORY OF ART AND ARTS EDUCATION IN SUDAN:

### **Ancient kingdoms:**

-Throughout the colorful African history, many empires have risen and fallen. These empires and other smaller ethnic groups have caused this type of art.

-The nomadic Medjaya peoples inhabit the Nubian Desert in the first millennium B.C, and Egyptian goods were traded with the Kingdom of Kerma to the south, a culture that buries its kings in vaulted chambers beneath huge earthen mounds, furnished with wooden beds inlaid with ivory and bronze.

-Kerma is now considered some of the finest ceramic art produced by any culture at any time.





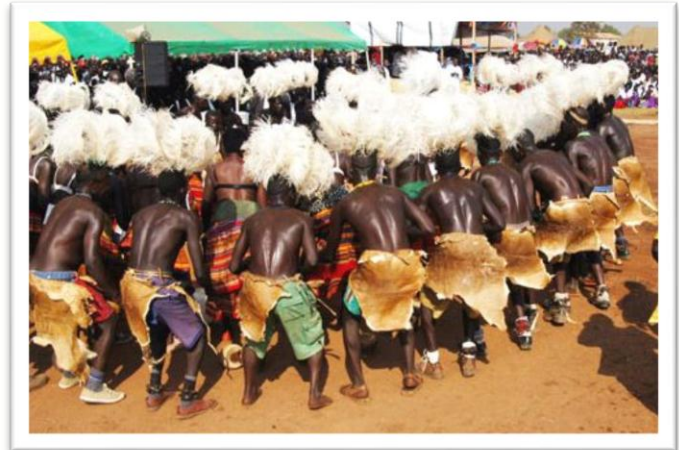
## **Tribal Art:**

- The oldest and most consistent form of Sudanese art is representative of the art and culture of nearly 600 tribes that inhabit the great continent, and is as extreme and varied as its geography of lush tropical forests to sandy deserts.

- The Sudanese tribal life has always been the least responsive to change. Art of the tribes of the Sudan shows great reservation and conservatism.

-An art of such continuity clearly exposes the spirit of such tribal cultures. In fact the richness of the Sudanese art is in its diversity.

-This entire heritage, past and present, constitutes the base on which the modern Sudanese artistic practices are deeply grafted. This is why Sudanese contemporary art, stands out among the different African schools of art as unique.



## **Art in the modern days of Islam in Sudan:**

-This entire heritage, past and present, constitutes the base on which the modern days of Islam in Sudan. It is traditional Qoranic School. Which continued to exist from as early as the 9th century AD until the present day, It teaches art as a practice, but not as an objective. Yet its artistic impact on the Sudanese child seems to be important.



## **The beginning of art education in Sudan:**

-In 1936, a department of art education was established in Bakht-el-Rida Institute of Education. The department was headed by Jean Pier Greenlow a British artist and art teacher he went into history as the founder of the modern art movement in Sudan. Since the pioneering efforts of Greenlow in 1936, Sudanese art has in fact developed into a relatively strong cultural medium of expression.

## **Sudanese modern and contemporary art:**

-Contemporary Sudanese art world did not experience a war of styles, nevertheless, there is a relatively strong art movement, which is highly experimental. In its own way this movement is modernist and seeking to globalize in spite of the rather restrictive conditions under which hundreds of Sudanese artists are working.

-Two most famous forms of art education in Sudan now are the fine and applied arts faculty and music and drama faculty.



## **Some of the influential Sudanese artists:**

- Ahmed Abdurrahman "calligraphy artist".
- AbdelKarim AlKabli, "singer".
- Abubakr El-shiekh "director and script writer".-
- Rashid Diab "artist".

those are only few of the names that had an influence in Sudan's cultural development , and this project aspires to encourage talents to grow and represent Sudan and participate in our cultural development even more.

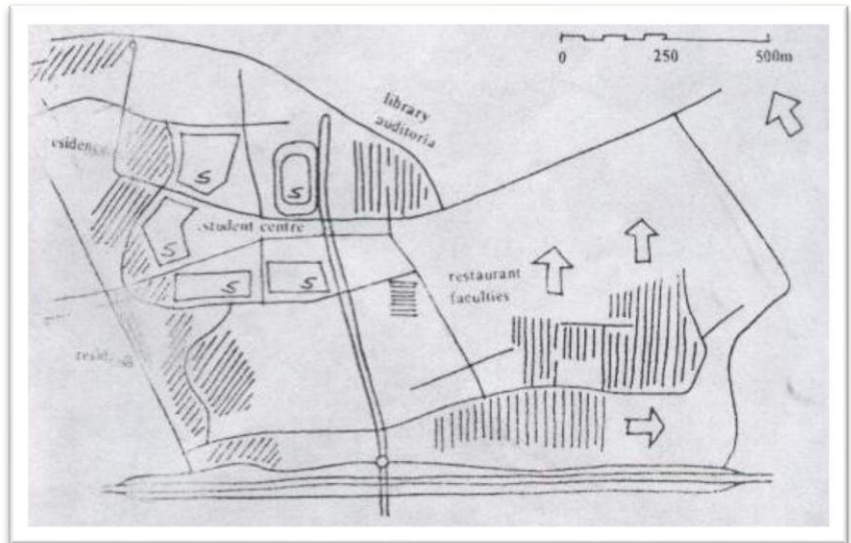
## 2-6 METHODS OF DESIGNING UNIVERSITEIS:

### **Central Spreading:**

-The general description of this type of design is low density growth with singular buildings gathering spread by site planning and service buildings at one location or several central locations.

-Students' number should not exceed 5000 in this type of design, Growth is produced by individual zone growth and the typical site of this designs located outside cities.

-an example for this type of design is Aurlin University in south France.



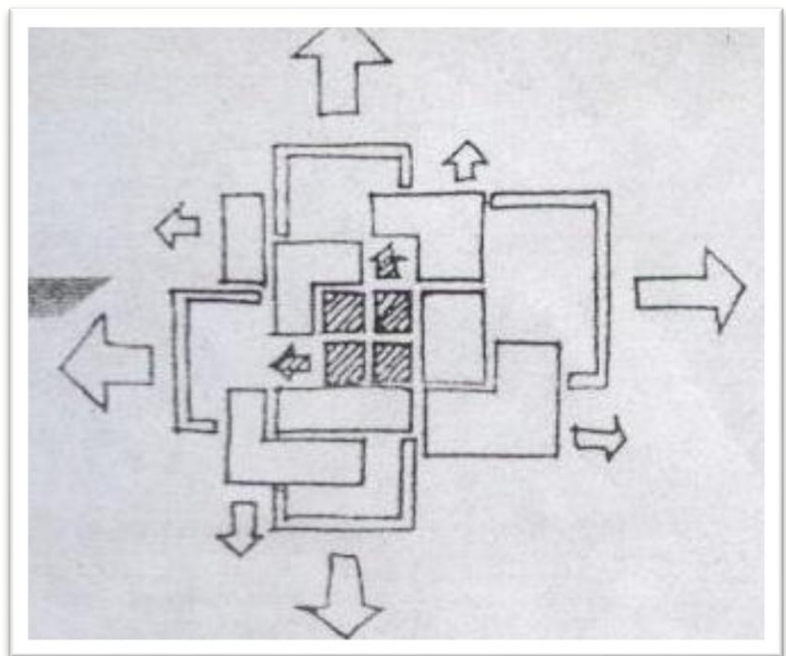
### **Central Design:**

-In this type of design buildings grow around a main center which contains general usage services and it is distinguished by short distances between different parts, which facilitates an improved transport, communication and easy access to service elements.

-This design is fitting for universities with under 5000 student count.

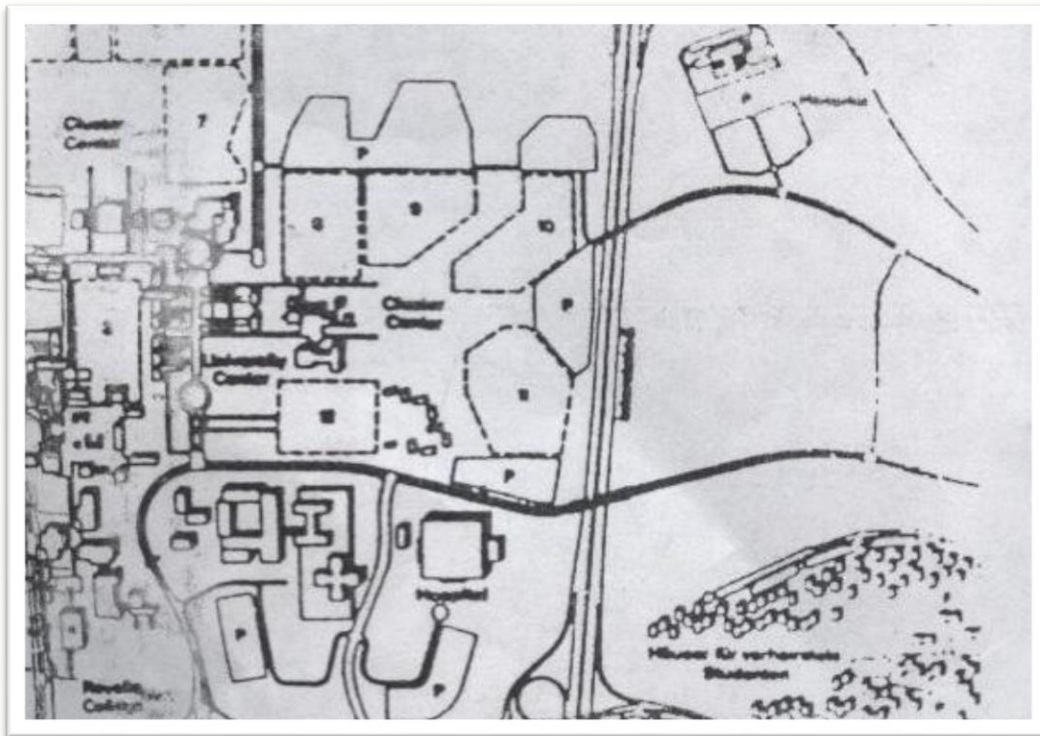
-Disadvantages: giving the design rigid boundaries.

-An example for this type of design is Marr University in south Germany.



## Separate Design:

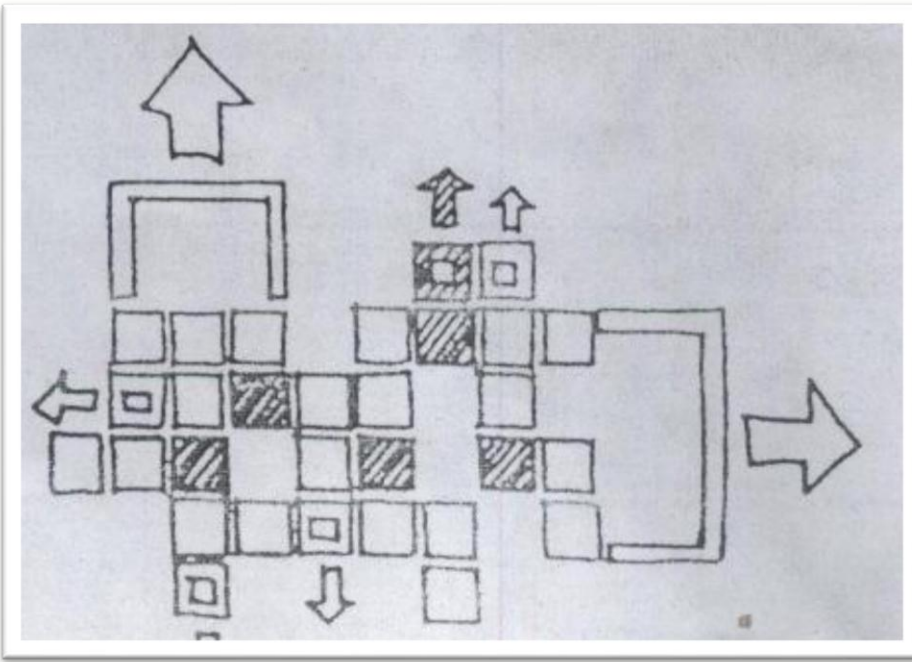
- The concept of this design is dividing the buildings in to groups with each group having an individual center and independence.
- Linking the different groups functionally should be held in consideration, and the buildings design should be longitudinal, crossed or central.
- The student count of Universities with this type of design should not exceed 10000.
- An example for this type is York University in England and Bleada University in Algeria.



## Net Design:

- This type is described by high and homogenous density for the buildings inside the campus area, also the buildings which share public service elements intercede.
- The design include a huge number of closed spaces that surround green areas and highly coordinated locations, as a result of functional efficiency in directing the buildings.
- This design can serve various numbers of students.

-An example of this design is Essex University in England.



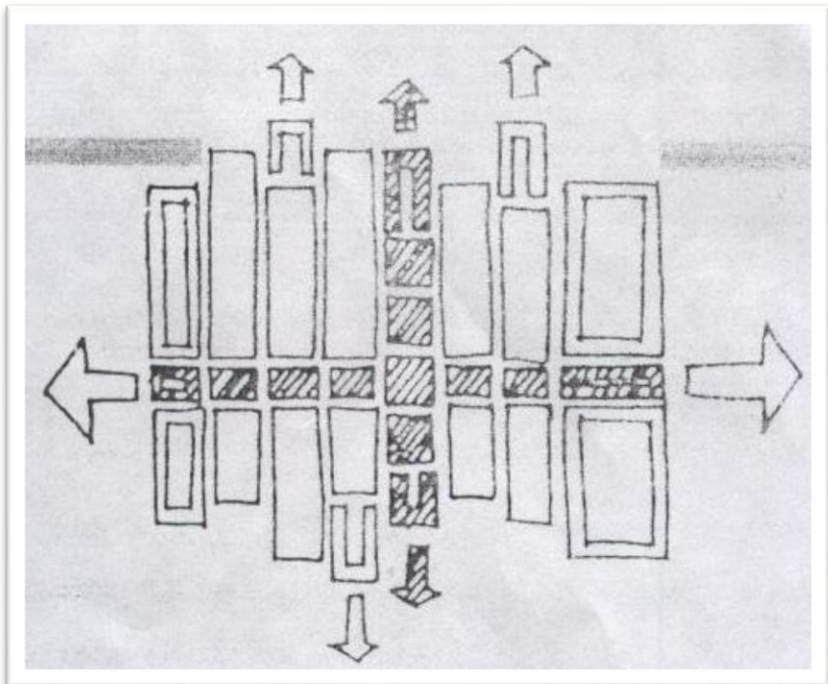
### **Cross linked Design:**

-This design has perpendicular construction buildings which are crossed linked together, and the service elements follow the central organization of the design.

-It's easy to move inside the campus and with high speed and through the walkers' passage.

-This type has a capacity for 10000 - 12000 student.

-An example for this type is Regensburg University in West Germany.



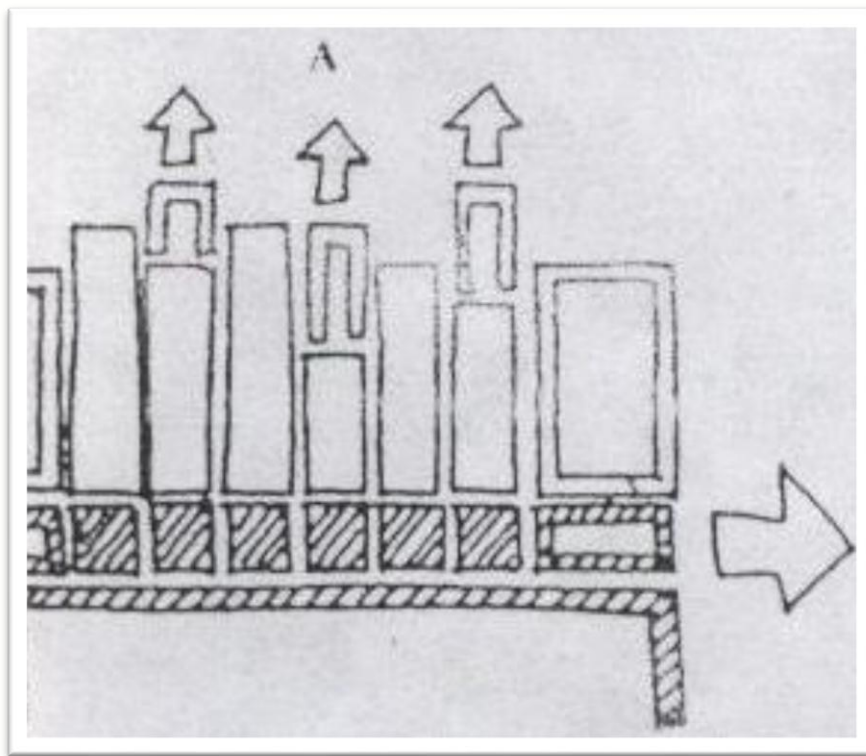
## Longitudinal Design:

-This type is described by a high density for buildings, and growth expansion in one direction.

-And it is distinguished by easy accesses to all parts, and services buildings are located so as to be surrounded by building gatherings from one or two directions.

-This type of design is applicable for Universities with different student counts.

-An example is Paff University in England.

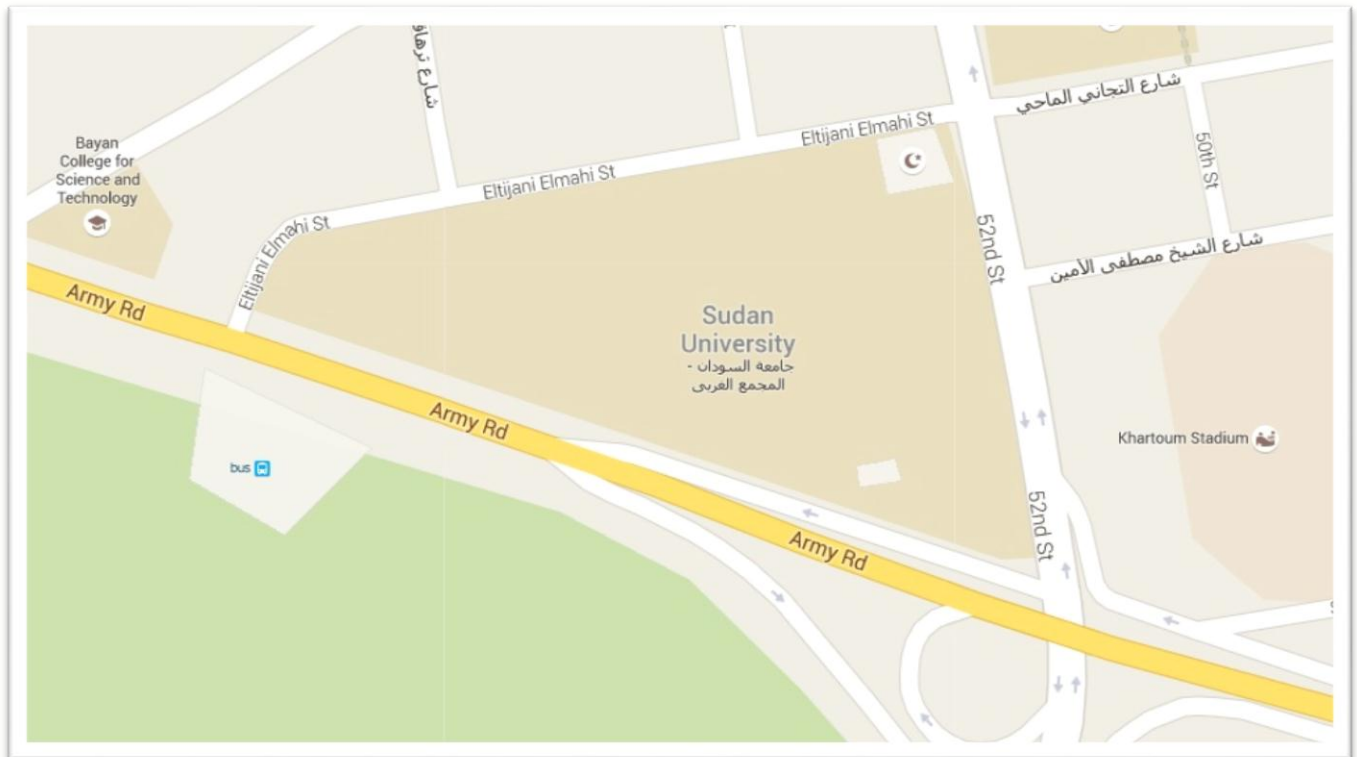


## 2-7 CASE STUDIES

### 2-7-1 LOCAL CASE STUDY:

#### **2-7-1-1 COLLEGE OF FINE AND APPLIED ARTS “SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY”:-**

College of fine and applied arts “SUST” is an institute of fine arts with all its applications founded in 1946 in the western campus of “SUST” , and it helps developing its students and raise awareness towards the importance of fine arts in our society.

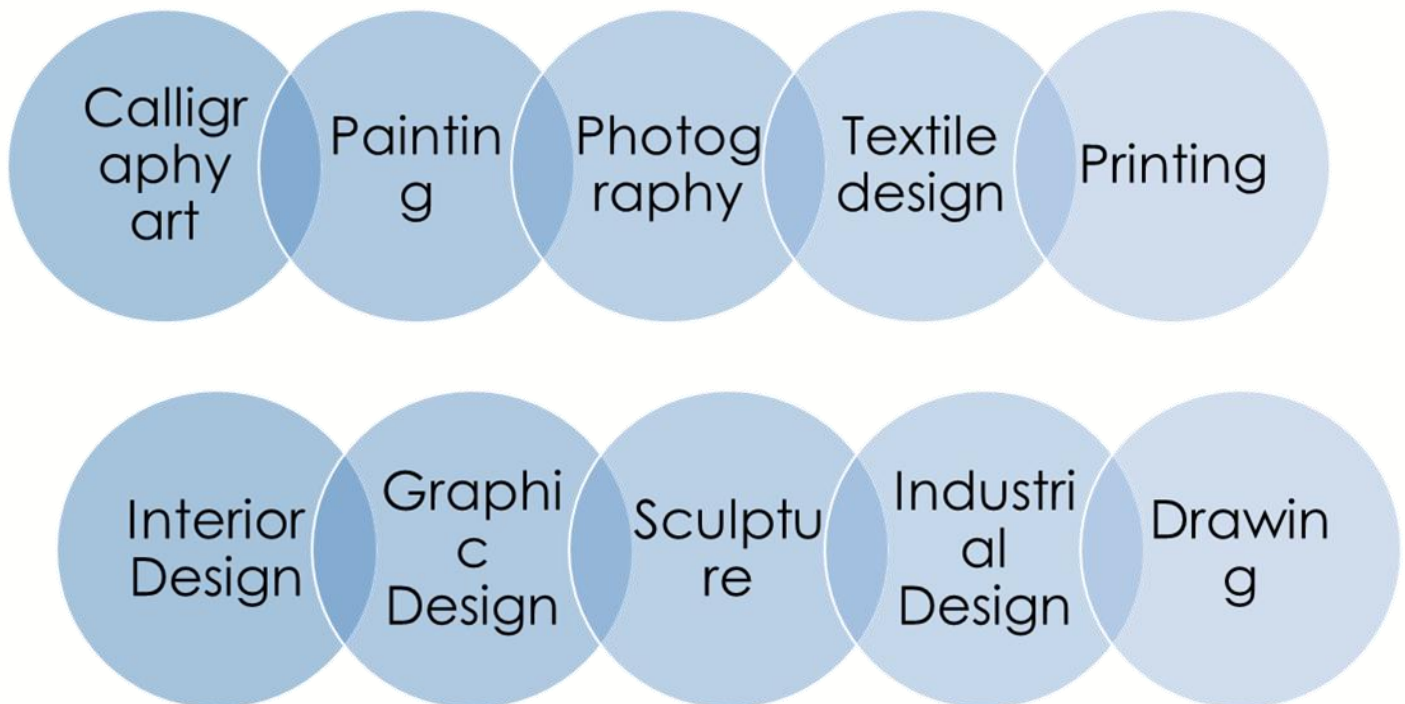


The college consists of several buildings within the university campus that resides nearly in the middle of the campus. “as in figure”

## The college buildings on campus:

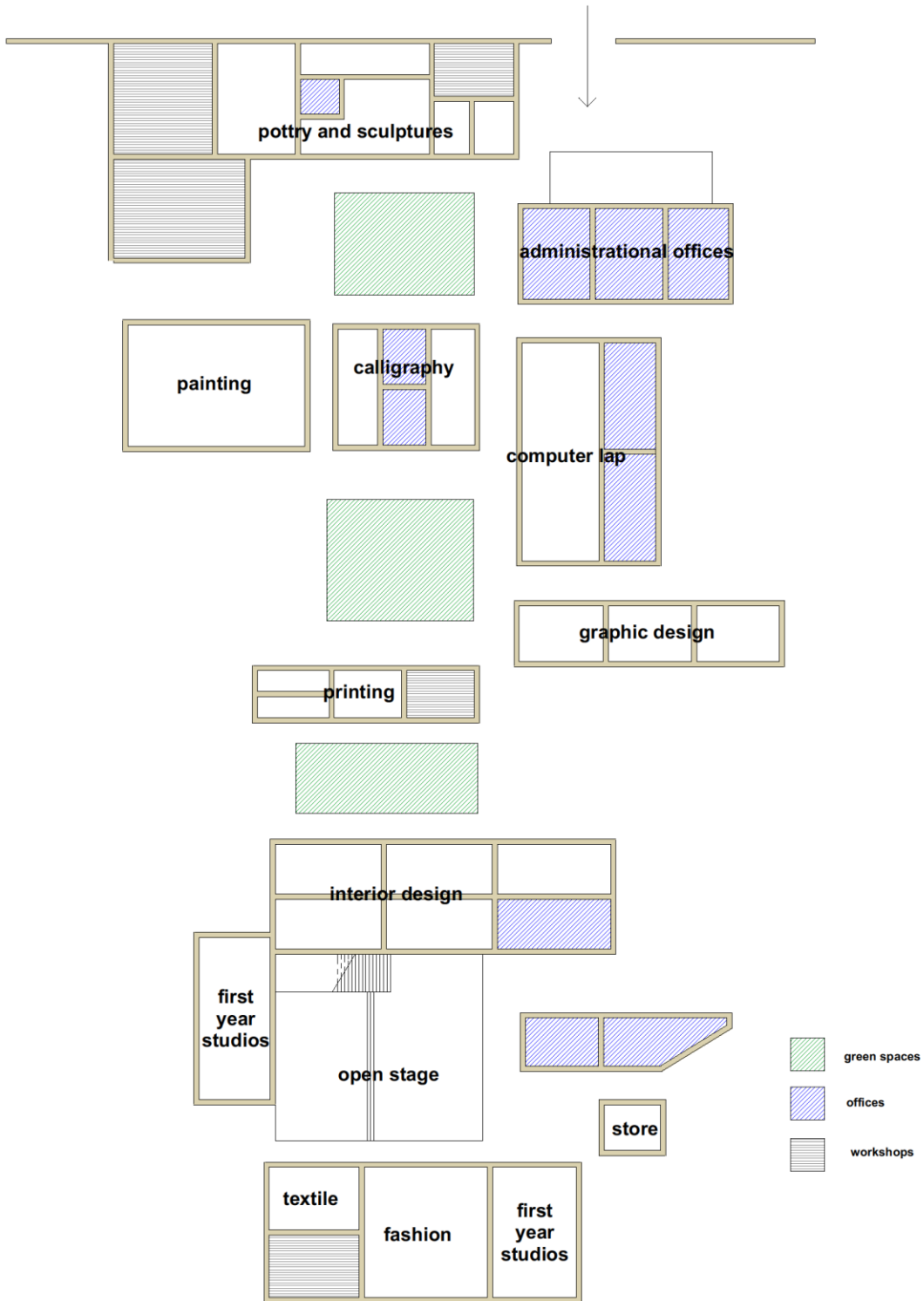


There are 10 main departments to the college:





# A crooked ground floor plan of the college:



## **Main spaces of the college:**

- studios.
- workshops.
- library.
- computer lab.
- offices.
- open stage.
- storages.
- heavy workshops which are located far away from the main college buildings.

## **Pros:**

- \* diversity of the departments.
- \* specialized and well prepared workshops.
- \* the relationship between the main spaces of each zone is quite good.
- \* Exterior spaces well distributed.

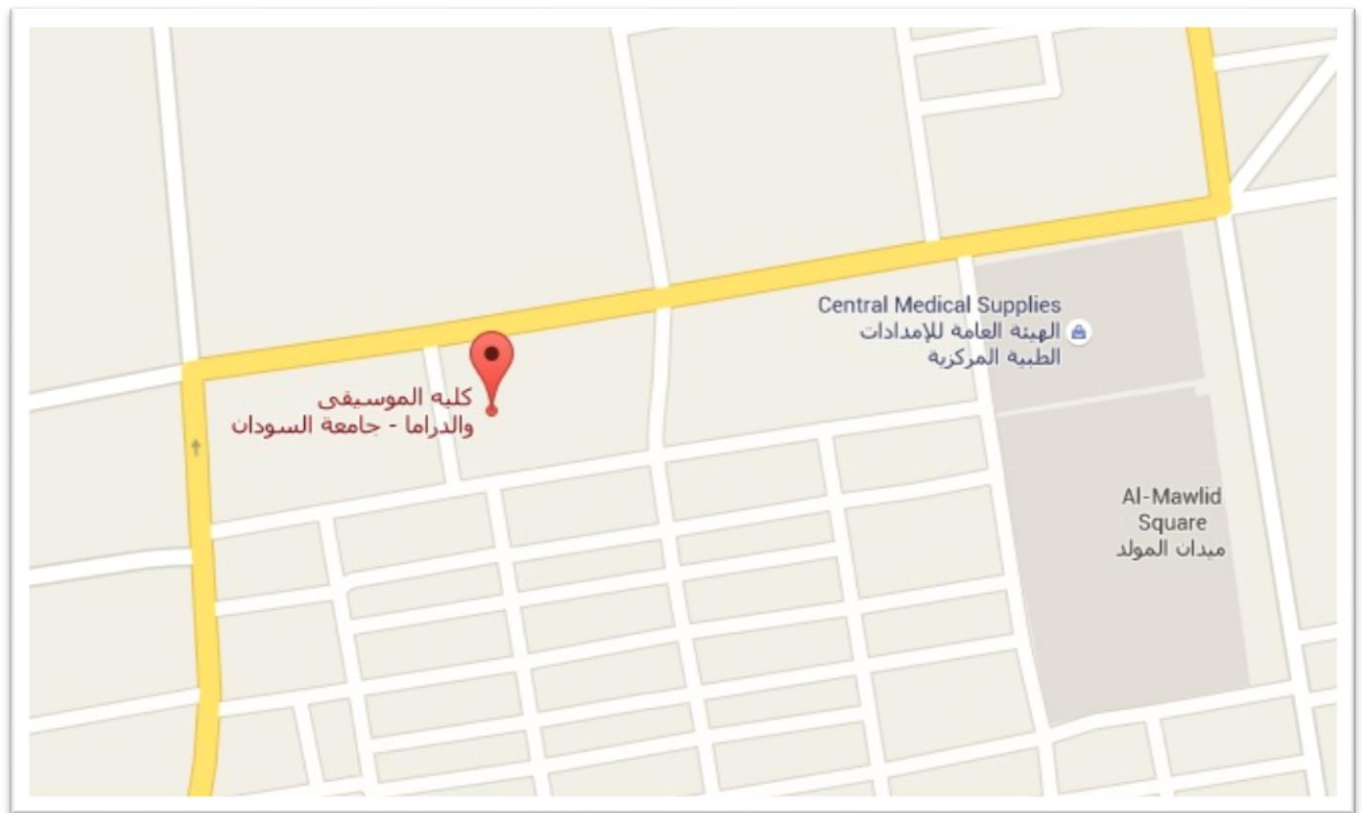
## **Cons:**

- \* college is not separated from other colleges in the university, therefore no privacy to the art students.
- \* Some of the departments are not well prepared specially on the area of right distribution of spaces.

## 2-7-1-2 COLLEGE OF MUSIC AND DRAMA “SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY”:

located in Khartoum-Elilha Eljadeeda. Was Founded in March 1969 under the control of the Ministry of Information and Culture.

The Institute started to perform its functions with the first intake of students selected from those who had interest, talent and previous knowledge about music or theatre.

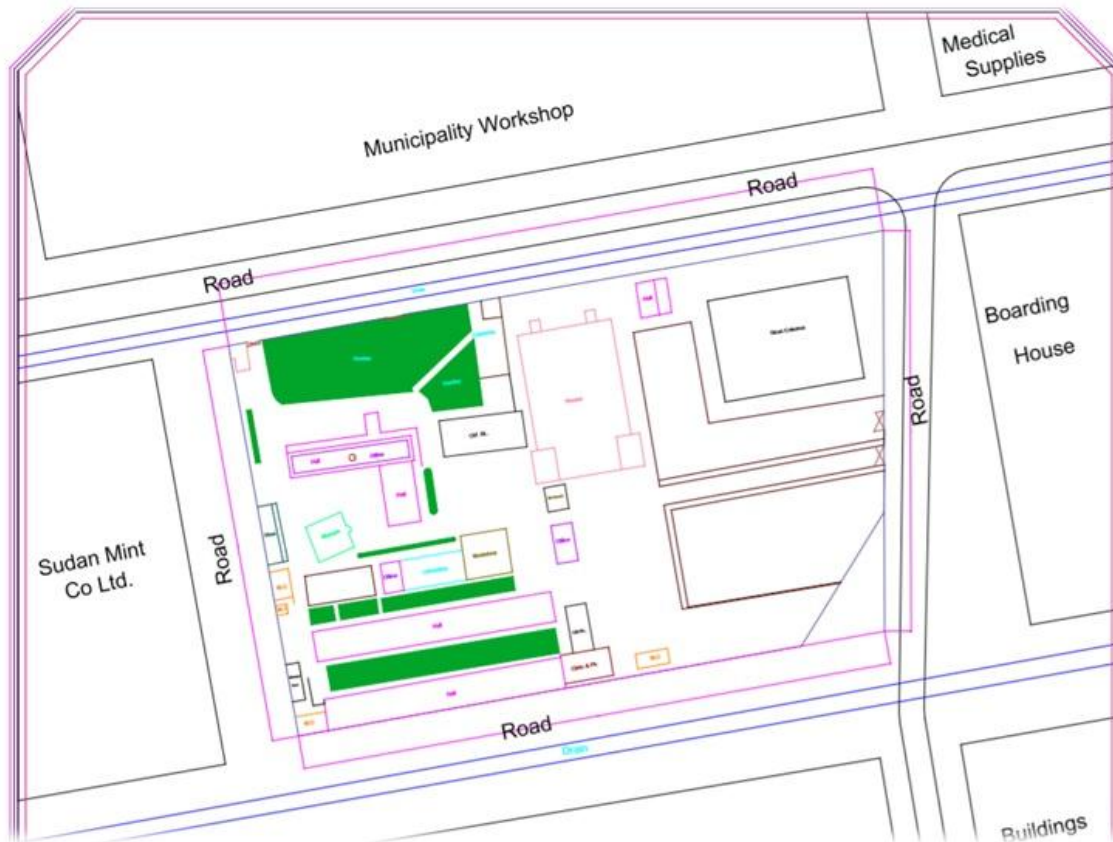
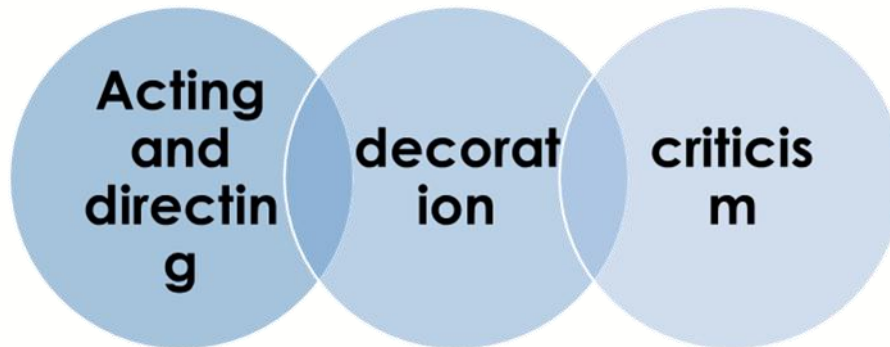


The 2 main departments:

Music:



Drama:



master plan

## Main spaces:

- administration building.
- classrooms.
- single training rooms.
- Coral rooms
- convention hall.
- theatre.

## Pros:

- \* the educational system to both music and drama is quite good.
- \* Single and group rehearsal rooms.

## Cons:

- \* not well prepared.
- \* Sound echo affects the educational process.
- \* The lack of special standards when designing the college.
- \* Weakness of the design and spaces distribution.

## 2-7-2 INTERNATIONAL CASE STUDY:

### 2-7-2-1 TOKYO UNIVERSITY OF THE ARTS “JAPAN”:

\*Location:

Japan,Tokyo-ueno park.

\* The university was formed by the merger of Tokyo school of fine arts and Tokyo music school ,and was established in 1949. With a 277 teacher staff.



#### **Main departments:**

##### **1-department of fine art:**

- Japanese painting.
- oil painting.
- sculpture.
- craft.
- Design.
- Architecture and planning.
- aesthetics and art history.
- inter-media arts.
- film and new media.

##### **2-department of music:**

- composing.
- conducting.
- vocal music.
- piano.
- organ.
- string instruments.
- wind and percussion.
- Early music.
- musicology.
- Traditional Japanese music.

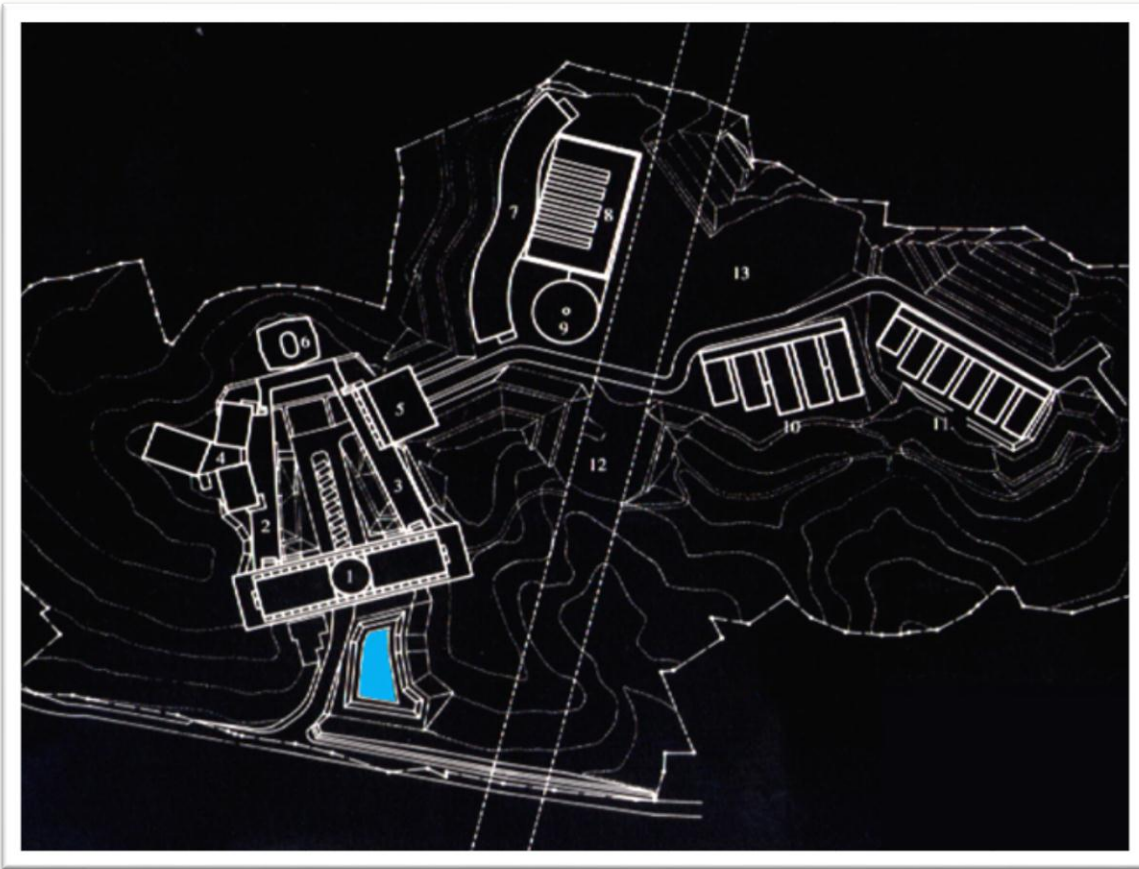
## The university consists of four main buildings:

**A:** for academic and administrative purposes and also galleries and other cultural purposes.

**B:** for students, both their everyday needs and socializing and resting.

**C&D:** for workshops.

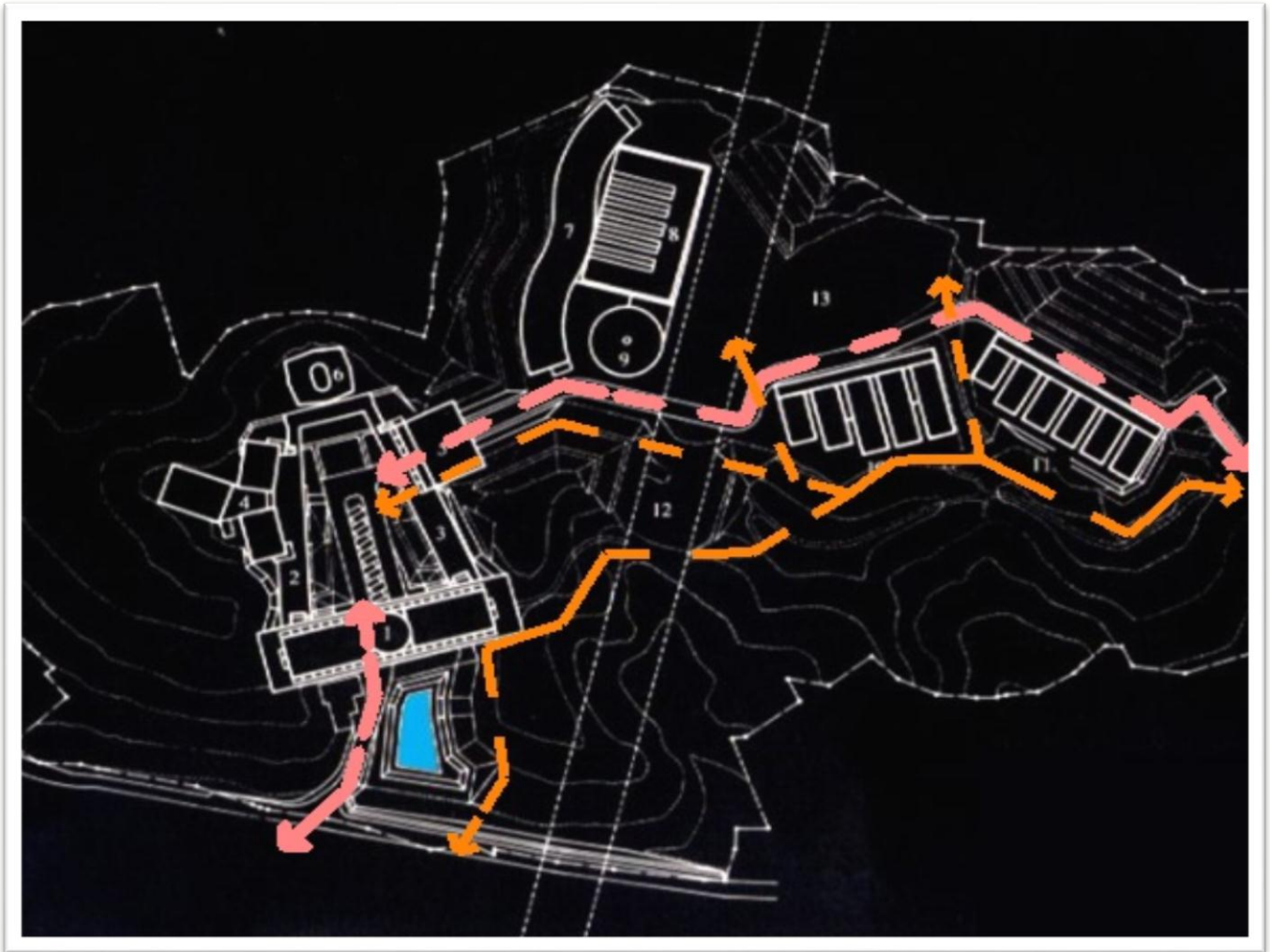




### **Main zones:**

- 1-administration offices.
- 2-studios.
- 3-studios.
- 4-cinema halls and theatre.
- 5-library.
- 6-gallery.
- 7-dorms.
- 8-students' services.
- 9-cafeteria.
- 10-workshops.
- 11-workshops.
- 12-plaza.
- 13-open space.



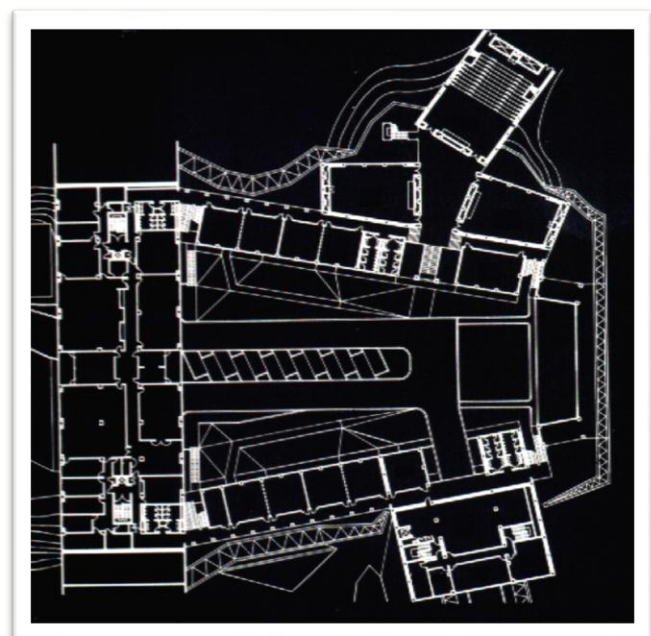


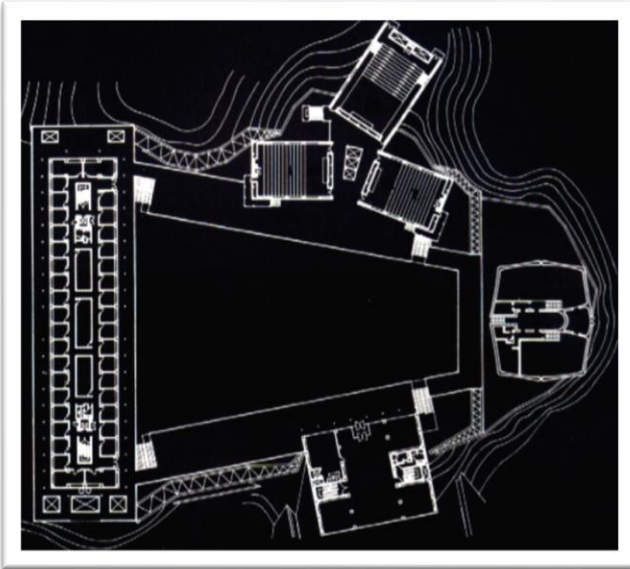
**Movement and entrances diagram**

Ground floor plan,  
building A

**main spaces:**

“administration, concert hall,  
art media center ,gallery,  
languages center, library”



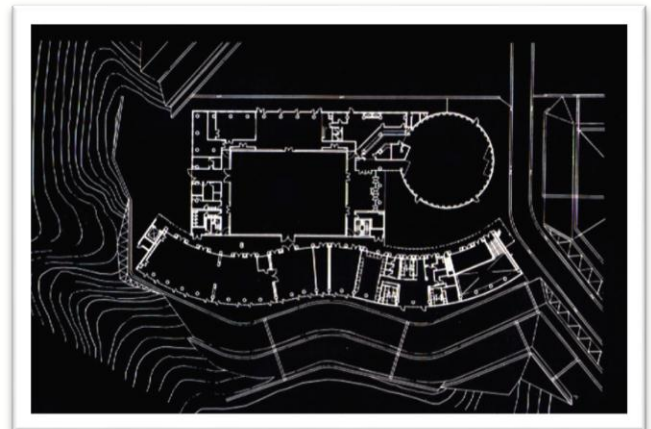


Second floor plan,  
building A

**main spaces:** “administration,  
gallery, library, concert hall, art  
media center”

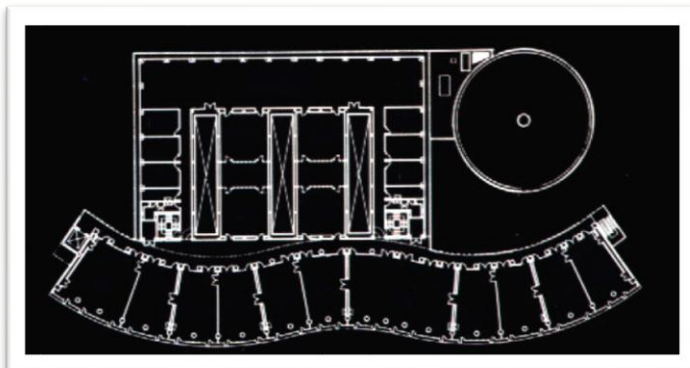
Ground floor plan,  
building B

**main spaces:** “dorms, social hall,  
cafeteria”



Second floor plan,  
building B

**main spaces:** “dorms,  
services, cafeteria”



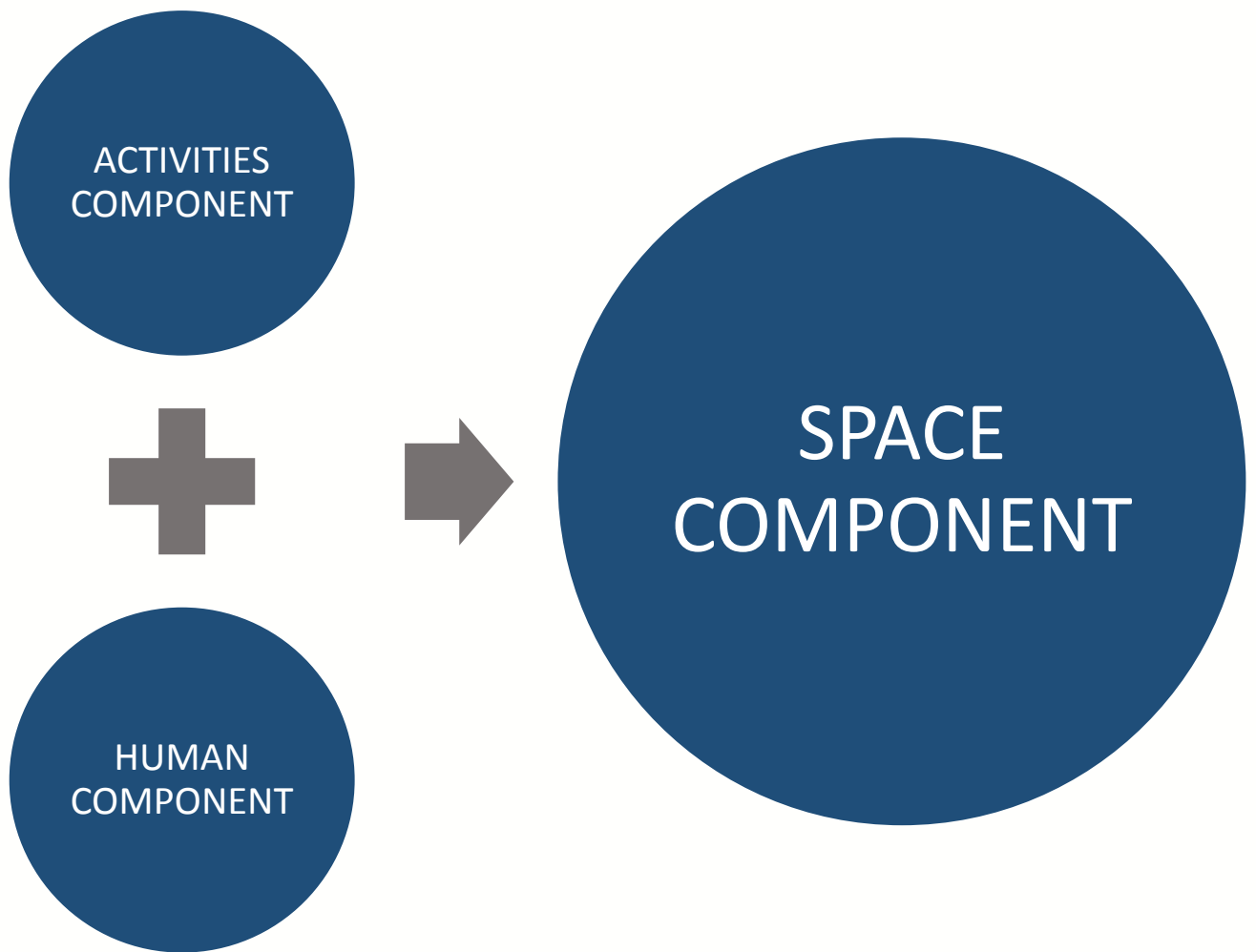


### Pros:

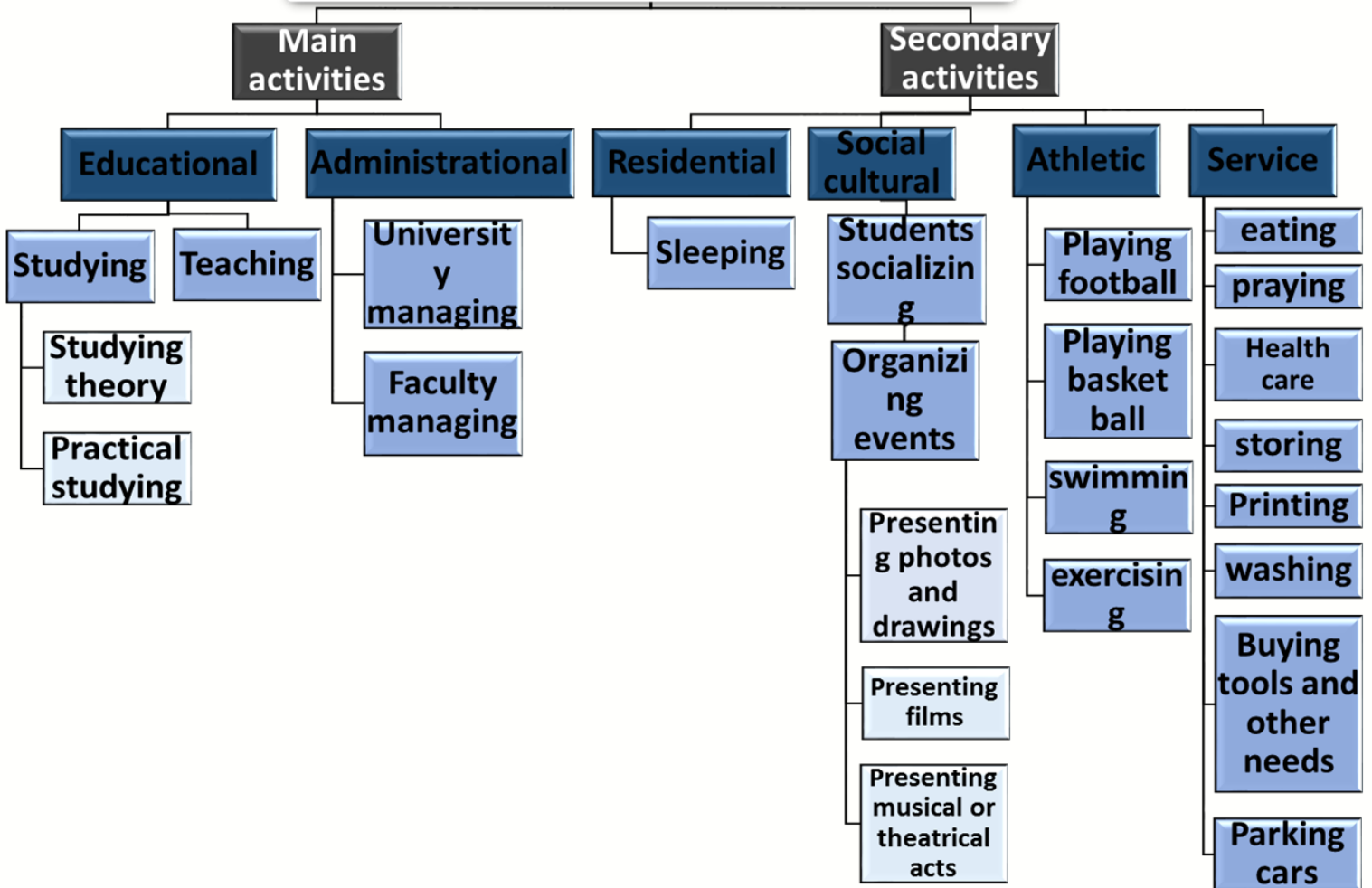
- \* diversity of spaces allowing students to be more creative.
- \* Easy access to all facilities.
- \* The existence of specific spaces such as: “art media center and concert hall” allowing students to present their work and achievements.
- \* Creative academic environment.
- \* the building is ecofriendly and is located in a park



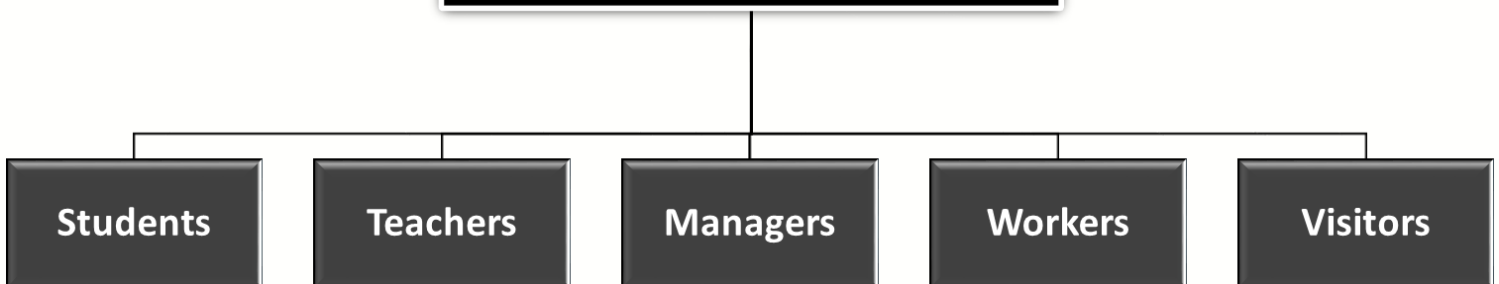
**3-1 Functions Analysis:**  
**Components Analysis:**  
**Project's Components:**



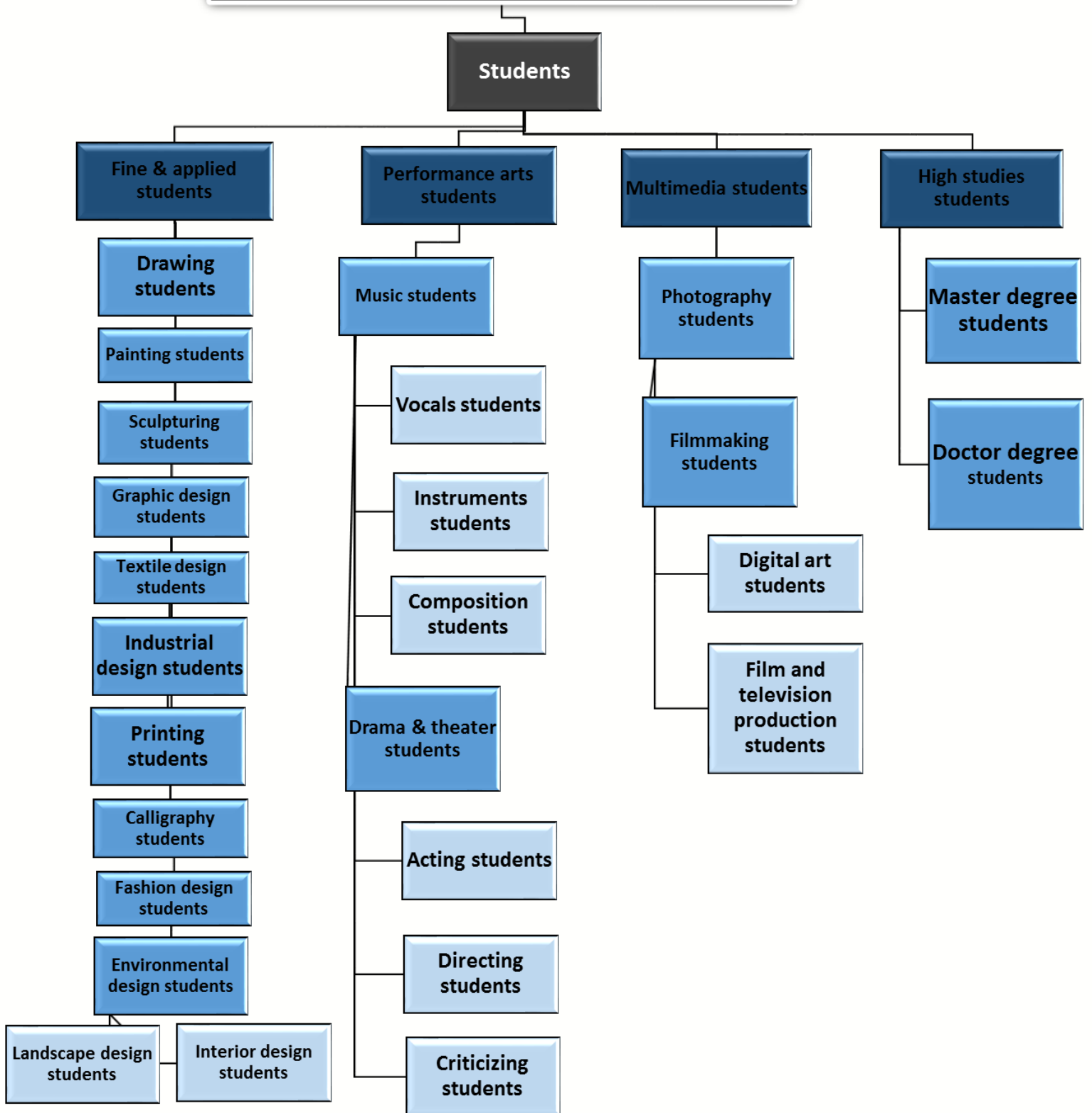
# Activities component



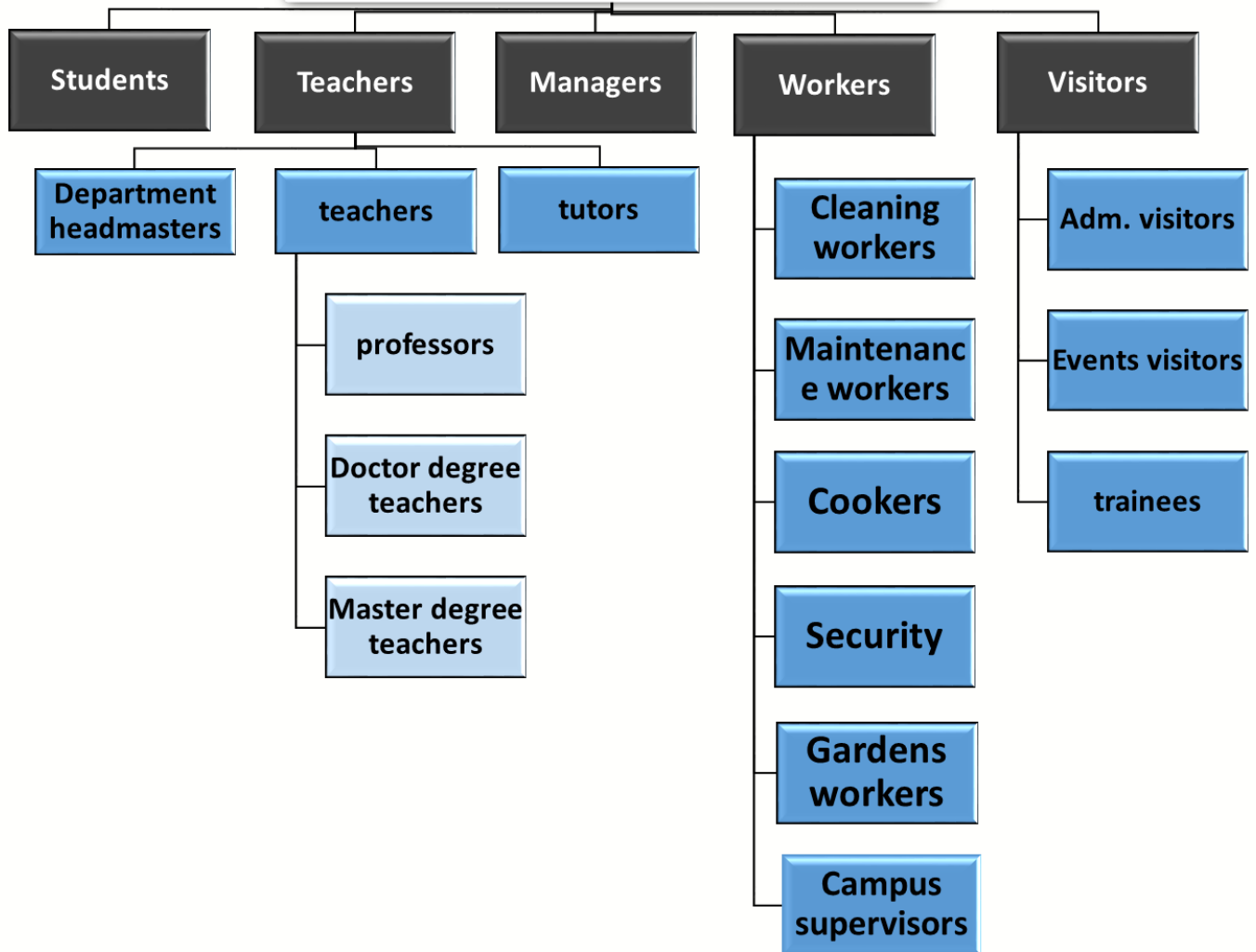
# Human component



# Human component

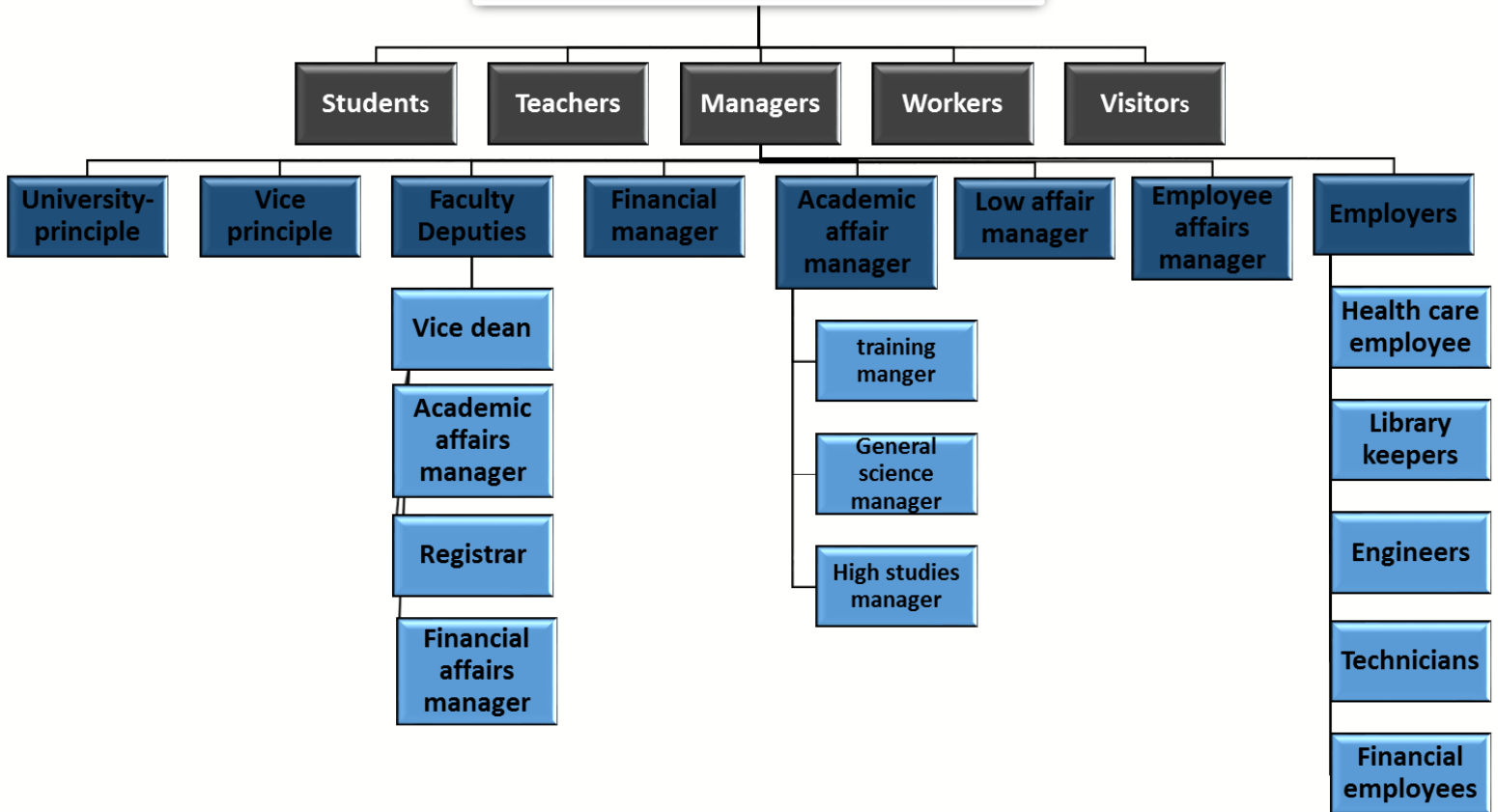


# Human component

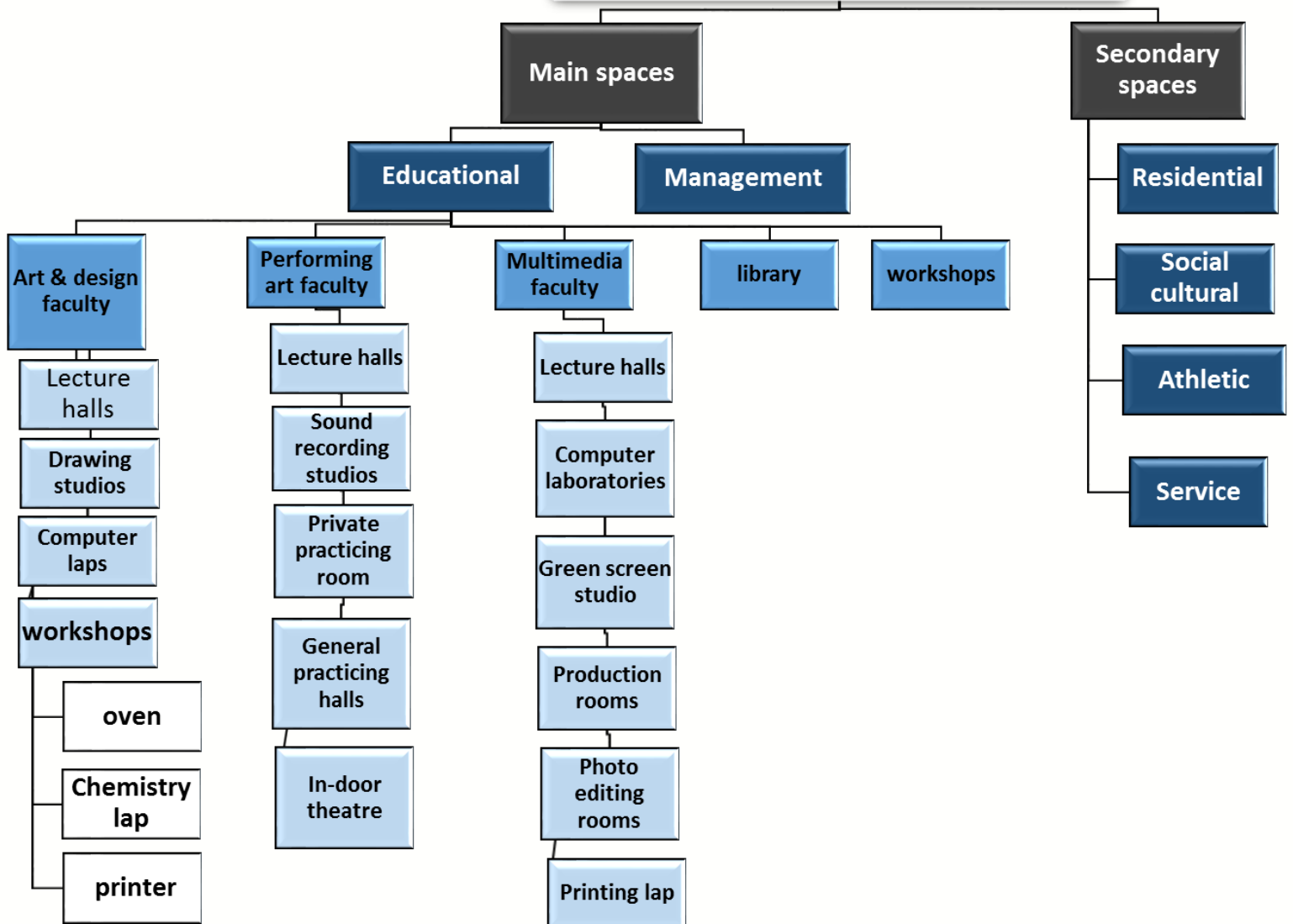




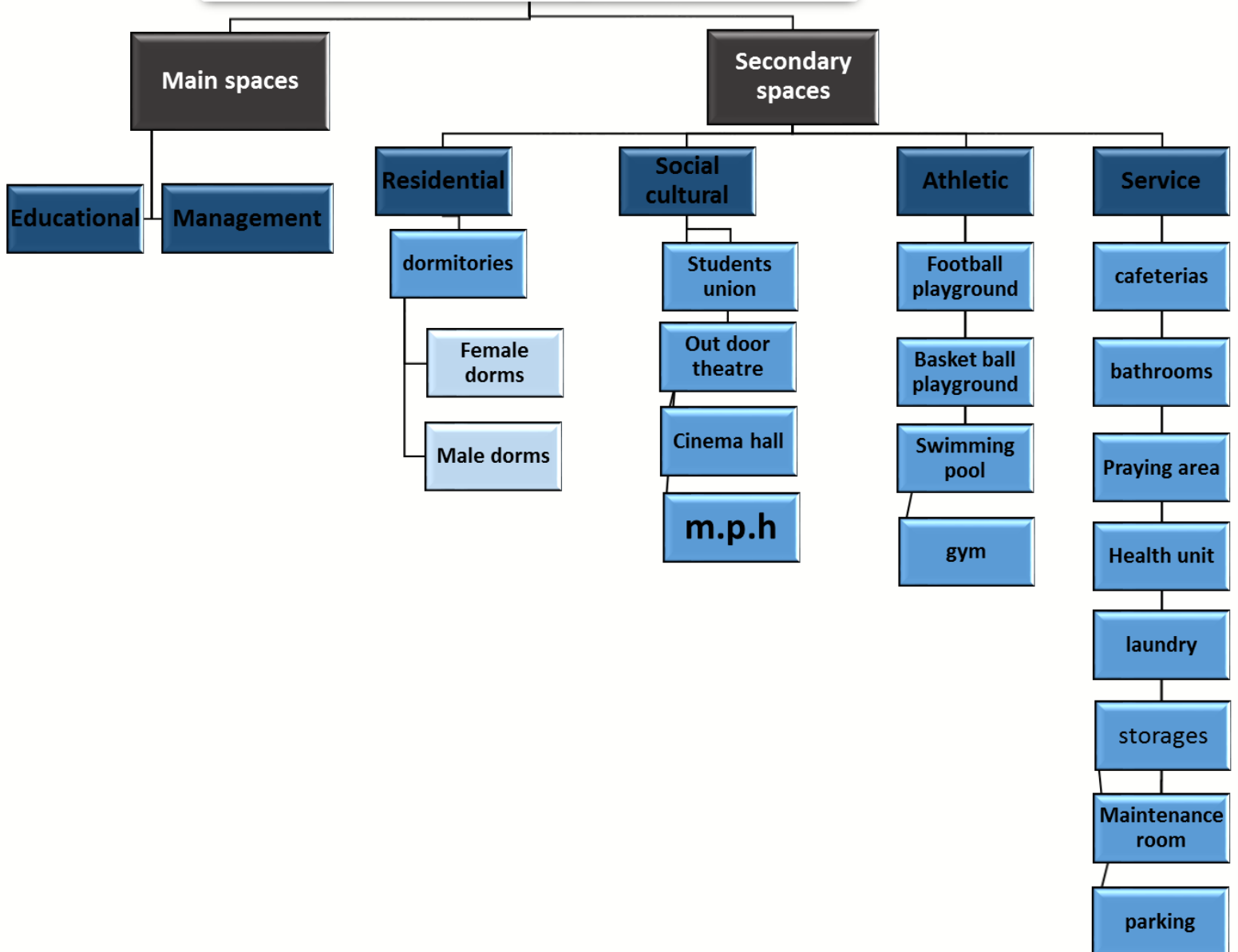
# Human component



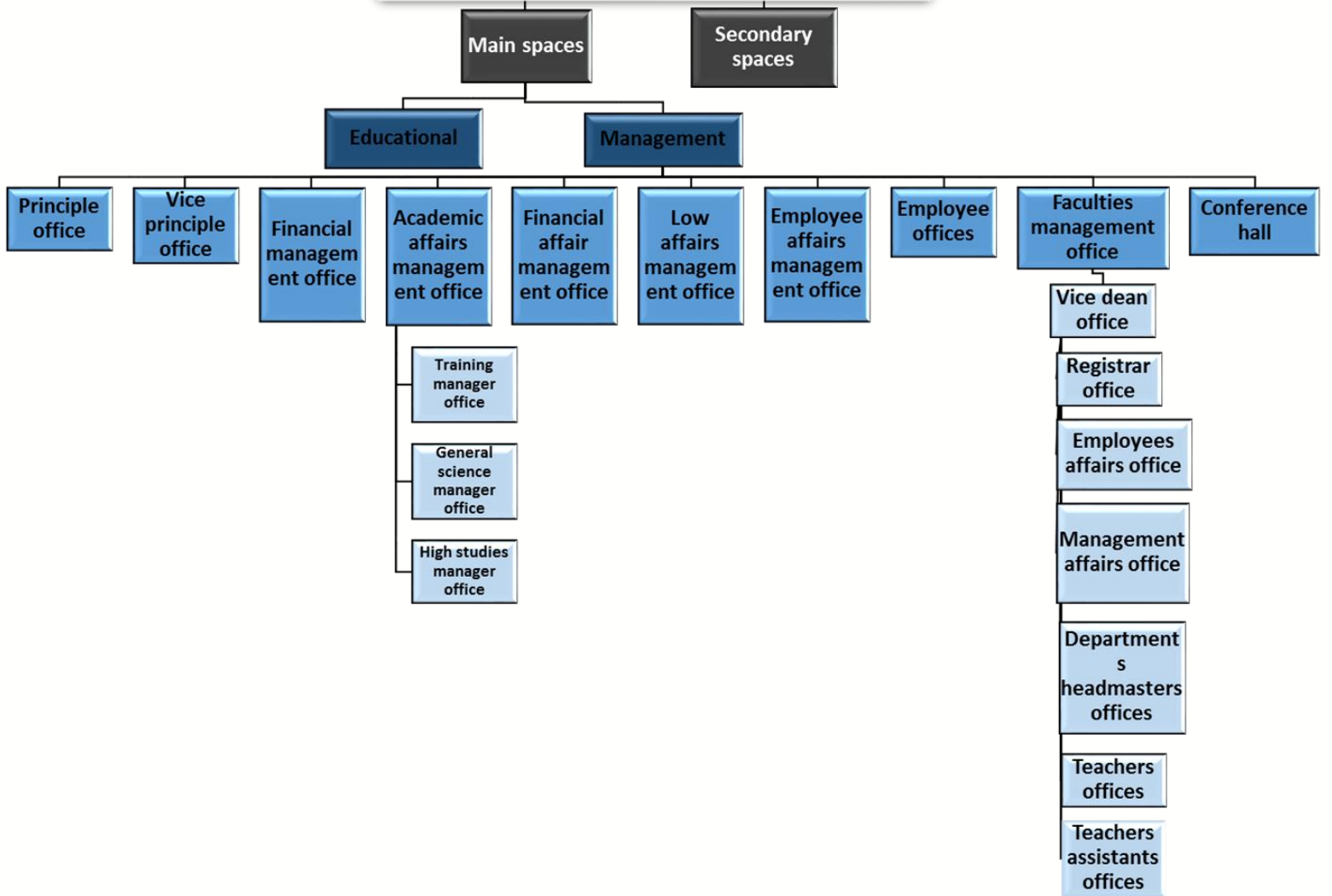
# Space component



# Space component



# Space component



## 3-2 USERS' CALCULATIONS:

### **college of fine and applied arts:**

- 11 departments.
- 1<sup>st</sup> grade: 180 students.
- 2<sup>nd</sup>-4<sup>th</sup> grade: 20 students per department for each year, with the exception of the applied arts students (10 students per department for each year).

Total of the students for the college = **720 students**

### **College of performing art:**

- 2 departments.
- 1<sup>st</sup>-4<sup>th</sup> grade: 90 students per department.

Total of the students for the college= **720 students**

### **College of multimedia:**

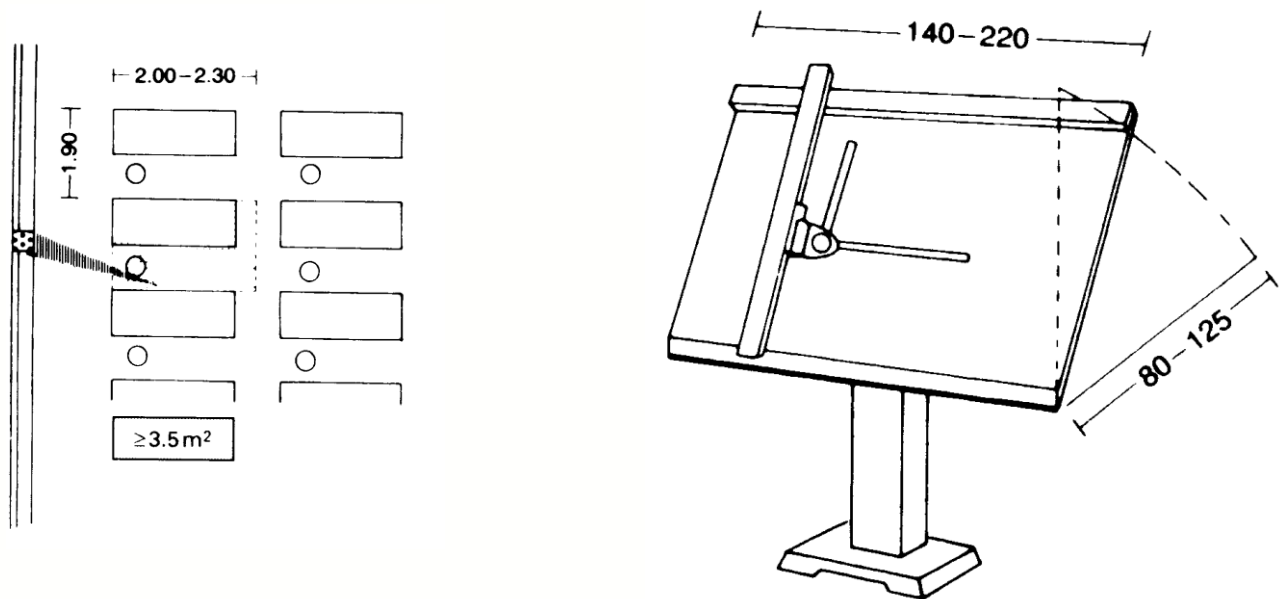
- 2 departments.
- 1<sup>st</sup>-4<sup>th</sup> grade: 90 students per department.

Total of the students for the college= **720 students**

## 3-3 SPACE STUDY:

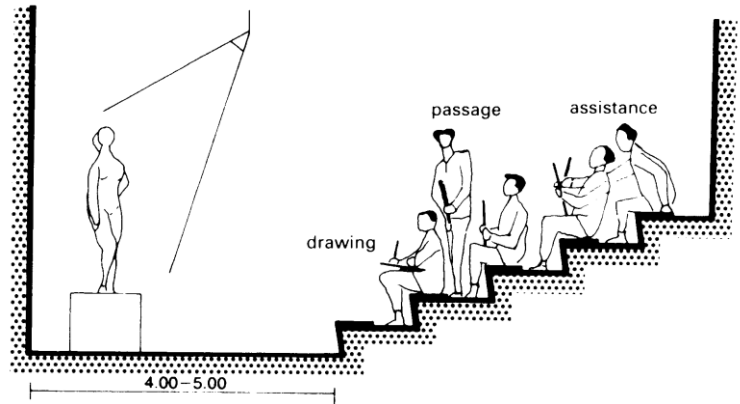
### Drawing Studios:

- In this space most ideas come to life, it's where students first ideas come to sketch, draft and draw their ideas.
- Working area for a single designer is 3.5-4.5 square meters.
- Circulation paths around the working area with a width of 1m.
- natural lighting is preferred, and artificial lightning should be at 500 lx.



## Live drawing studio:

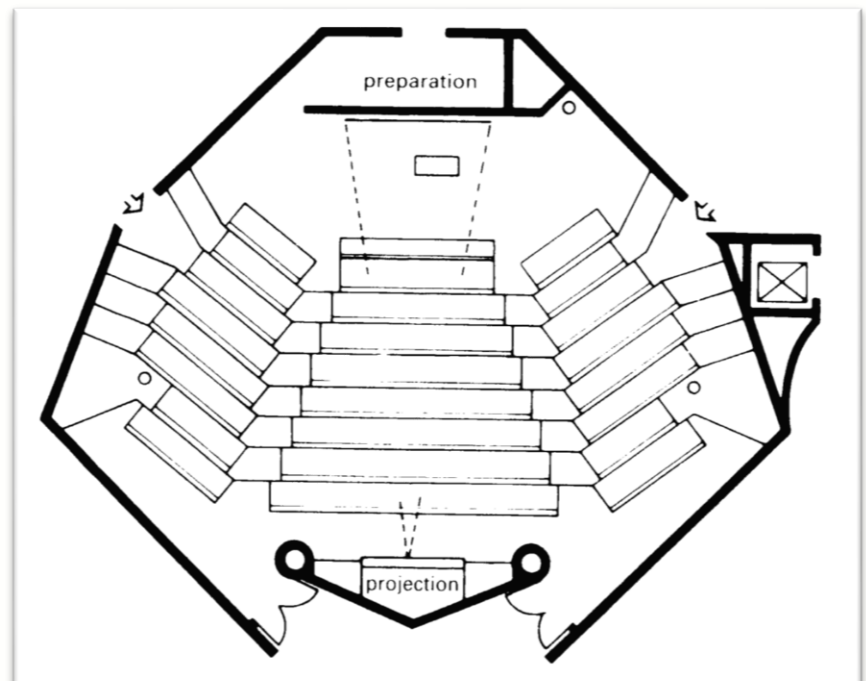
- this space is meant for life drawing, where a certain object is put and students try to imitate it.



- natural lighting is preferred, and artificial lightning should be at 500 lx.

## Lecture theatre:

- students enter from the back of the lecture hall.
- Lecturers enter from the front.
- Each lecture theatre should have an ancillary room, with no fixed function.

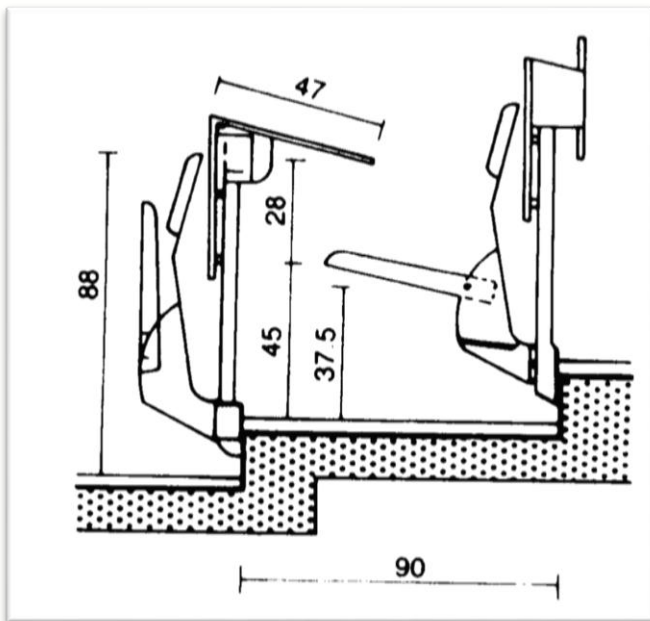
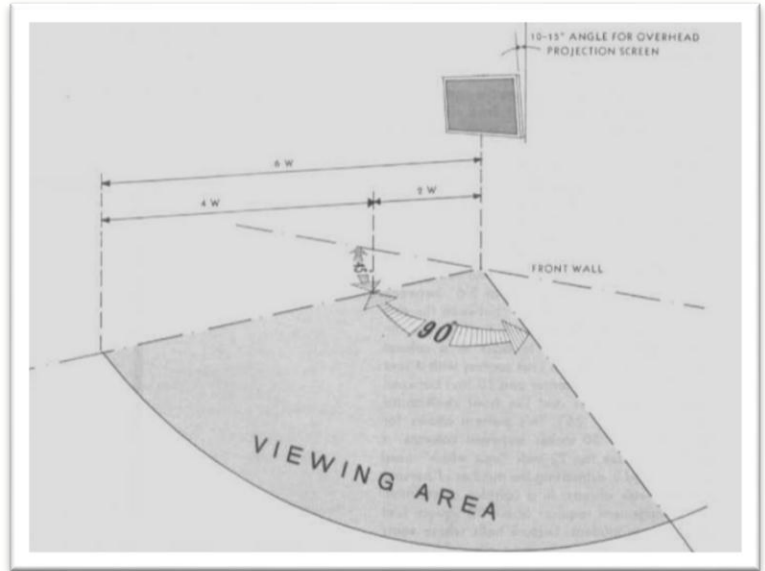


Acoustics and lighting:

- Sound should reach each member of the audience with equal amplitude without any echo.
- Suspended ceilings for reflection and absorption.
- Rear walls lined with sound absorbent material, other walls smooth.
- Light level in a windowless lecture re theatre: 600 lx.

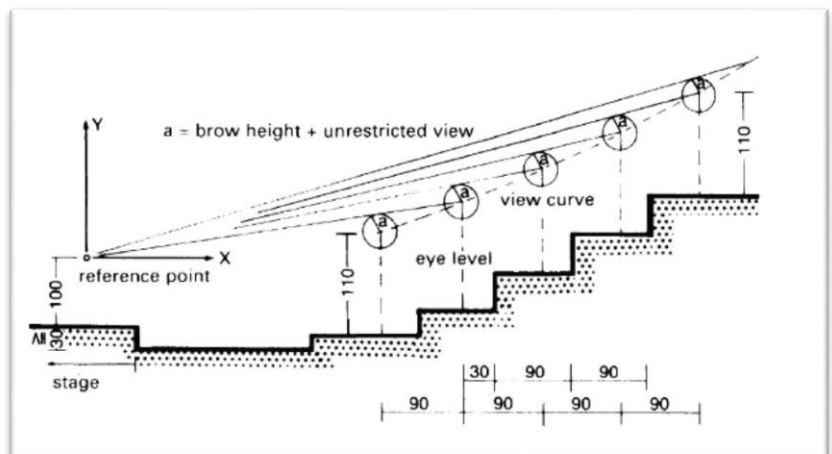
view point:

If lecture rooms are built in a fan shape instead of a rectangular shape, the minimum angle between line of sight and the blackboard should be at least 30 degrees and preferably more than 45 degrees.



- Amount of space per students .60 m2 for larger theatre hall, smaller ones the comfortable required space is .80 - .95 m2.

- view point and eye level dimensions

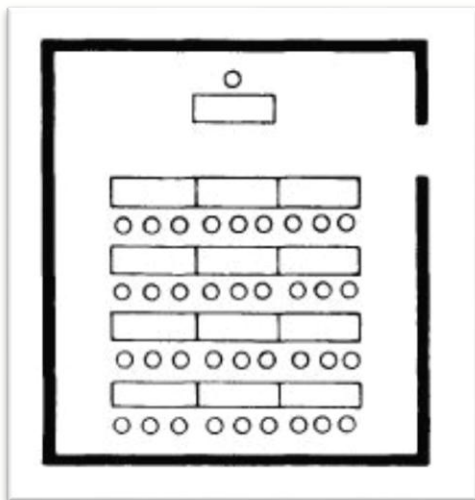


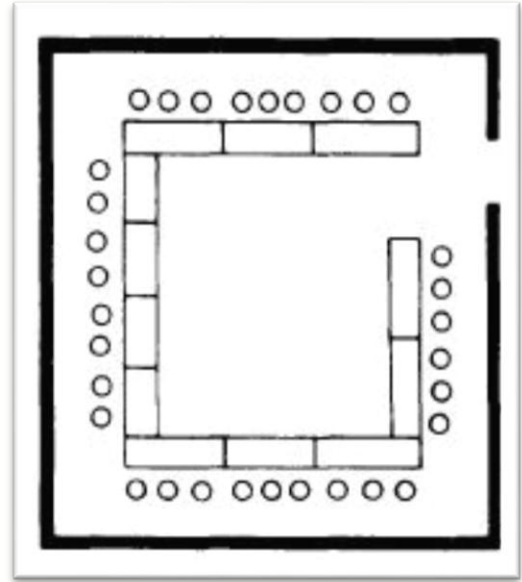




**General purpose seminar rooms:**

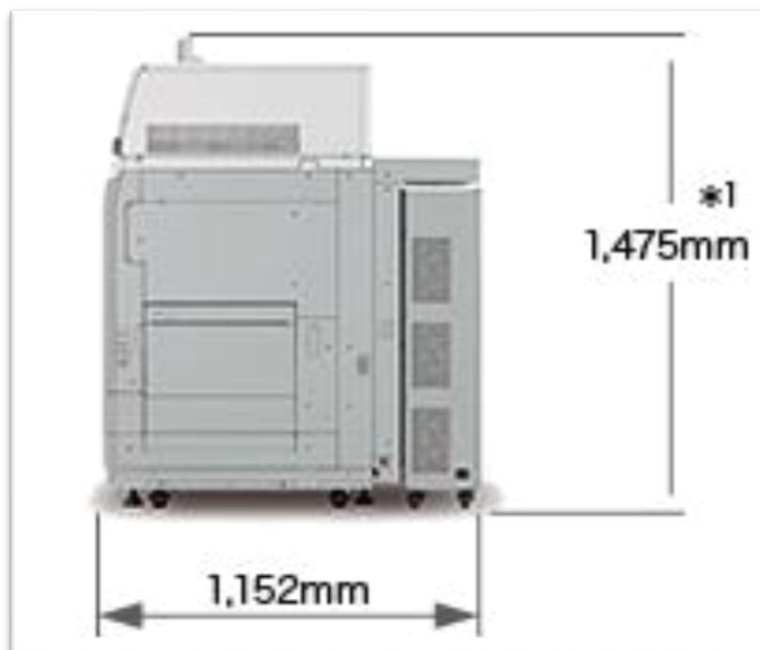
- space required per student .90-2.00m<sup>2</sup>.
- can be arranged in several ways.
- can take up to 60 seats.





### Printing rooms:

- the space where drawings are being printed.
- Number of copy machines: 3
- the space of copy machines: 26 m<sup>2</sup>



### 3-4 SPACES TABLE:

#### 3-4-1 Educational:

college of fine and applied arts:

activity	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
educational \  Fine and applied arts	Lecture hall	200	.6 m2	160 m2	1	160m2
	Class room	30	.9 m2	36 m2	4	144 m2
	Seminar rooms	30	.9	36 m2	10	360 m2
	Basic Drawing studio	45	3.5 m2	210 m2	2	420 m2
	Live drawing studios	40	1.5 m2	80 m2	1	80 m2
	Drawing\workshop studios	25	4 m2	130 m2	12	1560 m2
	workshops	10	10 m2	140 m2	4	560 m2
	Computer lap	25	3 m2	98 m2	6	588 m2

Total area of spaces + circulation= **3850 m2**

College of multimedia:

activity	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
<b>Educational\ multimedia</b>	Lecture hall	200	.6 m <sup>2</sup>	160 m <sup>2</sup>	1	160m <sup>2</sup>
	Lecture hall small	30	.9 m <sup>2</sup>	36 m <sup>2</sup>	4	144 m <sup>2</sup>
	Seminar room	30	.9 m <sup>2</sup>	36 m <sup>2</sup>	6	216 m <sup>2</sup>
	Computer lap	25	3.0 m <sup>2</sup>	98 m <sup>2</sup>	6	588 m <sup>2</sup>
	Green screen studio	20	-	170 m <sup>2</sup>	1	170 m <sup>2</sup>
	Production room	10	-	85 m <sup>2</sup>	1	85 m <sup>2</sup>
	Photo editing room	3	-	25 m <sup>2</sup>	2	50 m <sup>2</sup>
	Printing hall	6	-	70 m <sup>2</sup>	2	140 m <sup>2</sup>

Total area of spaces+ circulation = **1600 m<sup>2</sup>**

College of performing arts:

activity	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
<b>Educational \ Performing art</b>	Lecture hall	200	.6 m <sup>2</sup>	160 m <sup>2</sup>	1	160m <sup>2</sup>
	Lecture hall small	40	.9 m	60 m <sup>2</sup>	4	240 m <sup>2</sup>
	Private practicing rooms	2	-	16 m <sup>2</sup>	5	80 m <sup>2</sup>
	Group practicing halls(instruments)	60	6.0 m <sup>2</sup>	360 m <sup>2</sup>	1	360 m <sup>2</sup>
	Group practicing hall ( coral)	60	3.0 m <sup>2</sup>	180 m <sup>2</sup>	1	180 m <sup>2</sup>
	Indoor educational theatre	220	.8 m <sup>2</sup>	300	1	300 m <sup>2</sup>
	Recording studio	10	-	150	2	300 m <sup>2</sup>

Total area of spaces+ circulation= **1650 m<sup>2</sup>**

library and workshops:

activity	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
educational	workshops	25	-	500 m2	2	1000 m2
educational	library	250	-	1000 m2	1	1000 m2

total area = **2000 m2**

**3-4-2\_Administrational:**

Activity]	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
administrational	Principle office	1	-	30 m2	1	30m2
	Vice principle office	1	-	25 m2	1	25 m2
	Offices of managers (ad.+fac.)	1	-	20 m2	19	380 m2
	Offices of employee	2	-	15 m2	12	180 m2
	Offices of employee	3		15 m2	10	150 m2
	deans	1		25 m2	3	75 m2
	Offices of head departments	1		15 m2	20	300 m2
	Offices of teachers	2		20 m2	50	1000 m2
	Offices of teachers	3		20 m2	25	500 m2

total area + circulation= **2700 m2**

### 3-4-3 Residential, social cultural and athletic:

activity	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
residential	Bed rooms	2	3.16 m <sup>2</sup>	9 m <sup>2</sup>	1080	9720 m <sup>2</sup>
<b>total</b>						9720 m <sup>2</sup>
Social cultural	m.p.h	750	-	675 m <sup>2</sup>	1	675m <sup>2</sup>
	Outdoor theatre	250	0.6 m <sup>2</sup>	1500 m <sup>2</sup>	1	1500 m <sup>2</sup>
	Cinema hall	100	1.8 m <sup>2</sup>	200 m <sup>2</sup>	1	200 m <sup>2</sup>
	Students union	-	-	860 m <sup>2</sup>	1	860 m <sup>2</sup>
<b>total</b>						3250 m <sup>2</sup>
Athletic	Small playgrounds	10	-	135 m <sup>2</sup>	4	540 m <sup>2</sup>
	gym	-	-	340 m <sup>2</sup>	2	680 m <sup>2</sup>
	Swimming pool	-	-	470 m <sup>2</sup>	1	470 m <sup>2</sup>
<b>total</b>						1690 m <sup>2</sup>

### 3-4-4 Services:

activity	Space name	No. of users	Person's area	Space area	No. of spaces	Total area
services	cafeteria	600	1.3 m <sup>2</sup>	780 m <sup>2</sup>	1	780 m <sup>2</sup>
	mosque	1200	.85 m <sup>2</sup>	1326 m <sup>2</sup>	4	1326 m <sup>2</sup>
	Health unit	8	-	55 m <sup>2</sup>	1	55 m <sup>2</sup>
	laundry	-	-	10 m <sup>2</sup>	6	60 m <sup>2</sup>
	Water cycle	5	-	20 m <sup>2</sup>	40	800 m <sup>2</sup>
	parking	300	-	4875 m <sup>2</sup>	-	4875 m <sup>2</sup>
	Maintenance unit	-	-	30 m <sup>2</sup>	3	90 m <sup>2</sup>
	Lockers and showers	-	-	40 m <sup>2</sup>	2	80 m <sup>2</sup>

Total area= **8000m<sup>2</sup>**

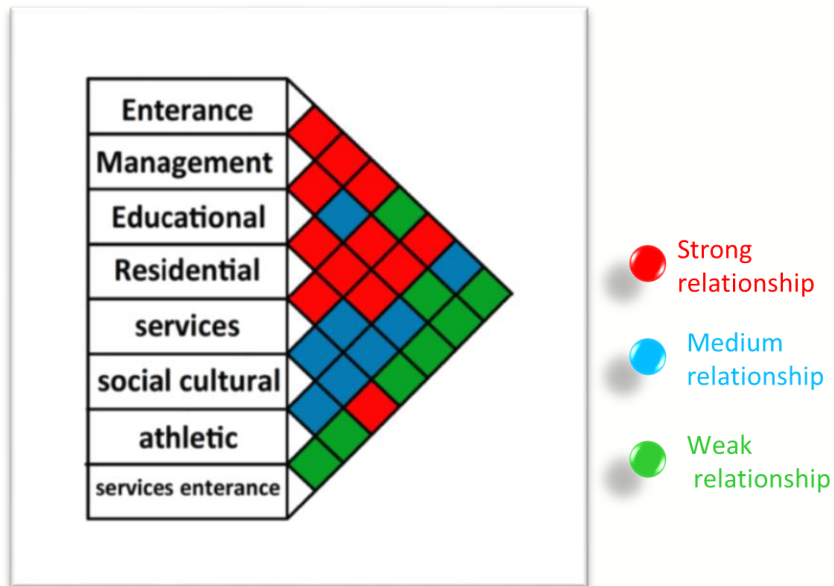


### 3-4-5 Total area schedule:

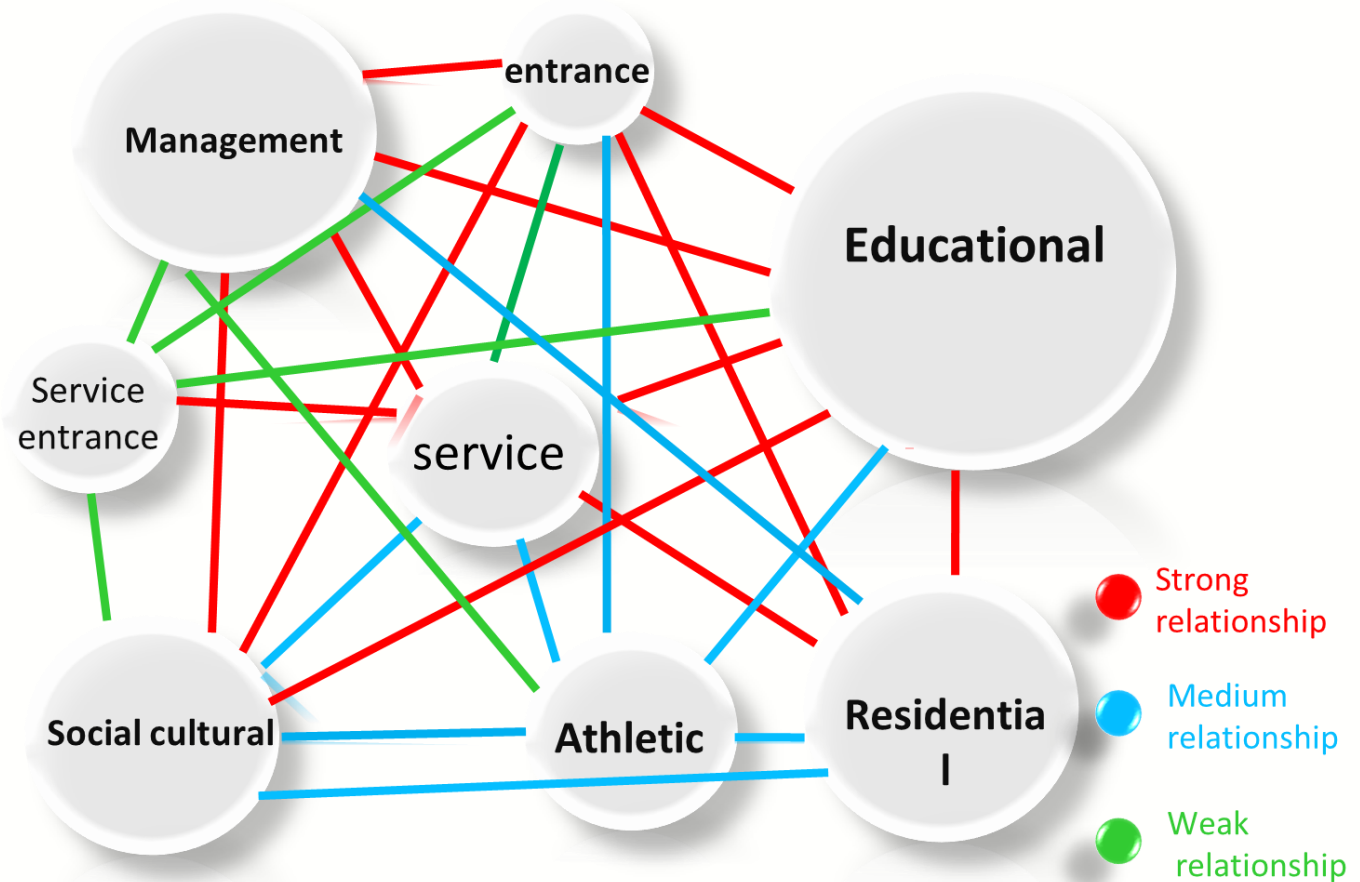
<b>zones</b>	<b>Total area</b>	<b>Percentage</b>
<b>educational</b>	<b>11400 m2</b>	<b>11.8%</b>
<b>administrational</b>	<b>1550 m2</b>	<b>1.6%</b>
<b>residential</b>	<b>11660m2</b>	<b>12.0%</b>
<b>Social cultural</b>	<b>3900 m2</b>	<b>5.5%</b>
<b>athletic</b>	<b>2000 m2</b>	<b>4.0%</b>
<b>services</b>	<b>8000 m2</b>	<b>8.1%</b>
<b>Non built area</b>	<b>57700 m2</b>	<b>57.0%</b>
<b>Total area of the project</b>	<b>96210 m2</b>	<b>100%</b>

### 3-5 FUNCTIONAL RELATIONSHIP:

#### 3-5-1 Matrix diagram:

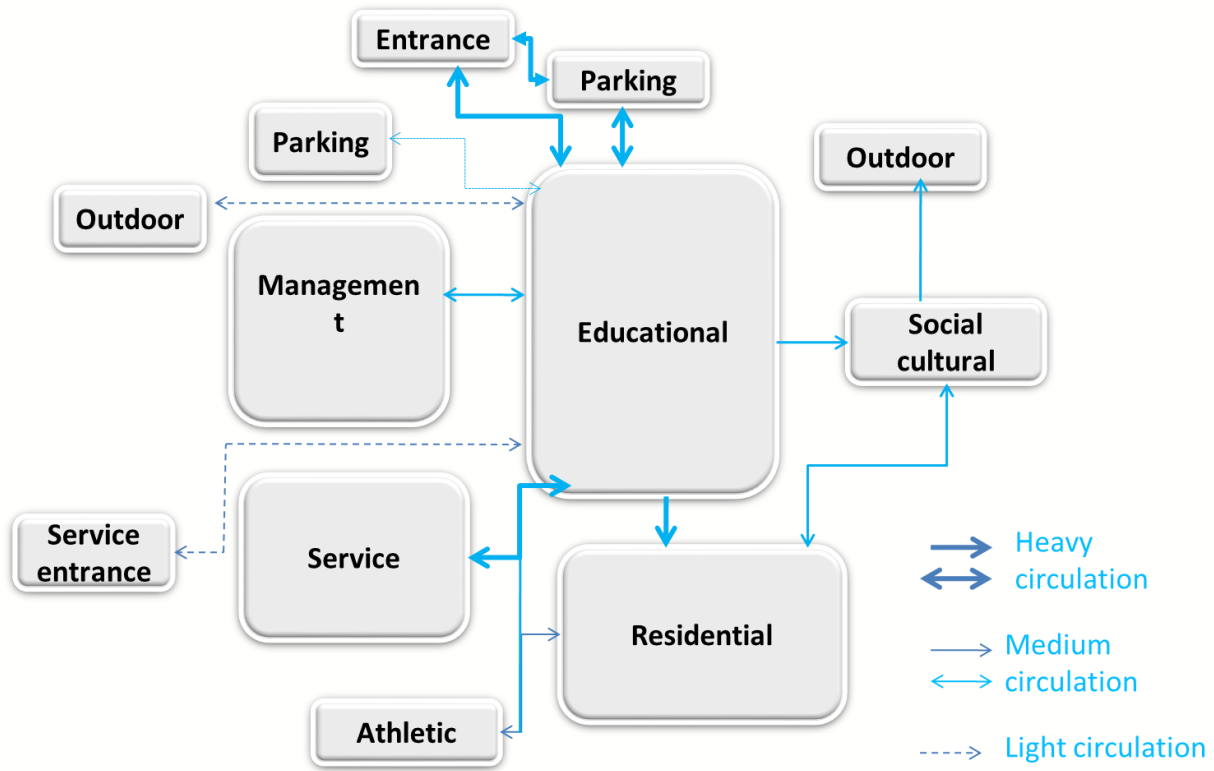


#### 3-5-2 bubble diagram:

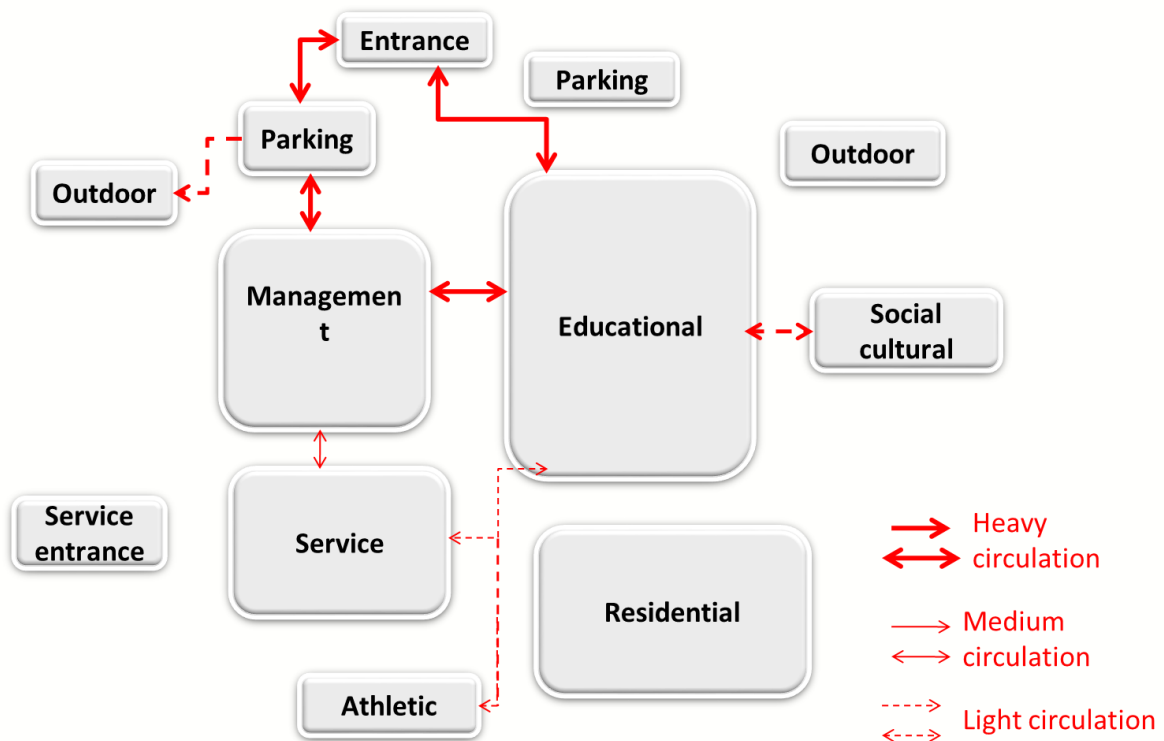


### 3-6 MOVEMENTS DIAGRAMS:

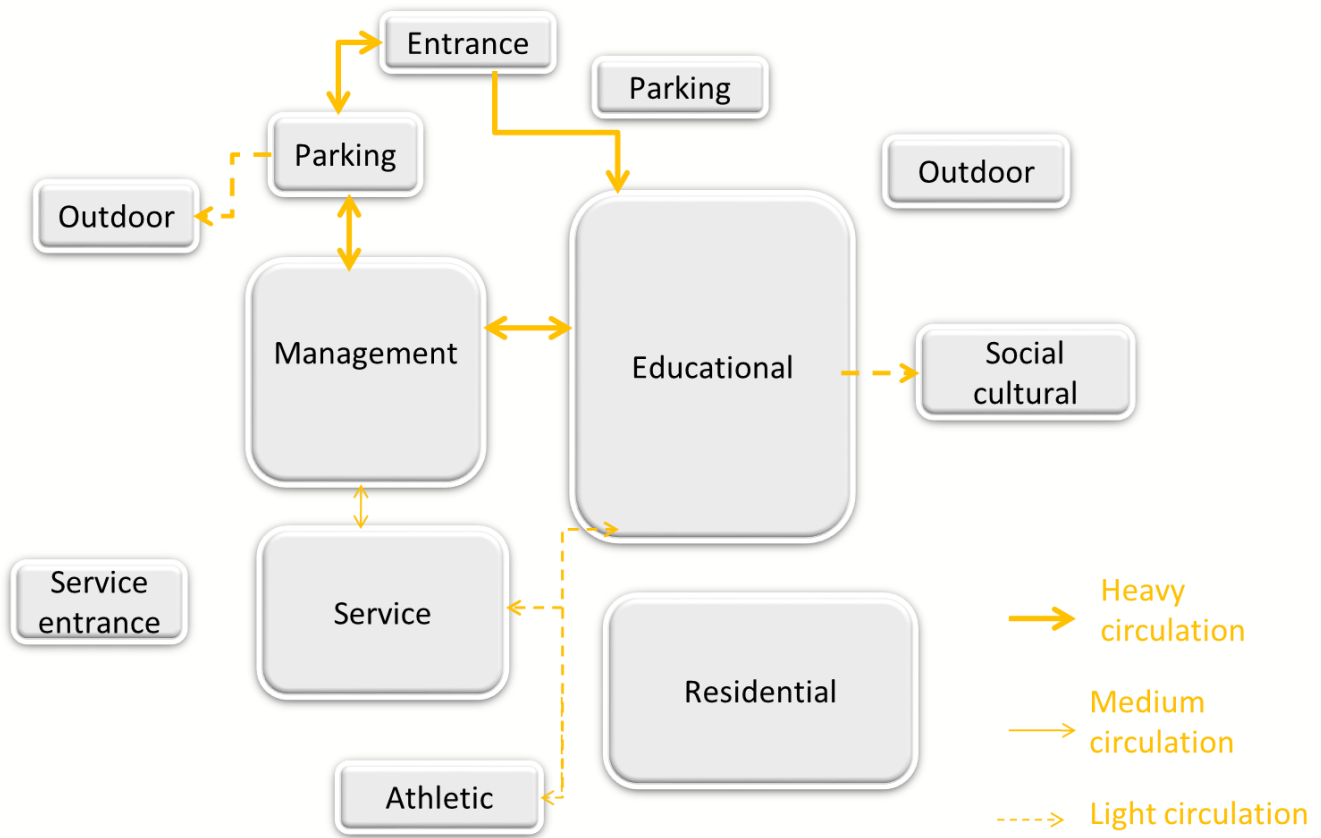
#### 3-6-1 students movement:



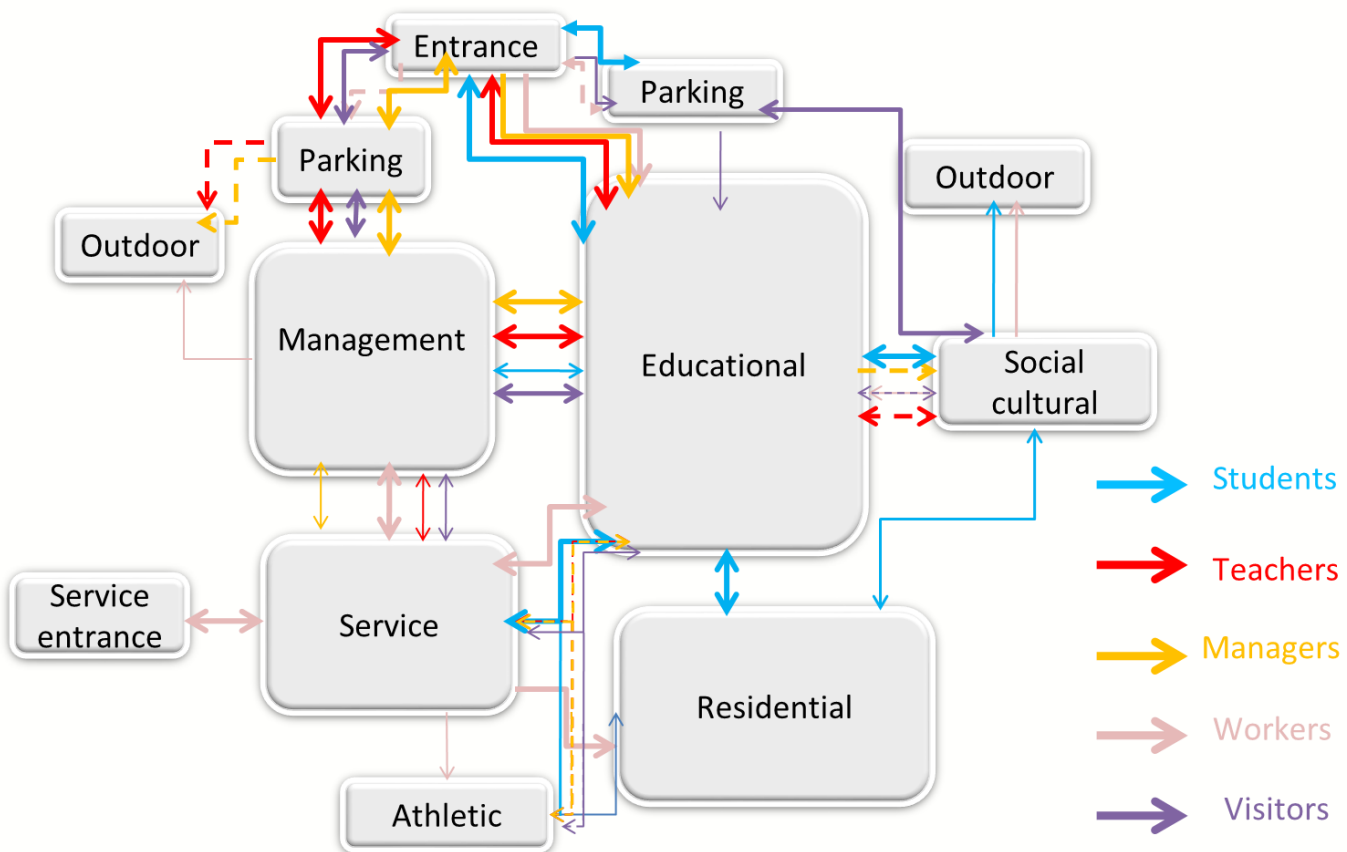
#### 3-6-2 teachers movement:



### 3-6-3 Managers movement:



### 3-6-4 general movement diagram:



### 3-7 SITES'S STUDY:

#### **Site Information:**

total area: 4.5 hectares.

Location: Khartoum – Soba, west of Alhawa street

Neighbors:

East: residential

West: residential area

South: investment site



site accessibility:

the closest main street is Alhawa street, but the location is surrounded with streets from all sides.



#### Services

\*water :

there is a water station on the north direction ( Soba water station ) .

\*sewage system:

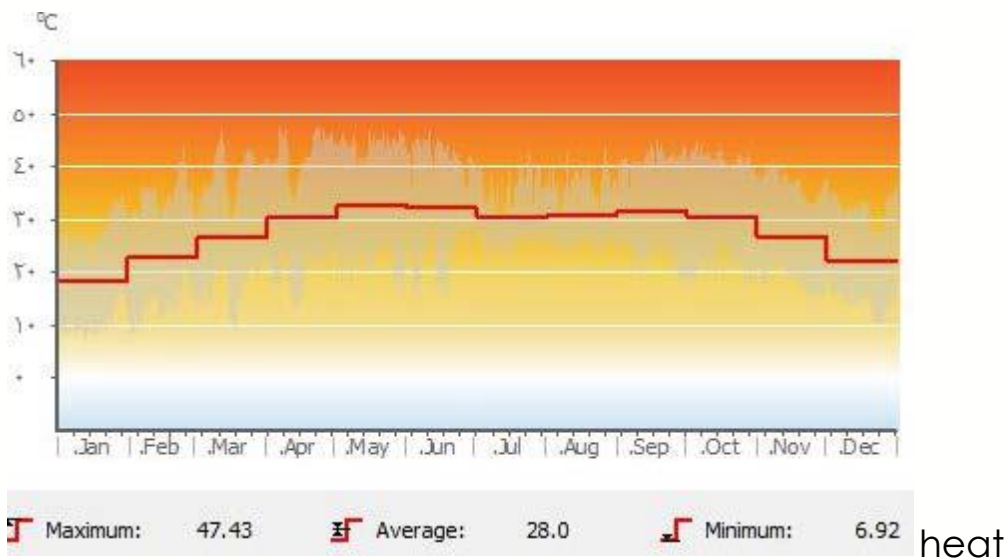
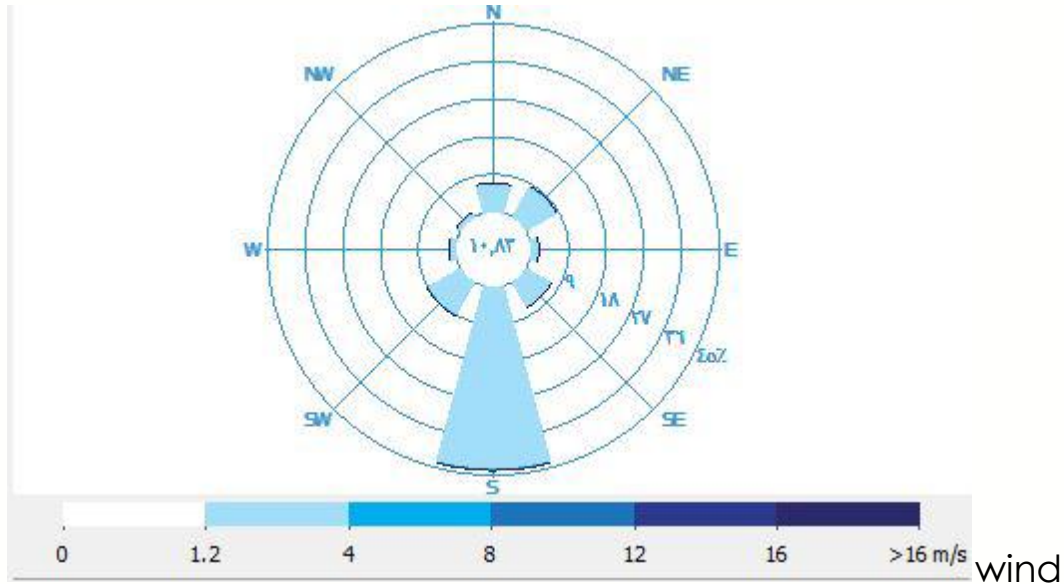
there is no existing system in the area, (using man halls and septic tank system in the design) .

\*drainage system:

using slopes on the buildings' roofs with slope 1: 100 and on the ground with slope 1: 200

## Environmental analysis:

Climate: Khartoum features a hot desert climate with a dry season occurring during "wintertime".



## Conclusion

Heat: We find that Khartoum state has a high heat degrees averagely on the most of the year, so design must include green areas, water surfaces and planting to help in cooling the weather.

Wind: Planting trees to help in isolating the noise and the damages of the hot winds which cause drying.

## **Indicators and Guidelines:**

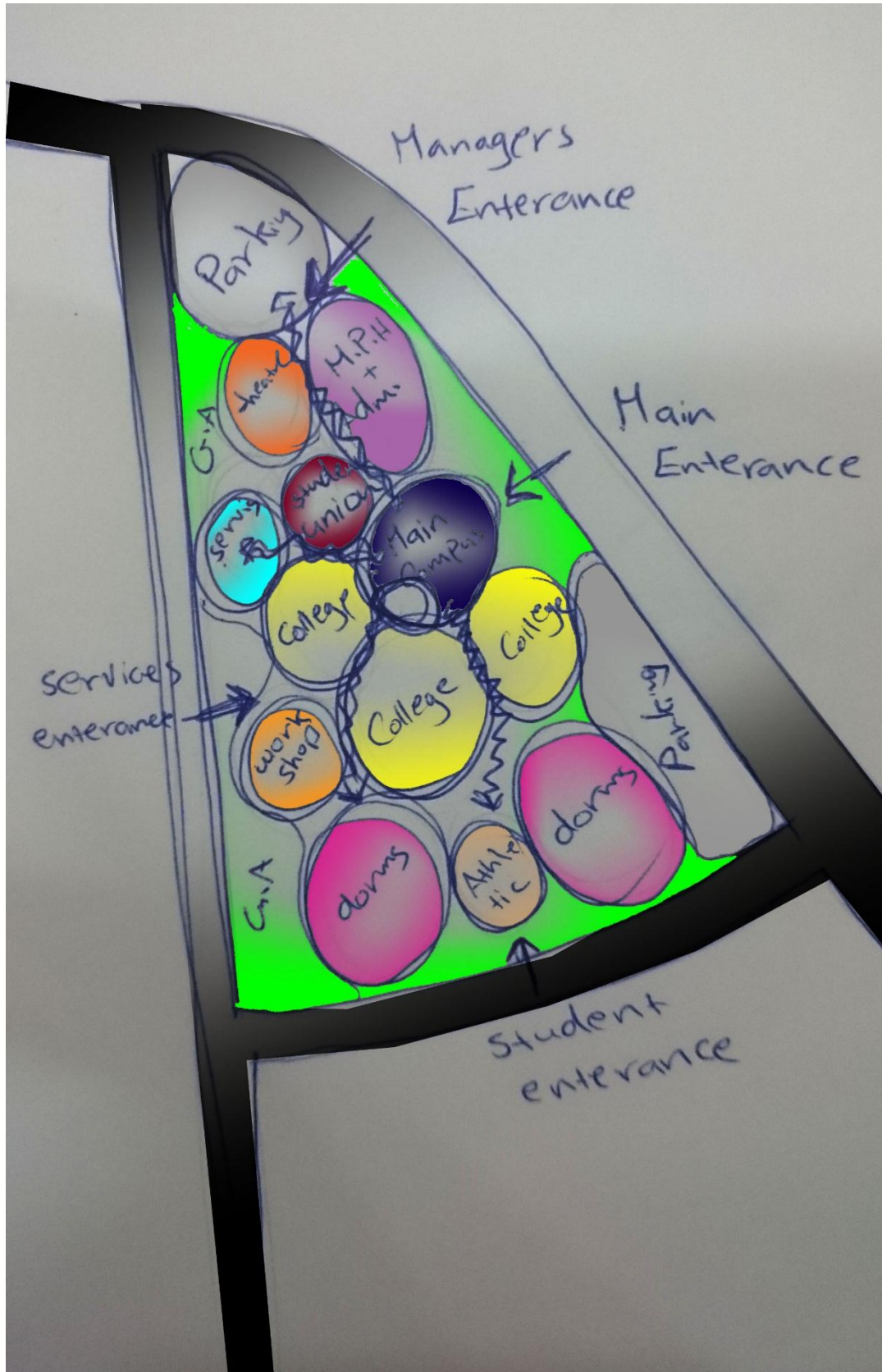
### **Indicators:**

- The widest road is one the east of the site and it's the closest from the entrance of the Site therefore the main entrance is from the eastern side.
- Placing some trees around the sides of the project to protect it from the different types of pollution.

### **Guidelines:**

the library and the students union are open to the canters pixxa

# Zoning:







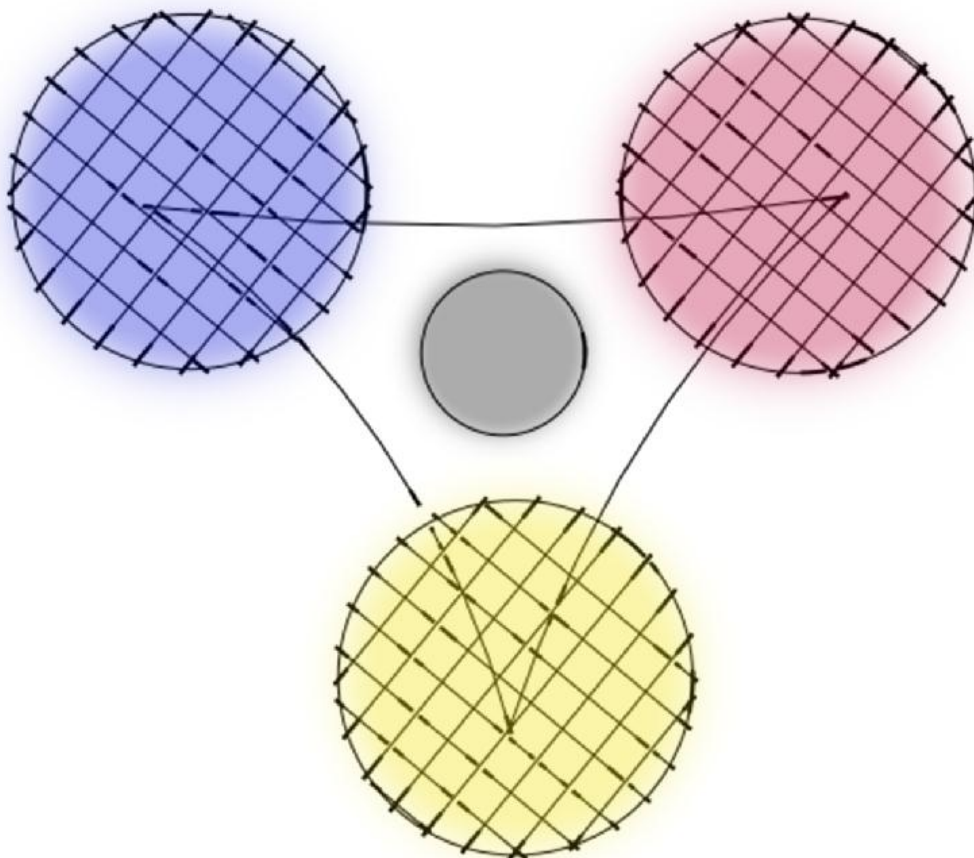
## 4-1 DESIGN CONCEPT:

### 4-1-1 Planning Concept:

the planning concept is based on the circulation and the different zones of the project, and the main focus was the ease of access between the different functions.

The development of the project's zones and accesses that led to the manifestation of the planning:

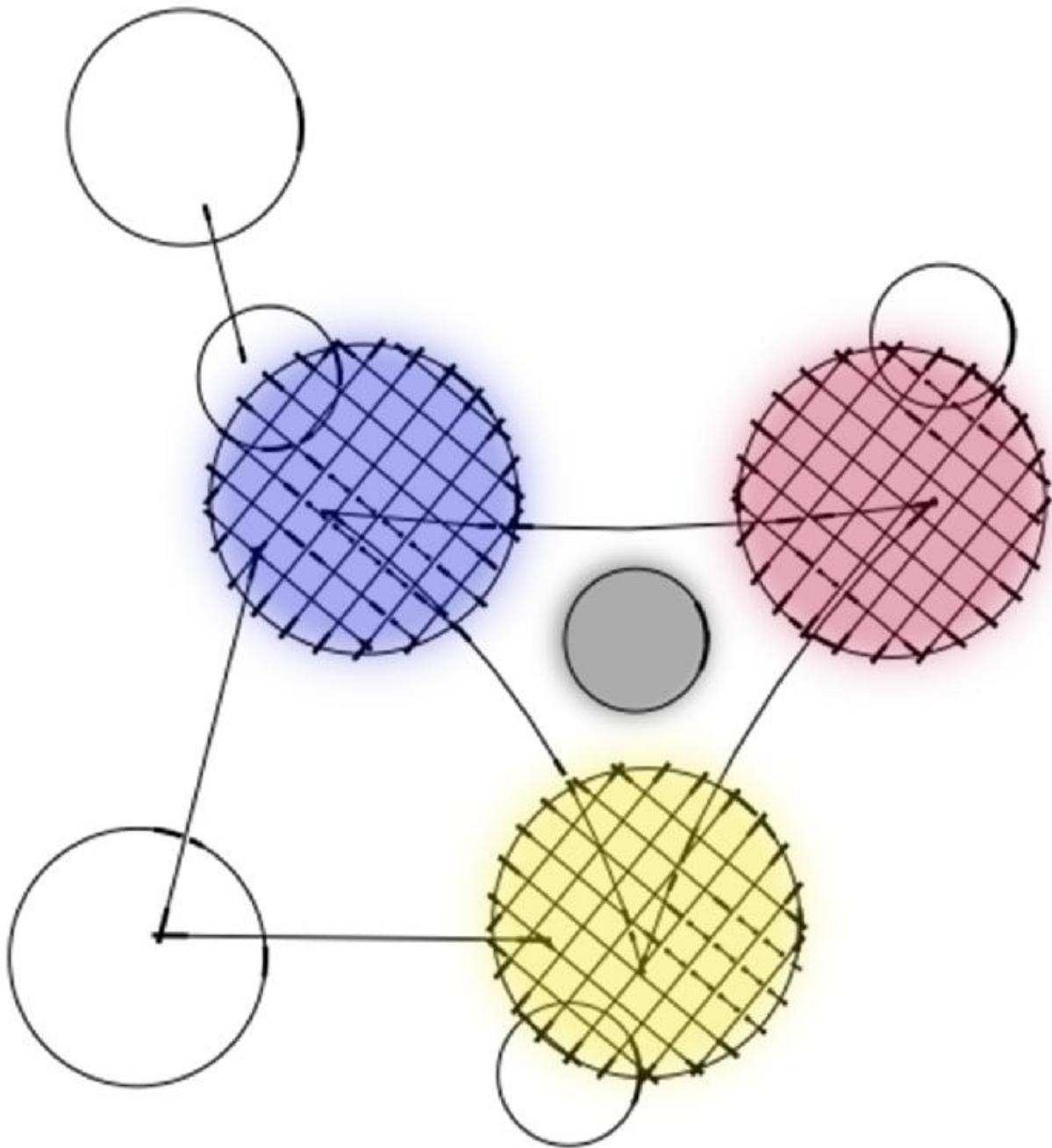
\*the main focus was on the educational zone, since it's the dominant and main function.



4-1-1-1

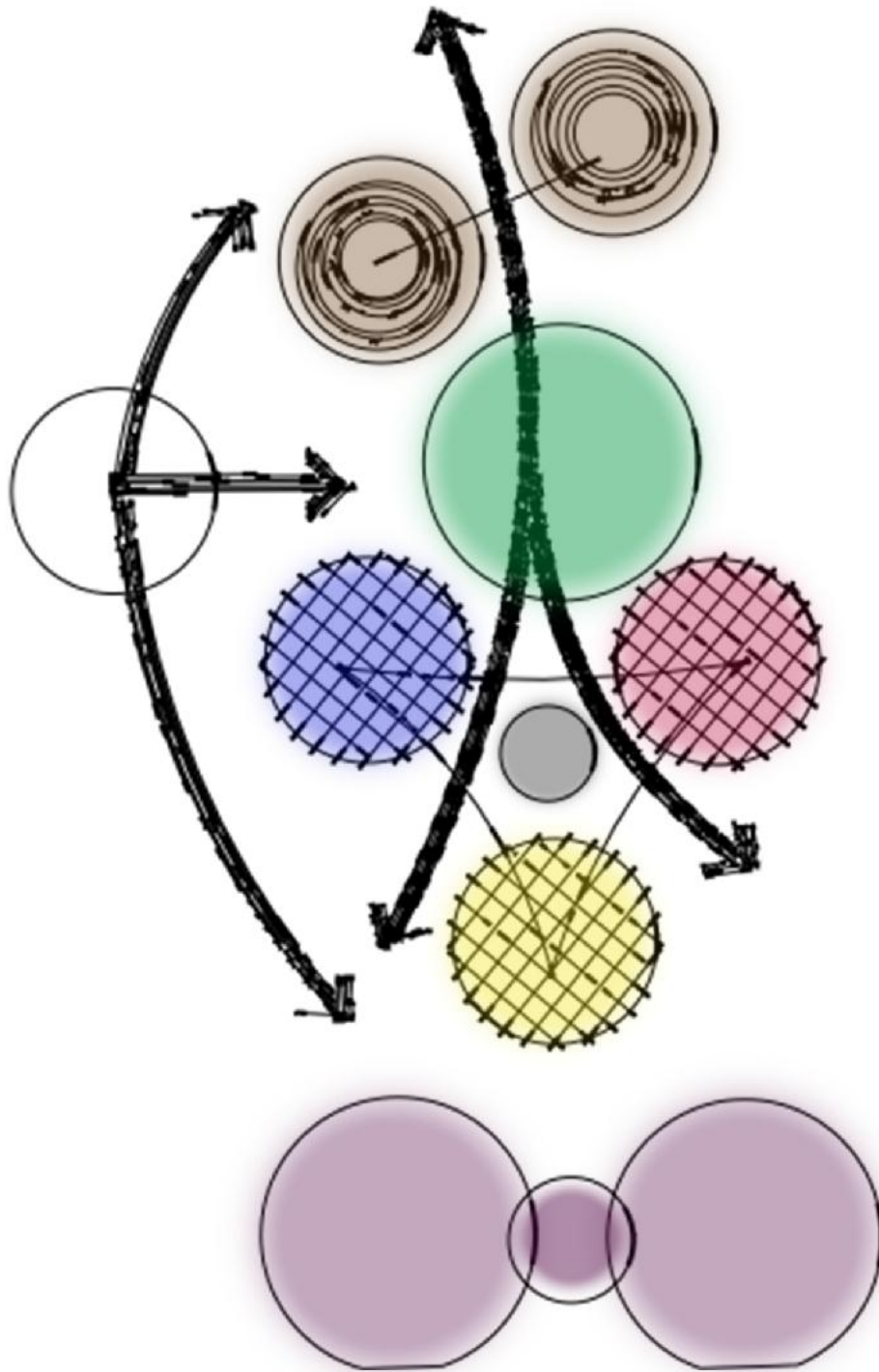
The three colleges “performing arts in **blue**, fine and applied arts in **yellow**, multimedia in **red**” and the main connection between the three is the library in grey. The thin black line represent the connection

between zones.



4-1-1-2

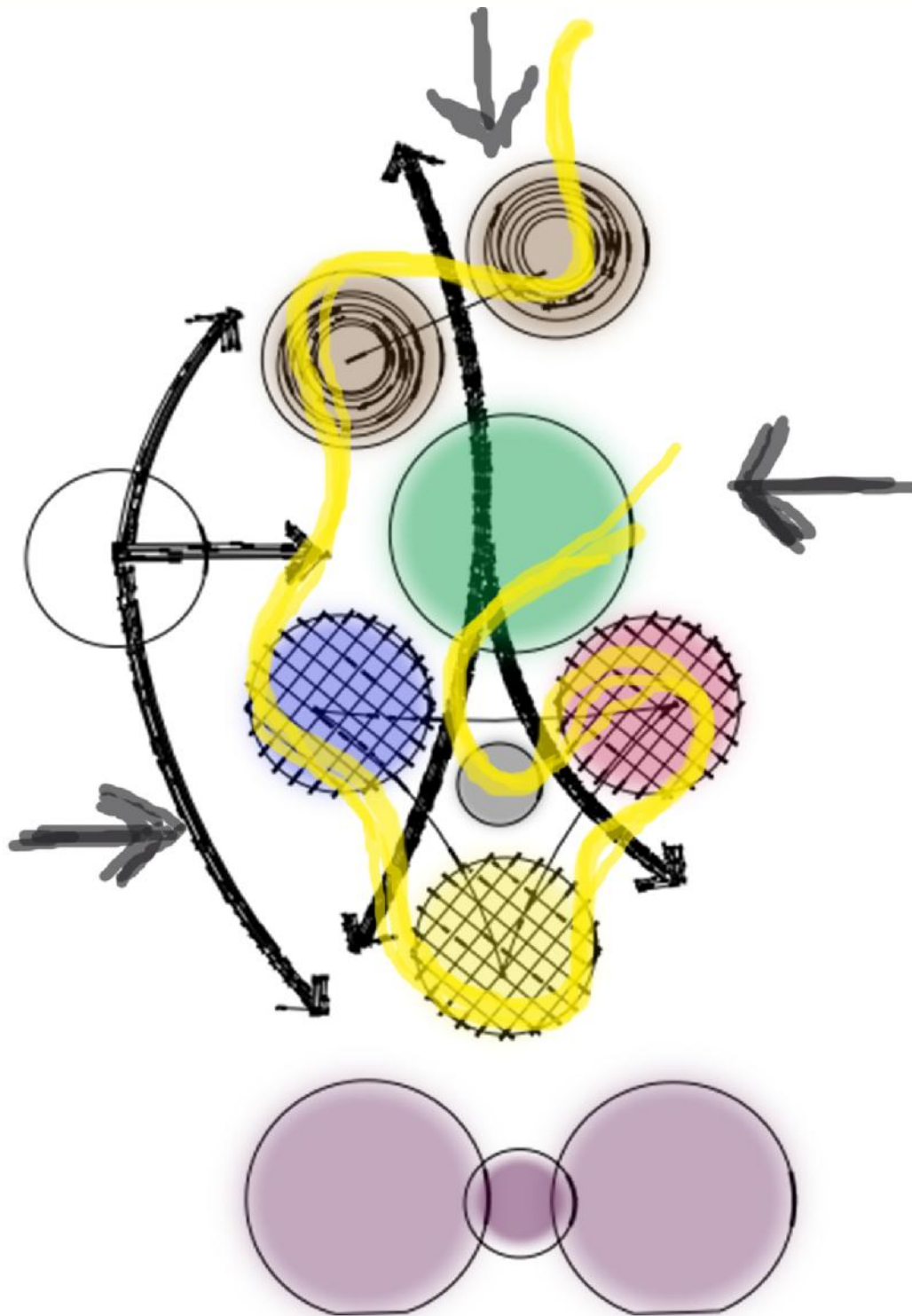
the supportive spaces were then taken under consideration and were added "the cinema hall to the multimedia, the indoor and outdoor theatre to the performing arts, the life drawing studio to the fine and applied arts, and the joined workshop"



### 4-1-1-3

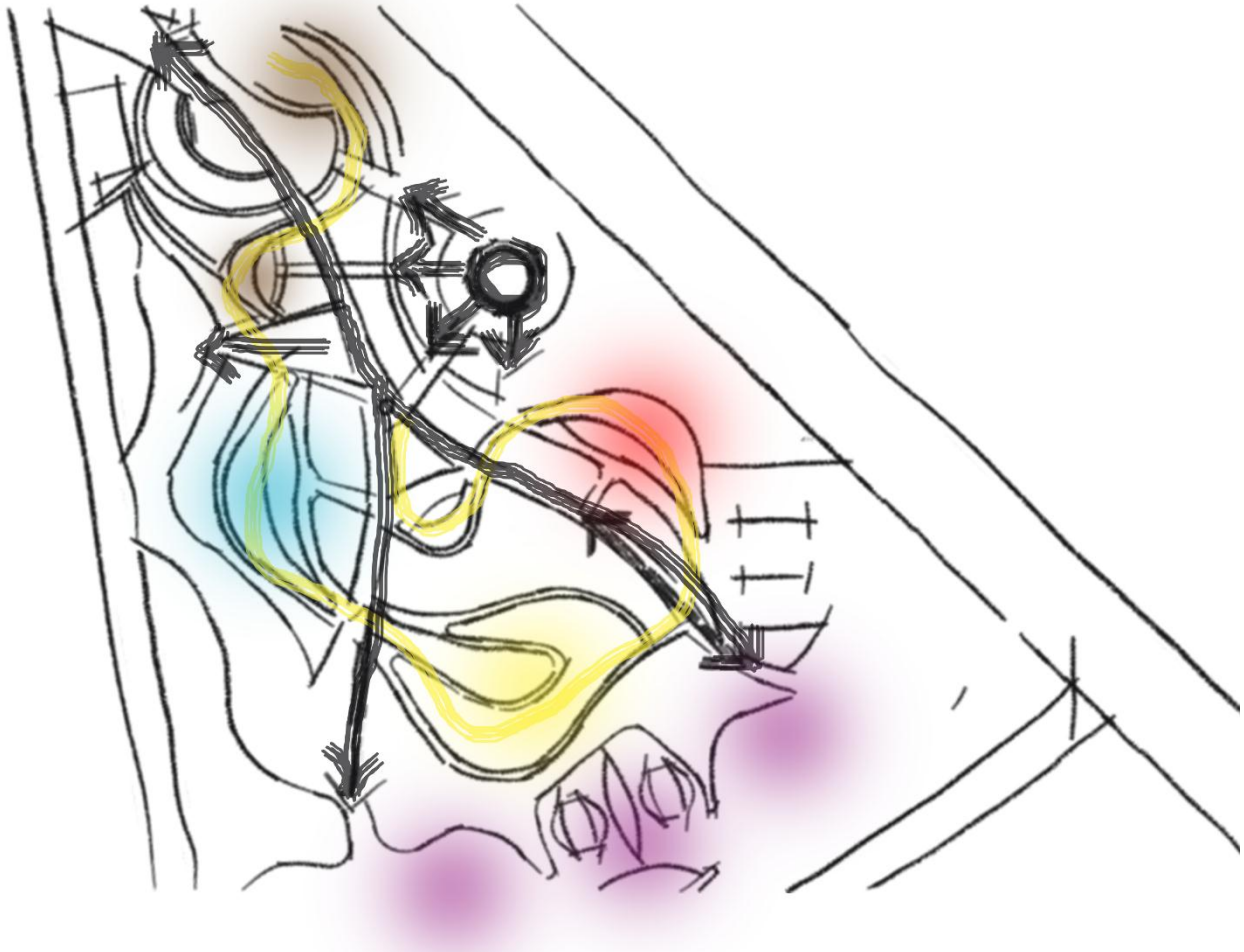
the other supportive zones were then added with an access from the main campus in **green** so that the main and basic circulation access are now clear .

“The administrative and the students union in **brown**, the residential and athletic in **purple**, the services in **white**, the main campus in **green**”.



4-1-1-4

the **yellow** line resembles the main attachment between the buildings in site plan.



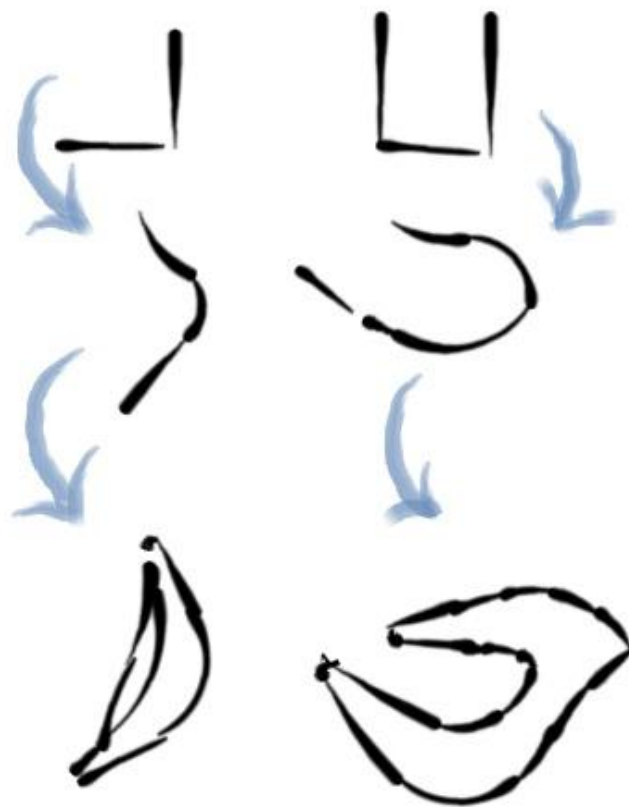
4-1-1-5

\*Initial structure plan according to the zoning and circulation axes that demonstrates the main axes and plaza

#### 4-1-2 Design concept for the educational buildings:

\*two of the most preferred forms for the educational buildings are the “U” and “L” shapes.

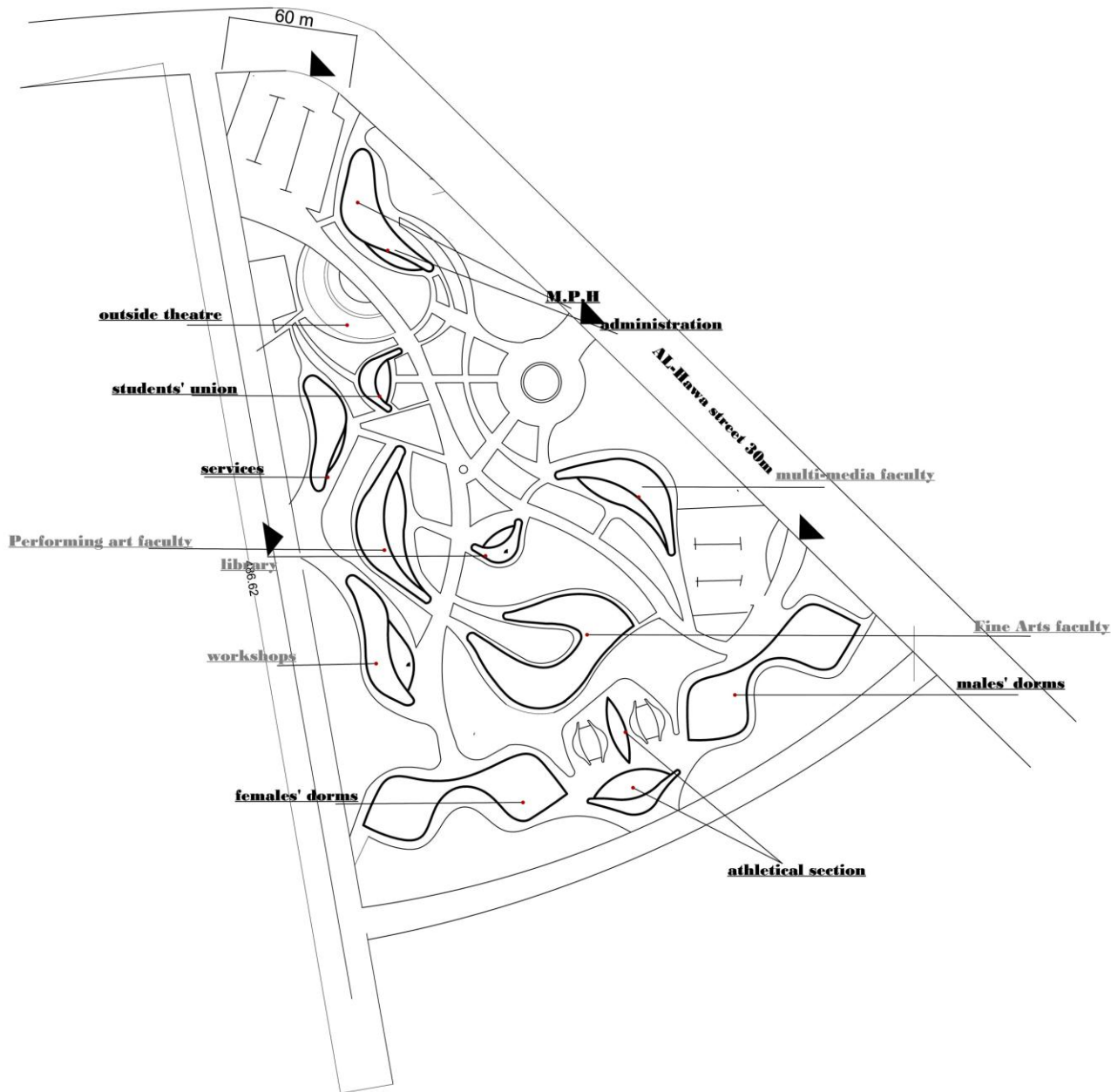
\*the simple shape of the “U” and “L” in site plans were then shifted with curviness according to several factors “sun light, ventilation,..etc.” to create a smooth movements that goes along with the site circulation.



\* the “L” shape Form was used for the college of fine and applied arts because it has more departments therefore it has more spaces.

\* the “U” shape form was used for the other two colleges

## 4-1-3 Initial structure plan:

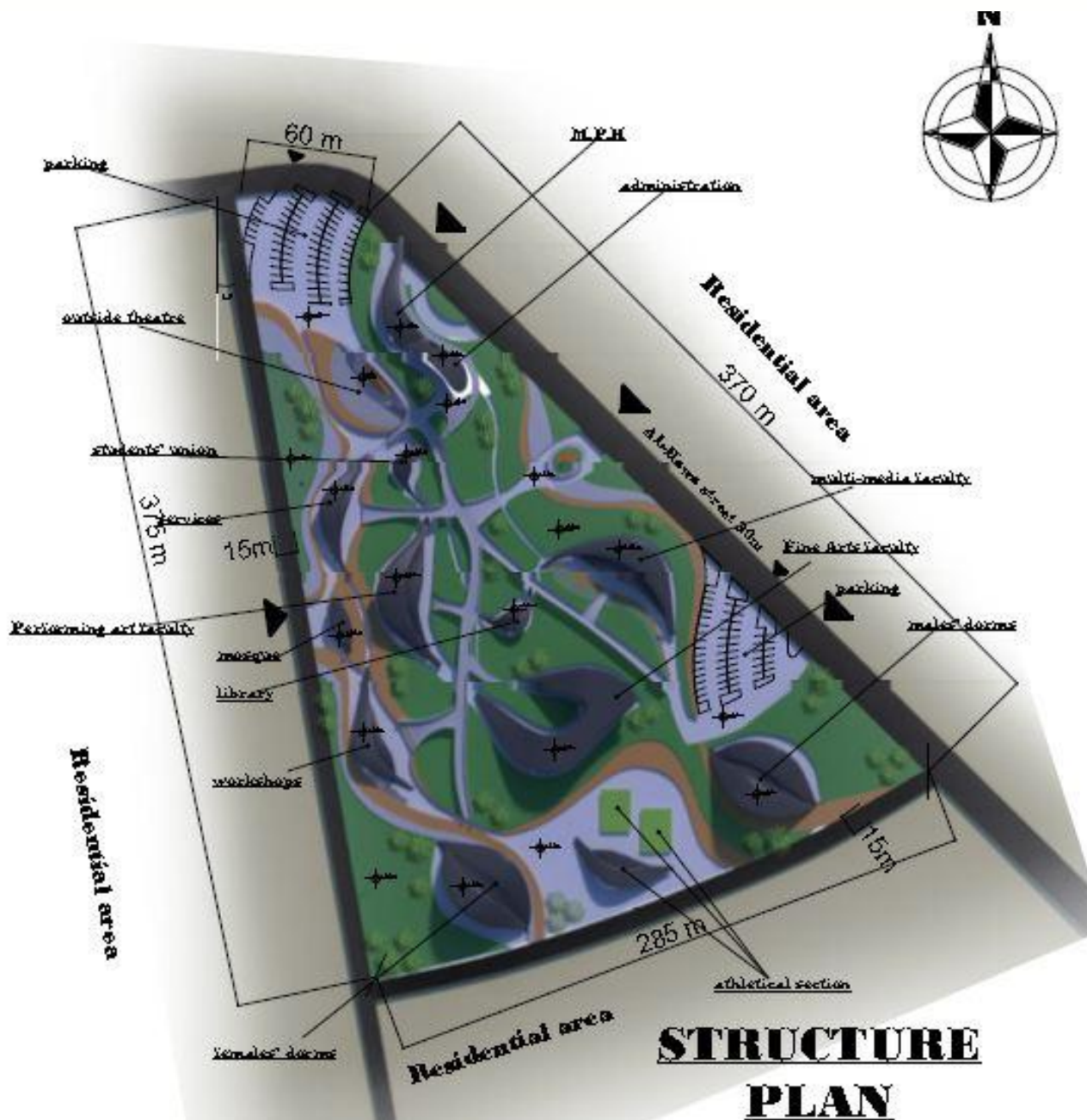


### The flaws:

- irregularity of the buildings' forms:
- the residential and athletic zone do not get along with the rest of the buildings.
- circulation paths are still not clear.
- parking lots are not enough.
- residential entrance.



#### 4-1-4 developed structure plan:



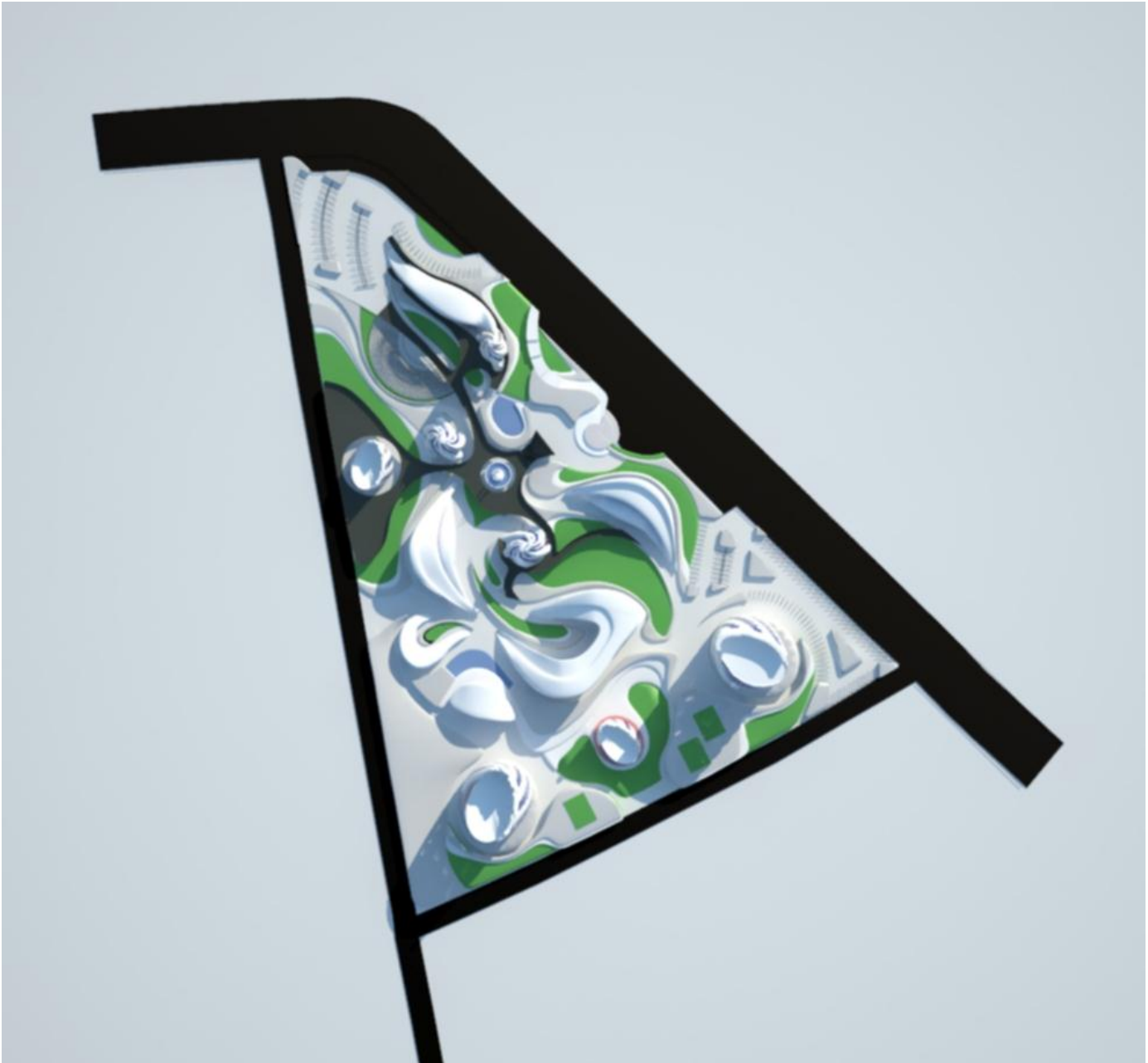
#### The development through the two stages:

- zoning did not change
- the buildings are now almost similar to each other. "in site plan".
- a footbridge was added to connect the different zones of the project visually, and to make it easier to move between them, and to be considered a sculpture\landmark.

#### **4-1-5 The flaws of the stage:**

- the footbridge design is too stiff in comparison with the other elements of the site.
- the colleges buildings disappeared in the site and became less distinguish.
- workshops location is far from the college of fine and applied arts

#### **final structure plan:**

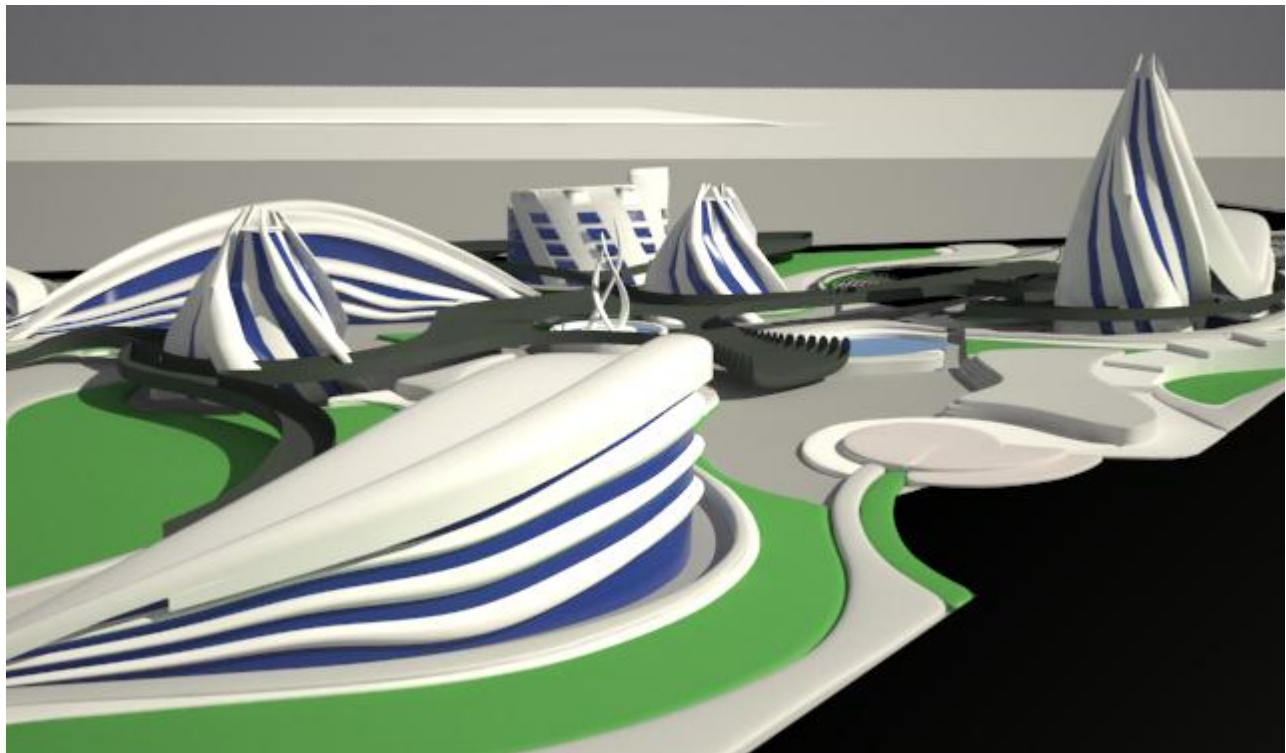


## The development through the two stages:

- circular and oval shapes were added to give the educational buildings its more unique form.
- More parking lots were added.
- the residential entrance became from the south and near both dorms.
- the main entrance became more identified.
- the footbridge's design is now more suitable and the access is limited to the main campus area.
- the footbridge ends with a terrace towards the services area.
- life drawing studio is added outside of the college.



panoramic elevation





## 5-1 TECHNICAL SOLUTIONS:

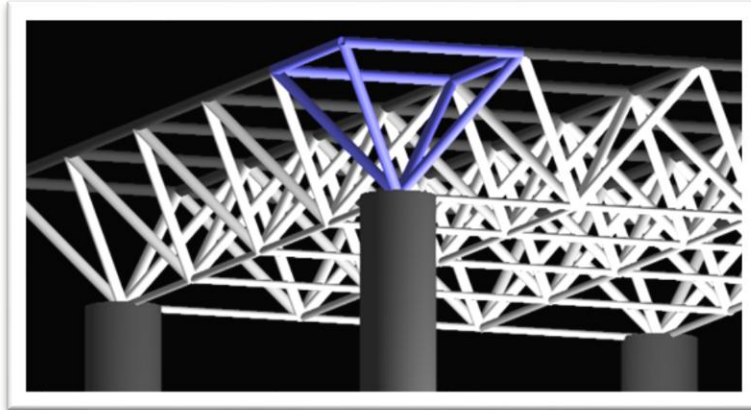
### 5-1-1 STRUCTURAL SOLUTIONS:

**The type of structural system that's been used is:**

steel frame system with free form space frame as a ceiling connected with the steel columns.

**Reasons why choosing those two systems together:**

- To achieve the free form of the building specially the ceiling.
- The presence of large spans.



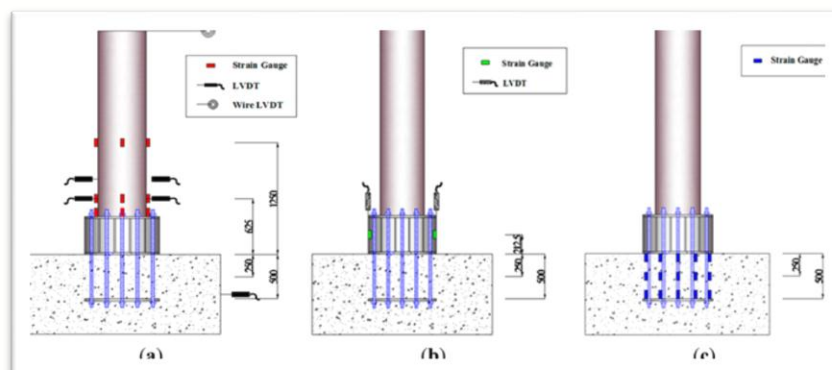
**The characteristics of the steel framing systems:**

- Easy to construct.
- Free-column spaces and large spans.
- Flexibility.
- holds heavy loads.

### FOUNDATIONS:

The foundation that's used is the isolated foundation, because:

- the building only consists of 5 stories.
- doesn't contain basement.



## Columns:

Steel Circular section columns were chosen, because: they are easier to be installed with the circular joints of the space frame. The columns covered by concrete to insulate the steel and give it more strength to resist fire.

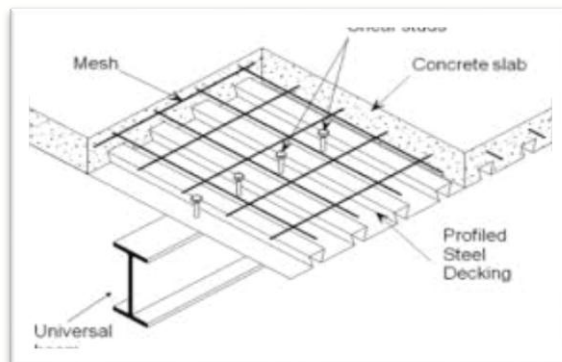
## Beams:

The project has steel I-Section beams that connect the columns together to achieve more stability.



## Slabs:

The type of slabs that's been used is the composite deck slab.



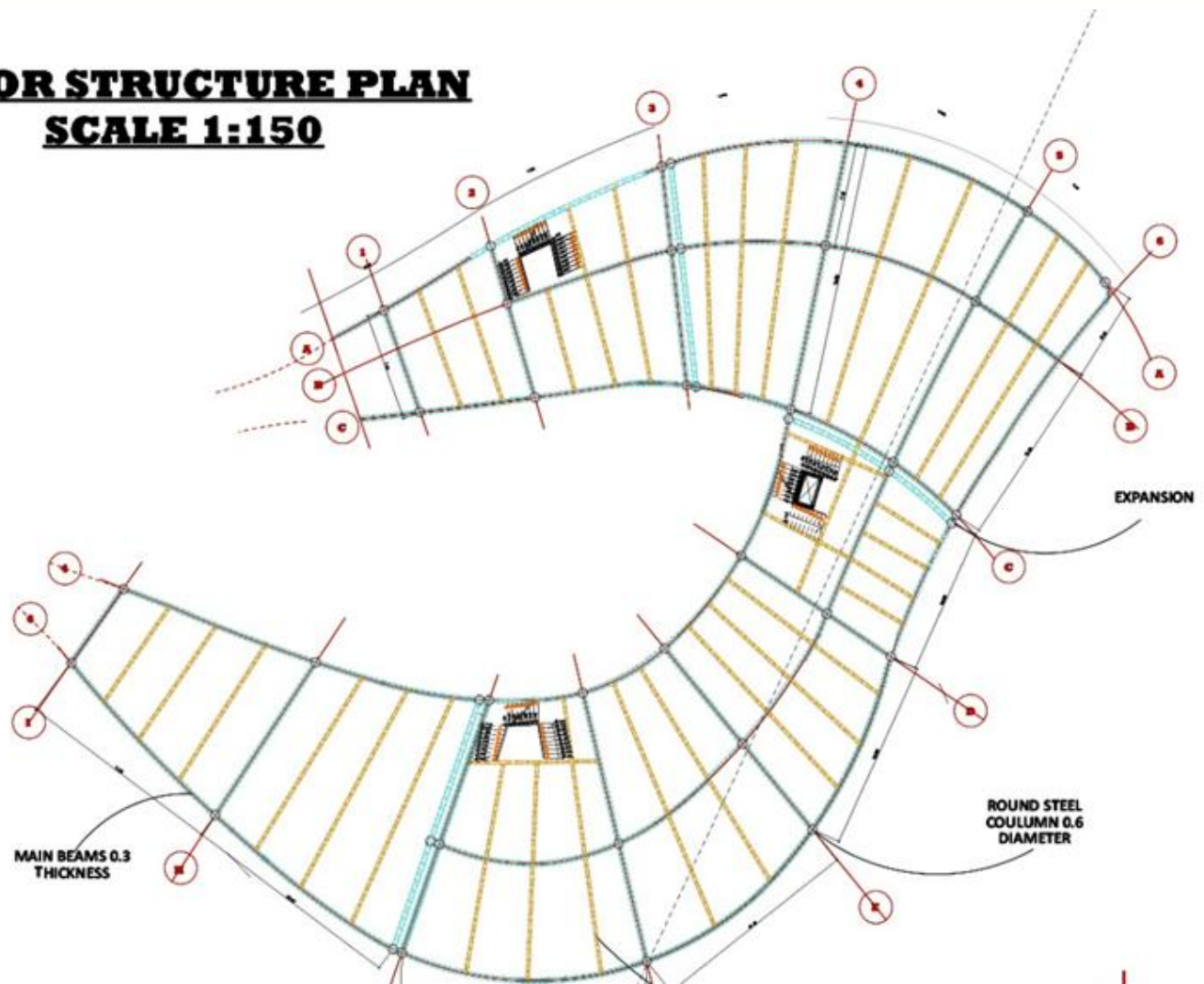
## Joints:

the columns are connected with the space frame with steel joints.



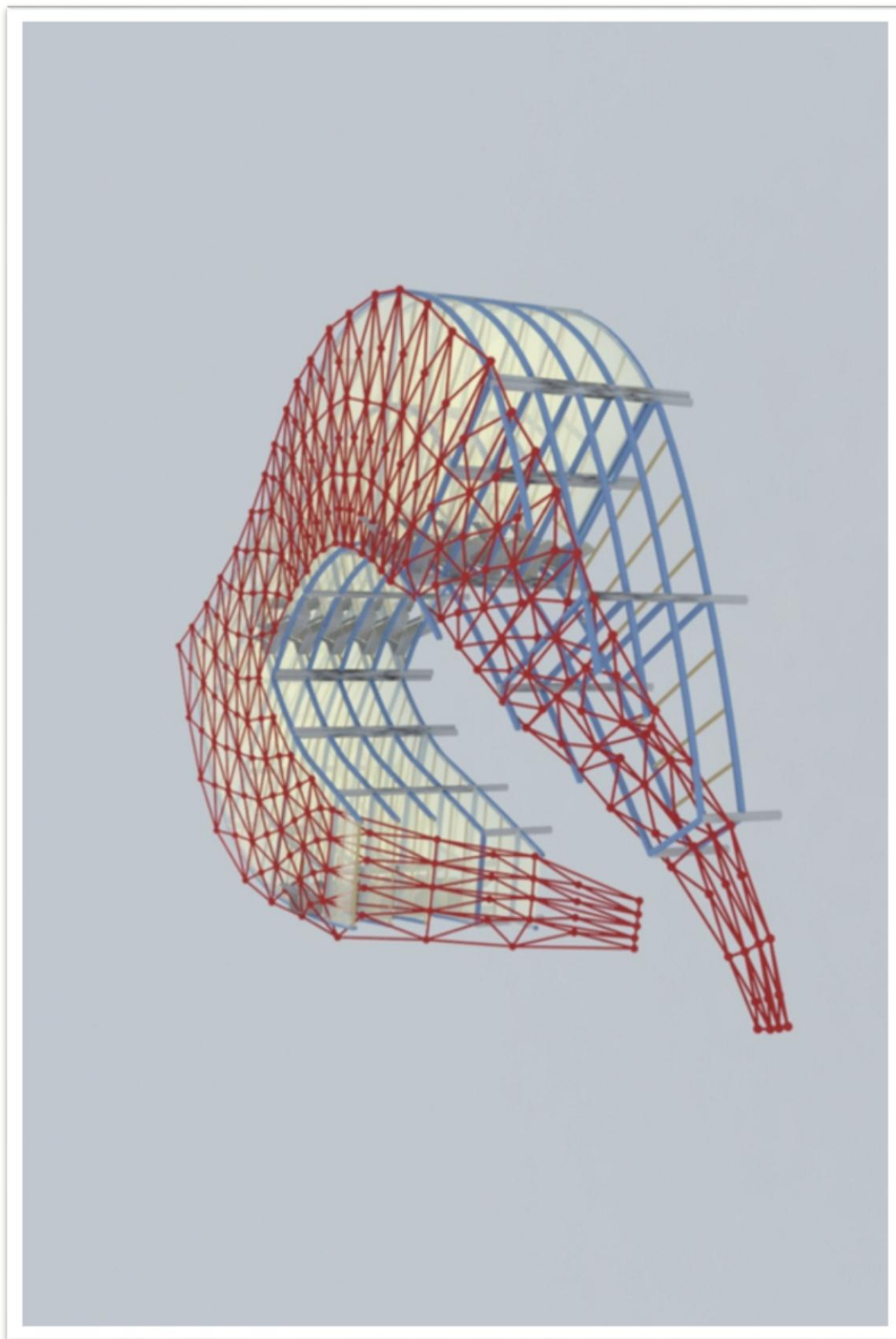
Picture from the project:

**FLOOR STRUCTURE PLAN**  
**SCALE 1:150**



- red line: the grid.
- blue lines: girders.
- golden lines: secondary beams.

3d illustration of the structure:



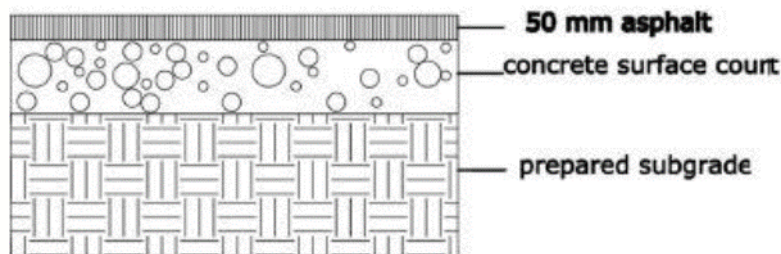


## 5-1-2 FINISHINGS SOLUTIONS:

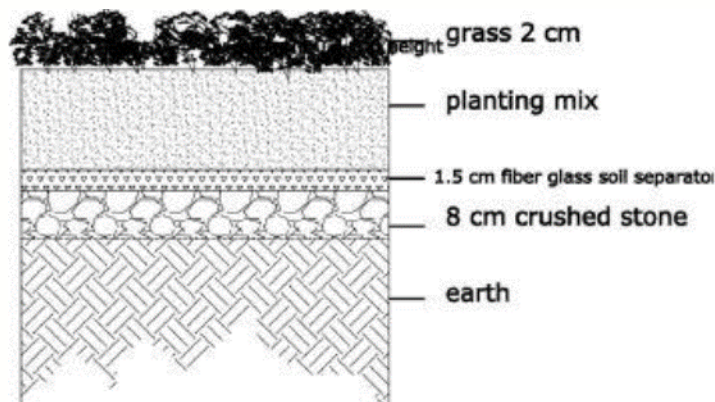
### Site finishing and treatments:

The site plan has different types of finishes on it which are:

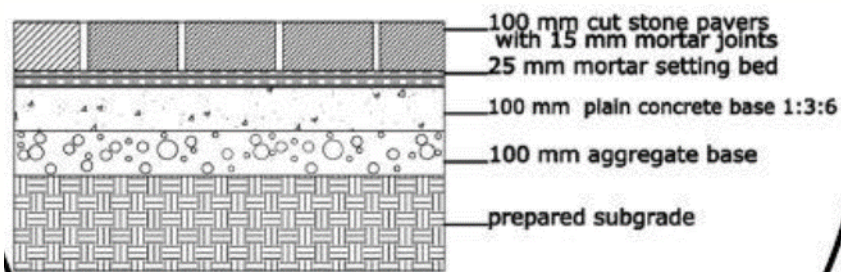
- Asphalt (for the parking).
  - Brick pavement (in the pathways and corridors). Brick was chosen because it can handle the different weather elements and the friction caused by the high number of users in the project.
  - Cement tiles (in the slab around the buildings).
  - Grass.
  - Trees, to supply the needed shade and shadow for the project.
  - Fountains and water elements.
- \* Landmark.



PARKING LOTS



LANDSCAPE

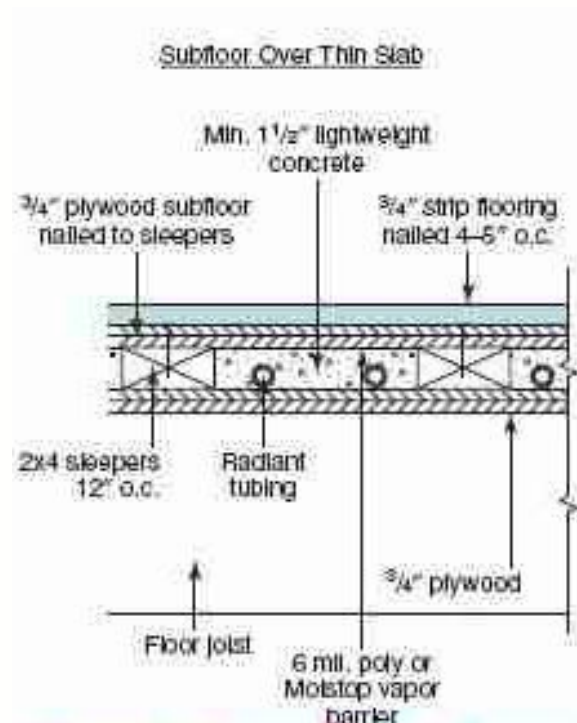
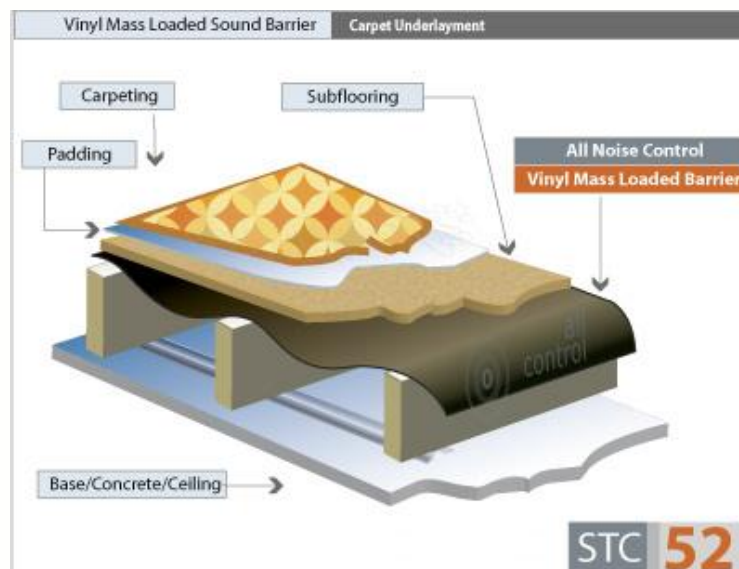


WALKING PATHS

## Interior finishing:

### Floors:

- Porcelain tiles 90cmx90cm in the main corridors and in the lobbies **and** offices.
- Carpet floor in the lecture hall and life drawing studio.
- Wooden floors in the studios.

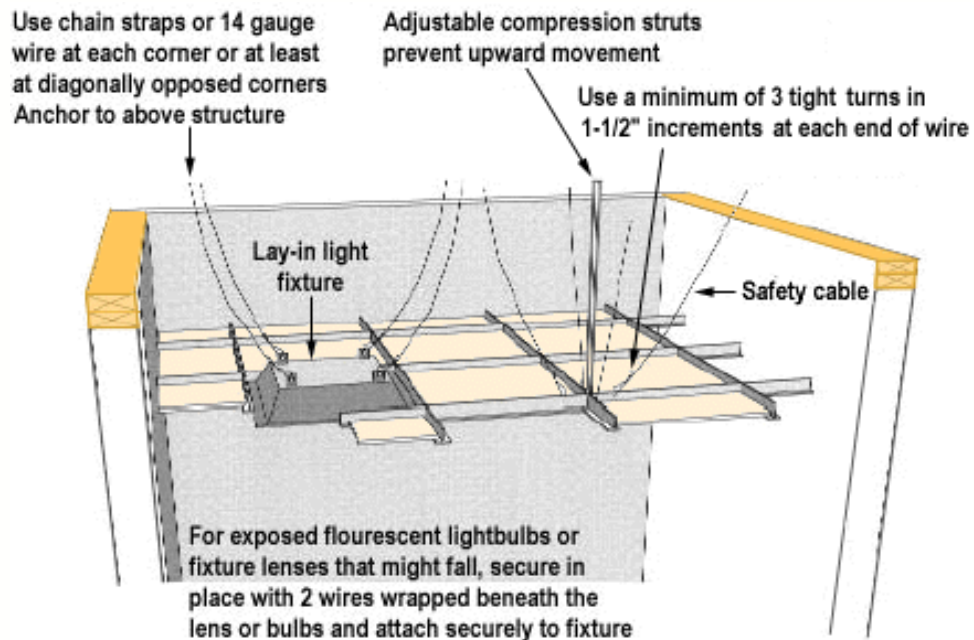


## Walls:

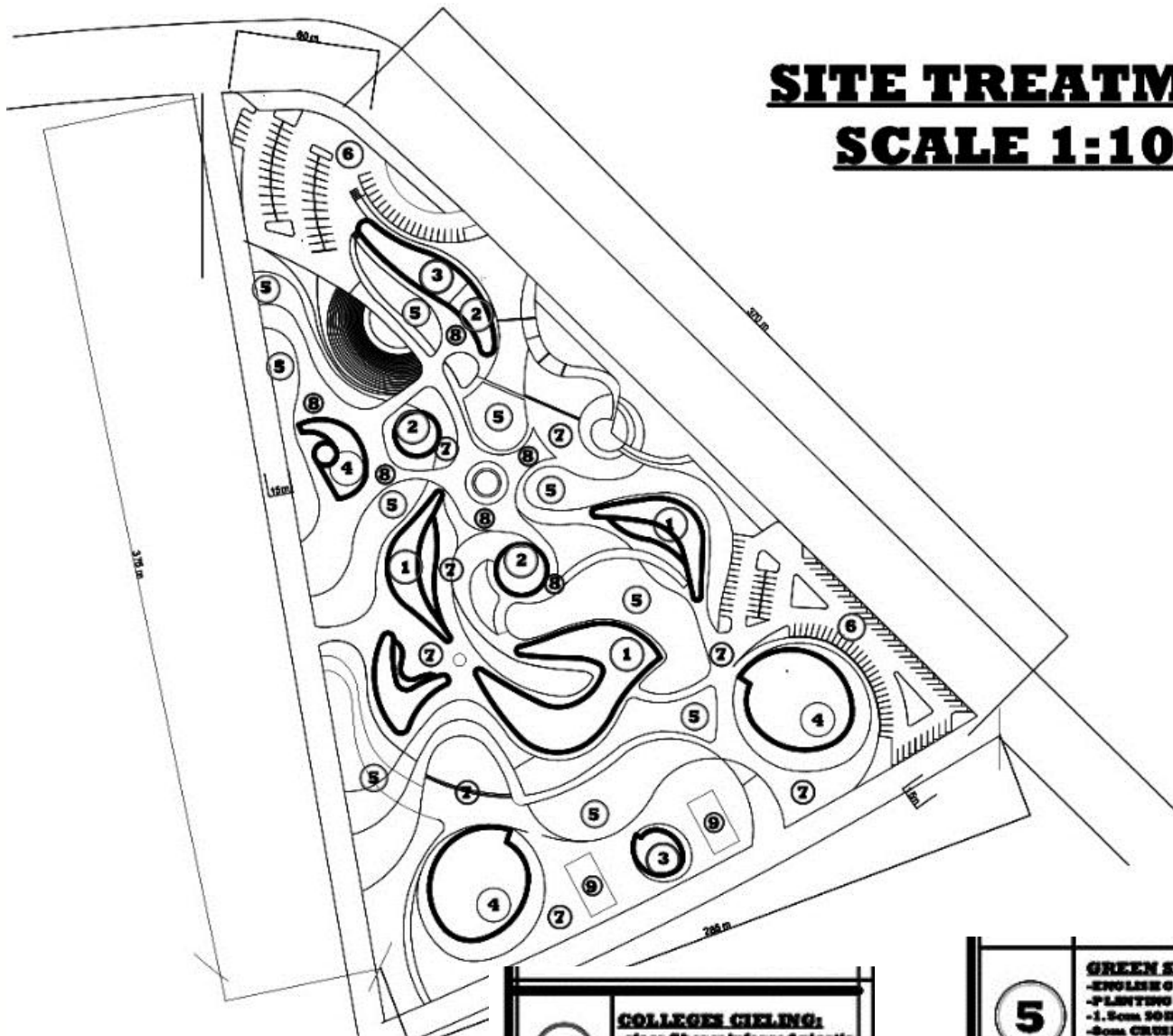
- White paint with some stripes of other colors to the offices and corridors and lobbies.
- \* Wooden walls for the studios.

## Ceilings:

- Gipsen board false ceiling 60cmx60cm.
- \* Wooden board false ceiling 60cmx60cm.
- White paint with some colored stripes.



Drawings:  
Site treatment:



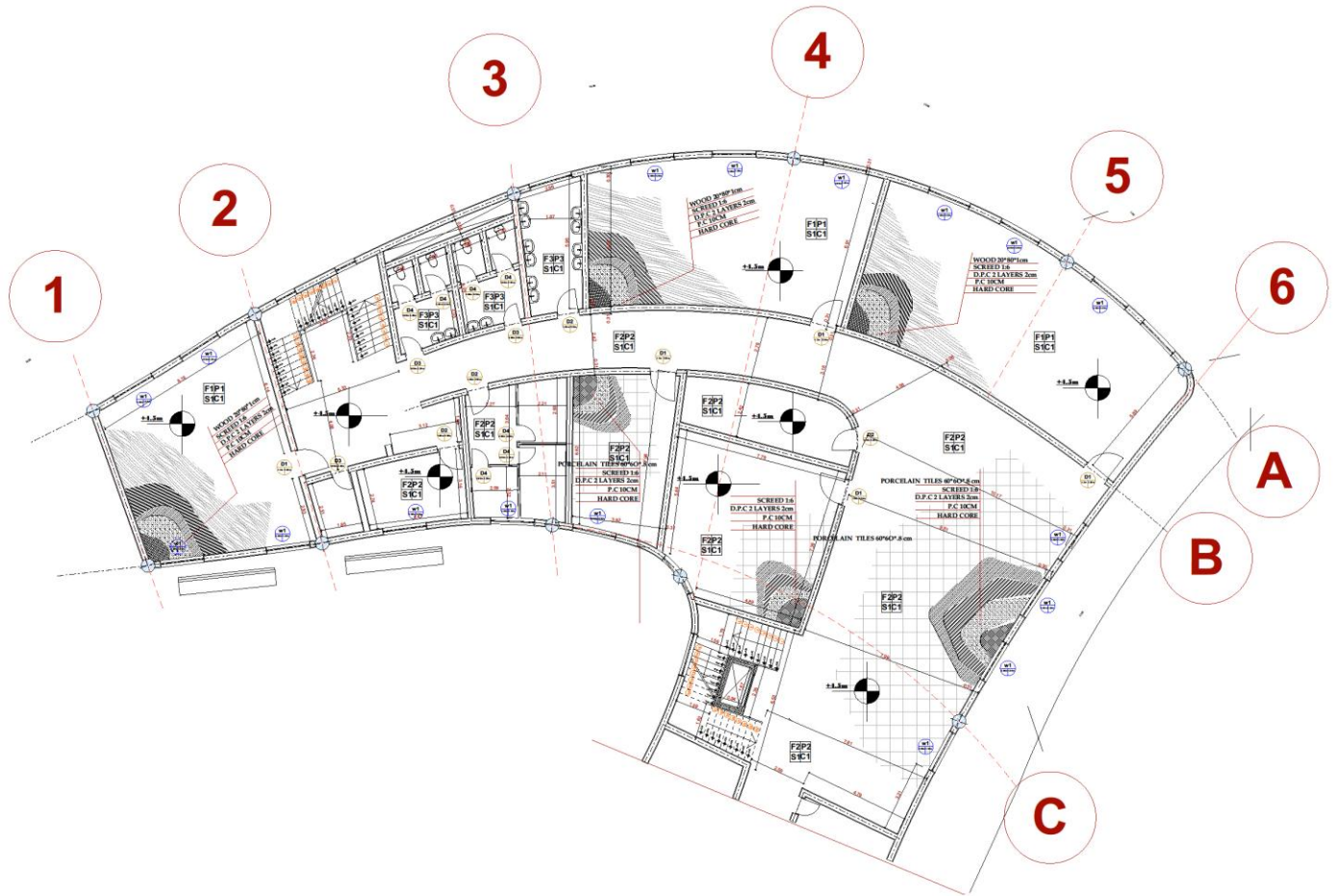
## **SITE TREATMENT** **SCALE 1:1000**

<b>1</b>	<b>COLLEGE CEILING:</b> -glass fiber reinforced plastic -light aluminum tubes -space frame -steel frame -light aluminum tubes -false ceiling
<b>2</b>	<b>ADMINISTRATION, LIBRARY, STUDENTS UNION</b> -REINFORCED CONCRETE SLAB 20cm -SAND 1CM -D.P.C 3 FACES 0.6 CM -CEMENT MORTAR 1:2:6 2cm -CEMENT TILES 40*40*2cm
<b>3</b>	<b>M.P.E. POOL:</b> -DOUBLE GLASS 6CM -LIGHT ALUMINUM TUBES -SPACE FRAME UNITS
<b>4</b>	<b>DORMS, SERVICES:</b> -REINFORCED CONCRETE SLAB 20cm -SAND 1CM -D.P.C 3 FACES 0.6 CM -CEMENT MORTAR 1:2:6 2cm -CEMENT TILES 40*40*2cm

<b>5</b>	<b>GREEN SPACES:</b> -ENGLISH GRASS 2cm -PLANTING MIX 15cm -1.5cm SOIL SEPARATOR -5cm CRUSHED STONE -EARTH
<b>6</b>	<b>PARKING LOTS:</b> -PREPARED SUBGRADE -CONCRETE BASE 15cm -ASPHALT 50mm
<b>7</b>	<b>WALKING PATHS:</b> -CUT STONE PAVING -25mm MORTAR SETTING BED -100mm PLAIN CONCRETE BASE -100mm AGGREGATE BASE -PREPARED SUBGRADE
<b>8</b>	<b>WALKING BRIDGE:</b> -CUT STONE PAVING -25mm MORTAR SETTING BED -100mm PLAIN CONCRETE PLATES
<b>9</b>	<b>PLAYGROUNDS:</b> -RUBBER -SHOCK ABSORBENT LAYER -CONCRETE AND ASPHALT

**part plan to one of the departments of the college:**

-it has drawing studios , seminar room, offices, stores, computer lap.



## 5-1-3 WATER SUPPLY, DRAINAGE AND SEWAGE SOLUTIONS:

### Water Supply:

The project's site is supplied with water from a main pipe 8" west of the site, it enters with a 6" pipe, then distributed to:

- 1\ the fire tank, that's connected to the main underground tank.
- 2\ the main underground tank. Which then a 2" pipe take its turn around the site and supply all the buildings.

\*most of the buildings in the project are under 5 floors so they are supplied through a high level tank (on the ceiling). And connected to a water pump to secure high pressure.

\*the other buildings that are above 5 floors are supplied through an underground tank and also a high level one and a pump to ensure good pressured water at all times.

3\the green spaces tank.

- which is also connected with a pump to ensure good pressure.
- and also connected with the surface water station

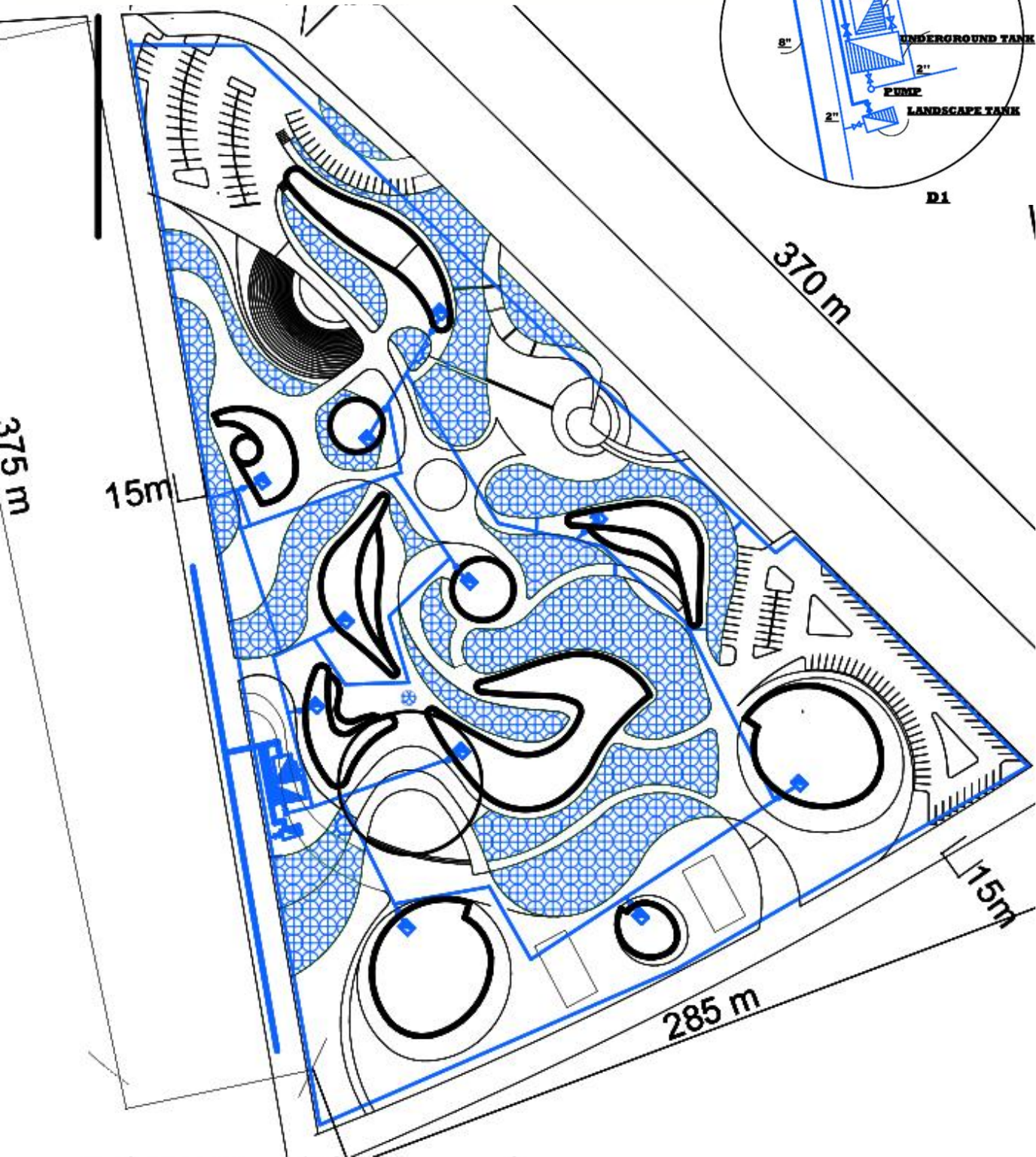
### Sewage:

- the two pipe system was used to the bathrooms.
- the manholes system was used for the bathrooms, and connected to a septic tank west of the site.

### Drainage:

- all the buildings' slope is 1:200.
- all the floors' slope is 1:100.
- down pipes were put on the ceiling to ensure the flowing of water.
- then all the excess water is drained to the tranche line.
- all the surface water then is contained on the surface water station which can be used for the green spaces instead of the public net.
- the surface water station is connected to the green spaces tank.

Drawings:  
water supply:



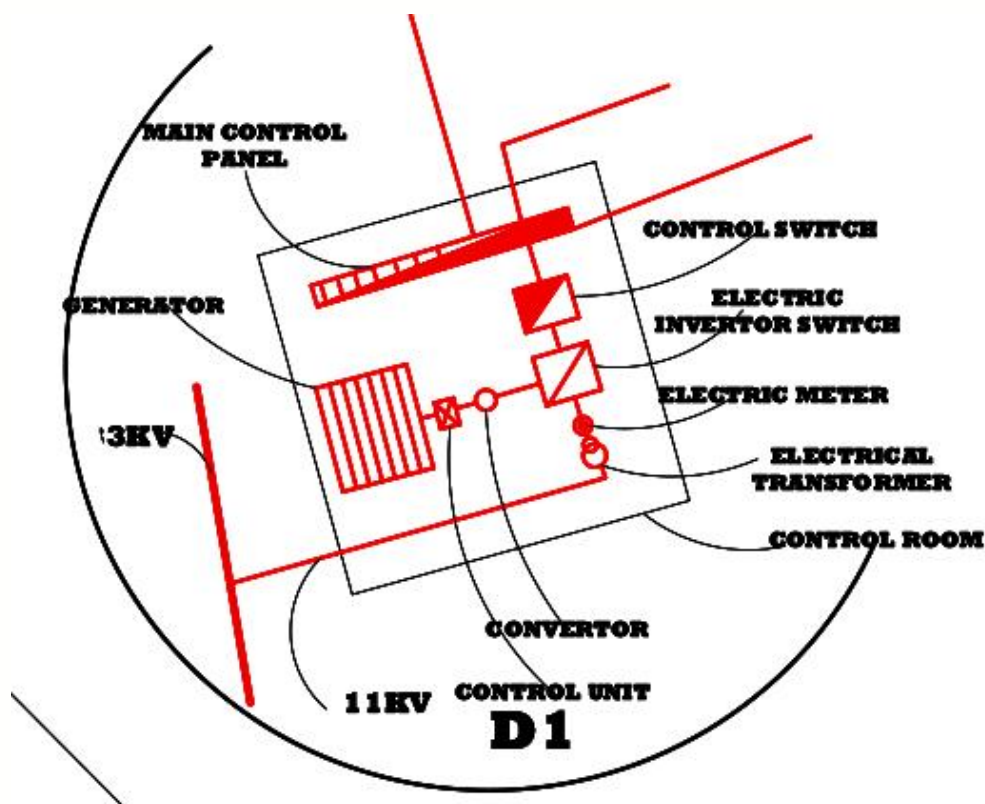
drainage and sewage:





## 5-1-4 ELECTRICITY SUPPLY:

- the main electricity line is west of the site.
- it enters as a 11kv .
- then it is transformed into 415v.
- and then it is distributed through the main control panel.
- there's also a generator that's connected to the inverter switch to ensure an electrical supply to the site in case of shutdowns.
- site lamps are supplied through solar power panels on each one, and contains battery to save power, it is also connected to the public web in case there are outside factors that weakens the solar power to work properly.





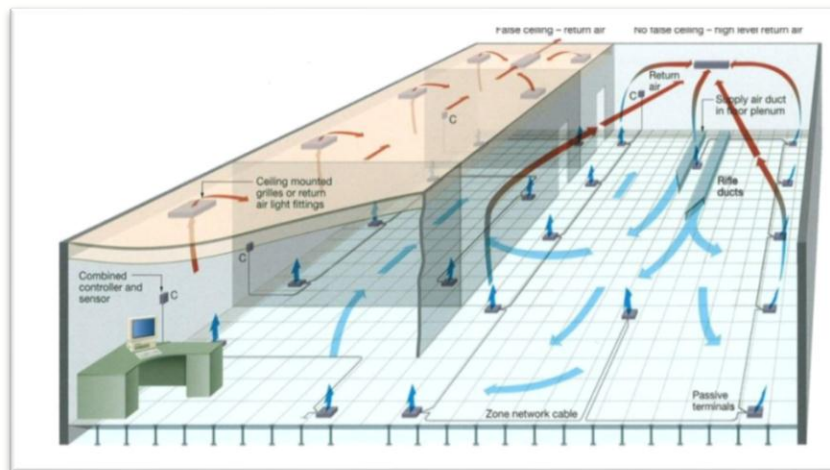
## 5-1-5 AIR CONDITIONING SYSTEM:

The system that's been used is the ALL-AIR system.

### Reasons for choosing this system:

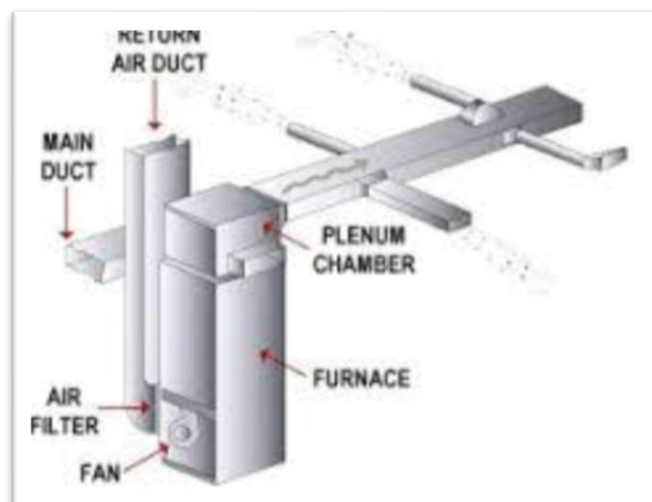
- type of space: multiple spaces.
- the need for the conditioning system: cool and heat.
- major needs: temperature, air renovation, quite environment.

\*Controlling this system is central and there is different sizes of spaces.

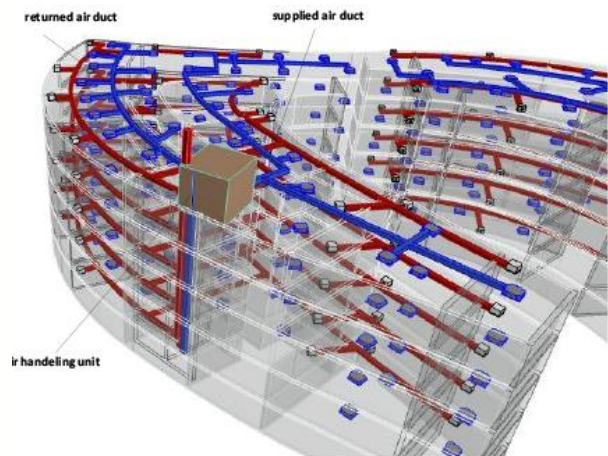


### The system's technical parts:

- Air ducts, one for the supplied air and another for the returned air.
- Supply air outlets, which diffuses the clean air.
- Returned air outlets, which return hot air.
- Handling unit, which is the supplier and also it process the returned air through a filter and a fan.



the project's drawings:



**3D VIEW TO THE SYSTEM**

## 5-1-6 FIRE FIGHTING:

Fire Fighting can be accomplished through two stages:  
Number one: detecting the fire:

which can be done:

\*Automatically:

-this can be done through fire detectors according to the space level of danger and use, and it's either smoke or heat detector, and in this project HEAT DETECTORS were used because:

- all materials and furniture are carbon based
- it detects heat from around 57-92 centigrade.

And those detectors are connected to the main control panel which in case of fire immediately sets off the alarm and the sirens and lights for the emergency exits.

\*Manually:

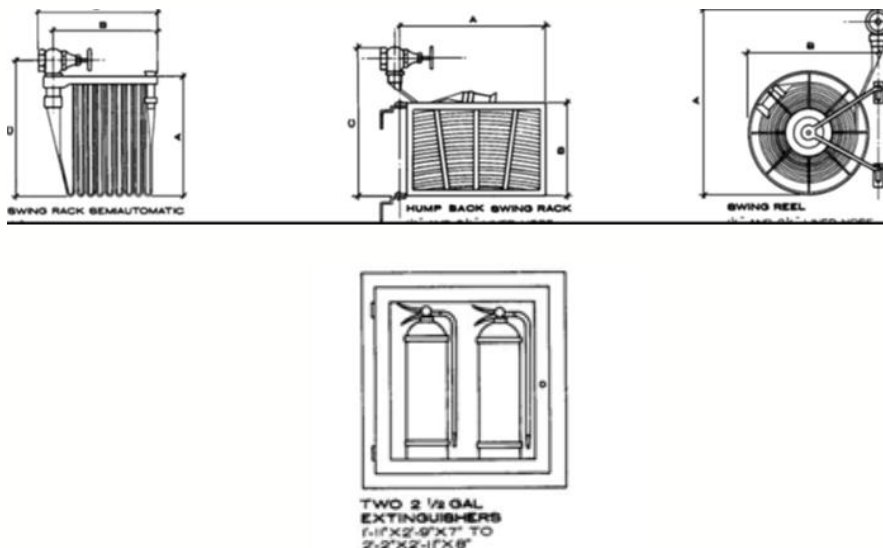
through the manual alarm buttons that works when it is pressed manually.

Number two: putting out the fire:

which can be done:

\* Manually : using:

- hoses: distribute boxes with hoses with a diameter up to 30m.
- Fire extinguishers: that are distributed in each space close to the door, and near the exits



\*automatically:

using the sprinklers system.

reasons:

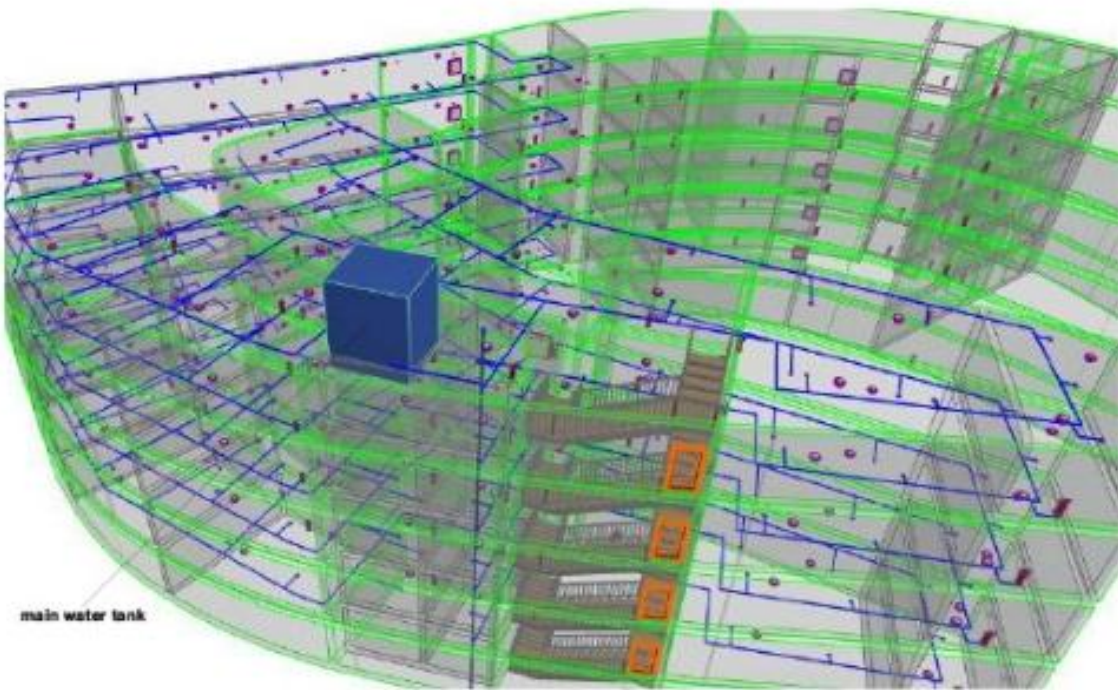
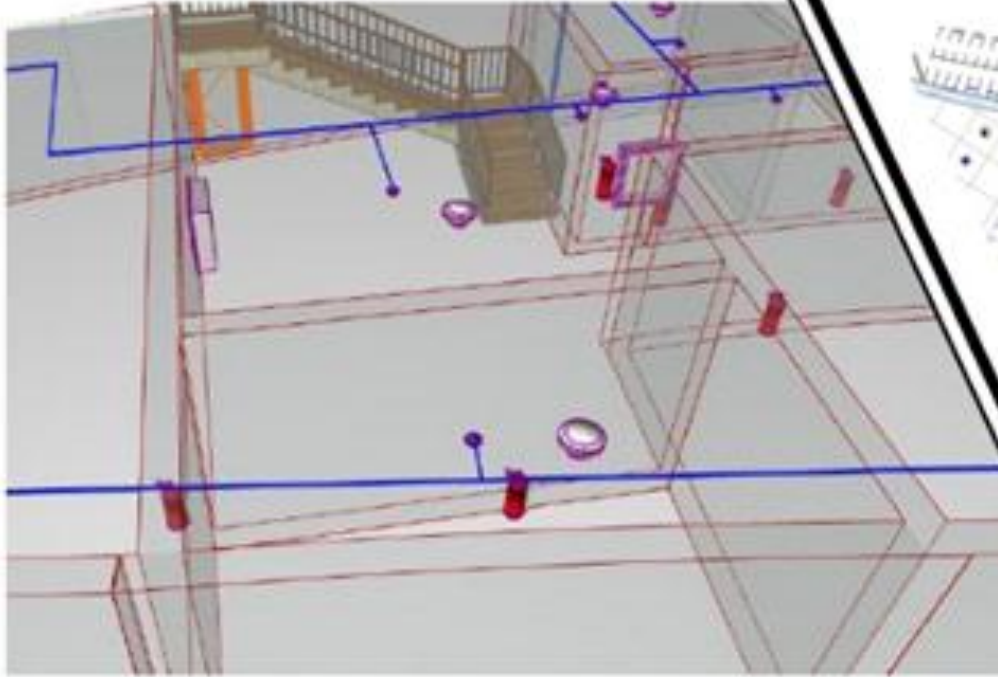
- the building's space is over 465m<sup>2</sup>.
- the building's users are over 300 person.

The sprinklers are installed in the ceiling through a water net supplied by a main water pipe. And the sprinklers cover the spaces of 8,12,15m<sup>2</sup>

**the project's drawing:**



**INTERIOR TO  
THE EXIT  
AREA**



**3D VIEW TO  
THE SYSTEM**

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