SUSTAINABLE PALM PRODUCTS

DEVELOPMENT AND PRODUCTION CENTER

IN ASWAN

PRESENTED BY:
HAMS HESHAM ALI

INNOVATE RESEARCH

PRODUCE SUSTAINABLY

EMPOWER COMMUNITY

RESEARCH · PRODUCTION · INNOVATION · COMMUNITY

LOCATION	SITE AREA	CLIMATE	PROJECT TYPE
ASWAN, EGYPT	61,406 m²	HOT DESERT	ACADEMIC PROJECT

Project Information

- Project Title :Sustainable Palm Products Development and Production Center

- Author : Hams Hesham Ali Abdelatif
- Degree Bachelor of Architecture Engineering
- Institution Faculty of Engineering: Benha University
- Department : Architecture
- Engineering Graduation : Project Class of 2026
- Academic Supervisor Dr.: Almoataz Bellah Gamal-eldin
- Co-Supervisor : Abdallah Saied
- Project Location : Aswan, Egypt Project
- Category : Architecture

1-Introduction

- The date palm has long been one of Egypt's most valuable natural resources, particularly in Aswan, where palm cultivation is deeply connected to the local identity, economy, and cultural heritage.

- Despite the abundance of palm resources, a significant portion of palm by-products remains underutilized or treated as agricultural waste, resulting in lost economic opportunities and environmental challenges.

- This project proposes an integrated center dedicated to the development, production, and innovation of sustainable palm products.

- Beyond manufacturing, the project aims to establish a collaborative environment that combines research, education, entrepreneurship, and public engagement to transform the palm industry into a sustainable economic driver.

2-Problem Statement

- **Although Aswan possesses one of Egypt's richest concentrations of date palms, the local industry still faces several critical challenges.**

- **Large quantities of palm residues are discarded despite their potential as valuable raw materials.**

- **Traditional production methods remain limited, research activities are fragmented, and there is a lack of integrated facilities that connect innovation, production, education, and marketing.**

- **Consequently, many economic opportunities are lost while environmental pollution caused by agricultural waste continues to increase.**

- **This project addresses these challenges by creating a comprehensive center that supports sustainable production, promotes innovation, and strengthens the local economy through value-added palm products.**

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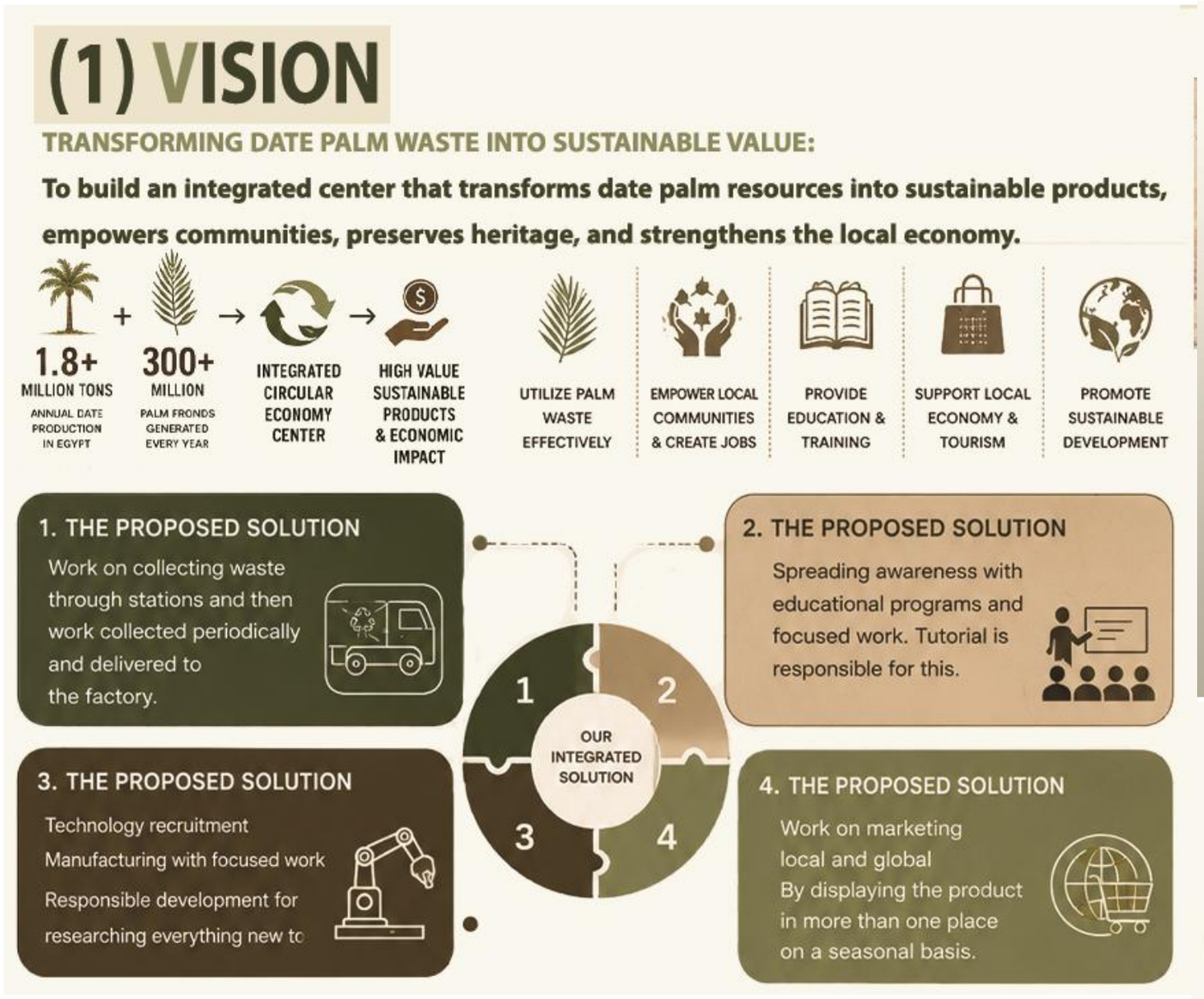
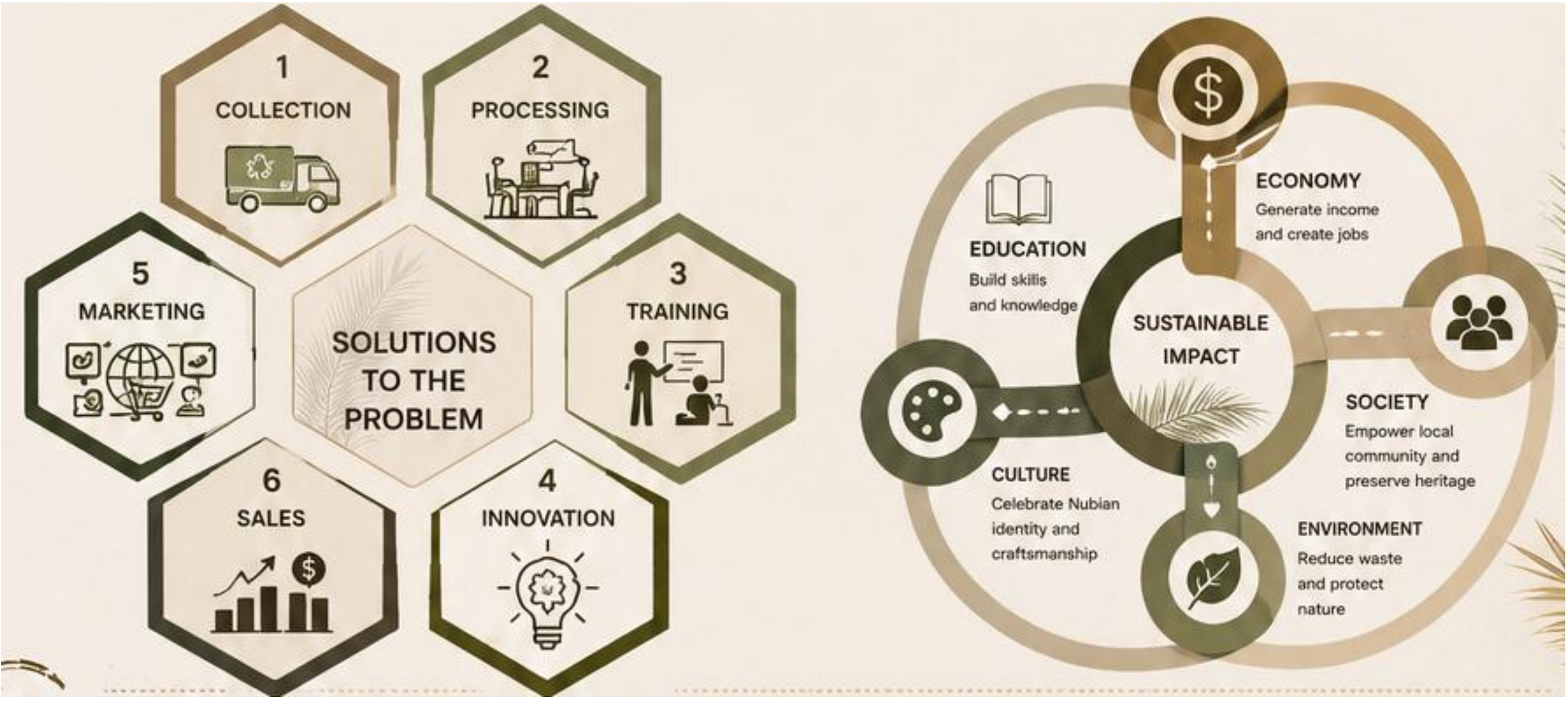
3-Project Vision

- **To establish Aswan as a leading regional hub for sustainable palm product innovation by integrating research, education, production, and community engagement within a climate-responsive architectural environment.**



4-Project Mission

- **To maximize the value of palm resources through sustainable design, advanced manufacturing, knowledge exchange, and community participation while preserving the environmental and cultural identity of Aswan.**



5-Objectives

- Enhance the economic value of palm resources.
- Reduce agricultural waste through sustainable production.
- Support research and innovation in palm-based industries.
- Create employment opportunities for local communities.
- Preserve Aswan's cultural identity.
- Promote environmental sustainability.
- Encourage entrepreneurship and product development.
- Provide educational and public awareness spaces.

6-Project Location

Strategically Located in Aswan, Egypt

The project is located in Aswan Governorate, Southern Egypt, one of the country's most important regions for date palm cultivation and sustainable agricultural development.

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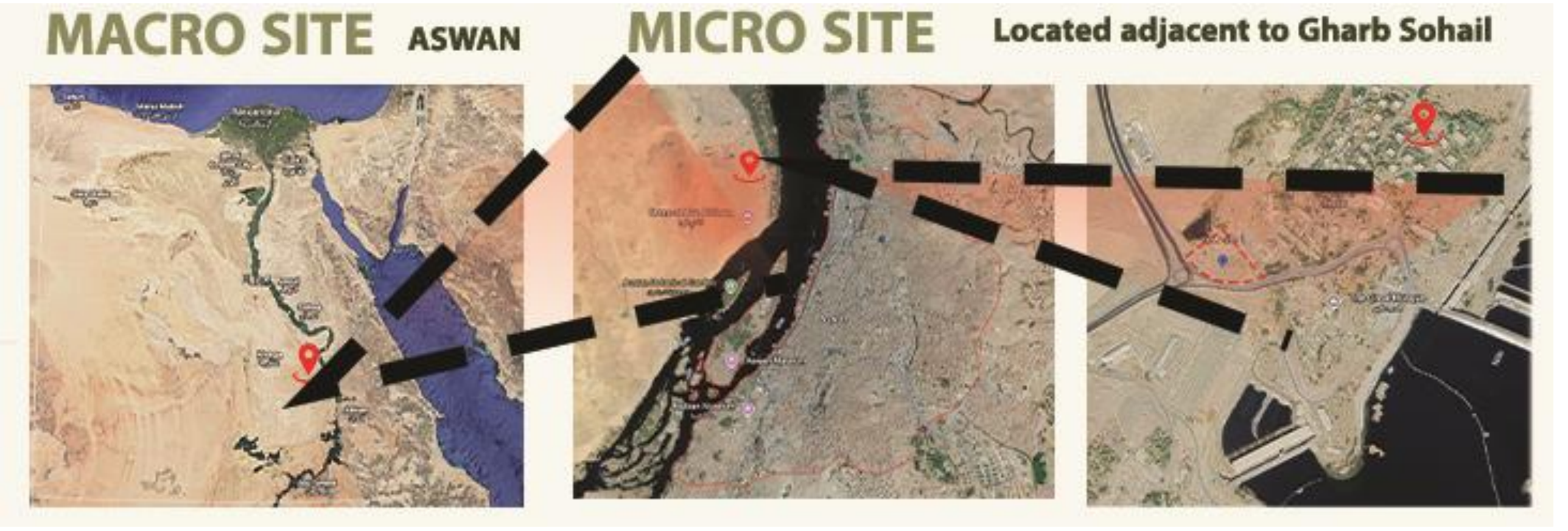

6-Project Location

Strategically Located in Aswan, Egypt

Aswan is distinguished by its rich cultural heritage, extensive palm plantations, favorable climatic conditions, and strategic position as a gateway connecting Egypt with Africa.

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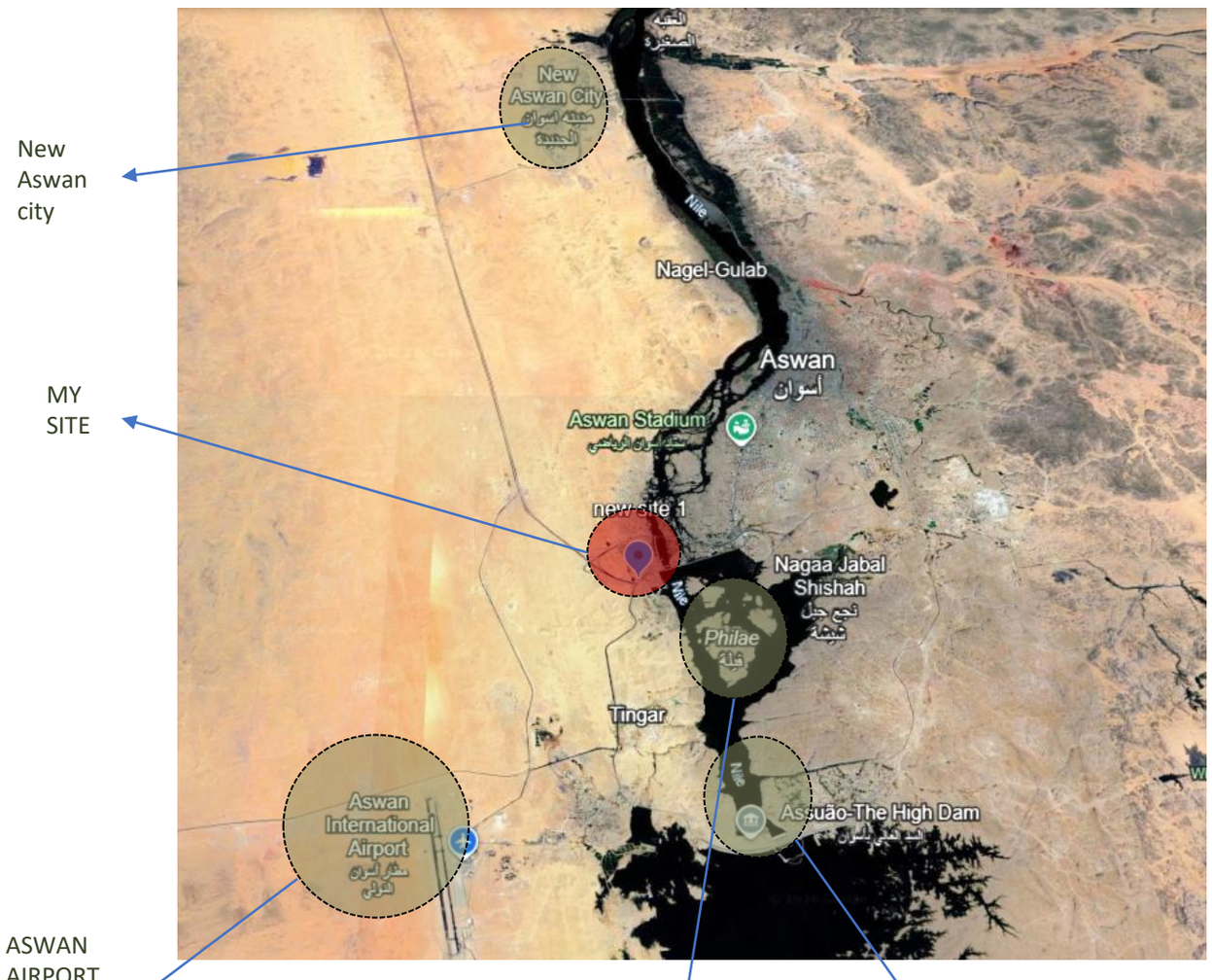
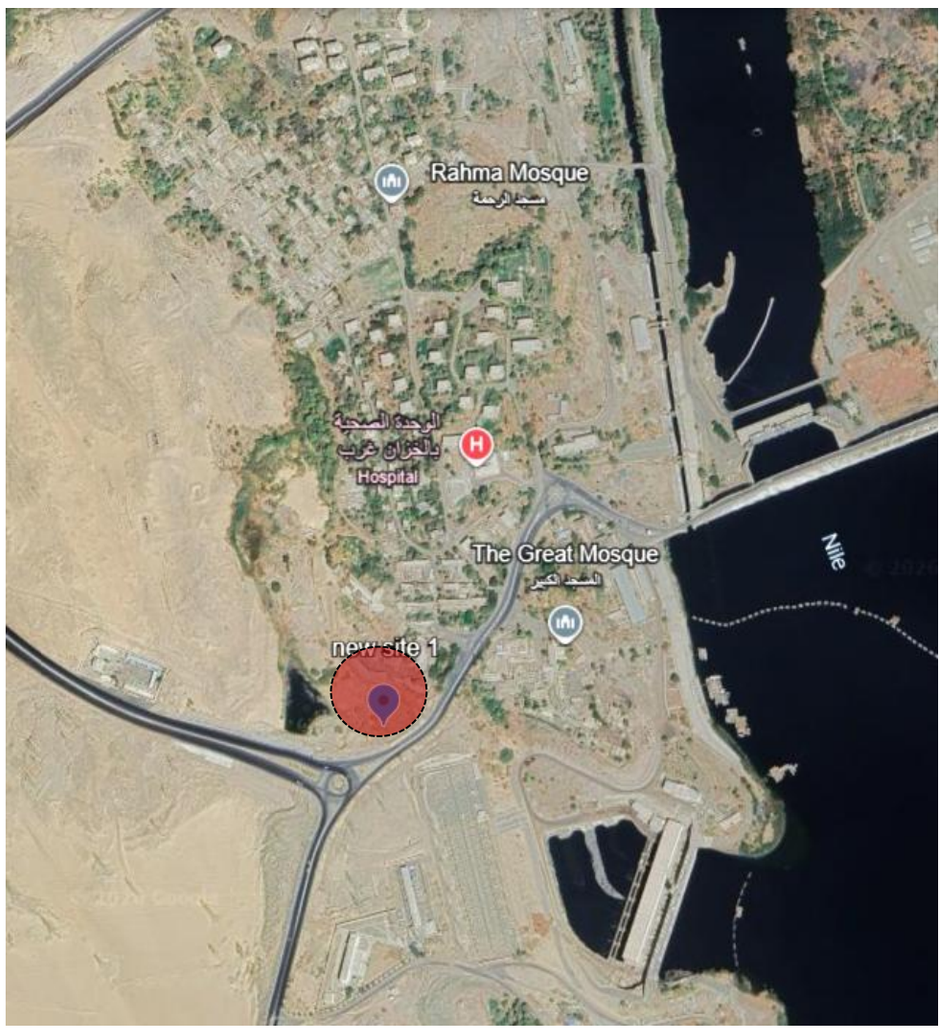
Context View



Close-up View



6-Project Location

Strategically Located in Aswan, Egypt

The site was selected due to its strategic location within one of Egypt's richest palm-producing regions, providing direct access to raw materials, skilled local craftsmanship, transportation networks, and opportunities for sustainable economic development.

Item	Information
Country	Egypt
Governorate	Aswan
Project Type	Sustainable Palm Products Development and Production Center
Site Area	**62,000**
Land Area	**≈14.76 Feddans**
Climate	Hot Desert Climate

7- Why Aswan?

- **Aswan is one of Egypt's most significant regions for date palm cultivation, with a unique environmental, cultural, and economic context that makes it an ideal location for this project.**
- **The governorate possesses extensive palm plantations, a rich handicraft tradition, and growing tourism activity. These assets provide exceptional opportunities for developing high-value palm products while supporting local communities and promoting sustainable economic growth.**
- **Furthermore, Aswan's climatic conditions encourage the adoption of passive environmental strategies, allowing architecture to respond efficiently to the local climate while reducing energy consumption.**

WHY ASWAN?

Aswan is the ideal location for an integrated center that transforms date palm waste into sustainable products. Its unique environmental, cultural, economic, and social advantages make it the perfect place for this projec

ABUNDANT DATE PALMS

Aswan has millions of date palms that generate large quantities of organic waste annually.

STRATEGIC LOCATION

Aswan is a vital link between Upper Egypt and Africa, with easy access to water transport and trade routes.

RICH NUBIAN HERITAGE

A deep cultural history of crafts and handmade products using natural materials like palm.

TOURISM POTENTIAL

Aswan is a major tourist destination attracting visitors interested in culture, nature, and sustainability.

WASTE MANAGEMENT NEED

A deep cultural history of crafts and handmade products using natural materials like palm.

SUSTAINABLE ENVIRONMENT

High solar energy, low humidity, and natural resourc support sustainable and eco-friendly industries.

COMMUNITY EMPOWERMENT

The project creates jobs, empowers women and youth, and preserves traditional craftsmanship.

SUPPORTIVE CONTEXT

Aswan supports development projects focused on sustainability, innovation, and local community growth.

NATURAL WEALTH

Rich in date palms, sunshine, Nile resources, and fertile soil.

ECONOMIC OPPORTUNITY

Turning waste into value, creating new green industries and local income.

SOCIAL IMPACT

Building skills, creating jobs, and improving the quality of life.

SUSTAINABLE FUTURE

Promoting a circular economy and protecting Aswan's unique environment and culture.

8- SWOT ANALYSIS

STRENGTHS

Abundant local date palm resources and materials

Integrated production, training and community hub

Empowers local community, women and youth

Circular economy approach zero waste utilization

Strategic location near Gharb

WEAKNESSES

Need for continuous skills development

High initial investment in equipment and infrastructure

Seasonal availability of raw materials

Complex management of diverse activities

Need for strong quality control and food safety systems

OPPORTUNITIES

Growing global demand for sustainable and natural products

Eco-tourism growth in Aswan and cultural experiences

Partnerships with universities, NGOs and local institutions

Export potential for palm products and date based foods

Government support for green economy and local industries

ANALYSIS

THREATS

Competition from mass-produced and cheaper alternatives

Climate change impact on date palm production

Fluctuations in market prices and demand

Risk of fire in natural fiber storage

Changing consumer preferences and market trends

9- CITY CHARACTER

ASWAN IDENTITY

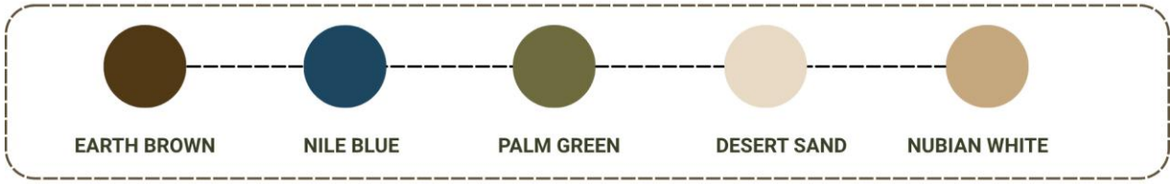
IN ARCHITECTURE

Architecture inspired by Aswan's heritage, climate, colors & the spirit of Nubian culture.

Aswan's architecture is a reflection of its land, people & history.

It is simple, vibrant, sustainable & deeply connected to nature.

ASWAN COLOR PALETTE



TEXTURES & MATERIALS

ARCHITECTURAL FEATURES

ORGANIC FORMS & DOMES

Soft, curved forms that harmonize with the landscape and climate.

GEOMETRIC PATTERNS

Traditional motifs and triangular openings for ventilation and decoration.

NATURAL VENTILATION

Use of courtyards, wind catchers and small openings for thermal comfort.

LOCAL MATERIALS

Mud brick, stone, palm wood and natural plaster for durability and insulation.

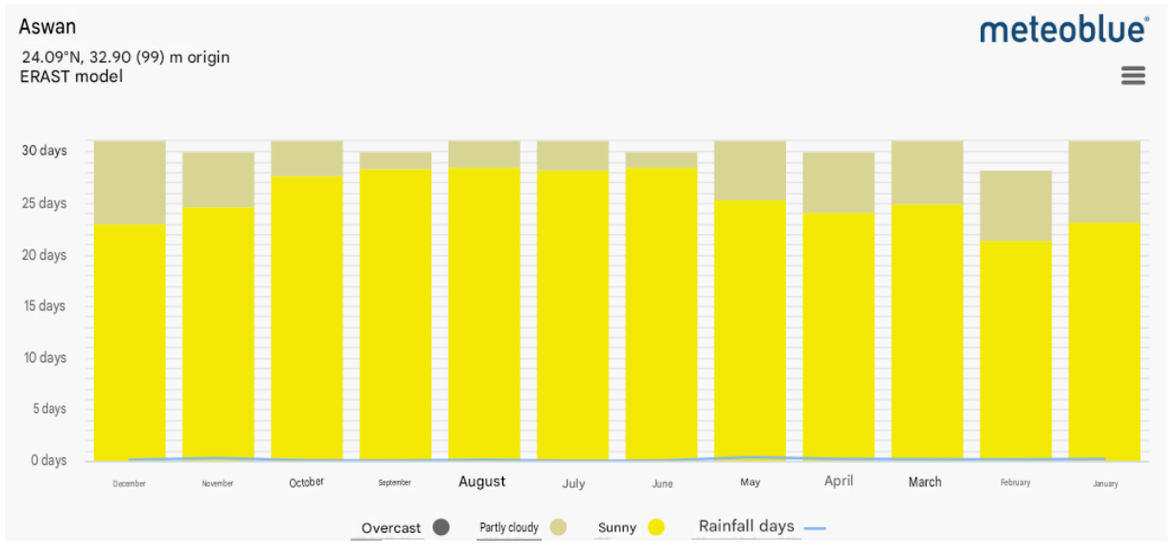
CULTURAL CONNECTION

Buildings reflect Nubian heritage, lifestyle and a deep connection to the Nile.

8- Site Analysis

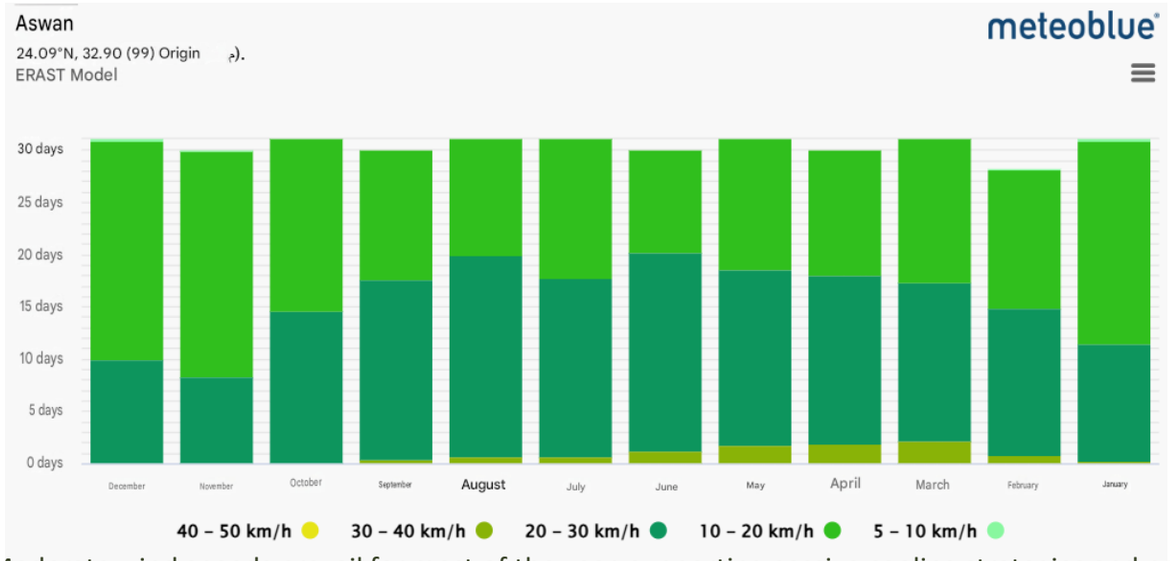
Climate :

Annual Sunshine & Cloud Cover



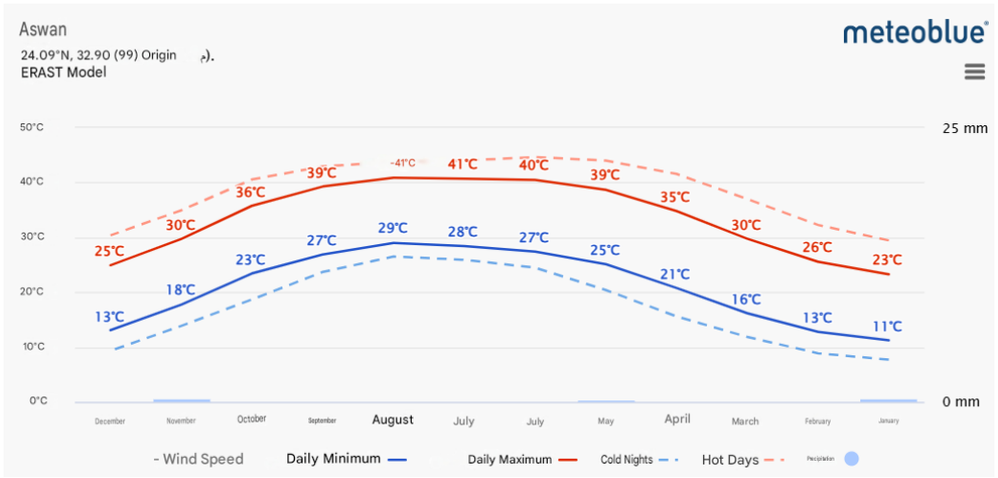
Aswan enjoys clear skies and abundant sunshine throughout the year, providing excellent conditions for daylight utilization and solar energy generation.

Monthly Wind Speed Distribution



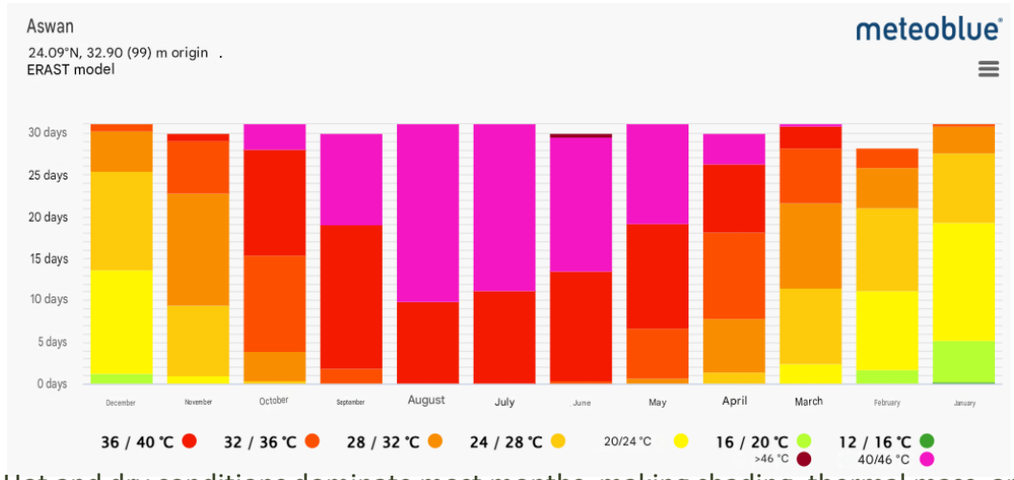
Moderate wind speeds prevail for most of the year, supporting passive cooling strategies and natural ventilation.

Monthly Temperature Profile



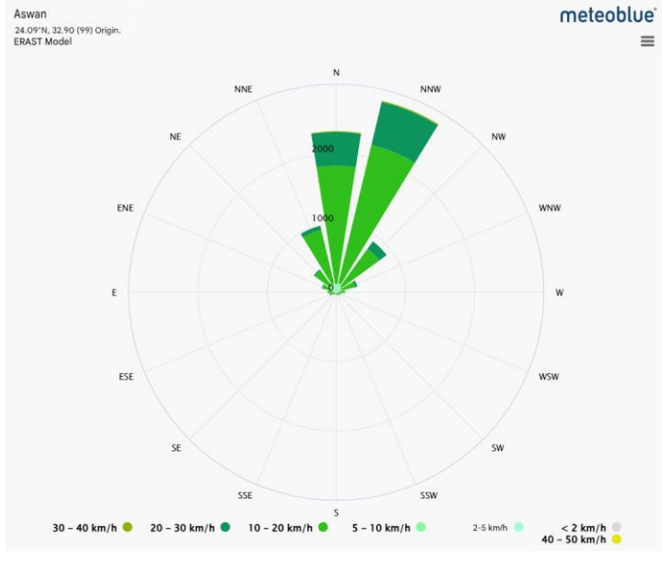
Summer temperatures exceed 40°C, while winters remain mild, emphasizing the need for climate-responsive architectural solutions.

Thermal Comfort & Climate Conditions



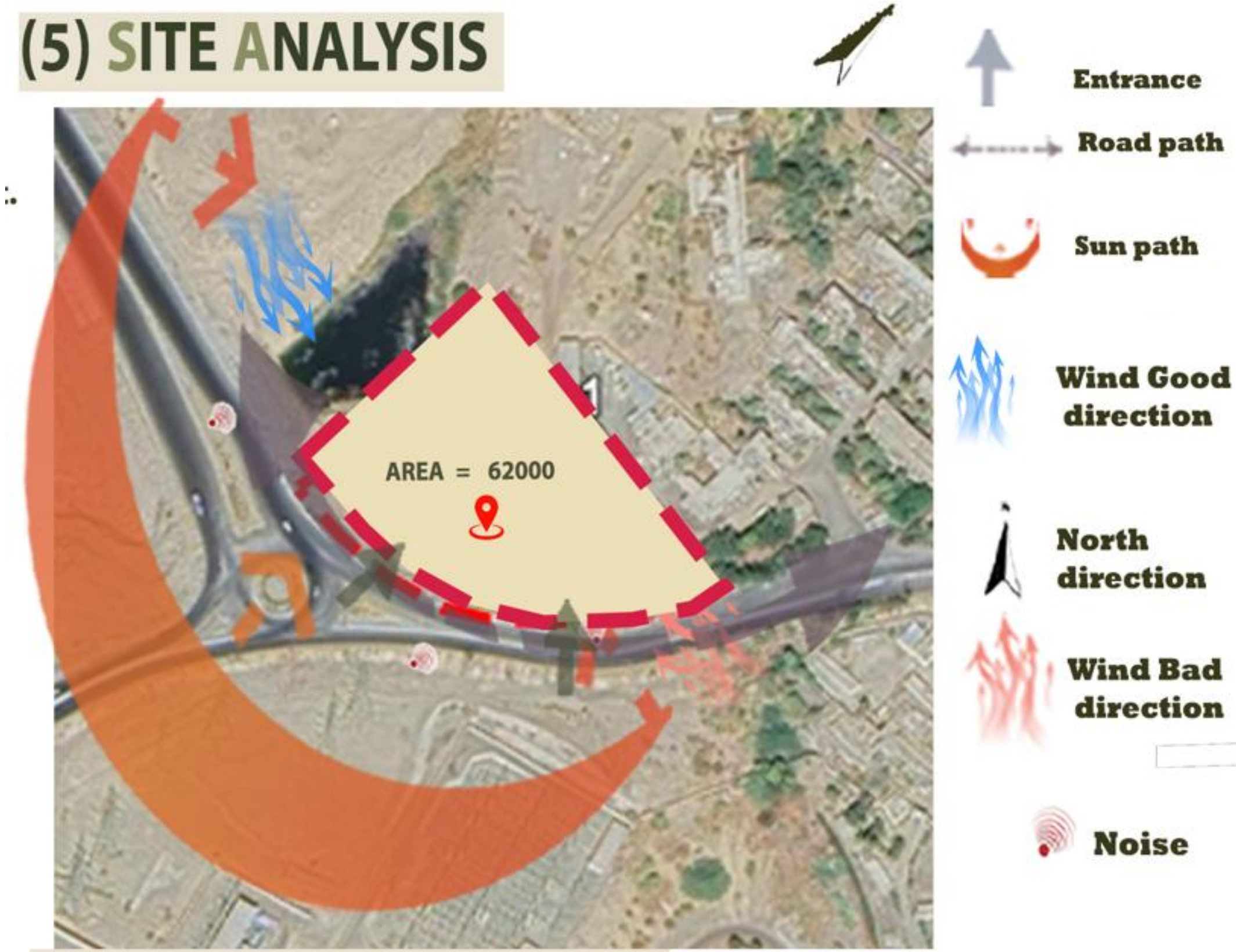
Hot and dry conditions dominate most months, making shading, thermal mass, and passive cooling essential design strategies.

Prevailing Wind Direction



The dominant winds originate from the north and northwest, guiding building orientation and ventilation design.

8- Site Analysis



9- Design Criteria

Design Criteria:

- **The design criteria establish the fundamental principles that guided every architectural decision throughout the project.**
- **They ensure that the proposed center responds effectively to its environmental, functional, cultural, and economic context while supporting long-term sustainability.**

Environmental Criteria:

- **Respond to Aswan's hot desert climate through passive design strategies.**
- **Maximize natural ventilation using the prevailing north winds.**
- **Reduce solar heat gain through shading devices and proper orientation.**
- **Integrate native vegetation to improve the microclimate.**

9- Design Criteria

Functional Criteria:

- **Organize spaces according to the production process.**
- **Separate public, educational, administrative, and industrial functions while maintaining efficient connections.**
- **Provide flexible spaces that can adapt to future expansion.**

Social Criteria:

- **Encourage interaction between researchers, artisans, students, visitors, and investors.**
- **Create public spaces that promote education and community engagement.**
- **Preserve and celebrate local craftsmanship.**

9- Design Criteria

Economic Criteria:

- **Support value-added palm industries.**
- **Encourage entrepreneurship and small businesses.**
- **Increase employment opportunities for the local community.**

Architectural Criteria:

- **Reflect the identity of Aswan through contemporary architecture inspired by the palm tree.**
- **Achieve harmony between built spaces and landscape.**
- **Create an iconic landmark that represents innovation and sustainability.**

10- Concept Story

- The concept is inspired by the life cycle of the date palm, where every component contributes to a unified and productive ecosystem. Similar to the palm tree, the project integrates multiple functions that work together to create a sustainable environment for innovation, production, education, and community development.

- The design begins with two interconnected circular forms representing collaboration between research and production. As these elements interact, new spaces emerge, creating opportunities for learning, creativity, and economic growth.

- Landscape plays a central role in connecting the architectural masses. Green corridors, shaded pathways, and open gathering spaces become the physical link that unifies the entire project, reflecting the continuous relationship between nature, people, and architecture.

- Ultimately, the project becomes more than a production center; it evolves into a living ecosystem where knowledge generates innovation, innovation creates products, and products support sustainable development for the local community.

Concept

The concept is inspired by palm craft techniques such as braiding and rolling, translated into a dynamic radial layout centered around a main hub. The interconnected masses create fluid movement, while courtyards enhance climate responsiveness. The design reflects a balance between traditional identity and contemporary architectural expression.

Braiding wicker ropes

The main radial pattern inspired by braiding techniques.

Rolling the palm fronds

Inspired the central circular hub and the flowing circulation.

Interconnected & Complementary Circles

The two circles represent interconnected functions that complement each other.

Landscape as the Beginning of the Concept

The green areas and open spaces form the base, inspiring the radial layout and enhancing climate responsiveness.

Central Hub (Inspired by Rolling)

The main circular hub acts as the heart of the project, organizing movement and connecting all functions.

Interconnected Buildings & Complementary Functions

The buildings are arranged in a radial pattern around the hub, creating fluid movement and visual harmony.

Fluid Movement & Connectivity

The design ensures seamless circulation between the two circles and through the entire landscape.

Landscape as the beginning of the concept

Main radial layout inspired by braiding

Central hub inspired by rolling

Interconnected & complementary functions

Fluid movement & connectivity

11- Form Generation

The architectural form evolved through a sequence of design decisions directly derived from the project concept.

Step 01:

Two primary circular forms were established to represent the project's core functions: research and production.

Step 02:

The circles were offset to generate interaction and create dynamic transitional spaces.

Step 03:

Connections were introduced to strengthen circulation and encourage collaboration between different departments.

11- Form Generation

Step 04:

The built masses were carefully oriented according to climate conditions, prevailing wind direction, and solar exposure.

Step 05:

Landscape elements were integrated between the architectural volumes, reinforcing the concept of connectivity while improving environmental performance.

Step 06:

The final composition emerged as an interconnected architectural system that balances functionality, sustainability, and visual identity.

FORM GENERATION DIAGRAM

INSPIRED BY PALM CRAFT TECHNIQUES : BRAIDING & ROLLING

01 DUAL CIRCULAR HUBS

The concept begins with two circular hubs representing the heart of the project and the dual-center system.

02 POLYGONAL TRANSFORMATION

The left circle is transformed into an octagonal (implicit) form to create a stronger spatial identity and define the main axis linking the two hubs.

03 RADIAL MASS DISTRIBUTION

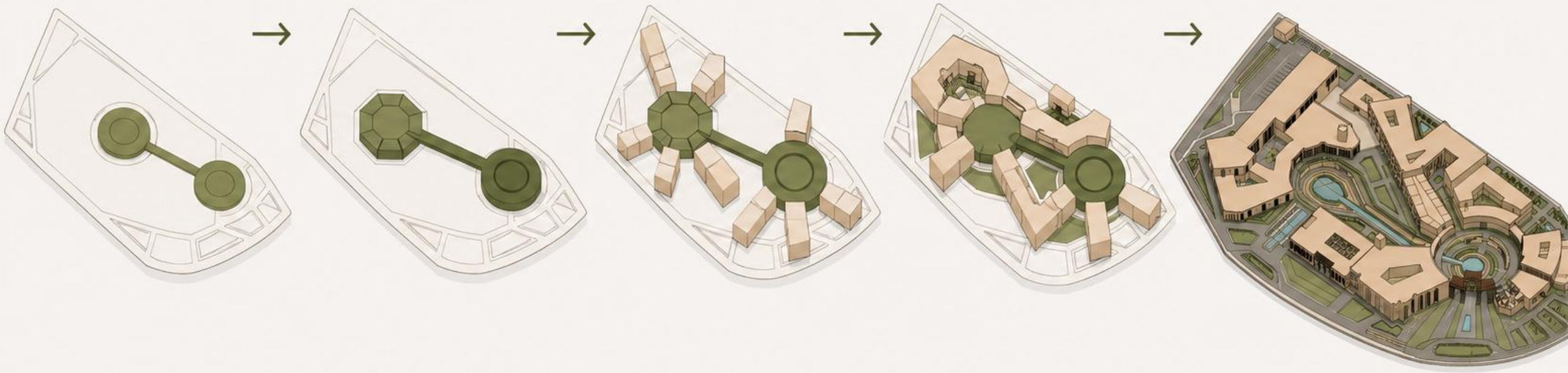
Masses are radiated from both centers following the functional requirements and the radial logic of the hubs.

04 SOLID & VOID

Courtyards and open spaces are introduced within the masses to enhance climate responsiveness, natural light, and ventilation.

05 FINAL FORM

The final architectural form achieves balance between identity, function, and environment.



SOLID MASS

OPEN SPACES / PLAZAS

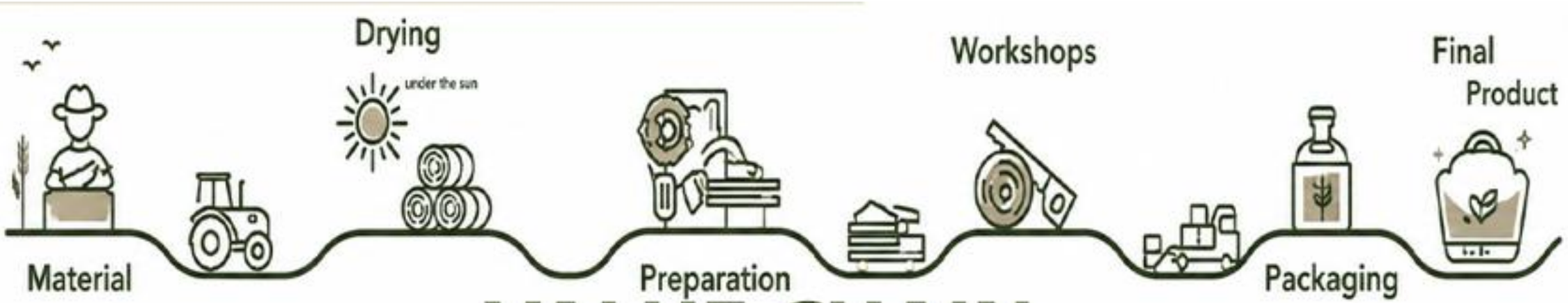
BUILDING MASSES

CIRCULAR HUBS

OCTAGONAL TRANSFORMATION

MOVEMENT & CONNECTIVITY

12- PROCESS STORY



VALUE CHAIN

01 RAW MATERIAL
Wild Palm Waste

02 PROCESSING
Material treatment and sorting

03 TRAINING
Capacity building for artisans, women and youth

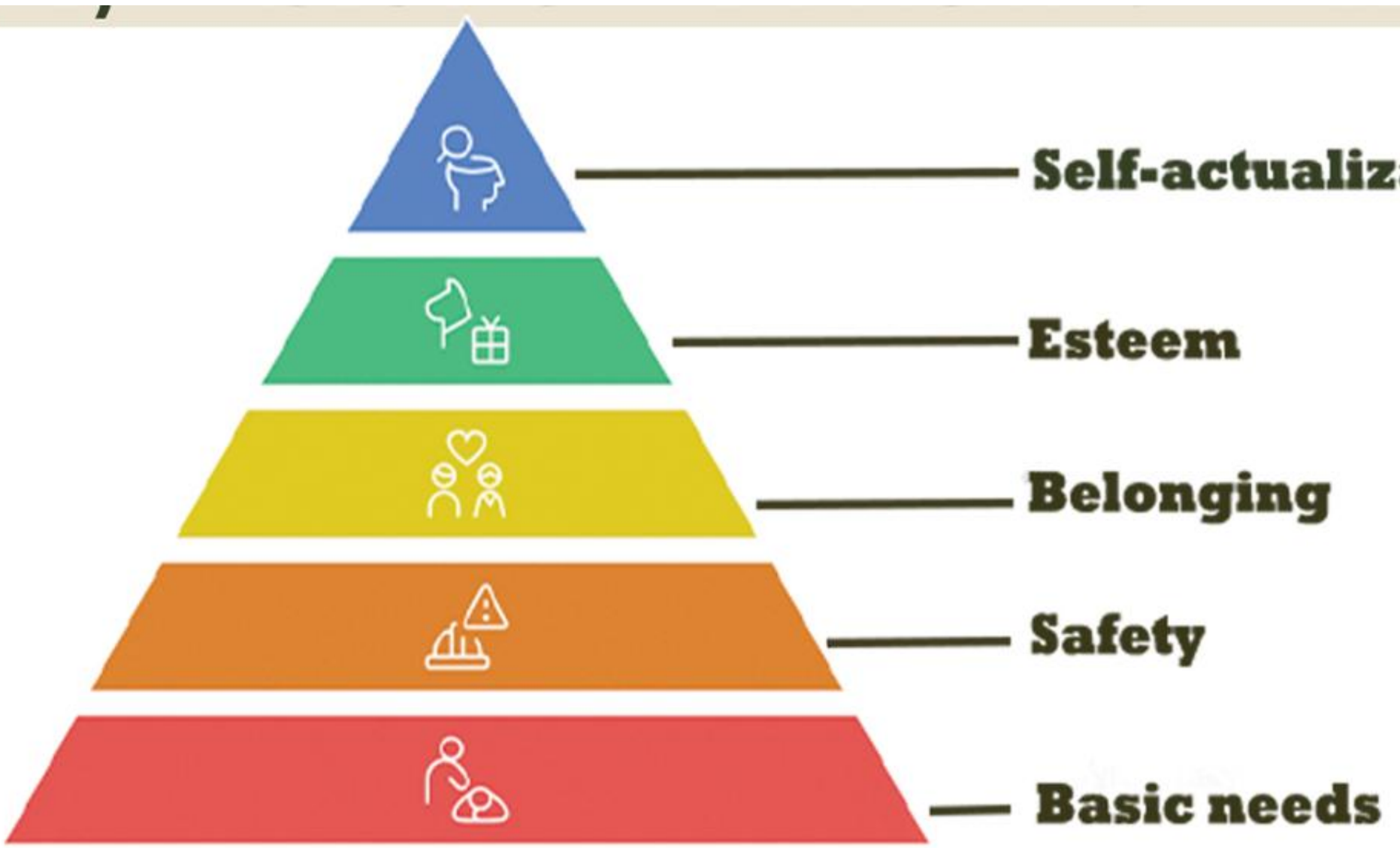
04 PRODUCTION
Production of lightweight furniture, handicrafts and food products

05 MARKETING
Exhibitions – Stores – Events – Export

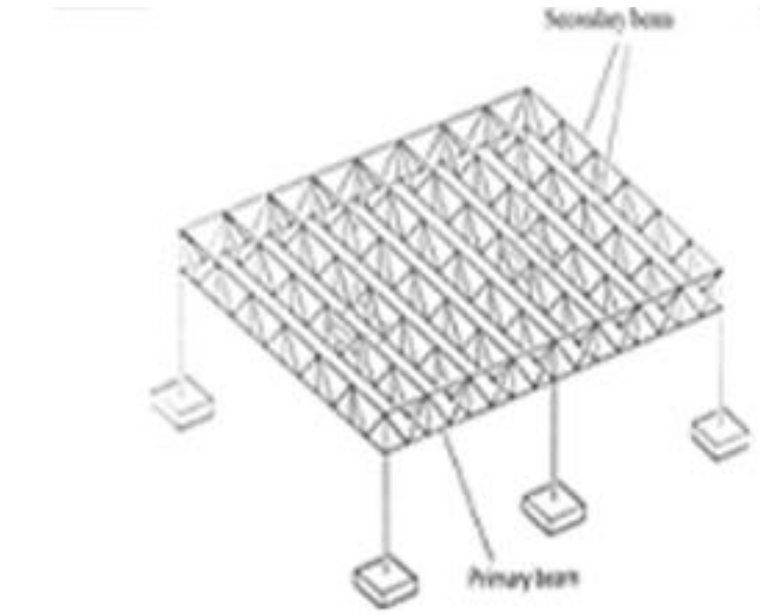
OUTPUTS

- SUSTAINABLE LIGHTWEIGHT FURNITURE
- HANDICRAFT PRODUCTS
- DATE-BASED FOOD PRODUCTS
- NATURAL INSULATION MATERIALS

13- MASLOW'S HIERARCHY OF NEEDS

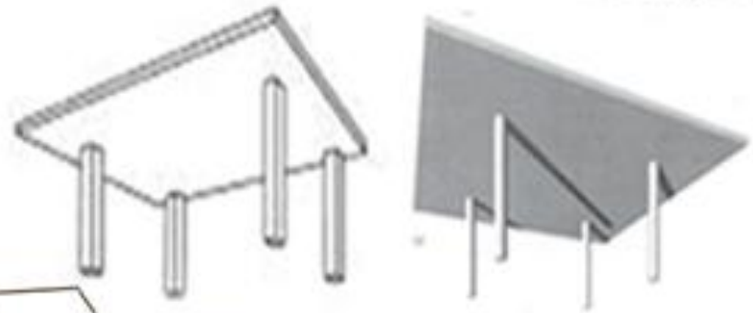


14- STRUCTURE SYSTEM

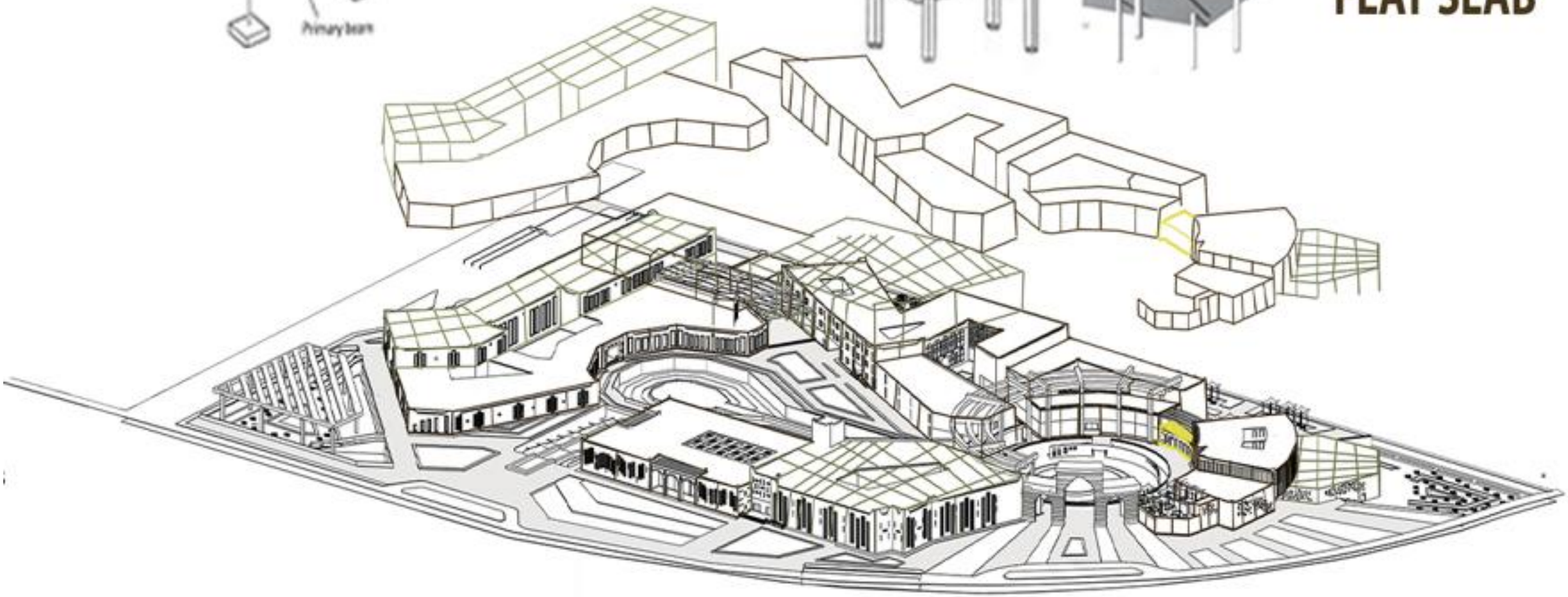


TRUSS STRUCTURE SYSTEM

Deck Arch Bridge

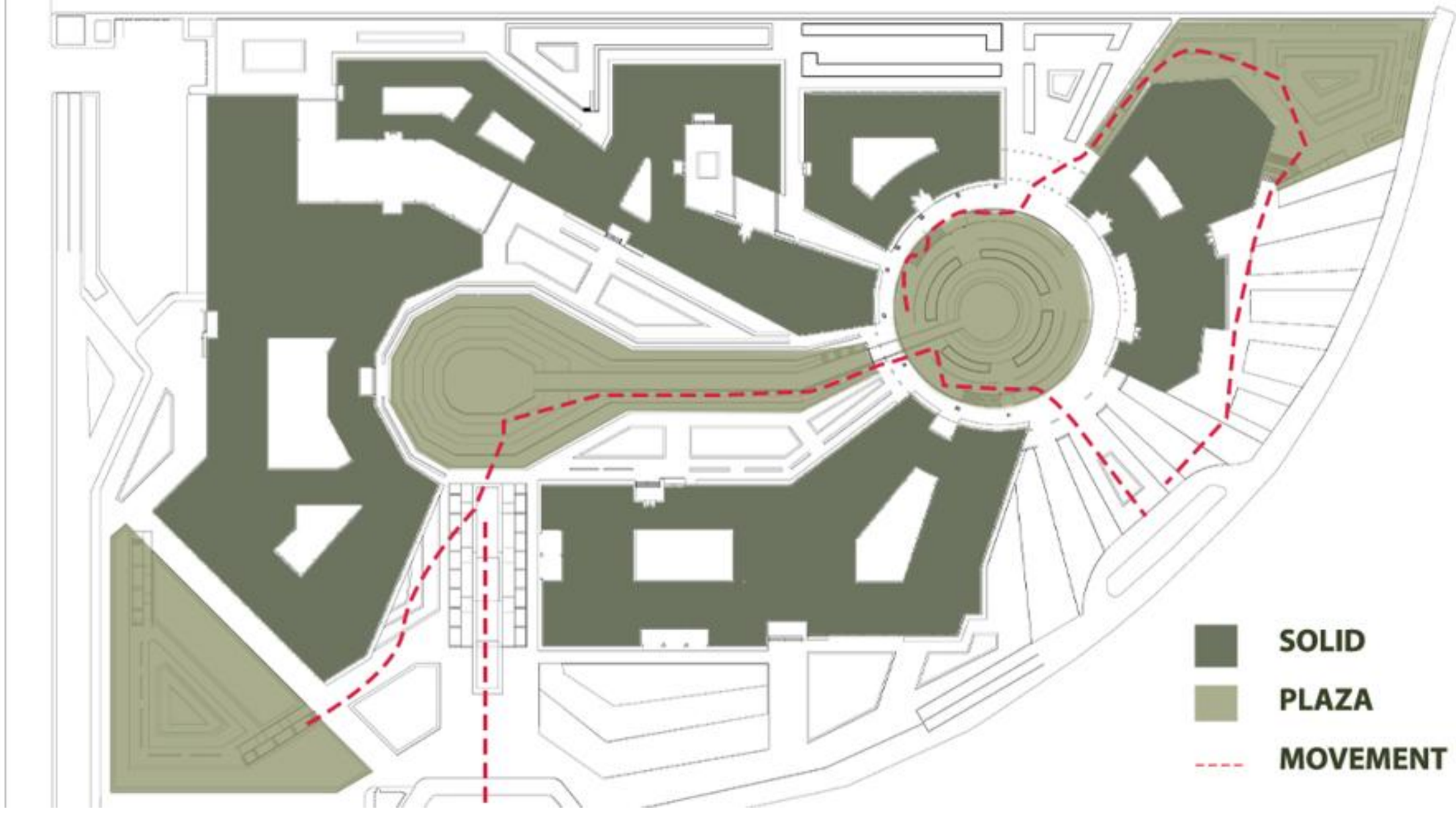


FLAT SLAB

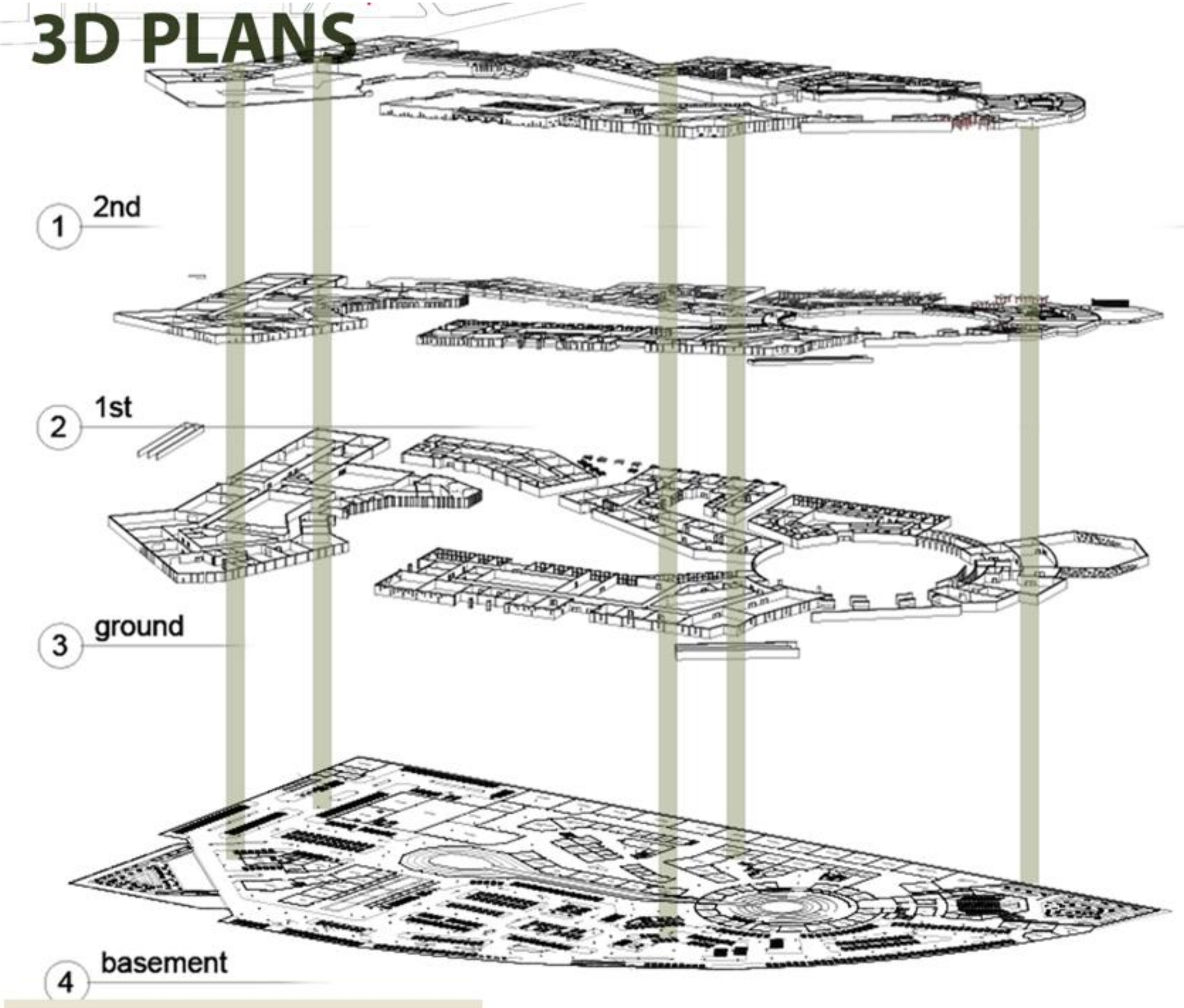


15- PLAN ANALYSIS

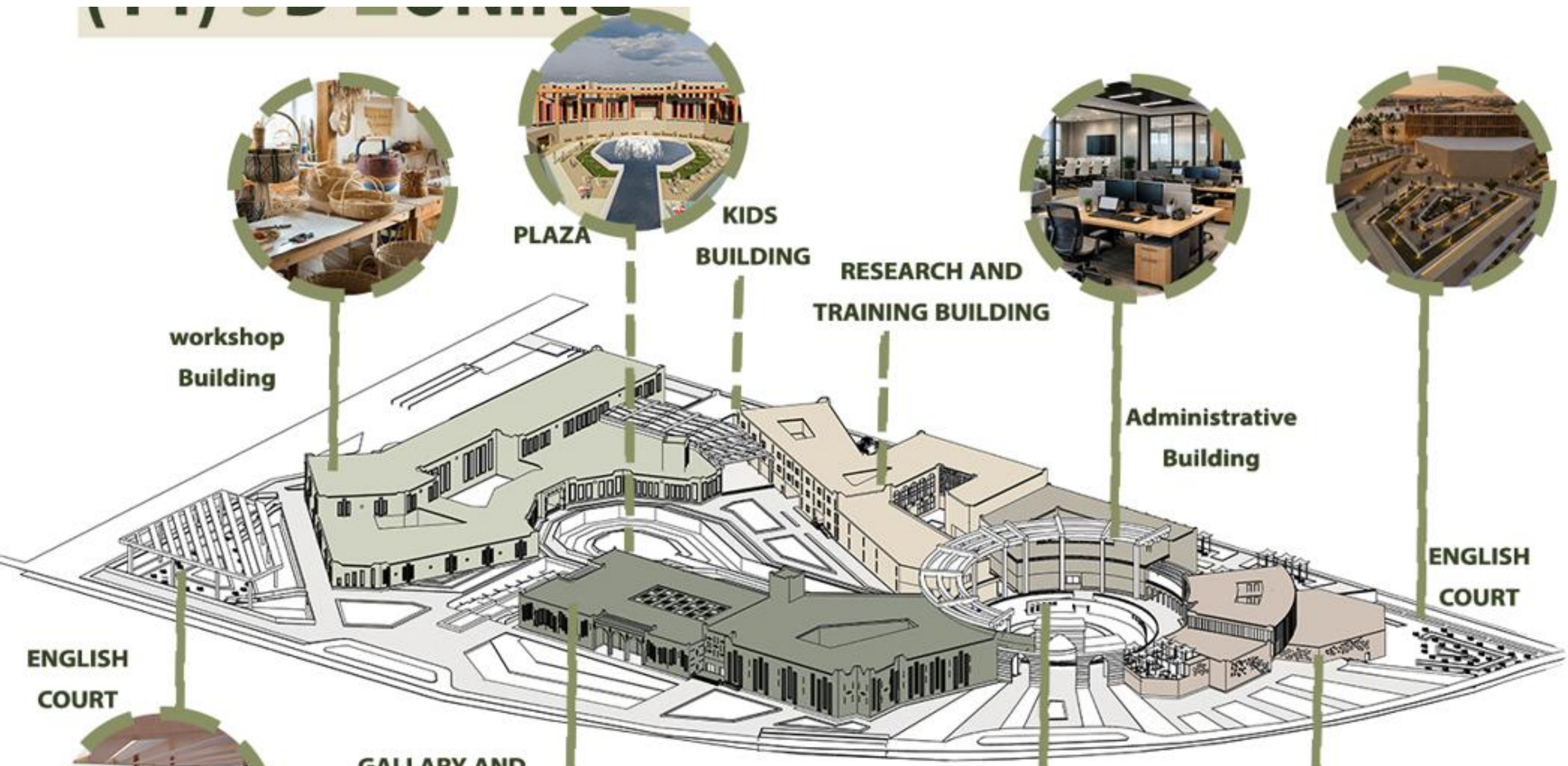
Solid & Void



15- PLAN ANALYSIS



17- 3D ZONING


PLAZA
KIDS
BUILDING
RESEARCH AND
TRAINING BUILDING
workshop
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MARKET BUILDING
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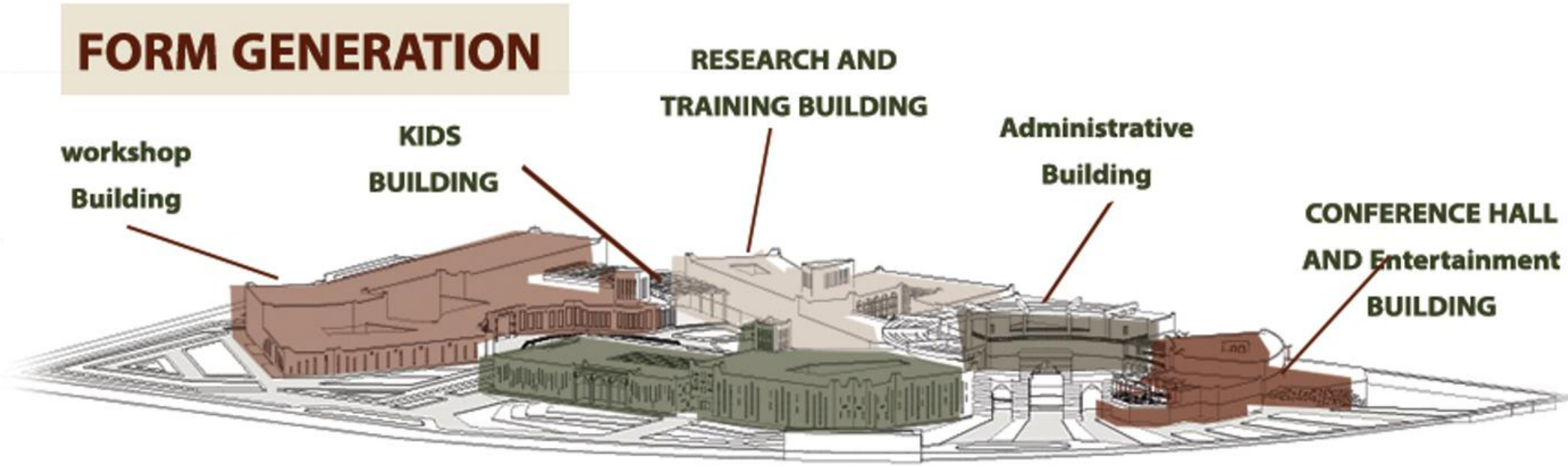
CONFERENCE HALL
AND Entertainment
BUILDING

17- 3D ZONING


FORM GENERATION
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TRAINING BUILDING
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Building
CONFERENCE HALL
AND Entertainment
BUILDING

18- Sustainability Strategies

18- Sustainability Strategies

USING SHEDS

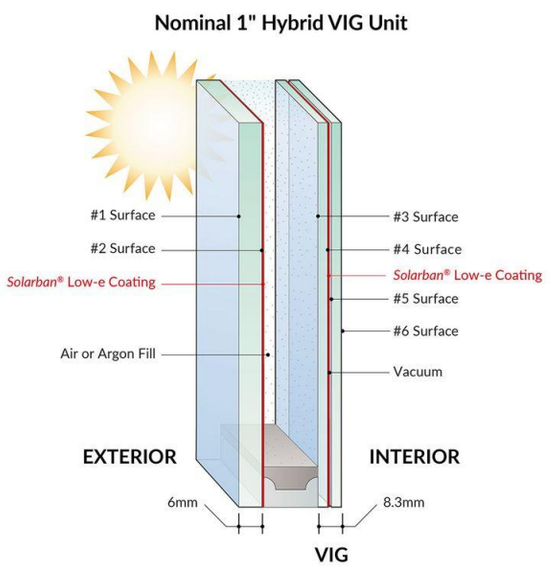
A large shaded courtyard forms the heart of the project, creating a comfortable outdoor gathering space while reducing direct solar heat gain and improving thermal comfort.

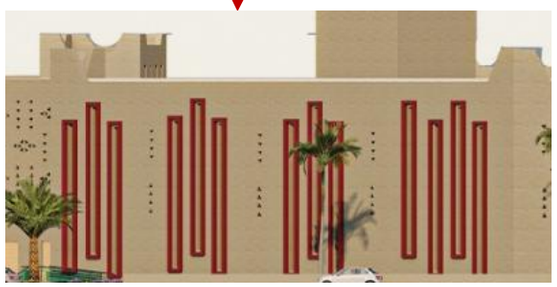
Local & Sustainable Materials

Locally sourced materials such as clay bricks, palm fronds, palm wood, and natural stone minimize environmental impact while reflecting Aswan's architectural identity.

High-Performance Insulated Glazing

Low-emissivity insulated glazing minimizes heat transfer, enhances daylight quality, and reduces cooling energy demand.

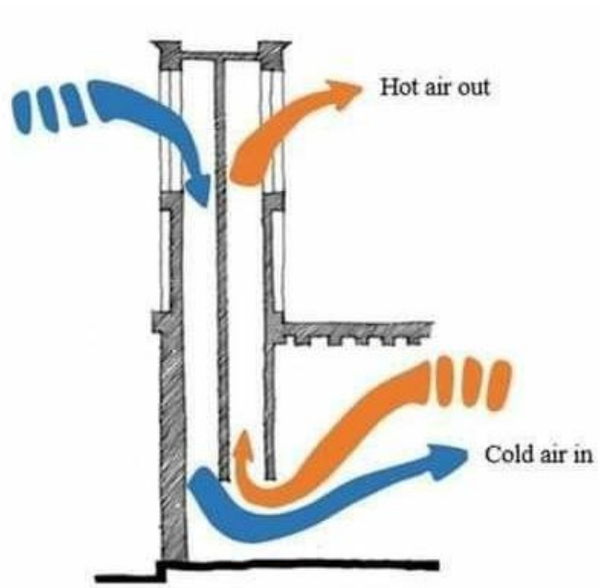




South Façade Shading

Vertical shading elements reduce intense southern solar radiation while allowing controlled daylight to penetrate the interior spaces.

Passive Stack Ventilation



The ventilation system utilizes the stack effect to extract hot air naturally while drawing cooler air through lower openings, improving indoor air quality without excessive energy consumption.

19- LAYOUT

19- LAYOUT

MAIN PROJECT ENTERENCE

secondary PROJECT ENTERENCE

Service road

The main road of the project

20- MASTER PLAN

- The master plan is organized around a central landscape spine that acts as the primary circulation and social space connecting all project components.

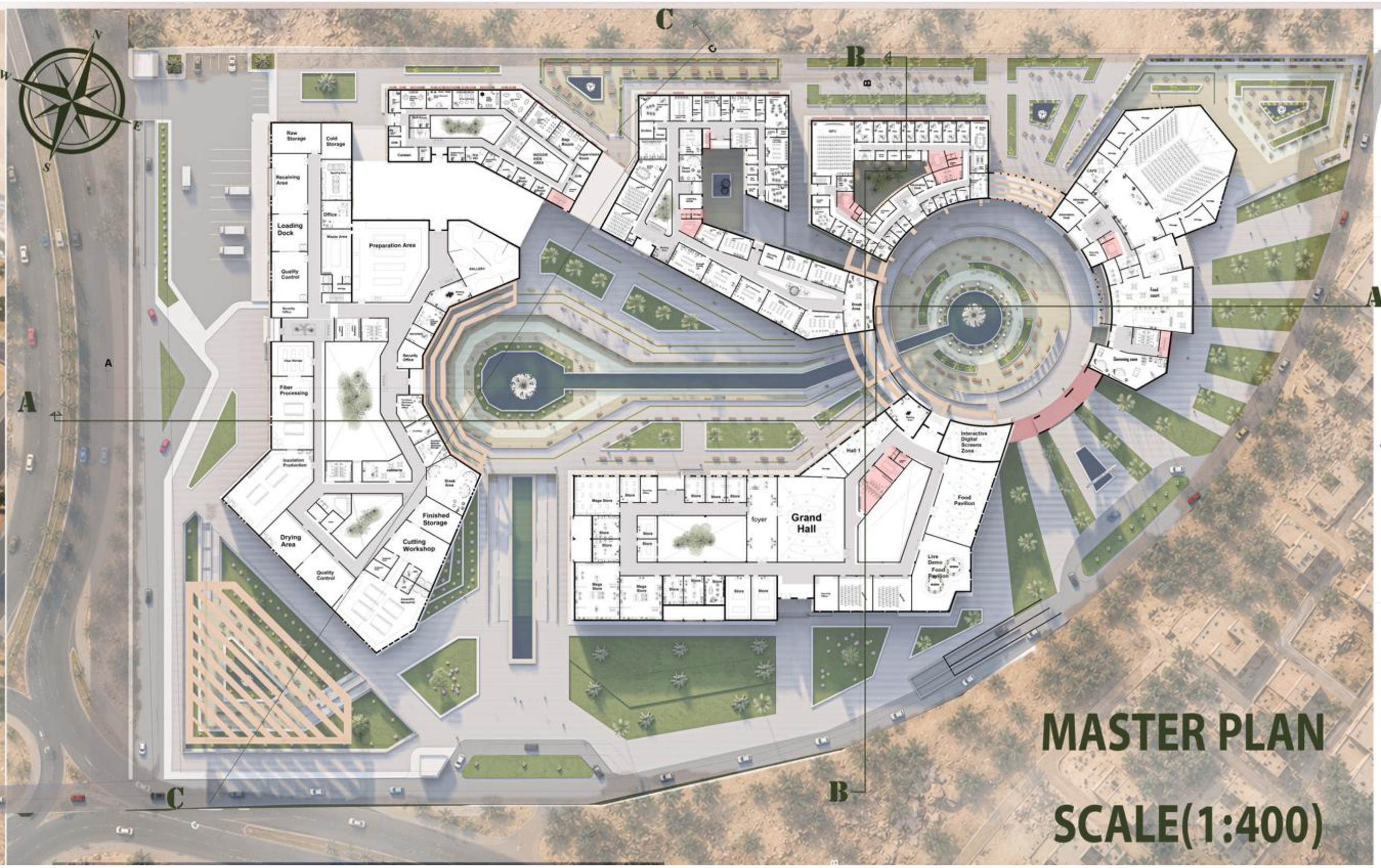
- Public functions are positioned near the main entrance to maximize accessibility, while research and administrative facilities occupy quieter zones that support focused activities.

- Production and workshop areas are strategically located to optimize logistics and service access without disturbing visitor circulation.

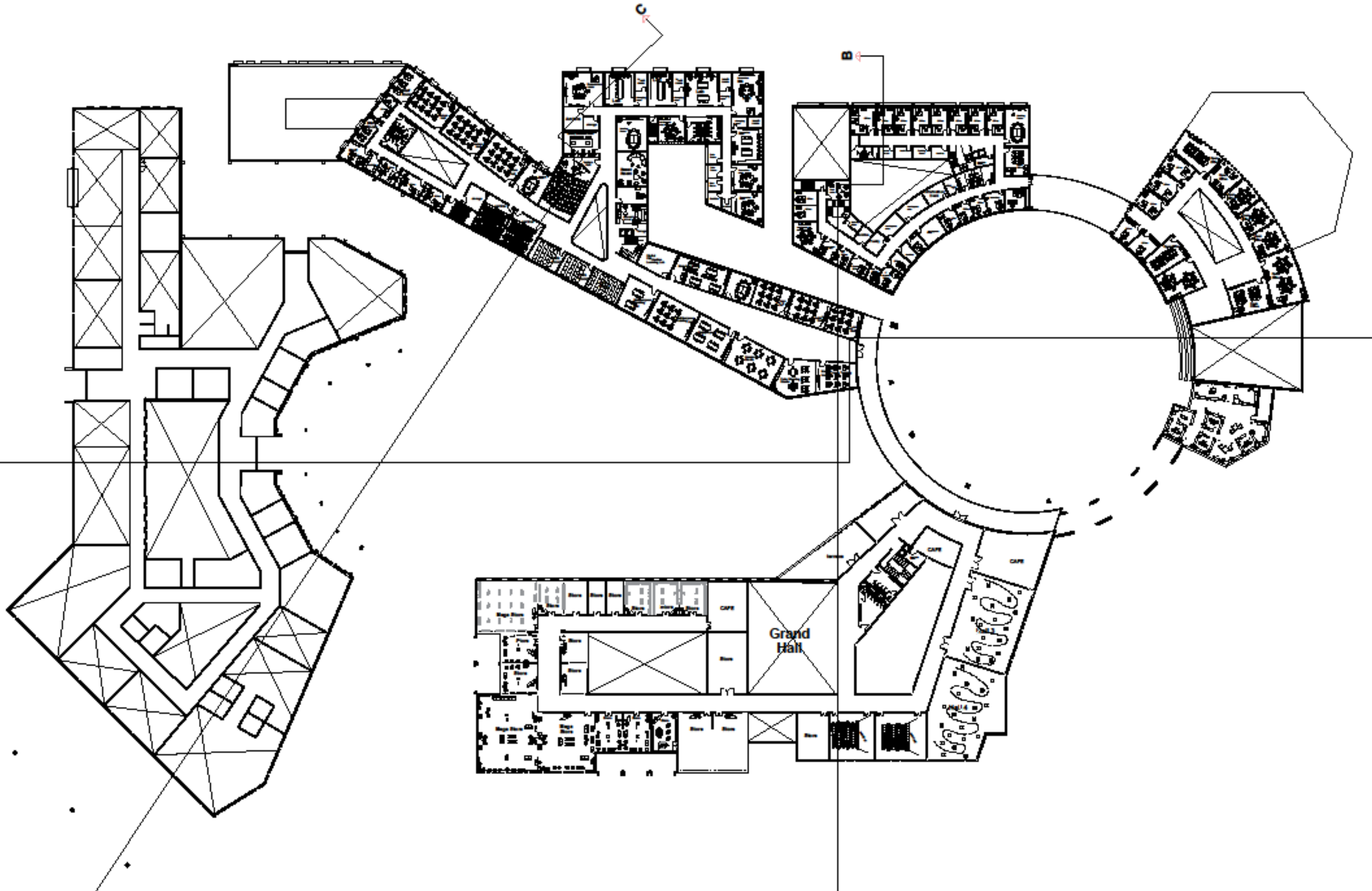
- Open spaces are designed as extensions of the built environment, creating shaded gathering areas, outdoor exhibition spaces, educational gardens, and recreational landscapes inspired by the natural character of Aswan.

- The overall planning strategy establishes a clear hierarchy of movement, enhances environmental performance, and reinforces the project's vision of integrating architecture, landscape, and sustainable development into one cohesive experience.

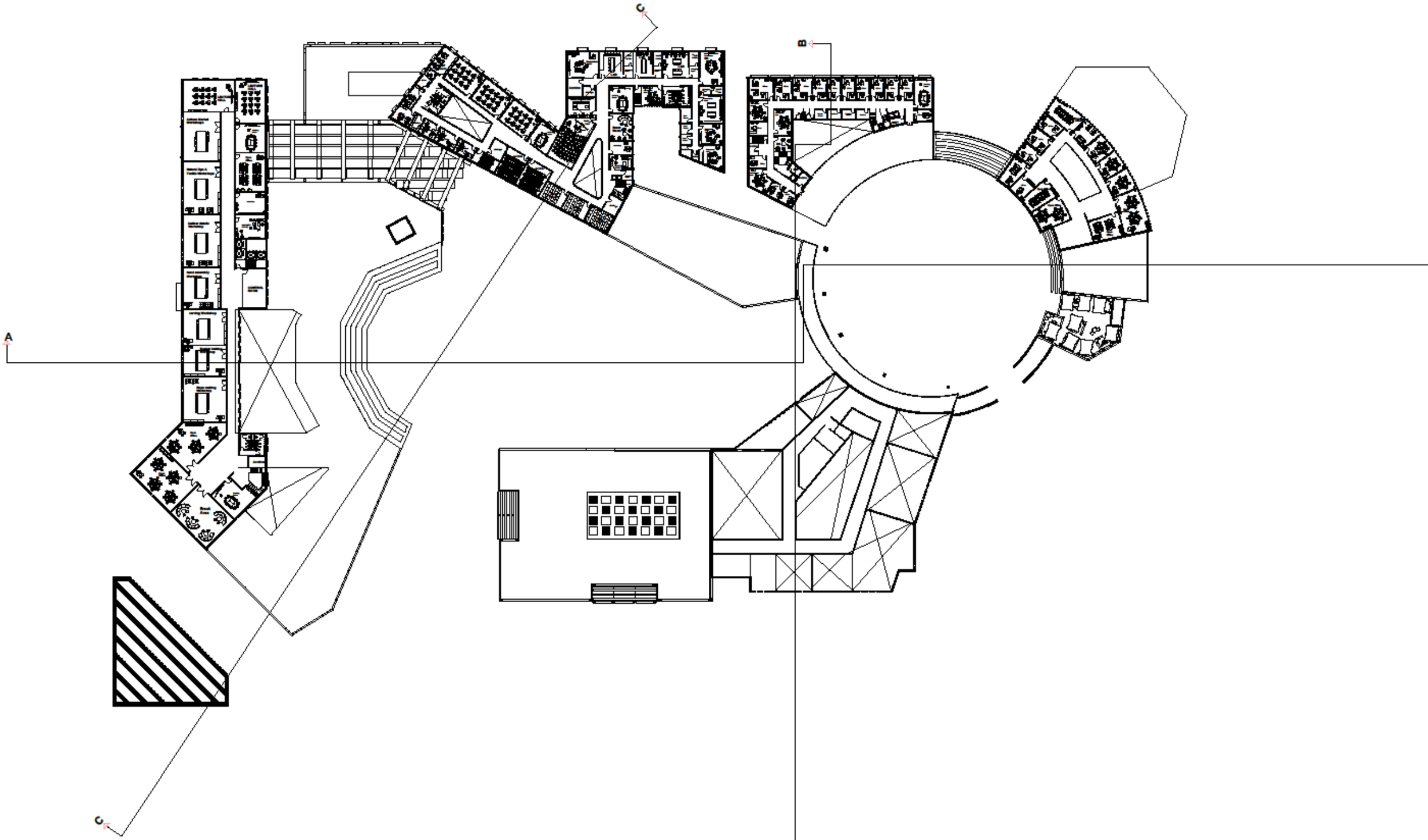
20- MASTER PLAN



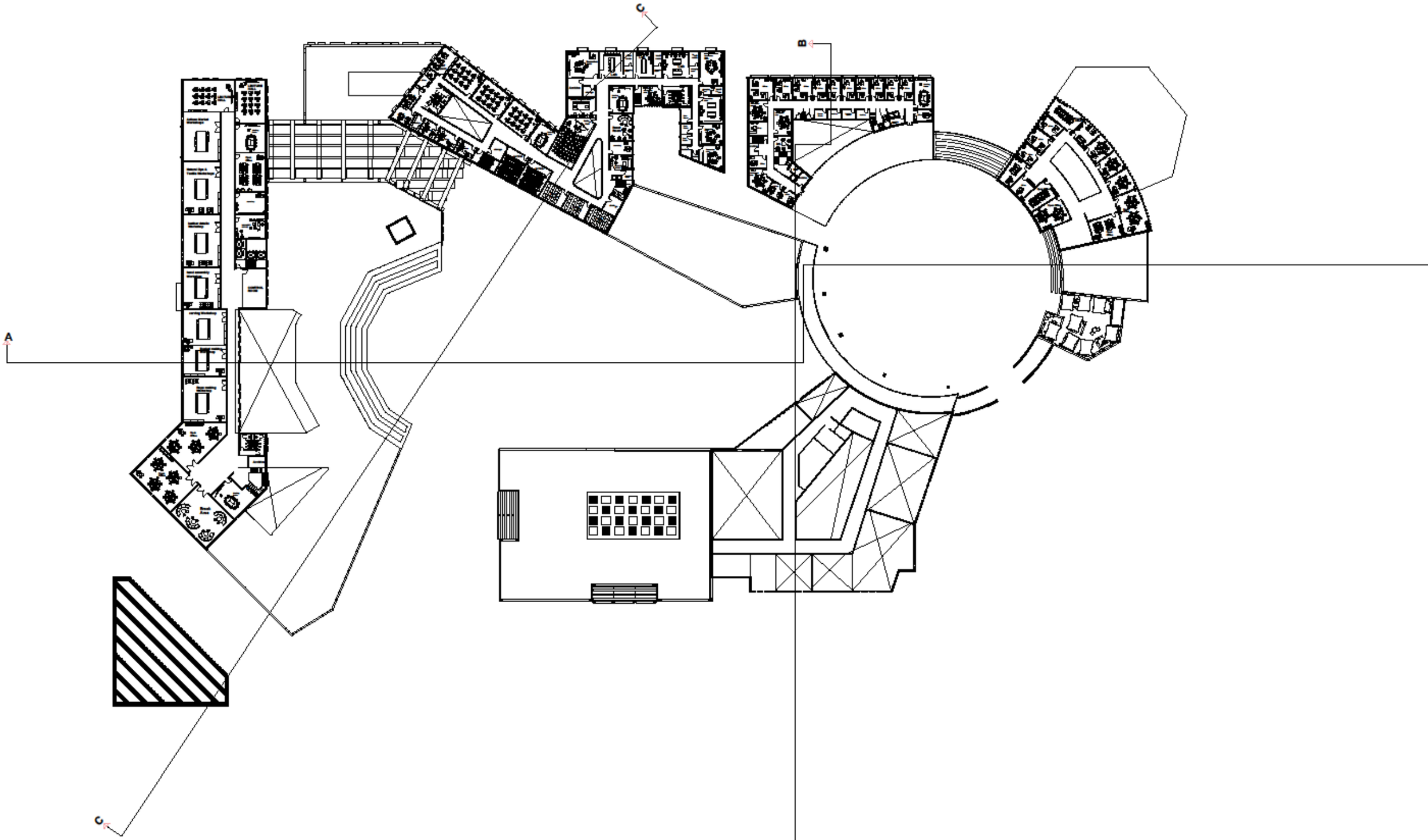
21- FIRST FLOOR PLAN



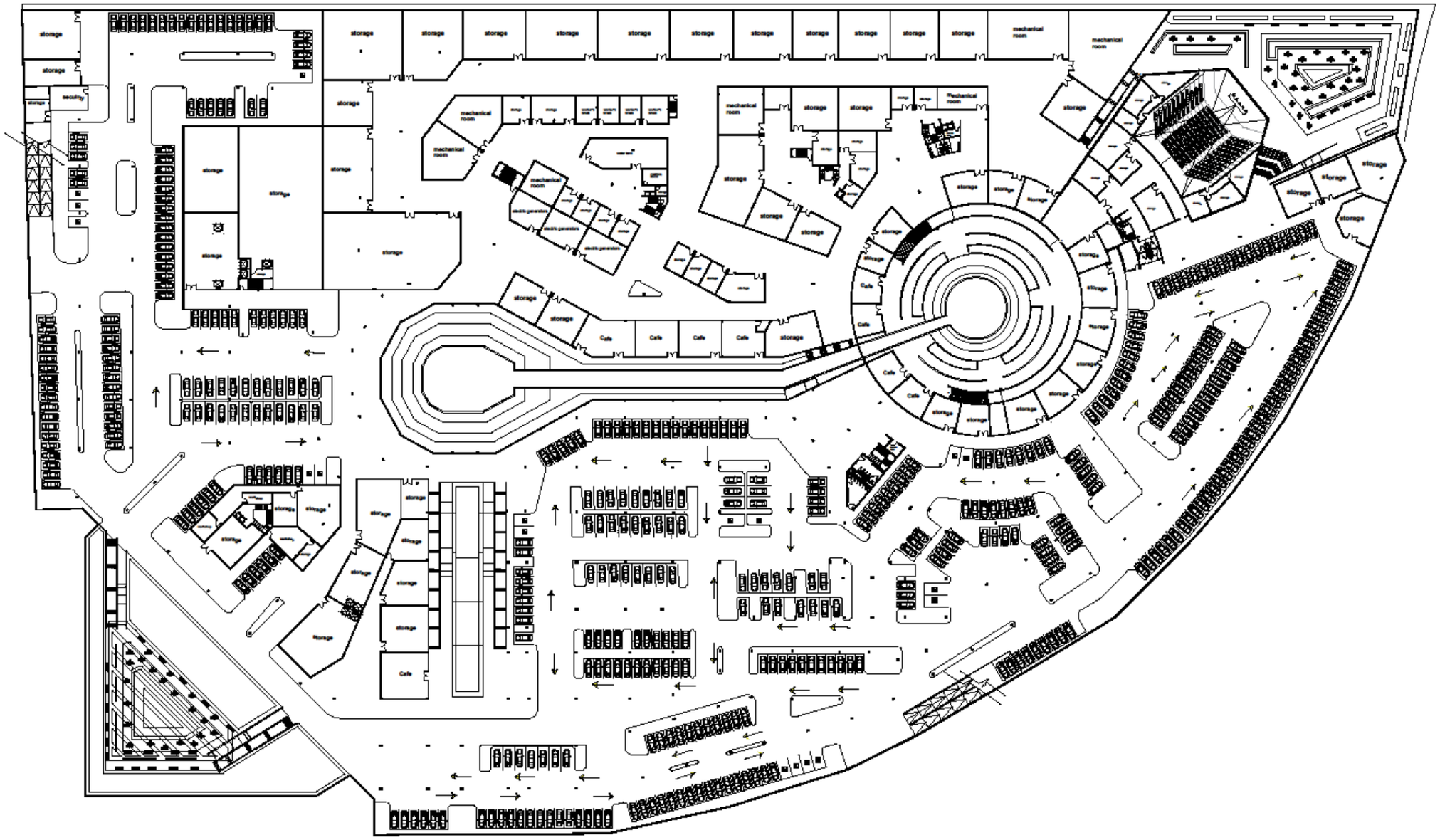
22- SECOND FLOOR PLAN



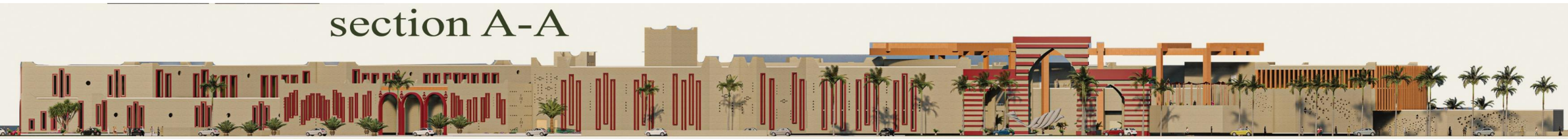
23- SECOND FLOOR PLAN



24-BASEMENT FLOOR PLAN



25-ELEVATIONS



section A-A

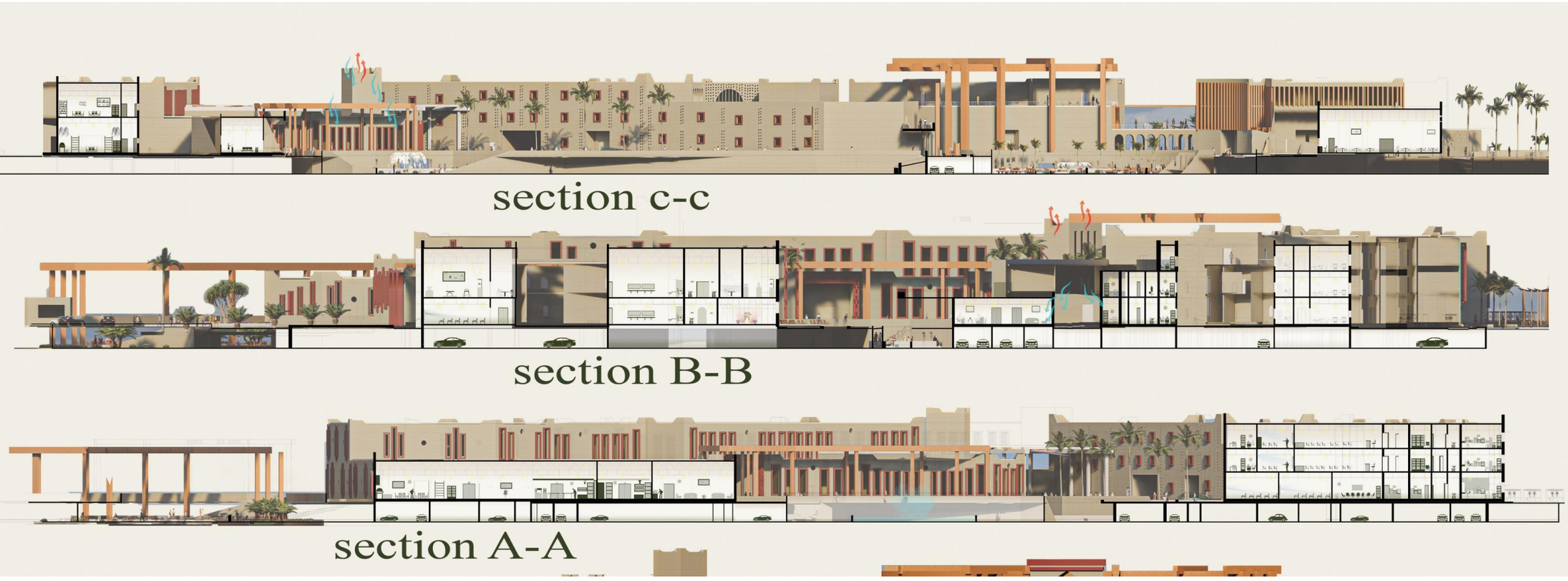
Southern elevation

Northern elevation

western elevation

Eastern elevation

26 -SECTIONS



section c-c

section B-B

section A-A

Southern elevation

Northern elevation

western elevation

Eastern elevation

27 –3D SECTIONS

WORKSHOPS

Flexible industrial spaces for crafting, assembling and hands-on learning.

COURTYARD

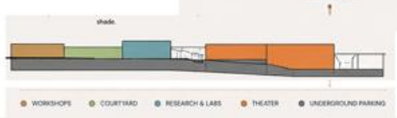
A lively open court for gathering, events and daily interactions.

RESEARCH & LABS

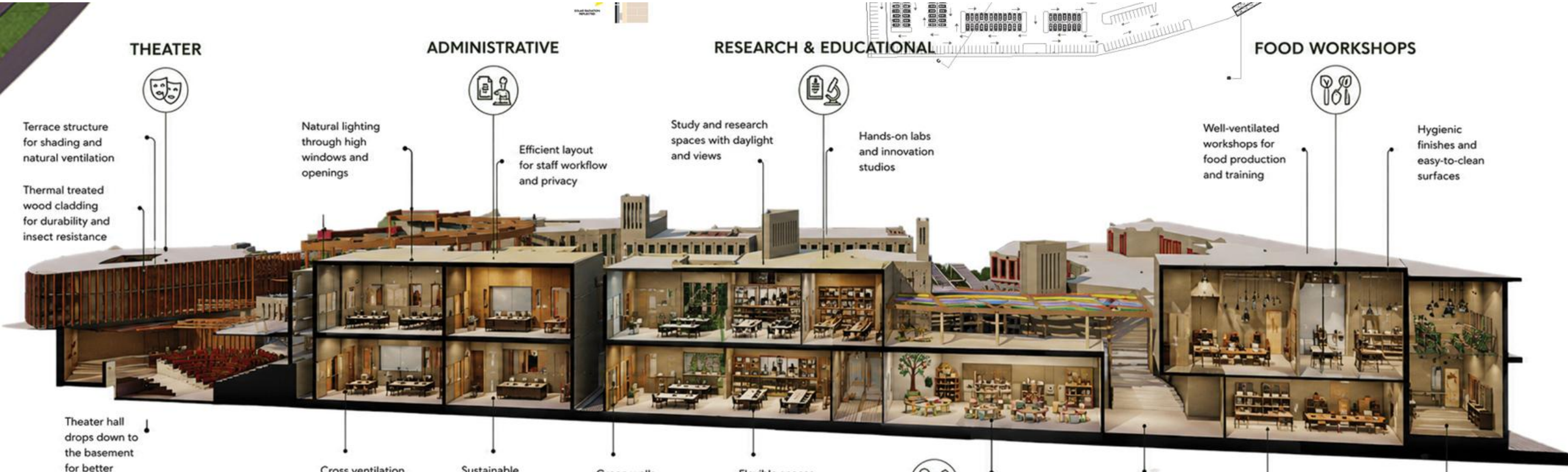
Advanced laboratories and study spaces fostering innovation and collaboration.

THEATER

Theater starts from the ground level and descends to the basement with a performance stage and front emergency exit.



3D SECTION

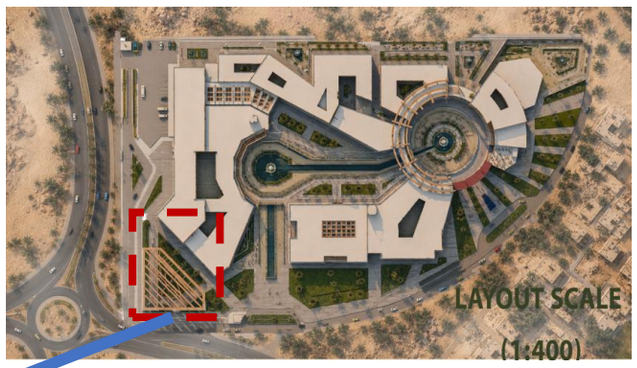


28 –MAIN SHOT

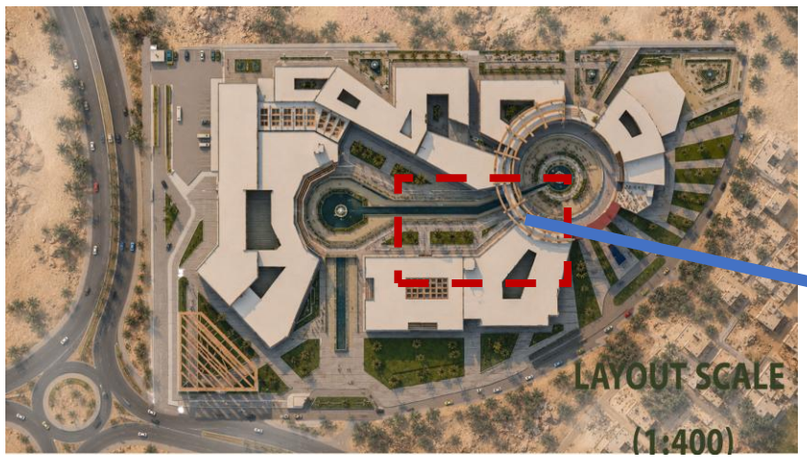
28 –3D SHOT

28 –INTERIOR PROJECT SHOTS

ENGLISH COURT SHOT
INFRONT OF WORKSHOPS



28 –INTERIOR PROJECT SHOTS



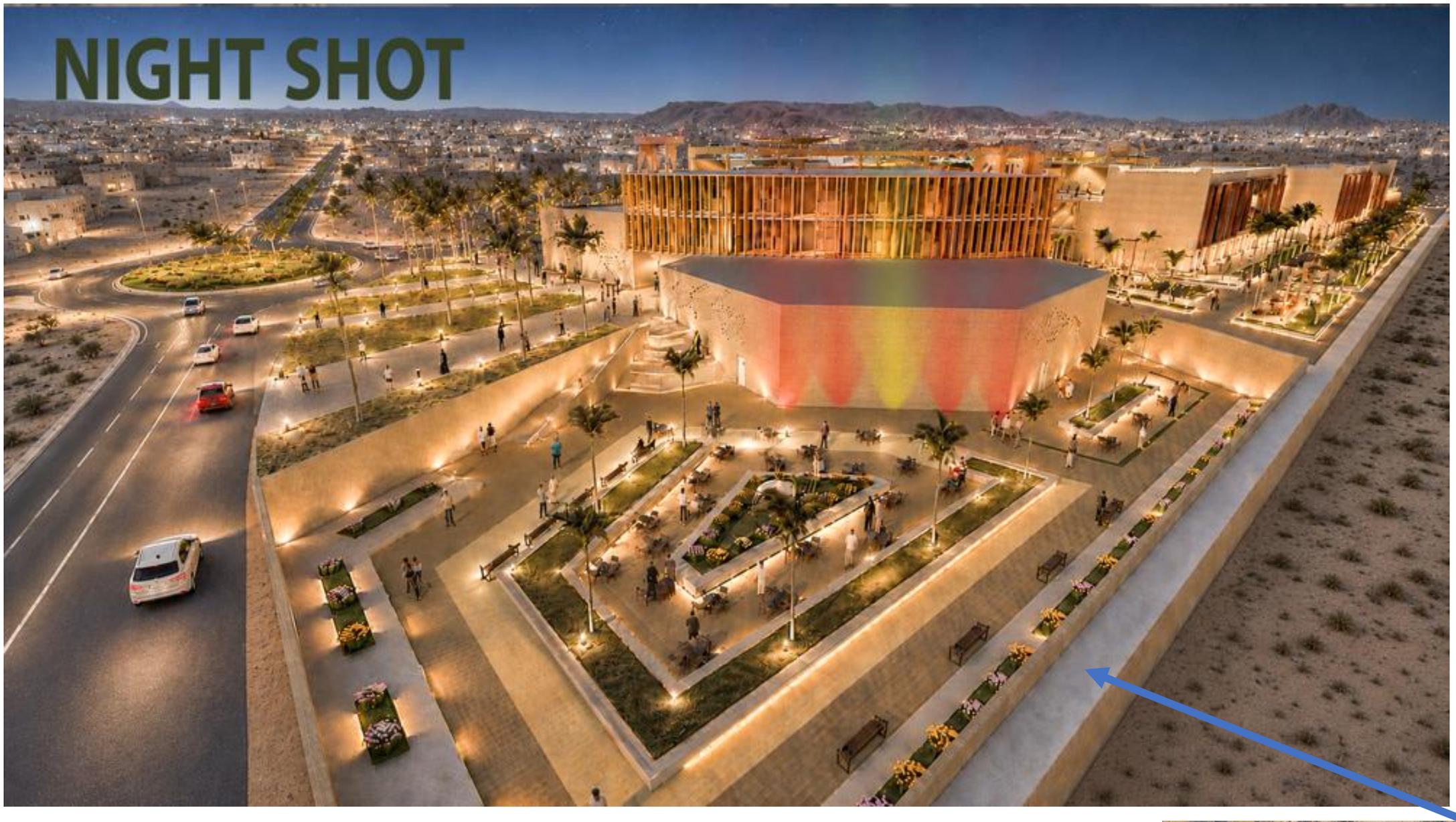
PLAZA SHOT

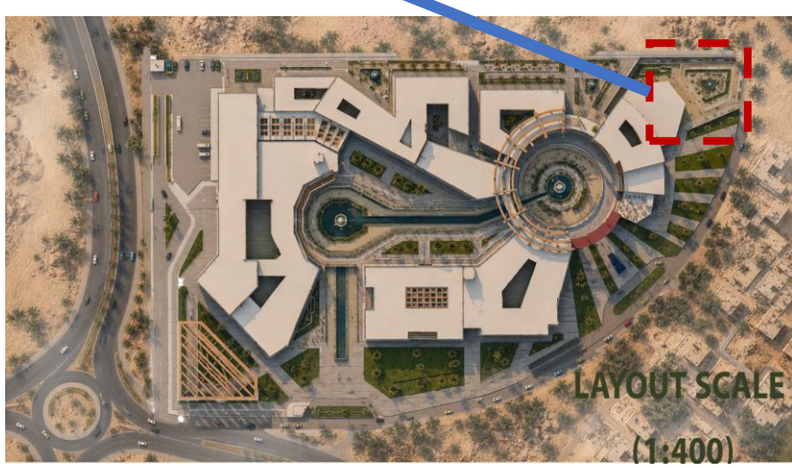
28 –INTERIOR PROJECT SHOTS

PLAZA SHOT

28 –INTERIOR PROJECT SHOTS

28 –INTERIOR PROJECT SHOTS





29 – POSTER PRESENTED TO COLLEGE