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# **International Design Competition for Incheon Geomdan Museum ·**

## **Library Cultural Complex**

### **DESIGN DESCRIPTION**

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# 1. INTRODUCTION

Incheon is a city located in the northwest region of South Korea. It is the third most populous city in South Korea, with a population of approximately 3 million people. Incheon is a major transportation hub, with the Incheon International Airport serving as one of the busiest airports in the world. The city is also home to the Port of Incheon, which is a major seaport in the region. Incheon is known for its cultural and historical sites, including the Incheon Chinatown, the Incheon Grand Park, and the Incheon Bridge. The city also has a thriving arts scene, with numerous museums, galleries, and performance venues. Incheon is home to 13 international organizations, including the Green Climate Fund (GFC). The GCF is a fund established within the framework of the United Nations Framework Convention on Climate Change as an operating entity of the Financial Mechanism to assist developing countries in adaptation and mitigation practices to counter climate change. The site is located in Geomdan new town

In order to meet the needs of the surrounding population within Incheon, a building complex that encompasses cultural and assembly facilities (museum, multi-purpose hall) and Educational research facilities(Library) is needed for residents, local and international visitors alike with a cultural space that'll revolutionize what people believe a Museum/Library complex can offer. In 2015, Incheon-si had over 4 million tourists and in 2019, the population of registered foreigners in the area grew to 72 thousand people. Our design calls for a balance between the city's modern urban aspect, the rich traditional history of the area, and the sustainable green landscape desired by people that will be timeless and add to the city's image as an international hotspot.

# 2. SITE ANALYSIS

## Site Overview

- Site location: Geomdan new town(stage 3), inside the Neighborhood park No. 14
- No. floors: 4 or less floors above ground
- Zoning: Green belt zone, Cultural park(to be changed), Residential development district
- Building Use: Cultural and assembly facilities(museum, multi-purpose hall), Educational research facilities(Library)
- Site area: Approximately 26,500m2(Entire park area: 93,663m2)

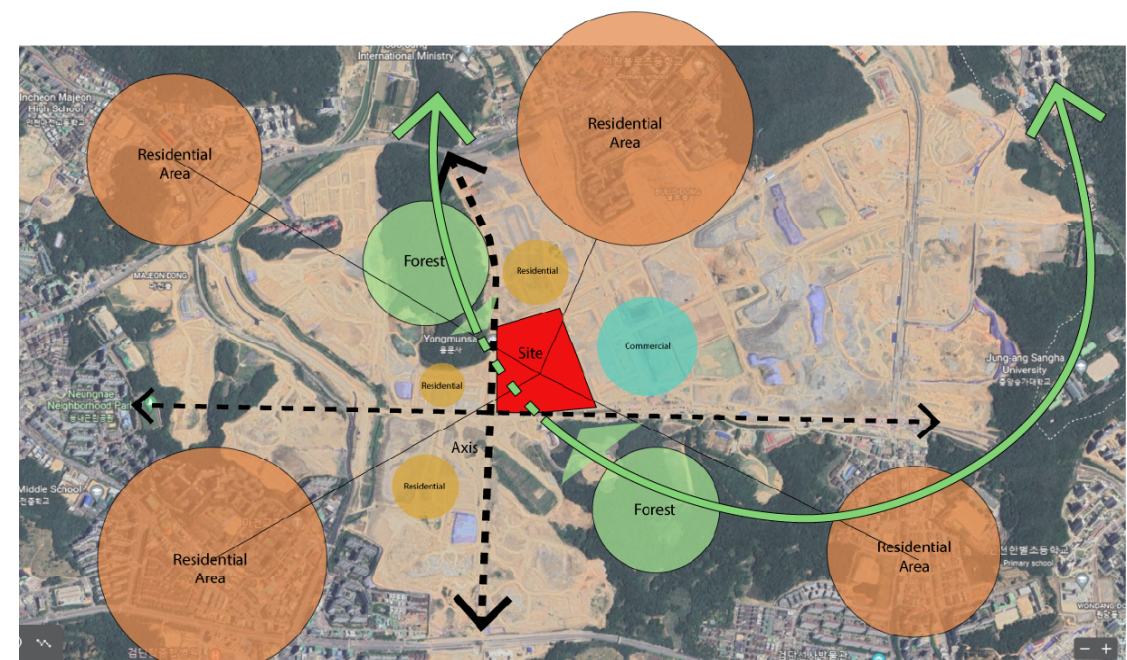


## Climate Analysis

- The temperature at the site fluctuates between colder months (early December to early March) and warmer months (late May to late September). Temperatures in 2018 ranged from -17.1°C to 35.9 °C with an average of 12.5 °C.
- The amount and chance of precipitation at the site fluctuate between wetter months (mid-June to Mid-September) and dryer months for the rest of the year. The total precipitation level in 2018 was 1,134.4 mm.
- The humidity levels at the site fluctuate between humid months (mid-June to Mid-September) and less humid months for the rest of the year. The humidity level in 2018 had an average of 65% with a minimum of 9%.
- The length of the day at the site varies over the course of the year. Days range from about 9 hours of daylight to over 14 hours of daylight.
- The wind speeds at the site fluctuate between the windy months (mid-October to Mid-May) and less windy months for the rest of the year. The wind speed in 2018 had an average of 3.1 m/s with a maximum of 12.2 m/s.
- The area does not experience significant snow, thunder, lightning, fog, or frost conditions.

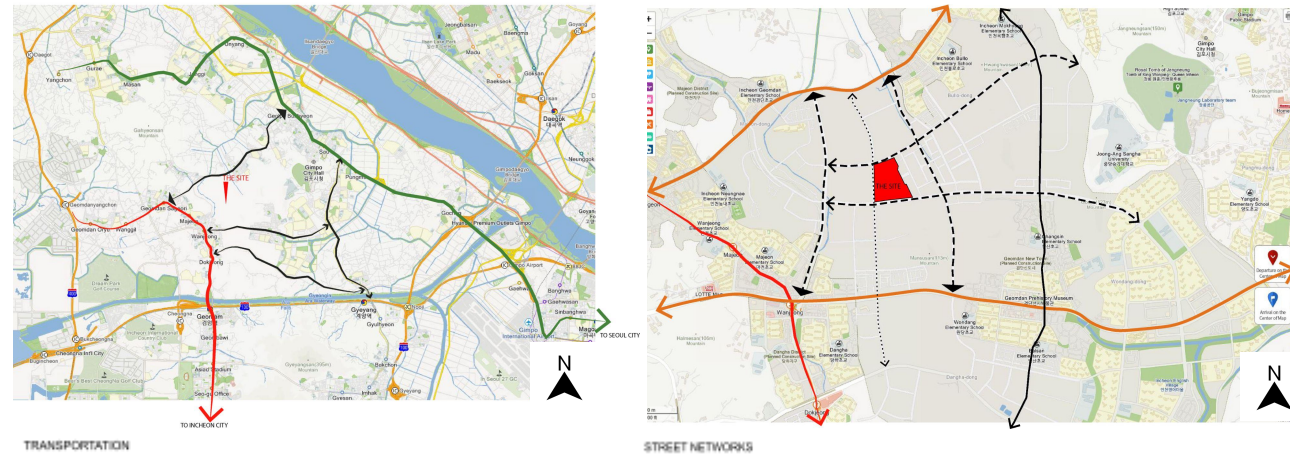
## Contextual Analysis

- The site is between two green mountains amidst a planned commercial and residential district by the government accompanied by an under-construction train line connected to the vast existing train network.
- It is Central to many institutional buildings, mainly schools and one nearby museum.



### Accessibility and Transportation

- The site is located near the one John train line Incheon subway line 2. this train line is in addition to the Incheon subway line one that is under construction directly west of the site. these train lines connect to the main Network that connects to the main cities in Korea.
- There are multiple bus routes that run through the main streets near the 1 John train station. these buses include the regular bus, blue bus, and red bus making busing an ideal method of transportation on the site.
- In terms of roads, the site is adjacent to
- Walking to the site is generally unfavorable, with its location and major roads as negative factors.



### 3. DESIGN CONCEPT

The inspiration and ideas behind our design come from the traditional Korean architectural concept of simplicity, humility, and harmony with nature and the use of connecting to nurture by TEN SYMBOLS OF LONGEVITY. These symbols come from a universal theme in the Joseon-period visual culture of Korea. these 10 symbols are Mountains, water, clouds, sun, Pine trees, turtles, deer, cranes, peaches, and herbs of eternal youth.

Mountains: symbolizes stability, strength, and longevity

Water: symbolizes life and the flow of time

Clouds: symbolize good fortune, longevity, and a long life

Sun: symbol light, warmth, and life

Pine trees: symbolize longevity, strength, and steadfastness

Turtles: symbolize stability, endurance, and longevity

Deer: symbolize long life and good luck

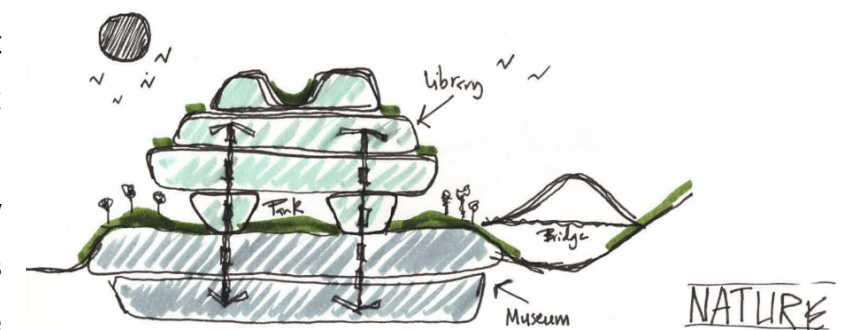
Cranes: symbolize eternal youth and longevity

Peaches: symbolize longevity, health, and immortality

Herbs: symbolize health, longevity, and the pursuit of a long and fulfilling life.



Our surrounding context of nature was taken into heavy consideration in our design process. We recognized that the mountains/parks within our site are connected physically and felt that our project existing there has created a discontinuity in the natural ring. With that in mind, we wanted to allow our building not just to be a public complex but, also a bridge that connects and allows the continuity of the neighboring parks. We also took the 10 elements into consideration for our design concept by allowing a visual and physical connection with the Natural Urban fabric on the first level and allowing it to be a place of connection, continuity, and harmony with nature. To unlock this continuity and harmony with nature we elevated our building by using what we call Coors as columns resting on top of a platform. this allows for open and accessible environmental space that opens many opportunities for our design. this allows us to incorporate the 10 symbols by creating a park for animals to be able to live in the space and to interact visually or physically with the people visiting the space. We also wanted to imitate the intention and the hierarchy of the painting by allowing the horizontal glass wall to be a reflection of the mountain Skyline inspired by the painting. With that, we also implemented the traditional architectural methods that Koreans have used for generations that promote an uninterrupted connection with mountains through having a low building by creating a horizontal glass floor to allow a visual connection to the nearby mountains.

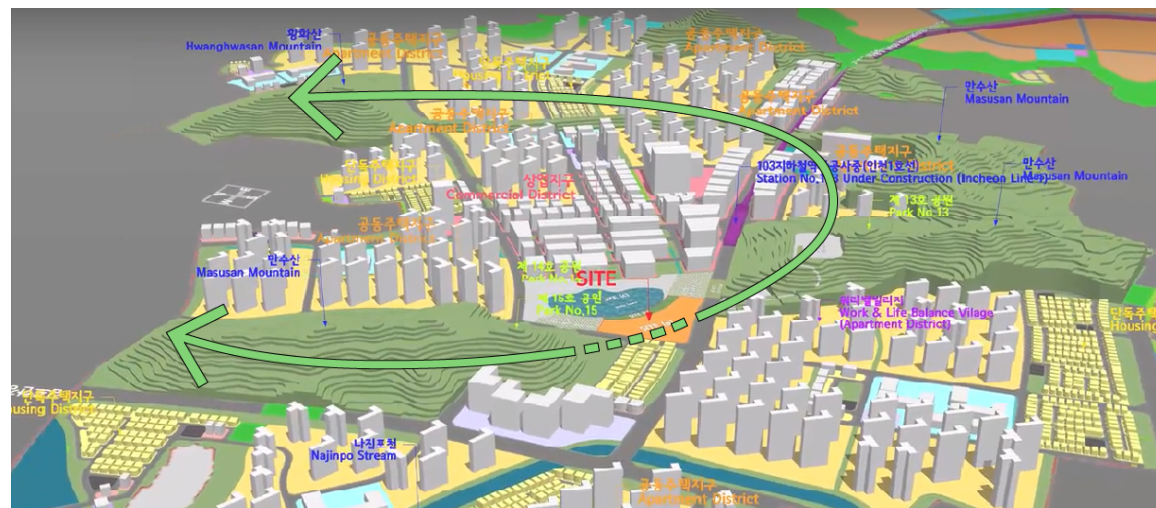


## 4. BUILDING DESIGN

We engaged in 7 characteristics that we reflected in our design:

### 1. Urban Context:

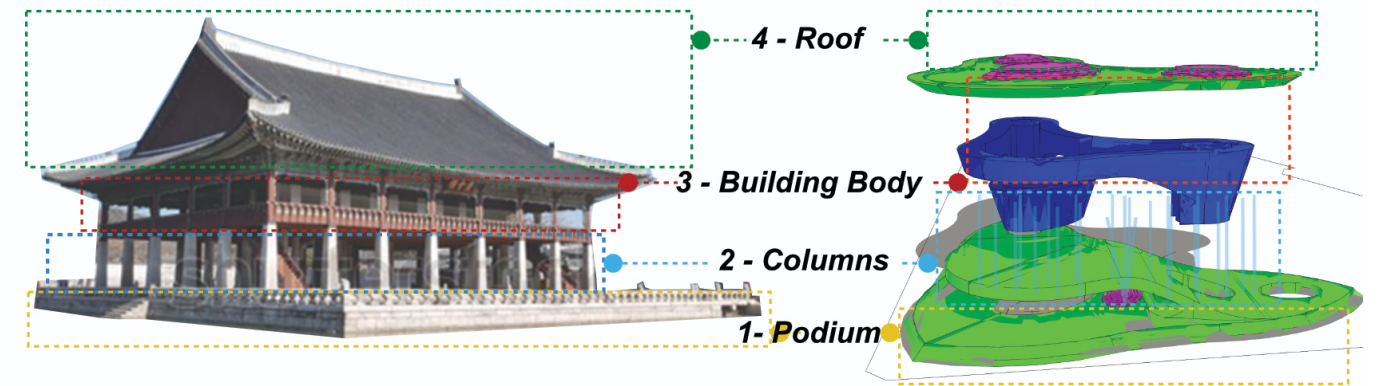
The first aspect we implemented in our design is the existing Urban fabric. the site sits in between open green parks that are connected through the natural physical infrastructure. in order to create Harmony in continuity with the existing natural infrastructure, we allowed that continuity to flow from the parks through our project.



### 2. Architectural Configuration:

The second aspect was in regard to the architectural configuration. From our research, we wanted to incorporate the FOUR COMPONENTS IN S. KOREAN TRADITIONAL BUILDINGS in our design; we also incorporated a vertical relationship between the functions: We put the Museum (at the podium) and the Library (at upper levels), and we have the shared functions in addition to the vertical circulations in between.

- Podium
- Columns
- Building Body
- Roof
- Vertical Circulation

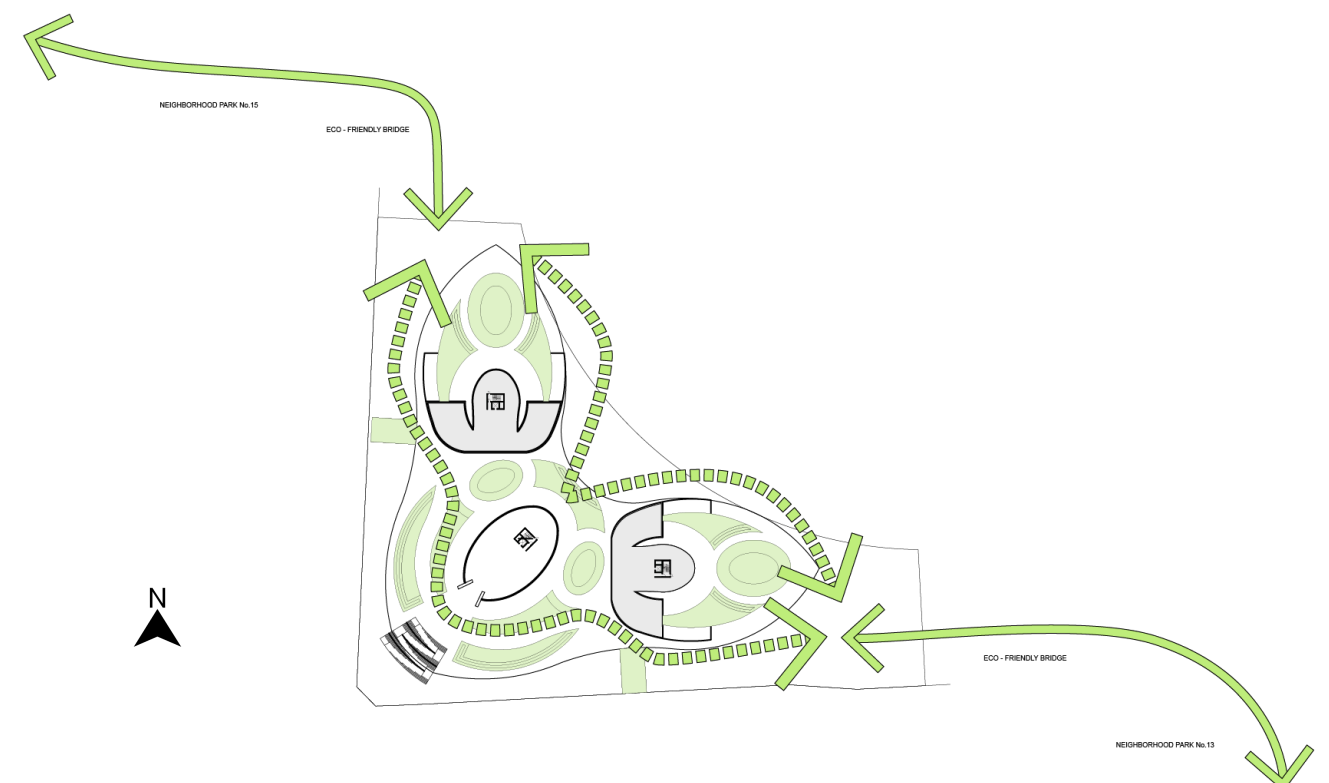


S Korea traditional building

4 layers in the complex design

### 3. Continuity Through Landscape & Architecture:

The third aspect was the overlap between landscape and architecture. Our design was inspired by the existing natural park environments within our site. The surrounding parks extend throughout the developing site and are connected through its natural infrastructure. With the site sitting in between the parks, this creates a disconnect. So we configured the ground floor to allow for this continuity by creating green open spaces that harmonize with nature.



#### 4. *Environmental & Sustainability Design:*

South Korea has passed and updated its laws regarding green building design and energy efficiency/usage in recent years. Specifically, certifications include Green Standard for Energy and Environmental Design (G-SEED), Building Energy Efficiency, and Zero Energy Building (ZEB). The goal is to make buildings more eco-friendly, increase the use of renewable energy, and increase overall buildings' efficiency. Our designs include several technologies and conscientious decisions to achieve high certification levels.

- Land Use and Transportation
  - Preserving the ecological value of parts of the existing land.
  - Avoiding excessive underground development and minimization of cutting.
  - Orientating the design-build to maximize sunlight.
- Energy and Environmental Pollution
  - The inclusion of monitoring systems to ensure efficient energy performance, including testing, coordination, evaluation, and commissioning of energy-efficient equipment, including lighting, HVAC, and plumbing systems.
  - The use of renewable energy and low-carbon energy source technologies for heating and cooling.
  - The use of efficient windows to limit heat exchange.
- Materials and Resources
  - Avoiding the use of Ozone-depleting and hazardous materials.
  - Utilization of low-carbon emitting, recycled, and other green materials through the use of the Environmental Declaration Products (EPD) library and other reliable sources.
  - The inclusion of collection bins and storage facilities for recycling.
- Water Management
  - The surrounding landscape around the building and the green roof will reduce rainwater loads.
  - The use of storage tanks for rainwater reuse.

- The use of water-saving devices such as low-flow toilets and leak-proof plumbing with monitoring systems to ensure efficiency, with water monitoring systems to ensure effectiveness.
- Construction/Operation & Maintenance (O&M)
  - The use of an Environmental Management Plan during construction to ensure compliance with regulations as well as best management practices to limit dust, noise, pollution, etc.
  - Providing proper user manuals/guidelines for managers/operators to ensure effective operations and adequate maintenance.
  - Providing G-SEED information for owners.
- Ecology
  - Our design calls for the linking of the buffer zone with the library/Museum's landscape with minimal disturbances in the area.
  - The landscape area shall be expansive, with vegetation throughout the area.
  - The dedication of library and museum spaces as an ecological learning center.
  - The reuse of topsoil for landscaping.
- Indoor Environment
  - Avoiding the use of air pollution-emitting paints and adhesives.
  - The use of natural ventilation.
  - The installation of individual thermal controls and monitoring systems.
  - The use of materials to limit noise from outside and from within different sections of the building.
  - The installation of a sunshade to limit direct sunlight and glare at certain times.
  - The addition of a lounge-style common area so patrons can rest.

In order to meet the vision of creating a sustainable building that will both be green and energy-efficient that will meet high-level ZEB, G-SEED, and Building Energy Efficiency Class certifications, we incorporated several technologies in the design:

- Geothermal System

By taking advantage of the naturally occurring temperature difference between the above-ground air and the subsurface soil, a geothermal system can move heat in a building to support dual heating and cooling. A heat pump re-circulates heat-conveying fluid through a network of interconnected pipes buried underneath the ground to transfer heat from one area to another. Installation of the pipes can be placed in horizontal

trenches just below the ground surface and in vertical boreholes. During colder weather, fluid in the pipes absorbs heat from the earth and carries it through into the building, and during warmer periods, the system is reversed by pulling heat from the building and dispersing it in the ground to cool the building. Paired with a desuperheater, water can be heated by transferring excess heat from the pump's compressor to the building's hot water tank.

Ground source heat pumps require a small amount of electricity to drive the heating/cooling process. As acknowledged by the United States Environmental Protection Agency, for every unit of electricity used in operating the system, the heat the pumps can deliver as much as five times the energy from the ground, resulting in a net energy benefit and reduced dependence on local energy utilities. Additional benefits include simple operation and maintenance upkeep, cost savings, and the avoidance of exposed outdoor equipment.

- Photovoltaic Panels

These panels would convert sunlight directly into electricity. By placing these panels in optimal positions to maximize solar energy intake, they can generate operations throughout the library, including a heat pump. This provides a source of clean energy for the building and makes it more energy independent as well as lower energy costs.

- Green Roof

The roof will be covered with vegetation to enable rainfall infiltration and evapotranspiration of stored water. Benefits include reducing the effects of atmospheric pollution, reducing energy costs, decreasing the "heat island" effect, and creating an appealing environment for library patrons to appreciate.

- Rain Barrels and Cisterns (Rainwater Storage System)

Rain barrels are installed at roof downspouts to capture stormwater runoff from rooftops. Cisterns store it for later use for non-potable applications such as toilet flushing and landscape irrigation, including the Green Roof as mentioned above. The systems are low-cost, allowing the library to supplement its water supply with a sustainable source.

- Radiant Floor Thermal Heating System

Through a system of tubes under the floor, heated fluids flow through, and the heat is conducted through the floor to warm the air in the space above. This system is ideal for larger volume spaces since it warms the area more efficiently than traditional HVAC systems

- Sump Pumps

With Climate Change affecting weather patterns and rising sea levels, coastal areas are more vulnerable to flooding. With that concern in mind, our design includes sump pumps to expel water from the underground structure to prevent moisture and structural damage.

- Glass Fiber Reinforced Concrete (GFRC) Perforated Facade Layer

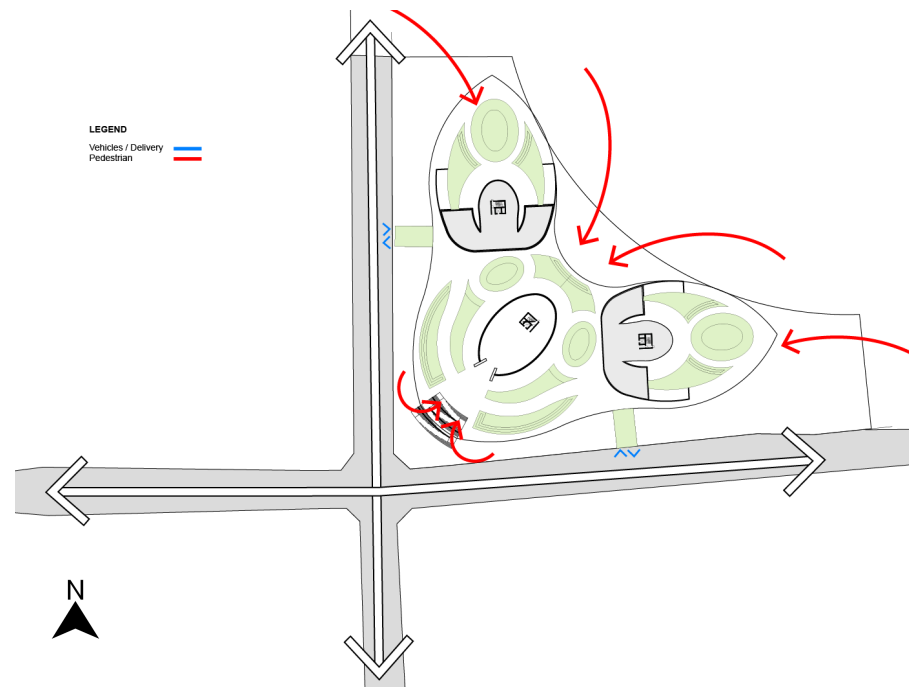
The material is fire, corrosion, and UV-resistant and helps reduce noise levels from outside.

## 5. *Circulation:*

There will be accessibility to the building for Public & Private circulations, such as front of house (FOH), back of house (BOH) and visitors

There will be many access points to the landscape and the building through the bridges, park, and main entrance. The BOH staff will have a drive-through and loading dock access from the street ramps into the buildings. FOH staff and visitors visiting the space with a vehicle will also have access points through these ramps as they share the same access points.

Visitors that come through other means of transportation, such as walking or cycling, can access these spaces through the main entrance, using Bridges and Landscape to enter the podium space. Pedestrians and bicyclists will have many openings through the main entrance by the stairs, and side entrances by the green spaces, and back entrance through the green buffer zone.



The Site Plan

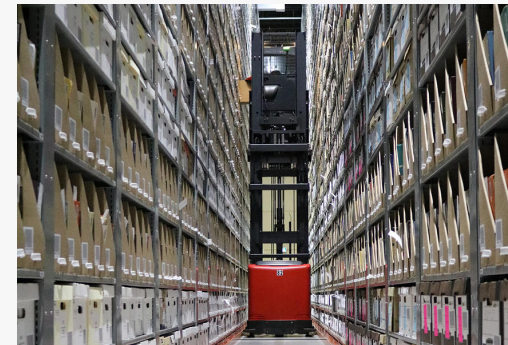
6. *Landscape Design:*

For the design of the landscape. We wanted to make the space both functional and visually pleasing. To do so, we included the following:

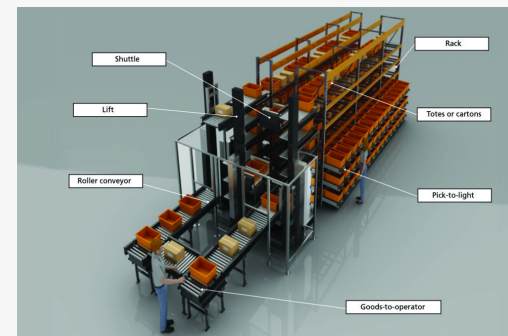
- Cultural/Educational Plaza
- Water Surface
- Amphitheater
- Green Roof

7. *Storage*

- BOH High-Density Mobile Shelving: This type of storage system uses mobile carriages to store shelving units, which can be moved along tracks to create more space.



- Automated Storage and Retrieval Systems (ASRS): These systems use robotics and computer control to store and retrieve items from a storage facility.



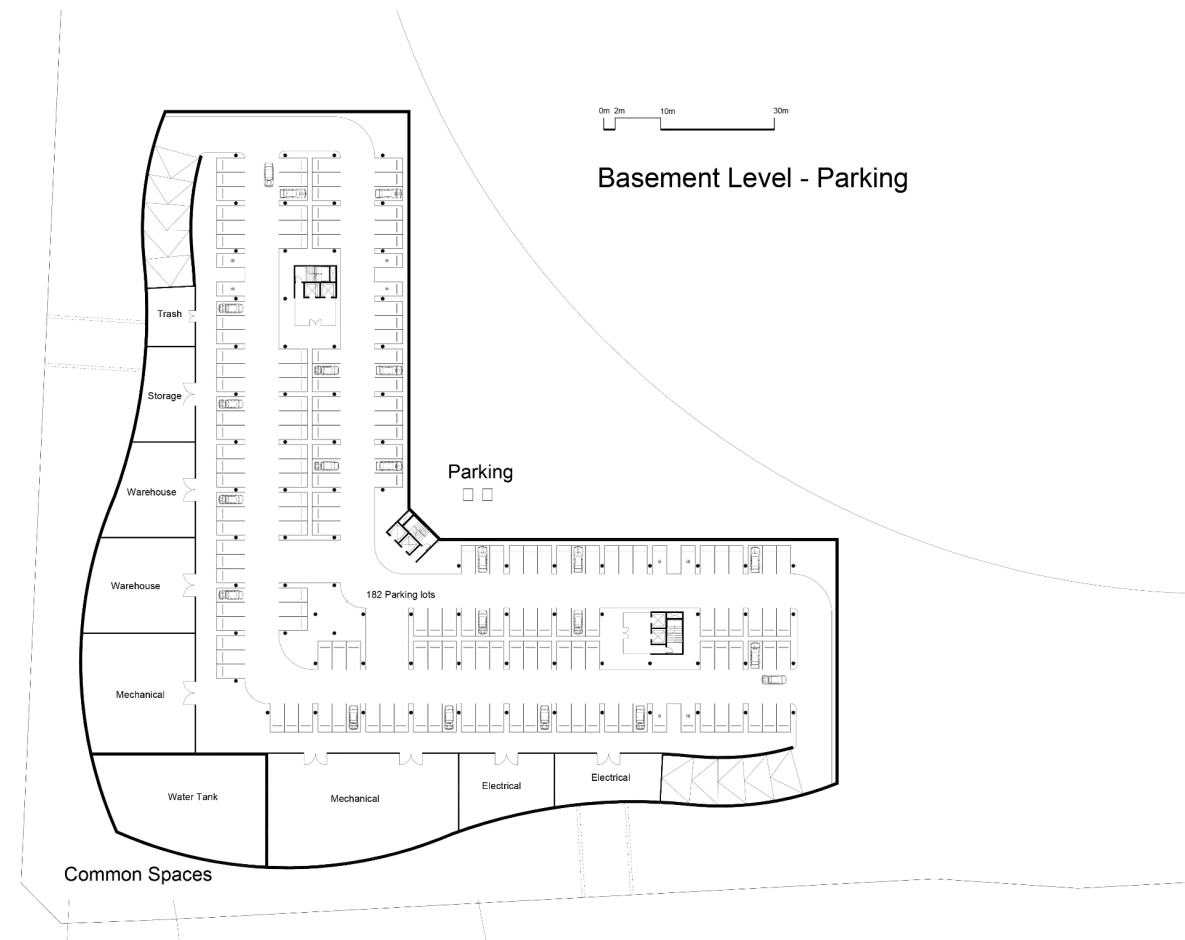
- Self-Service Lockers: These lockers can be used to store and retrieve items on a

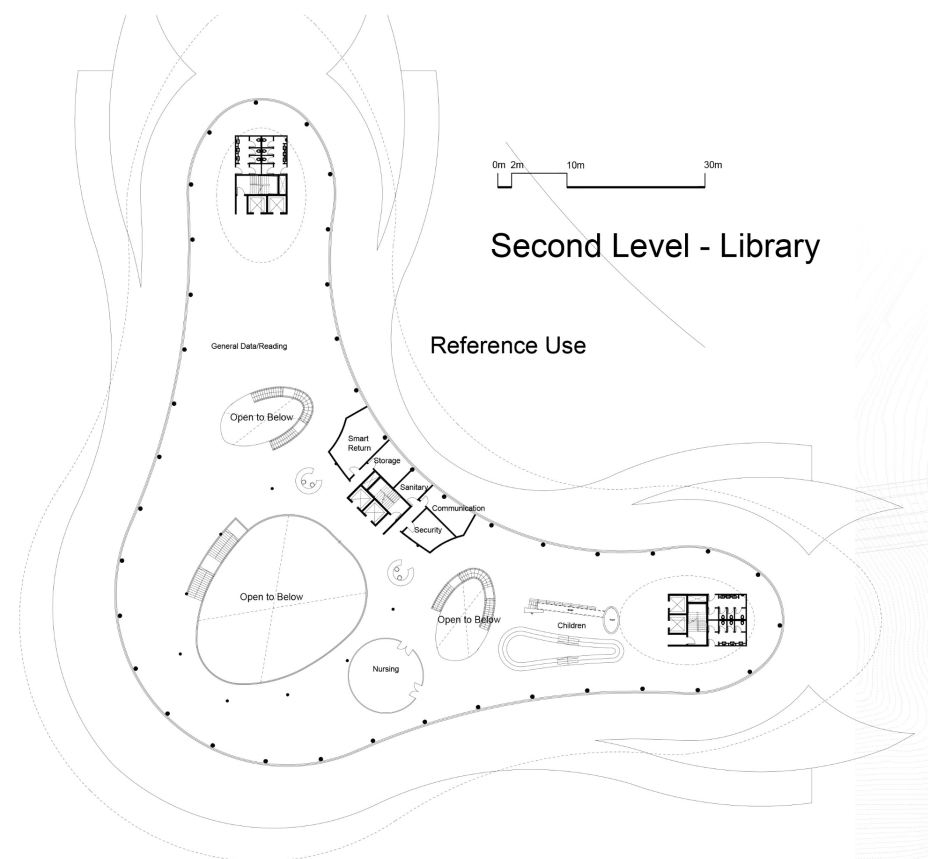
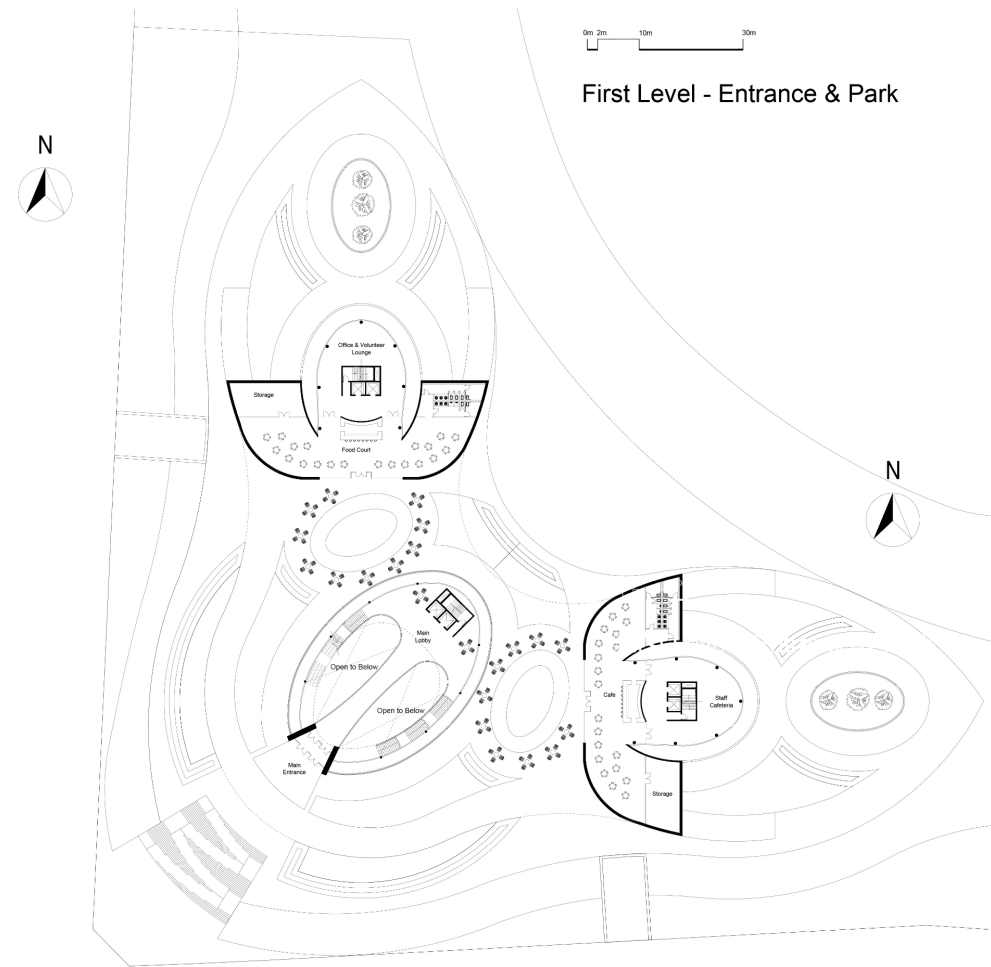
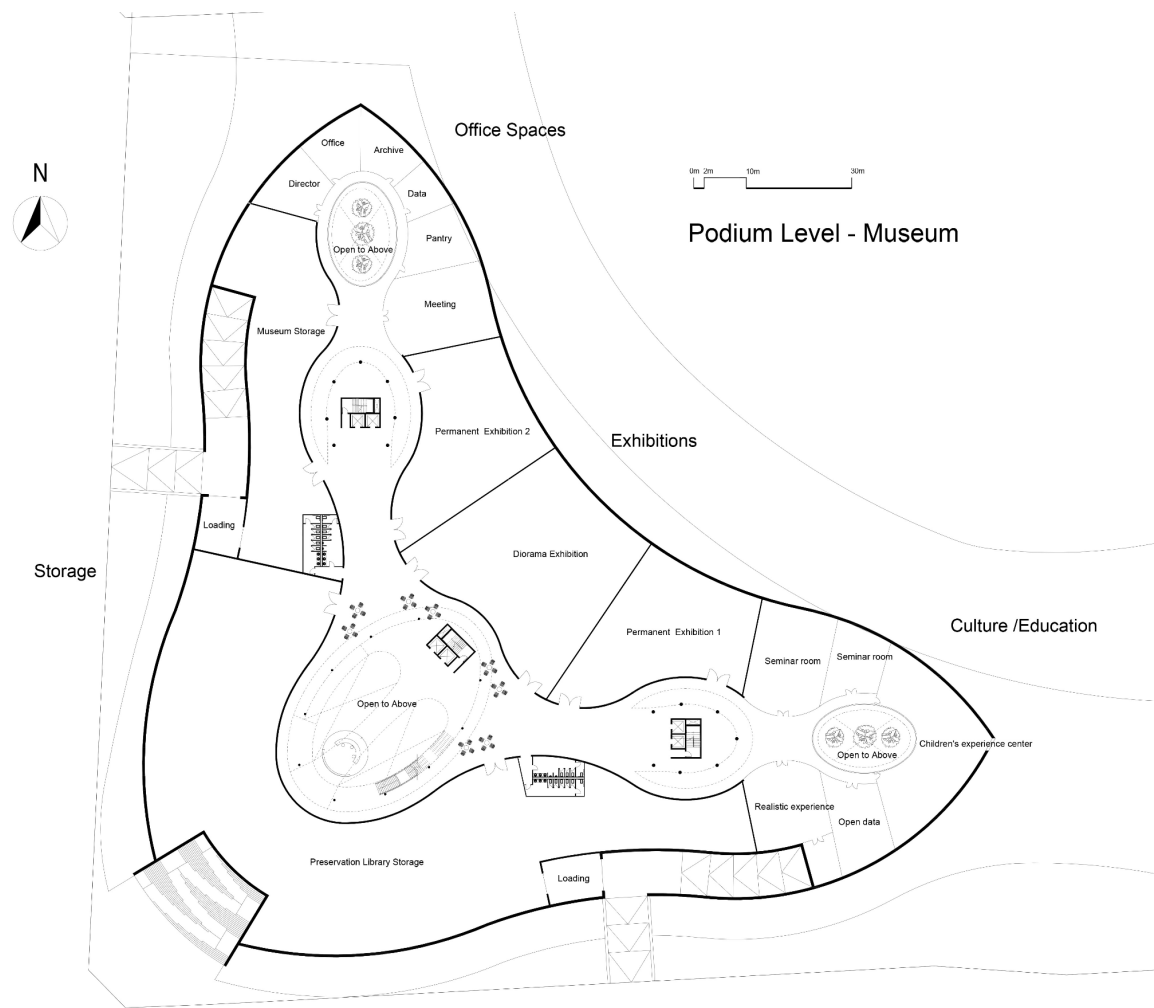


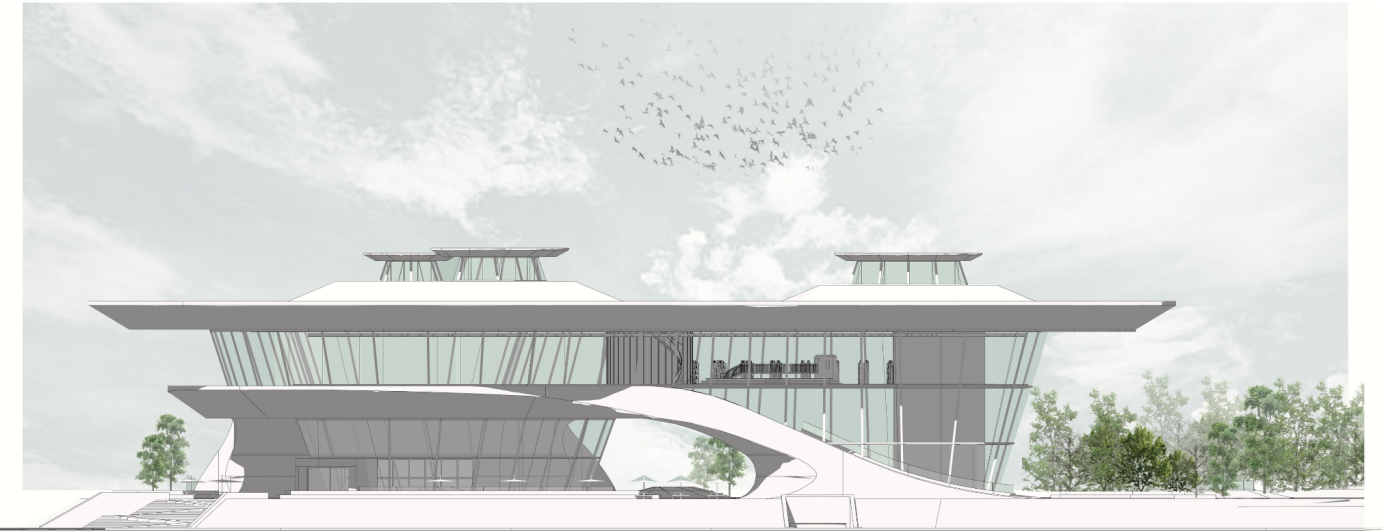
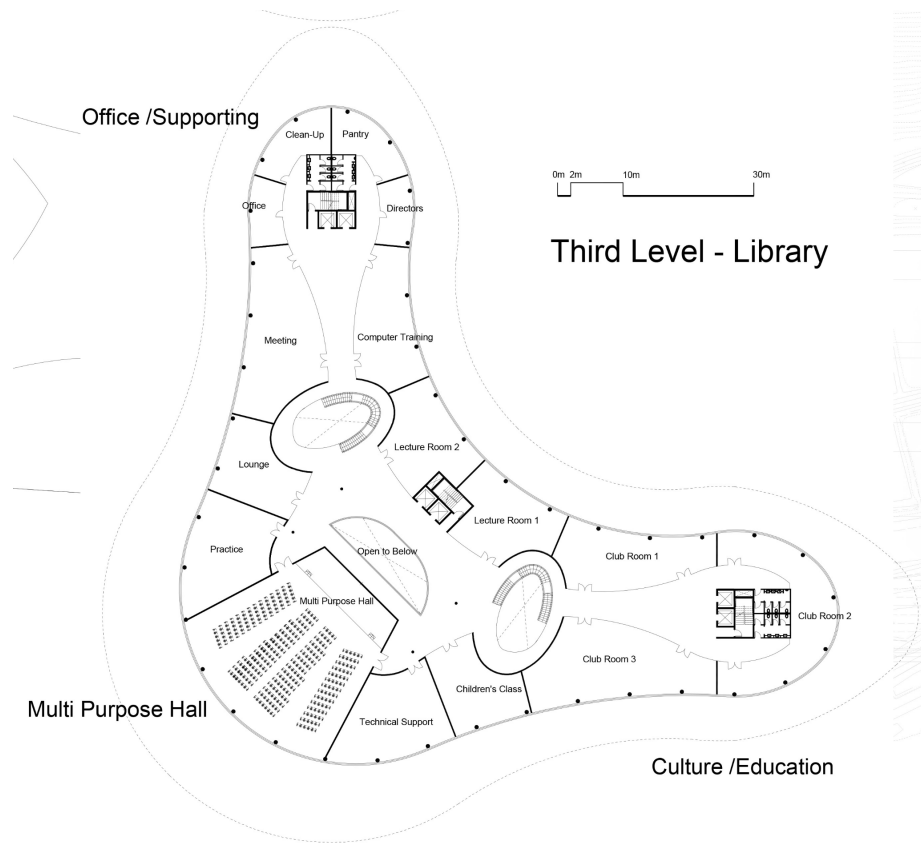
self-service basis, using a barcode system or other automated system.



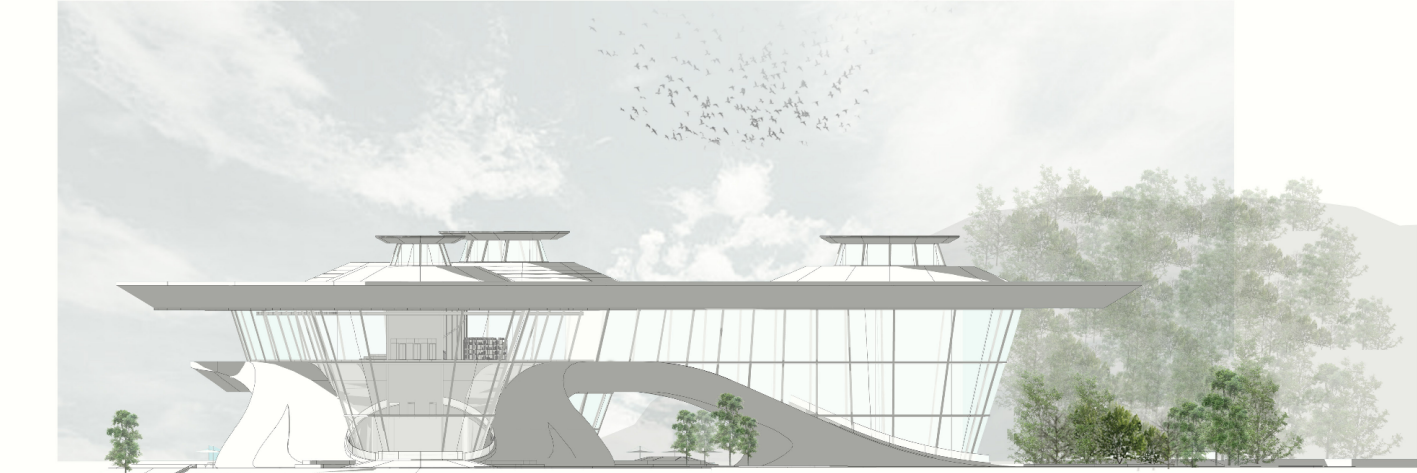
## 5. DRAWINGS & RENDERINGS



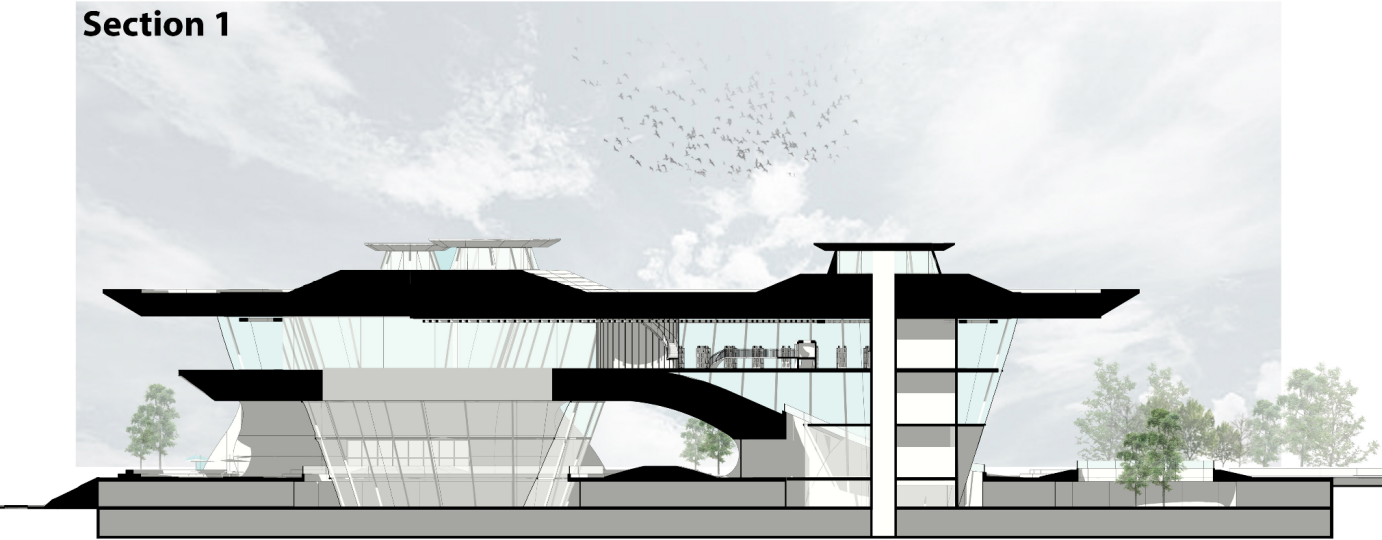




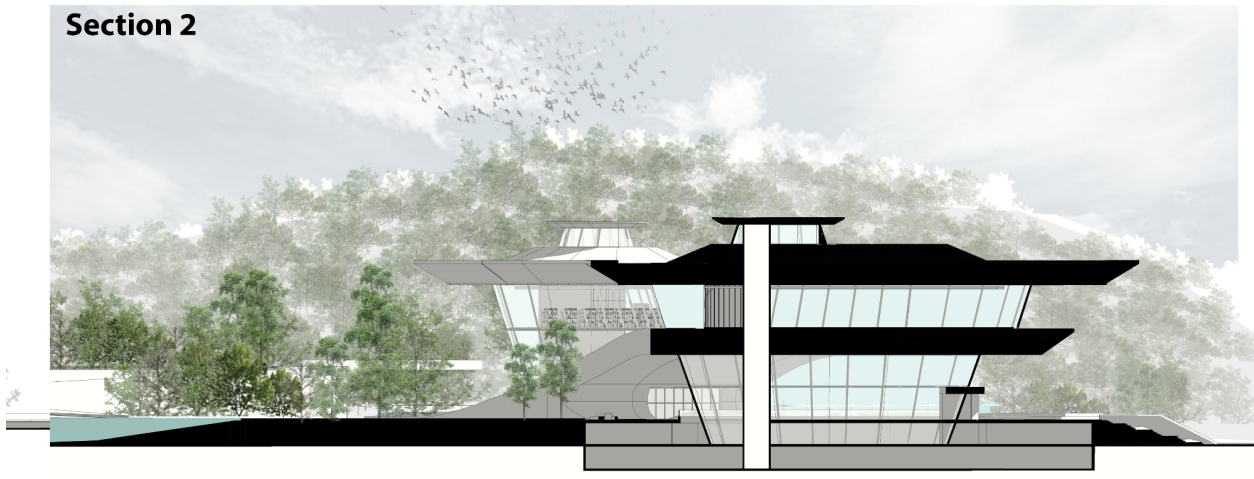
South Elevation



West Elevation



Section 2



INTERIOR AND EXTERIOR SHOTS



