

## Table of Contents

① DESIGN OVERVIEW	2
② ANALYSIS ON THE CURRENT STATUS OF THE SITE	2
③ BASIC DESIGN DIRECTION (DESIGN INTENT AND IDEA)	3
④ DETAILED USE FOR EACH FLOOR AND THE AREA TABLE FOR EACH FACILITY	3
⑤ REVIEW OF THE KEY DESIGN CONCEPTS AND SURROUNDING REQUIREMENTS	4
⑥ SITE PLAN, FLOOR, ELEVATION, CROSS-SECTIONAL DRAWINGS	6
⑦ OUTSIDE SPACE PLAN	11
⑧ INTERIOR DESIGN CONCEPT	11
⑨ SPECIALIZATION SPACE AND PLAN OF THE LIBRARY	11
⑩ PARKING AND TRAFFIC LINES PLANNING	11
⑪ STRUCTURAL SYSTEM REVIEW AND PLAN	11
⑫ ENVIRONMENTAL EQUIPMENT SPECIALIZATION PLAN	12
⑬ CONSTRUCTION METHOD PLAN AND SUGGESTIONS	14

## ① DESIGN OVERVIEW

Incheon-si is one of the most modern and eco-friendly cities in the world. Incheon is turning itself into the business hub of Northeast Asia with its highly ranked Incheon International Airport to its port and the international business complex, and 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 region was also the first in S. Korea to be declared a Free Economic Zone, specially designated areas created to improve the business and living environment for foreign-invested firms. The site is located in Songdo International City, within Incheon, known for its emerging bio sector, education facilities, and tourist destination.

In order to meet the needs of the surrounding population within Incheon-si, a public library is needed for residents and international visitors alike with a cultural space that'll revolutionize what people believe a library can offer. In 2015, the 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 an international hotspot.

## ② ANALYSIS ON THE CURRENT STATUS OF THE SITE

### Site Overview

- Site Address: 115-2, Songdo-dong, Yeonsu-gu, Incheon (in Songdo International City and within the Incheon Free Economic Zone), S.Korea
- Zoning District: 2nd General Residential District, 1st District Unit Plan Area (in an International Business Complex), and an Intensive Landscape Management Zone
- The site area is 9,427.4 m<sup>2</sup>.

### Climate

- 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 fluctuates 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 or thunder and lightning as well as fog and frost conditions.

### Urban Environment

- The site is directly adjacent with a low-hilled buffer green and a planned public government office building on the eastern side and the Incheon Yesong Kindergarten on the western side.
- Major facilities around the site include Incheon Yesong Middle School, Yesong High School, Incheon Academy of Science and Arts, Incheon National University, high-rise apartment building complex, sports facility, and knowledge-based manufacturing plants.
- In terms of roads, the site is adjacent to the Convensia Main St. # 320 to the north (average road width 26m) and Academy St. (average road width 33m) to the south, with vehicle access blocked from entering the site via Academy street.

- There are nine different bus routes around the site for public transportation, including the regular bus, blue bus, and red bus. Accessibility via bussing is ideal with the bus stop within 200~400 m of the site. Travel by rail is less suitable since the site is 840 m away.
- Walking to the site is generally unfavorable, with its location and major roads as negative factors.

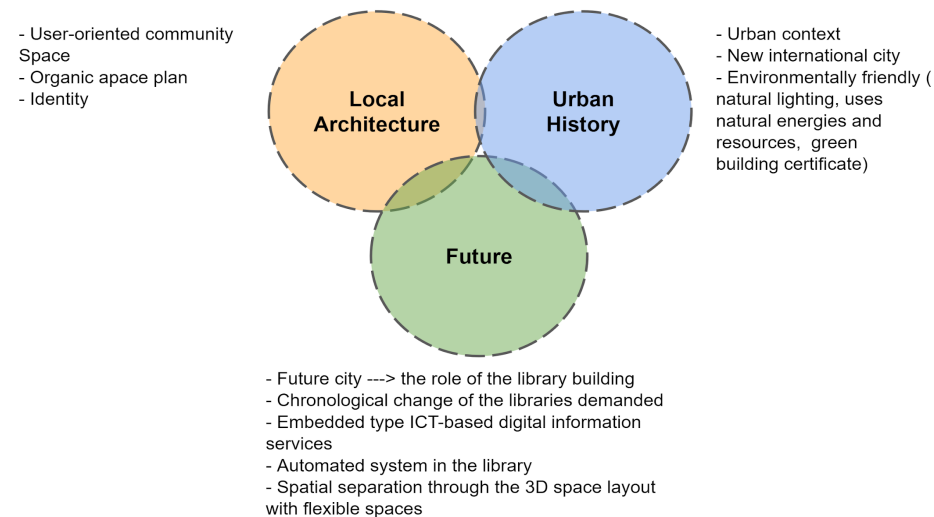
**Geological Data**

- The entire site is situated on reclaimed land, so the risk of environmental concerns regarding soil contamination is minimal.
- Based on geological survey data provided, it is determined that site conditions will not significantly impede construction.

**③ BASIC DESIGN DIRECTION (DESIGN INTENT AND IDEA)**

We used the guidelines and incorporated the feedback from the survey results. We also researched South Korean architecture, the future of libraries, demographic information, and sustainable technologies and materials. With all of that information and data, we determined that our design's main features needed to be shaped by the local architecture, the future of libraries, and the city's urban history. The design needed to have a clear identity and needed to be a people-oriented, multi-faceted community space. It also needed to be designed for the future with smart technology and become a sustainable and eco-friendly building with efficient and automated systems.

**Design Guidelines:**



**④ DETAILED USE FOR EACH FLOOR AND THE AREA TABLE FOR EACH FACILITY**

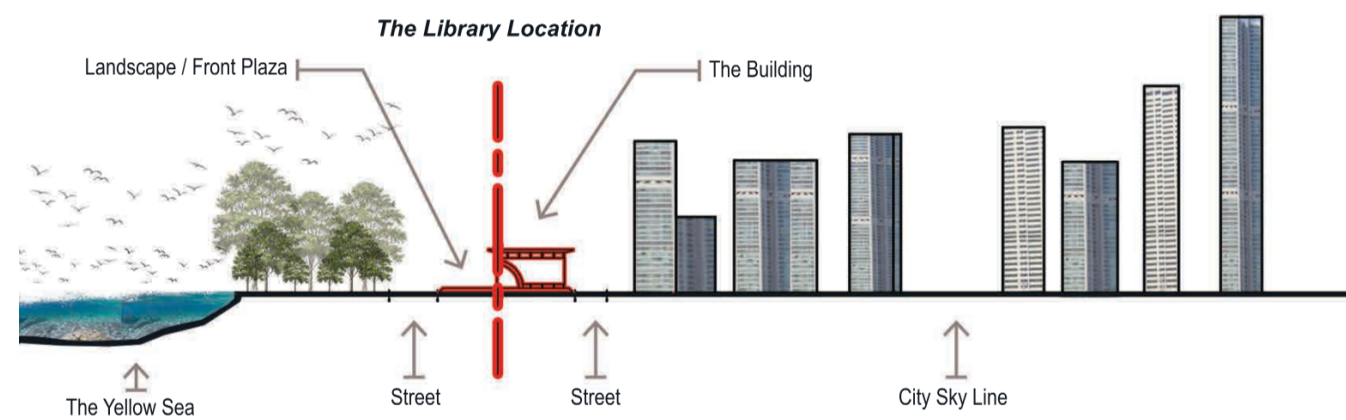
Classification	Space	Plan Area	
Material	General Materials	General Materials	1,400 m <sup>2</sup>
		Series	
		Valuable / Local Materials	
		Elderly / Disabled Materials	
	Children Materials	Multimedia	365 m <sup>2</sup>
		Sub-total	1,765 m <sup>2</sup>
		Children Materials	700 m <sup>2</sup>
		Infant Materials	118 m <sup>2</sup>
		Communication Room	
	Cultural Class	47 m <sup>2</sup>	
	Sub-total	865 m <sup>2</sup>	
Common Space		690 m <sup>2</sup>	
Sum 1		3,320 m <sup>2</sup>	
Culture & Education	Cultural & Educational Classroom		143 m <sup>2</sup>
	Club Room		68 m <sup>2</sup>
	Multipurpose Room		364 m <sup>2</sup>
	Exhibition Space		102 m <sup>2</sup>
	Learning Space		182 m <sup>2</sup>
	Common Space		695 m <sup>2</sup>
	Sum 2		1,554 m <sup>2</sup>
Work & Management	Main information desk		24 m <sup>2</sup>
	Office	Chief executive room	29 m <sup>2</sup>
		Office	188 m <sup>2</sup>
		Archive	34 m <sup>2</sup>
	Conference room		49 m <sup>2</sup>
	Office pantry/ Lounge		74 m <sup>2</sup>
	Volunteer room		45 m <sup>2</sup>
	Server/Communications		68 m <sup>2</sup>
	Incoming materials & arrangement		78 m <sup>2</sup>
	Preservation Room		340 m <sup>2</sup>
	Common Space		700 m <sup>2</sup>
	Sum 3		1,629 m <sup>2</sup>
Others	Machine, Electricity, Warehouse, etc.		985 m <sup>2</sup>
	Underground Parking Lot		1,454 m <sup>2</sup>
	Sum 4		2,440 m <sup>2</sup>
Total (Sum1+ Sum2+ Sum3+ Sum4)		8,943 m <sup>2</sup>	

## ⑤ REVIEW OF THE KEY DESIGN CONCEPTS AND SURROUNDING REQUIREMENTS

We focused on 6 main aspects and reflected that in our design:

### 1- Urban Context:

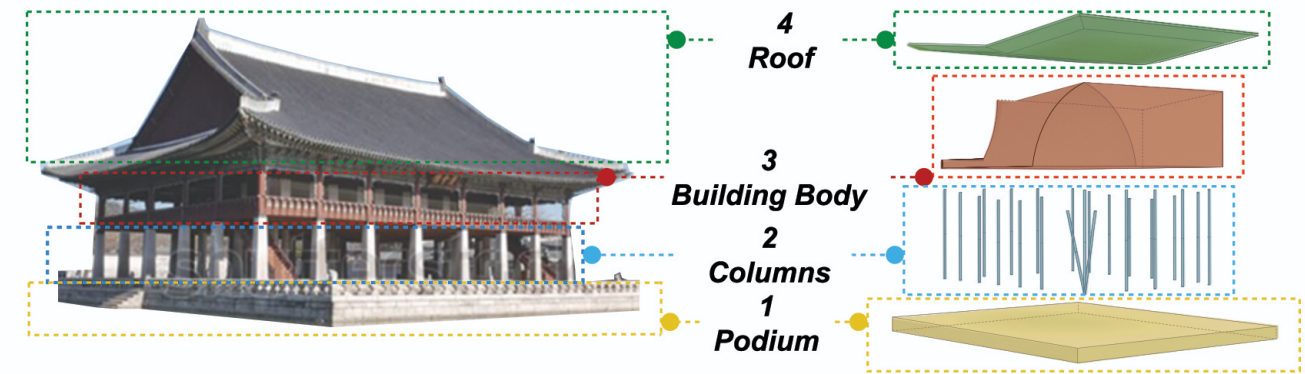
The first aspect of our design is the urban context. The site sits where the transition between open green areas meets the city skyline's high-rise buildings (meet between the horizontal and vertical).



### 2- Architectural Configuration:

The second aspect was in regards to the architectural configuration. From our research, we wanted to incorporate the four components in S. Korea traditional buildings in our design;

- Podium
- Columns
- Building Body
- Roof

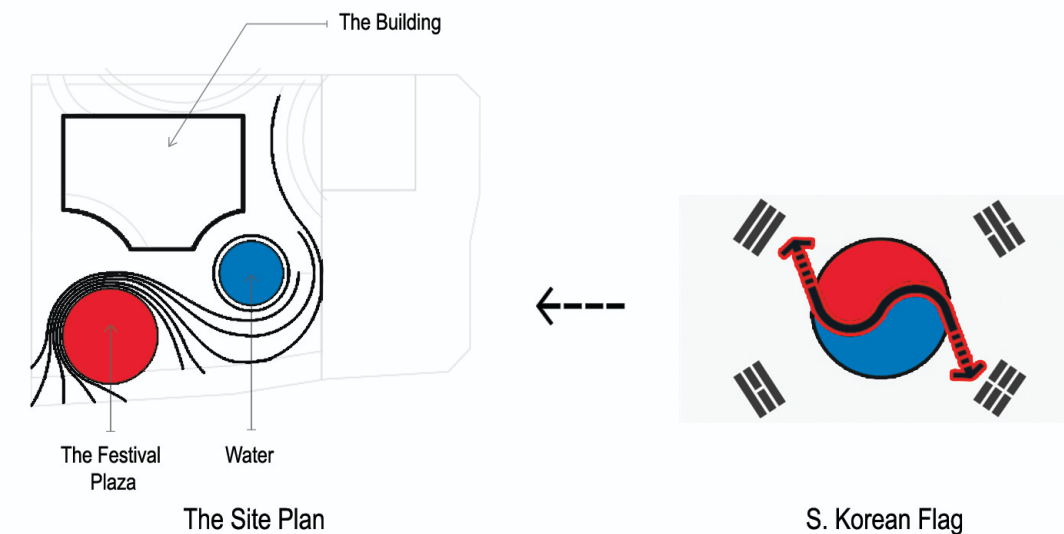


S Korea traditional building

4 layers in the library design

### 3- Overlap Between Landscape & Architecture:

The third aspect was the overlap between landscape and architecture. Our design was inspired by the flag's organic and main lines and reflected it from the 2D to 3D design of the building and landscape. The open space connects with the buffer green zone and creates a free-flowing space from the street to the main building entrance.

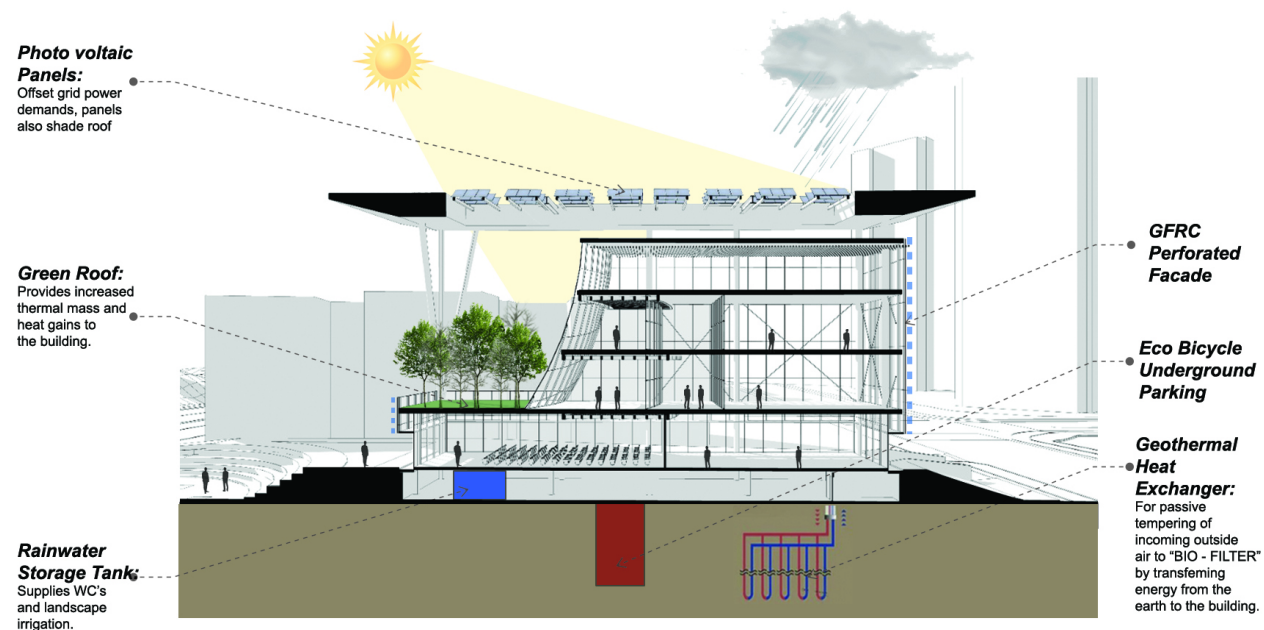




#### 4- Environmental & Sustainability Design:

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, Building Energy Efficiency Class certifications, we incorporated several technologies in the design:

- Geothermal System
- Photovoltaic Panels
- Green Roof
- Rain Barrels and Cisterns (Rainwater Storage System)
- Radiant Floor Thermal Heating System
- Sump Pumps
- Glass Fiber Reinforced Concrete (GFRC) Perforated Facade Layer
- Automated Underground Bicycle Parking Facility

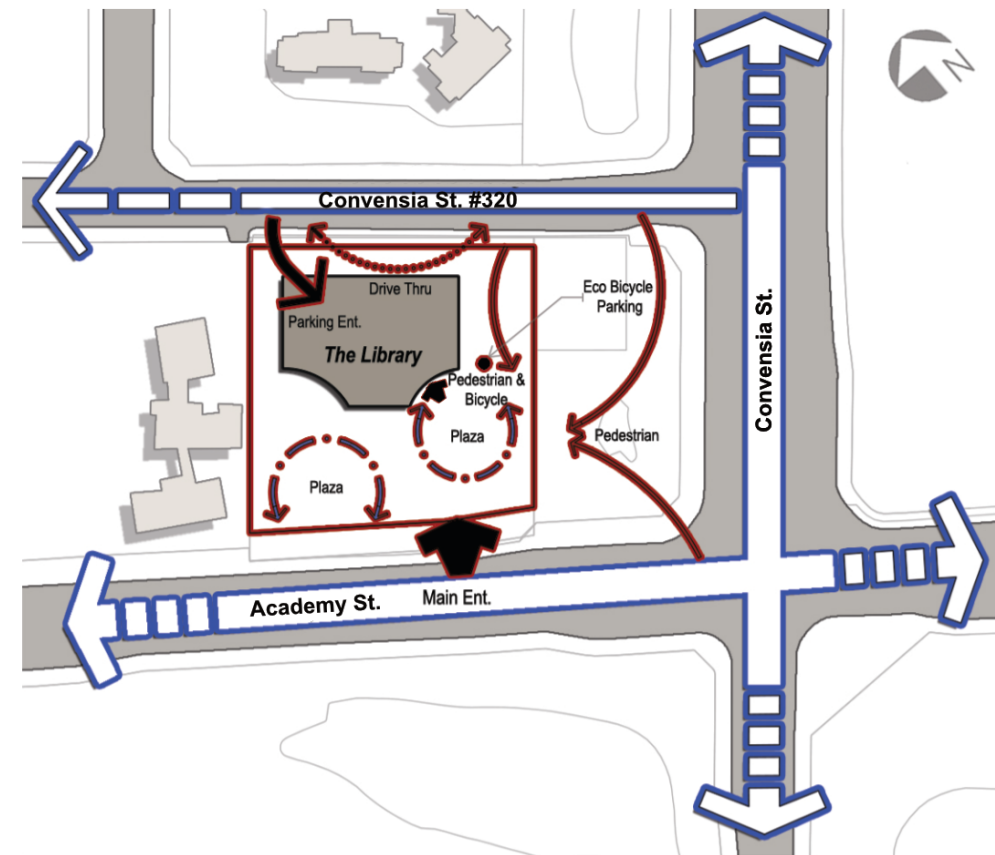


#### 5- Circulation:

Visitors will have different options for entering the library.

The drive-through and loading dock will have separate access points from Convensia St. #302.

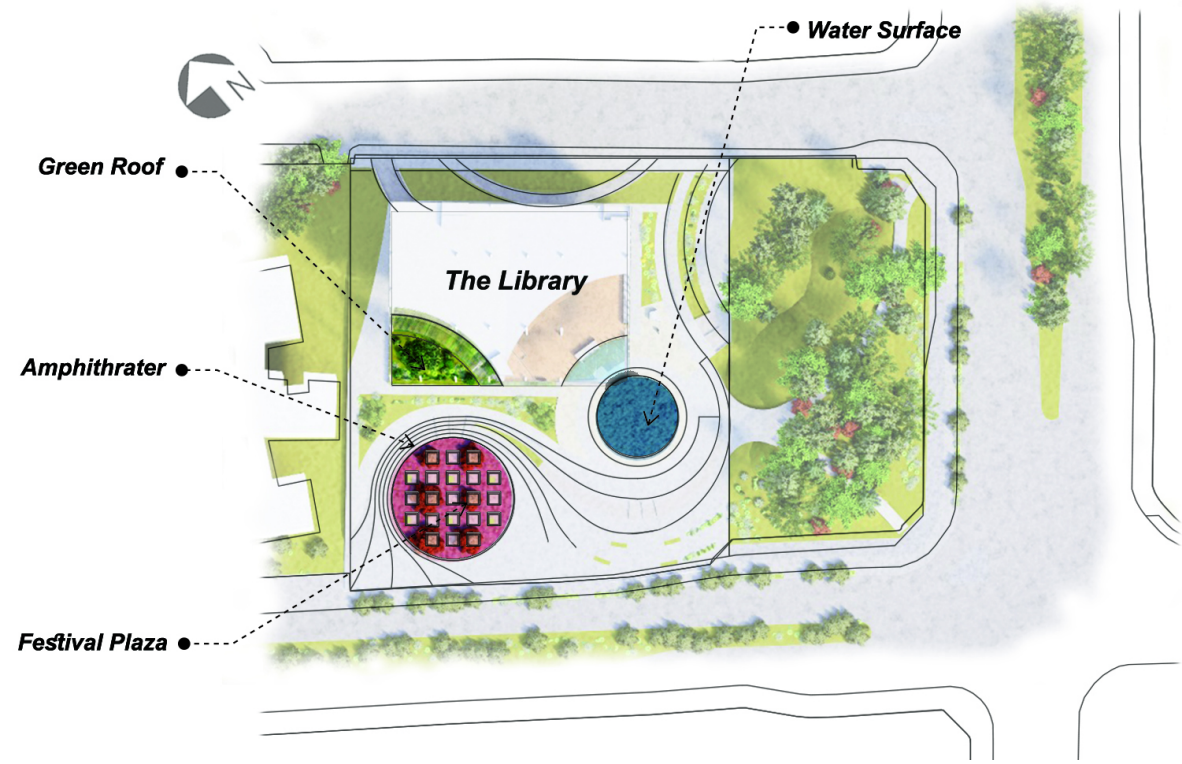
Pedestrians and bicyclists will have many openings through the main entrance on Academy Street, a back entrance from Convensia St. #302, and two separate entrances through the buffer zone that connect with Academy St. and Convensia St. #302.



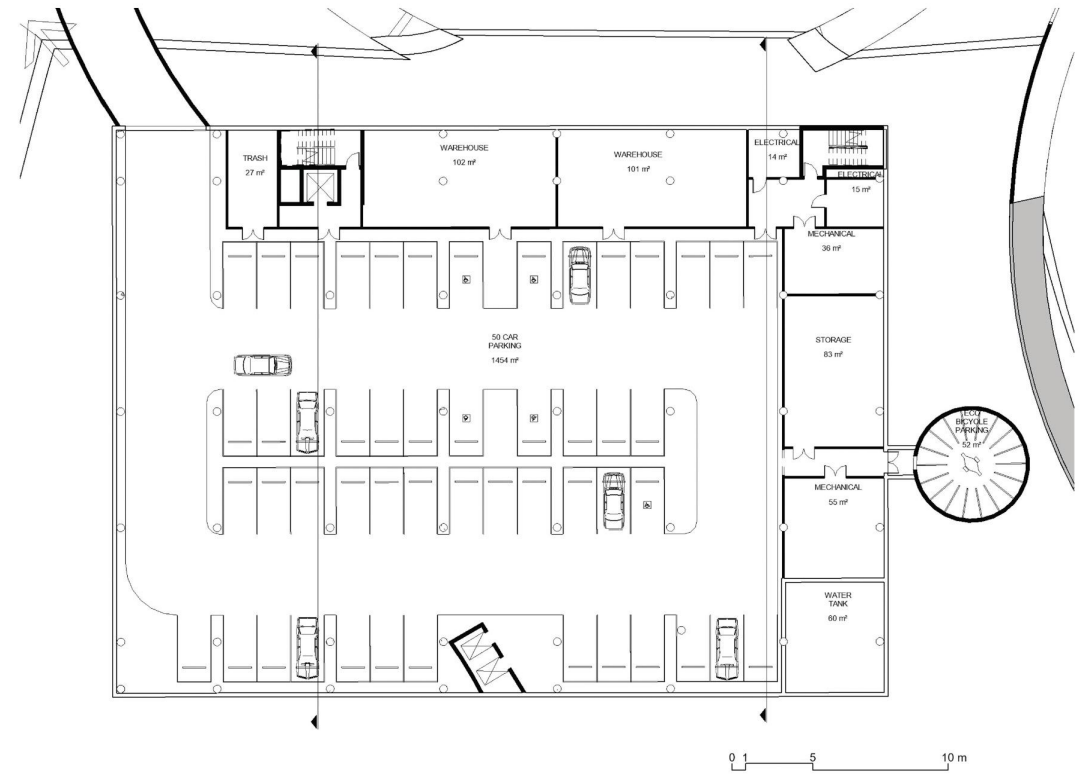
#### 6- Landscape Design:

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

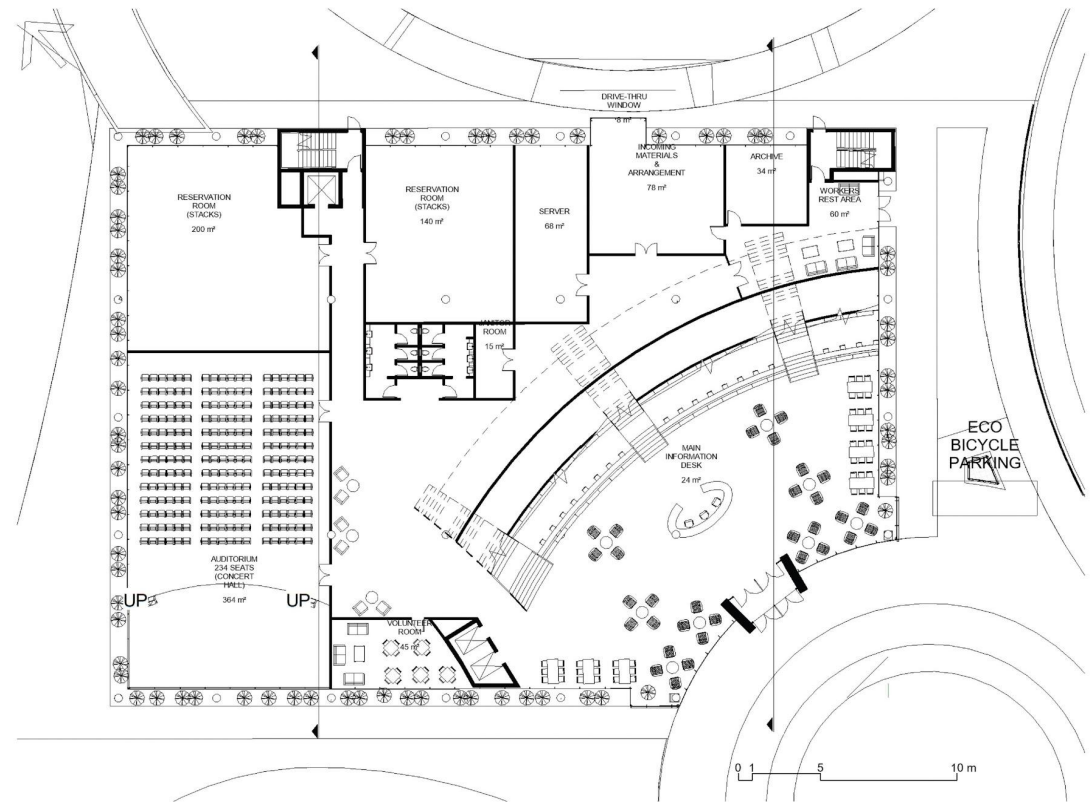
- Festival Plaza
- Water Surface
- Amphitheater
- Green Roof



Basement Floor

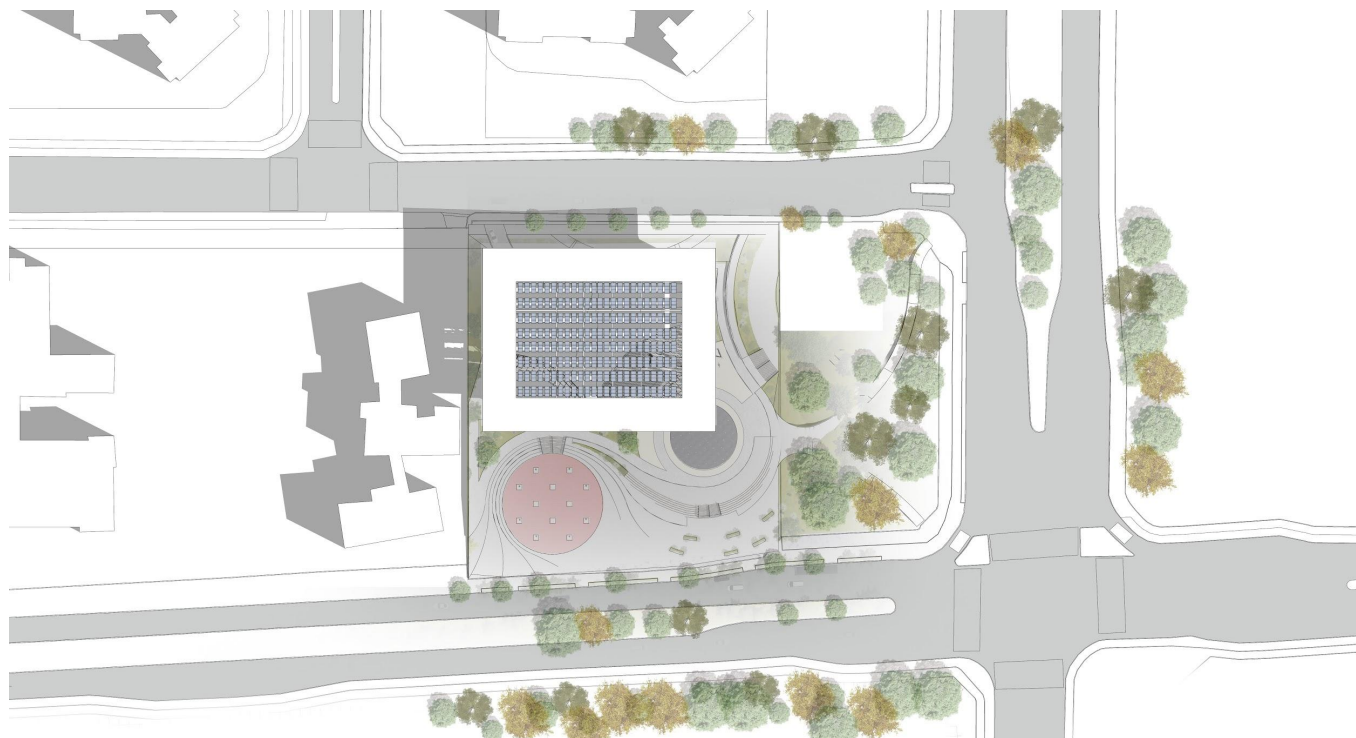


Ground Floor



⑥ SITE PLAN, FLOOR, ELEVATION, CROSS-SECTIONAL DRAWINGS

Site Plan

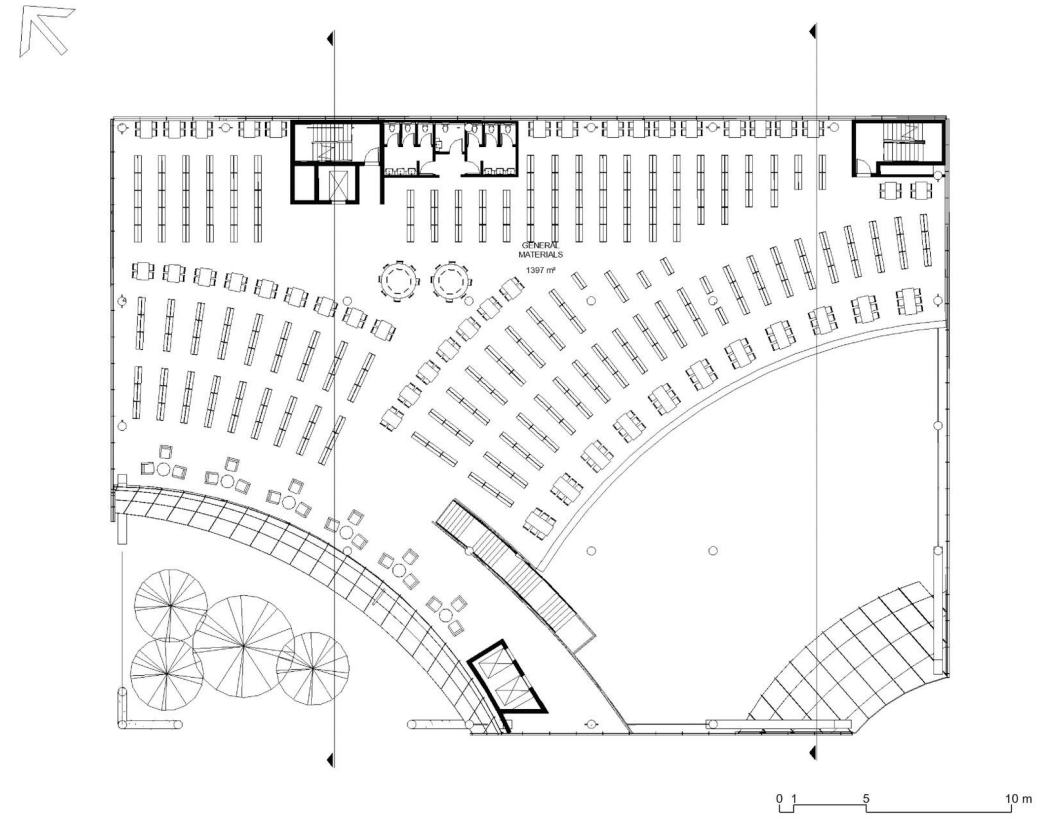




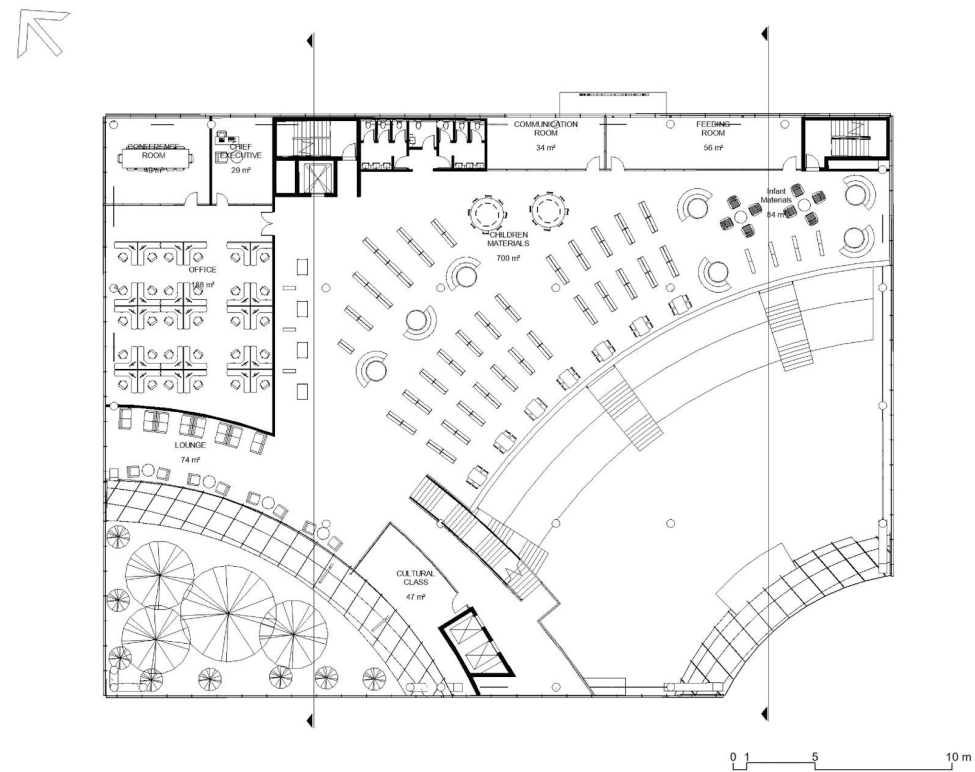
First Floor



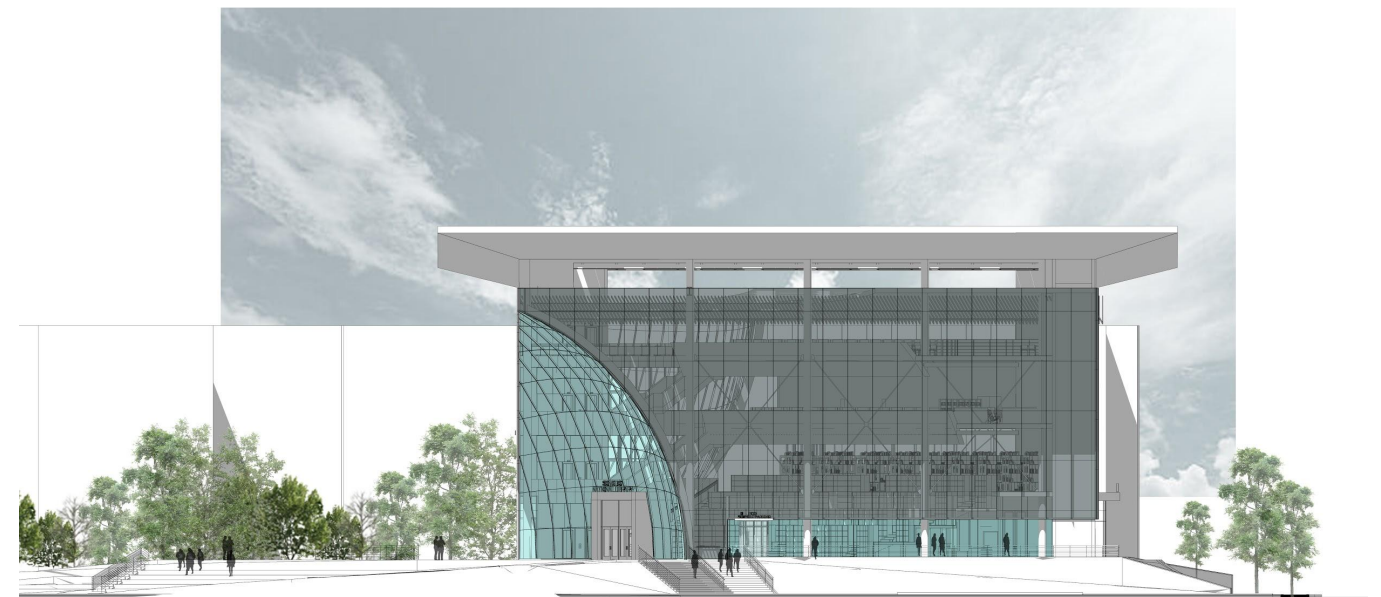
Third Floor



Second Floor

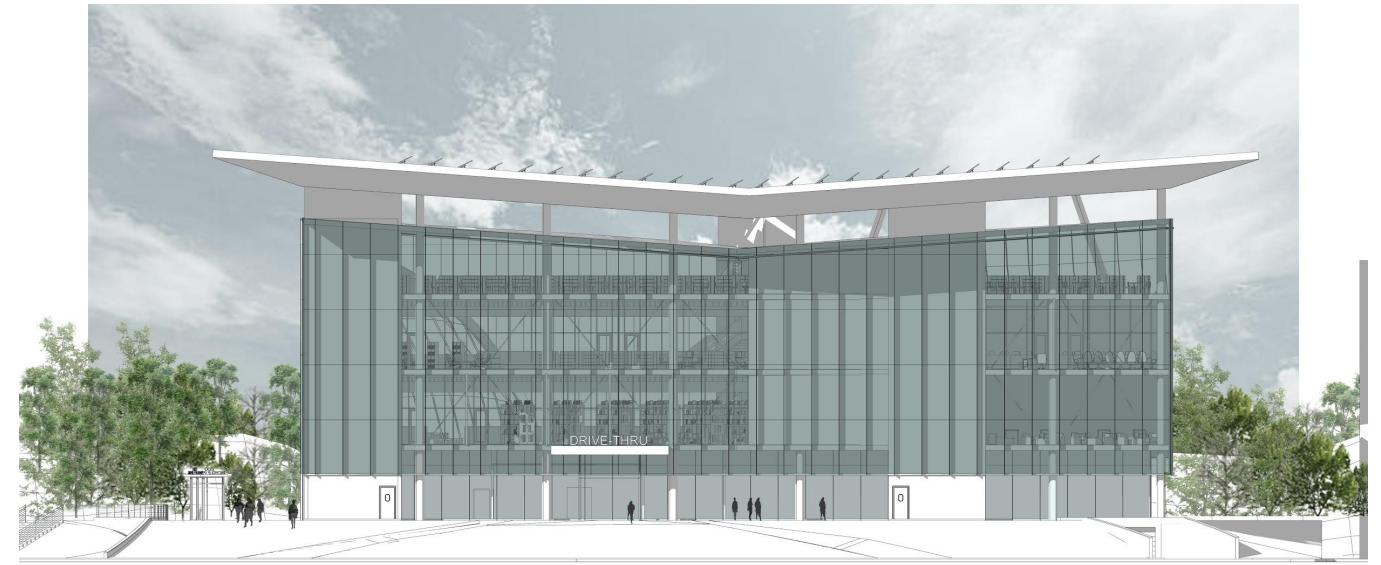
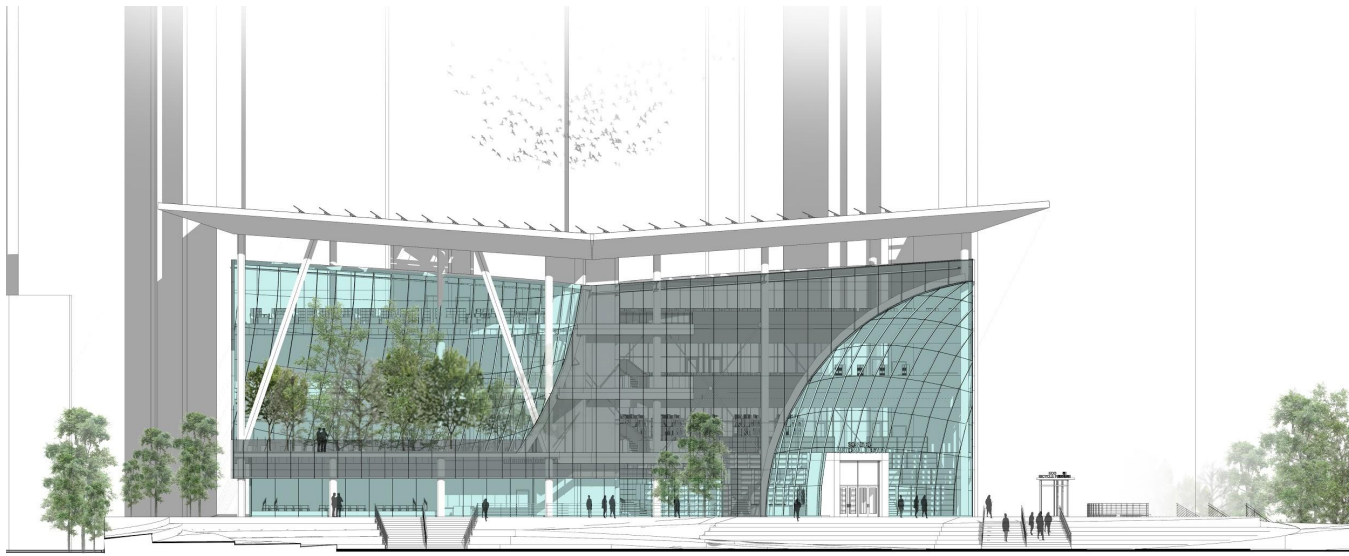


South Elevation



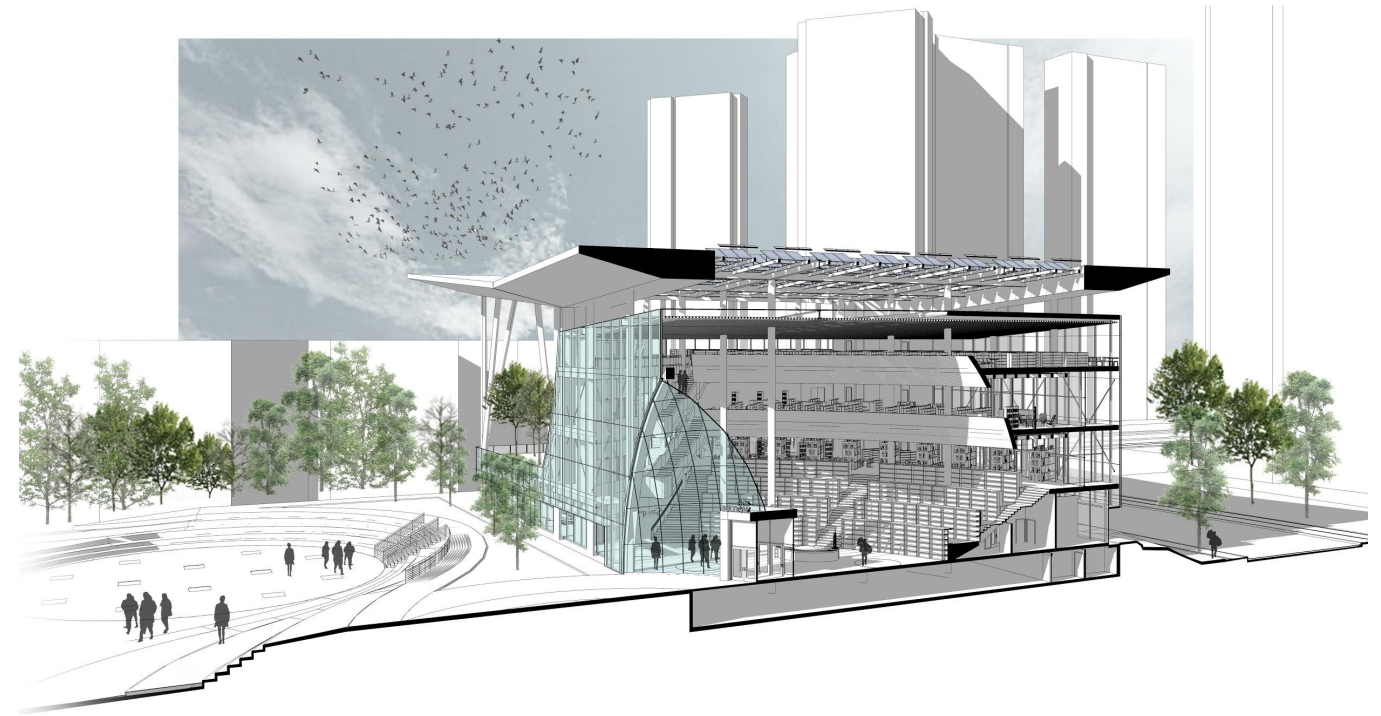
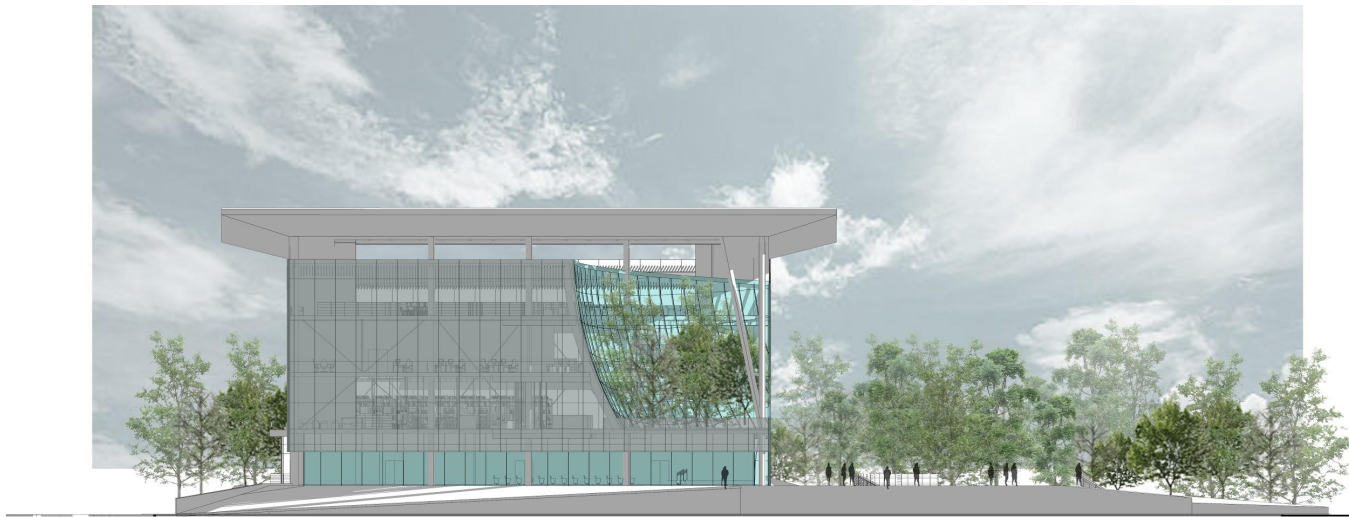


West Elevation



3D Section 1

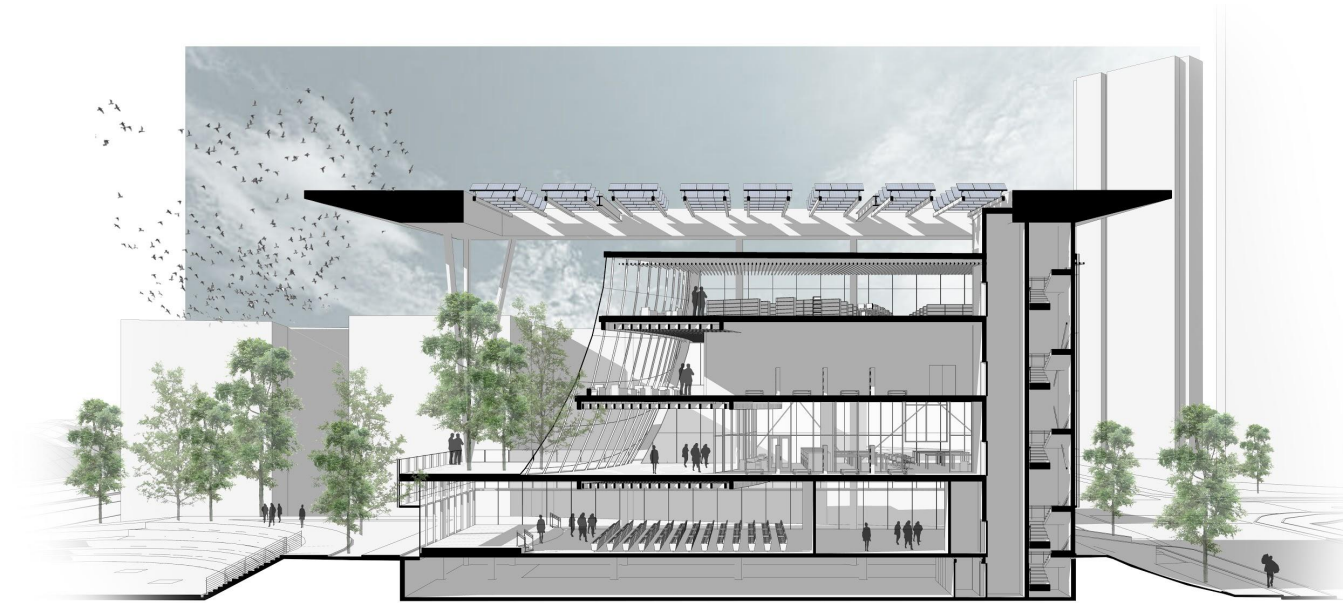
North Elevation



3D Section 2

East Elevation

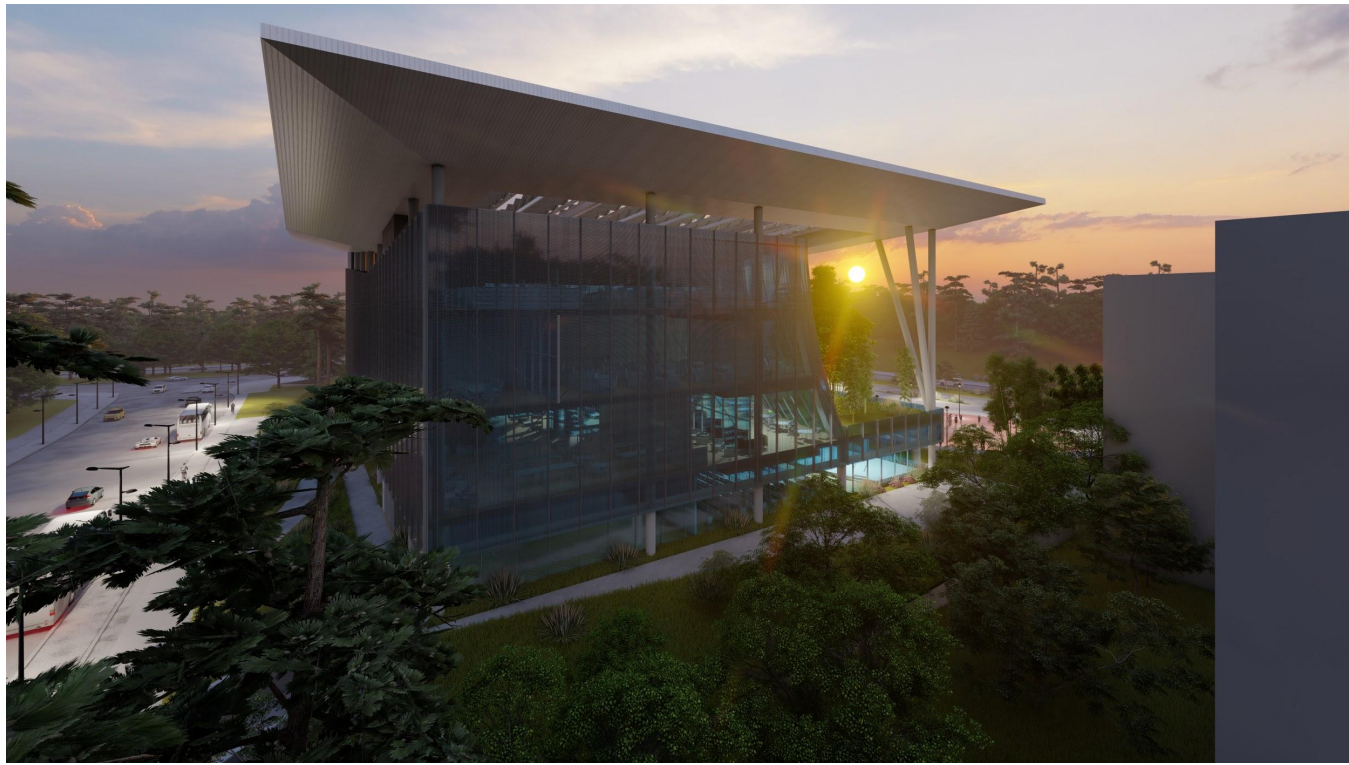




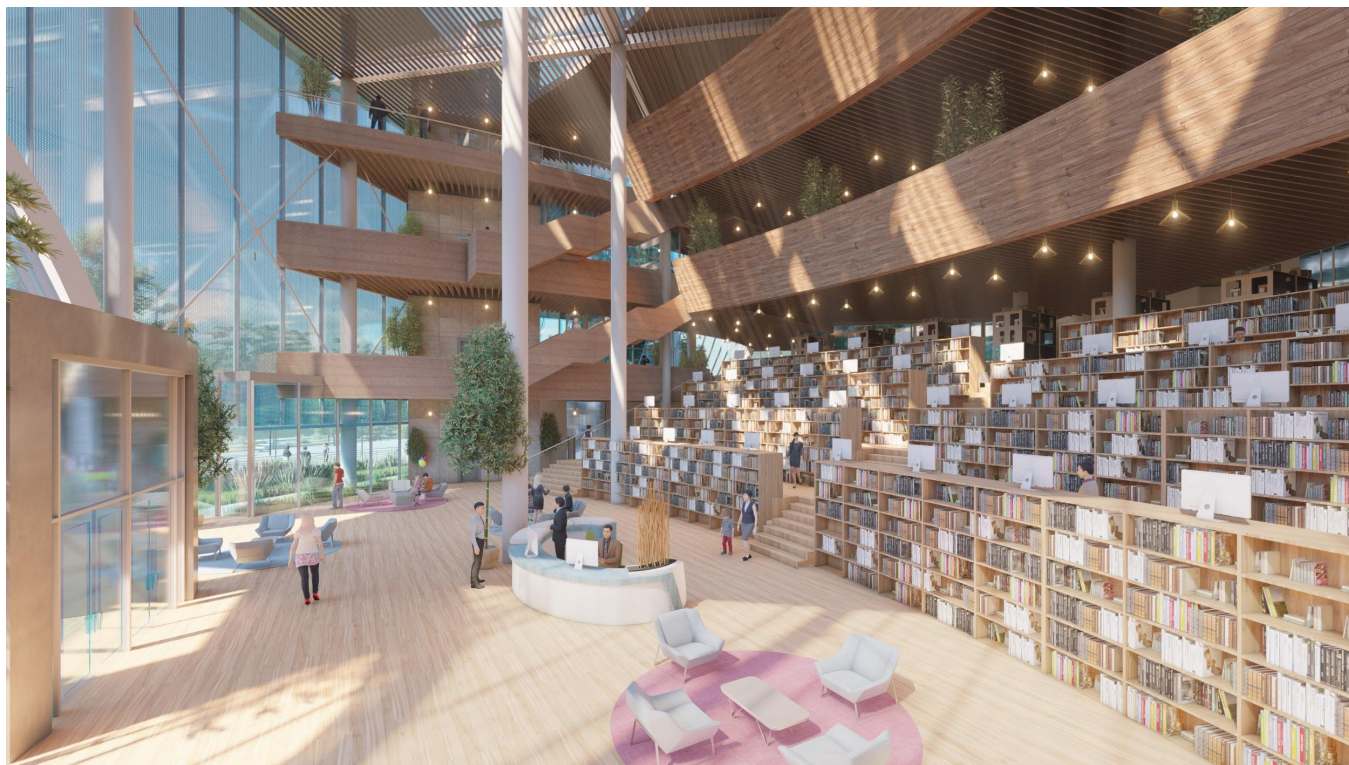
Exterior Shots







Interior Shots





## ⑦ OUTSIDE SPACE PLAN

The landscape plan includes many aesthetic and functional design choices with the main concept being the integration between the landscape and the building.

With our design of pathways and transitions, visitors have a smooth and user-friendly circulation flow from the outside into the building.

We also created different areas outside for outdoor activities during pleasant weather.

We also wanted visitors to have a visual connection with the library from different locations outside and be engulfed in the different environments.

## ⑧ INTERIOR DESIGN CONCEPT

Following our design aspect that calls for an overlap between the landscape & architecture, we made the transition between interior and exterior transparent.

Once inside, we have an open floor concept with open spaces connecting the main height volume lobby. We also reflected the exterior lines in the interior design and furniture layout, and the central vertical circulations are clear and direct from the main lobby.

To further the overlap between the landscape & architecture, we used wood materials for the floors and ceiling with green plantation to reflect an engaging modern, and sustainable experience for the users.

## ⑨ SPECIALIZATION SPACE AND PLAN OF THE LIBRARY

Once inside, we created a monumental amphitheater by the main lobby with numerous bookshelves and a large amount of seating to become a focal point within the building.

From the main lobby, you are visually and physically connected with all the levels that emphasize user-friendliness and a simple plan layout.

## ⑩ PARKING AND TRAFFIC LINES PLANNING

To fully utilize the outside space and the podium layout for traditional architecture, we designed all of the vehicle parking underground with handicap spots prioritized near exits and to be

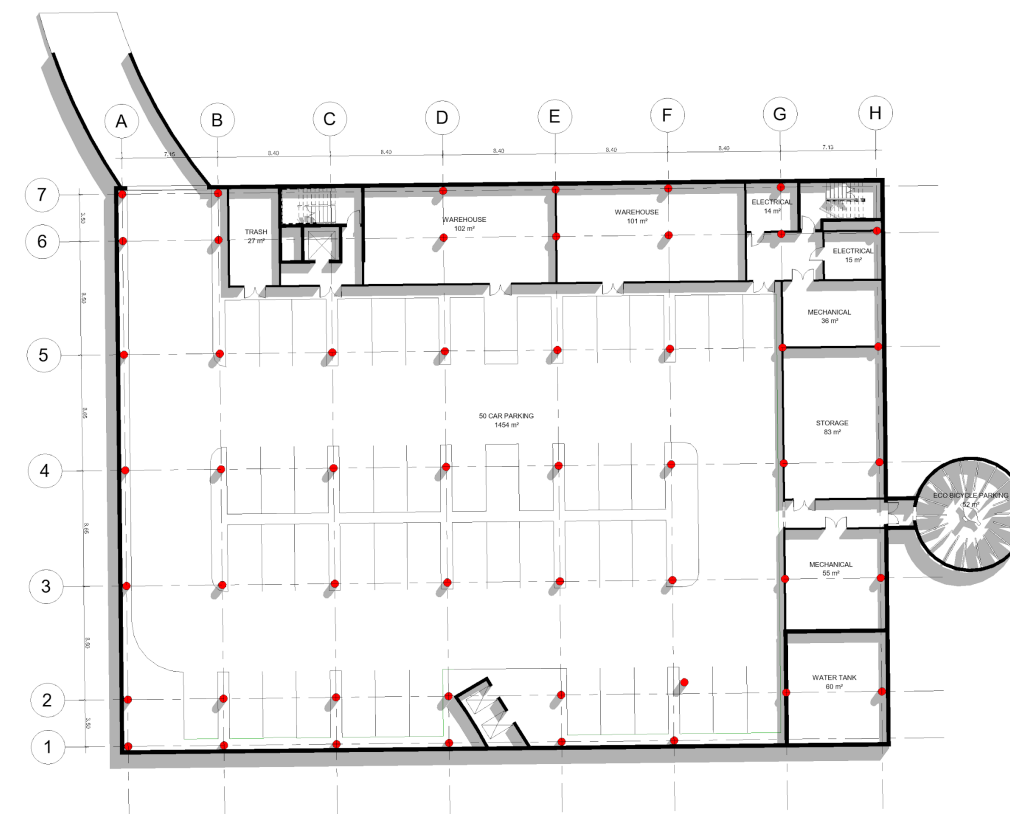
maximized for different car sizes and smooth circulation. We also designed the bicycle parking facility to maximize storage capabilities and not to hamper the landscape view.

For the drive-thru line, we created it with a ramp so that occupants could reach out to the window at the ground level without the need to get out.

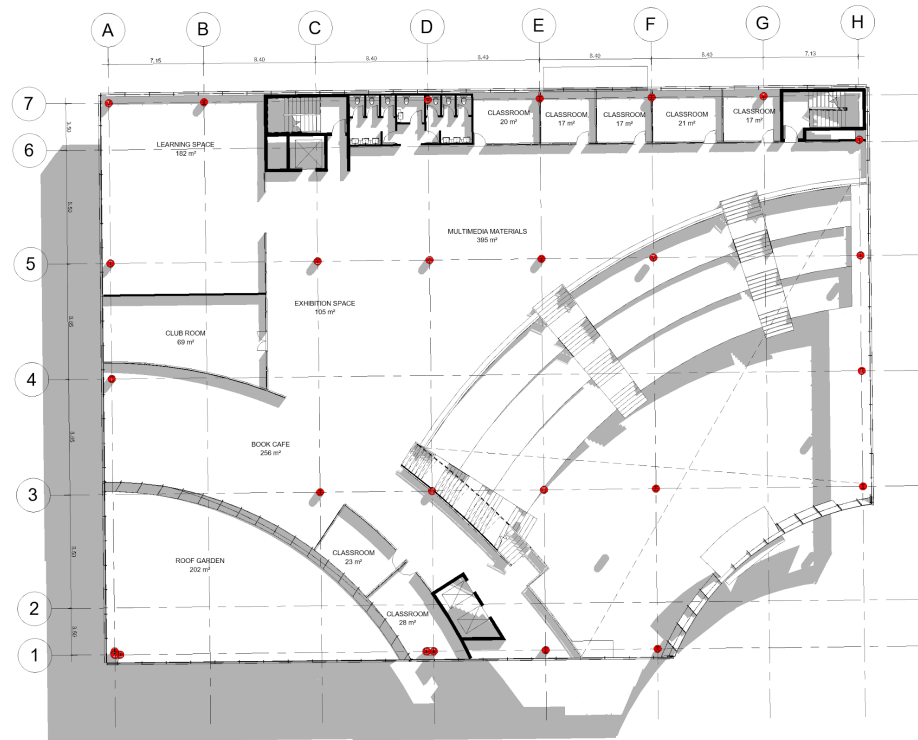
## ⑪ STRUCTURAL SYSTEM REVIEW AND PLAN

Steel framing was selected as the structural system since it is a durable, reliable, cost-effective, sustainable option for many building types. The range of available shapes and sizes allows for flexibility in the design, and South Korea's major steel industry will ease the procurement of supplies.

Specifically, we call for the use of prefabricated concrete for the underground parking level for the short spans and modular grid. For the 4 levels and the roof above the ground level, we call for a steel-framed structure for the long spans.



Prefabricated concrete for the underground parking level



Steel-framed structure for the 4 levels and the roof above

## 12 ENVIRONMENTAL EQUIPMENT SPECIALIZATION PLAN

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 certifications levels.

- Land Use and Transportation

- Preserving the ecological value of parts of the existing land.
- Avoiding excessive underground development and minimization of cutting.
- Avoiding a high-rise design and construction to prevent interference in the right to sunlight for nearby buildings.
- Orientating the design-build to maximize sunlight.
- The creation of a bus drop-off zone near the entrance of the property.
- The installation of an automated bicycle parking facility.

- 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 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 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's landscape with minimal disturbances in the area.
  - The landscape area shall be expansive, with vegetation throughout the area.
  - The dedication of library space 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 library.
- The installation of a sunshade to limit direct sunlight and glare at certain times.
- The addition of a lounge-style area so patrons can rest.

Listed is more detail of the major technologies and materials that we plan to incorporate in our sustainable and eco-friendly 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 pump 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 long-term 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

*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 for the underground structure to prevent moisture and structural damage.*

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- *Glass Fiber Reinforced Concrete (GFRC) Perforated Facade Layer*

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

- *Automated Underground Bicycle Parking Facility*

Designed with a compact entrance booth, the facility only requires a minimal space aboveground and provides automated storage underground for a large amount of bicycles.

	the loading dock and drive-through locations as well as the underground bicycle parking structure.	
7th	Will include MEP commissioning, facility O&M training for staff, the delivery of furniture, equipment, and books.	6 Months

### ⑬ CONSTRUCTION METHOD PLAN AND SUGGESTIONS

Phase	Details	Time Period
1st	Will include a site survey to ensure all parameters have been considered, and the site will be fenced off from the public to ensure safety. This phase will also consist of creating Environmental and Safety Plans, with contractor mobilization occurring shortly afterward.	2 Months
2nd	Will include excavation and foundational work. Specifically will consist of the excavation needed for the building foundations, geothermal piping system, and underground parking structure.	3 Months
3rd	Will include the erection of the building's structural support system.	3 Months
4th	Will include the mechanical, electrical, and plumbing (MEP) build-out of the interior, green roof, and subroof installation.	4 Months
5th	Will include the roof and PV panels installations.	3 Months
6th	Will include completing the interior layout and the beginning of the landscape work. It will also include	6 Months