

JINGAN XIA

THE FLOW

Natatorium at Buffalo Bayou



ABSTRACT

Urban catalysts is a redevelopment strategy comprised of a series of projects that drive and guide urban development. Similar to the chemical "catalytic agent", urban catalysts can arouse and stimulate urban construction. Many cities have considered urban catalysts as a means for revitalization. Among the most noted catalytic projects are sports stadiums and arenas. In Houston, serious traffic problem and pollution have become a problem of city development. To solve these problems, in this project, Buffalo Bayou Park was rescheduled as a green transportation hub and a sports park. The redesigned park acts like an 'Urban Catalyst' of Houston. The influences of the master plan were analyzed. One of the planned sports facilities—the Public Natatorium Center was designed.



ACKNOWLEDGEMENTS

First and foremost, I want offer my thanks to everyone who gives me strong support during this proecss.

I would like to express my very great appreciation to my committee chair, Dr Aitani, for your valuable and constructive suggestions during the planning and development of this project. Your patient guidance, enthusiastic encouragement and useful critiques really helped me a lot.

I would like to express my deep gratitude to Professor Erminy for your wiseful advice and support. Your understanding on architecture will give me a long-term benefit and life-long memory.

My grateful thanks are also extended to Professor Bracci for your suggestion about structure and construction.

I would also like to extend my thanks to Professor Gibbs. Your encouragement helped me find the correct direction for the design project.

I also want to thank all of my friends I know here. I will never forget the days that we spent together.

Finally, I wish to thank my family for your support and encouragement throughout my study. I finally could make you proud.

Thanks again! To everyone supported me these years!

Jingan Xia

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COMMITTEE CHAIR

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MARCEL ERMINY

COMMITTEE MEMBER

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RESUME

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ABOUT ME

My name is Jingan Xia. I am a graduate student of Texas A&M University. My goal as an architect is to create appealing works of intrinsic beauty which appeal to people mentally through its space and idea as well as appropriate forms and materials. In the future, I aspire to design buildings with a strong aesthetic and spiritual appeal. While accounting for its form and space, I plan to ensure that a building is sustainable and structurally safe in order to avoid any compromises within the design. I feel that design should incorporate a sense of history and culture. My dream is to operate my own architectural firm with connections to a variety of industries so that I would have the opportunity to positively impact the design of architecture.

EDUCATION

Texas A&M University
Master of Architecture

Aug. 2018— May. 2020

China University of Mining and Technology
Bachelor of Architecture

Aug. 2018— May. 2020

SKILL

Photoshop



Solid Modeling



Sketchup



Revit



AutoCAD



Rhino



SCHOLARSHIPS AND AWARDS

Department of Architecture Undergraduate Scholarship

2019

Outstanding Leadership Scholarship from CUMT

2016

Architecture Research Scholarship for Ancient Village Research

2015

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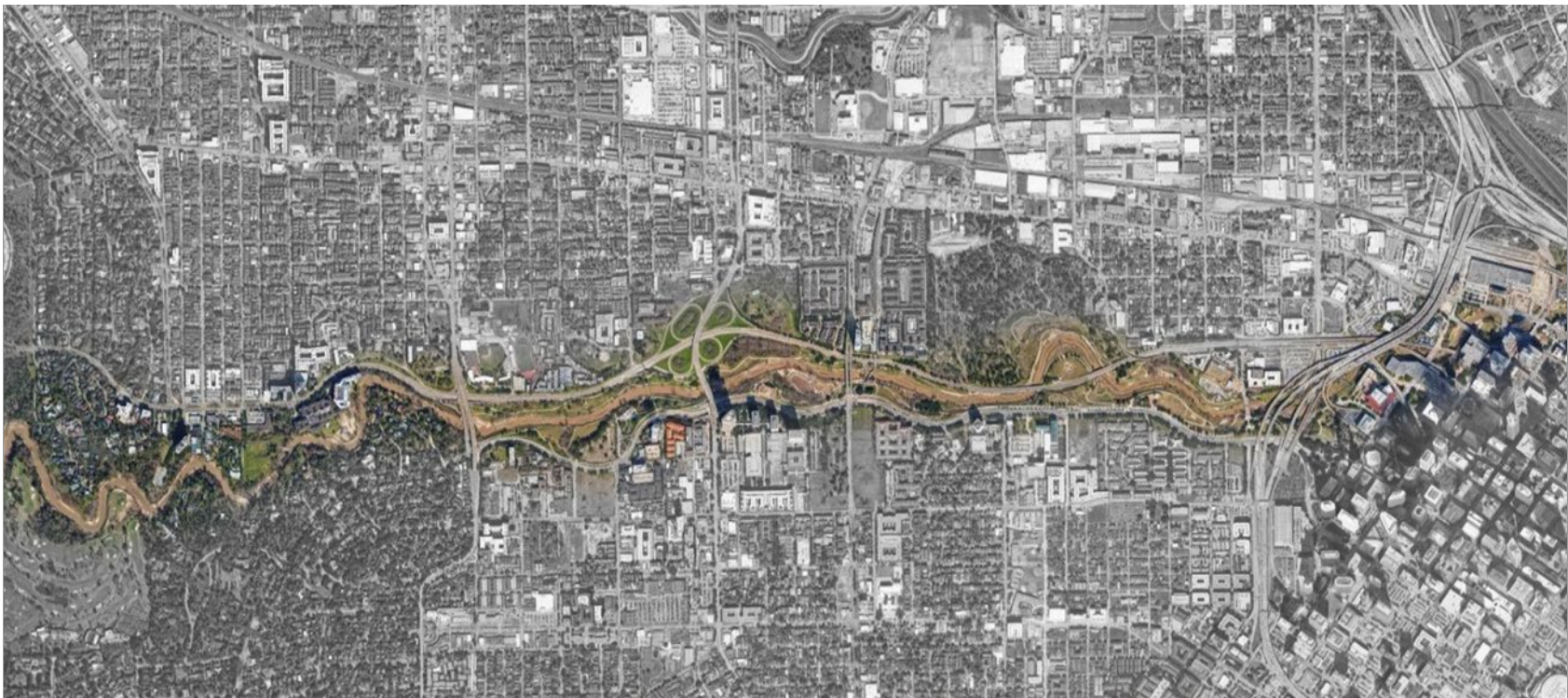
BACKGROUND & HISTORY

'Urban Catalyst', which means one or several architecture projects can benefit to the development of surrounding districts or even the whole city. Similar to the chemical "catalytic agent", urban catalyst can arouse and stimulate urban construction and rejuvenation and urge the continuous and gradual reform of urban structure.

Many cities have considered urban catalysts as a means for revitalization. Among the most noted catalytic projects are sports stadiums and arenas.

In Houston, serious traffic problem and pollution have become a problem of city development. To solve these problems, the 'Urban Catalyst' theory was used in the design.

In this project, Buffalo Bayou Park was reprogrammed as a green transportation hub and a sports park. The redesigned park acts like an 'Urban Catalyst' of Houston. The influence of the master plan were analyzed. One of sports facilities, the Public Natatorium Center, was designed.



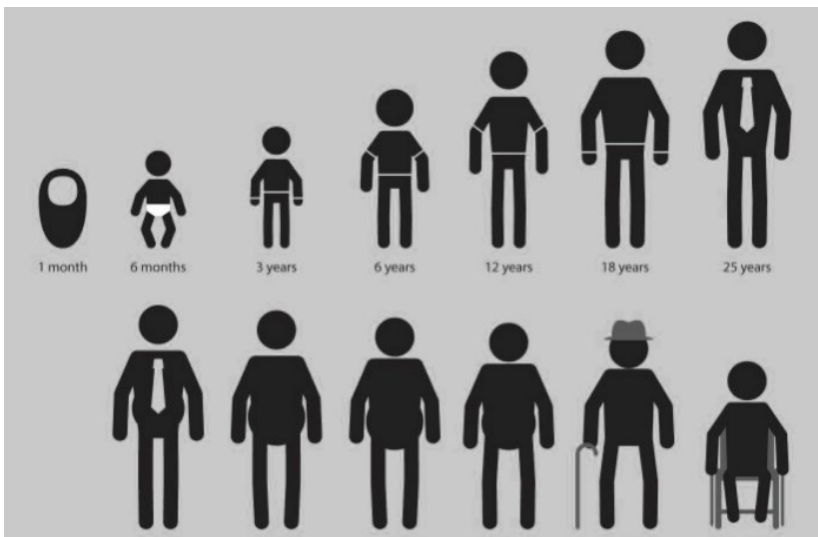
The site is located along Buffalo Bayou, a 52-mile river that flows slowly through the heart of Houston. The river originates east of Houston at the Addicks and Barker Reservoirs. It then flows east through the city until it intersects the San Jacinto river near Galveston Bay and the coast. The river has been a focal point in Houston since the Allen brothers founded the city in 1836. It witnessed the development of Houston. Today, the Bayou still plays an important role shipping, the oil industry, and recreation in Houston.



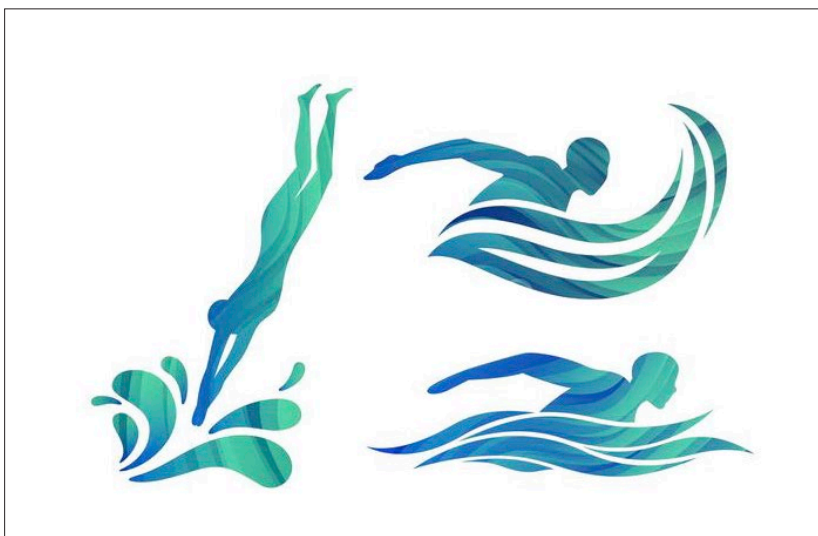


GOALS

1. Make the whole project an 'urban catalyst' to benefit to the development of surrounding districts.



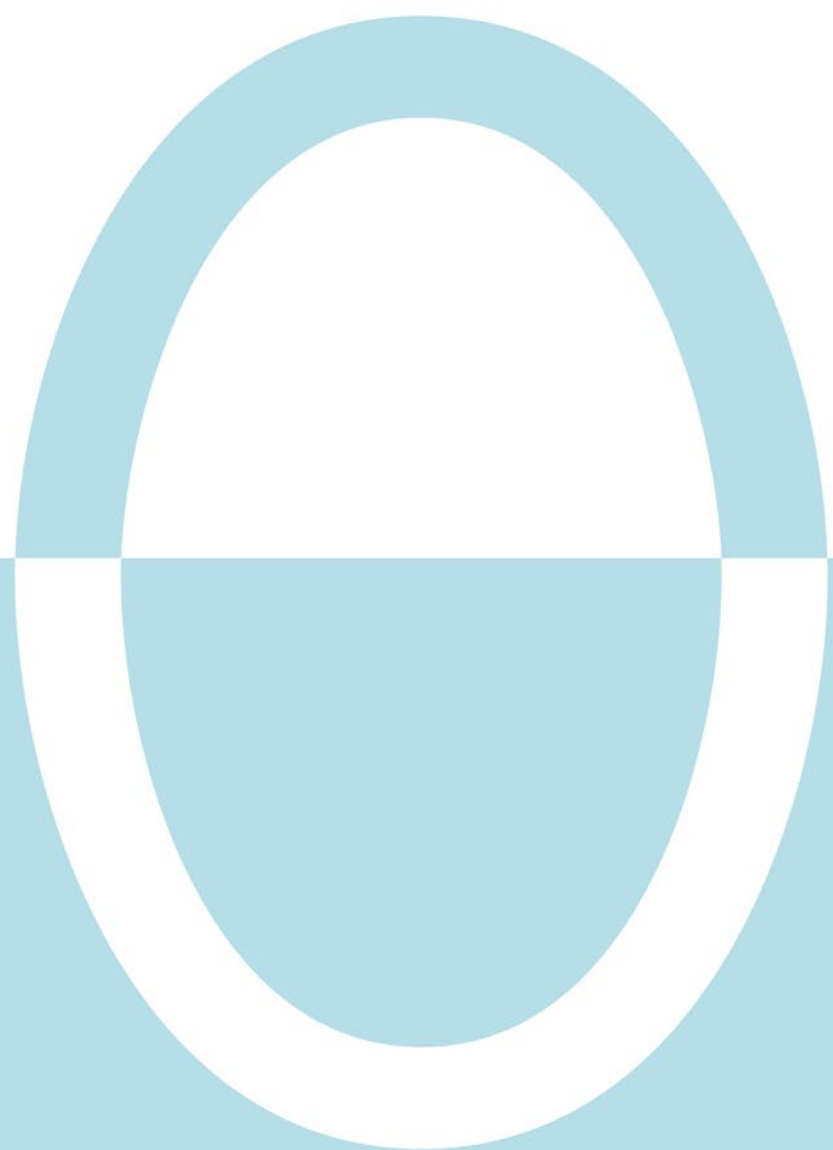
2. Design the natatorium to serve people of different ages.



3. Design the facility for different types of water sport.



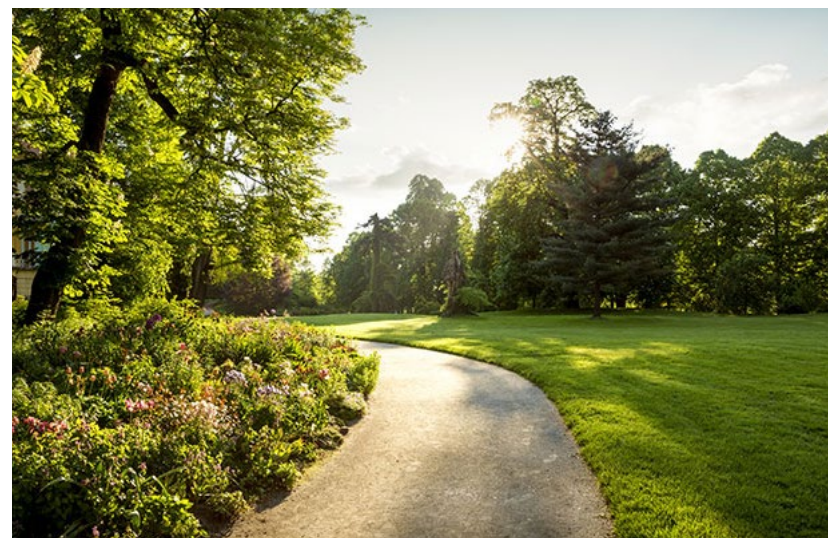
LITERATURE REVIEW

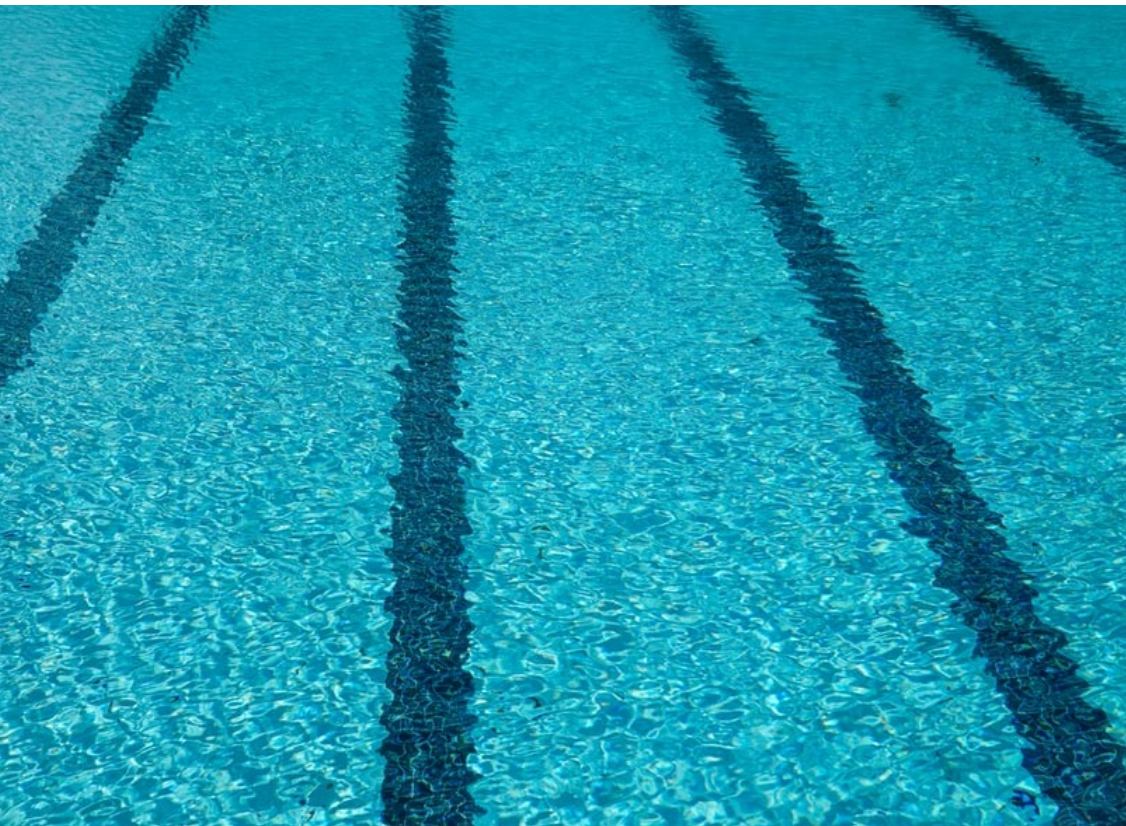


URBAN ASPECT

The urban catalyst theory says design can be linked to place through the study of contextual factors in urban design. These factors include: morphological, social, functional, perceptual, visual, and temporal.

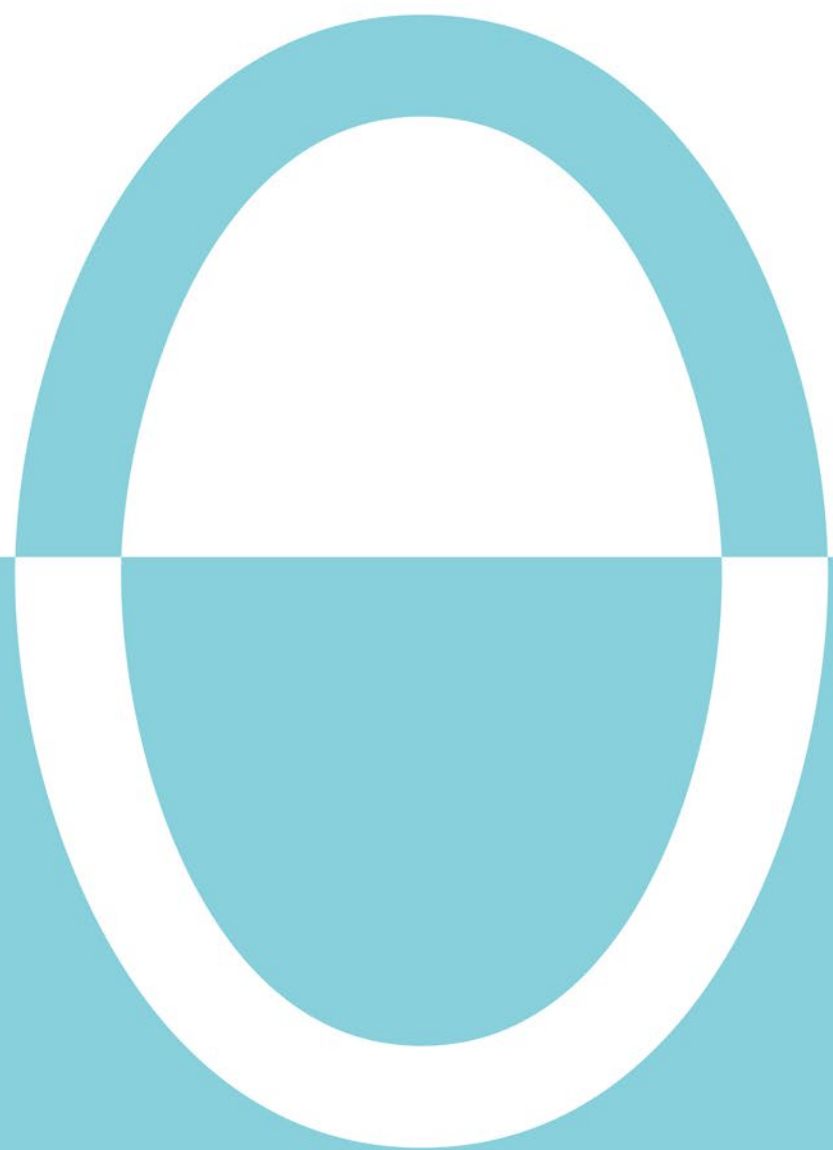
Based on the theory, since the Buffalo Bayou symbolizes the city of Houston. the master plan was designed around the river. The final purpose of the master plan design is to achieve the sustainable development of the district and the city.





ARCHITECTURE ASPECT

In this project, 6 planned sport facilities were separated along the bayou in the park. The public natatorium was well designed for two purposes. First, it is a landmark for the whole sports district. Second, it is a recreation facility for the surrounding residents. A large span structure system with trusses and concrete plinth was designed to satisfy the requirement of indoor swimming pools.



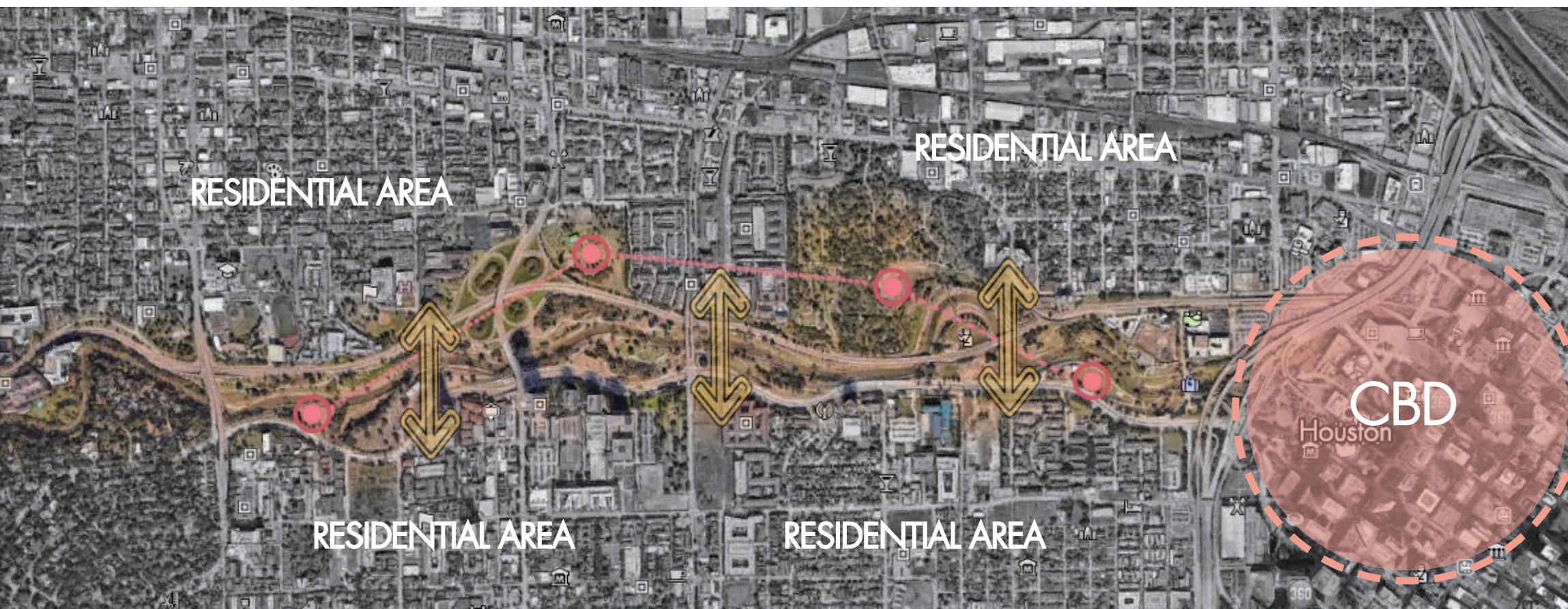
URBAN DESIGN

LOCATION

This site is in Buffalo Bayou Park, which is just west of downtown Houston. Stretching from Shepherd Drive to Sabine Street between Allen Parkway and Memorial Drive, the 160-acre Buffalo Bayou Park is one of the country's great urban green spaces. The park connects the downtown and uptown areas. In the park, there are many scenic spots. For example, Waugh Bat Colony, Wortham Foundation Grove, Johnny Steele Dog Park and many other scenic spots are all along the river.



UNITED STATES





TEXAS

HOUSTON



SURROUNDING BUILDINGS

Buildings to both the north and south of the area are mostly low-rise residential buildings and apartment buildings. A high-rise residential building is on the north side of the site. On the east side is the central business district of Houston.

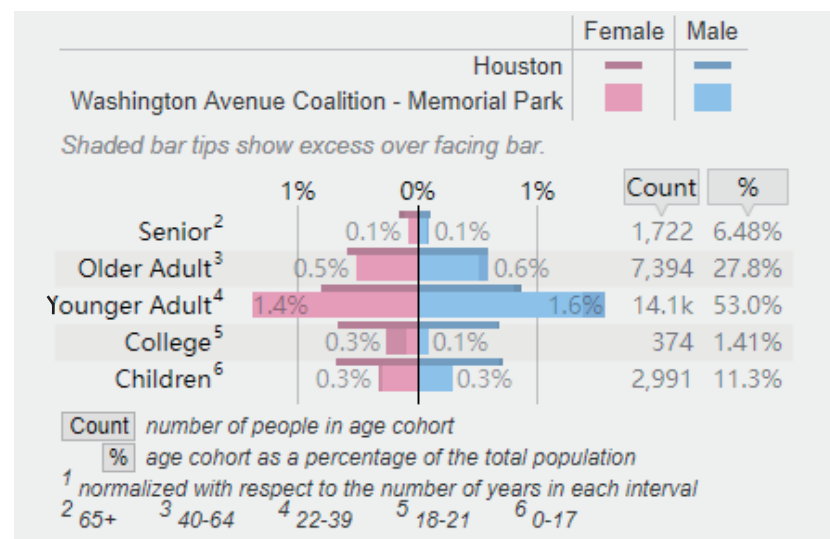
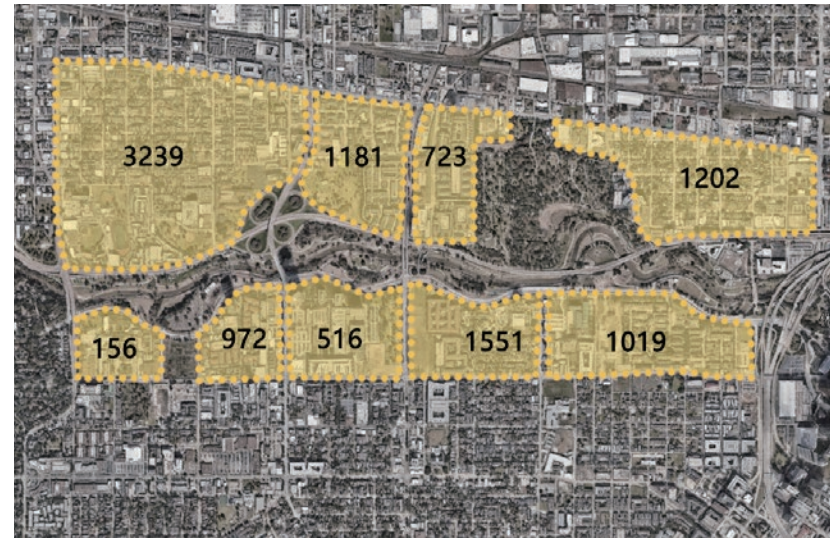
CURRENT CONDITION

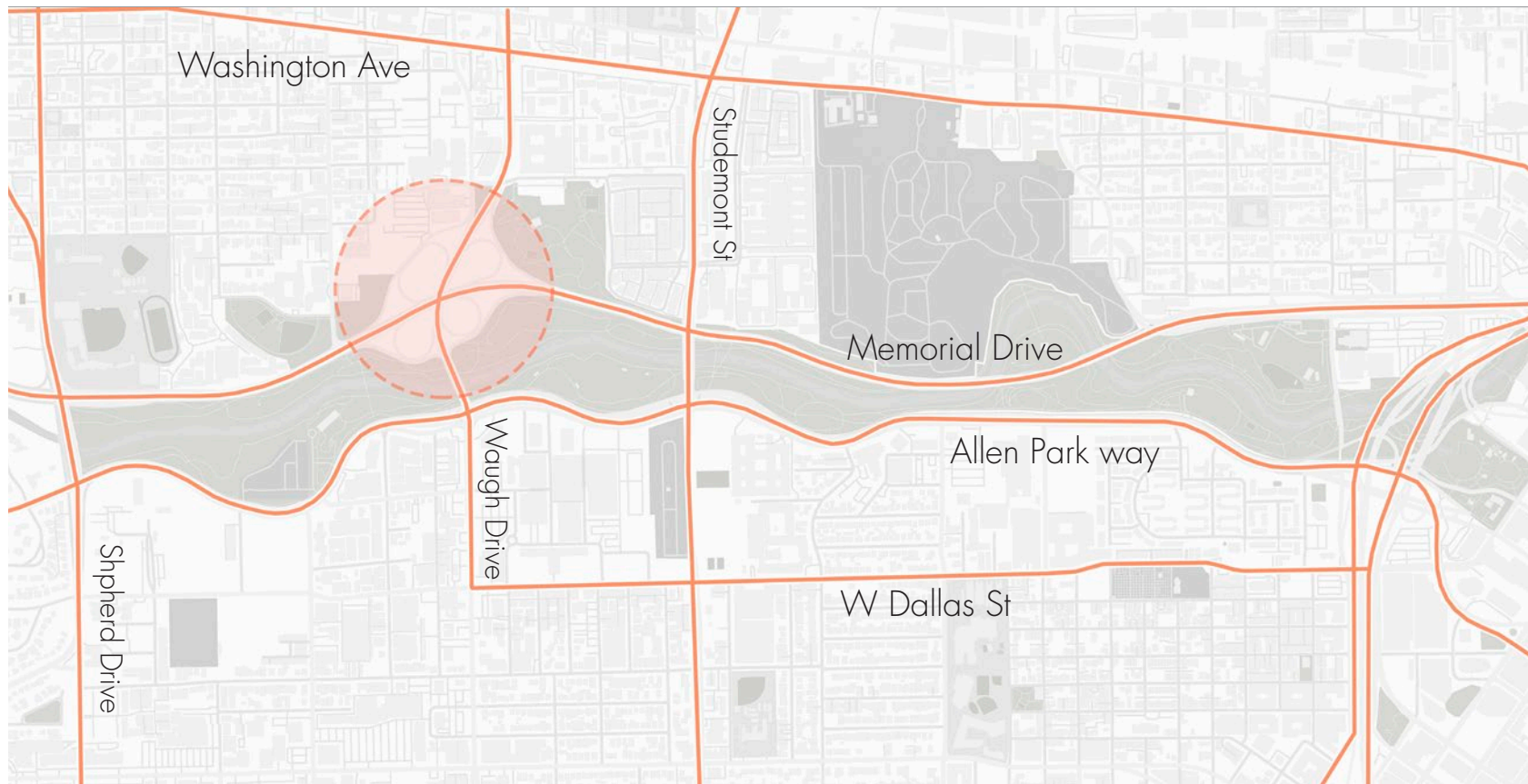
POPULATION

The population of the district is about 10,100.

Since buildings surrounding the site are mostly low-rise residential buildings and apartment buildings, the population density of this area is low.

The population of this district is made up mainly of seniors (6.48%), older adult (27.8%), younger adults (53.0%), colleges (1.41%) and children(11.3%).



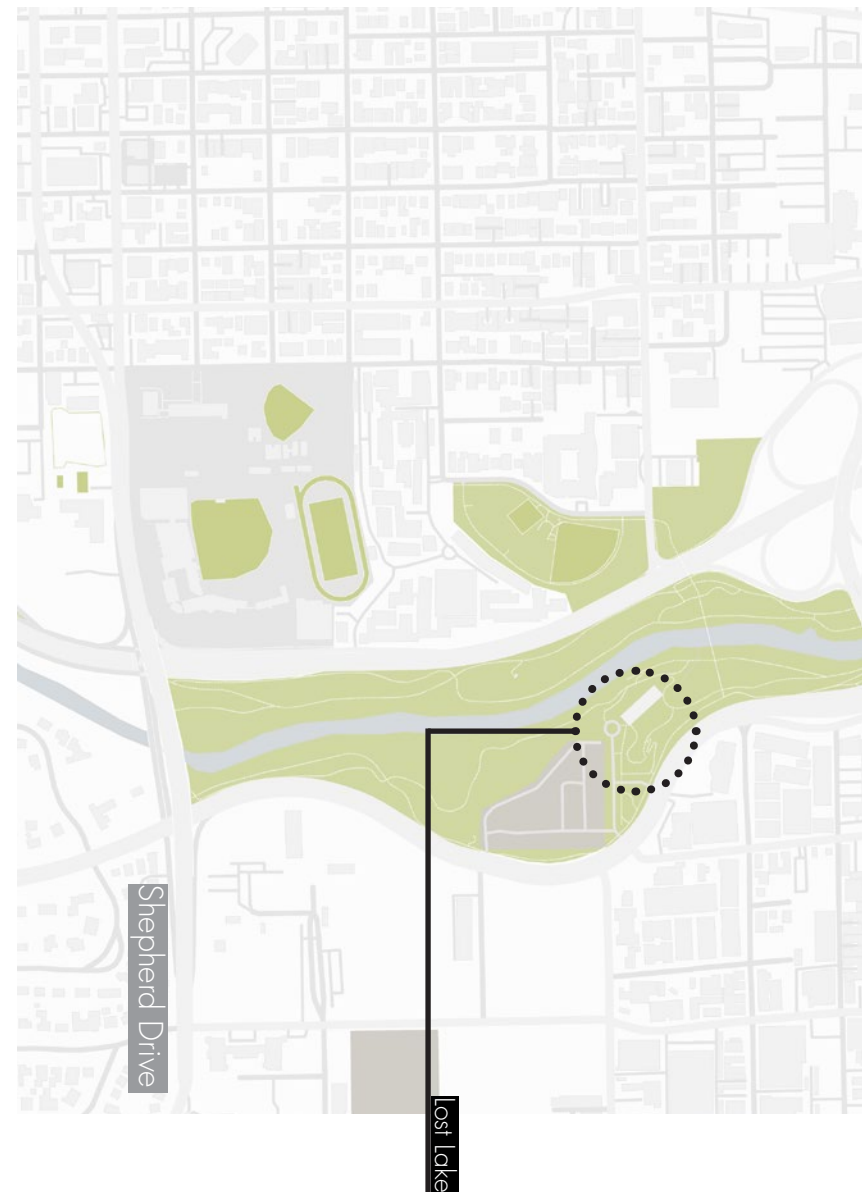


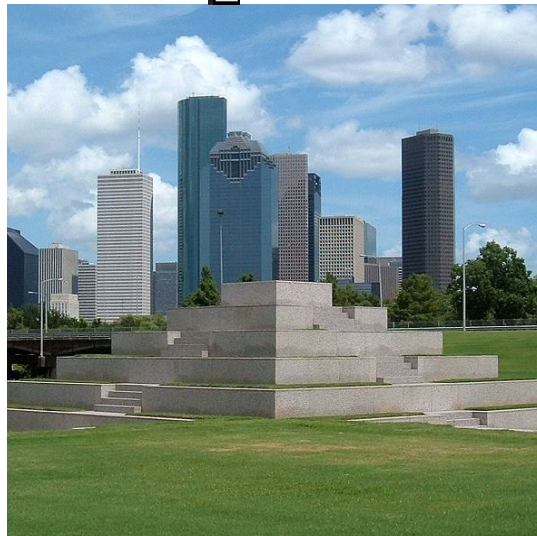
TRAFFIC

The traffic situation of this area is complex. There are four freeways passed this area. Close to the center of the park area, there is a highway junction of the Memorial Drive and Waugh Drive, which complicated the traffic condition.

FACILITIES & ENVIRONMENT

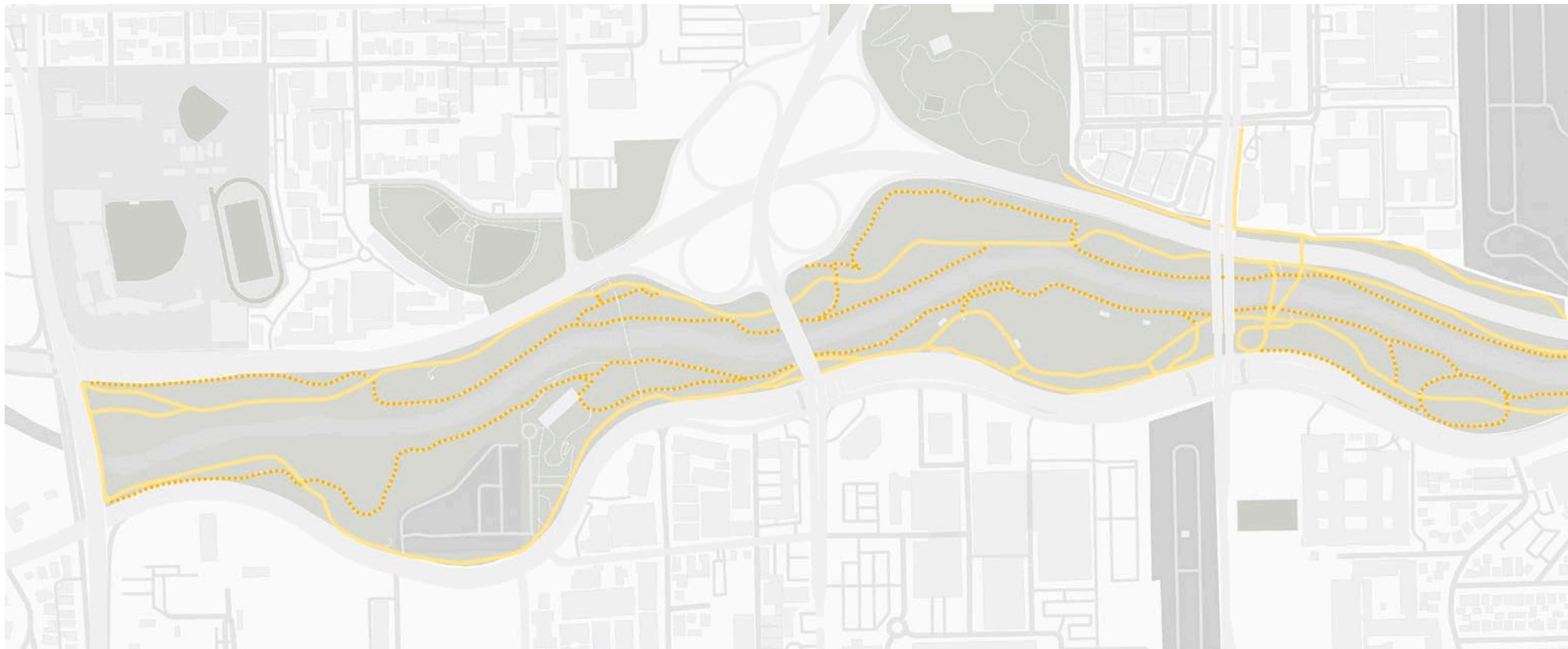
Along the river, there is a large landscape belt with a series of beautiful gardens and native landscaping. This area is picturesque but lacks nodes for people to gather.

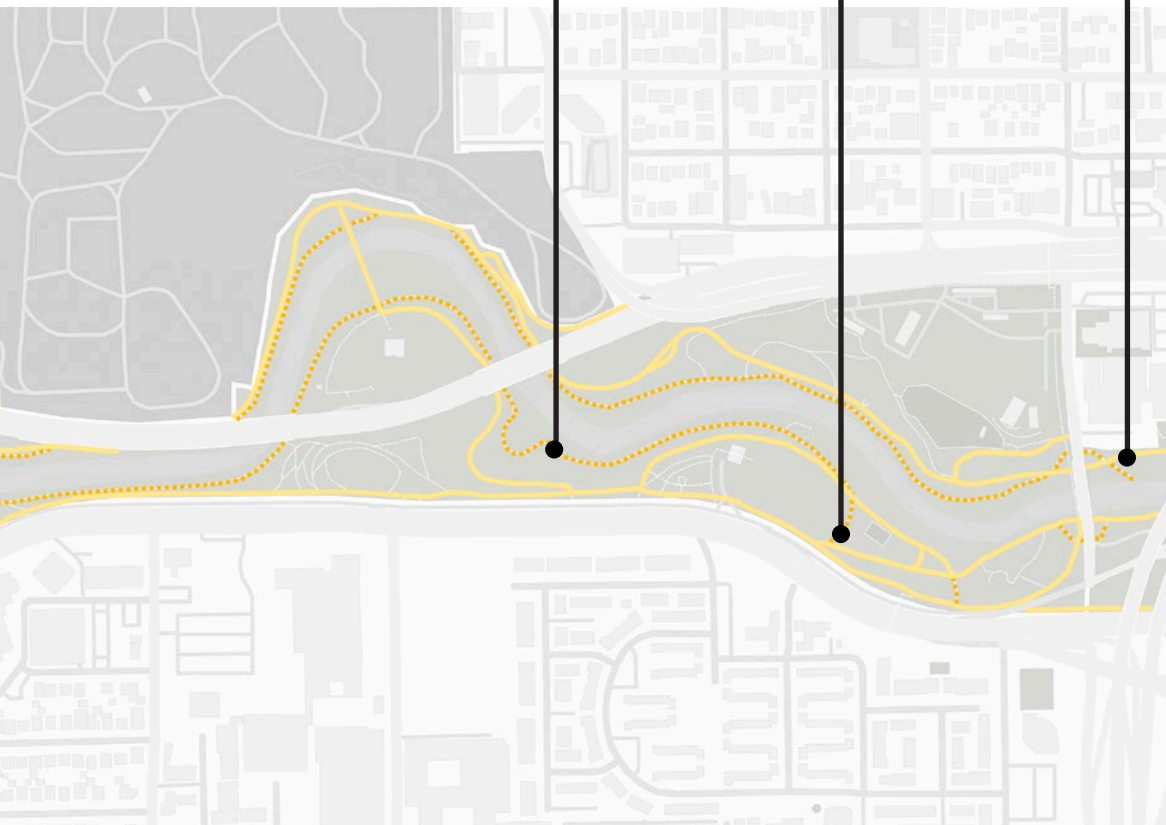




SPORTS & EVENTS

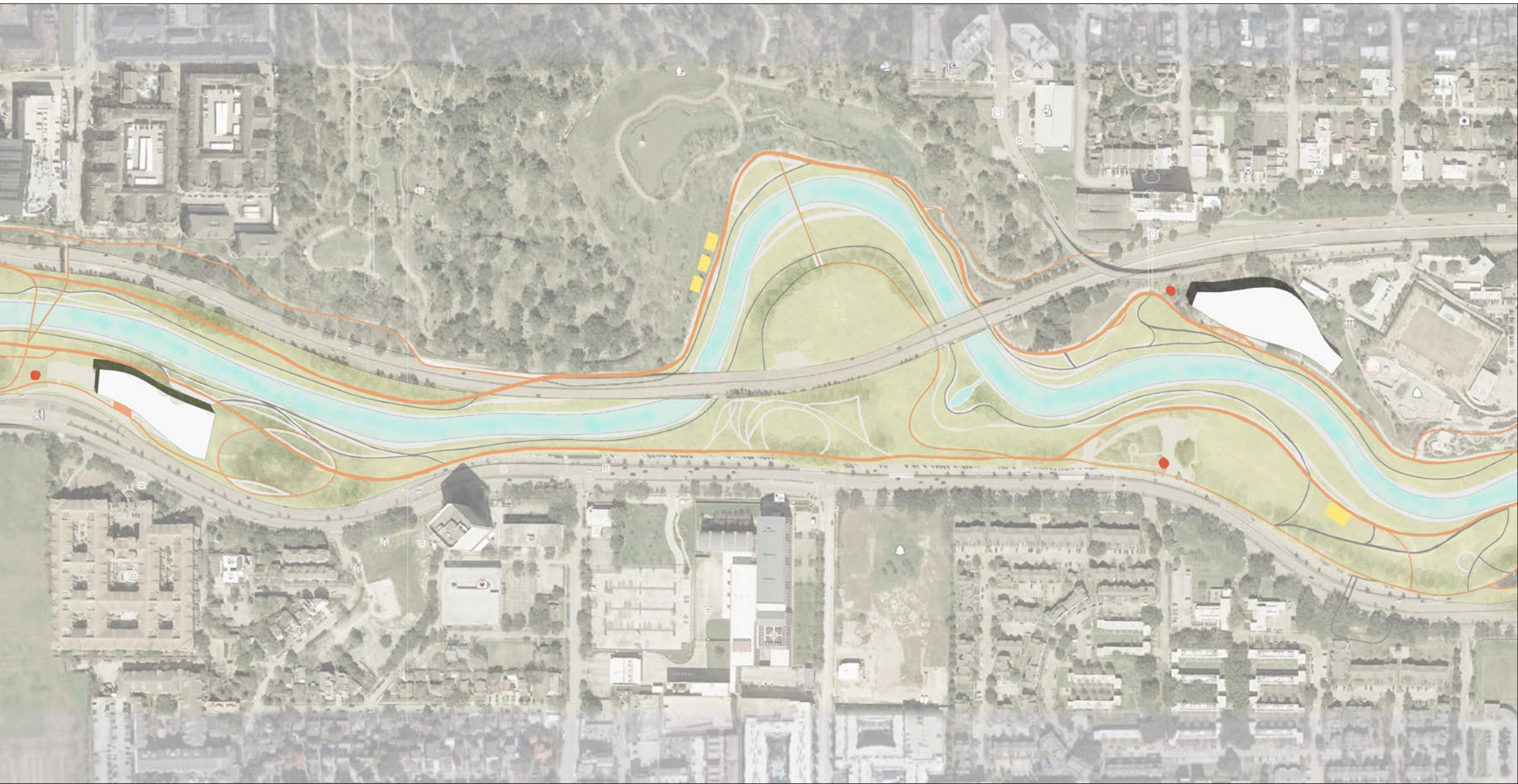
The park is an important sport activity area for the surrounding residents. It offers several different sport facilities and services. There are 3 public bike stations near the site. A 2.5-mile bike trail and several walkways go through the site. Each year, Buffalo Bayou Partnership holds sporting events such as bike and hike tours and family runs. The route of the Chevron Houston Marathon passes through Buffalo Bayou Park area. The park already has a good atmosphere of sports and physical activity.



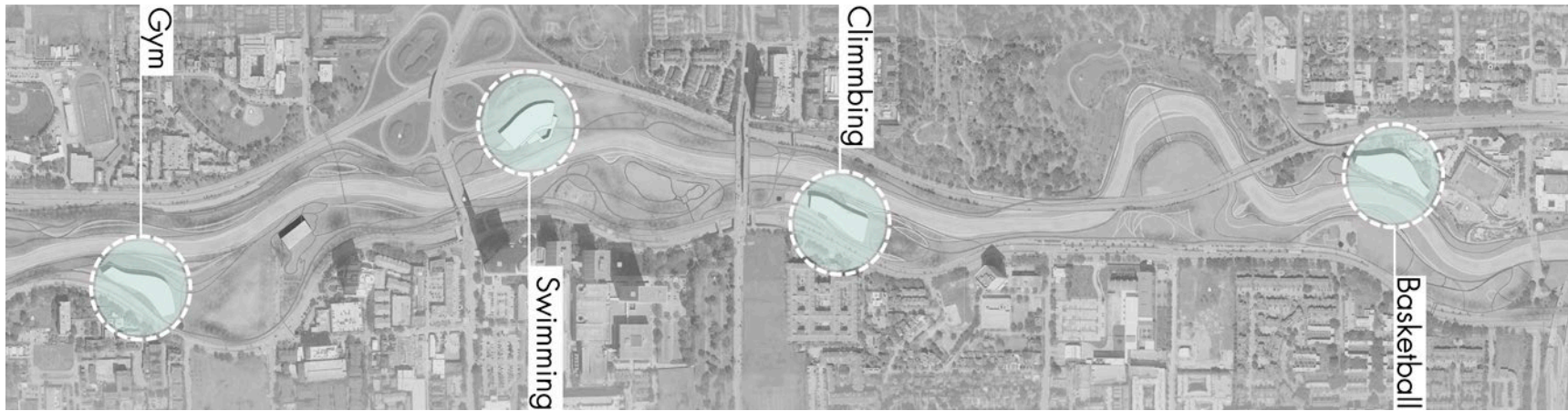


MASTER PLAN





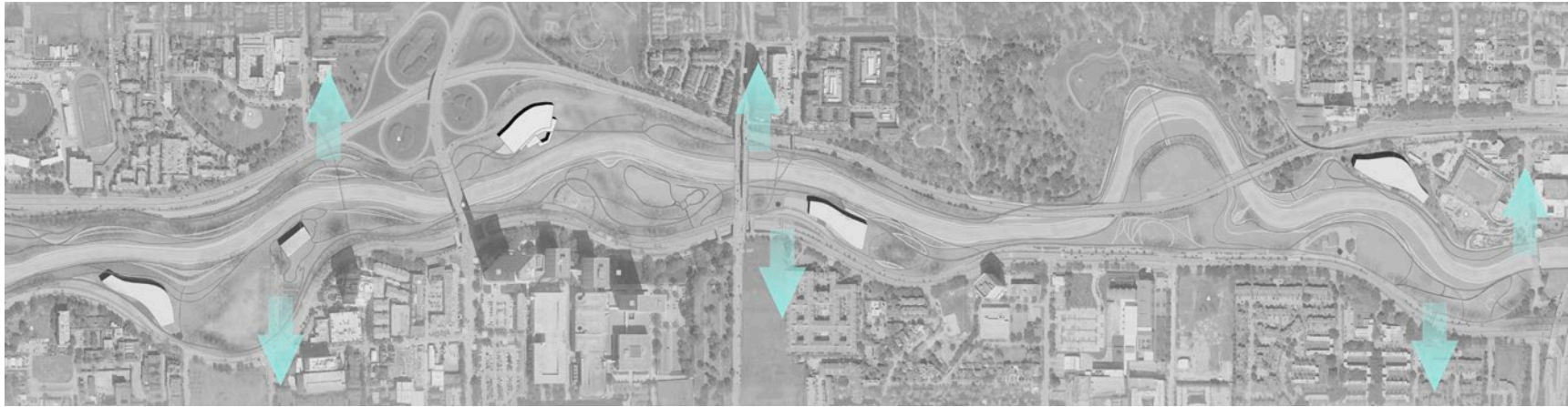
ANALYSIS



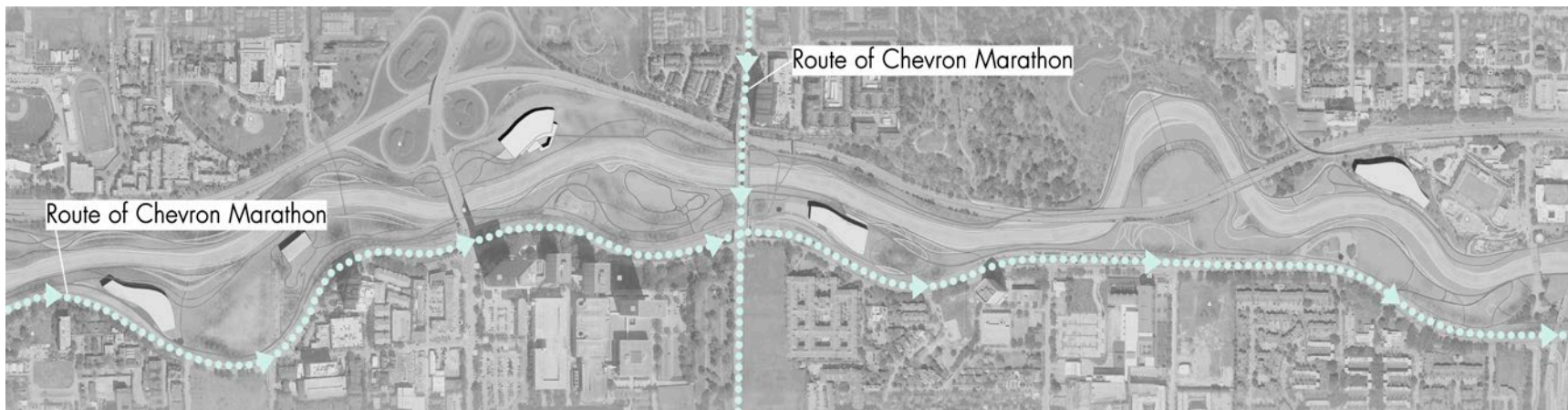
Different sports facilities were separated along the bayou.



The park is a connection between uptown area and the CBD of Houston.



More entrances were added along the park.

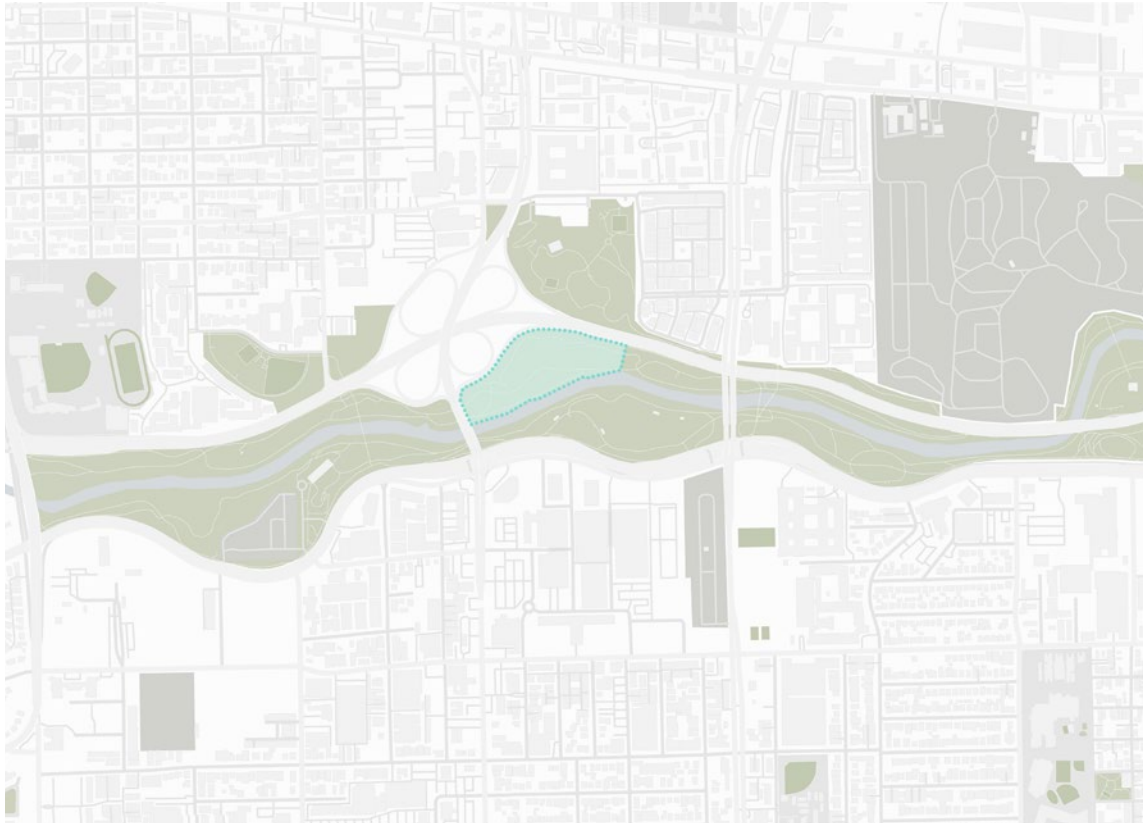


Route of Chevron Marathon partly pass by the bayou.

ARCHITECTURE DESIGN

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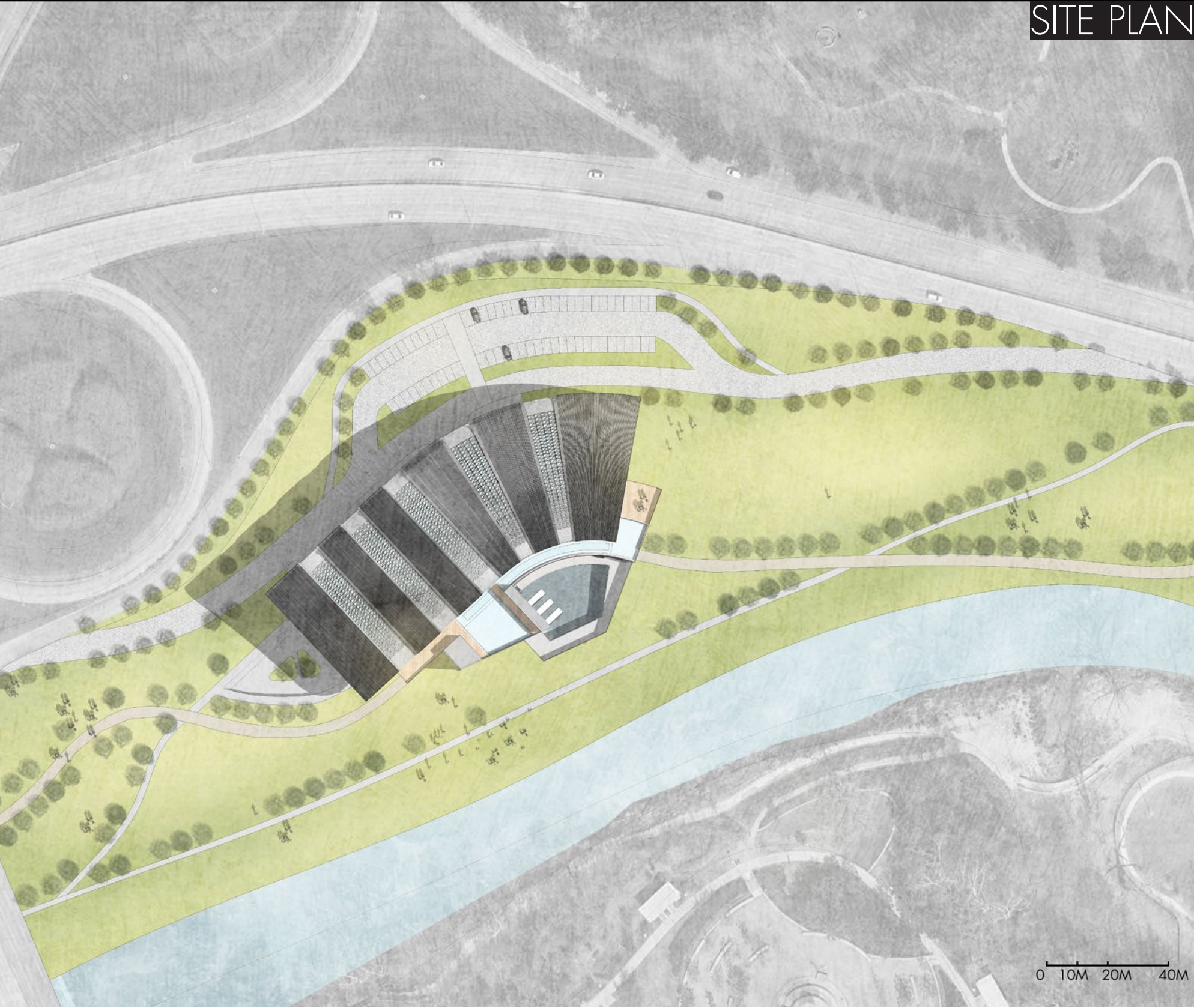
LOCATION

The site is in the middle of Buffalo Bayou Park. It is about 1.5 mile from the CBD area of Houston. The size of the site is about 8 acres. The elevation difference between the south part of the site and the north part of the site is about 20 ft. The north part is higher. Memorial Drive is on the north of the site. There is no secondary road to connect the site and outside area.

Around the site are Waugh Bat Colony, Wortham Foundation Grove, Johnny Steele Dog Park and many other scenic spots are seperated. Buildings surrounding the site mostly low-rise residential buildings and apartment buildings.



SITE PLAN

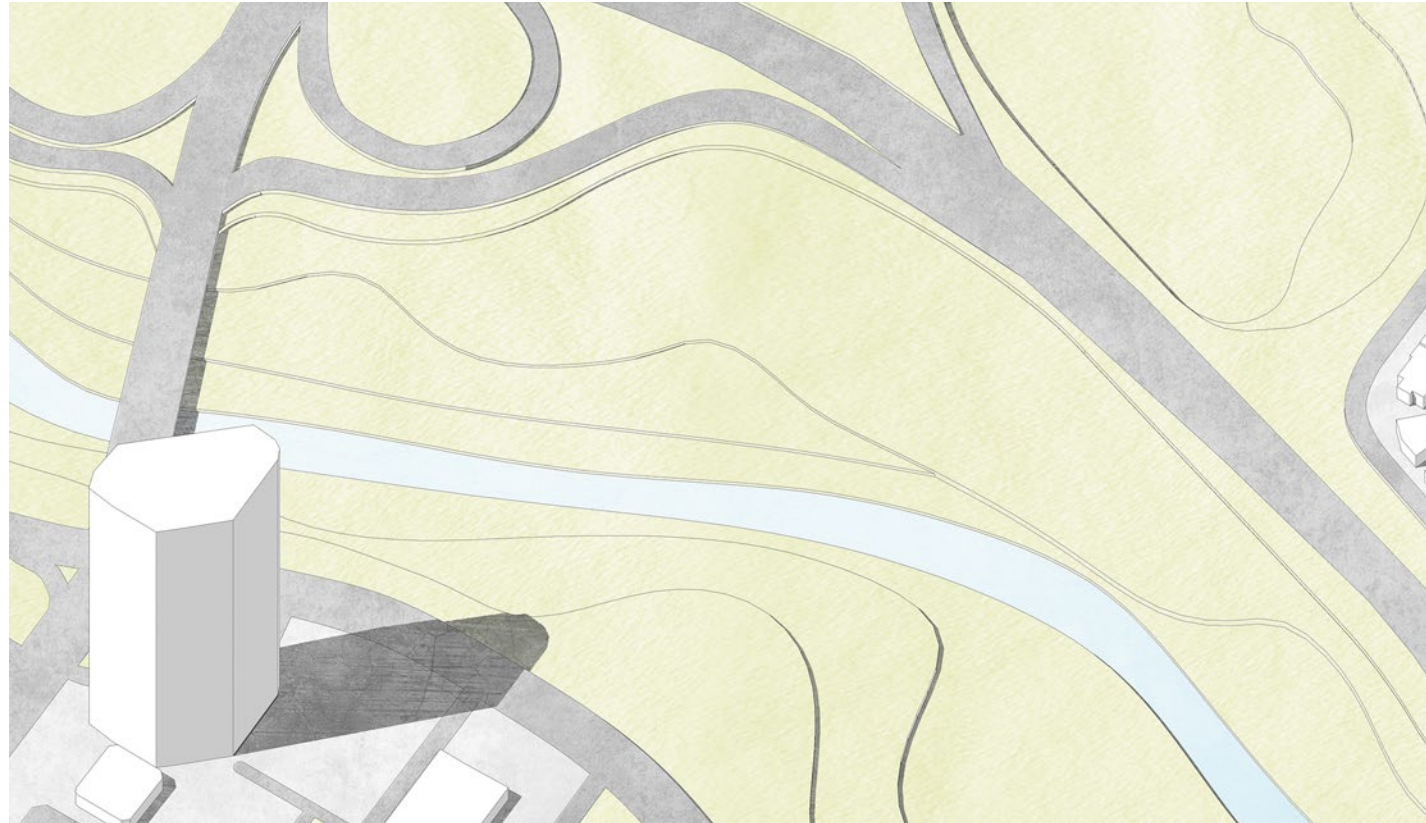


0 10M 20M 40M

SITE CONTEXT

EXISTING CONDITION

The site is located along Buffalo Bayou. There is a bike way running through the site.



SITE BOUNDARY

The site boundaries include Memorial Drive , Waugh Drive, the Hawkins Meadow and Buffalo Bayou.





URBAN GREENSPACE

The site is surrounded by a series of greenspaces. It is a goal of the project to intergrate the building into the park activities.



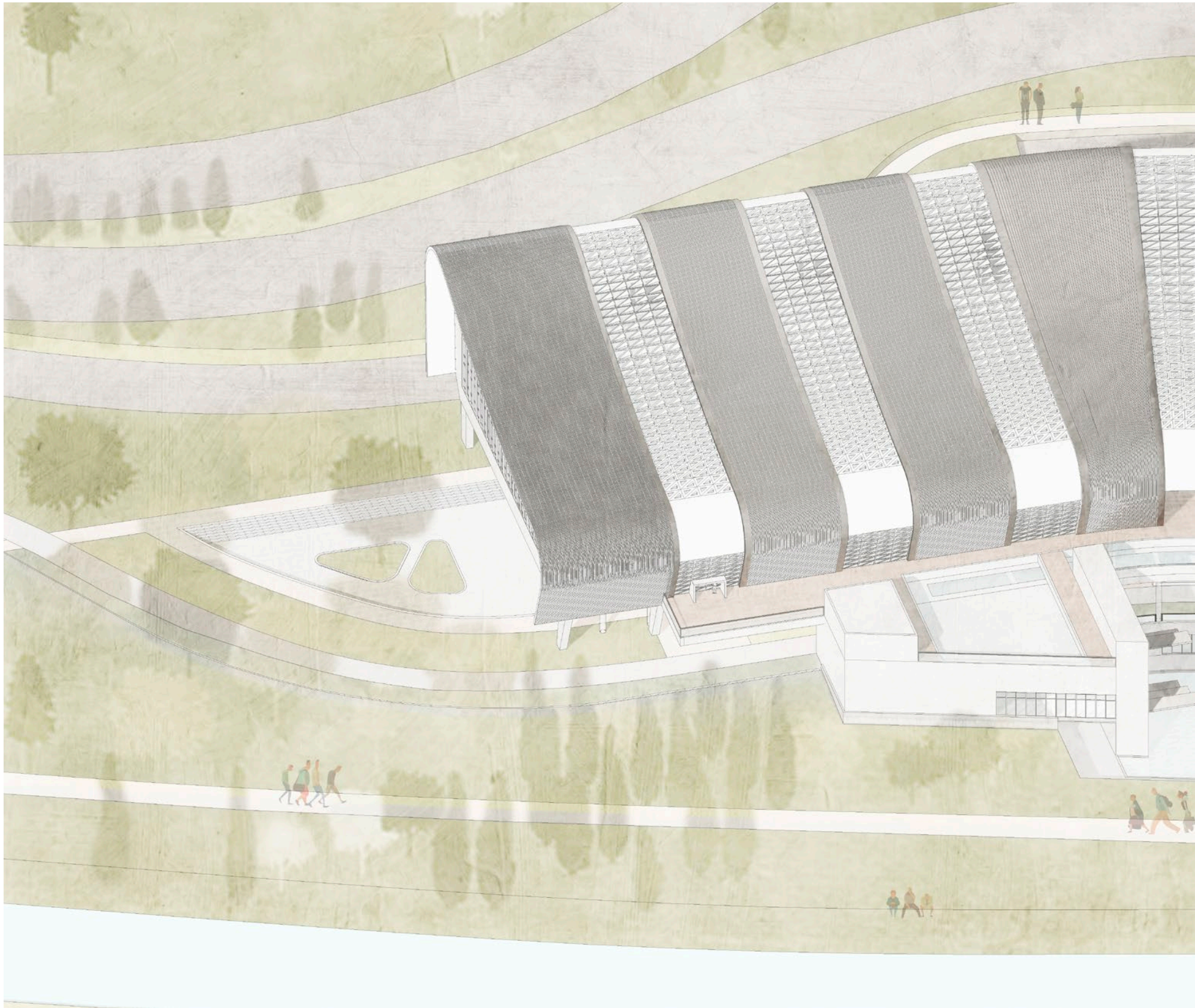
BUFFALO BAYOU

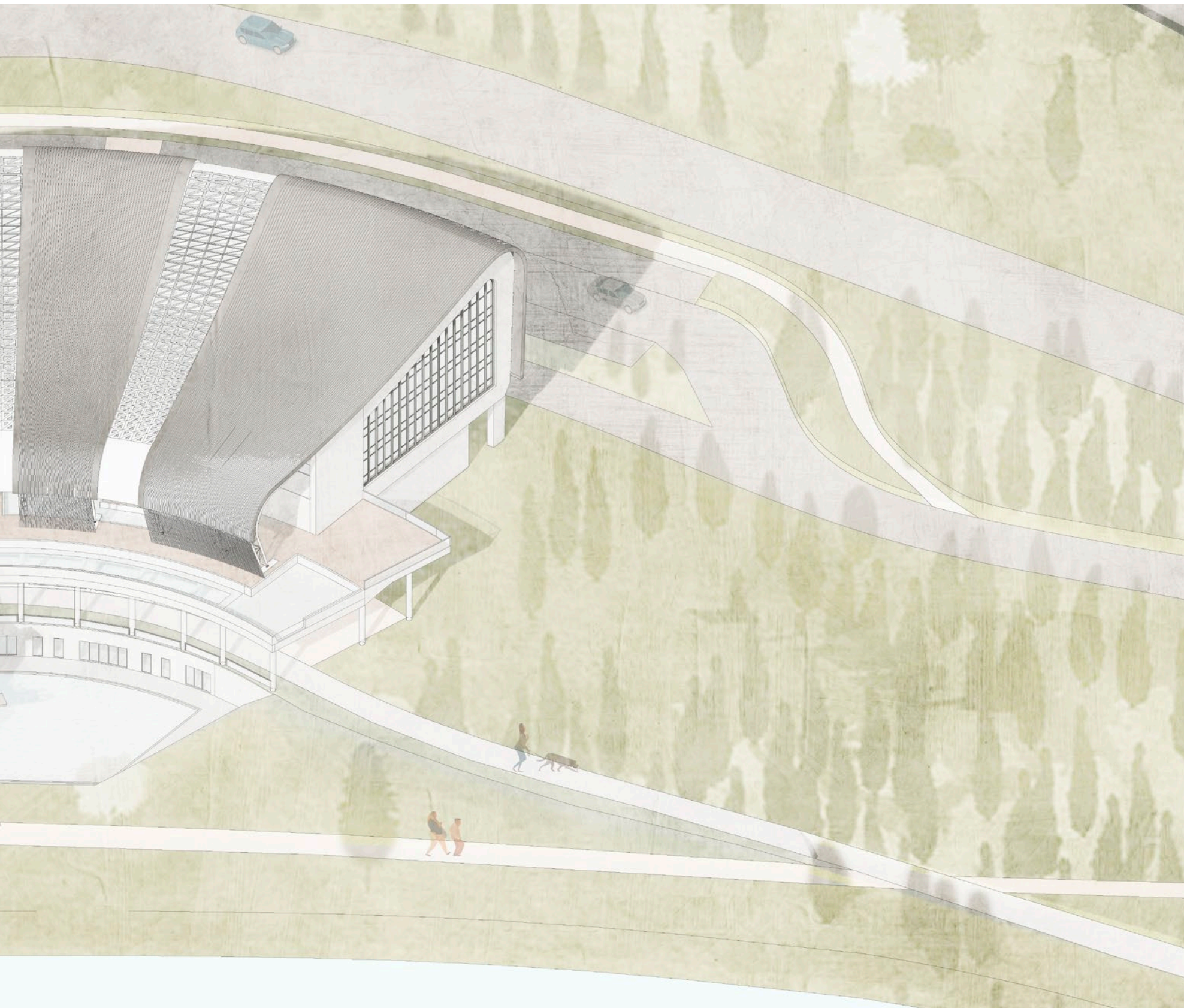
Buffalo Bayou is one of the most important elements of the site. It is crucial to build relationships between the architecture and the bayou.



TOPOGRAPHY

The elevation difference between the south part of the site and the north part of the site is about 20 ft. the North part is higher.

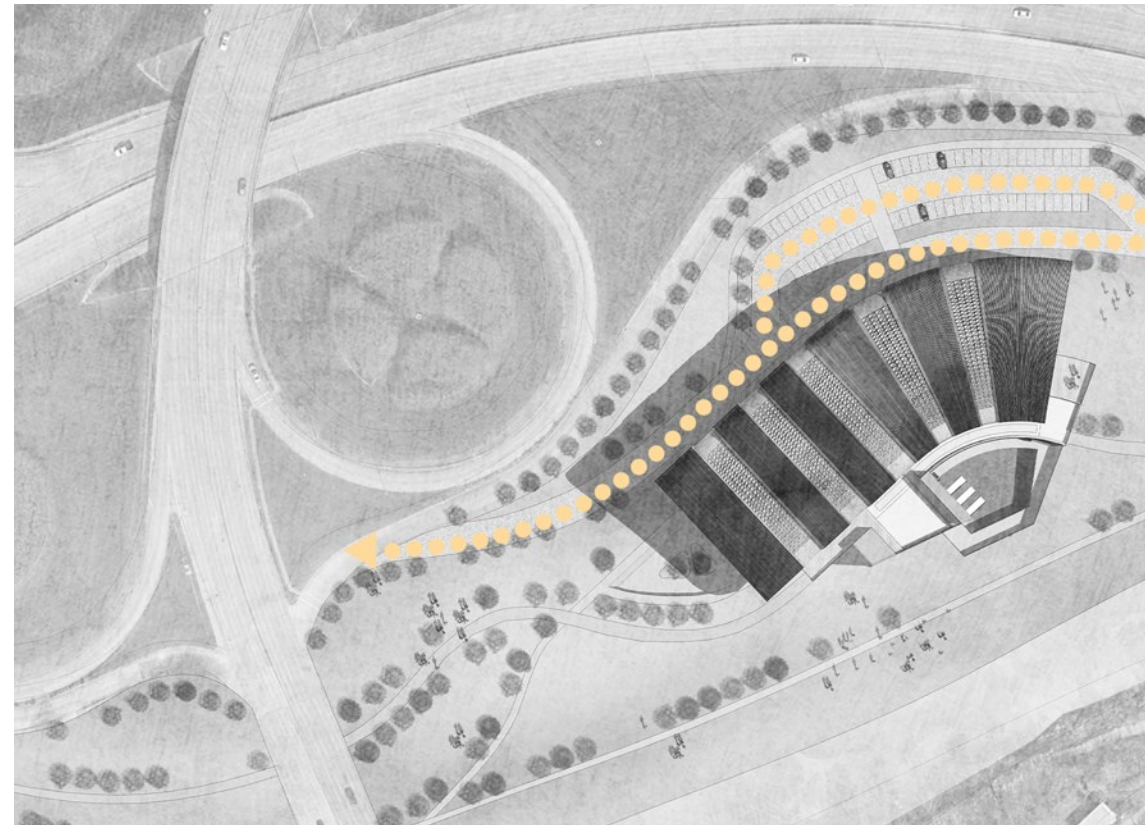




TRAFFIC CONDITON

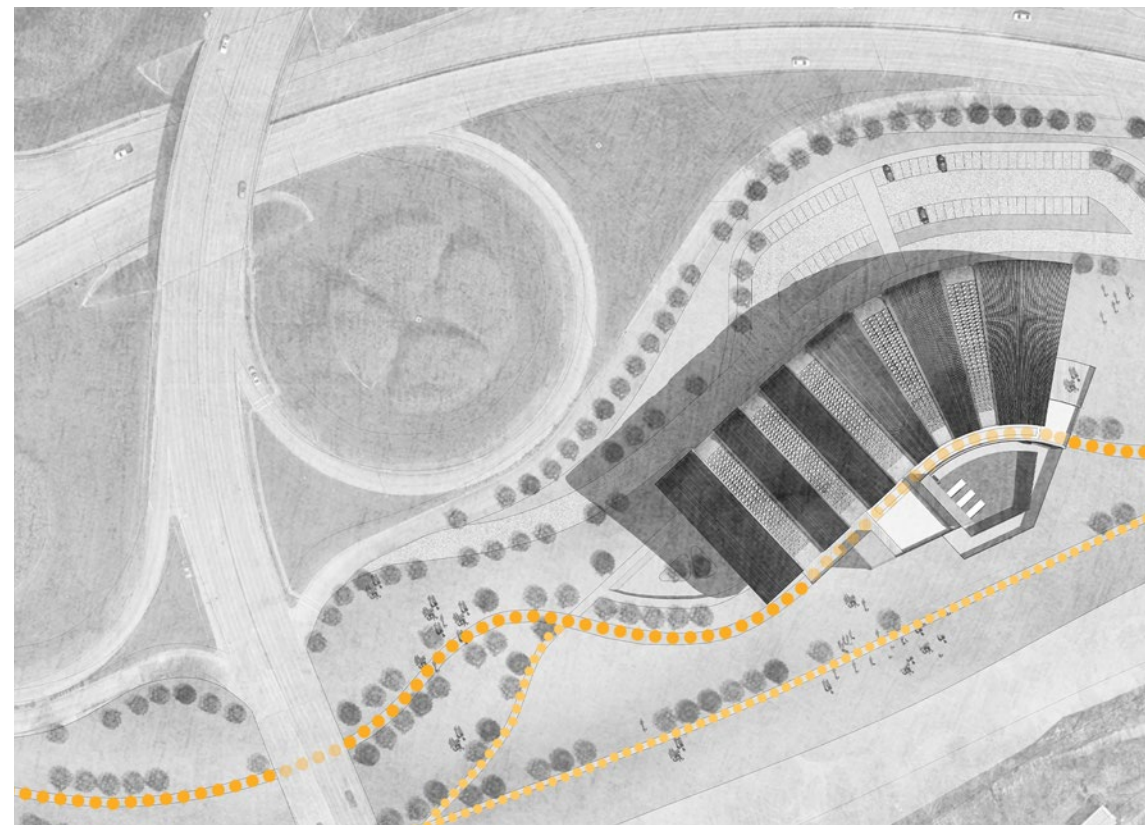
VEHICLUAR ACCESS

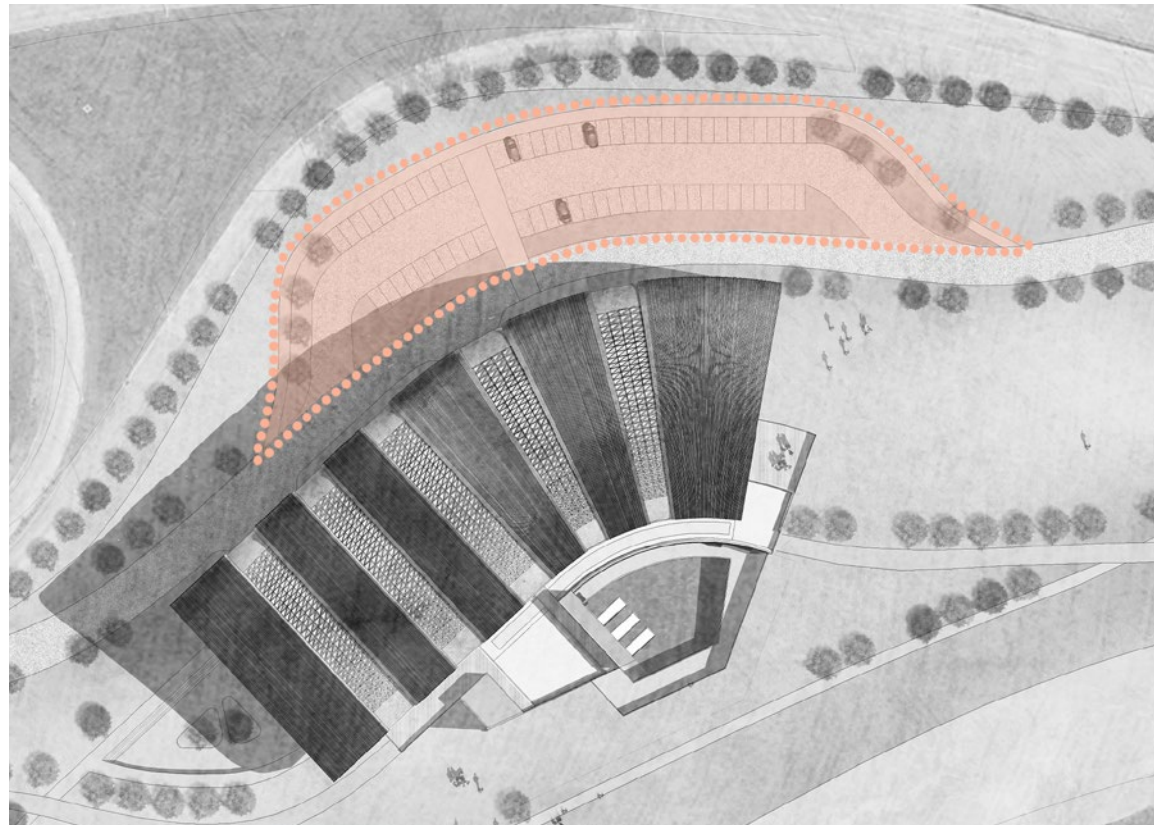
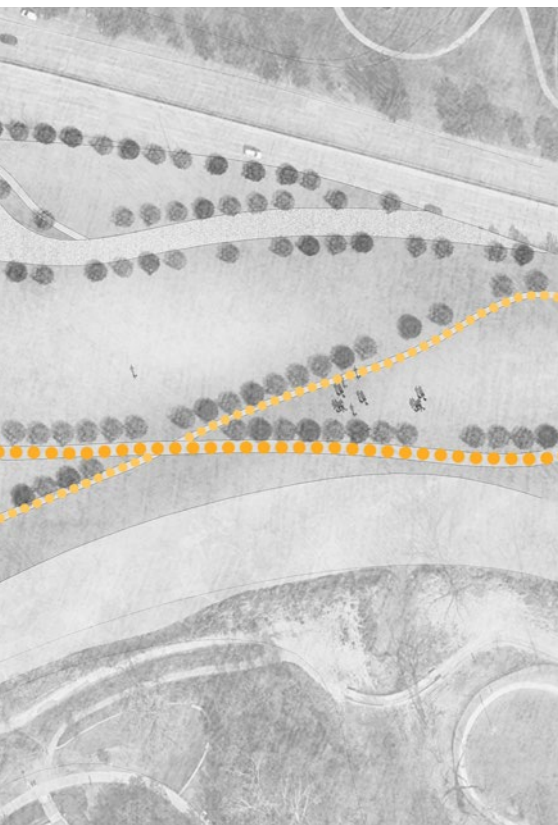
Since there was no secondary road to connect the site and surrounding areas, a vehicular road was created in the north part of the site.



BIKEWAYS & WALKWAYS

The bikeway and walkways were redesigned to connect this site with surrounding residential areas.





PARKING SPACE

A parking area was located in the north part of the site. Its capacity is 80, including 4 handicapped parking space.

In the south part of the site, a bike station was added. The bike station includes a bike parking area and a service area where bikers and joggers can shower and rest.

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PROPOSAL

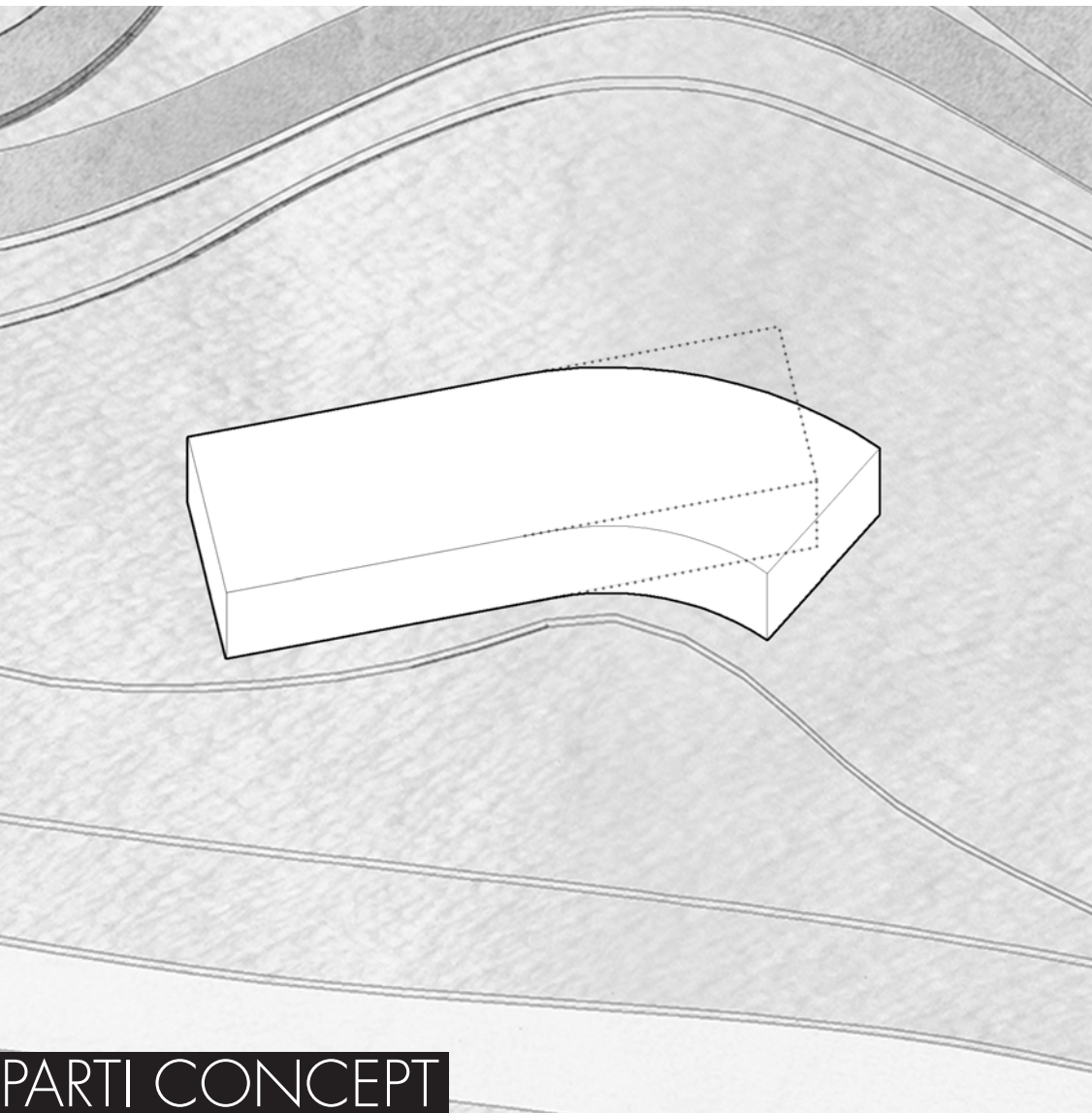




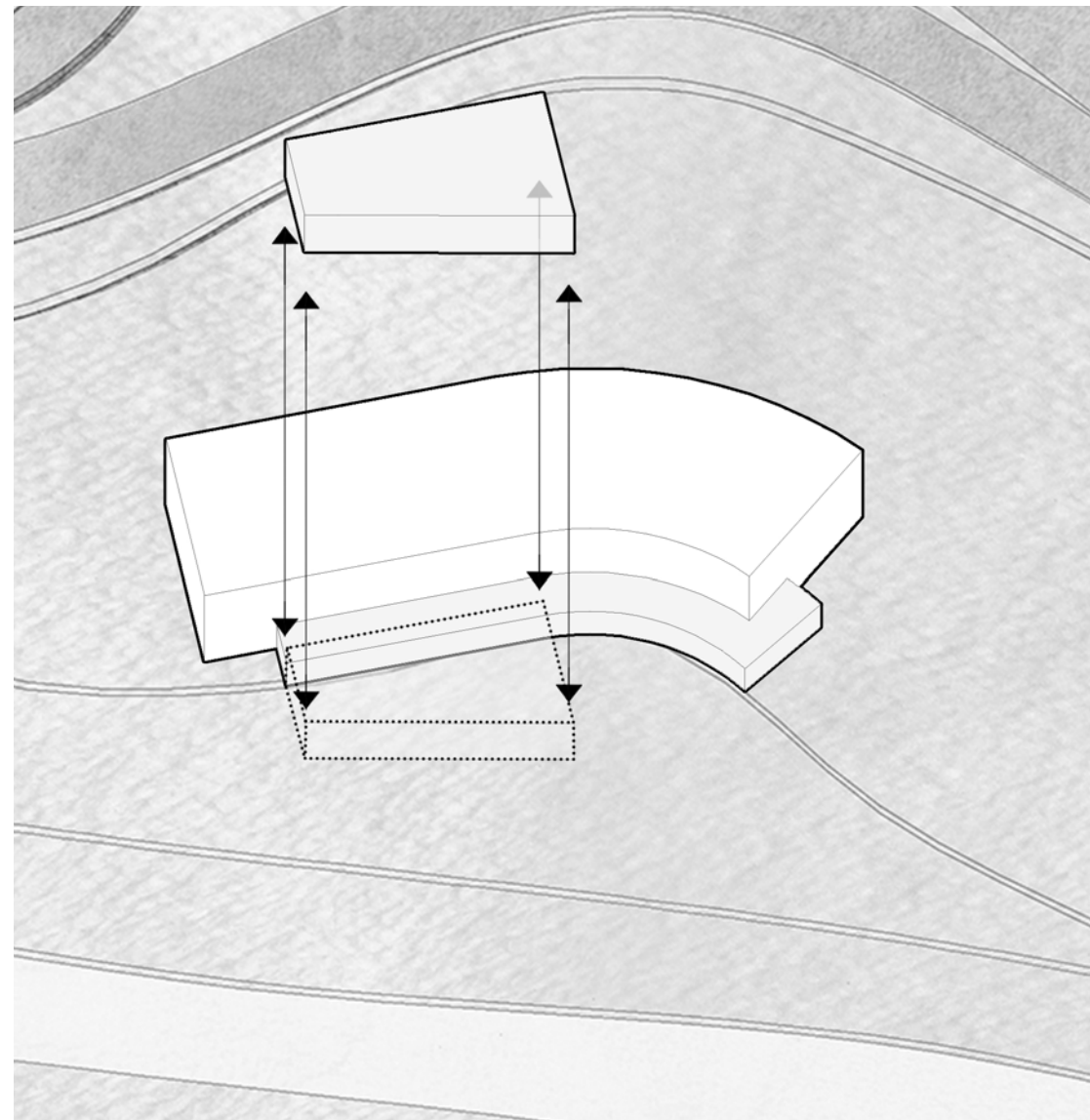
PROGRAMMATIC

The building is divided into 4 different parts – service area, activity area, spa area and staff area.

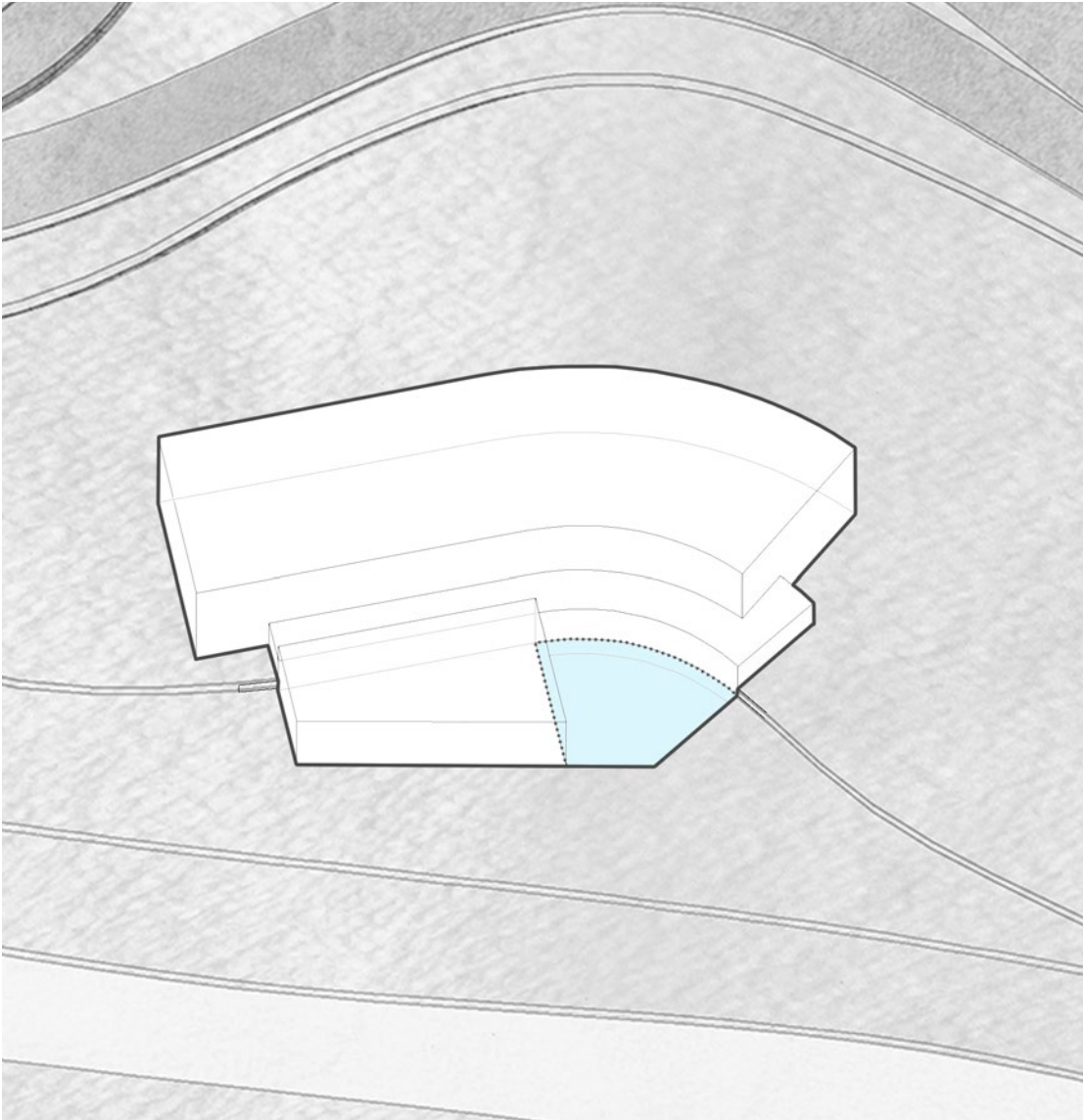
The building gross floor area is 80,546 square feet.



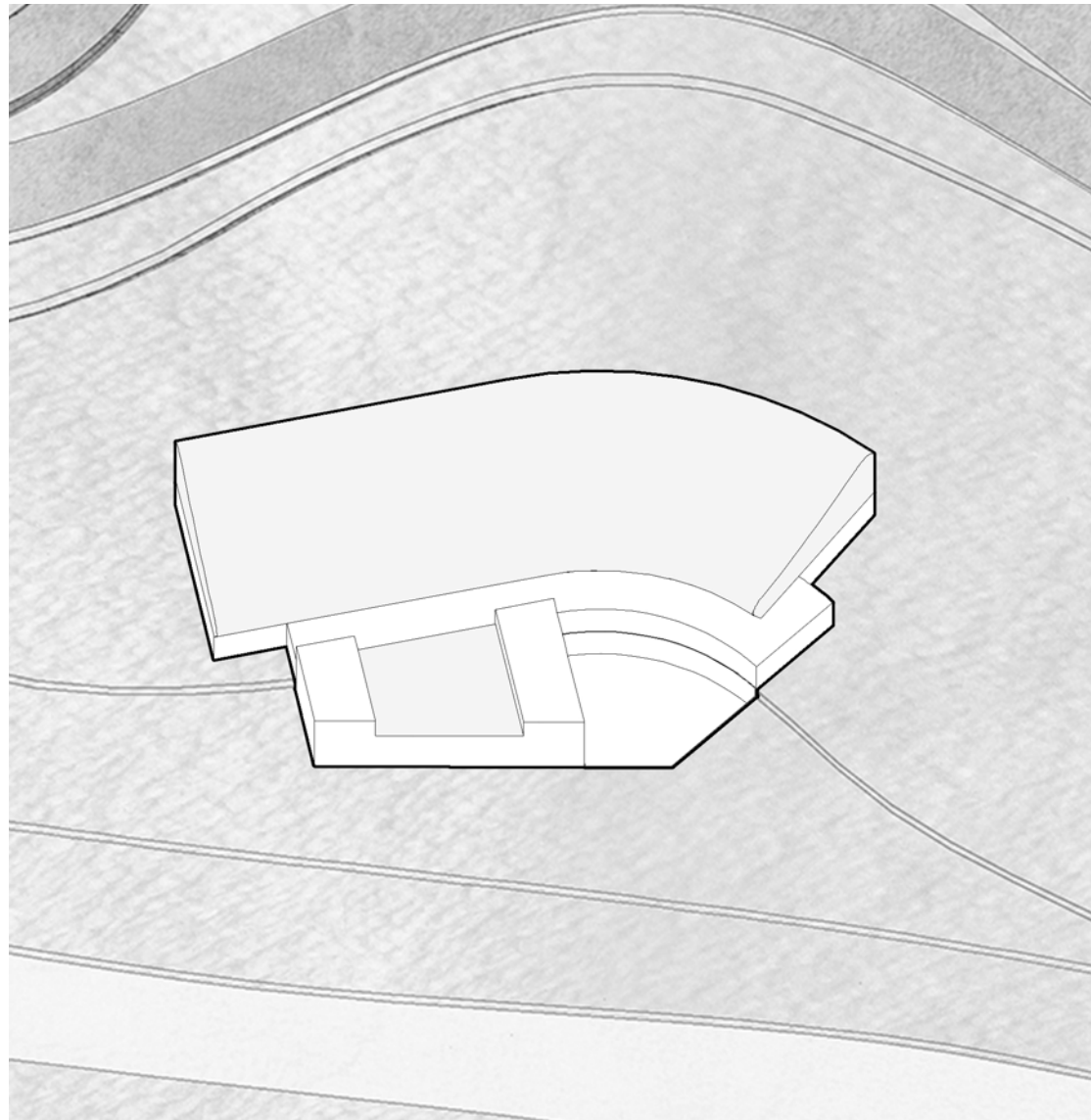
1. The building volume is curved to follow the boundary of the site.



2. A new massing is added beside the main volume.

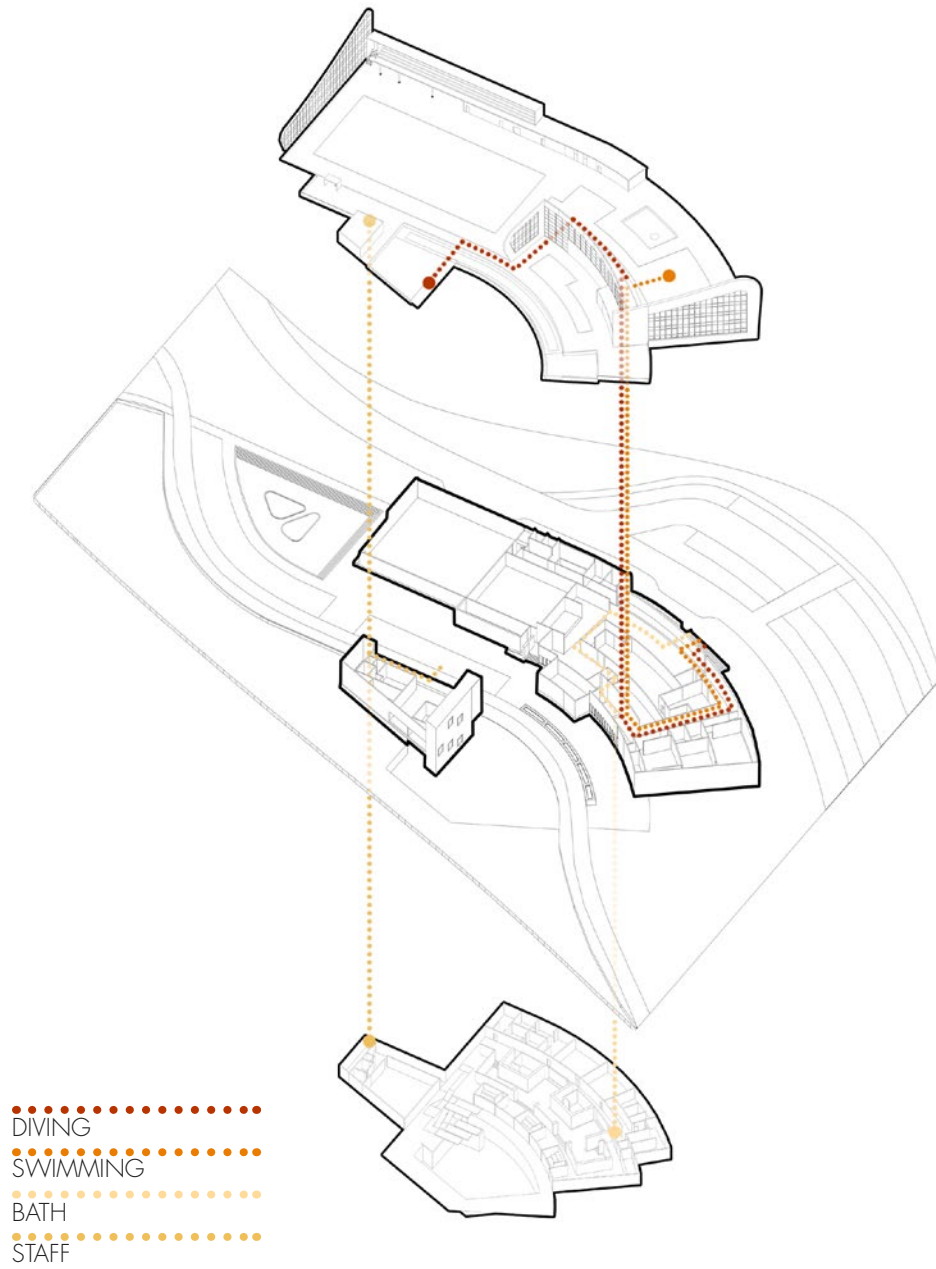


3. A pool area is sunk into underground.



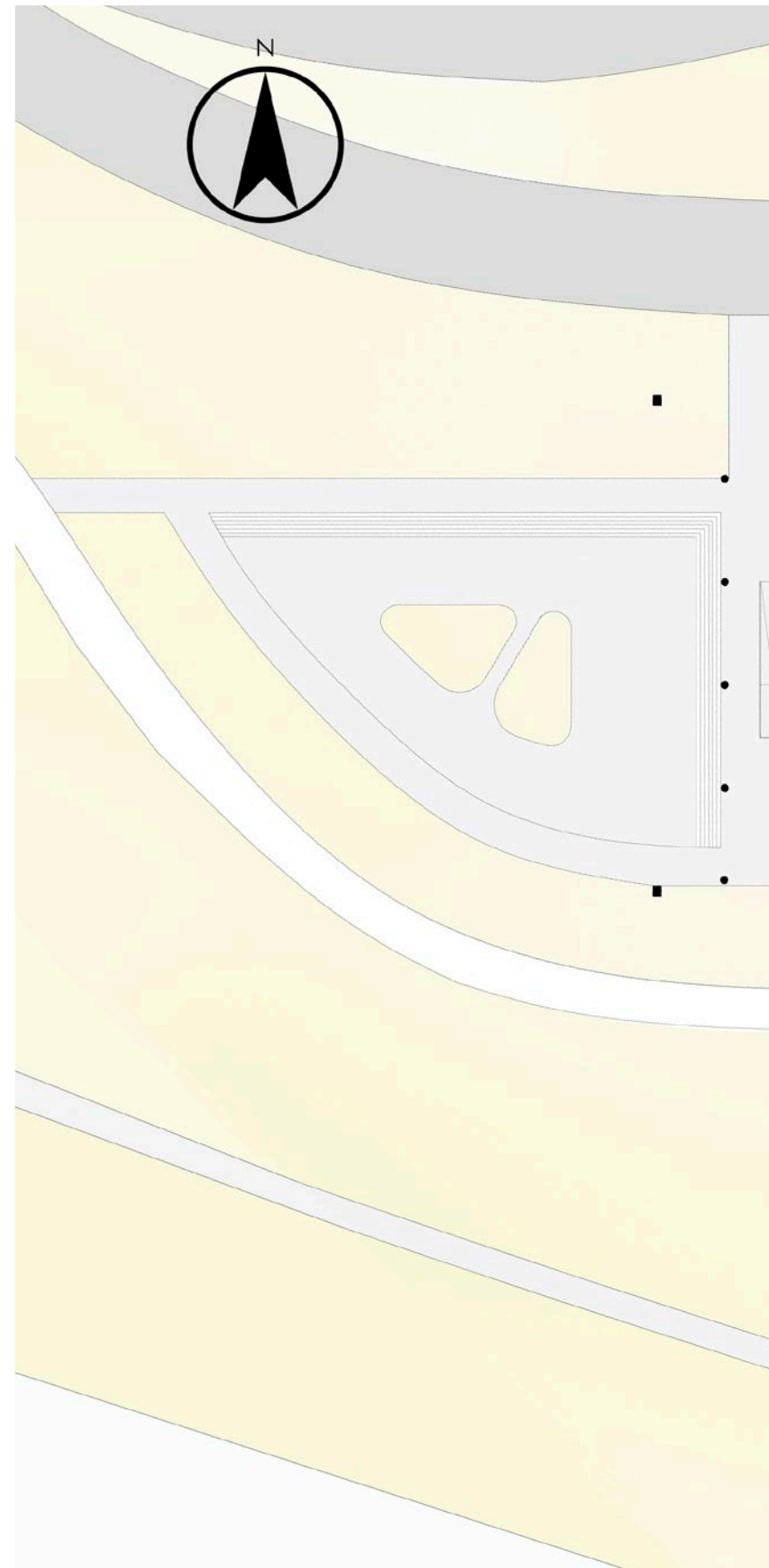
4. The roof of the main volume is designed.

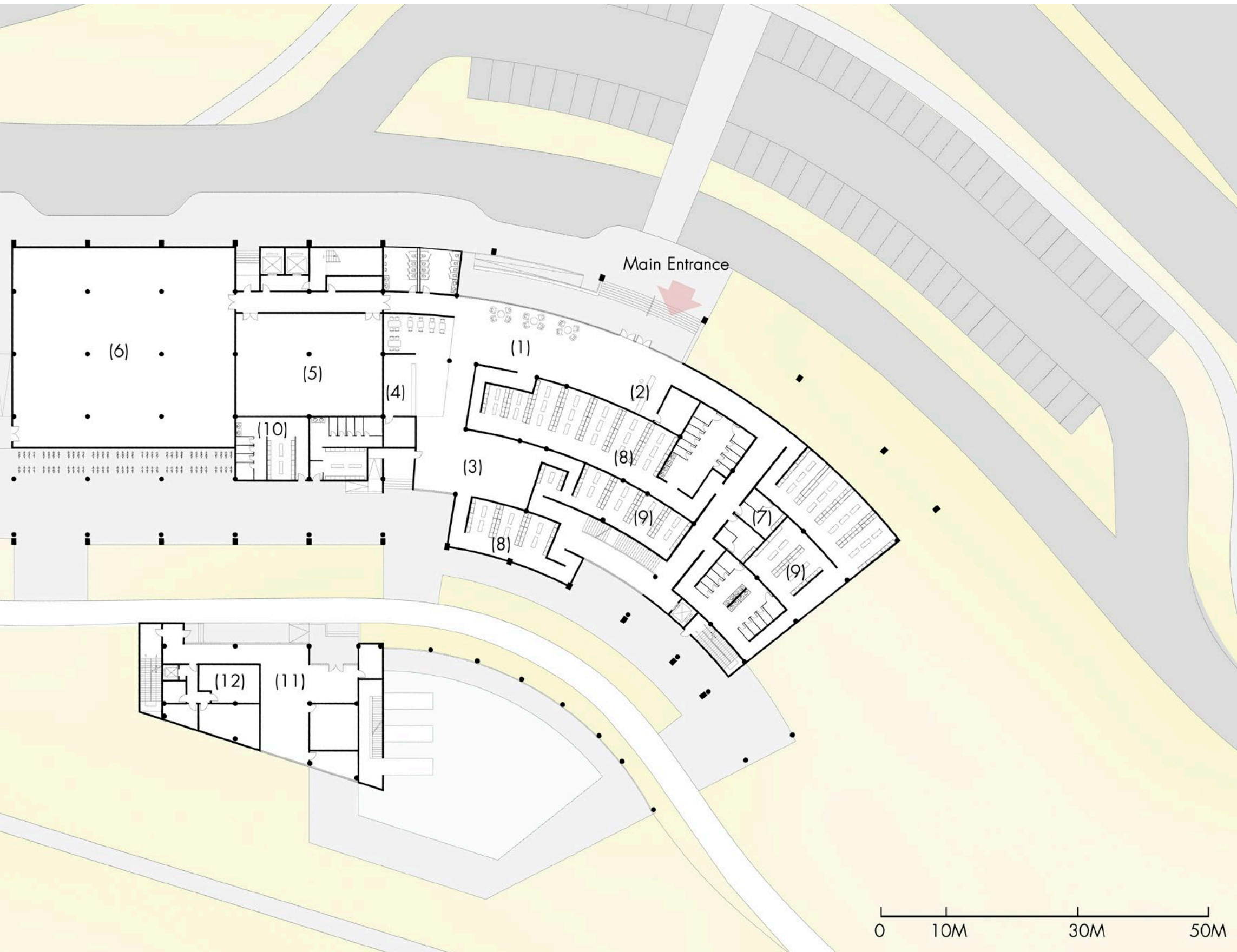
FLOOR PLAN DESIGN



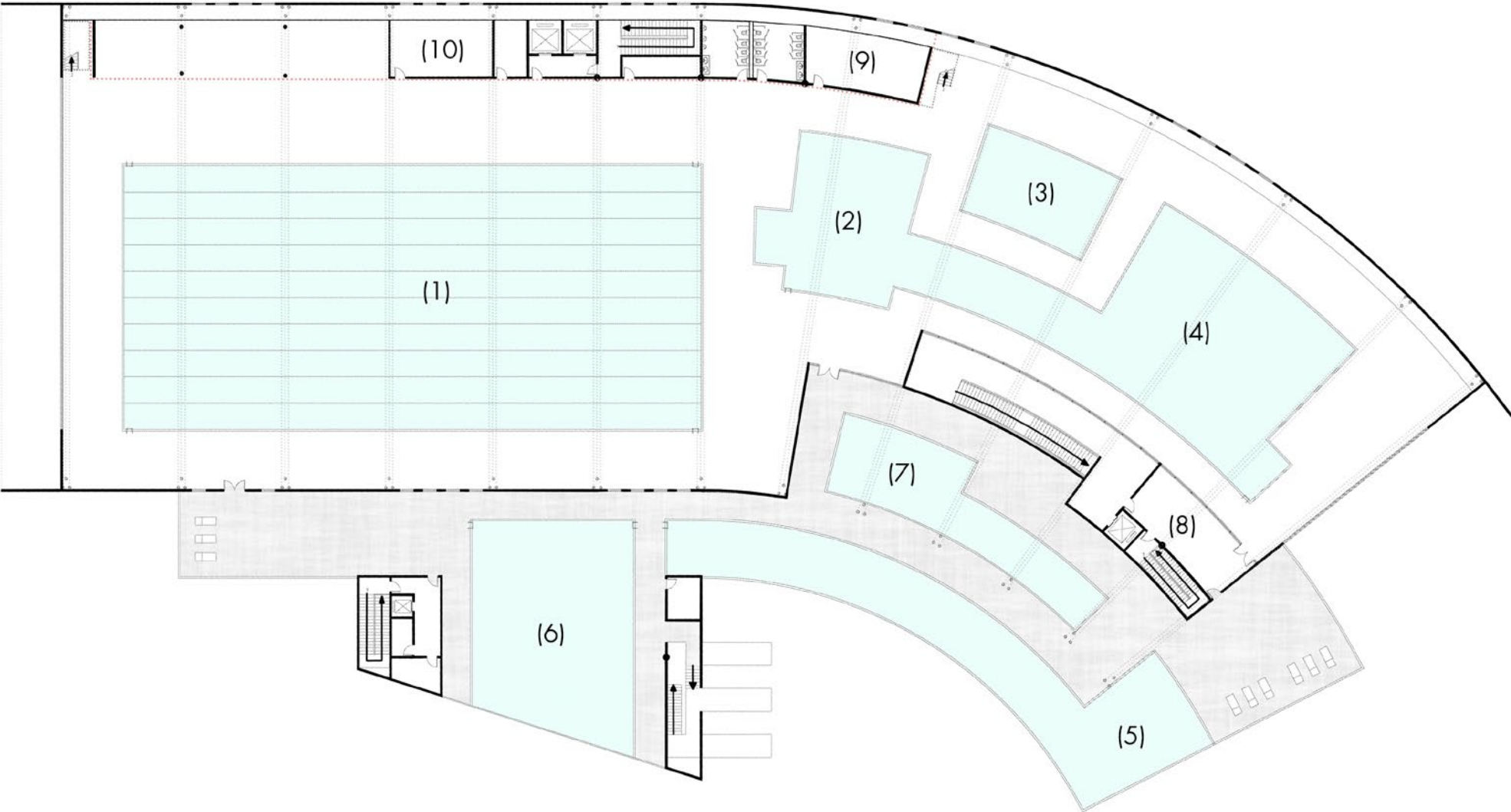
1ST FLOOR DESIGN 1:600

- | | | |
|-------------------|--------------------|-------------------------|
| (1) Lobby | (5) Chiller Room | (9) Female Changing |
| (2) Reception | (6) Equipment Room | (10) Biker Service Area |
| (3) Lobby for SPA | (7) Family Chaning | (11) Office |
| (4) Cafe | (8) Male Changing | (12) Staff Changing |

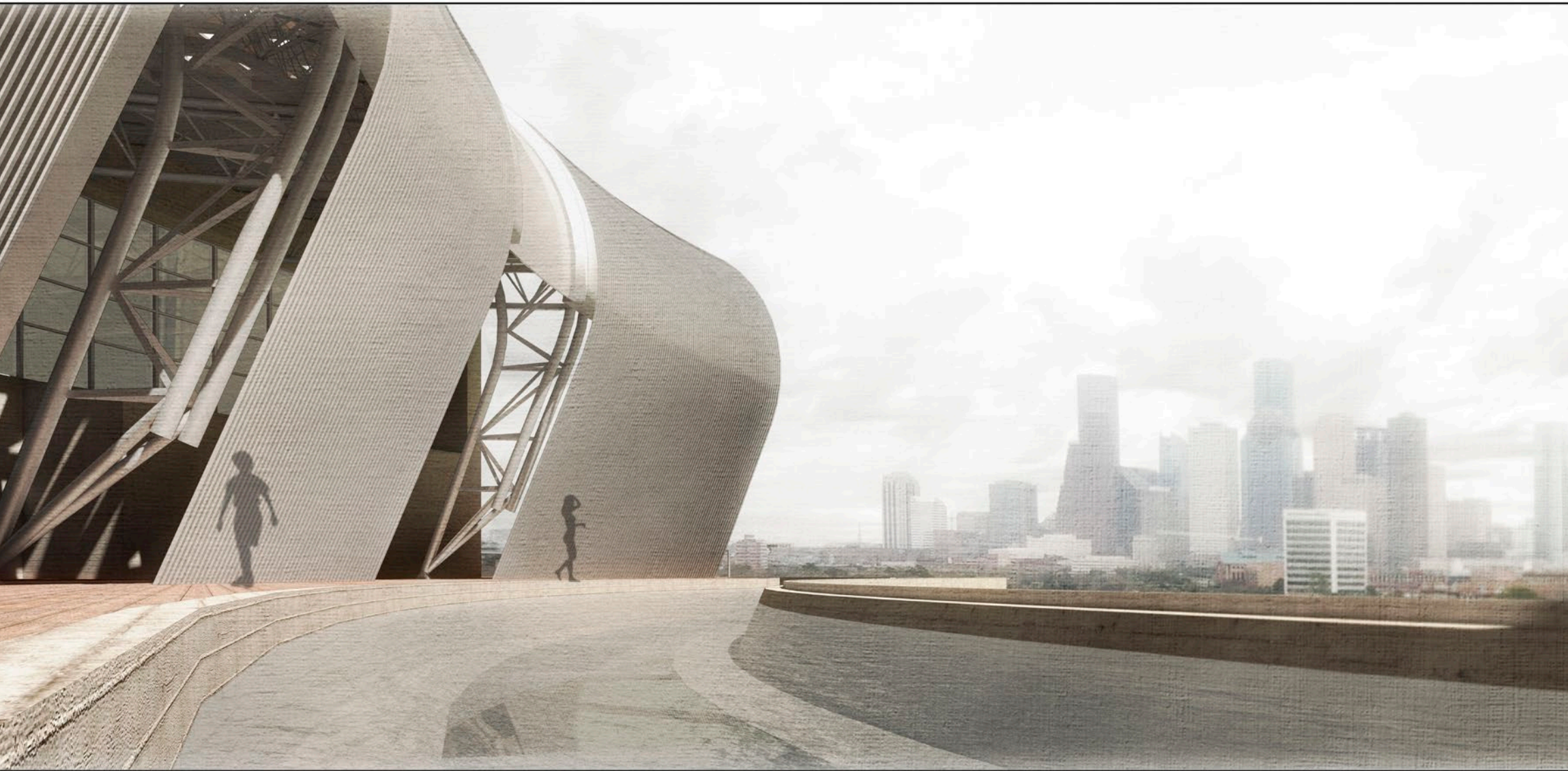




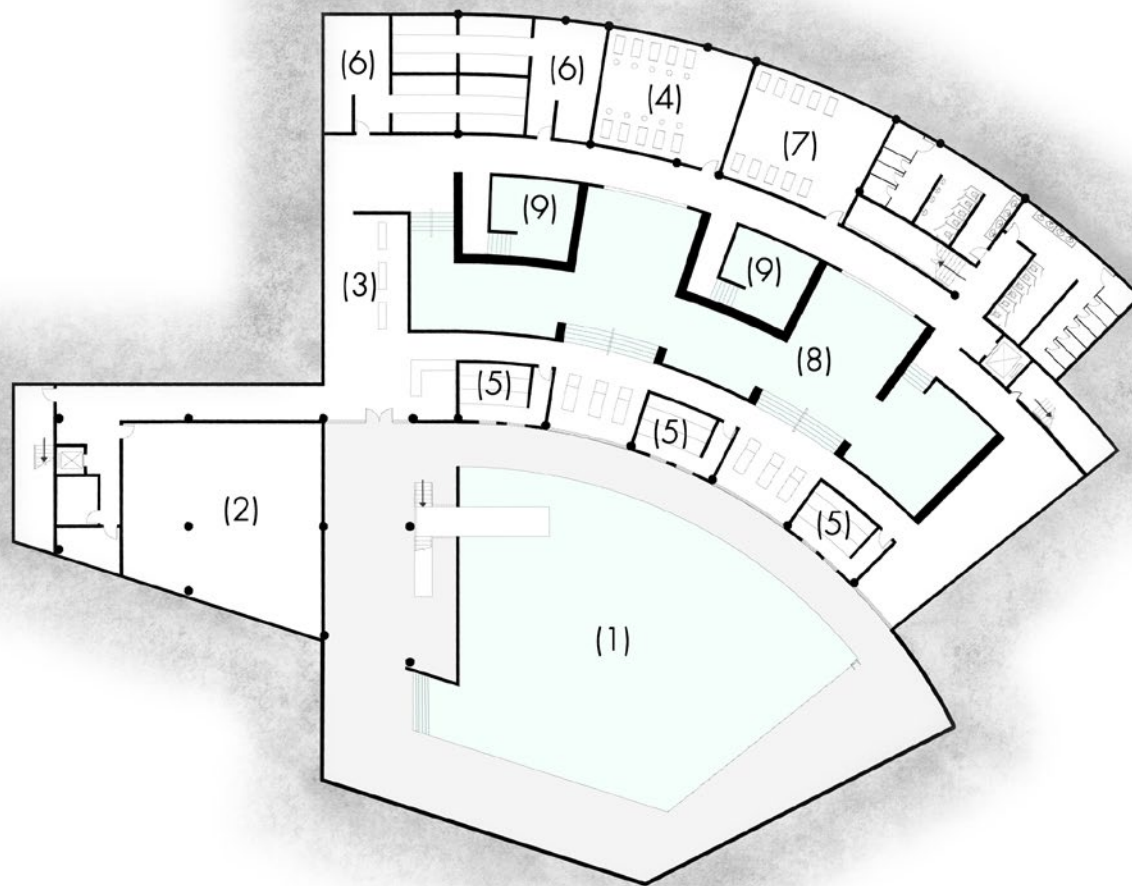
2ND FLOOR DESIGN 1:600



- (1) Standard Pool
- (2) Training Pool
- (3) Children Pool
- (4) Teaching Pool
- (5) Paddling Pool
- (6) Outdoor Pool
- (7) Shallow Pool
- (8) Lobby
- (9) First Aid Room
- (10) Life Guard Office
- (11) Auditorium
- (12) Rest Area



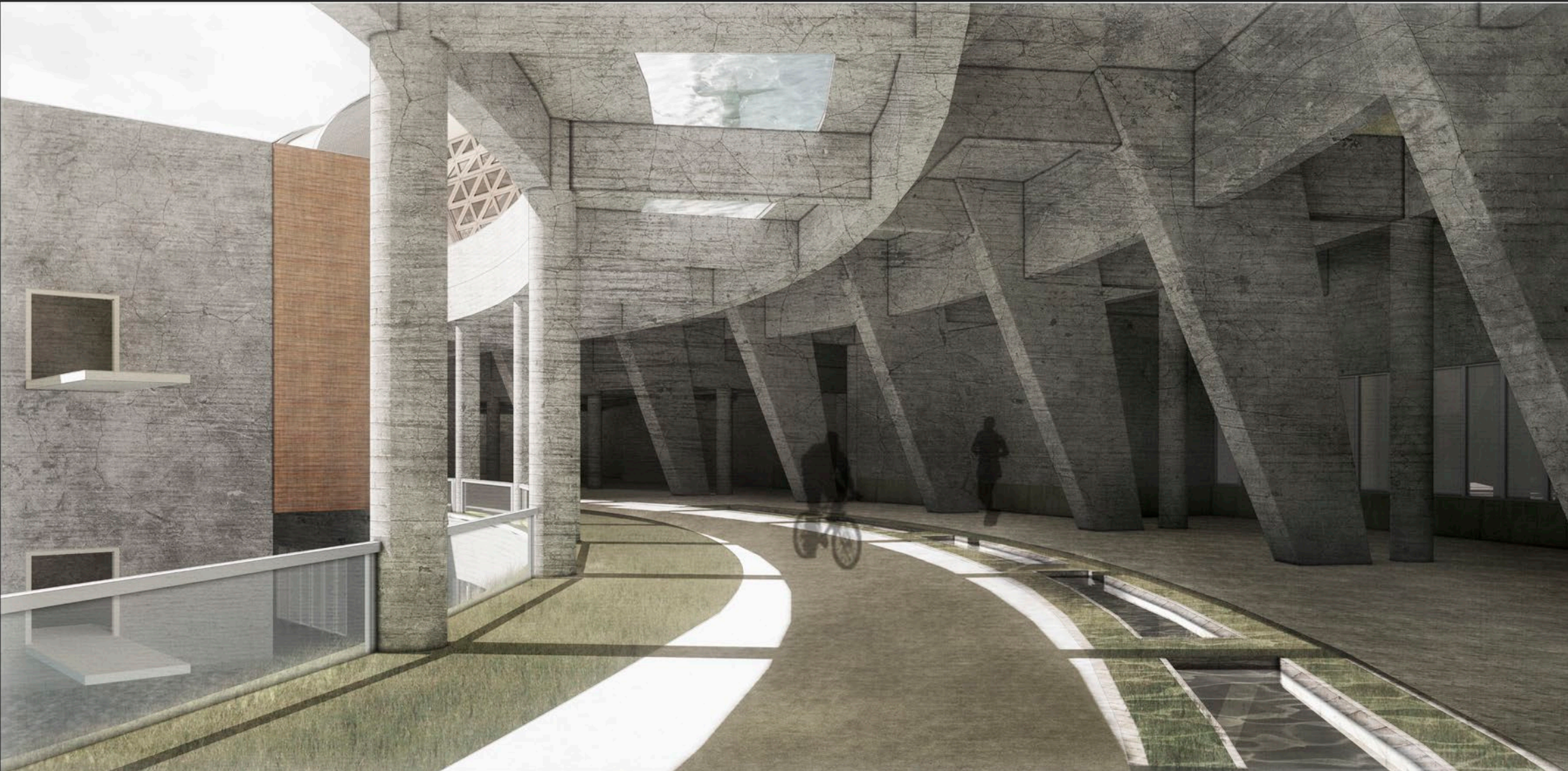
UNDERGROUND FLOOR DESIGN 1:600



(1) Diving Pool
(2) Equipment Room
(3) Rest Place

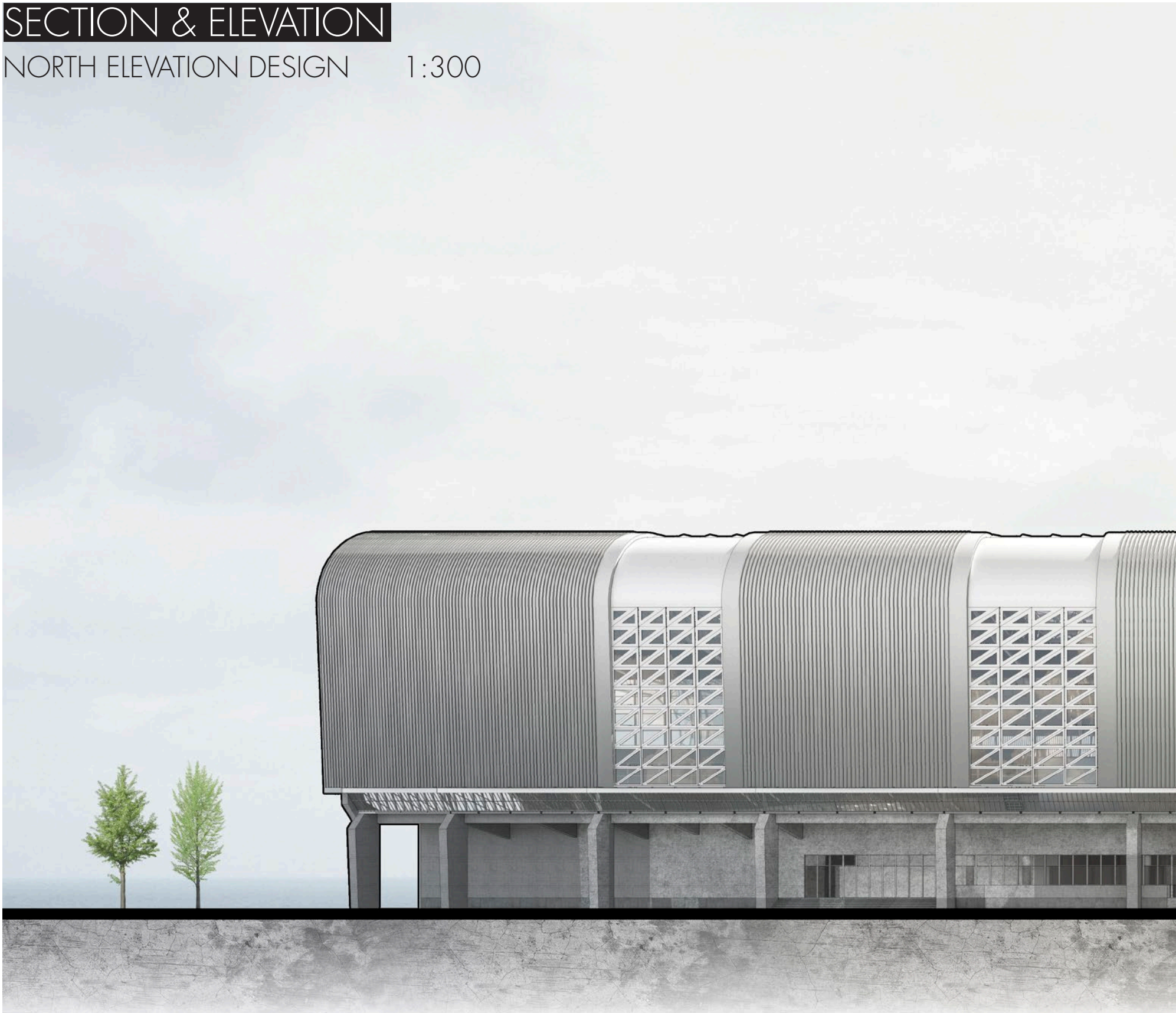
(4) Massage Room
(5) Sauna
(6) Turkish Bath

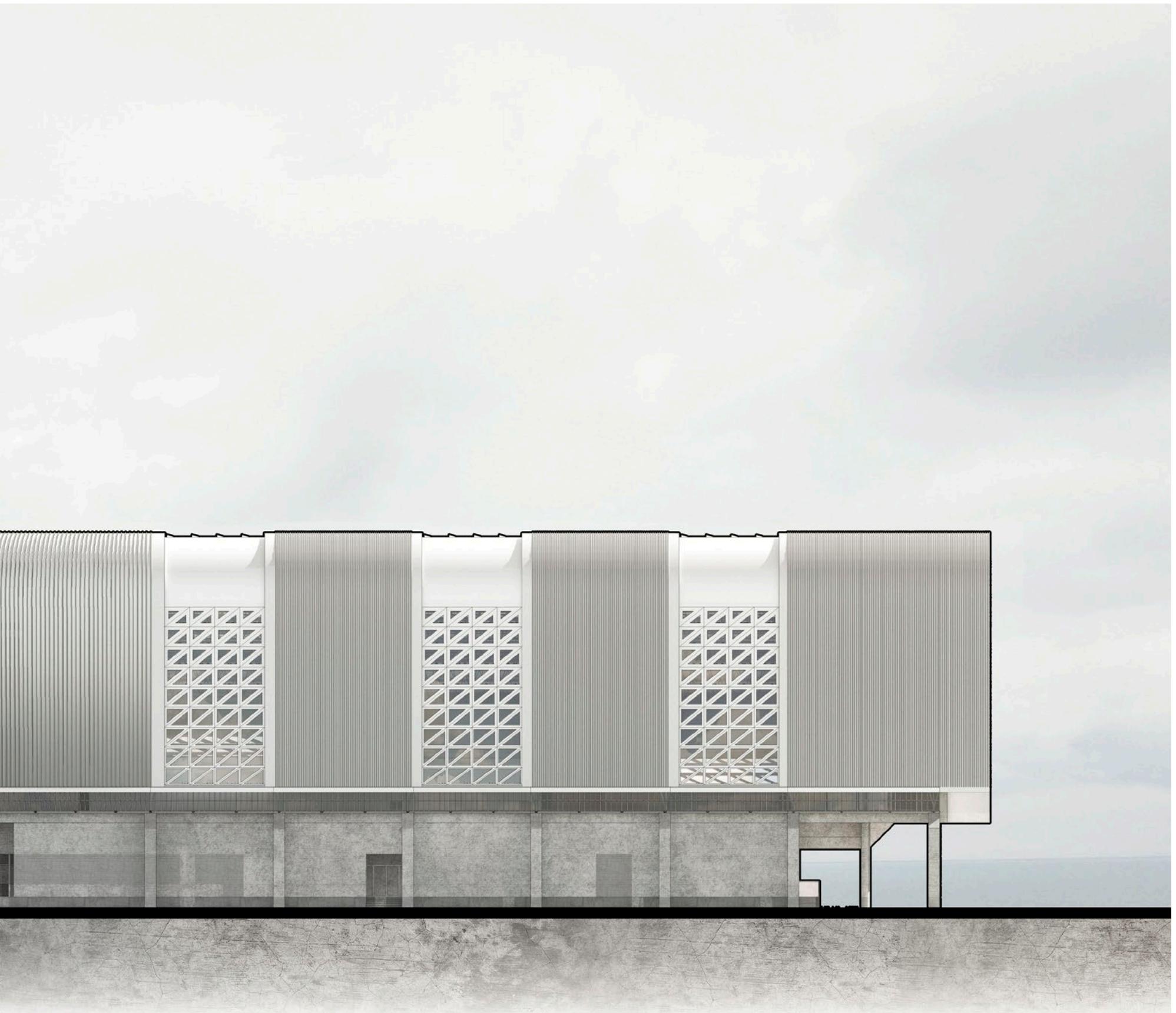
(7) Spa Room
(8) Inside Bath
(9) Cold Bath



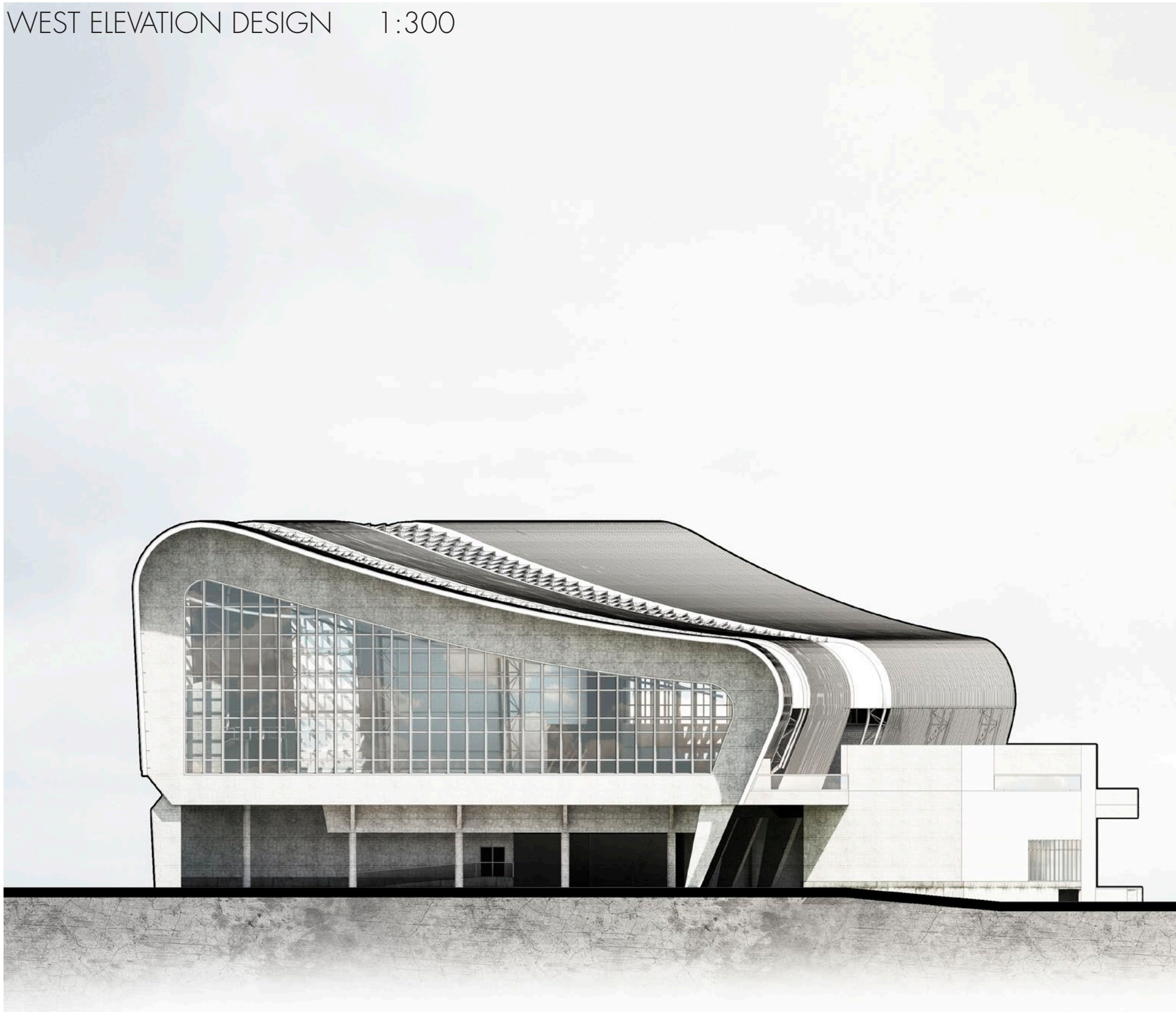
SECTION & ELEVATION

NORTH ELEVATION DESIGN 1:300



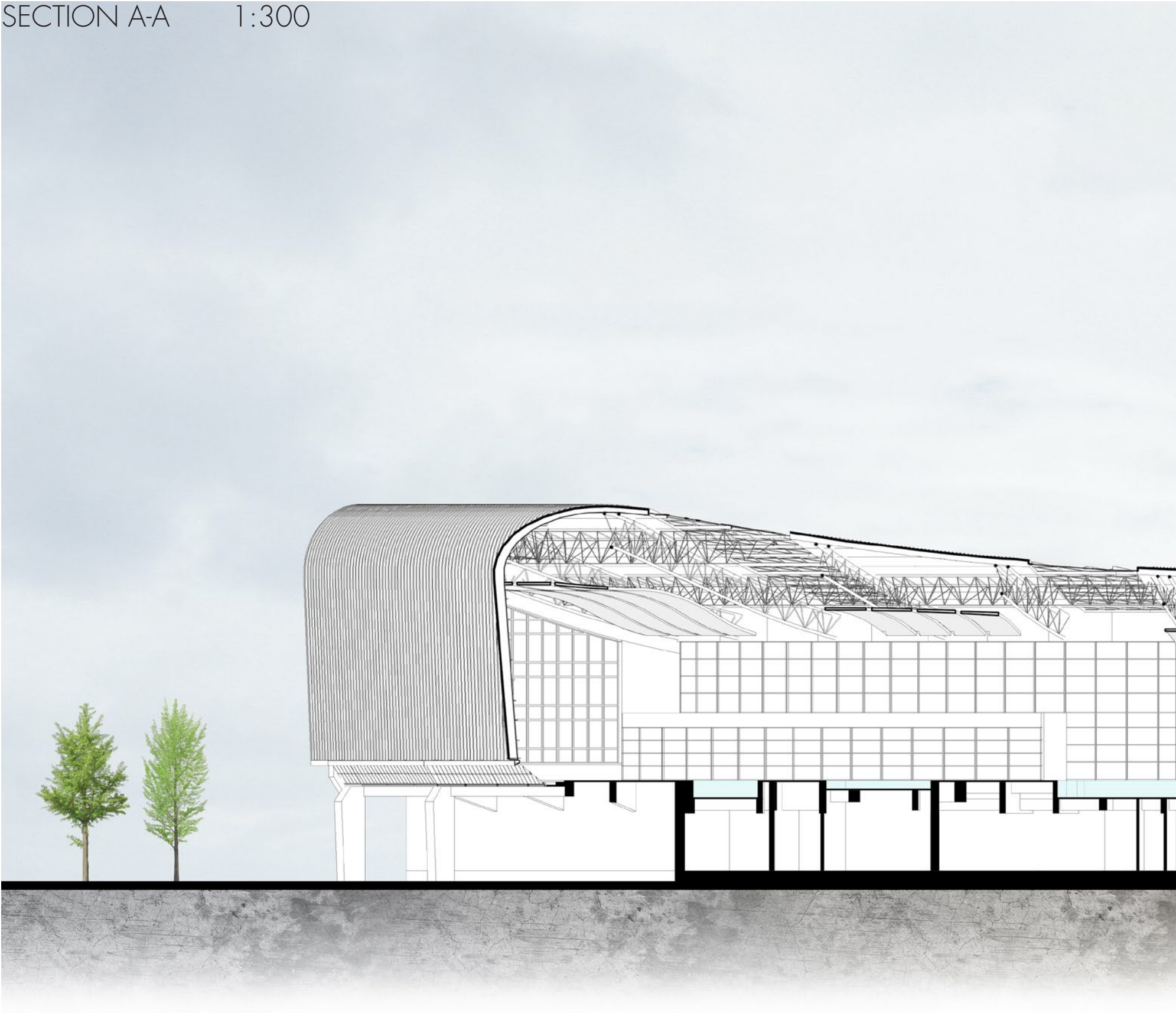


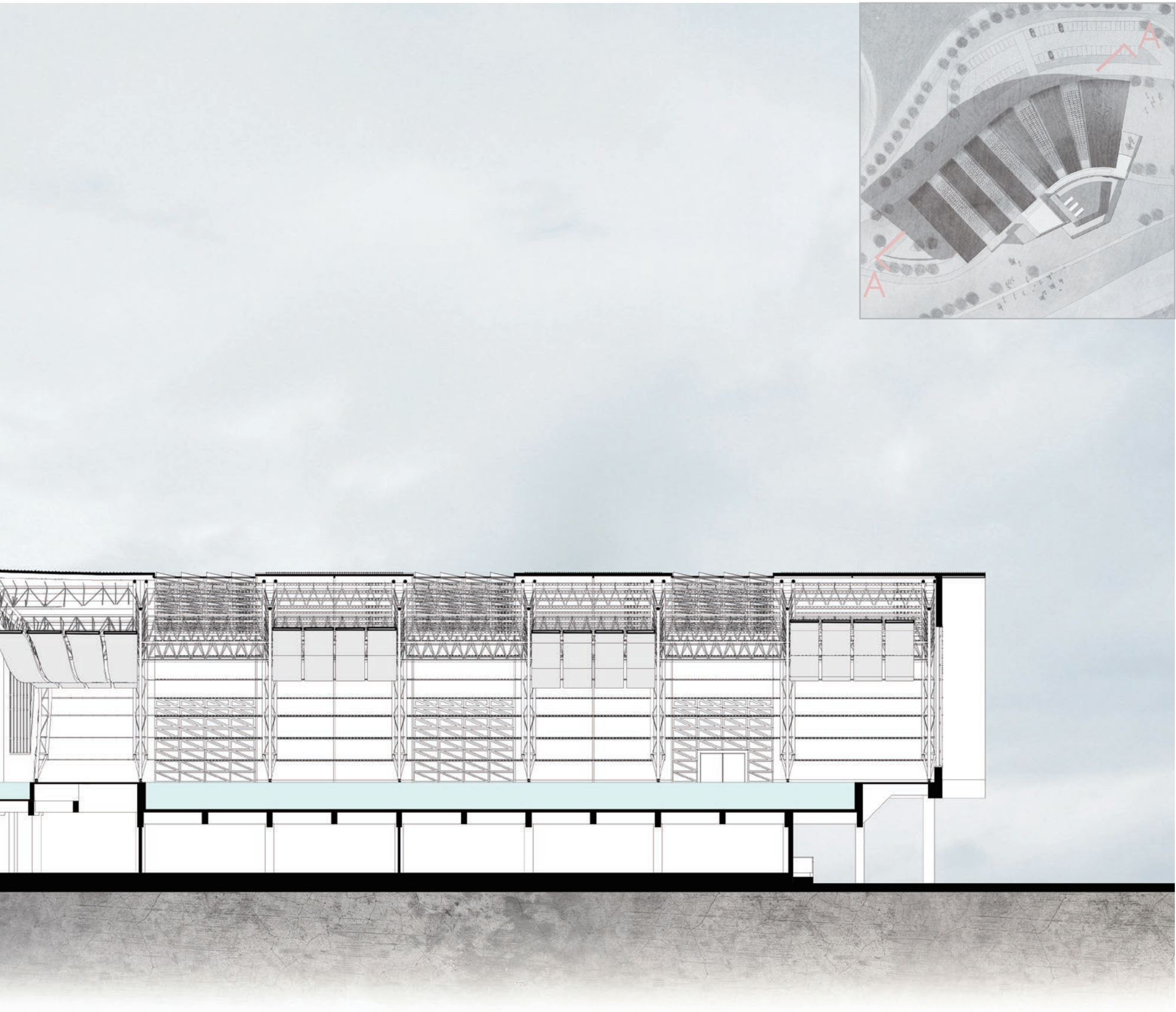
WEST ELEVATION DESIGN 1:300



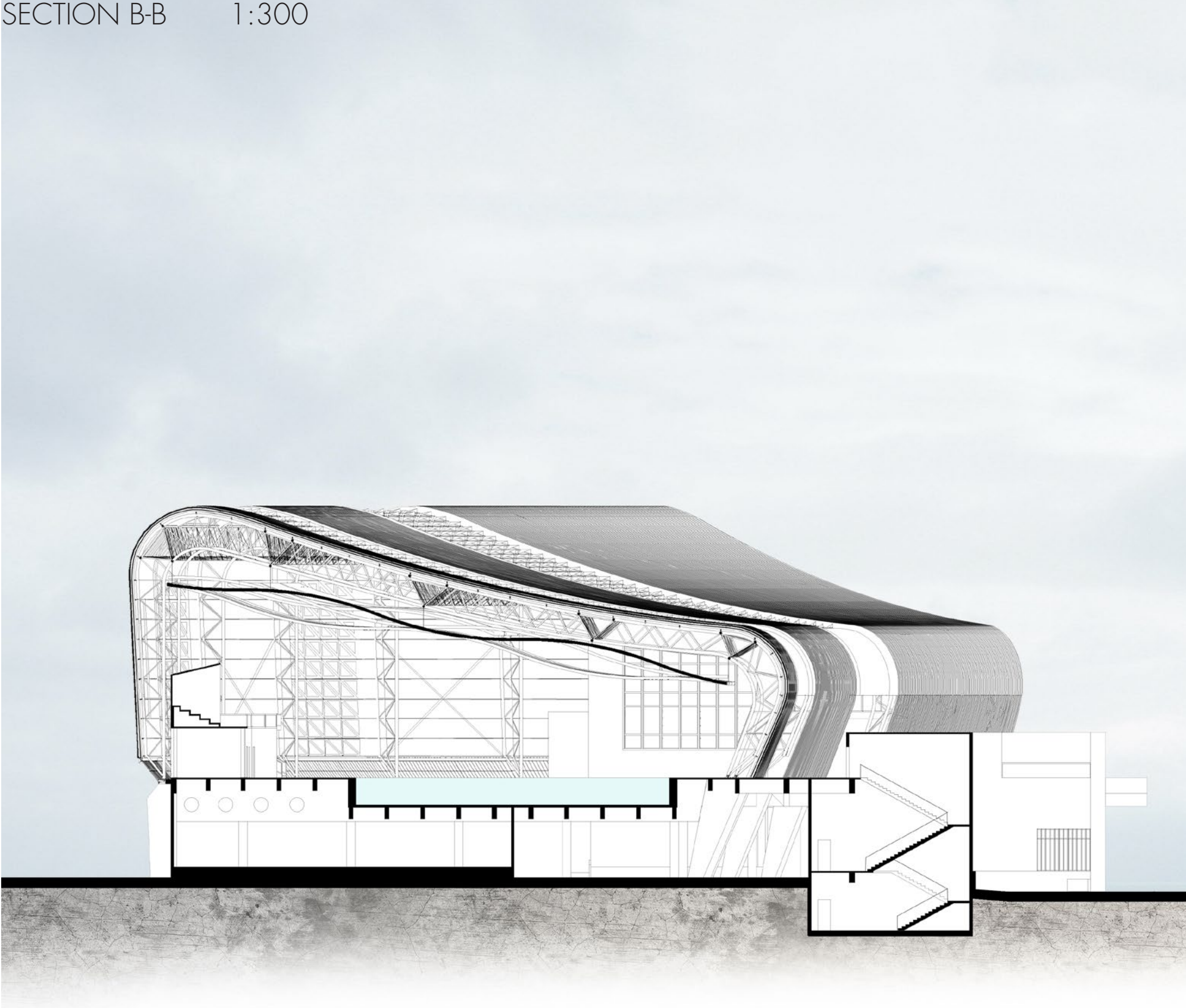


SECTION A-A 1:300





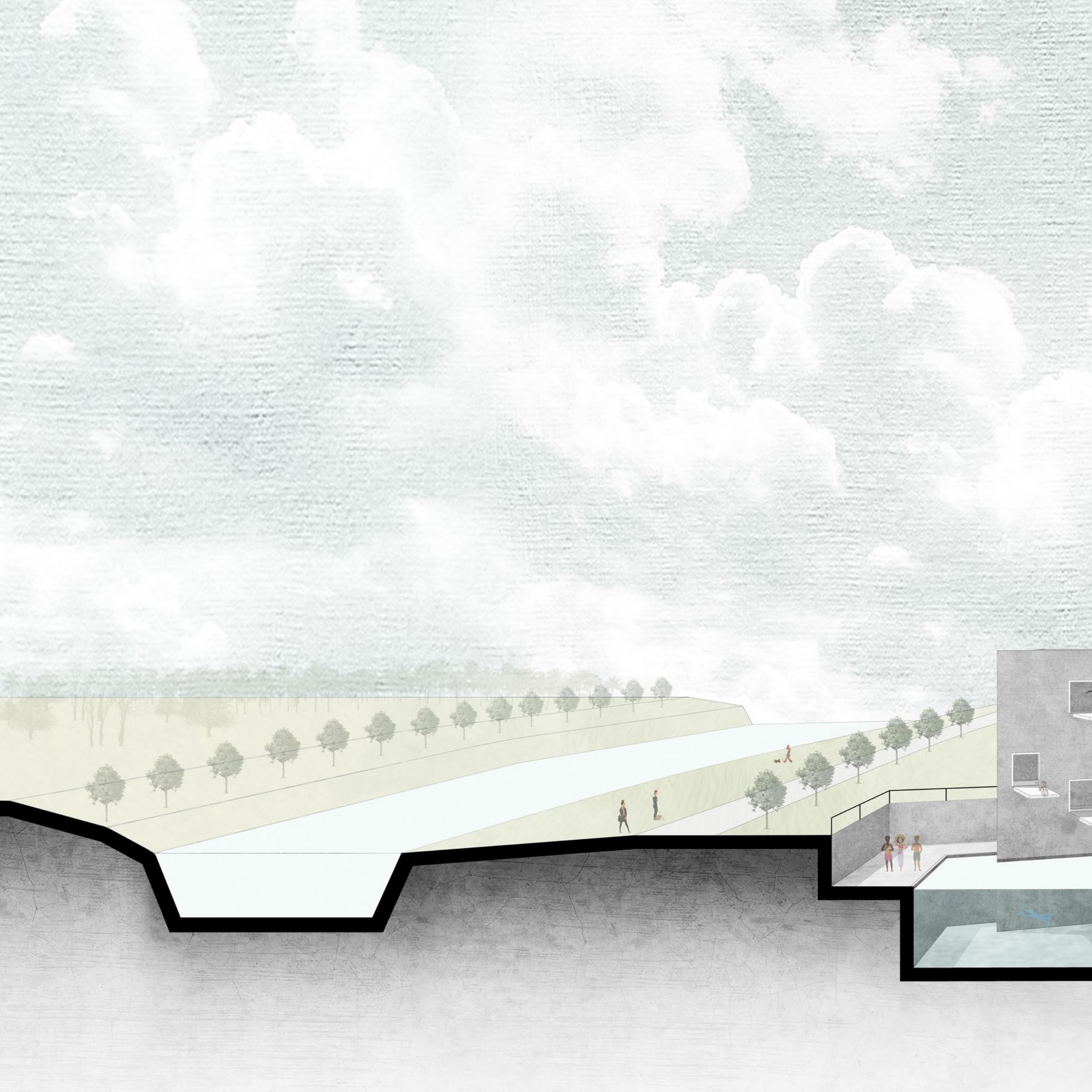
SECTION B-B 1:300

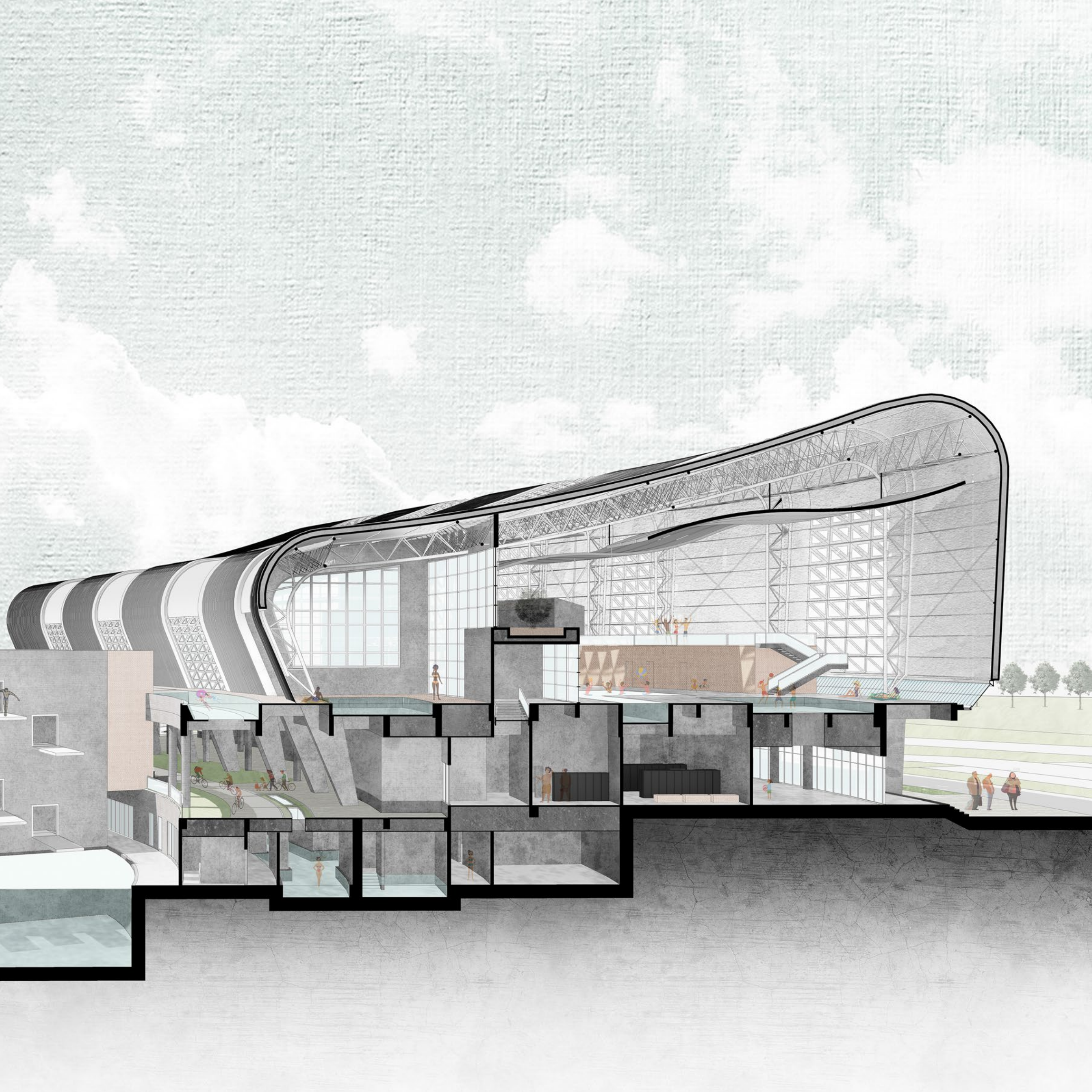




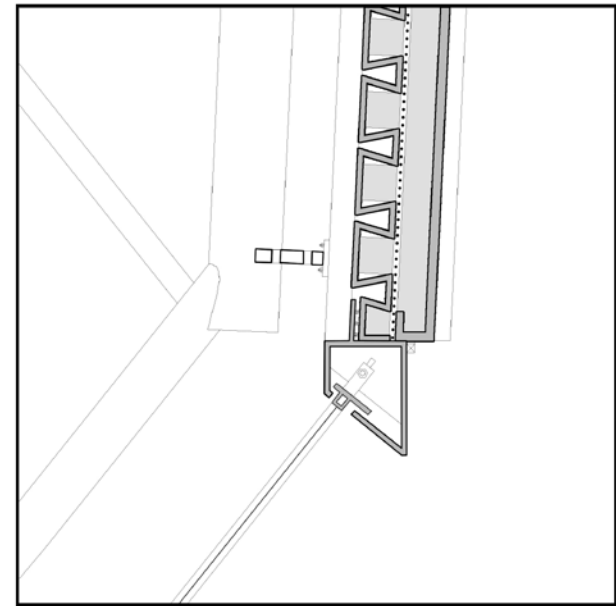
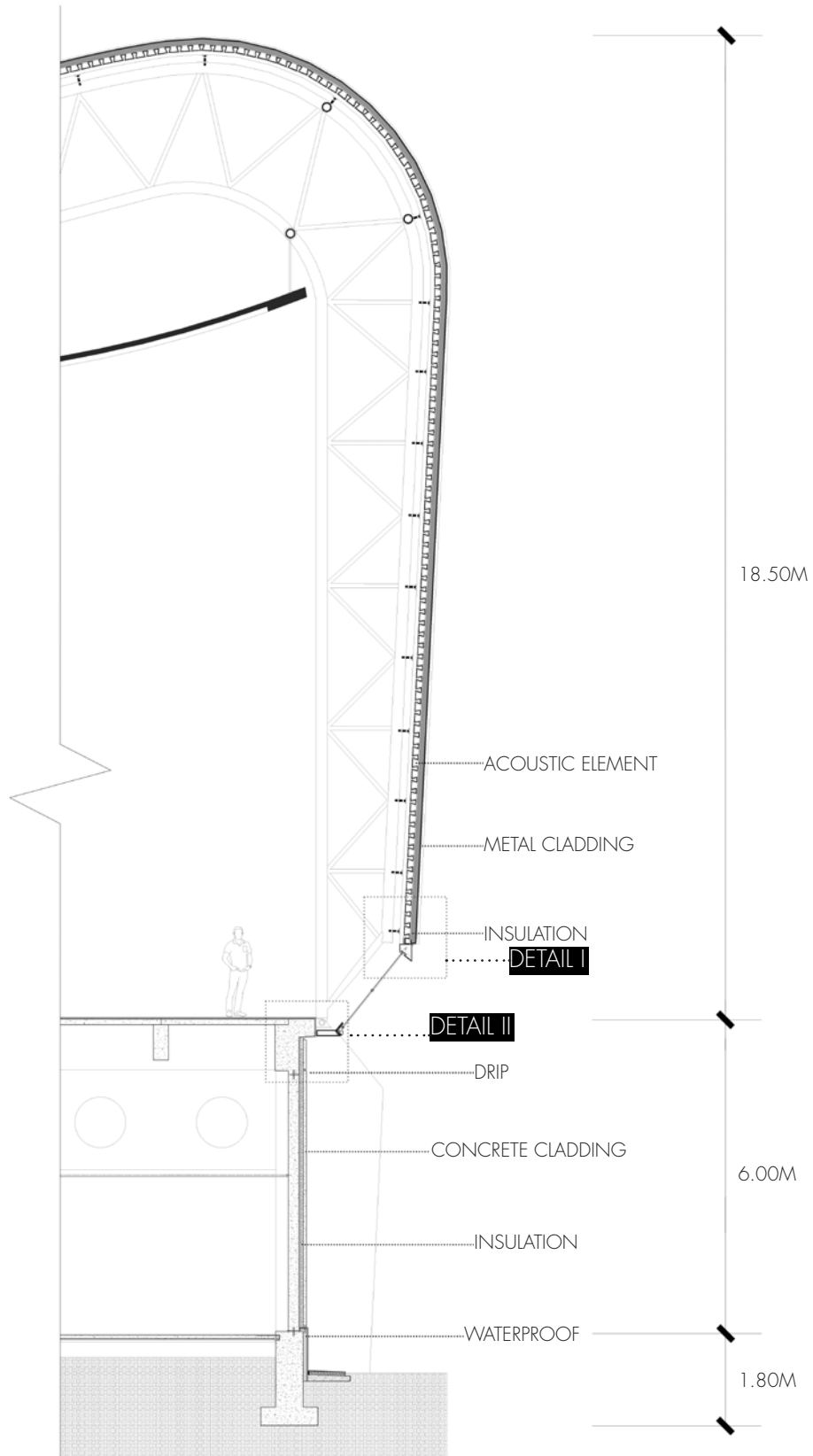




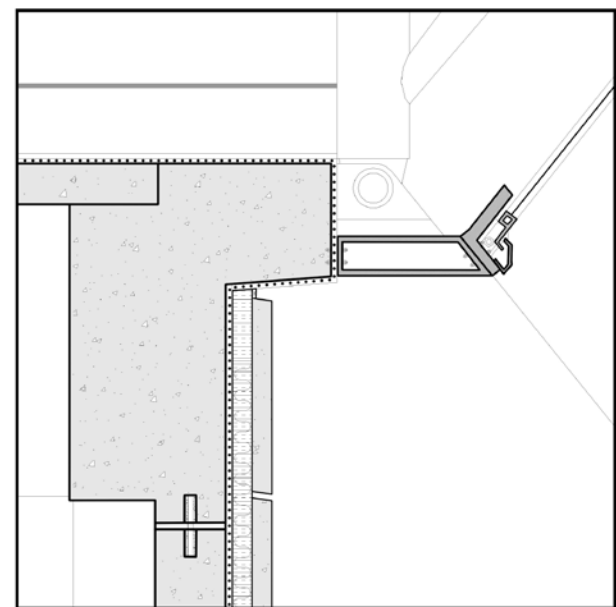




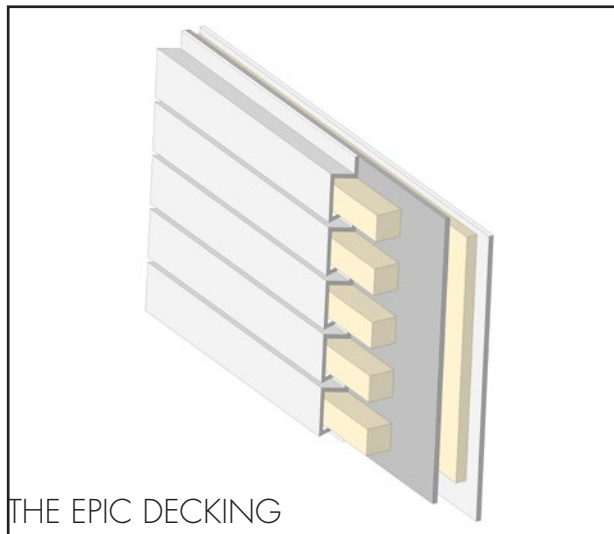
STRUCTURE DESIGN & ANALYSIS



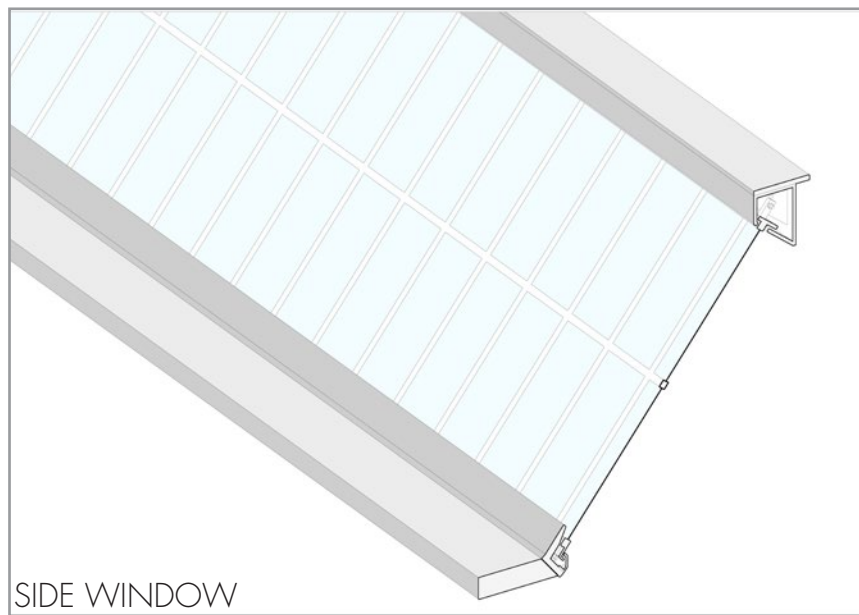
DETAIL I



DETAIL II

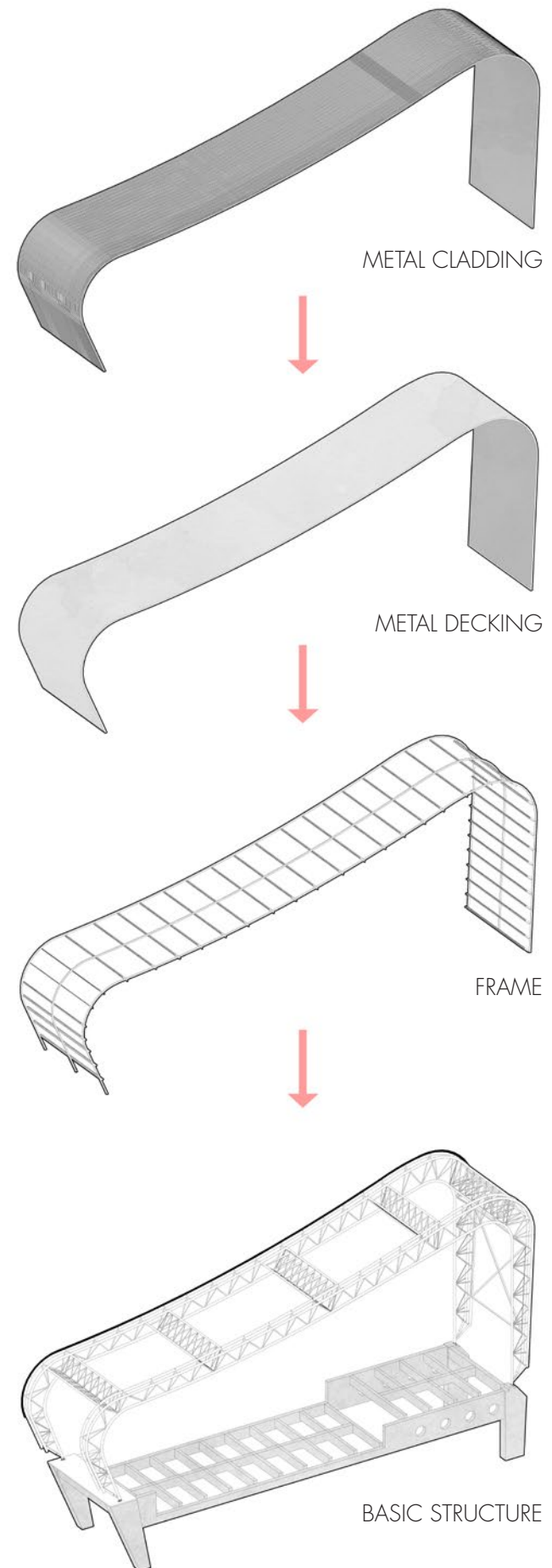


THE EPIC DECKING

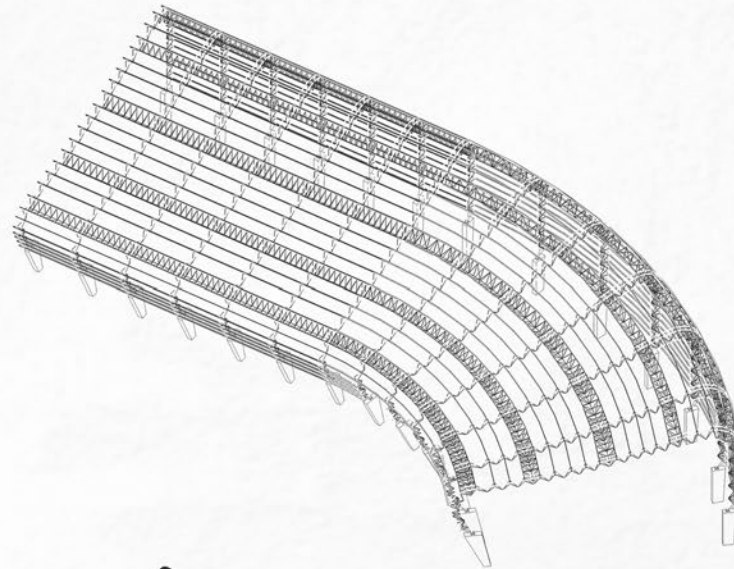
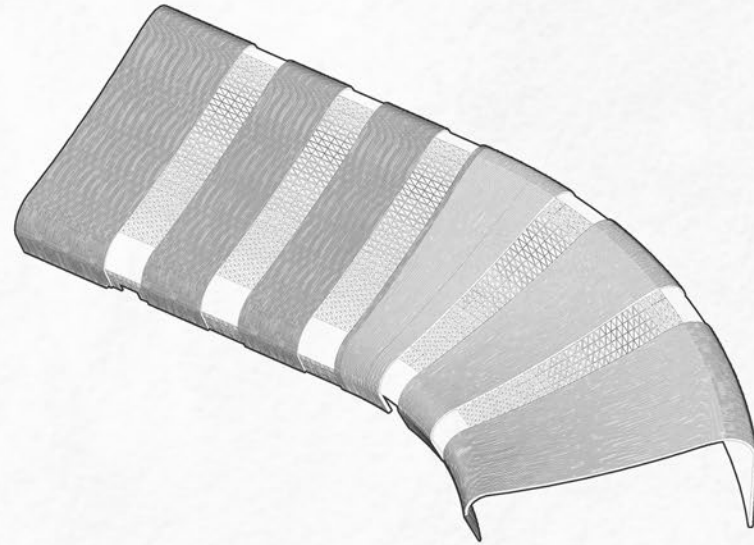


SIDE WINDOW

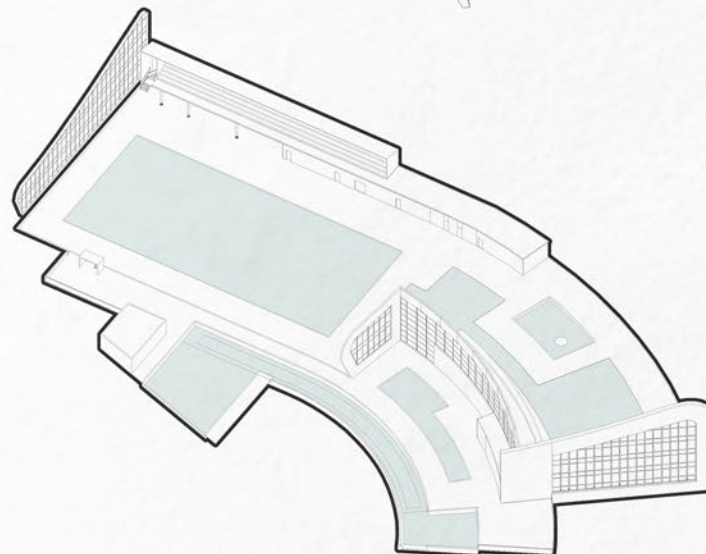
The structure consists of a concrete podium structure and steel truss structure. Since the pool area requires large spans, a large span roof structure system was designed. The system consists of curved trusses, lateral connected trusses, lateral bracing, roof support and epic deck system. The roof structure is attached to the bottom podium concrete structure by hinged connections.

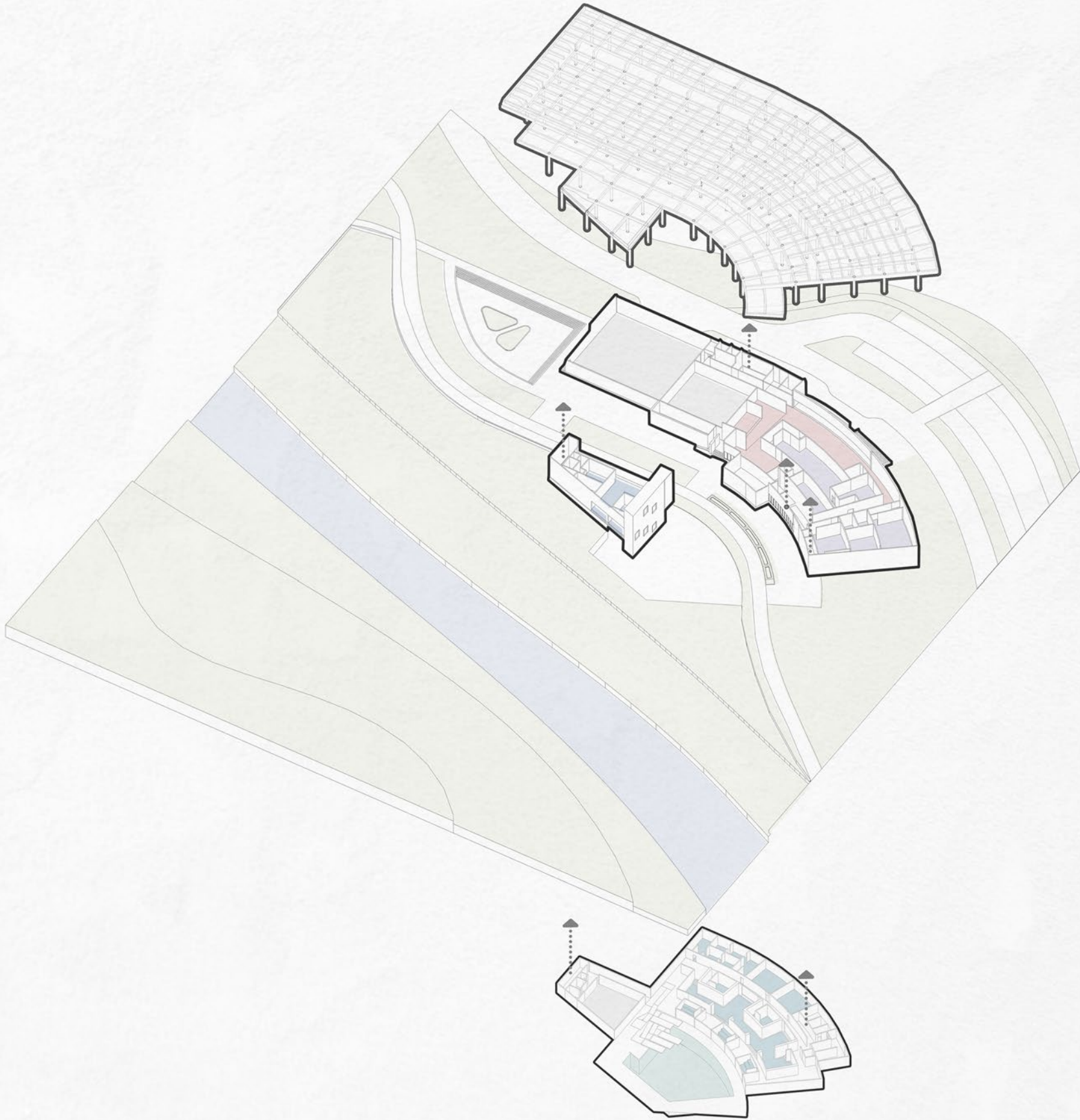


EXPLODED AXONOMETRIC

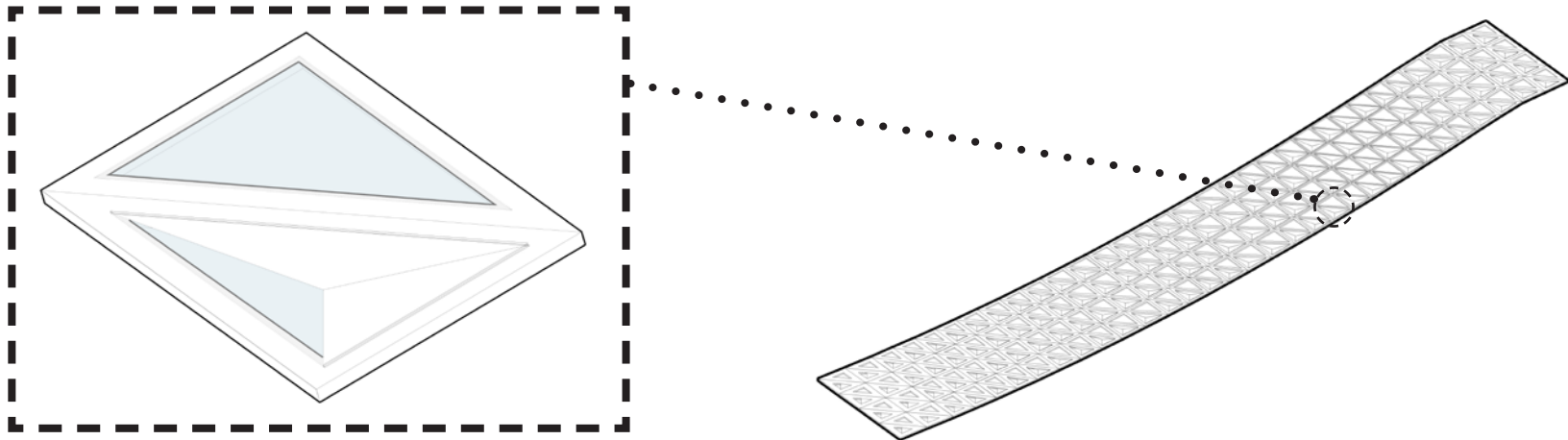


-  EQUIPMENT AREA
-  HYDROTHERAPY AREA
-  STAFF AREA
-  CHANGING AREA
-  SERVICE AREA
-  POOL AREA





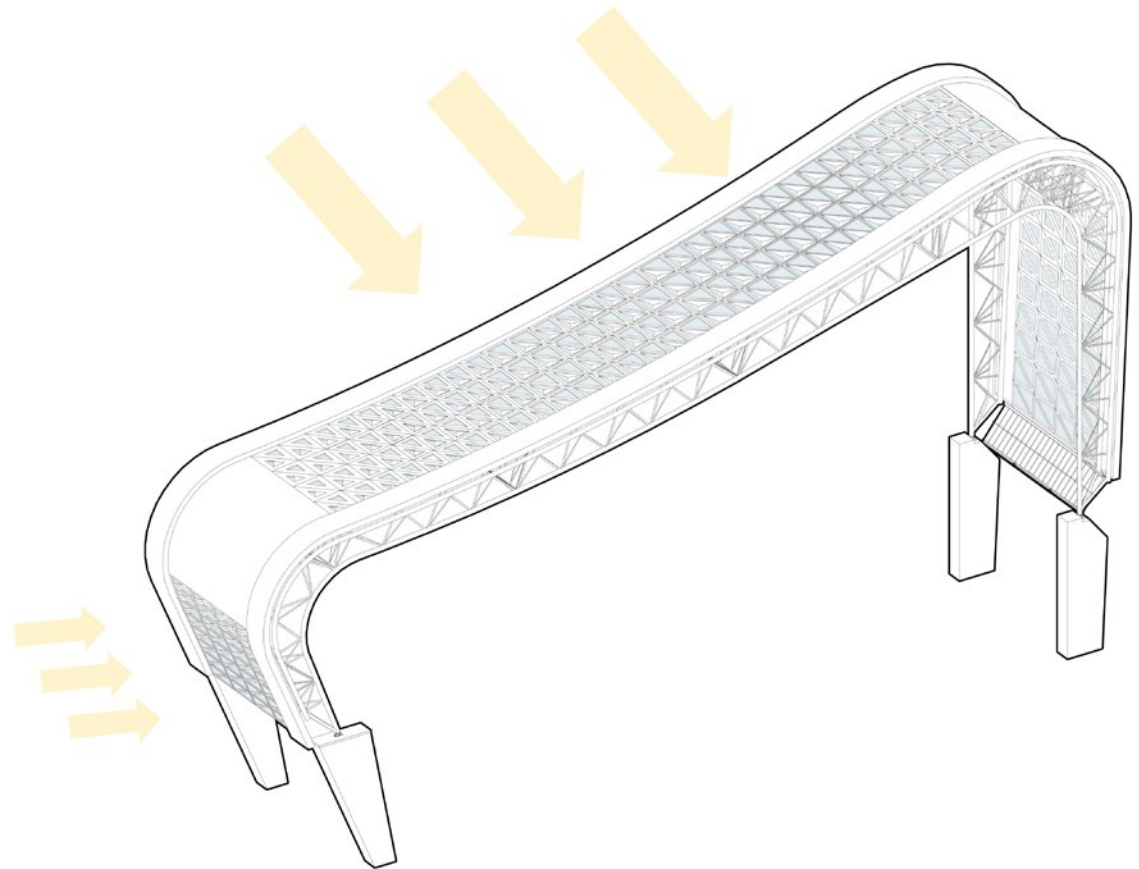
LIGHTING DESIGN & ANALYSIS

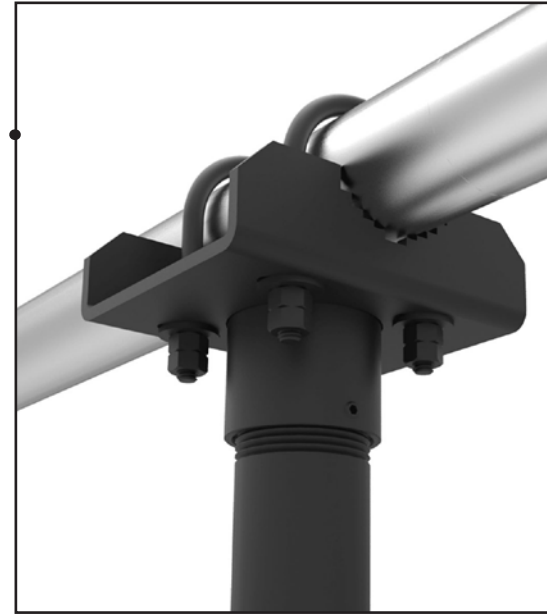
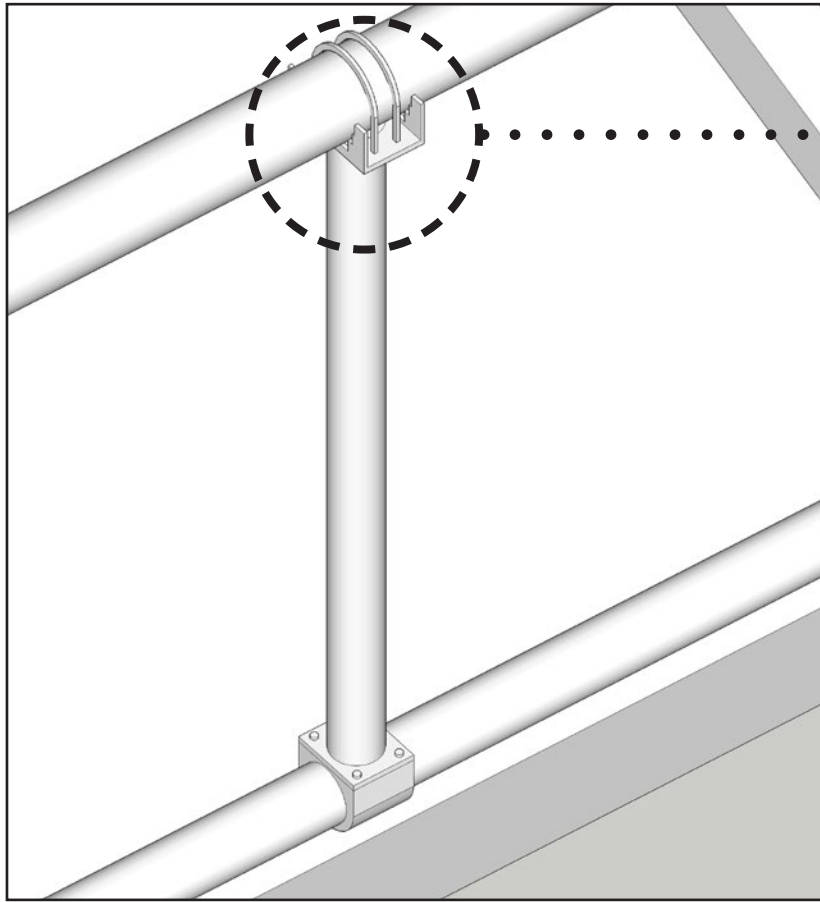


The skylight is partly shaded to reduce solar heat gain in summer.

NATURE LIGHT SYSTEM

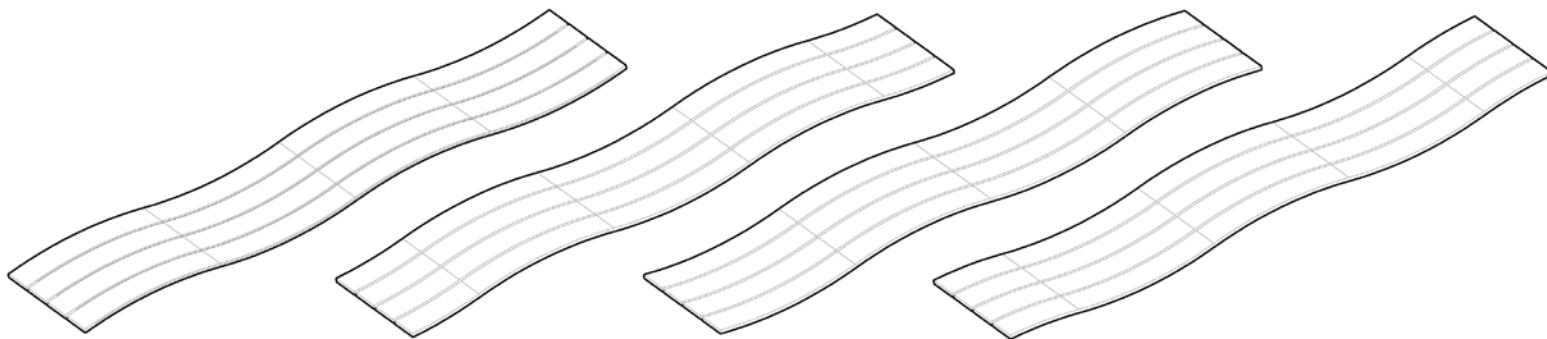
The lighting design includes natural light and artificial light. The roof of the building was special designed for natural light. For every second bay, there is a skylight and window system to allow natural light to come into the building.





Special connection was designed between the ceiling and the trusses system.

NATURE LIGHT SYSTEM



For lighting at night, an artificial illumination system was designed for the main pool area. Groups of wavelike ceilings with LED light strips are set above pools and connected to the roof truss system.

CONCLUSION

The project is not only a building design project but also an urban design project. The main goals of this project were to study how public facilities can influence the development of surrounding area and to design a large span structure which can be used on this type of buildings. The rescheduled park and the well-designed facility will act like 'Urban Catalysts' of Houston and accelerate the development of surrounding area.

