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ECO-BAHN

STUDIO GREEN IS THE NEW BLACK

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ECO-BAHN

Thesis Studio: Green is the new black

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ABSTRACT

- Abstract
- Keywords

ABSTRACT

In the studio, Green is the new black 2, we discussed about what sustainability is and also set a target of identifying how the motorways in Germany impact a future location and the existing possibilities or problems that have arisen as part of the increasing road networks. This thesis research will look into the environmental movement and its impact on architecture and building. At present, energy efficiency is the key measurement for sustainability. Therefore, in the effort to unify both the external and industrialized world in an energy-efficient and urban context manner, architects continuously introduce new technologies. In addition, this thesis offers an overview of the environmental and financial costs of implementing sustainable design and indicates that the most significant factors for the building industry are the life cycle and up-front costs. Sustainable construction can become a more attractive business venture if maintenance costs and up-front costs can be reduced. In conclusion, it will be expected that the momentum of the environmental movement and economies of scale will make sustainable construction more feasible as sustainable construction technology continues to be refined in the context of a highway in Berlin (A100) and in greater scale as Germany.

ECO-BAHN is a vision that incorporates motorway, biodiversity and sustainability to build a new typology for future gardening and community leisure programs. This thesis study aims to establish a holistic approach to build a sustainable and resilient design proposal that could encourage others in order to achieve a perfect balance between these three main elements.

KEYWORDS

#Autobahn #Sustainability #Interaction #Social #History #Green #Community space

02

Introduction and Site

- Introduction
- Audience
- Framework
- Field
- Research question
- Aims and objectives
- Site study and Site selection

INTRODUCTION

Greater understanding of the atmosphere has been a result of the new Environmentalism movement, which has triggered key cultural changes that have changed the architecture sector. As Fieldson mentions, "architecture has closely reflected the period of development of environmentalism since the 1960s." The historical development of a movement, which decides its basic aims and therefore the effect it will have on society, needs to be understood. The topic of climate change has traditionally been contentious, which has sparked endless debates. Ecological variations have arisen from climate change, and they have changed the things that people value. As a result, because they have to suffer crop failures, altered temperatures, and seasons, people have moved and modified their ways of living. Climate change is not about saving the world because of this aspect, but it is about the susceptibility of humans to disruption that humanity has never seen before. Before anything, society should avoid speaking about climate change as a remote issue in time and space. Instead, at this point, they should see it as something that is induced by a multitude of problems. All in all, as people know what they can do to control climate change, it can still be mitigated [1].

AUDIENCE

The possible audience for the project would include academic field, architects, and many individuals involved with gardening groups may also be deemed accountable because they play a major role in relation to the overall program.

FRAMEWORK

In relation to the autobahn, the projects began by challenging the existential issues and associated problems. In exchange, all these problem statements gave a brief idea of the Global Warming that the autobahn system is a requirement for the coming future. The purpose of the frame work was to concentrate on a trend that could point out the situation and followed by the experiments on how to come up with a possible intervention[2].
A potential alternative was a study that considered the existing neighborhood(Kleingarten) around and within the planned site area. The framework followed along with the context studies that helped to explain few possible future scenarios on the web that have potential. For example, farming and a solution where the autobahn could be treated as an energy generator that is important when considering the current challenges facing sustainable energy production.
As the key elements of the topic are autobahn and gardening, background research is carried out first to understand more about the subject and object of this project. The key stakeholders of this proposal have verified the background analysis, in addition to that. The design specifications and assessment framework were prepared to determine the final design proposal in order to satisfy user needs and requirements.

ECO-BAHN is a vision that incorporates motorway, biodiversity and sustainability to build a new typology for future gardening and community leisure programs. This thesis study aims to establish a holistic approach to build a sustainable and resilient design proposal that could encourage others in order to achieve a perfect balance between these three main elements.

FIELD

It was an important part of the project to research and understand the major problems and challenges. Approaches to the site study and its interpretation cantered on historical research helped to clarify the condition of the new communities and residences living around the site. A research on current farming scenarios and urban gardens trends why these trends are increasing and their motivational aspects are the main backbone that helped to connect the overall field with the potential community program that is possible Agriculture and a lack of knowledge of sustainability and agriculture skills among the younger generation. Integrated concepts of growing their own food with modular and sustainable construction techniques would adopt the typologies expected to be built within the site. And when considering the solution to breaking the current work-life-unbalance, when viewed with the site currently serving the area around at least, the autobahn raises a huge possibility. Choosing the portion divided by the motorway, Kleingartens, has the potential for a location that minimizes any effect on the surrounding land and community. The goal is to strike a perfect balance between the three main elements: autobahn, history of site(kleingarten) and sustainability

RESEARCH QUESTION

1. How to improve Sustainability in proposed site (Berlin A100 Highway - Charlottenburg-Nord)?
2. How to transform a Consumer society to a Productive society?
3. How to revitalize a cultural and historical lifestyle and integrate it with modernity in Berlin?
4. How to improve the food habitation of a society and respond to their new demands?

AIMS AND OBJECTIVES

The primary aims of the study are to answer the research's questions, and in other words, they are:
1. Recycle the waste (provide internal eco-cycle in the site) / water management / waste management.
2. Transform the role of people from consumer into productive.
3. Producing help the country economy and government.
4. Use the history of “Kleingarten” (in past people were gardening there) and bring the idea of gardening and improvise it.
5. Multi-purpose area with different functions (co-working place).
6. Provide an area for young generation like Ausbildung instead of travelling to other cities.

MIND MAP

- Sustainability
  - Ecology
    - Global warming
      - Meat consuming
      - Co2 emission
    - Bio
      - Bio veggies
      - Bio wastes
    - Eco system
      - Clean energy
    - Waste water
  - Economy
    - Business
      - Startup
    - Sustainable development
    - Technical efficiency
    - Creating job opportunities
      - Productive society
  - Social
    - Job rate
    - Homeless
    - Affordable housing
    - Safety
      - Crime rate
    - Equity
    - Topic branch
    - Refugee
      - Job
      - Accommodation
  - Timeline
    - Culture
    - History
      - Heritage
    - Healthy society
      - Organic foods
  - Scale
    - Traffic congestion
    - Urban sprawl
    - Conservation
      - Green areas
    - Density

CHALLENGES (CRITERIA)

25% ECOLOGY

25% Green spaces
20% Use of renewable resources
15% Carbon emission
10% Waste management

25% SOCIAL

20% Homelessness
20% People interaction
20% Education
15% Cultural heritage
15% Common Shared Spaces
10% Equality

20% ECONOMY

20% Housing affordability
20% Urban food production
20% Rental supervision
15% Start-up and job opportunities
15% Common Shared Spaces
10% Equality

15% TIMELINE

25% Development action to impact of future generation
25% Long-term sustainability planning for Society and environment
20% Equality in development
15% government implementation
15% Equality in development

15% SCALE

20% Centralize areas
20% Efficient land use
15% Livable density
15% Population density
10% Virtualization
10% Co-working. places
10% Smart planning of urban sprawl

- Site location

AUTOBAHN A100

The proposed site is a highway which is located in Charlottenburg-Nord district in Berlin, Germany.

Charlottenburg-Nord has 19,597 inhabitants (as of December 31, 2019).
In the district, 320 meters of the Bundesautobahn 100 (exit to Tegeler Weg) and 3.6 kilometers of the main lane of the Bundesautobahn 111 belong to the large-scale and 10.4 kilometers of the A 100 and 2.4 kilometers of the A 111 (exits and entrances) to the higher-level road system . The latter also includes 8.4 kilometers of city streets. The main road system is supplemented by 5.4 kilometers of the Friedrich-Olbricht-Damm, Jungfernheideweg and Heckerdamm streets. The following list shows the 54 dedicated streets and squares of the district. Seven of these streets also belong to neighboring districts. The total length of these streets in the district is 27.4 kilometers

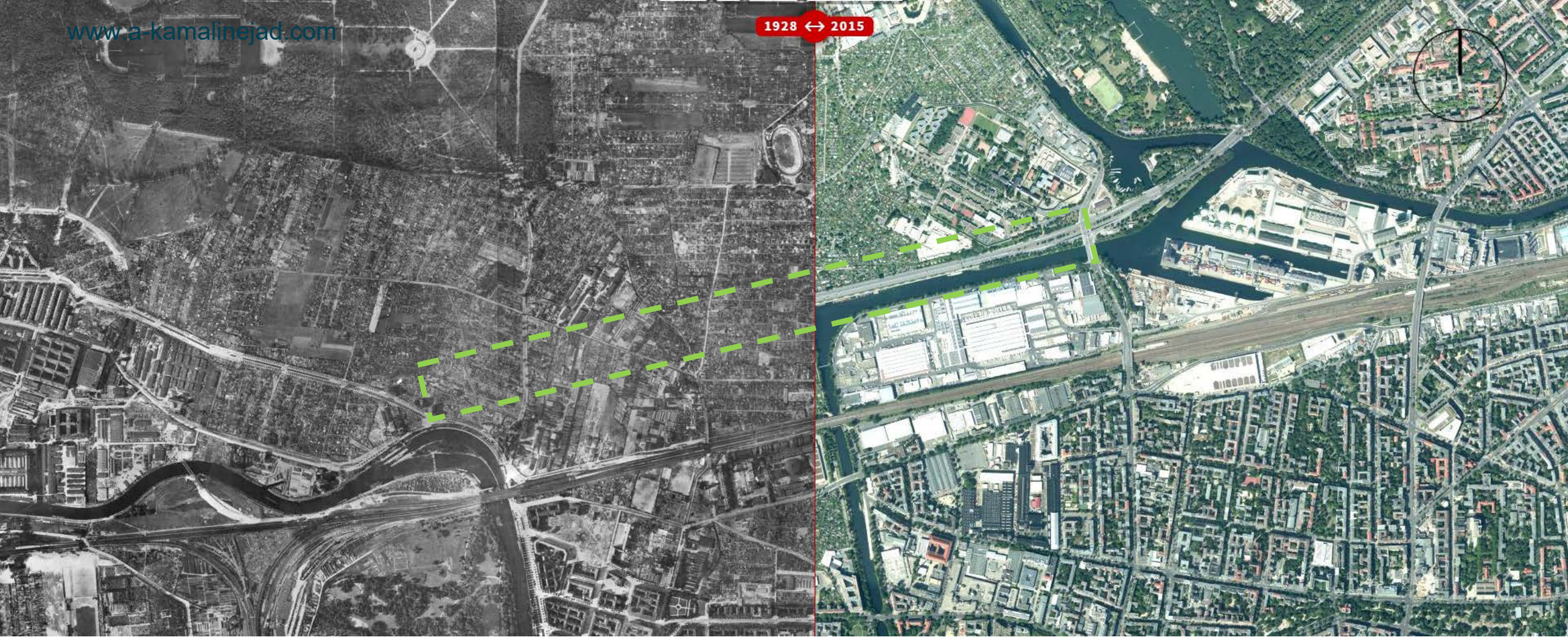
Charlottenburg-Nord

Population : 19,597

Area : 6.17 Kmsq

Density : 3,173 / Kmsq

https://www.citypopulation.de/en/germany/berlin/admin/B04__charlottenburg_wilmersd/



- *The picture shows the Site location in different situation in 1928 and 2015*
  https://1928.tagesspiegel.de/

HISTORY OF KLEINGARTEN

Allotment gardens have a long tradition. At the beginning of the 19th century, the first came into being in northern Germany. Population had grown by leaps and bounds without similar increases in economic output. More and more people were suffering.The small gardens should give the needy the opportunity to meet their own needs for fruit and vegetables [3].

- *A view of a Kleingarten in Markkleeberg in 1955*

https://commons.wikimedia.org/wiki/File:Fotothek_df_roe-neg_0006359_028_Besucher_an_Kleing%C3%A4rten.jpg?uselang=de

- *A view of a Kleingarten in Berlin(Ullstein) around 1900*

https://www.nzz.ch/zuerich/schwaechlinge-heilen-streuner-erziehen-ld.1354269

- *Water Canal and River*

Waterbody

- *Supermarkets locations around the Site*

Supermarket

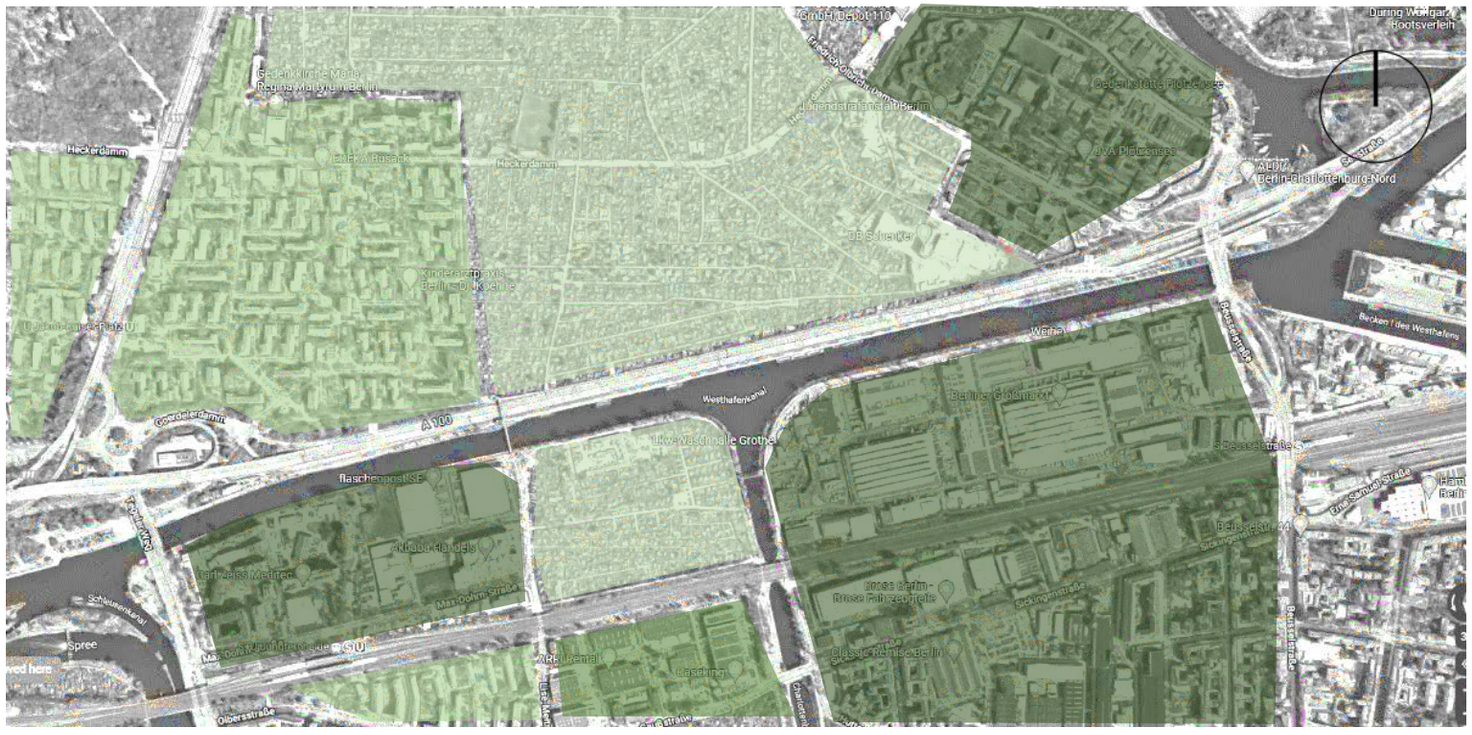
- *Transportation network and Bridges*

Bus Station

Train Station

Motorway

Pedestrian Bridge

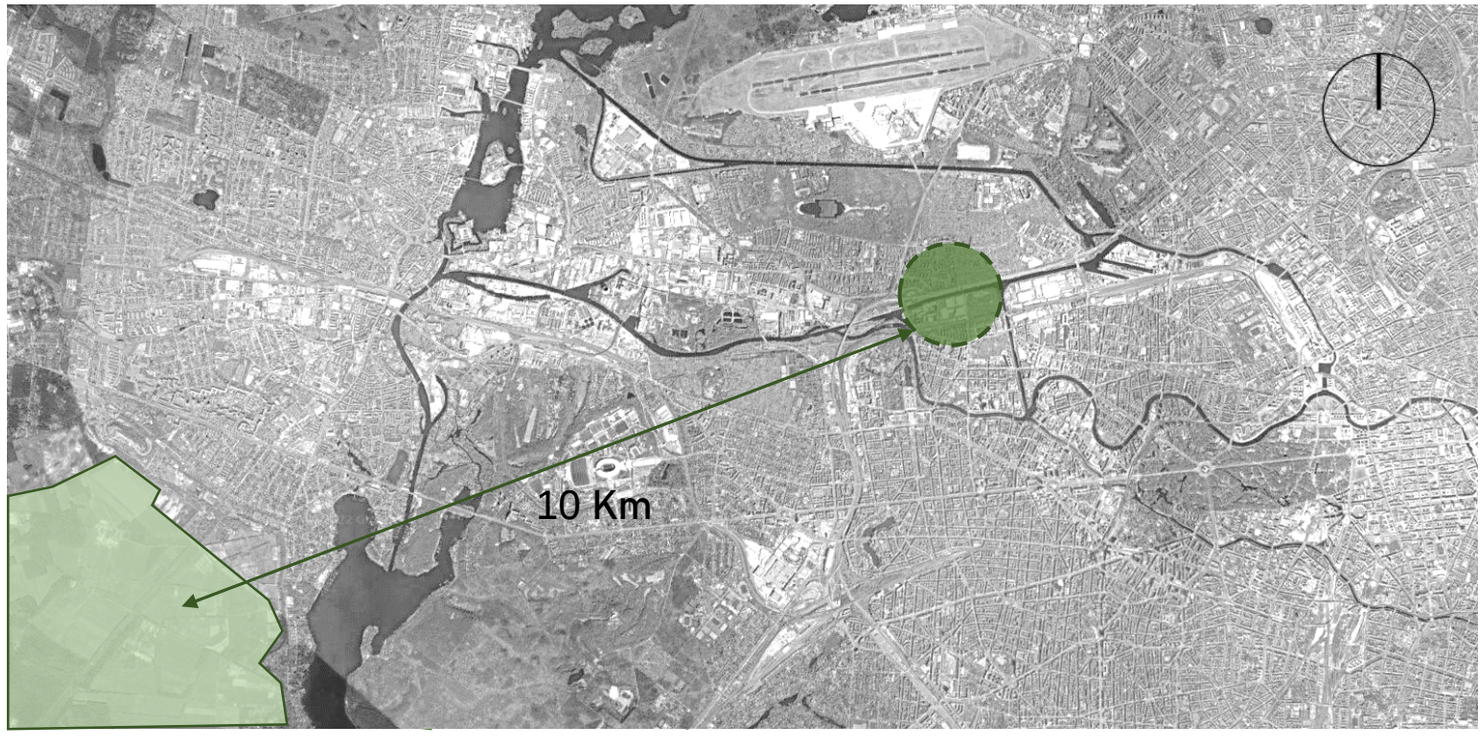


- *Land use*

Garden

Residential

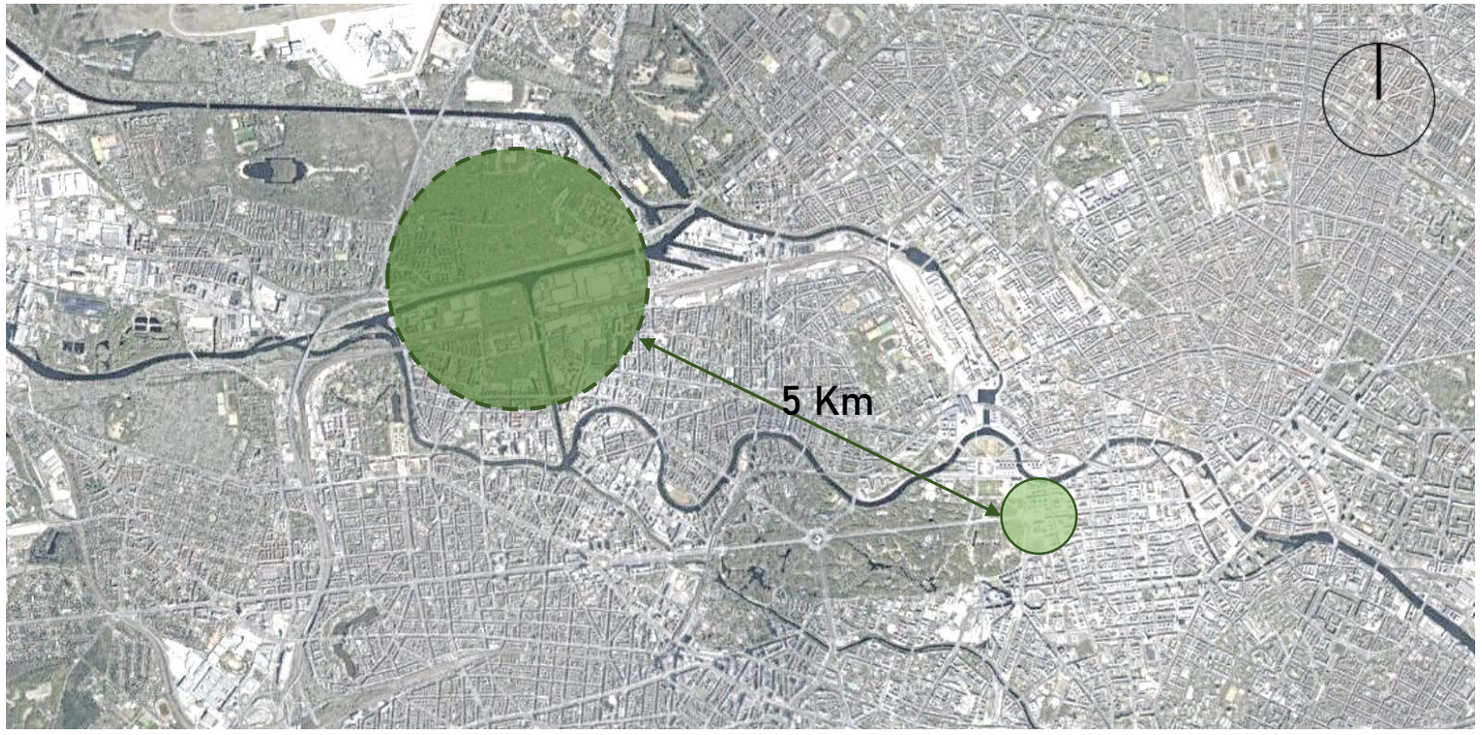
Commercial



Farm fields

Site location

- Farm field distance to Site



City center

Site location

- Site distance to City center

SITE NEIGHBORHOODS

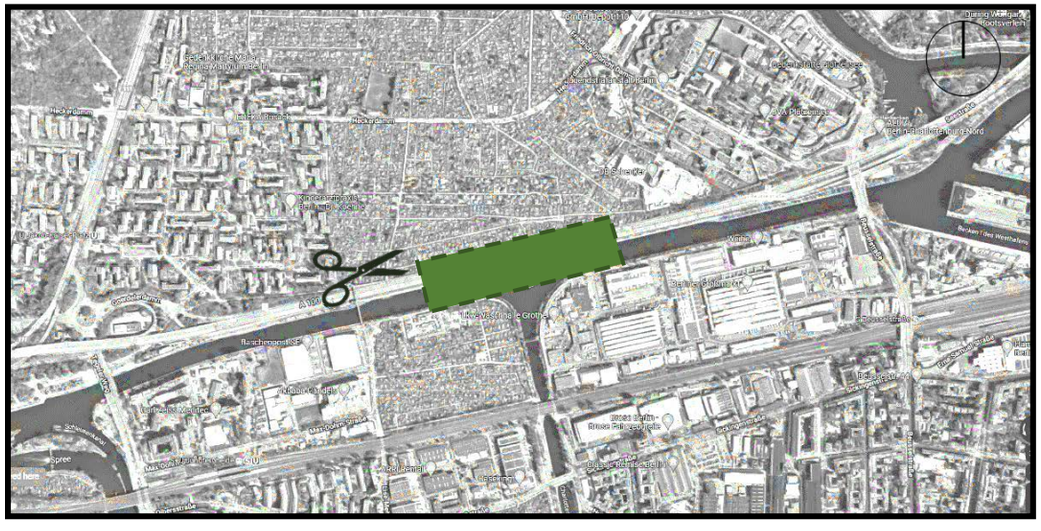
Residential

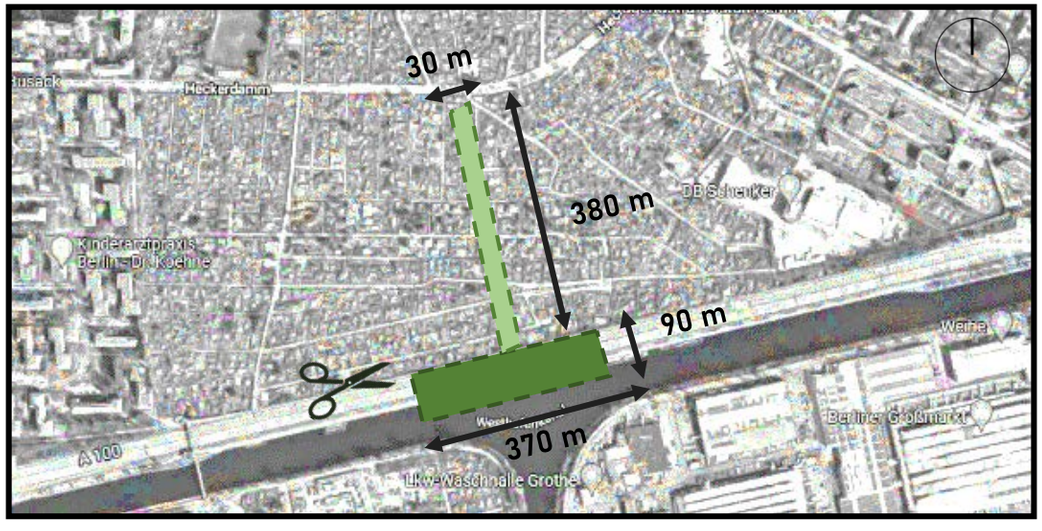
Kleingarten

Commercial

Governmental Sector

SITE BOUNDARY/ SITE SELECTION





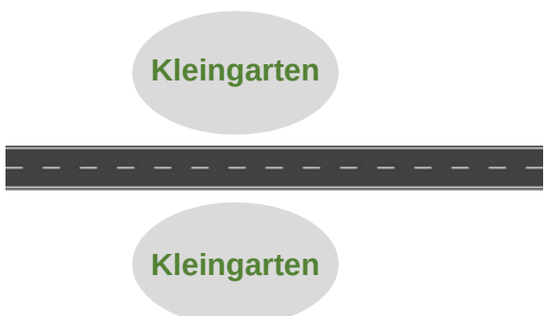
Site selection for future developments

Site selection(Main design phase)

ECO-BAHN (An Eco-Friendly Complex project with the Approach of Sustainability)

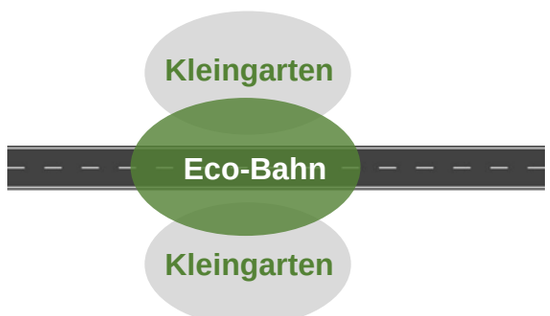
Eco-Bahn, can be an eco-friendly project beside the Autobahn.
A unique place in future of Berlin.

The highway has separated the historical part of site which is called ‘Kleingarten’.



- Improve life quality +Sustainability connected two historical part by their old function in the past
- connected two historical part by their old function in the past

ECO-COMPLEX / URBAN FARMING COMPLEX



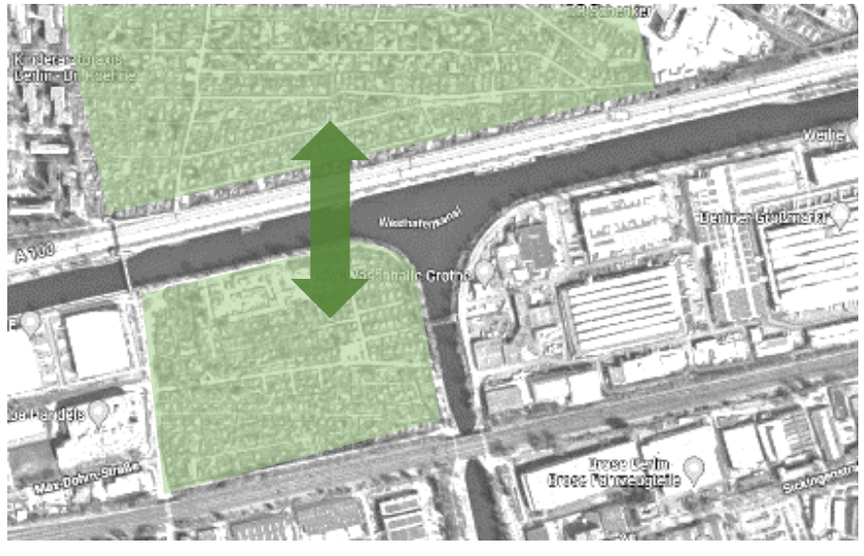
03

Design concept and Program

- Design concept
- Program
- Exploded diagram

1928 ↔ 2015

Site selection boundary
https://1928.tagesspiegel.de/



Make a connection to historical separated part

Autobahn has devided the “Kleine Garten”

PROGRAMS

GREENHOUSE Area= 2400 m²

- Mass Production Warehouse
- Packing
- Storage
- Laboratory
- Management
- Cloakroom
- Hygiene Steam Room
- Kitchen
- Fish Farming
- Technical Room
- WC

PRIVATE GREENHOUSE Area= 950 m²

- Private Warehouse
- Storage
- Fish Farming
- Hygiene Steam Room
- Kitchen
- Cloakroom
- Technical Room

OUTSIDE FARMING Area= 2000 m²

- Outside Planting Farm

POWER SUPPLY Area= 600 m²

- ECO-SHELL (which collects waste rain water pipes and has solar panels)
- Water Supply Tanks

BIO RESTAURANT Area= 950 m²

- Fresh Veggies Buffet
- Bar
- Kitchen
- Fish Farming
- Technical Room
- WC

BIO MARKET Area= 1340 m²

- Shopping Area
- Storage
- Kitchen
- Staff Room
- Management
- HR
- Cloakroom
- Technical Room

PARKING Area= 5700 m²

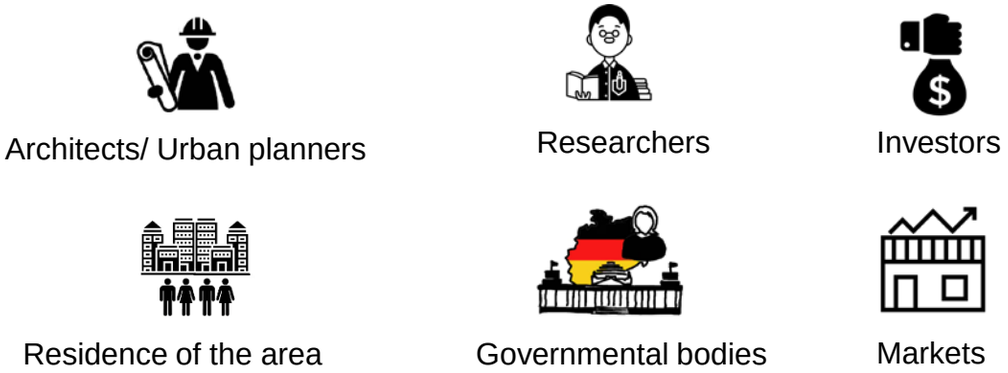
- 66 Car Park Spaces
- 94 Bicycle park stands
- Trolley Stand

EDUCATION/ ADMIN Area= 1000 m²

- Information
- Server Room
- Security
- Library
- Meeting/ Audio Room
- Management
- Classroom
- HR
- Workshop Room
- Lounge Room / Smoking Room
- Technical Room
- Kitchen
- WC

STAKEHOLDERS

The concept combines a variety of innovative technologies, such as energy positive homes, renewable energy, energy storage, door-step high-yield organic food production, vertical farming aquaponics system, water management and waste-to-resource systems.



SYSTEM OF FARMING IN THIS PROJECT

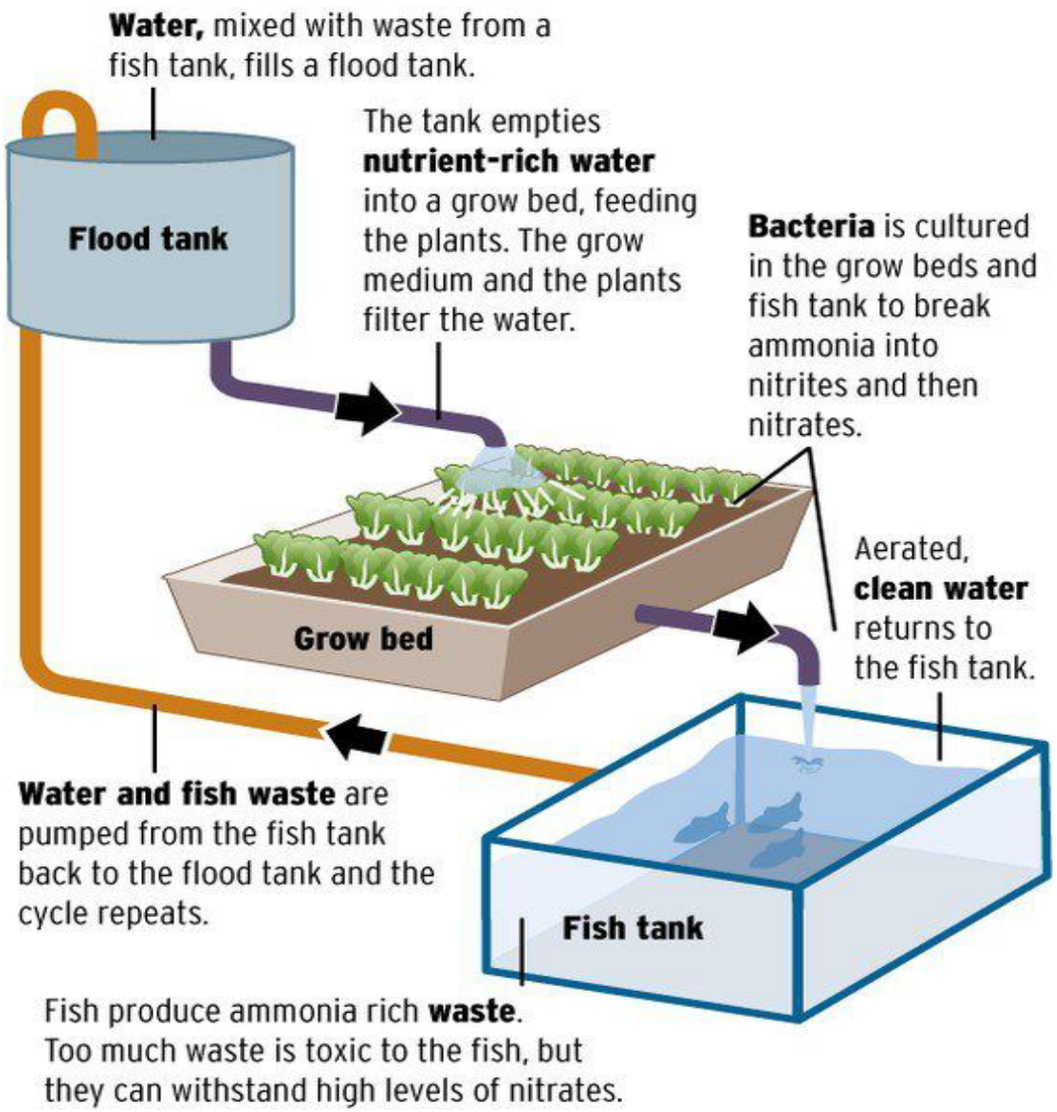
What is Aquaponics and How Does it Work?

Aquaponics is one of the most sustainable ways to grow food. It involves a combination of aquaculture and hydroponics in one integrated system. Once you're set up, there's very little maintenance or effort required.

The basic premise of aquaponics is that the waste produced by your fish feeds the plants, and the plants clean the water for the fish, producing one continuous cycle.

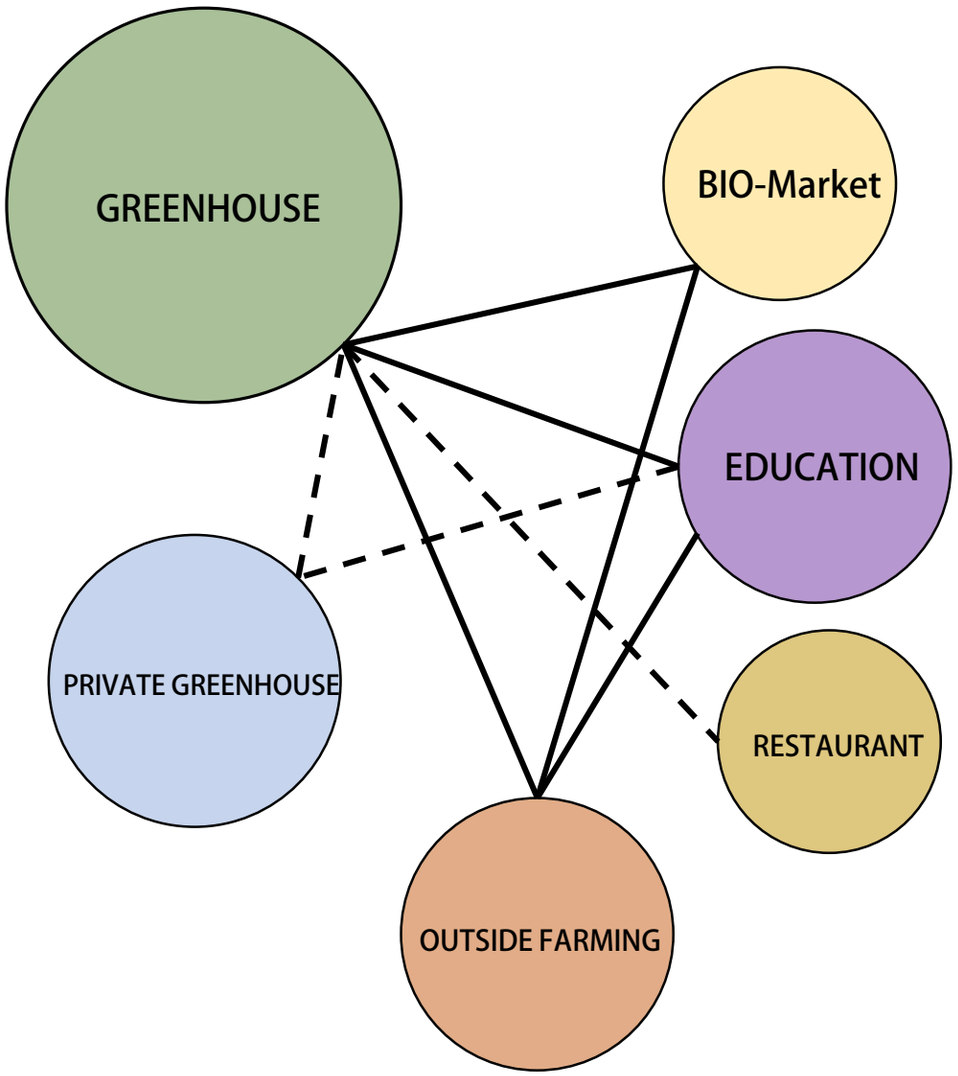
This system is based entirely around the nitrogen cycle. When the fish produce waste (ammonia), bacteria break it down into nitrates. A pump then carries this water, which is high in nitrates, to the grow bed where plants are growing. The plants draw nitrogen from the water, which both feeds the plants and cleans the water, making it safe to return to the fish tank.

This cycle repeats over and over, with the fish providing nutrition for the bacteria, the bacteria breaking down the fish waste and feeding the plants, and the plants cleaning the water to return back to the fish [4].



https://i.pinimg.com/originals/0b/c3/f9/0bc3f9b3da7762eac9df1ddb55eb079b.jpg

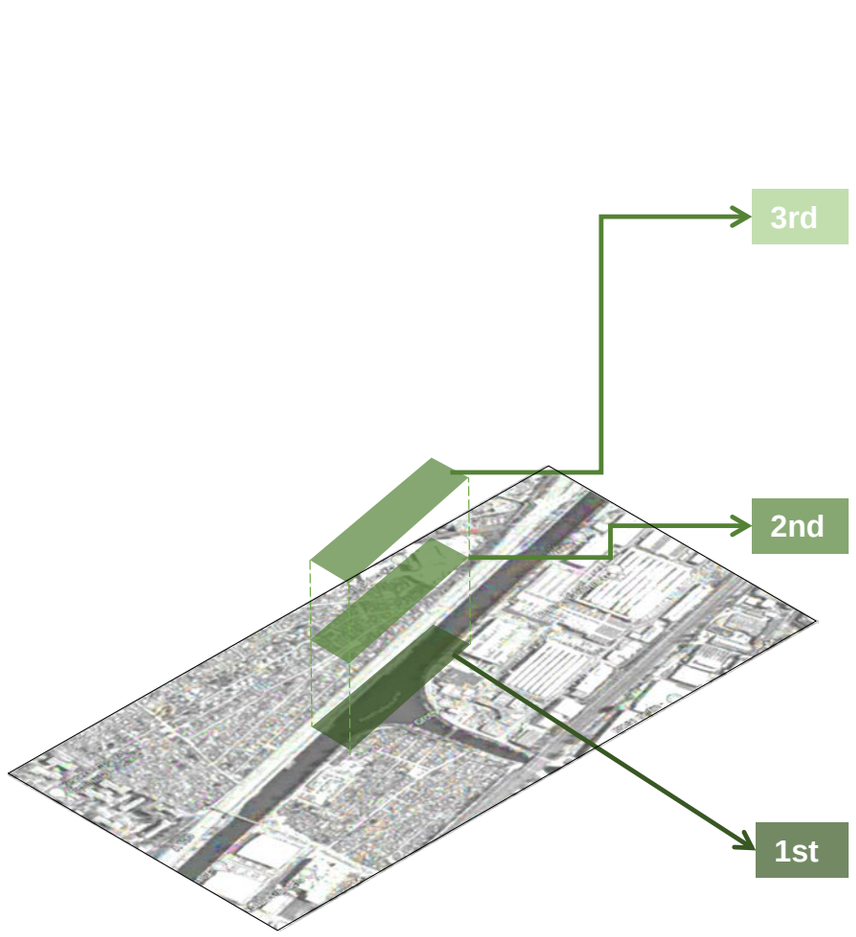
BUBBLE DIAGRAM (In main design phase)



- Semi-desired

- desired

ISOMETRIC DIAGRAM (In main design phase)



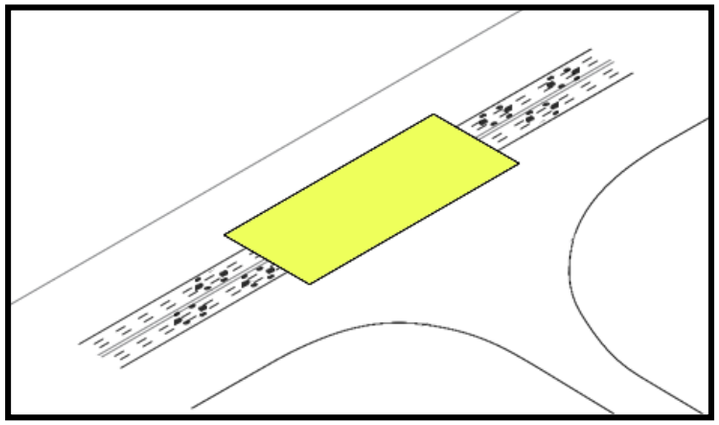
- Roof Garden
- Lounge
- Bridge
- ECO-SHELL

(Power Sources)

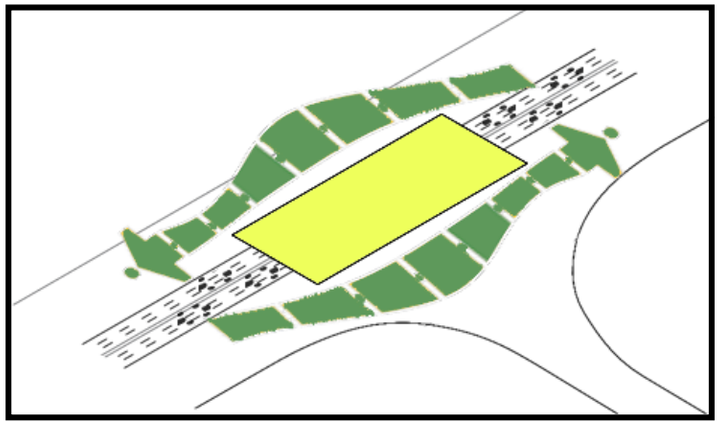
- Green House
- Education
- Restaurant
- Bio-Market
- Private Greenhouse

- Parking
- River Wall
- Meditation/ Site viewing
- River Walk
- Meditation/ Site viewing
- Bike Lanes
- Seasonal Farms

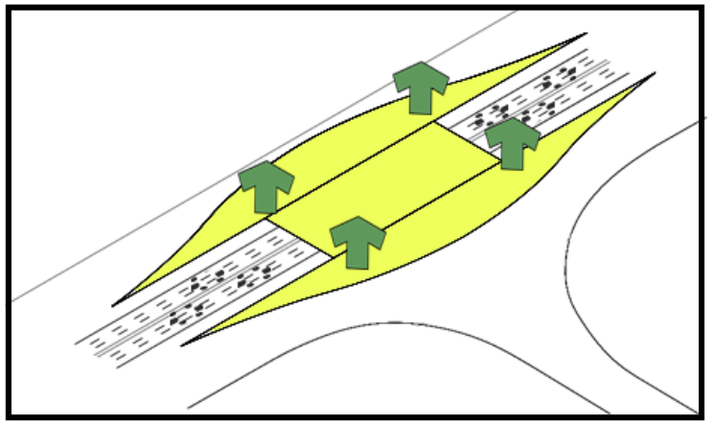
EXPLODED DIAGRAM



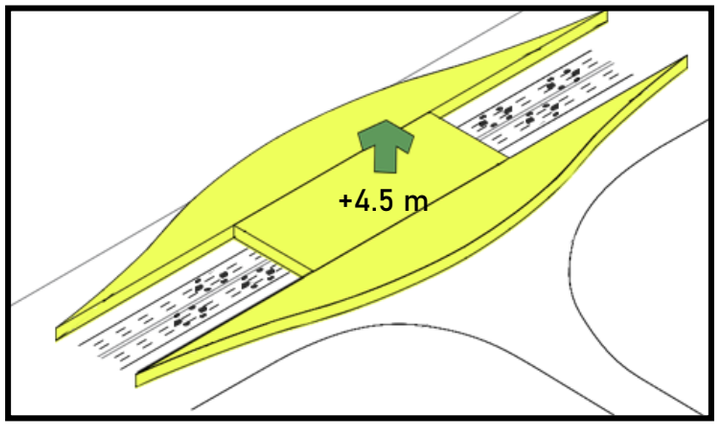
Connecting two sides of Autobahn



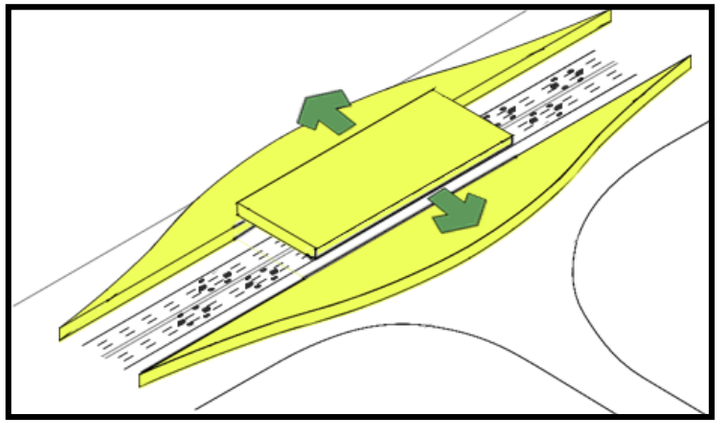
Providing two access for both side of Autobahn



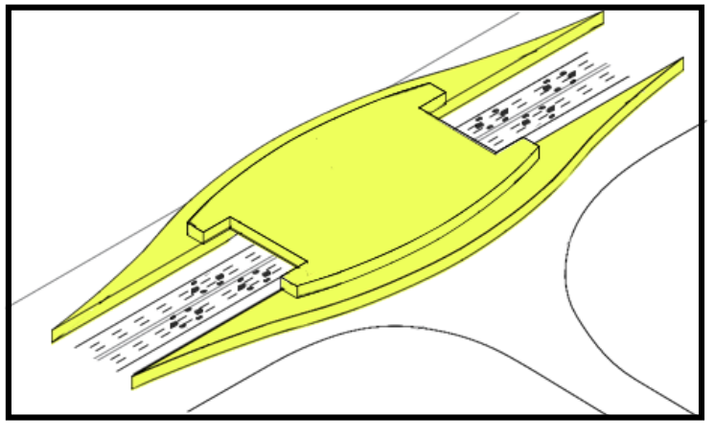
Pull up



Move up



Pull out and reconnecting

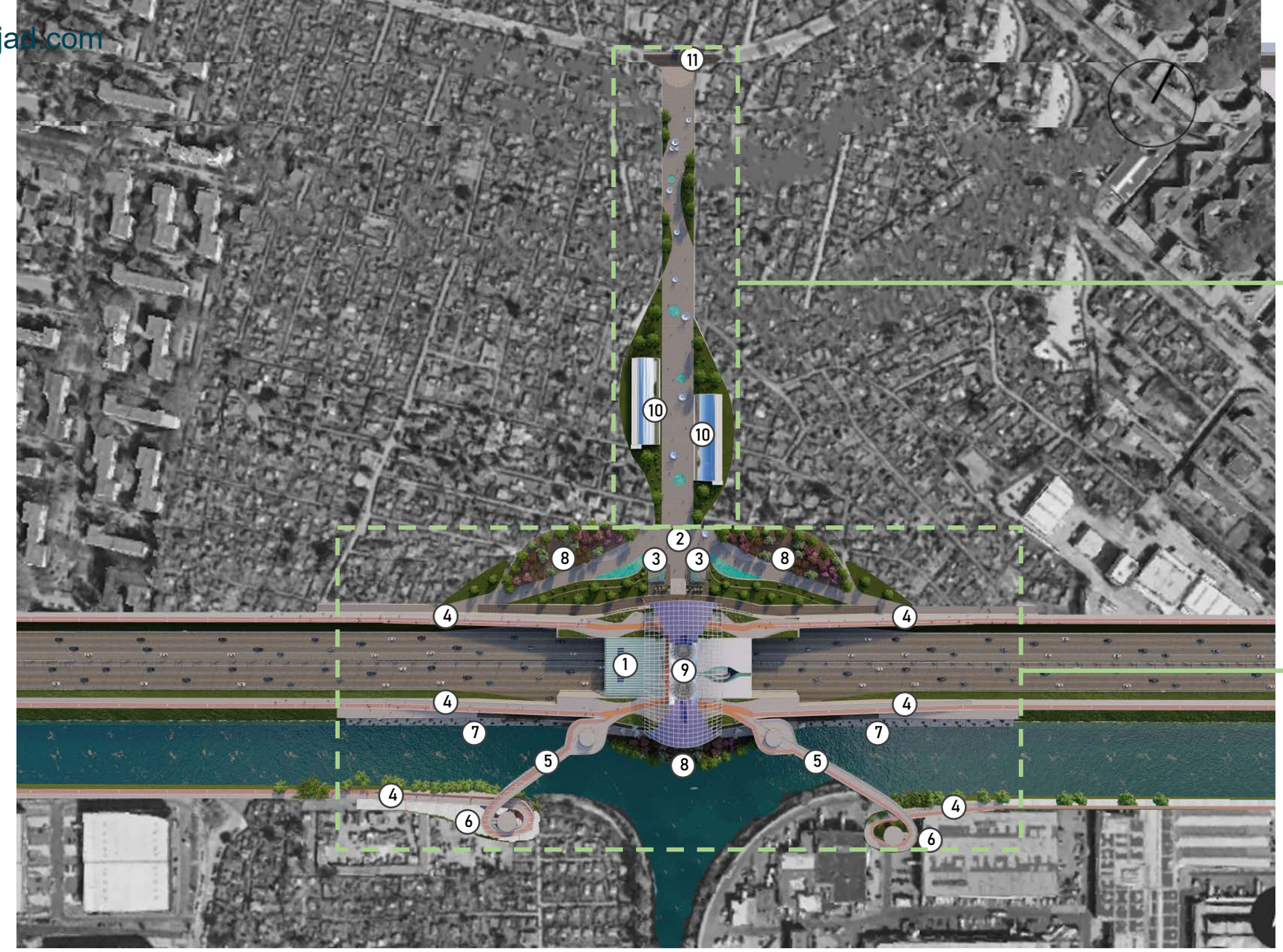


Main volume

04

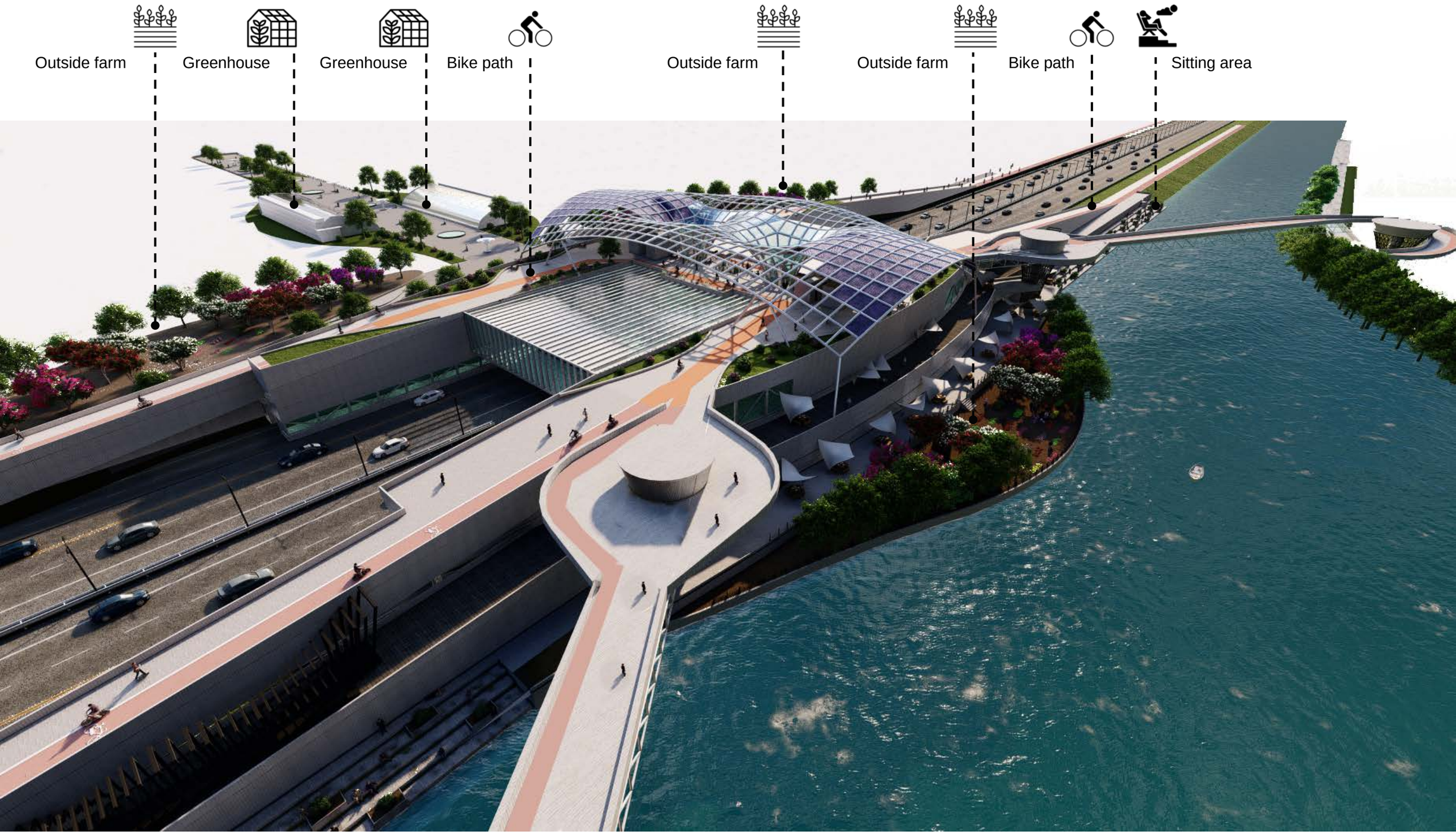
Master plan

- Site zoning
- Master plan layers



Site Plan

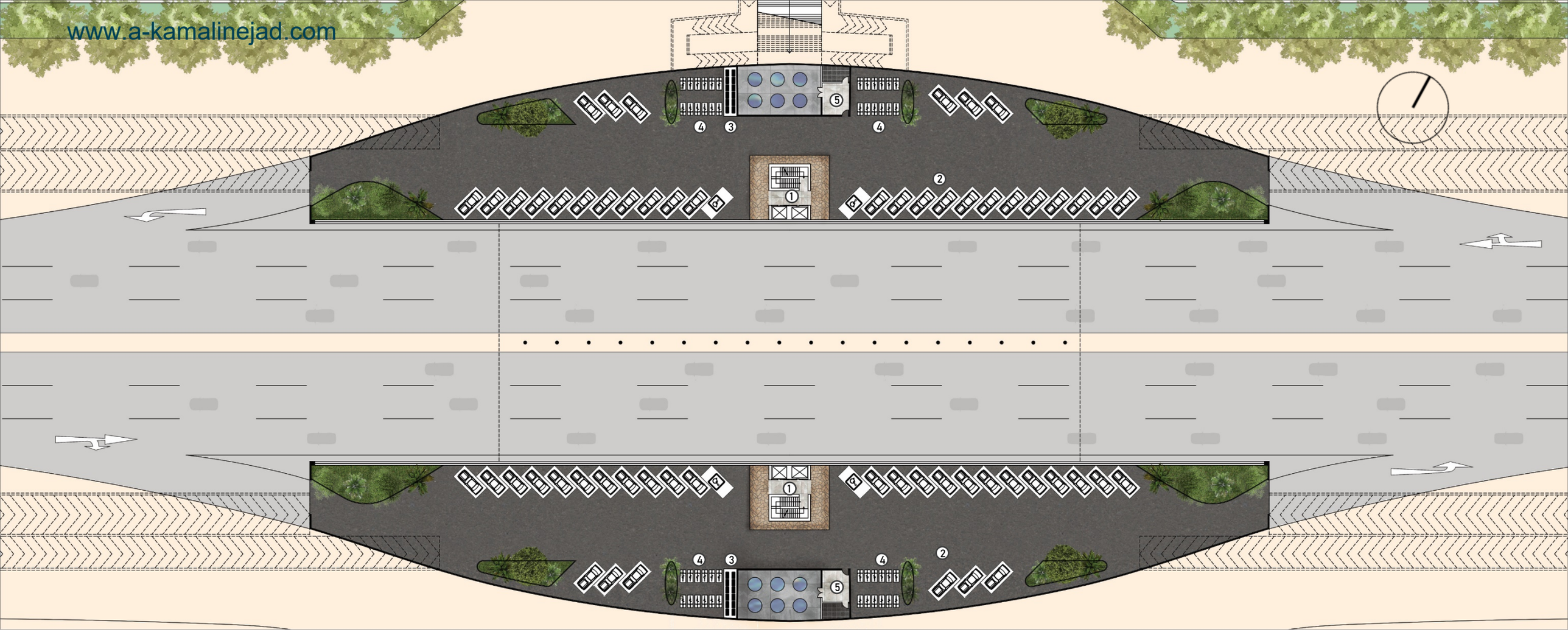
1- Main Building
2- Main Entrance
3- E-Bike Stand
4- Walk path /Bicycle line
5- Bridge
6- E-Bike Stand/Bridge Entrance
7- Site viewing/River Side Meditation
8- Outside Farm
9- ECO-SHELL
10- Outside Greenhouse
11- Bus Station (currently exists)


Outside farm
Greenhouse
Greenhouse
Bike path
Outside farm
Outside farm
Bike path
Sitting area

05

Drawings

- Plans
- Sections
- Elevations
- Renders



GROUND FLOOR

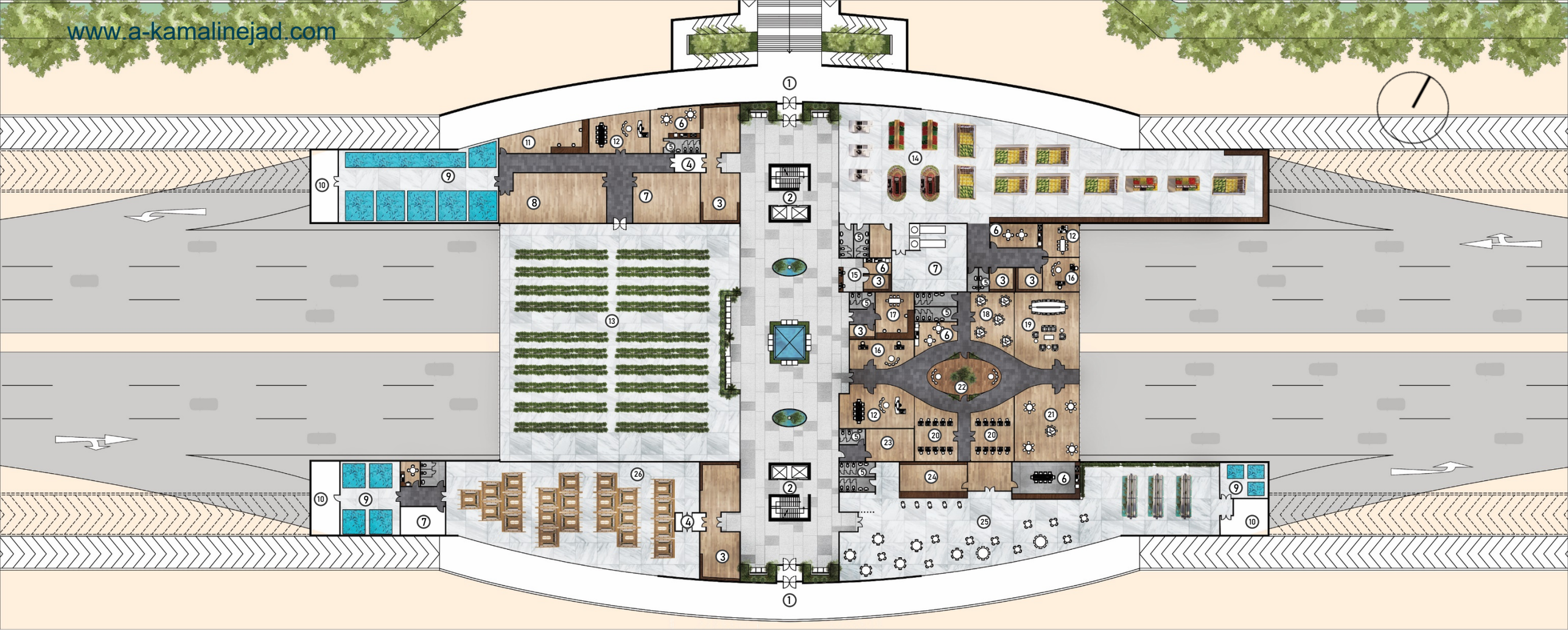
1-Lift/Staircase

2-Car Park Place

3-Trolley stand

4-Bicycle Stand

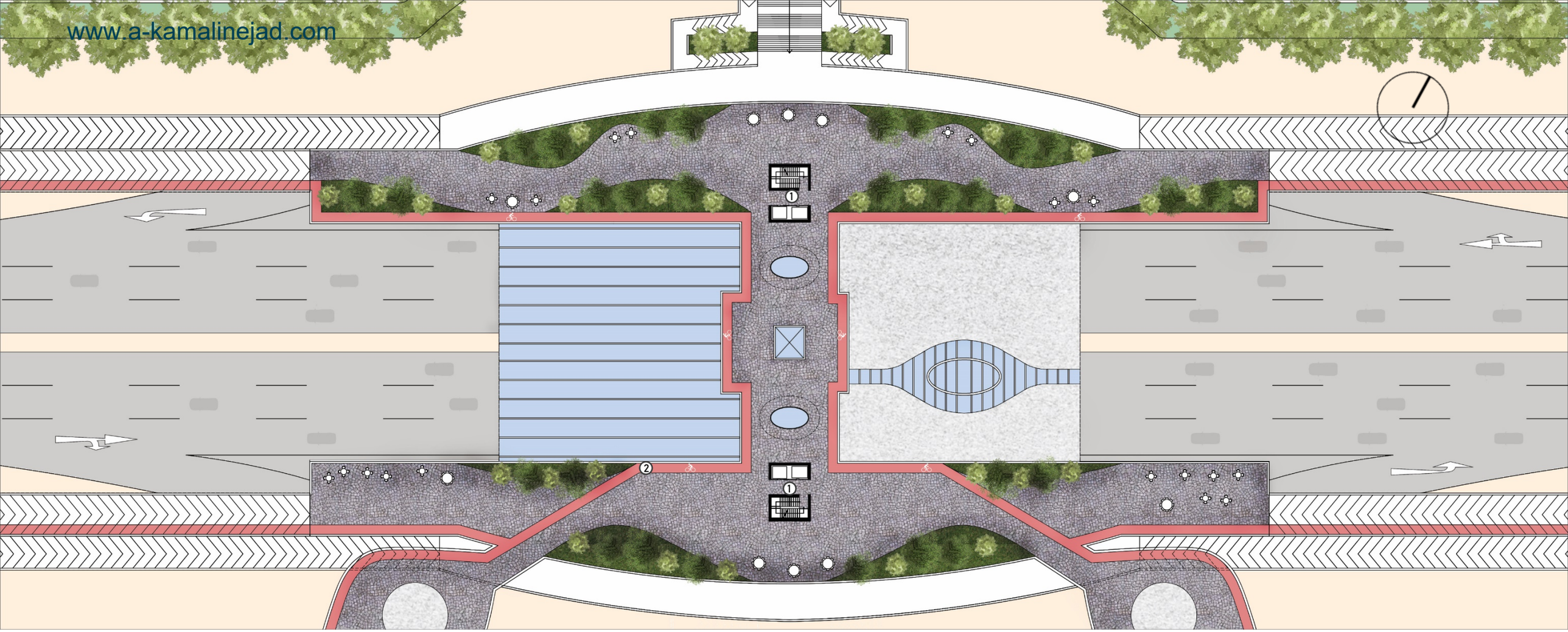
5-Water Tank/ Technical Room



FIRST FLOOR

0 2 7m

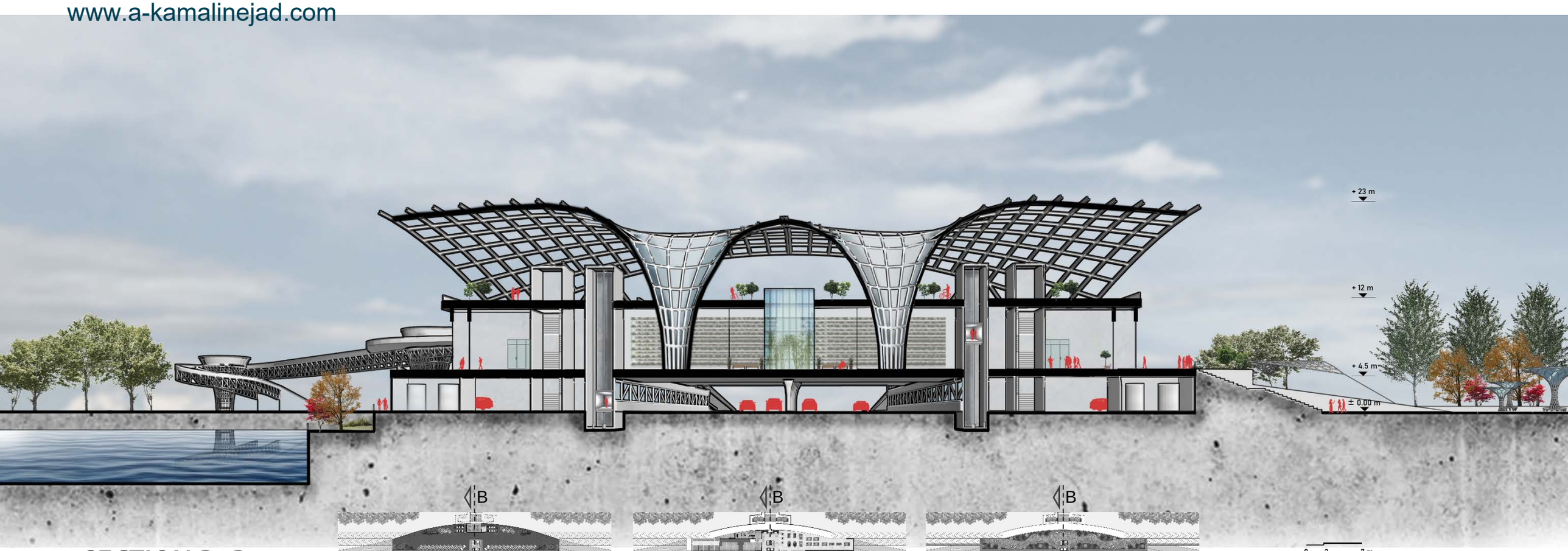
1-Main Entrance
2-Lift/Staircase
3-Cloakroom
4- Hygiene Steam Room
5-WC
6-Kitchen
7-Storage
8-Packing Area
9-Fish Farm
10-Technical Room
11-Laboratory
12-Management
13-Greenhouse
14-Market
15-Information Desk
16-HR
17-Security
18-Library
19- Audio Room/Meeting Room
20-Classroom
21-Workshop
22-Lounge Room / Smoking Room
23-Server
24-Bar
25-Restaurant



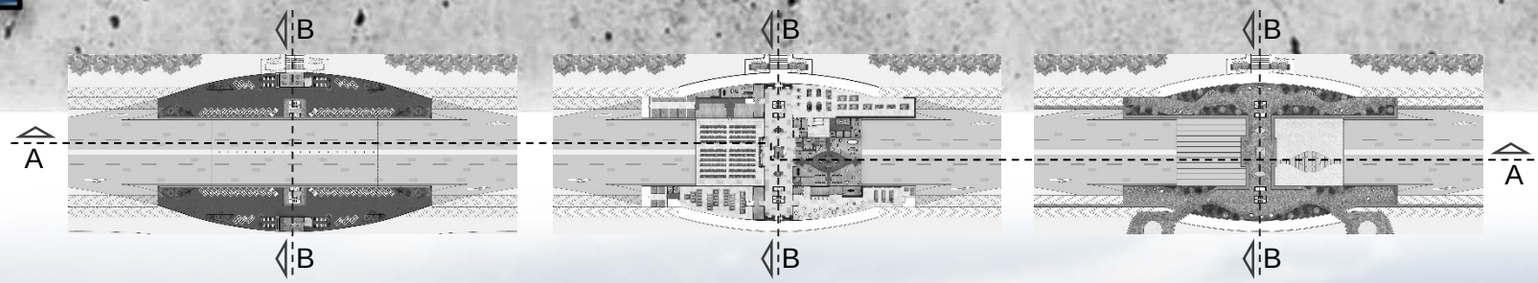
ROOF PLAN

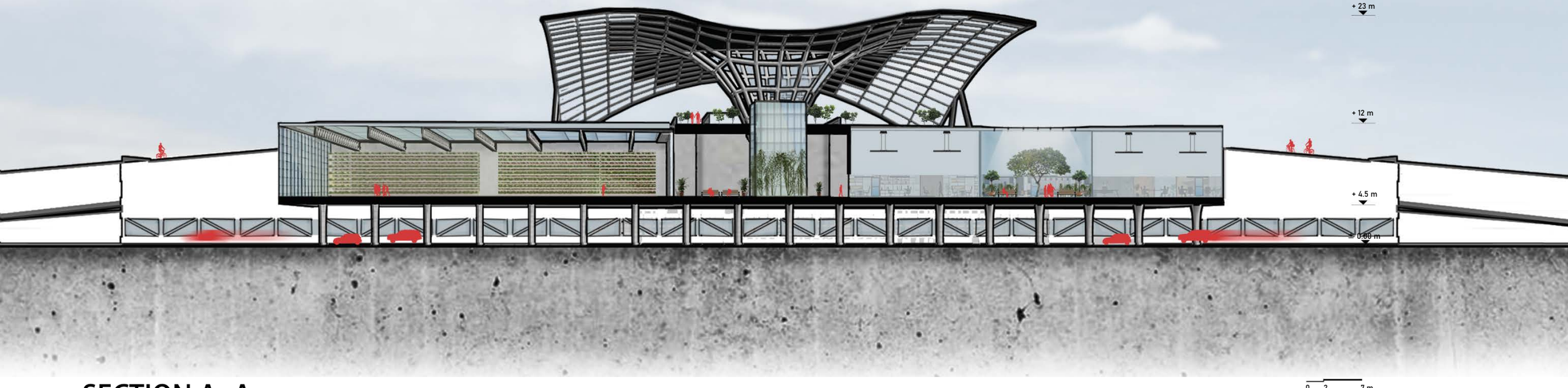
1-Lift/Staircase

2-Bicycle Path

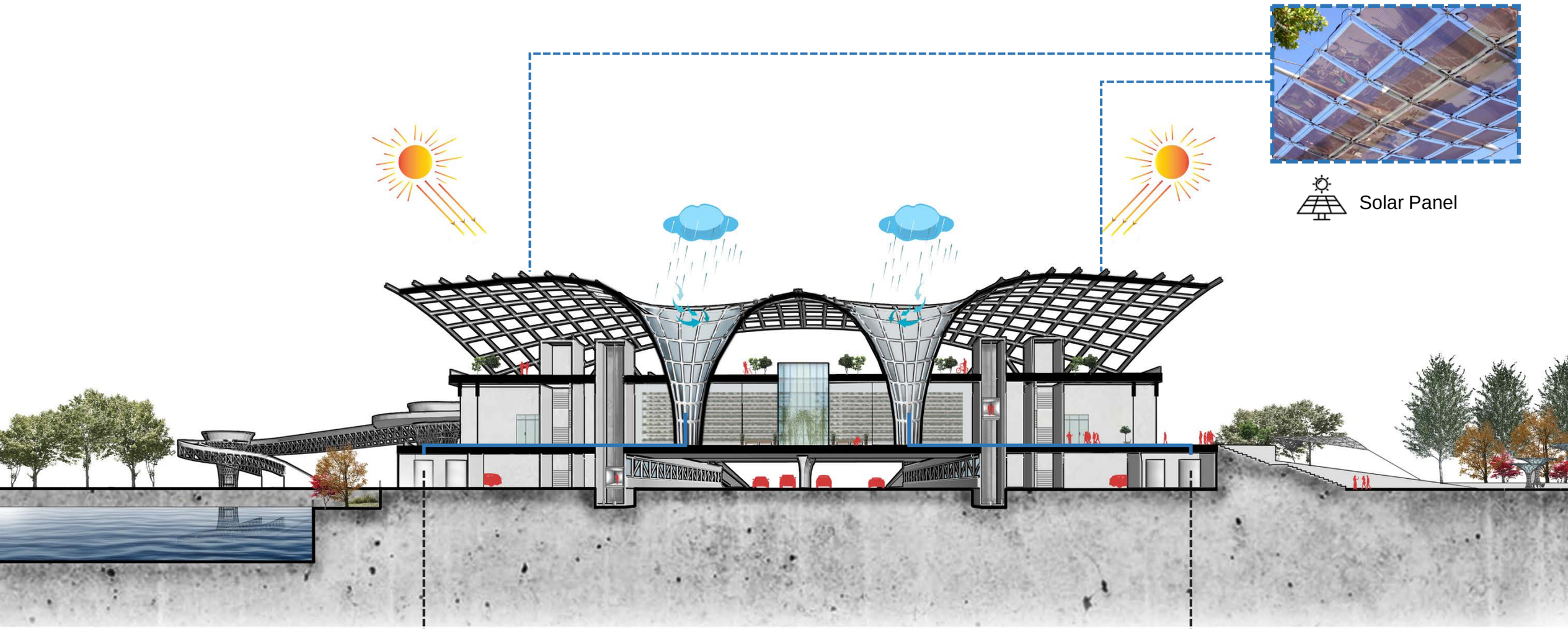


SECTION B_B





SECTION A_A



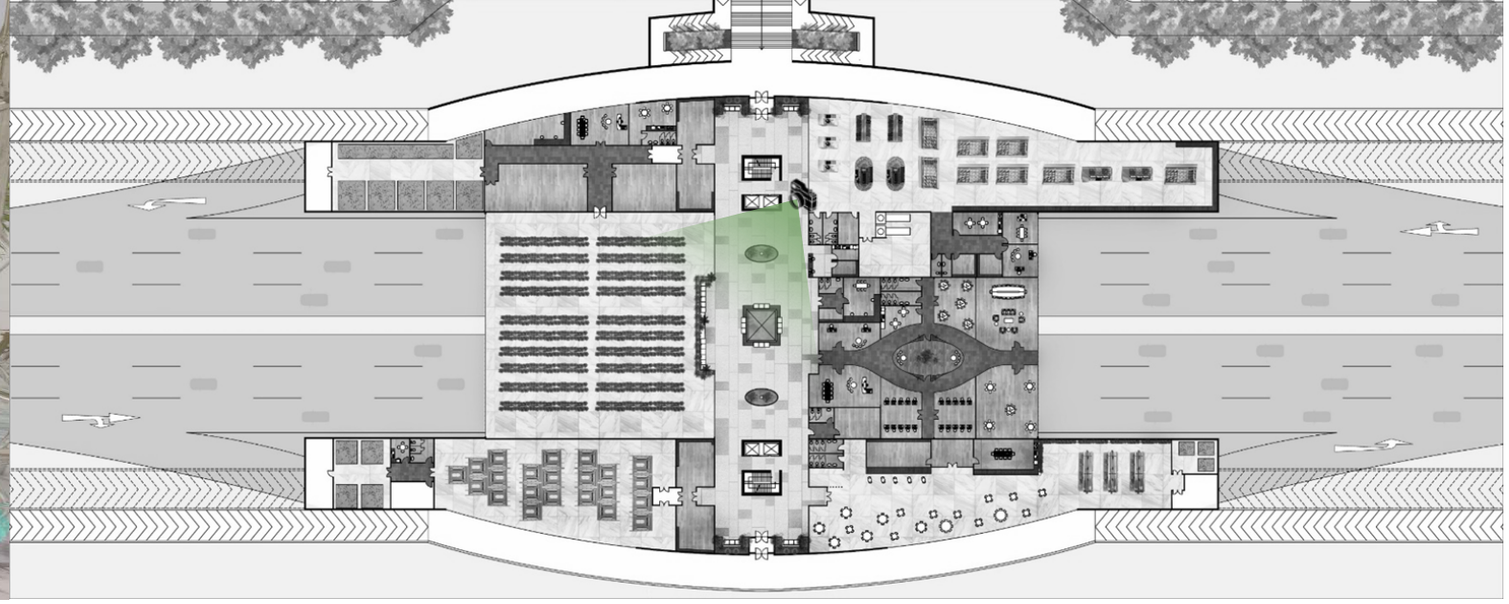
SECTION B_B

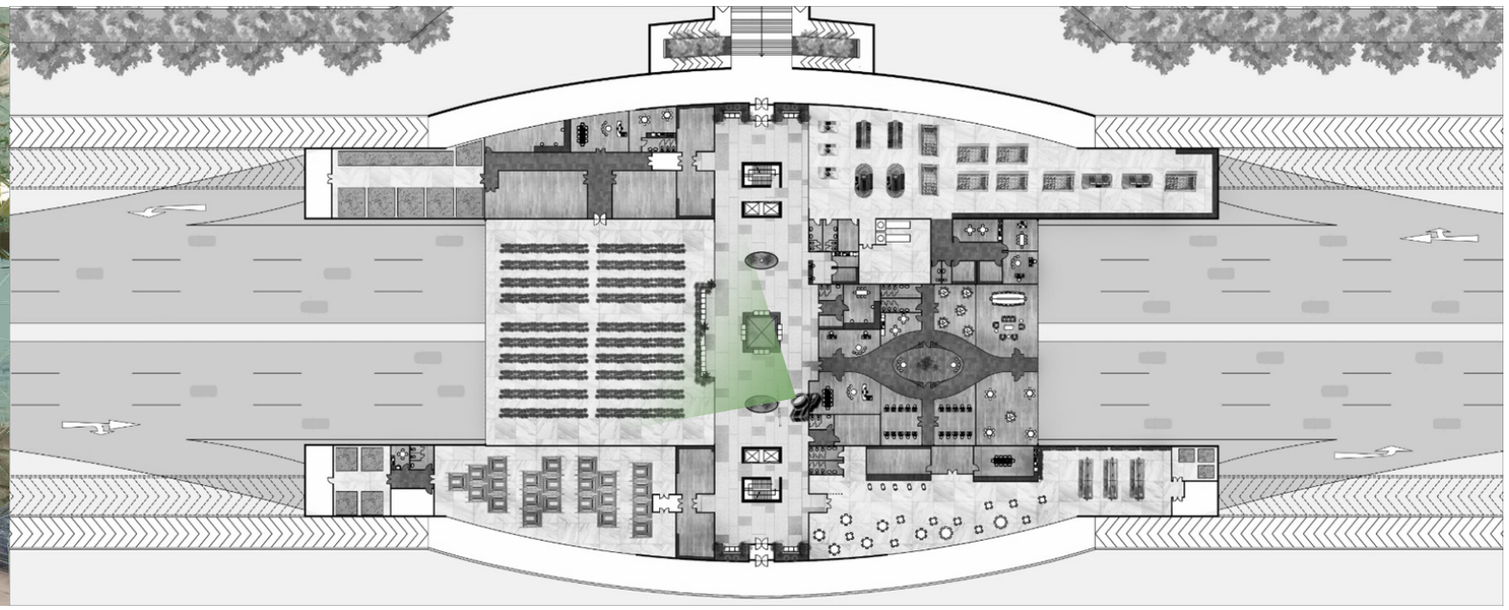
ECO-Shell has two symmetrical pipes which collect the waste rain and links to the water tanks in first level that work as water supply for farming system in building(Aquaponics).

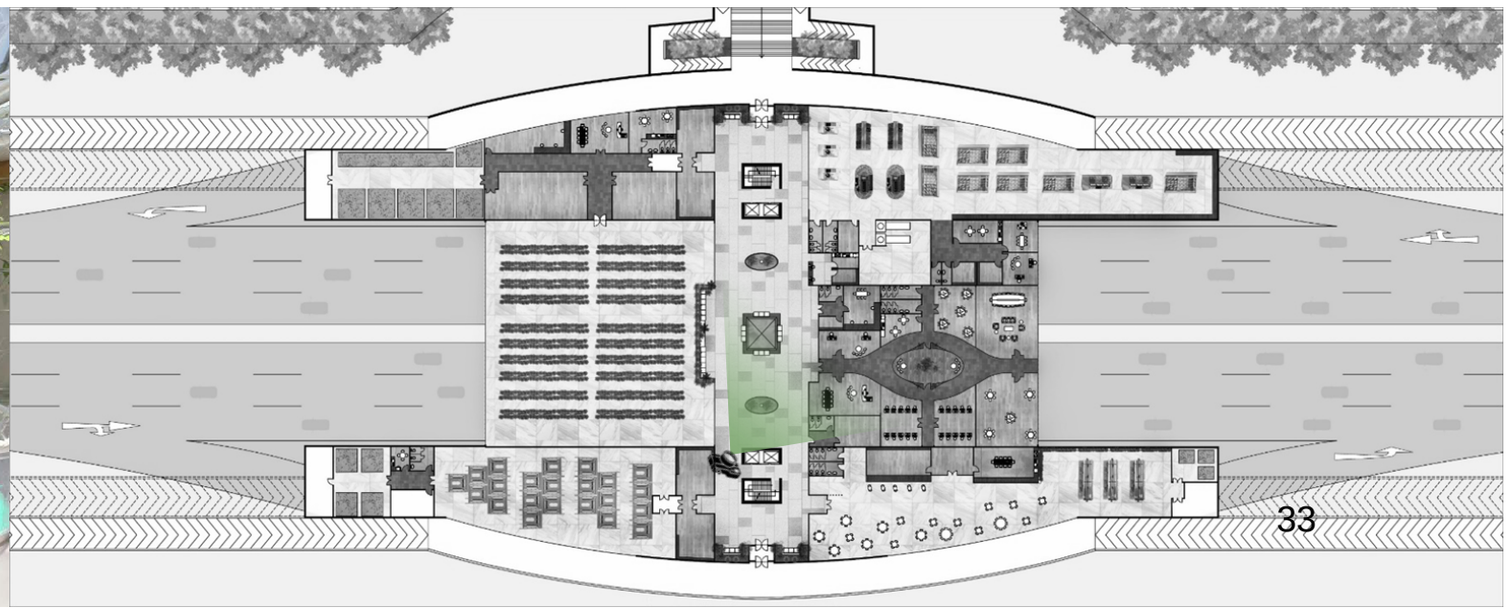
Also, it produces electricity by using Solar Panel.

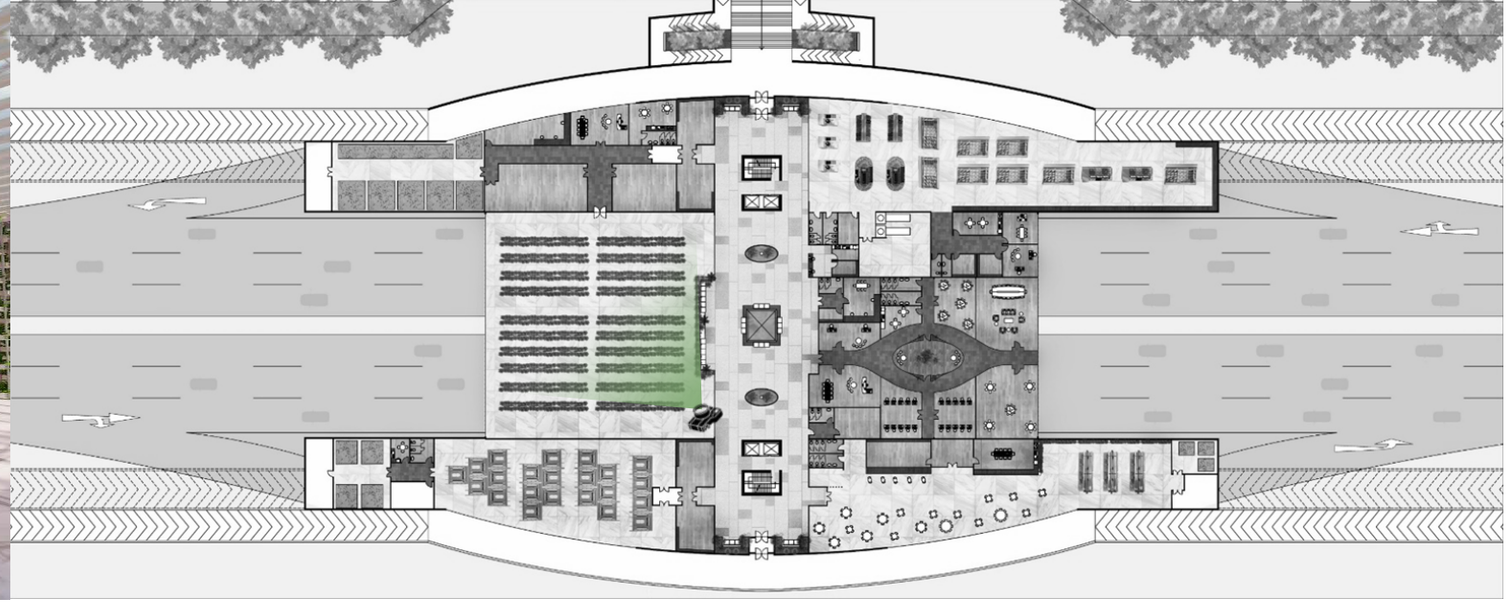
NORTH VIEW

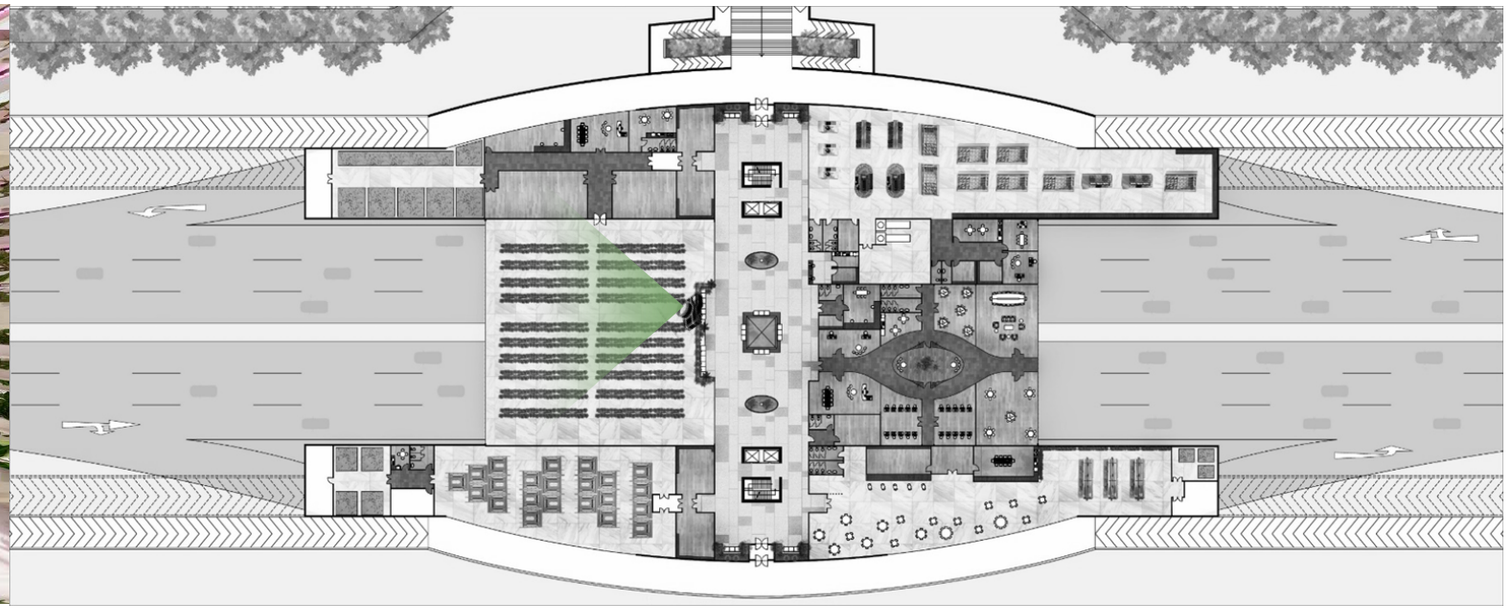
SOUTH VIEW

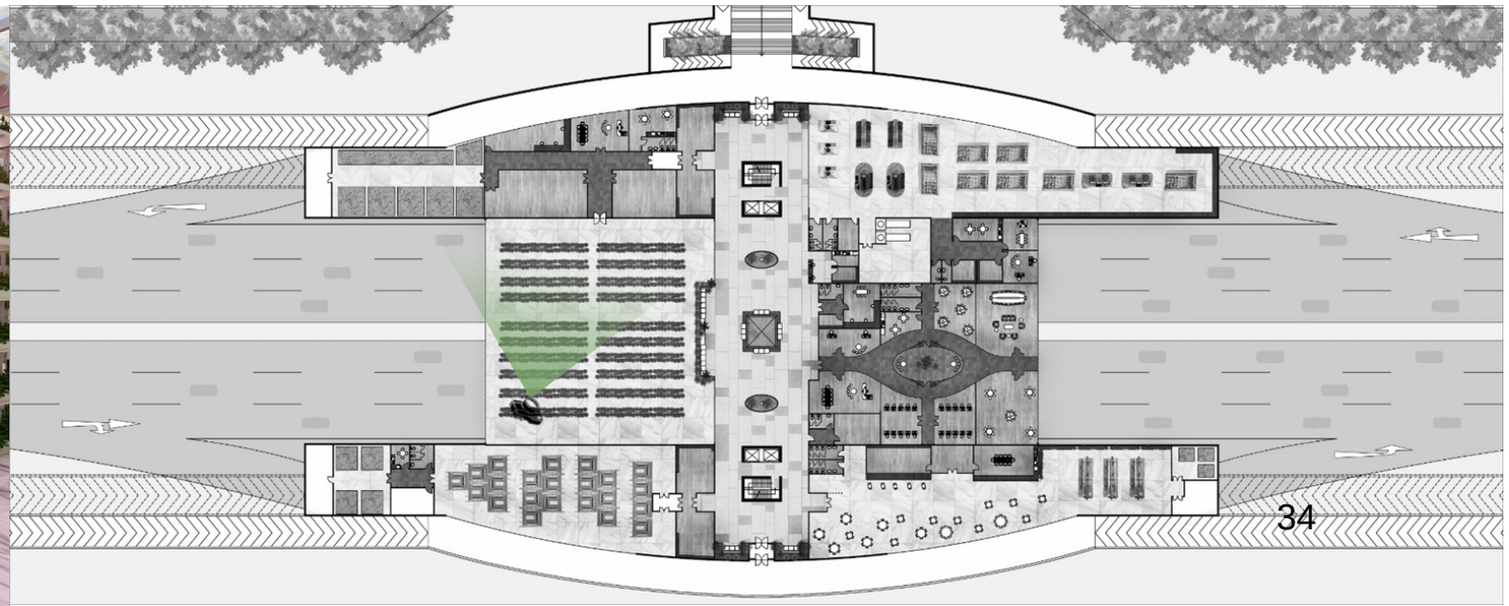


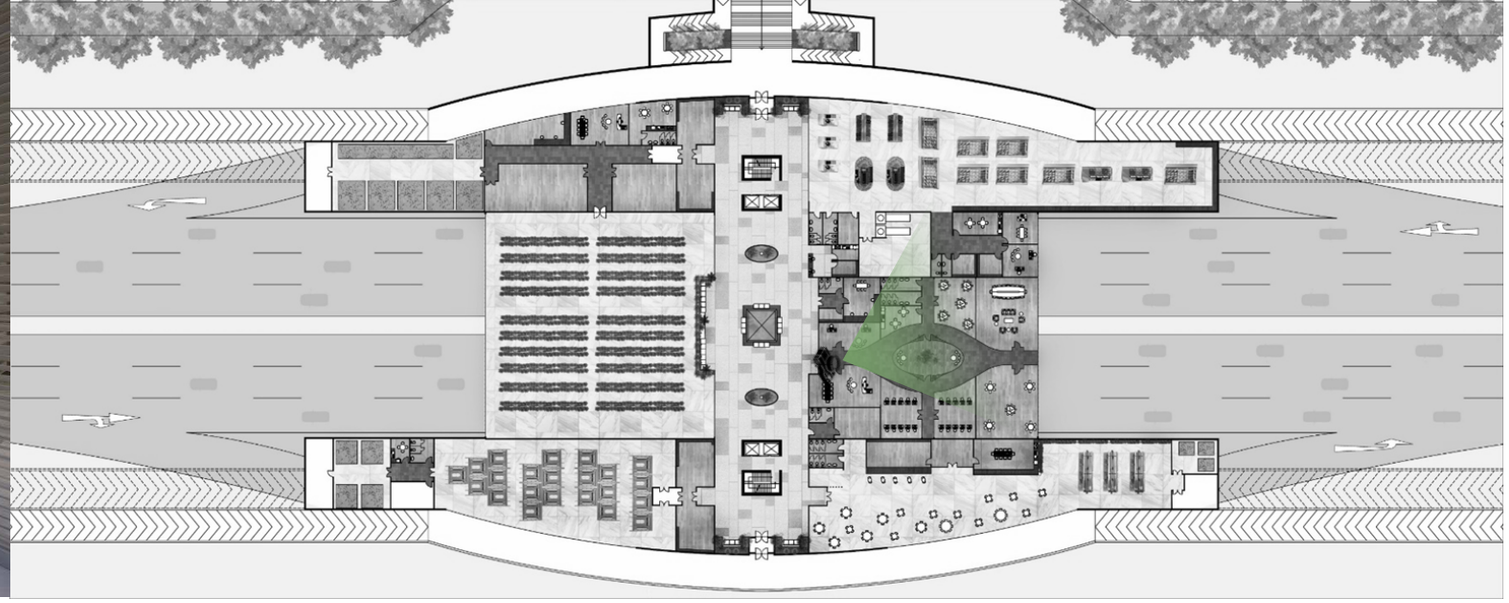






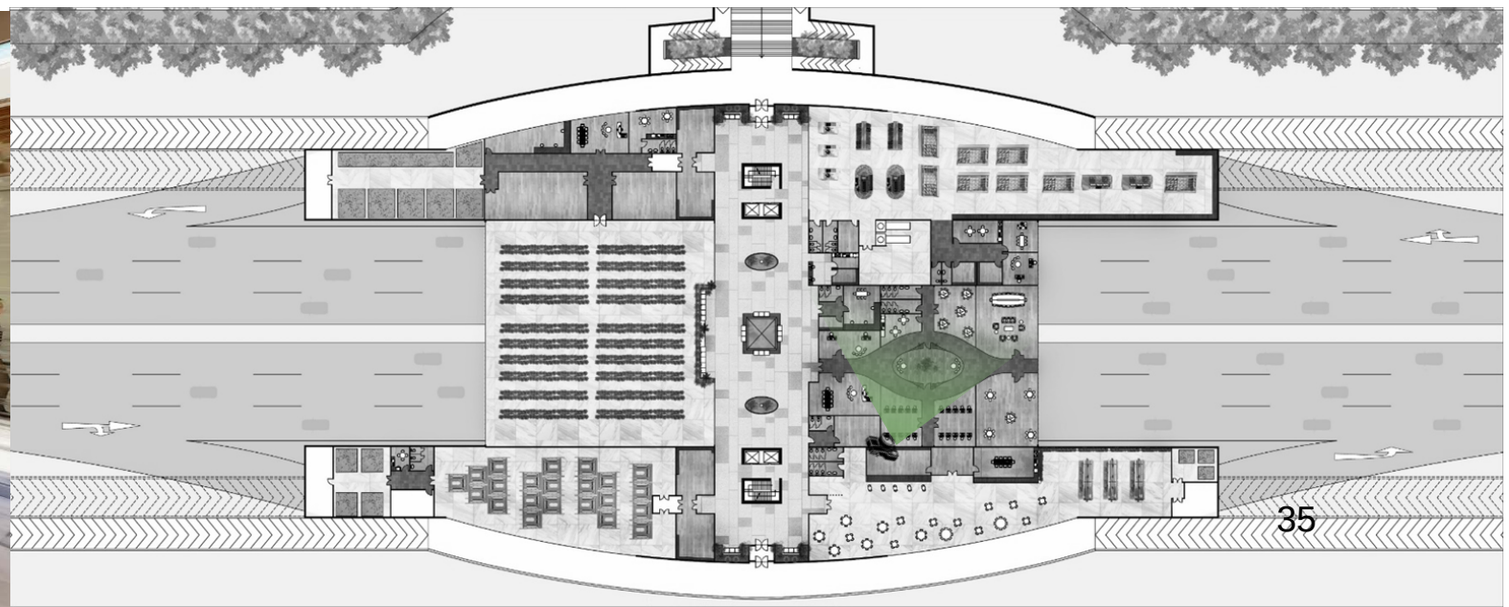


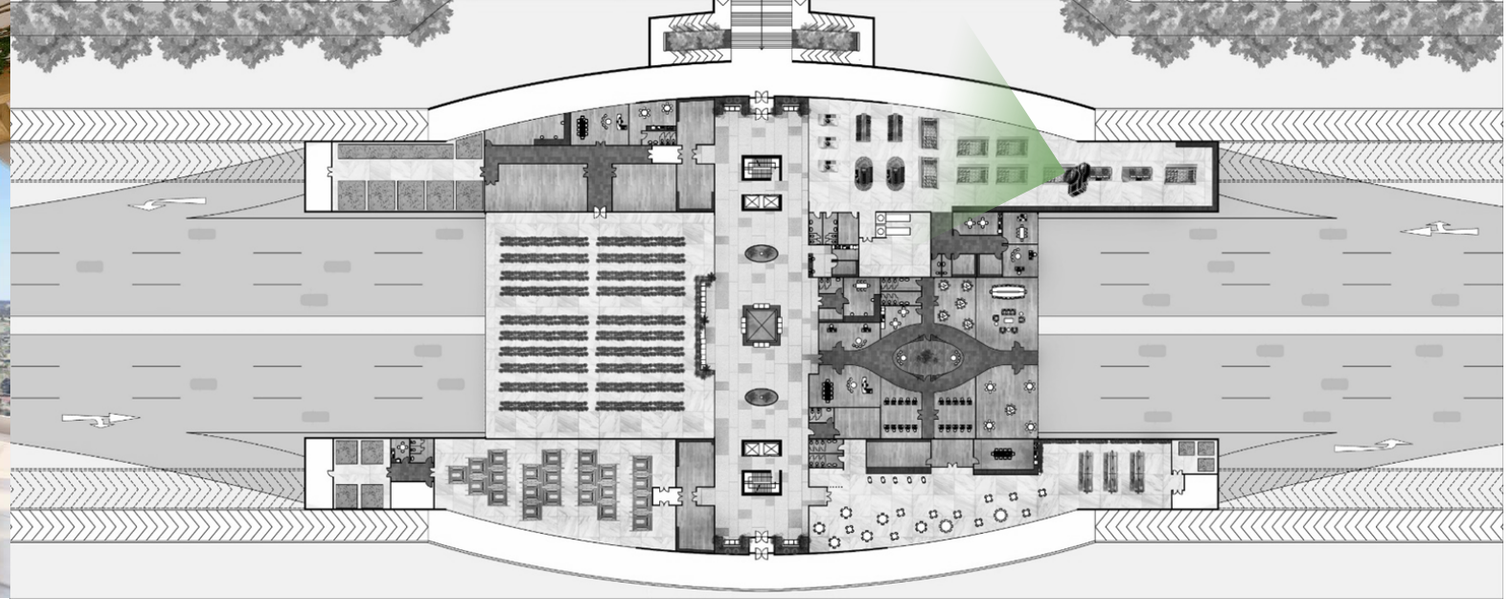


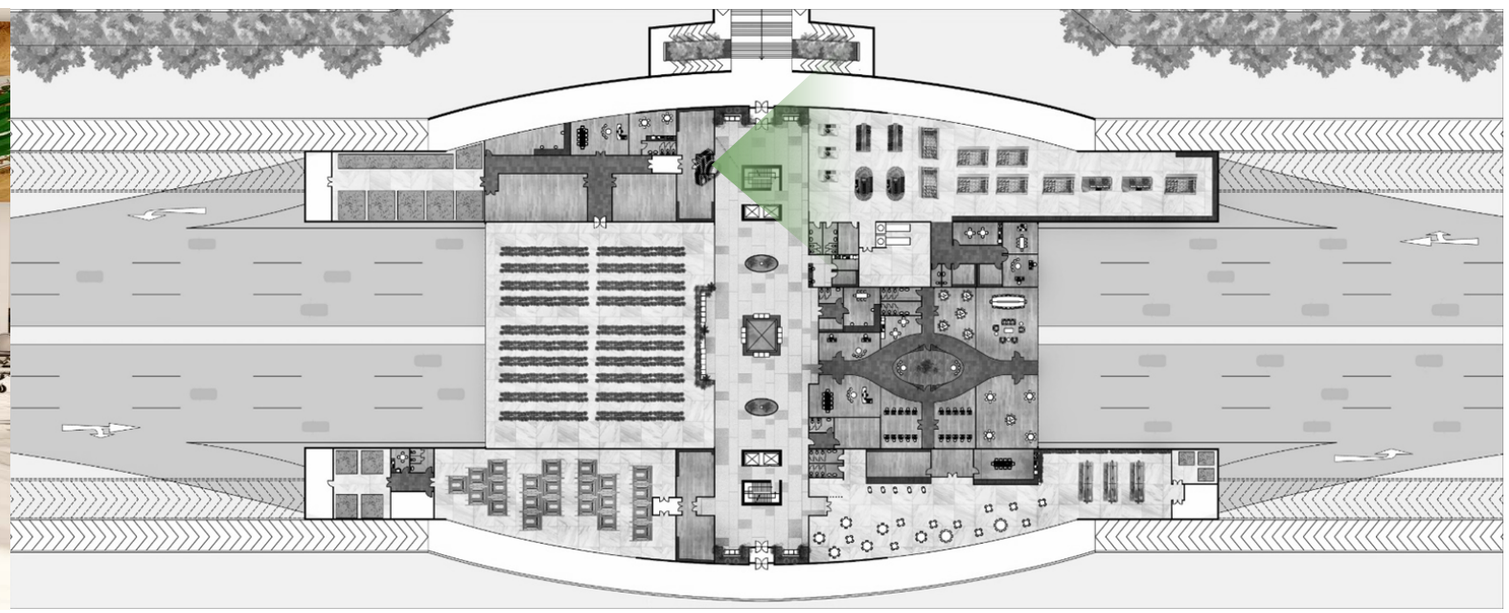


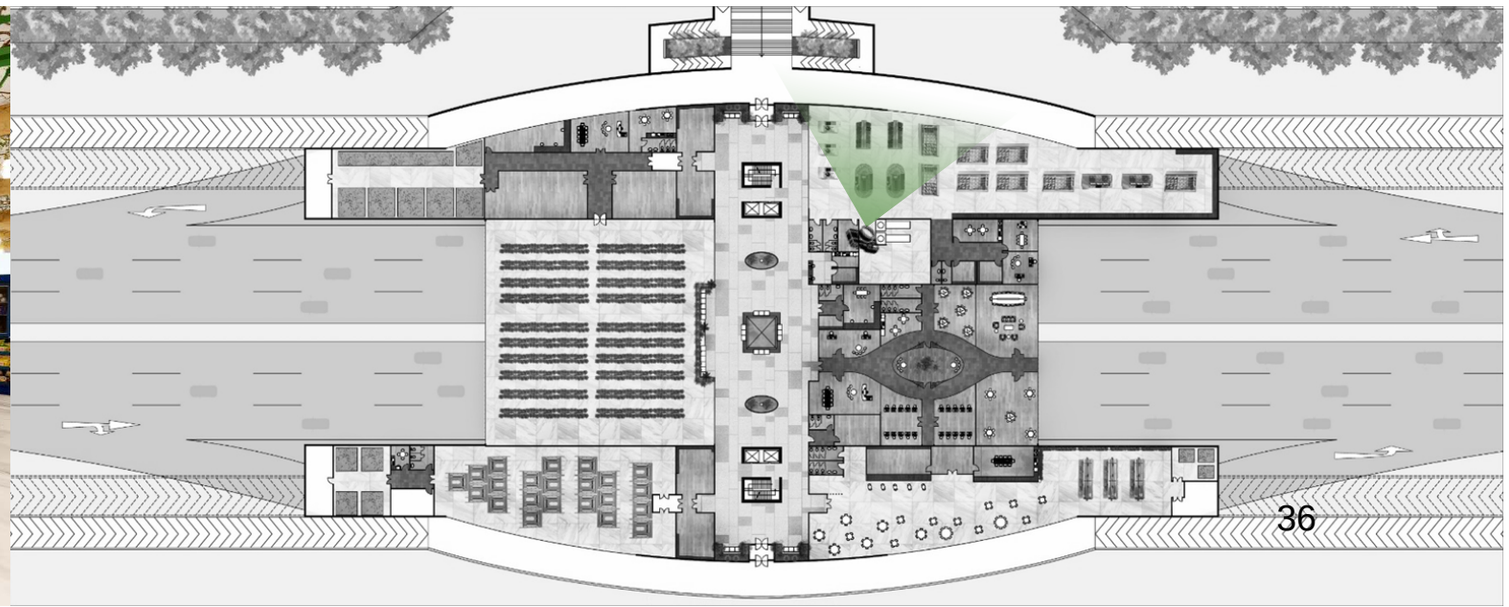
OPEN CEILING

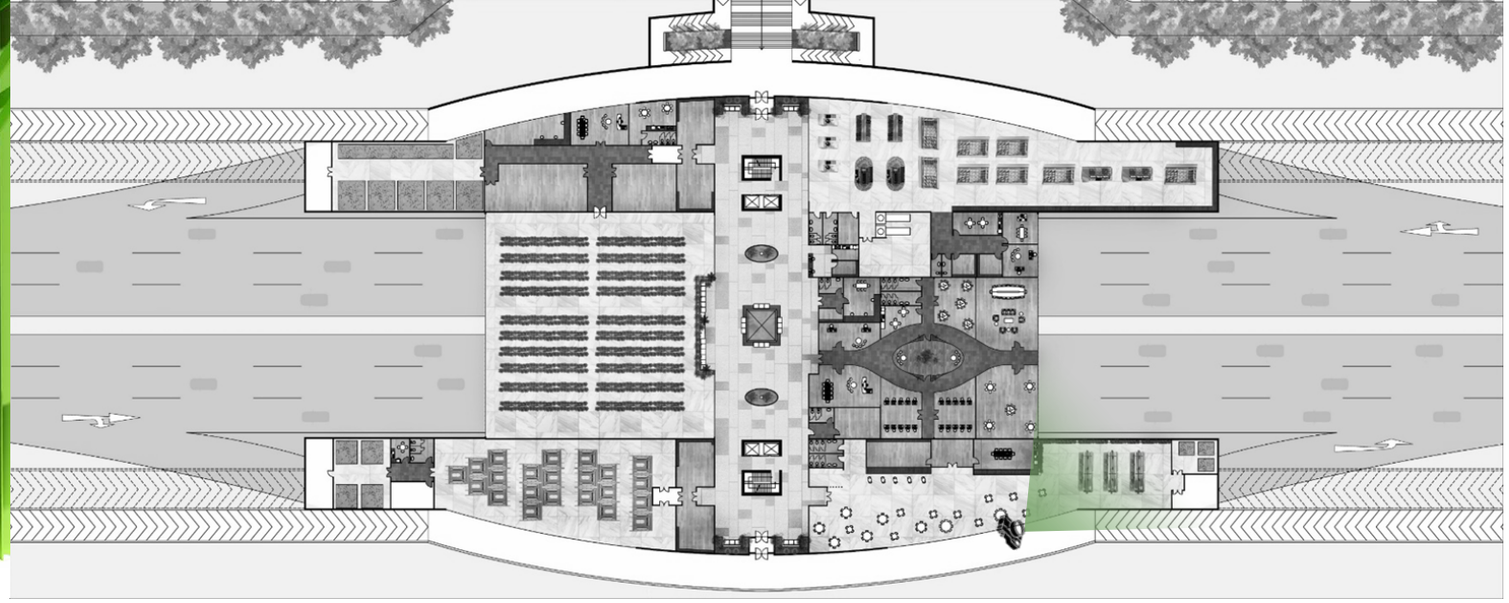
CLOSED CEILING

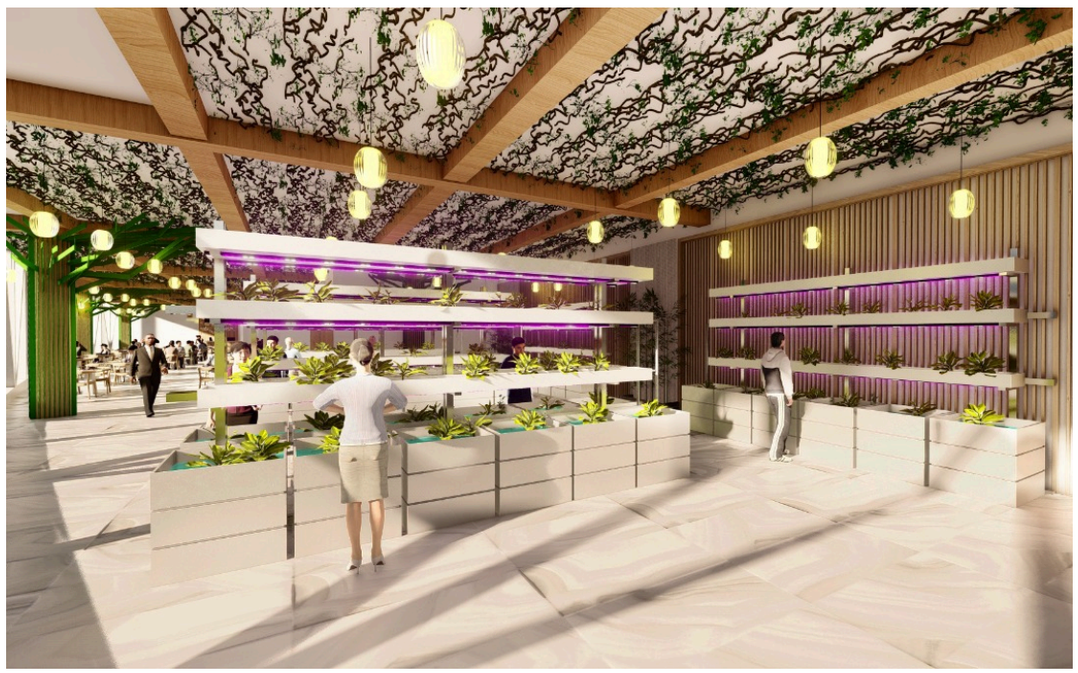


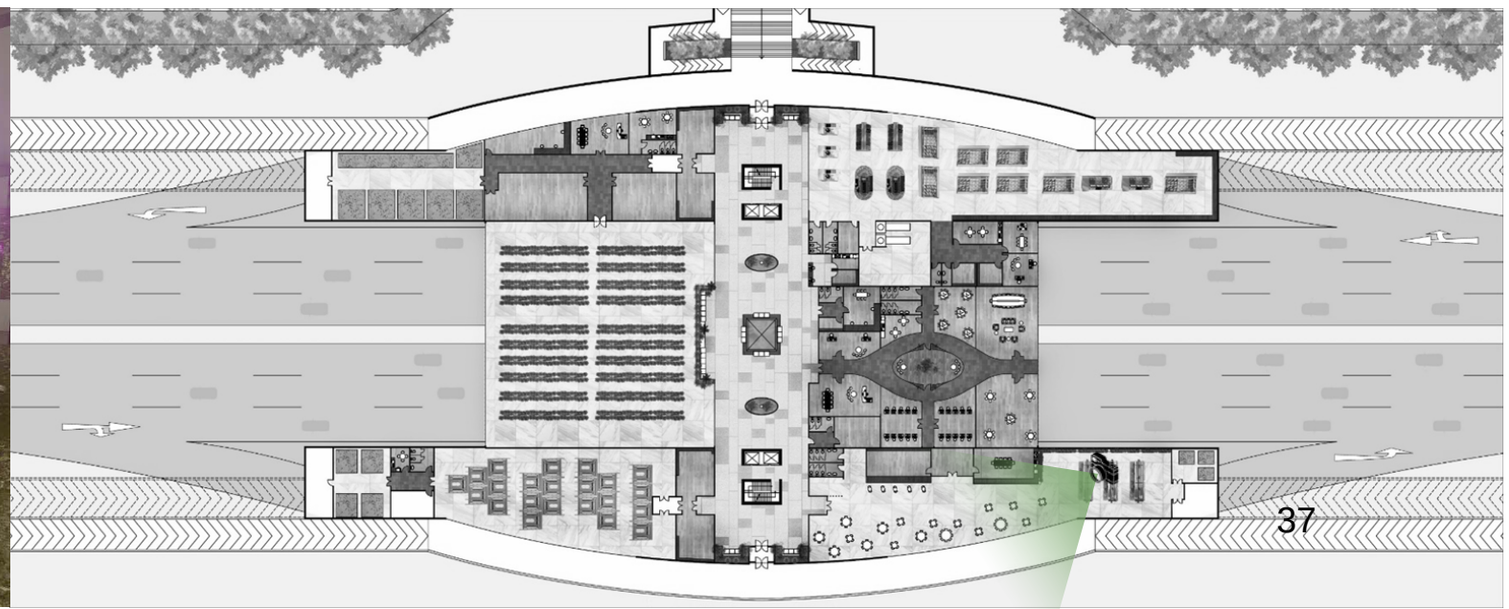


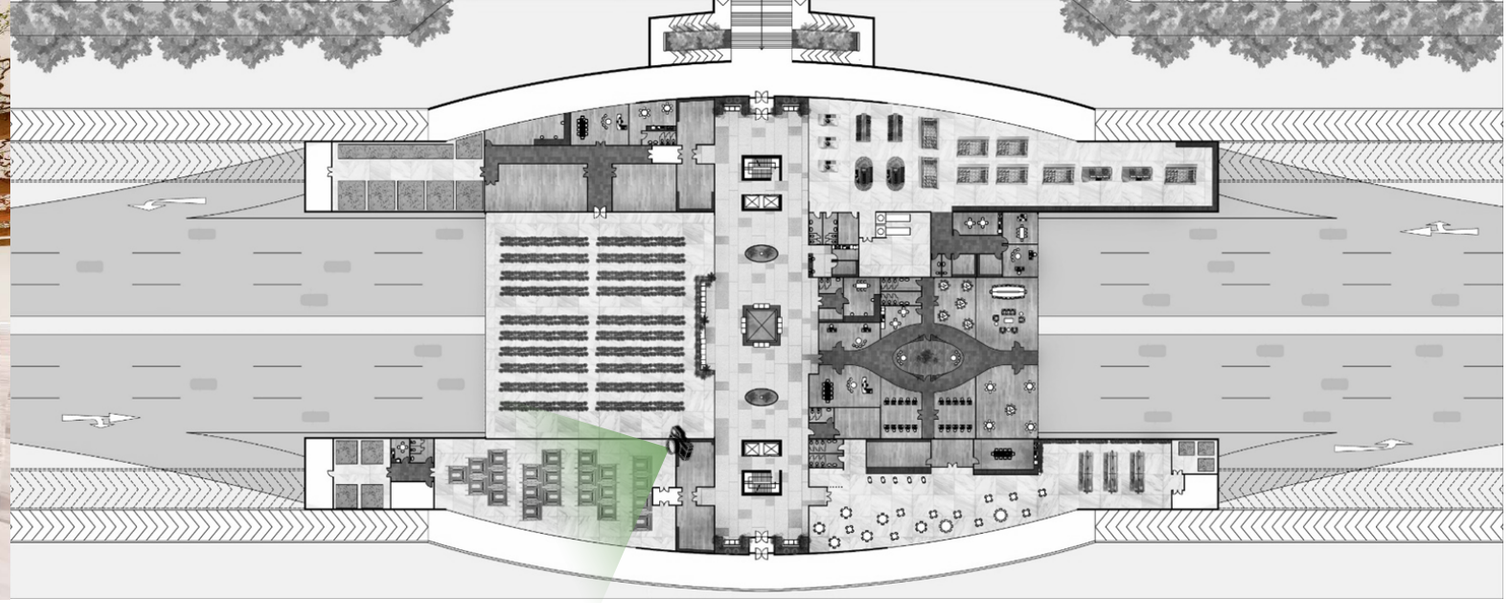


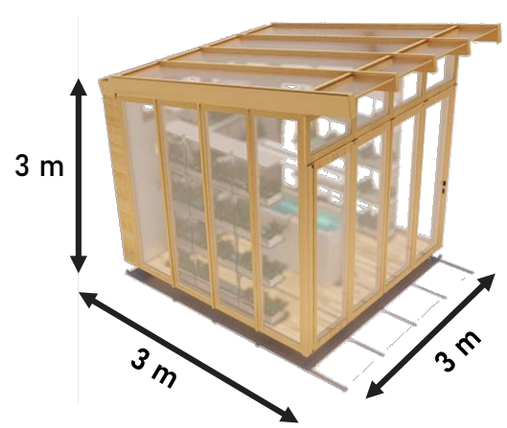




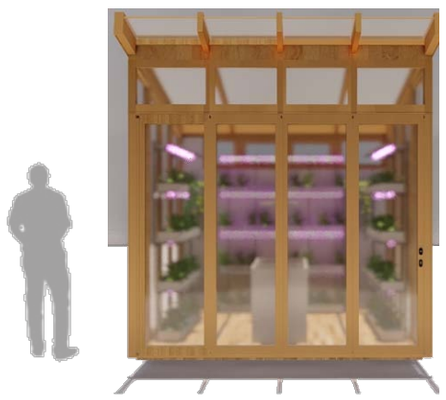






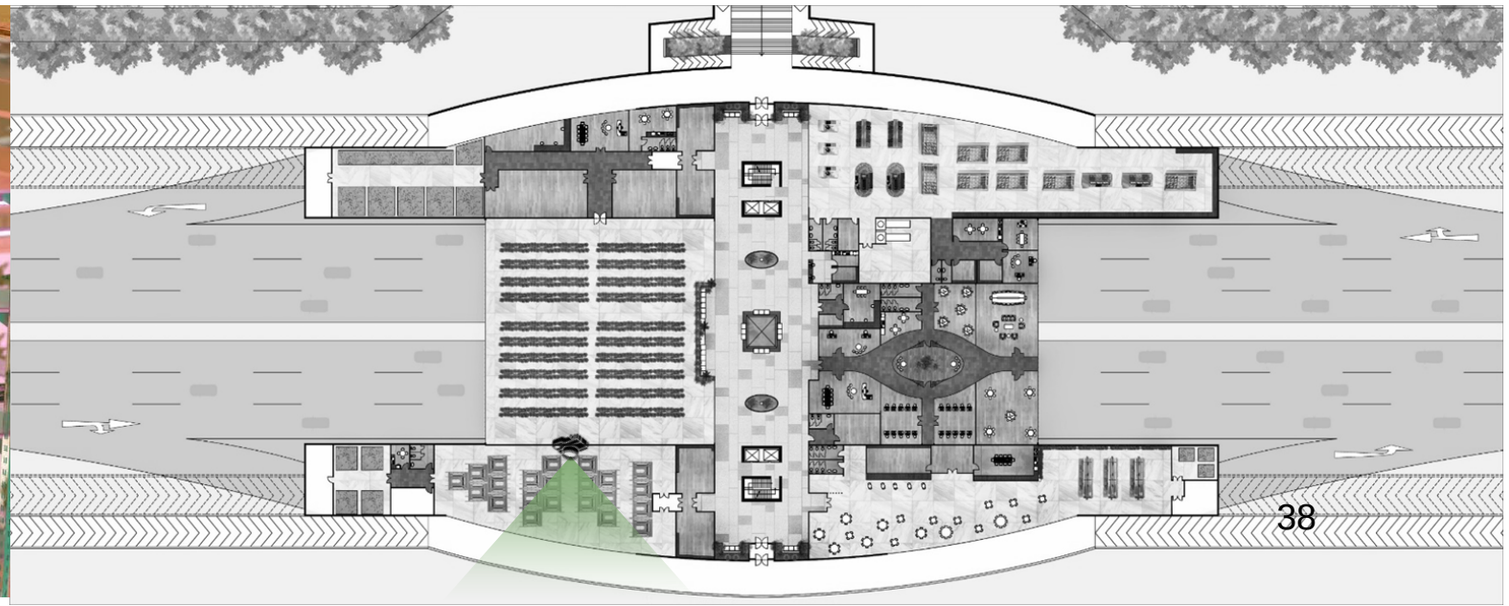


ISOMETRIC VIEW



FRONT VIEW

TOP VIEW



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D/A