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SUBMITTAL FORM

GRIDS AS LANDSCAPES

by

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AMERICAN UNIVERSITY OF BEIRUT

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[grids] as landscapes

final year project report

tina el moheb

01

aknowledgment

I would like to express my gratitude to the many people who saw me through this final year project; it would not have been possible without the help of many individuals and organizations.

I am highly indebted to my professors Dr.Mihran Midani, Dr.Hana Alamuddin, for their constant guidance and above all my advisor Dr.Yaser Abunasr for his constant patience, support and guidance in completing this project.

My thanks and appreciations also go to my classmates for their constant feedback,reassurance and encouragement.

Finally I would like to thanks the department of landscape architecture at the American University of Beirut,proffeseurs and staff members for my growth and development in these four years.

02

table of content

03

table of figures

03

table of figures

011 design development

04

introduction

The industrial sector plays an important role in Lebanon's economic development as it is one of the main sources of wealth and employment.This sector in Lebanon has experienced a major expansion since the end of the war in 1990 .

As per January 1999, there were 72 industrial zones in Lebanon.However, not all of them have been authorized, and none are adequately equipped to host industrial establishments (e.g., waste collection and treatment).

Industries in Lebanon are frequently blamed for many environmental harms.
Currently, most of the liquid, solid and gaseous emissions are discharged into the environment without any form of treatment.This can have severe and long term consequences on the environment as well as the health of residents.The environmental effects include air and water pollution, toxic waste dumps erosion and loss of soil quality.

This report will focus on an industrial zone in Kfarchima,Baabdat,South Lebanon.

The industrial strip found on the upper region of kfarchima was established in the 60's with the introduction of a Lecico a sanitary-ware industry.
The industrial strip then boomed and expanded with a combination of heavy light and medium industries making it a prominent part of kfarchimas identity.

The introduction of the industrial strip lead to many pressures on the environment, the industries are poorly equipped to collect or treat the industrial waste. The infrastructure needed is lacking causing severe consequences on the surrounding environment.
Needless to say, the effects are also on the neighboring residents, pose severe risks to public health and safety.

Figure 1: Artech marble factory kfarchima

The industrial strip is mostly composed of cement,marble,leather and wood companies that dispose of both their solid and liquid waste in the Ghadir river that runs through the site.

The contaminated water will not only pollute the river, but then will be transported and discharged at the sea at the Ouzai coast causing severe effects on water quality and marine life.

One of the many environmental impacts is first the degrading the existing maquis and agricultural land to host the new landuse,which causes severe land instability, erosion, loss of biodiversity and loss of soil quality.

Theses pollutions are caused by first and formost a lack of policies, and if these policies were made a lack of implementation, secondly an unplanned industrial growth.

This is where the role of landscape architecture plays in to evaluate the ecological conditions of the site, as well as solutions and strategies to aid in its renewal and rehabilitation.

Secondly, to evaluate the dominant social dimension and how the environmental conditions can play in a role in aiding or negatively impacting the health and well-being of the laborer.

05

project statement

The purpose of this project is to conceive and adopt a thorough landscape strategy on the entire Kfarchima industrial strip, that will combine both an ecologically sensitive approach as well as a prominent social diminsion,that will solely aim to improve the livelihood of workers on site.

These issues will be looked at on two separate scales ; Kfarchima's industrial strip as a whole, as well as a single factory as a prototype for future development.

The project on the large scale will focus on the recycling of the industrial waste, as well as adding a social dimension to the site creating seating areas across the river spaces.

The generated renewable energy will make use of the underutilized resources found in site, including solar energy as well as making use of the highly conductive pollutants found in the ghadir river to generate power and electricity to be used by the factories.

An education layer will also be added to site by allocating outdoor common training centers for the new laborers.

A similar approach will be used on the factory scale, by creating pocket seating areas catering for the different needs of the workers as well as an in-depth waste management proposal.

06

methods & research

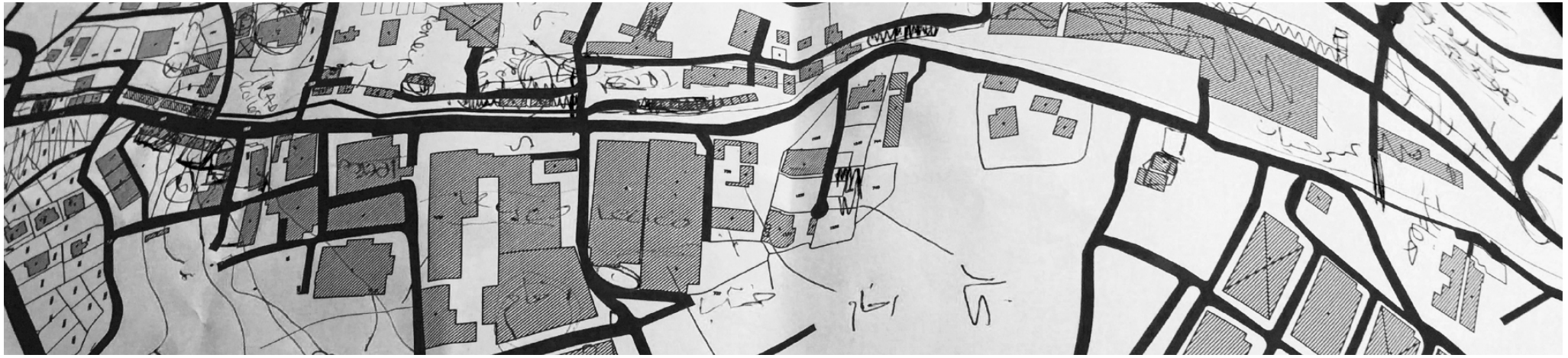


Figure 2: on site mapping

Research for this project includes continual communication with Kfarchima laborers who make up the users of the site. Continuous site visits to be able to record and document existing factories, labor numbers, break time preferences.

The study also included meetings with the residents of Kfarchima to be able to develop a narrative to the site, and to be able understand the people's perception of the industrial zone ; its history as well as its developments.

The research includes several meetings with the mayor of Kfarchima to understand the presence/absences of laws and policies governing the industrial strip, as well as possible future insights and developments.

It also includes meetings with ecologists and hydrologists to be able to identify key issues on site, as well as approaches and strategies for site restoration .
As well as case studies of recent landscape architectural projects done on industrial sites, riverfront projects, as well as projects that target the issues of recycling.

07

literature review constructivist theory

The constructivist approach in the field of landscape architecture, deals with the ability to give a space through a specific design a meaning.
This meaning is solely based on a collaboration between the user and site, generating specific norms and rituals.Rituals "reproduce and reshape their social and cultural environments" (Bell, 1997, p. 76).

According to Bell, the natural of the rituals depends on 7 rules of which

1.Formalism: formal activities that are tied to a specific set of rules.
2.Traditionalism: Rituals that are based on "the way its been always done "
3.Invariance Repetition: frequently repeated actions.
4.rules governing "chaos of personal self-interest" (Bell, 1997, p. 153)
5. sacral symbolism : quality helps to mark ritual space as sacred in opposition to profane non-ritual space
"The study of ritual spaces demonstrates that through design, landscape architects manipulate not only the physical landscape but also the internal landscapes of individual users (C Calorusso -2002)
In order to reach a design phase, it is crucial for the designer to study and to generate a thorough analysis of the space that collaborates the user and site, and that understands not only the physical landscape but the internal landscape per user.

"A constructivist approach to design engages multiple senses and the movement of the body itself in the production of meaning. It seeks to connect the site with the user on all levels, not just the visual" (C Calorusso - 2002)

A constructivist approach to design engages multiple senses and the movement of the body itself in the production of meaning. It seeks to connect the site with the user on all levels, not just the visual.

Kineshtietic engagement, a part of the physical interactions with the site, focuses on the body movement in creating rituals and habits.
“Things and places can be properly understood only through nearness and intimacy, through bodily participation” (James Corner,p. 127).
Another engagement of high importance is sensory engagement that triggers all senses and does not strictly focused on the visual .When all senses are highlighted, it adds both meaning and depth to the site.

The site under study is the industrial zone of Kfarchima, and more specifically a medium sized marble factory.
In order to develop further on a detailed design, an in-depth study was conducted on the site to try to understand both the physical and internal environment.

A participatory approach was conducted, in which multiple interviews were conducted to grasp an idea about the day to day life of the laborers ; their working conditions, working hours, where they take their break etc, where some laborers reside on site.

These observations were then mapped in the inventory maps below.

The method of research and analysis follows a constructivist approach since it was mapping not only physical environment but the internal one as well.

It was noticed by examining the laborers at lunch break that some made a ritual of taking a break under an old eucalyptus tree, others prefer resorting to their on site housing as others prefer staying indoors.

By examining these different actions, the sites of interventions were identified, according to each specific preference, to be later developed in the upcoming stage.

source Calorusso C. (2002). ARTICULATING THE CONSTRUCTIVIST DESIGN APPROACH.:

Figure 3: restored site

Figure 4: working with existing topography

Figure 5: recycled wind turbine

Figure 6: recycled tank

Figure 7: recycled gabian wall

Figure 8: recycled benches

08

case study: ballast park ,sydney australia

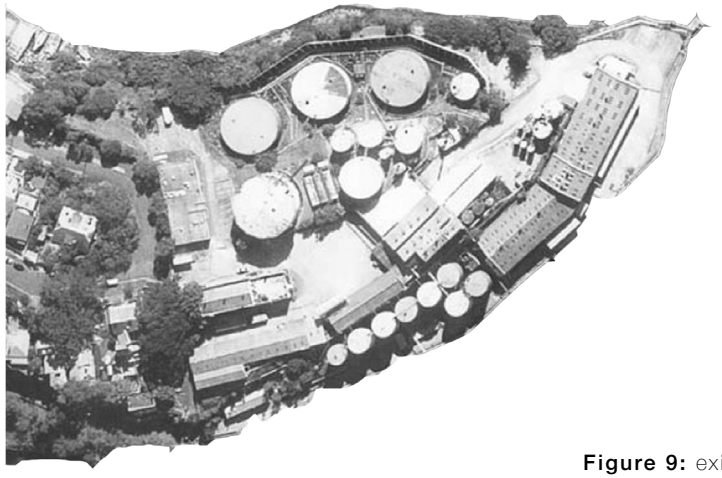


Figure 9: existing plan

Figure 10: restored plan

“A design that would embrace the history of the site while adding a new story”

General Information

Type : Post Industrial
Landscape Architecture: McGregor+Coxall
Location : Sydney,Australia
Size : 2.5 ha

Project Description

Located on the former Caltex lubricant production facility site, the 2.5ha park occupies the Birchgrove Peninsula in Sydney’s inner western harbour suburb of Balmain.
The site, has a rich history, from the privately owned residence “Menevia’ of the 1860’s, to a quarry for ship ballast.
It was transformed into a park that includes walking paths, access for cyclists and green picnic spots with incredible views of Sydney Harbour Bridge.

Design Approach

On site energy producton was a big factor in the concept that includes stormwater filtration though bioswales, rain gardens and wind turbines for on-site energy production.

Figure 11: masterplan

Figure 12: linear parks

Figure 13: colored murals

Figure 14: recreational beaches

Figure 15: educational corridor

Figure 16: futuristic city

08

case study: activate a resilient river, minneapolis river

Figure 17: minneapolis masterplan

"A fifty-year framework for investment that focuses on: ecological renewal, social equity, new economies and a new identity for the city of the river"

General Information

Type : River Restoration
Landscape Architect:Turenscape
Location: Minneapolis River

Themes

Ecological Renewal :

1. How to build a healthy natural ecosystem and make best use of a park system for its productive potenwtial ?

2. Social equity :
How can this project create a more equitable society in which North Minneapolis becomes as much of a destination for the whole city as its other areas?

3.Vibrant economy:
How can investments in the river catalyze broader economic activity and attract the businesses of the future?

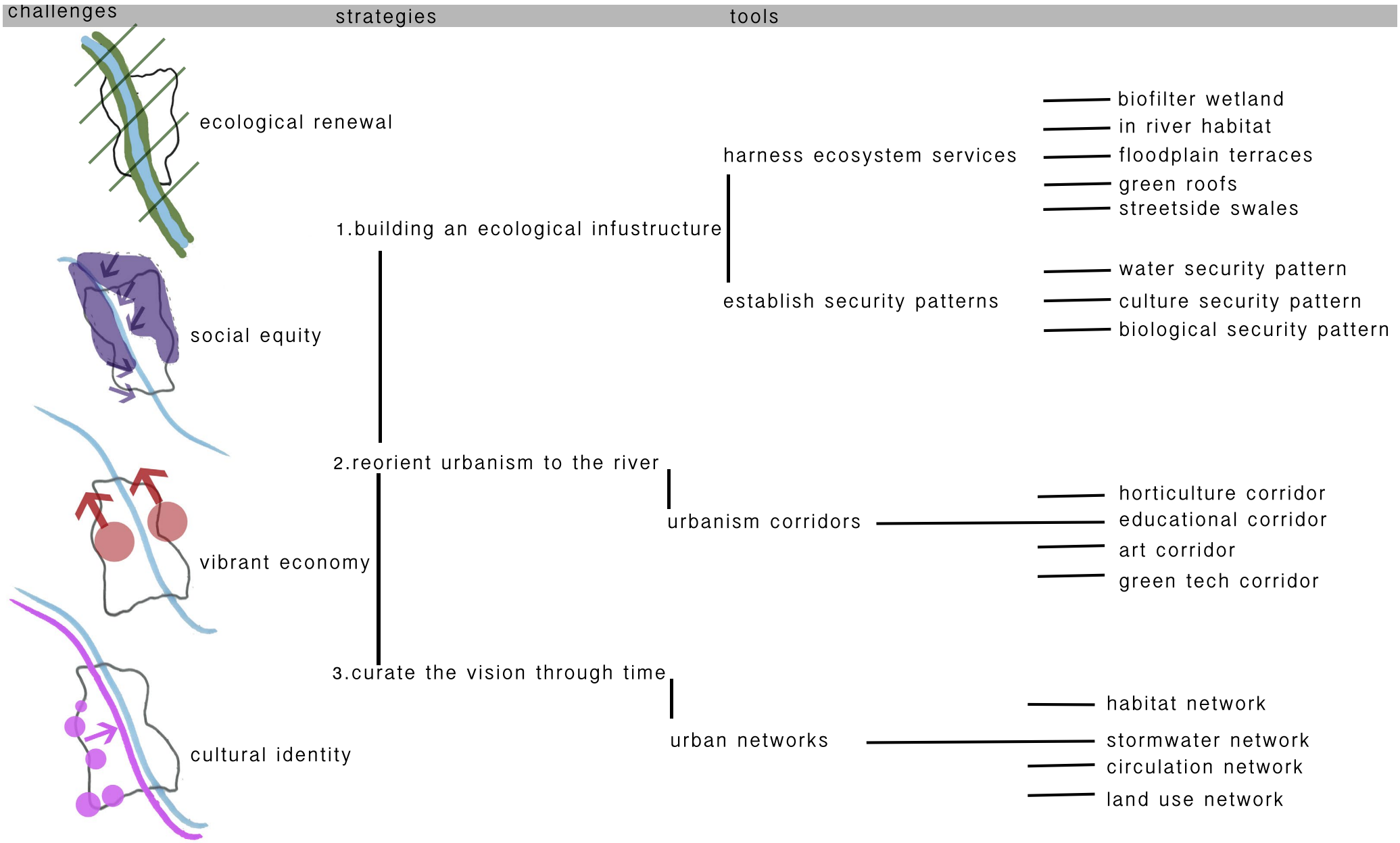


Figure 18: tools & strategies

08

case study: recycling granite and marble experiment

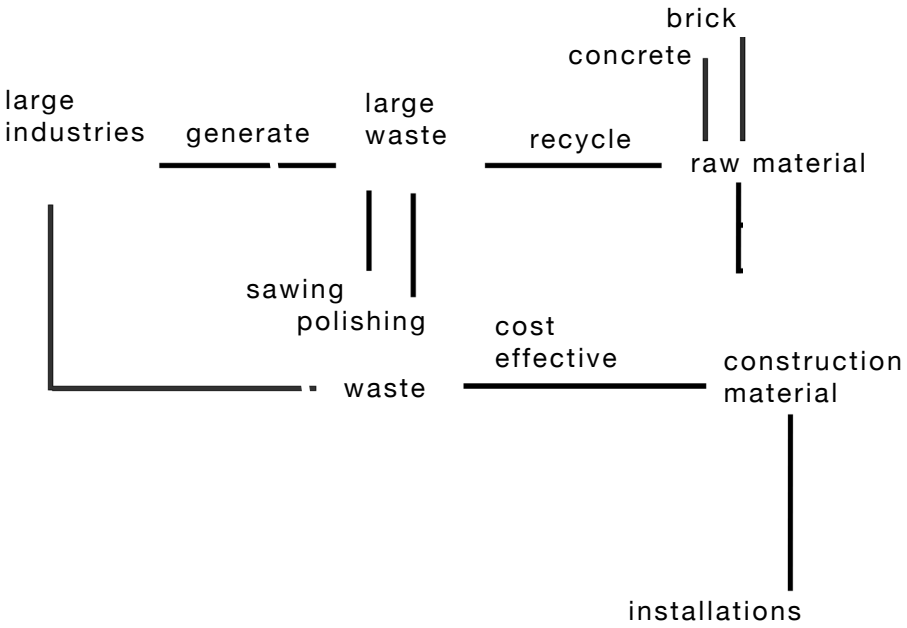


Figure 19: conclusion diagram

“Granite and marble waste mixture imparts physical strength to the bricks when they are kilned at higher temperature”

Results

1.Flexural strength was found to increase due to the addition of the above mixtures. This is because of the fact that the addition of the mineral matter specially quartz and feldspar to the clay, act as flux when they arekilned at higher temperature as evidenced by the physical test of the bricks.

2.From the results of technological tests, it is suggested that granite and marblewastes can be incorporated up to 50% into clay materials for theproduction of bricks.

3.The incorporation of granite and marble wastes has negligible effecton the mechanical properties during the entire process.

4.No cost modifications in the industrial production line.

Figure 20: industrial heritage

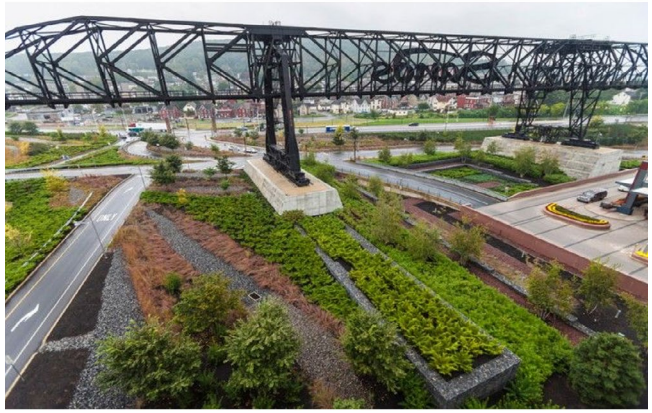


Figure 21: redeemed soil

Figure 22: streetscaping

Figure 23: night view

Figure 24: office space planting

Figure 25: recycled gabion wall

08

case study: the sands bethworks, pennsylvania,usa

Figure 26: Bethworks masterplan

“The project promoted the recovery of land that was considered a residual place and was affected by previous mineral-mining activity”

General Information

Type : Ecological Restoration
Landscape Architect: SWA group
Location: Pennsylvania U.S.
Area: 20 acre

Project Description

As the mining economy dwindled, the industry left behind empty and abandoned buildings – as well as contaminants and toxins.
The project consisting of a new casino, hotel,museum, and mixed-use retail.

Challenge

The contamination of the soil became was the main problem to solve. SWA landscape architects and local authorities found out that the ground of the factory presented high levels of heavy metals and toxin compounds The quantity of soil contaminated was around 375 tons, inside the factory site.

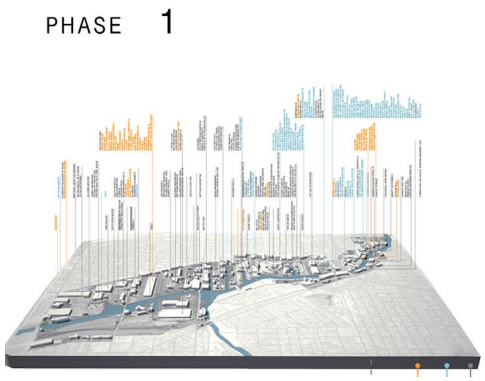


Figure 27: analysis phase

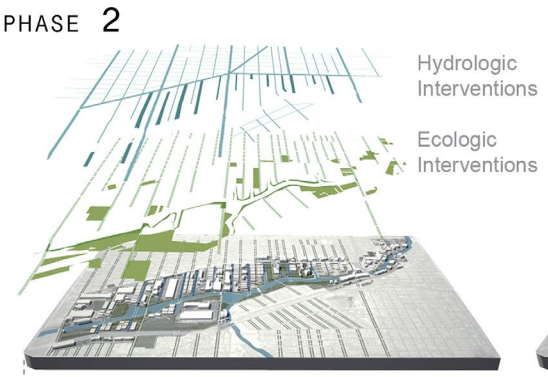


Figure 28: functional water systems

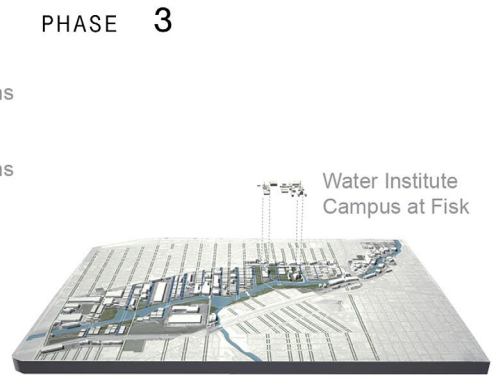


Figure 29: making room for water

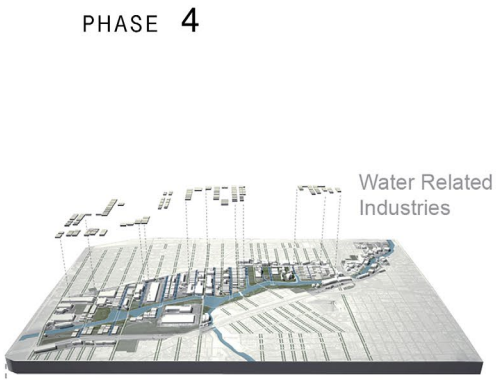


Figure30: masterplan

08

case study: chigago's testing ground for new industry

Figure 31 : masterplan

"The project promoted the recovery of land that was considered a residual place and was affected by previous mineral-mining activity"

General Information

Type : Industrial Landscape
Landscape Architect: Harvard Graduate School of Design ; Nina Chase
Location: Chigago

Project Description

The existing Pilsen Industrial Corridor will become Chicago's
Slip Distict, home to Chicago's first Water Institute. The Institute will be devoted to research, training, and technological developments related to water filtration, community awareness, andwater policy and planning.
The knowledge generated will spur the development of water industries, creating needed jobs and a local economy entirely based on water.

Design Approach

1.Analyzing the exisitng land use : infustructural commercial residential industrial vacant open space institutional.

2.proposing functional systems Innovative stormwater management, increased open space, and riverfront access set the stage for appropriate, sustainable development.

Figure 32: stormwater management

Figure 33: green networks

Figure 34: river access

Figure 35: event locations

Figure 36: old buildings

Figure 37: industrial buildings

09

site inventory & analysis: site location

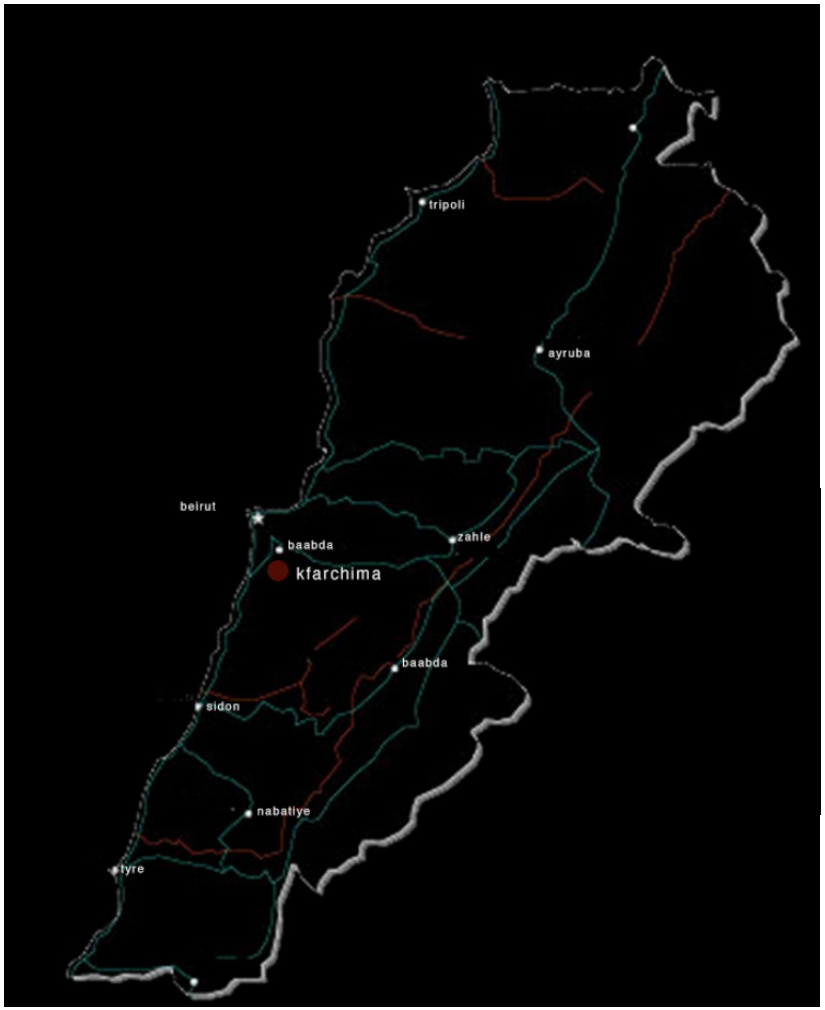


Figure 38: Lebanon map

location : Baabda district, Mount Lebanon

distance from capital : 12km

altitude : 110 m

population : 70 thousand

landuse : agricultural - industrial - residential - military

features : ghadir river intersects at industrial zone

Figure 39: Kfarchima entrance

Figure 40: Kfarchima entrance

Figure 41 : residential Kfarchima

site location

Figure 42: Kfarchima map
scale 1.10.000

Zoning :

A : Residential
A1: Residential& commercial
B: Expansion zone
M: Military
OT: Second transitional industrial area
T: First transitional industrial area
G: first industrial area

As shown the small town of Kfarchima is mixed used.
The industrial area covers the upper part, containing light medium and heavy industries.
As shown the residential area takes the most part of Kfarchima's land use. The residential area is on a higher elevation.
The site has a prominent military base, off limits.
It is foreseen that the industrial area will expand and spread to the OT zones.

site location

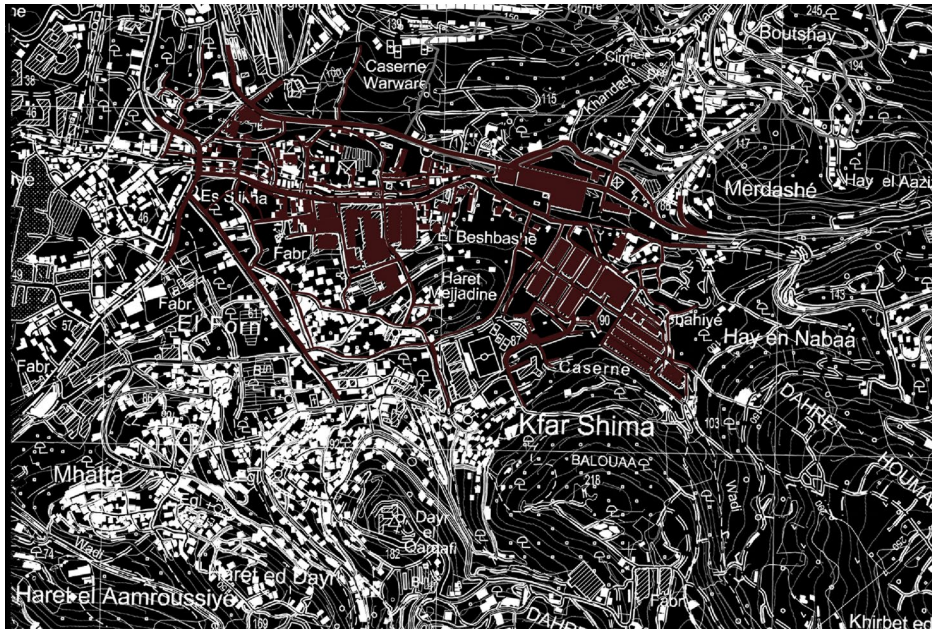


Figure 43: Kfarchima context map
scale 1.10.000

Figure 44: Kfarchima map
scale 1.10.000

The area highlighted in red represents the industrial area the area of intervention .
size of industrial area : 1.5km^2
The industrial area is relatively flat compared to that of its surrounding residential area.

Neighboring Kfarchima lies choufiet a crowded residential hub, in which most of the workers live in.
The site is also a strategic military area with around 3 bases on higher slopes.
The Ghadir river intersects Kfarchima at the industrial zone and continues to Chouefiet.

site history

Kfarchima's industrial area witness vast changes over a span of 50 years.In the 1950s it was a combination natural and cultivated land, with no built areas.
The wide Ghadir river flowed naturally and the area by the river was a gathering point for the residents of Kfarchima.The roads to the river were left natural dirt roads.

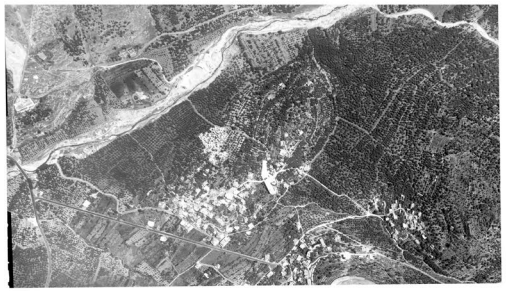
By the 1970's with the introduction of a sanitary-ware company Lecico, the area was defined as an industrial area. Primary and secondary roads were designated. There was a severe loss in the vegetation cover to host the new land use,with the increase of people came the increase in agricultural land.

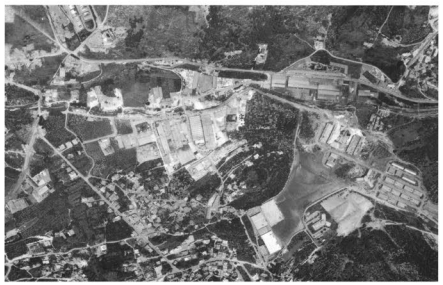
By the 1990s the industrial area more than double in spread,and with that the increase in secondary and tertiary roads. There was a severe loss in the vegetation cover and a decline in agricultural land.

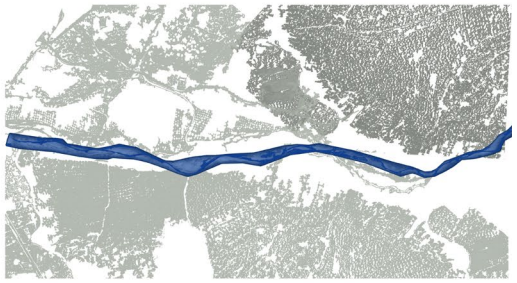
By the 1990s the industrial area more than double in spread,and with that the increase in secondary and tertiary roads. There was a severe loss in the vegetation cover and a decline in agricultural land.

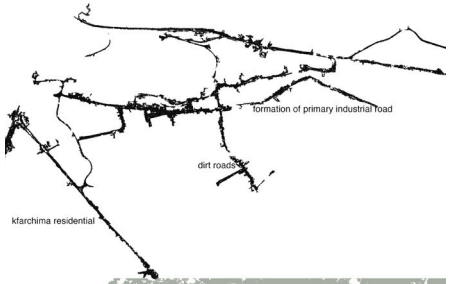
The Ghadir river shrank in size only serves as a dump for industrial waste, and in 2015 is barely visible. The industrial waste is the only only driving force in the river with high level of alkalinity and toxicity. The vegetation cover is merely patches that are prone to disappear with the expected increase growth in industries.

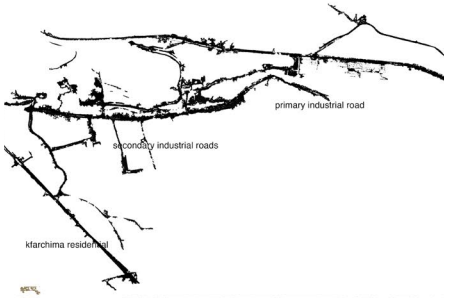
1956 1970 1983

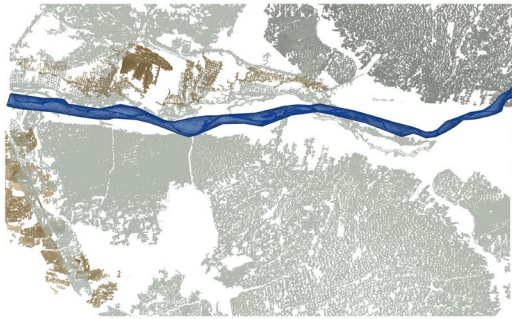


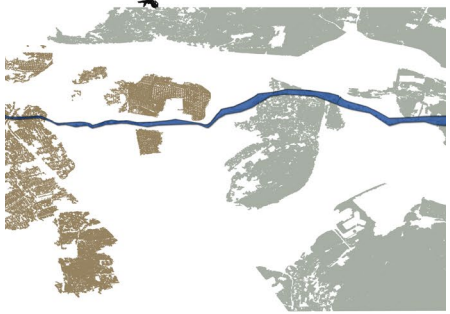












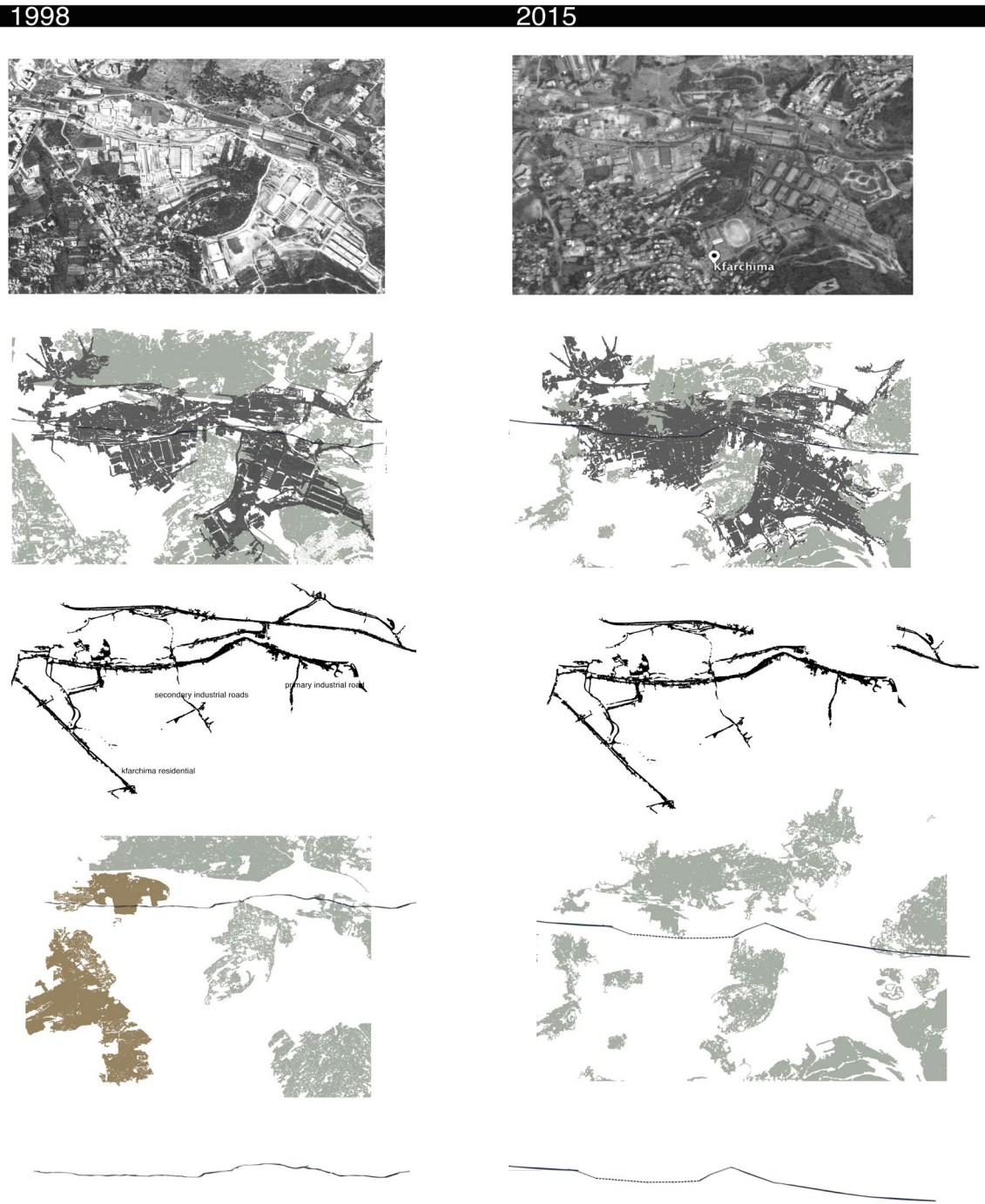
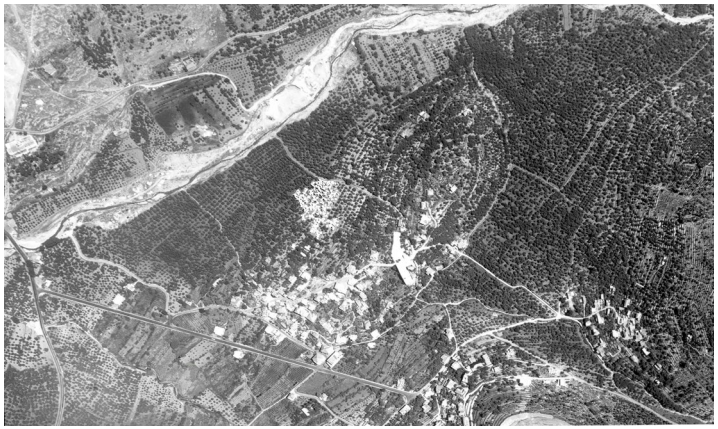
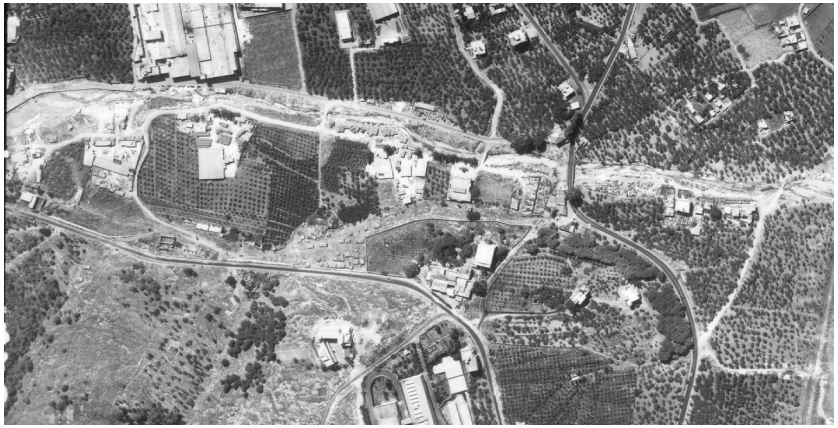


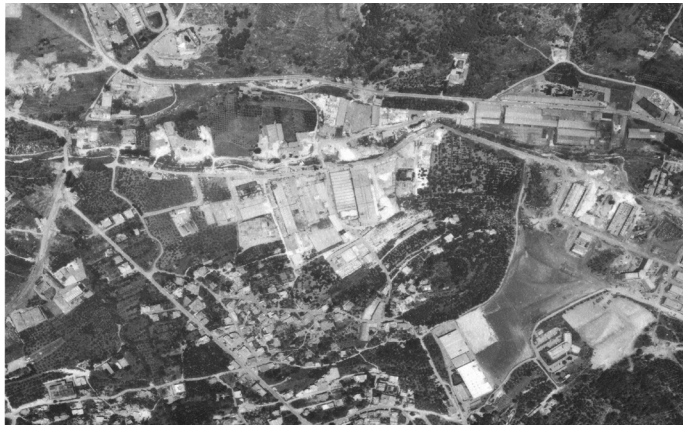
Figure 45 : Kfarchima timeline



1956



1970

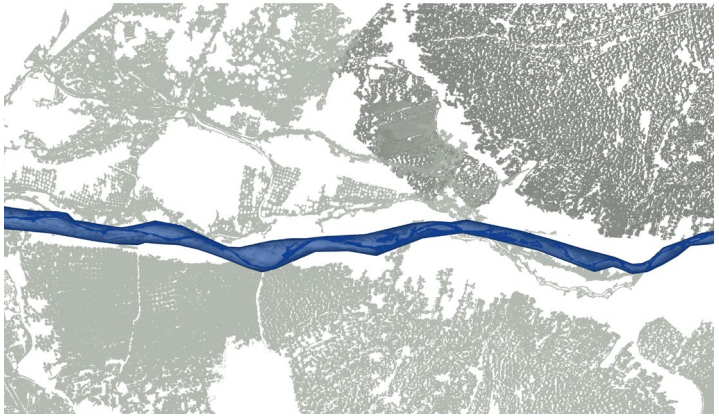


1983

1998

2015

site changes



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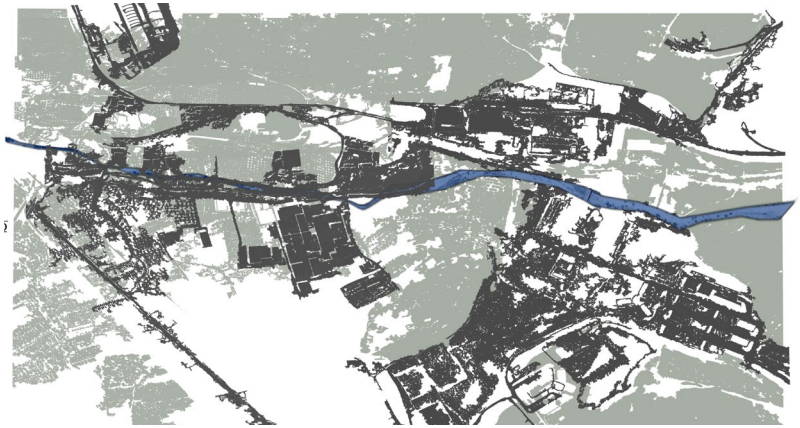
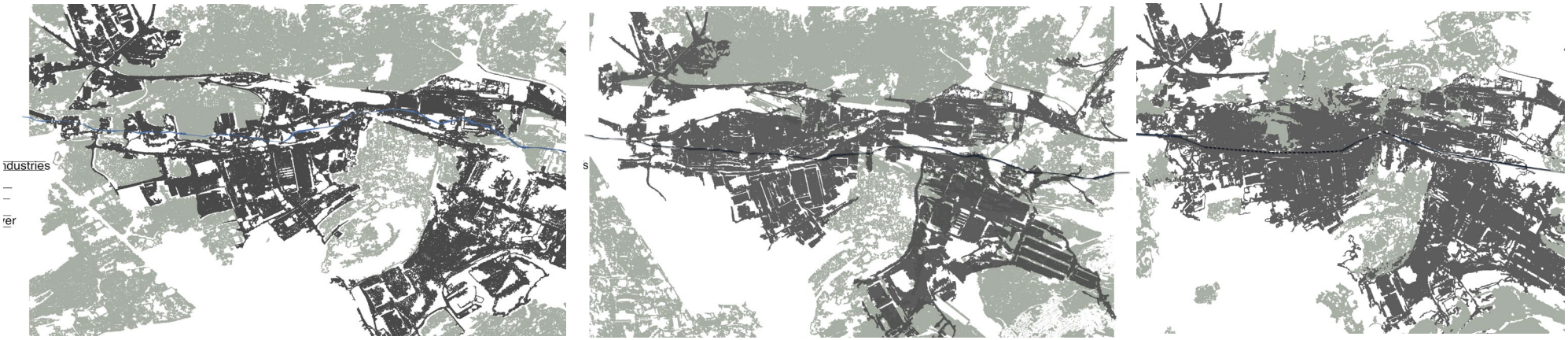
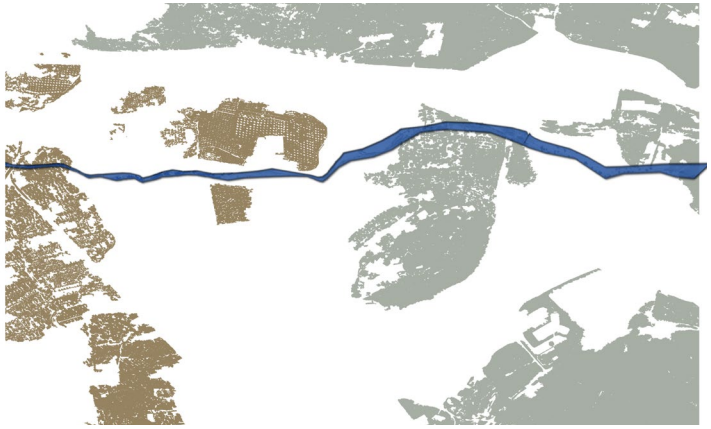


1970



built vs.natural

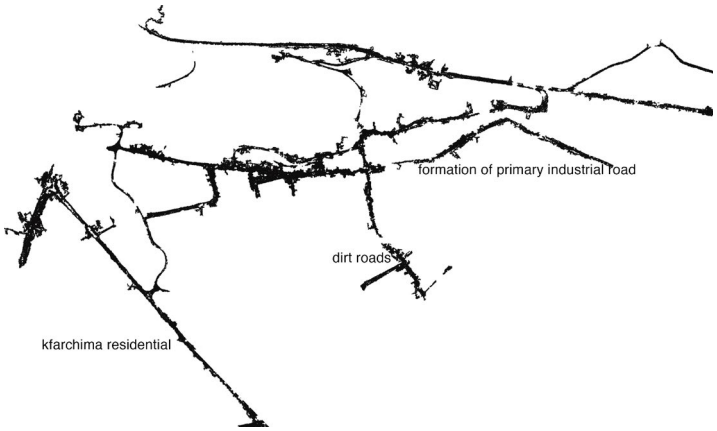
1956



1970

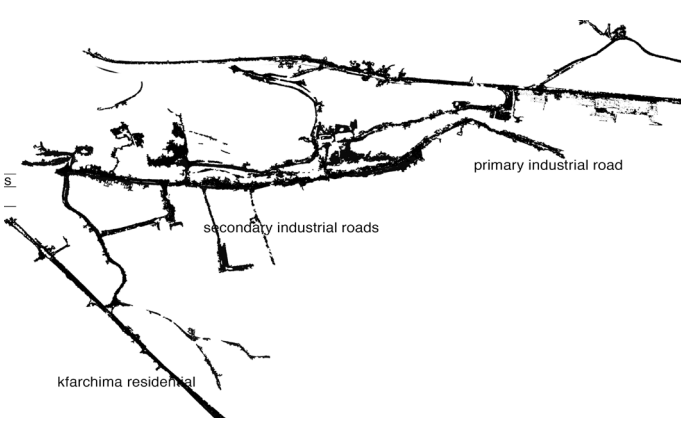
agriculture vs.natural vegetation

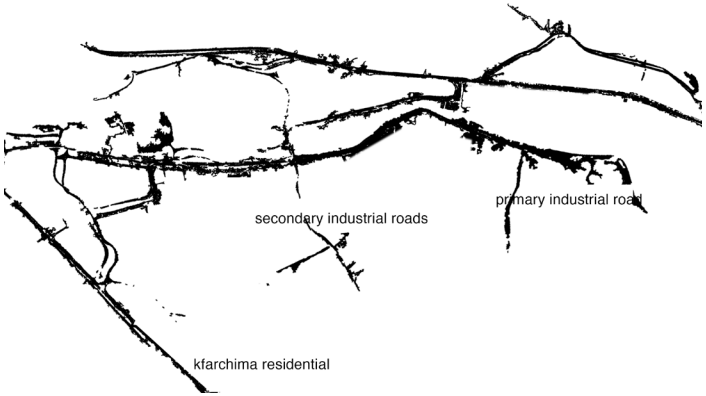

dirt road
kfarchima residential


formation of primary industrial road
dirt roads
kfarchima residential

1956

1970





1983 1998 2015

roads & river changes

Figure 46: industrial landuse

Figure 47: commercial landuse

Figure 48: commercial landuse

land use

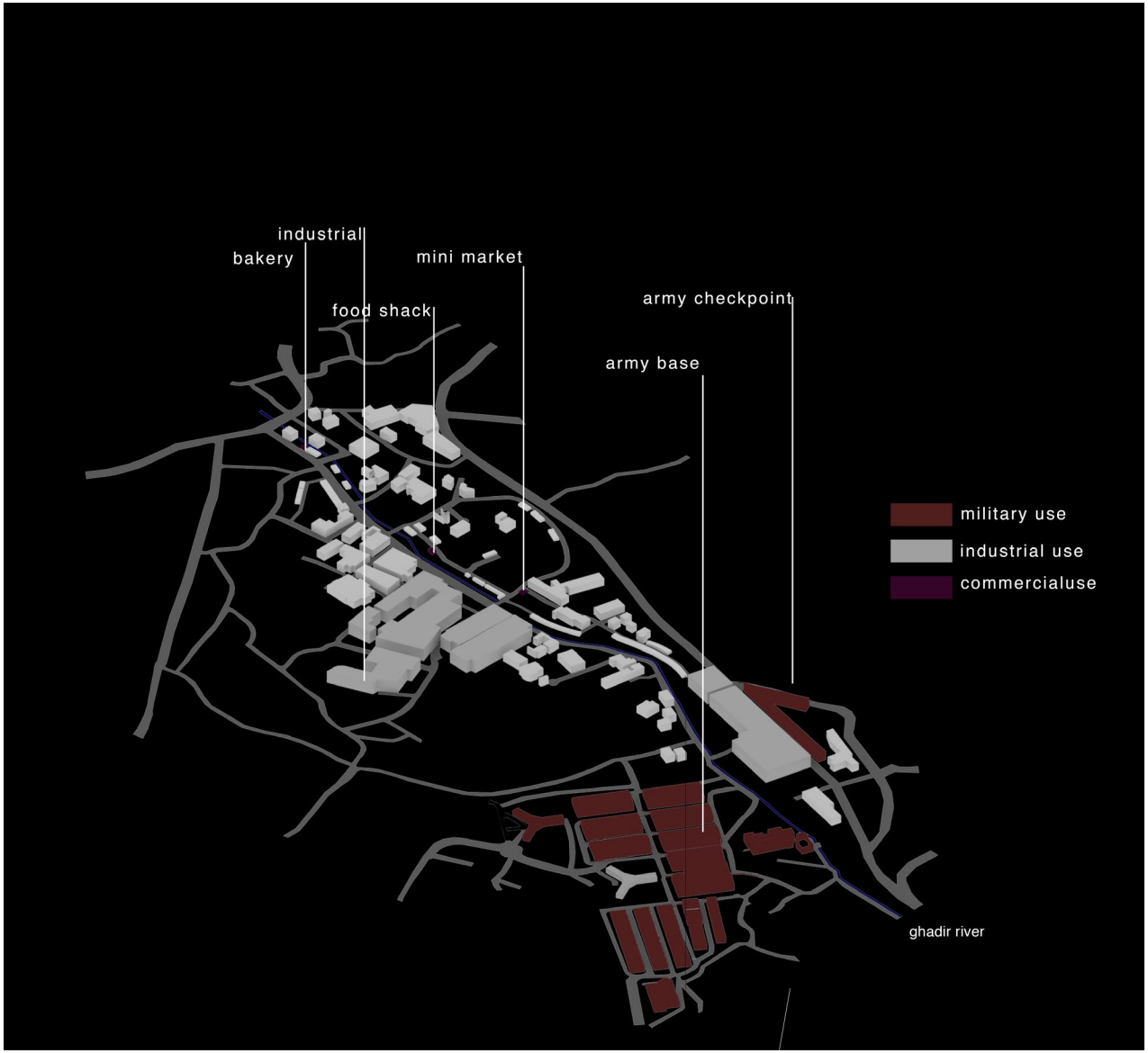


Figure 49: landuse map
scale: 1.4.000

The land use in the industrial area is limited and quite restricted to only industrial activity. The military unit is off limits and is found on the entrance and on the periphery of the industrial zone. The commercial land use in the area which spreads along 1.5km2, is also considered minimal with one/two minimarkets, a bakery and a mini food shack who are monopolizing the commerce activity.

type of industries

Figure 50: light industries

Figure 51: medium industries

Figure 52: large industries

type of industries

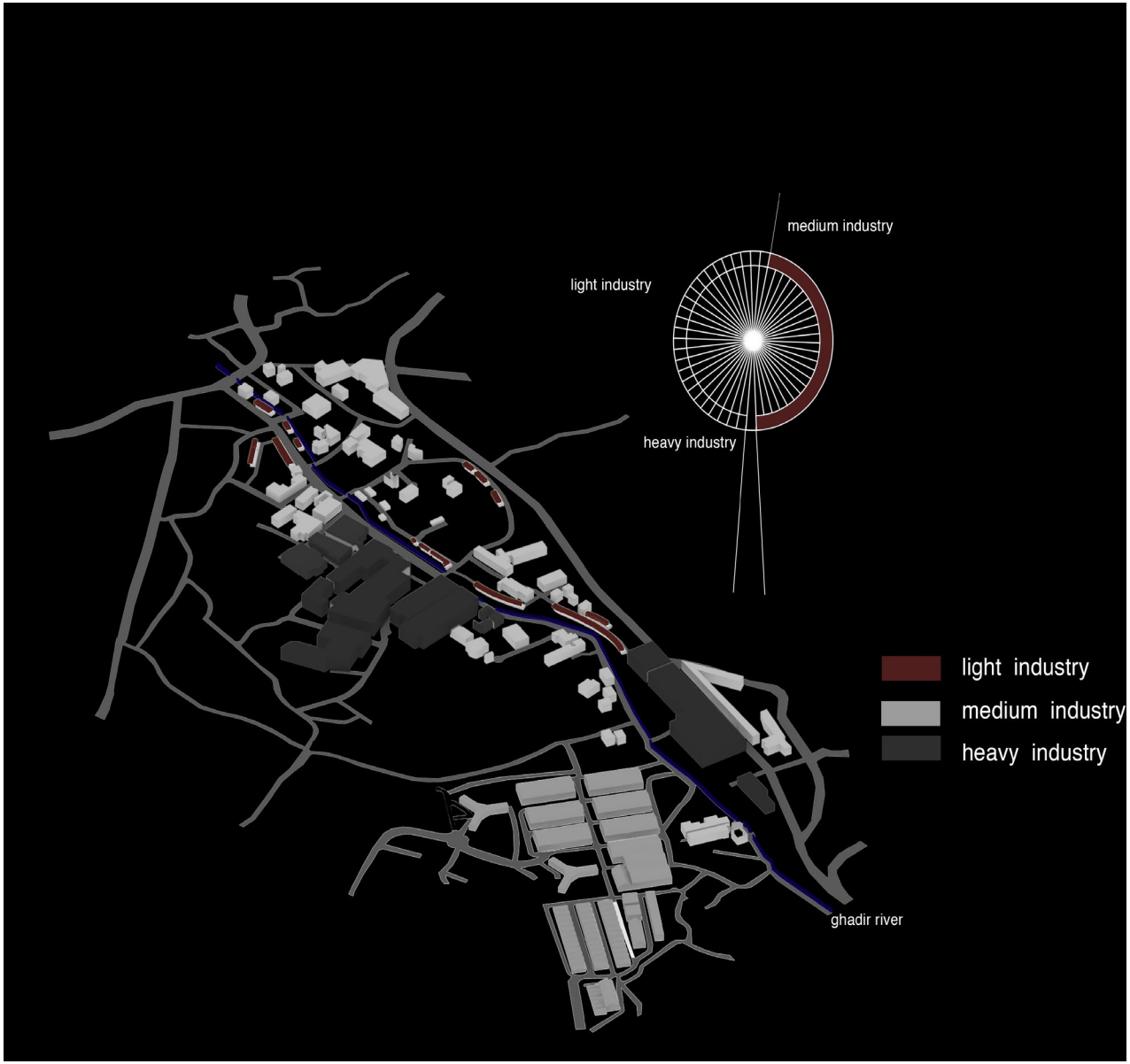


Figure 53: type of industries
scale: 1.4.000

The industries can be divided into three types light, medium and heavy. The medium sized industries dominate the industrial zone. The medium size industries include: marble, cement, wood and leather factories. The light industries are squeezed into two main districts and are primary made of car engine: mechanics, electrics, exhaust as well as car body paint and tire repairs. The heavy industries are composed of mainly two, a sanitary ware factory as well as a metal manufacturing industry.

Figure 54: car mechanic

Figure 55: marble industry

Figure 56: cement industry

trades in industry

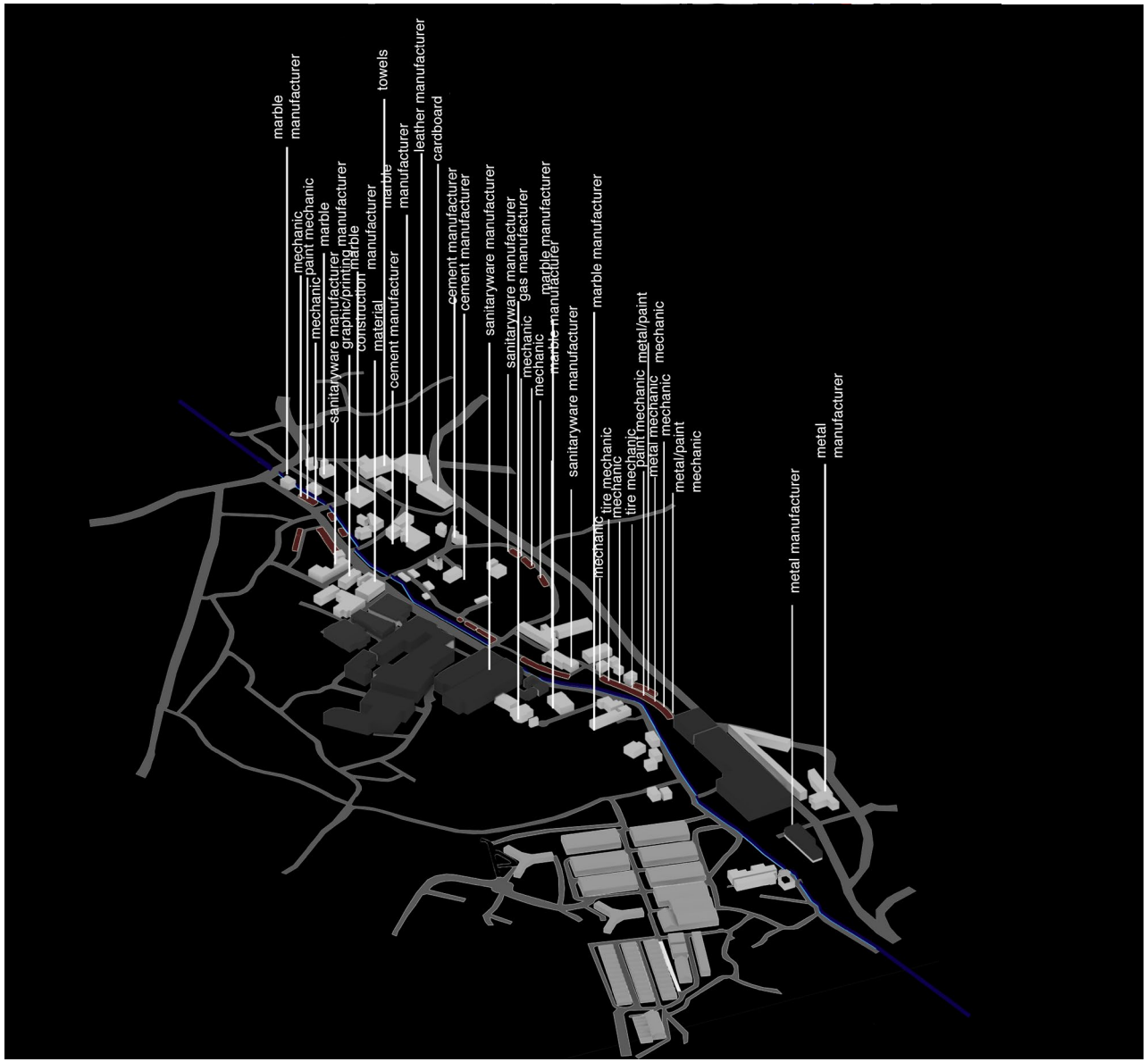


Figure 57: trades in industry
scale: 1.4.000

This map indicates the kind of trades specific to each industry.
It originated from thorough surveys applied on most industries as well as interviews with laborers who are years familiar with Kfarchima's industrial zone.
The light industries highlighted in red, as mentioned previously, made up of the car industries created a specific identity for the extended population with regards to a publically recognized car repair zone.
The medium industries highlighted in light grey are made up of, mostly, marble, wood and cement factories.
The heavy industries highlighted in dark grey, are made of a metal and sanitary ware factories.

number of workers

Figure 58: marble industry laborer

Figure 59: single managed workshop

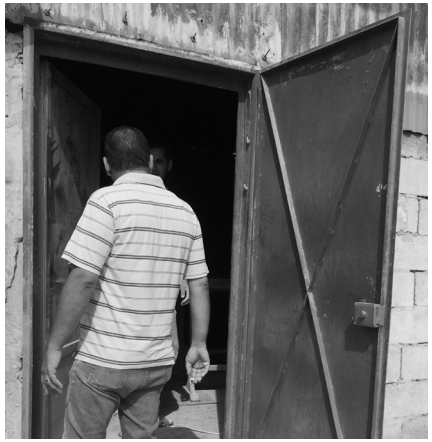


Figure 60: single managed workshop

number of workers

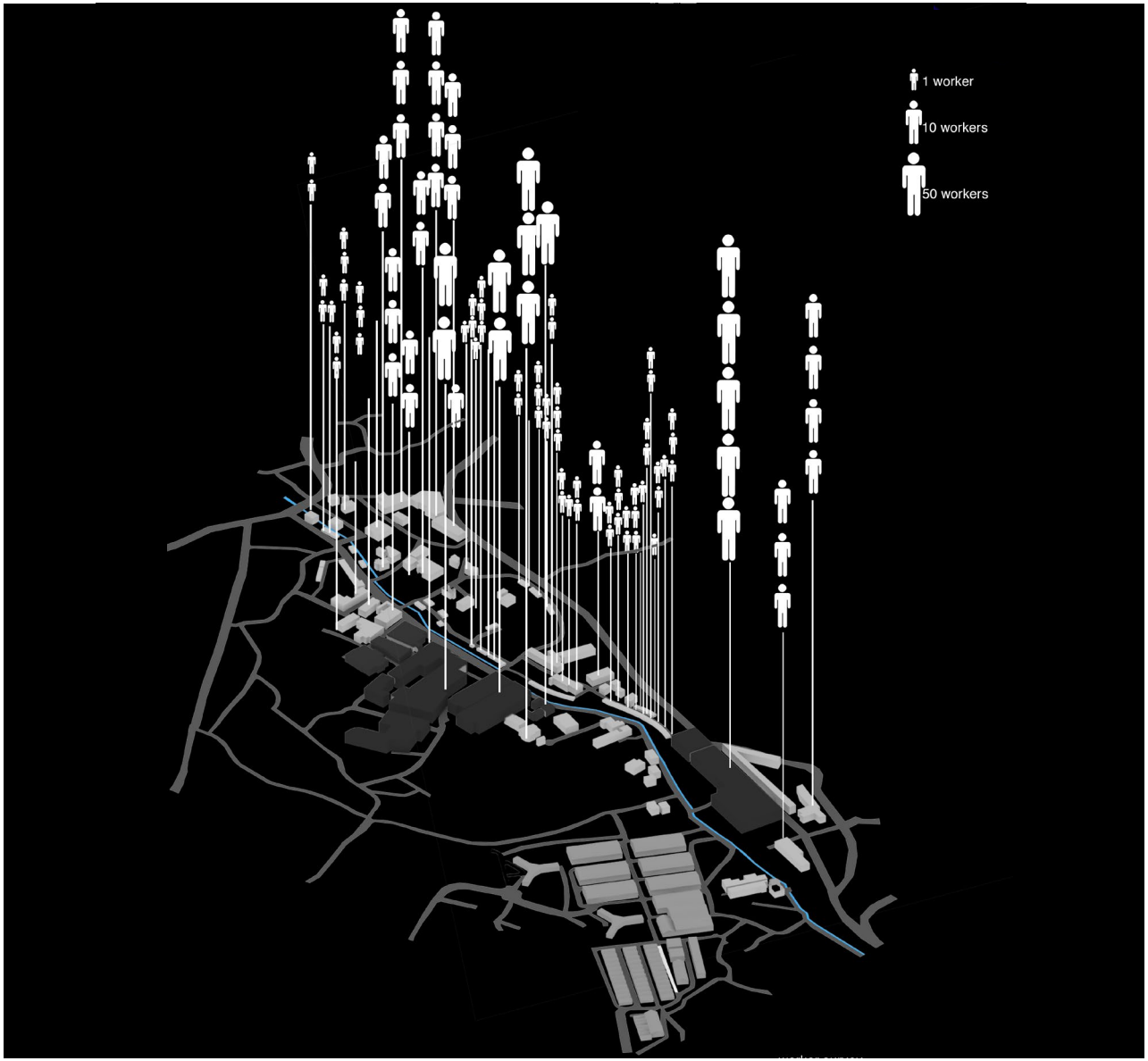


Figure 61: number of workers
scale: 1.4.000

This map specifies the number of workers per industry.
It originated from thorough surveys applied on most industries as well as interviews with laborers who are years familiar with Kfarchima's industrial zone.
The light industries are made up of one to three laborers, usually family inherited, made up of one or two families.
The medium industries, which make up most of the industrial zone, are made up of full time 10-30 laborers. The nationality of the laborers are Lebanese, Syrian, Egyptian as well as Bangladesh.
The heavy industries, as mentioned previously are two, containing between 200-500 laborers each , composing most of the Kfarchima laborers

illegal settelments

Figure 62 & 63: industry invasion

Figure 64: labor housing invasion

illegal settlements

Figure 65 illegal settlements
scale: 1.4.000

The Ghadir river passes through the Kfarchima industrial zone.The river as well as the two banks are,by law, non edificandi zones (zones of non construction) .
The actual situation does not obey by this regulation.
As shown in red,there is a substantial invasion of illegal built-up construction.
This construction is made up of light industries, laborer housing as well as private parking spaces.

break preferences

Figure 66: resting chair

Figure 67: break under tree

Figure 68: break in labor housing

break preferences

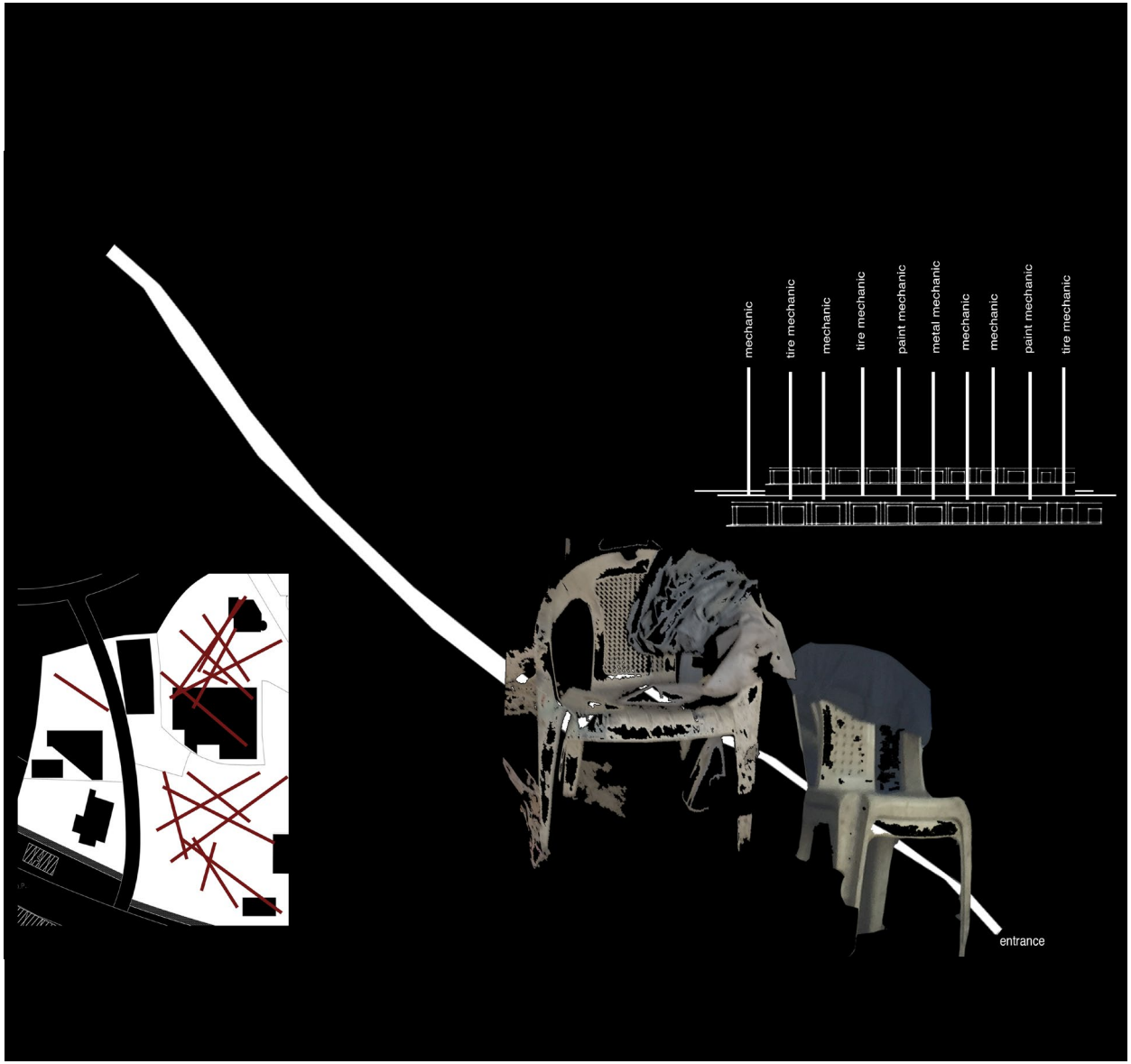


Figure 69: break preferences

The break preferences in the different types of industries differ.
The light industry laborers, rest in the “resting chair”. The resting chair is found in every light workshop, it symbolizes sweat tears and generations of laborers. The laborers in this case cannot afford to close down and reopen at lunch to not miss a possible job opportunity.
The chair shown became the inspiration for the project, in which resting areas would be allocated.
The medium industries as shown on the left, have the space and luxury to wonder.
Some laborers live around the factory and head back to their housing, others prefer resting under the shade of the tree, and others prefer resting in the factory itself.
The heavy industries that host up to 500 laborers, allocate indoor facilities that include cafeterias, and resting rooms.

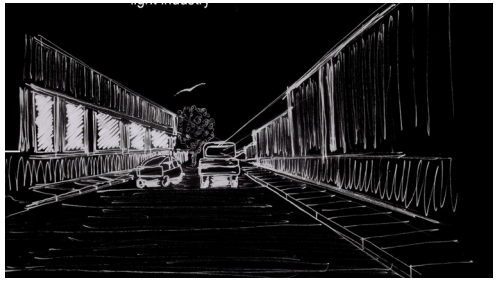


Figure 70: entrance

Figure 71: light industry road

Figure 72: heavy industry road

Figure 73 : vertical invasion

road dynamics

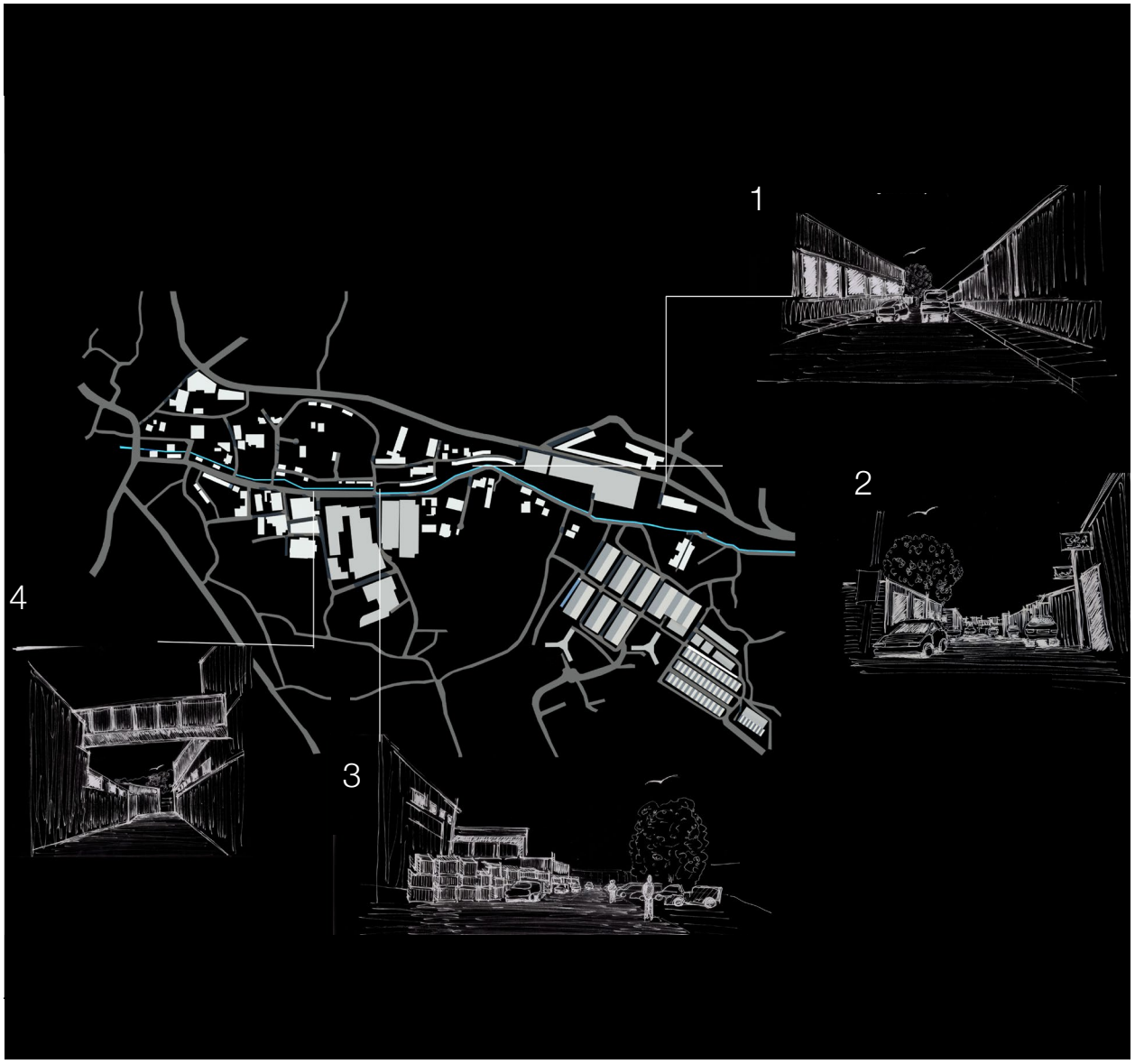


Figure 74: road dynamics

1. Entrace :

The rusty entrance to kfarchima's ndustrial zone on one side the industrial metal manufacturer to the other army base.creating a strongsense of perspective.

2. Light Industry Road :

dynamics of the light industries that combines ,density culture,people, and chaos

3.Primary Industrial Road :

Infront of the heavy factory lecico.
Invasion of the streets by the outdoor storage.

4. Secondary Industrial Road :

vertical invasion of heavy industry
on secondary road

Figure 75: light industry signs

Figure 76: heavy industry signs

road synergy

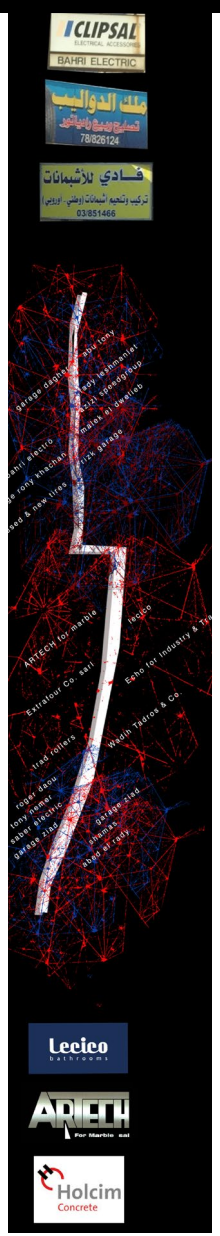


Figure 77: road synergy

The diagram represents the different dynamics of the industrial zone, specifically the difference in the inter-connection between the light and heavy industries.
As mentioned previously, the light industry laborers are composed of strictly family businesses, while heavy industry are more corporate oriented.
This is clearly shown in the signs indicating the name/identity of the trade/workplace.
The light industries are known by first name basis.
The heavy industries are known by formal company name.
The existing synergy between the light industries, is not found in the heavy corporate ruled company.

noise pollution

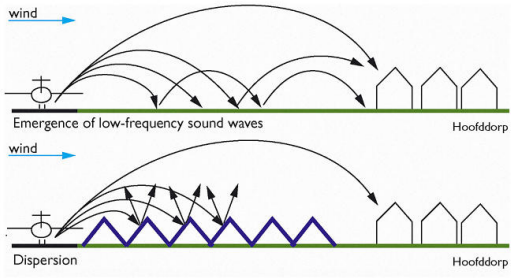
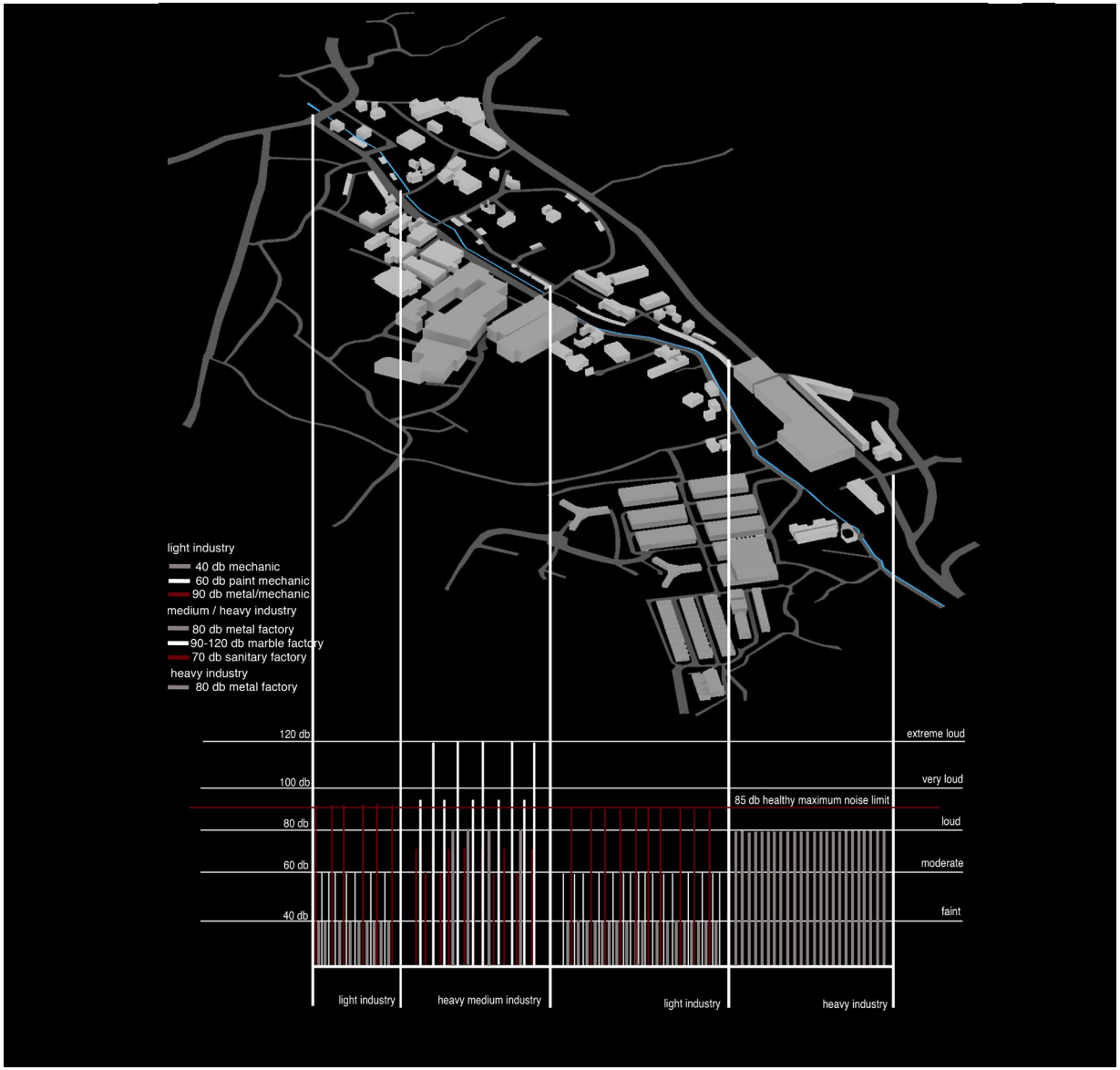


Figure 78: Amsterdam noise pollution project

noise pollution



This diagram represents a pollution that is often overlooked; noise pollution.
In the light industry, the three main trades mechanics, paint mechanics and metal/mechanics generate 40,60 and 90db respectively.
The maximum noise limit is 85 db.
In the medium and heavy industrial zone, made up of mostly metal and marble factories and sanitary-ware factories generate 80,90-120 and 70 db respectively.
In the heavy industry zone, composed of metal factories the noise pollution hits 80db,
These values that are at the maximum limit or above, create health hazards for the workers.
There is a substantial role of that the landscape plays in reducing noise pollution.

Figure 79: industrial noise pollution

industrial waste recycling

Figure 80-81-82: industrial recycled art

industrial waste recycling

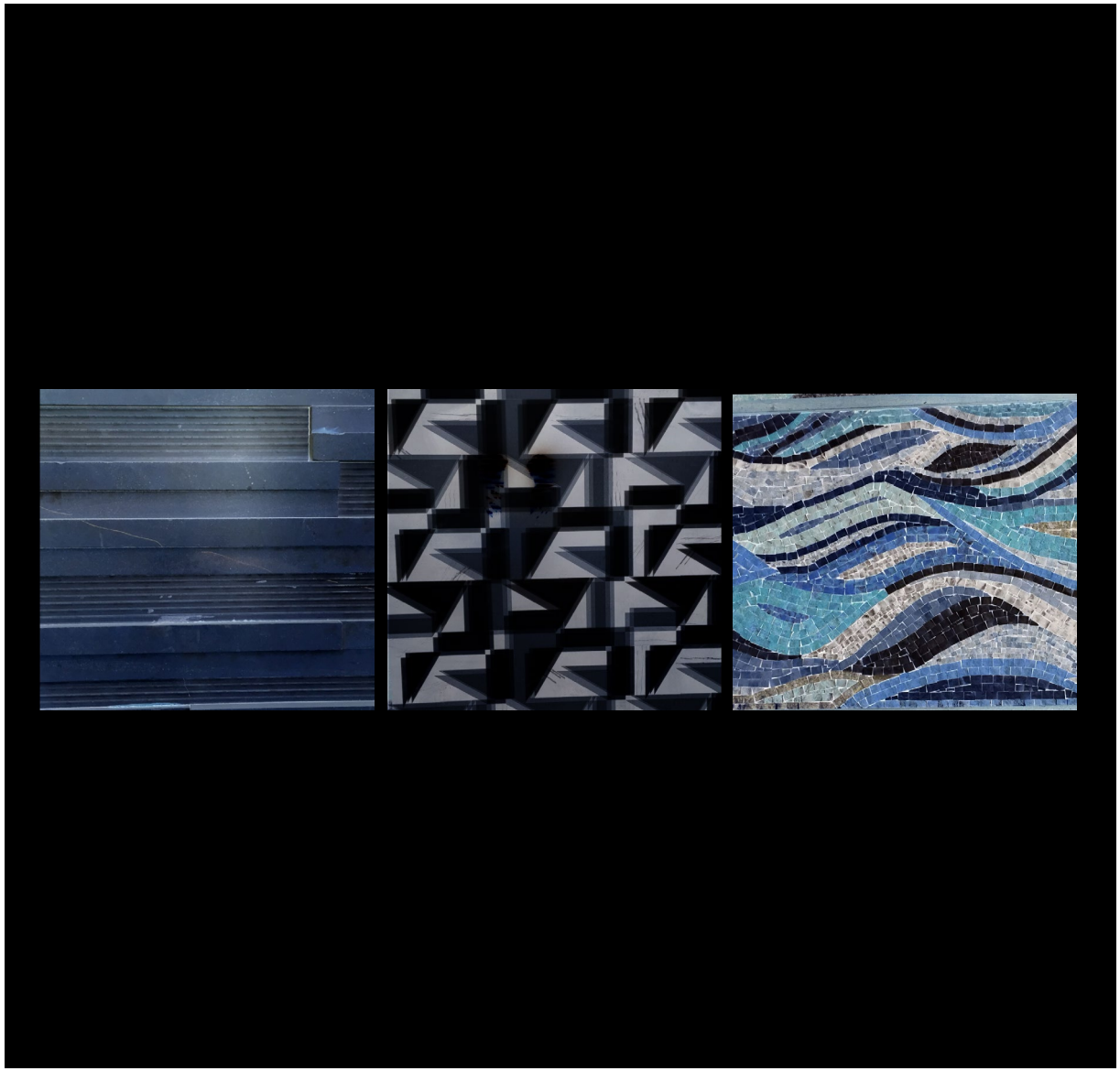


Figure 83: recycled marble art

The marble industry generates a substantial amount of solid waste, referred to as “Kaser”.
These wastes can be used to generate ceramic designs as well as can be used to generate new art as shown in these diagrams
These works were created by the laborers themselves as part of an experimentation.
Currently these waste are left to pile up and are causing storage issues.
Industrial art movement is been getting a lot of recognition.
Many artists have been using these industrial waste to create sculptures, land art as well as for expositions, creating an awareness about how waste to one domain can be a primary material for the other, in this case benefiting both sides.

Figure 84: hay el selloum

Figure 85: chouefiet

Figure 86: kfarchima

Figure 87: wadi chahrour

ghadir watershed

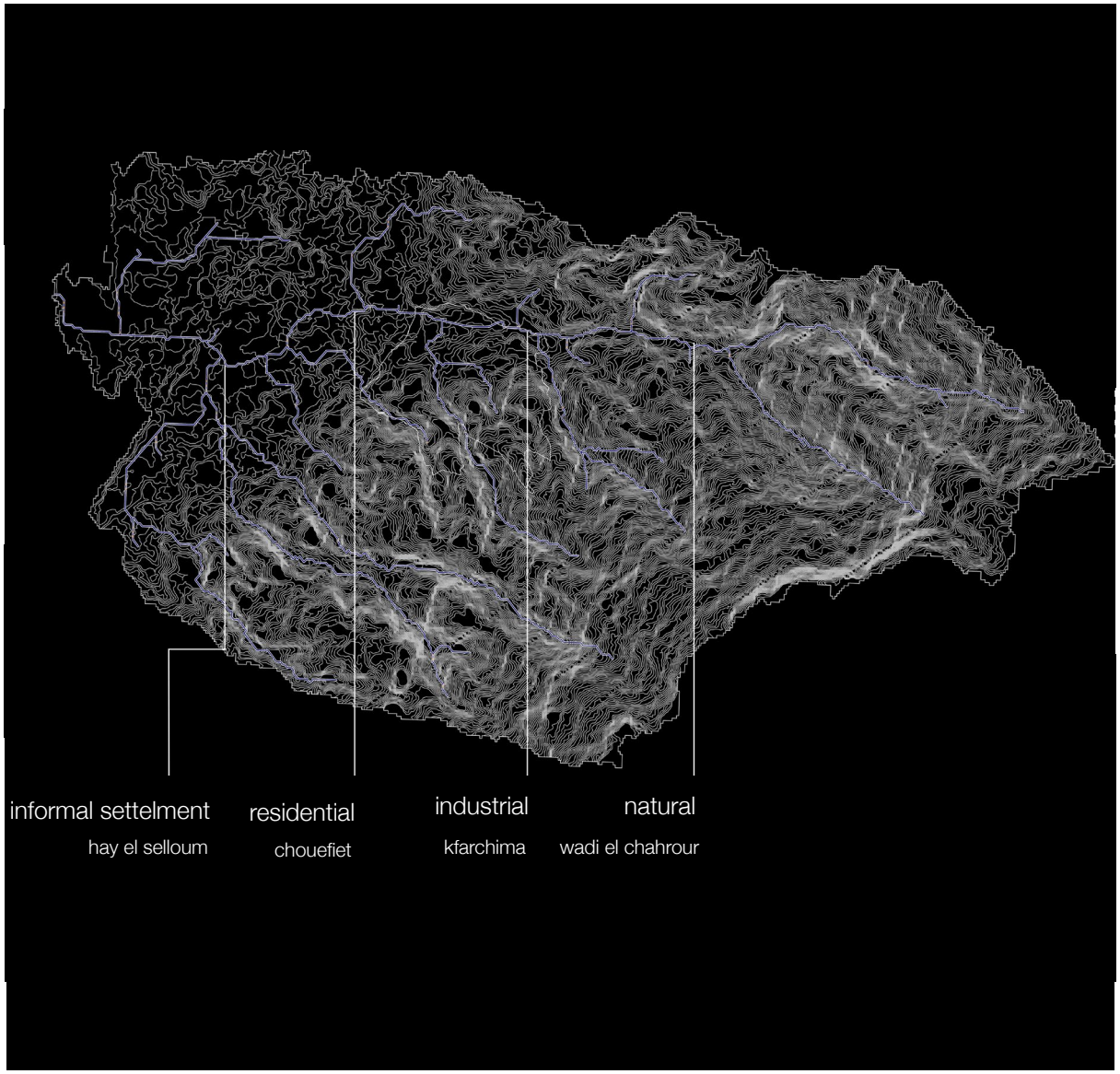


Figure 88: al ghadir watershed
scale: 1: 50.000

size

one of the smallest rivers in Lebanon.
total length : 12.5 km.

origin/outlet

This river originates from Aley (Mount Lebanon) and flows through Chouefiet then passes through the Kfarchima industrial zone till it reaches the Mediterranean Sea at Ouzeieh, south of Beirut.
river dynamics
During dry seasons, the flow of the river became slow and dry from its origin but the industrial effluents and the municipal wastewater
generate the flow of the water in the river.

river chemistry

The percentage of sodium is over 100mg in E and it would be a potential sodium hazard for the crops if this water was used for irrigation
The high conductivity could be justified by the calcareous characteristics of this area and the calcareous wastes released. Ex. gypsum material released from the different types of industries

ghadir industrial pollution

Figure 89: light grey river

Figure 90: brown river

Figure 91: dark grey river

Figure 92: white river

ghadir industrial pollution

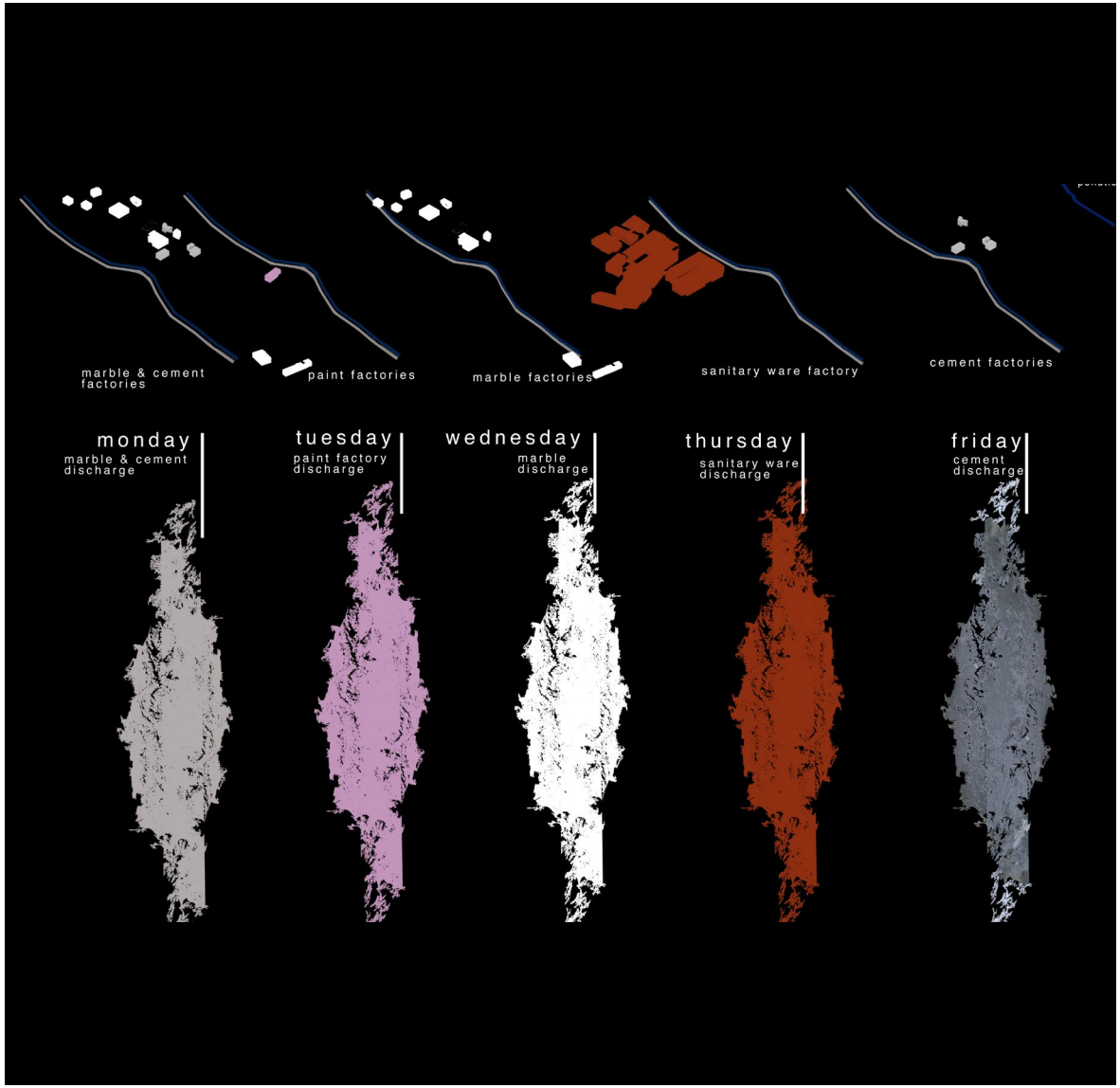


Figure 93: river pollution schedule

On several site visits it was noticed that the color of the river changes.

The different industries dispose of their solid and liquid waste into the Ghaidr river without any disposal or treatment, this causes the color of the river to change according to who disposed what when.

On a Monday for instance, the color of the river was noticed to be light grey , this color probably originated from the marble factory waste or the cement factory or both.

On a Tuesday, the color of the river was noticed to be a light pink, this probably originated from a printing workshop.

This color difference as though created a narrative and a new dynamic for the river.

factory scale plan

Figure 94: factory entrance

Figure 95: road to factory

Figure 96: cement factory

Figure 97: marble factory

Figure 98: ghadir river

factory scale plan

Figure 99: site plan
scale: 1:1.000

Entrance : The main entrance starts with a bridge, that crosses over the ghadir river.

Circulation: two accesses to the site either from the primary road, or a secondary road.

Factories: four factories two cement factory a false ceiling factory and the factory of study the marble factory.

Vegetation : Few Eucalyptus found on the secondary industrial road, a degraded agricultural road as well as a natural maquis on the higher topography.

Rubble stock and storages were also documented in order to examine areas of possible intervention.

marble factory :

name : ARTECH for marble
since : 2008
previously : marble factory
size : 3000m2
laborers : 20 laborers : 5 staff
composition : offices,factory,storage/crane,backyaed storage area

factory layout

Figure 100: factory workplace

Figure 101: stock area

Figure 102 : road to river

factory layout

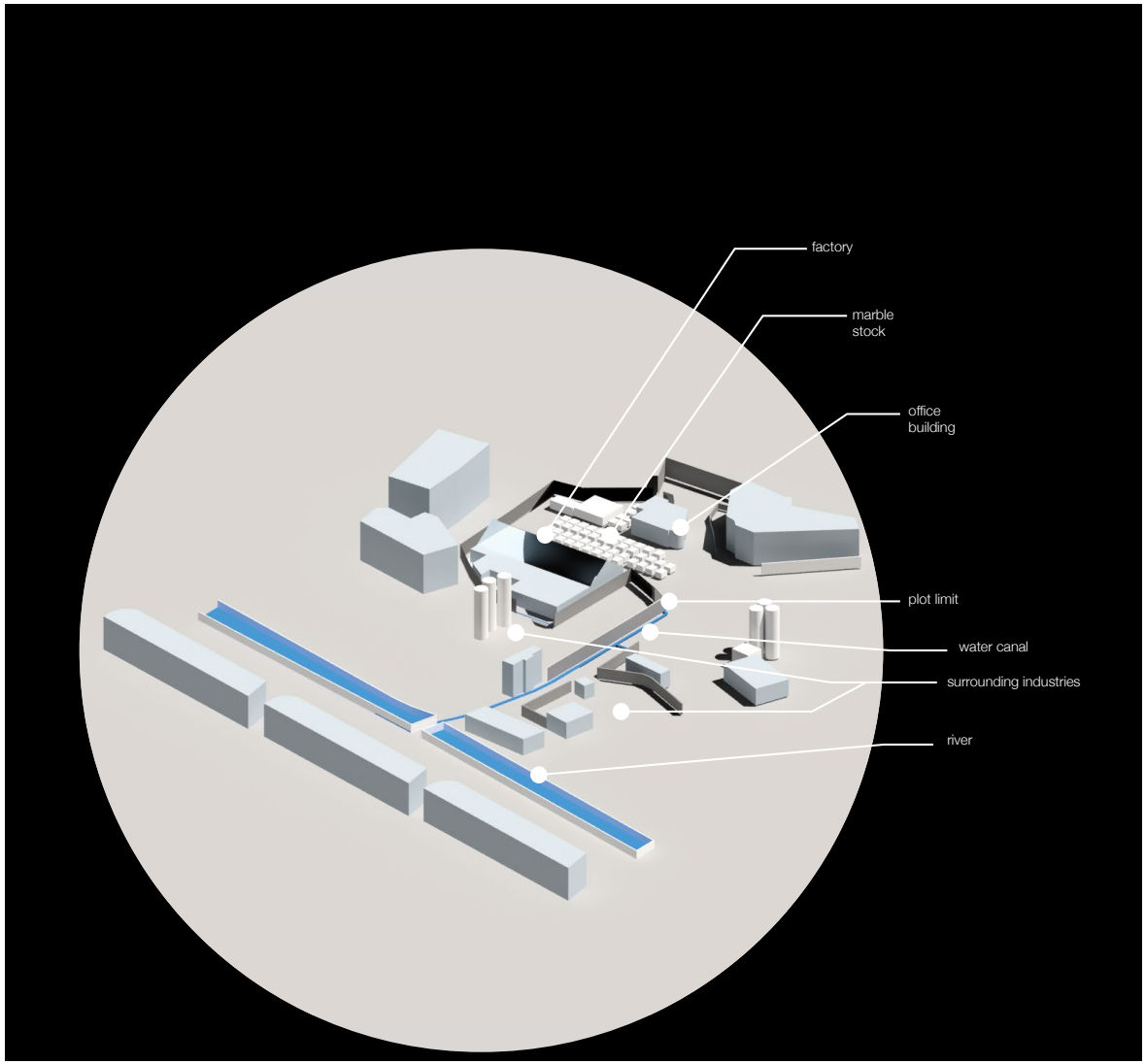


Figure 103 : factory layout & context

the factory is composed of a two story office building,a factory workshop,and a marble stock area.The connection of the factory to the river consists of a water canal that takes the polluted water from the marble factory to the river.The surronding context is composed of two cement factories and a false ceiling.

Figure 104 :labor housing

Figure 105 : break under shade

Figure 106: break in factory

factory laborers survey

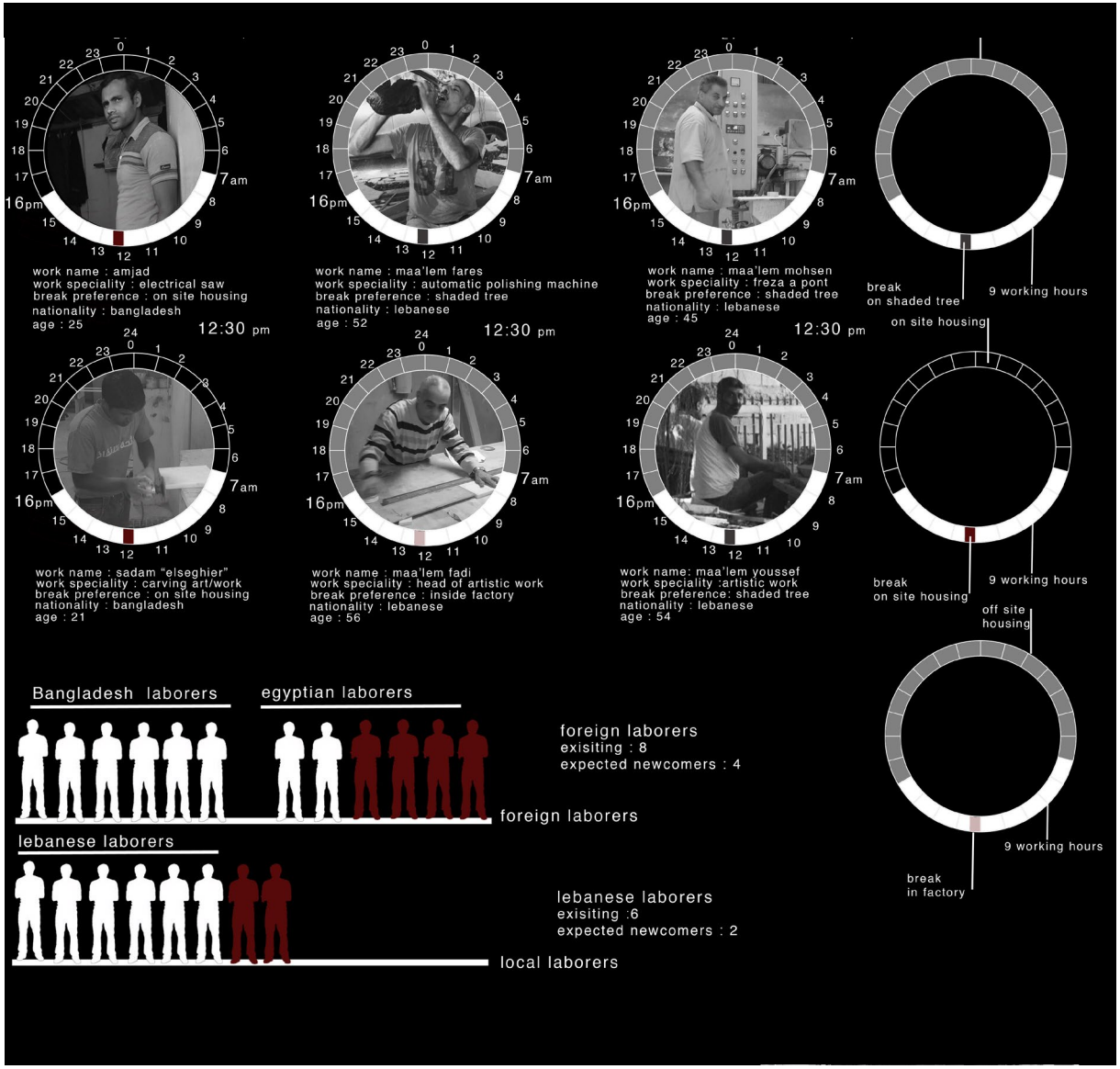


Figure 107: labor survey

A thorough survey was conducted was done on the laborers of the marble factory.

The total number of workers is 20, out of which 12 are foreign and 8 are Lebanese.
All workers are full time workers w

ith a shift from 7am to 4pm with a half an hour break from 12-12:30.

A shown the foreign laborers reside on site in a labor housings, and go back to their housing during break time.

Some of the local laborers interviewed like maa'lem Nabil, prefer taking a break under the shade of a tree

Other laborers, like maa'lem Fadi prefer taking a break indoors.

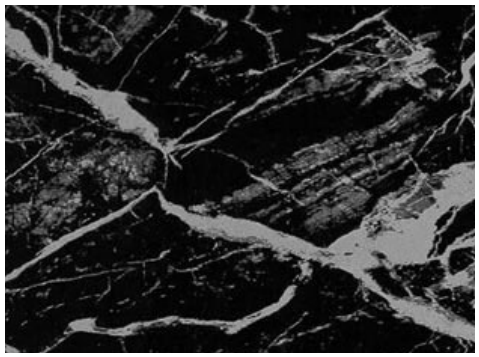
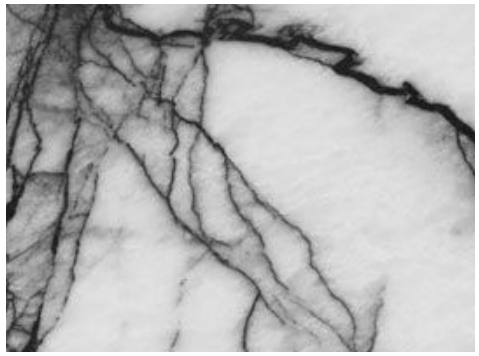
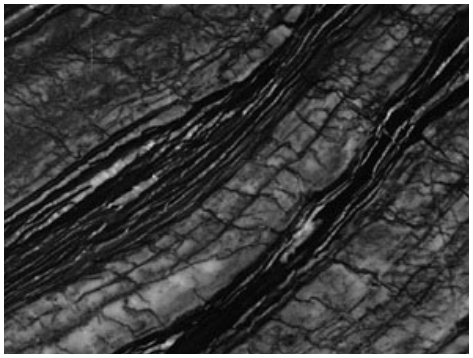




Figure 108-109-110 : marble veins

marble analysis

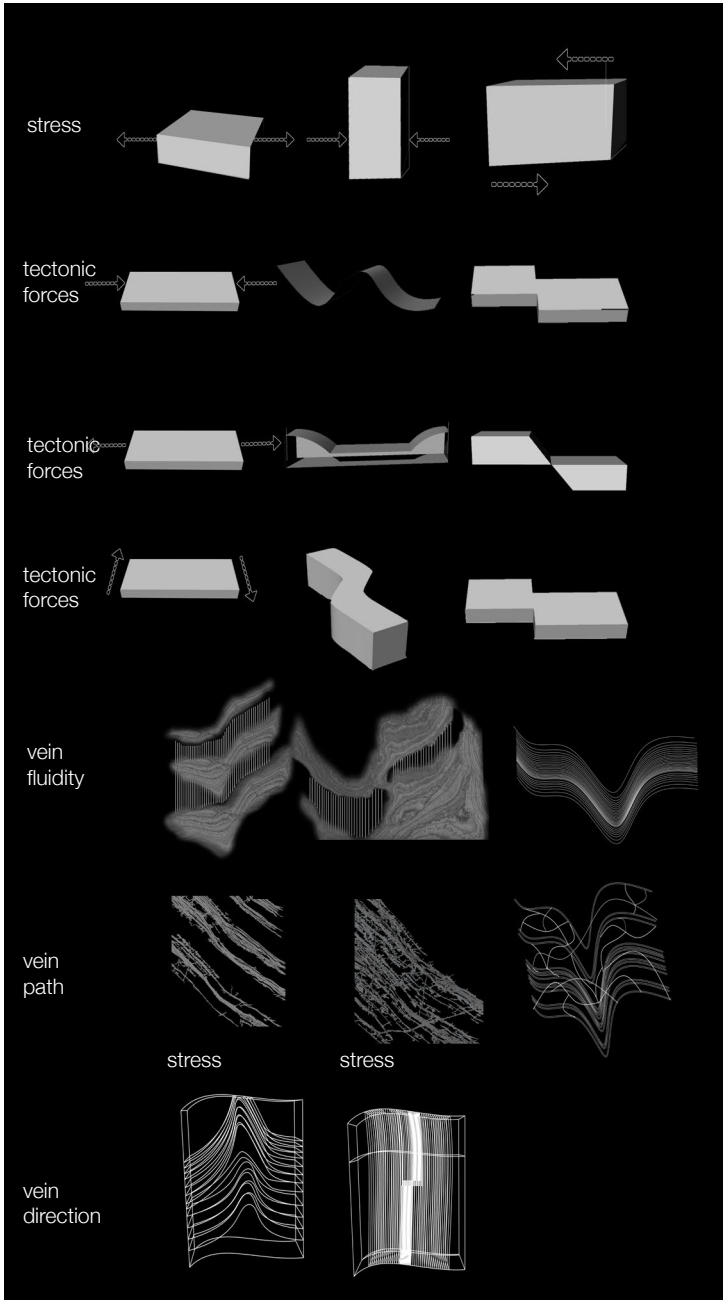
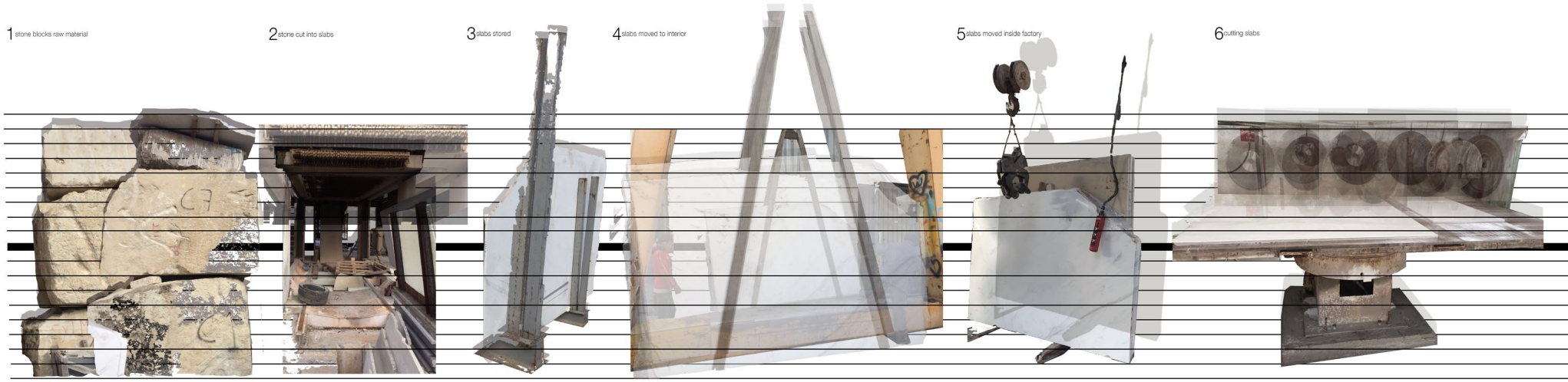


Figure 111 : marble analysis

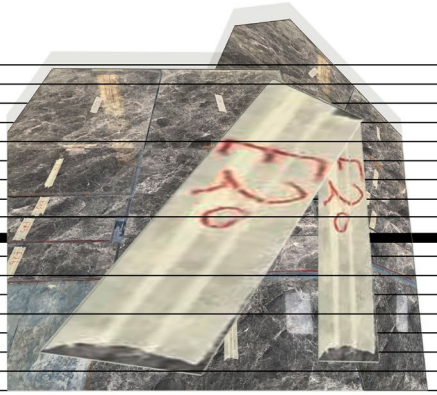
A marble analysis was conducted
in order to understand one of its main characteristics :
the marble veins.
The tectonic movements of the earth create different forces :
Compressive, tensional, stretching & thinning, sheer forces
that create the variety of the veins shapes.

industrial procedure



industrial procedure

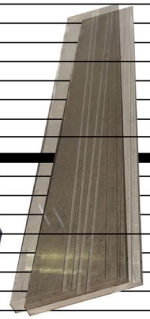
7 resulting cut slabs



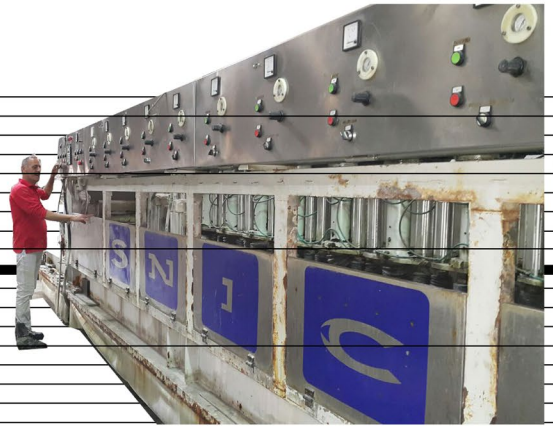
8 carving slab

machine : **detailing saw**
health concern: **dust & noise pollution**

9 resulting detailed slab



10 polishing slabs



machine : **automatic polishing machine**
health concern: **dust & noise pollution**

11 loading slabs

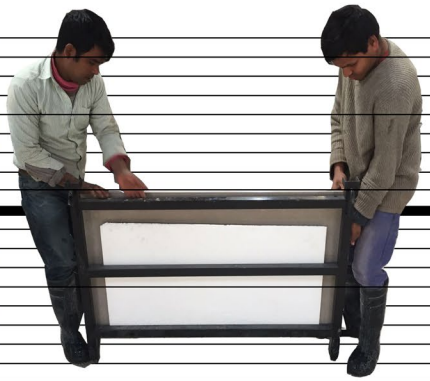
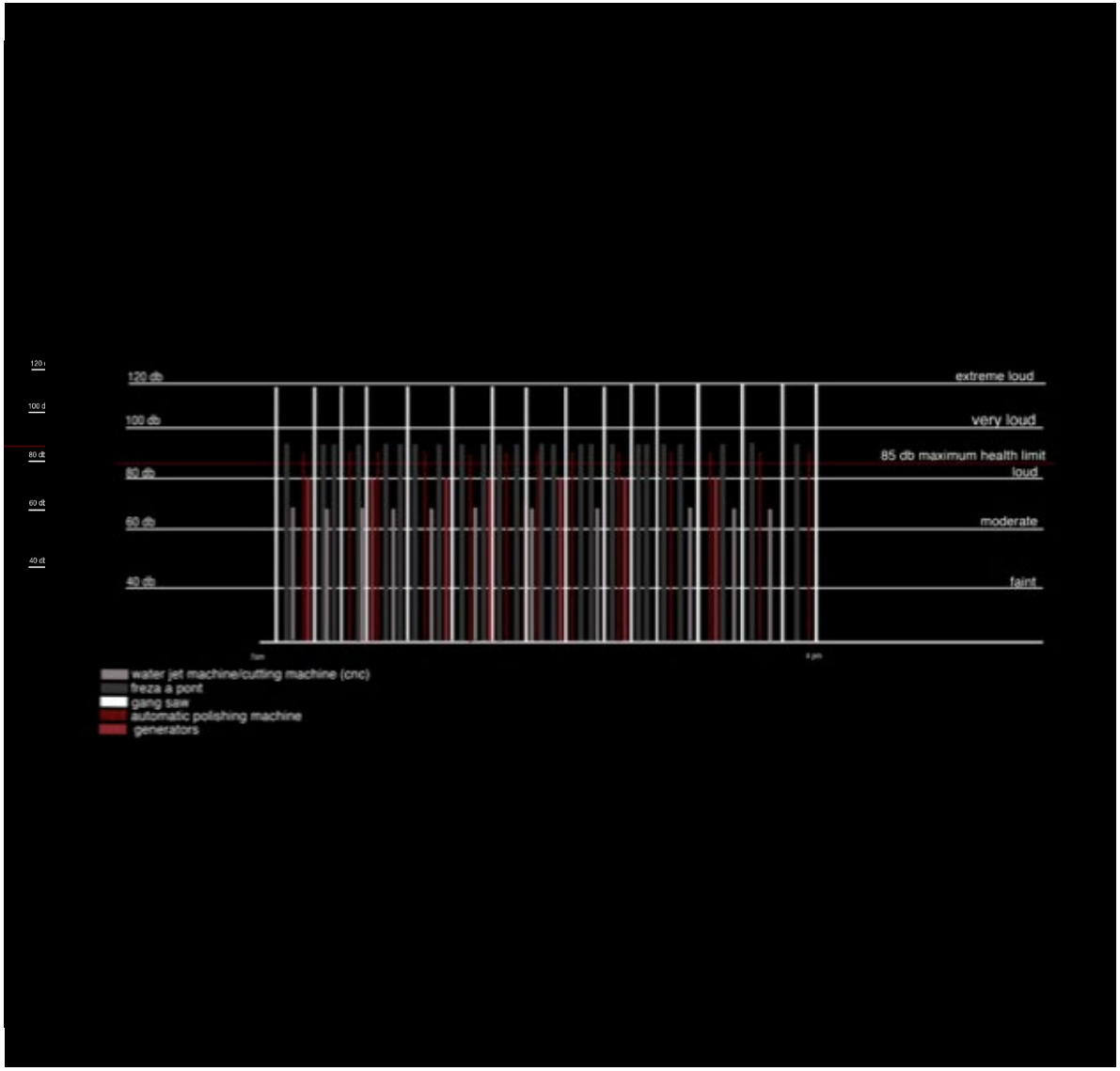


Figure 113: automatic polishing machine

Figure 114: cutting machine

Figure 115: gang saw

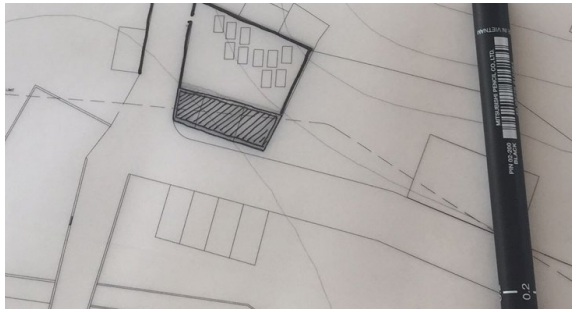
factory laborers



By surveying the types of machinery found inside the marble factory, it is evident that noise pollution is a great concern.
First and foremost all the machines are on all day, in which three of which generate noise over 85db,which as mentioned previously, is the maximum noise health limit.

Figure 116: factory noise pollution


YARD
MAIN GATE
GAR



010
concept phase

The phase after site analysis and inventory, was to generate three different concepts that respond to the different needs of the site, each with its own set of priorities.

As mentioned previously, the project looks at two different scales simultaneously; the industrial zone as a whole as well as a single factory as a prototype.
A strategy will be developed on the large scale tackling the issues of ecology, waste management, labor spaces.
A detailed design will be developed on the factory scale that will tackle similar issues but in more depth.

The concepts for the industrial zone include, a strategy focused on purely the laborers while the second focuses on the ecological aspects

The concepts for the factory scale include, creating a linear park for both the residents of kfarchima and the laborers, an ecological based approach as well as laborer facilities.

Strategy : labor spaces

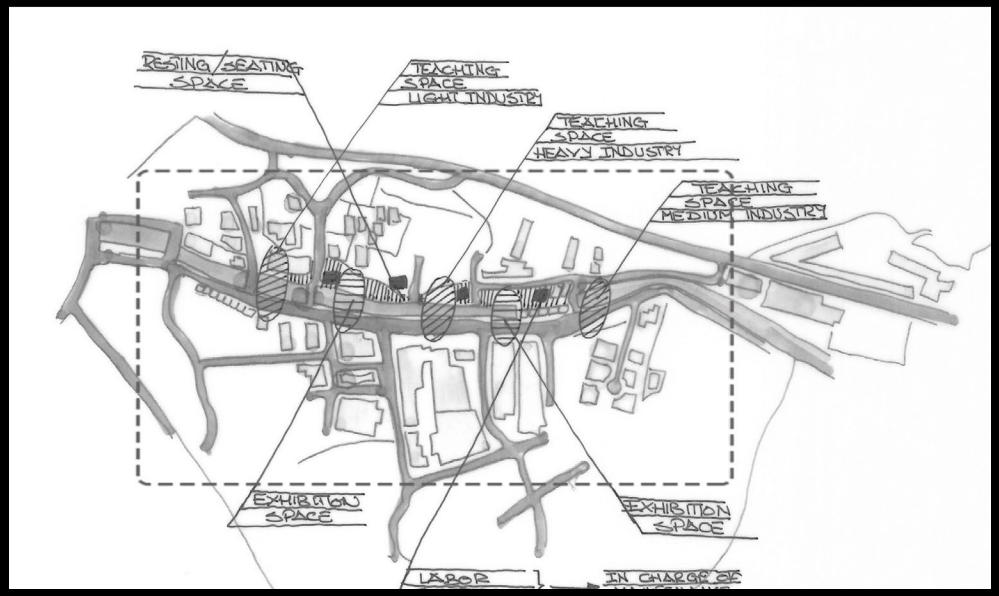


Figure 116: labor oriented strategy
scale : 1.3000

program

-shaded resting spaces across the river
-walking path across river
-allocate teaching spaces for light industries
-allocate teaching spaces for heavy industries
-allocate teaching spaces for medium industries
-multiple exibition area to showcase industrial products
-exibition area to showcase art made from recycled industrial material
(collaboration with artist)
-keeping the illegal labor quarters and them being in charge of maintenance «after work time»

Strategy : ecological renewal

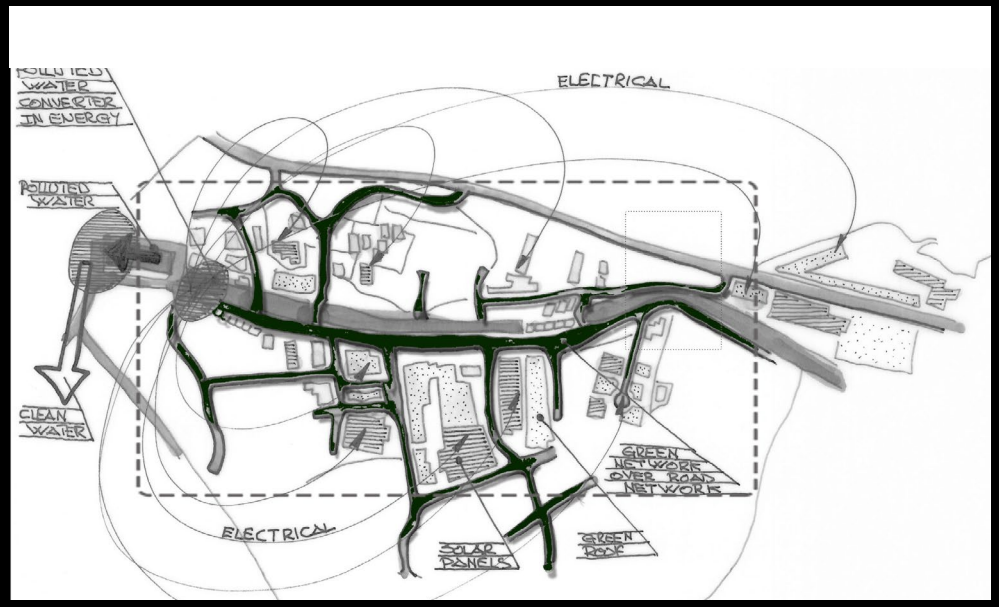


Figure 117: ecological strategy
scale : 1.3000

program

-green network over road network
-green roofs on industries
-solar panels on roof (reusable energy)
-introduction of plant that will convert waste water into renewable enegy
-introduction of plant that will clean the polluted water at the extremity of industrial zone
-recycling solid waste network between industries waste of one will be used as raw material for the other

Concept : labor spaces

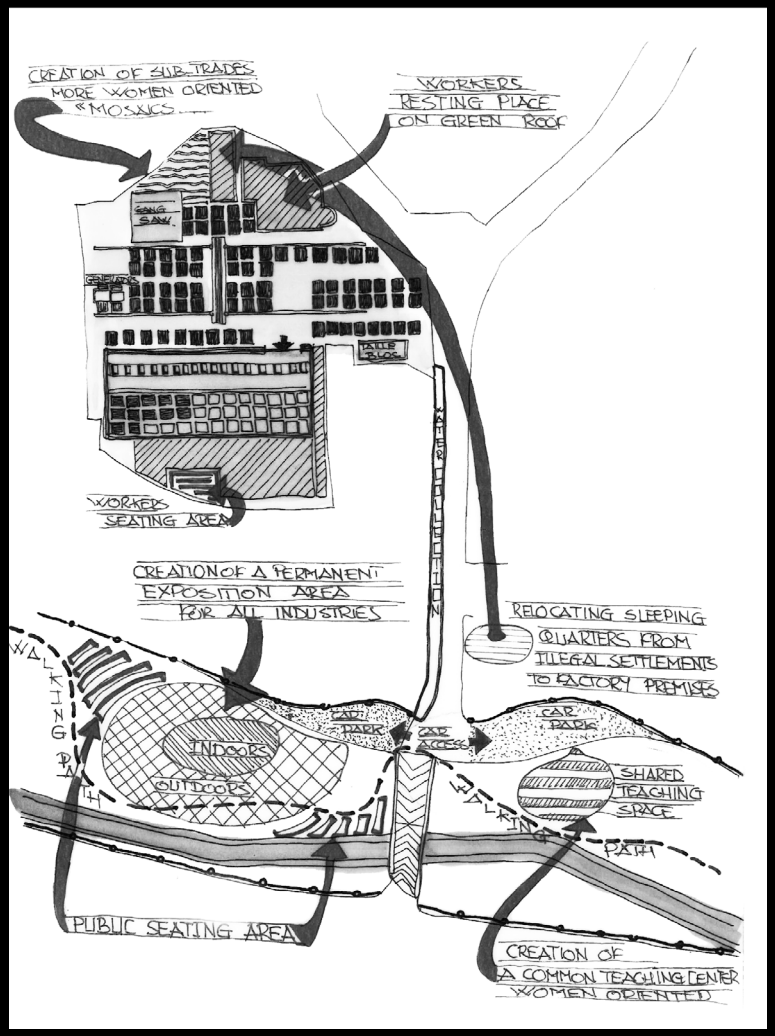


Figure 118: labor oriented concept
scale : 1.1000

program

-rellocating laborers from illegal settlement to factory premises
-network of labor seating areas within factory
-green roofs as labor seating area
-outdoor permanent exposition area for all industries
-creation of a common teaching center for new incoming labor
-harscape made from recycled industrial material
-walking path along river
-public seating area along river
-car park areas

Concept : ecological renewal

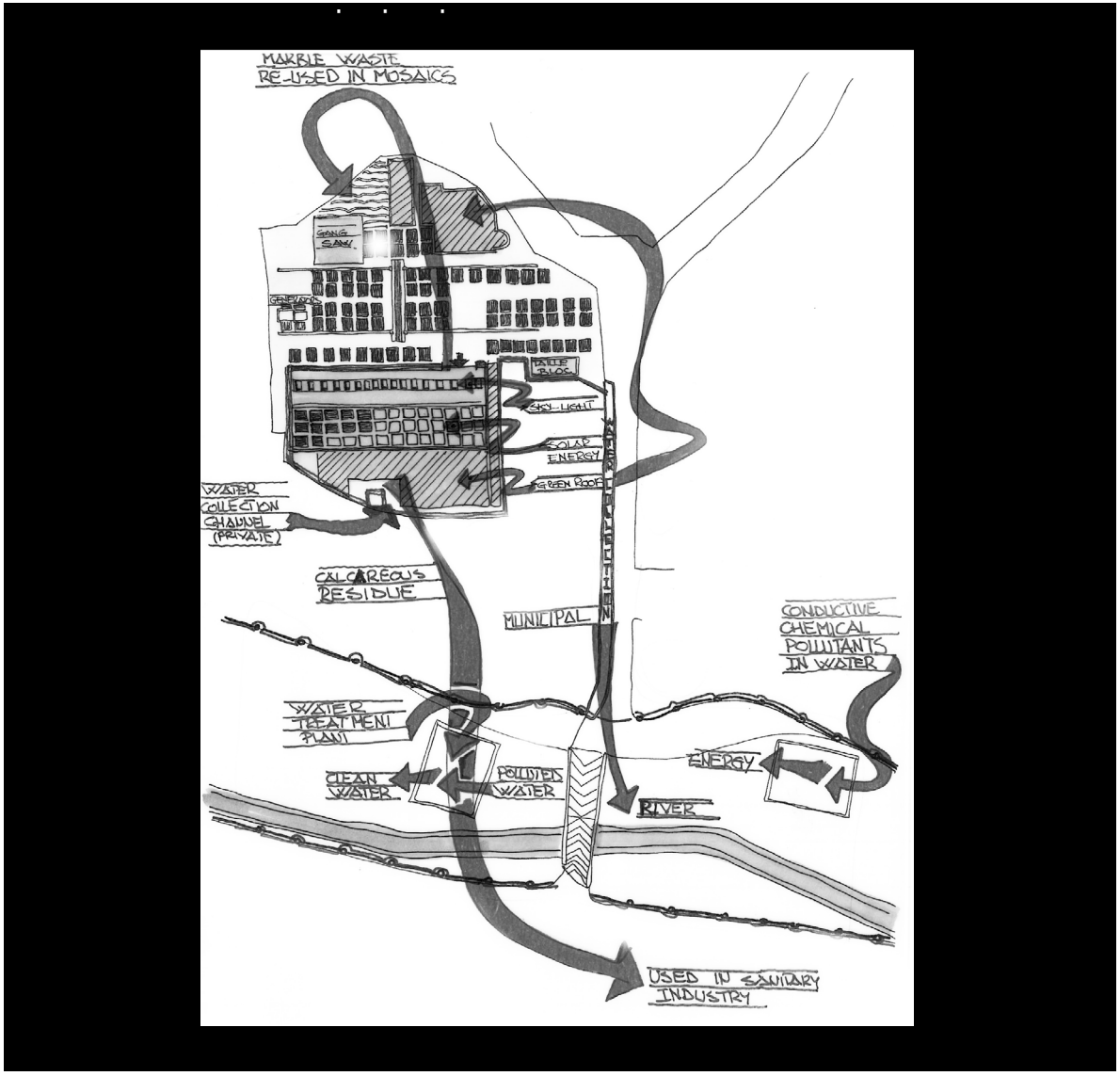


Figure 119:ecological concept
scale : 1.1000

program

-ecological green strip along river “buffer”
-waste water management
-hydrological restoration / wetlands
-recycling plants that will reuse polluted water to convert to energy used in industry
-green networks for air/noise/eye pollution
-green roofs on industries
-harscape made from recycled industrial material
-converting solar rays to usable energy
-recycling waste network between Industries.

Concept : linear park

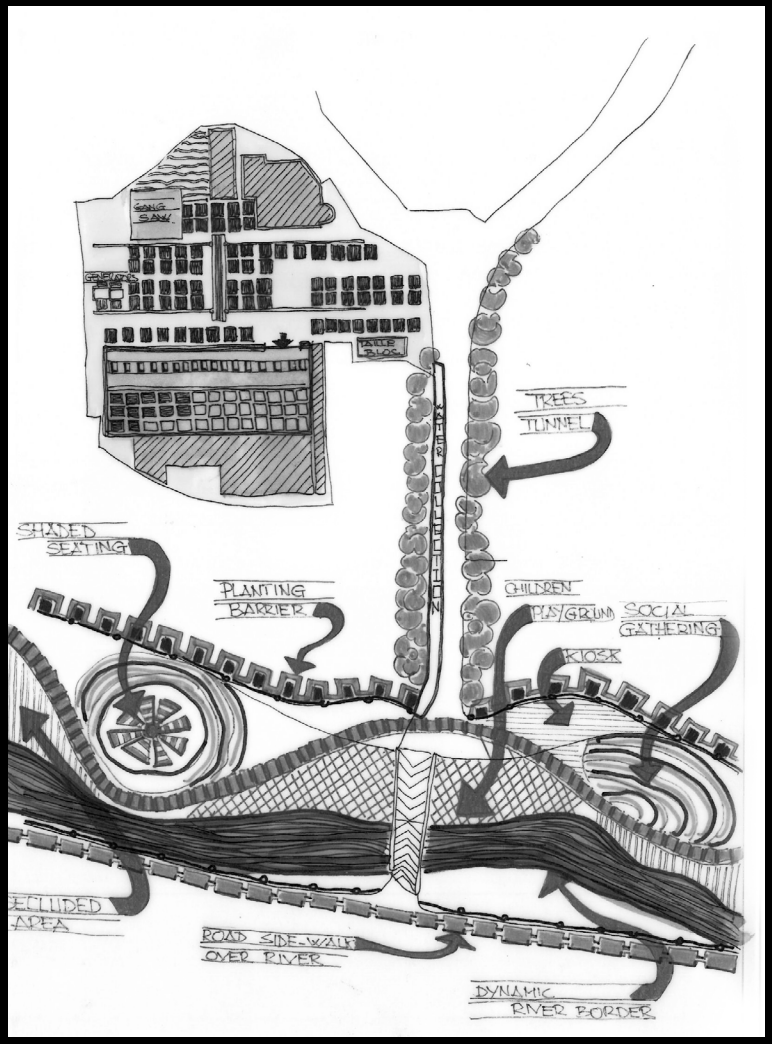


Figure 120:linear park concept
scale : 1.000

program

-creation of a linear park along river
-users : kfarchima residents/laborers
-spaces for social gathering
-children playground
-side walk across river
-secluded planting areas
-planting barriers between industries and park
-kiosks/ food stands
-walking path along river

Concept : labor spaces

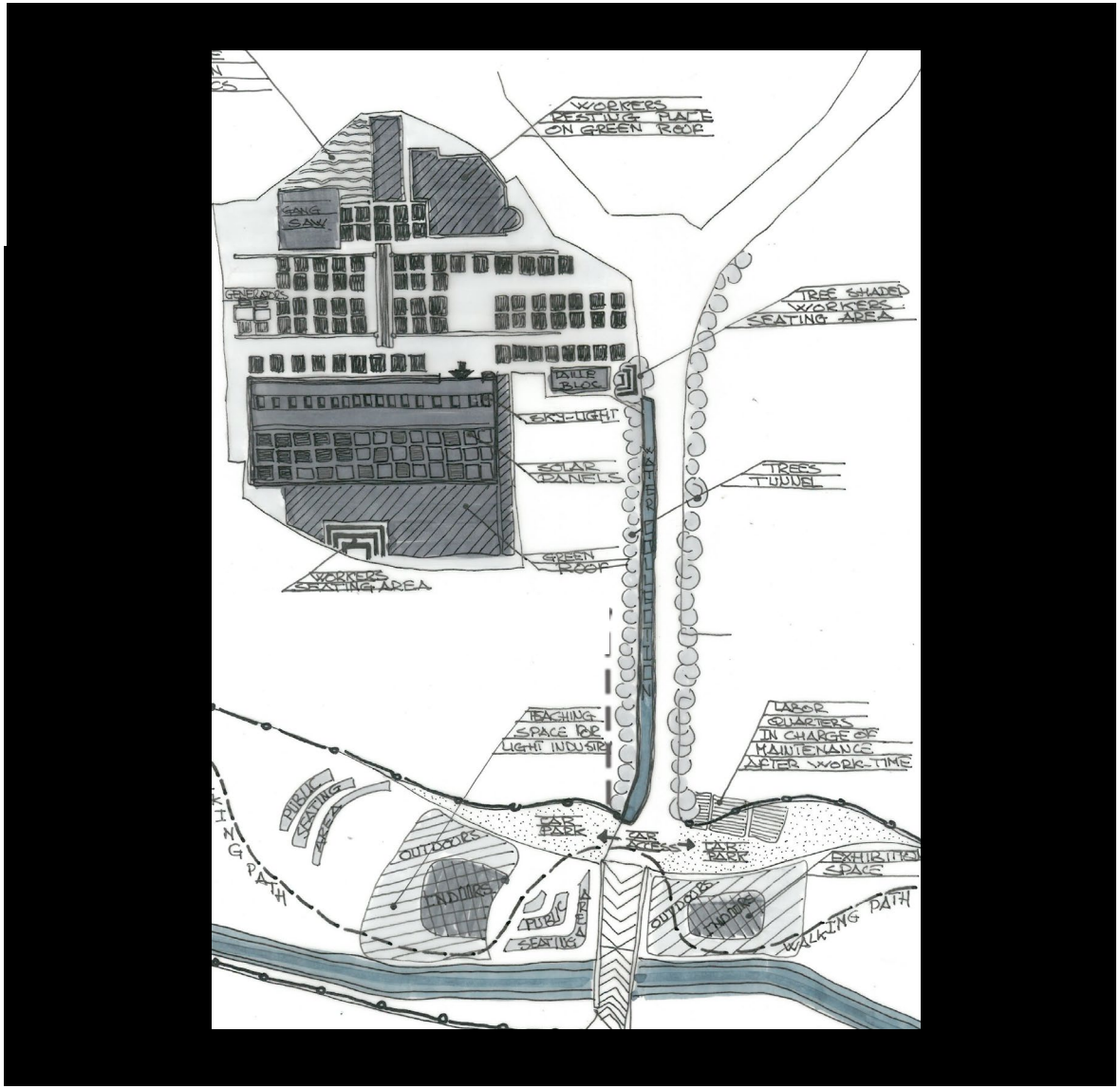


Figure 121 :labor spaces

The concept first and foremost links the factory to the pubic space by the river, and creates a network of resting area for the workers ; including seating areas as well as walking paths.

The public space by the river also includes an educational layer that creates allocates teaching spaces for the common trades.

From an ecological point of view, green roofs as well as green filters will be added to filter out the industrial pollutants. Solar energy as well as making use of the pollutants in the river to generate electricity comes into play as part of the ecological umbrella.

verticality concept

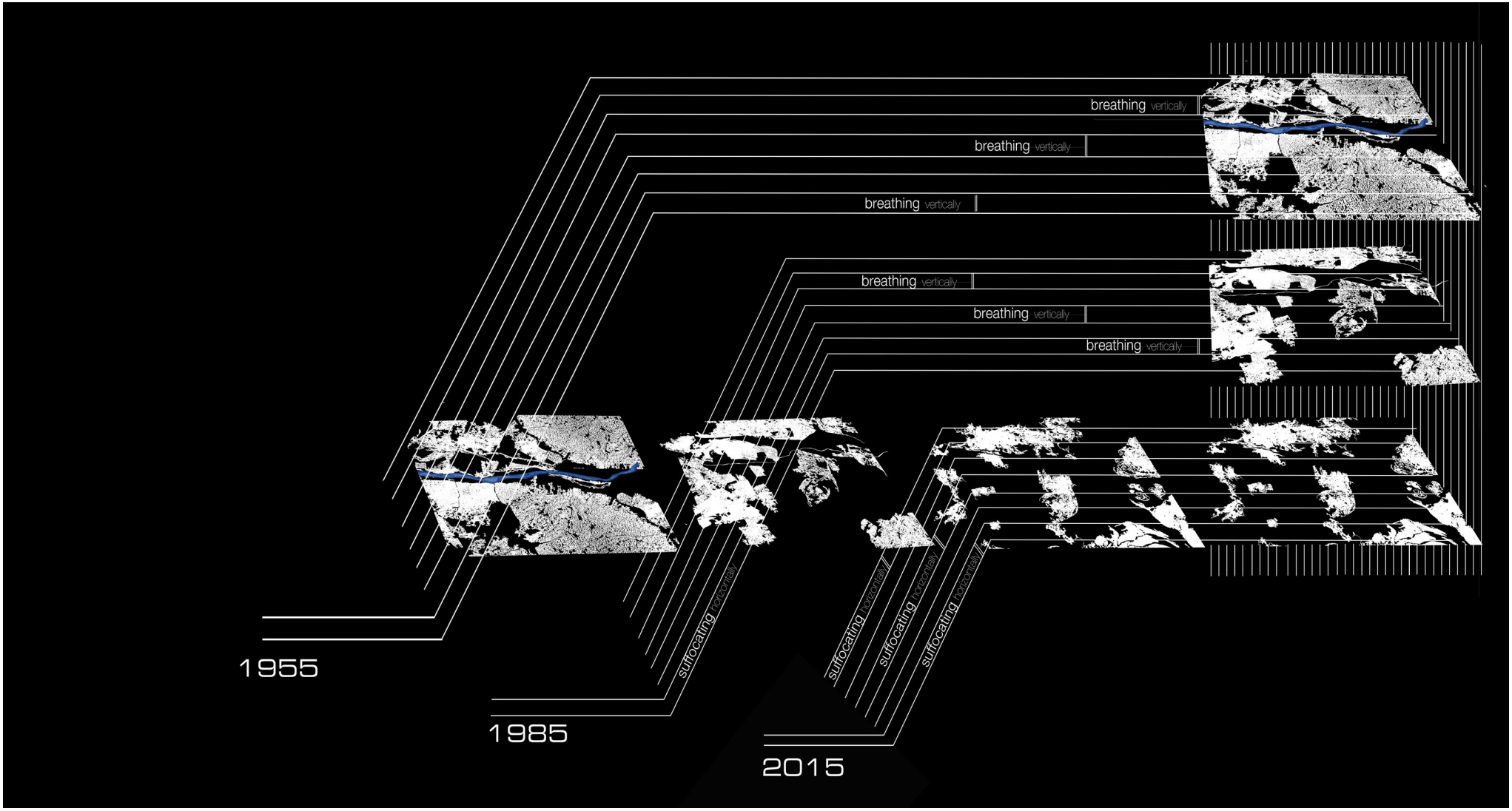


Figure 122: verticality concept

Final Concept :the resting chair

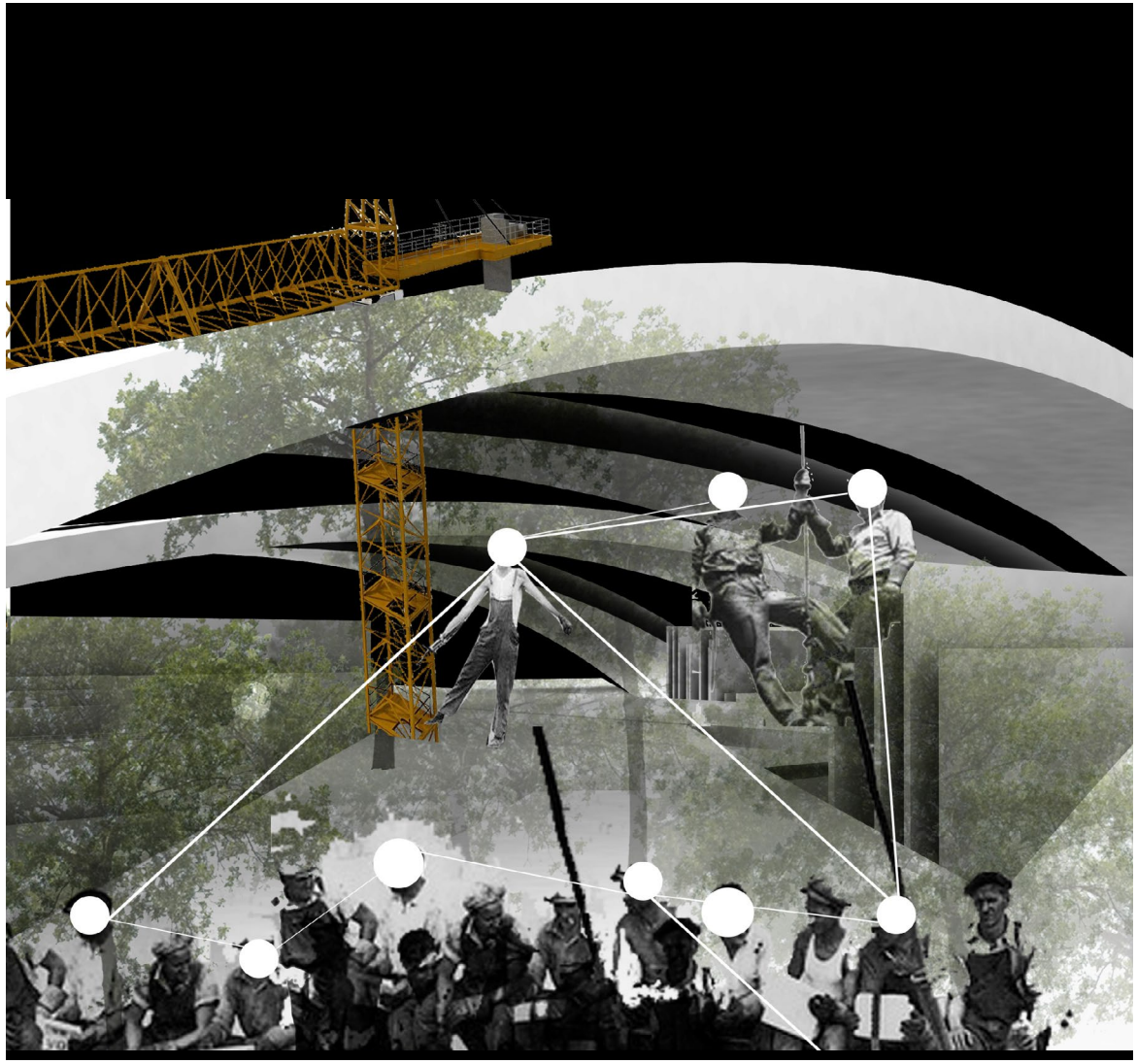


Figure 123: vertical cover concept

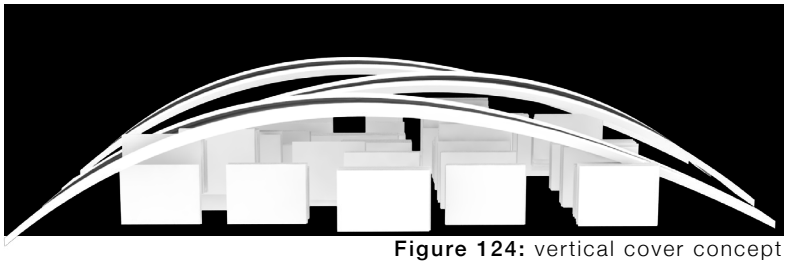


Figure 124: vertical cover concept

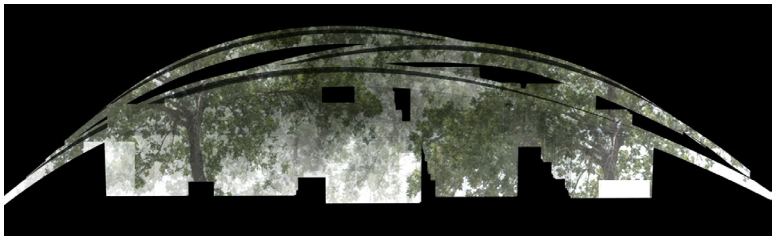


Figure 125: vertical green cover concept

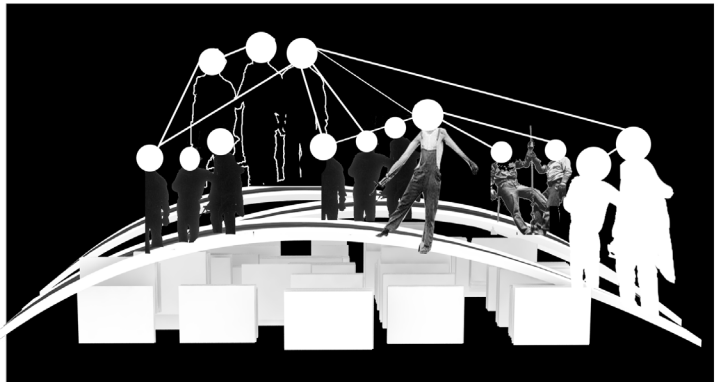
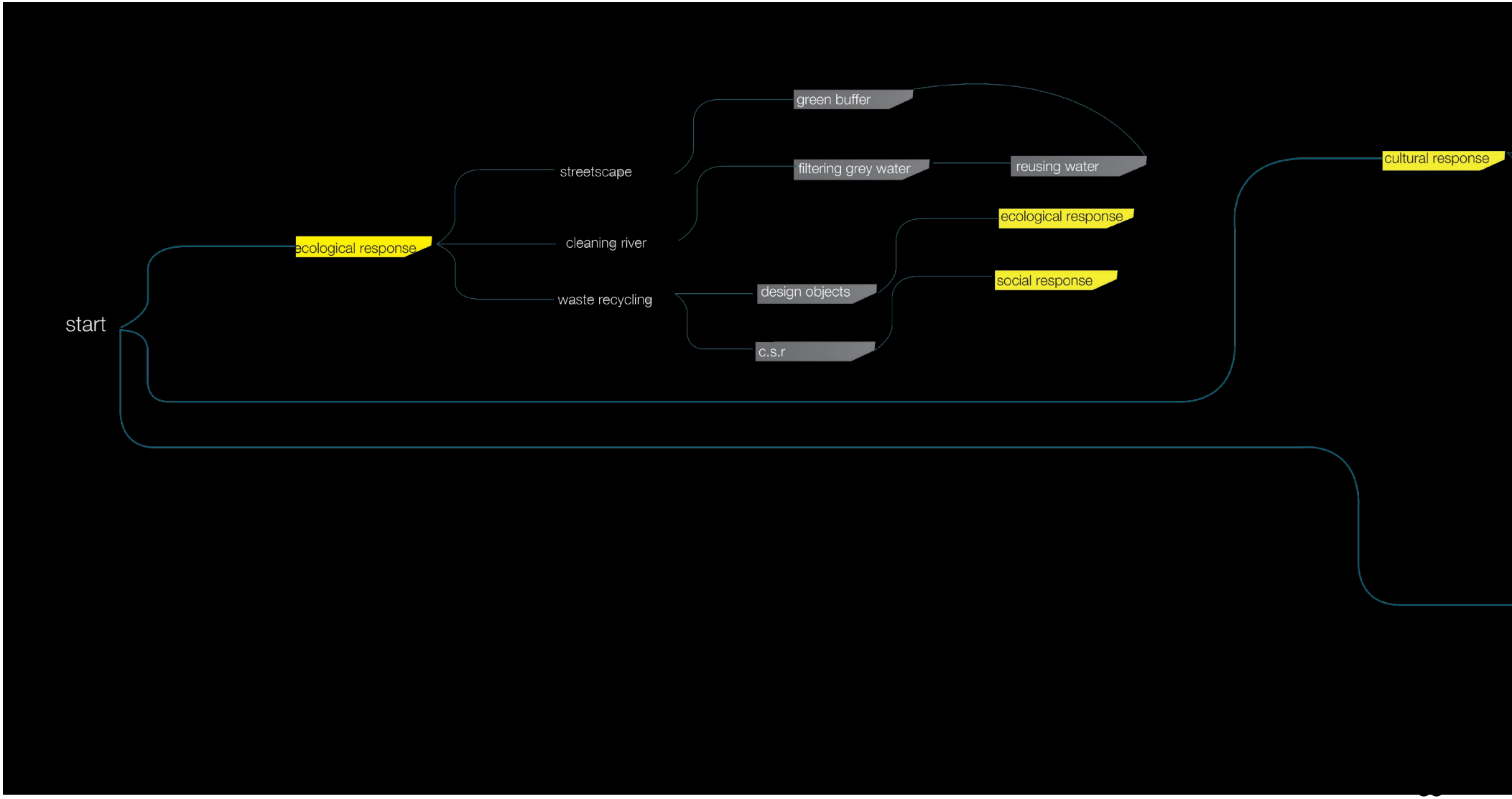


Figure 126: vertical social ;cover concept

macro to micro design strategy



macro to micro design strategy

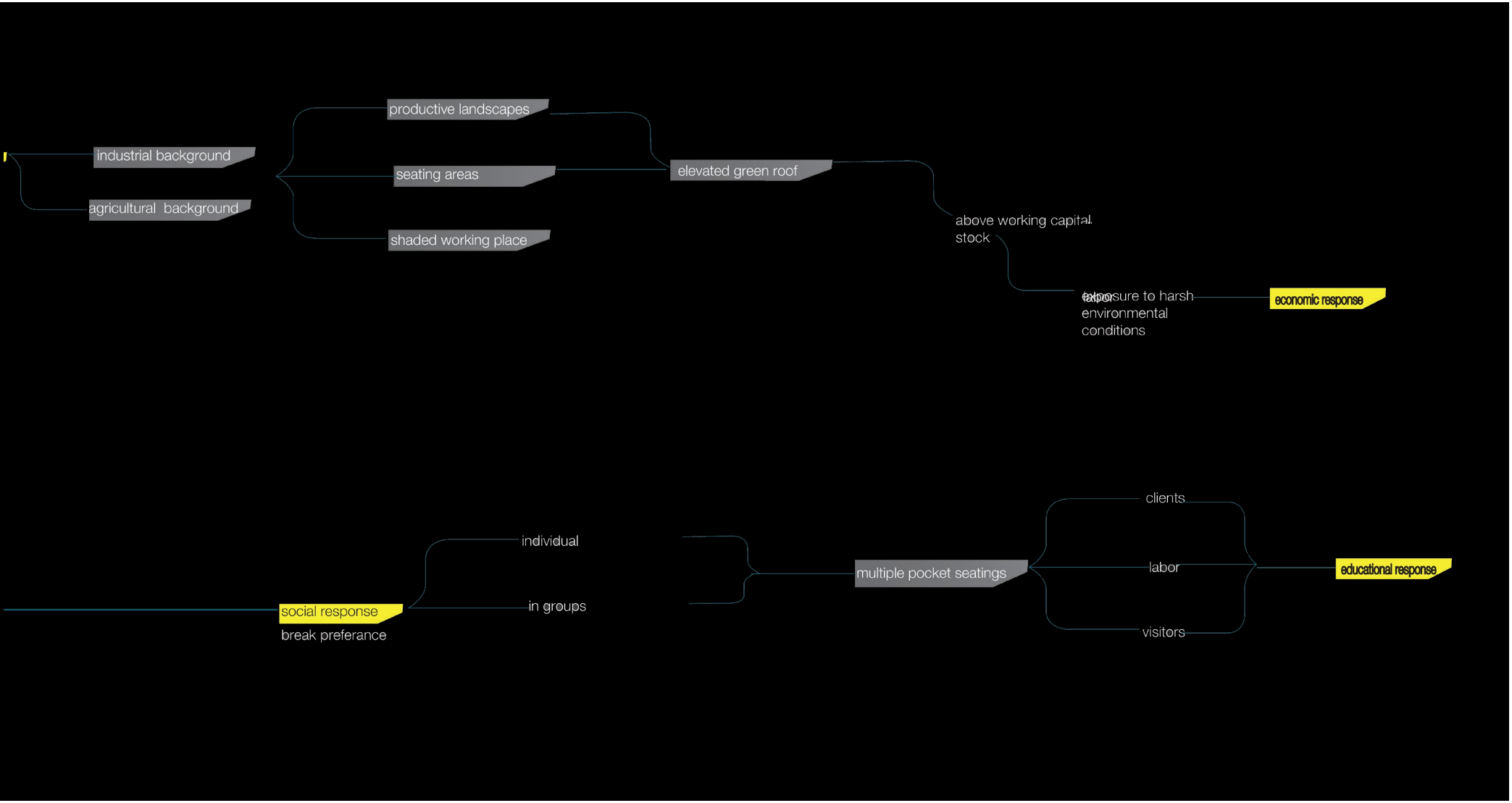
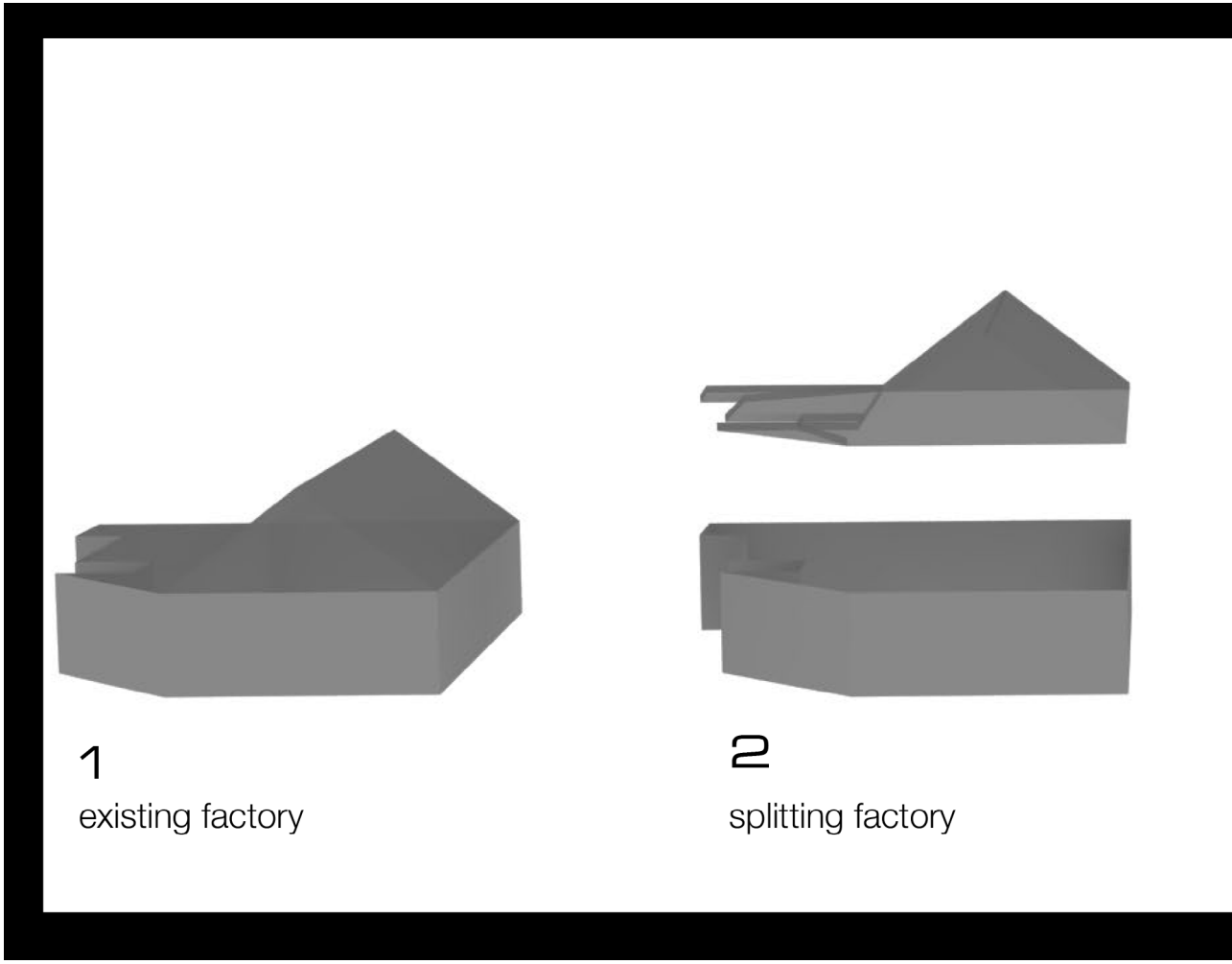
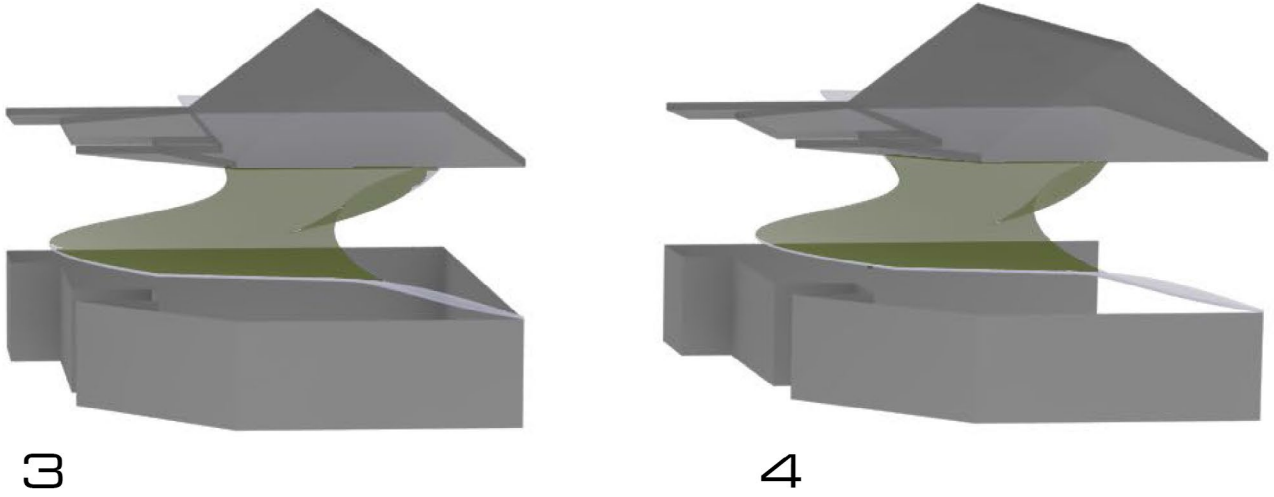


Figure 127: macro to micro strategy

general strategy





3

landscape intervention

4

use of renewable energy

Figure 128: general strategy

011
design development phase

The design phase consists of the design of a marble factory on three levels.

The ground-floor level that includes, reshuffling the industrial layout to both enhance the industrial activity as well as create a space for the landscape intervention.

The ground floor intervention extends to the river, creating a an ecological layer composed of a tree tunnel and water filteration.

The intermediate plan is a green roof structure that starts at 6m. It is composed of seating areas and productive landscapes.

The roof structure is used for renewable energy ; photo-voltaic panels with sustain the roof structure .

old layout V/S proposed layout

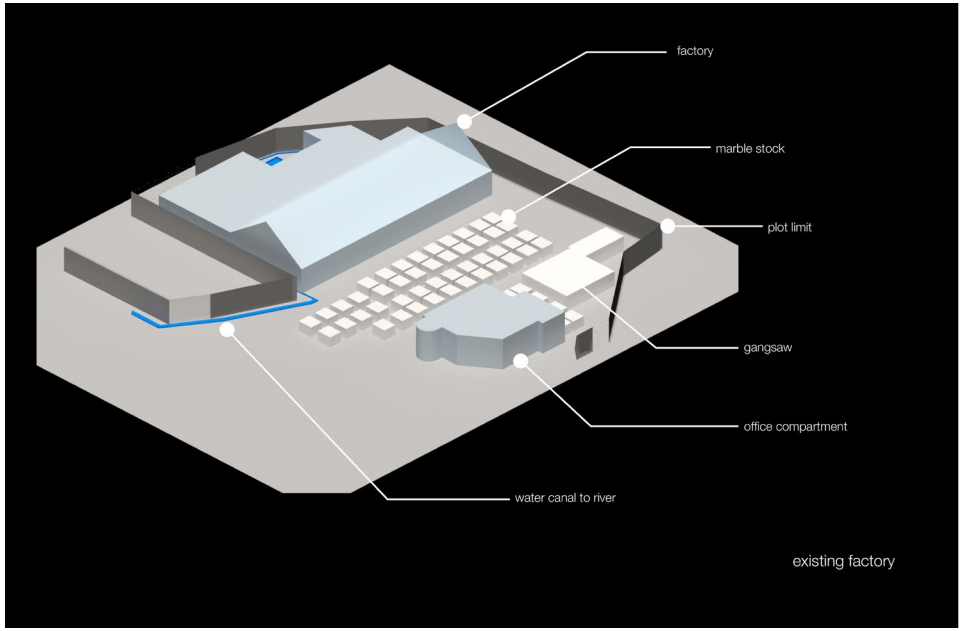


Figure 129: old factory layout

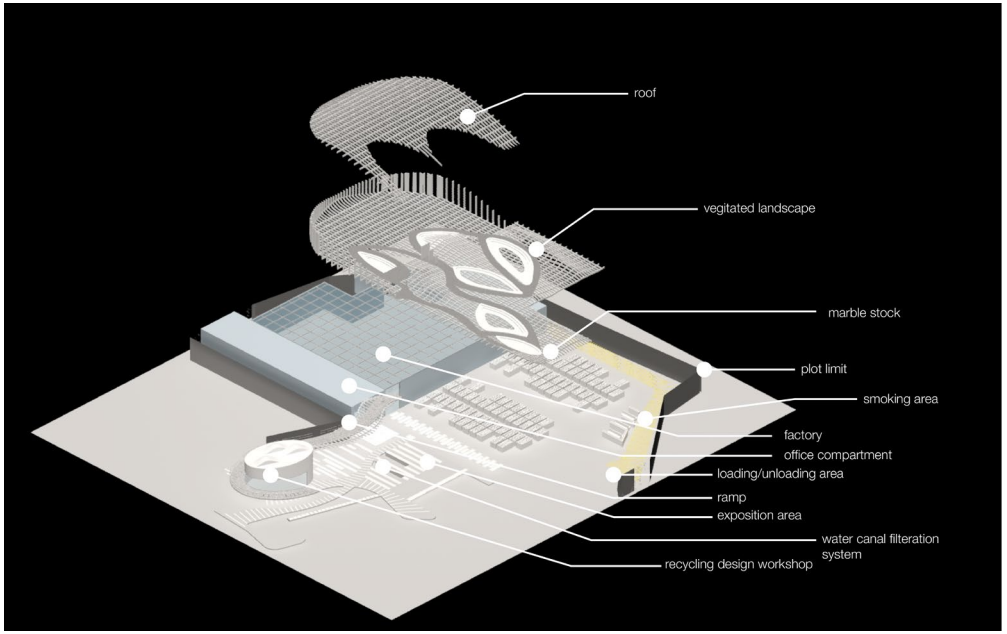


Figure 130 : proposed factory layout

ground-floor plan

Figure 131 : proposed factory ground-floor

The concept first and foremost links the factory to the pubic space by the river, and creates a network of resting area for the workers ; including seating areas as well as walking paths.

The public space by the river also includes an educational layer that creates allocates teaching spaces for the common trades.

From an ecological point of view, green roofs as well as green filters will be added to filter out the industrial pollutants. Solar energy as well as making use of the pollutants in the river to generate electricity comes into play as part of the ecological umbrella.

Figure 132: proposed road to river

The link with the river belongs to the Ecological layer where :
The used water is cleaned & filtered then directed to the river through a channel alongside of the street;
This street is bordered on both sides by a line of trees creating a green tunnel over it, helping in filtering the dust and protecting from the heat.

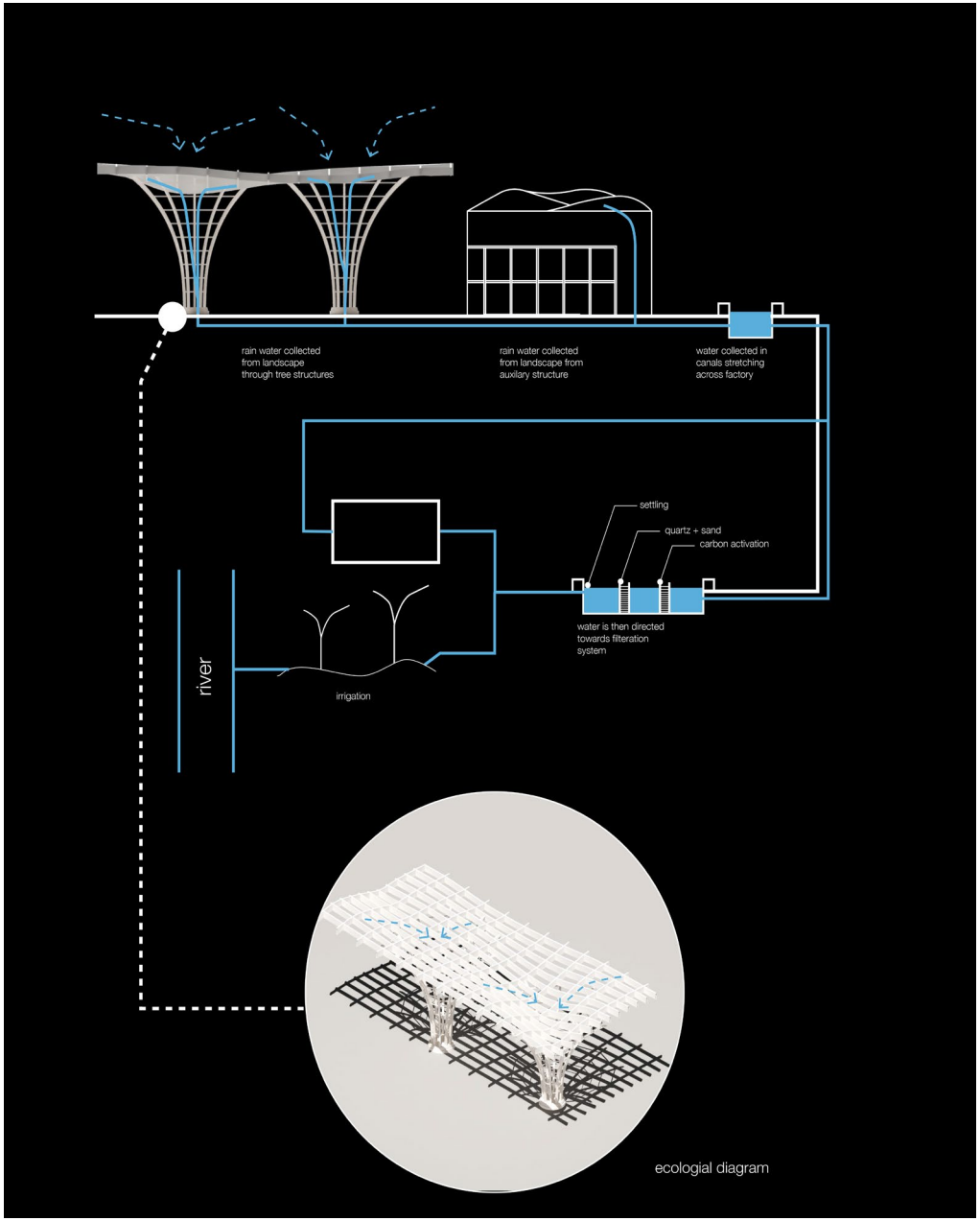
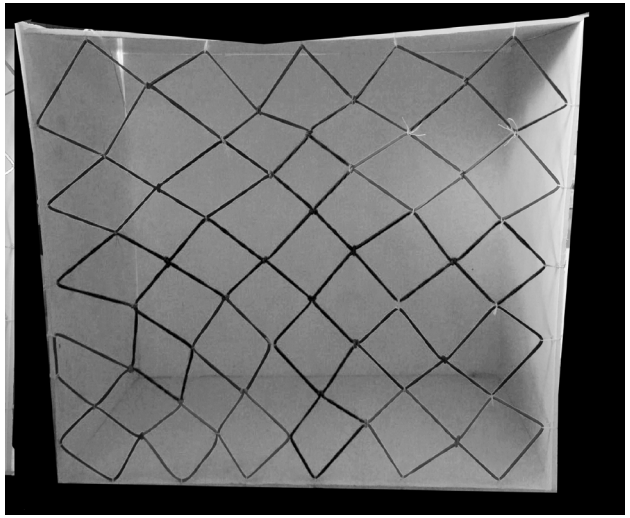
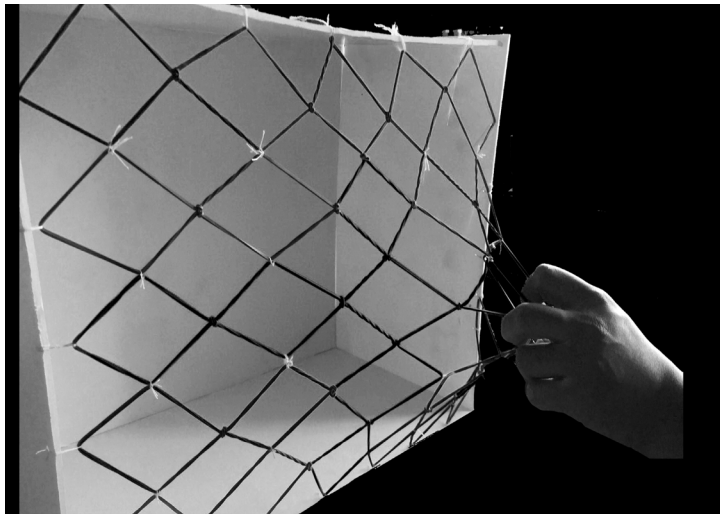


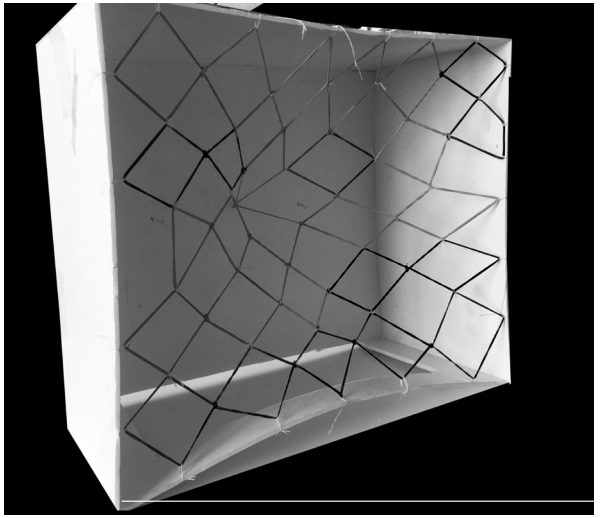
Figure 133 : ecological layer

As previously mentioned the link with the river belongs to the Ecological layer. Water from the green roof structure (mentioned in the next page), will collect rain water through an horizontal network that will reach the ground-floor through vertical pipes embedded in a tree structure. The collected water will be then transferred though channels to the water filtration unit, it will be mixed with the polluted machinery grey water and filtered to be reused in industrial and agricultural activity. This filtration unit is placed at the entrance, in order to showcase the ecological intervention. The filtered water will be transferred to the river through a channel.

industrial grid inspiration







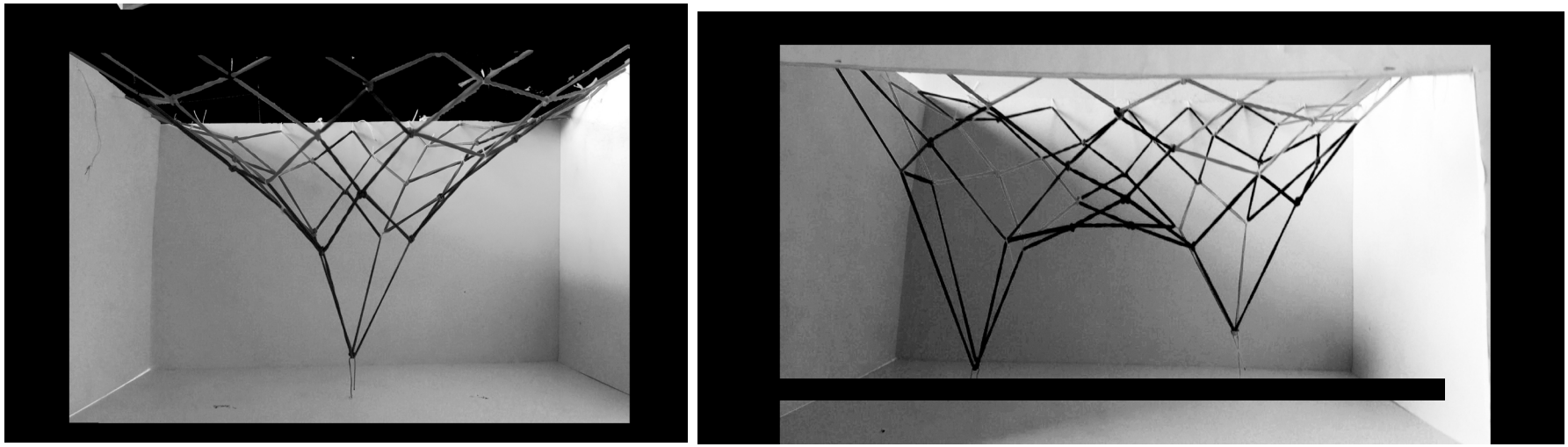
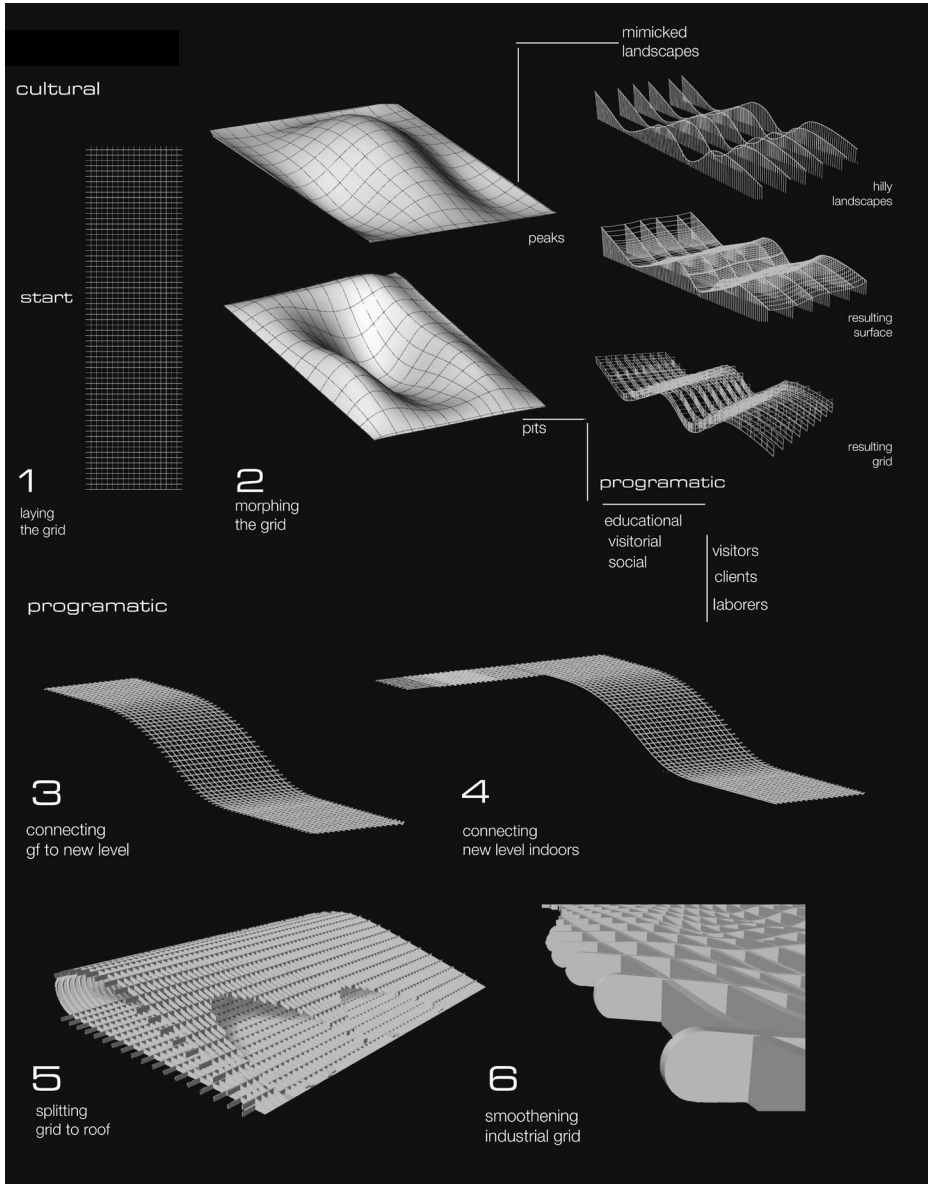


Figure 134 : grid/tree experimentation



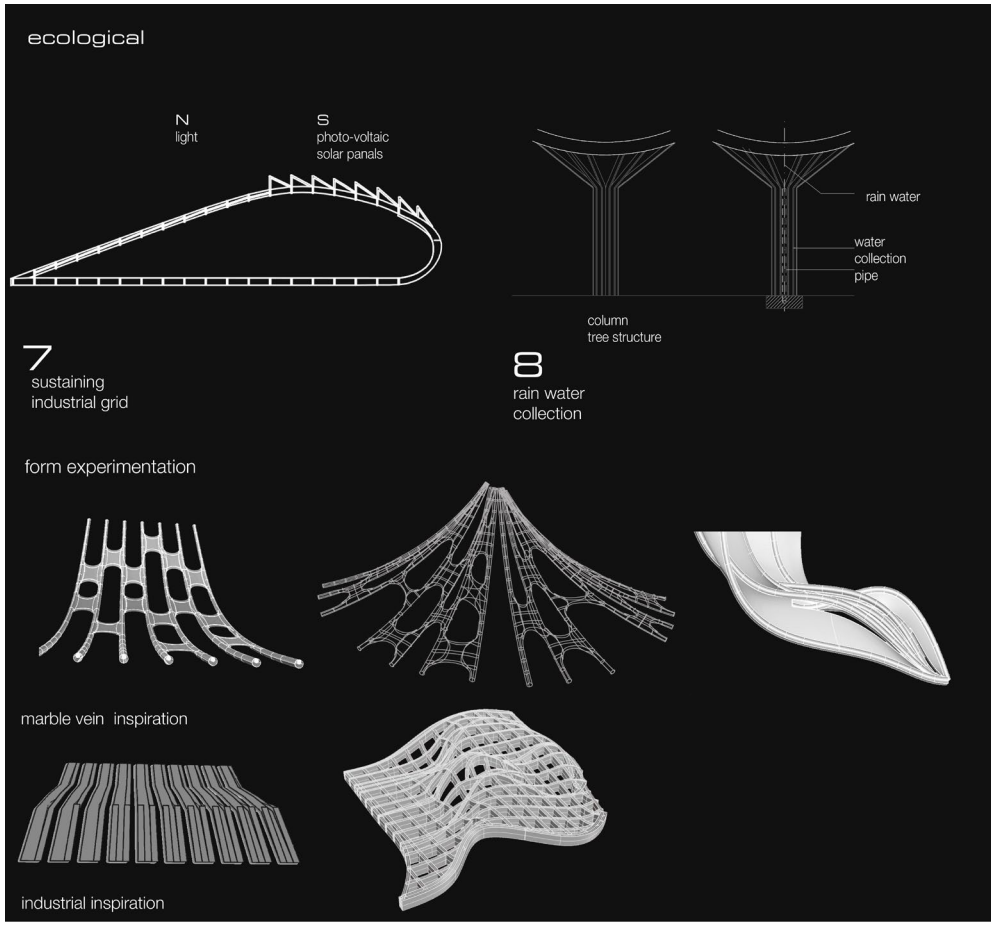


Figure 135 : morphing the grid

intermediate plan +6m

The intermediate plan represents the main landscape intervention on site.
It is the non-existent in the existing site.
The roof, takes the shape of kfarchima's landform.
The base of the roof is a grid, inspired by the industrial nature of the site.
The landform I composed of hills and depression, that take similar for on the roof. The grid takes the form of depressions (pits) and hills (peaks).
The pits proposed serve a programmatic purpose, the serve as seating areas, viewing platforms and educational platforms, for the laborers on site,visitors and clients.
The peaks on the other hand are vegetated with both productive landscapes, of vegetables and fruit trees, for the self-sufficiency of the laborers.
The grid then continues indoor to the second floor of the workshop, and creates a shaded seating area in case of bad whether.

Figure 136 : intermediate plan

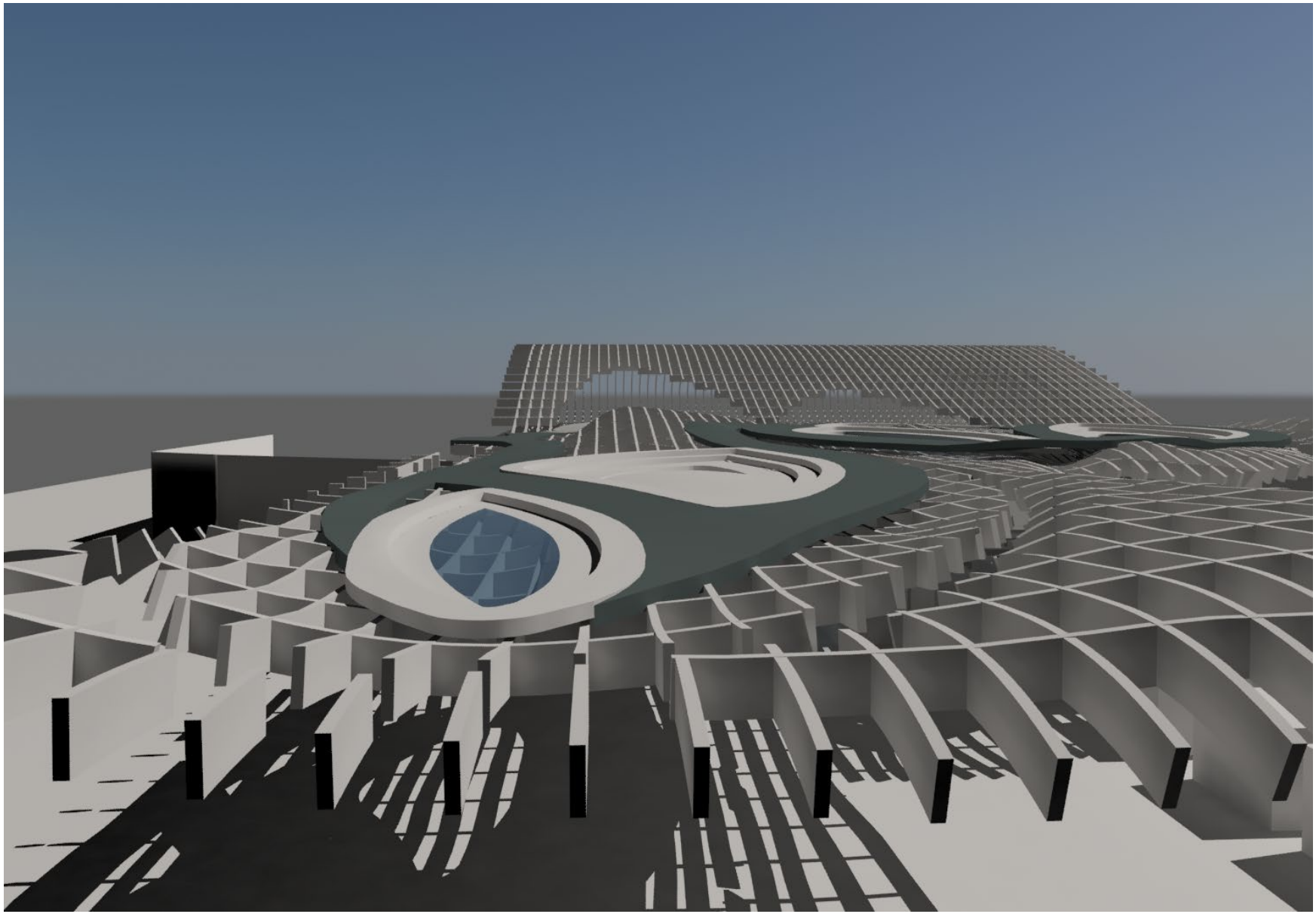


Figure 137 : grid structure

ground-floor view of grid

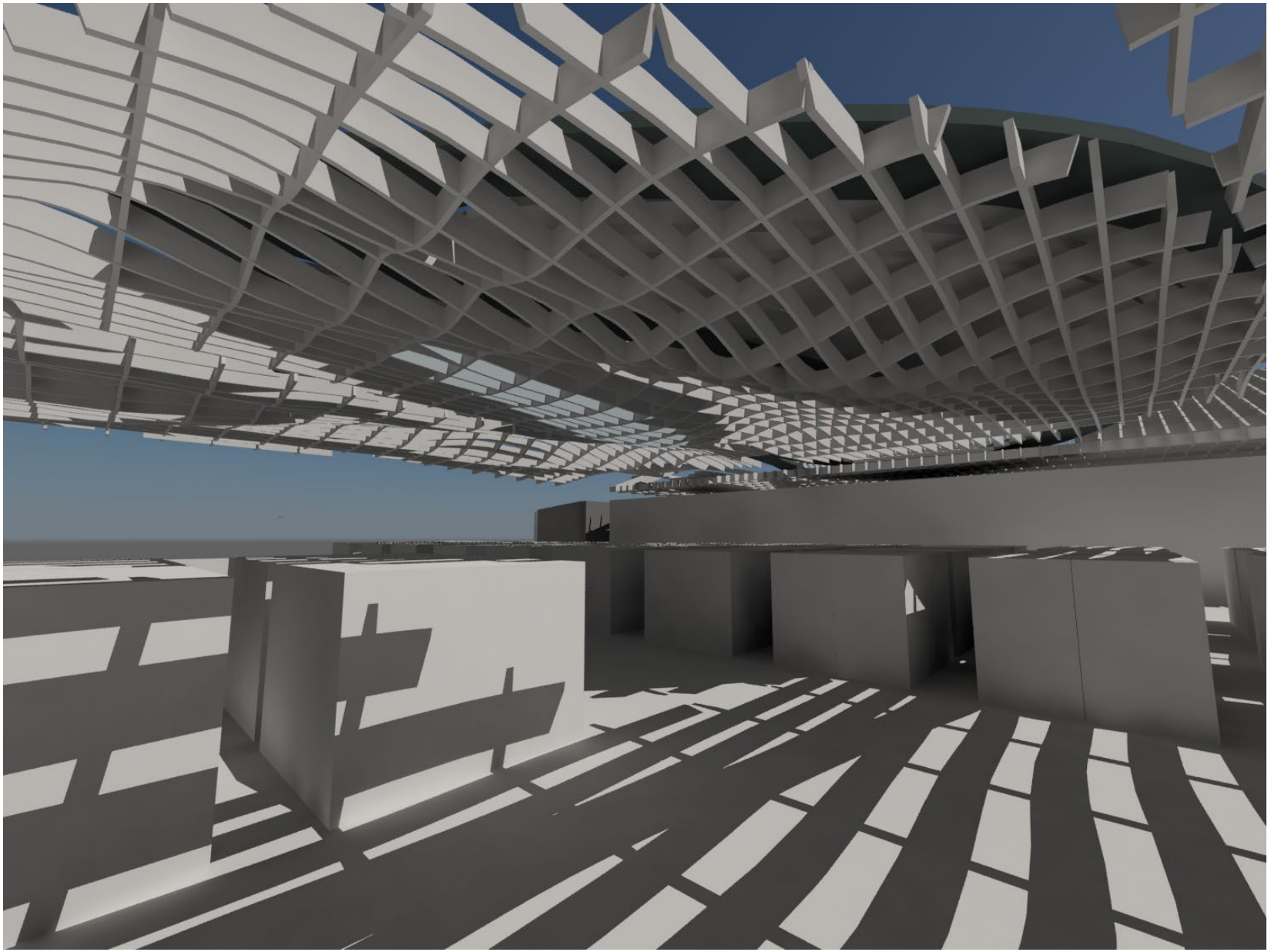


Figure 138 : grid structure seen from ground-floor

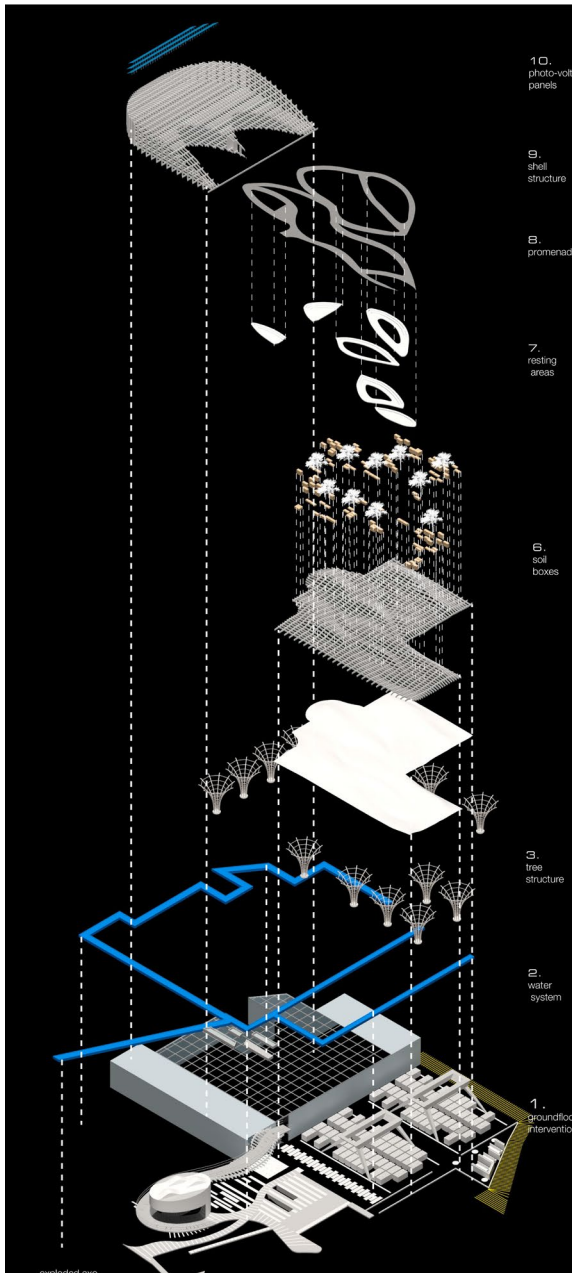


Figure 139 : complete intervention

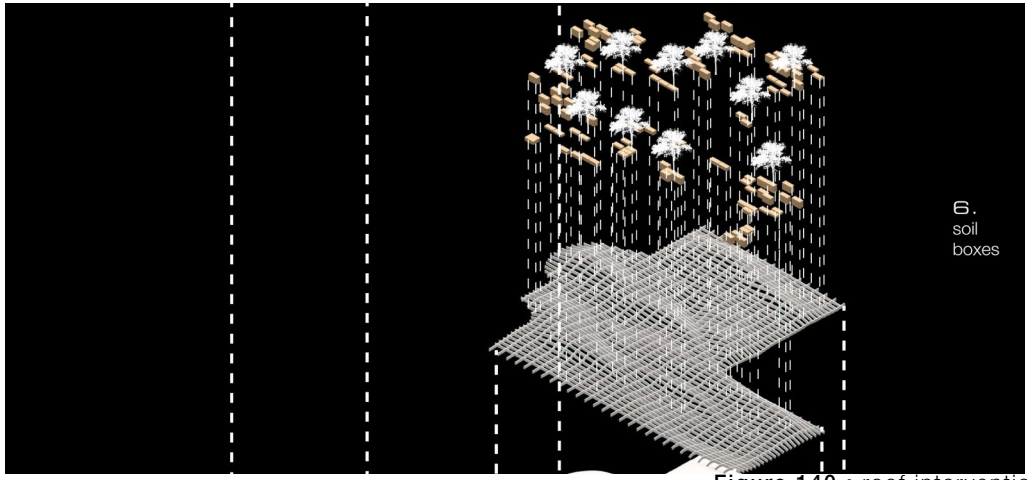


Figure 140 : roof intervention

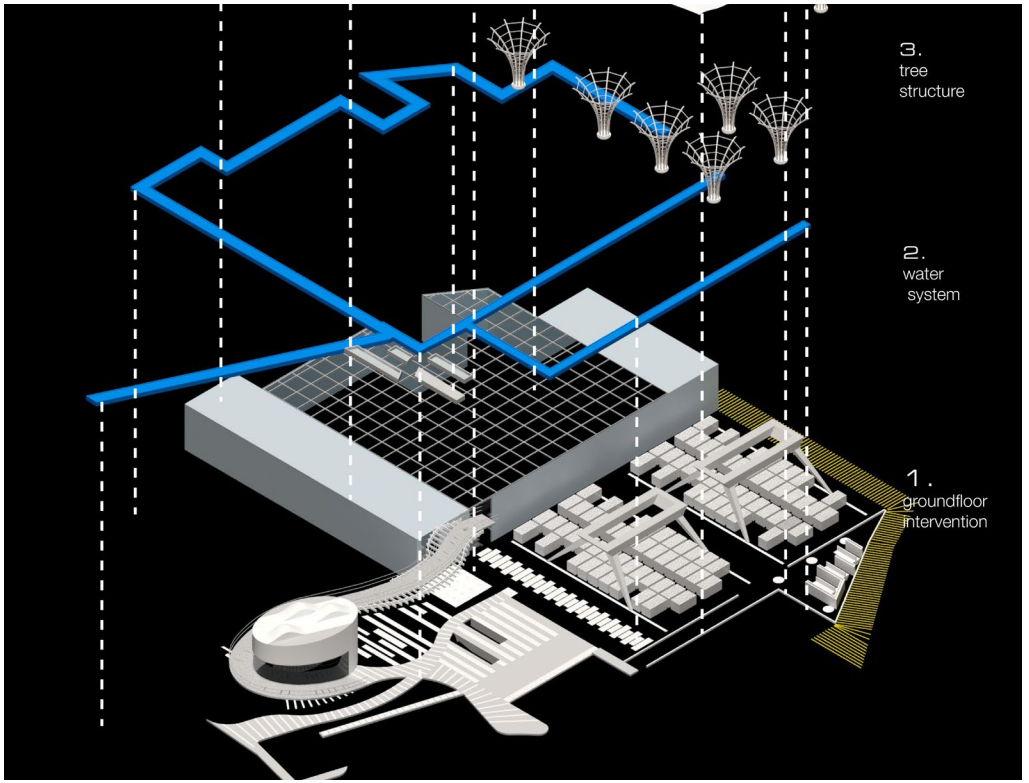


Figure 141 : zoom in ground floor

intermediate plan +6m

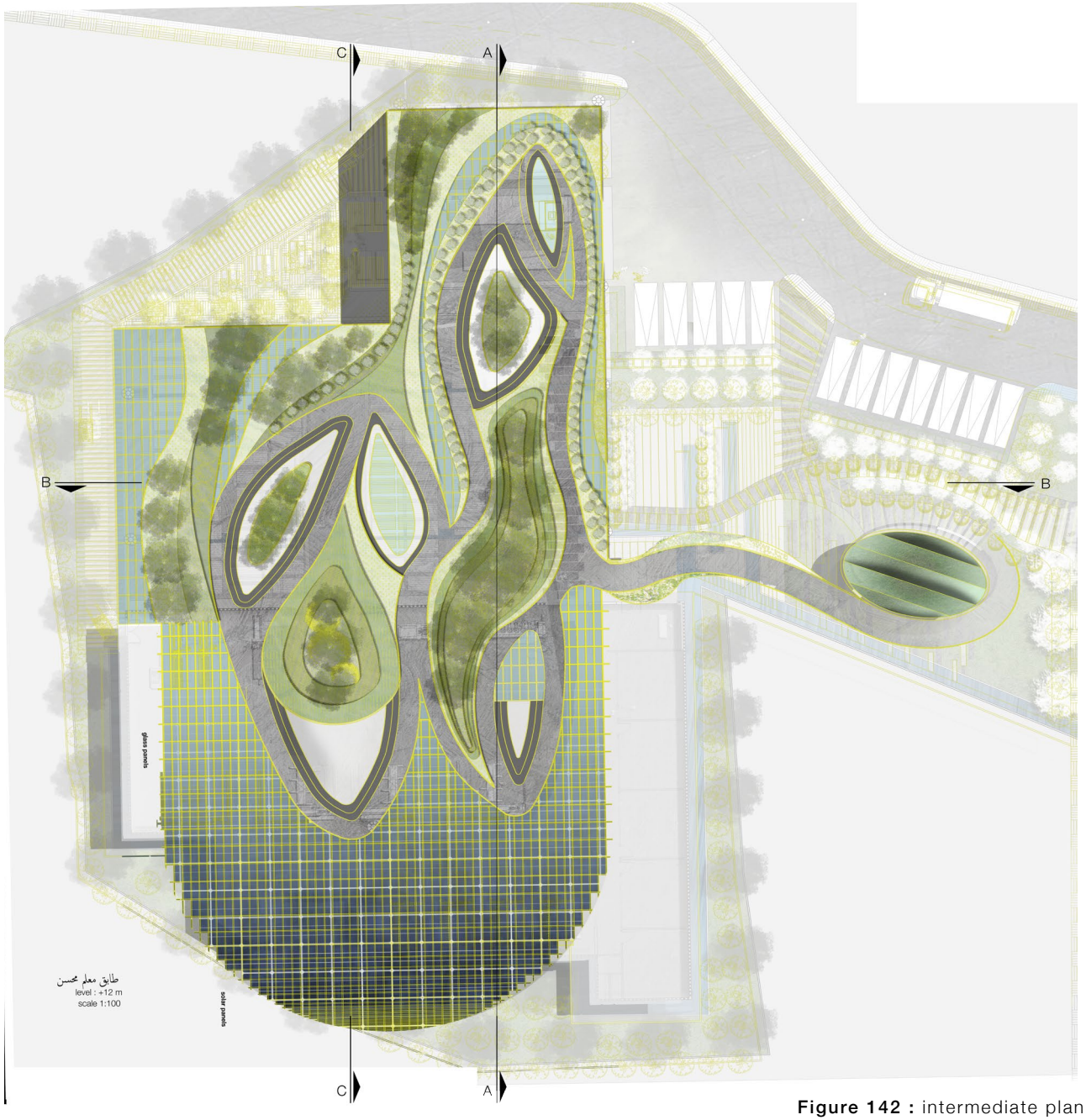
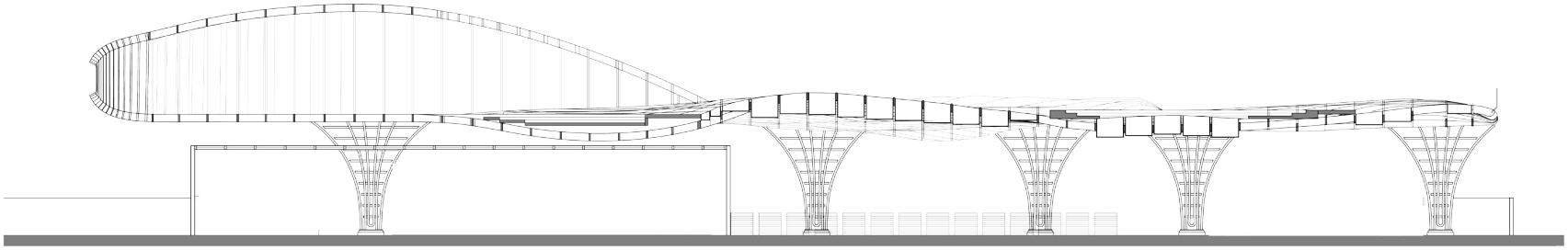


Figure 142 : intermediate plan

The interior of the grid at the 2nd floor clasps the roof forming a curved roof strcture, that continues the same design language.
The roof structure contains on the northern side glass panels, in order to decrease costs of heating in winter, and on the southern end, contains a series of photo-voltaic solar panels in order sustain all electric works of the structure including lighting.

section aa’



technical section aa’
scale 1:100

Figure 143 : technical section aa

technical section BB’

Figure 144 : section aa

section bb’

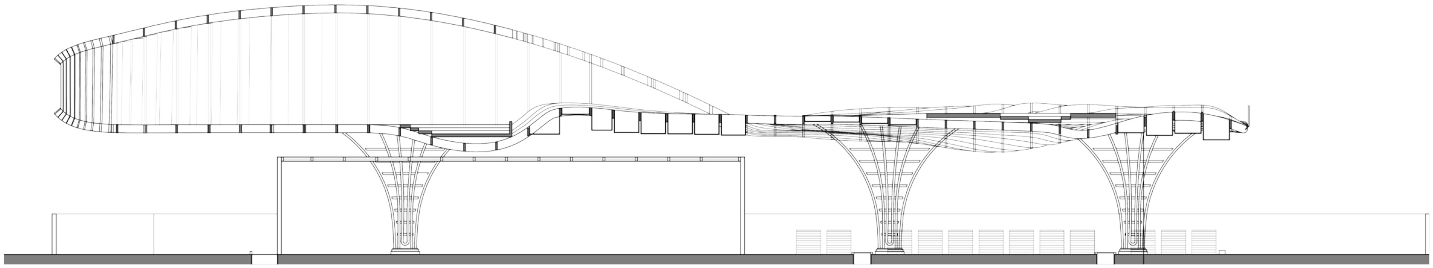
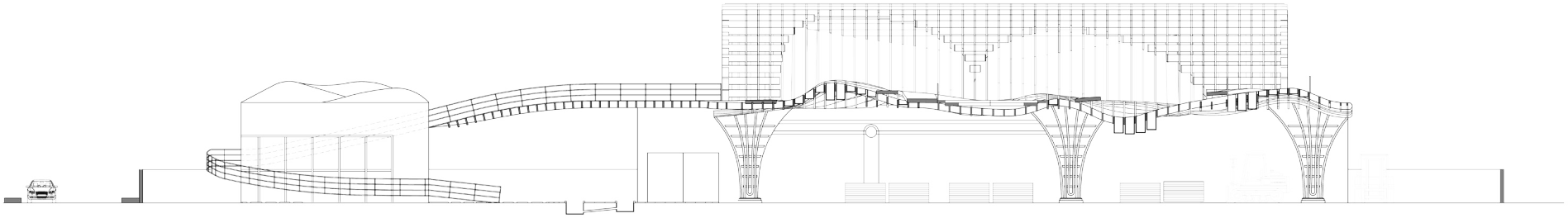


Figure 145 : technical section bb

Figure 146 : section bb

section bb’



technical section cc''
scale 1:100

Figure 147 :technical section cc

section cc''

Figure 148 : section cc

view from street

Figure 149 : view from street

view from industrial ground

Figure 150 : view from industrial ground

view from green roof inwards

Figure 151 : view from green roof inwards

view from green roof

Figure 152: view from green roof outwards