



ORÇUN KORAL İŞERİ

2012 - 2018



ORÇUN KORAL İŞERİ

EDUCATION

High School University Master
Le Lycée Français Saint Joseph d'İzmir (% 100 scholarship)
İzmir Yaşar University - Architecture (% 100 scholarship)
İzmir Yaşar University, Architecture
(Computational Design, Energy, Sustainability (% 100 scholarship)

EXPERIENCE

Internship
Tolgatur Ltd.
Mita Architecture and Restoration
Professional
Teksoy Architecture
Part time Assistan
Arch 211 - Introduction to Digital Design
Lecturer
Arch 211 - Introduction to Digital Design
Arch 380 - Building Information Modelling
Arch 451 - Artificial Intelligence in Architecture
Conferences
IEEE/Canada - Energy optimization on historical building (Selçuklu City Museum)
Mstas.17 - Odtü - Net Present Value and UDI optimization with HypE
Genetic Algortihm for Architectural Design
Organization
Tasarım Köyü İzmir, Umob 15
Tasarım Köyü İzmir, 2016
Cinema
Kronos Media
Student Program
Work & Travel U.S.A

WORKSHOP / EXHIBITION

Workshop
Whatabout Microtowns
TU Delft, Bornova Municipality SWAT Studio
TU Delft, Bornova - Master Studio
İzmir Ekonomi Üniversitesi, Approacing Localy Specific
Exhibition
İzmir Yaşar University, End-Year Exhibition
İzmir Yaşar University, End-Year Exhibition
İzmir Yaşar University, End-Year Exhibition

2005 - 2011
2012 - 2016
2016 - 2018

2014, summer
2015, summer
2016, August-2017, January
2017, September-October
2018, February- May
2018, February- May
2018, February- May
2016, August

2017, 14-15 June

2015, July
2015, August
2014, Summer
2013, Summer

2014, Autumn
2016, Spring
2016, Spring
2016, Spring
2015, Summer
2016, Summer
2017, Summer



ADRESS

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Karşıyaka / İzmir, Turkey

CONNECTION

+90 506 925 86 90

E-MAIL

orcunkoraliseri@gmail.com

ABOUT

Traveller : India / U.S.A. / Italy / Greece
/ Kazakhstan
Photography : Travel / Landscape
/ Documentary

LANGUAGES

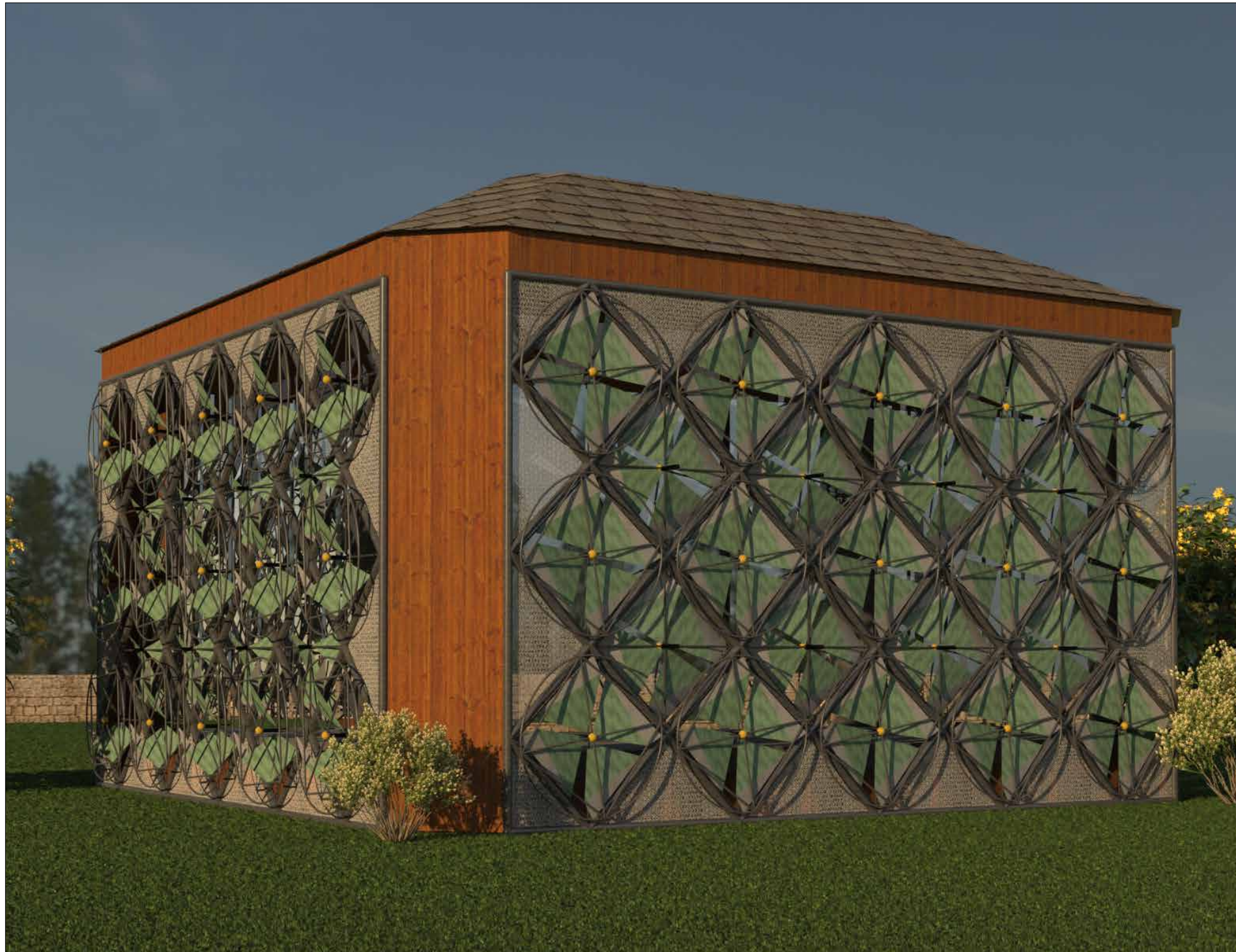
English ●●●●●
French ●●●●●
Italian ●●●●●

PROFESSIONAL

Rhinoceros / Grasshopper / Python
EnergyPlus / Open Studio / SketchUp
LadyBug / Honeybee
Revit / AutoCAD
Excel / Word
Adobe Creative Cloud

INDEX

ARCH 532_MASTER PROJECT	ENVELOPE DESIGN
ARCH 531_MASTER PROJECT	HEALTHCARE & EDUCATION CENTER
ARCH 420_STUDENT PROJECT	URBAN LIBRARY
ARCH 410_STUDENT PROJECT	VERTICAL NEIGHBOURHOOD
ARCH 310_STUDENT PROJECT	PDEMO – BBOM
STUDENT PROJECT	DISPLACEMENT YACHT DESIGN
STUDENT PROJECT	HOLOCAUST MUSEUM REINTERPRETATION
STUDENT PROJECT	FOLDED PATTERN BEAN
STUDENT PROJECT	APOLLON & DIONYSOS
BASIC DESIGN	WORMHOLE
BASIC DESIGN	BOOK CONTACTOR
CONCEPT DESIGN & VISUALISATION	VILLA ALAÇATI
CONCEPT DESIGN PROPOSAL	JEDDAH, BACKYARD GARDEN
PRESENTATION & VISUALISATION	BAYRAKLI, APARTMAN COMPLEX
WORKSHOPS	TU DELFT, SWAT STUDIO / MASTER STUDIO

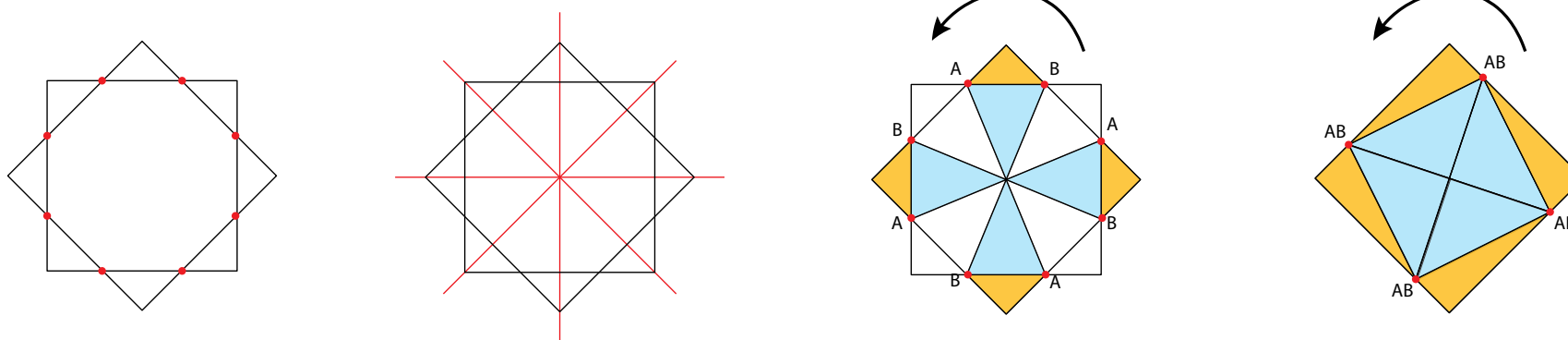


ARCH532_MASTER PROJECT

ENVELOPE DESIGN

DESIGN / PANELIZATION

One term that's used a lot when building a house is 'building envelope'. The concept of a building envelope relates to design and construction of the exterior of the house. A good building envelope involves using exterior wall materials and designs that are climate-appropriate, structurally sound and aesthetically pleasing. These three elements are the key factors in constructing your building envelope. A building envelope is the physical separator between the conditioned and unconditioned environment of a building including the resistance to air, water, heat, light, and noise transfer.



2017, spring

ARCH532_MASTER PROJECT

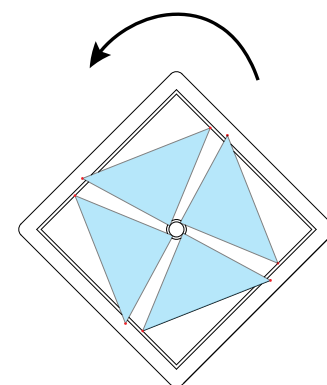
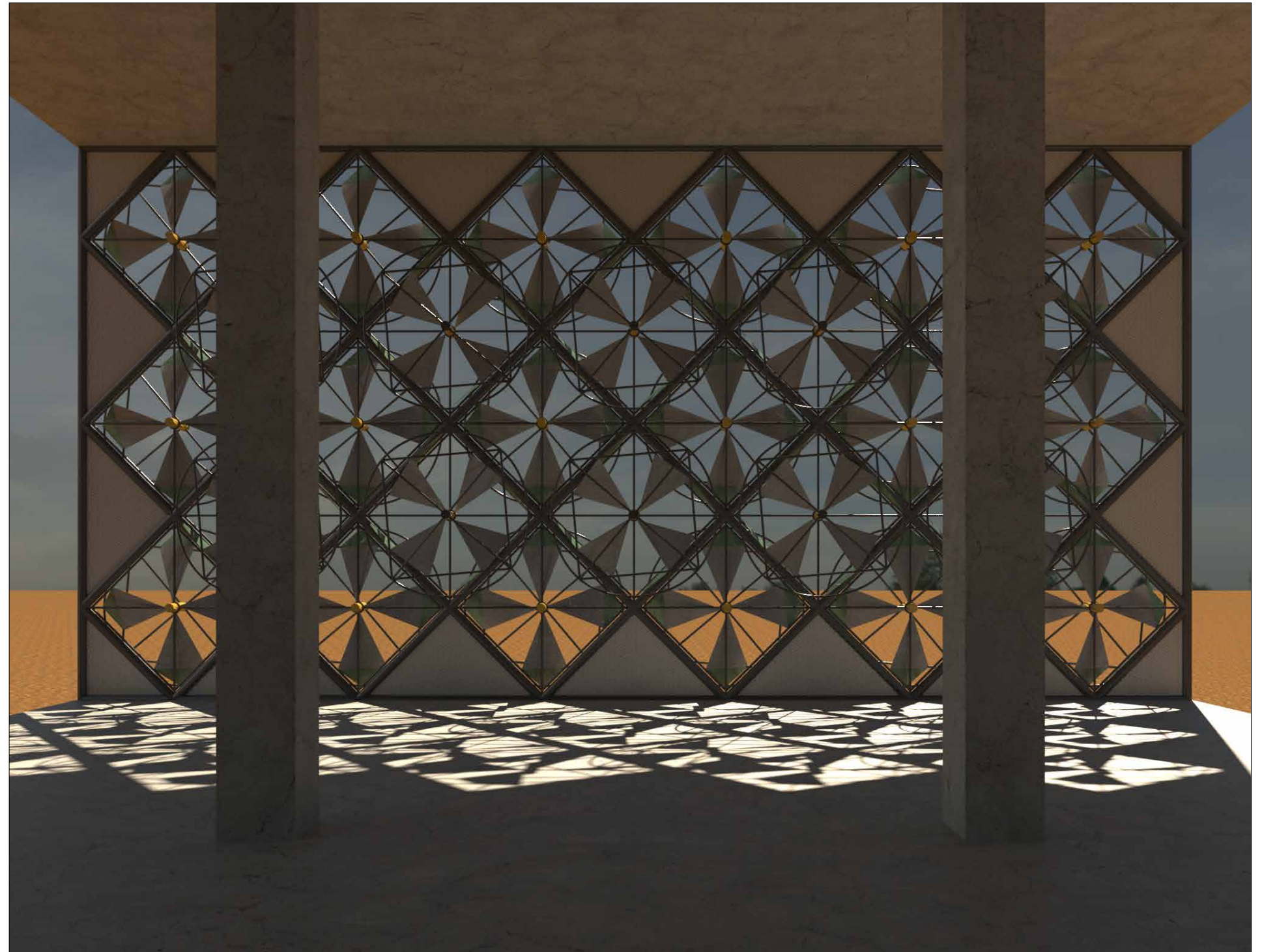
ENVELOPE DESIGN

DESIGN / PANELIZATION

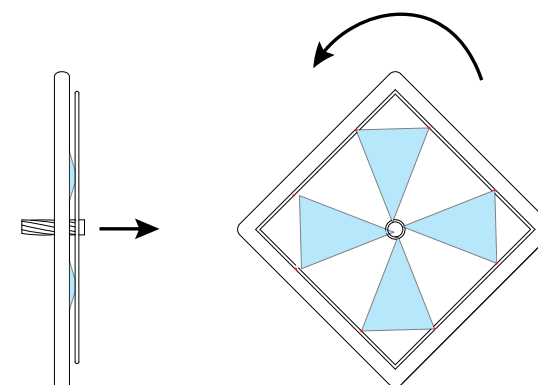
Objective 1 : Energy
insulation or close surface
prevent cold or hot air to balance
indoor temperature

Objective 2 : LIGHT
Solar control glazing is glass
designed to reduce or prevent
solar heating of buildings

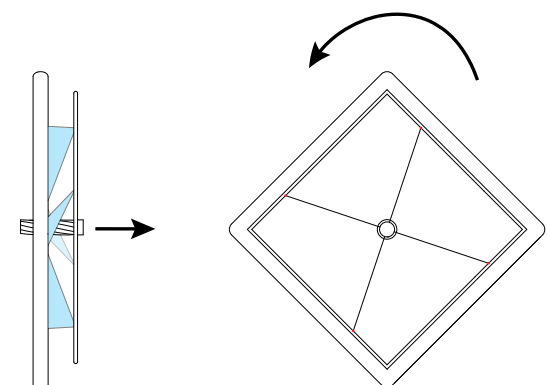
Objective 3 : VENTILATION
Studies have shown that
perforated surface help reduce
sound levels and creates
ventilation



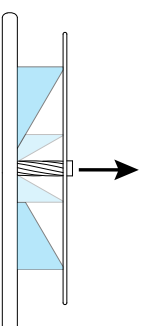
10 degree open



40 degree open



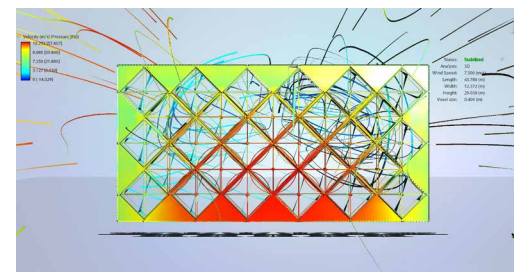
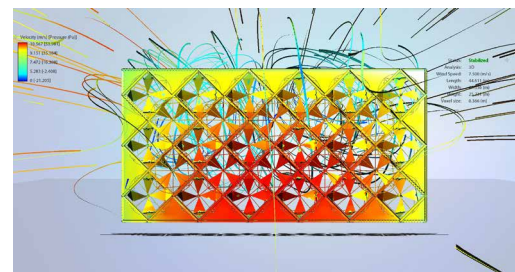
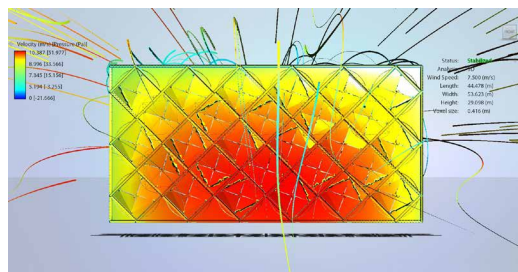
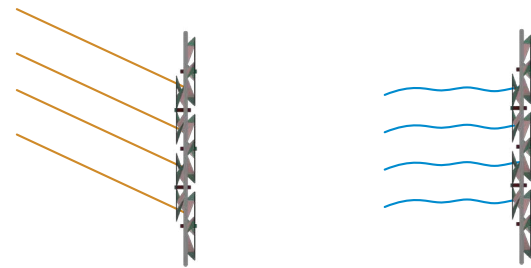
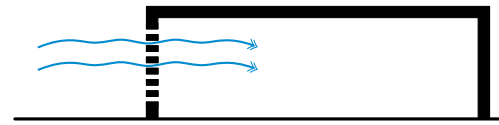
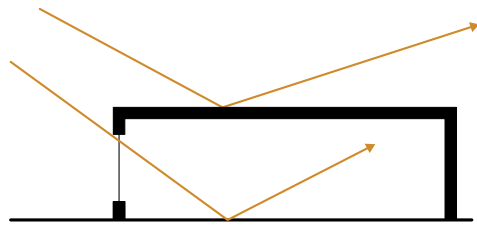
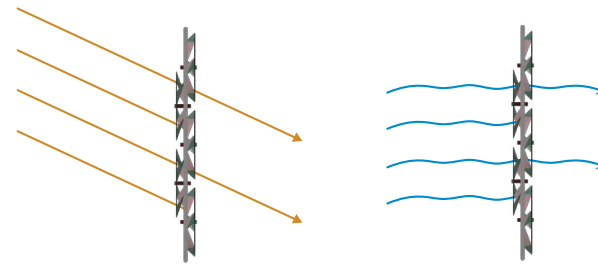
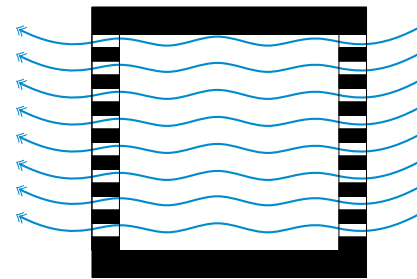
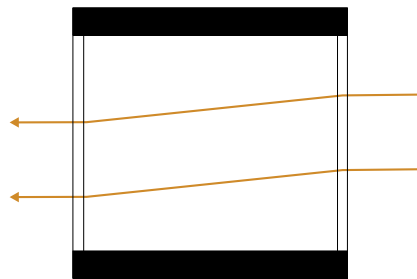
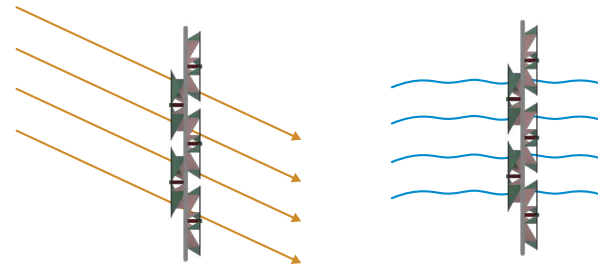
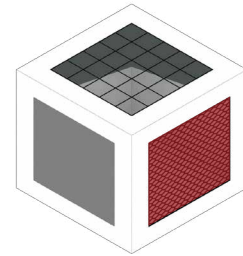
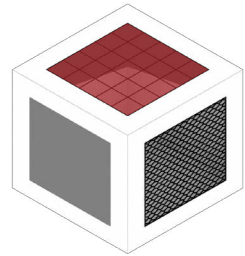
90 degree open



ARCH532_MASTER PROJECT ENVELOPE DESIGN

DESIGN / PANELIZATION

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ARCH532_MASTER PROJECT

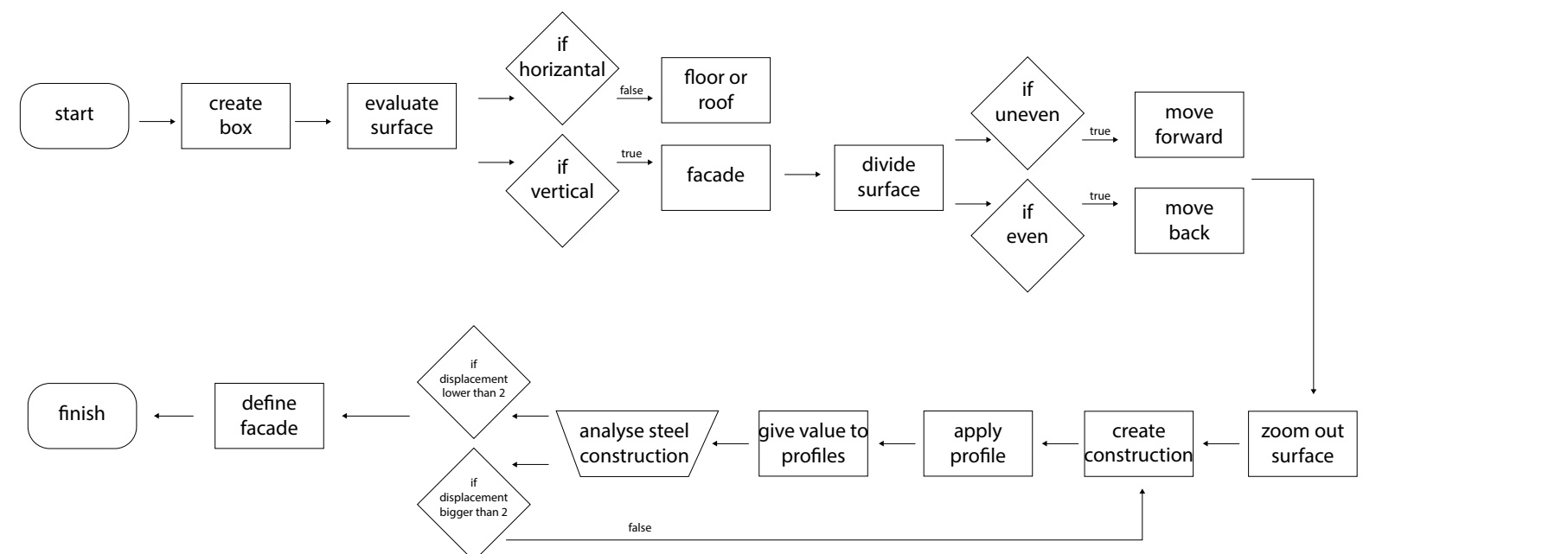
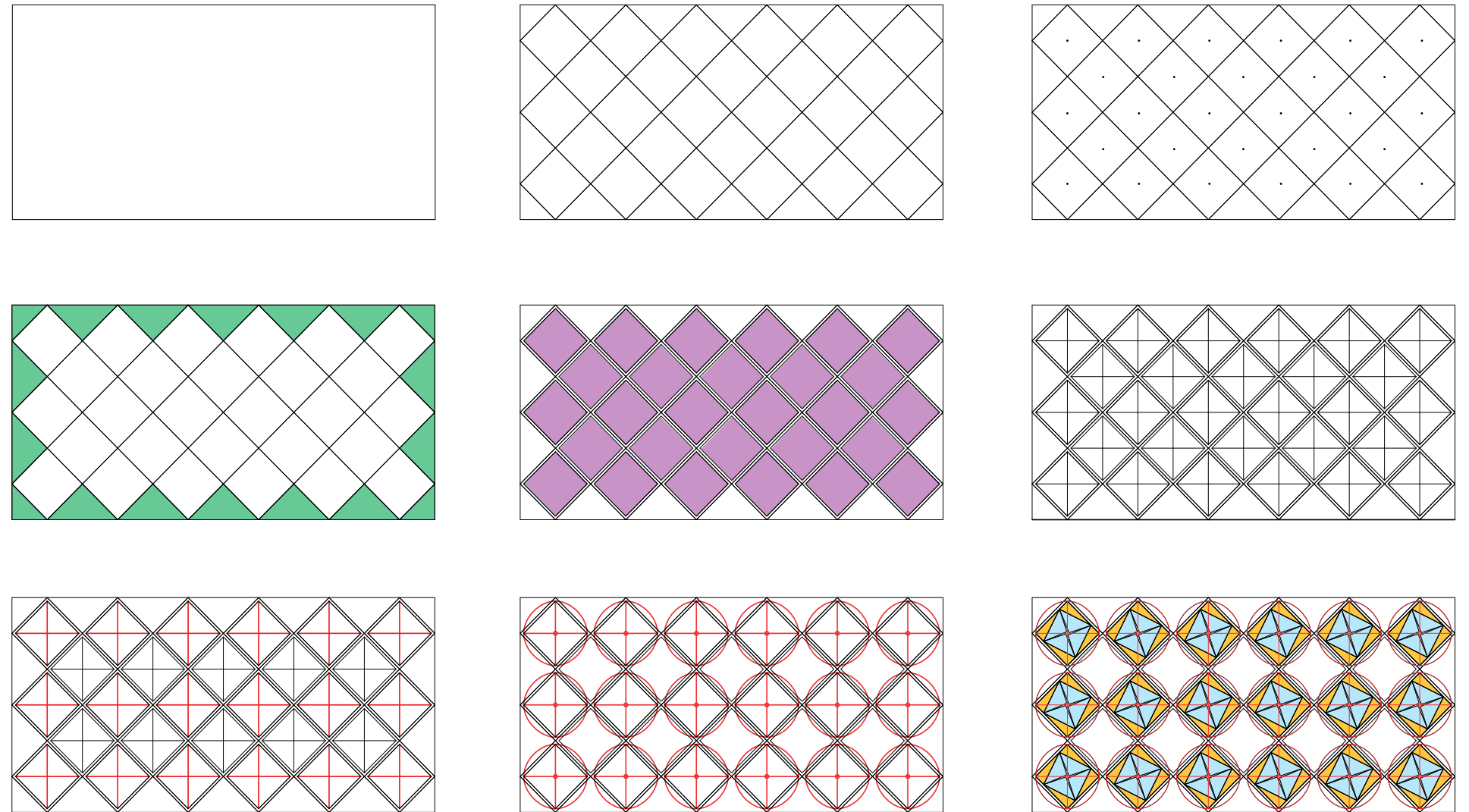
ENVELOPE DESIGN

DESIGN / PANELIZATION

Objective 1 : Energy
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Solar control glazing is glass
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ARCH531_MASTER PROJECT HEALTHCARE & EDUCATION

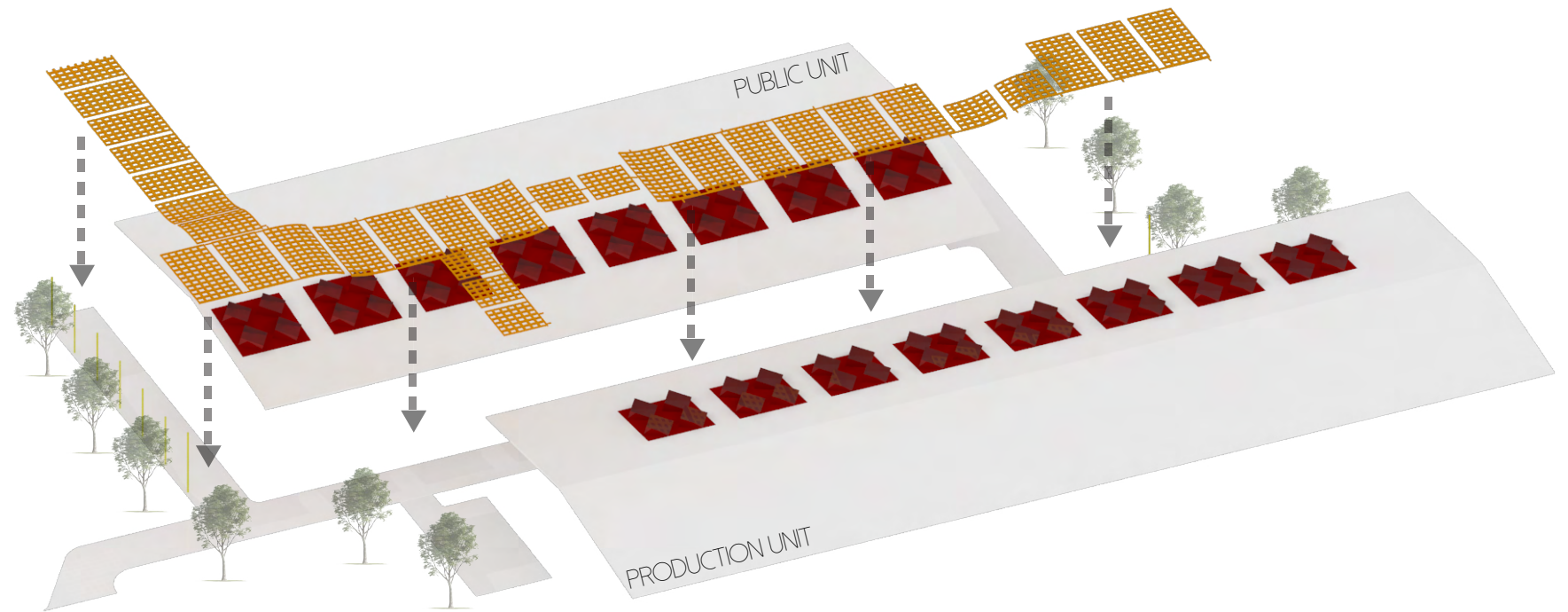
APPLICATION / OPTIMIZATION

While human population augments day by day new building facilities are in need of to cover requirements of society but it is massively important that to focusing on renovation projects such as reorganizing programs and forming new creative designs. Also, it is a chance to see for new and traditional techniques simultaneously, compose genuine architectural forms but thankfully the old structure gives the idea about transformation. Besides that climate change problem force us such designers to reevaluate the non-used structures and adapt them back to community with new features in terms of energy efficiency or lightning units.

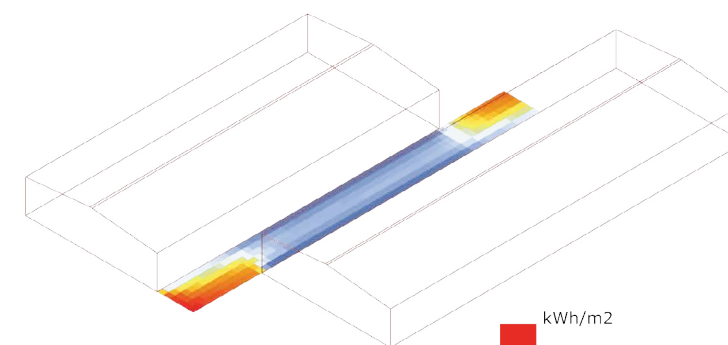


ARCH531_MASTER PROJECT
HEALTHCARE & EDUCATION
APPLICATION / OPTIMIZATION

The Project is a drug production unit with its own public and social facilities. Site location is an abandoned industrial area back side of Bornova Yasar University Campus. There are 4 hangars built for storage function but now just 3 of them is empty and the last one are being used as parking area. The structure is made from reinforced-concrete columns and beams to cover building walls are also concrete walls. There is no sign of aesthetical concern about units so even new architectural design can create difference likewise neither any improvement or working about energy performance of buildigs. Program is

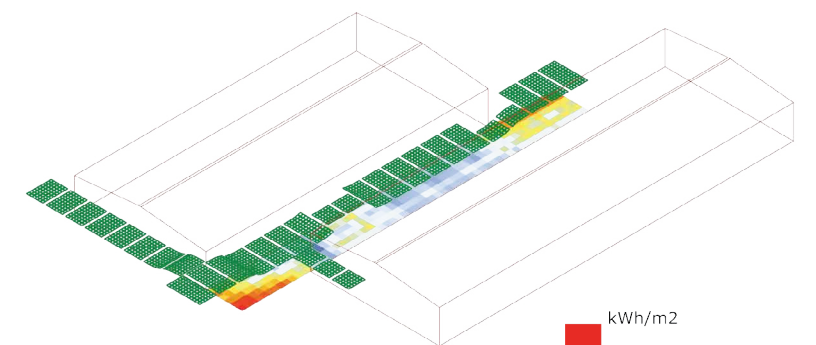
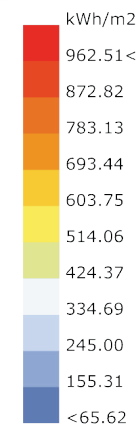


to augment impression for connection of two unit there is a wooden canopy



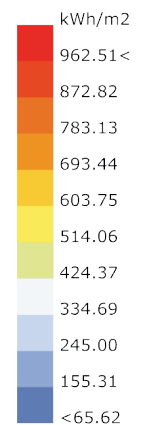
Radiation_analyses
IZMIR_TUR
1 JAN 1:00 - 31 DEC 24:00

Total Radiation on street :
925.188 kWh/m²

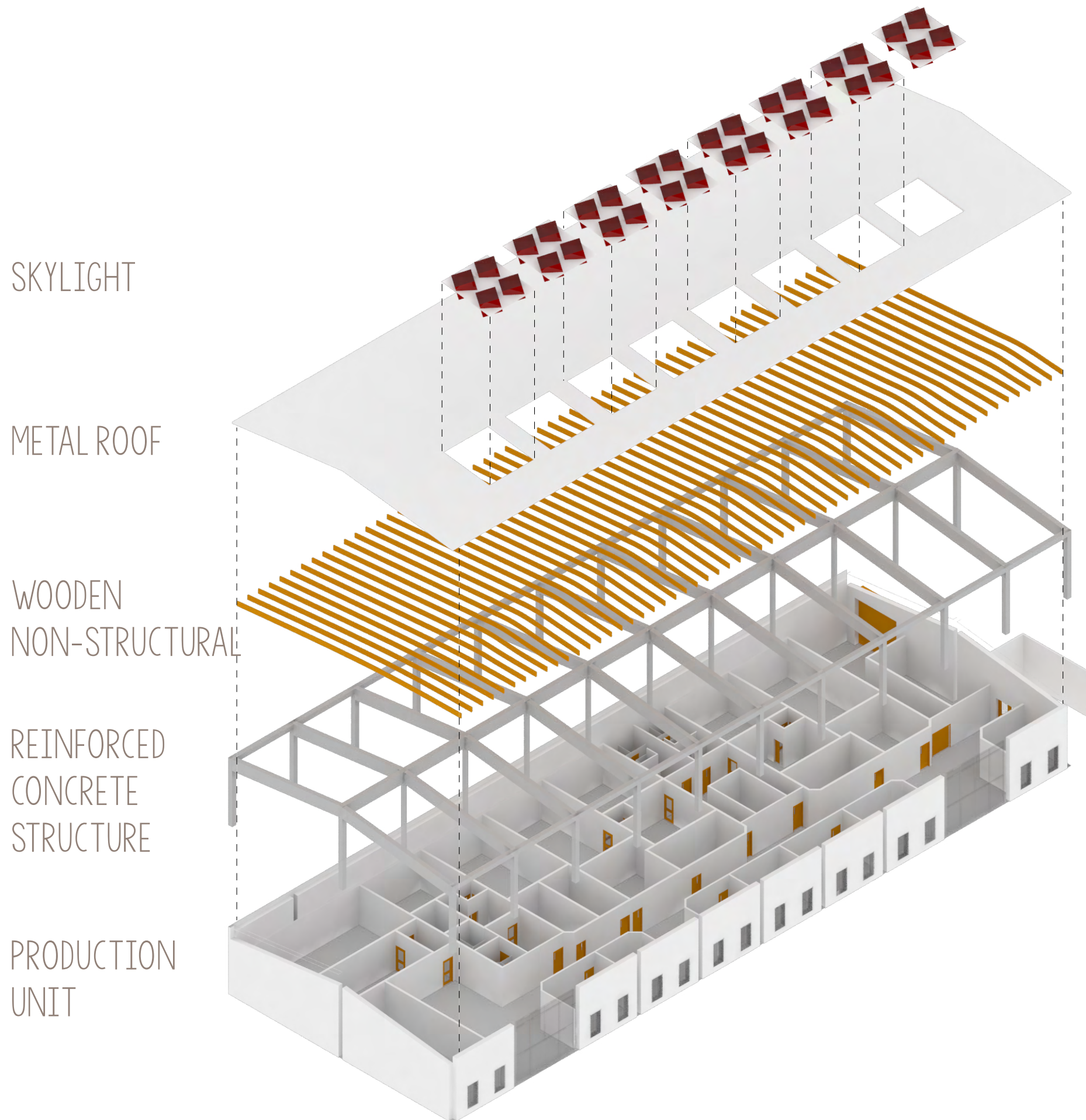


Radiation_analyses
IZMIR_TUR
1 JAN 1:00 - 31 DEC 24:00

Total Radiation on street :
496.475 kWh/m²



to reduce radiation amount between two unit wooden canopy could create difference



ARCH531_MASTER PROJECT

HEALTHCARE & EDUCATION

APPLICATION / OPTIMIZATION

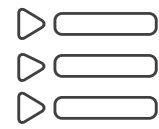
renovation of hangars to transform medicine production unit without changing reinforced-concrete structure of building and all forms up for new program with architectural aesthetics. Additional aim of the study and Advanced Computational Design lecture's main objective is focusing daylight performance in the way of implementing skylights at one side of the roof and these implementation dimensions, orientation and glass type will be defined with an optimization problem creating an algorithm at Rhino/Grasshopper. The definition contains decision variables for skylight properties and objective functions.

ARCH531_MASTER PROJECT

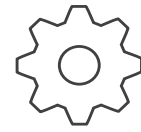
HEALTHCARE & EDUCATION

APPLICATION / OPTIMIZATION

To augment performance of the system. The definition propose and contains decision variables for skylight properties and objective functions to augment performance of the system. New program of building give some constraints about optimization, for example, people are using the building all year to production of medicine mostly between 8 am to 6 pm and circulation areas could be enlighten by natural daylight at these hours. Implementing skylights to roof can reduce lightning bill for all year about reducing total enlightning loads of energy consumption due to heating and cooling loads consumption of energy.



LISTING



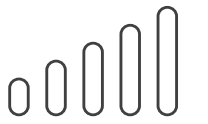
GEOMETRY
CONSTRUCTION



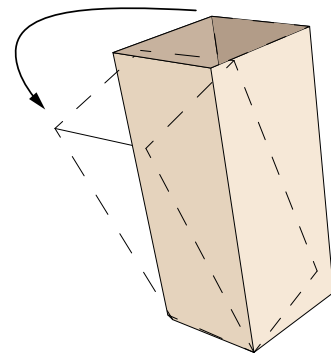
SIMULATION
PREPARATION



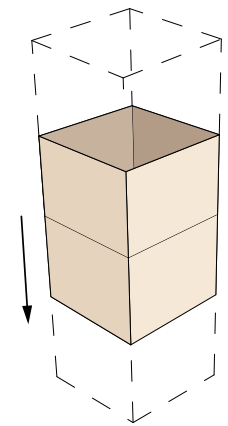
OPTIMIZATION



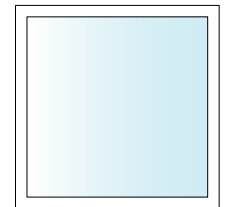
RESULT
EVALUATION



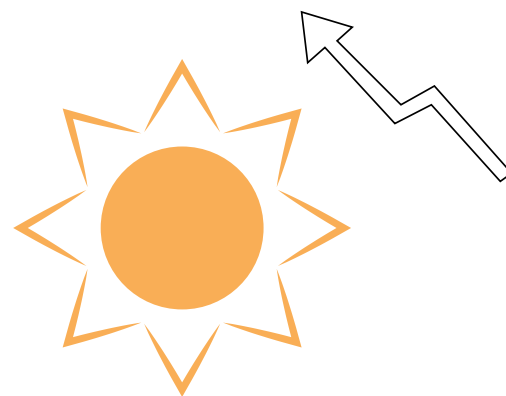
ROTATION OF
LIGHT TUBE



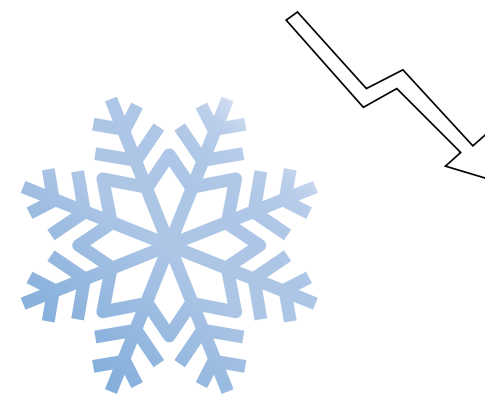
DEPTH OF LIGHT
TUBE



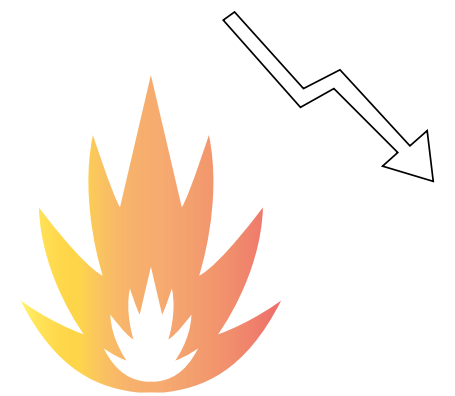
GLASS TYPE



DAYLIGHT



ENERGY CONSUMPTION
OF COOLING LOADS



ENERGY CONSUMPTION
OF HEATING LOADS



ARCH420_STUDENT PROJECT

URBAN LIBRARY

COMPOSE / TRANSFORM



Library as a phenomenone has been changing from antique age from 21.centuries and it seems it will continue to change. Conventional usage occured a reflex which based on script collecting and classification and we can not deny that this system still works on 21.centuries libraries and most of people believe that hard copies is the classic and correct method to conserve knowledge. In the other way while technology and data processing gets help from technological improvements and methods, production and collection of knowledge has been started to change and it effects directly to our lives. Library which we predict contain both methodology which are conventional and digital. To compose these two methodology, we are creating a hub to encounter them to share their informations and to transfer each other.

2016, spring

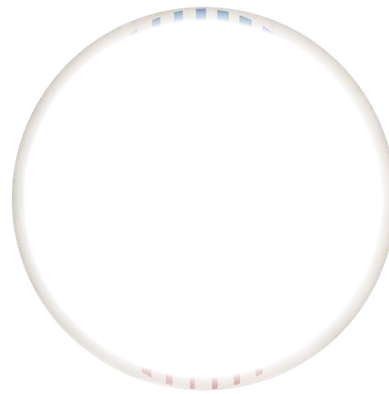
ARCH420_STUDENT PROJECT

URBAN LIBRARY

COMPOSE / TRANSFORM

So library would have a forum to produce this collective information by analog methods. Library get another function works as forum to connect communication between users. To adapt that reflex building has to give some opportunities and between three structures will be connection area to encounter them and indicate open face of buildings. To analyze periphery of site, user profiles, permeability and accessibility values. Quality values are not definitely explain the characteristic of zones correctly because classification system is depends on subjective decisions but mainly express zones function type. Inside of zones, there are subzones which represents focus areas of zone characteristic reflex.

intersection



landmark



steel



workspace



collective



forum



library

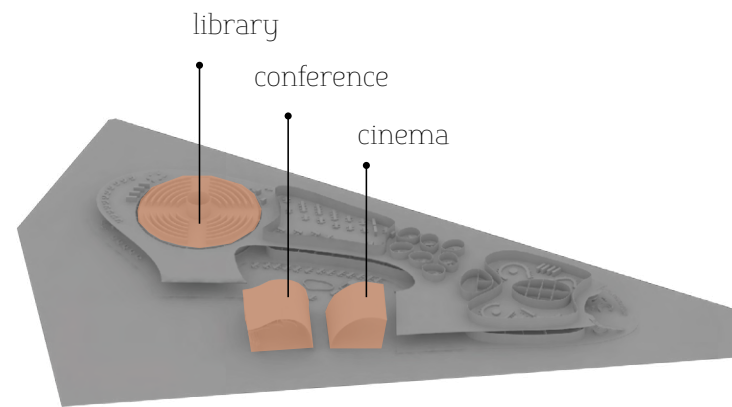
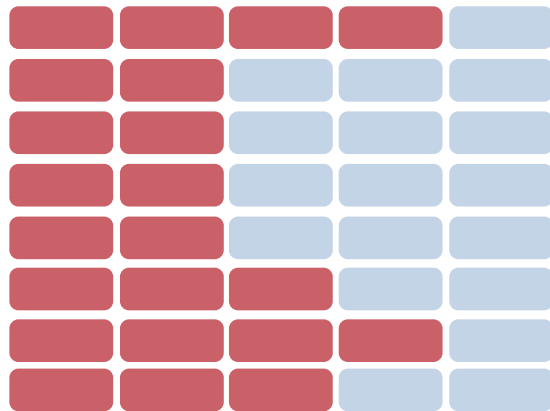


Library as a phenomenon has been changing from antique age from 21st centuries and it seems it will continue to change. **Conventional** usage occurred a reflex which based on script collecting and classification and we can not deny that this system still works on 21st centuries libraries and most of people believe that hard copies is the classic and correct method to conserve knowledge. While time is changing designers try to create new forms and ideas to conduct between generations.

Can design **TRANSFORM** in a way of form and function
according to needs of current times ?

2010's

library units
free time reading
collective work area
workshop areas
office areas
cinema hall
conference hall
exhibition area



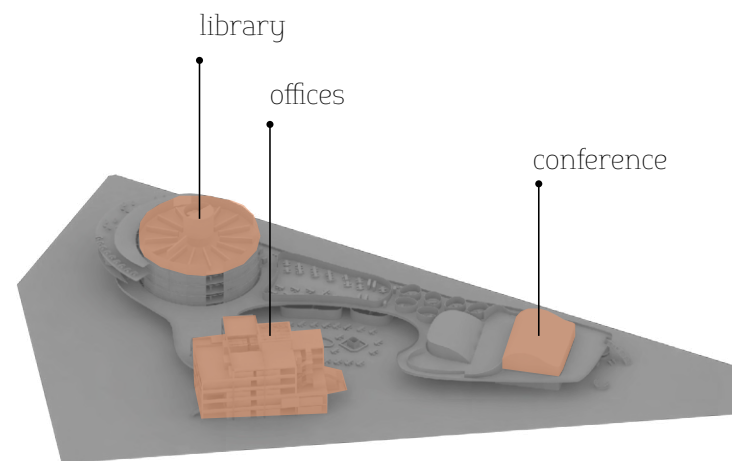
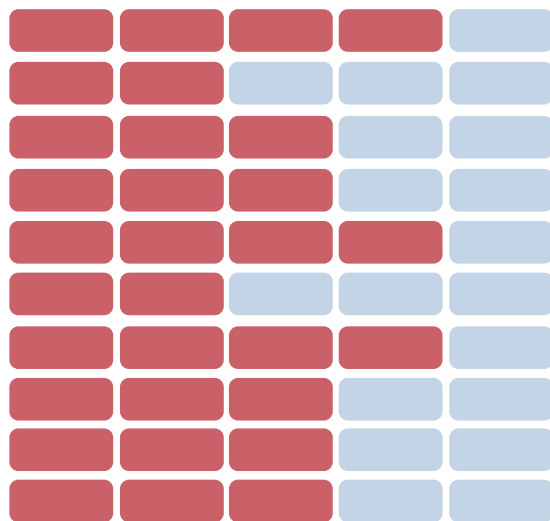
most active units

ARCH420_STUDENT PROJECT URBAN LIBRARY

COMPOSE / TRANSFORM

2020's

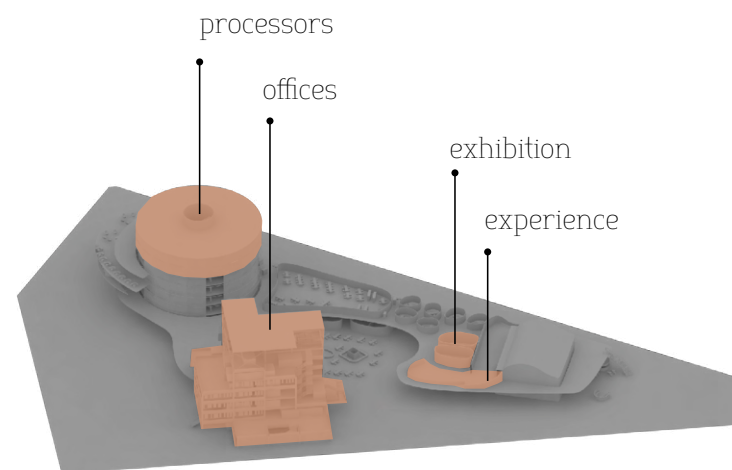
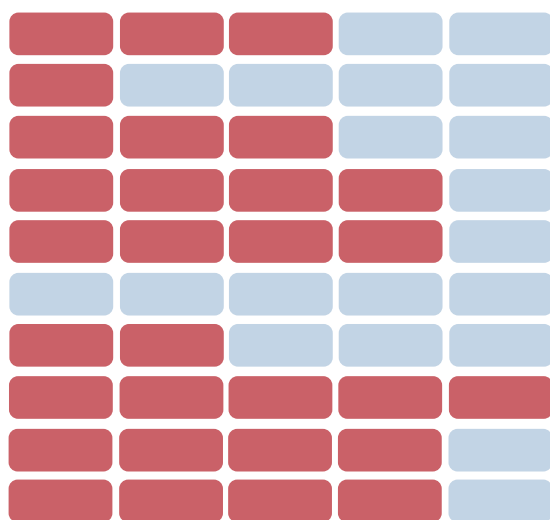
library units
free time reading
collective work area
workshop areas
office areas
cinema hall
conference hall
processor units
digital experience
exhibition area



most active units

2030's

library units
free time reading
collective work area
workshop areas
office areas
cinema hall
conference hall
processor units
digital experience
exhibition area



most active units

Nowadays, library is the urbanistic volume about learning and socializing activities also. Each person became the member of collective forum and this exist since ancient greek. Also, web is the new age forum and it has direct effects on current library notion. People are changing with interactions between each other so it reflects to volumes of they use. We can not precisely presume certain shapes or needs of future library. So instead of defining form today, designing a shell can a solution because a cover can wrap transforming volumes according to changing functions. From the foundation of library, content of institution has been changing and increasing by new functions. Initially, it was for collecting government files but after it becomes as home for astrological researches and philosophical learnings.

2016, spring

ARCH420_STUDENT PROJECT

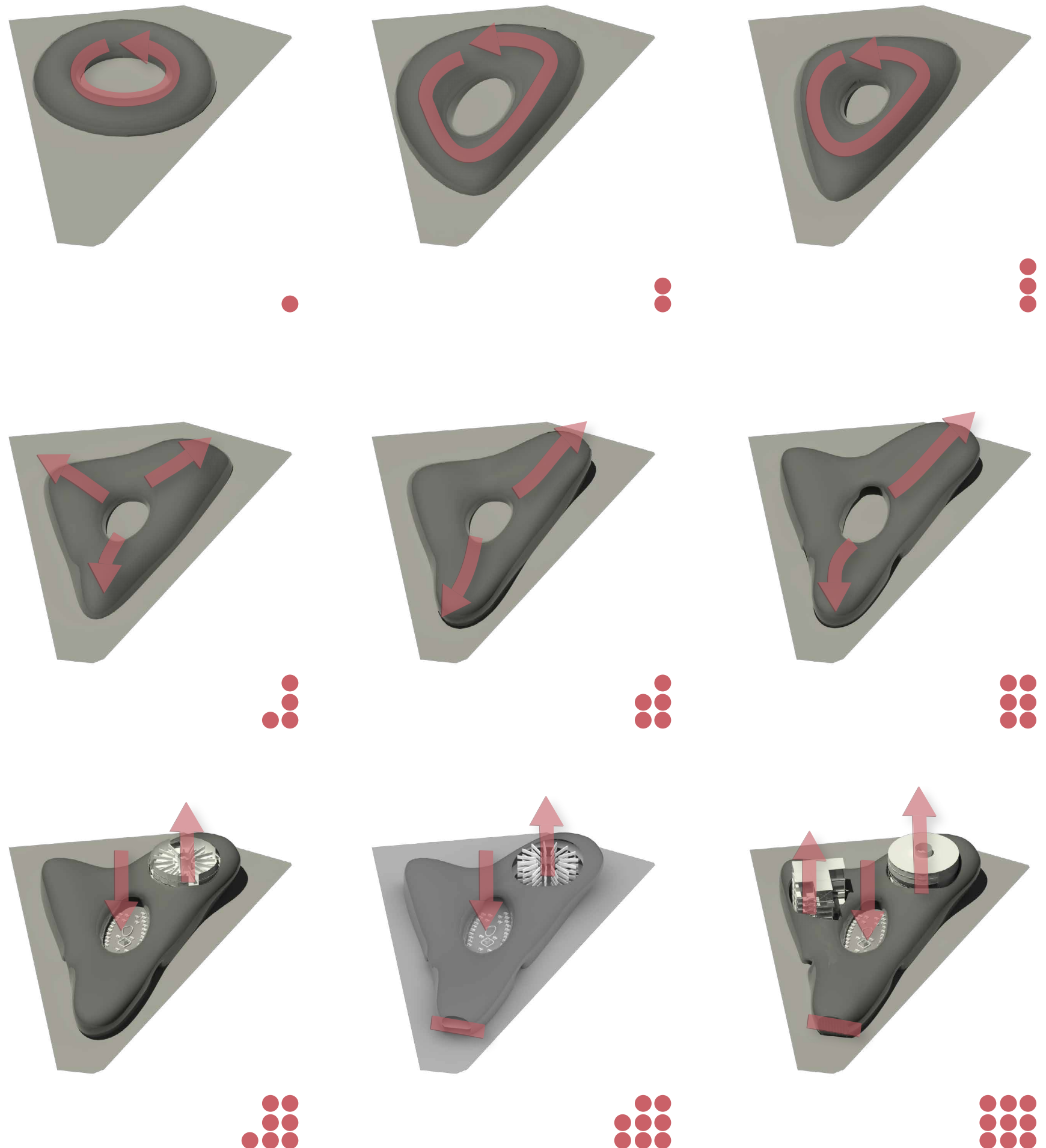
URBAN LIBRARY

COMPOSE / TRANSFORM

Through the process, users express themselves differently because they get new effects from around so some parts of library can change also such as cinema halls can transform visual and physical experience rooms which includes smell and realistic visual ambiance. According to users needs so library programs can get different requirements even while seasons otherwise building won't change so main reason which is elasticity, won't happen as it should.

'There is nothing permanent except change'

Heraclitus



2015, autumn

balcony

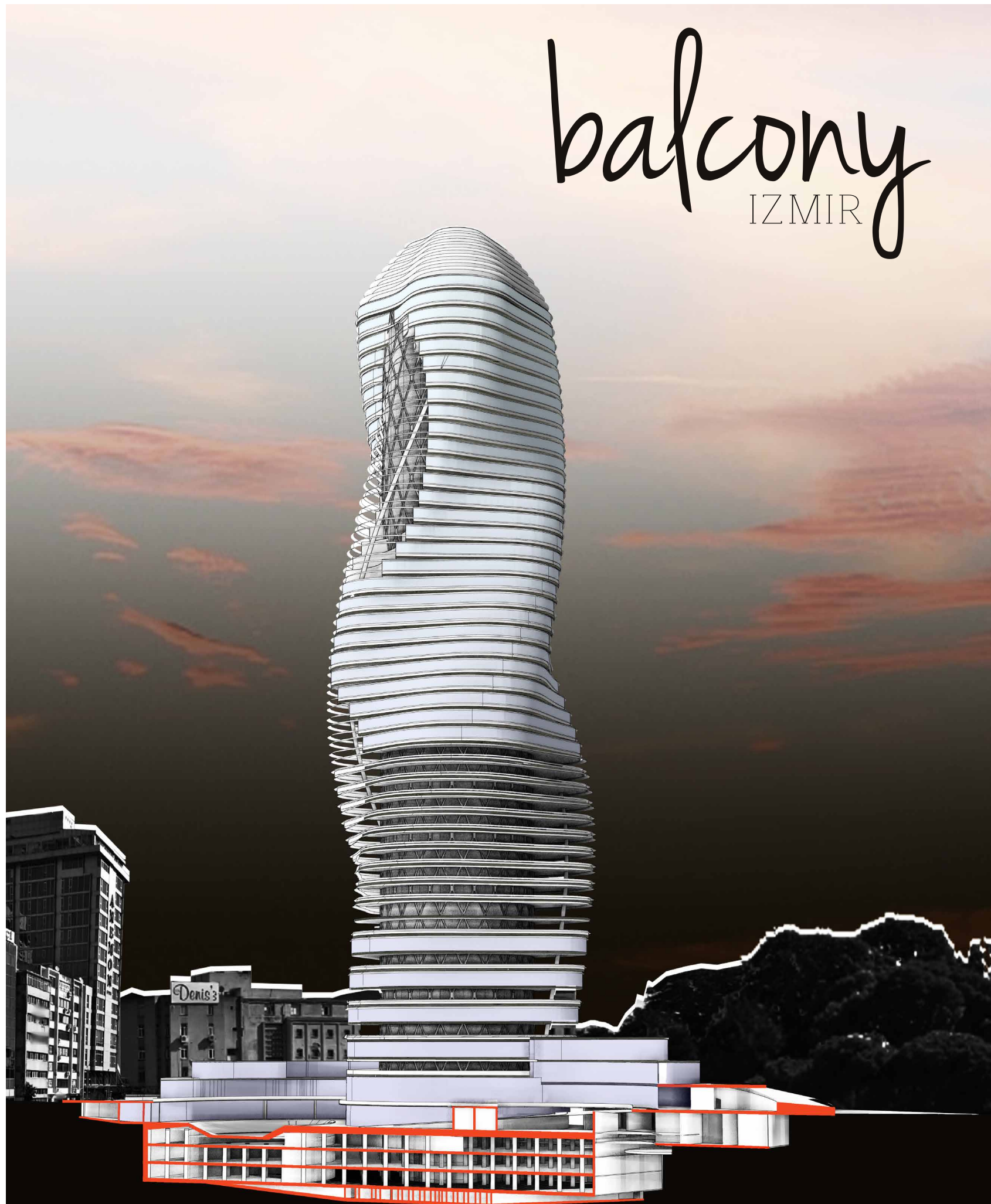
IZMIR

ARCH410_STUDENT PROJECT

VERTICAL NEIGHBOURHOOD

HIGHRISE / PARAMETRIC / MIXED-USAGE

At the center of Izmir, Konak there is a gap which is a valuable place and can be related with Izmir. At 1998, a investor decide to construct a building into the site but a conflict occured between municipality and investor that's why from this date, place is empty and 410 studio program concern that for place to form a vertical neighbourhood. Besides that nowadays, there are lots new skyscraper are rising near the site. Lecturers and students get involved that kind of a program to experience and discuss how it could be a vertical neighbourhood possible in Izmir form general perspective. We had 120 000 sqm program to organize at the site and this includes offices, flats, caffeterias and restaurants, culture centers, shopping mall and amphitheatre. These functions are defined for needs of basmane and Izmir.

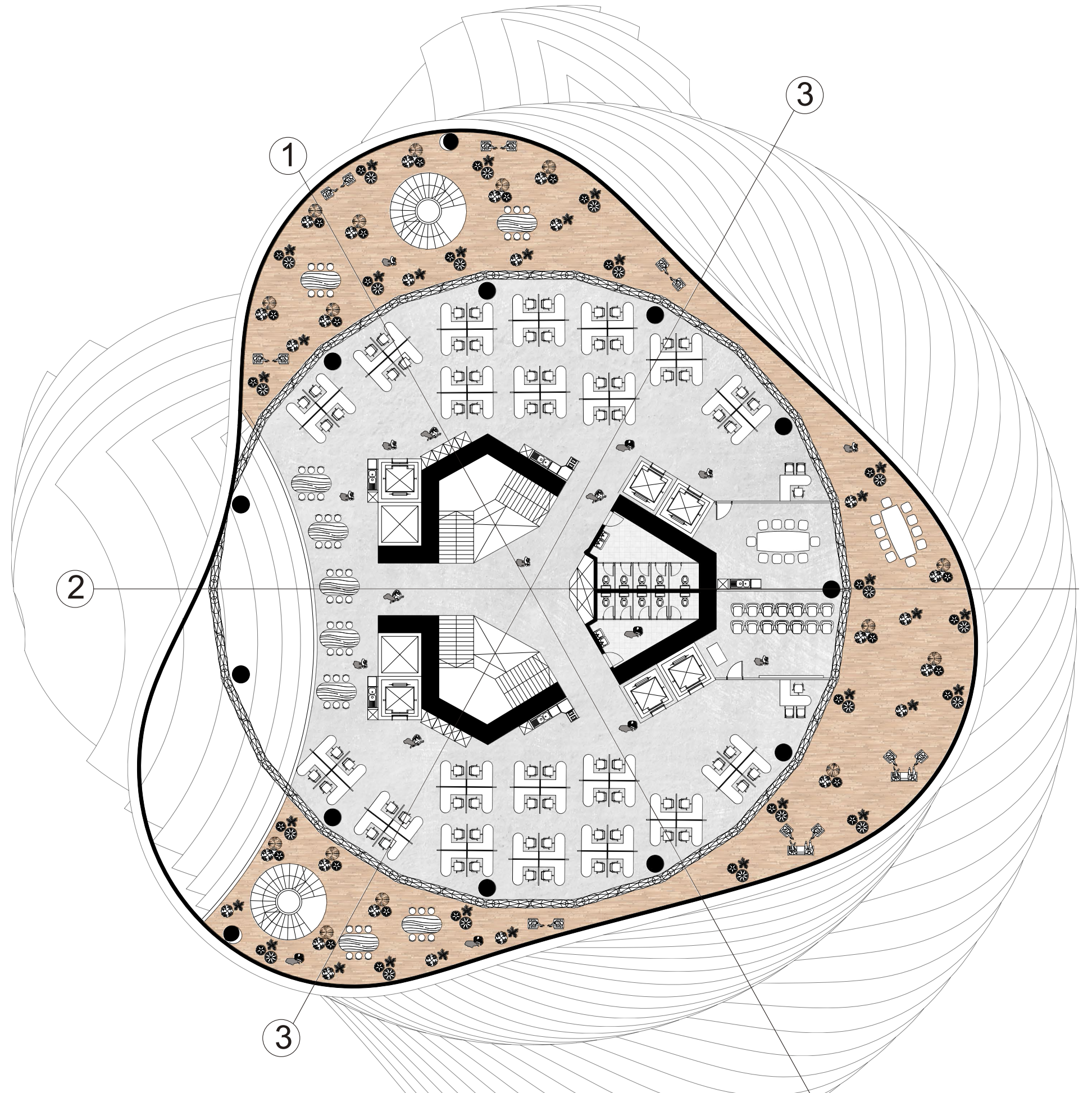


ARCH410_STUDENT PROJECT

VERTICAL NEIGHBOURHOOD

HIGHRISE / PARAMETRIC / MIXED-USAGE

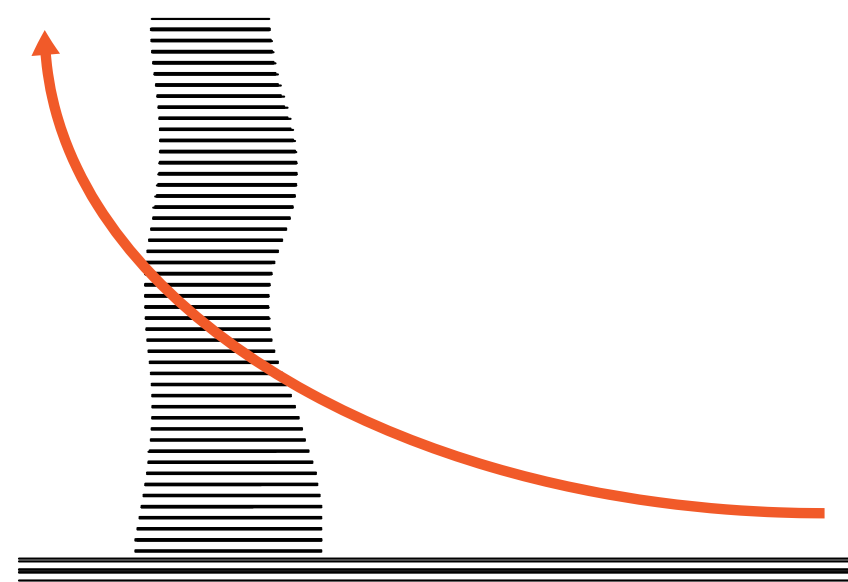
Basmane is one of the oldest centers of Izmir and recently it gets a function as carrefour because of its location that some main car roads intersect at Basmane. First of all, some analyses have been made around the site in a way of permeability, solid-void density, pedestrian, car road relations and green areas positions because near the site project there is beautiful landscape to us as city park which is called fair of Izmir. For all these analyses gave us information about periphery and some numbers. To be concern, these values as stable and modeled the high rise with a parametric tool which is called grasshopper works with Rhinoceros digital design program. It gave extra time to focus on details of project and strong arrangement between functions of program to create more liveable spaces.



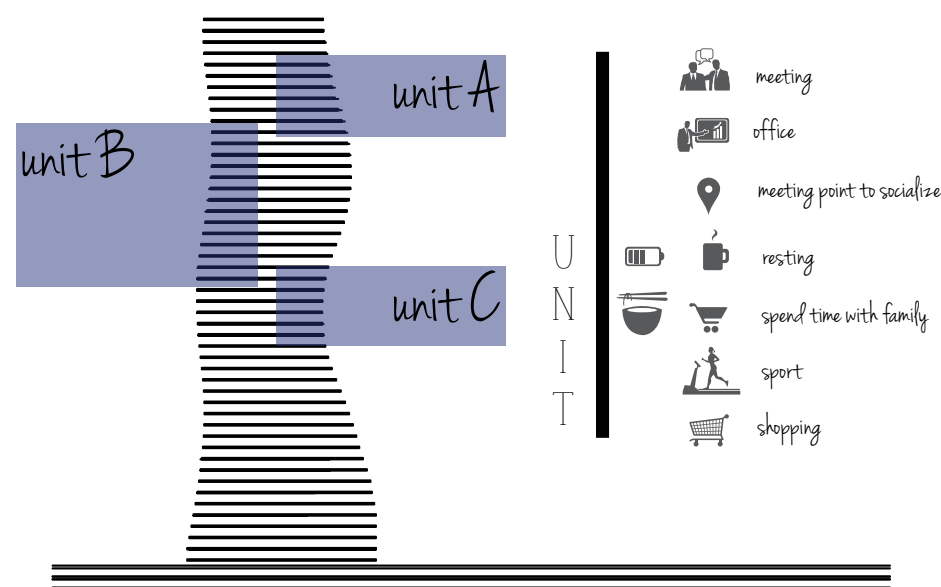
ARCH410_STUDENT PROJECT

VERTICAL NEIGHBOURHOOD

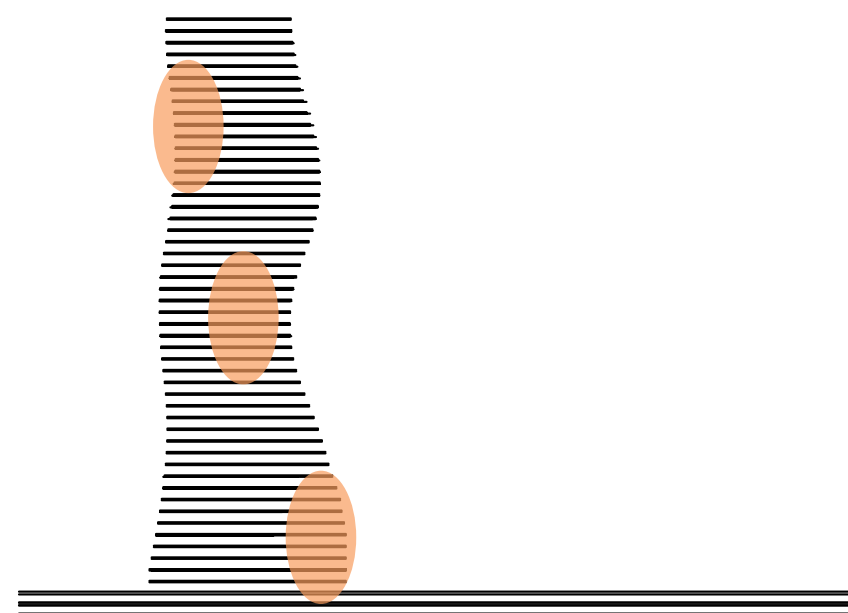
HIGHRISE / PARAMETRIC / MIXED-USAGE



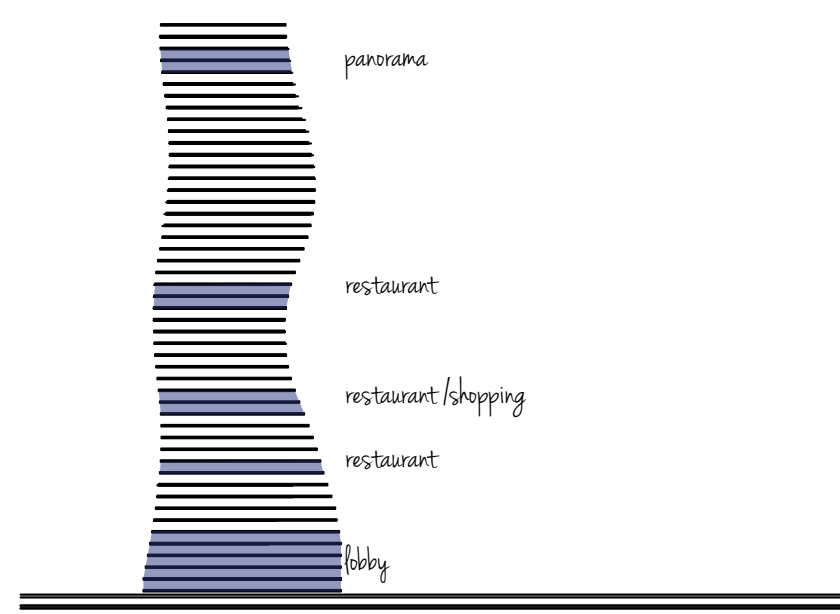
HUMAN MOVEMENT



DIVIDING VERTICAL UNITS



INNER YARDS



PUBLIC FLOORS

Program has been formed up according to analyse results. Two main users extract themselves to spend more time to think about their daily routine. Students and office workers because their jobs and education facilities are very close to site but contrary to this they trespassing next to area because there is literally nothing to excite their attention. These two users are forms majority for the population of Basmane and it is obvious that program has to serve their interest and their needs such as cafeterias, restaurants, book stores, cinema and theatres house and personal shopping. Furthermore, Basmane has two faces at day and night so this creates security problem at night time. Instead of making boundaries project program aim to create live population to overcome this problem and also it can change daily life of Basmane.

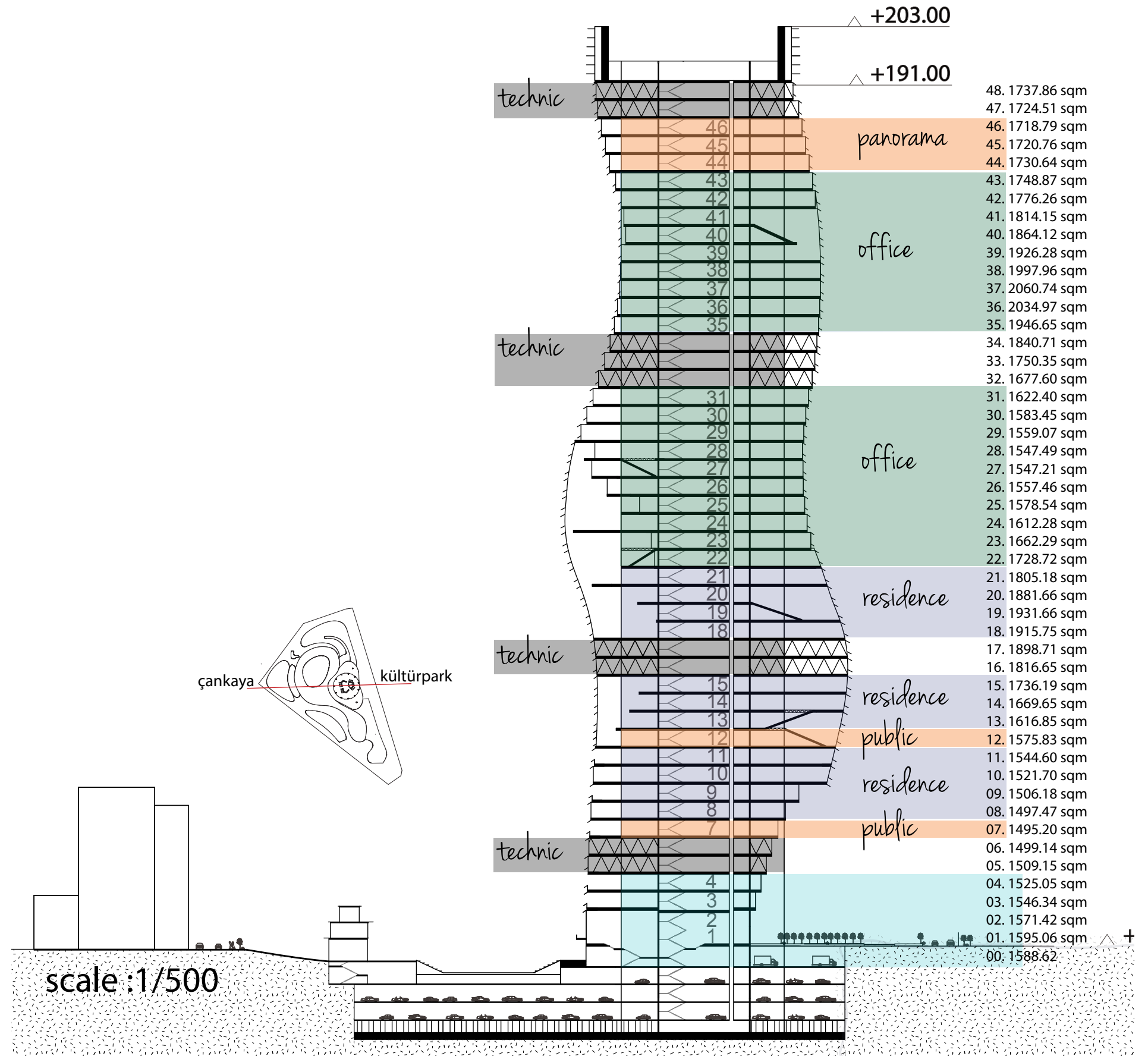
2015, autumn

ARCH410_STUDENT PROJECT

VERTICAL NEIGHBOURHOOD

HIGHRISE / PARAMETRIC / MIXED-USAGE

Mixed usage has own difficulties because it creates complex circulation loops inside of the building so it needs to be organized. To explain basically, floors which are close to the basement are offices and public floors because they have larger demand than residence floors. Residence floors have maximum 20 users but office floors can hold more than 100 users and this number can augment at public floors. Public floor is important. Nowadays, we see many high rise buildings but they bring problems with them. Normal size buildings are more open than skyscrapes because towers are extensive structures, they have been made for rich people and money can not create relation with society as it should. It creates sterile places around high rise so public floors are organized to prevent these situation to call citizens to building.





ARCH310_STUDENT PROJECT

PDEMO - BBOM

SCHOOL / EMERGENCY / PARK



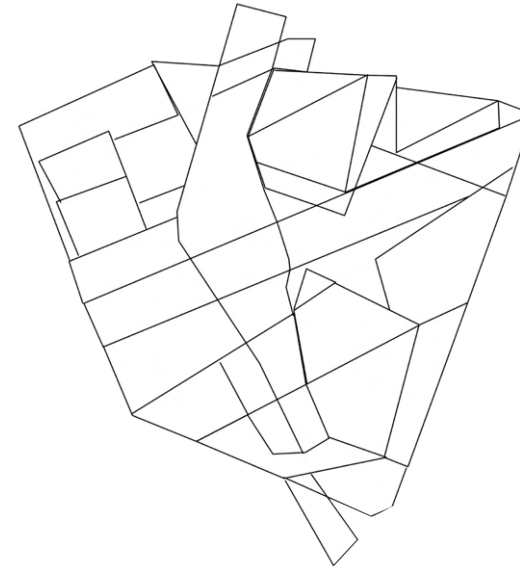
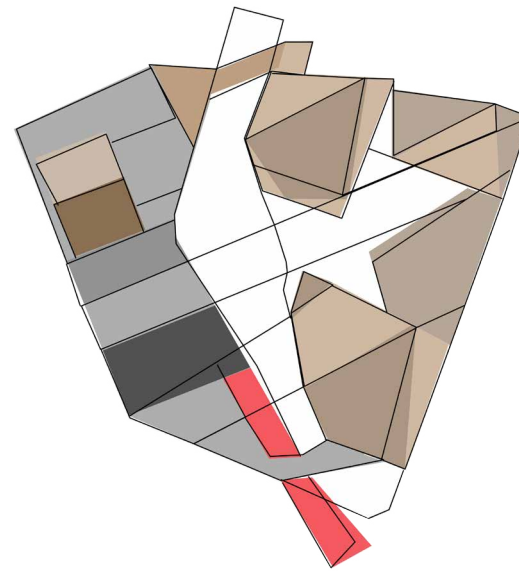
Anatolia is situated at fault line and this has a many serious results such eartquakes and while designers are forming and creating buildings and cities it is necessarily to consider these conclusions and Arch 310 program includes primary school and emergency center at same place because of this earthquake issue. Site is near low income accomodation areas and that direct to design for a question that is 'how can to provide a secure primary school atmosphere near questionable secure zones ?' It is obviously exist a conflict about communities who has different incomes so process starts with analyse the around and follow right questions about. How different communities relate and know each other and how design can serve to combine school and emergency center function into one program ?

ARCH310_STUDENT PROJECT

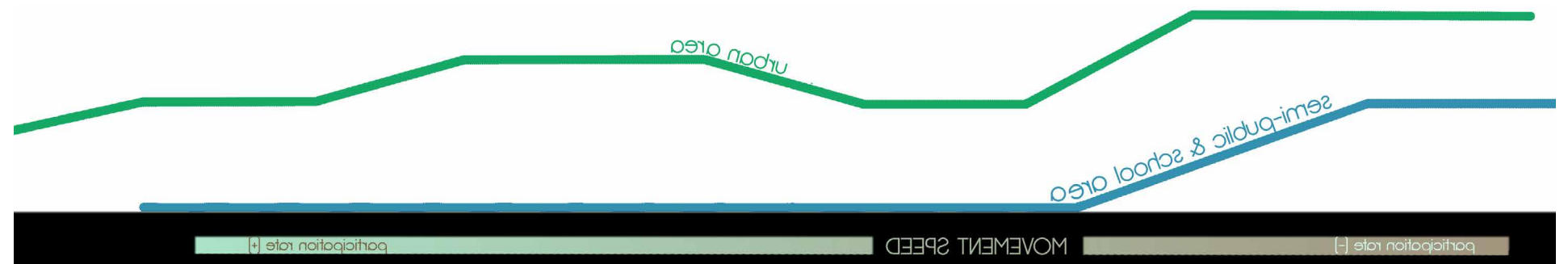
PDEMO - BBOM

SCHOOL / EMERGENCY / PARK

Firstly, there was a concern for letting people to enter area freely and they have to be called. To overcome of that challengei, it has been put several entertained functions such as cafeteria and game parks to gather communities each other because shared times and activities decrease insecure situation range. Second of all and it is very important side that is inevitable if there will be emergency occurs, building transform a emergency center to help wounded peoples physically and psychologically and organize post disaster situations from one hand. So building has to be STRONG enough to stay stabile after disaster. Design offeres a square grid system to form the place and provide enough seismic force resistant complex. A sport hall, classes, public axes and community areas is located to create a school and communicate with periphery.



PLAN DIAGRAMS



SECTION DIAGRAM



REAL SECTION



STUDENT PROJECT

YACHT DESIGN

DISPLACEMENT / YACHT

Yacht designed at within th scope of yacht design lecture and it has been chosen displacement type according to program. Design serves for promenade function and also can be use to go fishing for more than 6 people at the same time. It has motor which gives opportunity to drive every weather type no matter what happens this also gives more control power to use yacht . Four person can lie down and also they have own shower and toilet cabins to spend their time without any need.

length : 12.5 m

displacement wooden yacht

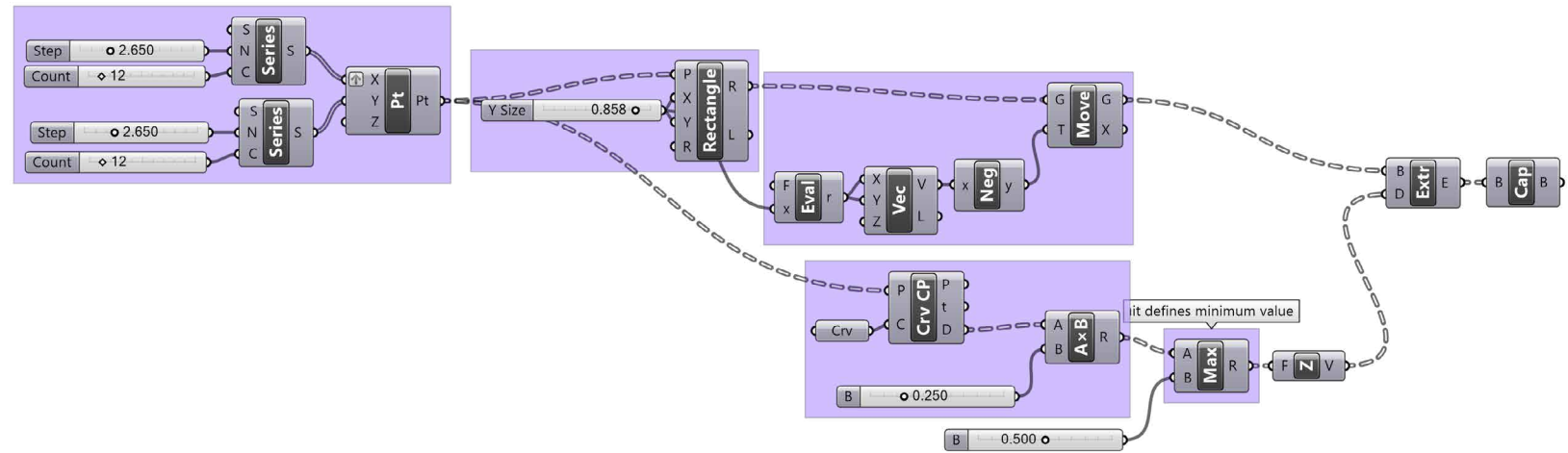
motor yacht

STUDENT PROJECT

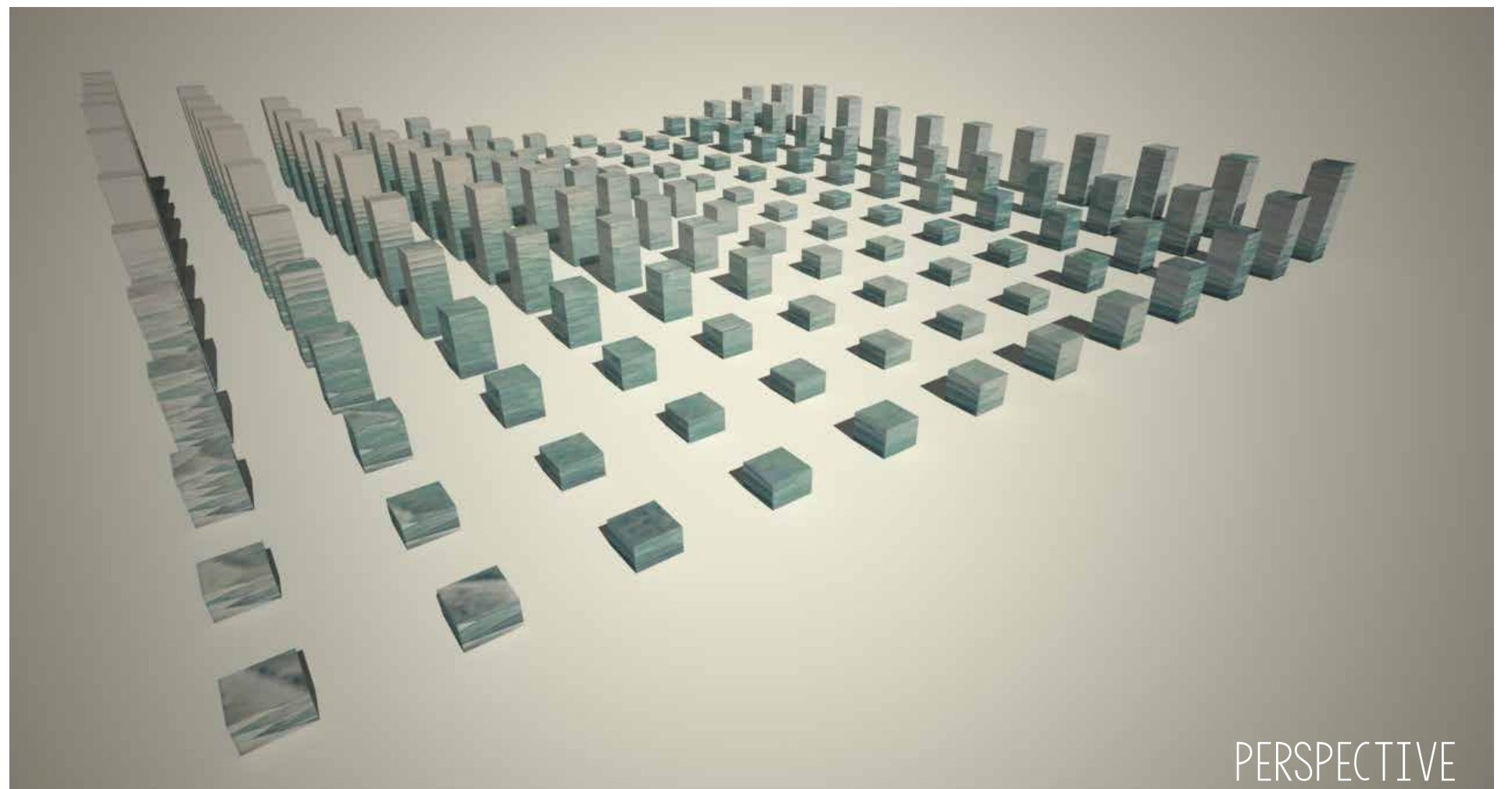
HOLOCAUST MUSEUM

REINTERPRET / PARAMETRIC

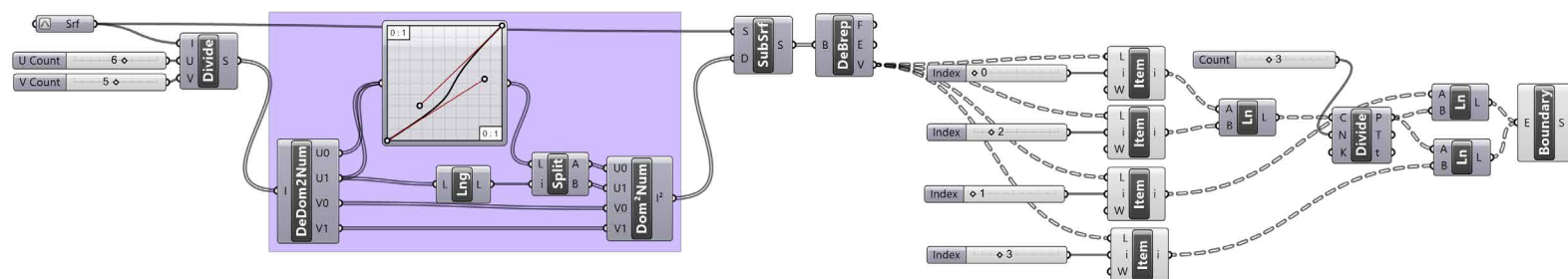
In this work, program was actually focused to reinterpret a monument by just algorithmic tool and visualise it in a unrealistic approach to create contrast between actual meaning of building and re-interpreted one. It was just a one lecture work to test consrtuct efficient definition so instead of add the work another monumental or emotional meaning it is preferred to leave it with raw visualisation to not spoil the actual monument impression because it refers important historical moment for human history. It has been prepared with algortihmic based program Grasshopper which works as a plug in of Rhinoceros digital modelling program.



DEFINITION



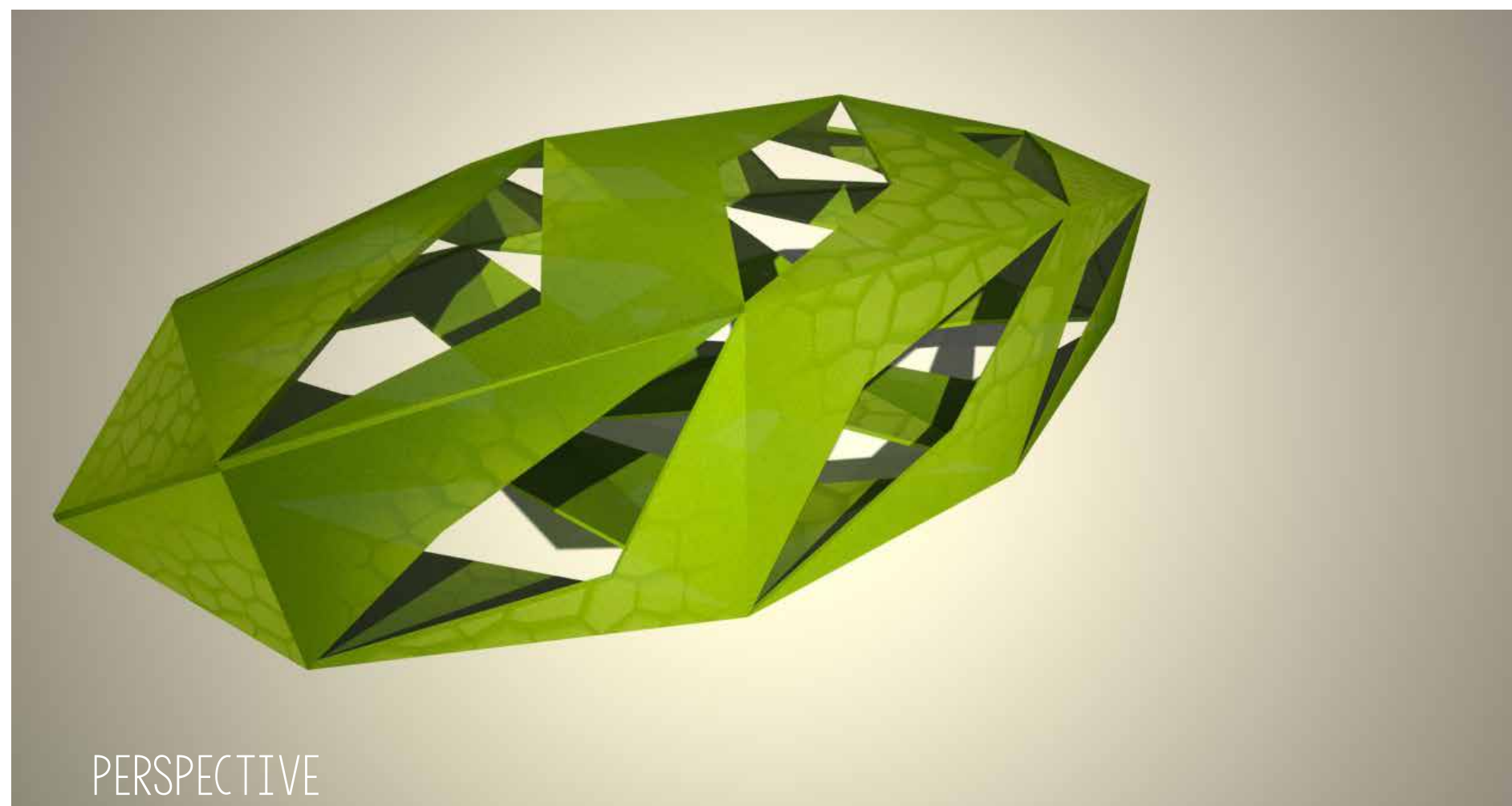
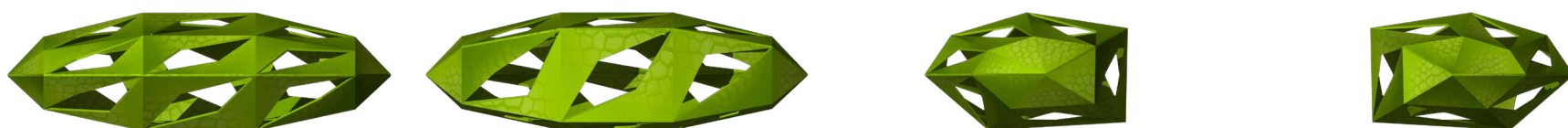
PERSPECTIVE



DEFINITION

STUDENT PROJECT FOLDED PATTERN BEAN

REINTERPRET / PARAMETRIC



PERSPECTIVE

From initial stages of architecture disciplines endurance was the center of designs and it can not just apply with horizontal and vertical way to do. There can be alternatives to reach the form such as folded patterns which are inspired to build tensile, organize architecture and lately architects and engineers are searching new methods to build their design with lighter structures and folded patterns works as same logic with structure itself. This work represent how plan a folded pattern just by using algorithmic tools in terms of parametric equation and to transform futuristic impression to become inspiration for future works, a green texture are implemented on the face of design.

2012, autumn

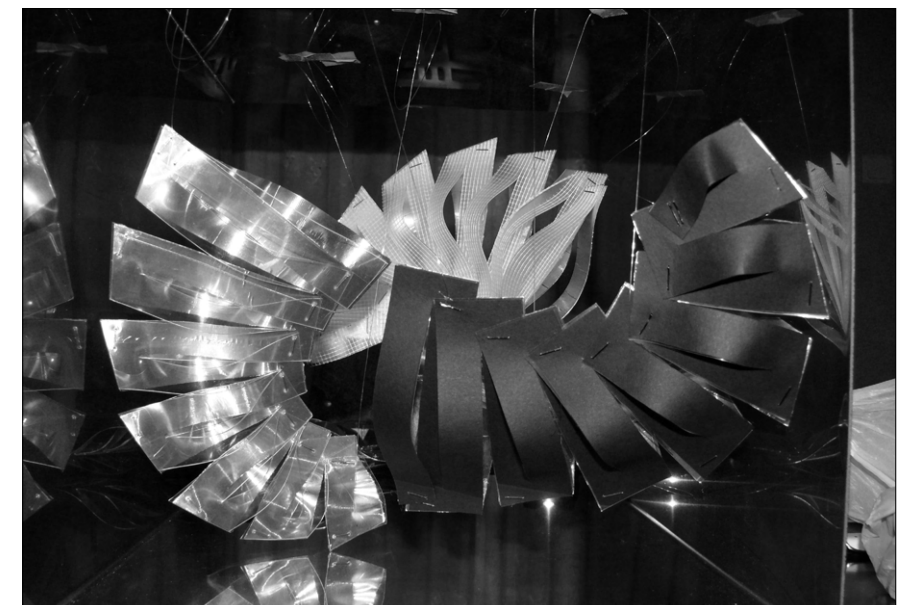
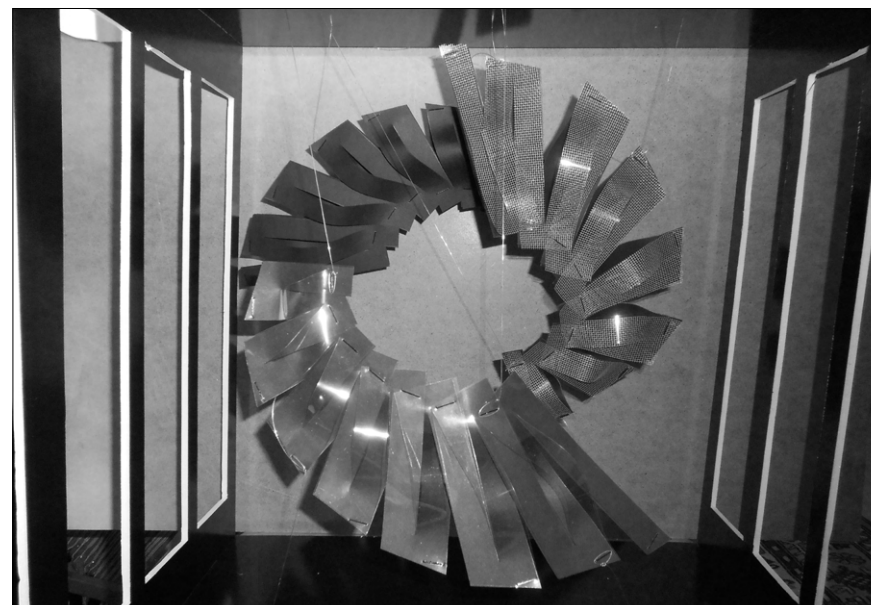
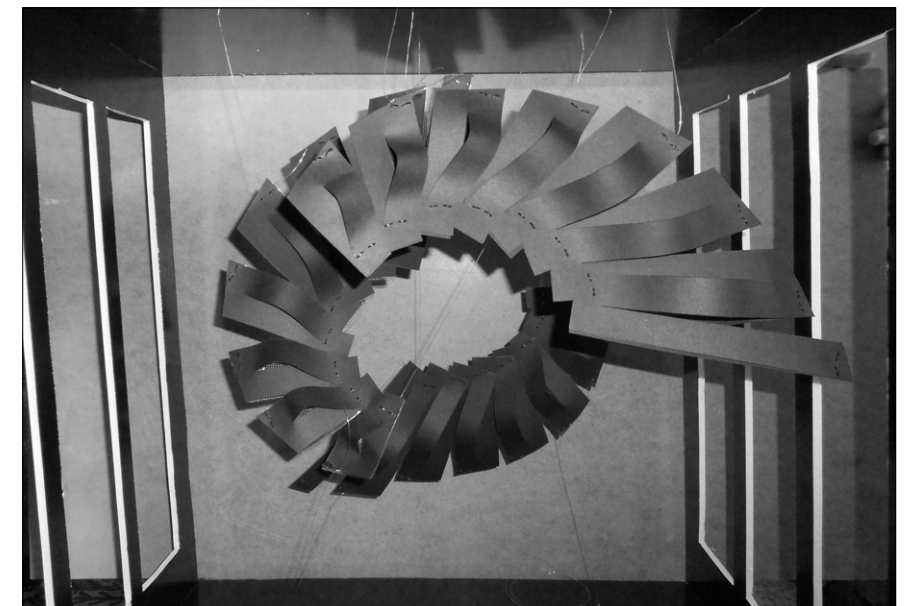
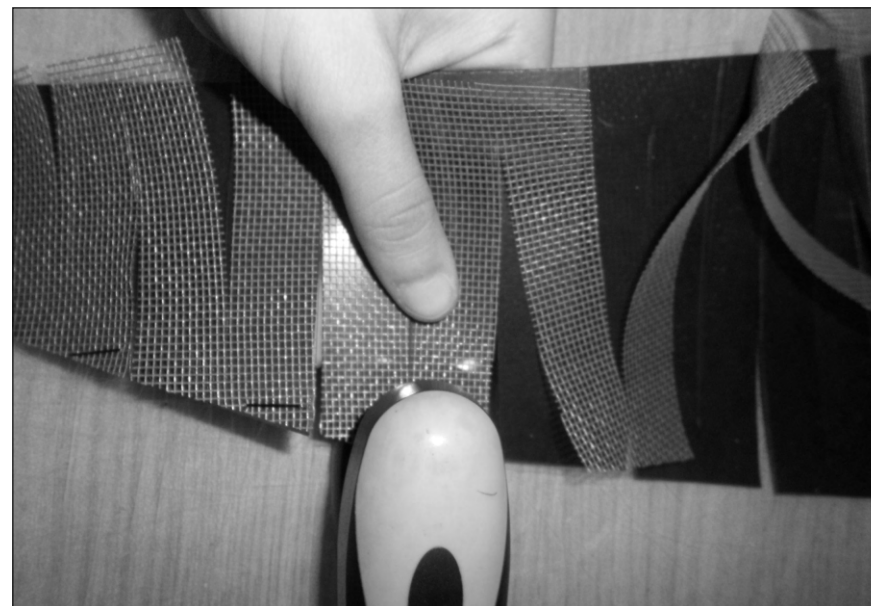
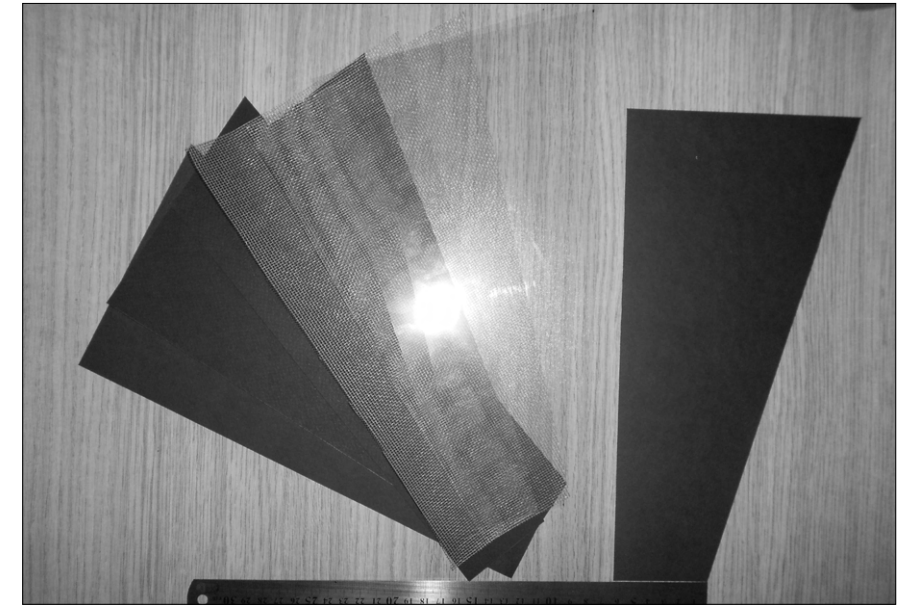
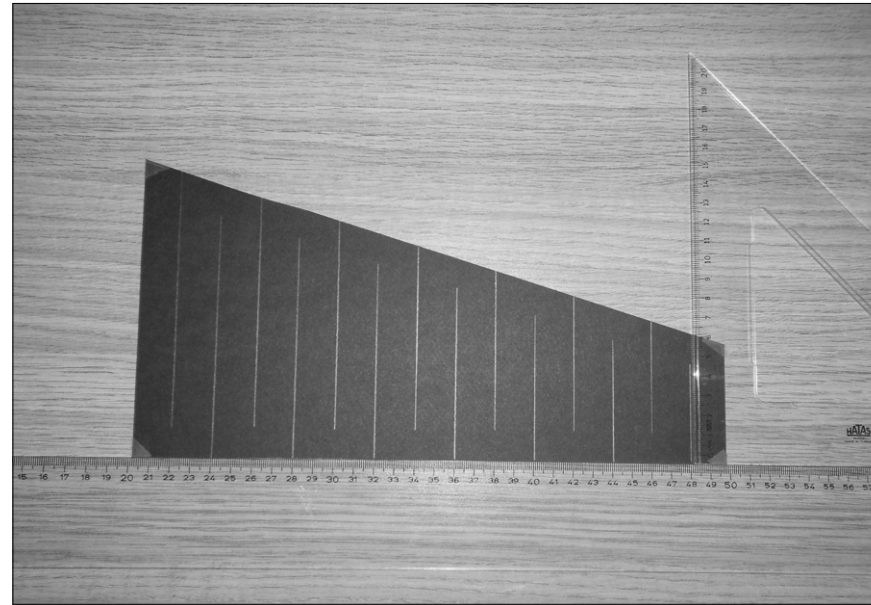
BASIC DESIGN

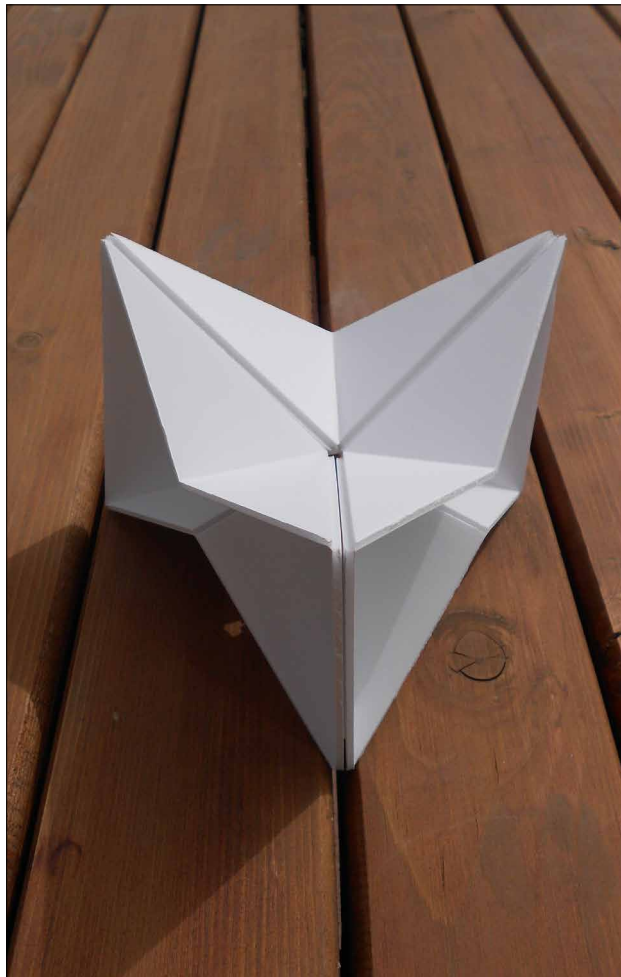
WORMHOLE

REFLECTION / RULE BASED DESIGN

- A set of rules
- A database of knowledge
- An algorithm for applying the rules to the knowledge

Architecture designs some rules about process and these transform to form something predictable at the end of the design. This basic design project was aimed to learn and experience about rule based design and how can it transform a form with following steps that loops. There are just cardboard and industrial materials to produce a design. Design logic was simple but meaning reaches a bit far more than materials and patterns. Design served to see how reflection can create new perspectives and how can interpret rather than a concrete material.



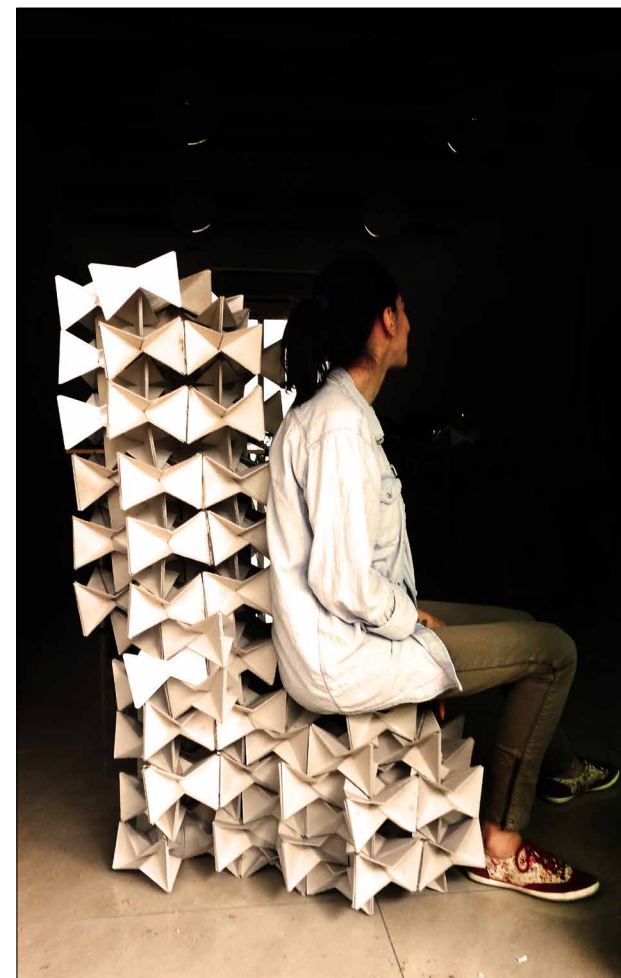
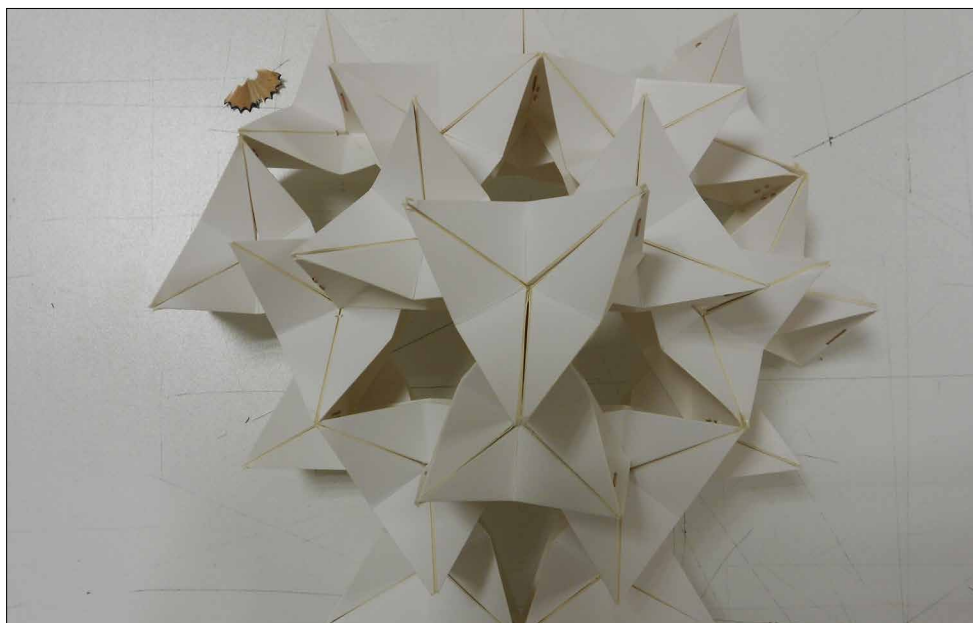


BASIC DESIGN

BOOK CONTACTOR

MODUL / REPETITION / FOLDED / CARDBOARD

- A set of rules
- A database of knowledge
- An algorithm for applying the rules to the knowledge



50mm*80mm cardboards as a module was starting point to design. By folding cardboard, we try to get a new forms to produce a seat to use in library. One cardboard transform a module and awhile production process goes on it reaches some design to use as seat but it was subjective way to follow a rule but repetition was simple folding a cardboard and three cardboard become a module which is shown at first image and after it transform to a seat.

PROFESSIONAL WORKS

2016 - 2017



PROFESSIONAL
VILLA ALAÇATI

CONCEPT DESIGN / VISUALISATION

Recently, Alaçati start to transfrom from village to vacation place and thanks to municipality concern there is architectural integrity about buildings. Local stone for walls generally masonry structures, besides that greatly wooden usages for consoles which is called 'cum-ba' and shadings. From the outside it can bee seen as typical eagean town which is effected form greek and anatolian culture simultaneously. To explain breifly about materials, tuff stone has been chosen for masonry walls also to create a frame effect brick also can be seen near openings. Due to contractors demand, walls are masonry

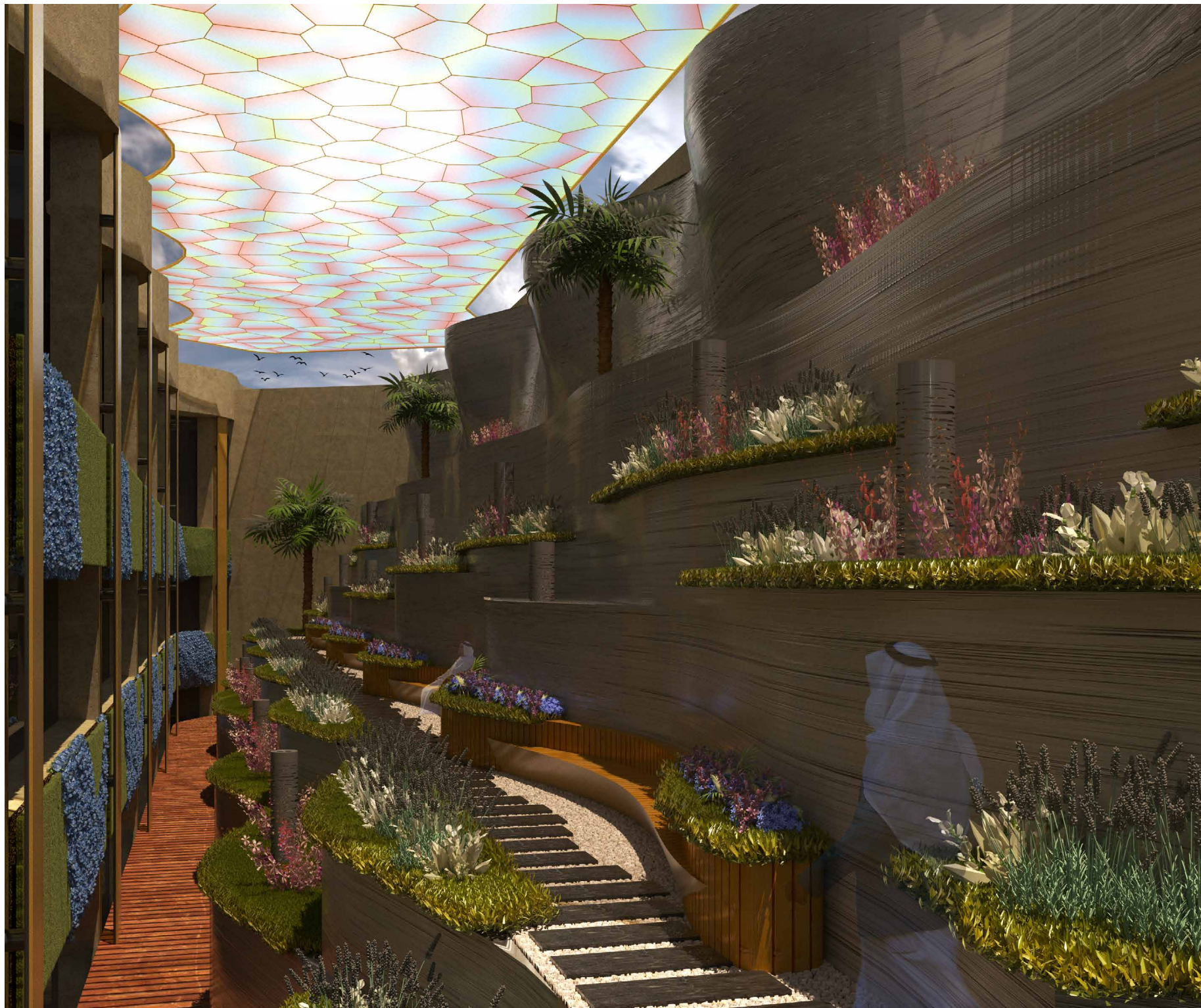
2016, autumn

PROFESSIONAL
VILLA ALAÇATI

CONCEPT DESIGN / VISUALISATION

and to give modernistic appearance they covered with whitish plaster. In the project there are 3 separated villa. Each of them has different plan schema. For the project, just façade design and visualisation has been change, plans was already drawn.





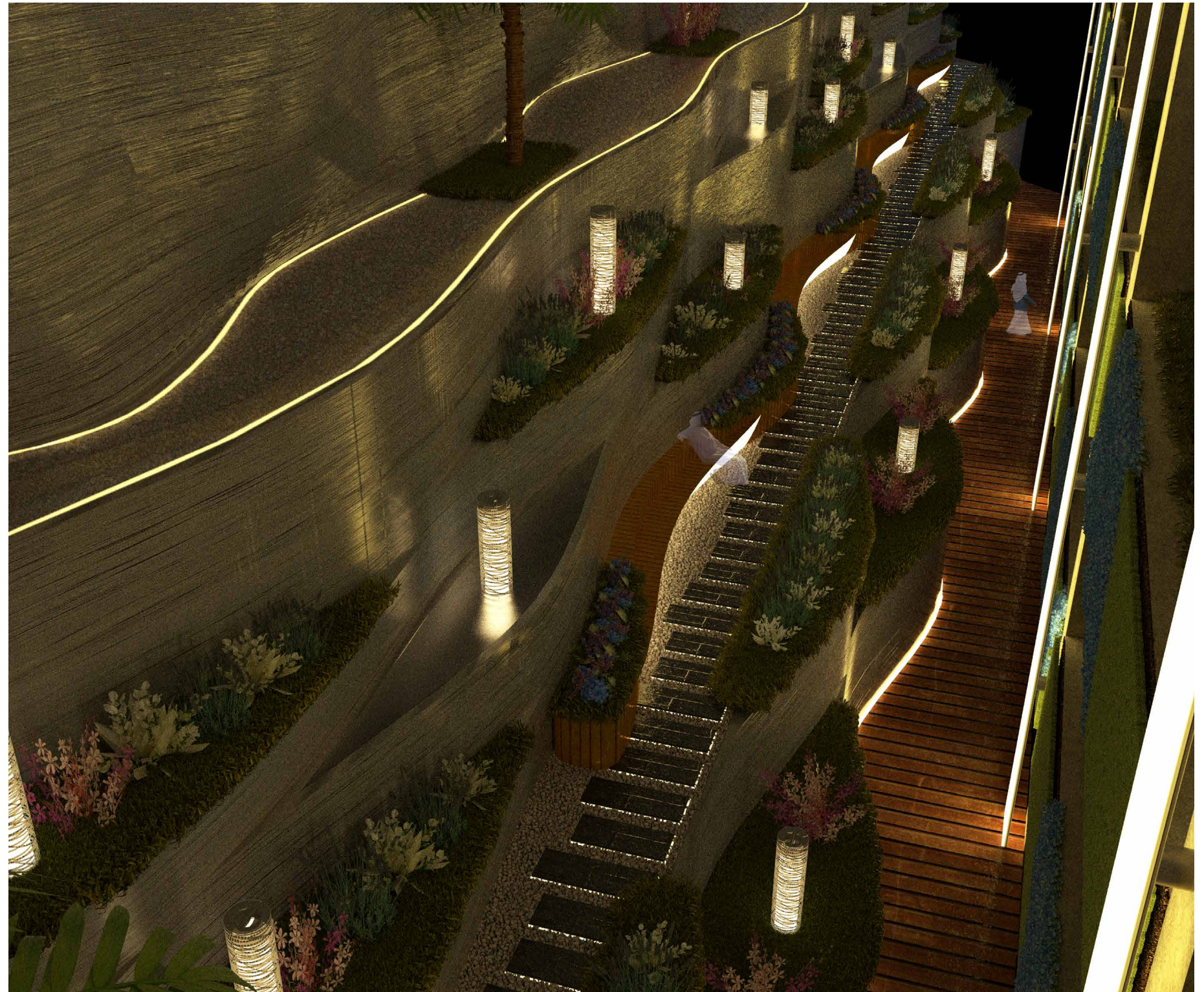
PROFESSIONAL
BACKYARD GARDEN, JEDDAH
CONCEPT DESIGN PROPOSAL

Jeddah is a city from Saudi Arabia and hotel management demand was to design the back garden of hotel which facing through public spaces. Current view was not impressive enough and FRESH for guests of complex according to them. Project is interesting to thinking process because space of garden was not big enough to implement plantation and seating areas for spending time because it was build just for terracing the ground because hotel subside slope and back side of complex stay under the ground level. To get sunlight through public spaces, designers are planned to use retaining walls at that place.

2016, autumn

PROFESSIONAL
BACKYARD GARDEN, JEDDAH
CONCEPT DESIGN PROPOSAL

There is a limit for weight of total of all materials because of the retaining walls. So generally precast light materials has been chosen. Design process started to decrease retaining walls brut appearance with wave form with precast materials and cover with plantation and small ponds form place to place. At night these pond create gloomy lightning for the space. Besides that Saudia Arabi has sunny wheather and it can cause overheating and glare for public spaces to solve this concern and at the same time create local green atmospher semi diffuse semi colorfull diffuse material has been used above all space.





PROFESSIONAL BAYRAKLI APARTMAN COMPLEX

VISUALISATION / PRESENTATION

Project location is Bayraklı/ İzmir. It has own shopping units itself. To personally, I was not at design phase at the project. I joined analyse and visualisation periods for this project. To explain, it is mass house apartman complex which contains 8 different type of flat design. Design idea comes for getting benefit from constant wind in terms of natural ventilation of public spaces and at the same time decreasing wind load on façades. These openings let the sunlight enter the public areas. Instead of creating dark areas it is better to collaborate with weather elements. As it seen from the perspective view,

2016, autumn

PROFESSIONAL BAYRAKLI APARTMAN COMPLEX

VISUALISATION / PRESENTATION

building has genuine look in comparison with similar apartman complex. TERRACING method has been chosen for high floors to take more advantage from daylight for enlighting to inner spaces. Izmir has mostly sunny wheather yearly period. Before decide design decisinios, several snalyses has been made to understand the project area. Wind, radiation, shadow analyses included of these.

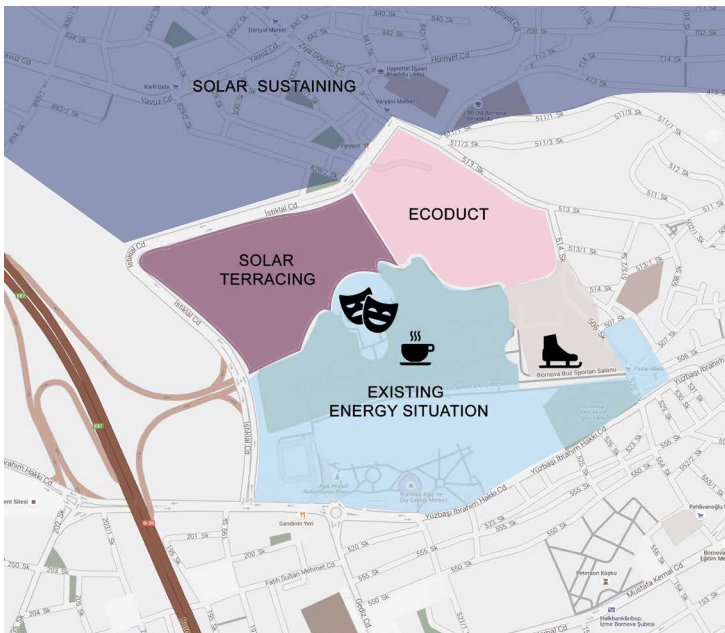
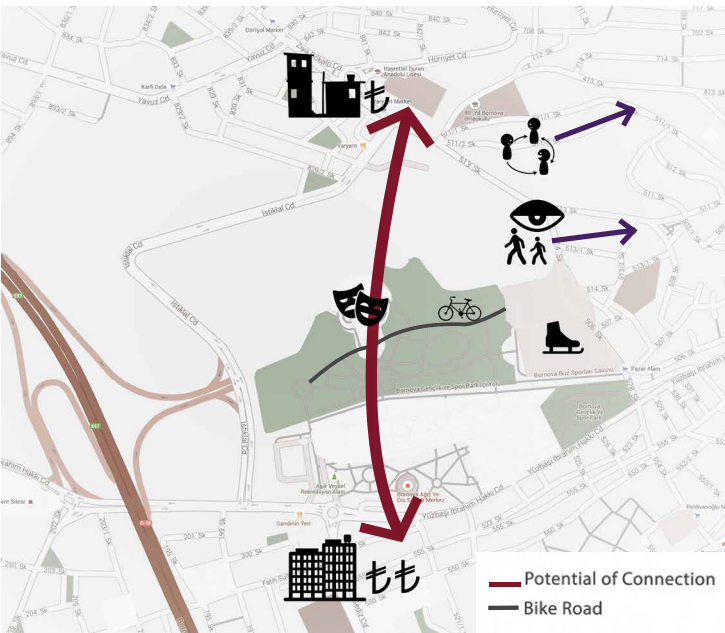
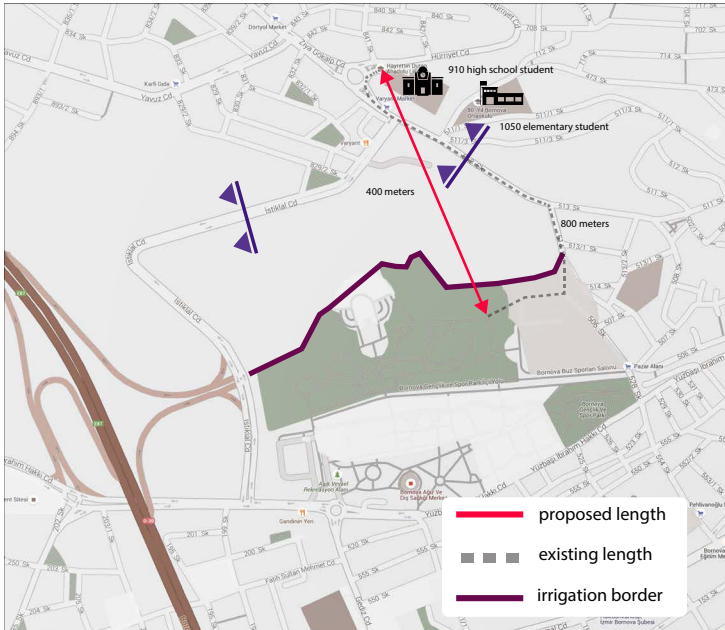


WORKSHOPS

2016

WORKSHOP
TU DELFT MASTER CLASS
ANALYSE / SITE PROPOSAL

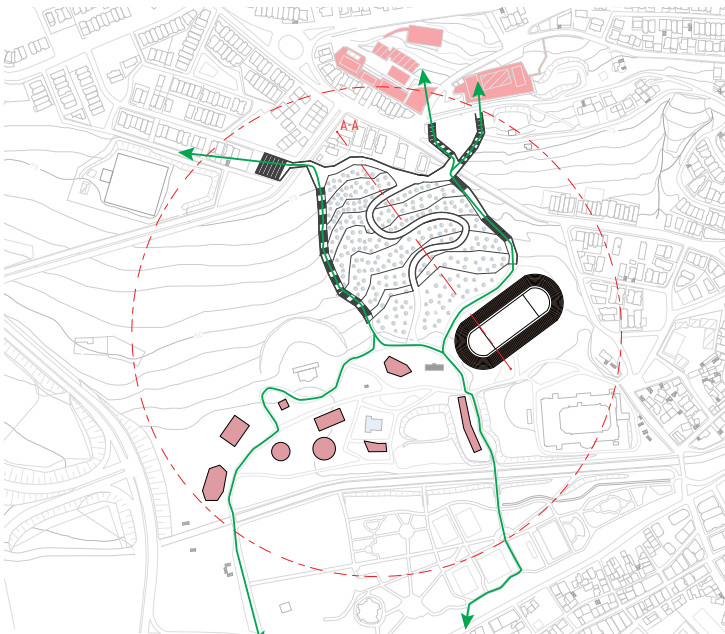
Bornova is from the biggest towns of İzmir and population rising masivley recent years but on the contrary commune and green spaces couldn't get larger portion from total area. It is a huge problem for cities of Turkey. Becoming a city, not just living close or stay at apartments it requires social spaces and green spaces for health issues. Physically and psychologically, simultaneously. This workshop focusing the analyse a empty place and transfrom it to a public space that people can use every time for sport or resting. It contains energy analyses and offer new plannigs. It was collaborative job with TU Delft master class.



Calculations with David MacKay

High Density	17017m ² Total area	90% of space used
Medium Density	102828 m ² Total area	45% of space used
Low Density	110378 m ² Total area	10% of space used

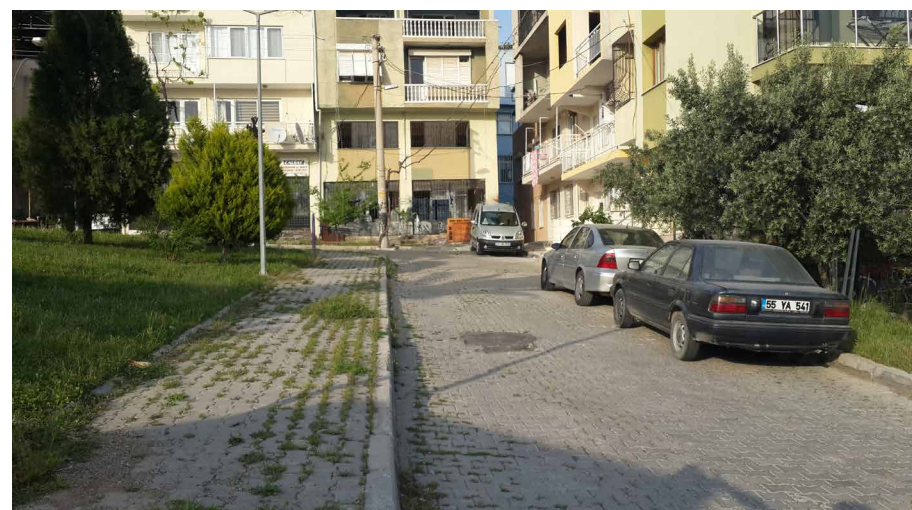
	Solar Radiation kWh/m2	Ac Energy kWh/m2
High Density	2,24	200,92
Medium Density	1,32	100,46
Low Density	0,29	27,92
Total	Solar Radiation kWh	Ac Energy kWh
High Density	262361,48	23510587,57
Medium Density	135782,32	10329895,22
Low Density	32389,32	3082195,27



2016, spring

WORKSHOP
TU DELFT SWAT STUDIO
VISUALISATION / PRESENTATION

Bornova is location of project and workshop's main aim to transform streets for users who use bicycles. It is a huge problem for cities of Turkey. Streets are not the places just for car users it has to transform for multiple type of users otherwise cars are dominating cities. It cause huge energy consumption, lack of space in cities. In the other hand, bicycle users doesn't cause carbon emission and it is healthy vehicle for society. This workshop attenders propeosed bicycle routes and pedestrians near car roads in the city of Bornova. It was collaborative job with TU Delft master class.





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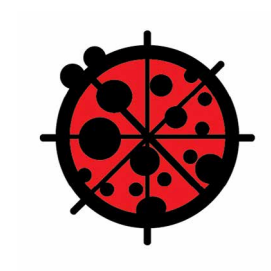
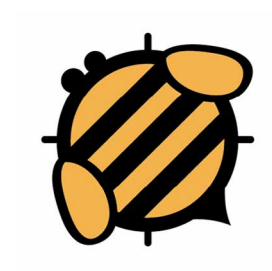
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thank you ...