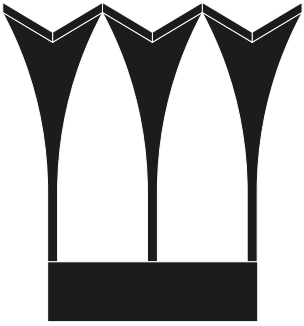

2021 – 2022

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AR3CP100

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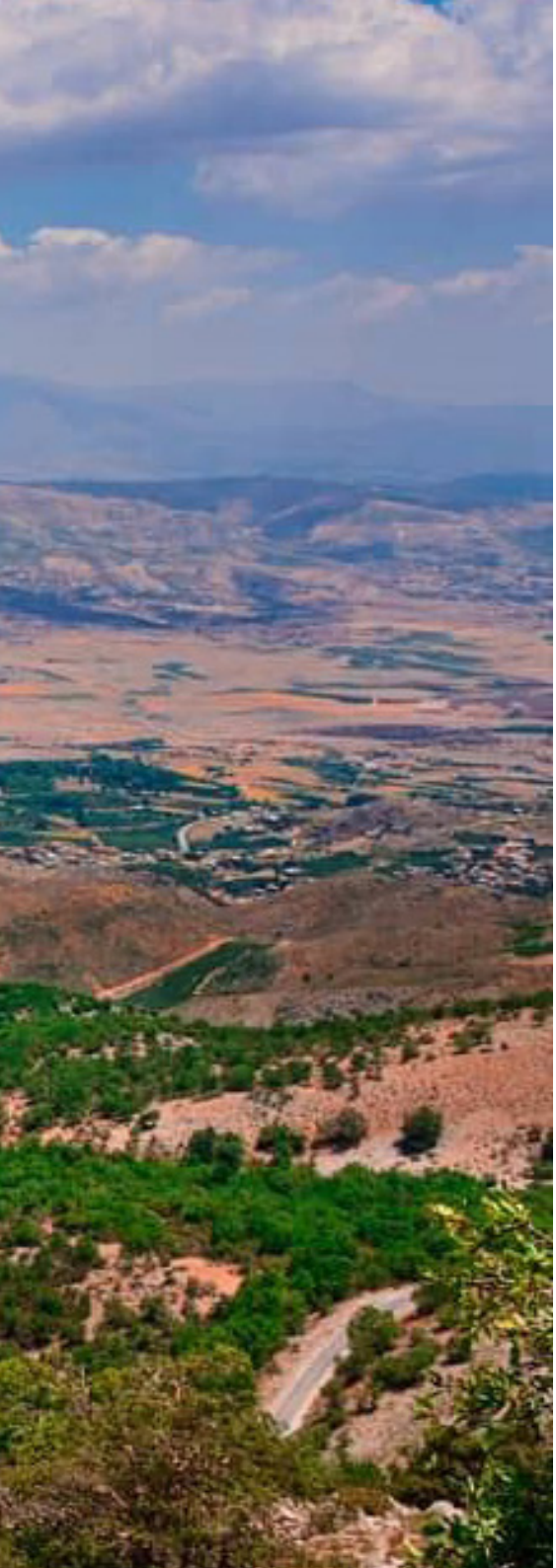
Beirut Mosaic
Mar Elias Crop Market

INDEX

O, LEBANON

00

O Lebanon, with your mountains ...



... and valleys ...

... and forests ...

... and plains ...

... with your seasons dry ...

... and your seasons wet ...

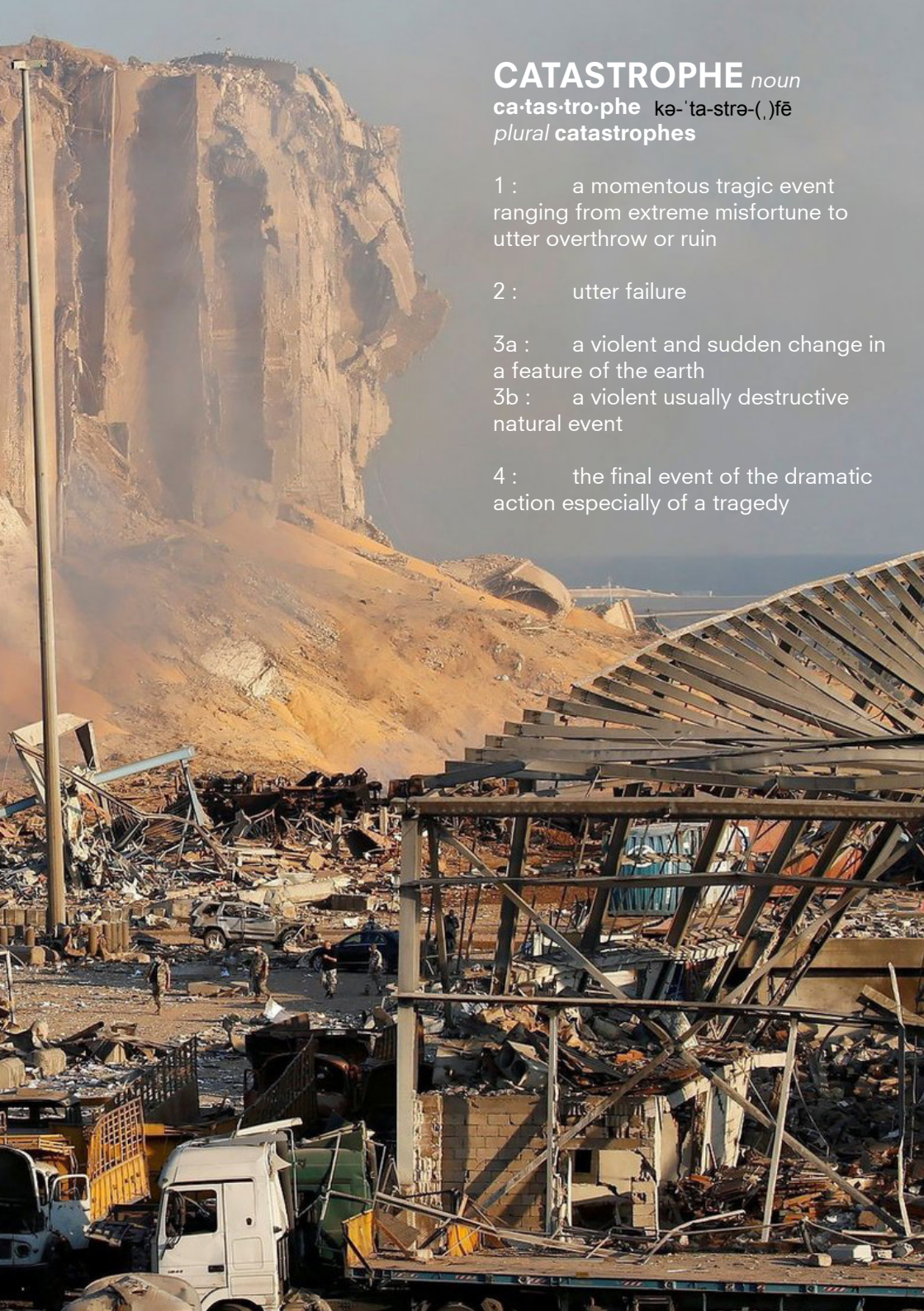
... and the potential to feed the world

Where did you go?

What happened to you?

INTRODUCTION

01



CATASTROPHE *noun*

ca·tas·tro·phe kə-ˈta-strə-(ˌ)fē
plural **catastrophes**

1 : a momentous tragic event ranging from extreme misfortune to utter overthrow or ruin

2 : utter failure

3a : a violent and sudden change in a feature of the earth
3b : a violent usually destructive natural event

4 : the final event of the dramatic action especially of a tragedy

Once this was a harbour – 2750 tonnes of ammonium nitrate turned it into a wasteland


218 deaths
7000 injured
300 000 homeless
$15 billion in
property damages

catastrophe and crisis

Lebanon, a secular Mediterranean country in between Syria and Israel, is struck by catastrophe and crises in the last decade.Lebanon went through many changes in its tensed up, post-Civil War society.

In 2011, 1.5 million Syrian refugees came to Lebanon. They drastically changed the population composition in the country. In 2019, a financial crisis hit Lebanon causing the Lebanese pound (lira) to collapse and push society into further despair and tension (Hamadé, 2020).

In 2020, the August 4 Port Blast was the tipping point. It crippled Lebanon's import dependant economy, and costs the country over $15 billion in repairs. The only grain silo in the country, with a capacity of 120,000 tons was obliterated by the blast (Chehayeb, 2020).

The aftermaths of the 2020 blast and the devaluation of the lira, in combination with the already existing extra demand for food due to the 2011 crisis, caused a extreme rise of food prices for suppliers and consumers (Chehayeb, 2020).

These catastrophes challenge the food security in Lebanon, which was already largely dependant on import. Not only recent crises are impacting Lebanon's food security, but also long term approaches.

from industry to service

After the end of the civil war in 1990 the country's economy slowly changed from a productive economy with flourishing agriculture and industry sectors to a service-based economy, relying on banking, luxury tourism and real estate (Chehayeb, 2020 & al Rajji, informal group interview, October 5 2020).

The financial crisis affects the Lebanese agriculture also by threatening it's production capacity. For the last 25 years, the Lebanese agriculture industry relied on importing seeds, seedlings, fertilizer, pesticide and irrigation systems. This could be done because the lira was connected to the US dollar by the Lebanese central bank. The collapse of the lira means a higher production cost, which the farmers are not able to afford (Hamadé, 2020).

On top of this food production insecurity, there is practically no planning and overview by the Ministry of Agriculture (MoA) which leads to a lack of regulations. That lack of regulations has as a consequence a chaotic food market, a bad food quality assurance, and leads to certain crop surplus.

Besides the lack of regulations, the government budget allocated to the MoA is only 0.5% of the total, while in neighbouring countries this five times more is (Rahhal, 2016). There is a lack of food transportation systems and a non-existent distribution system. This bad state of post-harvest handling results in a crop loss (up to 25% of the harvest) and unnecessary food waste (Rahhal, 2016 & Hamadé, 2020). These factors also challenge the food security in Lebanon and Beirut.

food and city

Steel (2013) states that nowadays, man has detached from food and its origin. Food is the most devalued commodity nowadays, but food shapes the city.

Without food and food supply, there would be no city.

To secure the future of farming in Lebanon, a (Beiruti) youth interest in food and farming is necessary. The advantage is that Beiruti youth act conscious about healthy food due to the rich Lebanese food culture and traditions. They are eager to learn more about the origin of Lebanese cuisine and eager to discover new interests. Another advantage is the education system. In Lebanon, (higher) education is in good shape, but the disadvantage is proper jobs after a degree are lacking. Many young professionals escape their country, resulting in a lack of development and a so called "brain drain".

Getting the Beiruti youth interested in food and farming is important for future food security and the future of agriculture and food, as the average farmer is 52 years old. These factors form an opportunity to increase food security in Lebanon and Beirut.

production in Lebanon

During the last 30 years Lebanon has changed its economy from production based to service based.

Lebanon has a varied production industry. Metal fabricating, oil refining, wood and furniture production, mineral and chemical production, textile, jewelry, food processing, cement, and wine are all sectors in the Lebanese production economy. However, growth in these industries is lacking (CIA Factbook, 2021).

agriculture sector

The agriculture sector in Lebanon is one of Lebanon's biggest sectors, producting products in six categories (IDAL, 2020):

– vegetables and edible vegetables
– fruits, edible fruits and nuts
– live animals and animal products
– unmanufactured tobacco
– cereals and cereal seeds
– coffee, tea, maté and spices

A benefit for the agriculture sector in Lebanon is the moderate climate, combined with rich soil, abundant water and lots of sun. 64% of Lebanese territory is agricultural land, which is the highest percentage in the Middle East.

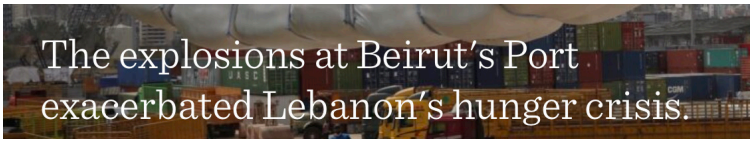
All these factors make that Lebanese agriculture can produce crops ranging from tropical (e. g. bananas) to cold (e. g. apples) climates.

77.8% of agriculture export goes to Arab countries, with Saudi Arabia, Qatar and Syria as the largest importers of Lebanese agriculture crops.

Lebanon: land of plenty?

Lebanon's agriculture sector weighed down by challenges

Since the massive explosion on Tuesday, August 4th, families' smoldering hunger has turned into a full-blown crisis.



Beirut blast worsens Lebanon's already concerning food crisis

Revolutionising Lebanon's agriculture sector as food runs out

Lebanon's farming industry has gone underfunded and underdeveloped for many years, hindered by a lack of modern equipment and inefficient production techniques.

collaged news article headlines regarding the blast and food production

problem statement
The first research into the production topic shows there are three major challenges which can be distinguished.

the processing center (logistic)
Beirut needs a [food logistics center] which addresses the packaging, transportation, and storage of harvested crops to improve food security and combat food waste.

There is no structured post-harvest handling, which results in an unnecessary loss of crops.

Opportunities are in for example producing packaging crates and transportation systems, as well as producing niche items such as an olive-press for farmers in the vicinity of the Greater Beirut area.

Opportunities are in creating a transport system to aid farmers in their post-harvest handling. A minimal amount of Lebanese farmers have the means to properly transport their harvest, which result in unnecessary crop loss.

Opportunities are in providing storage and cold storage of harvested crops: to reduce food waste and loss of crops.

the wholesale market (public)
Beirut needs a [(wholesale) crop market] where farmers can sell their crops and easily reconnect with other farmers to better communicate and plan future harvests.

Opportunities are in creating a partial farmer's market, cutting out the middle man, which results in fairer price for the farmers. The market can also help farmers who produce too little, and form selling groups. This way, the farmer's market acts as a catalyst to produce more.

Opportunities are in creating a wholesale fruit and vegetable / seasonal crop market, where Beirutis can go and buy fresh products, as well as meet the people behind that product, and meet up with other Beirutis.

Opportunities are in creating a wholesale crop market, where farmers can meet other farmers, discuss the harvest and price, and plan future strategies which farmer grows which crop in what area.

the crop garden (public)
Beirut needs a [crop garden] which addresses the importance of farming, crops and Lebanese food culture and engages the Beiruti youth.

Opportunities are in creating a crop garden / exhibition garden to showcase the diversity and richness of Lebanese agriculture, interesting young Beirutis into farming and agriculture, as well as educating visitors where your fresh products come from.

vision collage

research question
Research in the first semester formed the ground work for the research question:

How can a food logistics facility and wholesale crop market be integrated in a high density urban fabric in Beirut?

This research question addresses the topic of production, with a specification of food security in Beirut.

By analyzing architectural reference projects, which are wholesale markets with a logistics part, the following research subquestions were formed:

What characterizes the architecture of the project?

What is the logistic/public program division?

How is the public and logistic program in the project organised?

How is parking organised in the project?

How are the entrance flows organised in the project?

The main findings from the reference research form the basis for the design brief and the design in the second semester.

thesis relevance
This thesis addresses the global themes of food waste, urbanisation and food insecurity through growth of population and climate change.

Every year roughly one third of food produced for humans is lost. This amounts to 1.3 billion tonnes per year. In Lebanon, because of the crippled food chain and post-harvest handling, up to 25% of crops are lost.

More and more people are moving to the city, causing pressure in cities on food security. In the city there are more and more mouths to feed, which results in the need for a streamlined distribution of food and a well-connected food chain from land to city.

ambitions
As mentioned, the main challenges in Beirut regarding the production topic and group research are: food waste, food insecurity, and disconnection. These challenges can be translated into three ambitions: improving post-harvest handling, sparking youth interest in agriculture, and providing public space.

These ambitions can be translated into a building proposal, containing the following aspects: food logistics center, crop garden, and wholesale crop market.

theoretical framework

The question elements that are used in the research question are: urban fabric, logistics facility and wholesale market. In this section, definitions and descriptions will be used to form a framework for further research.

urban fabric

The urban fabric is a concept that has never been clearly defined. In many articles, urban form means the form of the urban fabric.

Over the past decades, the modern city has grown exponentially due to urbanisation and population increase. The urban fabric has changed from a closed fabric with links between plot, street, space, and open space, to a fragmented suburban fabric. In this new suburban fabric, the urban elements are less in relation with each other. On top of that, the scale of the elements has changed (Levy, 1999).

Steel (2013) argues that cities and food are linked to each other. The supply of food has shaped the urban fabric and infrastructure in the city over the course of history. Food (livestock and crop cultivation) used to be part of the urban fabric, but in the 19th century this changed due to the rise of the supermarket. Distribution moved to the outskirts of the city. As a result, over time the people in the city have lost their touch with food and its origin. But according to Steel, food is powerful. It brings us together in physical space, forging bonds other media can't reach (2013, p. 120)

wholesale market

According to Cadilhon et al. (2013), wholesale markets are physical places where professional agents come together to buy and sell products to other professionals.There are two types of wholesale markets. Rural wholesale markets gather food products from producers in bulk. Urban wholesale markets de-bulk food shipments to sell to other institutional stakeholders who then retail to the general public.

According to Francis & Griffith (2011), integration of the social meanings of farmers' markets into the built environment results from a combination of policy, program, planning, design, and management. There are four different market realms as a framework: the promenade, the working market, the market landscape, and the market neighborhood.

The promenade is a central movement corridor where patrons and visitors stroll past products on display and mingle.

The working market is a pragmatic translation of the farmer's market and includes varied vending spaces and backstage areas.

The market landscape is the open space next to the promenade and the working market, providing leisure space. The market landscape provides (optional): seating elements, play areas, thematic gardens.

The market neighbourhood is the surrounding of the market. Succesfull markets respond to the surrounding neigbourhood in planning, design and operation by integrating the community and culture.

logistics facility

Most logistics buildings deal with non-food products; a few deal with fresh food products. Food logistics require cold chain technology, specific handling procedures, and temperature requirements increase the operational costs. In general, distribution of goods in urban zones is not organized in a proper manner. This mainly leads to congestion, CO2 emission, air, and noise pollution. By organizing and coordinating transport these negative impacts will be reduced.

Urban Distribution Centers (UDCs) were developed to improve traffic and increase collection and distribution, with the goal of reducing congestion and reducing environmental impact in the city. This is to save time, make delivery reliable, and reduce the number of trips. There are different variations of the definition of urban food distribution. There are three core components: distribution and wholesale activities, active coordination, and permanent facilities.

There are four different food "hubs" (forbidden word, but used in literature...): producers, farmers markets, wharehouse produce markets, terminal markets (Morganti & Gonzalez-Feliu, 2015).

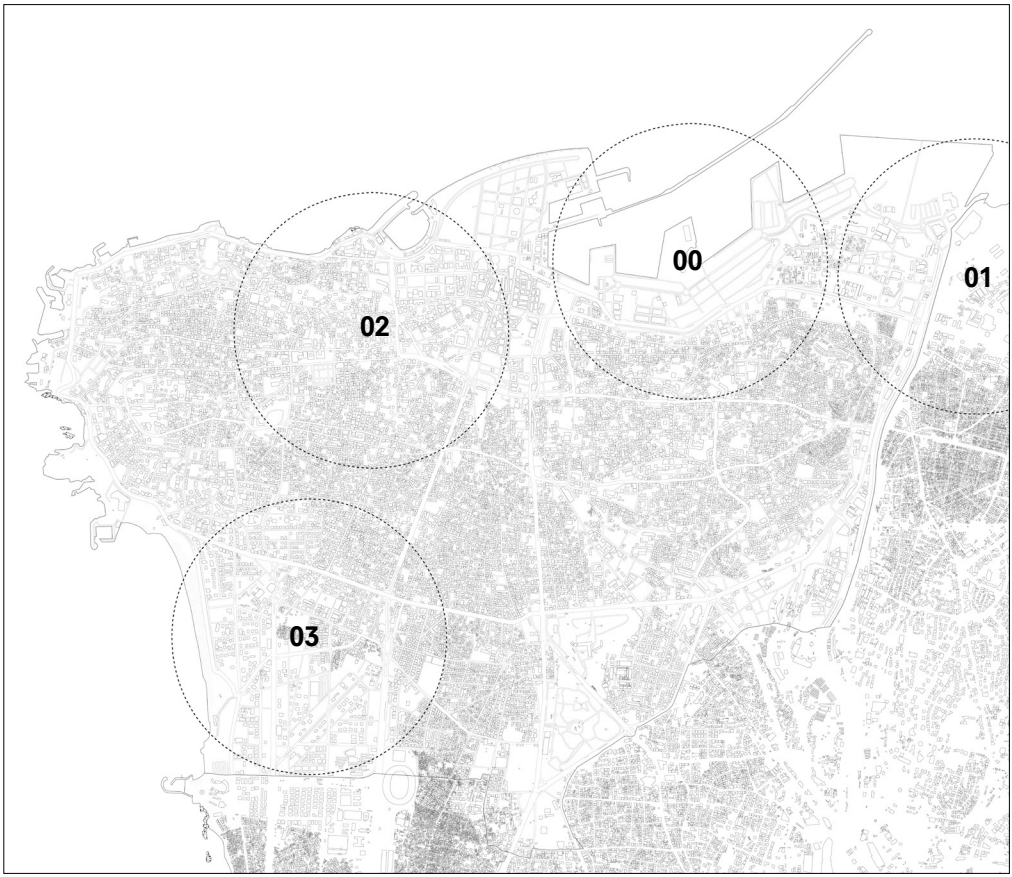
Accroding to Cadilhon et al. (2013), wholesale places have certain functions: transport, de-bulking, stocking, handling, and sometimes processing. On top of that, they create adminstrative and financial flows: sourcing, selling, marketing and merchandising, and flow management.

research application

These theories regarding urban fabric, wholesale market, and logistics facility can be applied during research.

Definitions of urban fabric are used during the site analysis and urban layers research that are useful for the project. Definitions and the framework of (wholesale) markets are used during the reference analysis and shaping the design program. Definitions and the framework of food logistics and urban distribution centers are also used during the reference analysis and shaping the design program.

This theoretical framework forms a stepping stone to further elaborating the design brief and shaping the narrative of the project.



map of Beirut indicating location of the group sites

the graduation studio
Complex Projects is a graduation studio in the master Architecture from the faculty of Architecture and the Built Environment at Delft University of Technology.

Complex Projects investigates and analyzes urban space with different themes and contexts around the world.

This time the CP studio has settled in Beirut, Lebanon and investigates with the theme "dealing with catastrophe in the built environment".

group work
The studio is set up in 4 groups, each researching a different part of Beirut. The group site has a diameter of 2 km and covers a different part of the city: blast site, harbour, city centre, suburbs. Each group consists of 5 to 7 students who work together to create an urban strategy / vision for 2030-2050.

Group 00, aka Cornucobay, started one semester earlier and focused on the blast site and harbour.

Group 01, aka Beirut, Anchored, focused on the harbour and empty landfill east from the blast site.

Group 02, aka Bidhara'I Beirut, focused on the city centre west from the blast site.

Group 03, aka Beirut Mosaic, focused on the suburbs near Ramlet al Baida beach, south west from the blast site.

individual work
Individually students choose a topic, ranging from mobility to culture to production. This topic is the field for individual research, and forms the basis for the protagonita topic design in the second semester.

Mar Elias Crop Market as production protagonist is part of the Beirut Mosaic group strategy. It is placed in the market district in the center of the group site, relating to the National Winery (culture/ production) and Beirut's Living Room (housing).

In relation between studio groups the Mar Elias Crop Market is linked to Fruitful Beirut agriculture campus (education) in the Beirut, Anchored group, also focusing on agriculture and the revival of Lebanon's agricultural sector.

satellite collage for the Beirut Mosaic urban masterplan

the Beirut Mosaic

The Beirut suburbs are varied in location and urban density. Researching the urban layers of Beirut in different suburbs in the first semester concluded that the suburbs near Ramlet al Baida, the last public beach, had the best potential. This suburb contains various neighbourhoods separated by busy roads. The neigbourhoods, ranging from the low-class, poor Palestinian refugee camps to the ultra high-class UNESCO coastline apartment towers.

Historically this part of Beirut contained the Bir Hassan airfield in a series of sand dunes and emptiness. The different parts of the city coming from all directions slowly colonized the sandy dunes, creating a composition of different neighbourhoods. This combination of various neighbourhoods formed the basis for the group name: the Beirut Mosaic, emphasizing the different neighbourhoods and their different atmosphere.

The Beirut Mosaic urban masterplan consists of 7 protagonist projects divided over 4 districts. The main districts that were focused on are as follows:

the beach district
1. Leisure – Lebanon Dance Institute
2. Mobility – Ramlet al Baida Ferry terminal

the security district
3. Civic – Salam Emergency Station

the market district
4. Production – Mar Elias Crop Market
5. Housing – Beirut's Living Room
6. Culture – National Winery

education campus
7. Education – Jnah Public School

the urban masterplan

The group developed a four step urban masterplan in the first semester:

Create pedestrian friendly connections
Currently the city of Beirut is a car based city with big motorways intersecting the urban fabric. The pedestrian has little to no space in the urban setting. Through the development of new street sections where the pedestrian has more room, various axes are created in the Beirut mosaic, connecting the various districts and the whole suburb region with the rest of the city.

Enhance mosaic character
As mentioned, the mosaic character is one of the qualities of the group site. By implementing district specific protagonist projects (emergency station to security triangle, crop market to market district, etc...) the character of the mosaic pieces is enhanced.

Develop key public spaces
The lack of public space in Beirut is concerning, prohibiting the people from meeting each other. The development of the beach district (public beach), market district (central event square and air park), together with a public program in every protagonist project adds public space to the site, connected through pedestrian axes.

Add affordable housing and education
To provide a bright and affordable future, education (public school) and affordable housing are placed in the empty plots, filling the Beirut Mosaic.

RESEARCH

02

WMA – 2008 – Spain
Mercabarna Flor Market

15 000 m^2
flower market

SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m^2
fruit & vegetable market

HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market

MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market

OMA – 2015 – United States
West Louisville Food Port

95 625 m^2
food market

3xn – 2019 – Australia
Sydney Fish Market

80 000 m^2
food market

reference projects

During the first semester six reference projects were analyzed. The six projects are subdivided in food markets, flower markets and fruit and vegetable markets. All six projects have a public and logistic program, which correlates with this design project (food logistics center and wholesale crop market), and have solved this design challenge in various ways.

These five analysis questions were formed during the analysis:

- *What characterizes the architecture of the project?*
- *What is the logistic/public program division?*
- *How is the public and logistic program in the project organised?*
- *How is parking organised in the project?*
- *How are the entrance flows organised in the project?*

The analysis of these projects provided answers for these questions, which were summarized in preliminary design conclusions and were visualized in diagrams. The conclusions from this research formed the basis for the set of constraints that were formed for the design brief. The analysis is done with a certain colour scheme:

logistic

administrative

public

slab

WMA – 2008 – Spain
Mercabarna Flor Market

15 000 m^2
flower market

slab

SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m^2
fruit & vegetable market

open hook

HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market

slab

MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market

massing

What characterizes the architecture of the project?

The diagrams are an graphic abstraction of the footprint of the building. The form of the 6 projects is to be categorized in three typologies: the slab, the hook, and the open hook.

These simple forms provide a simple structure to house elaborate industrial processes (unloading, selecting, storing, packaging, distributing) of products.

hook 3x

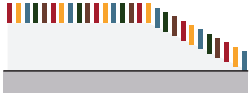
OMA – 2015 – United States
West Louisville Food Port

95 625 m^2
food market

slab

3xn – 2019 – Australia
Sydney Fish Market

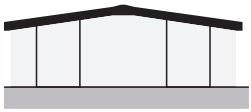
80 000 m^2
food market



folding roof/colourful facade

WMA – 2008 – Spain
Mercabarna Flor Market

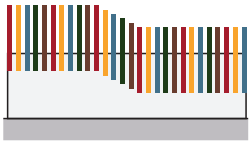
15 000 m^2
flower market



big roof

SB – 2011 – India
Mohali Fruit and Vegetable Market

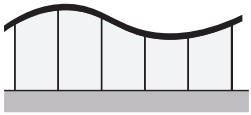
18 720 m^2
fruit & vegetable market



colourful facade

HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market



undulating roof

MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market

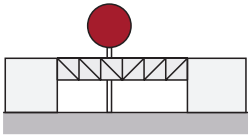
characteristic
What characterizes the architecture of the project?

The diagrams are an abstraction of the facades of the reference projects. The main characterstics of the reference projects are categorized in two sorts:

- a stand out canopy; either undulating, flowing, enveloping, or colourful, sheltering the program

- a stand out facade, colourful or with design elements (a big truss, a big pin)

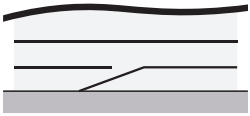
These characteristics make the project stand out in the surroundings and causes the architecture and design choices to be the eyecatcher in the area.



truss walkway & pin

OMA – 2015 – United States
West Louisville Food Port

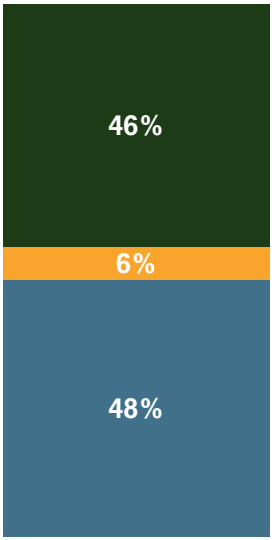
95 625 m^2
food market



flowing roof

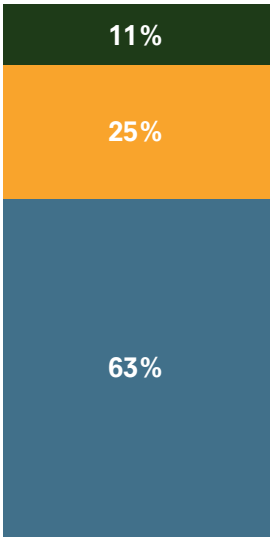
3xn – 2019 – Australia
Sydney Fish Market

80 000 m^2
food market



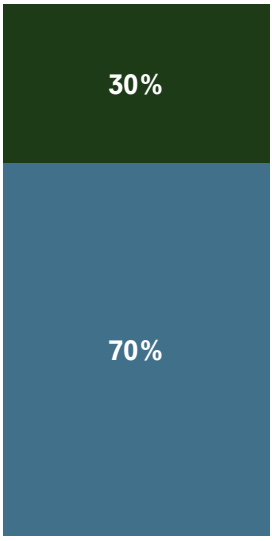
WMA – 2008 – Spain
Mercabarna Flor Market

15 000 m^2
flower market



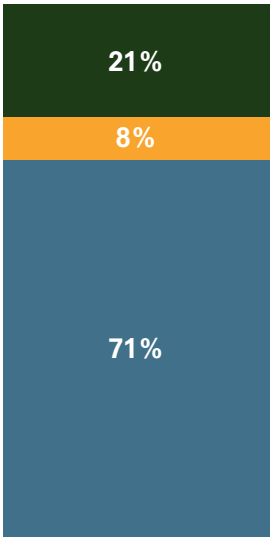
SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m^2
fruit & vegetable market

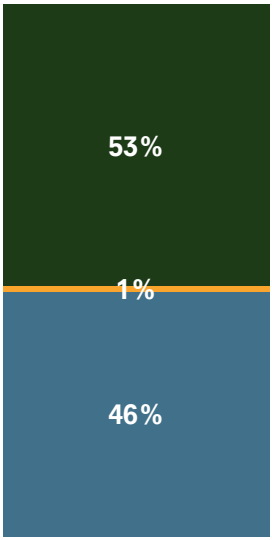


HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market

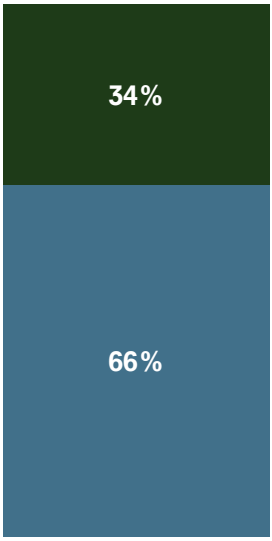


MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market



OMA – 2015 – United States
West Louisville Food Port

95 625 m^2
food market



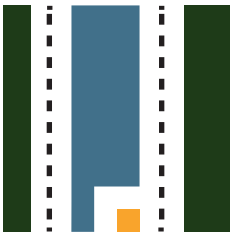
3xn – 2019 – Australia
Sydney Fish Market

80 000 m^2
food market

program division
What is the logistic/public program division?

The diagrams are a visual representation of the program. The program in all reference projects is public oriented with on average more than half being a public oriented program.

The logistic program is on average a smaller part of the projects with the administrative program acting as support for both logistic and public program elements.

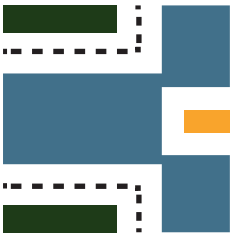


clear separation public and logistic side

logistics has two access points

WMA – 2008 – Spain
Mercabarna Flor Market

15 000 m^2
flower market



clear separation public and logistic side

logistics has two access points

SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m^2
fruit & vegetable market

clear separation public and logistic side

logistic “drive in”

HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market

separated program under big roof

logistic “drive through”

MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market

program relation

How is the public and logistic program in the project organised?

The diagrams are a graphic abstraction of the floor plans. The program relation can be categorized in two categories:

- public program sandwiches between logistic "ends"

- a clear separation between logistic and public program

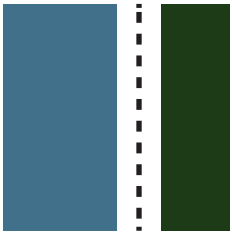
In almost all projects the administrative program is accessible from both public and logistic program functions. The administrative program is the controlling part of the building. Planning, organisation and administration take place. The administrative part is the "command center" of the program.

clear separation public and logistic side

logistics has multiple access points

OMA – 2015 – United States
West Louisville Food Port

95 625 m^2
food market

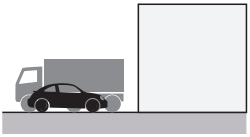


clear separation public and logistic side

logistic "drive in"

3xn – 2019 – Australia
Sydney Fish Market

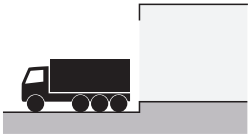
80 000 m^2
food market



– big parking lot around building

WMA – 2008 – Spain
Mercabarna Flor Market

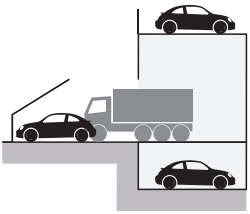
15 000 m^2
flower market



– big parking lot around building
+ unloading flush with truck height

SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m^2
fruit & vegetable market



+ "hidden" outside parking
+ logistic & public parking integrated

HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market

– big parking lot around building
+ logistic parking integrated

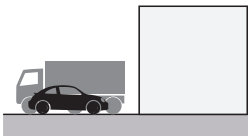
MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market

parking
How is parking organised in the project?

The diagrams show an abstraction of the parking organisation. The parking program is organised in different ways in the reference projects.

A big parking lot around the building is not the best solution, turning the project into an island in a sea of asphalt.

The optimum is to integrate the parking program into, or semi-into / as close to the building as possible. This way the parking program doesn't function as a barrier in the urban design.



– big parking lot around building

OMA – 2015 – United States
West Louisville Food Port

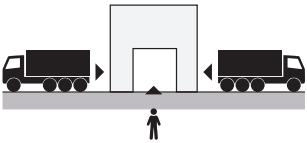
95 625 m^2
food market

– no public parking

+ logistic parking integrated

3xn – 2019 – Australia
Sydney Fish Market

80 000 m^2
food market

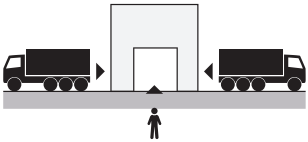


– same plot entrance for L and P flows

+ separate building entrance

WMA – 2008 – Spain
Mercabarna Flor Market

15 000 m^2
flower market

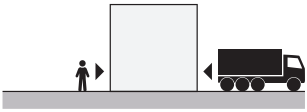


+ separate plot entrance for L and P flows

+ separate building entrance

SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m^2
fruit & vegetable market

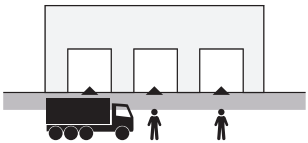


+ separate plot entrance for L and P flows

+ separate building entrance

HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m^2 + 7 300 m^2
flower market



– same plot entrance for L and P flows

+ separate building entrance

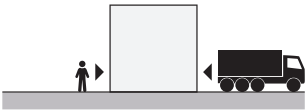
MVRDV – 2019 – Taiwan
Tainan Wholesale Fruit and Vegetable Market
11 150 m^2
fruit & vegetable market

entrance flows

How are the entrance flows organised in the project?

The diagrams are a visual abstraction of the different flows entering the building. The entrance flows are organised in different categories.

What stands out is that all the flows that go in and out of the reference projects may have a joint acces to the plot, but have a separate entrance to the building itself. The plot acts as a first separator of the flows. The building itself is the second separator of flows.

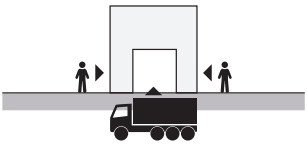


– same plot entrance for L and P flows

+ separate building entrance

OMA – 2015 – United States
West Louisville Food Port

95 625 m^2
food market

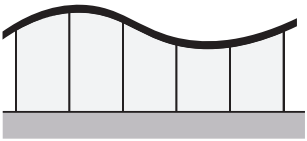


+ separate plot entrance for L and P flows

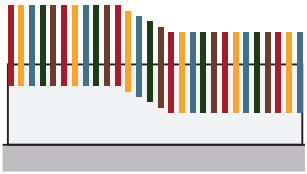
+ separate building entrance

3xn – 2019 – Australia
Sydney Fish Market

80 000 m^2
food market

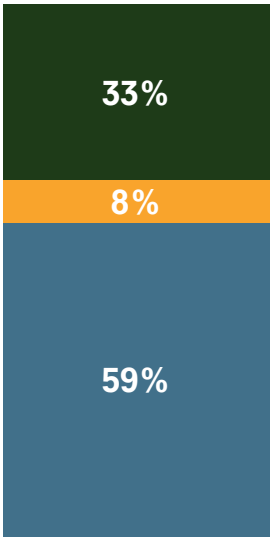


roof



facade

CHARACTERISTIC



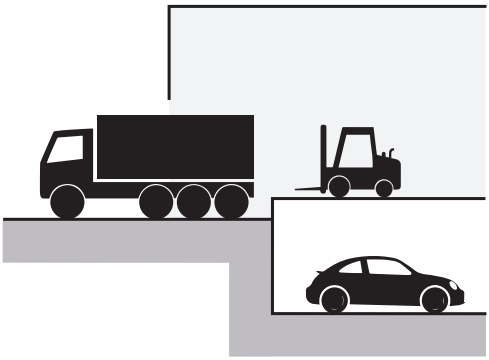
PROGRAM DIVISION

slab footprint

hook footprint

MASSING

PROGRAM RELATION



reference findings

characteristic

The main characteristic in the architectural design are that the projects has a stand-out canopy that envelops a large part or all program elements. The façade is recognisable/ unique in the urban context.

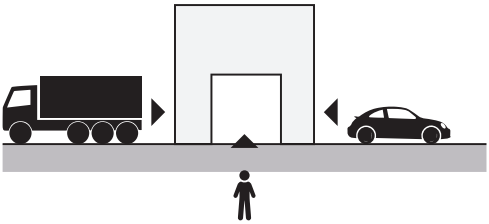
massing

The form or massing of the project is a simple form, focussing on the interior program and design: a low/medium rise slab or hook massing is most common. The surface is around 20 000 m^2.

PARKING

program

The projects are public oriented, with administratrive program acting as offices and support. The program is separated in logistic and public program elements. The adminstrative section is accessible from both logistic and public program.



parking

The design is optimized by having both logistic and public parking separate but also integrated in the building program to avoid enormous parking lots around the building.

flows

The plot entrance is separated in a logistic and public entrance, in which the individual flows (car, pedestrian, truck) are separated as well.

FLOWS

SB – 2011 – India
Mohali Fruit and Vegetable Market

18 720 m2
fruit & vegetable market

– island in asphalt parking lot
– no integrated parking
– canopy and design are not nice (opinion)
+ large open market space

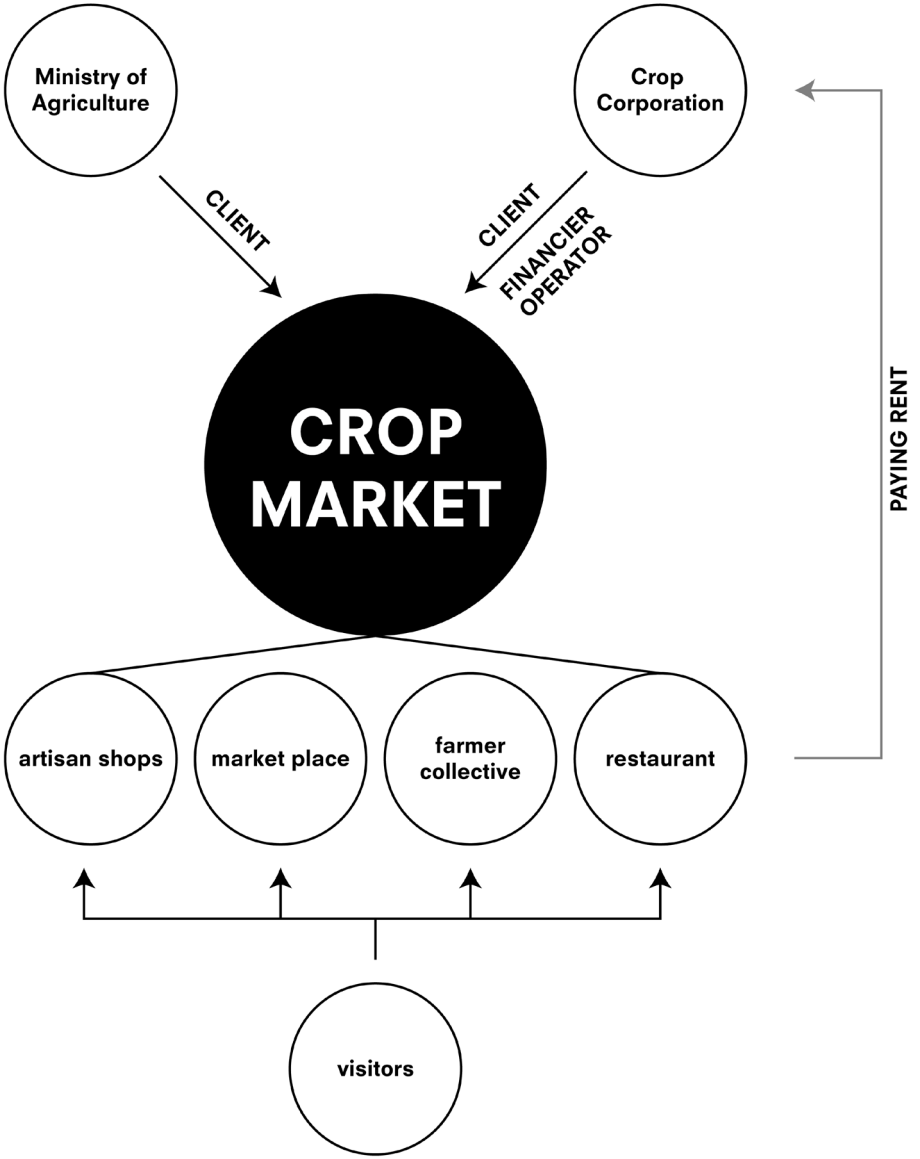
HPCA & P – 2012 – Taiwan
International Flower Trade Center

29 700 m2 + 7 300 m2
flower market

+ integrated parking
+ integrated in the urban context / accessible
+ colourful facade
+ intricate design, able to expand program

DESIGN BRIEF

03



P2 Client diagram

client

Who is the client of the project?

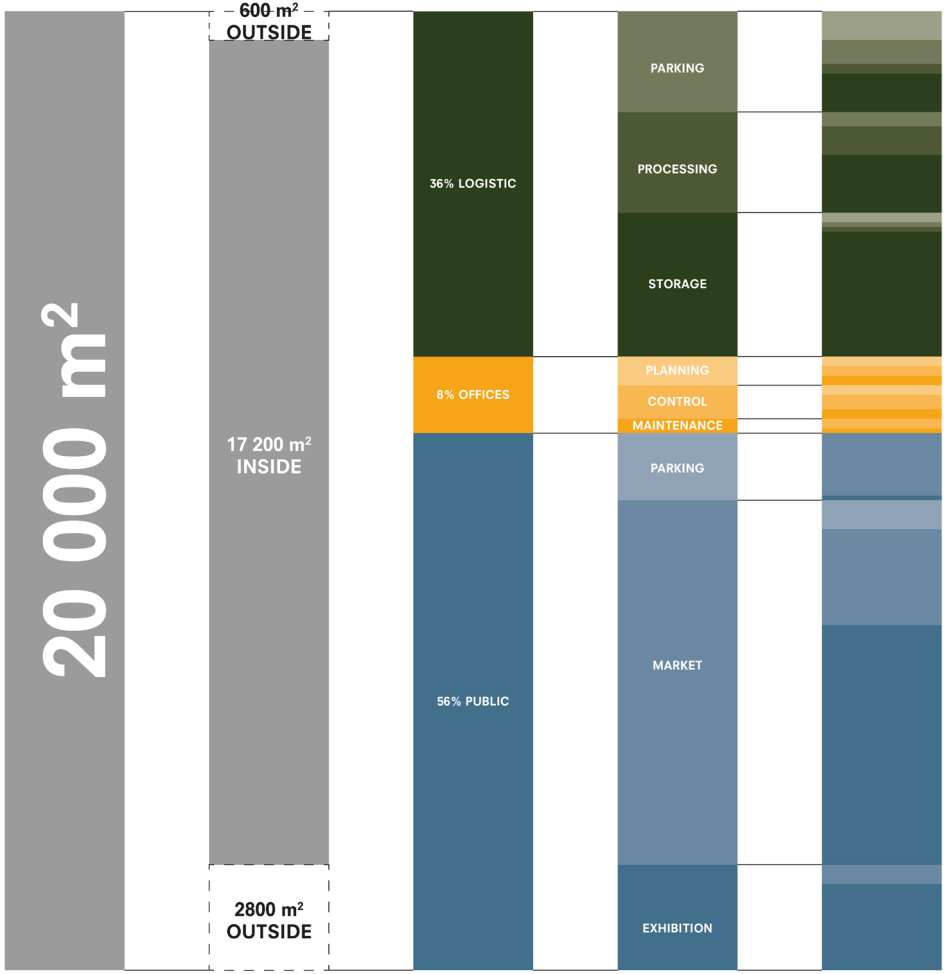
The Mar Elias Crop Market as a building is commissioned by two clients:
the Ministry of Agriculture and the newly formed Crop Corporation.
The CC operates and finances the building.

The Mar Elias Crop Market consists of certain functions: artisan shops and market stands in the market place, meeting rooms for farmers collectives, and a restaurant.

These functions with their allocated space can be rented by tenants for an amount per month. The tenants have a place to showcase and store their products.

Public visitors and logistic buyers visit the market and make use of the certain functions, paying for the products and services on offer by the tenants of the program functions.

With the funds from rent income, the Crop Corporation has the operational means to maintain the building. This circle of rent and maintaining the building is fuelled by the visitor.


20 000 m²
600 m² OUTSIDE
17 200 m² INSIDE
2800 m² OUTSIDE
36% LOGISTIC
8% OFFICES
56% PUBLIC
PARKING
PROCESSING
STORAGE
PLANNING
CONTROL
MAINTENANCE
PARKING
MARKET
EXHIBITION
3% MANOEUVRING
2,5% PARKING TRUCKS
1% PARKING VANS
4% PARKING EMPLOYEES
1,5% (UN)LOADING
3% SORTING
6% PACKAGING
1% SHOP STORAGE
0,5% RESTAURANT STORAGE
0,5% CROP SHOWROOM
13% STORAGE
1% LOGISTICS PLANNING OFFICE
1% MARKET HALL PLANNING OFFICE
1% INTERNAL LOGISTICS OFFICE
1% QUALITY CONTROL OFFICE
1,5% CENTRAL ADMINISTRATION OFFICE
1% SHOP ADMINISTRATION OFFICES
1% MEETING ROOMS
0,5% GARDEN MAINTENANCE OFFICE
6,5% PARKING VISITORS
0,5% PARKING DISTRIBUTION CLIENTS
3% RESTAURANT
10% SHOP
25% MARKET HALL
2% SQUARE
9% GARDEN

program
The project program is divided over 20 000 m2, of which 2800 m2 is outside. The program is divided into a logistic, public and office program based on reference analysis of program division.

Logistic is subdivided in parking processing and storage. Public is divided in parking, market and exhibition. The offices are divided in planning, control and maintenance, which correspond with the logistic and public functions.

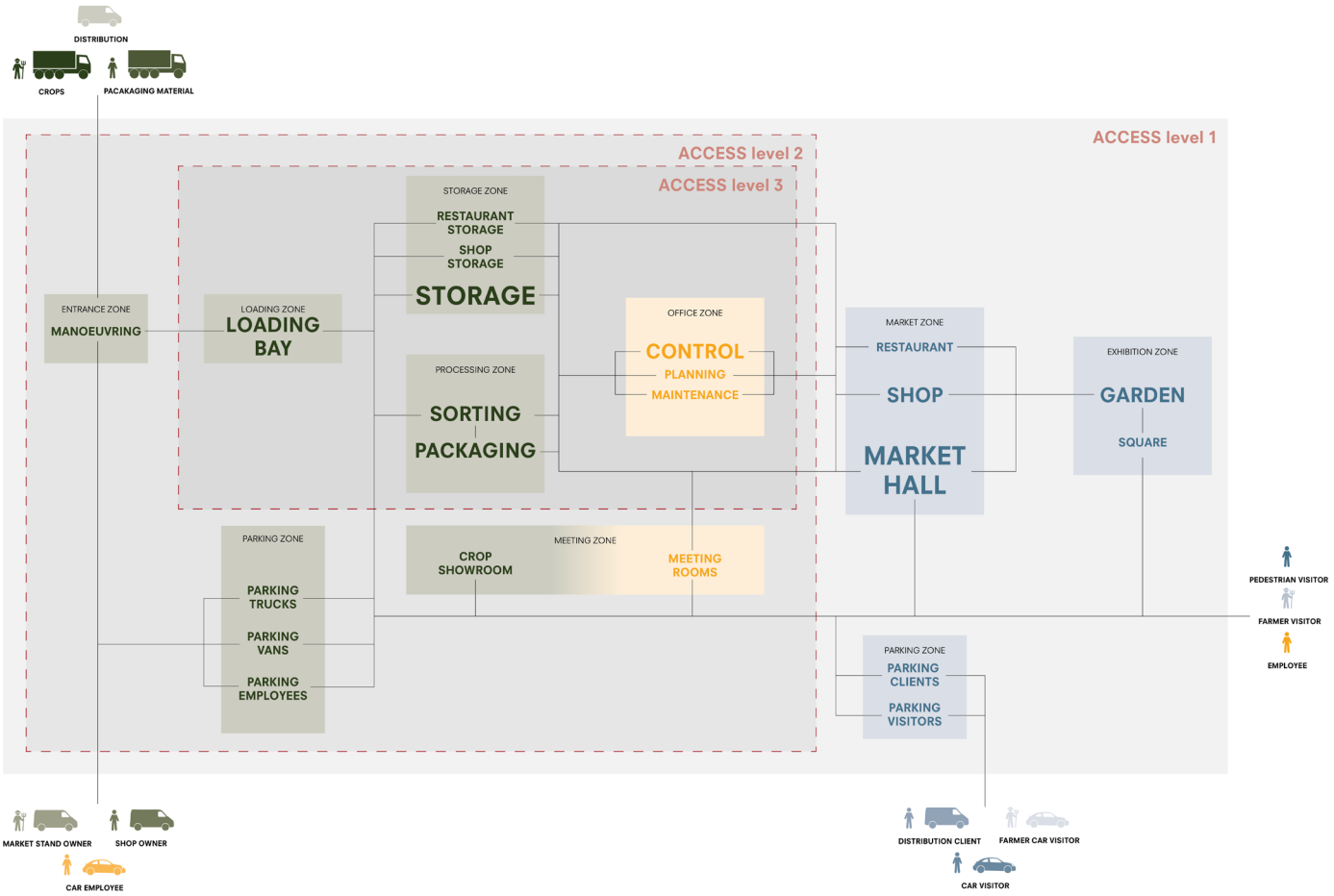
Technical space, toilets, circulation (elevators and stairs) are not detailed in the program, since they are not the objective of the program division. These spaces are included in the current program elements.

program changes - design phase
During further elaboration of the urban masterplan, specifically the market district, certain program removed. The size of certain program functions proved not big enough after further individual research.

The main function that was removed is the parking for visitors. Spinneys square (in between the Mar Elias Crop Market and Beirut's Living Room; see the urban masterplan satellite collage) will host an underground parking big enough to fit this program part (and parking functions from other supermarkets).

This change freed up space for a larger processing hall where crops are sorted and packaged. Also a temporary cold storage was added to the program to already separate the crops for direct distribution and longer storage / market hall use.

Design decisions also shifted the indoor vs outdoor program square meters. A part of the market hall moved to the outside, creating an indoor and outdoor market space. All final program functions and the square meters are indicated on the floor plans.



P2 relation diagram

users

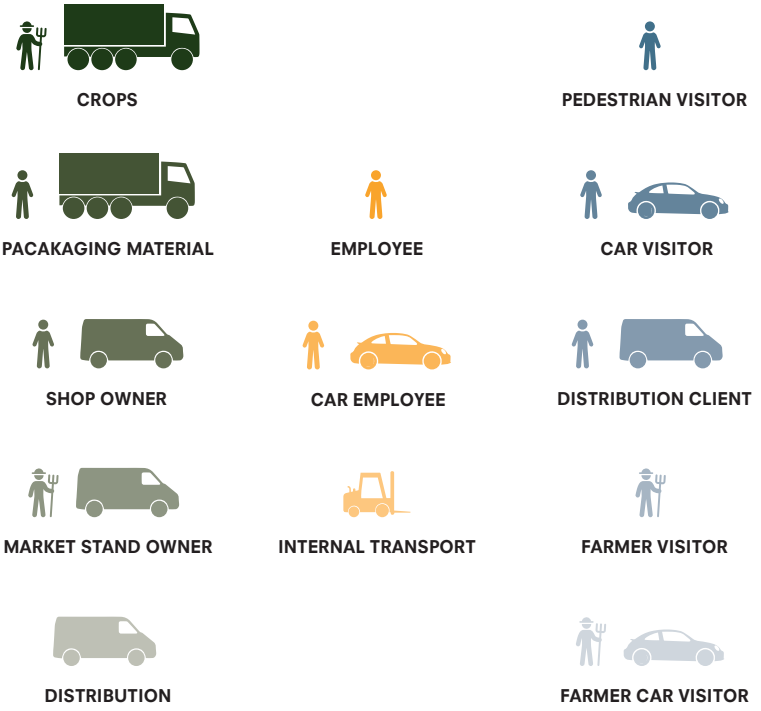
These users have different access to the building. This is divided in three security zones to avoid clashes between user groups.

The users are colour coded. Green users are the logistic users, yellow are the employees/support staff, blue are the public users. These users are separated in four groups, each having a different approach to the building. This is visible in the relation diagram. The public users (blue) have access level 1, with an exception that farmers and clients can meet in the meeting rooms in zone 2. The logistic users and support staff has access to all levels.

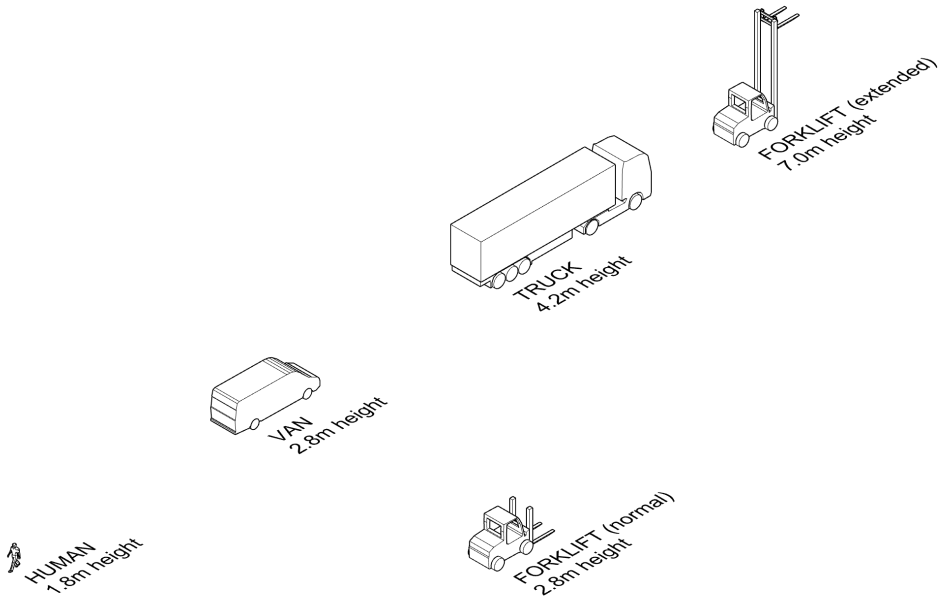
relation diagram

The relation diagram is divided in three different access zones to avoid clashes between public and logistic users. These functions are clearly separated in the programmatic layout of the building.

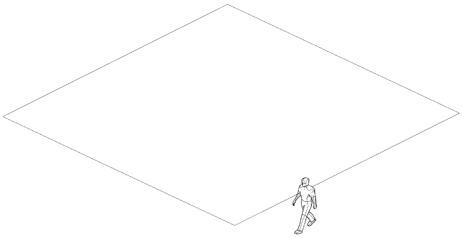
The offices act as barrier between the two differnt aspects of the building.



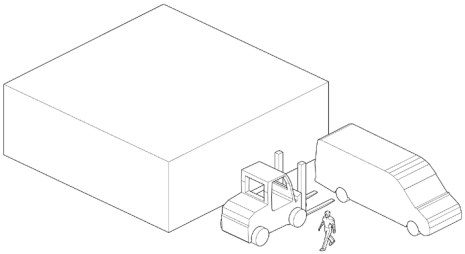
P2 Users grouped to logistic, employee, public



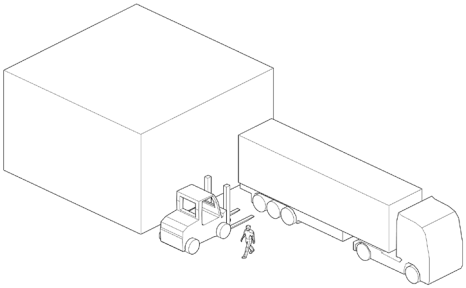
P2 User dimensions



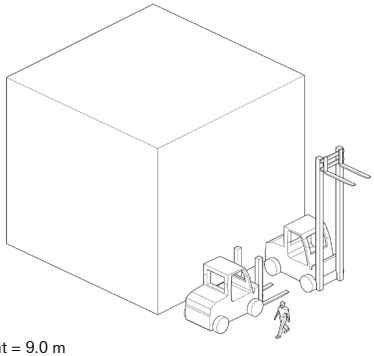
1) height = ~ m



2) height = 3.5 m



3) height = 6.0 m

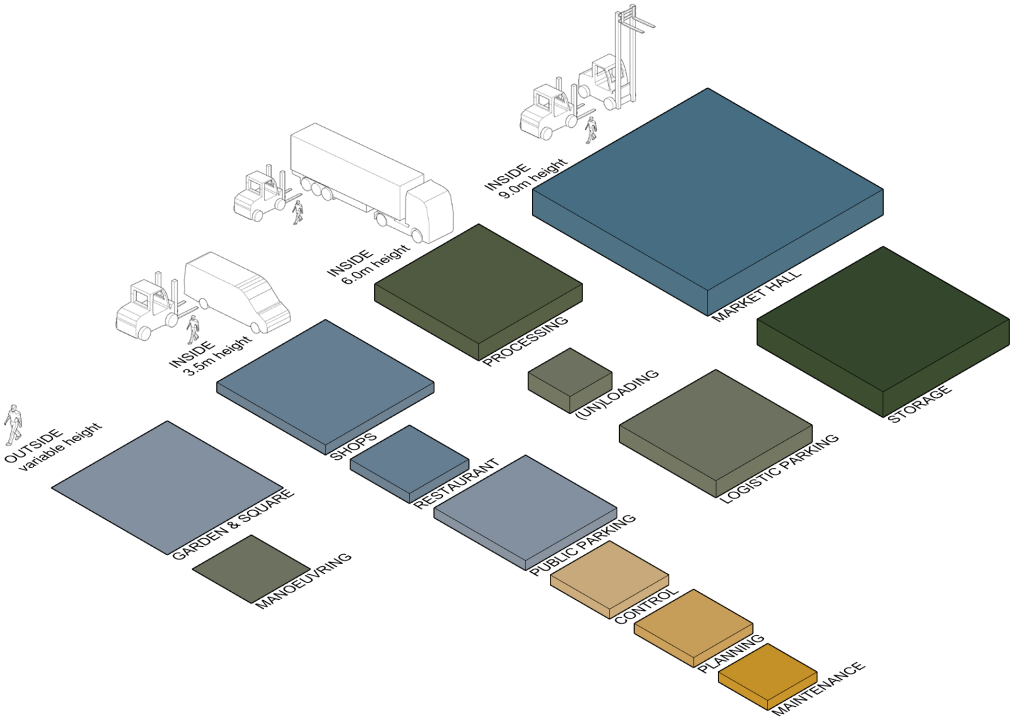


4) height = 9.0 m

P2 Spatial principles

principles

The program sections are divided according to their users in 4 sections: var, low, middle and high. These principles can be combined into typical sections for the market, for parking and logistics. To answer the research question preliminary: a combination of program elements and a compacting of functions leads to the optimal integration into a dense fabric.



P2 Spatial principles

NEW

+ higher building height allows program integration

+ different floor height cause new visual interaction/view on market hall

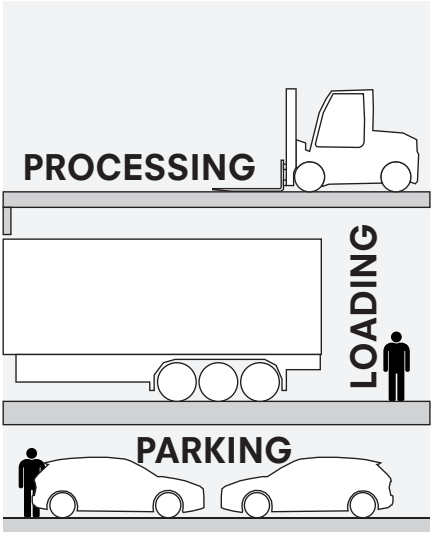
+ variation in program: shop and market stand

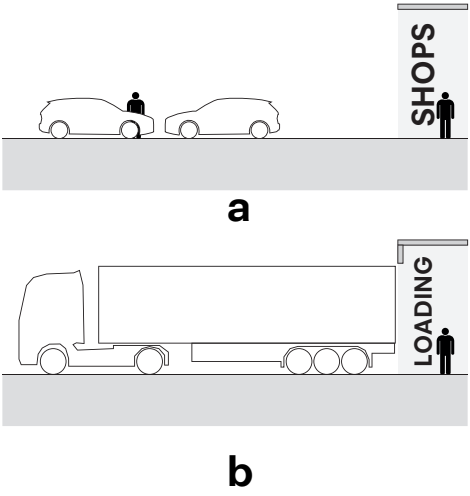
TRADITIONAL

- repeating section

- monotonous

- lower ceiling





NEW

+ parking public and logistic are separated

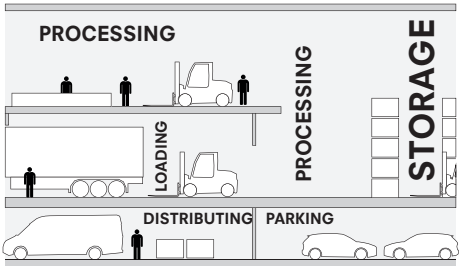
+ parking is integrated in building

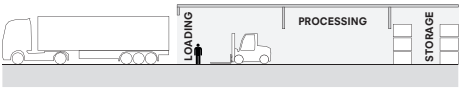
TRADITIONAL

- parking not integrated in the building

- plot needs massive parking lot

P2 Typical sections





NEW

TRADITIONAL

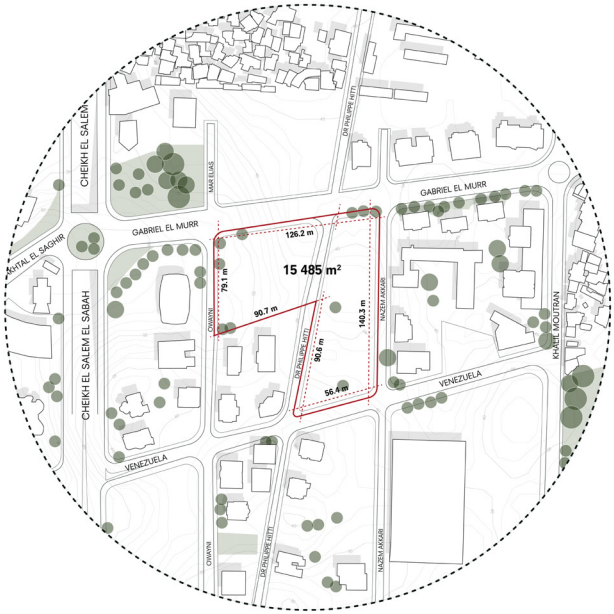
+ integrating the whole process in one building

- functions are next to each other, requiring larger plan

+ parking part of the building

- parking is outside

P2 Typical sections



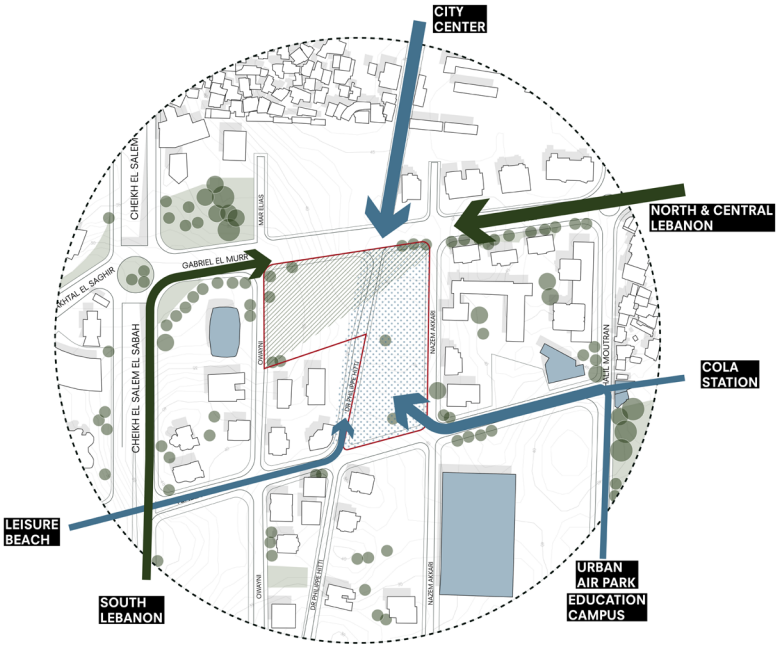
P2 Site analysis

site

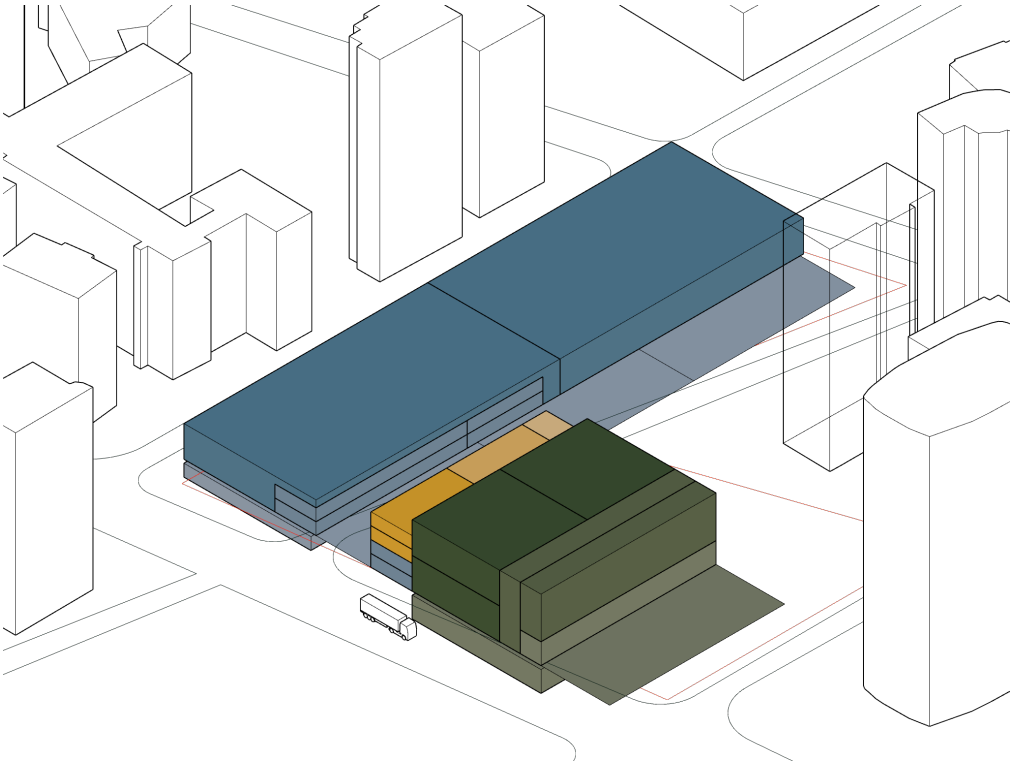
The site itself is around 126 by 140 meters, totalling 15 485 m2. The setback is on average 4-8 meters from the plot border. The site is intersected by dr. Philippe Hitti street.

The site is surrounded by local shops, markets, and refugee camps and the stonecutting industry. The site is intersected by the pedestrian boulevards connecting all the mosaic districts. Public flows approach the site from north and south, logistic flows approach the site from east and west.

Concluding from site analysis, the building should be approachable from all sides, the boulevard as public heart of the building, and program placement according to the site context and pressure from the approaching flows.



P2 Site analysis



P2 Massing conclusion

massing

Beirut's urban rules approve of 23 228 m2. Reference research averages a program of 20 000m2. The plot setback according to the urban context is 4 to 8 meters varying on the plot borders. The urban context has masses ranging from 5 to 70 meters and averages a 40 meter height.

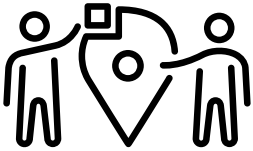
Hook, slab and tower typology fit best according to reference research and site context. The final massing is a combination of the slab, and hook typology. The street intersecting the plot is a quality and must be kept in the mass. The street acts as a pedestrian (public) axis in the urban masterplan, connecting the city center and the market district in the Beirut Mosaic.

The massing should integrate program functions in each other, compacting the program as much as possible.

The administrative program should connect to both programs, acting as the control centre of the project.

FOOD CHAIN

strengthening the food chain from land to city



PUBLIC SPACE

adding public space to Beirut

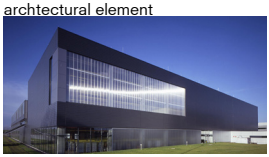
RESILIENT FUTURE

contributing to food security in Beirut and Lebanon

General ambitions

integrating program functions to save space

simple layout enveloped by archtectural element



combining program in simple mass

pointed arches

brise soleil (public + offices)

stone monolith (logistic)

closed facade (logistic)

semi open facade (offices)

open facade (public)

FUNCTIONAL

functional building operating efficiently

LEBANESE DESIGN

using traditional Lebanese design and morphology

APPEARANCE

open and closed façade according to program elements

Architecture ambitions

general ambitions
The project aims to strengthen the food chain in Beirut, add public space to the city and contribute to a resilient food future.

architecture
The building is a modern functional building. The architecture should use traditional Lebanese design shapes, and should be a closed appearance with logistic program, and (semi) open appearance for the public program.

construction
The building construction should take up the least space possible to have more room for storage and activity. The construction should adapt to the program function and user dimensions. The construction has a difference according to the program.

materials
The project should have a contrast in materiality: steel structure and stone cladding resembling cold atmosphere and heavy mass for logistic. Wood structure and glass and textile resembling inviting warm atmosphere. Local materials are used from stone industry and wood production.

sustainable
The building should generate electricity to minimise grid use. Use local materials. Solar energy and rainwater collection to power cooling and processing, use water for grading. Use natural ventilation and passive cooling architectural elements to minimise grid use.


wood construction for public program


slender steel construction for logistic program


open vs. closed

SPACE

construction taking up least space possible

INTEGRATION

construction to be with program function

APPEARANCE

different construction materials according to program

Construction ambitions

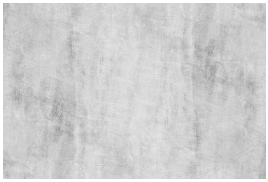
olive wood

coloured marble

limestone

cedar wood

grey marble



concrete

CONTRAST

contrast in materiality resembling the program elements

LOCAL MATERIAL

using local materials from the wood and stone industry

ATMOSPHERE

contrast in atmosphere: warm for public, cold for storage

Material ambitions

solar energy collection

rainwater collection

creating a microclimate

PASSIVE CLIMATE

using and integrating passive climate solutions to minimize footprint

LOCAL MATERIAL

using local materials from the wood and stone industry

CREATING ENERGY

generating electricity to minimize grid use and support future transport

Sustainable ambitions

P2 Project conclusion collage

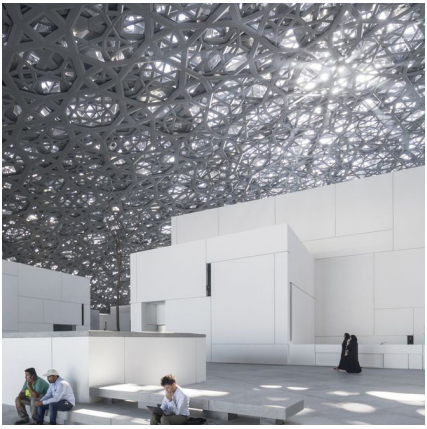
DESIGN

04

terrain

context

flows



light

concept drivers
The four elements that formed the basis for the concept are: terrain, user flows, context, and light.

terrain
The project site is characterised by the terrain, ranging from +32 to +42 meters above sea level. Originally the site and surroundings were part of a series of sand dunes "Bir Hasan sand dunes".

The terrain is at the lowest on the west side, quickly raising going from there to the intersecting road which follows a ridge like path. The right side is characterised by mostly flat surface with a slight dip.

flows
In the design proposal a public and non-public program was described, as well as various user groups which have different access levels to the building.

The main logistic flow arrives at the west side of the site and the main public flow arrives at the north and south side of the side. The design proposal states a clear separation in program is needed in order to avoid clashes between public and logistic flows.

In the design concept this is realised by having different entrances for the logistic and public flows, and within the building there are different access level zones.

context
The context of the site is varied. In the north there is industrial activity (stonecutting factories) and in the west and south there is commercial activity. Another context element is the road as pedestrian boulevard in the urban masterplan intersecting the plot.

To contrast this intersection, a mass is placed not perpendicular on the road, but perpendicular to the north. This creates a sharper cut through the mass. The western part of the plot has only public functions, responding to the surrounding functions.

light
Sunlight plays a big role in Beirut. A market and direct sunlight do not go hand in hand, as sunlight acts as a catalyst in the ripening process.

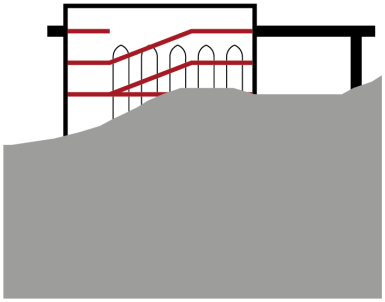
Filtered, and or diffuse light create a pleasant atmosphere not only for the users but also extend the lifespan of fruit and vegetables.

In the design concept a play with light and shade is proposed, animating the interior of the market hall.

mass

canopy

arch



street

design elements

The concept drivers relate to the four design elements: mass, canopy, column, and street.

mass

Turning the terrain into an asset, is placed into the terrain, creating a lowest level that is partially underground. The "intestines" of the project (mostly logistics) are hidden.

canopy

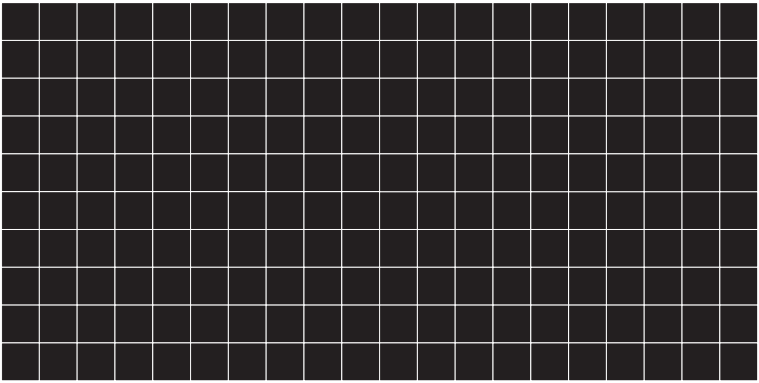
The canopy shelters the main mass, and reflects on the market in a simpeler, smaller structure. This canopy emphasises the hierarchy of the design. The mass is a formal structure, and the outdoor market an informal structure.

column

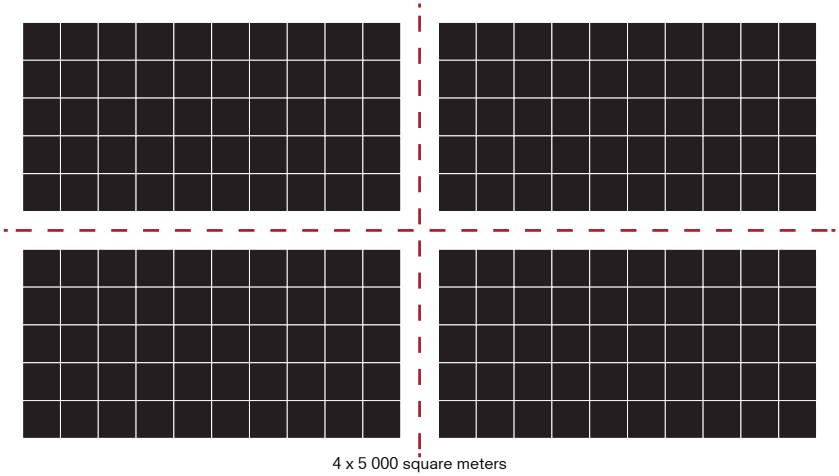
The structure that carries the canopy is a forest where the columns become trees, carrying the canopy.

street

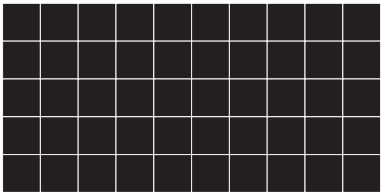
The terrain has a height difference in the north-south axis. Approaching from the north, the terrain terraces into the main market hall. Adjacent to the street intersecting, big stairs lead up to the next floor where another market hall is placed.



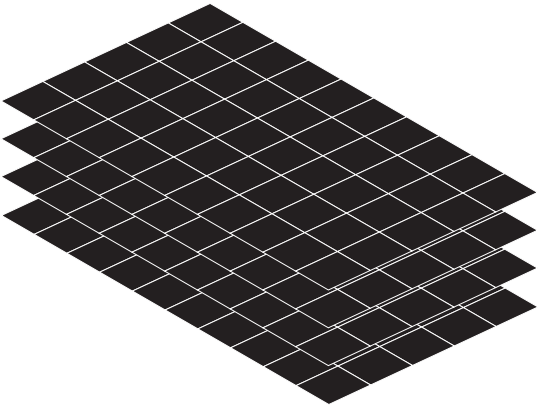
20 000 square meters



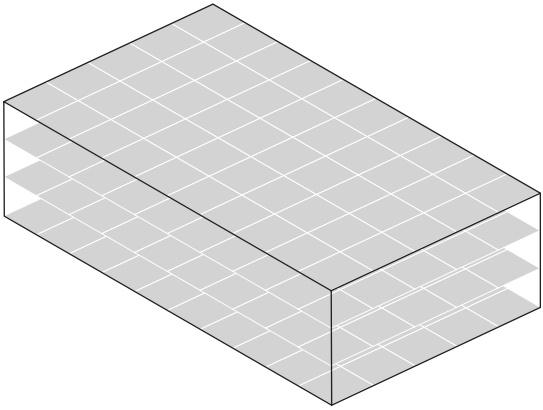
4 x 5 000 square meters



5 000 square meters

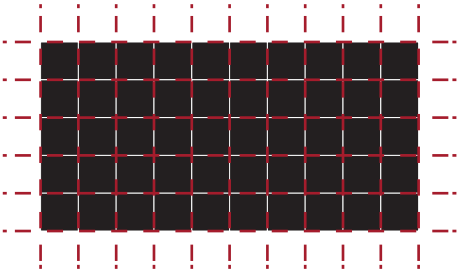


4x 5 000 square meters



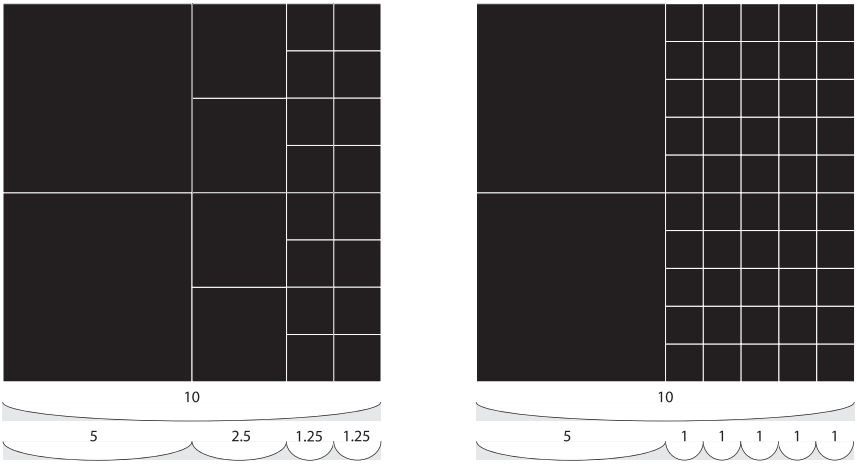
building mass
4x 5 000 square meters

Grid system



5 000 square meters
10 x 10 m grid

one grid unit
100 square meters



2 x 100 square meters

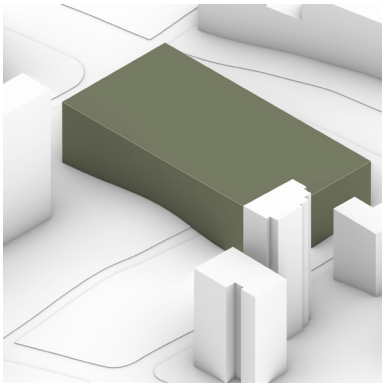
grid

The grid is based on the program size. 20 000 m^2 can be divided into 200 squares of 100 m^2. This program is cut into four equal parts. If stacked, these form a slab mass.

A floor plan of the mass is divided in 10 x 5 equal parts through a 10 x 10 m grid. One grid unit can be divided into 2 and then 2, creating a system of 10, 5 2.5 meter system. It can also be divided in 2 and then 5, creating a 10, 5, 1 meter system.

With this grid and division system the design is developed during the second semester

1)



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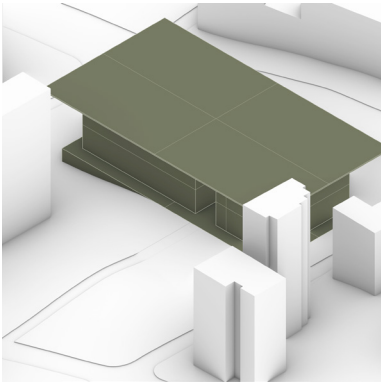

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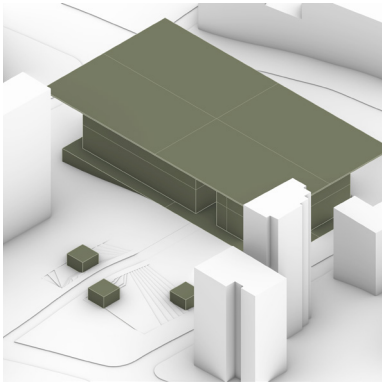


6)

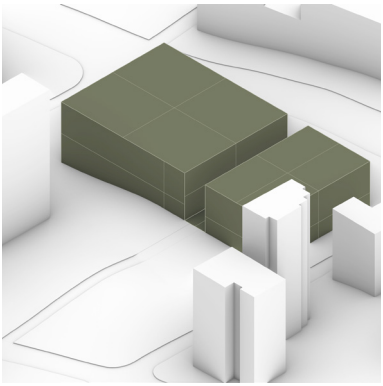
concept development

1) The site has a rough terrain, ranging from +32 m on the northwest side of the plot to +42 m on the west side of the plot.

2) The main mass is placed on the north side of the plot, creating an open space on the south side of the plot. The mass emerges from the terrain. On the west side of the mass the elevation is lower than the east side, creating an approach to the mass on various heights. The logistic flows enter the mass on the lower entrance, and public flows enter the mass on the higher entrance. The terrain creates a natural separation in flows.

3) The public boulevard intersects the mass in the north south axis, creating a passage in the mass. The project is located on the north side of the market district. The mass becomes a gate to the market district when approached from the north by public.

4) A setback in the mass creates a transition space from the outdoor to indoor in the mass. The setback in the mass emphasizes the terrain and the entrances on different levels. The setback creates a base, partially in



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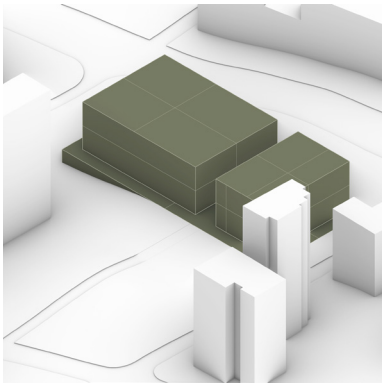

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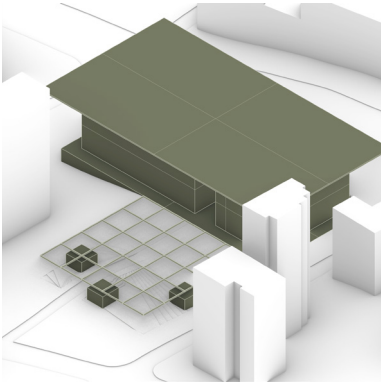

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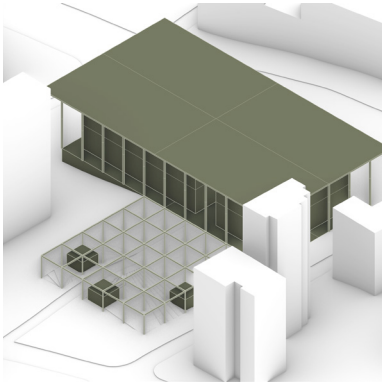


8)

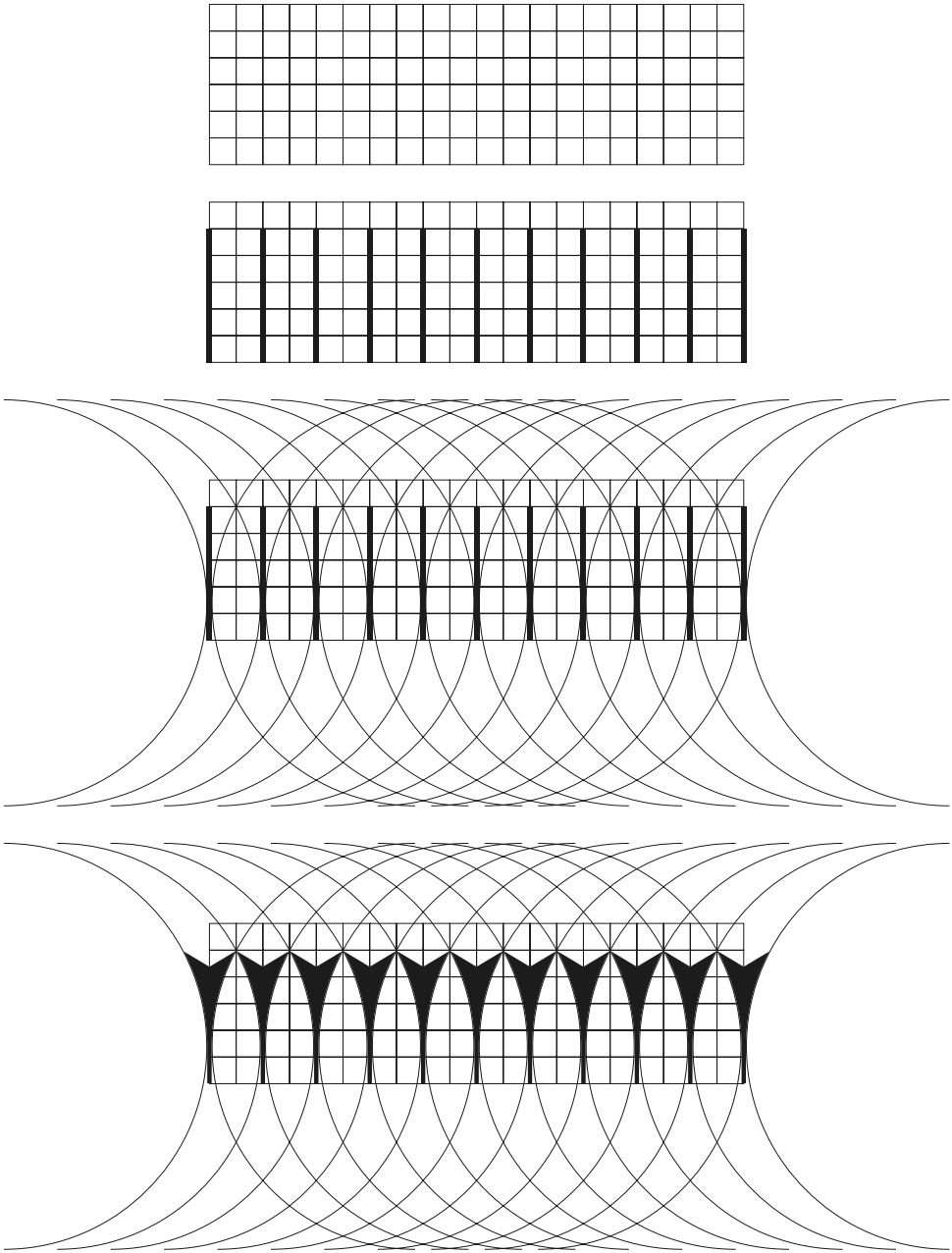
the ground where the majority of the logistics program is placed. This base envelops the logistics process from unloading to storage, separating these flows from the public.

5) A canopy envelops the mass with the logistic program functions as a base and the public program functions on the base. The canopy is separated from the main mass and extends beyond the dimensions of the main mass, emphasizing the transition between the indoor and outdoor. The canopy shelters the program functions on the base from the sun.

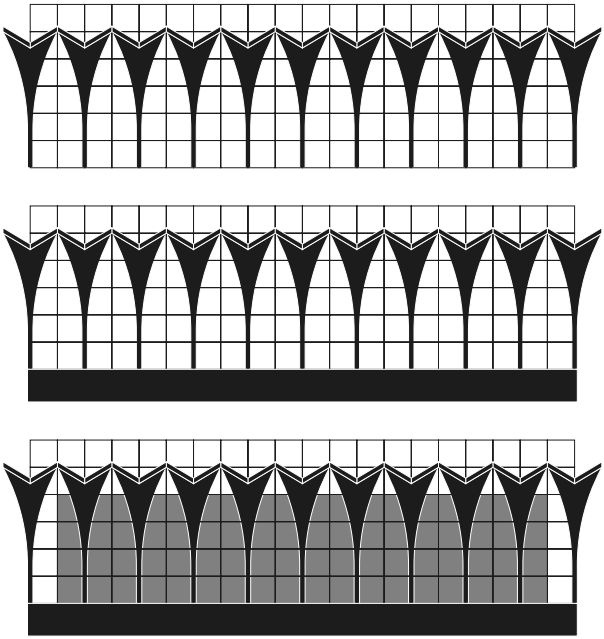
6) On the open space on the south side of the plot, pavilions are placed to create a more informal outdoor space which is intersected by the public boulevard.

7) A open canopy structure envelops the informal outdoor space, framing the space and interiorizing the exterior.

8) The open canopy and the canopy enveloping the main mass are structured and carried by columns on a grid, connecting the indoor and outdoor in the same rhythm.



Geometry of the canopy



geometry

The column geometry and form stem from the division system in the grid and concept development. The 10 x 10 grid is divided into two, creating a 5 x 5 grid. On the grid lines columns are placed. These columns are the basic form, but with the help of the circle they can meet on the 5 m grid lines, touching each other and creating a chaliced column. The counterform, which is the space between columns, has the shape of the arch.

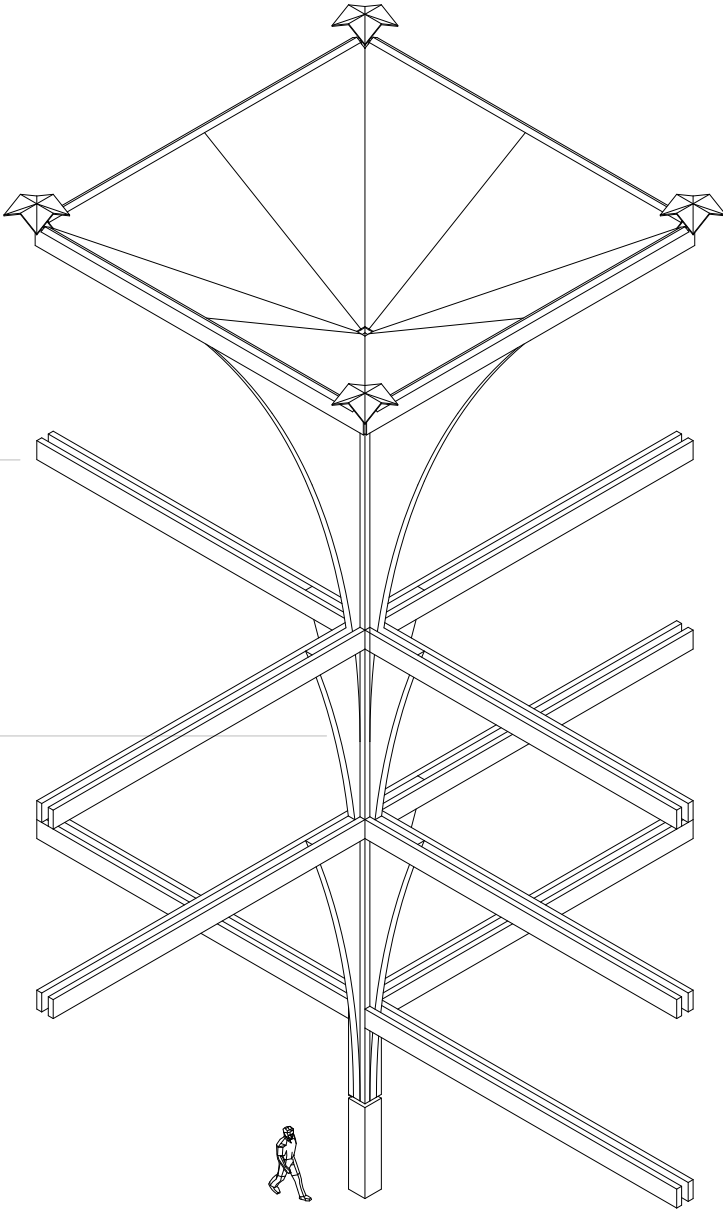
The columns carry the chalice elements on top, forming a canopy. The canopy and columns stand on a solid base. Under the canopy, with a setback of 5 meter, the remaining mass is placed.

beams

- branching out from the column
- main load bearing structure bolted to flanges
- light elements in between beams creating atmosphere

flanges

- mimicking branching of a tree
- inserted in column milling seam, shortening the span of the beams



construction principle

The construction of the project consists of a column and roof element, integrated into one sculpture wich forms the canopy of the main mass.

The column is a double column laminated veneer lumber (LVL) system, resting on a concrete base. The column spreads its flanges the closer to the roof element, connecting with the other columns and forming a consistent whole.

The column itself is a combination of two 175x500 LVL beams with flanges, forming two T beams at the rooftop. The flanges are connected to each other with a steel element. The LVL column hide the rain water pipe that collects water from the chalice. The LVL column are resting on a concrete base, which has a slight separation through a steel connector element, making the rain water pipe visible and questioning what is carrying what.

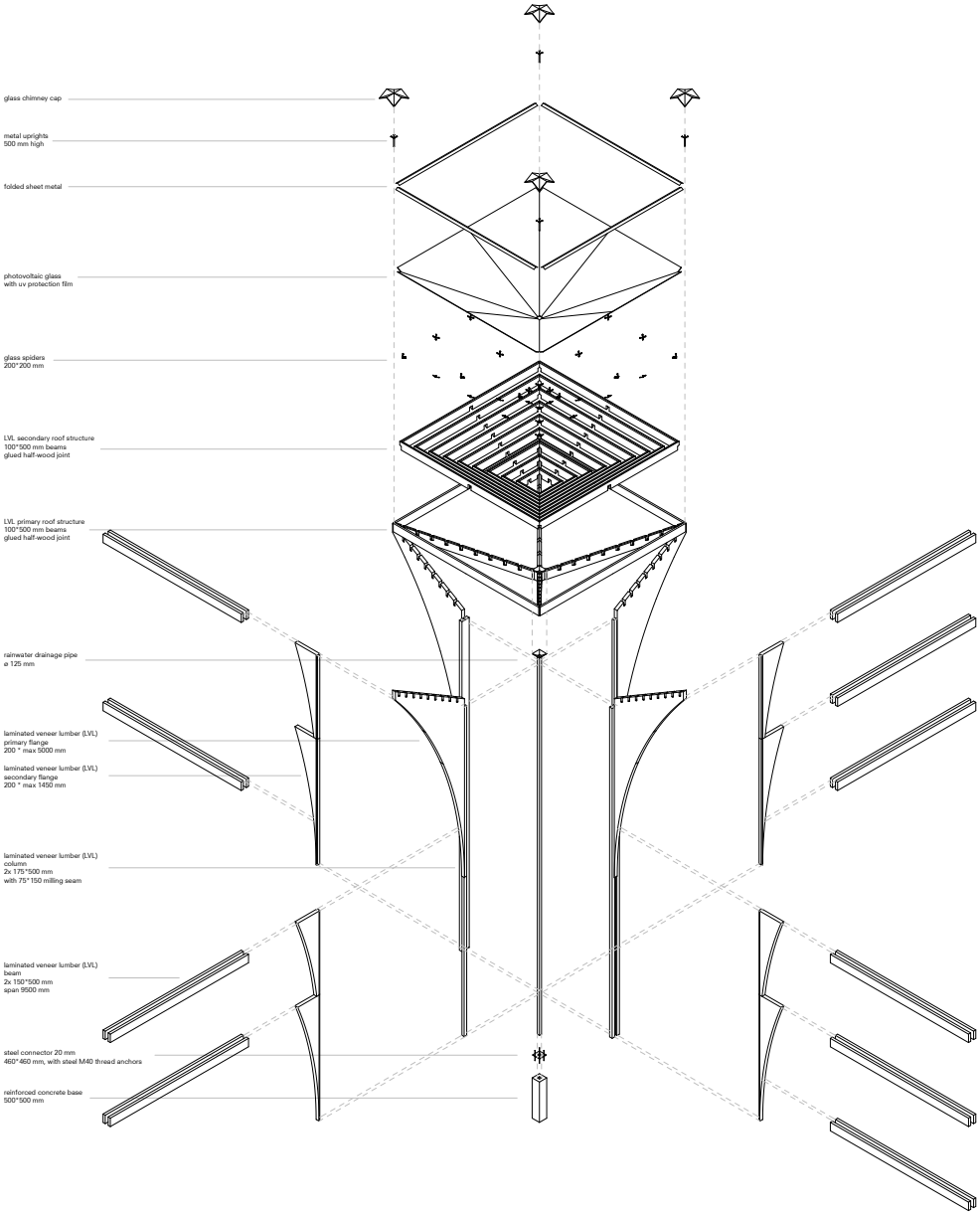
The roof element is placed on the flanges and by means of a secondary structure which keeps the direct sun out for the most part of the day, the photovoltaic glass elements are placed on a glass spider, slightly raising it from the secondary structure.

In total the canopy of the main mass consists of 66 construction elements in a 6 x 11 placement.

The forest chalice rests on a concrete base , which houses the logistic process. The concrete base or bassin consists of the concrete columns which are an extension of the roof/column system, and concrete beams which form the main connecting structure.

Where it is needed in the program design, main load bearing beams are connected to the column with an additional flange. These load bearing beams are also a double system, creating a space in between for lighting systems.

The column with flanges is an abstraction of a tree with its branches reaching up and forming a canopy.



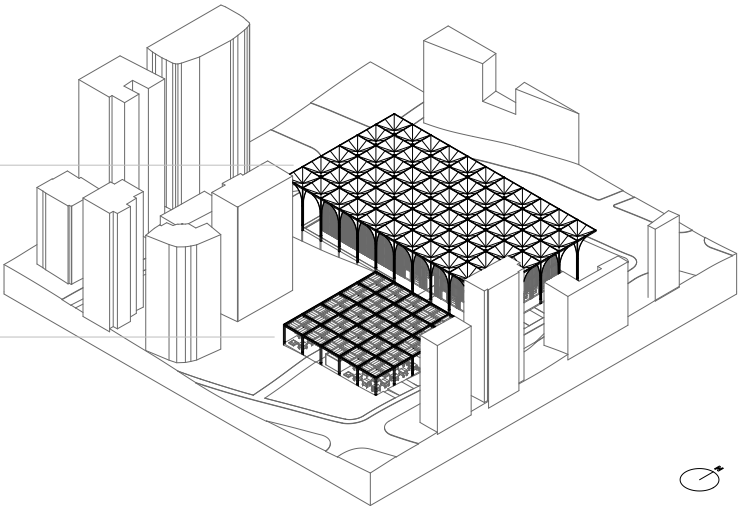
Exploded axonometry of the column and chalice element

building mass

- 100 x 50 meter plan surface with 10 x 10 meter grid
- columns placed on 66 grid intersections
- columns support 6600 m² canopy enveloping the program functions

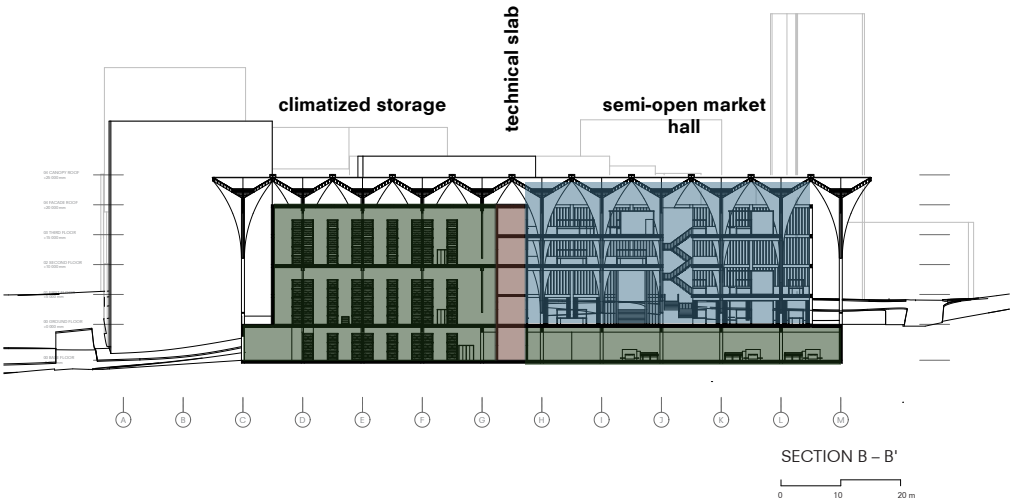
outdoor square

- 50 x 50 meter plan surface with 10 x 10 meter grid
- columns placed on 36 grid intersections
- informal 2500 m² pergola structure with textile canopy enveloping the program functions
- pergola main structure 500 x 500 LVL hollow column steel connector element on 500 x 500 concrete base with 150 x 500 LVL beams



DESIGN
axonometry

Formal canopy construction and informal pergola structure


climatized storage
technical slab
semi-open market hall
A
B
C
D
E
F
G
H
I
J
K
L
M
SECTION B – B'
0
10
20 m

climate principle

The climate principle of the project is divided in two general principles. The design (see concept explanation) is divided in the mass by a technical slab, which hosts the technical space and the circulation cores. The two main climate principles are the storage hall and the market hall, which both are enveloped by the canopy.

The canopy has a main climate principle of passive shading. This is done by the overhang of the canopy of 5 meters, and the canopy covering the total floor area The canopy has active climate principles. The canopy collects energy through photovoltaic glass, and each roof chalice collects water when raining. The generated electricity is used for the main climate principle of the storage hall, which is cooling. The collected water is used for the exhibition garden and the grey water system in the main building.

the storage hall

The storage hall functions as a sealed box, where the fruit and vegetables are kept for a longer time period. Insulation, ventilation, and floorspace are the main ingredients for a well functioning storage space.

Insulation is used to prevent the cold from escaping. Therefore doors should be seen as air locks functioning as intermediate temperature rooms. Strips interrupt the airflow and the doors seal tight.

Cooling is done in three components. Air flow, humidity and temperature. These three components are used to maintain an optimal climate.

In the cold storage the floor slab has underfloor glycol cooling in it, creating a {geleidelijke} transmission of cool air. As it heats up the air rises and is extracted by an evaporator, which also extracts humidity from the air. Cold air is blown in the room by an air cooler, which is connected to a temperature sensor and ambient temperature sensor.

The evaporator is connected to a condensing unit and has a drain pipe attached for water excess.

This system constantly checks the climate with help of the temperature and ambient temperature sensor to make sure the climate is maintained.

the market hall

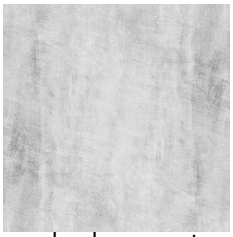
The market hall is a semi-open structure sheltered by the canopy. The market hall makes use of natural cross ventilation.

The canopy prevents most of the direct sunlight coming in during the day and reflects uv lighting, creating a more pleasant atmosphere.

The canopy has openings on the connection points of the chalices, which acts as a ventilation chimney. The chimney is above the roof line, creating a natural air draft of hot air from the market hall escaping through the chimney.

The facade of the market hall is a simple structure which contains vertical slabs. These slabs filter and block direct sunlight going to the market hall.


LVL wood


washed concrete


steel


birch wood


concrete

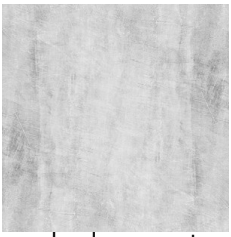

limestone

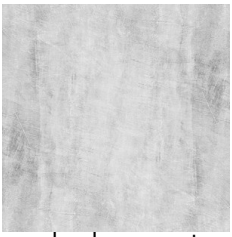

travertine

materials
The main materials used in the project are a mixture of concrete and wood.

column and canopy
The columns are materialized in a concrete base with a LVL wooden column. These elements are connected with steel.

market interior
The interior walls are materialized in washed concrete, creating a subtle difference with the construction elements. The flooring of the market hall is in limestone tiles, and the flooring of the market street is in travertine tiles. The market stands are made of a light birch wood. These materials create a light and warm atmosphere.


washed concrete


washed concrete


olive wood


concrete


concrete


steel

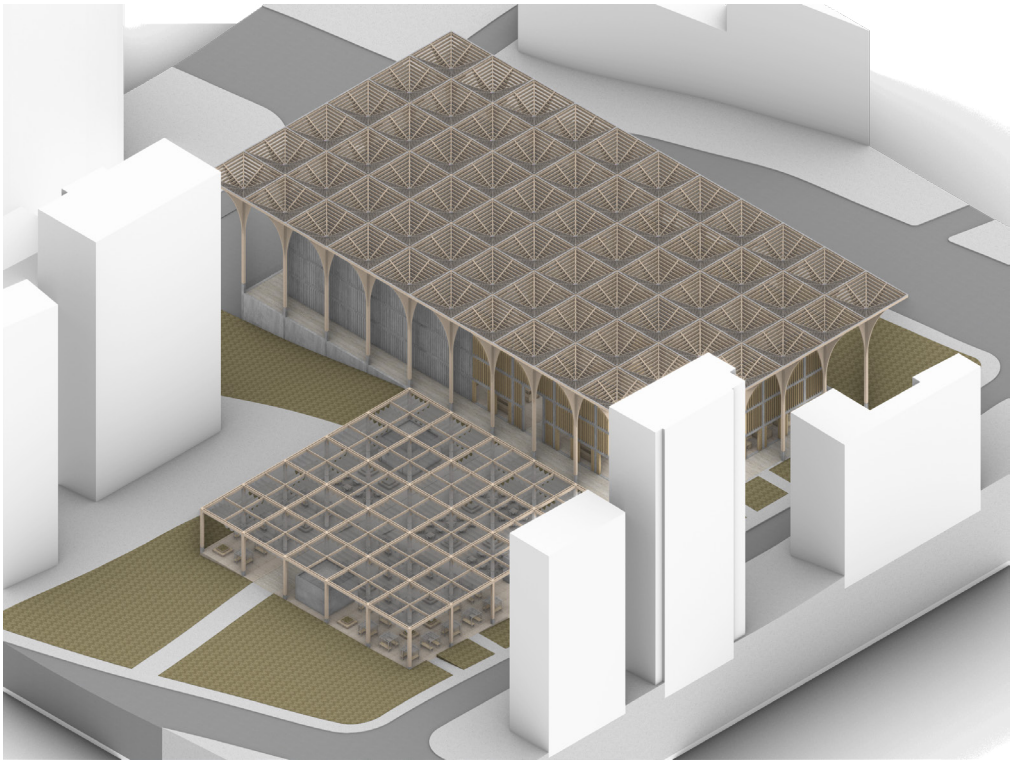

aluminium

facade
The facade is divided in two parts. The main grid structure is materialized in concrete. The market hall facade is materialized in olive wood vertical slats, and the office and storage facade is materialized in washed concrete.

logistic interior
The logistic base is materialized in concrete. Concrete columns and beams form the basis for the canopy and washed concrete interior walls are accentuated with steel door frames with aluminium doors. These materials create a light and cold atmosphere.

CONCLUSION

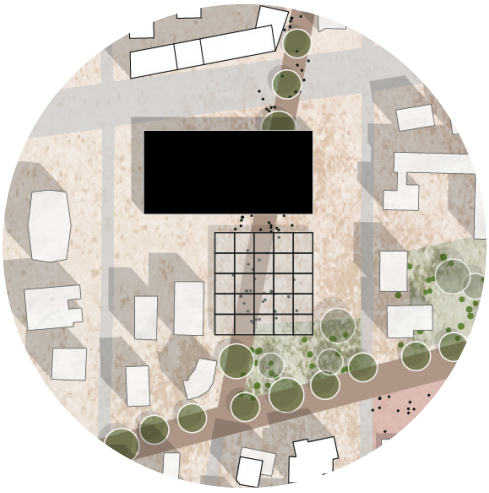
05



conclusion

The research question is as follows:

How can a food logistics facility and wholesale crop market be integrated in a high density urban fabric in Beirut?



*"The **Mar Elias Crop Market** connects Beirutis with the Lebanese food chain through a varying and diverse program under a public canopy"*

– Tycho van Gelder, Production

The Mar Elias Crop Market lands in the Beirut Mosaic as the protagonist project of the market district in the urban masterplan. The Mar Elias Crop Market functions as a gate to the market district when approached from the north, accentuated through the form of the canopy which stands out in the urban context. The research formed a set of tools and design constraints regarding flows, shape and form. These tools were used in the design process to form this building.

This design matches the stated ambitions, formulated at the end of the research semester. The ambitions and design brief are site specific, but the end design in form and shape can be used in other contexts as well, creating a recognisable typology.

The Mar Elias Crop Market project is intended as a decentral food storage, processing and distribution building to cover a part of Beirut and their need of food. This building is intended to be part of a larger system of storage and distribution buildings.

The public market functions as a place where Beiruti's can meet and where the food and market culture of Beirut and Lebanon is revived and enhanced.

reflection

ASPECT 1
the relationship between research and design

The research conducted in the first semester has a direct basis for the design phase in the second semester, but overall the research conducted influenced the design approach, and the design decisions and approach provided further research exploration and elaboration.

Group research regarding the Beirut context and suburban site context in combination with topic research directly influenced the building typology choice and provided a basis for the program. The topic research was a basis for the project ambitions which formed the basis of the design brief. These project ambitions are as follows: strengthening the food chain by improving post-harvest handling, adding public space to the suburb and improving the food security in Beirut and Lebanon.

Reference research into projects containing a (similar) logistic and public program provided a clear set of principles and benchmarks which formed the basis of the design brief. The preliminary research question and sub questions conclusions, provided clear constraints that were put in the design brief.

During the process of designing, new aspects of the topic and research will be encountered which demands a deeper investigation. The advantage of this combination is that research during the design phase can be implemented and tested directly in the current design, allowing for more design options and thorough research.

ASPECT 2
the relationship between your graduation topic and studio topic

The topic of the Complex Projects Beirut Studio is (dealing with) catastrophe in the built environment. In Beirut on August 4 2020, an explosion in the port area devastated the city, injuring people and completely obliterating the port area and surroundings. One structure demolished by the blast was Lebanon's only grain silo, containing over 80% of the country's grain reserves. These reserves were lost due to the blast and sparked the interest for the research topic production.

Further research into food production and the food chain in Lebanon and Beirut showed that the Lebanese are facing challenges regarding this topic. The group research where the Beirut urban context was analyzed showed challenges that were translated into a group ambition and strategy. The combination of the group ambition and strategy and the topic challenges formed the basis of the narrative.

The design project is a reacting to the challenges in Beirut regarding the studio and graduation topic. The design touches three components:
– a decentralised, smaller food (in this case fruit and vegetable) storage; in case future catastrophe there will be multiple storages and the food chain will not be (completely) paralyzed
– a program containing multiple parts of

the food chain, making it more efficient and resulting in less loss of product.
– a project integrated in and responding to the (suburban) city fabric, also providing new public space for Beirut inhabitants.

ASPECT 3
research method and approach chosen by the student in relation to the graduation studio

The complex projects studio has a defined research method and approach which is template based.

The studio research is comprised of two parts: one is the group research. The group research is based on a circle containing the urban fabric of the Beirut suburbs near the Ramlet al Baida beach area. The area is analysed through the lenses of the individual topics, collecting hard and soft data through map analysis and a site excursion. This data is processed in conclusion which form the basis for the urban strategy and group vision.

Adjacent to the group research individual research is done. The research is done according to the complex projects guidelines, with the exception that in the individual research more time was focussed on reference analysis and reference project benchmarking. The reference analysis was mainly focused on flows and program relation and division, since the proposed program for the design is clashing. From the reference analysis and topic research preliminary conclusions and design constraints were formed that are the basis for the design brief.

The group strategy has had impact on the design decisions in the individual project. In this case the street intersecting the building plot became a public boulevard in the masterplan. The street has a central role in the individual design. The group strategy also decided the zones and districts in the masterplan, with the public boulevard that intersects the plot as a main axis that connects the city centre to the central market district. This causes the project also to act as a gate to the market district.

Upon further elaboration of the urban strategy, the program requirements of the indivual project changed. Since the Spinney's square south east of the project location was transformed into a public square with underground parking garage, the public parking program reserved in the individual project could be transformed into more space for program functions of the logistic process.

ASPECT 4
relationship between the graduation project and the wider social, professional and scientific relevance

The project investigates the contrasting combination of public and logistic functions and flows in one design, compacting the process and shortening the food chain. The project is designed on the basis of a grid, making it modular to a certain extent. The main structure (column and canopy) is placed on the grid; together with the connecting beams and flooring the structure is easily adaptable to changing demand in program.

The project is smaller in comparison to the reference projects, but as it is a protagonist project for a decentralised storage and distribution system it is a node of a system in the city. These decentralised systems are easily scaled up and down according to the urban context. The combination of both logistic and public program in one project allows for central building management and more control and efficiency of the process.

ASPECT 5

ethical issues and dilemmas you may have encountered during graduation

The main issue was to design the project in a way seen through the lens of Beirut and Lebanon and not from the perspective of the Netherlands. This issue brought certain dilemmas, regarding the realism of the project and the Beirut/Lebanese building regulations (which are far less developed than the Dutch bouwbesluit).

The materialisation of the project was a dilemma. At TU Delft we are encouraged to design with sustainability and circularity in mind, which pushes for a certain decision making. The Lebanese and Beirut materialisation is less concerned with circularity and sustainability. The materialisation ambition was to use as much local materials and building ways as possible.

Another dilemma is the ambition to design a semi-open market hall that is accessible day and night. The street intersecting the plot and the building brings the dilemma of closing of the public boulevard going through the building to prevent damaging the interior and having unwanted sleepovers. This resulted in a compromise to set back the market hall from the logistic base, creating a transition space in the project that also acts as a detour of the public boulevard at night.

APPENDIX

06

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interview transcripts

[transcribed; see appendix]
Rani al Rajji (Rani al Rajji architects)
Beirut; part 1 – in the streets near LAU
(R. al Rajji, informal group interview, October 5 2020)

[not transcribed]
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Beirut; part 2 – at BHIVE café
(R. al Rajji, informal group interview, October 5 2020)

Roula el Khoury (LAU assistant professor)
Beirut – at PAUL on Bliss street
(R. el Khoury, informal group interview, October 6 2020)

Tarek Zeidan (Nabil Gholam architects)
Beirut – at NG[a] office
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Rani al Rajji_interview_part_1
00:00-12:50_32:18

Rani Al Rajji 00:00
"The civil war ended in 1990, but it didn't end in any reconciliation at the popular level. It ended under the reconciliation on the political level. So you had the intervention of super powers, including the United States back then the Soviet union was collapsing. So it wasn't... It was already the hegemony of the United States and regional super powers.

The regional super powers at the time where Saudi Arabia and Syria, they all, digged in the end together with the political party in Lebanon, and they made a sort of arrangement for the end of the war and the so-called reconstruction phase started, but the reconstruction phase started by heavily, by heavily indebting the country. So we started borrowing money from the banks in order to reconstruct the country.

And at the beginning we started borrowing the money in our own currency, the Lebanese pound, but then, the {sovereign} that became big and the banks, they became doubtful at that.

So they decided to go to... to minimize the risk on them, to turn that into a debt in dollars. And they said to the state, like, if people want to borrow money, we can lend you money in dollars only, to which the state said yes, which is political suicide, basically economic suicide, because we're borrowing money in a currency that we don't print.

Well, basically, like we started borrowing money with no prospect of ever giving the money back eventually. It started with $2 billion. It ended up now with a gap that is estimated around a hundred billion dollars.

Meanwhile, the reconstruction process, so-called reconstruction process from 1990 till now, cost the country around $280 billion, plus the $100 billion of gap so we're talking about $380 billion.

We're talking about the country of 10,000 square kilometers. This is like one third of Belgium. We have here the population of 4 million Lebanese.

So, meanwhile, if you want to compare for... for just the sake of comparison: at the end of the Second World War, there was something called the Marshall plan for the reconstruction of Western Europe, basically to reconstruct Italy, France, Germany, the Benelux,parts of Yugoslavia and Britain.

It cost adjusted to the prices of 2019, a Marshall plan all together, cost $40 billion. So we're talking six, seven major countries in Europe with probably 300 million people; the reconstruction process costs 40 billion.

For a country like Lebanon it cost $380 billion and we don't know if it hit rock bottom yet; we don't know if this gap, it was a hundred or maybe 200 or 120 nobody knows, because the central bank in Lebanon doesn't give correct figures because. Sorry for the crash course in economy, it's not your major, but to understand the problem you need to understand where it came from.

Right now, if you talk about the energy, for instance, the reason why we don't have electricity is not because

somebody from the political class is hampering the construction of electrical plants.

The main reason why we don't have electricity is that the main electrical authority in the country is bankrupt and has been bankrupt for 25 years. Because for electricity, we need fuel because we don't have renewable electricity. We don't have wind power. We don't have solar power, not enough, at least, or water based power.

So basically we need to, we need to buy heavy fuel and to buy this fuel, we need to pay it in dollars. We're selling the kilowatt hour of electricity at the price as if the fuel barrel was at $16, which was the price of the early nineties when the, when the oil barrel price collapsed.

So this was, , fixed since then at this price. Meanwhile, at one point the fuel barrel, each of the brands reached $160, 10 times more.

So over the course of the last 30 years, we wasted around $42 billion between the defects on the network, the losses on, the technical losses, on the, on the network, the people who don't pay their bills and the difference in price that we're paying.

All of this was called subsidies by the government. They used to say we're subsidizing electricity. In reality, they were reaching out to the private banks, taking the depositors' money, using it to buy the fuel and telling the depositers that we're subsidizing electricity. So they were paying from the pocket of the depositers. It was, it was a vicious circle: so everybody was paying from their own pocket and thinking that things were subsidized.

We reached several boiling points in 1998 and 2003 when the invasion of Iraq happened, et cetera, but every time there was an international thing that happened, that delayed the crash or stopped it. Whenever it almost happened, there was something happening in the world where, money put, people put money in the Lebanese banks because we have banking secrecy. So a lot of money comes to the Lebanese banks; no questions asked, and this is probably dirty money in most cases."

Tycho van Gelder 05:35
"They say just like Switzerland, right?"

Rani Al Rajji 05:39
"In Switzerland they have more restriction, but yeah...

So basically we avoided falling in the hole several times, until finally, in 19, in 2019, we actually fell in the hole.

The reason is why are multiple... It's too recent to analyse the whole event. People are still trying to figure out what happened exactly. But in my opinion, it was way overdue. And if it had to happen before it would have had a minimal impact. Nowadays it became super difficult to get out of this hole. So basically this is in a nutshell, the economic situation and the reason for the crisis.

We're talking about the crisis that was described by the World Bank a few months ago, as the most severe crisis since the economic crisis in the 1930s in

Spain and the third most severe crisis in history. So we're talking about the crisis at the scale, that is beyond our reach.

Especially that we turned our economy from a productive economy where we had agriculture, we had industry, into an economy based on services that no longer exists because most of those services are financial and nowadays nobody trusts the financial institutions in Lebanon so nobody wants to put money in Lebanon. Basically towards the end from 2016 till 2019, the banks in Lebanon were offering up to 16% interest rate on deposits.

So it was counter intuitive and counter productive to actually make a project in Lebanon. Like for instance, when I opened my bar, if I look at the return rates of a bar, which is around 20%, I could have put the money in the bank, with a return rate up 16% without risks supposedly, because banks always say that there are no risks. Which means that nobody's going to invest in the real economy; everybody's going to invest in the virtual economy until the whole thing crashed and people realized that the money that they think they have is actually virtual money.

Because at the end of the day, 3% of the money that exists on the planet in circulation is real money, that's bank notes, and 97% is just numbers on screens. So I don't want to sound like a communist or a pessimist, but that's the reality."

Tycho van Gelder 08:07
"You sound as a realist."

Martin Grech 08:08
"And what were the industries that you were speaking of before the services?"

Rani Al Rajji 08:12
"We never had heavy industries here in Lebanon, but we had like small industries that were actually like with a proper plan. We could have made interesting industrial products.

Let's say, for instance, if you take the example of the Netherlands right now, you have a big booming design scene, but you don't have facilities to produce on location because it's too expensive.

So most of the production is happening in places like Vietnam or China or Malaysia. But for these big producers, it doesn't make sense to make prototypes. They want to make large scale production.

So if you want to make a prototype, why would you go if you had the country like Lebanon, where people are qualified, skilled, and they have a small industry. You can actually make the prototyping in Lebanon. It's four hours by plane from the Netherlands. It's convenient.
The weather is nice. We can come here on a pseudo vacation. We can talk to someone who speaks English or French, or like multiple other languages. You can make your production, precisely made.

I used to work in industrial production and I know that you can make precise production and yeah, you profit. We profit. Everybody profits from this scheme.

But since we don't have electricity, since we don't have subsidizing for industry, since we don't have subsidizing for

agriculture, this didn't happen in reality. So we spent a lot of money on the wrong items. Basically that's a, that's a very small example; I'm not talking about, like for instance, things that are super easy to do.

If you go work with, farmers, for instance, like one of the biggest products we have in Lebanon is olives and olive oil we have a lot of them and the quality is amazing. Like if you go talk to the farmers and tell them how to make the {press}, like, because now everybody in the world wants extra virgin olive oil.

To have extra virgin olive oil, one of the conditions is not to water the olive trees, which already we have here.

The second condition is to pick the olives as early as possible after the first rain which happens normally in October. So you don't wait until it rains heavily because then the olives are soaked with water. You pick the olives after the first rain.

If you tell the... the farmers, how to do that, if you give them – if you build them an olive press, which works on cold temperature next to the field, so they don't have to transport the olives several kilometers in the sun. Then the olives ripen, and then you don't have a big quality, a good quality – then you get a product that is good for export.

And this means you get fresh dollars or fresh euros from this product, because nowadays everybody wants, for instance, extra Virgin olive oil from Italy. But you know that Italy doesn't produce enough olives to produce the oil it's required to produce? So Italy buys others from Tunisia, from Spain, from Turkey in order to produce the olives – the olive oil.

So basically like there is a niche, there are several niches; we have multiple... multiple microclimates in Lebanon because we have mountains that will reach up to 3,100 meters. So we have all the ranges from subtropical to Alpine in a country that is 10,000 square kilometers, which means that you can grow raspberries, which you can't do anywhere else without controlled temperatures in the area. We can go grow mushrooms and you can do all subtropical plant plants like mangoes and bananas.

Basically you have all the ranges. All you need to do is have a master plan work on certain niches, realize what the area around us needs in terms of products and make those products, whether it's agriculture or industry, which we're not doing. Basically we're wasting all these resources on the wrong items, on things that are virtual and temporary."

Markets in Beirut

Monday
no city centre markets

Tuesday
Souk el Ard

The Beirut Earth Market – Organised by the Slow Food Foundation, this farmer's market aims to preserve interest in food choice, tradition, and cultivation, as opposed to the fast-paced, eat-what-you-can-lay-hands-on lifestyle we have developed.

What?
Bread, spices, herbs, honeys, pastries, and more, by 15 farmers and producers from areas around Beirut

When and where?
7 AM to 2 PM, by Bread Republic , Hamra

Wednesday
Souk el Tayeb

A bi-weekly farmer's market where Lebanese food traditions and small farming are promoted for all generations to enjoy. Find fresh seasonal products home-grown and made by Lebanese farmers.

What?
Fruits and vegetables, juice, pastries, baked goods, dairy products, and derivatives.

When and where?
12 PM to 6 PM, Geffinor Center, Clemenceau

Thursday
Souk el Akel

A compilation of Lebanon's best street food set on featuring the world of cuisines and novelty edibles Beirut has to offer. It has dubbed itself a "traveling culinary feast," so keep an eye open for its out of town events.

What?
Lebanese, Middle Eastern, and International street food made by local cooks, chefs, and eateries.

When and where?
5 PM to 11 PM, parallel to Foch Street by the Seaside road, Beirut City Center, or occasionally in special locations.

Friday
no markets

Saturday
Souk el Tayeb

Originally, Souk el Tayeb was a recurring Saturday market, until they (recently) added their Wednesday edition. Nevertheless, you now have the choice to go to one or the other… or both!

What?
Fruits and vegetables, juice, pastries, baked goods, dairy products, and derivatives.

When and where?
9 AM to 2 PM, Trablos Street, Beirut Souks

Sunday
Badaro Urban Farmers Market

What?
Every Sunday, starting March 4, between 9am and 2pm! At a new location: College Saint Sauveur, Museum Street. The market offers Lebanese food items such as fresh produce, mouneh, honey, bread, wine, as well as handicrafts made from recycled materials. You will meet the producers, including a number from organic and permaculture farms, and buy directly from them.

Address
College Saint Sauveur, Badaro

When and where?
Open Every Sunday from 9am - 2pm
Free entrance

All these markets take place in the city centre and Armenia street area. There are no active markets in the suburbs of Beirut.

https://www.beirut.com/l/47080
https://theculturetrip.com/middle-east/lebanon/articles/the-5-best-markets-in-beirut/