Hamam for refugees

a temporary safeguard in a refugee camp

de Rouw, L.J.A.

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2017

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Colophon

Title
Hamam for Refugees
A Temporary Safeguard in a Refugee Camp

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Graduation studio
A public building for refugees

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Preface

This graduation report is the result of a research conducted into the topic of public buildings for refugees. The starting point for this topic was the refugee crisis that is going on now. Because who are those people that flee their home country? And how is it to live in a refugee camp?

The graduation studio "a public building for refugees" was divided into three parts. A group work research, the designing of a building system and an individual designed public building for in a refugee camp.

The group work research enabled us to get an overview of the refugee crisis and everything that is involved. The result of this is a dictionary and a catalogue. In the dictionary 27 topics are briefly investigated to make a broad overview of different topics that are related to the refugee crisis. The catalogue is a more in–depth research where the topic is researched on the following three scales: urban plan, public building, material & technique.

For the Dutch Design Week (DDW) we had the fantastic opportunity to expose our graduation studio. Therefore I designed together with Brian Bekken a new building system that is called BinAir. This flexible, cheap and easy to build system wants to be an answer to the now commonly used containers and tents that lack architectural quality.

With the knowledge of the group research, the first design steps into a new building system and the aim of the studio in mind I designed a hamam (Islamic bathhouse) inside a refugee camp. Because one of the things that strike me most was that they do not feel really humane anymore. And with the facilities and environment provided in this hamam it is for refugees possible to feel themselves at least temporarily away from their daily problems. Because I concluded from the research there are to many problems to solve them all.

Finally after an intense year I want to thank the following people. First my tutors who helped me with the design process to make a more elaborate design. Secondly my family, friends and fellow students of this graduation studio who helped me wherever they could.

Luuk de Rouw,
February 2017

Summary

This graduation report is the result of a research conducted into the topic of public buildings for refugees. The starting point for this topic was the refugee crisis that is going on now. These issues vary from minor to life treating situations and they occur everywhere. Therefore it is impossible to solve them all, even when focussing on the scale of one refugee camp there are still many issues. But when looking at solutions instead of only issues an overall opinion of the refugees is that they want to regain their standards that they were used to. Most of the refugees living in a refugee camp lived before they fled a normal life. So the overall problem is not to solve everything but to solve the lack of life standards.

As already mentioned it will be impossible to regain these standards on the camp scale so the aim of this research is therefore to temporarily solve the problems on a building scale. In the design of this public building the following three goals need to be facilitated: A temporarily escape of their daily issues and also improve temporarily their life standards. A place where refugees can get clean. An environment that is needed to let refugees make new social connections.

To find an answer for facilitating these three goals the research is divided into three parts. A group work research, the designing of a building system and an individual designed public building for in a refugee camp.

The group work research enabled us to get an overview of the refugee crisis and everything that is involved. The result of this is a dictionary and a catalogue. In the dictionary 27 topics are briefly investigated to make a broad overview of different topics that are related to the refugee crisis. The catalogue is a more in–depth research where the topic is researched on the following three scales: urban plan, public building, material & technique.

For the Dutch Design Week (DDW) we had the fantastic opportunity to expose our graduation studio. Therefore I designed together with Brian Bekken a new building system that is called BinAir. This flexible, cheap and easy to build system wants to be an answer to the now commonly used containers and tents that lack architectural quality.

With the knowledge of the group research, the first design steps into a new building system and the aim of the research in mind I designed a hamam (Islamic bathhouse) inside a refugee camp. Within a hamam it is possible to facilitate the goals that were set as the aim of this research.

The final design of the public building is a result of merging all the applicable gained knowledge of the refugee situation, hamams, the Maslow theory and the BinAir building system into a new building, a hamam.

With its large indoor axis, outdoor patios, cleaning rooms and spaces to rest this hamam will create a safe heaven within the camp where refugees can safely retreat and forget their problems temporarily. Because all the needs from the Maslow pyramid are met within the hamam people can socialize and can make in this way new connections.

With also all the properly working sanitary facilities available this hamam will provide for every refugee a place to get clean in a comfortable way. This will eventually lead to less illness within the camp, always good sanitary facilities available, less boredom and more friendships and connections.

For creating the right atmosphere there is a big role for the building system. The BinAir bins enabled a design with enough flexibility. For the walls it is possible to make the required maze like routing in order to get more and more segregated from the outside world. For the daylight entrances it was possible to make small punctures within the roof or big holes in the facade to let the light enter. With the holes, transparent bins or windows placed on the right place interesting view lines are created between the different rooms and floors and indoor and outdoor. The versatility in stacking the bins also enabled walls with different forms and small cracks between them to let light enter the room.

The final result is a safe heaven where refugees can temporarily feel themselves back to the life standards that they were used to before they became a refugee.

Keywords:
BinAir, flexibility, hygiene, Maslow pyramid, sacred light, refugee crisis, public building, escaping daily problems

Contents

Introduction

Project Description

Assignment as described in the study guide

With this graduation studio we aim to develop prototypes of community and public buildings that support self–development within refugee–camps around the world. At this moment in history we are confronted with the highest number of displaced persons ever, due to war and conflicts, drought or flooding caused by climate change. To house displaced persons a large variety of solutions have been developed that cater primary needs. But more long–term, public and community facilities have been neglected as an important mean of creating an environment of hope and dignity.

With this graduation studio we aim to develop designs and prototypes of public buildings that can empower the life of displaced persons. Although refugee–camps are envisioned to provide short–term accommodation, the reality shows that people tend to stay here for years. The permanency of these camps asks for long term solutions with not only housing but adequate community facilities to empower personal socio–economical development and enforcement of communities. Within this graduation studio we will design solutions for these public buildings.

In order to develop a prototype of a so–called "Public Building for refugees", the use of state–of–the– art knowledge on integral building concepts, climate adapted buildings, full energy self–sufficiency, building technology will be studied thoroughly and coinciding building methods that primarily focus on the use of local materials and adaptability of the method and execution by the inhabitants of the camps.

Problem Statement

When looking at the refugee crisis the Internet is full of refugee issues. These issues vary from minor to life treating situations and they occur everywhere. Therefore it is impossible to solve them all, even when focussing on the scale of one refugee camp there are still many issues.

But when looking at solutions instead of only issues an overall opinion of the refugees is that they want to regain their standards that they were used to. (Graber, 2016) Most of the refugees living in a refugee camp lived before they fled a normal life. So the overall problem is not to solve everything but to solve the lack of life standards.

As already mentioned it will be impossible to regain these standards on the camp scale so the aim of this research is therefore to solve the problems on a building scale.

"I miss simple things that were once so obvious, like sitting on a bench alongside the river with my father and my sister looking at the city on the other side"

Saja Al Khamissi, former refugee living in Zwollle, once living in Baghdad, 2016

Research Question

The formulation of the research question is the result of the desire to solve four issues. These four stood out most during the research into all of the issues present in refugee camps. The issues are:

— *Refugees want to be out of the problems they are in and do things that were ordinary when they were home*

— *The permanent sanitary facilities inside the camp frequently fail*

— *Refugees are bored because they don't have anything to do and no idea what the future brings*

— *Refugees don't have many places where the circumstances are good enough to let them make new social connections*

These issues are subsequently translated into three goals that the research question needs to answer. The goals are:

— *Facilitate for refugees a temporarily escape of their daily issues and also improve temporarily their life standards*

— *Facilitate a place where refugees can get clean*

— *Facilitate an environment that is needed to let refugees make new social connections*

In order to do this the term life standard will be translated into more specific demands with the help of the Maslow pyramid. With this pyramid it is possible to measure if the desired needs are available in the design and if the desired improvement is met.

Finally these issues are translated into the following research question:

In which way can a hamam contribute to the improvement of sanitary and social conditions of refugees living in a refugee camp?

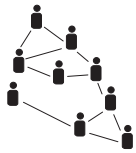
Concept

A lots of problems occur in refugee camps, which not all can be solved

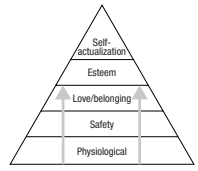
VISION

REDUCE PROBLEMS TEMPORARILY
IN A HAMAM

New social connections



Temporary rise in Maslow pyramid



HAMAM

Get clean

RESEARCH QUESTION

In which way can a building contribute to the improvement of sanitary and social conditions of refugees living in a refugee camp?

Fig. 01 – Concept flowchart

Theoretical Framework

Islamic Architecture

Architecture made in the Islamic world often has other demands than architecture build in Europe. To get a better understanding of how buildings are designed in the Islamic world it is necessary to investigate the main differences of Islamic architecture compared to European architecture.

Facade

The difference of Islamic architecture compared to architecture in Europe is already clearly visible when people approach a building. Instead of open curtain wall like facades, Islamic architecture is much more focused on the inside as opposed to the outside (Michell, 1978, p. 10). This results in buildings that present themselves to the outside world with high windowless walls interrupted only by a single low door (Michell, 1978, p. 10). The reason for this can be traced back to religious and climatological reasons.

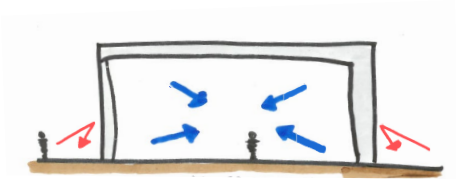


Fig. 02 – Focused on enclosed space

Spatial organisation

Houses in Islamic architecture are often arranged around a courtyard. These courtyards provide a safe and enclosed outdoor area and play a main role in the spatial organisation. (Michell, 1978, p. 38) These courtyards are often defined by another typical Islamic element, the arcade (Michell, 1978, p.13). These arcades with vaults enclose the courtyards and provide an intermediate space between the indoor and outdoor.

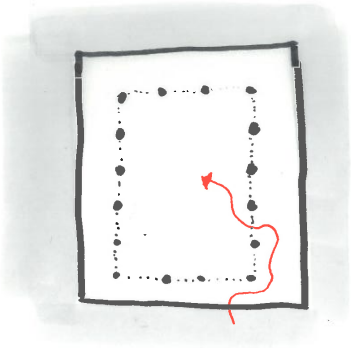


Fig. 03 – Courtyard with arcades

Fig. 04 – Syrian courtyard house

Another recognisable observation is the lack of a direction or focus in public buildings. There is often a lack of balance between the various parts of a building complex as can be seen in (Michell, 1978, p. 13). An advantage of this is that a building can be enlarged, by adding units of almost every shape and size in almost any direction, without disturbing the original balance of the spatial organisation. According to Michell this is a characteristic that Islamic architecture shares with that of no other major culture. (Michell, 1978, p. 13).

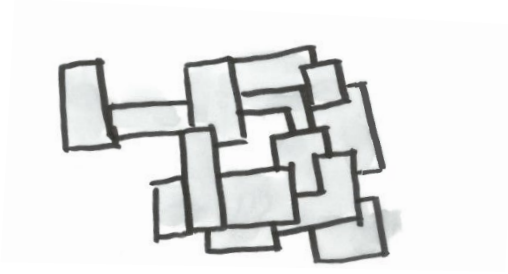


Fig. 05 – Adding rooms without structure

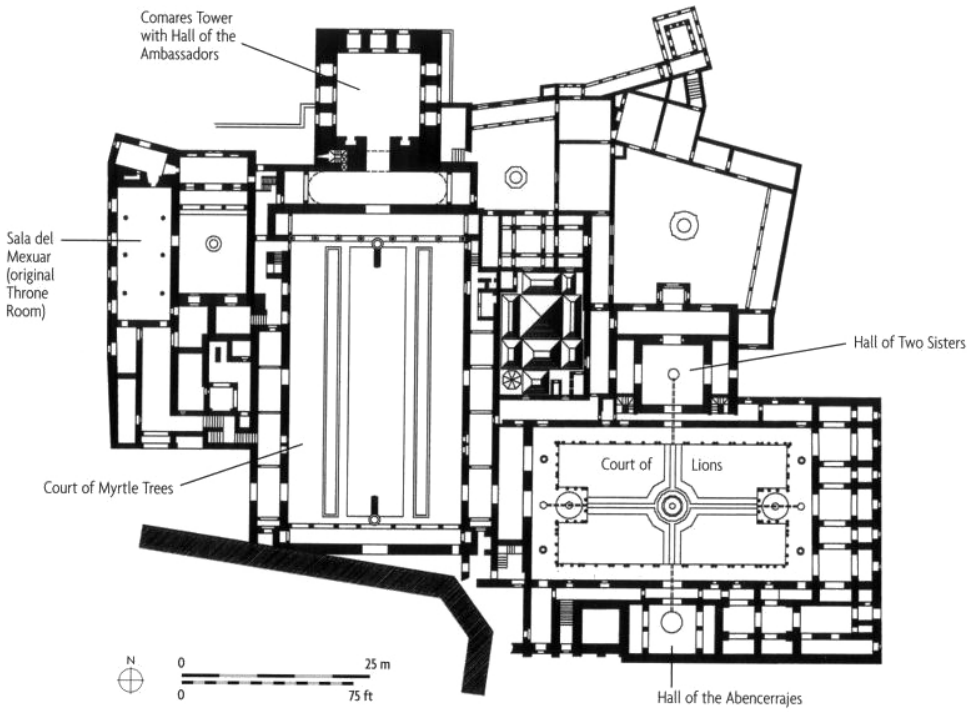


Fig. 06 – Umayyad Great Mosque shows the lack of balance between different parts of the building

Hamam Typology

Evolved from the Roman and Byzantine public baths hamams still play a crucial role inside a city. Their location and appearance is based on religion, climate and use. For this research the focus is put on the characteristics that form the guidelines for designing and building a hamam.

Location

Hamams are often well hidden buildings inside the urban fabric of a city. Their presence is discrete and mostly the door is the only well decorated element that is visible from the street. Despite the modest character, it plays a key role within the urban facilities in Islamic cities. The hamam fulfils the role of a place to rinse yourself before going to the mosque. Due to this role a hamam is often located nearby a mosque.

When visiting a hamam the journey starts on the 'busy' streets. From these streets you get step–by–step more segregated from the busy streets. The first step is that the visitor often has to leave the main road and continues his route through an alley to find the entrance of the hamam.
When entering the hamam the visitor experiences the second step of segregation in the intermediate zone that is formed by the entrance. And in the third step a person is in the hamam where there is a complete segregation from the outside world due to the lack of windows and the absence of sound. Inside the hamam itself there are even more steps of segregation but these will be explained in the following paragraphs.

Function

Hamams traditionally serve many more functions then it's main function of getting clean. As already explained it plays a crucial role inside a city but what are these extra functions. In order to find an answer for this the different rooms are analysed.

Entrance

After entering through the front door the entrance is often formed by a narrow corridor. This corridor doesn't have much spatial qualities its only purpose is to bring you from the street to the actual hamam.

After this intermediate zone a completely different 'world' is present. This 'world' that is the hamam starts with the changing room. Because of the simplicity of the corridor compared to the changing room the effect that you feel yourself somewhere else is enhanced.

Changing

The changing room is the starting point of the hamam ritual. The view to the outside is already been blocked by the high windows but light can still enter freely. According to Sibley and Jackson about 45% of the total area of a hamam is dedicated to the changing room (Sibley & Jackson, 2012, p. 170). This high percentage can be explained by the importance of the changing room. The changing room has not only the purpose to change clothes but also, or maybe even of more importance, functions as a place to socialize where people drink tea together,

do business, gossip, go to the barber, make wedding preparations, meet new people and more. It was in fact so important that in the past it was for women their only gathering point

Warm (tepidarium)
After changing into the traditional hamam peshtemal (sort of towel used in hamams) visitors enter the warm zone of the hamam. In the warm room the visitors can get used to the higher humidity and temperature. Due to the scarce entrance of light and the humidity a relaxing atmosphere is created that brings you even further into the segregation process as told in the paragraph of location.

Another function of this room is that it is the firs step of the traditional 5 step cleaning process (Aaland, 1978, p. 23). The cleaning starts with washing yourself with the water that comes out of the faucets positioned alongside the walls. This is another good moment to chat with other visitors while cleaning.

Hot (caldarium)
Connected to the warm room is the hot room. The function of this room is to get completely purified and relax. Therefore the next four steps of the cleaning process take place in here. These are consecutively: vigorous massage, peeling of outer layer of skin and removal of body hairs, soaping, relaxation. For the massage and relaxation part there is a so called bellystone in the middle of the hot room. This stone provides a space to lay down in the steamy atmosphere, and enables you to receive any kind of treatment like a massage or being poured onto with warm or cold water. For the more intimate cleaning a hot room also have semi–dark niches or 'iwans' where people can get cleaned. Due to the even higher temperatures and minimal light this is the last step in the segregation process. In this room you can experience optimal relaxation.

Cold (frigidarium)
The last room before visitors return to the changing room is the cold room. The temperature here is a fusion between the hot air from the hot room and the colder air from the cold room. Here visitors can acclimatise from the previous rooms. The atmosphere here is equal to the warm room.

Hamam Layout

When analysing different hamams there is always a clear configuration of rooms visible. According to a research done by Sibley and Jackson this is an octagonal configuration or a linear configuration. In both configurations a hamam consist out of the same type of rooms. To get a better grasp on the layout of a hamam three floorplans are analysed (analysis are shown on the next pages).

From the analysis several things concerning the layout can be concluded. The most obvious is the big difference between the size of the changing room compared to the other rooms. This confirms the findings about the changing room on page 25. When looking at the configurations of rooms of the different hamams it can be concluded that when the hamam is located within the urban fabric the layout is organic an adapted to the spaces left between the buildings that already consists.

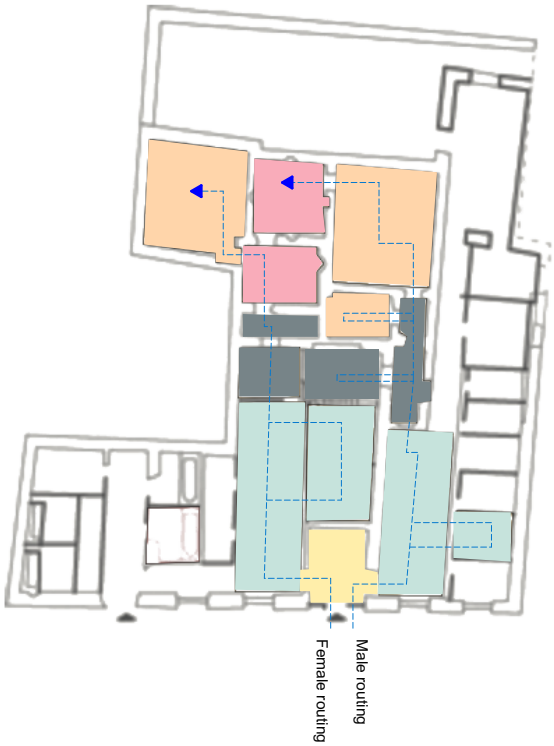
In terms of energy efficiency it can be concluded that in all the analysed hamams the rooms that have the same temperature are positioned next to each other. This means that the male and female part share walls through where heat can be exchanged.

Bathhouse of the Winds — Athens, Greece

The first hamam is the Bathhouse of the Winds. Despite its location in Athens it is a traditional Turkish hamam built during the Turkish rule (1453–1669). This hamam has like other hamams of this size a separation between male and female. Another remarkable observation is the size of the changing rooms compared to the other rooms. In this hamam the changing rooms fill up about 50% of the total surface area.

Fig. 07 – Male changing room

Fig. 08 – Light entrances warm room



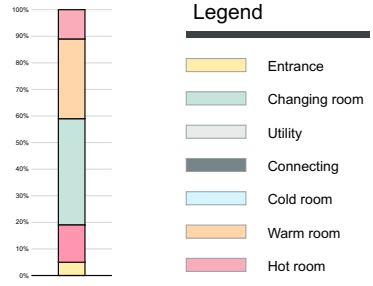


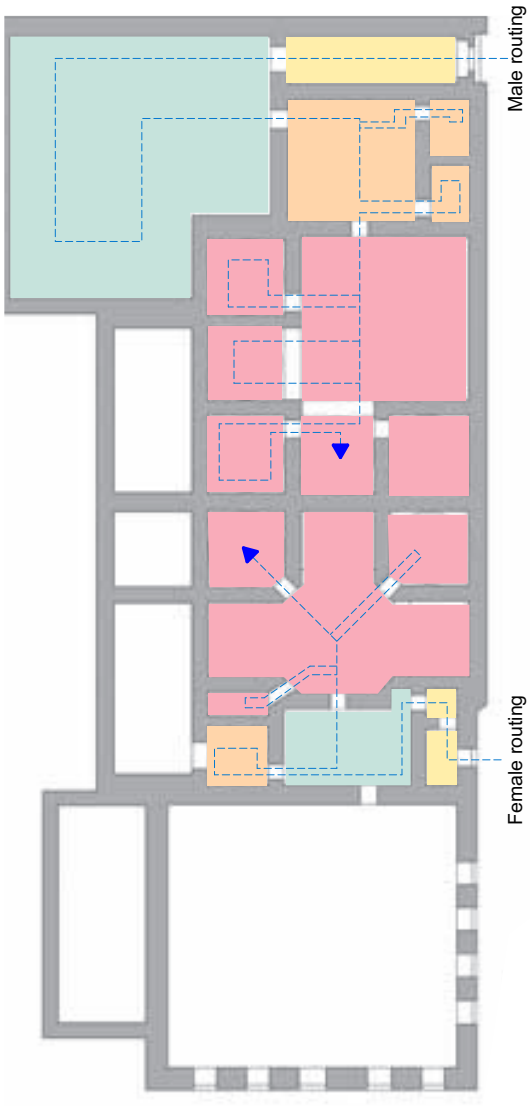
Fig. 09 – Analysis of floorplan Bathhouse of the Winds

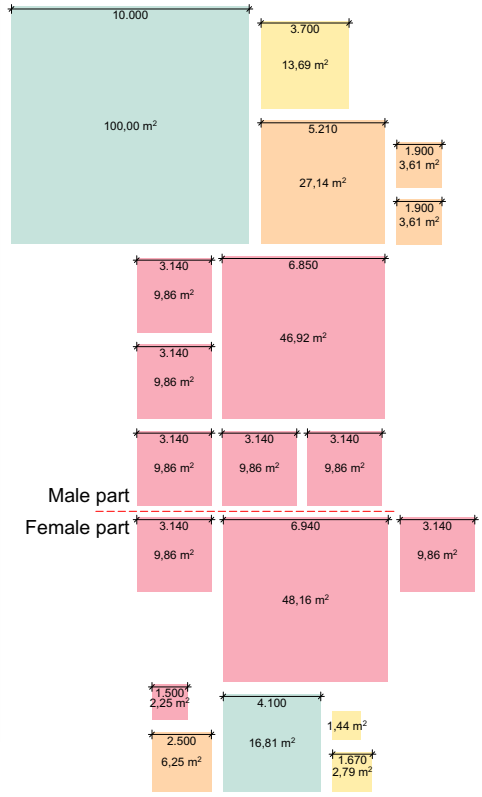
Hamam Sengul — Ankara, Turkey

This hamam in Ankara has the same program as the hamam in Athens but the execution of this program is done differently. This can already be seen at the entrance. The entrances for the male and female are positioned as far away from each other as possible. Inside the building the hot room consist out of multiple rooms instead of one room. This enhances privacy during the cleaning ritual. What is also different compared to the first hamam is that there is a significant difference in size between the female and the male hamam and the size of the changing rooms compared to the other rooms.

Fig. 10 – Aerial view of the hamam

Fig. 11 – Changing room





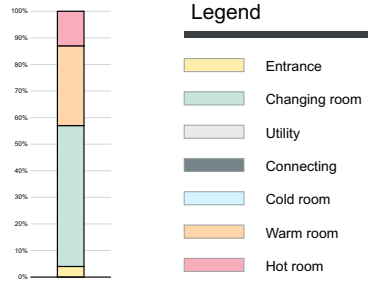


Fig. 12 – Analysis of floorplan Hamam Sengul

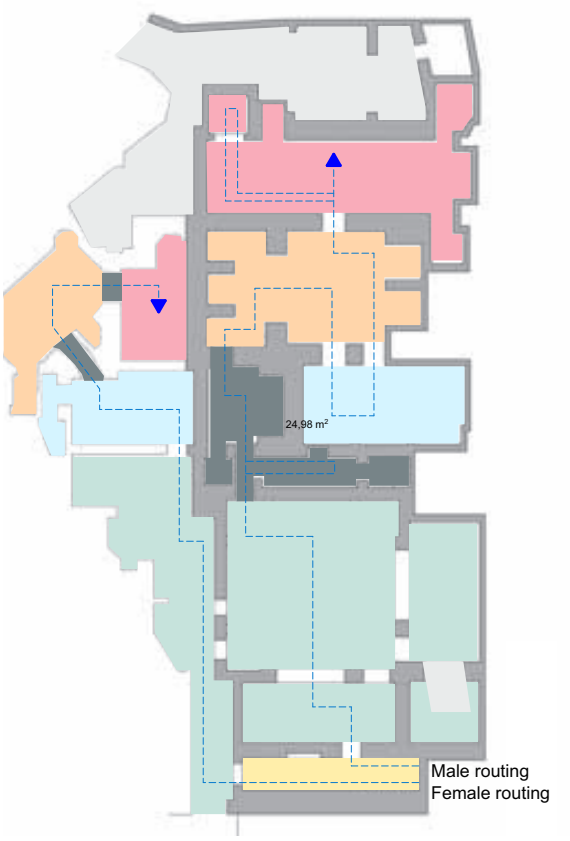
Hamam Seffarine — Fez, Morocco

This hamam has compared to the other hamams a cold room this cold room. This room is the end of the cleaning process. Here person can acclimatise from the heat and humidity of the hot room. Just like the Bathhouse of the Winds this hamam has an entrance that is shared by male and female.

What is also noticeable is the organic structure of the layout. This organic structure can be explained by its location within the urban fabric.

Fig. 13 – Roof structure with different light entrances

Fig. 14 – Warm room



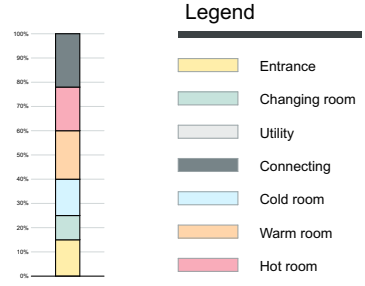


Fig. 15 – Analysis of floorplan Hamam Seffarine

Light

Inside a hamam light is one of the key elements to set the right atmosphere. Besides the heat and the humidity the intensity of light determines the amount of segregation and physical relaxation. The visitors move between those rooms to perform the different steps of the cleaning process. (Sibley & Jackson, 2012, p. 156).

At the beginning of the cleaning process, in the changing room, the amount of daylight is comparable to the light in living rooms. This light enters through the windows in the wall. These windows are placed above eye level so looking to the outside world is not possible anymore.

When entering the rooms where the real cleaning process starts the only way the daylight can enter is through the little glass domes in the roof. (Vogt-Göknil, Turkse bouwkunst, 1967, p. 175). With the amount of light entrances becoming less and less the amount of segregation from the outside world is increasing.

Fig. 16 – Light enters through a dome

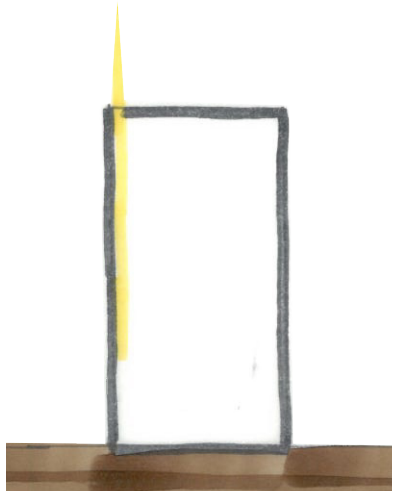
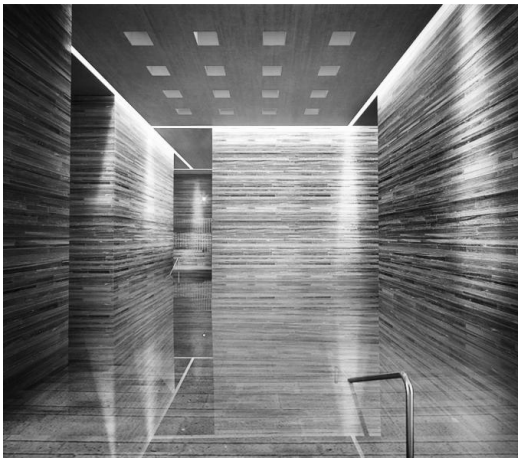


Fig. 17 – Light enters through roof light



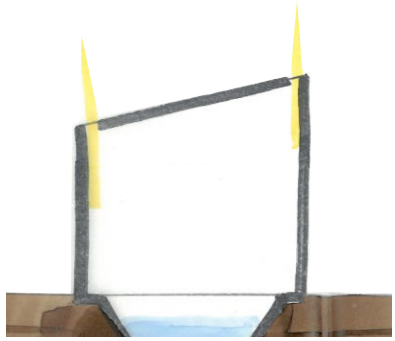


Fig. 18 – Light enters through roof light on both sides

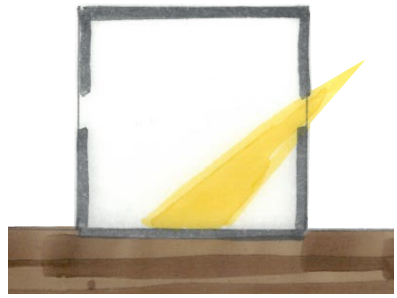


Fig. 19 – Light enters through perforated window

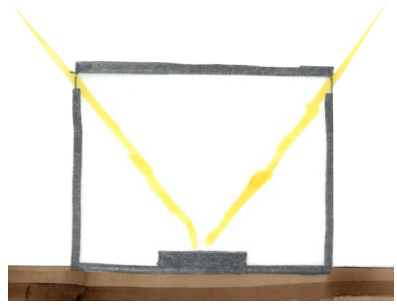


Fig. 20 – Light enters through a small high window

Fig. 21 – Light enters through a small hole in the roof

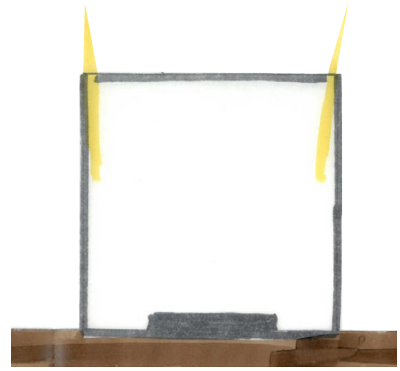


Fig. 22 – Light enters through multiple small holes

Fig. 23 – Light enters through roof light and small slots

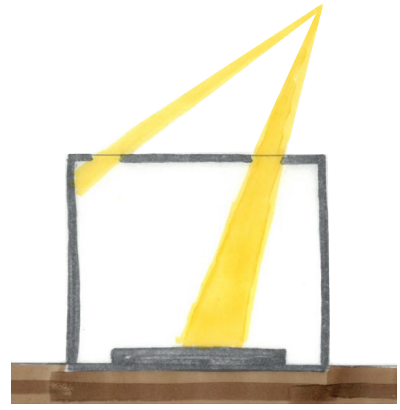


Fig. 24 – Light enters through big and small roof lights

Maslow's Pyramid of Needs

Invented in 1943 by Abraham Maslow the Maslow pyramid is a well–known value assessment tool for measuring life quality. The idea for this theory started when he was observing monkeys. In this experiment Maslow let the monkeys choose between water and food. The result of the experiment was that the monkeys chose the water over the food. What followed was a second experiment with two groups of monkeys to see what happens when water or food is taken away. The result of this experiment was that the first group reacted more aggressively when the water was taken away then when the food was taken away from the second group. This pattern made Maslow to establish his theory that some needs are more important then other needs (Poston, 2009, p. 348)

Maslow later translated this theory to the human needs. In this theory some needs are more important then others. This order has formed the basis for the pyramid that is commonly used now.

The Maslow pyramid exist out of five layers as can be seen in Fig. 26. How more needs are met how higher an individual can rise in the pyramid. The theory of Maslow is that if an individual has a deficit in for example the second layer this individual can't rise in the pyramid (Poston, 2009, p. 348). So in order to reach the level of self–actualisation all lower levels has to be fulfilled.

Fig. 25 – Abraham Maslow

Relation of Maslow theory to refugees in refugee camps

For this research into improving sanitary and social conditions the pyramid as described before will be used to determine the influence of the designed hamam on the visitors. In this way it is possible to make tell if the hamam has the desired positive influence on the users.

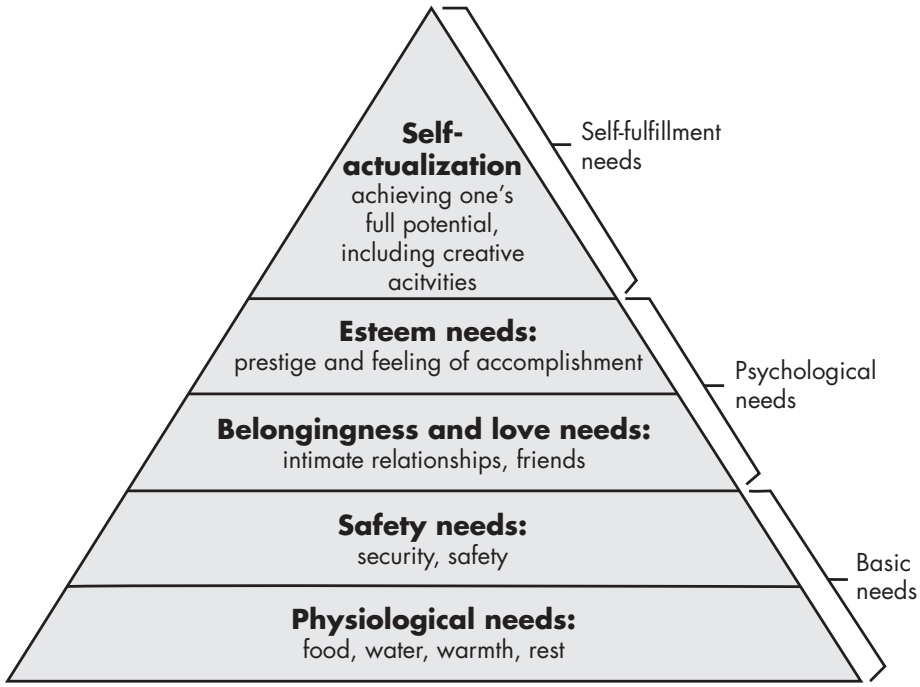


Fig. 26 – The Maslow pyramid

Initial Research

Group Research

The initial research was conducted with the whole graduation studio. The goal was to get an overview of the refugee crisis and everything that is involved. The result of this is a dictionary and a catalogue. In the dictionary 27 topics are briefly investigated to make a broad overview of different topics that are related to the refugee crisis. The catalogue is a more in-depth research where the topic is researched on the following three scales: urban plan, public building, material & technique.

The most striking conclusion of this is that the public buildings in refugee camps now are in almost all the cases just tents. They lack all qualities except giving shelter. The public building for the final design must therefore have the characteristics that give the building its functions.

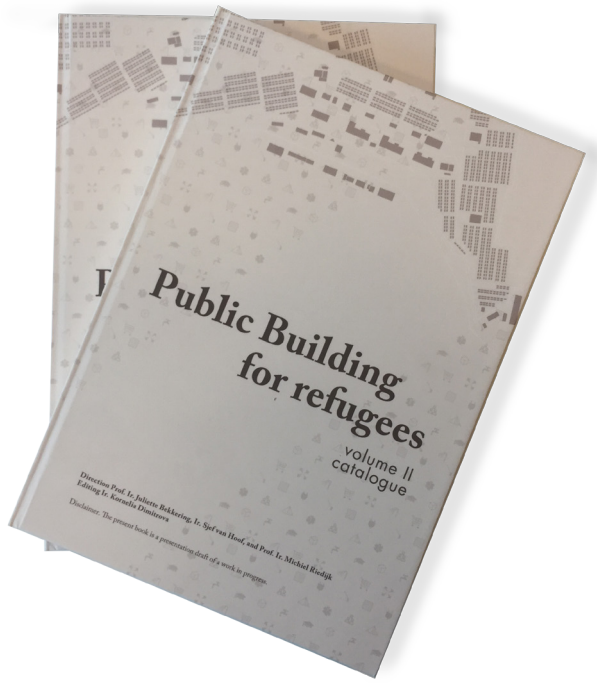


Fig. 27 – The catalogue made during the group research

 **ARDOCH** Scotland	 **AUSCHWITZ II** Poland	 **SHUAFAT** Jerusalem, Israel	 **GLASTONBURY** United Kingdom	 **KAPISE** Malawi	 **ADRIANO** Italy	 **CALAIS** France
5.120 persons	100.000 persons	2.000 persons	135.000 persons	10.117 persons	2.548 persons	5.497 persons
13 m2 per person	50 m2 per person	85 m2 per person	27 m2 per person	13 m2 per person	> 1000 m2 per person	92 m2 per person
Roman soldiers	prisoners	Palestinian refugees	festival visitors	refugees from mozambique	Italian holiday makers	refugees on their way to UK
strict, guarded border	strict, guarded border	strict, controlled border	strict border, strict control, 7 access routes, 12 gates	no border, no control of access	no border, mild control of access	no border, no control of access
Roman military base	concentration camp	Palestinian refugee camp, established by the israeli government in 1955	festival grounds and camp	transit camp, expected transfer to Luwani (closed 2007 - reopened 2016)	holiday camp	transit camp
seasonal use. intended time-span of use. archetype of urban planning for discipline.	continuous population flow. example of urban planning for discipline.	established by unrwa used all-year-round consolidated camp overcrowded, self-built housing expansions	seasonal use. public facilities are permanently on site.	illegally established by refugees. used all-year-round	seasonal use. public facilities are permanently on site.	illegally established by refugees.

Fig. 28 – An overview of the main statistics from the analysed camps

 **ZA'ATARI** Jordan	 **ONCUPINAR** Turkey	 **DOMIZ** Iraq	 **DARA SHAKRAN** Iraq	**KARA TEPE** Lesvos, Greece	 **AZRAQ** Jordan	**SUJJO** Syria
79.138 persons	13.935 persons	40.400 persons	10.951 persons	2.000 persons	28.016 persons	5.284 persons
67 m2 per person	103 m2 per person	28 m2 per person	105 m2 per person	> 1000 m2 per person	524 m2 per person	24 m2 per person
Syrian refugees in Jordan	Syrian refugees in Turkey	Syrian refugees in Iraq, intending to return	Syrian refugees in Iraq, intending to return	Syrian refugees, on their way west	Syrian refugees in Jordan	Syrian refugees, on their way to Turkey
strict border. one entrance/exit point.	strict border, with two entrances next to the highway	strict border. one entrance/exit point.	strict border with three access points	strict border. one entrance/exit point.	strict border. one entrance/exit point.	strict border. one entrance/exit point.
refugee camp, with open access for economic and social reasons, i.e. can work in Mafraq	transit camp, expected to continue	transit camp, expected to return	transit camp, expected to return	transit camp, expected to continue	refugee camp, with open access for economic and social reasons, i.e. can work in mafraq	transit camp, expected to continue
under transformation to suit its long-term establishment infrastructure is developed by UNHCR, government, and ngos	illegally built by refugees.	established by unhcr depends on situation in syria	established by unhcr depends on situation in syria	dependent on eu policy	established as a support camp for za'atari clearly structured, may function as a long-term camp	dependent on turkish policy

Fig. 29 – An overview of the main statistics from the analysed camps

Athens

Study trip to Athens

As part of the graduation studio the group went on a study trip to Athens from august 19 till august 26 2016. On the next pages a variety of pictures is visible that give an impression of the trip.

The trip was a good addition to get a better impression of the refugee crisis. During the trip the following three refugees locations were visited: Eleonas refugee camp, Elliniko refugee camp and the City Plaza Hotel. These visits showed that there is indeed a lot of boredom inside camps. Out of conversations held with the refugees it also became clear that the future is indeed unknown.

Inside the refugee camps there are as expected from the research almost no good public buildings. The public buildings were in both camps just big tents with nothing in it. They have no spatial quality.

For the final design of this research it was clear that the building must at least have a function in order to have spatial quality. It also was clear that the goal of this research, to facilitate circumstances where refugees can make new social connections, is indeed needed.

Fig. 30 – Volunteers entertain refugee children inside the former dining room
photo taken inside the squatted City Plaza hotel

Fig. 31 – The disuse of public space
photo taken in Eleonas refugee camp

Fig. 32 – Infrastructure between the living units
photo taken in Eleonas refugee camp

Fig. 33 – Makeshift school inside the camp
photo taken in Eleonas refugee camp

Fig. 34 – Street inside the camp
photo taken in Eleonas refugee camp

Fig. 35 – Refugees create their own private space with tents and blankets
photo taken in Elliniko refugee camp

Fig. 36 – Refugees create their own spaces within the former departure area of the airport
photo taken in Elliniko refugee camp

Shifting Permanence

A one week research in a non–permanent flexible pavilion

This non–permanent pavilion, consisting out of 18 movable boxes, has the ability to create an almost infinite number of floorplans. Because of the urban context of the pavilion there will be many different users that can adapt the flexible building according to their needs. By moving a box a larger space can for example become a cosy seating area or an ATM. This flexibility creates an interesting interaction between open and closed and inside and outside.

The construction of the pavilion consists out of a steel frame covered with wooden panels. The panels on the exterior side will be painted white to minimize heat from the sun and the panels on the exterior side will remain their original warm wooden character. This enhances the flexibility but also creates room for the discussion: 'what is inside and what is outside?' These frames form the boxes which can be slided outwards and inwards over rails. The boxes have each a width of 1 or 2 meters. These dimensions go hand in hand with the 2 by 2 meters of the concrete core. This concrete core will contrast against the wooden appearance of the rest of the pavilion and therefore form a figuratively handhold for the wood. Besides the figurative handhold this core is also literally a handhold for humans because it contains one of our most basic needs, namely water. This potable water flows through the openings in the wall and can be tapped by the user. When the pavilion will be removed the water supply also stops which will give the core his new function as a wishing tree.

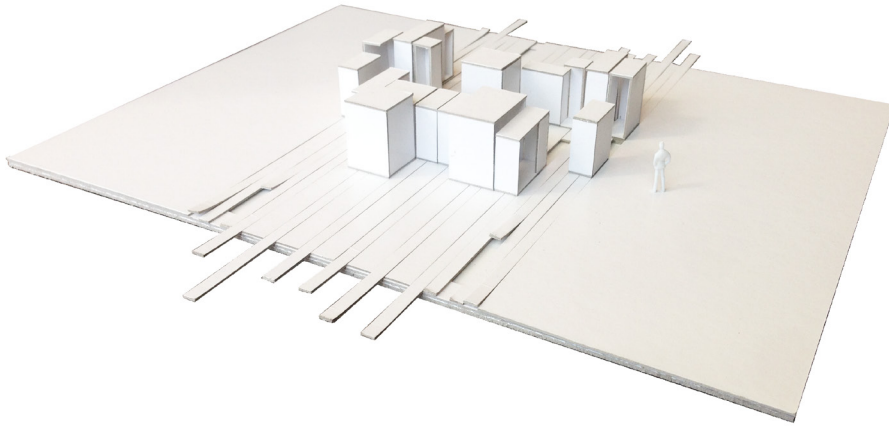


Fig. 37 – Pavilion in one of the open positions

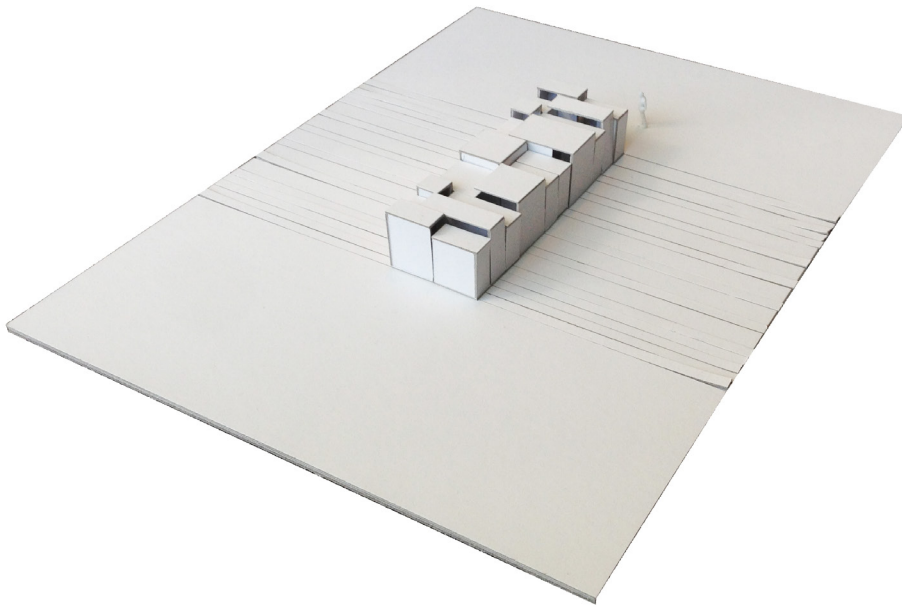
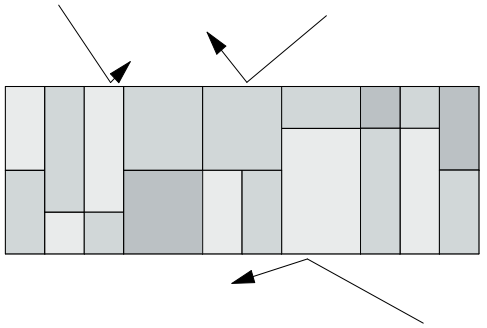
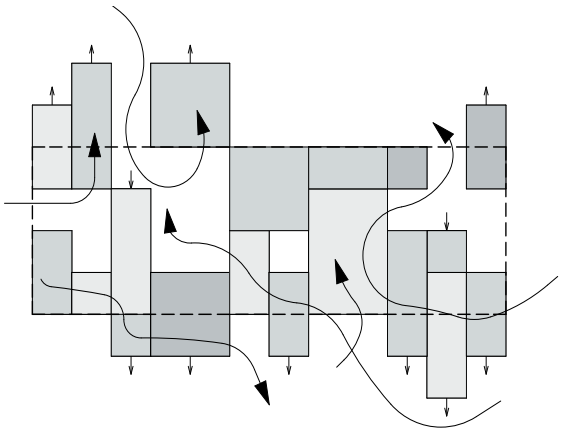


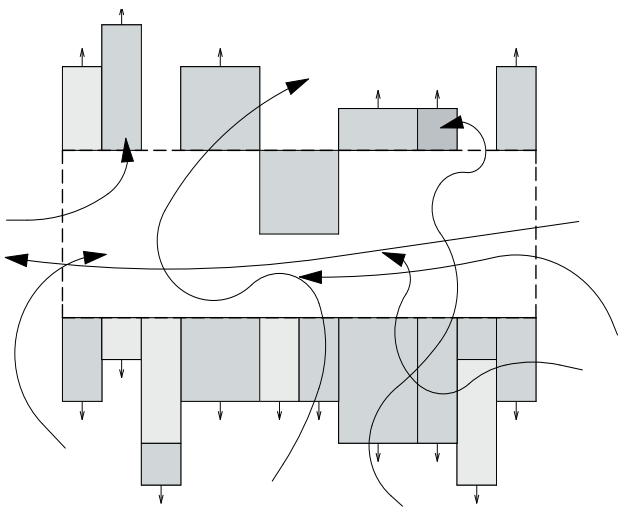
Fig. 38 – Pavilion in closed position



Pavilion in closed position



Pavilion in one of the open positions



Pavilion in maximum open position

Fig. 39 – Different pavilion options

Building System Design

Introduction

As part of the initial research the designing of a new building system was kick–started with a so called 'Wochenaufgabe'. For this Wochenaufgabe it was the task to design in groups a flexible, intelligent and low–cost building system to built a KEK (kitchen, eatroom, canteen) with. The design group consists out of the following persons: Mustafa Anbar, Brian Bekken, Marta Panizzi and Luuk de Rouw.

The outcome of this two week design period is a building system called 'BinAir'. In this chapter the development of this building system, from the Wochenaufgabe to the shape it is now, is described. To make the bin really usable in a real building further research and development is still needed.

Kitchen/Eatroom/Canteen (KEK)

A kick–off exercise into designing a new building system

Inspired by ice cones this flexible and multi–functional building is a well–suited solution for semi–permanent buildings. Due to the simplicity of construction and the minimal need for tools this building can be built without expert knowledge in the field of building and construction.

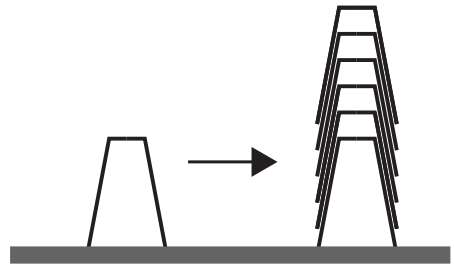
The main and most eye–catching elements are the plastic bins in the form of truncated pyramids. These bins mainly function as walls. It also operates as columns and inner walls.

After placing and connecting these elements to each other, they can be filled with earth, water, sand, rocks or whatever is available. Besides this main form, there are windows, doors and ventilation elements that can fit in the wall instead of the plastic bins.

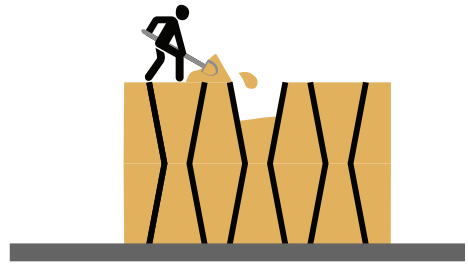
After the desired walls are placed the roof can be constructed. The roof structure is build up out of elements that form together a truss. The finished truss is then placed on the roof with the help of a small crane or another lifting device. When all the trusses are placed on the roof, the finishing will be made with translucent Rodeca panels.

To meet the endless possibilities, that can be created with the wall elements, this roof is also flexible in form and size.

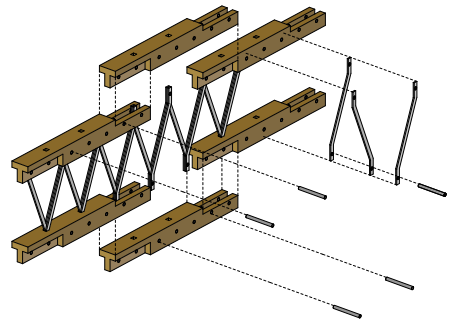
Stackable for transport and storage



Easy to fill with sand expert knowledge isn't necessary



Roof construction made out of detachable trusses



Exploded view of the system

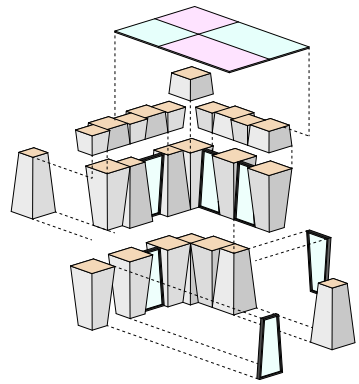


Fig. 40 – The BinAir system characteristics

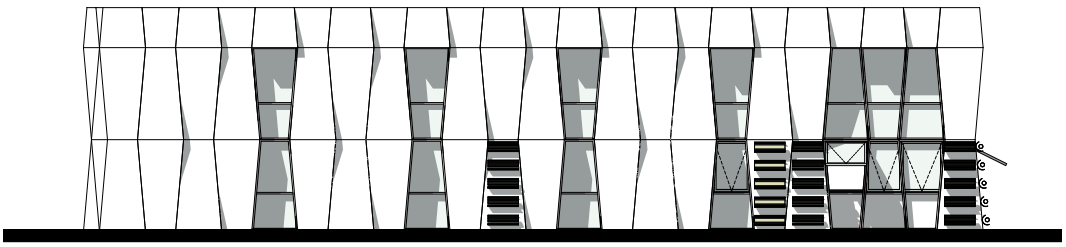


Fig. 42 – Facade

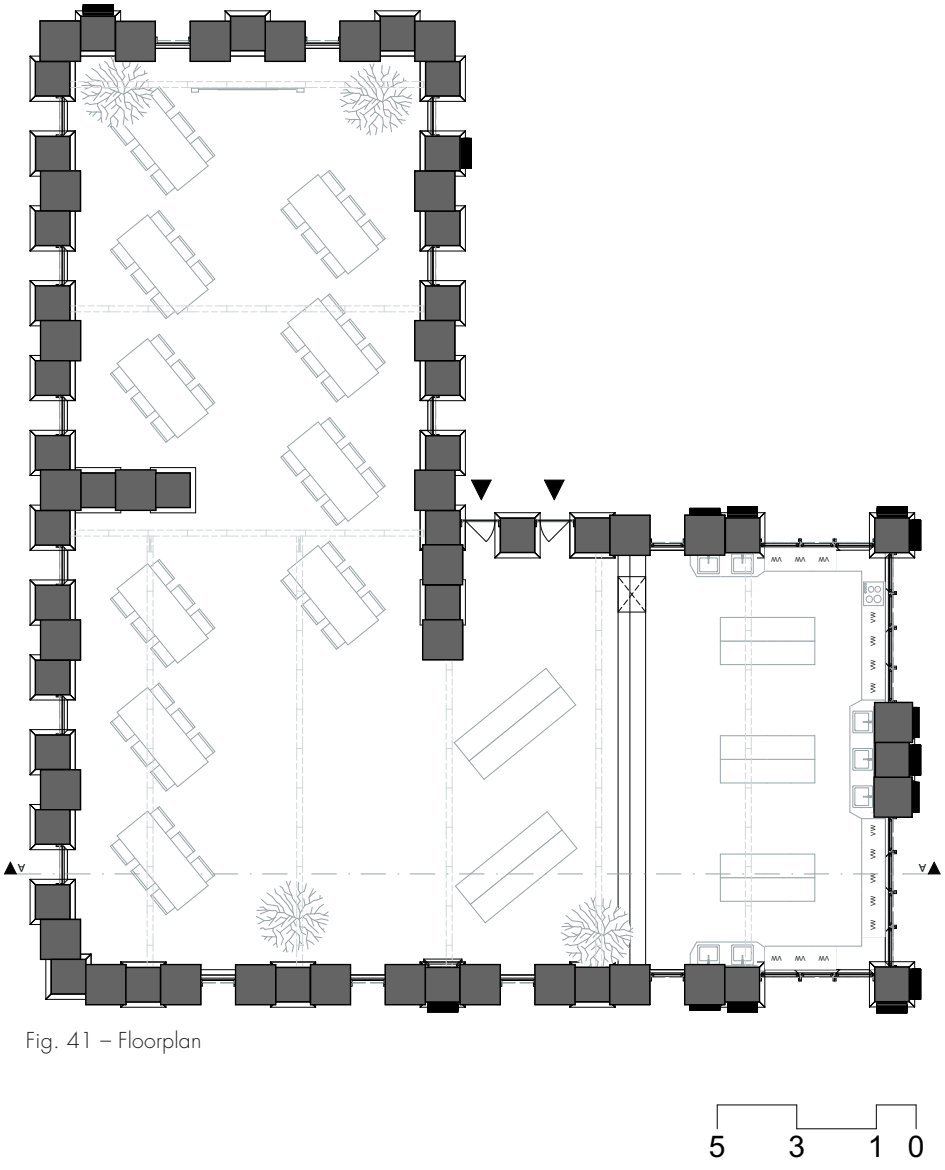


Fig. 41 – Floorplan

Fig. 43 – Photo model 1:200

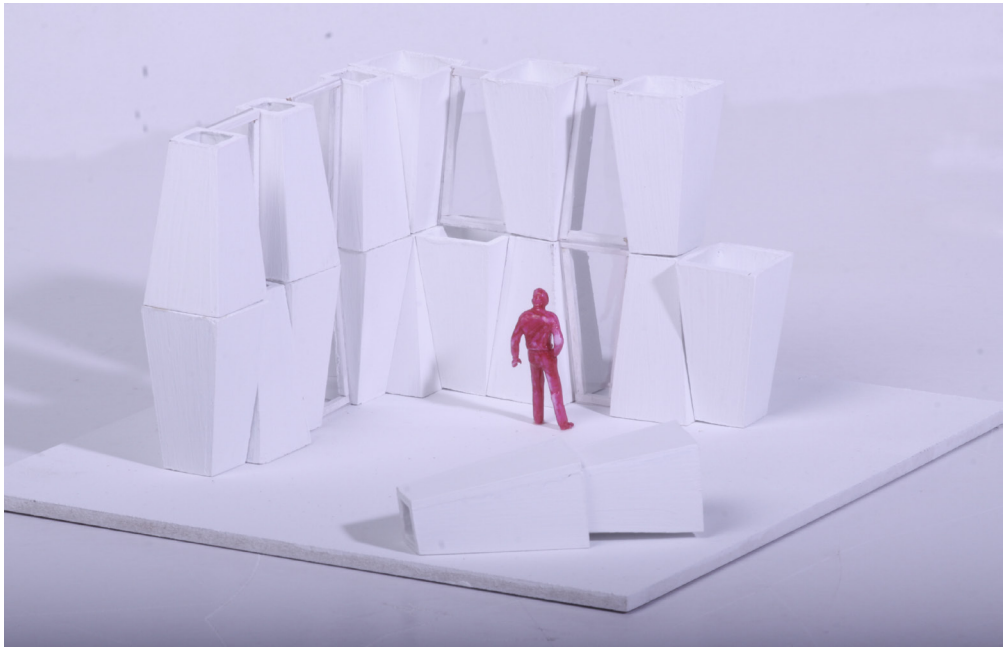


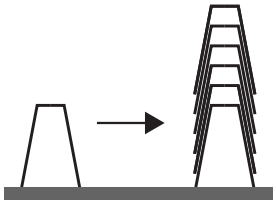
Fig. 44 – Photo model 1:50

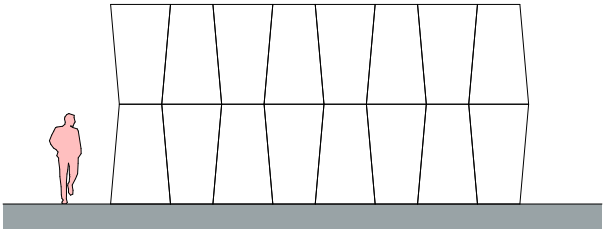
The Bin Shape

Enhancing the shape of the bin

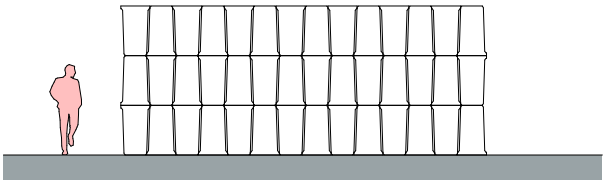
After the kickstart there was a wish to do more research into the exact shape of the bin. Because what is the ideal form in terms of architectural expression versus affordable and fast? And how can the form be enhanced while still using the guidelines as described in the Wochenaufgabe. To investigate this, a test was done with commonly available bins.

The result of this test was that all the commonly available bins aren't suitable enough for forming the building system. They all miss the refinement in design that is needed.

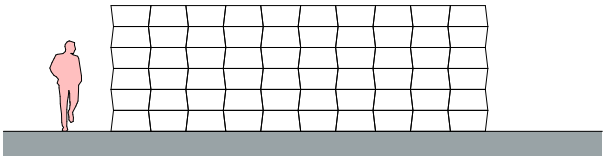




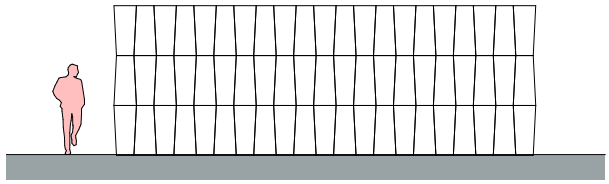
– Too high for easy handling
– Too big to allow desired flexibility



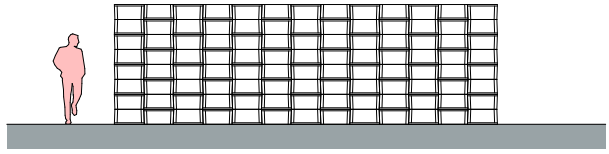
– Edge makes it difficult to connect



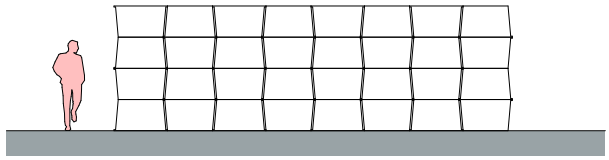
+ Good size to handle
– Easy to make corners because of the rectangular shape



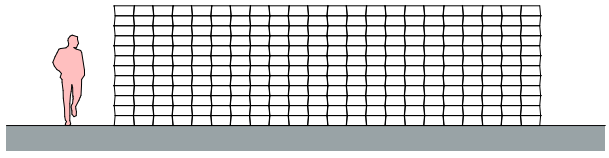
+ Good size to handle
– No slots to easily attach bins together



– Edge makes it difficult to connect
– Easy to carry
+ Good size to be flexible
+ Strong because of corners in multiple directions



+ Strong plastic
+ Good size to handle and to be flexible
– No slots to easily attach bins together



– Too flexible to function as a construction
+ Good small size to be flexible

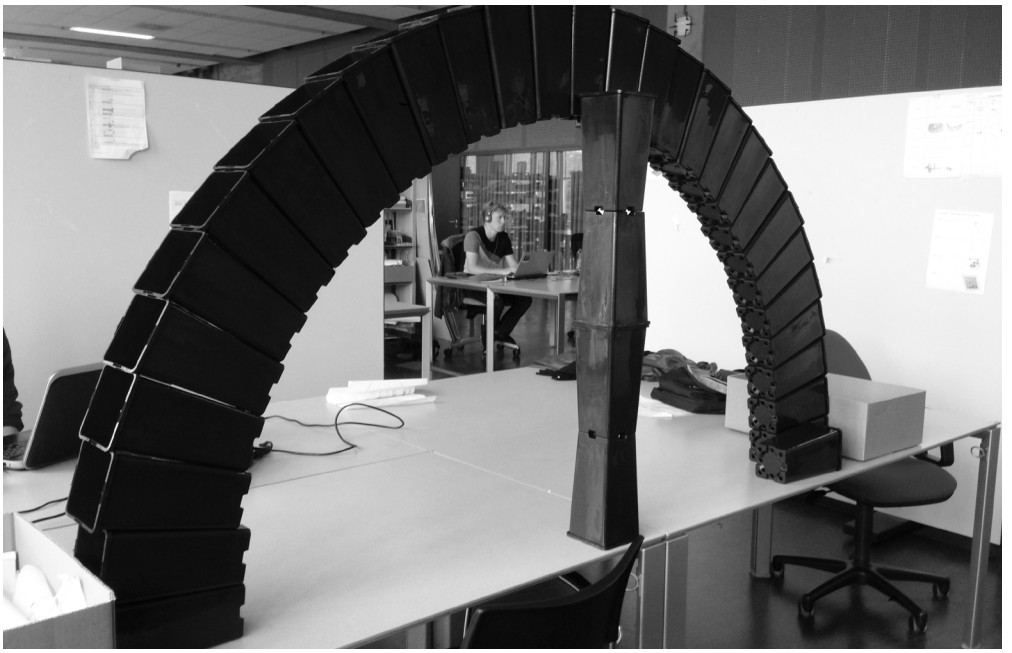


Fig. 45 – Small scale test with flower pot to make an self supporting arch

Fig. 46 – Small scale test with flower pot stacked to form walls

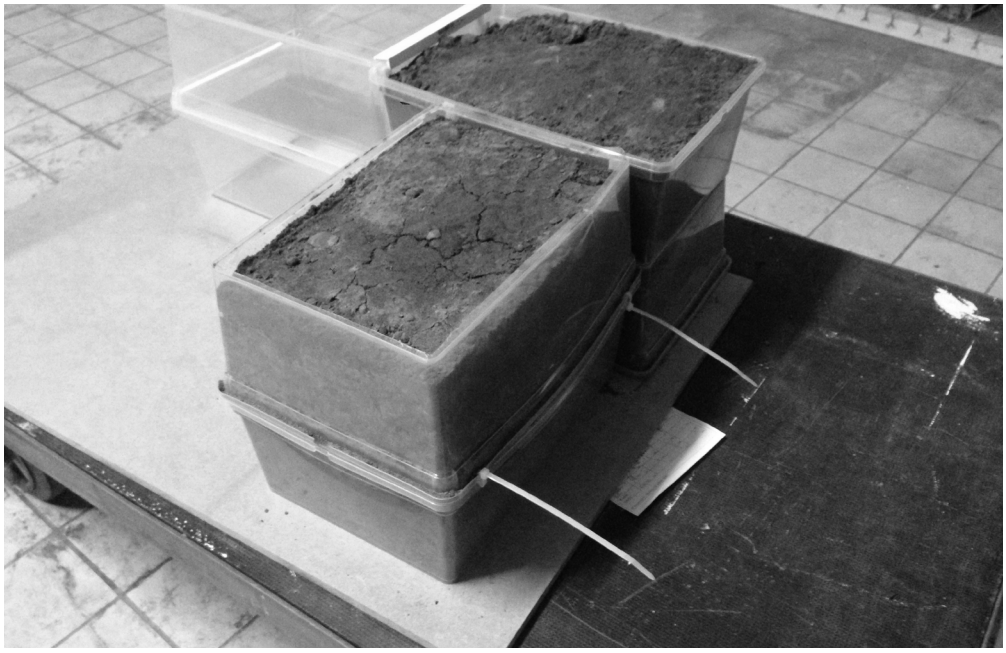


Fig. 47 – Filled bins to see what happens when they are filled

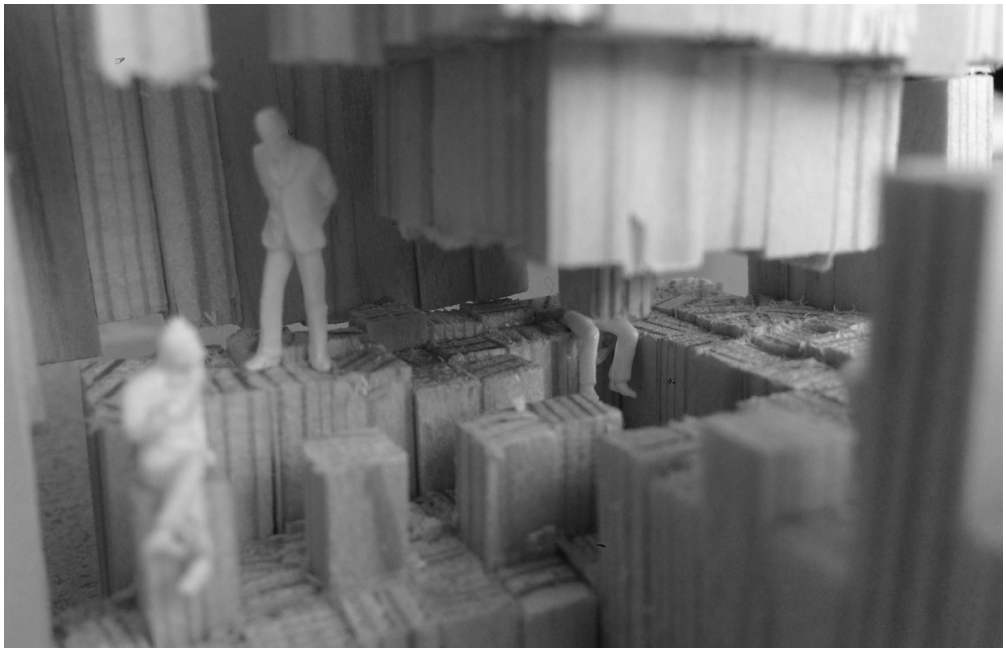
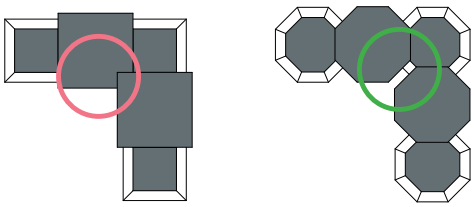


Fig. 48 – Small model of a initial room design

Refinement of bin shape

To find an answer for the refinement a short individual side experiment was done to find if a change in form can give BinAir more qualities and possibilities. Because up till now all the bins had a rectangular shape but this gave problems when making corners. To tackle this the rectangular shape was transformed into an octagonal shape. This change of shape enriches the direction in which the bins can be placed. With the octagonal bins diagonal lines are possible. Besides the improved functionality the octagonal form is a reference to a form widely used in the Islamic architecture.

Islamic religious shapes



old shape

new shape

Easy to made corners compared to old system

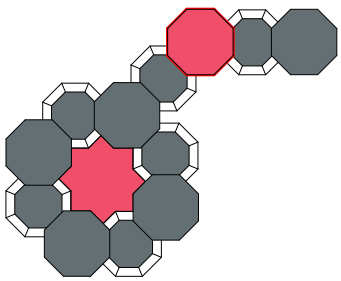


Fig. 49 – Octagonal bin connection concept

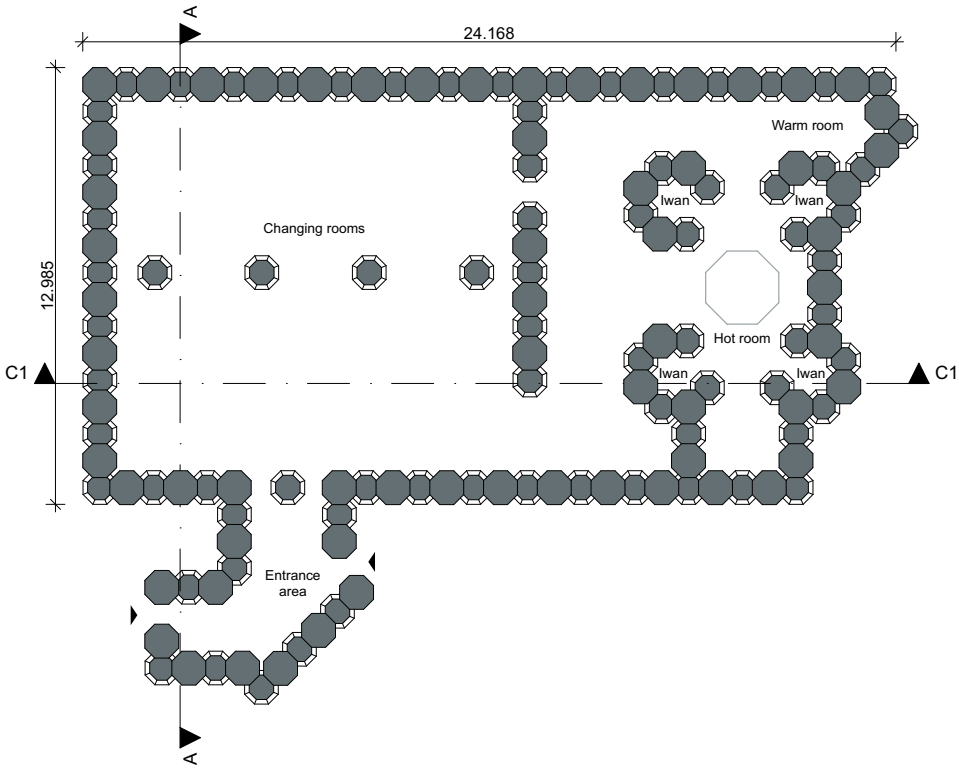


Fig. 50 – Test of the different possibilities with the new shape

Fig. 51 – Model of the octagonal shape

Roof and height adjustments

Another change compared to the first BinAir design of the KEK is the availability of bins in different heights. This allows more flexibility in height in walls and roofs. This can potentially create more interesting tectonics in the walls and roofs.

Also different is the look and construction of the roof. The roof in this version is also made out of the bins that are used for the walls. They are connected with each other via an integrated construction system. If desirable the elements can be covered with transparent or closed lids. This flexibility will make it possible to let in light where it is desired and block it when undesired. In case of a hamam the interaction with this light is very important to create the right atmosphere and let the visitors temporarily escape their daily problems.

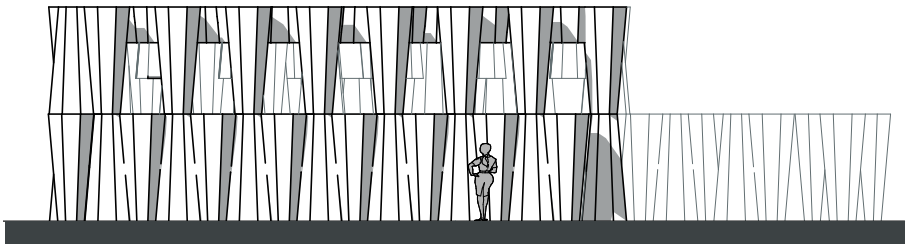


Fig. 52 – Facade constructed out of the octagonal bins

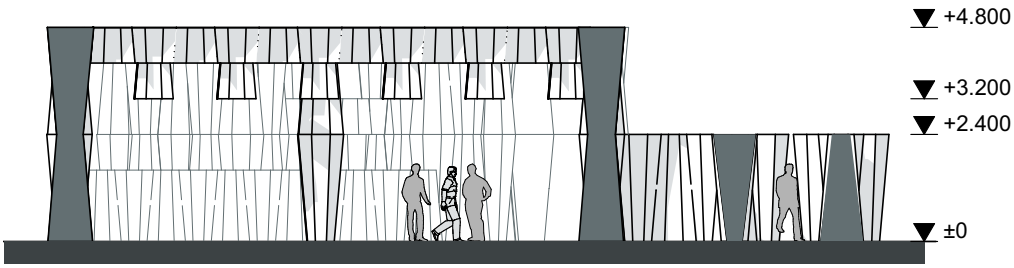


Fig. 53 – Facade constructed out of the octagonal bins

Fig. 54 – Hot room with the octagonal bin shape and variations in heights

Fig. 55 – Changing room with the octagonal bin shape and variations in heights

Finalisation of the Bin Shape

Making roofs, walls, windows and columns

After this short individual side experiment it was time to regroup and make a provisionally last step in the design. This design formed the basis for the Dutch Design Week model.

For this final step the octagonal shape was turned back into a rectangular shape. The octagonal shape would cause to much difficult corners then when building with the rectangular shape. Those corners would create to many different pieces to make it still suitable for a refugee situation where simplicity and fast building time are key.

This lead eventually to the following specifications of the bin:

Bin types

Up till now all the bins of each step had only one ground plane with only variations in height. But to solve the problems that were present at the first bin version a second bin type with different dimensions was added. As can be seen in picture Fig. 56 both types have a ground plane of 500x500 mm but they vary in width. The height of 600 mm is chosen because it is a suitable height to easily make storeys of 3000 or 2400 mm with and to make doors that have the correct height.

Grid

With the introduction of this second type it was also possible to introduce a grid. This grid will facilitate easy placing of the bins. This grid occurs every other bin where the ground plane of the bins is 500x500 mm.

Wall possibilities

By using the two bin types in different configurations it is possible to make endless variations in the walls. In this way it is for example possible to create small gaps where light can enter or visitors can look through.

Roof and floor possibilities

For the roof and floors BinAir provides two systems. The first one is a self–supporting system made out of concrete and bins. In this system bins will be place into a temporarily mould in the same way as is displayed in Fig. 56. Subsequently rebar will be placed between the bins and concrete will be poured.

The second type is an architectural more appealing system. In this system the bins will be placed as can be seen in Fig. 56. To support the roof an internal supporting structure will be added. This results in a type that hasn't got a chessboard like character. By arranging the bins like this light can also enter between the bins and not only through the transparent bins.

Column possibilities

Just like the walls the two bin types can be positioned into different configurations to form columns. Because the columns stand freely inside the space it isn't needed to take into account how the bins fit the next row. This allows even more combinations to be formed.

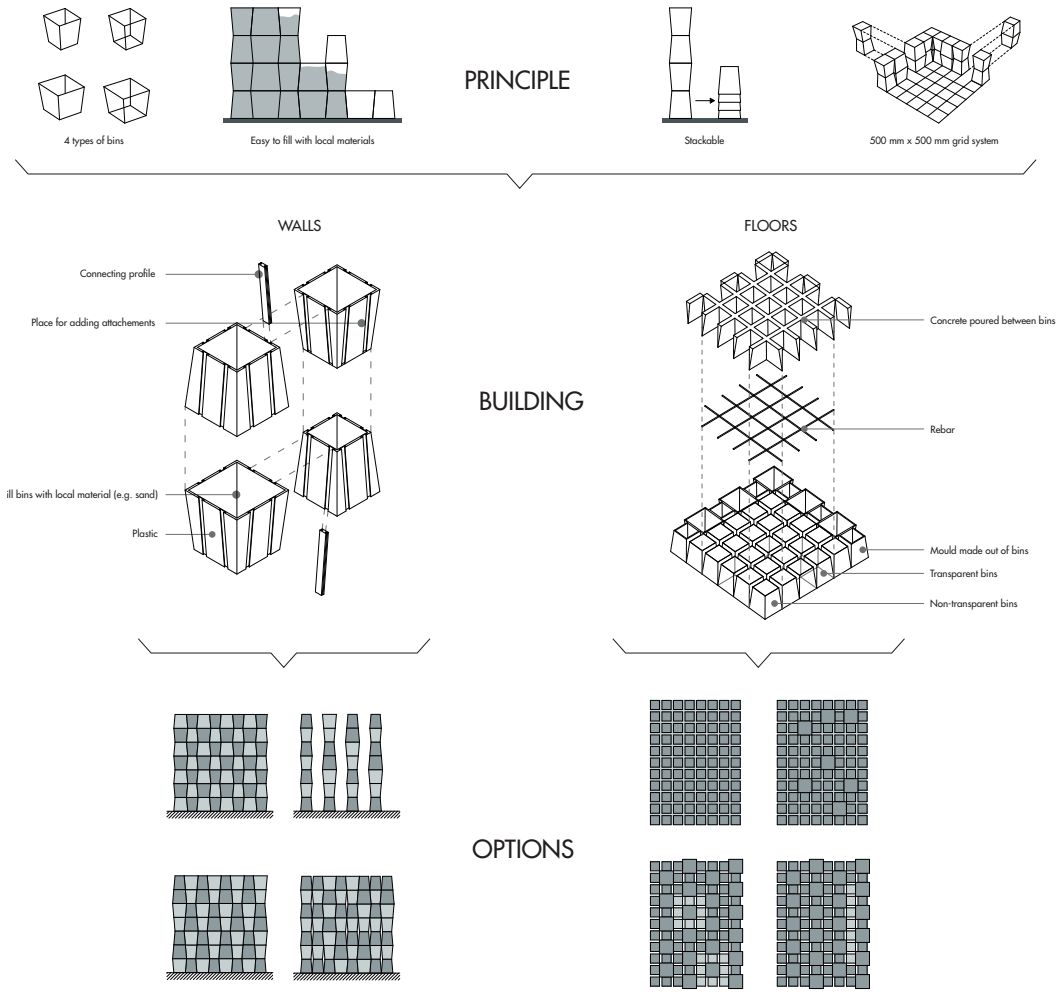


Fig. 56 – The BinAir design flowchart

Windows and doors
To make windows inside the building system there are two options possible. The first option is to replace closed bins with transparent bins. In this way it is possible to let light enter but it is not as clear as a glass panel.

In order to make windows multiple bins will be replaced by one big window. This frame follows the shape of the bins and therefore it will create a rather unusual window form.

Extra elements
When it is needed to add extra elements such as benches, ornaments, sinks, lamps these can be connected to the bins through the slots that are present on the side of the bins see Fig. 56. The system will work the same as the connecting profiles that are used to connect bins. If the element needs electric or water a pipe can be also mounted to the bins via those slots. To keep in line with BinAir principles (easy transport, cheap production and buildable without expert knowledge) these pipes will be visible on the outside.

Material
The choice for the materials is based on the key principles of the BinAir building system: stackable, easy to transport, cheap to produce and buildable without expert knowledge. To meet these principles plastic is used. With plastic there are less weak connections because the bin is constructed out of one mould. But further research is needed if this is the best material.

Connections
In order to make the stacked bins into one solid building it is necessary to connect the bins horizontally and vertically. Therefore there is a horizontal and a vertical connecting profile. The bins of the BinAir system can be connected as shown on Fig. 56.

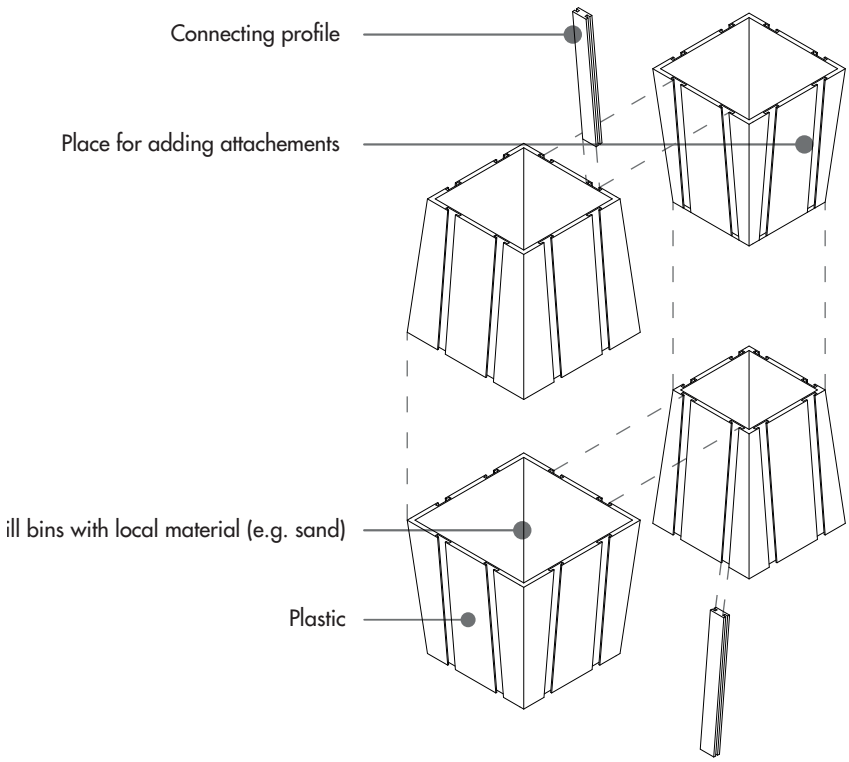


Fig. 57 – The connection of the bins

Dutch Design Week Model of a Hamam

Translating the system into a building

With the specifications for the system determined it was now possible to make a design. For the Dutch Design Week (DDW) a fragment of a hamam is designed. This 1:20 model shows a part of the hot room of a hamam. In this model all the possibilities of the building system are visible.

When making the design the elements that are present in a traditional hamam are translated into the building system. For example the traditional small round windows are changed into transparent bins. By positioning them in different ways it is possible to make patterns that are also visible in the 'Bathhouse of the Winds'. Another example is the translation of the traditional iwans. In this bathhouse the small niches are not created by making small extensions to the hot room but by placing columns an walls in such a way that they act as room dividing elements and thus creating the same effect as is done with niches.

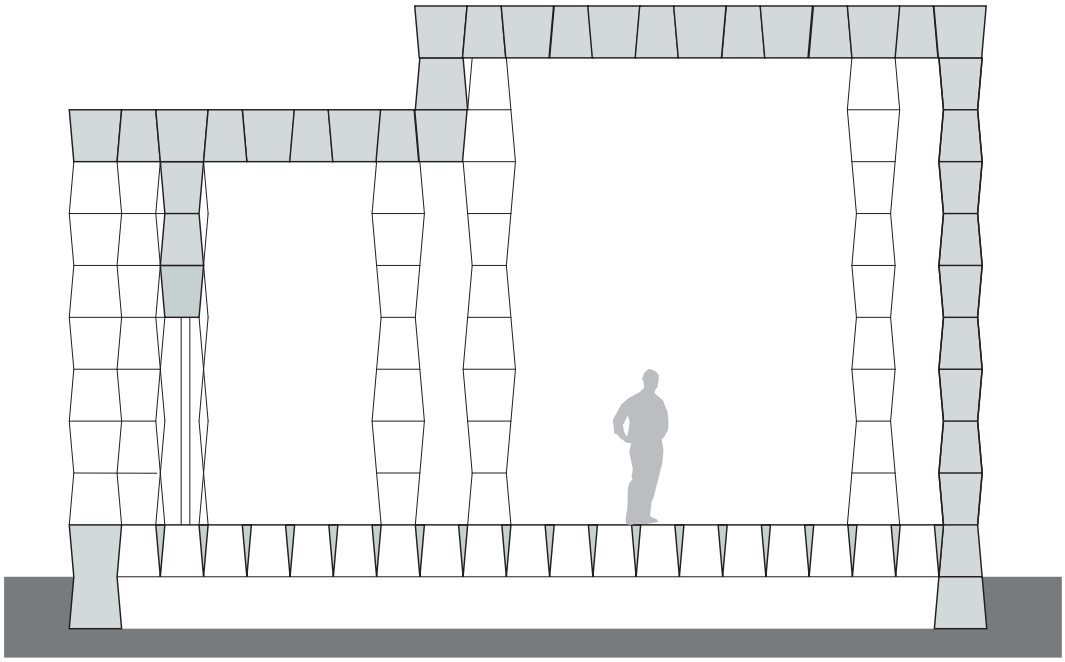


Fig. 58 – DDW hamam section

2,5 1,5 0,5 0

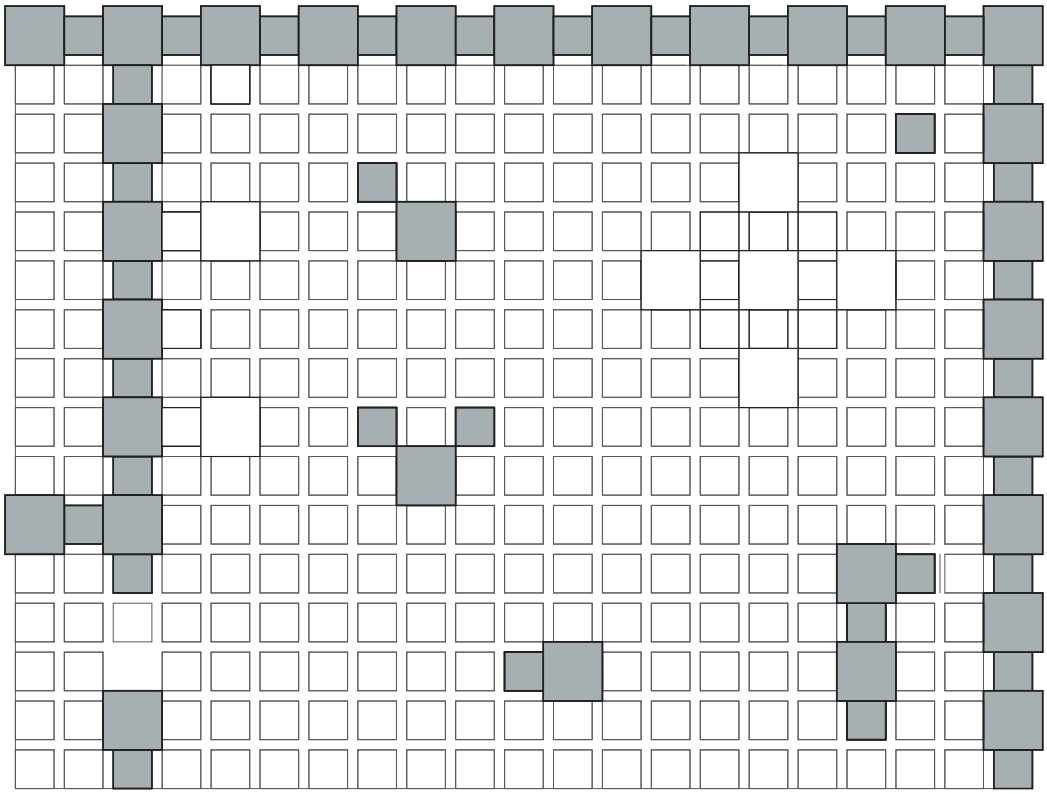
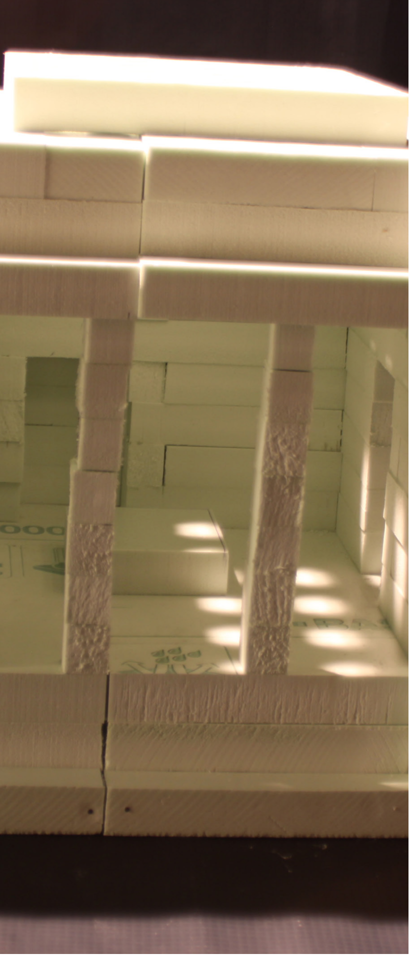


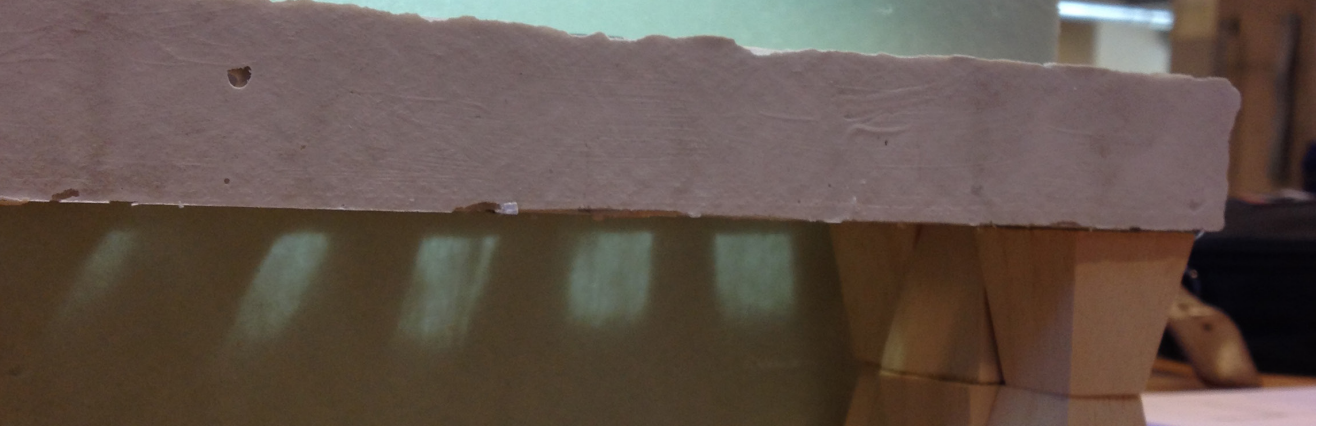
Fig. 59 – DDW hamam ground floor

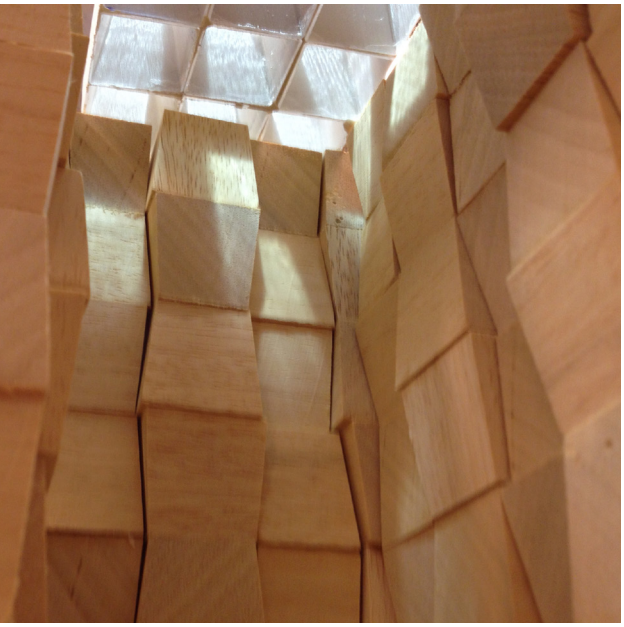
2,5 1,5 0,5 0

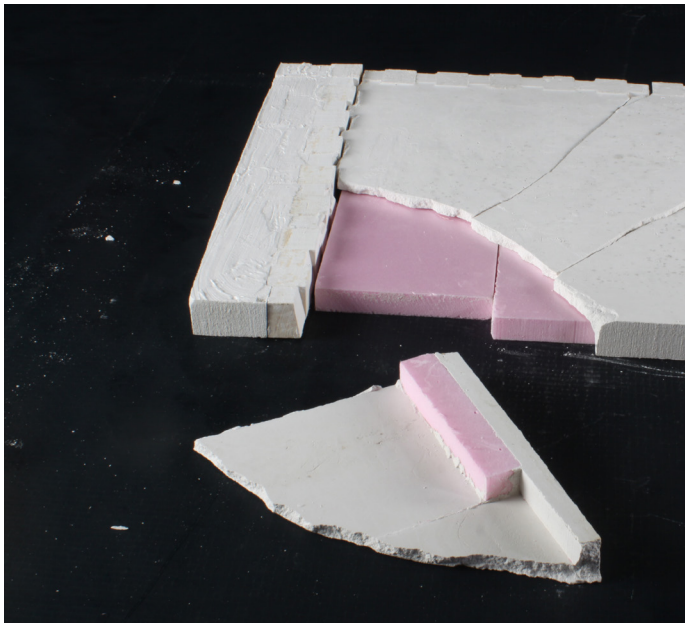
Next four pages – A collage of the building and exhibition of the DDW model ▶

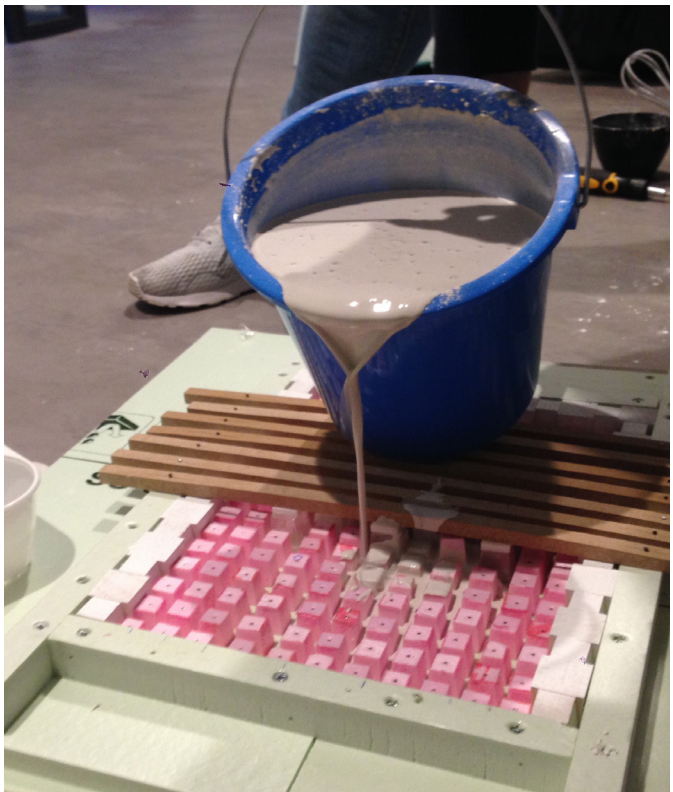


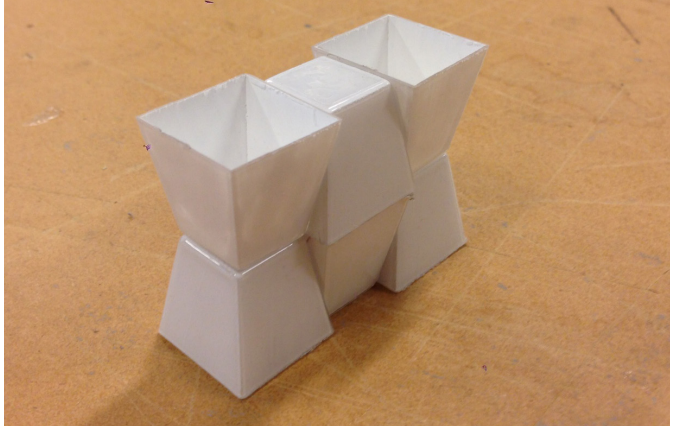

BinAir
The graduation studio "a Public Building for Refugees" has the aim to investigate how architecture can contribute to bring more dignity inside a refugee camp. Large common spaces provide more social coherence and should let them feel them more a resident inside a new society. 'BinAir' has the aim of being an answer. These stackable bins can be transported efficiently and with a small toolset mounted into walls, columns, windows, benches or floors. Subsequently these bins can be filled with local materials to get the required mass.
500mm
500mm
600mm
500mm
600mm
500mm
500mm
ing. Brian Bekken
brian.bekken@gmail.com
Luuk de Rouw
info@luukderouw.nl

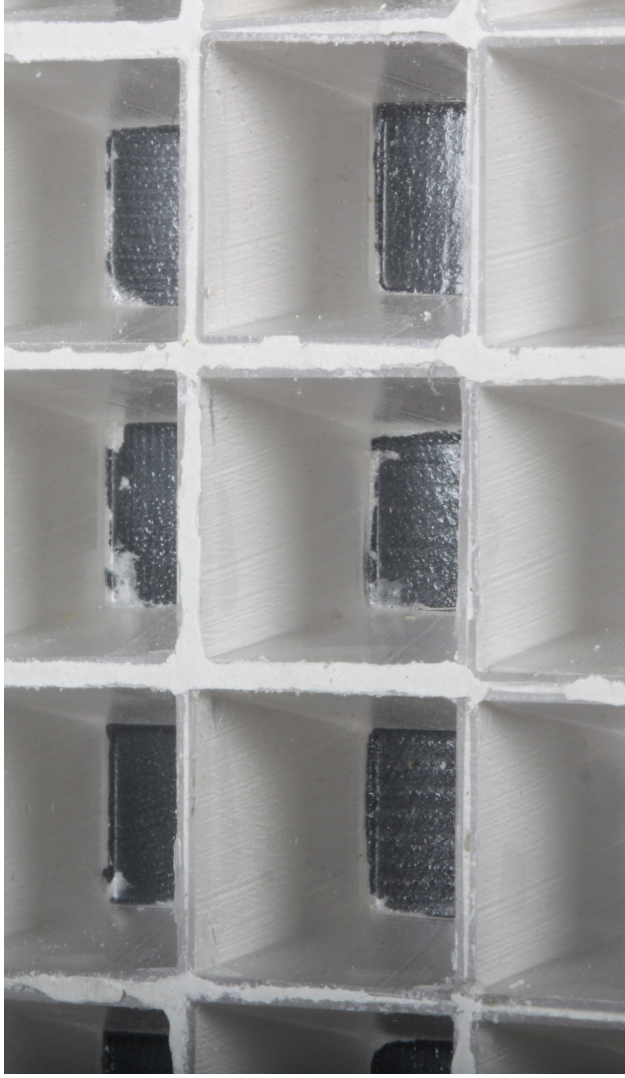


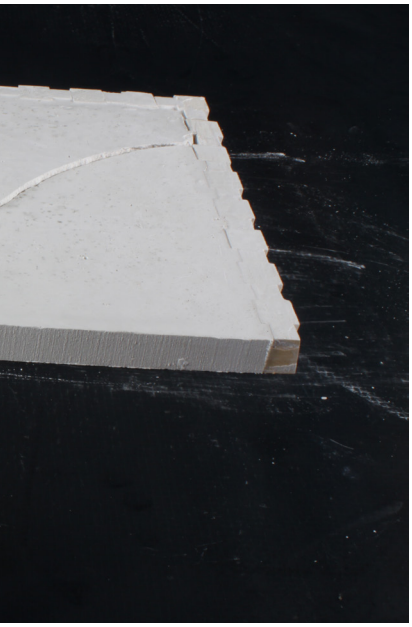


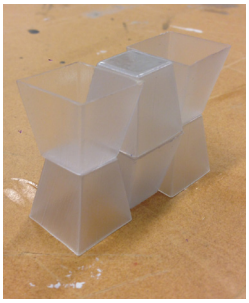


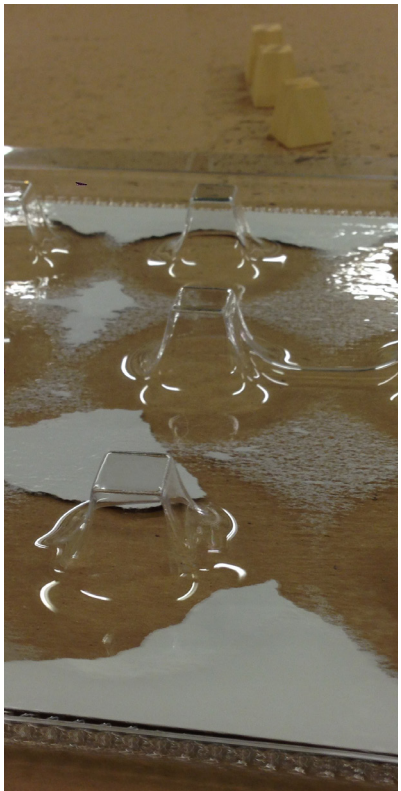


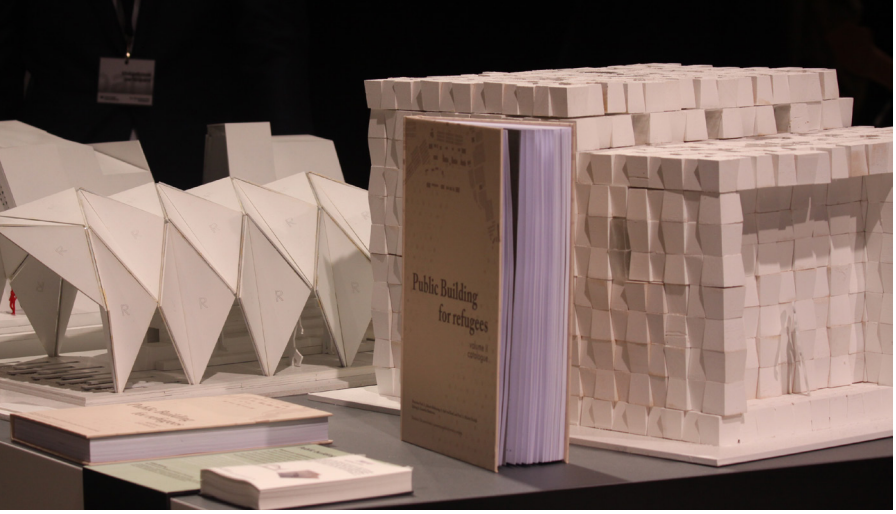


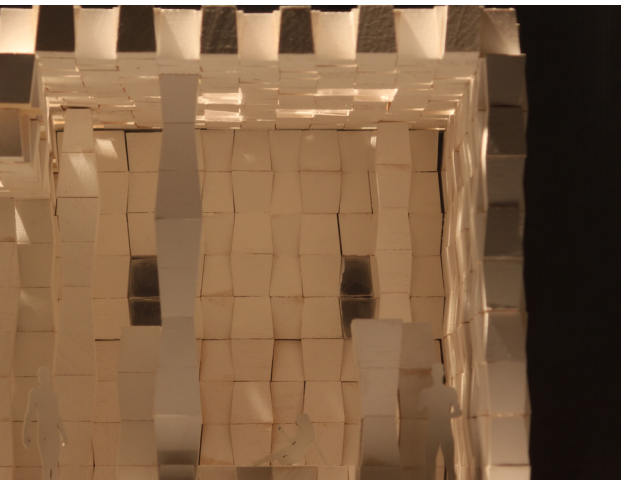









Public Building
for refugees



Final Design

Introduction

After the Dutch Design Week the focus of the research changed to designing a hamam for in a refugee camp. The design decisions made for this hamam are based on the knowledge gained from the previous researches done during this graduation studio. In this chapter the result of this final design period is showed.

Context

Darashakran is located in the Kurdish region of Northern Iraq. It is located is 30 km away from Erbil, the regional capital. The camp opened in 2013 and had an area of 1,150,000 m^2. The majority of the refugees are Syrians from cities such as Aleppo, Qamishli, and the region. The Kurdish government as well as many humanitarian organizations are actively involved with Darashakran.

The camp is set up with a clear layout based on an orthogonal grid. In terms of program, the largest part of public and administrative spaces are clustered on one side of the main road, leaving the residential districts entirely on the other.

The UNHCR standard indicators, such as food aid, security, healthcare, shelter, basic needs, water, and sanitation, are satisfactorily met, except education (93% of the children at school age are enrolled) (UNHCR, 2016).

The residential areas are divided into districts. Each district contains upgraded UNHCR tents that are clustered in groups of four. Next to each cluster, there is a separate concrete shed that contains a toilet, shower, and kitchen, each of 1.5 m^2.

Fig. 60 – Street in Darashakran

Fig. 61 – Tents inside the camp

Fig. 62 – Water storage

Fig. 63 – Central public space of the camp

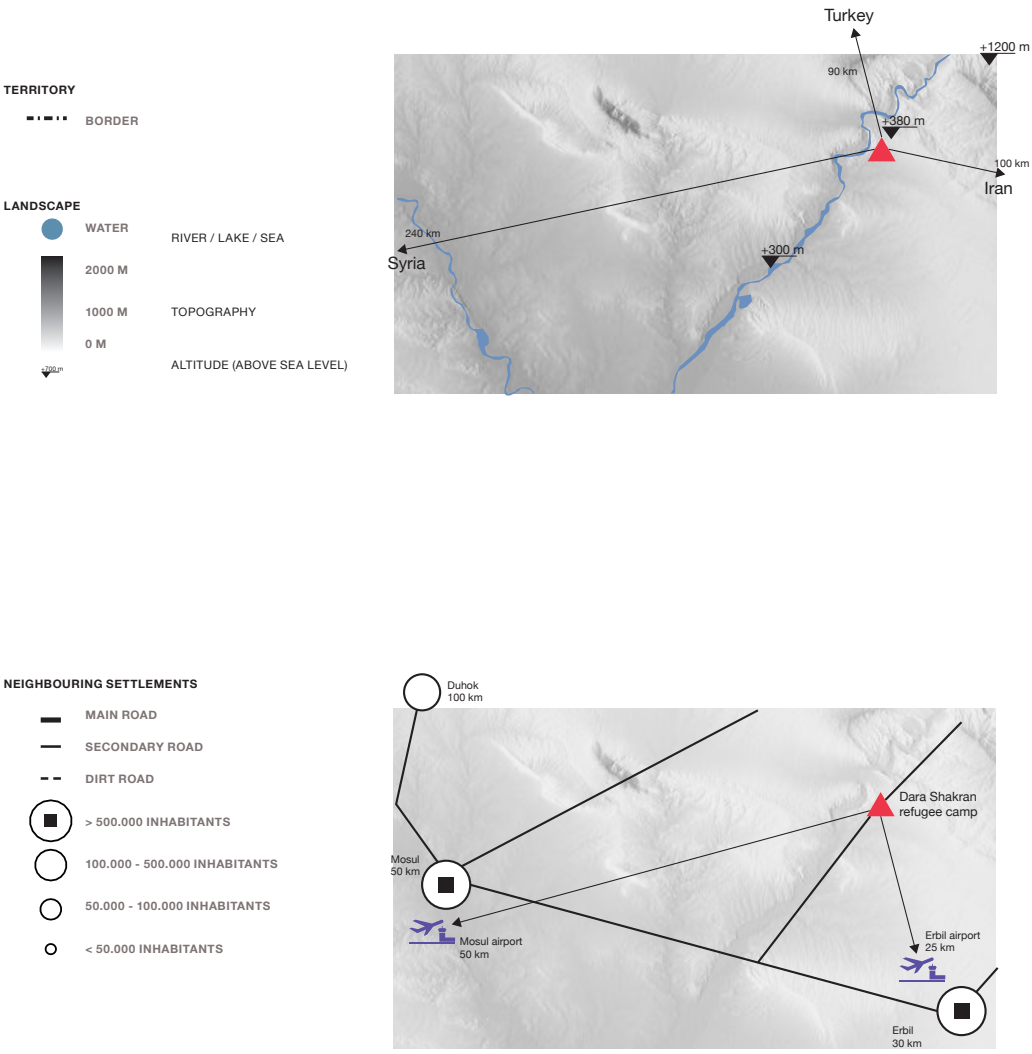


Fig. 64 – Surrounding analysis

FACILITIES

MARKET	PRIMARY AXIS
COMMUNITY	FOOTBALLFIELD, WOMEN- CULTURE- & COMMUNITY CENTER
PLAYGROUND	CHILD FRIENDLY SPACE
REGISTRATION	REGISTRATION AND RECEPTION CENTER
DISTRIBUTION	DISTRIBUTION POINTS
HEALTH	HEALTH CENTER
RELIGION	MOSQUE, CHURCHES AND OTHER RELIGIOUS BUILDINGS
SERVICES	SHOPS, BAKERY, WEDDING HALL
EDUCATION	PRIMARY AND SECONDARY SCHOOL
STORAGE	WAREHOUSE AND PARKING
ORGANISATION	NGO'S
PROGRESS	FACILITY IN DEVELOPMENT

INFRASTRUCTURE

- SECURED BORDER
- MAIN ROAD
- ENTRANCE
- SECONDARY ROAD

DENSITY

++++	SPACES OF EXCHANGE, MEETING AREAS
+++	AROUND FACILITIES
++	ESSENTIALS: SHOWER, TOILET & KITCHEN
+	RESIDENTIAL AREAS

URBAN FABRIC

SOLID	BUILT AREAS
VOID	UNBUILT AREAS

SATELLITE MAP

- FRAGMENT BORDER

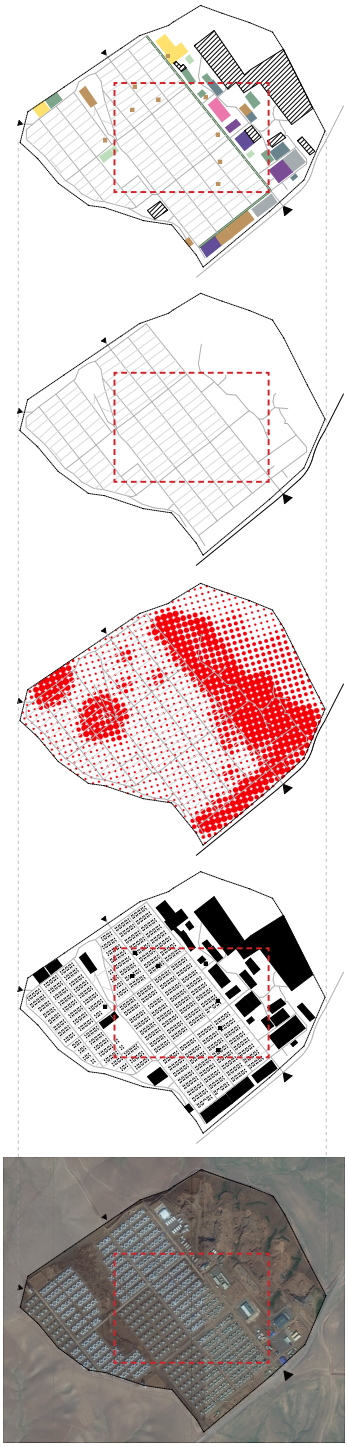


Fig. 65 – Camp analysis

The choice for Darasharkan and the location within the camp is a result of certain criteria that were set up after analysing the refugee problematic, different camps and hamams. These criteria are chosen in such a way that they are focused on solving the problem as stated in the research question. Darashakran matched those criteria on the moment of choosing a location the best compared to the other camps. The difficulty with refugee camps is that they change very quickly which makes it difficult to get the most actual information. The choice of the location could therefore be seen as a case study for the final design.

The hamam is located on an empty piece of land next to the mosque. This gives visitors of the mosque the possibility to clean themselves before they visit the mosque. The male and female entrances are each located on a different side of the building. This is done because of the cultural habits in the Middle East. The Male entrance is located next to the main road in order to make it visible for people passing by. The female entrance is more secluded and therefore located in an alley between the hamam and other dwelling units.

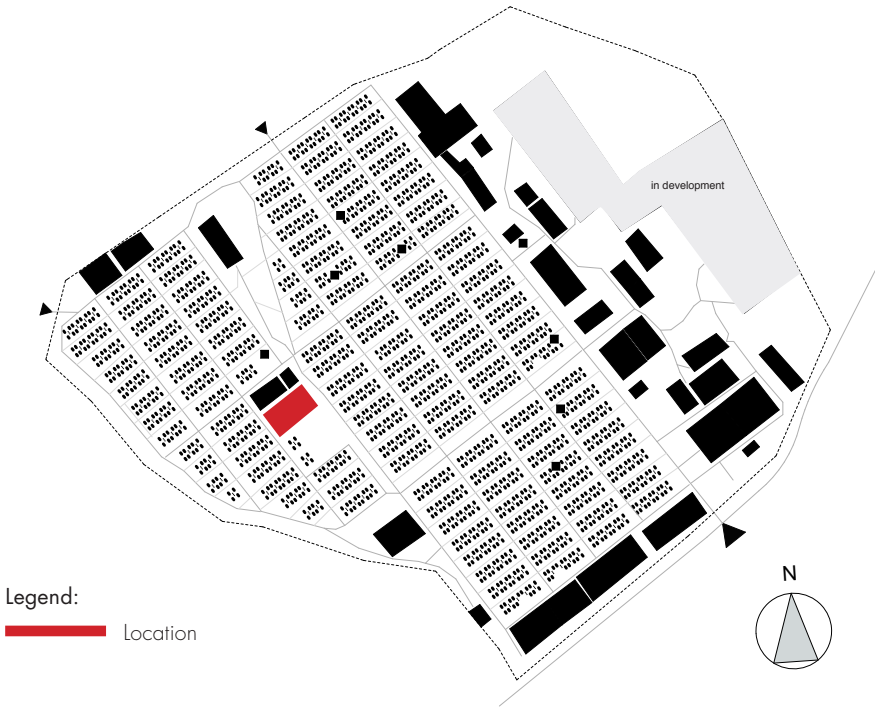


Fig. 66 – Map of Darashakran and with the location

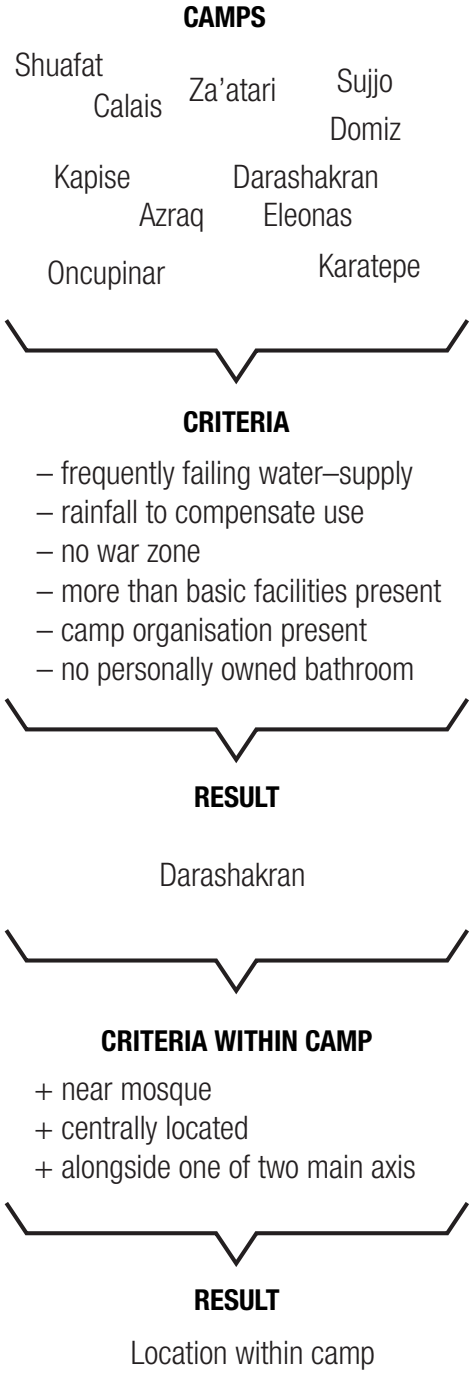


Fig. 67 – Location flowchart

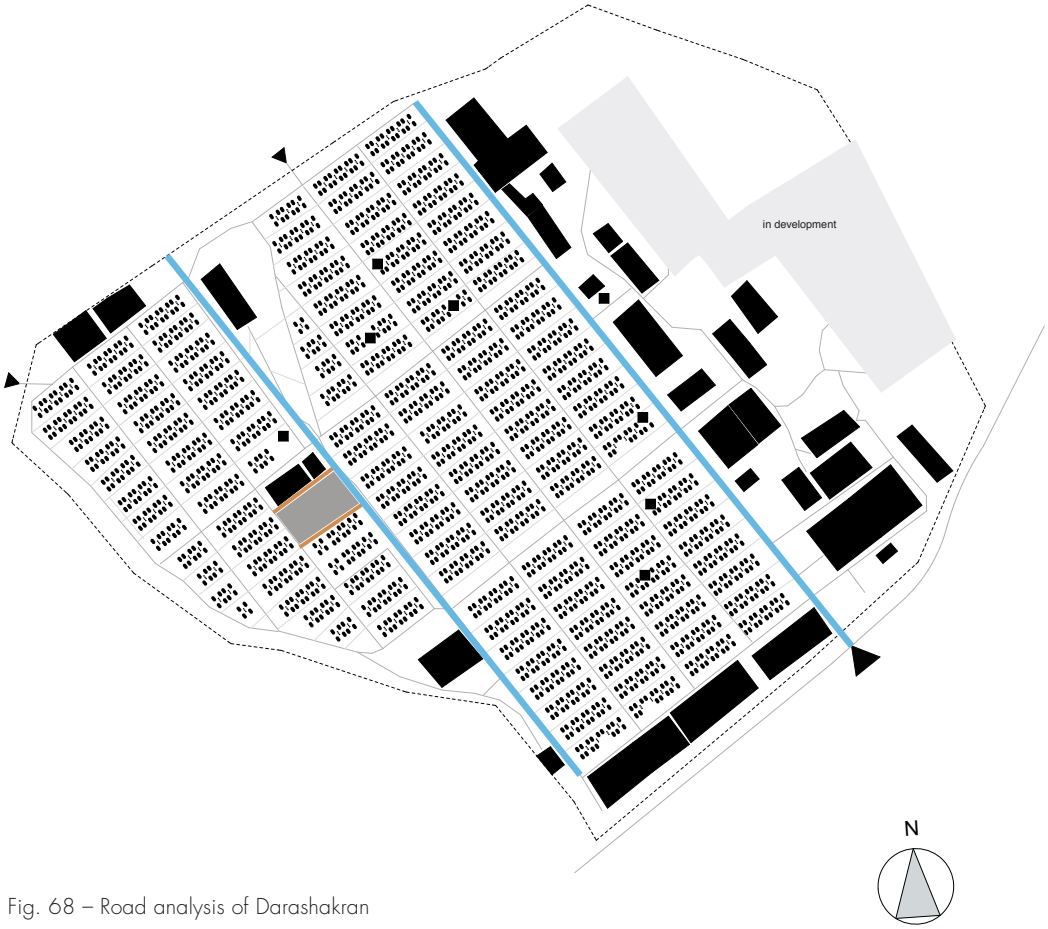


Fig. 68 – Road analysis of Darashakran

Legend:

Location

Main roads

Alley

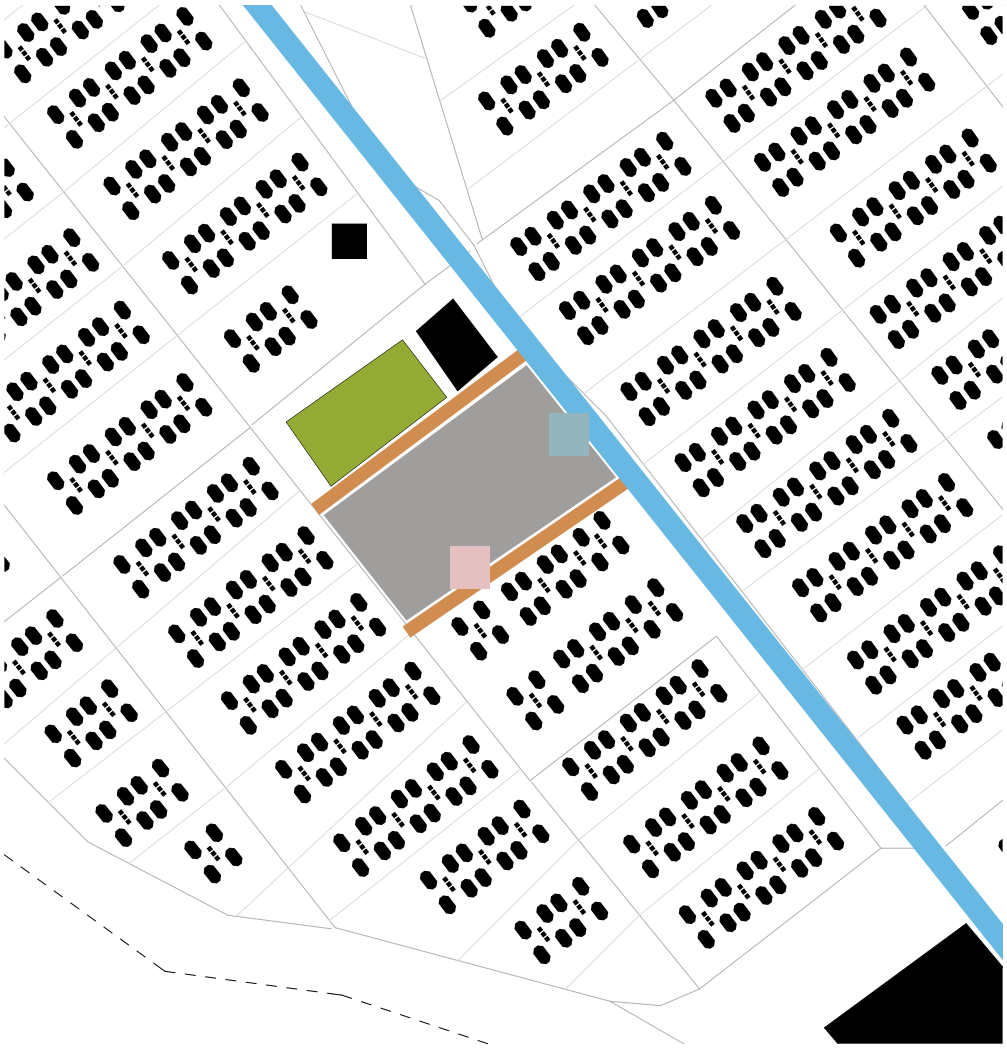
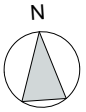


Fig. 69 – Entrances of the hamam



Legend:

Location
Main roads
Alley
Mosque
Male entrance
Female entrance

Program

The hamam design for this project is based on the traditional functions that are common in hamams in the Middle East. This will make it for the refugees that visit the hamam easier to feel familiar with. But because of its location within a refugee camp there are functions added.

The most obvious addition is the public space that surrounds the main functions of the hamam. This public space will have, in contrary to the public space that is now common in refugee camp, enough quality to stay comfortable. It is also a secure and enclosed space where refugees can safely retreat themselves. This will result in a broader group of people that visit the hamam.

The sizes of the different rooms are derived from the theoretical framework and subsequently translated to the requirements for Darashakran.

Entrance
♂ 15 m²
♀ 20 m²

– Male entrance located next to main road
– Female entrance located in alley
– Slow segregation from inside to outside

Central axis
♂ 350 m²
♀ 350 m²

– Connecting room
– Social interaction
– Vegetation
– Place to drink tea and smoke waterpipe

Buffer zone
♂ 170 m²
♀ 170 m²

– Place to walk outside
– Filtering of light

Changing room
♂ 130 m²
♀ 340 m²

– Place for social interaction
– Preparation for marriages
– Meeting point
– Gathering space

Warm room
♂ 55 m²
♀ 75 m²

– Getting clean
– Gossip
– Natural half–light
– Secluded
– Doing business
– New social connections
– Place for dancing

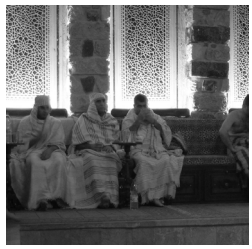
Hot room
♂ 70 m²
♀ 190 m²

– Relaxation
– Massage
– Steam
Quietness
– Secluded
– Only necessary natural light

Cold room
♂ 16 m²
♀ 36 m²

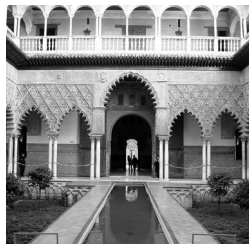
– Recovering from hot room
– Direct natural light

Relaxing space
♂ 80 m²
♀ 130 m²



– Place for social interaction
– Doing business
– Barber

Patios
♂ 120 m²
♀ 160 m²

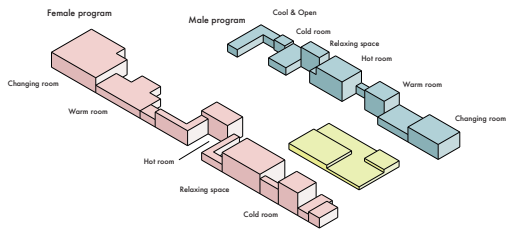


– Place to be outside without leaving the building
– Privacy

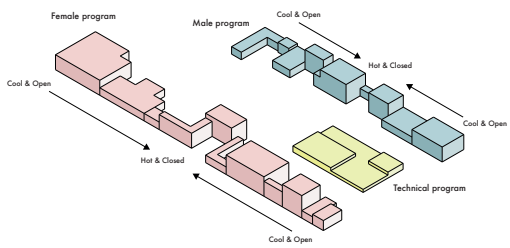
Concept

The building concept is based on the route that a visitor makes through a hamam. This route is for every visitor the same because they all will go from the outdoor temperature gradually trough different rooms to the hot and humid hot room. Because there is a separation between male and female there are two routes. These routes are each placed alongside a central axis and eventually they are interlocked to create the building shape. By interlocking the volumes and positioning them from colder to hotter there is an optimal use of heat exchange between the different rooms.

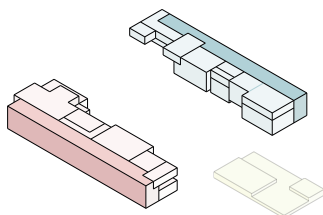
To improve the privacy and reduce sunlight from entering a buffer is added alongside the central axis. This will create an intermediate zone that makes it possible to design a facade with more freedom. With the addition of the central axis and the buffer a gradual transition between the busy streets and the calmness in the hamam is created.



1 | Hamam program translated into volumes

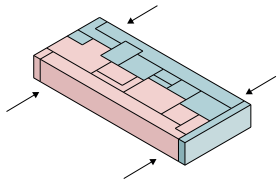


2 | Ordered in differences of hot & closed and cool & open

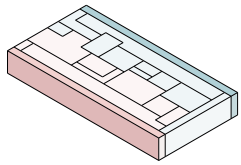


3 | Add central connection axis

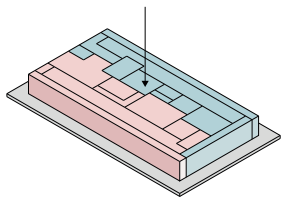
4 | Interlock male and female program to make optimal use of heat



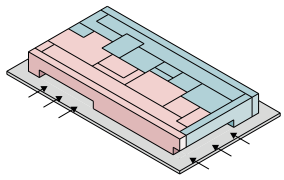
5 | Add buffer to improve privacy and reduce sunlight



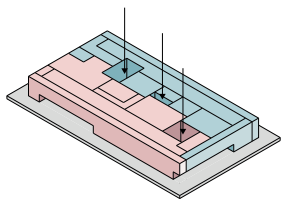
6 | Burrow the building by 1,2 meters to make use of cooler ground and to use the sand for filling the bins



7 | Add entrances



8 | Add patios



Routing

The routing of the hamam already starts outside the building. When refugees want to escape their daily problems they descend from the ramp to a level of 1,8 meters below ground level. This gradual descend between the walls of the buffer zone will already make them less aware of the surrounding. After descending the refugees enter the hamam in the central axis. The central axis is a large indoor garden where people are chatting, relaxing, playing games, etc. This is possible because all the basic needs are met inside the building. The visitors staying here are even more segregated from the outside world.

From the central axis on the refugees can choose between the short or the long way through the hamam. When taking the long way the refugees go through all the rooms of the cleaning process. To eventually the hot room, the most segregated room. To make it possible for the visitor to orientate themselves during their visit there are multiple connections made with the central axis. This is done through windows, from balconies and through patios.

When visitors for example just want to relax or have a drink it is possible to take the short route through the hamam. When taking this route the visitor will follow the central axis until they can enter the room they want.

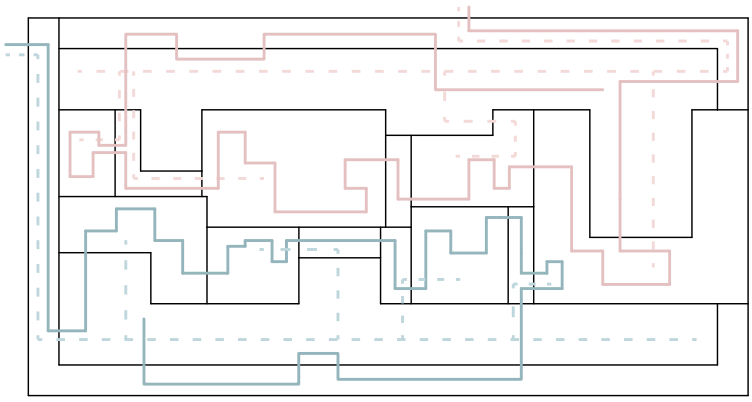


Fig. 70 – Long and short route through hamam

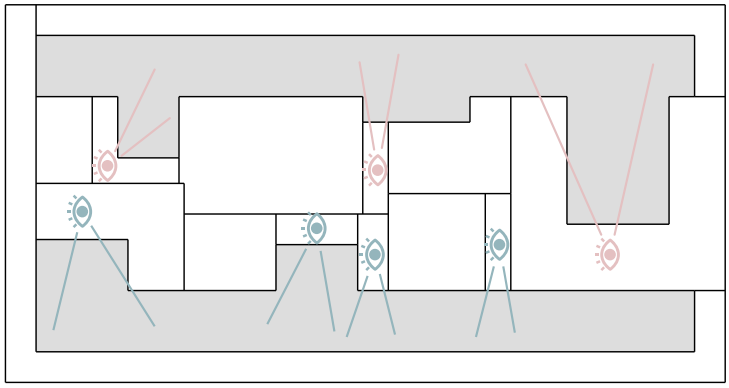
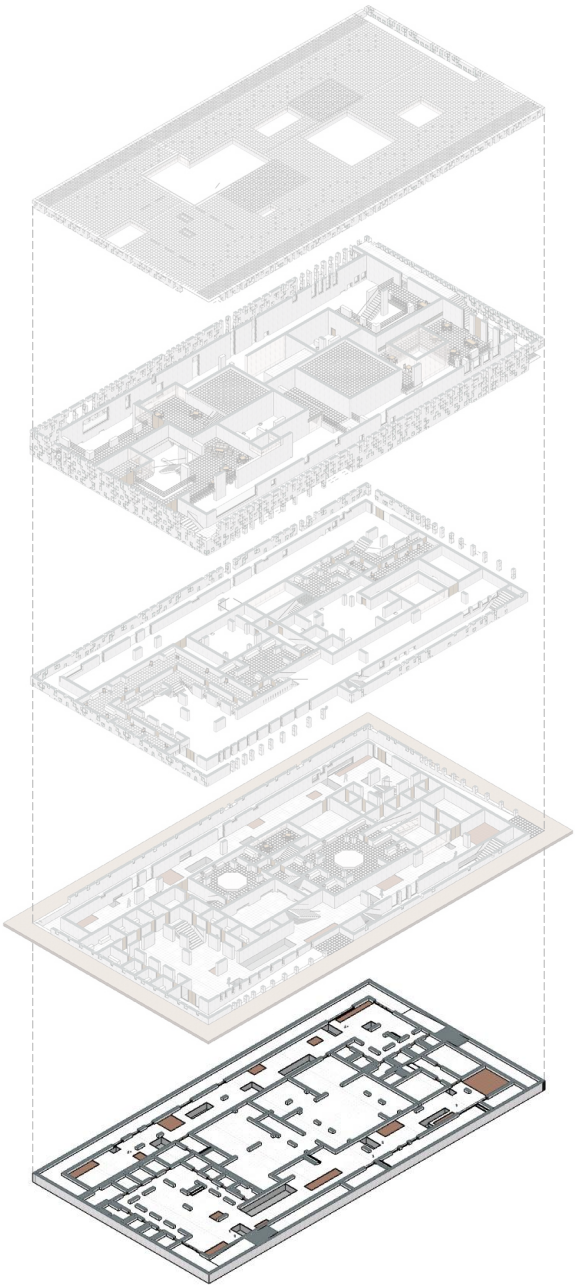


Fig. 71 – View lines on the central axis

Legend:

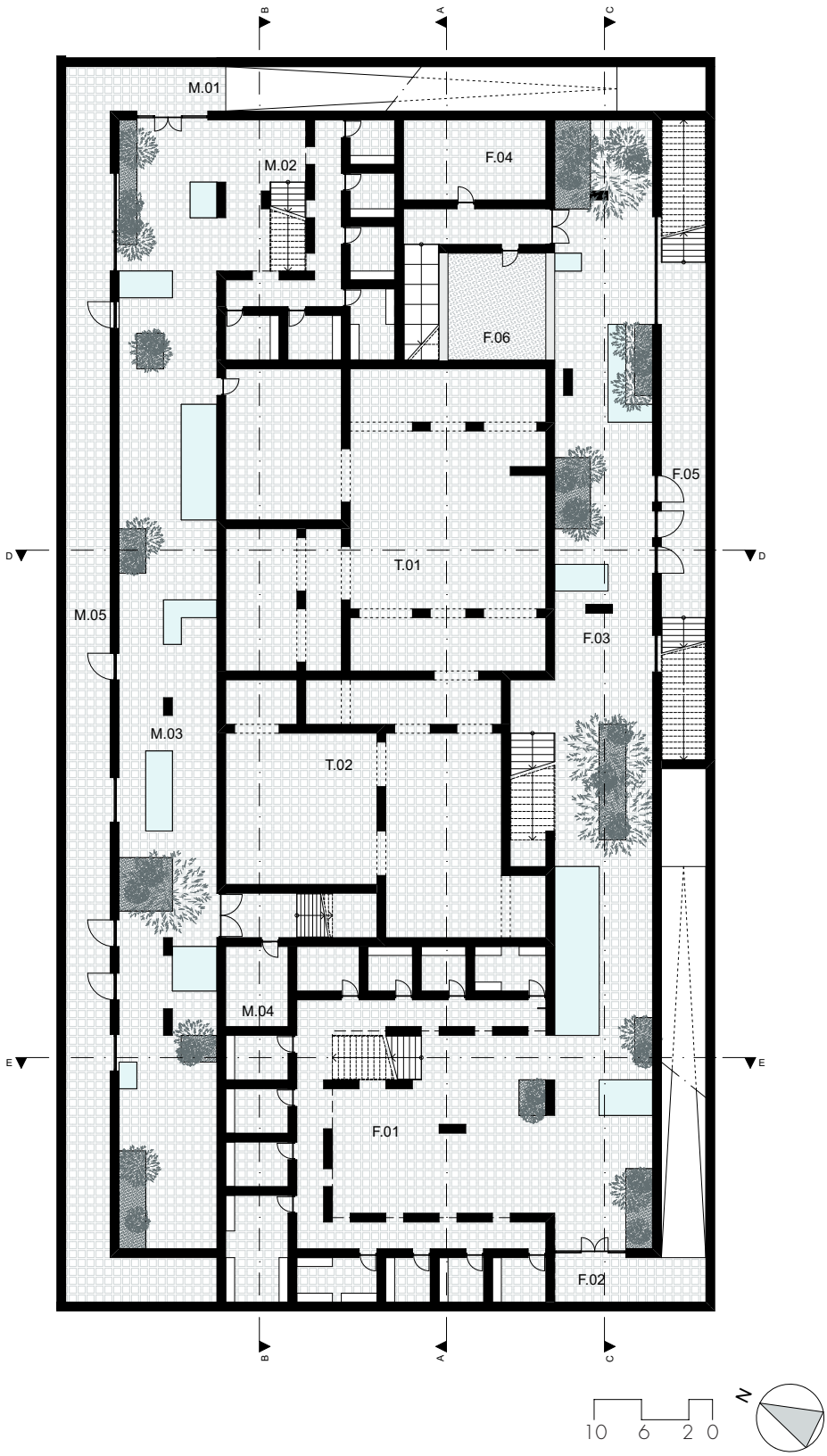
Male long route
Male short route
Female long route
Female short route
Central axis

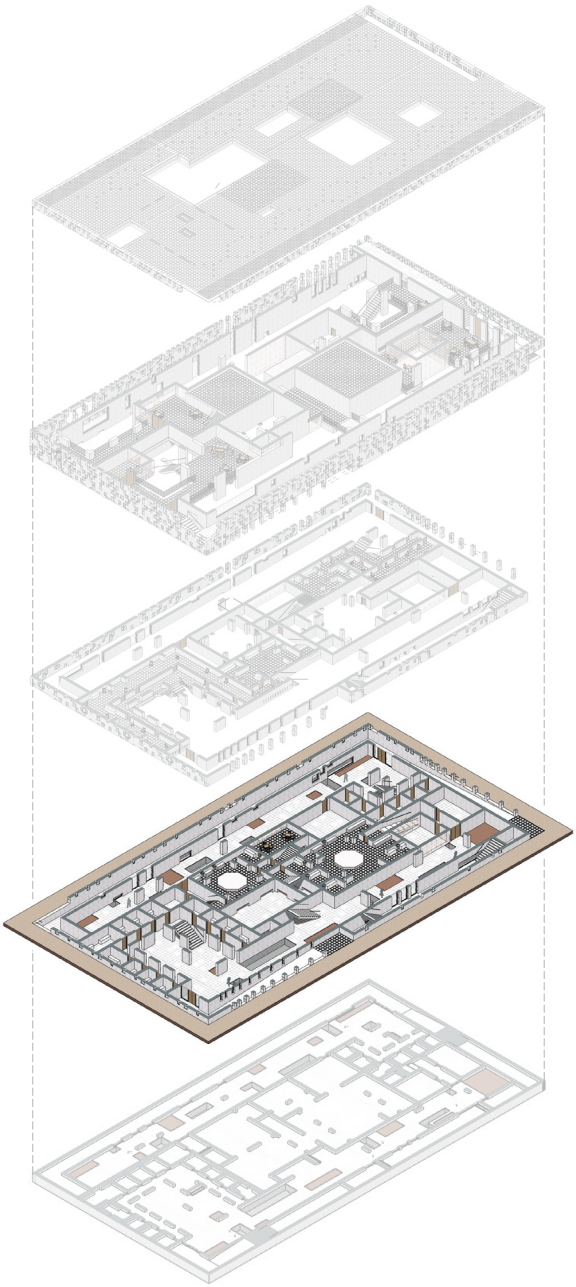


Legend:

M.01	Entrance
M.02	Changing rooms
M.03	Central axis
M.04	Cold room
M.05	Outdoor buffer zone
F.01	Changing rooms
F.02	Entrance
F.03	Central axis
F.04	Cold room
F.05	Outdoor buffer zone
F.06	Outdoor patio
T.01	Technical room
T.02	Technical room

Fig. 72 – Floor –1 (P–1200) ▶


B
A
C
M.01
M.02
F.04
F.06
F.05
D
D
T.01
M.05
F.03
M.03
T.02
M.04
E
E
F.01
F.02
B
A
C
10 6 2 0
N

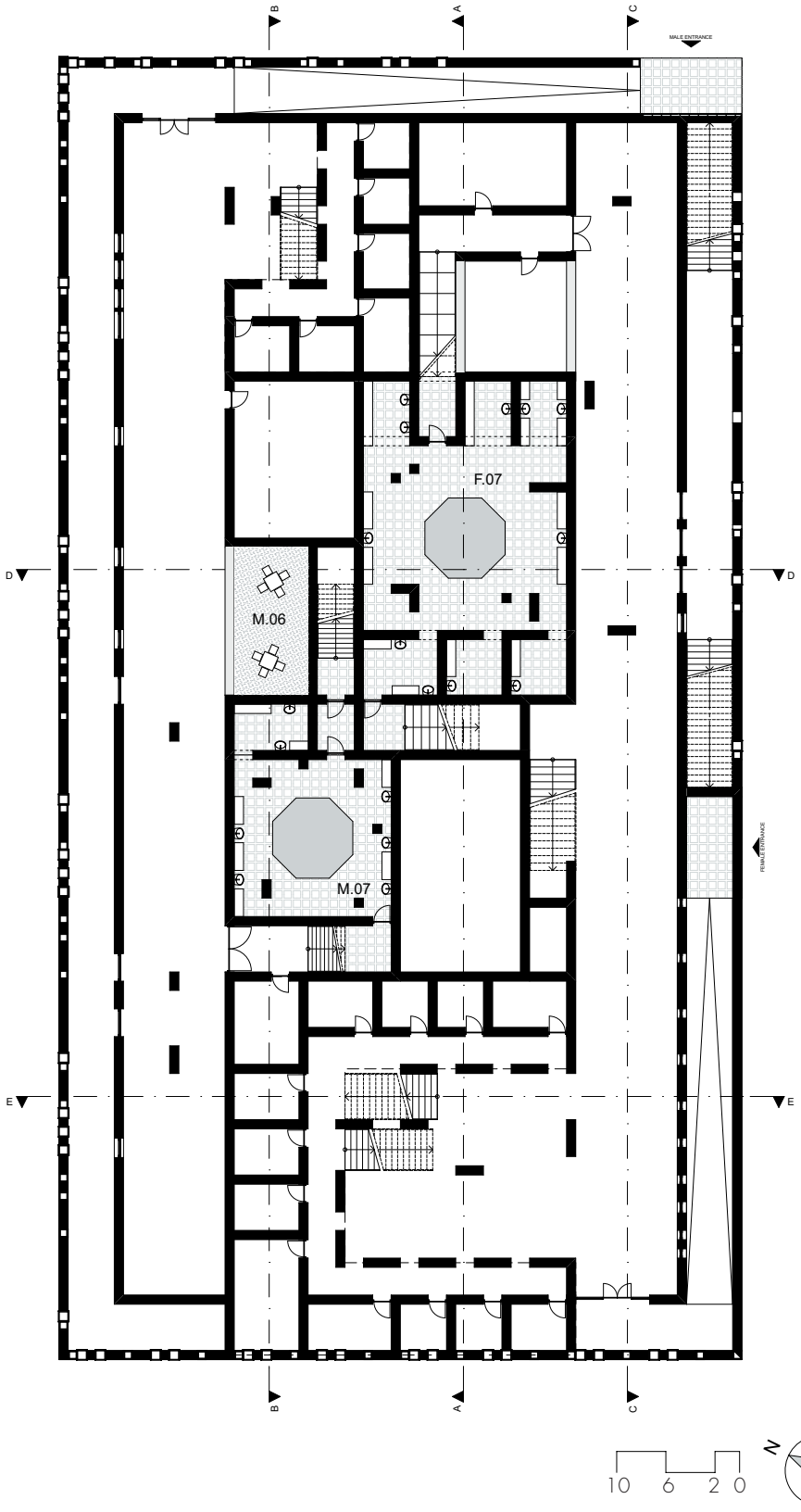


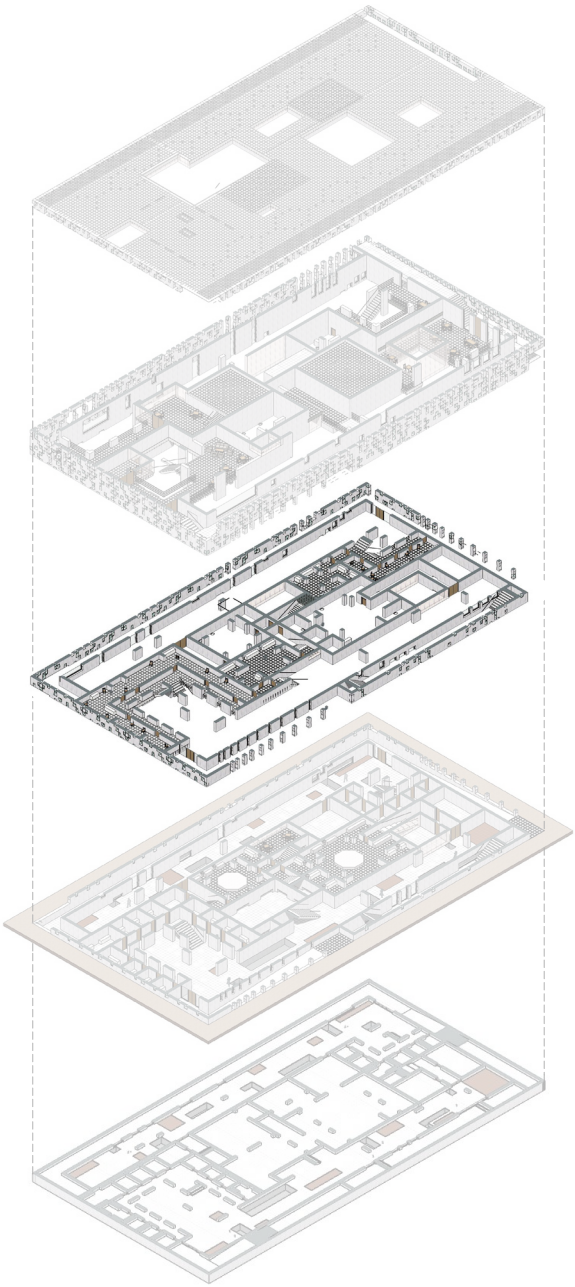
Legend:

M.06 Outdoor patio
M.07 Hot room

F.07 Hot room

Fig. 73 – Ground floor (P=0) ▶

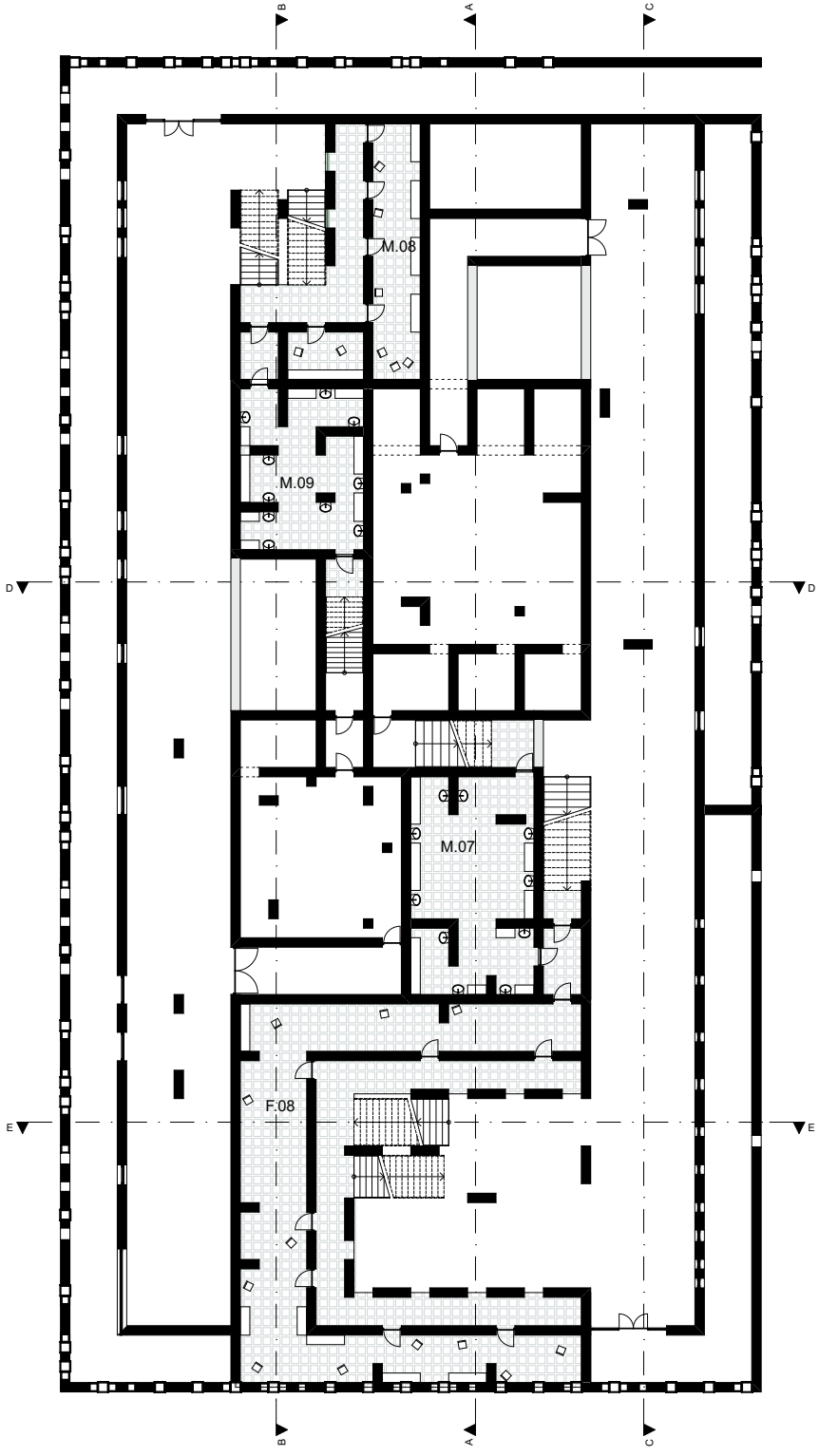

B
A
C
MALE ENTRANCE
F.07
M.06
M.07
D
D
E
E
FEMALE ENTRANCE
B
A
C
10 6 2 0
N

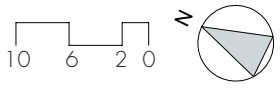


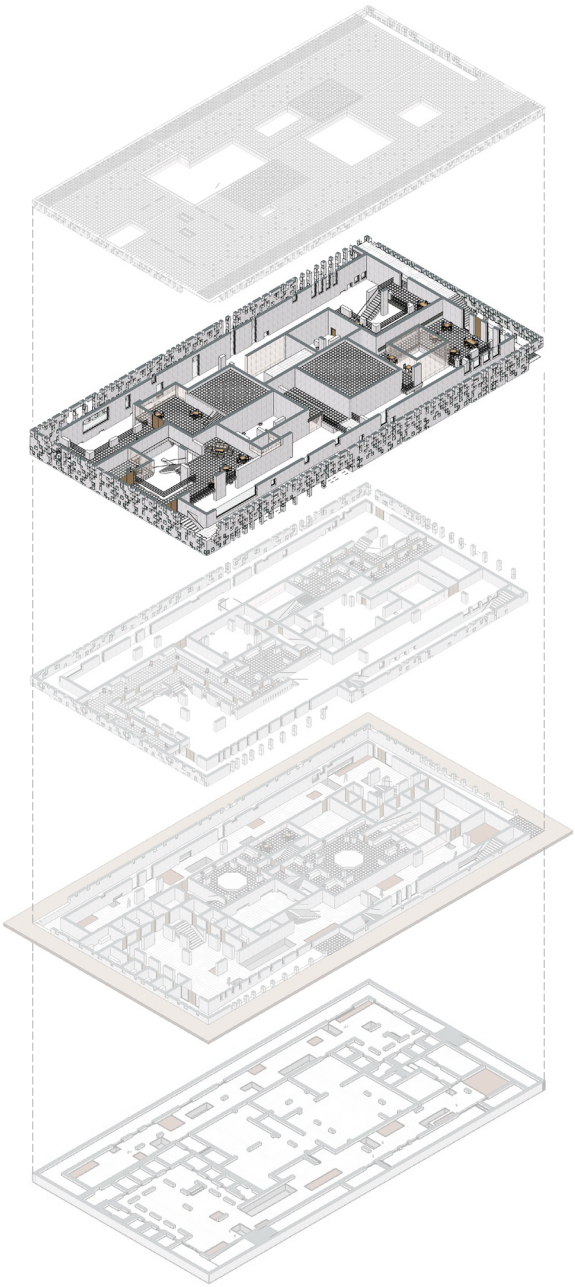
Legend:

M.08	Common changing rooms
M.09	Warm room
F.08	Common changing rooms

Fig. 74 – Floor 1 (P+1800) ▶


B
A
C
M.08
M.09
D
D
M.07
F.08
E
E
B
A
C

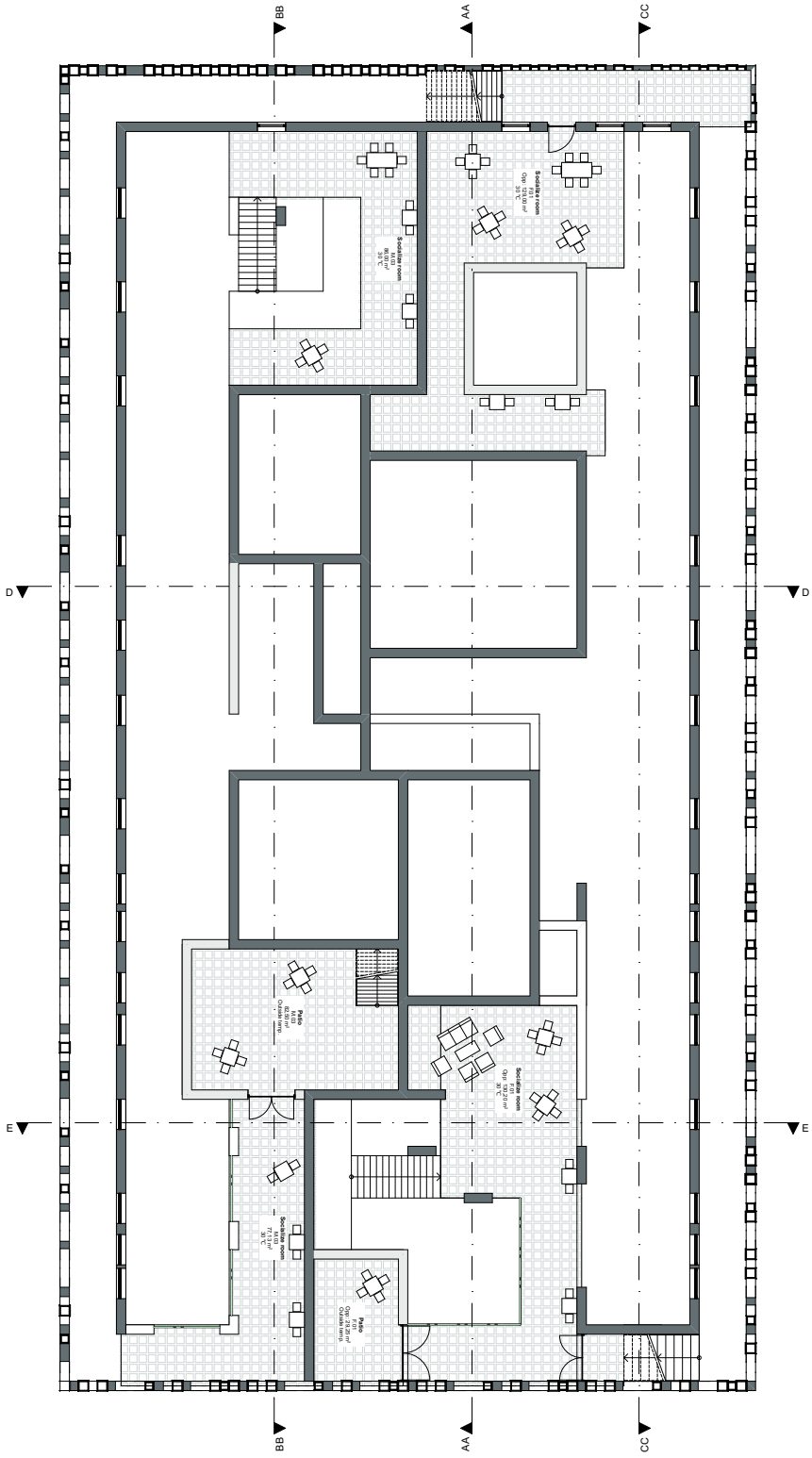

10 6 2 0
N



Legend:

M.10	Socialize room
M.11	Outdoor patio
M.12	Socialize room
F.09	Socialize room
F.10	Socialize room

Fig. 75 – Floor 2 (P+3600) ▶


BB
AA
CC
D
E
Socialize room
Patio
10 6 2 0
N

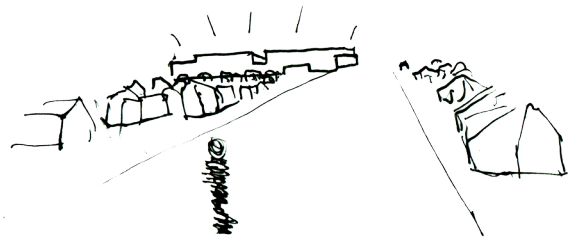
Facade

The building is build up out of a double facade. These are just like the rest of the building constructed out of the bins. With the program of the building placed behind the inner facade this facade plays in combination with the outer facade a big role in the way the program is exposed to the outside world.

When the building is approached from a distance the big holes in the outer facade are visible. These mark accents like entrances, balconies and accentuate important rooms that lie behind the facade. The holes also give the building more relation with surrounding. When getting more closer to the building a pattern on the facade becomes visible. This pattern is formed by leaving a bin away and thus creating a hole or using instead of closed bins also transparent or translucent bins. And when the building is approached closely a glimpse of the inside of the building is visible. But the holes are positioned in such a way that it is not possible for pedestrians to see the visitors inside directly. Only the shadows can be seen. This of course has to do with its function a hamam. But in the Islamic architecture it is also common to have facades that have no window openings that look out directly on the street. Buildings in Islamic architecture are more focused on the inside.

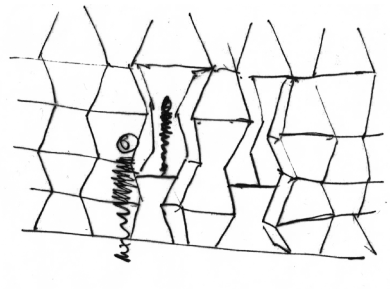
Apart from its main function this outer facade also functions as a barrier against direct sunlight entering the building. This will help in keeping the building at a more constant temperature. The inner facade is the thermal barrier between inside and outside. Doors and windows in this facade are based on normal materials such as wood and glass. This creates a more open look then if the windows would be made out of transparent bins. The result of this is that the building seen from the inside looks open and gives the visitors a possibility to look outside while still maintaining the protection that is giving by the outer facade.

From a distant only the accents are visible

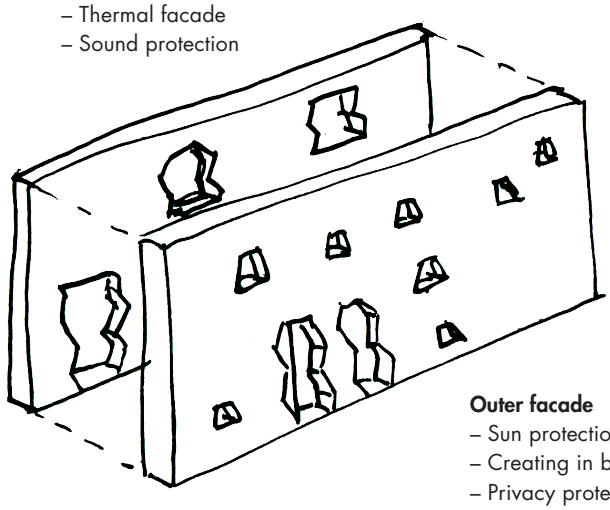


When positioned closer to the building the pattern created by the bins is visible

Close to the building glimpses of shadows inside are visible



Inner facade
– Thermal facade
– Sound protection



Outer facade
– Sun protection
– Creating in between zone
– Privacy protection
– Creates freedom to place inner facade windows freely

Fig. 76 – Multiple sketches that show characteristics of the facade

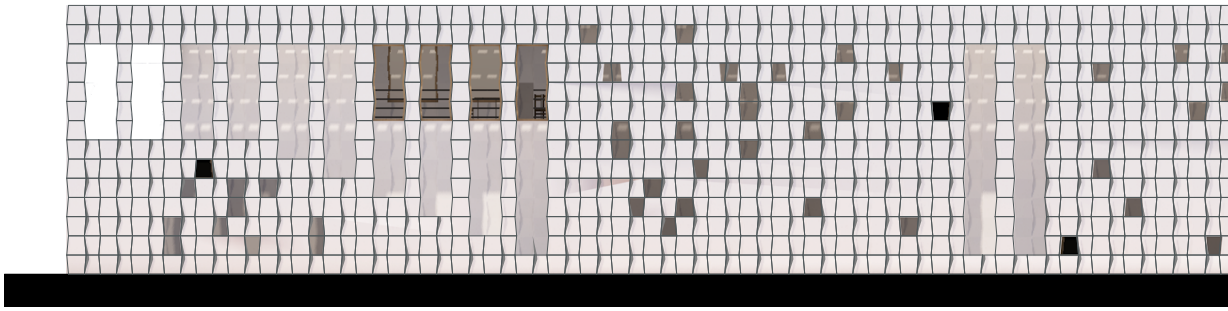


Fig. 77 – North elevation

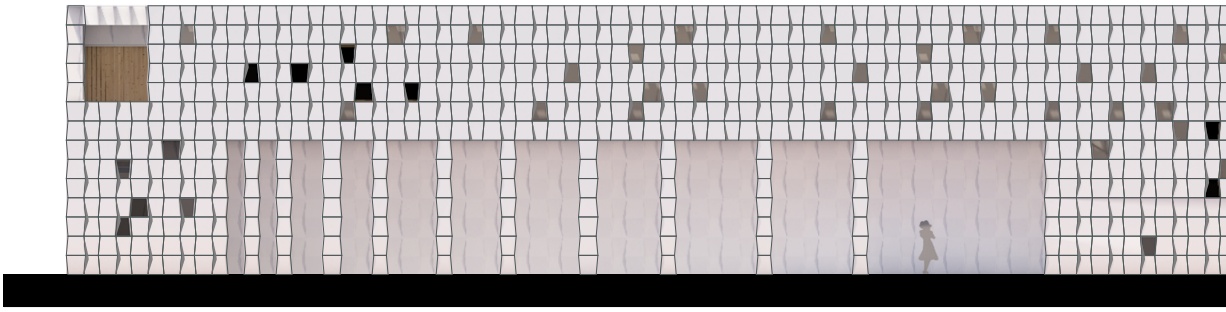
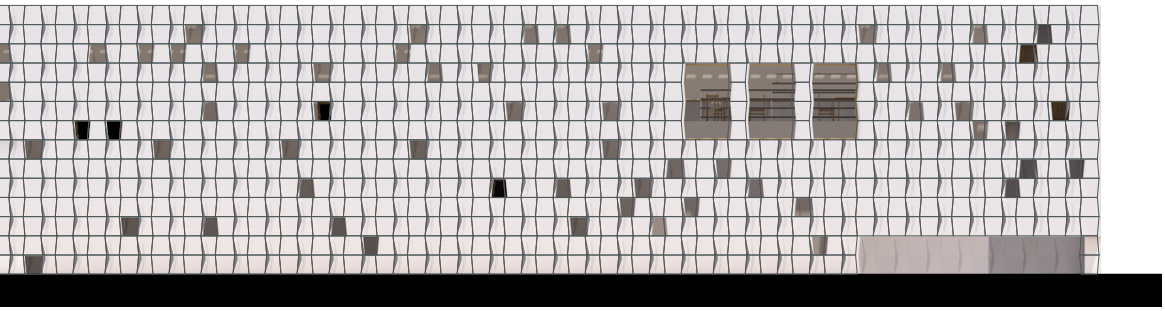
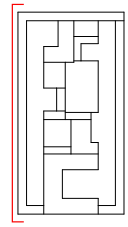
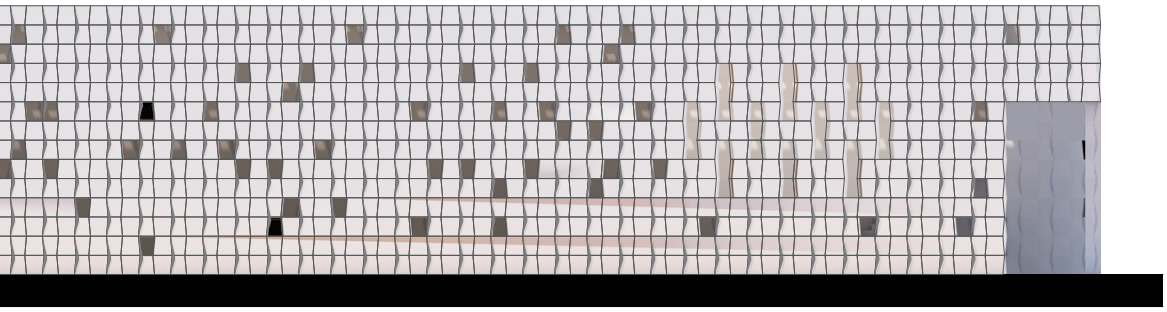


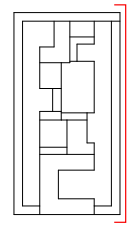
Fig. 78 – South elevation





5 3 1 0





5 3 1 0

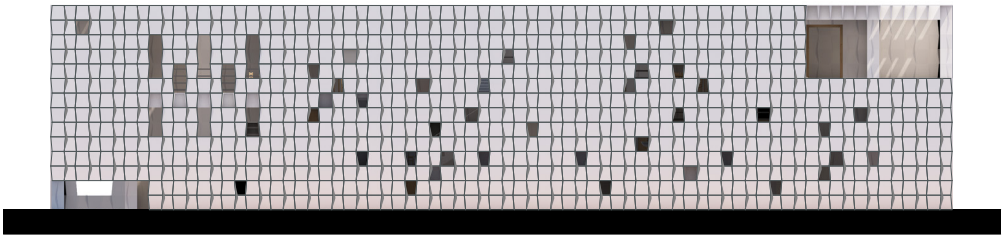
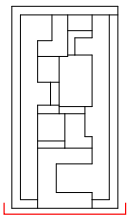
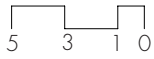


Fig. 79 – West Elevation





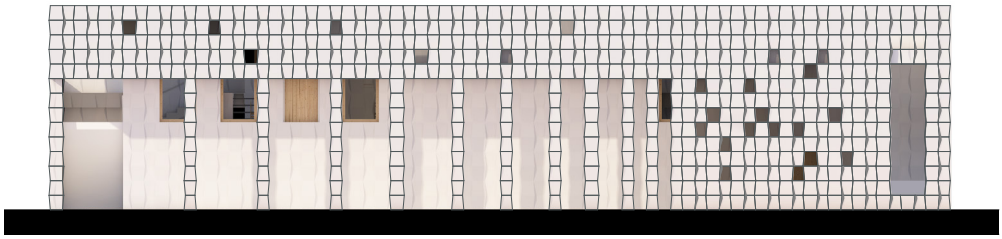
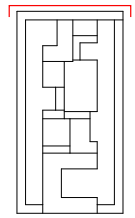
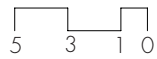


Fig. 80 – East elevation





Light

From the theory part it became clear that light is an important aspect of a hamam. In the design of this hamam the rooms are positioned in such a way that the light can enter the rooms in different ways.

In the rooms where more light is desired, such as the changing rooms and the relaxing rooms, there are more and bigger light entrances placed. In the hot room the light is reduced to only a few light entrances. With the use of the BinAir system it is possible to make the light entrances as big or as small as desired. It is also possible to hang transparent bins under the transparent bins in the roof. In this way the light is spread differently through the roof than that it would have been with just a transparent bin the roof.

Thanks to the extra facade created by the buffer there are even more possibilities to arrange the light entrances.

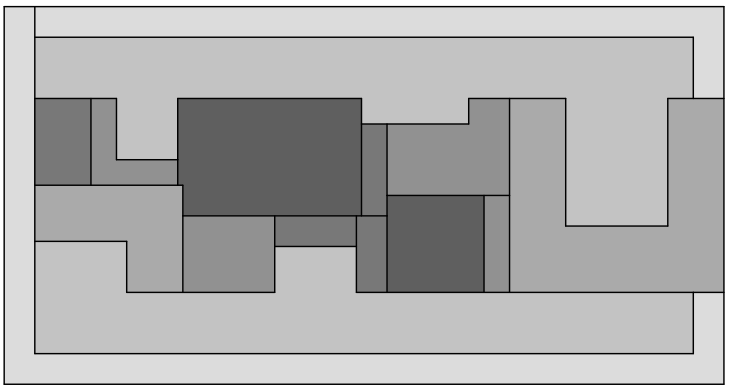
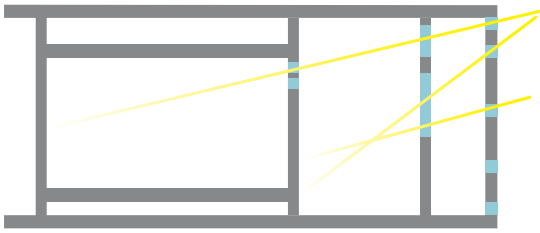


Fig. 81 – Light intensity

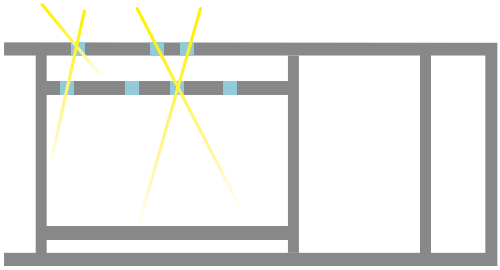
Legend:

Light intensity

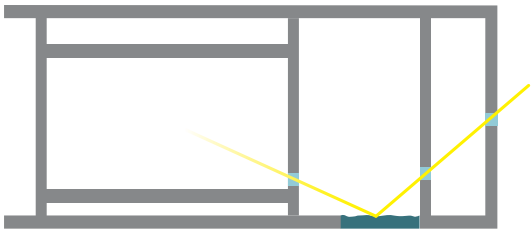
Light Dark



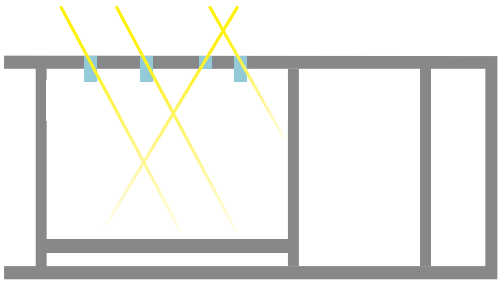
Light through buffer zone



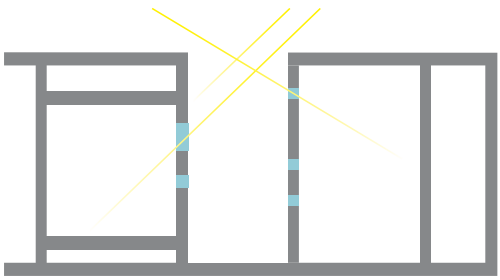
Light filtered through double roof



Light reflections on water



Light through lightholes in the roof

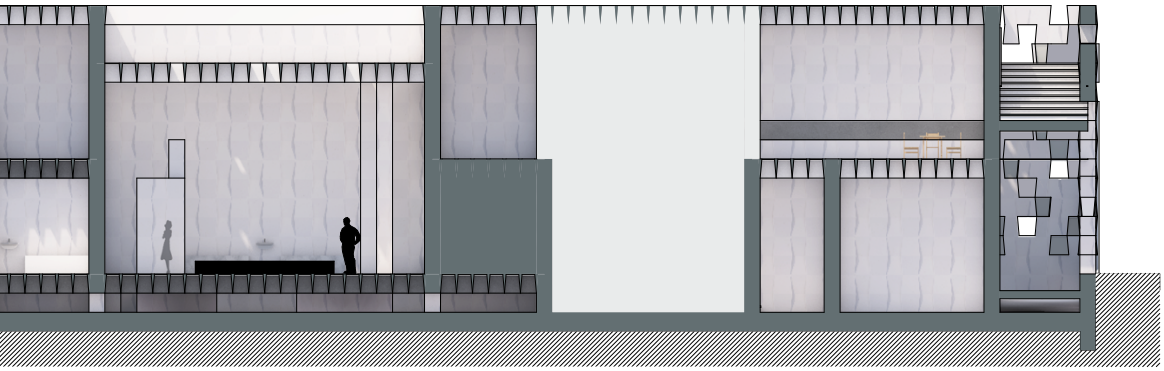


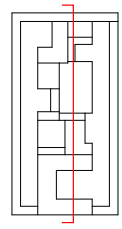
Light entering via patios

Fig. 82 – Different possibilities in light entrances

Fig. 83 – Section A–A

Fig. 84 – Section B–B





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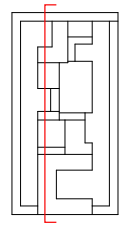

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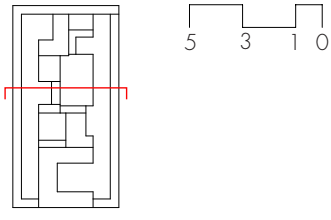
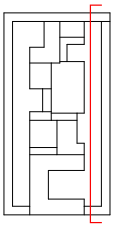
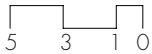
Fig. 85 – Section C–C

Fig. 86 – Section D–D







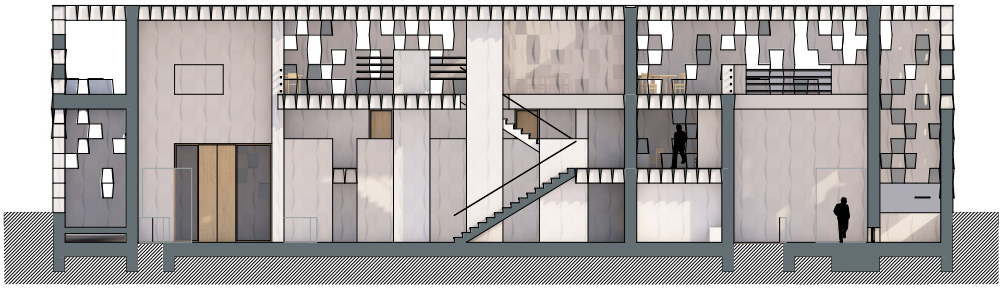
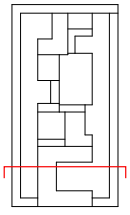
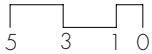


Fig. 87 – Section E–E





Materialisation

The materialization of the hamam is based on the key principles of the BinAir building system: stackable, easy to transport, cheap to produce and buildable without expert knowledge. To meet these principles plastic is used. With plastic it is of course possible to choose every colour desired but for the hamam white plastic with a little bit of transparency will be used (see next page). In this way the filling material, in the case of the hamam sand, is slightly visible through the bins. This will create more vivid walls. But the biggest advantage is its reflection against the sun radiation.

Besides the main material wood, glass and metal is used to make the other elements such as doors, windows and stairs. In this white plastic atmosphere these elements behave themselves also as decorating elements, they pop out in between all the white.

Fig. 88 – Appearance of filled bins

Sustainability

The hamam is located in a desert climate near the city of Erbil. This climate and its position inside a refugee camp make that it is desirable that the building is sustainable. This can of course be realized with multiple expensive installations but because of its location where money is not abundant the building is made as sustainable as possible by using passive methods that are incorporated within the architecture. The passive methods that are present within this hamam are: thermal mass, passive water filtering, double skin facade and cooling with water.

The sustainability aspect also plays a role when the building is demolished. The BinAir system fits the sustainability aspects well. This is because the system is relatively easy to demolish without wasting much materials. The bins that come out of the building can be used on another place and the filling material that once was in the bins is given back to the nature.

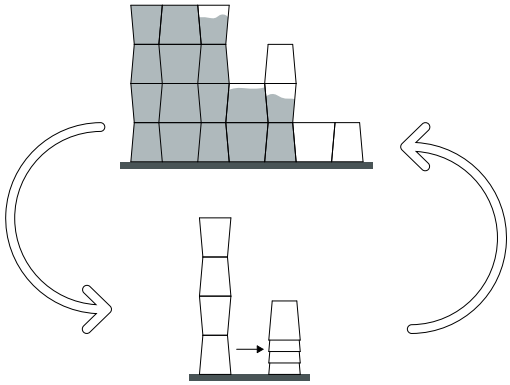


Fig. 89 – Reuse of bins after use

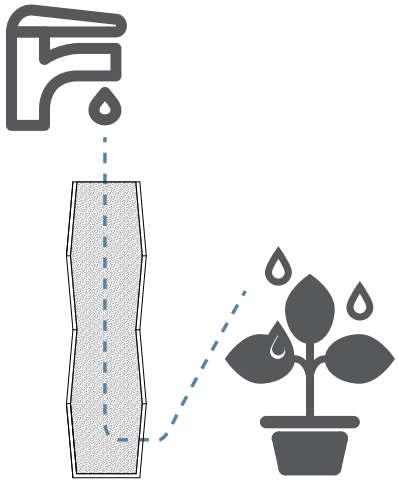


Fig. 90 – Water filtration through sand in the bins

Building Technology

The function of a traditional hamam results in a relatively closed building. The thick walls that surround the rooms give the visitor a feeling of safety and segregation from the outside world. And in a building physics way the thick walls give the building its necessary thermal mass and insulation to keep the warmth inside.
These requirements translate themselves well into the BinAir system. From the research into the design of a new building system a stacking method for the walls is developed which give the desired thick walls. Because the walls are completely filled with sand the desire is to make them self-supporting. But after the completion of the DDW model and thus the research into the BinAir system the focus of this research is changed into the elaboration of the hamam. The elaboration of the bin is therefore not developed enough to state that it is already self-supporting.

The heat inside the multiple rooms of the hamam is generated by pipes that run through the technical room. These pipes heat the floor of the different rooms to create the desired temperature. To pre heat the water inside this network the pipes will run over the roof to get warmth from the sun. To keep in the characteristics of the BinAir system in mind this is also done in such a way that it fits its location. This means that the system works without difficult and expensive installations.

To keep the temperature of the central axis on a comfortable level there are multiple basins placed inside. These basins will release the cold to the air inside the central axis. This effect is enhanced because the building is buried 1,2 meters under ground level. Because of the height of the room the temperature there are also temperature differences within the central axis. This resulted in higher placed rooms that need a higher temperature.

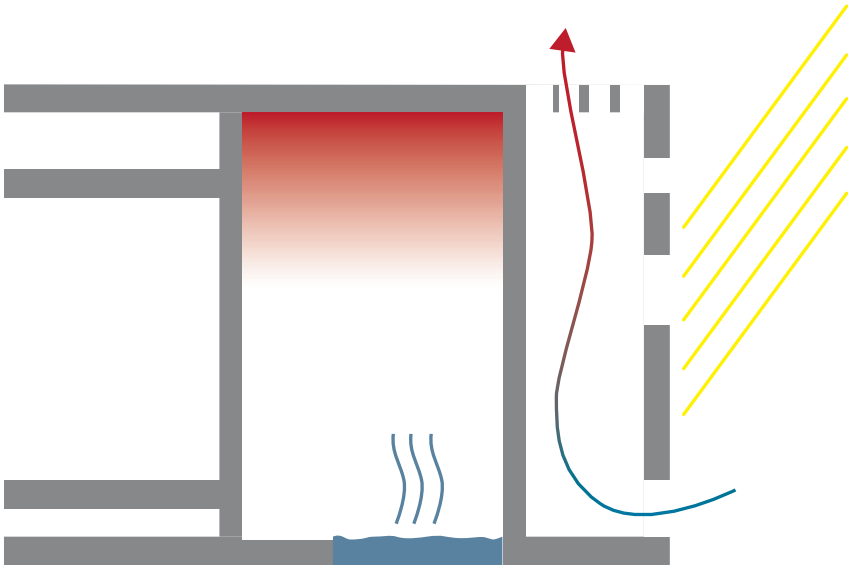


Fig. 91 – Passive cooling systems within the hamam

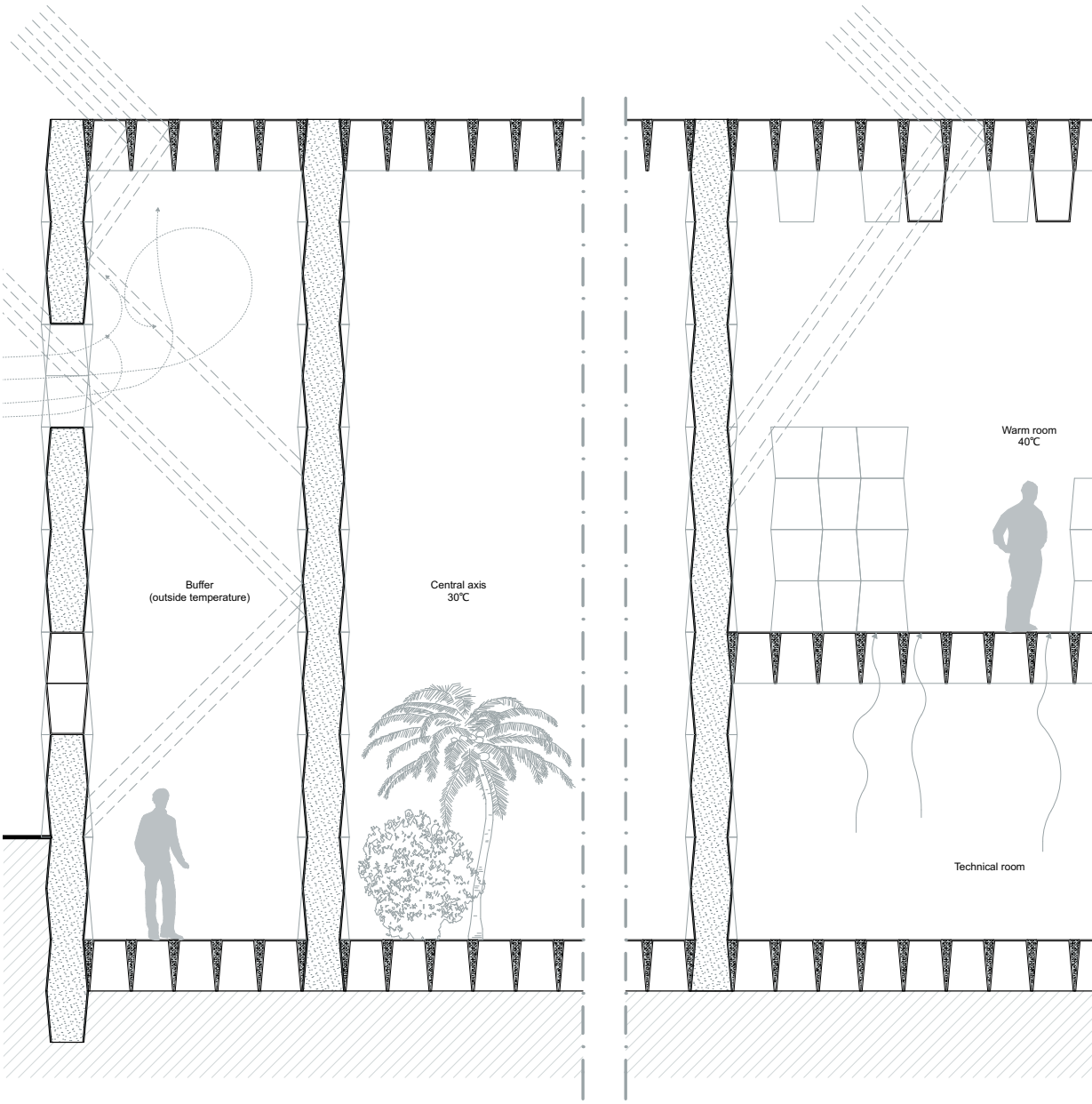
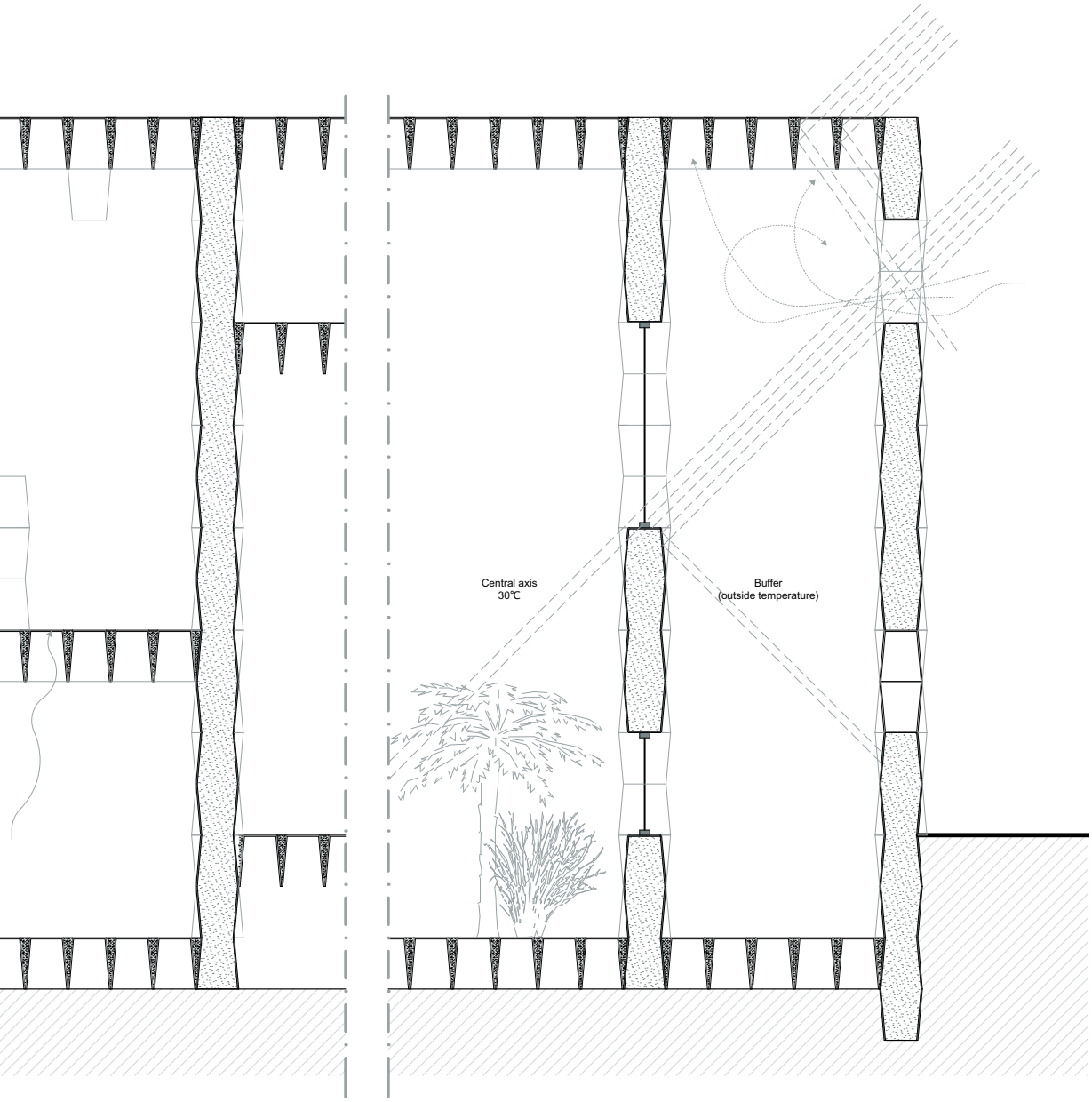
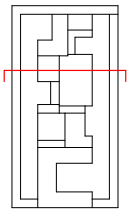


Fig. 92 – Technical section





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End Value

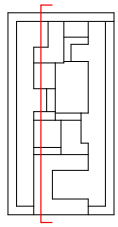
As already described before, the BinAir system is very flexible. This makes it possible to relatively easy add extensions to the building and to demolish parts. This is also the case for the hamam designed in this research. It is possible to let the hamam and its functions grow simultaneous with the increased demand caused by growth of the camp.

If the camp in the future will completely disappear the hamam still has the possibility to function individually where people from neighbouring cities can visit the hamam.

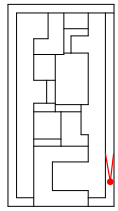
Besides a hamam the BinAir building system has also a lot of other possibilities everywhere on the world. It can be for example used as a temporarily exhibition space on festivals, temporarily extension to buildings, storage facility, holiday home, etc. Due to its flexibility a lot is possible in terms of layout and size of the building.

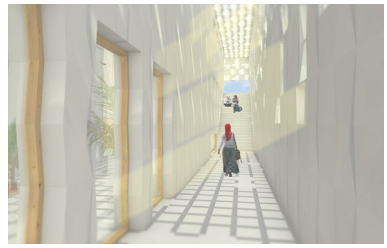
Impressions

3D section through building

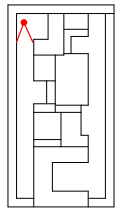


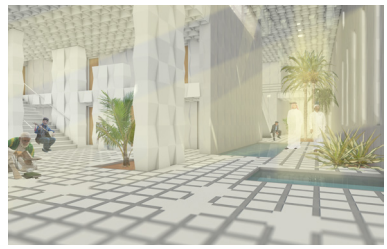
Female buffer zone



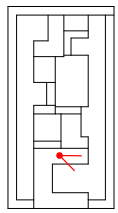


Male central axis

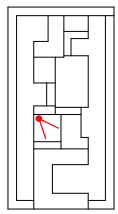




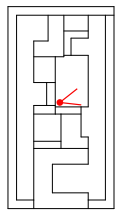
Female changing room

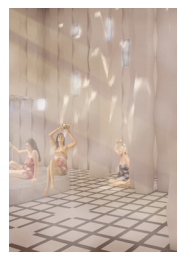


Male hot room



Female hot room





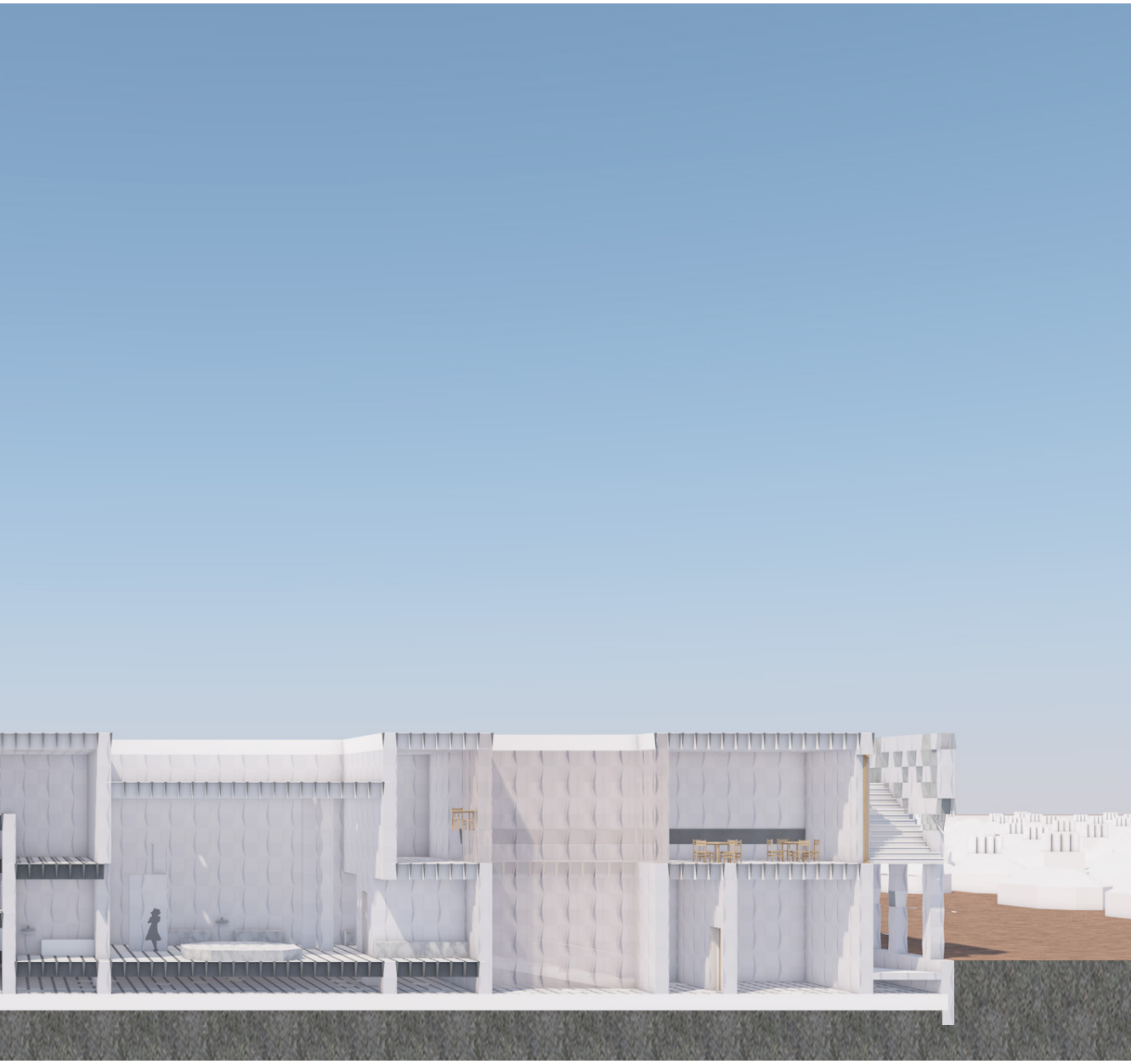


Fig. 93 – 3D section through building

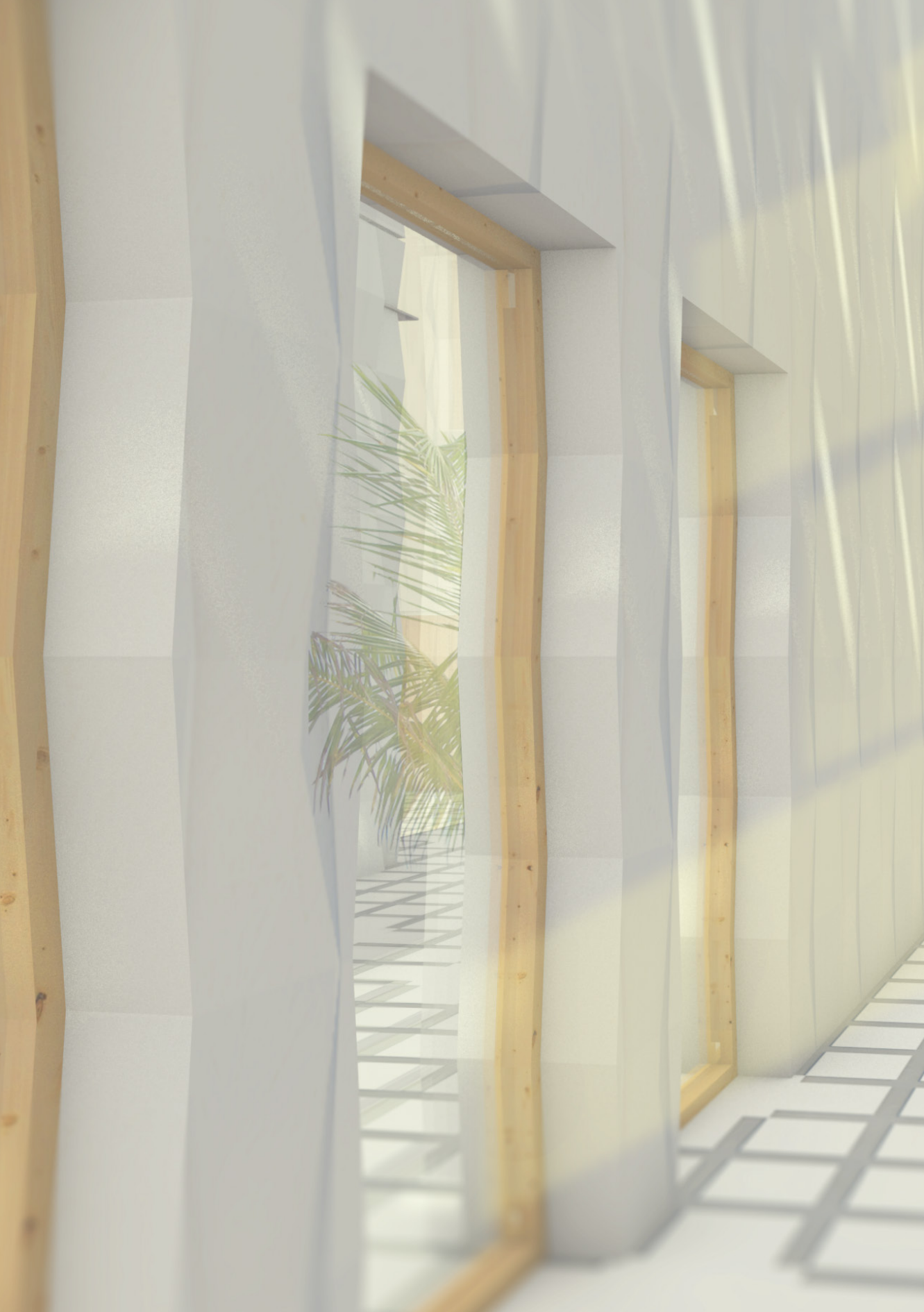


Fig. 94 – Impression female buffer zone

Fig. 95 – Impression male central axis

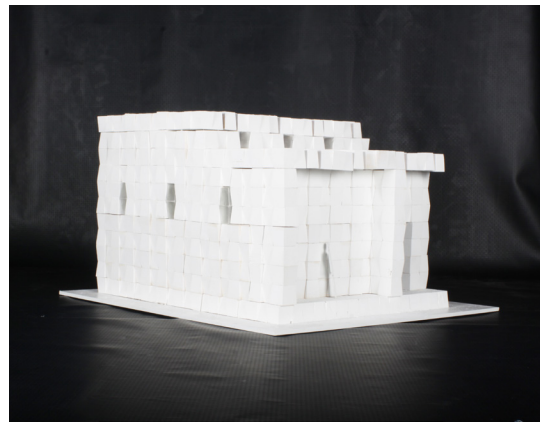
Fig. 96 – Impression female changing room

Fig. 97 – Impression male hot room

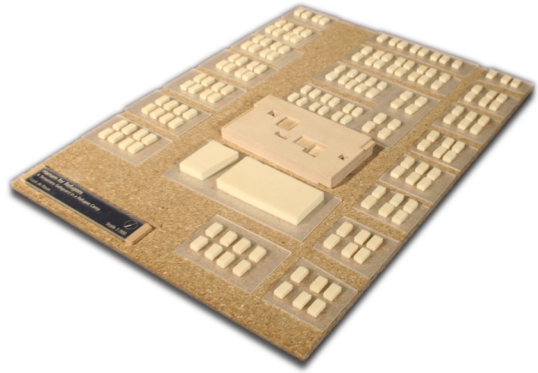
Fig. 98 – Impression female hot room

Models

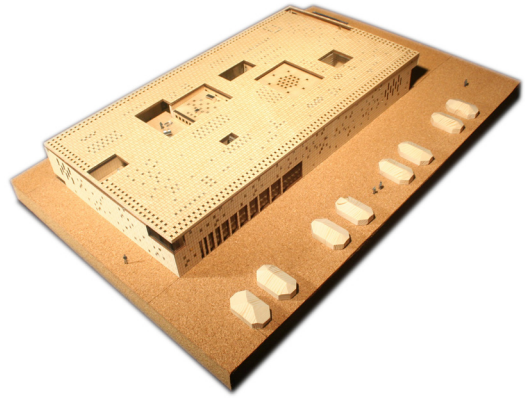
1:20 | Dutch Design Week model

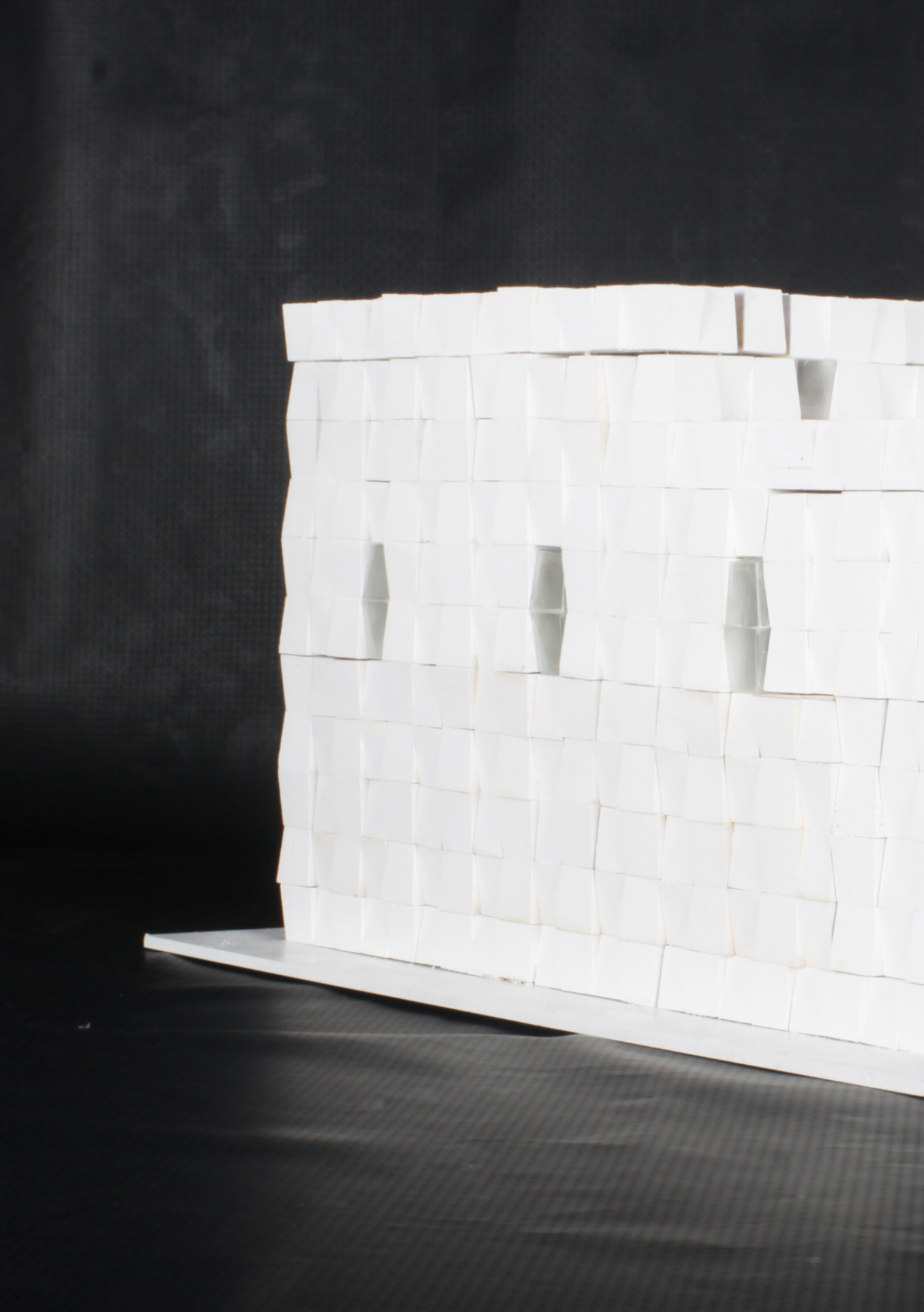


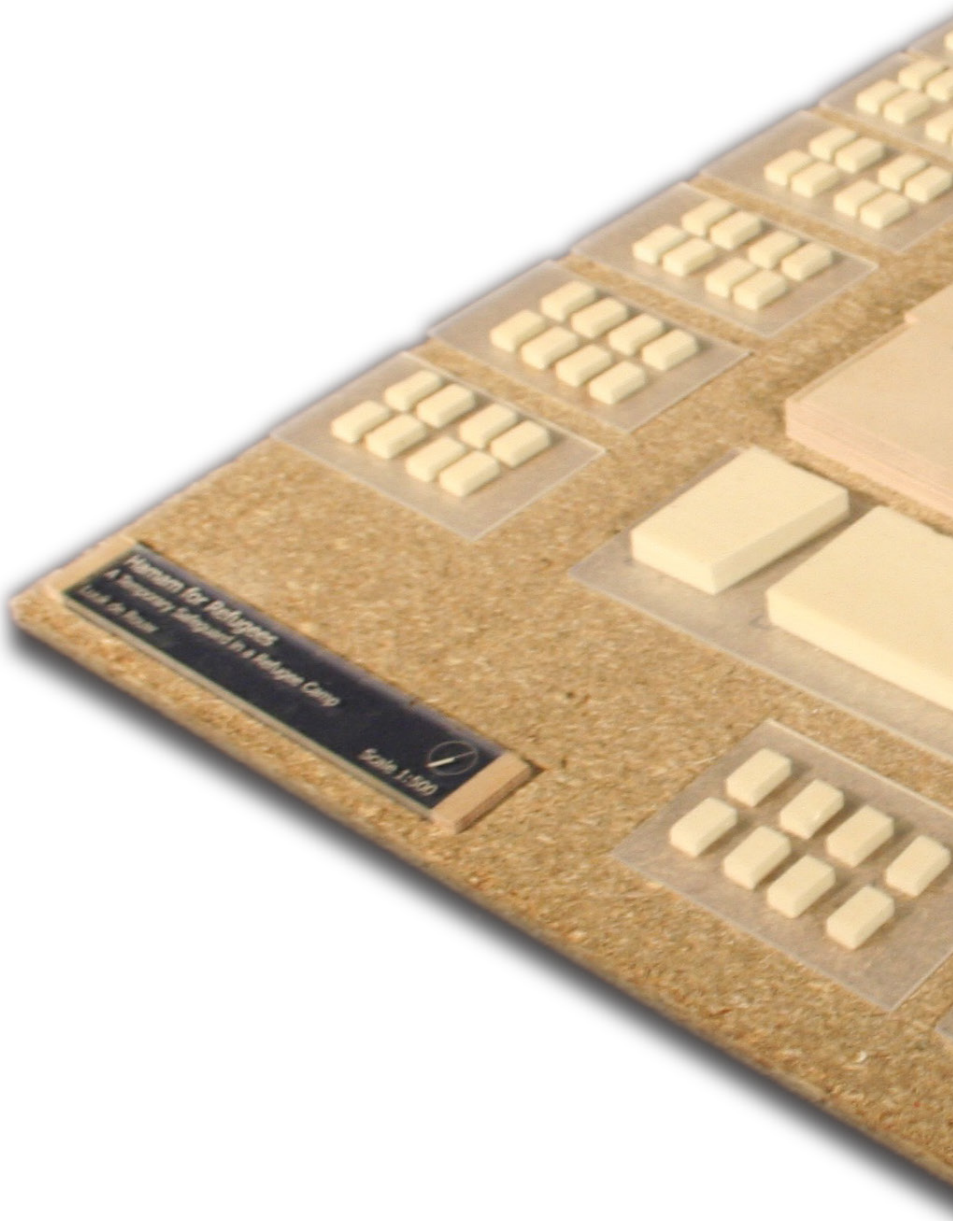
1:500 | Situation model

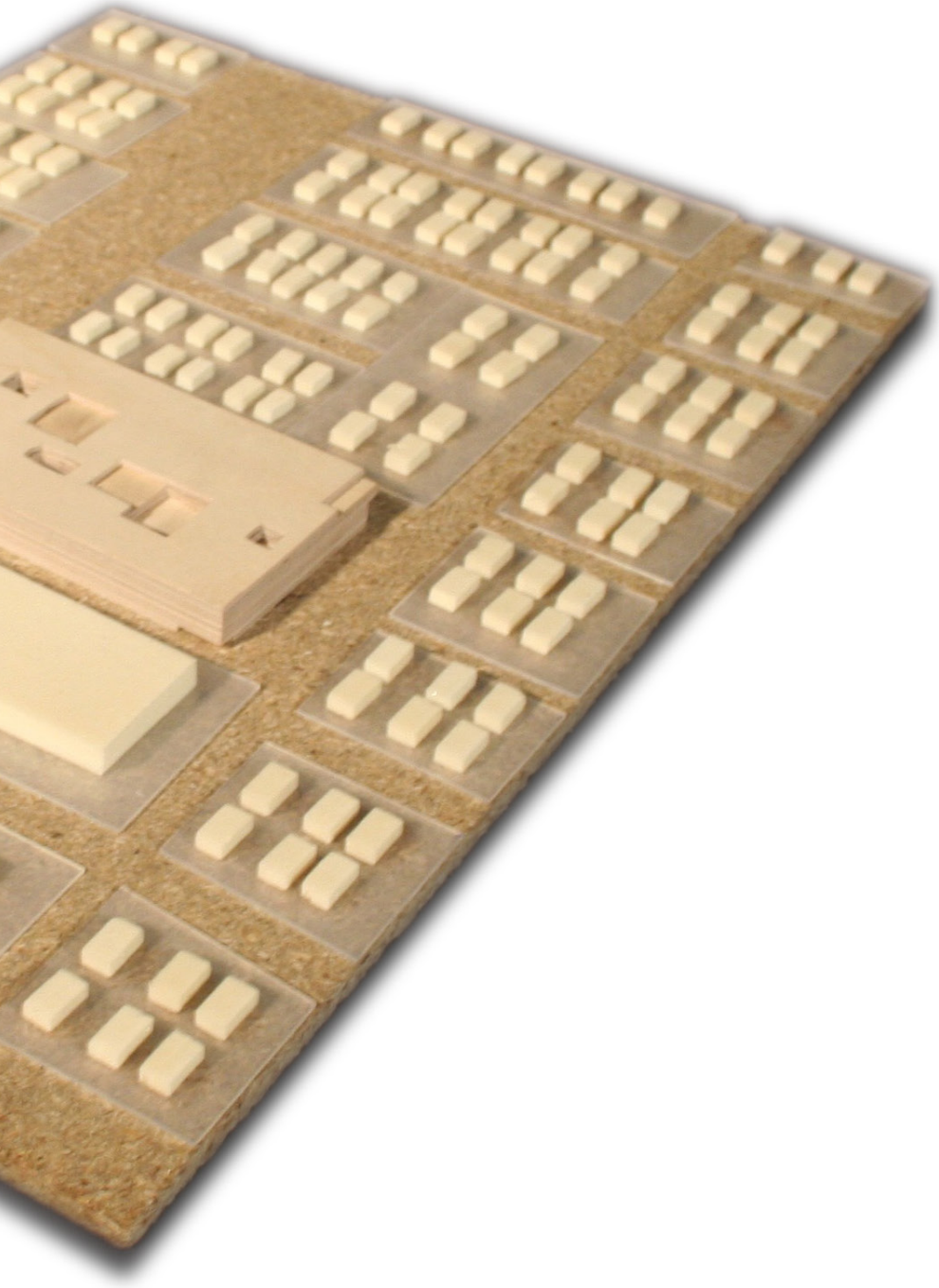


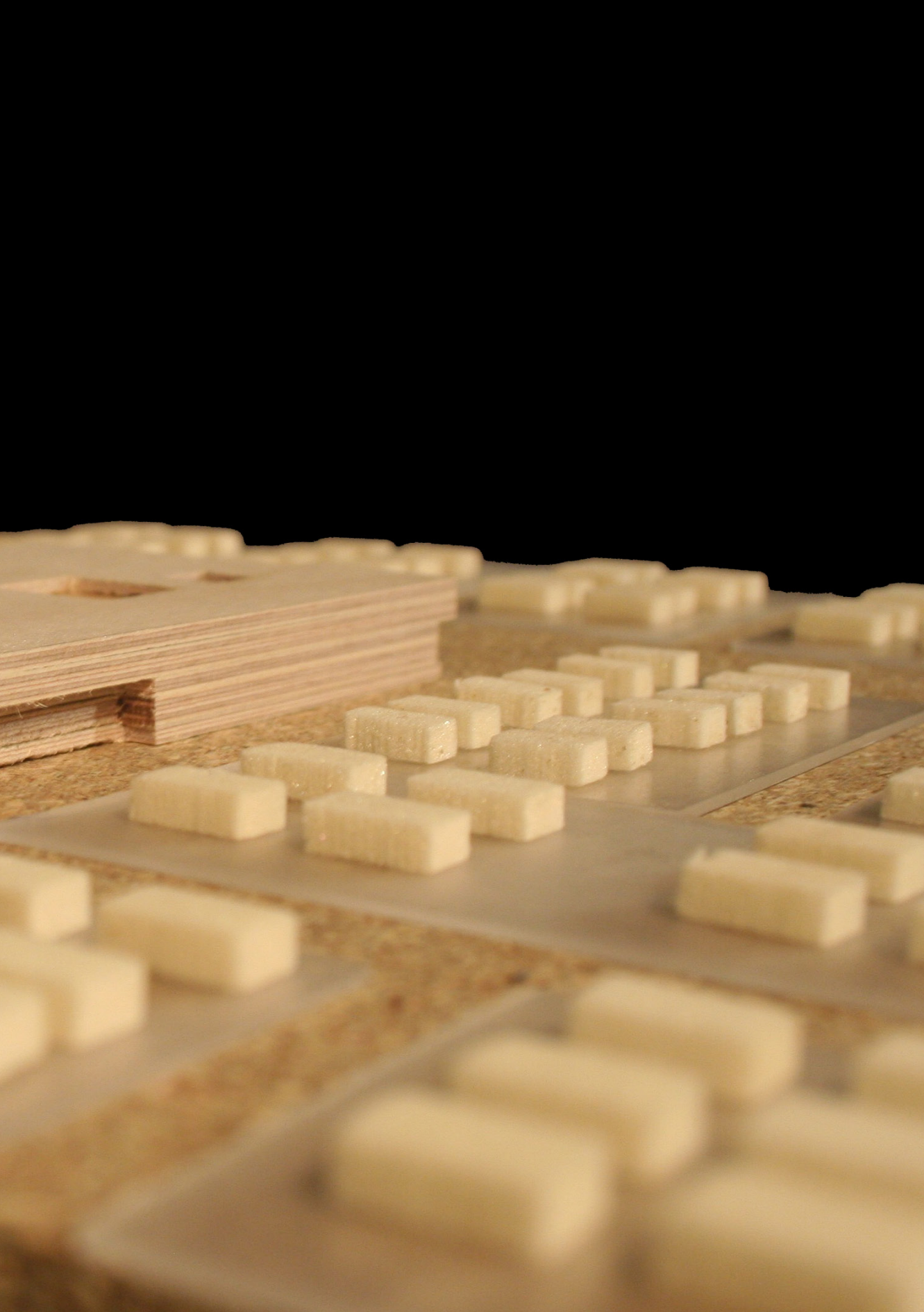
1:100 | Final design model

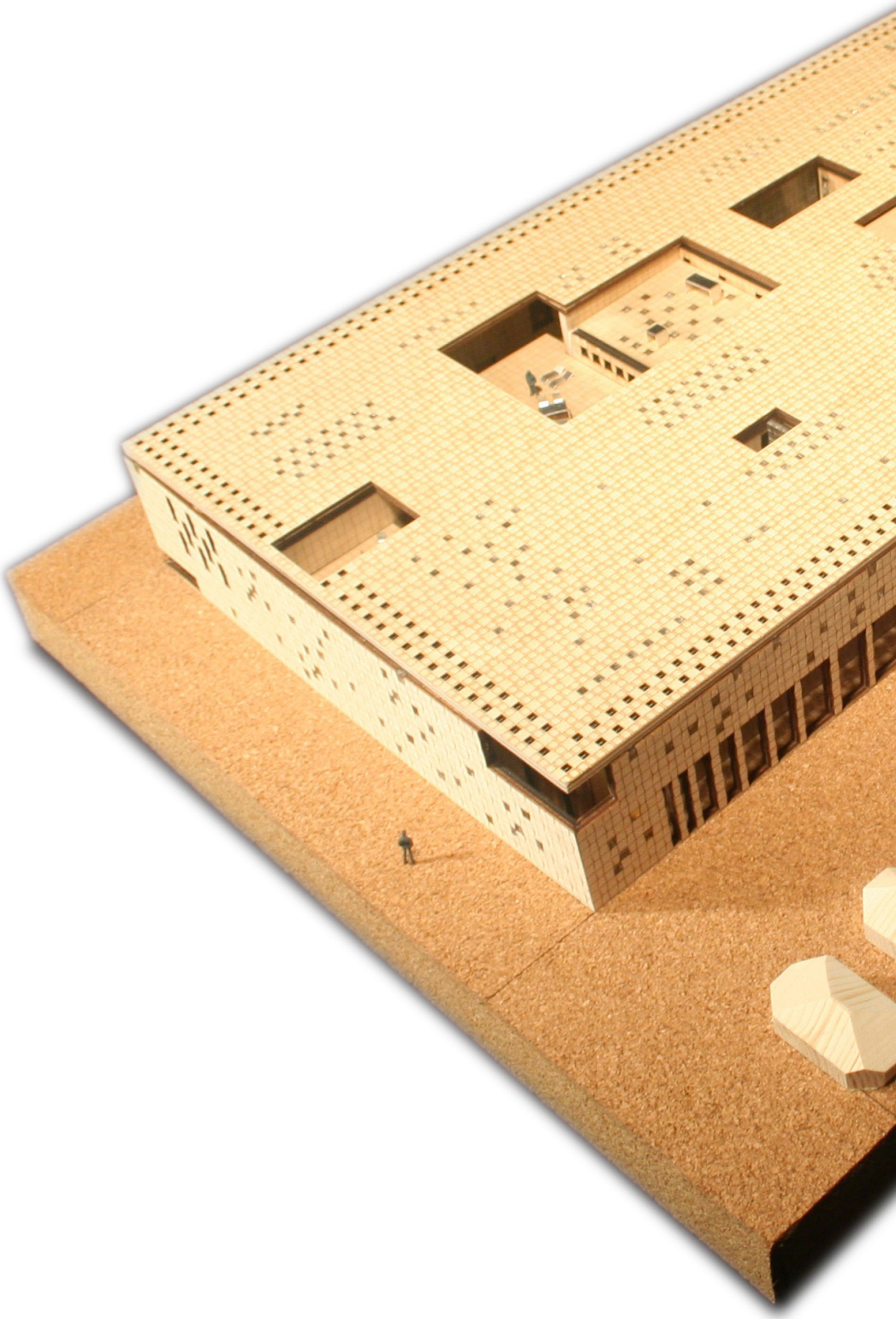


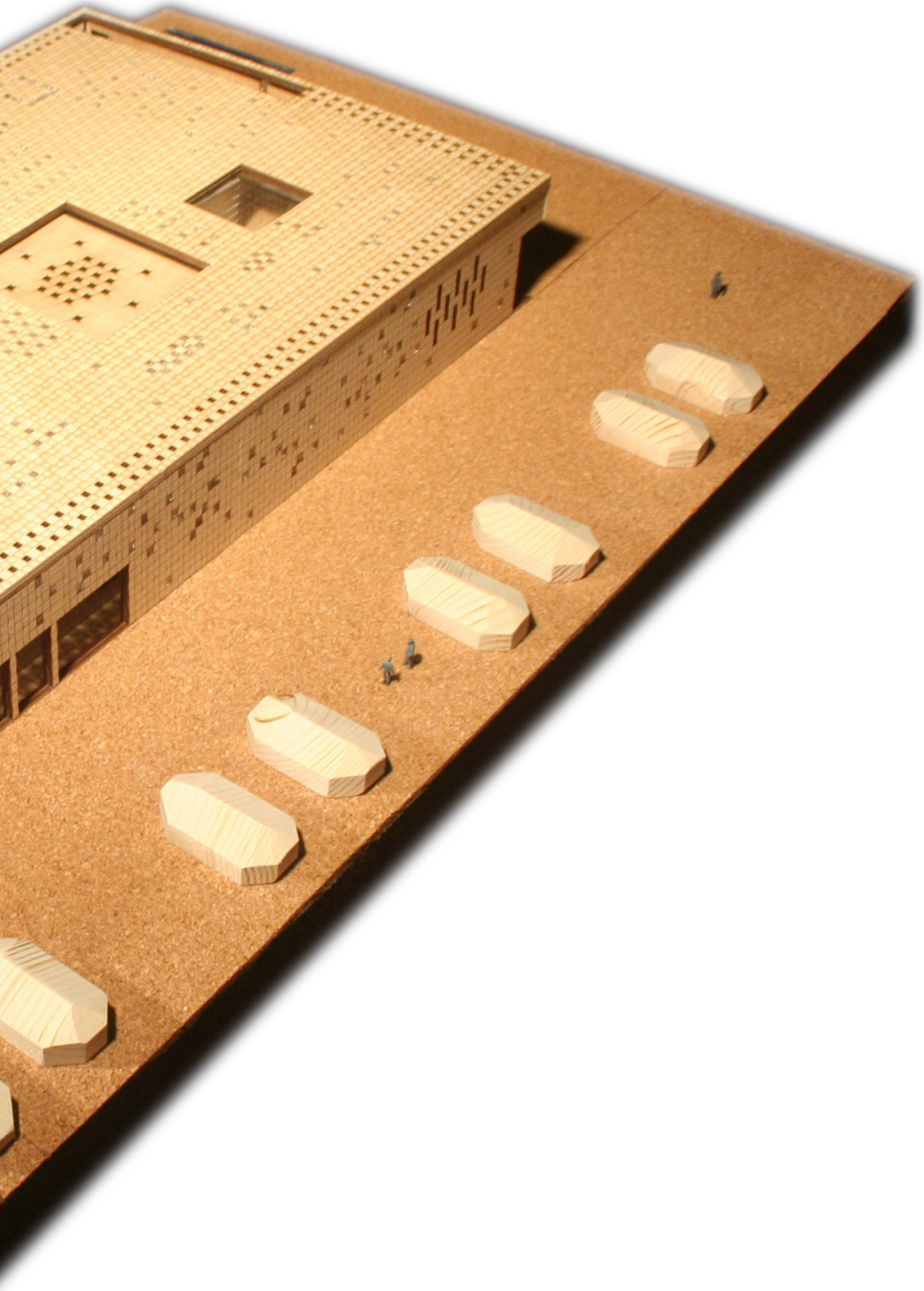


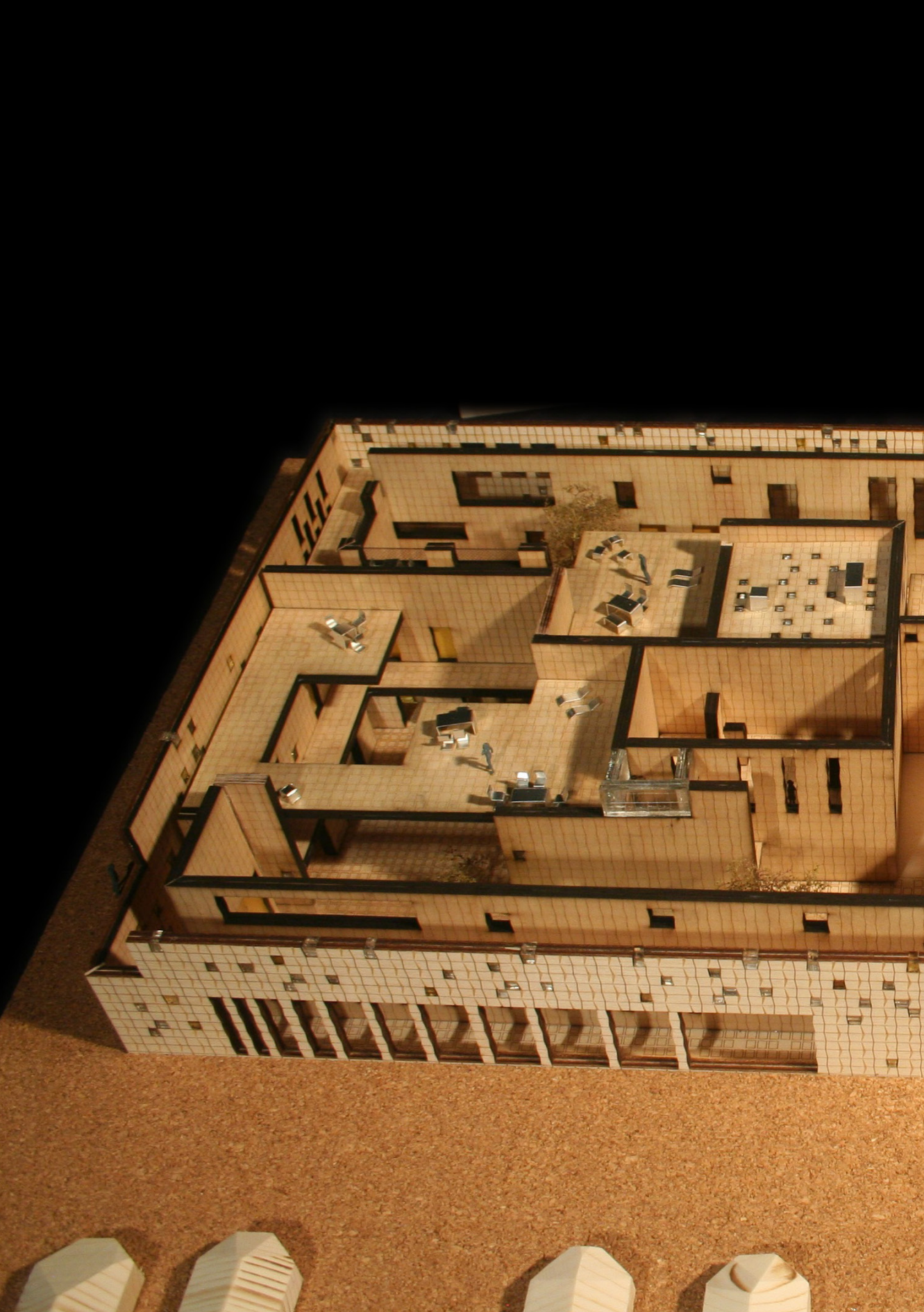

Hamam for Refugees
A Temporary Hammam in a Refugee Camp
Scale 1:500

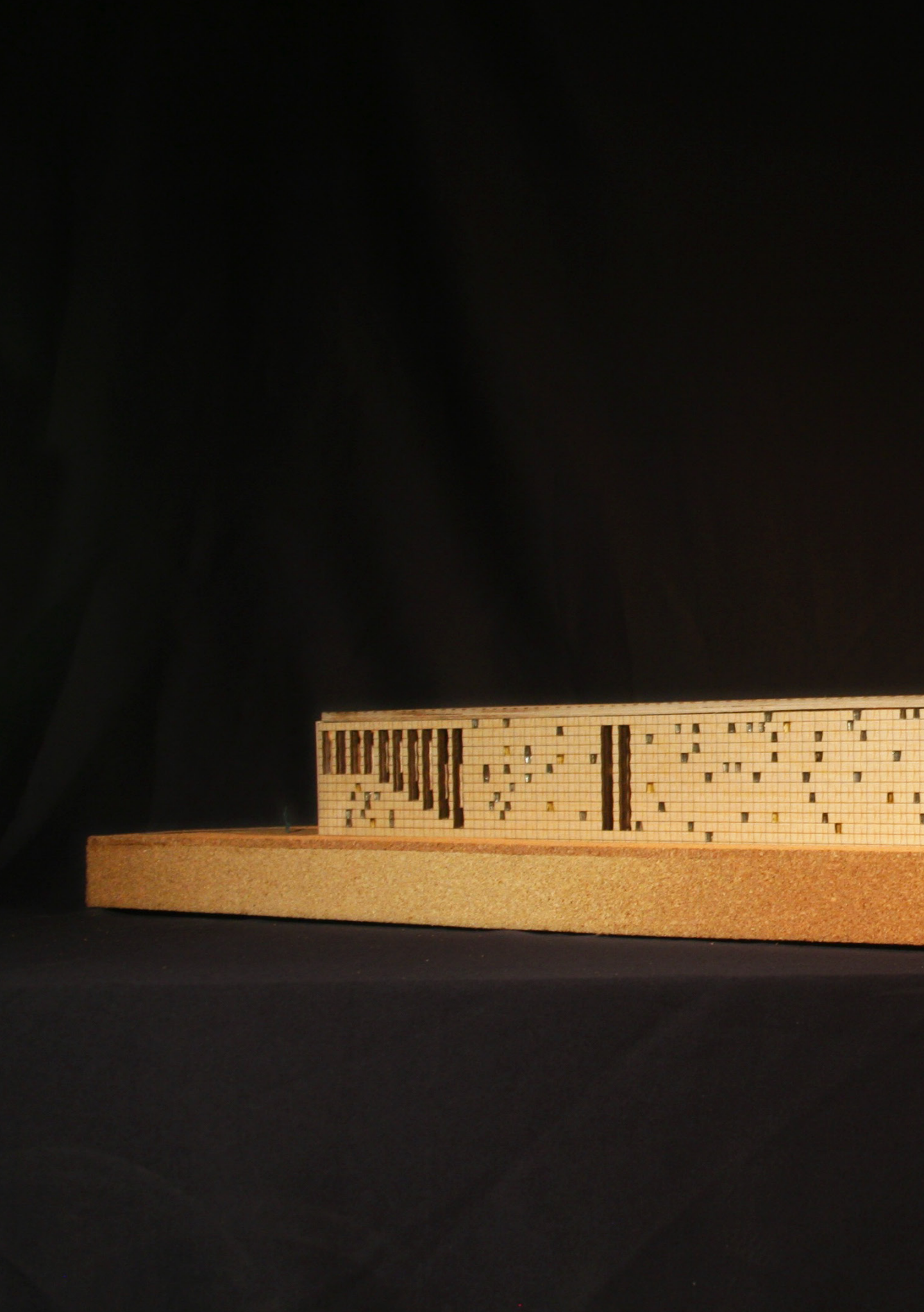


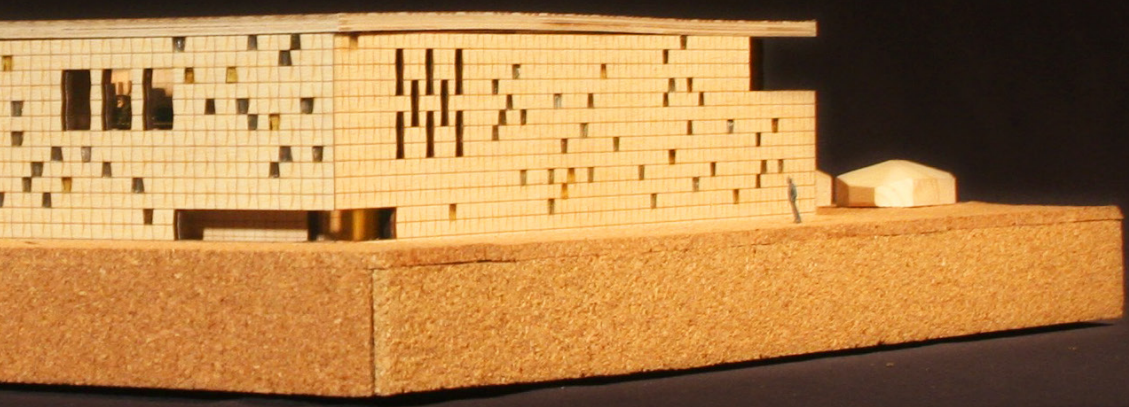


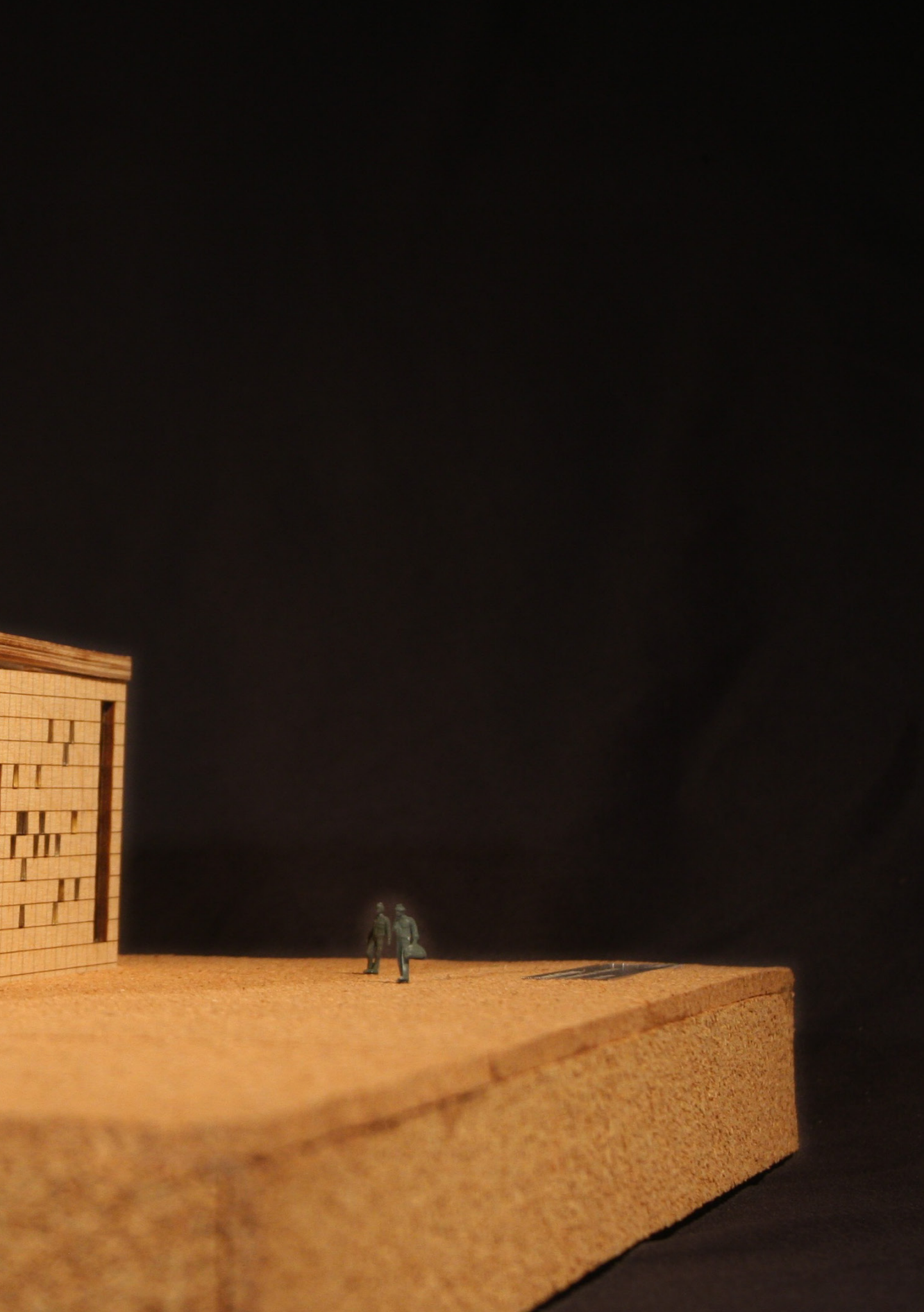


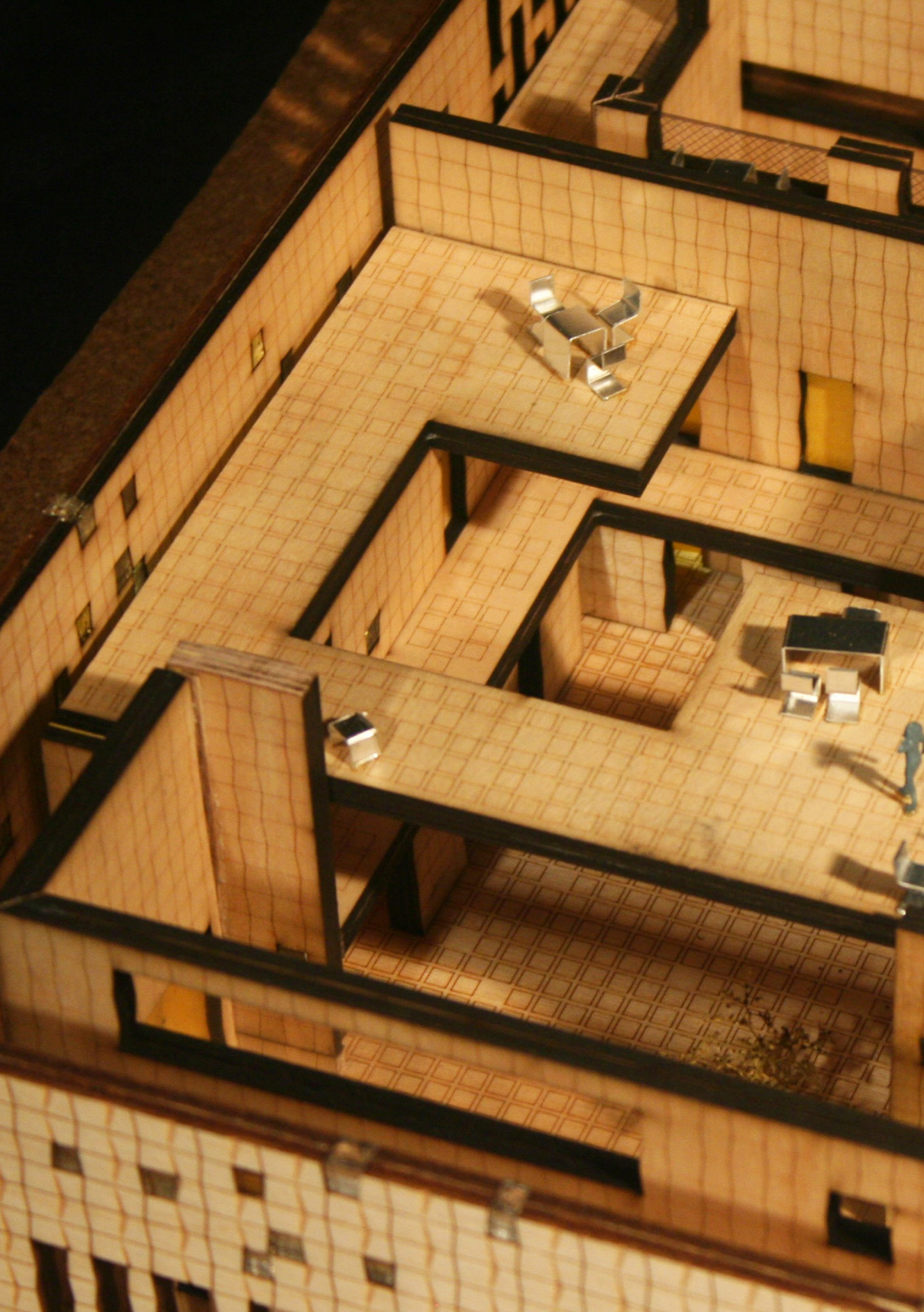


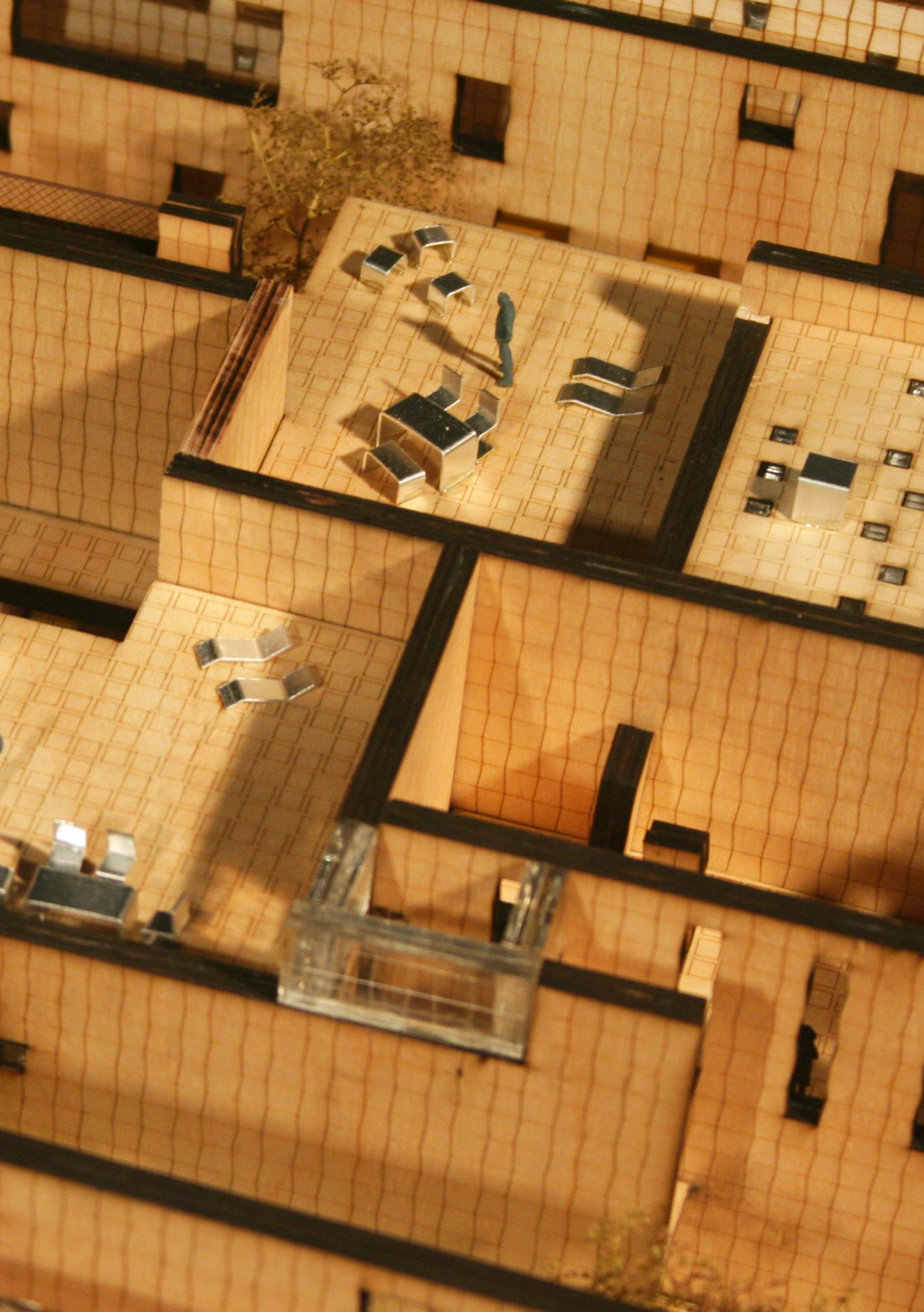


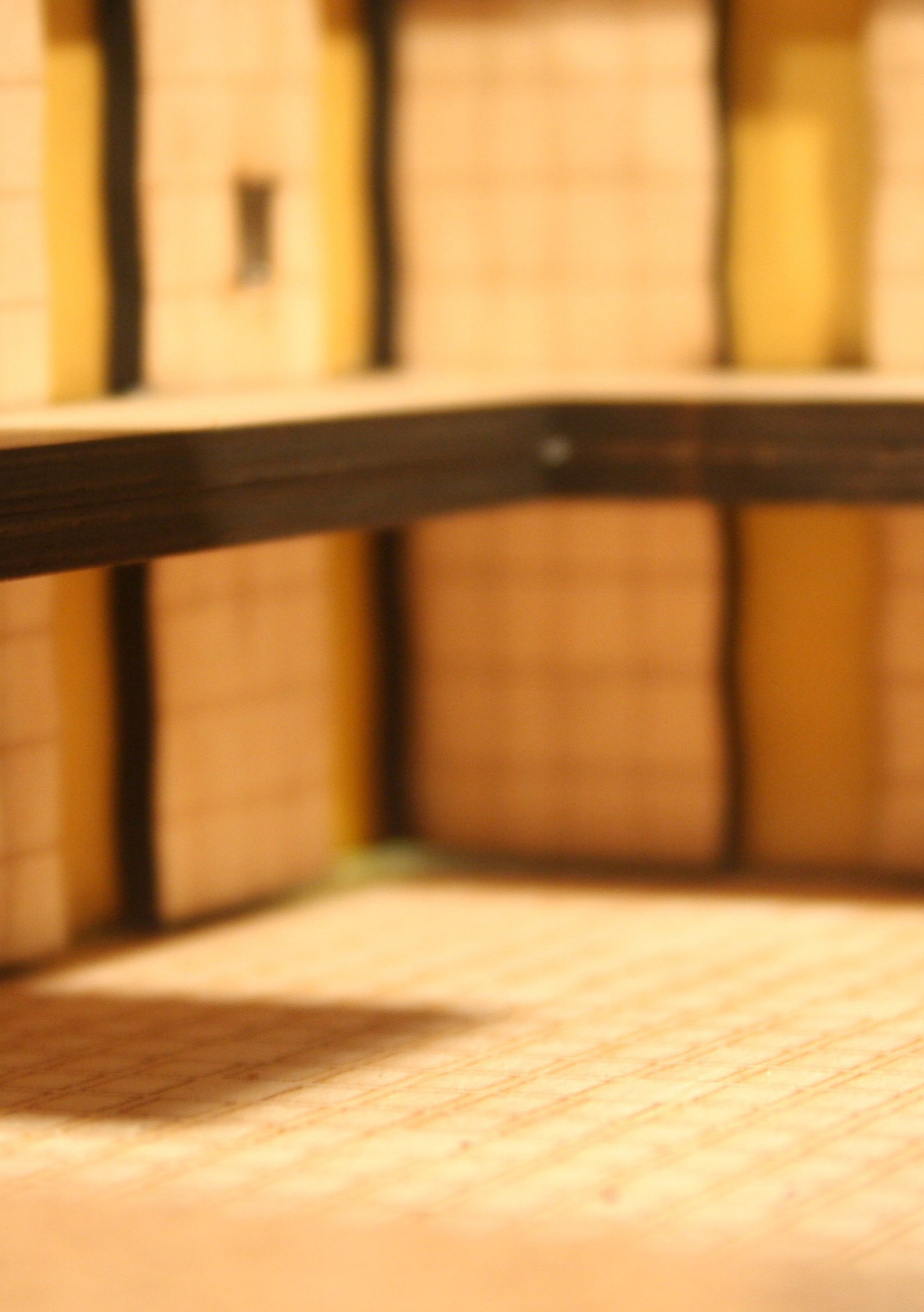


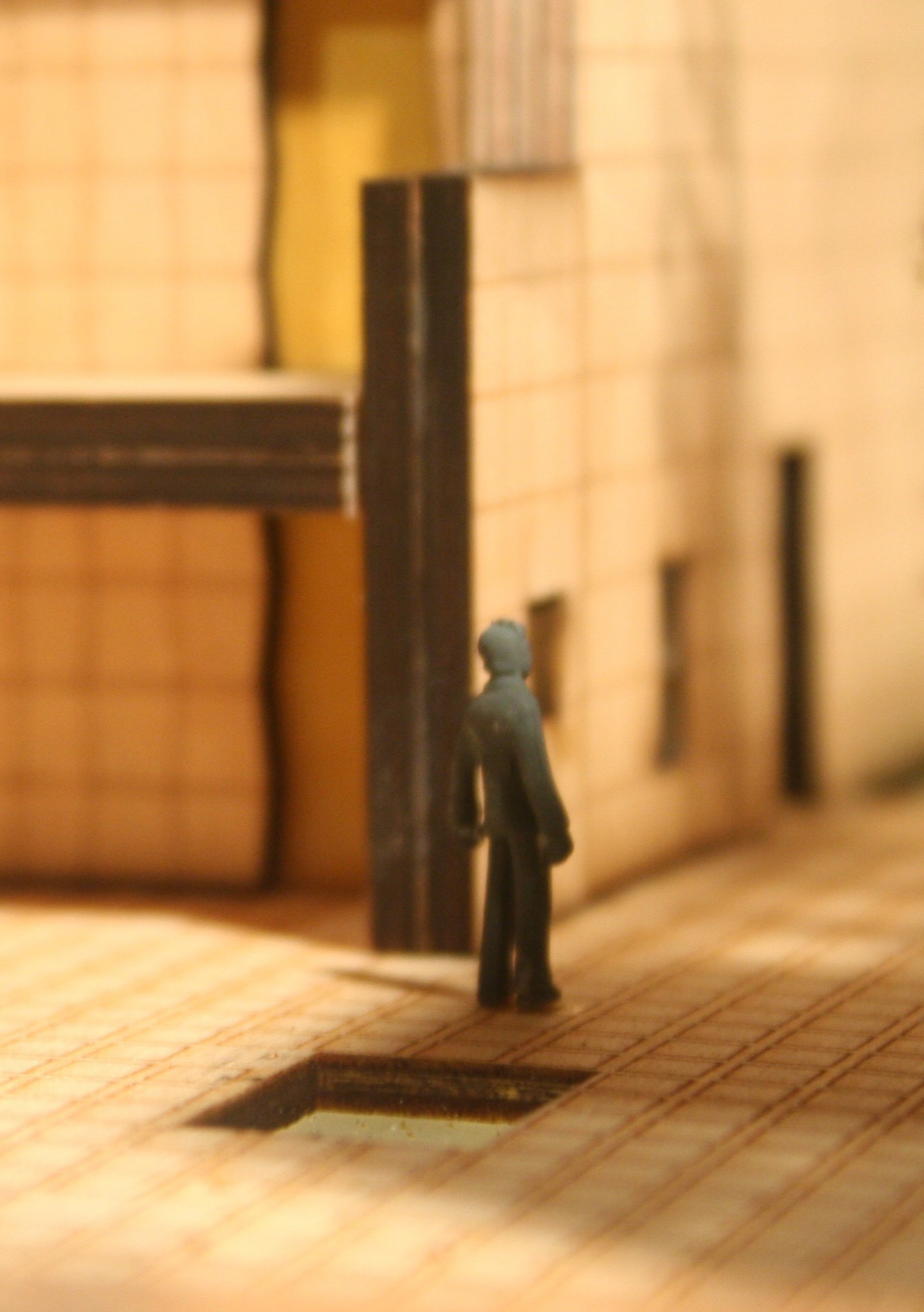


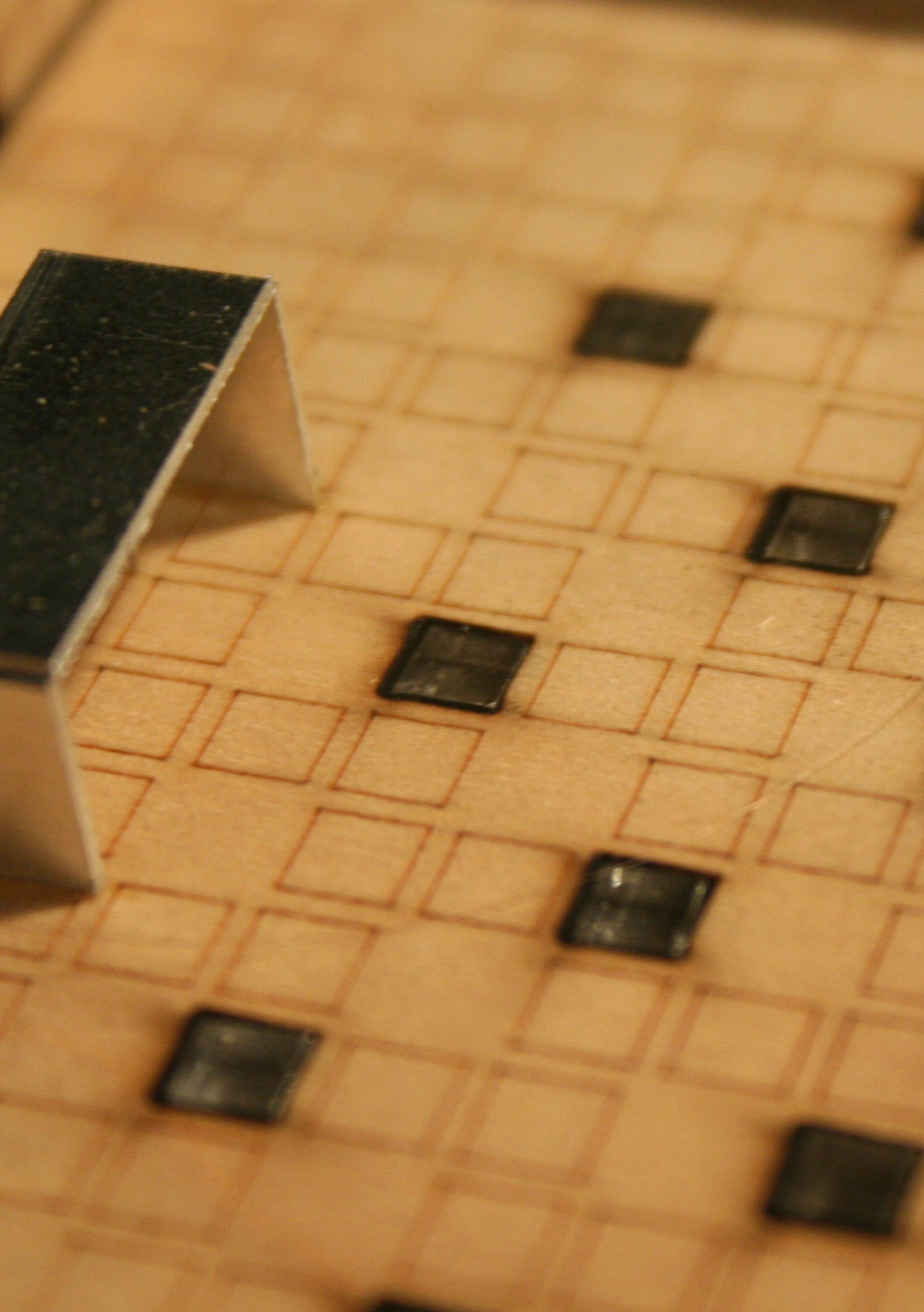


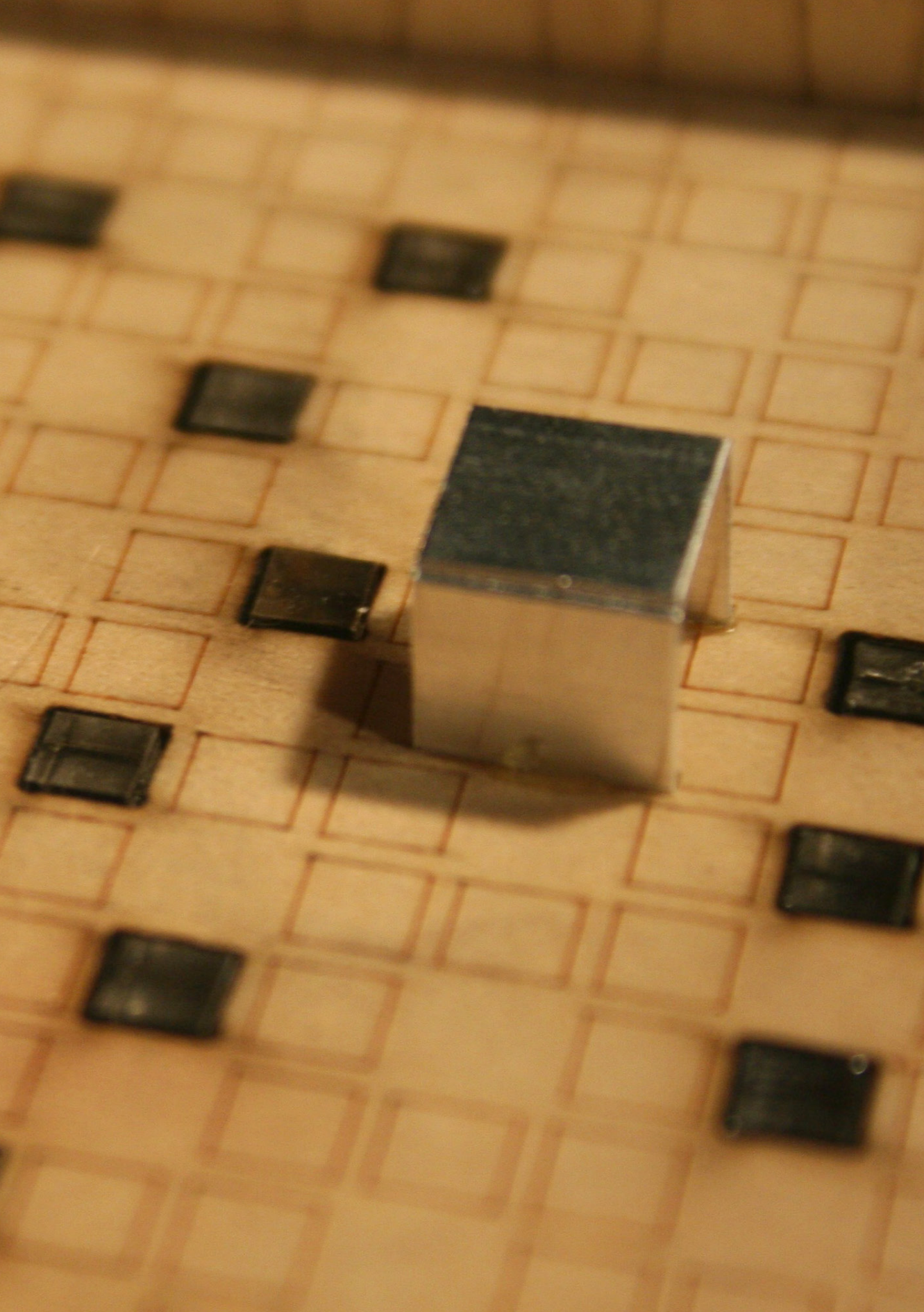












Conclusion

Conclusion

The final design is a result of merging all the applicable gained knowledge of the refugee situation, hamams, the Maslow theory and the BinAir building system into a new building, a hamam.

With its large indoor axis, outdoor patios, cleaning rooms and spaces to rest this hamam will create a safe heaven within the camp where refugees can safely retreat and forget their problems temporarily. Because all the needs from the Maslow pyramid are met within the hamam people can socialize and can make in this way new connections. With also all the properly working sanitary facilities available this hamam will provide for every refugee a place to get clean in a comfortable way. This will eventually lead to less illness within the camp, always good sanitary facilities available, less boredom and more friendships and connections.

For creating the right atmosphere there is a big role for the building system. The BinAir bins enabled a design with enough flexibility. For the walls it is possible to make the required maze like routing in order to get more and more segregated from the outside world. For the daylight entrances it was possible to make small punctures within the roof or big holes in the facade to let the light enter. With the holes, transparent bins or windows placed on the right place interesting view lines are created between the different rooms and floors and indoor and outdoor. The versatility in stacking the bins also enabled walls with different forms and small cracks between them to let light enter the room.

The final result is a safe heaven where refugees can temporarily feel themselves back to the life standards that they were used to before they became a refugee.

List of Figures

All figures are produced as part of this project except the figures listed below.

Fig. 23 - Riboud M. (n.d.). Cagaloglu hammam [Digital image]. Retrieved January 25, 2017, from http://marcriboud.com/en/countries/turkey/

Fig. 24 - A4 estudio. (2013, January 2). [Room in Entre Cielos Hotel & Spa]. Retrieved January 25, 2017, from http://www.architravel.com/architravel/building/entre-cielos-hotel-spa/

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Fig. 60 - Nur photo (2016, January 10). Syrian Kurdish Refugees in Iraq [Digital image]. Retrieved January 12, 2017, from http://www.gettyimages.nl/detail/nieuwsfoto's/syrian–kurdish–refugees–in–a–refugee–camp–in–erbil–nieuwsfotos/524795094?#syrian–kurdish–refugees–in–a–refugee–camp–in–erbil–governorate–in–picture–id524795094

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