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Vienna University of Technology

DIPLOMARBEIT

New housing concepts for the future of post- war Syria

Neue Wohnkonzepte als Zukunft für Nachkriegs-Syrien

ausgeführt zum Zwecke der Erlangung des akademischen Grades
eines Diplom-Ingenieurs / Diplom-Ingenieurin
unter der Leitung von

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Content:

Fig.1.1 Arabic pattern

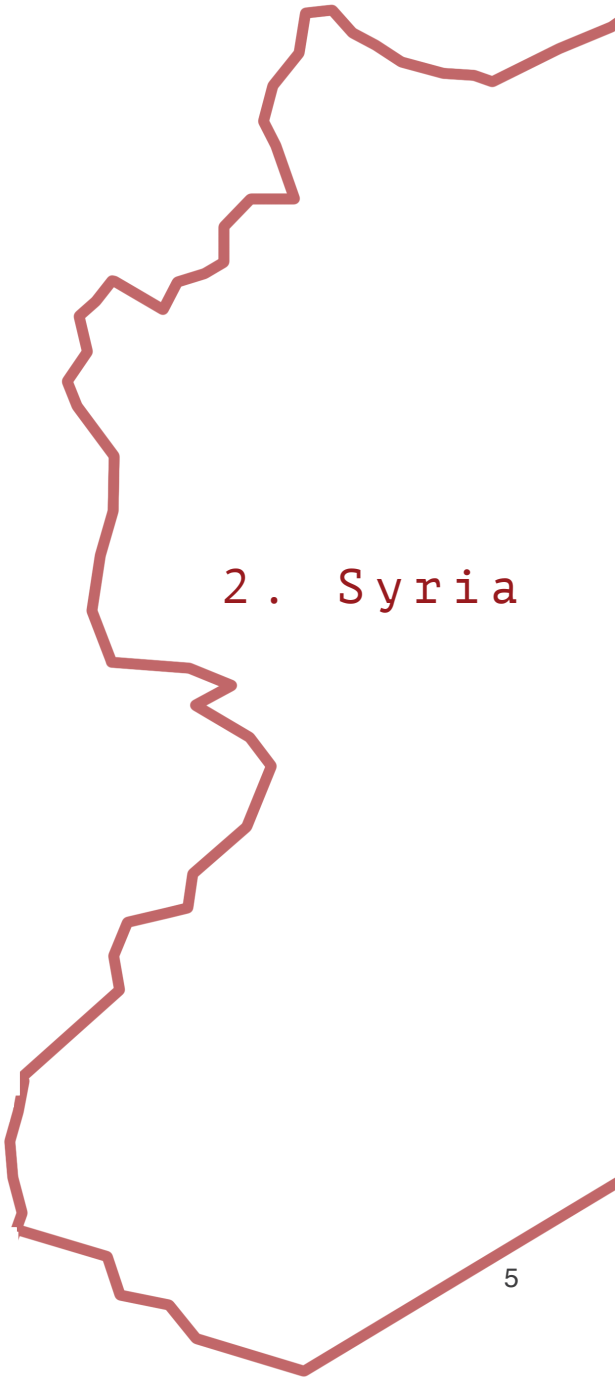
1. Introduction

Abstract

The Syrian war is without a doubt one of the worst humanitarian crises since the Second World War. More than 250.000 people were killed, 130.000 are missing and over 7,6 million are internally displaced and became refugees. Many countries accepted devastated people and offered them homes. But at the same time most of the countries were not able to accept a huge number of asylum seekers. In my master thesis I was motivated by the big question and a problem: What will happen to all the Syrians who want to return to their homeland after the war comes to an end. Entire Syria is in ruins now. Infrastructure, houses and industry in many areas are destroyed and irrevocably demolished.

I offered a new urban solution with an infrastructure and residential blocks. In my project all Syrians that are returning home will be able to build their own house using natural materials and following an aspect of tradition. During that process community of future residents will help and support each others.
But the most important of all, homes will be built on dreams and hopes for better tomorrow and better Syria.

Der Syrische Krieg ist ohne Zweifel die schlimmste humanitäre Krise seit dem Zweitem Weltkrieg. Als Folge fanden schon mehr als 250.000 Menschen den Tod, 130.000 sind noch immer vermisst und über 7,6 Millionen mussten fliehen. Viele Länder nahmen hilf- und mittellose Menschen auf, und boten Ihnen ein Zuhause. Gleichzeitig straucheln viele Länder jedoch dabei, mit der enormen Zahl an Asylsuchenden fertig zu werden.
Meine Diplomarbeit ist von der Frage und der dahingehenden Problematik geleitet, was nach dem Syrienkrieg passieren wird. Was wird geschehen, wenn die Bürgerinnen und Bürger in ihre Heimat zurückkehren werden- ein Land, das in Trümmern steht?
Viele Regionen sind auf Grund und Boden zerstört. Nicht nur die Infrastruktur, auch die Wirtschaft wird dadurch negativ beeinflusst.
In meiner Arbeit habe ich ein neues städtebauliches Konzept entwickelt. Die rückkehrenden Syrerinnen und Syrer werden die Möglichkeit haben, den Aufbau der Häuser mithilfe natürlicher Materialien und Ressourcen zu gestalten. Durch diesen Prozess wird ebenfalls eine Plattform der gegenseitigen Unterstützung und Hilfe geliefert.
Was jedoch das Wichtigste ist, ist die Tatsache, dass jene Häuser auf den Träumen und Hoffnungen für eine bessere Zukunft und ein besseres Syrien gebaut werden.



2. Syria

 Fig.2.1 Syria- country contours

Fig.2.3 World map

2.1 Geography

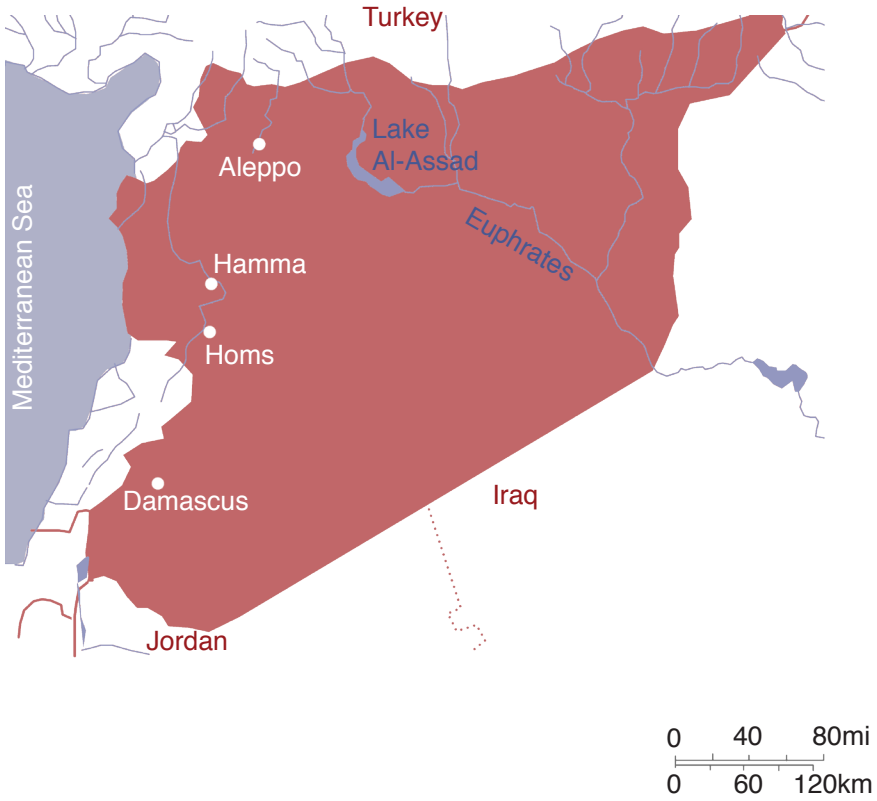


Fig.2.4 Map of Syria

Syria lies on the eastern coast of the Mediterranean Sea, bounded by Turkey in the north, Iraq in the east, Jordan in the south and Lebanon and the Mediterranean Sea in the west. The Syrian territory is divided into four geographical regions: coast, mountain, inside and desert regions. The largest lake in Syria is „Lake Assad“, which is a reservoir created by the dam. „Mount Hermon“ is the highest point (2.814 m), placed on the Lebanese border. Aleppo is the biggest city with a population of 2,301.570. The second largest city is Damascus and it is a capital city of the county. The overall area of Syria is 185,180 km^2.

Syria has 6 million hectares of cultivated lands with only 3% of forest and woodland; the remaining areas are desert and Rocky Mountains. Area includes about 185,180 square kilometers of deserts, plains, and mountains.

Middle zone of the country is steppe zone, positioned between the humid Mediterranean and the desert regions. This area receives hot and dry winds blowing across the desert.

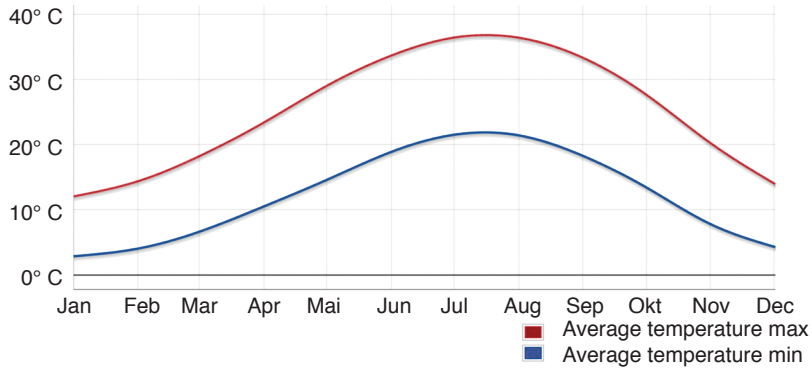
Syria has a relatively short coastline, which stretches for about 180 km along the Mediterranean Sea between the countries of Turkey and Lebanon. Sandy bays dent the shore, alternating with rocky headlands and low cliffs. The two major ports are „Al Lādhiqīyah“ and „Tartos“.

The Anti-Lebanon Mountains (Jabal Al-Sharqī) mark Syria's border with Lebanon. The Euphrates River is the only navigable river and at the same times the most important water source. Southeast of Aleppo is a largest seasonal saline lake „Al-Jabbūl“.

Almost half of the country is covered in porous rocks, mainly sandstone or chalk.

Because of barrenness, vegetation is poor and there is a lack of the organic matter and phosphorus with the exception of the black soil in the northeastern region of Al-Jazīrah. Clays and loams are very common soils.

2.2 Climate



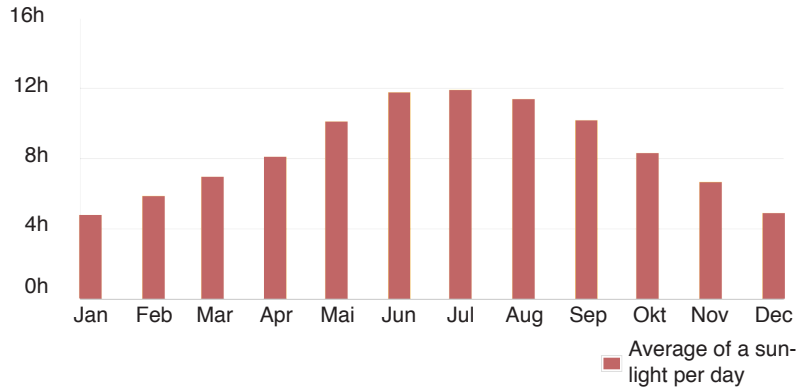
Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dec	Year
12,1	14,4	18,2	23,4	29	33,7	36,4	36,4	33,3	27,7	20,2	13,9	24,9

Fig.2.5 Temperature

Syria enjoys the climate that generally prevails in Mediterranean regions; cold rainy winters and dry, hot summers, separated by two short transitional seasons.

Coastal region is characterized by heavy rainfall in winter, moderate temperatures and relatively high humidity in summer. Rainy winters, and hot and dry summer characterize interior region. The daily temperature differences, from maximum to minimum are high. The area in the mountains is 1,000 m high or more. It is characterized by rainy winters where rainfalls may exceed 1,000 mm and a moderate climate in summer. Small rainfalls characterize desert region in winter and hot and dry summers.

Coast and the western mountains have a Mediterranean climate with a long dry season from May to October. In the extreme northwest there is some light summer rain. On a coast summers are hot, with mean daily maximum temperatures in the low to mid-80s F (upper 20s C), while the mild winters have daily mean minimum temperatures reaching the low 50s F (low 10s C). Only above about 5,000 feet (1,500 meters) are summers relatively cool. Inland the climate becomes arid, with colder winters and hotter summers. Maximum temperatures in Damascus and Aleppo average in the 90s F (mid 30s C) in summer, while temperatures reach average lows in the mid-30s to low 40s F (1 to 4 °C) in winter. In the desert, at Tadmur and Dayr al-Zawr, maximum temperatures in the summer reach averages in the upper 90s to low 100s F (upper 30s to low 40s C), with extremes in the 110s F (mid- to upper 40s C). Snow may occur in winter away from the coast, and frosts are common.[1]



Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dec	Year
4,7	5,8	6,9	8	10,1	11,7	11,9	11,3	10,1	8,3	6,6	4,8	8,4

Fig.2.6 Sun light

Coast and western mountains receive 760 to 1000 mm of precipitation annually. Annual precipitation decreases rapidly eastward: the steppe receives 250 to 500 mm, Mount Al-Durūz receives more than 200 mm, and the desert area of Al-Ḥamād receives less than 130 mm. Precipitation is variable from year to year, particularly in the spring and autumn months.[2]

Middle humidity shows in summer low value 25-30% in July and August. In December value reaches 75%. The table shows year overview of average precipitation, where the summer months June, July, August and September have minimum or none rainy days.

The winds

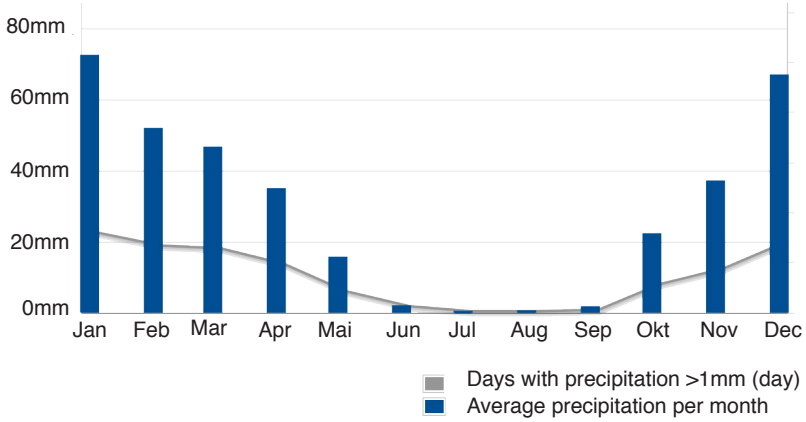
In winter the prevailing winds blow from the east, the north, and the west. In summer the prevailing winds are either northerly or westerly. During the summer the coastal region is subject to westerly winds during the day and easterly ones at night. Once or twice a year sand-bearing winds, or khamsin, raise a wall of dust some 5,000 feet (1,500 meters) high, which darkens the sky.[3]

Solar chart has an effect on the architecture. For orientation and sunshade in Damascus is the determination of the incidence angle of a huge importance, particularly for the hot month of June where the biggest altitude angle is at 12 pm and for the cold month in December with lowest altitude angle at 12 pm.

After few solar analysis it can be concluded that the south wall on 21.12. will be exposed with lowest sun. On the 21.06. exposition of the sun is the highest.

Other sun orientations are not so affordable and reasonable. They are till 21.12 very bad exposed to the sun, and till 21.06. they are receiving huge heat exposure.

The air temperatures can reach their maximum value around 2 pm, what in summer time (South-West orientation) can lead to thermal discomfort and over heating. The best position for openings in the house-residental building, is South- East orientation where the South is optimal.



Average precipitation per month (mm)

Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dec	Year
72,3	51,7	46,4	34,7	15,4	1,7	0,1	0,3	1,4	22	36,9	66,7	349,6

Days with precipitation > 1mm (day)

Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dec	Year
8	7	6	5	2	1	0	0	0	3	4	7	43

Fig.2.7 Rain diagram

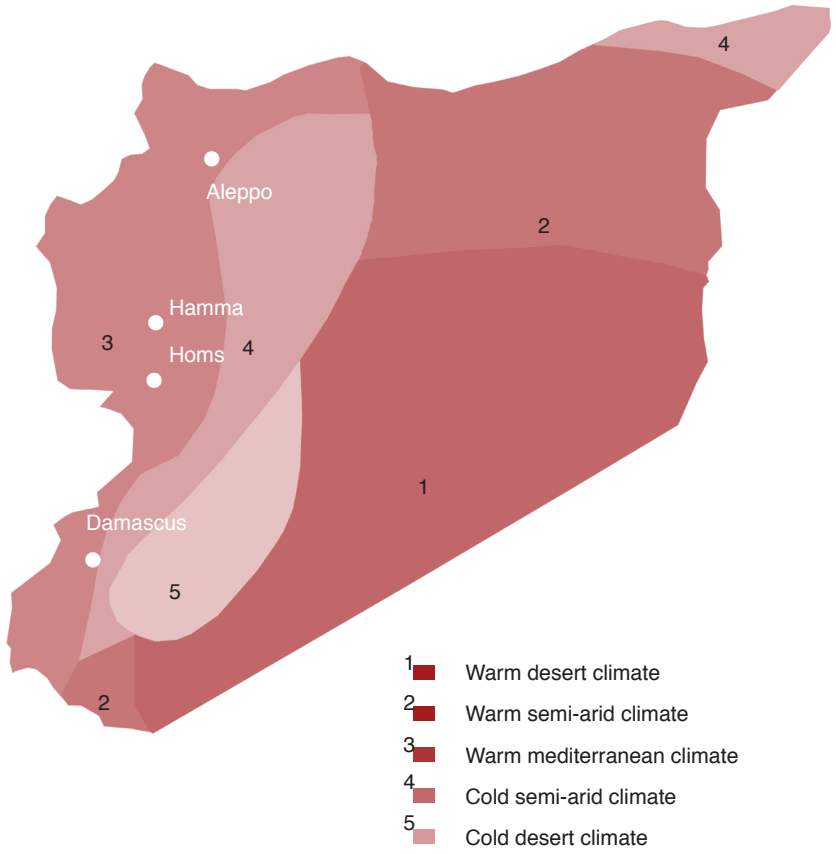


Fig.2.8 Climate

area		open (3)	sea shore (4)	sea surfa-ce (5)	hilles (6)
	5-6	6.5-7.5	7-8.5	8-9	10-11,5
	4.5-5	5.5-6.5	6-7	7-8	8,5-10
	3.5-4.5	4.5-5.5	5-6	5.5-7	7-8.5
	3.5<	4.5<	5<	5.5<	7<

(2)city-forest (3)low trees (4)low grass (5)10km in the sea (6)hilles

Fig.2.9 Wind

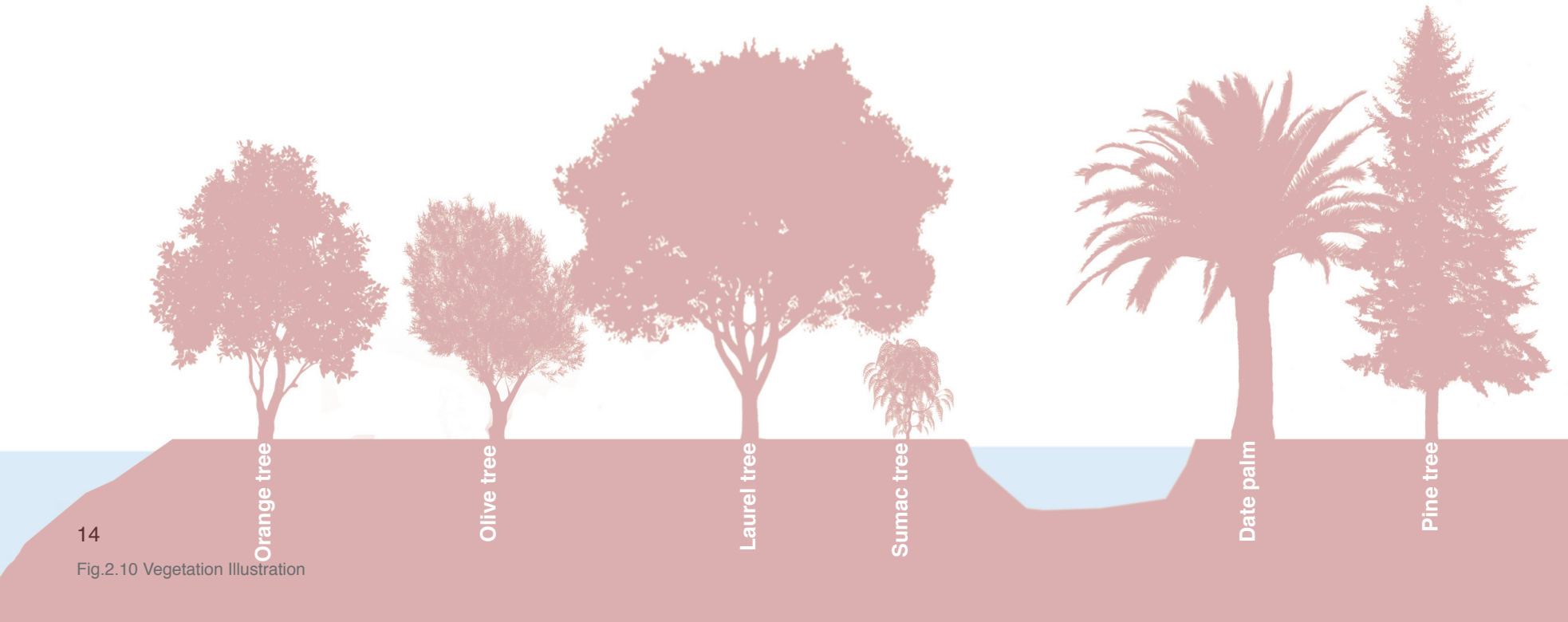


Fig.2.10 Vegetation Illustration

2.3 Vegetation

Yew, lime, and fir trees grow on the mountain slopes. The date palm is found in the Euphrates valley. In both coastal and inland regions, plants include grains, olive trees, grapevines, apricot trees, oaks, and poplars. Lemon and orange trees grow along the coast. Gargle, a degenerate Mediterranean scrub, and marquis, thick scrubby underbrush, cover many slopes.

Forests make up only a very small percentage of the country's total area and are primarily found in the mountains, especially in the Al-Anṣariyyah Mountains. Glossy-leaved and thorny drought-resistant shrubs such as myrtle, boxwood, turpentine, broom, arbutus, and wild olive abound to the south. Excessive exploitation of the forests for their wood has largely turned them into scrub. The government protects some forests. Commercially important forest plants include sumac, which is used as a spice, wild pistachio, which is important for its oil-rich fruit, laurel, which is used in the production of cosmetics, and mulberry, whose leaves are fed to silkworms. Pine tree branches are used for smoking tobacco leaves. Useful plants are winter vegetables such as khubbayzah, a kind of spinach; ʿakkūb, a flowering plant; and truffles. The steppe is characterized by the absence of natural tree cover. All other trees—such as those in the orchards of Damascus and Aleppo and along the banks of the Orontes and Euphrates rivers—are cultivated.

For a brief period before June, the land is covered with a variety of flowering and grassy plants. Under the implacable sun of June, however, the plants soon wither, casting off their seeds onto the dry ground.

Wild animal life is sparse. Wolves, hyenas, foxes, badgers, wild boar, and jackals can still be found in remote areas. Deer, bears, squirrels, and such small carnivores as martens and polecats are also found, while desert animals include gazelles and jerboas. Vipers, lizards, and chameleons are common in the desert. Eagles, buzzards, kites, and falcons frequent the mountains. Harmful insects include mosquitoes, sandflies, grasshoppers, and occasionally locusts.

The mule is the beast of burden in the mountains, and the camel on the steppe. Other domesticated animals include horses, donkeys, cattle, sheep, goats, and chickens.[4]

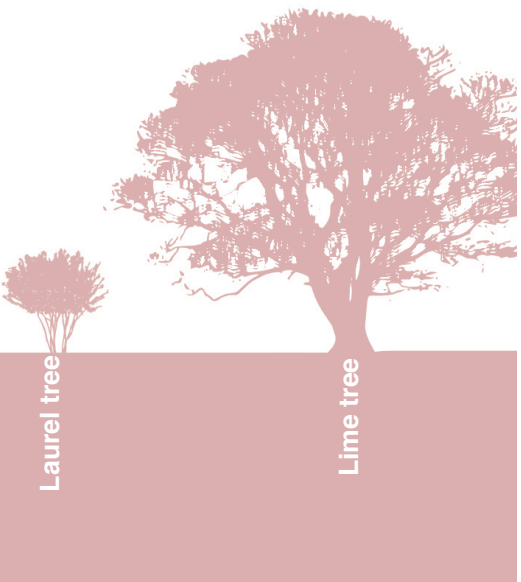


Fig.2.11 Animal life illustration

2.4 Demographics

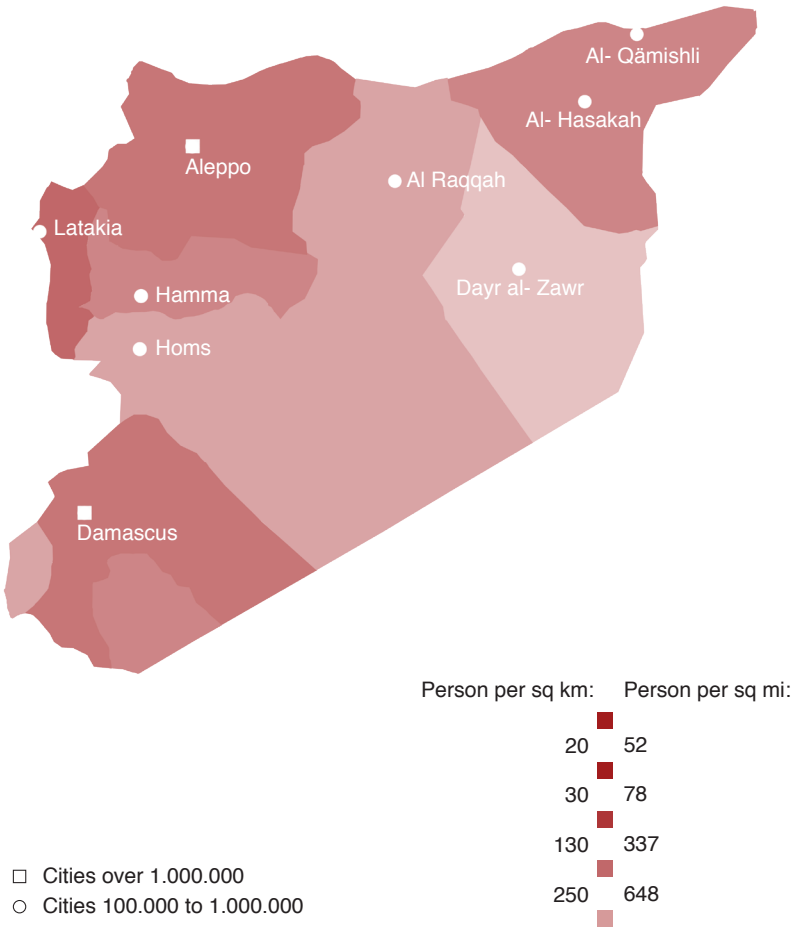


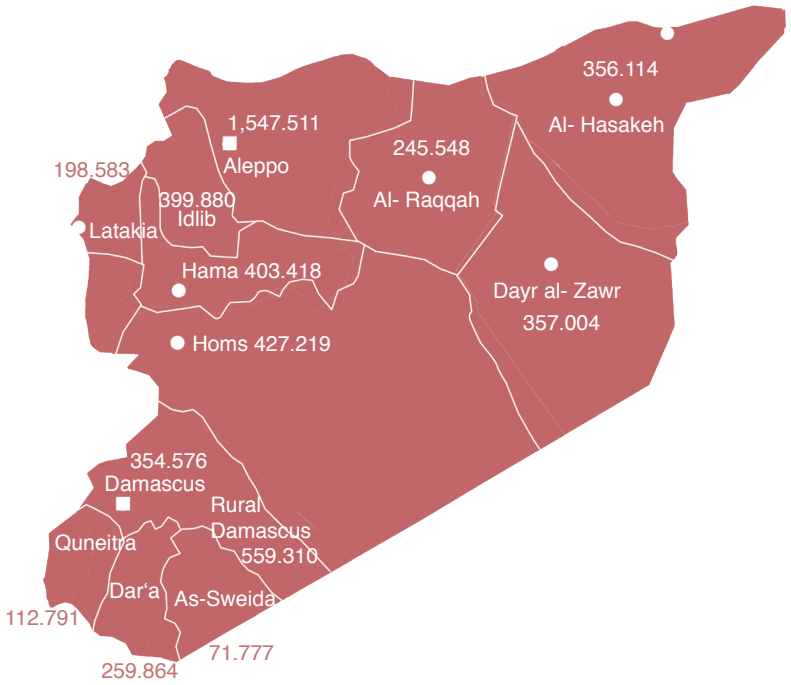
Fig.2.12 Demographics

In 2011, the Syrian population had 23 million permanent inhabitants, including people with refuge status. The current population (results from 25.06.2016) is around 18,5 million people. The population density is around 262 people per square meter. 69,4% of the population is urban (around 13,2 million people in 2016). The median age is 21,2 years.[5]

Religion
The majority religion is Islam, which makes up 87% of population. From that, 74% are Sunni Muslim, 13% Alawi, Ismaili and Shia Muslim. Christianity is measured as 10% with individuals identifying as Orthodox, Uneaten and Nestorian Christians. The remaining 3% are Druses.

Languages
Languages spoken in Syria include Arabic, which is official language and spoken by around 90% of the population. Kurdish, Armenian, Aramaic, and Circassia are widely understood. French and English are somewhat understood. In some areas of Syria, Assyrians have kept their customs, lifestyles and original language. In Maaloula, for example, inhabitants still use Aramean, the language spoken by Jesus Christ.

Access to education
In pre-conflict Syria, high rates of primary school attendance were achieved due to free public education. However, rates of primary school attendance in rural areas were significantly lower than the national average, and there were high dropout rates at the secondary school level, especially among girls. Further more, teachers were generally not permitted to express ideas that opposed government policy.
According to the Cultural Orientation Resource Center, 72 percent of Syrians of secondary school age were enrolled in school before the uprising. The current conflict situation has taken a severe toll on the education system, with school attendance rates down to 6 percent in some areas due to general insecurity, damaged buildings and a lack of teachers.
Prior to the conflict, a combination



of public and private universities existed to provide higher education access to men and women in Syria. However, as with primary and secondary school, restrictions on academic and political freedom were largely present. According to the World Bank, post-secondary school enrollment steadily increased over the years prior to the conflict and in 2010, 26 percent of the population in the five-year age group following secondary school had enrolled in post-secondary education. It is highly likely that enrollment has dropped by a large percentage since then.[6]

Fig.2.13 Number of students at pre- univesity level by province (2010)

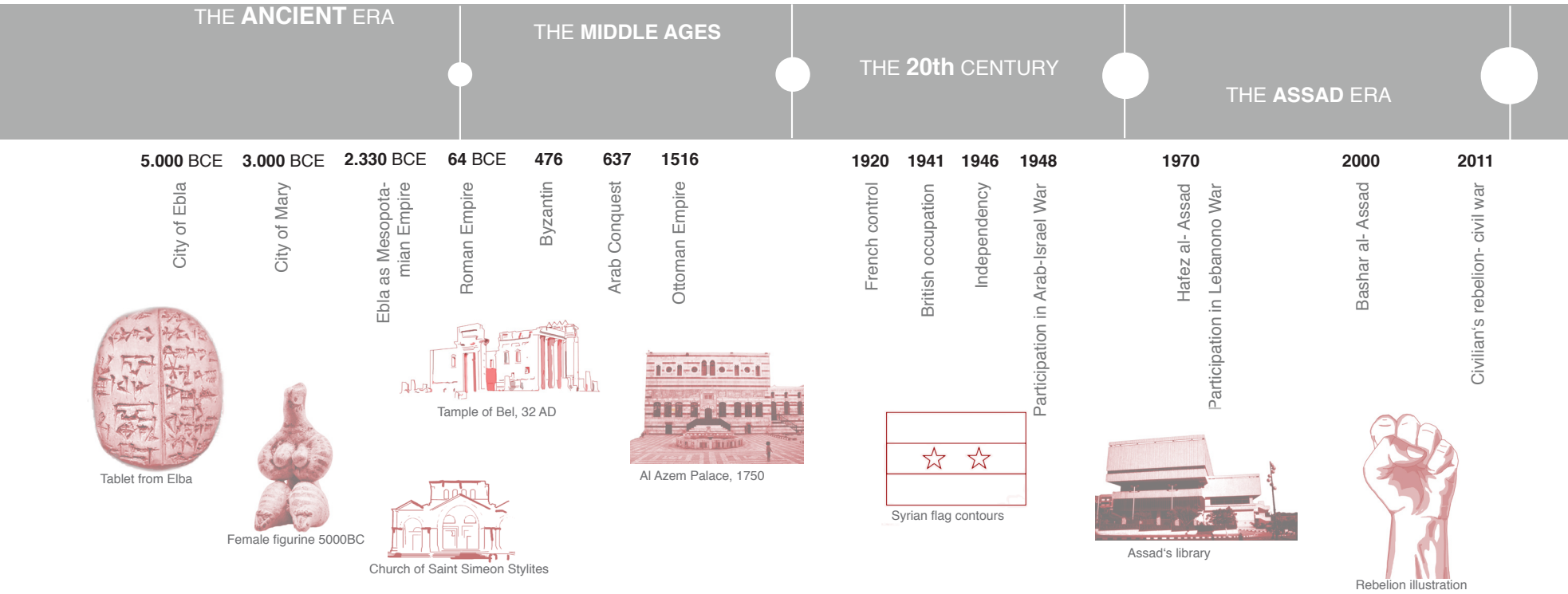


Fig.2.14 History chart of Syria

2.5 History

2016

Illustration

Civil war (2016)

The ancient era

Archaeologists believe the original civilization in Syria was one of the most ancient on earth. Seeing as it's part of the Fertile Crescent, where some of the first people on earth practiced cattle breeding and agriculture, the land is full of Neolithic remains.

The oldest remains found in Syria date from the Paleolithic era (c.800,000 BC). The ruins of Ebla, near Idlib in northern Syria, were discovered and excavated in 1975. Elba is the city where people spoke one of the oldest known written languages. From the third millennium BC all sorts of ancient empires—the Egyptians, Hittites, Sumerians, Mitanni, Assyrians, Babylonians, Canaanites, Phoenicians, Arameans, Amorites, Persians, and eventually, Greeks with the conquest of Alexander the Great occupied the land.

Name:

1. Theory

The name comes from Herodotus' habit of referring to the whole of Mesopotamia as ‚Assyria'. After the Assyrian Empire fell in 612 BCE, the western part continued to be called ‚Assyria' until after the Seleucid Empire when it became known as ‚Syria'.

2. Theory has been contested by the claim that the name comes from Hebrew word „Siryons", what means armor, referring to the soldiers metal armor.

3. Theory is a theory that `Syria' derives from the Siddonian name for Mount Hermon - `Siryon' – which separated the regions of northern Eber Nari and southern Phoenicia (modern Lebanon).[7]

Syria has a big importance in early Christian Church history. Local church of the Saint Simeon Stylites in Atioch is one of the oldest surviving churches in the world.

The middle ages

Around 395 CE Syria became part of the Byzantine Empire and several hundred years later, precisely at 637., it was conquered by Muslim Arabs. Damascus was the capital and the empire spread far and wide, making the city prosperous. Arabic became the main language, replacing Greek and Aramaic.

For the next several centuries, Syria was held by Crusader states, Mongols, Egyptians, Mamluks, and in 1400, Timur Lenk, who was a Turko-Mongol general from Central Asia. He captured Damascus, where many of the people were massacred and the Christian population suffered persecution.

In 1516, Syria was conquered by the Ottoman Empire led by Sultan Selim I, and it remained part until its collapse in 1918. There was peace during most of these centuries. Syrian territory constituted modern-day Syria, Lebanon, Israel, Jordan, Palestinian Authority, Gaza Strip, and parts of Turkey and Iraq.

The 20th century

In 1916, during World War I, Sykes-Picot Agreement secretly divided the Ottoman Empire into zones. In October 1918, Arab and British troops advanced into Syria and captured Damascus and Aleppo. Syria became a League of Nations mandate under French control in 1920. A large number of Syrians were not satisfied with the sudden French Mandate, and in 1925 a revolt broke out, spreading into Lebanon, but

Fig.2.15 Independence day 1946. illustration

was suppressed in 1926. In 1928 elections were held for a constituent assembly, which included a Syrian constitution, but France rejected the idea, leading to more protests.
Eventually, in 1936, France and Syria negotiated a treaty of independence, allowing Syria to maintain independence in theory, even though France held military and economic dominance. But the French never ratified the treaty, and when they themselves were captured in 1940 during World War II. Vichy France held Syria, until British occupied the land in 1941.
Syria was finally recognized as an independent republic in 1944, and the French military eventually left by 1946. Official independency happened on April 17, 1946. But between then and the late 50s, it had 20 different cabinets and four constitutions, what made Syria's government unstable.
In 1948 Syria got involved in the Arab-Israeli War out of protest from the establishment of Israel, and once the demilitarized zone under UN supervision was established, future Syrian-Israel negotiations became volatile and remain heavily so since.
For most of the 20th century, Syria's power remained in its military and not so much in its parliament. Because of the Suez Crisis in 1956, Syria signed a pact with the Soviet Union, allowing a Communist foothold in the government in exchange for military equipment. This angered neighboring Turkey, but brought Syria closer to Egypt because of their socialist leanings at the time.
Egypt and Syria decided to merge and become the United Arab Republic, but the idea lasted only a few years because of Egypt's dominance. Syria broke ties and became the Syrian Arab Republic, and most of the 60s were characterized by frequent coups, military revolts, bloody riots, and civil disorders.[8]

The Assad era

The Minister of Defense, Hafez al-Assad, seized power in a bloodless coup in 1970, and In March 1971, the new 21-member Regional Command headed by Assad was elected. Shortly after gaining power, Assad created a new legis-

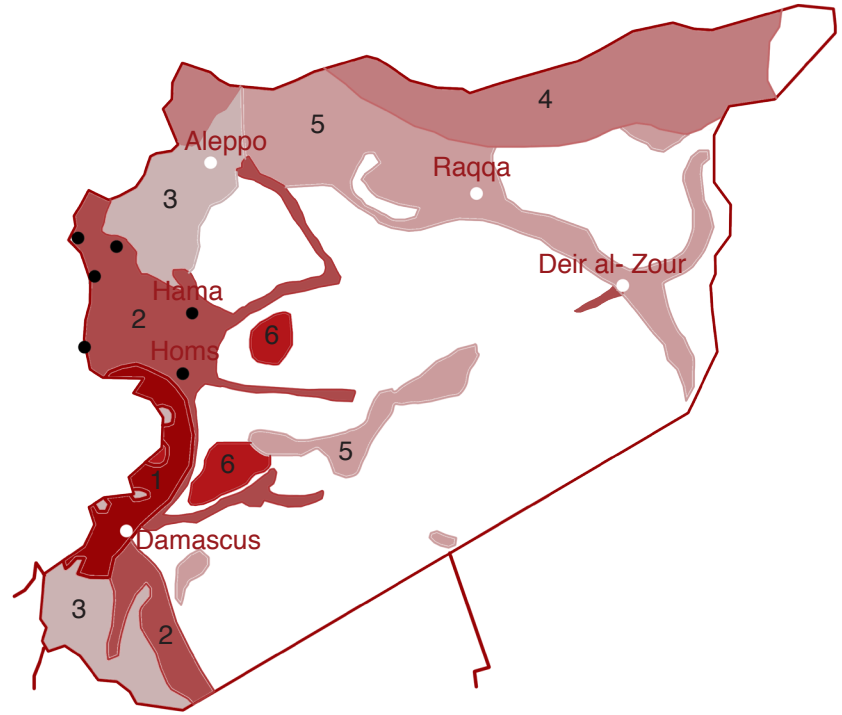


Fig.2.16 Rebelion groups and controls

lature and local councils to govern smaller provinces, consolidated political parties, wrote a new constitution, declared Syria a secular socialist state with Islam as the majority religion, and launched a surprise attack on Israel with Egypt. Syria got involved in Lebanon's civil war, which basically led to a 30-year Syrian military occupation. In 1982 between 10,000 and 25,000 civilians were killed or wounded by artillery fire in Hama in a battle against the Muslim Brotherhood. Syria joined the US-led coalition against Iraq in 1990, leading to better relations in the West.

When Hafez al-Assad died in 2000, his son Bashar al-Assad became his successor at age 34. He officially ran for president, but he ran unopposed and earned 97.3% of the vote. People were initially positive at the start of his regime, and even called this short era Damascus Spring. Assad released 600 political prisoners. But only one year later, pro-reform movements were suppressed, leading intellectuals were arrested, and in 2002, the U.S. officially accused Syria of acquiring weapons of mass destruction and included them in their list of "axis of evil" countries. Syria was accused of being behind the assassination of the Lebanese prime minister in 2005. In 2008, Assad met with French president Nicolas Sarkozy and the new Lebanese president Michel Suleiman, laying down foundations for better diplomacy between the countries.

In 2010, the U.S. renewed economic sanctions against Syria, accusing it of supporting terrorist groups, Hamas, Hezbollah, al Qaeda.[9]

Civil war

Protest that happened in Egypt in 2011, gave Syrian civilians courage to try and do the same. Unfortunately, the Syrian government did not respond peacefully.

The Syrian Uprising, later known as the Syrian civil war, is an ongoing internal conflict between the Syrian army and the rebel groups.

Protestors demanded political freedom and the release of political prisoners. The protestants were demanding President Assad‘s resignation. The government used force to crush the protests. By July 2011, hundreds of thousands were taking to the streets across the country. By June 2013, the UN said 90,000 people had been killed in the conflict. By August 2015, that figure had climbed to 250,000, according to activists and the UN.

The conflict is now more than just a battle between those for or against Mr Assad. It has acquired sectarian overtones, pitching the country‘s Sunni majority against the president‘s Shia Alawite sect, and drawn in regional and world powers. The rise of the jihadist group Islamic State (IS) has added a further dimension.

More than 4.5 million people have fled Syria since the start of the conflict, most of them women and children. Neighboring Lebanon, Jordan and Turkey have struggled to cope with one of the largest refugee exoduses in recent history. A further 6.5 million people are internally displaced inside Syria, 1.2 million were driven from their homes in 2015 alone.[10]

Fig.3.1 Arabesque pattern

3. Culture

3.1 Dance music and literature

Fig 3.2 Dabka, traditional dance, illustration

Syria is home to some of the oldest, most advanced civilizations in the world. The accent in the Syrian culture is given to the family, religion, respect, education and self-discipline.

Dance

Syria is very known as musical country. Folklore dance in this country was influenced by nature (labored in agriculture) and social habits. In some regions, like coastal mountains, dance is performed in quick steps and in Aleppo for example; dance is quieter and less vivacious. Dance inherited from old Arab beduin traditions is „al Dahha“ dance. Of the most famous dances in Syria is the Dabka, a dance of several light coordinated steps with movements of the body that express vivacity of the males and tenderness of the females, accompanied by frequent organized movements of feet, beating the ground in harmony with a drum, a flute or any other country musical instrument.[11] Other known dances are al- Samah and the sword dance.

Literature

Syrian literature played a crucial role in Arab literary and cultural revival of the 19th century. Well known contemporary Syrian writers are: Adonis, Muhamad Maghout, Haidar Haidar, Ghada al-Samman, Nizar Qabbani and Zakariyya Tamer.

During the French rule, Syrian authors were inspired by French Romantic influences, where they leave traditional Arab writing. „Literary of political commitment“ emerged as a result of disproval of the establishment of Israel in 1948. Hanna Mina was the most important novelist of this era. One of the novelist that were as well putting the critique on the present were Nabil Sulayman, Fawwaz Haddad, Khyri al-Dhahabi and Nihad Siris.

Syrian folk narrative, as a subgenre of historical fiction, is imbued with magical realism, and is also used as a means of veiled criticism of the present.[12]

Music

Damascus is the center of cultural and artistic scene, especially in the classical Arab music. Several famous pan-Arab stars is Syria. Aleppo is known for tis muwashahah (form of Andalous sung poetry). Syria is the place where the earliest Christian hymnody was played, as well as the distinctive Syrian Jewish religious music.

3.2 Traditional architecture

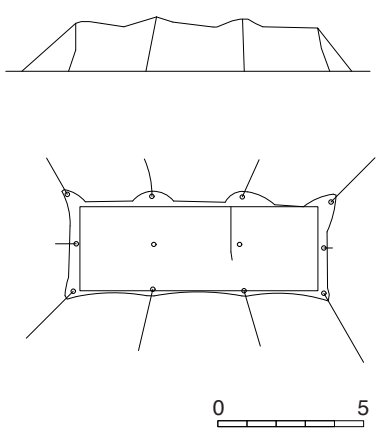


Fig.2.21 The tent

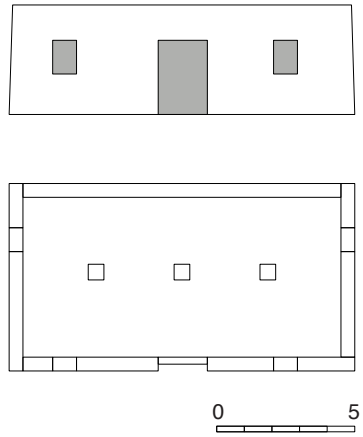


Fig.3.3 The basic house

Syria has a very old tradition of building, where 10.000 years ago one of the first city-states were Ebla and Mari.
This chapter describes the rich diversity in building types in Syria. They can vary according to the region and people's lifestyles. Two lifestyles generate difference of construction and dwelling: nomadic and sedentary.
Nomadic lifestyle, so called „Beduin", is dynamic one that requires constant migration in search of pastures and water.
Living unit of the Bedouins is a tent.
The sedentary lifestyle refers to the cities and the countryside. Among them the type of the houses are also different, according to the geographic location (seaside, mountain, valley...).
There are two main types of traditional house.
Traditional city house and traditional country house. City house is characterized by stone constructions with different types and colours. Rooms for daily and evening activities surround inner courtyard of a city house.
Traditional country house has a main inner courtyard that mainly functions as a garden and is surrounded by rooms on one or few sides and rest is bordered by a wall. Country has a two parts, one for animals and other for the inhabitants. Seasonal vegetables are usually grown in inner garden.
The number if inner courtyards can be different and it differs the wealth of the occupant as well the number of families living there. Big houses can have 2 or 3 courtyards. Some of them are with a fountain in the center, surrounded by trees.

7 main types of dwellings:

1. The tent
Bedouins uses tents as dwellings; they are easy to put down and up for transfer. A nomad's lifestyle is linked to sheep farming, which requires a constantly moving and looking for pastures. In Syria they are normally situated in the eastern areas, near to the banks of the Euphrates and close to the Turkish border.
These tents are usually separated in two parts: for women and men, with a section for storage.
There are also small tents, used for household activities.
The tent can be rectangular or square shape, made of woven wool that has good isolation properties.

2. The basic home
Simple house type, used mostly in rural areas. It consists of two living units, open to the exterior: „Mastaba" that has a leisture function (mainly used as a bedroom), and „Zribeh" used as a stable for animals and for the kitchen and storage area. These two area are connected through a door.
This type is found in the mountains near the city of Lattakia.

3. The House with a Riwaq
Riwak is the name of the covered gallery that connects several aligned rooms forming a residential unit. The house with riwak is in the villages of the southern Syria, to the north of Damascus.

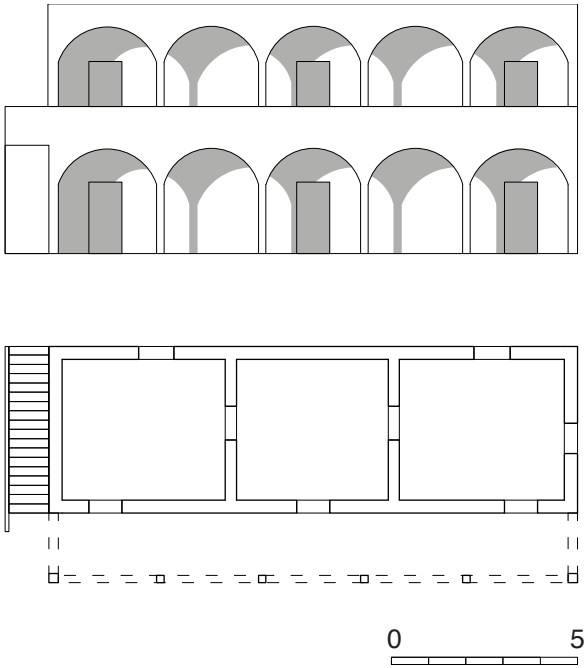


Fig.3.4 The house with a Riwaq

4. The House with a Liwan

This house is a typical multipurpose rural house that can be found north of Damascus. It has tree main units; two of them are used as living area and the central one liwan is open to exterior and is used as shelter for domestic animals, as a warehouse.

5. The Rural House with Courtyard

The building materials of the courtyard rural house can be very specific, as the one found in the surroundings of Aleppo, in the city of Sfireh. The mud is used for the cupolas in roofing. Typology is based on the main unit, 4x4m, covered in a mud cupola and repeated around the inner courtyard. The larger the house, the richer the owner and the bigger courtyard.

Houses are built just with one floor and have varies sections with rooms for men and women, kitchen and service rooms, special stable and stalls for animals, as well as room with „tanour“ (traditional oven). Openings on the house are very limited, from the front door to the small vertical long windows. Earth renderings are used to cover the outer wall that can be till 70cm wide; the inner walls are usually covered with lime wash. Mud itself is an insulator that keeps the temperature in the house stable in hot and cold seasons.

Mud cupolas are also used in Tiara, on the outskirts of Aleppo, but in this case the whole building takes on the shape of a cupola. Mud houses and rough stone houses can be found in the areas surrounding Damascus and Ghouta, and are often two floors high.

With a time, building with mud become rare due to lack of craftsmen capable of making and repairing mud structure, and emergence of reinforced concrete, cement and CMU (concrete masonry units). Buildings changed and roofs became flat; walls were either kept as a traditional structure or made with stone or CMU. But the new solution hasn‘t fulfilled the needs of the people on the level of thermal insulation: traditional buildings surpass modern structures in this field; they provide better acoustic and thermal insulation and are more environmentally adapted.[13]

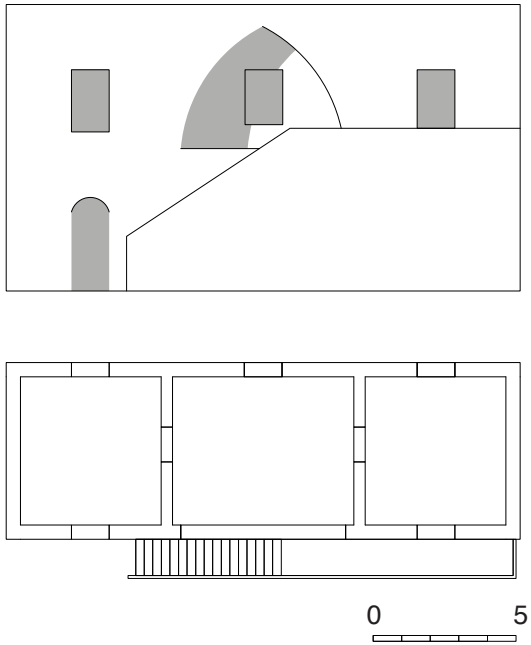


Fig.3.5 The house with a Liwan

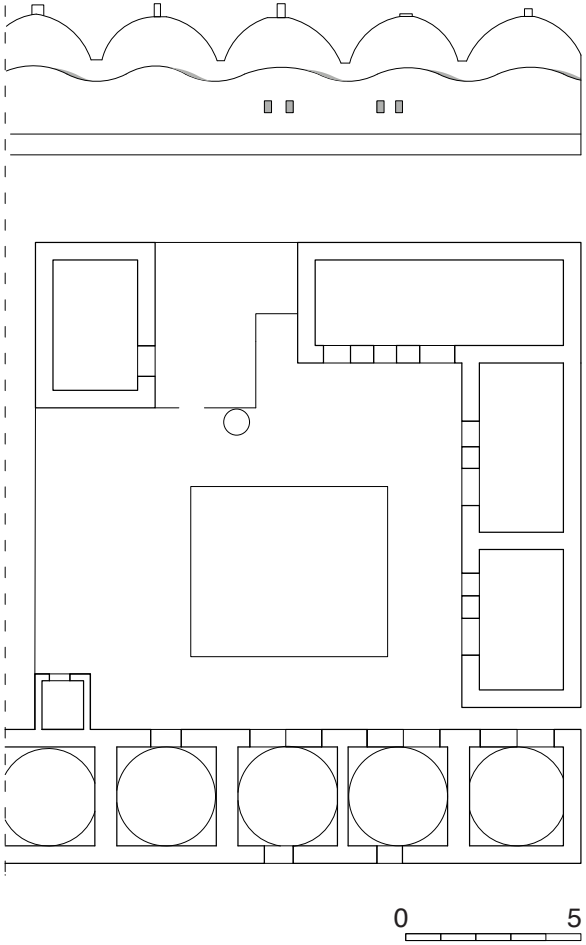


Fig.3.6 The rural house with a courtyard

6. The Urban House with Courtyard

One of the most common and enduring building typologies in Syria is the traditional courtyard house. It can be found in all Syrian cities, just as in all Mediterranean countries.

The center of the house is inner courtyard that is used as a garden, around which all the rooms are set. Usually it contains a fountain placed in the center that freshens the aid, trees (mostly lime and orange trees) and decorative planting such as climbing jasmine and rose bushes. Openings on the house are orientated to the courtyard and very small number is positioned in the external facade, what gives the occupants a feeling of privacy. The height of the traditional house is limited, usually no more that 10m for two floors. A ground floor comprising the main living areas called „Al Salamle“ and a first floor comprising the private areas called „Al Haramlek“. There is also a basement that enjoys an even temperature throughout the year. The thick walls and roofs are good insulators and help stabilize room temperature, while the variable roof heights and protruding elements in the facade provide shade. The iwan that is usually placed on the north facade is an important covered open space with a raised platform (by one or two steps), used as a pleasant and comfortable open-air reception and seating area.

1. The use of protrusions and cor - nices on the outer facades or on the inner court, facades that look over the courtyard.

2. The use of the “Kishks” (protru - ding wooden kiosk) to cover the openings in the external wall, rarely used on inner facades. Elements that held to increase the amount of shade areas.

3. Some traditional houses use the roof garden as a way to lessen heat in the house.

4. Covered streets protect external walls from direct sunlight.

5. A great variety of ceiling heights are used and the main spaces of the house conceived so as to be ventilated by soothing winds.[14]

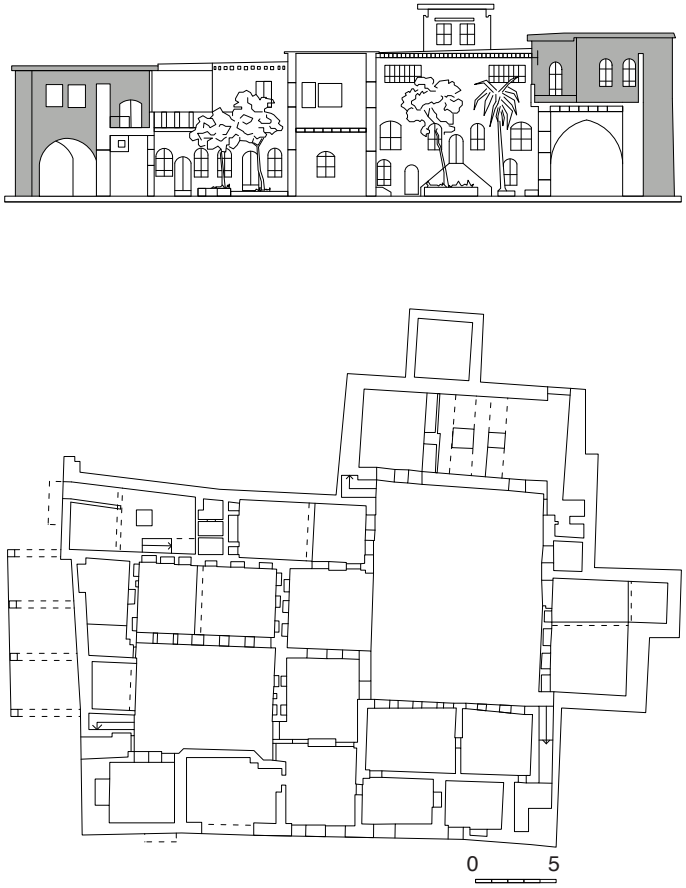


Fig.3.7 The Lebanese house

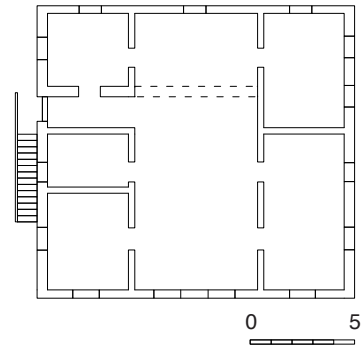


Fig.3.8 The urban house with a courtyard

The Lebanese House

The Lebanese house appeared in the second half of the XIXth century and is linked to both Ottoman modernity and the development of a middle-class in the area. This typology represents a great change in the organization of space in the traditional house. It is the result of the incorporation of new industrial materials as well as of the new urban regulations and development programmed in that period.

The central hall is the main characteristic element of the Lebanese house. Around this hall, or large central room, there are several rooms for dwelling. The façade rooms open into the outside through an ornate triple arch window. There is also often a balcony, which prolongs the room towards the garden or the street.

The Lebanese house generally found in Syria is very modest compared to the houses in Beirut, but it is the most modern middle-class traditional house in Syria. These houses are found throughout the Mediterranean area of Syria.[15]

4. Urbanism

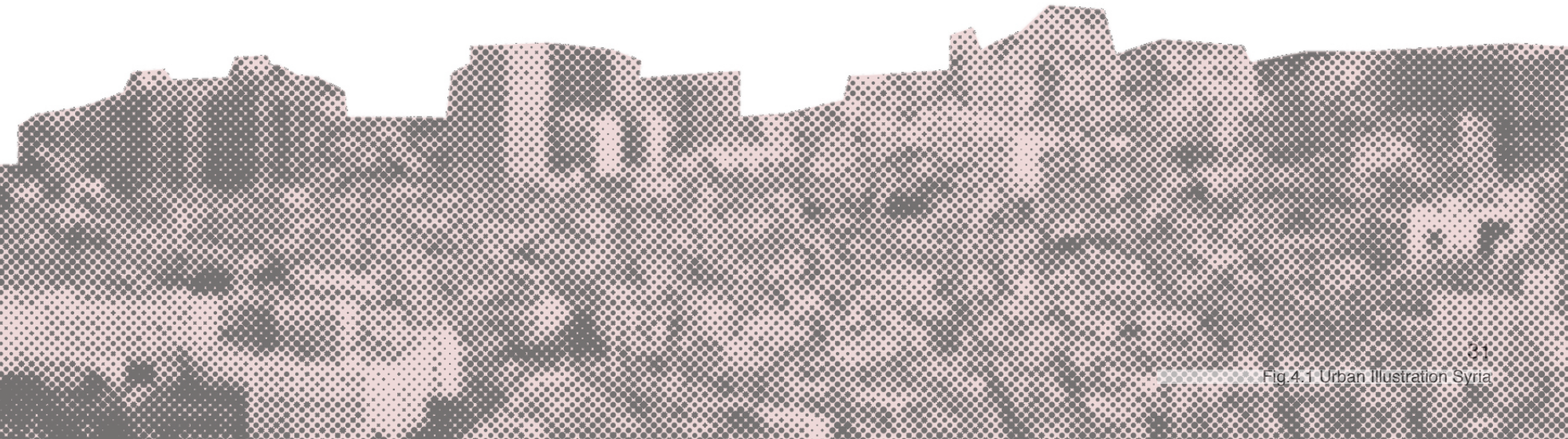
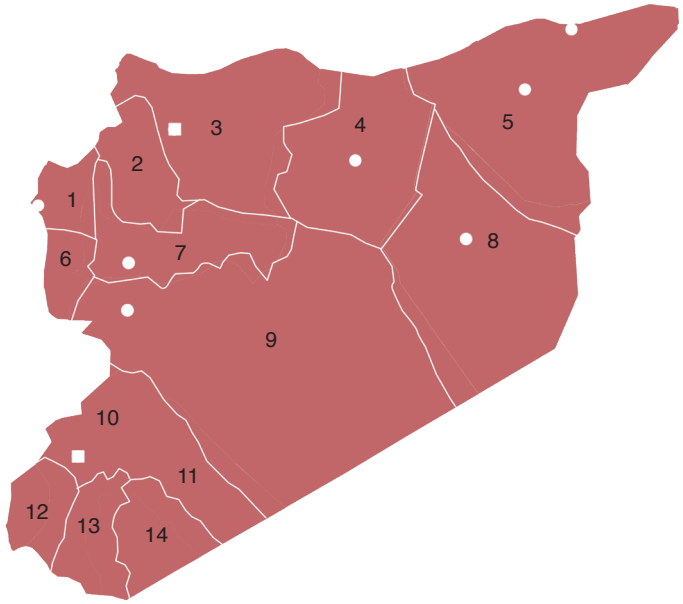


Fig.4.1 Urban Illustration Syria

4.1 Urban organisation

Syria's Administration is divided into 13 Governorates, and a special Governorate Status for the Capital City Damascus. Each governorate is organized around a major city known as the Governorate Center-City. The countryside of each governorate is then divided into regions. In the center of each region we find minor cities. A town must have a population of more than 20,000 to be considered a City and be allowed to administer its region. Smaller villages and farms are organized through smaller districts within each region.

By the year 2000, a total of some 84 urban centers had a City status. In the early 70's, as the urban growth was registering its highest rates, Syria enforced a new Local Administration System. Cities elected City Councils to supervise their administration. Each Council has a small Executive Bureau to steer its work and a Mayor heads this Bureau. The Governorate has an elected Governorate Council. Smaller cities depend on the technical services provided on governorate level. The Ministry of Local Administration is in charge of coordinating and administering operations of the Local Administration Law. However, technical decisions related to urban planning, infrastructure and housing are coordinated with the Ministry of Housing. These two Ministries combined control over 10% of the national budget. City revenues are constituted with locally collected fees and investments as well as a quota of national taxes (calculated on a per capita basis). Often, Central Government subsidies and grants are provided to finance large development projects. Specialized Ministry departments provide budgets for operations within their branch and for local projects in the governorates. All governmental budgets in Syria are submitted to approval on a national level. Between the City administration and the residents of the city, where are neighborhood committees and district clerks. The dialogue developed in these committees allows for an informal participation process. However, the true formal representation of residents is materialized in City Council elections, held every four years.[16]



1. Latakia; **2**. Idlib; **3**. Aleppo; **4**. Al-Raqqah; **5**. Al-Hasakah; **6**. Tartus; **7**. Hama; **8**. Deir ez-Zor; **9**. Homs; **10**. Damascus; **11**. Rif Dimashq; **12**. Quneitra; **13**. Daraa; **14**. Al-Suwayda

Fig.4.2 Governorates of Syria

4.2 Cities of Syria

Damascus

Damascus is a capital of Syria and the second largest city after Aleppo. The results from 2009. showed the population of around 1,7 million. It is as well one of the oldest continuously inhabited cities in the world. The city is about 80 km distant from the Mediterranean, surrounded with Anti-Lebanon mountains that mark the border between Syria and Lebanon and supplied with water by the Barada River. „Ghouta“, the irrigated farmland is surrounding Damascus, where many vegetables, cereals fruits have been farmed since ancient times.

Climate is cool desert, with dry and hot summers with less humidity. Winters are cool and short, sometimes rainy, and snowfall is infrequent.

History

There are clear indications to the emergence of the city, from the beginning of the eleventh century B.C. At that time, Damascus was an important city as it was the capital of the Aramaic kingdom.

It had no formal reorganised shape: the way in which the city was built was adapted to the nature of the landscape and the parameters of properties. Mud and wooden frameworks were used, exploiting a number of materials available locally.

In the year 333 B.C the city was linked to the Greek expansion and joined Alexander‘s empire peacefully. After the death of Alexander, the city was given up to the Salukis: during this period it was rather similar to European cities though its location made it an oriental–Greek city. Houses were built in rectangular neighbourhoods, identical in size, divided by straight streets.

With time, the Roman colony of Damascus grew independent but maintained the organized form it inherited from the Greek age, introducing a main street with large, important buildings on each side of the street.

That Arabs entered Damascus in the year 635 A.D. In the beginning, the only signs of the new rule were the mosque and the khilafah house. Later, the mosque was enlarged and was named the Umayyad mosque. City and its people were exhausted with wars. These uncertain times continued until the Fatimid age. During the Seljuks, due to insecurity in the city, inhabitants organised and gathered into groups. Each area had its own mosque and lived according to its own sort of lifestyle, even had their own door, that were locked every evening. The big mosque and the main market areas brought the city together as one.

In the time when Ayyubids controlled the city (1174 A.D.), the city was revived. In the matter of military and culture Damascus was more stable and prosperous. They built the castle, the sultan‘s residence, on the northern western corner of the Roman wall, and surrounded it with government buildings. They also restored the city wall, and many bimarstans and schools emerged in this era.

After the Mongolian conquest in 1260, Syria became part of Egypt under the rule of the Mamelukes. In this time population was growing what was calling for two new residential areas in Damascus. The Mamelukes, during their reign, left a number of monuments.

Fig.4.3 Damascus

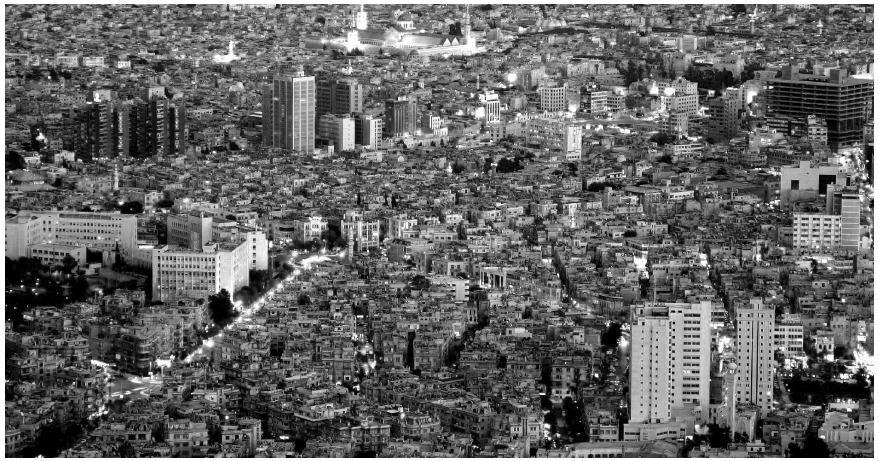


Fig.4.4 Damascus before the civil war (2009)

Fig.4.5 Damascus during the civil war, January 31, 2014

The city was in ruins when Sultan Saliem the Ottoman took over in 1516, but the vastness of the empire helped Damascus become once again a major trade area. They built large mosques and after Muhammad Ali's conquer of Damascus, city become health services, administrations, traffic organisation facilities and new markets.
The French occupied Syria in 1921. In this era, the influence of European architecture was prominent and western urban planning influenced the expansion of the city. 1946, independence of Syria has been signed where Damascus remained the capital.

Civil war
„On 6 January 2012, a car bomb exploded in Damascus killing more than 26 people, most of them civilians."
„On 17 March 2012, twin car bombs hit the heart of the city, targeting the Air Force Intelligence Service and the headquarters of the Security Forces killing at least 27 people, most of them civilians."
„In the early morning of 19 March, fire fights and explosions broke out in the West Villas section of the heavily guarded and upscale Mezzeh neighbourhood."
„By June 2012, bullets and shrapnel shells smashed into homes in Damascus overnight as troops battled the Free Syrian Army in the streets. At least three tank shells slammed into residential areas in the central Damascus neighbourhood of Qaboun, according to activists."[17]

Aleppo

With a population about 2,1 million (2004), Aleppo is the biggest city in Syria. It is as well, an ancient metropolis, one of the oldest continuously inhabited cities in the world. The city of Aleppo appeared in history for the first time in the Acadian period, in the third millennium B.C. In the middle of the third millennium it was a kingdom of Yamhad. Egyptians were ruling the city from 1600 B.C. and Assyrians from 612 B.C. till 539 BC when the Persians took over. During this time, the areas located south of the Old City were established.
In 103 B.C area was influenced by a Hellenistic style, with orthogonal and straight streets. 4th century was a rule if Khalstic and in 330 A.D. the Muslims entered the city. They build few mosques in this period. In the time of the Umayad rule, few more mosques, khans and tkiyas were build.
The walls were extended in the Ayubbid period and some new neighborhoods were established beyond the ramparts. The city continued to expand in the Mameluke era and residential areas surrounded the castle after the Mongolians destroyed it in 1258 A.D.[18]
From 1516 Ottoman Emire ruled city. They changed the administrative system and made lot of project within and beyond the city wall. Ottomans established new schools, markets, mosques and khans. Economy was developing very fast, with Aleppo becoming a central market for European products.
In the year 1832, the city fell in the hands of the Egyptians, but the Turks crossed the Euphrates again and regained the city.
In the 19th century, the city developed a great deal, new streets were opened, the moat was filled and became a street, two and three floor buildings started appearing and dominated the architecture of that period, introducing a new architectural style, the traditional Arabic courtyard house. Squares and public gardens were made, railroads and two train stations were established, new districts were planned and new directions were set for expansion, connecting with the Old City.[19]
During the French occupation in 1920, French planners Dange and Ecochar made city urban planning.
French planners Dange and Ecochar then set the city urban planning the quick development of the city continued up to French occupation in 1920.
Some areas of the old city were destroyed due to make a place for the Bab al Faraj project. But in 1986 Old City of Aleppo was listed as World Heritage, so further damage was stopped.

Civil war
„ On 12 August 2011, some months after protests had begun elsewhere in Syria, anti-government protests were held in several districts of Aleppo, including the city‘s Sakhour district. At least two protesters had been shot dead by security forces

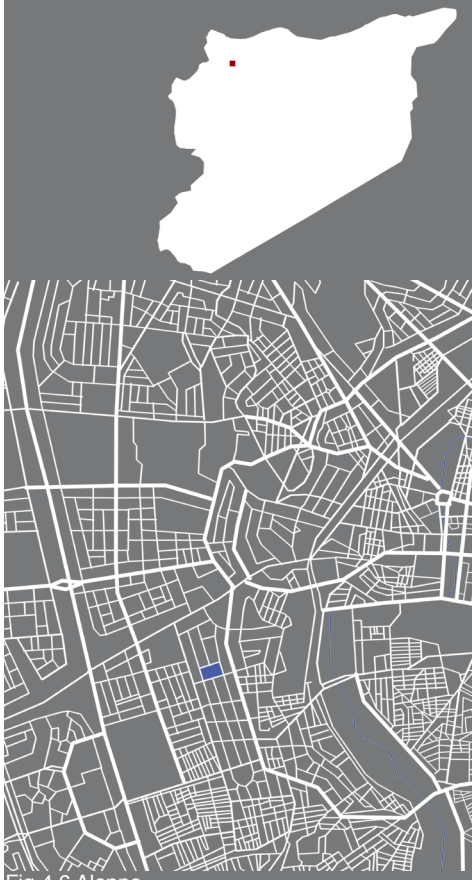


Fig.4.6 Aleppo

Fig.4.7 Aleppo before the civil war

Fig.4.8 Aleppo during the civil war (2016)

during a demonstration in Sakhour with tens of thousands attendees."

„On 10 February 2012, suicide car bombs exploded outside two security compounds...", „...reportedly killing 28 (four civilians, thirteen military personnel and eleven security personnel) and wounding 235."

„As a result of the severe battle, many sections in Al-Madina Souq (part of the Old City of Aleppo World Heritage Site), including parts of the Great Mosque of Aleppo and other medieval buildings in the ancient city, were destroyed and ruined or burnt in late summer 2012 as the armed groups of the Free Syrian Army and the Syrian Arab Army fought for control of the city."

„In February 2014, the opposition groups of the Islamic Front claimed responsibility for destroying a series of major historic buildings in the old city including the justice palace, the Carlton Citadel hotel which was being used as an army base, the old building of the city council, the Grand Serail of Aleppo, Khusruwiyah Mosque, Khan al-Shouneh and many other souqs and khans."[20]

Hama

Is a city on the banks of the Orontes River in west-central Syria. It is a fourth largest city in Syria, with a population of around 850.000 people (2009). It has a hot semi-arid climate; the city has a much hotter and dryer climate than nearby Homs. City is known by its old seventeen norias that are used for watering the gardens and that today presents one of the main attractions in the city itself. Most of the residents are Sunni Muslims, and the Hama is reputed to be the most conservative city in Syria. Old saying, reflecting that character is: *„In Damascus, it takes only three men to make a political demonstration, while in Hama it takes only three men to get the town to pray.“*[21]

The city of Hama is very old, the ancient settlement of „Hamath“ was occupied from the early Neolithic to the Iron Age. The archeological discoveries showed old Assyrian and Aramaean settlement.

858-824 B.C. Assyrian Kingdom ruled the Hama, and afterwards Aram took over some of Hamath‘s territory. In 743 BC, Tiglath-Pileser III took a number of towns in the territory of Hamath.

In 738 BC, Assyrian troops, conquered the city again. Sargon II razed the city ca. 720 B.C., recolonized it with 6,300 Assyrians, and removed its king to be flayed alive in Assyria. Hama was influenced in the second half of the 4th century B.C. with a Greco-Roman culture. Under the Seleucids there was a revival in the fortunes of Hama. Although Hama was an important city during the Greek and Roman periods, very little archaeological evidence remains. Big prosper of the city began when the capital of the Roman Empire was moved to Byzantin. These times churches were built in Hama and other cities of Syria.

During the Muslim conquest of Syria in the 7th century, it is written in the books that the city was walled marked, with a ring of outlying cities. The Byzantines raided the town in 968 and burned the Great Mosque. After few different rulers, in 1114

The Seljuks took it definitively under the control. In 1157 an earthquake shattered the city. City got its new mosque in 1172. build by Zengid sultan. In 1299 Hama passed to Mamluk control. Hama grew prosperous during the Ayyubid period, as well as the Mamluk period. It gradually expanded to both banks of the Orontes River, with the suburb on the right bank being connected to the town proper by a newly built bridge. The town on the left bank was divided into upper and lower parts, each of which was surrounded by a wall. The city was filled with palaces, markets, mosques, madrasas, and a hospital, and over thirty different sized norias (water-wheels).

1516 Hama came into the rule of Ottoman Empire. Under the Ottomans, Hama gradually became more important in the administrative structure of the region and A number of khans („caravansaries“s), Azem Palace and Khan As‘ad Pasha palace, were built in the city.

1918. under the French rule, Hama developed into a medium-sized pro

Fig.4.9 Hama

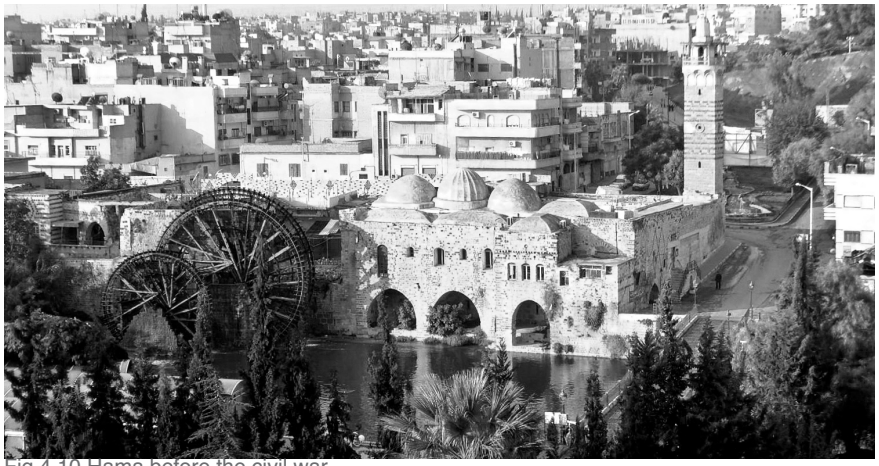


Fig.4.10 Hama before the civil war


Fig.4.11 Hama during the civil war

vincial town, important as the market for an agricultural area abundant in cereals, but also cotton and sugar beets.

Civil war

„On 10 May 2013, a cease-fire agreement between government and rebel forces in Halfaya broke down. Heavy shelling of the town started in which 25 people were reportedly killed."

„On 28 July 2014, rebels killed six soldiers and captured the „Btesh" checkpoint in Tarabih, located nine kilometers north of Hama military airport."

„The 2015 Hama offensive was a military operation launched by Syrian Islamist rebels during the Syrian Civil War in the northern parts of Hama Governorate."[22]

Homs

The city in western Syria, located on the Orontes River, Homs is the central link between interior cities and the Mediterranean coast. It was the third largest city in Syrian, with population of around 650.000 people (2004). Before the civil war, Homs was a major industrial center. Major religious presented among the population were Sunni, Alawite and Christian.
From the architectonical point of view, city was rich in a number of historic mosques, churches and monuments and it is very close to the world heritage site, named "Krak des Chevaliers" castle.
For approximately 2,000 years, Homs has served as a key agricultural market, production site and trade center for the villages of northern Syria.[23]
The city did not emerge in the history until the 1st century BC.
Seleucus I Nicator who established the Seleucid Empire upon the death of Alexander the Great, although the city did not emerge in the light of history until the 1st-century BCE, at the time of Seleucids, may have founded Homs itself. It later became the capital of a kingdom ruled by the Emesani dynasty who gave the city its name. Under the Bizantynes rule, it had a huge importance in Christianity and the city become an important center of Eastern Christianity. Church of Saint Elian date back to the 6th century and has a big architecture and historical value. In 637 CE Arab tribes took the city, and transformed half of St. John's Church into the city's Friday Mosque (Great Mosque of al-Nuri). Homs was likely the first city in Syria to have a substantial Muslim population. In 1090 Seljuk Turks occupied Homes, but it was really hard to defeat and break into the city due to big walls and great defense. Geographer Al-Idrisi noted in 1154, that Homs was very popular, had paved streets, one of the lergest mosques in Syria, with open markets and was crowded by travelers. In 1157 earthquake damaged the city and its fortress and the one that happened in 1170 finished it. But the city and the fortress were restored due to the importance in Syria.
and its fortifications were soon restored. After years of wars and insecurity in the city, in 1516 Homs became part of Ottoman Empire. Back then it was well known for the silk and wool weaving and it continued to thrive as economic center. Before the Ottoman government extended security to the city, Homs was attached by Beduin tribes and was not revitalized.
During the French rule, the city was part of the State of Damascus. 1973, in the time of the Yom Kippur War, the Israeli Air Force bombed the city's oil refinery.

Civil war
„In the ongoing Syrian civil war, Homs became an opposition stronghold and the Syrian government launched a military assault against the city in May 2011. The following Siege of Homs left much of the city completely destroyed and thousands dead. The war in the city ended in 2015 when rebels evacuated the city, resulting in a government victory."
„Thousands to tens of thousands gathered in the city's main square

Fig.4.12 Homs


Fig.4.13 Homs before civil war


Fig.4.14 Homs during civil war

on 17–18 April 2011 in a sit-in protesting the government of current president Bashar al-Assad. At least 62 people were killed by government security forces in armed clashes against local anti-government militants.“

„... Homs has since become a „blighted city,“ where authorities regularly block deliveries of medicine, food and fuel to the inhabitants of certain districts.“

„The Center for Documenting Violations in Syria claims that at least 1,770 people have been killed in Homs since the uprising began.“

„On 9 December 2015, under a UN-negotiated deal, the remnants of anti-government forces and their families, that had been under siege the al-Wair district for three years, began to evacuate from the city.“[24]

5. Refugees

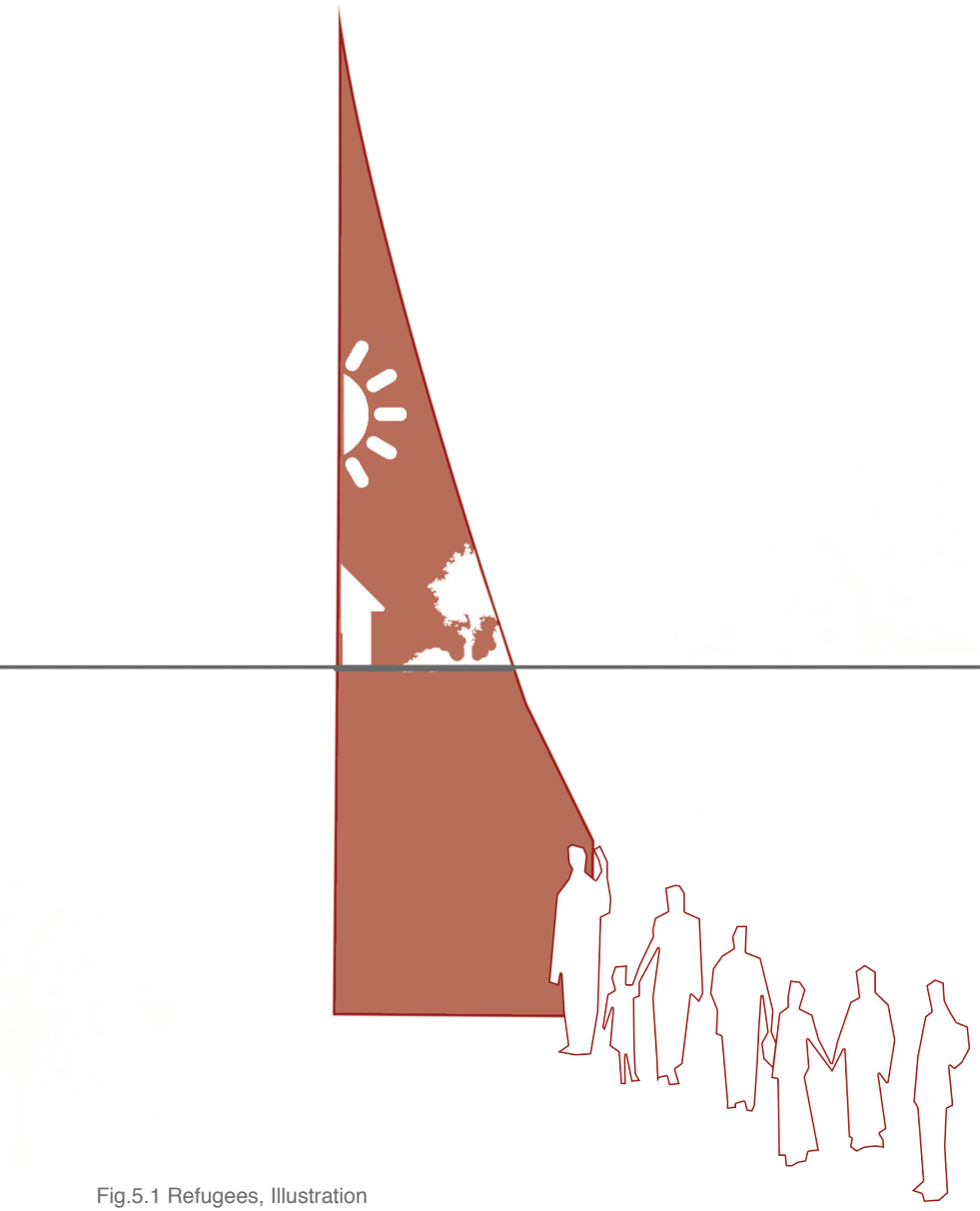


Fig.5.1 Refugees, Illustration

5.1 Statistics

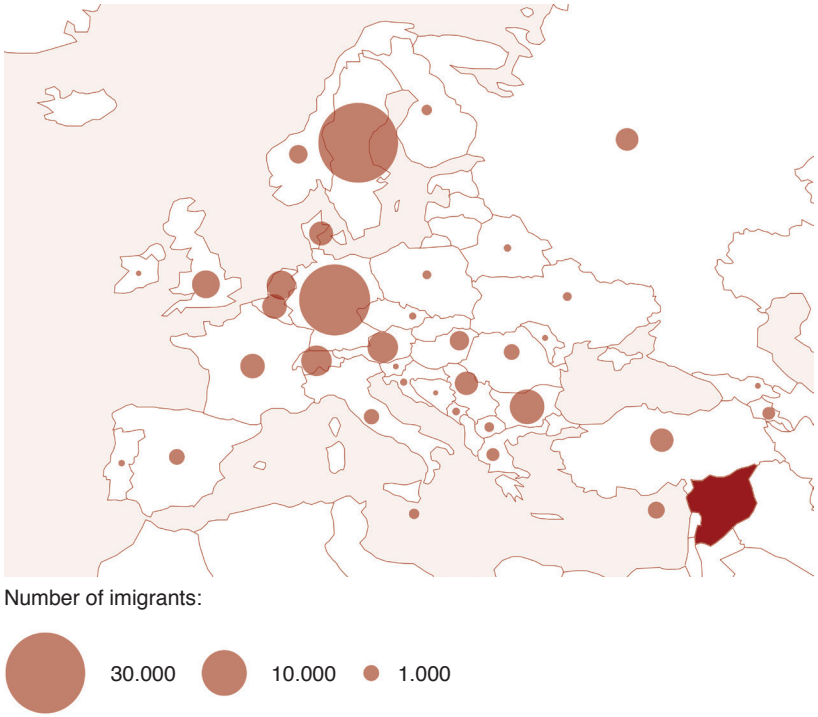


Fig.5.2 Syrian asylum applications from April 2011 to May 2014

Syria's civil war is the worst humanitarian crisis since the Second World War.

As a reminder, anti- government demonstrations began in March of 2011. Peaceful protests quickly escalated after the government's violent crack-down, and rebels began fighting back against regime. By July, army defectors had loosely organized the Free Syrian Army and many civilian Syrians took up arms to join the opposition. Divisions between secular and Islamist fighters, and between ethnic groups, continue to complicate the politics of th conflict.[25] In six years of the civil war, over 250.000 people were killed, half of whom are believed to be civilians. Bombings destroyed many cities to the ground. Basic necessities like food water and medical care are sparse or none. People of Syria often decide to finally escape after seeing their neighborhoods bombed or family members killed. The journey to escape the war country is often extremely difficult. Families need to walk for miles, sometimes even through the night, to avoid being shot at by snipers or being caught by soldiers who will kidnap young men to fight for the regime.

The United Nations results from February 2016 are showing that around 13.5 million Syrians are requiring humanitarian assistance, of which 6.6 million are internally displaced with Syria, and over 4.8 million are refugees outside of Syria.[26] The majority of Syrian inhabitants have sought refuge in neighboring countries or within Syria itself. According to the United Nations High Commissioner for Refugees (UNHCR), Turkey is the largest host, with around 2.7 million refugees. Other neighboring countries that took refugees are Lebanon, Jordan, Egypt and Iraq.

In the first half of 2015, lot of Syrian refugees, in a hope to find acceptance and opportunities, were risking their lives on the way to Europe. Around one million Syrians have requested asylum to Europe. Germany, with more than 300.000 cumulated applications and Sweden with 100.000, are EU's top receiving countries.

Other European countries that granted asylum are Italy, France, Netherlands and UK.

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Other European countries that granted asylum are Italy, France, Netherlands and UK.

5.2 Path to Europe

In 2015, The International Organization for Migration (IOM) estimates that more than 1,011,700 migrants arrived to another countries by sea, and almost 34,900 by land.
The figures do not include those who got in undetected.[27]
The research made by Frontex (the EU's external border face) shows that more then 1,8 million refugees arrived at Europe's border in 2015.
Most of them took a short voyage from Turkey to the Greece islands, Kos, Chios, Lesvos and Samos- very often in flimsy rubber dinghies or small wooden boats. It is known to be a very dangerous trip and according to the IOM, more than 3.770 migrants were reported to have died trying to cross the Mediterranean in 2015.([28]) Other dangerous trip across the sea is the one from north Africa to Italy. During summer months is the busiest time for migrants attempting to reach EU border, and this is the time when the most accidents happen. The most deadly month for migrants were April 2015, where due to overcrowding, the boat with 800 people capsizes in the sea off Libya. In 2015 Hungary had the highest number of asylum applications. Nearly 1.800 refugees per 100.000 of Hungary's local population claimed asylum. The after Hungary Sweden is following with 1.667 per 100.000 local populations. Germany had around 600 and UK 60 applications for every 100.000 residents. European Union average was 260. Despite the huge numbers of Syrians that applied for asylum, very small number of them got the same.
Records from 2015 showed that in 2015, EU countries offered asylum to 292.540 refugees. The same year, more than a million migrants applied for asylum.

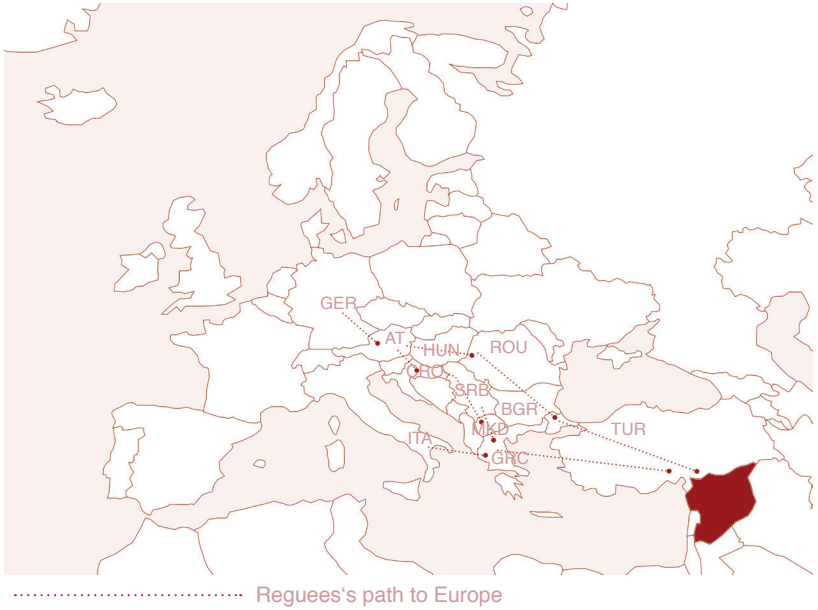


Fig.5.3 Refugee's path to Europe

5.3 Refuge camps- living conditions

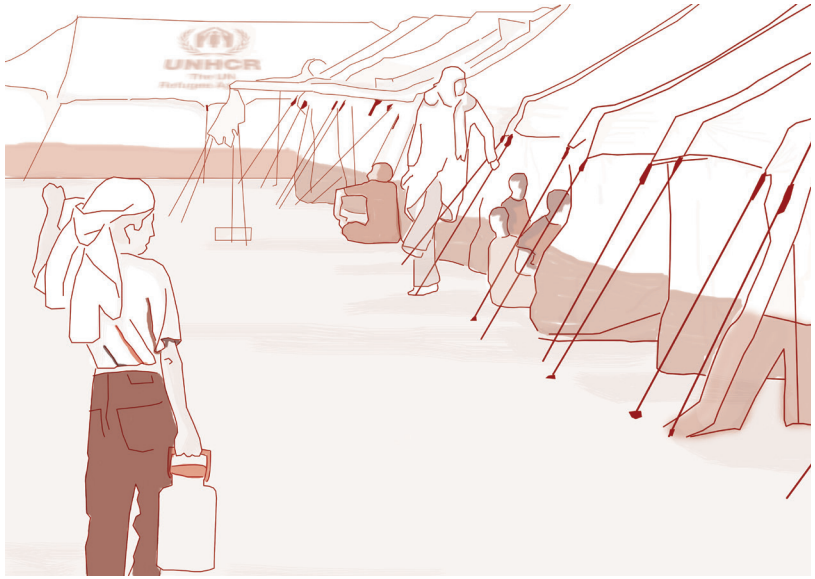


Fig.5.4 Refuge camp, Illustration

Starting from 2011, when the civil war began, the number of refugees is growing extremely. In 2012, there were 100.000 refugees. By April 2012 the number has increased by 800.000. That doubled to 1.6 million in less than four months. Many countries were not ready to receive and to deal with large amount of asylum seekers. Jordan‘s Za‘atari is the first official refugee camp, opened in July 2012 located in Jordan. It is the camp of the newly- arrived refugees, and it has approximately 79.000 Syrians, which makes it one of the Jordan country‘s largest cities. Refugees find shelter wherever they can. Most of them are first weeks or even months sleeping on the streets. Some of them are in abandoned chicken coops, derelict, abandoned buildings, and in storage sheds with no hear or running water. The living conditions of Syrian refugee are very challenging and sometimes completely inhuman. Because of the lack of clean water, sanitation and security, diseases like cholera and polio can easily spread, threatening the lives of refugees. In some areas with the largest refugee populations, water shortages have reached emergency levels; the supply is as low as 30 litres per person per day.

The situation can get even worse. Most of the refugees must find a way to pay rent, even for very derelict structures. They struggle to find odd jobs, and accept very low wages, and very often they do not cover their most basic needs. The other big barrier for finding a job is a language. Worrying fact are the youngest refugees. They face an uncertain future. According to the Un, more than half of all Syrian refugees are under age of 18. Most of them have been out of school for months or even years. Some school in some countries have been able to receive Syrian students and make room working in two shifts, but for some children there is simply not enough space and many families cannot afford the transportation to get their kids to school. The older children are forced to grow up too fast, finding work and taking care of their family in desperate circumstances.[29]

“But what will happen after the Civil War in Syria will come to an end?”

Fig.5.5 Quote, Architecture Competition, Matterbetter.com

Fig.5.6 Syria in ruins

5.2 What happens after?

Many Syrians received asylum in the foreign countries, but still there is a huge number of them waiting for asylum. However, the vast majority of refugees will not be able to receive a permit in order to stay in the country. The question is: What will happen when the horrific Civil war in Syria comes to an end? What will happen to all those Syrians that are looking forward to the opportunity to come back home as soon as the war is over? The whole county is in ruins. Some cities, villages and their infrastructure is completely damaged and devastated to the ground. There is nowhere to return. Millions of people lost their homes, freedom and security. Many of them lost their family members. Children lost their parents, brothers and sisters, safety and childhood.

I have found an inspiration for my master thesis in an international architecture competition matterbetter.com, where participants were asked to make a creative project of post war architecture in Syria.

I come from Bosnia and Herzegovina, a country that went through a war, and still is trying to recover from all the consequences. As a child I experienced certain difficulties that war caused to my country and I lost relatives and friends. Many of them left the country and never came back and some of them returned after few years living as refugees. Their return to the mostly devastated or ruined homes was really hard.

At that time the government had an enormous economical problem and furthermore it did not develop any projects of post war housing.

Consequently, all this inspired me to choose this topic for my thesis.

In this project I will make a new housing concept for the future of the post- war Syria. I will present the methods of fast building construction preserving country‘s tradition.

I will make a detailed approach from the psychological and social aspect and closely explain how this could help in the process of building a new home.

Matterbetter.com:

„Competition participants are asked to propose a solution for housing scarcity crisis, which will affect the country as more and more cities of the wartorn country will be freed and refugees will start to come back. Living conditions in the current refugee camps and temporary buildings across Europe and other countries are mostly inhuman, making refugees feel desperate, since there's also nowhere to come back as the Syrian towns are in ruins, offering nothing to people who once lived there.

The vital part of the new housing concept should become a creation of such living conditions which will be attractive for once displaced Syrians to return. People, who spent years in temporary shelters and adapted buildings, will look for "solid ground" to begin a new life. New housing concept should be able to permanently accommodate people in need of a new home and become a new page in the history of Syria.

It is a chance for us to play a signi cant role in solving the post war crisis.

Fig.5.7 Ruins of Syria

Program and location

There are no restrictions in regards to the size of the housing block or its location within Syria's border. The objective is to provide maximum freedom for all participants to develop a project in the most creative way and to push the boundaries of how the new post war housing should look like. However, it is required to provide a detailed scheme of the smallest (or key) housing unit(s) and the principle of their arrangement in large groups.

Participants are asked to:

- Introduce new housing concept for the post war Syria, which will in short term provide qualitative solution for mass social housing with at least 50+ years lifespan;

- Choose either developed or non-developed site;

- Define approach towards existing constructions (damaged and/or ruined);

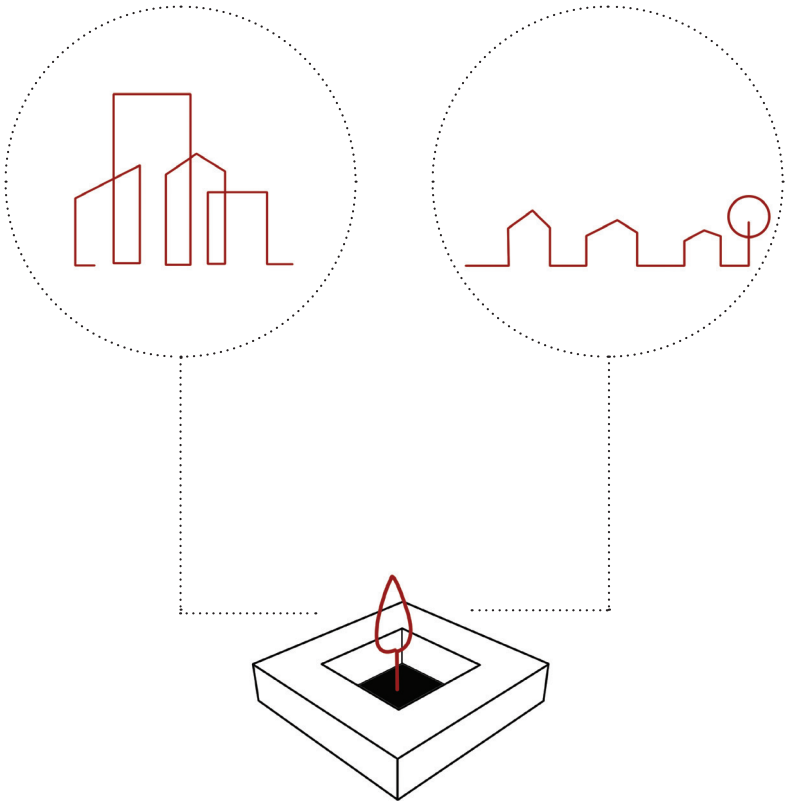
- Provide exibility and adaptability of living spaces/ buildings through time;

- Take into consideration local construction and living culture;

- Minimize energy consumption by implementing inovations in the field of sustainable design"[30]

6. Idea development

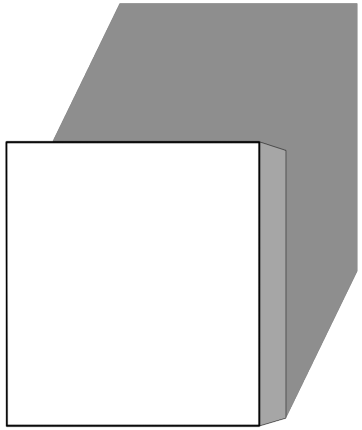
6.1 Court yard



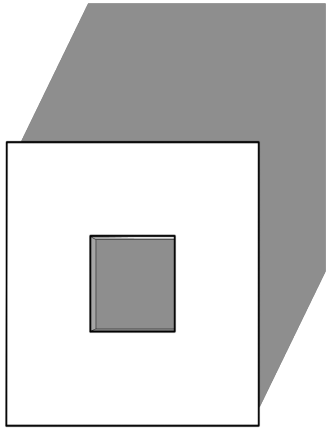
Tradition architecture of Syria is shaped so that it can protect people against strong sun and offer them privacy. Providing shades in city area means very high density and narrow streets. Openings on a façade are usually small and covered with shadings in different patterns of Islamic architecture (arabesque). The courtyard is a very specific house typology in Syria. It reflects Islamic culture and climate of that region. By orientating their windows to the yard, families are able to have their privacy and peace. Some rooms are specifically divided into male and female section. In old houses situated on countryside, protection against a strong sun is very well provided by usage of a clay and mud on the facades.

Fig.6.1 Court yard concept development

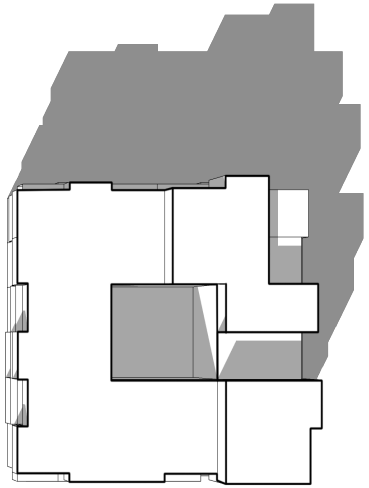
6.2 Insolation



1. Simple square building shows less shadows then building with courtyard



2. Building with courtyard shows less shadows as building with consoles and with differences in hight



3. This building shape shows the most shading

Fig.6.2 Insolation concept development

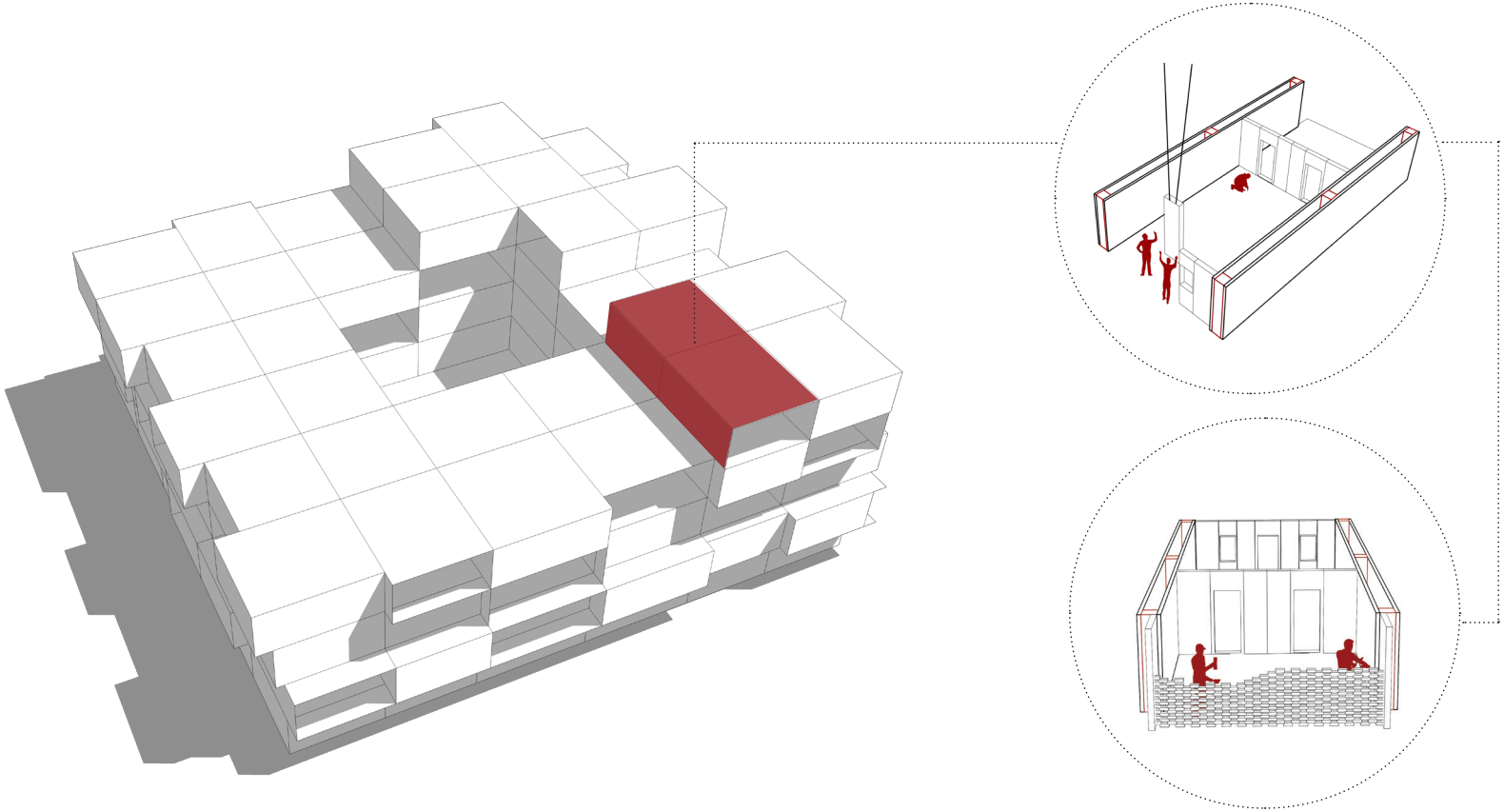


Fig.6.3 Materials and construction, illustration

6.3 Precast concrete

Concrete is a material made of cement, water and sand. It is a natural material with a virtually unlimited range of applications. Many of concrete‘s finer characteristics are quite beyond dispute: no material is as structurally reliable and, if properly finished, grows old with such dignity.

Fist houses made by precast concrete were those in 1830s, manufactured using increasingly sophisticated machinery developed during Industrial Revolution. Through the 20th century recasting became so popular, that various architects and designers tried their hand at prefab housing. Some of them were Frank Lloyd Wright, Walter Gropius and Marc Breuer. [31] Ecology and sustainability are concepts that currently enjoy great influence, and have a bearing on many spheres of life today, especially that of architecture. Theory of global warming are very likely to be true, due to many evidences which we all have been witness. The need to reduce our CO2 emissions and ensure that our lifestyles are more respectful of the environment the way of building our homes needs to be considered. As far as architecture is concerned, there are significant changes and developments. In the sphere of residential architecture the number of houses is already on the rise thanks to the growing population and, as a result, there is also increased consumption of raw materials and greater environmental cost for transportation. It is therefore imperative to search for new building solutions that are environmentally friendly and lead to a reduction in the consumption of materials and energy, including both active and passive systems One of those constructions solutions are prefabricated buildings. The ecological, social and economic consequences of these systems are obvious: you get a reduction in execution time, a more uniform and perfect finish, and a reduced environmental impact and occupational hazard at the site.[32]

Precast concrete construction system has its own characteristics, which influence the layout, span length, construction depth, stability system, etc. Theoretically, all joints between the precast concrete units can be made in such a way that the completed precast structure has the same monolithic concept as a cast-in-situ structures.

Long spans, appropriate stability concept, simple details, etc. Designers should from the very outset of the project consider the possibilities, restrictions & advantages of precast concrete, its detailing, manufacturer, transport, erection & serviceability stages before completing a design in precast concrete. Following are the elements generally constructed in precast concrete building construction:

- Precast concrete frame
- Precast concrete wall
- Precast concrete floor

Fig.6.4 Concrete texture

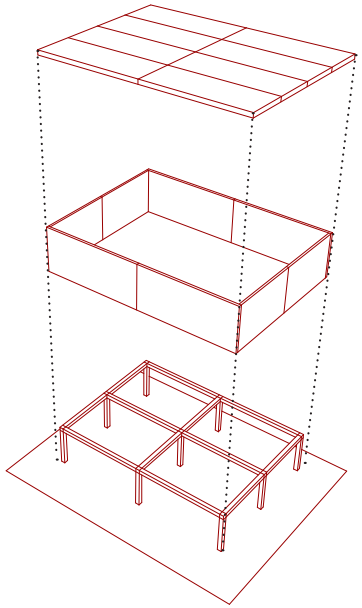


Fig.6.5 Precast main concrete elements: frame, wall, floor

Precast concrete frames involve an entire structure being fabricated off-site. In addition, structural components can be supplied for incorporation into a structure on-site. Frames can simultaneously achieve both structural and decorative design requirements – a wide variety of mixes, colors and finishes can be accommodated. Architecturally finished precast structures can be left exposed to exploit concrete's high thermal capacity in a building's "green" energy management system.

Precast concrete frames are cast in the same way as precast concrete cladding, but as they are designed as structural elements have heavier reinforcement than is required for non-structural cladding. Elegant connections are required between columns and beams to transfer considerable forces without adversely affecting the visual appearance of the frame.

Precast concrete frames:

Improve build ability – structure is fabricated off-site for rapid erection on-site

Produce a high standard of workmanship in factory conditions – reduces potential for accidents, addresses on-site skill shortage.

Have a high quality finish that can be left exposed – concrete's thermal properties can be exploited in low-energy buildings.

Precast concrete wall

Precast concrete walls are used for internal & external walls, lift shafts, central cores etc. Precast wall system is mostly used in domestic construction, both for individual housing & for apartments. The solution can be considered as the industrialized form of cast in-situ walls or classical brick or block masonry walls. The precast walls can be load bearing or only partition walls. The surface of the elements is smooth on both sides & ready for painting or wallpapering. Precast walls offer the advantage of speed of construction, smooth surface finishing, and acoustic insulation & fire resistance.

Precast concrete floor

Types of precast concrete floors:

- Hollow core floors
- Ribbed floors
- Concrete roof elements

Massive slab floors

The principle advantages of precast floors are speed of construction, absence of scaffolding, large variety of types, large span capacity, & economy. Precast floors can also be classified according to their manufacture into totally & partially precast floors. Totally precast concrete floors are composed of units, which are totally cast at the plant. After erection, the units are connected to the structure & the longitudinal joints are grouted. In some cases a cast in-situ structural topping screed is added. Partially precast concrete floors are composed of a precast part & a cast in-situ part. Both parts are working together at the final stage to achieve the composite structural capacity. The main totally precast floor & roof types are described hereafter.[33]

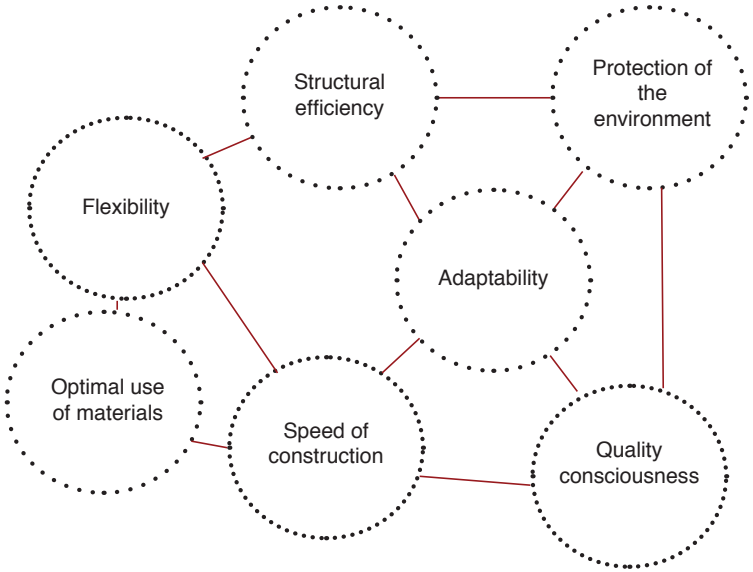


Fig.6.6 Positive sites of pre-cast concete

„Following are the advantages of precast concrete:
- The concrete of superior quality is produced as it is possible to have better technical control on the production of concrete in factory.
- It is not necessary to provide joints in the precast construction.
- The labour required in the manufacturing process of the precast units can easily be trained.
- The moulds employed for preparing the precast units are of steel with exact dimension in all directions. These moulds are more durable and they can be used several times.
- The precast articles may be given the desired shape and finish with accuracy.
- The precast structures can be dismantled, when required and they can then be suitably used elsewhere.
- The transport and storage of various components of concrete for cast in situ work are eliminated when precast members are adopted.
- The work can be completed in a short time, when precast units are adopted.
When precast structures are to be installed, it is evident that the amount of scaffolding and formwork is considerably reduced.
- Precast concrete offers flexible solutions for floors, walls and even roofs in every type of domestic construction from individual houses to multi-storey apartments. - Concrete's high initial embodied energy can be offset by its extended life cycle (up to 100 years) and high potential for reuse and relocation.

Following are the disadvantages of precast concrete:
- If not properly handled, the precast units may be damaged during transport.
- It becomes difficult to produce satisfactory connections between the precast members.
- It is necessary to arrange for special equipment for lifting and moving of the precast units.
- The economy achieved in precast construction is partially balanced by the amount to be spent in transport and handling of precast members. It becomes therefore necessary to locate the precast factory at such a place that transport and handling charges are brought down to the minimum possible extent."[34]

Main precast elements:

Columns are available in a range of shapes, sizes and finishes, can be circular or square and are designed to incorporate any additional features or fittings. Single storey columns are generally 2.5m - 4m high. Beams bear directly on top of these units with a dowelled connection between them. Multi storey columns are cast with corbels or alternative connections at locations to suit the beams at intermediate levels. Projecting rebar can be provided for tying in to in situ floors. Options for foundation connections include cast in base plates, dowel tubes or projecting bars.[35]

Precast columns in a way of symmetry can be:

a) Internal columns – symmetrical in all directions.
b) Edge columns – symmetrical in one direction.
c)Corner columns – simple without extensions

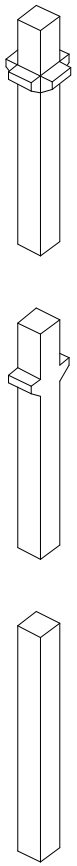


Fig.6.7 Types of precast columns

Beams:
Horizontal members that support deck components such as double tees and hollow-core slabs, beams typically are considered structural components. Three types cover the majority of uses: rectangular beams, inverted tee beams, and L-beams.
Where single storey columns are being used, continuous beams are cast to reduce the bending moment of the beam and, therefore, its depth. Continuous beams can also extend beyond the column support and provide bearing for smaller drop in beams between them.
Edge/Spandrel Beams- span around perimeter to provide a bearing edge on one side for flooring slabs and structure above.
Spine Beams- Provide a bearing edge on two sides for flooring slabs.
Lintel Beams - Span over door or window opens, to provide bearing for structure above.
Balcony Beams- These are beams cast with an integral balcony.
Raker Beams- Can be designed and supplied with required bearing for terracing units.

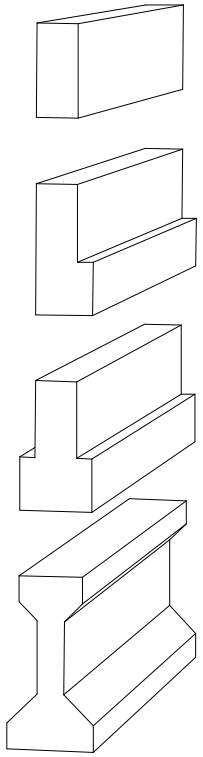


Fig.6.8 Types of precast beams

Precast floor slabs:

The main types of slabs are used in the precast frames are:

a) Hollow core slab
b) Double tee slab
c) Solid slab

a) Named for its shape, double-tees are used primarily as floor and roof deck components for any type of structure, including parking structures and all types of buildings.
b) Hollow-core slabs are used predominantly for floor and roof deck components for various structures such as residential, hotel, office buildings, schools, and prisons.
c) Solid slabs are used as structural deck components similar to hollow-core slabs. They can be made in a long-line pre-tensioning facility and reinforced with prestressing strand or cast in individual forms with either prestressing strand or conventional reinforcing bars. They are typically cast in the same position as used in the structure.

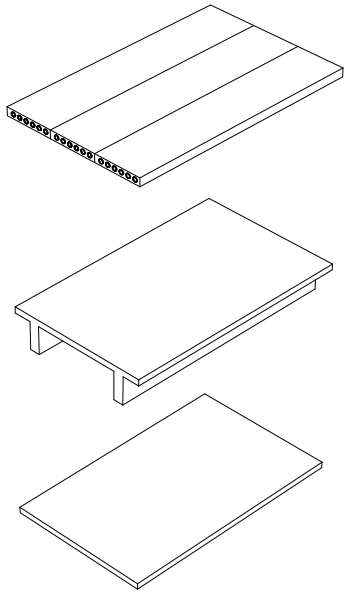


Fig.6.9 Types of precast slabs

Precast walls:

Precast concrete walls serve two functions:
Stability
As walls or boxes surrounding staircases and lift shafts.
Walls may be classified as infill or cantilever:
Infill walls rely on contiguous composite action with the beam and column frame.
Cantilever walls or boxes act as deep beams to which the frame is attached.

Precast staircases:

Three options are available for precast staircases:

A single precast unit containing all the flights and landings
Separate precast flights and landings
Parts of the flights and landings are made in one piece.

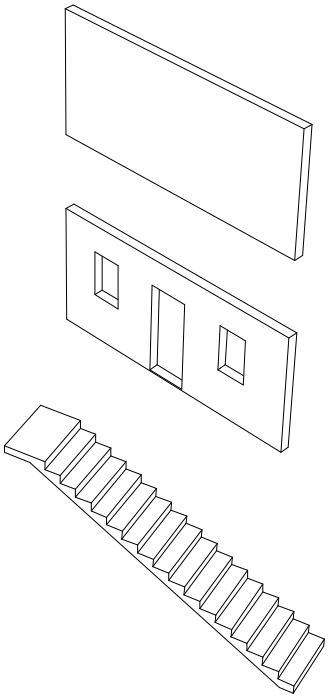


Fig.6.10 Different precast elements

Precast foundation:

a) Corrugated socket

b) Sleeve socket

c) Strip foundation

d) Plate fundation

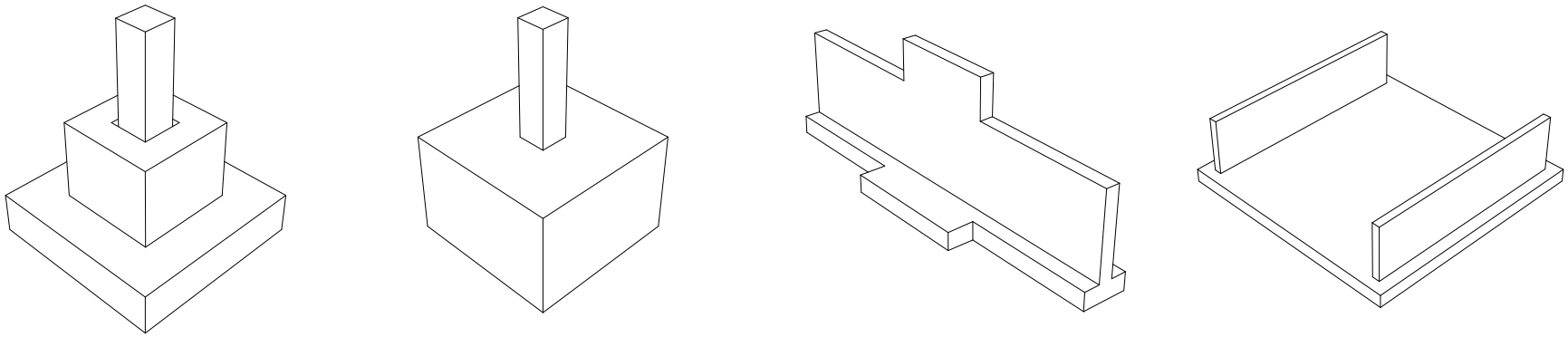
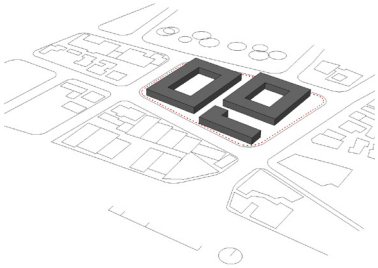


Fig.6.11 Types of precast foundation

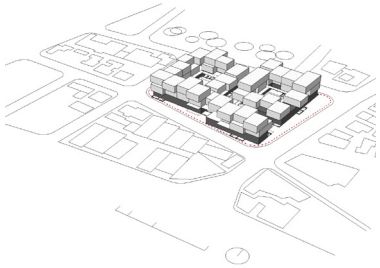
6.4 Precast project evolution

Precast project test idea is based on precast construction of beams and columns that will provide a framework for every future home.
In a case of the countryside, framework of columns will be minimized because of the small number of floors (1 max). Together with architects and construction engineers every resident of a future building will plan and shape their future living unit. The shape will depend on a number of residents, their activities, level of privacy they want to have and sun protection. Precast walls, doors and windows will be adapted to the modular system of construction net. Every unit will have a private courtyard/loggia. Depending on the level of privacy and sun protection residents will build fences on the loggia/courtyard with clay bricks. Clay is very affordable material in Syria and at the same time perfect representative of a traditional architecture.

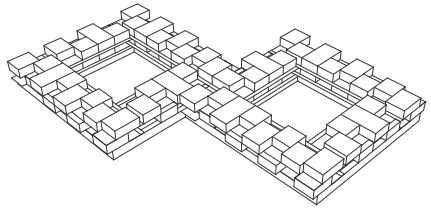
Fig.6.12 Evolution of drawings. Precast apartment units



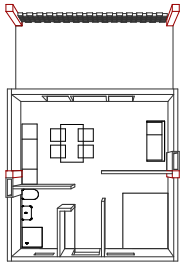
1. Location Homs. Groundfloor



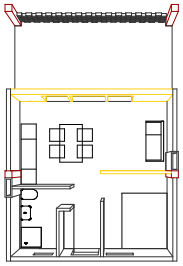
2. Upper floors



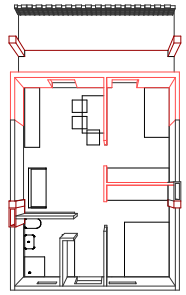
3. Variations



The smallest unit
One room apartment



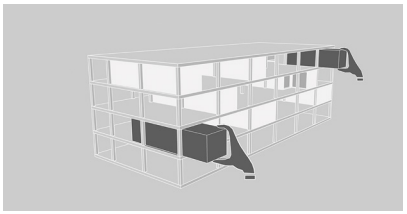
Reconstruction



Two room apartment

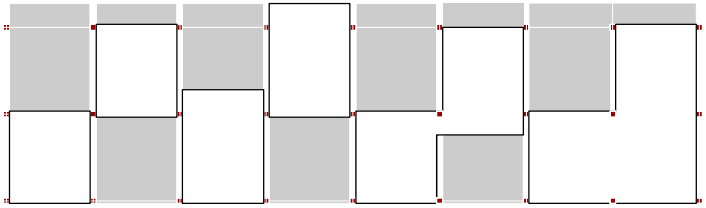
Fig.6.13 Evolution of drawings. Concept development and apartment flexibility

Precast main construction in project test is made of columns, beams and hollow core slab. Recycled concrete blocks are used for apartment walls. Simplicity of skelet construction offers high flexibility in size of apartment units. Just by taking one raster more it is possible to get bigger apartment for families with many members. By time family can grow up to 4 new members.
Getting 2 or more extra rooms, will be easy, due to not constructive dividing walls.
In few drawings, various apartment plans are introduced.
Future residents are engaged in the construction process.

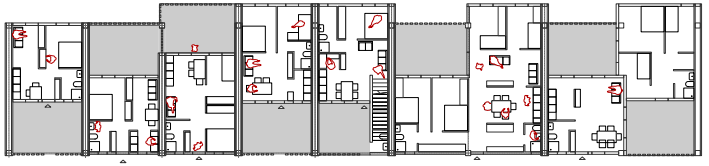


Test drawing construction

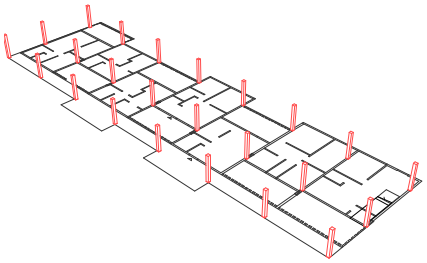
Test visualisation



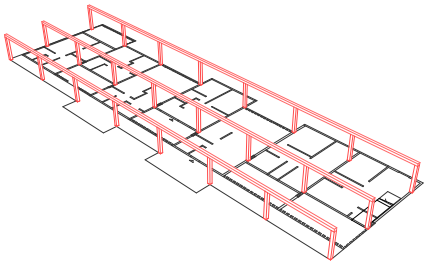
Possible apartment size



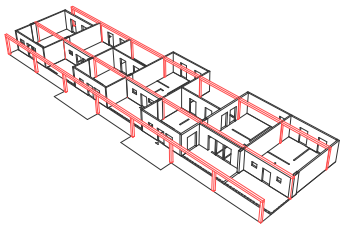
Possible apartment plans



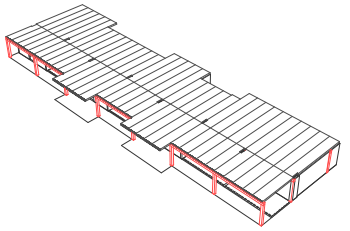
1. Columns



2. Columns + beams



3. Columns + beams + recycled bricks



4. Columns + beams + recycled bricks + hollow core slabs

Fig.6.14 Concept development. Renderings, floor plan, construction

7. Concept

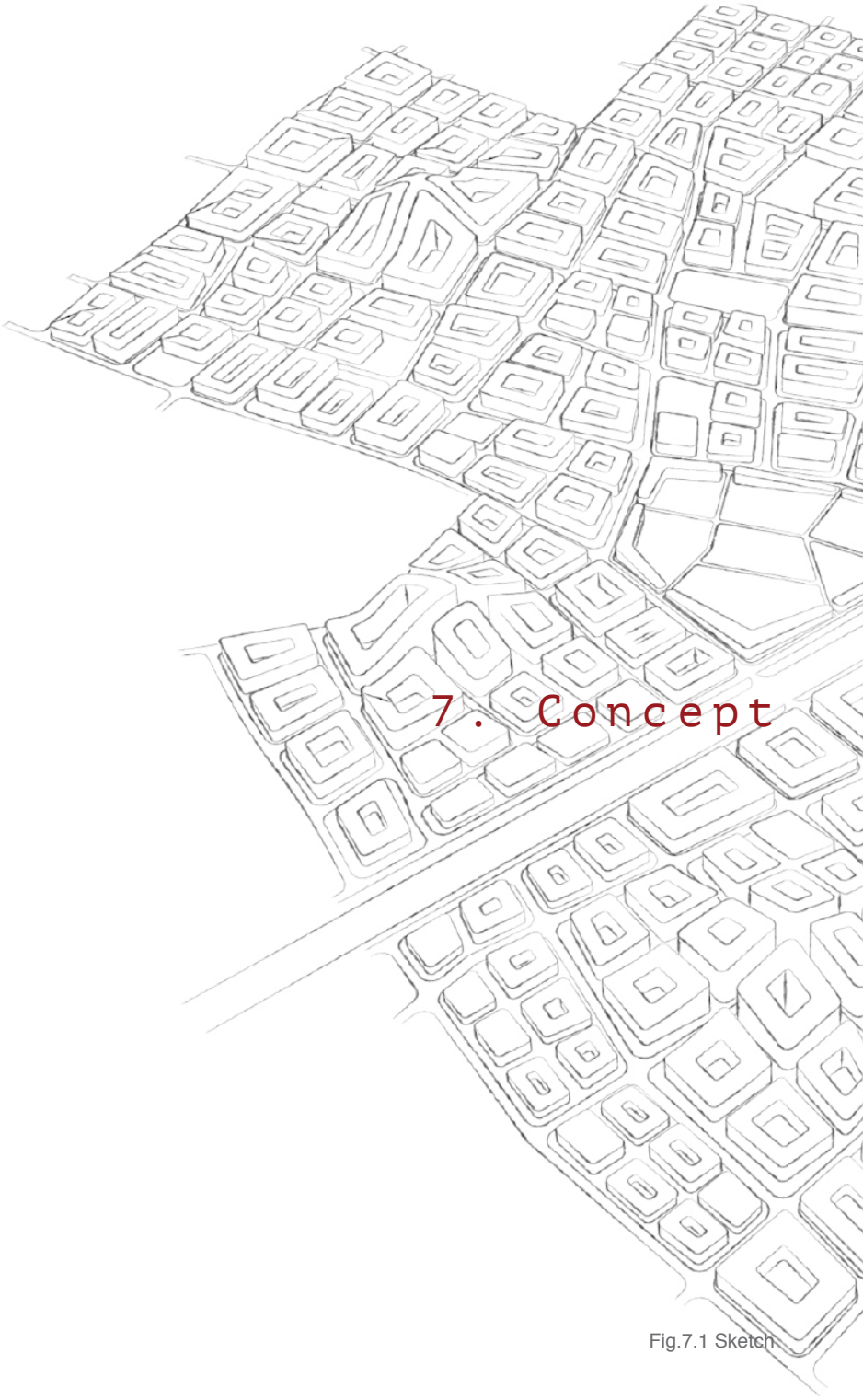


Fig.7.1 Sketch

7.1 Selection of location

Fig.7.2 Ruins of Syria

It was previously mentioned that many parts of Syria are destroyed to the ground but this project will approach a territory like to a clean area where the new life will start. With a main precast construction of columns and slabs, people will continue to plan their apartments with engineers and architects. Depending of a number of people living in one unit, level of privacy and insolation, varies plan units will be offered. Crafts in Syria are not so expensive as a material. Facade will be complately made by people with craft skills, masons and future residents. Material for facade are clay bricks. Goal of this project is that all people work together and help each other to build better home.

Fig.7.3 Damascus Center

Fig.7.4 Damascus Mosque

Syria, **Damascus**

Capital Damascus was hit hard by civil war. Google earth documentation shows that rural area is up to 80% destroyed.

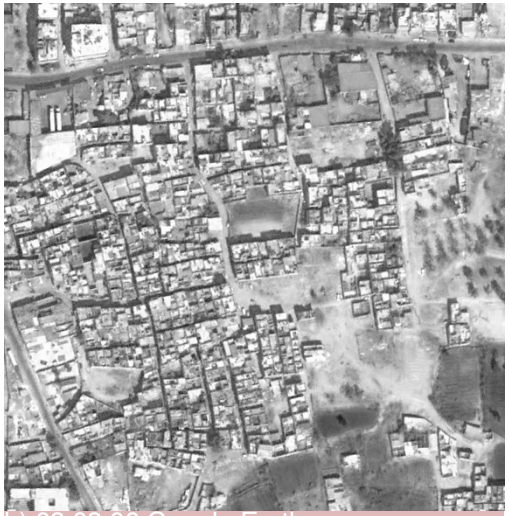
In this project, one big urban area is selected for new growth. (Fig.7.5) Drawings in the next pages are showing new approach in a way of building and connection with tradition and culture.

Fig.7.5 Selected location plan; Damascus

7.2 Destruction analysis

Fig.7.6 Selected location; Periphery Damascus

a) 01.03.13 Google Earth



b) 03.03.06 Google Earth

c) 02.21.13 Google Earth

a) 04.17.15 Google Earth

b) 04.17.15 Google Earth

c) 04.17.15 Google Earth

Fig.7.7 Google Earth, before- later

7.3 Urban plan

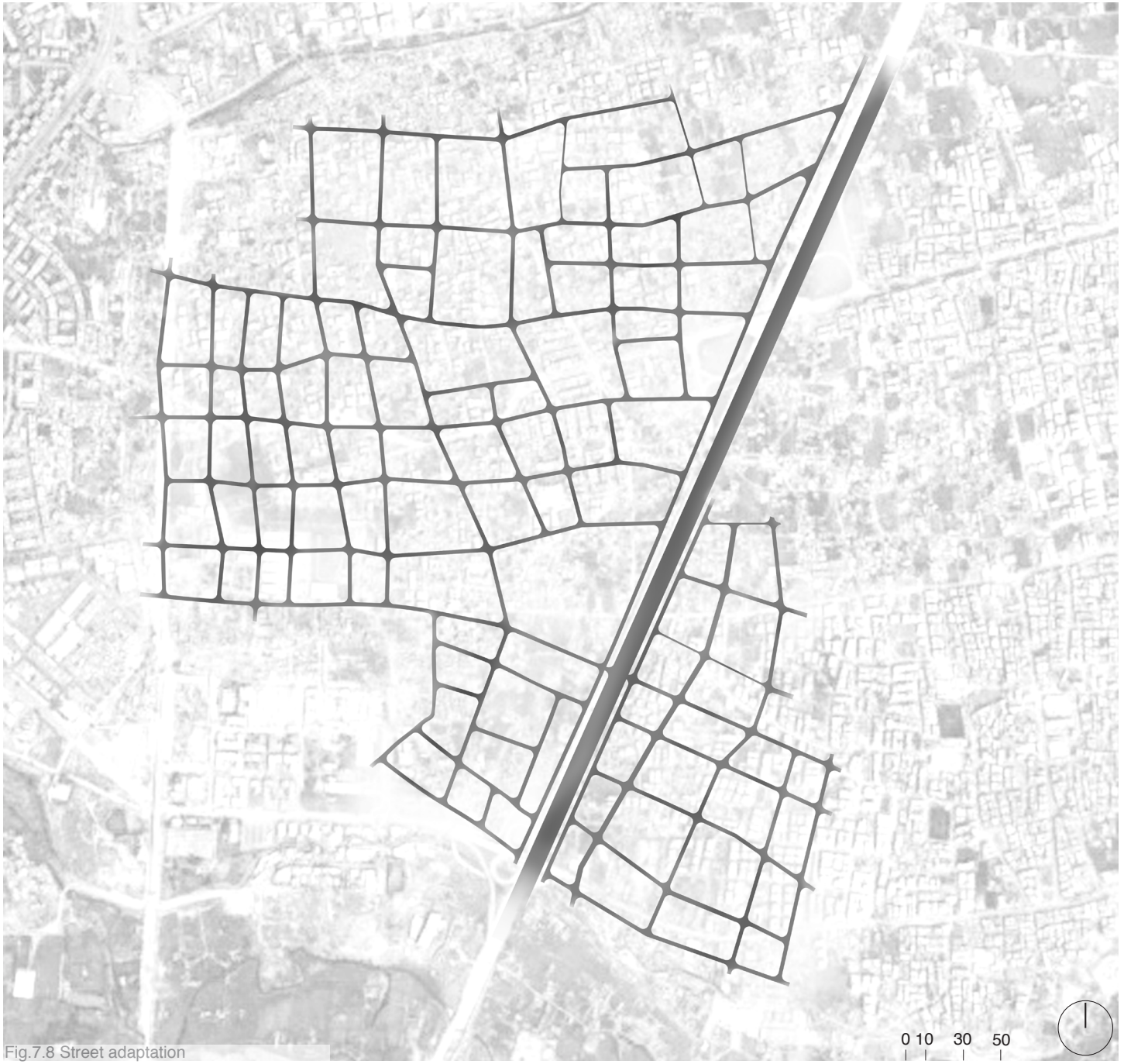


Fig.7.8 Street adaptation

Urban plan with streets, buildings and recreation area

Fig.7.9 Urban concept

Density

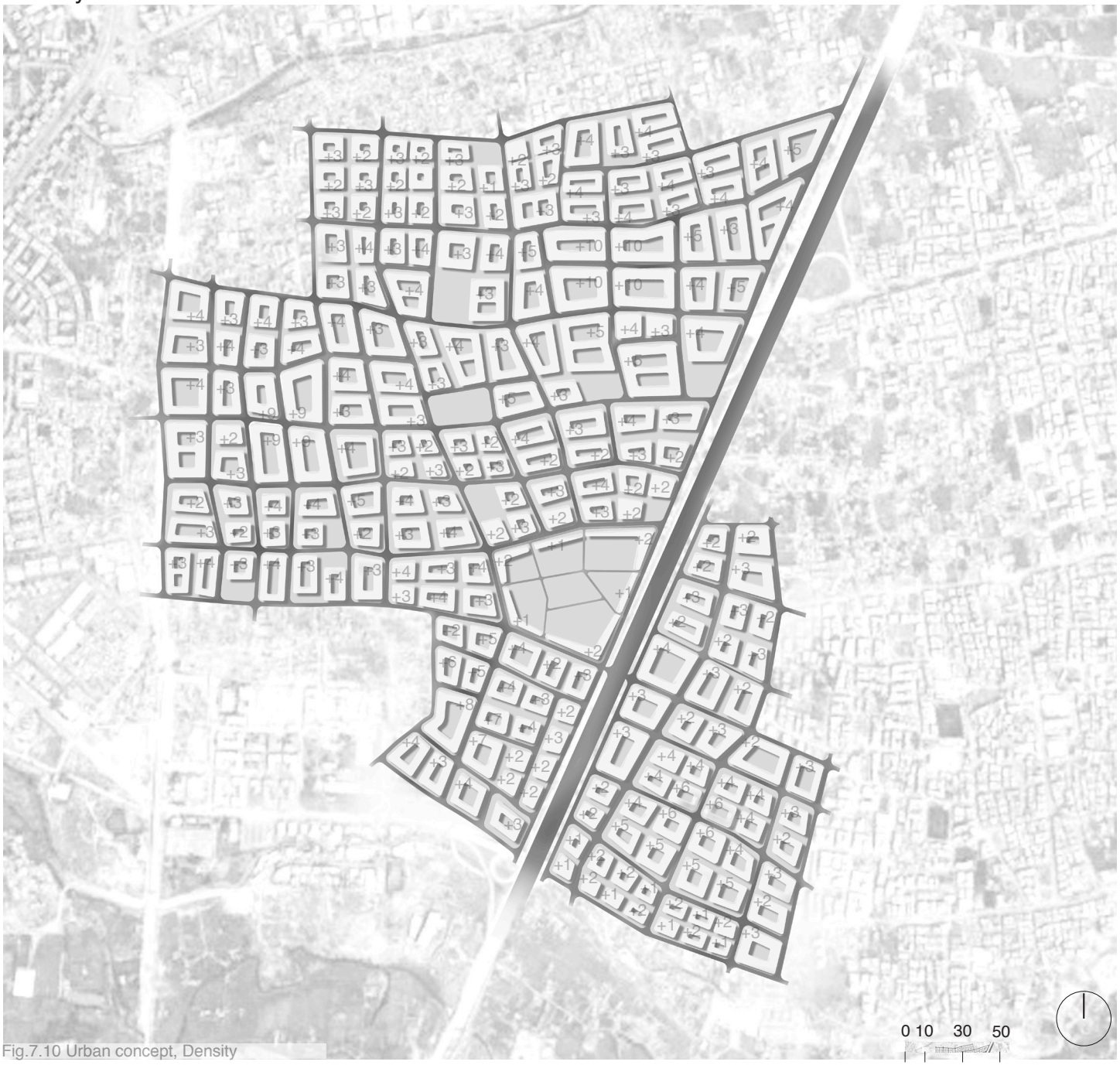


Fig.7.10 Urban concept, Density

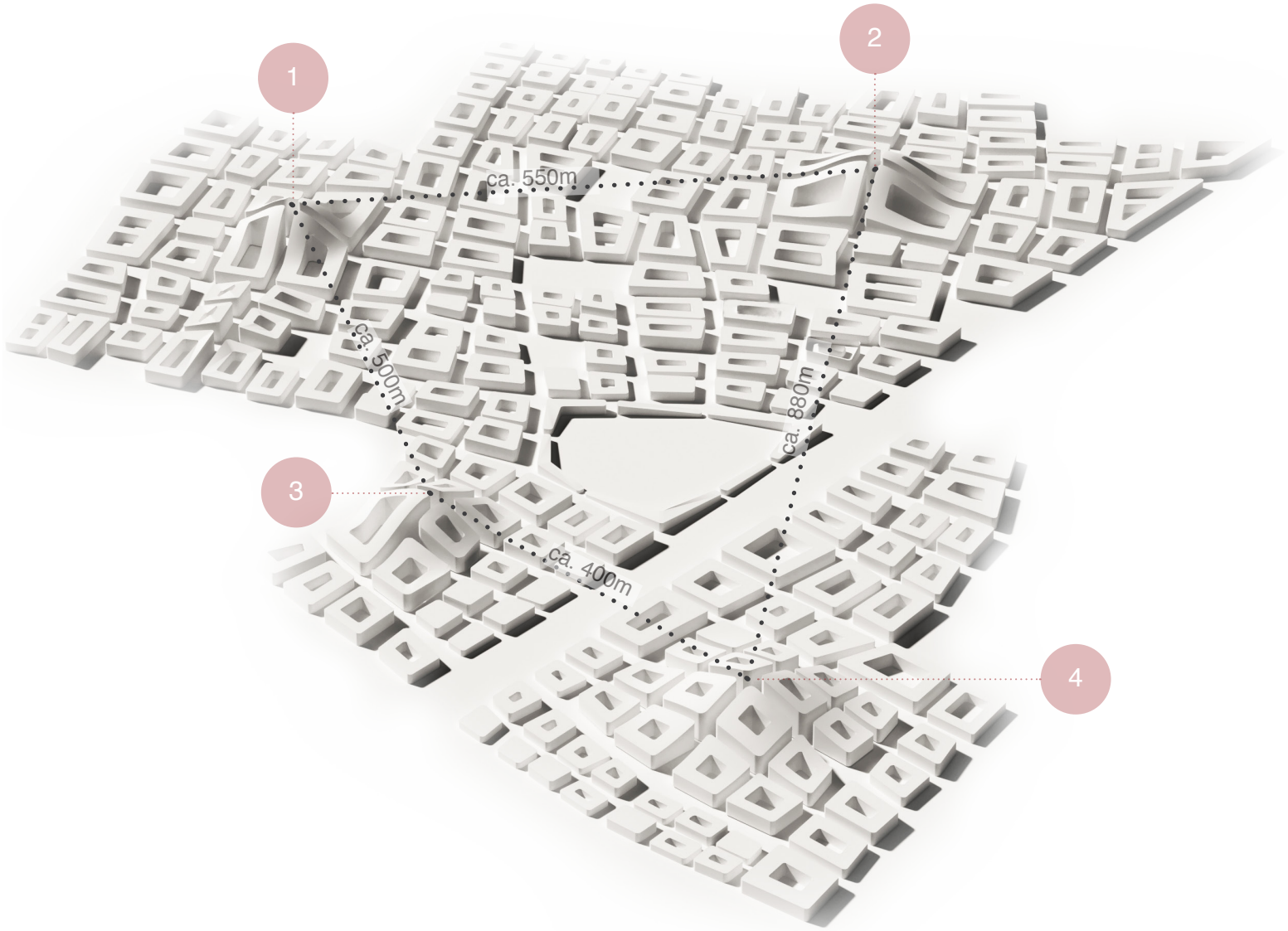


Fig.7.11 Urban concept visualisation

1. Public transport, bus/ tram station, Post office, Shopping, Phone, Info, Bussiness Center, Comunity Center

2. Public transport, bus/ tram station, Kindergarden, Library, Hospital, Firestation

3. Public transport, bus/ tram station, Shopping, Ambulance, School, Magistrat, Post office

4. Public transport, bus/ tram station, Education Center, Kindergarden, Shopping, Comunity Center, Post office

Fig.7.12 Urban concept with the main bus stations

6.6 Urban development through time

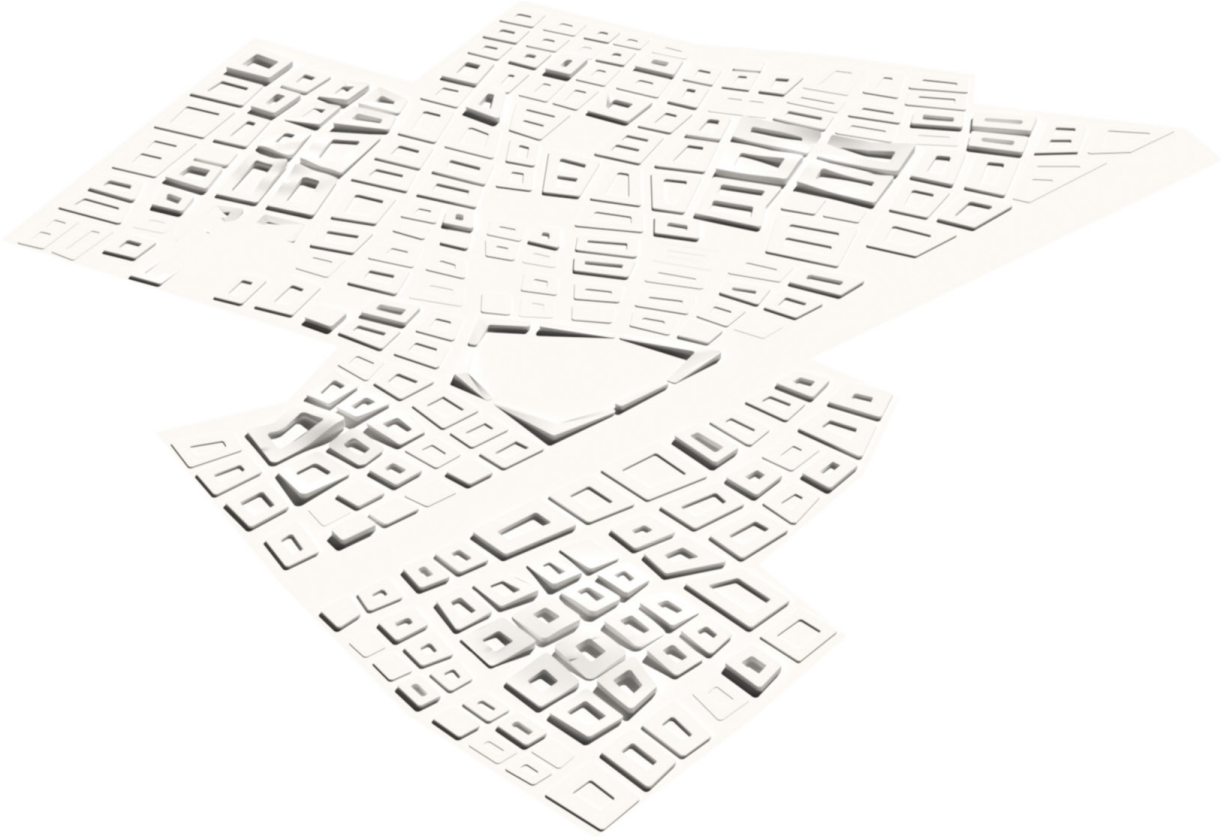


Fig.7.13 Urban concept development (2025)

Fig.7.14 Urban concept development (2035)

Fig.7.15 Urban concept development (2030)

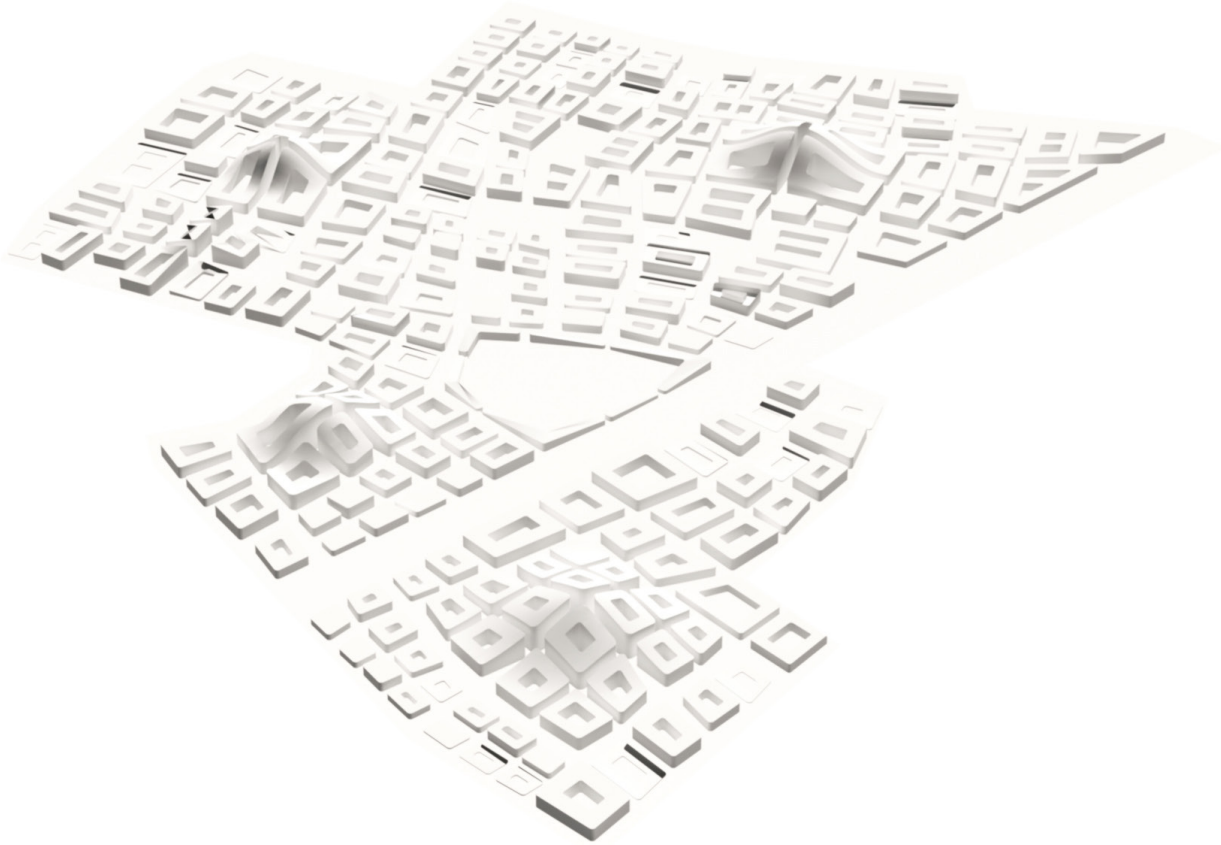


Fig.7.16 Urban concept development (2045)

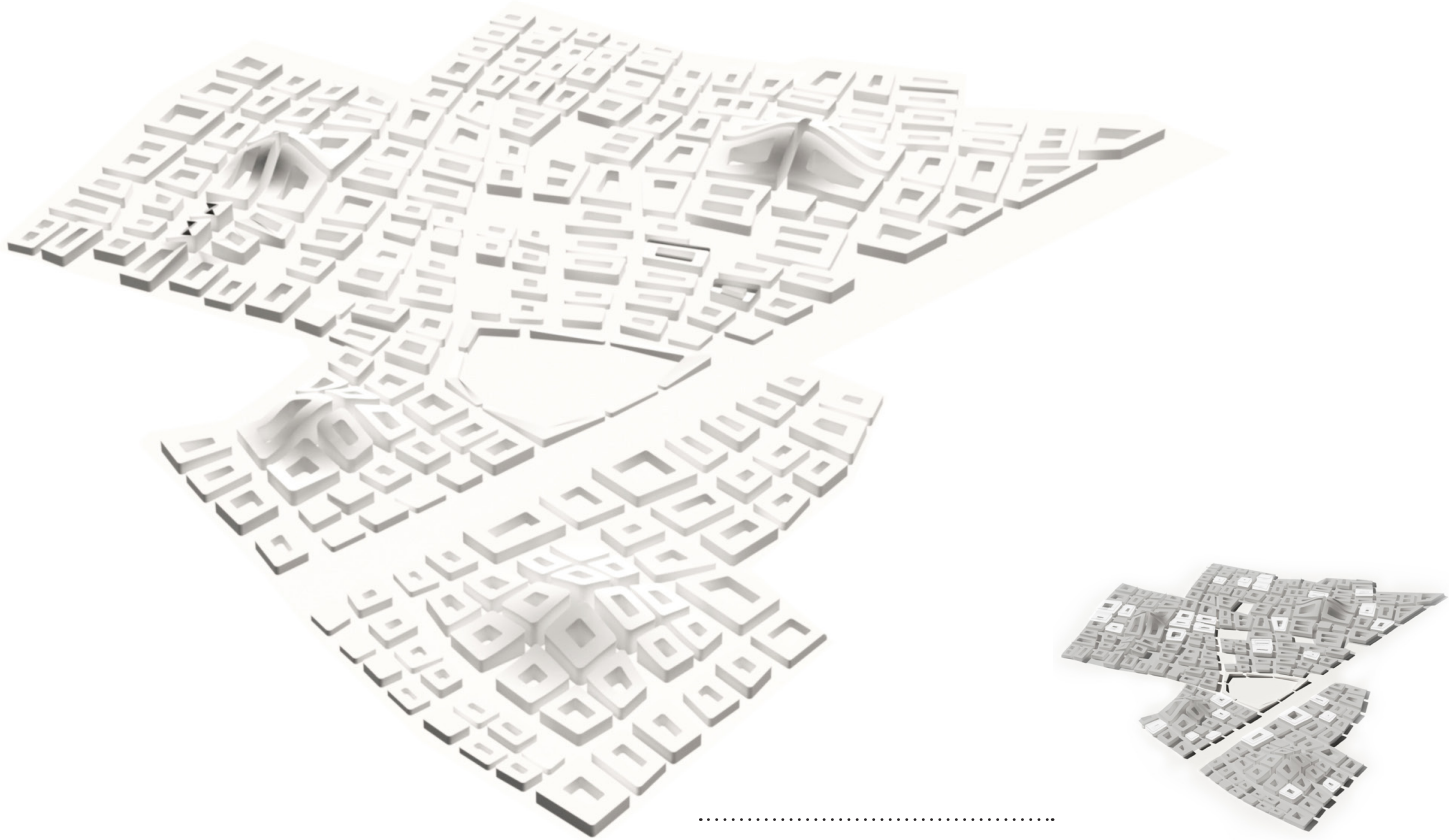
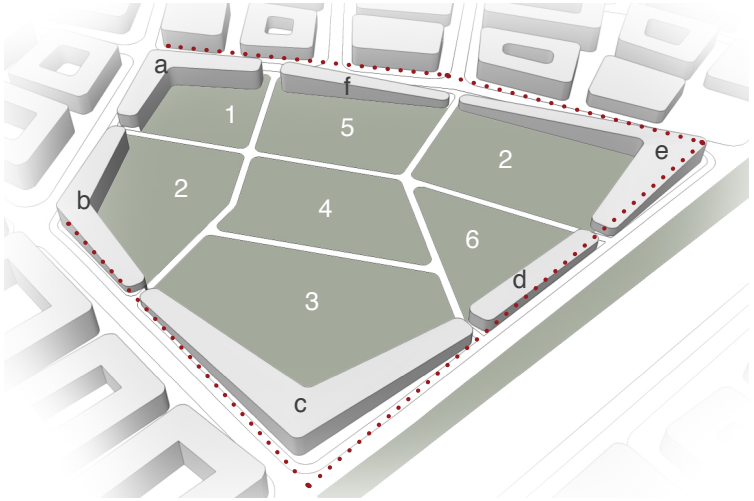
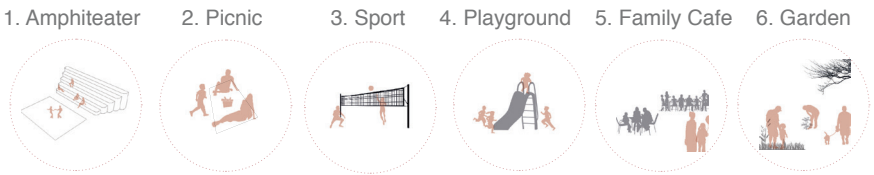


Fig.7.17 Urban concept development (2050)



In urban plan, free places are left for recreation area. These are: huge green area as a main recreation zone and smaller pocket parks. Big recreation area is separeted into multiple zones with different functions, as a picnic, family cafe, sport and ect. There is, as well, water area as a refreshment during long summer days. This central green zone will be main gathering point for citizens of all generations. It is meant to be very flexible and creative. All area is surrounded by park buildings that mainly have educational-purpose. These will be schooling centers for the people who during the war, lost few years of school. Nevertheless, these buildings that sourround a park, make more privacy and security for their users.



a) Artistic school (acting, painting, music) b) Kindergarden c) Elementary school d) Workshop space for non- government organisations e) High school f) Cafe space

Fig.7.18 Green, recreation areas

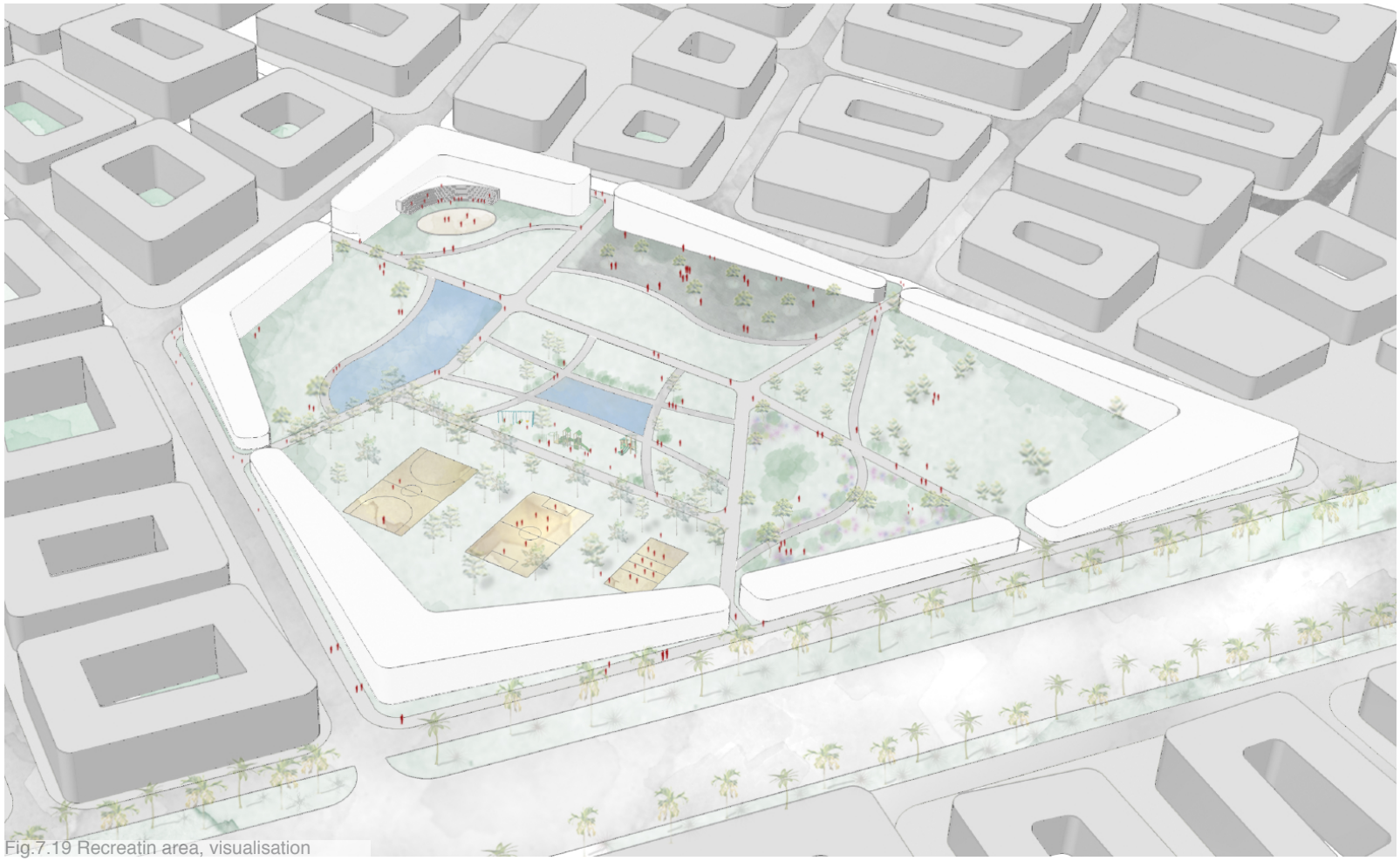


Fig.7.19 Recreatin area, visualisation

8. Masonry

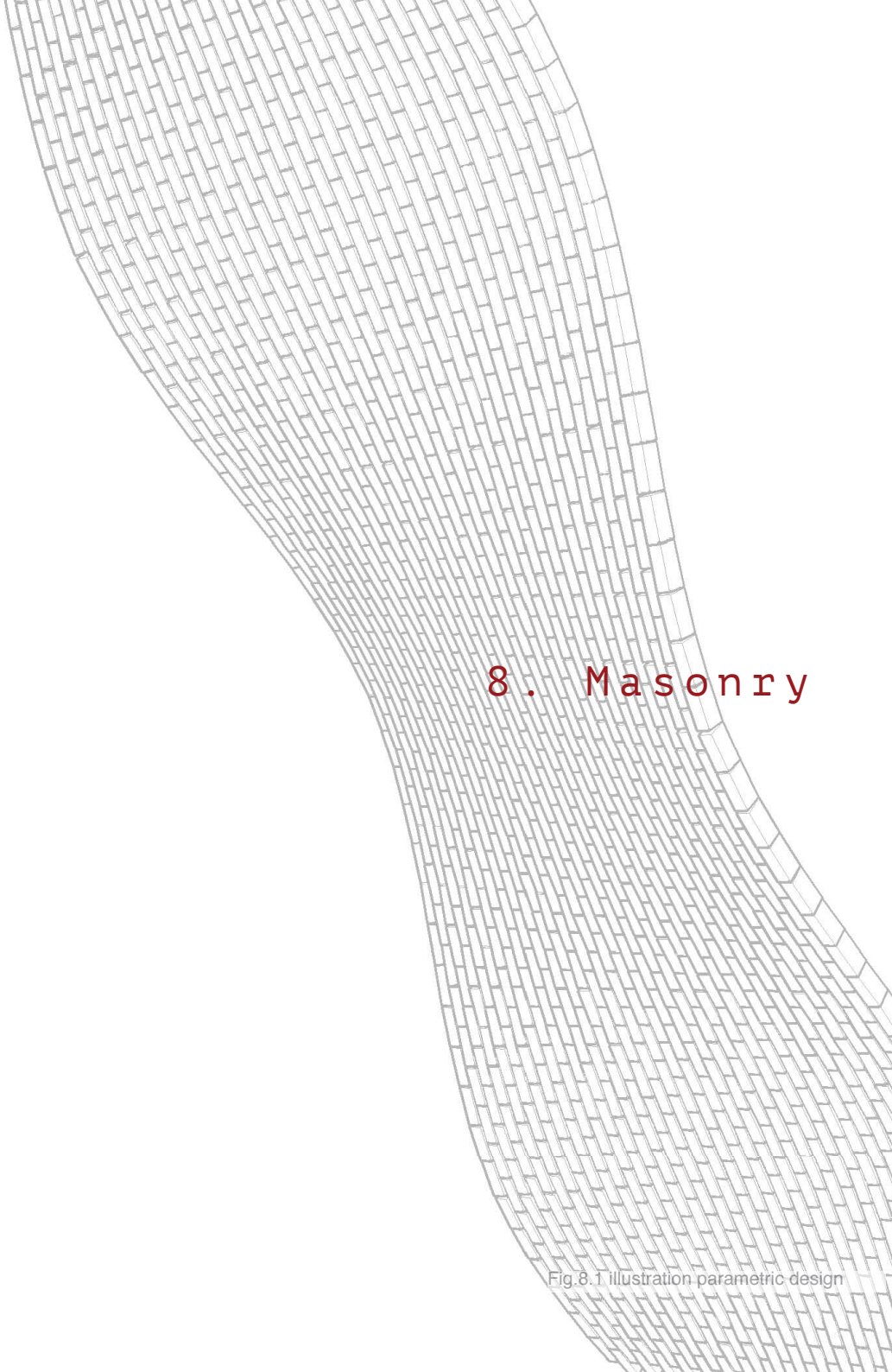


Fig.8.1 illustration parametric design

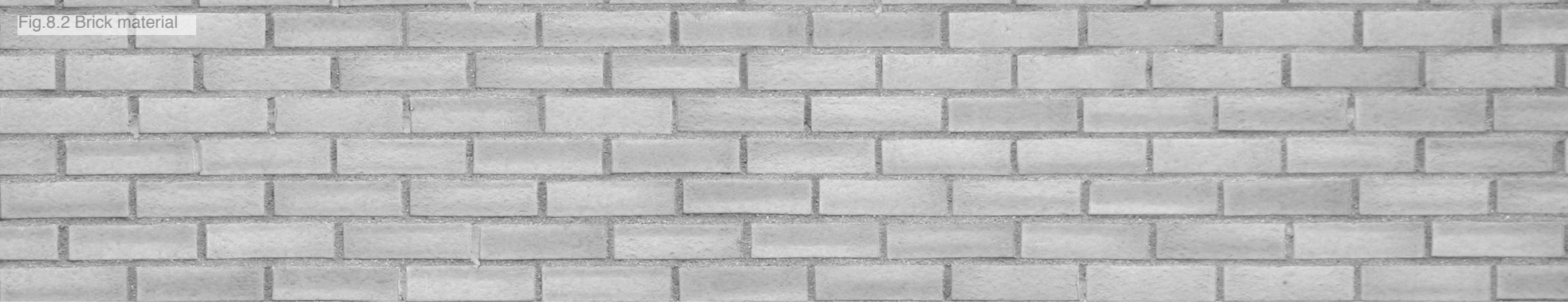


Fig.8.2 Brick material

8.1 Definition and usage

„Masonry is the building of structures from individual units, which are often laid in and bound together by mortar; the term masonry can also refer to the units themselves. The common materials of masonry construction are brick, building stone such as marble, granite, travertine, and limestone, cast stone, concrete block, glass block, and cob. Masonry is generally a highly durable form of construction. However, the materials used, the quality of the mortar and workmanship, and the pattern in which the units are assembled can significantly affect the durability of the overall masonry construction.
ADVANTAGES:

-The use of material such as bricks and stones can increase the thermal mass of a building and can protect the building from fire.
-Masonry is non-combustible product.
-Masonry walls are more resistant to projectiles, such as debris from hurricanes or tornadoes.“[36]

Ablaq technique in Syria

Ablaq (Arabic; particolored; literally ‚piebald‘) is an architectural style involving alternating or fluctuating rows of light and dark stone. Records trace the beginnings of this type of masonry technique to the south parts of Syria. It is associated as an Arabic term, especially as related to Arabic Islamic architectural decoration. The first recorded use of the term ablaq pertained to repairs of the Great Mosque of Damascus in 1109, but the technique itself was used much earlier.
This technique is a feature of Islamic architecture. The ablaq decorative technique is a derivative from the ancient Byzantine Empire, whose architecture used alternate sequential runs of light colored ashlar stone and darker colored orange brick.
The first known use of the term ablaq in building techniques is in masonry work in reconstruction improvements to the walls of the Umayyad Mosque of Damascus. According to records, these reconstruction masonry improvements to the north wall began in the early twelfth century. The local stone supply may have encouraged the use of alternating courses of light and dark stone. In the south part of Syria there is abundance of black basalt as well as white-colored limestone. The supplies of each are about equal, so it was natural that masonry techniques of balanced proportions were used.[37]

Advantages:

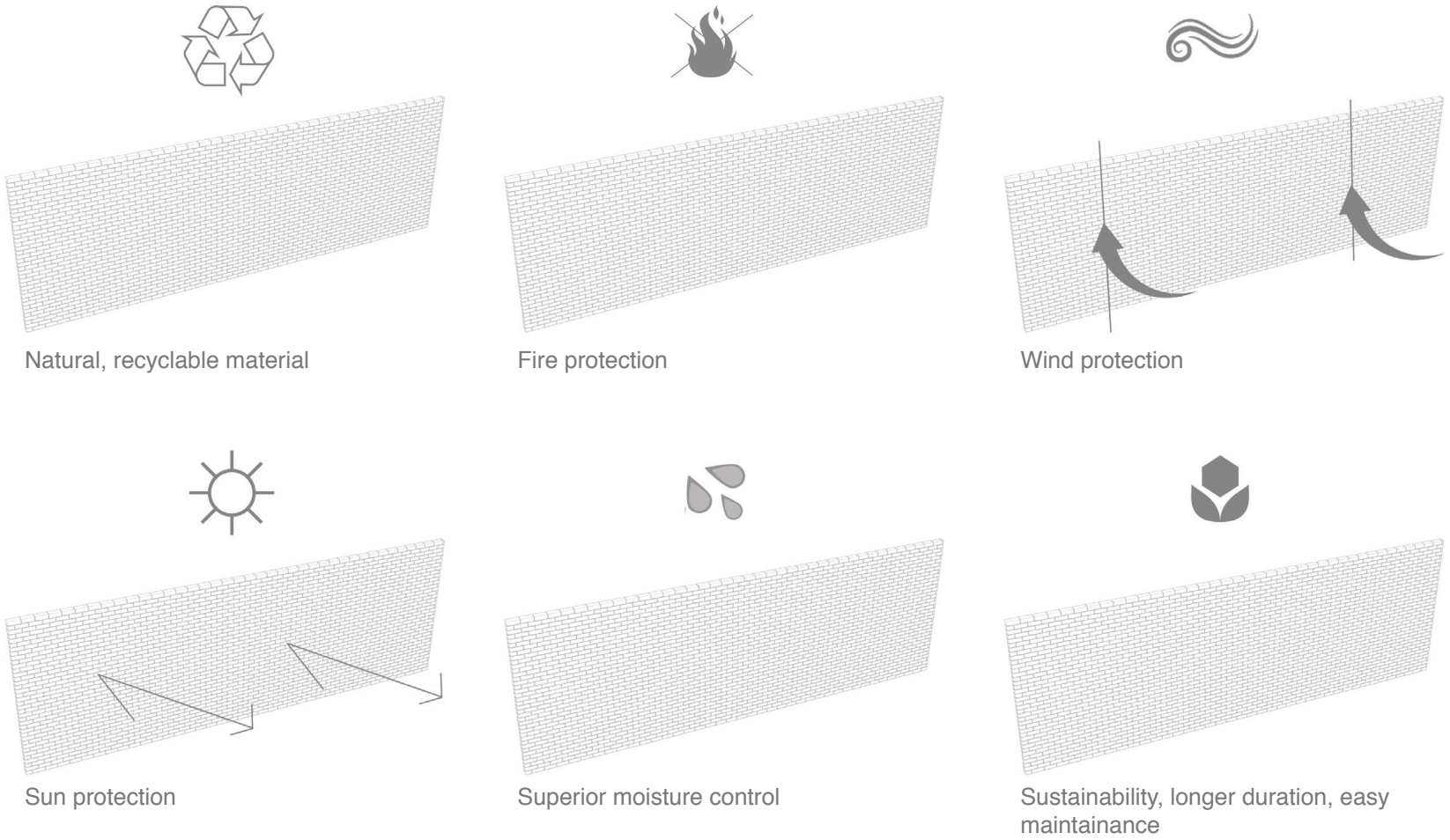
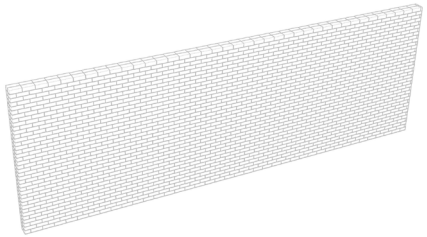
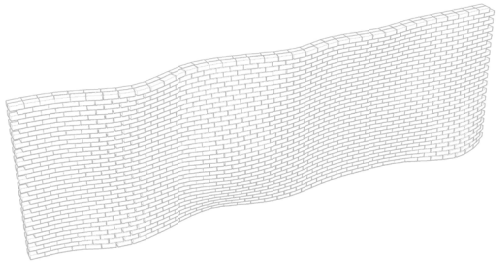


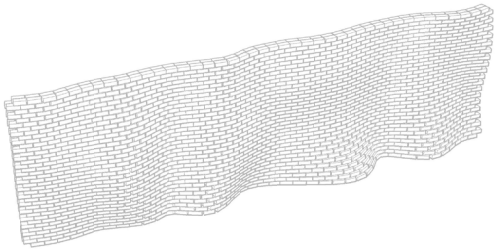
Fig.8.3 Positive aspects of the brick wall



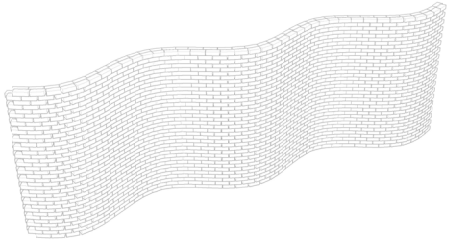
Simple and straight brick wall



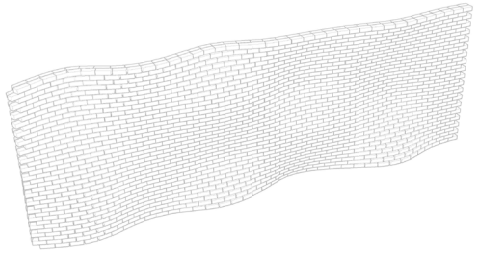
Diluted irregular wavy shape



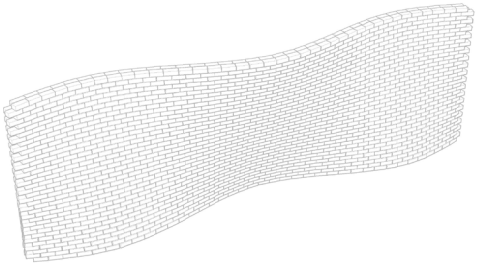
Densed irregular wavy shape



Regular wavy shape



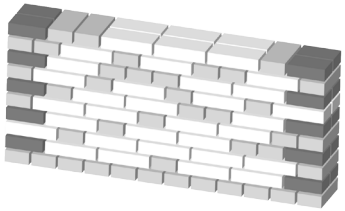
Irregular wavy shape



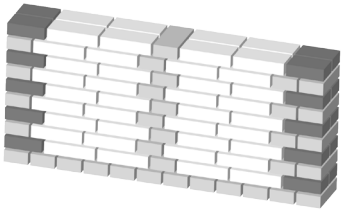
Regular wavy shape with rhythmic changes in height

Fig.8.4 Parametric shapes

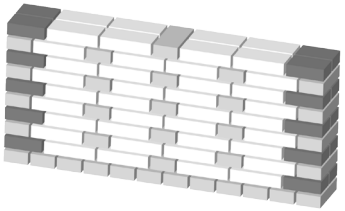
Brick wall bond typology



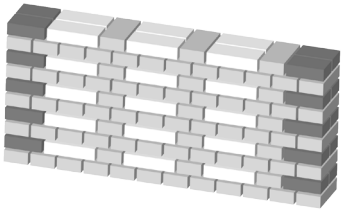
Wilder bond



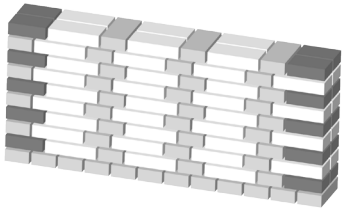
Silesian bond



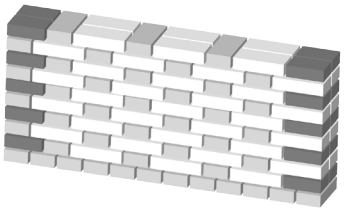
Military bond



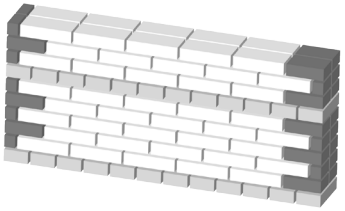
Dutsch bond



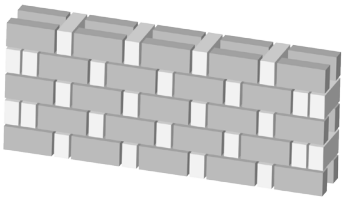
Gothic bond



Flemish bond

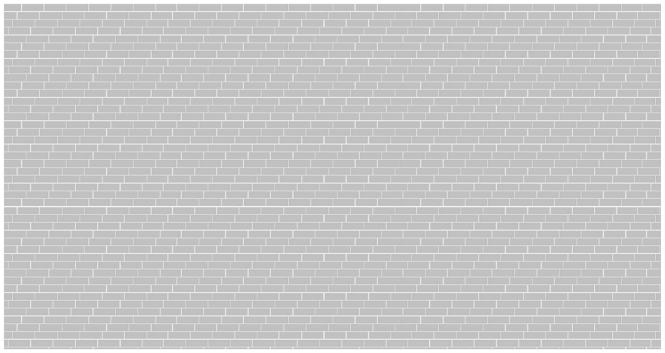


American bond

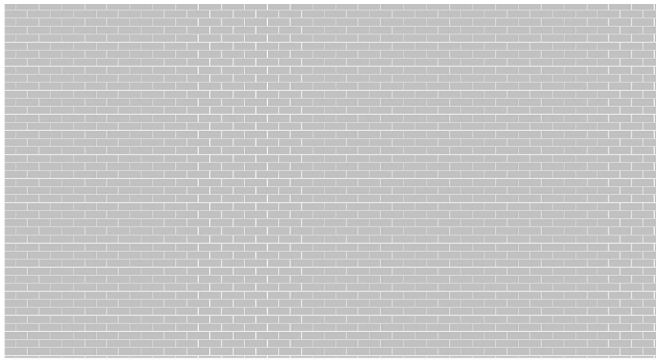


Chinese bond

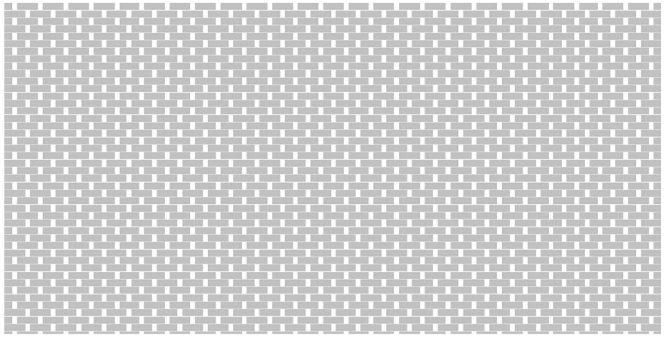
Fig.8.5 Brick facade; conctruction methods



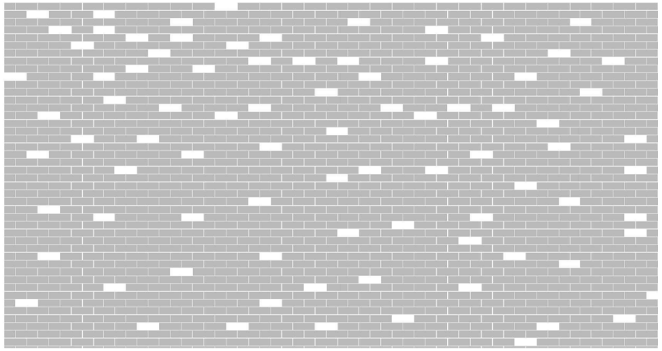
Row offset 20%



Row offset 50%



Brick gaps regular



Brick gaps iregular

Fig.8.9 Brick facade shapes

8.3 Project wall construction

Wall shape for project concept

After variation of test models of parametric design walls in bricks, one shape proved the best quality.
That is dinamic wavy shape, whose curves are changing by hight. This wall has an optimal dimensions and angles for construction stability.
Wavy shape is making shading efects that are needed during hot summers in Syria. Wall shaped like this, is offering different view points. To be more precise, windows can be placed in many angles, not just straight.

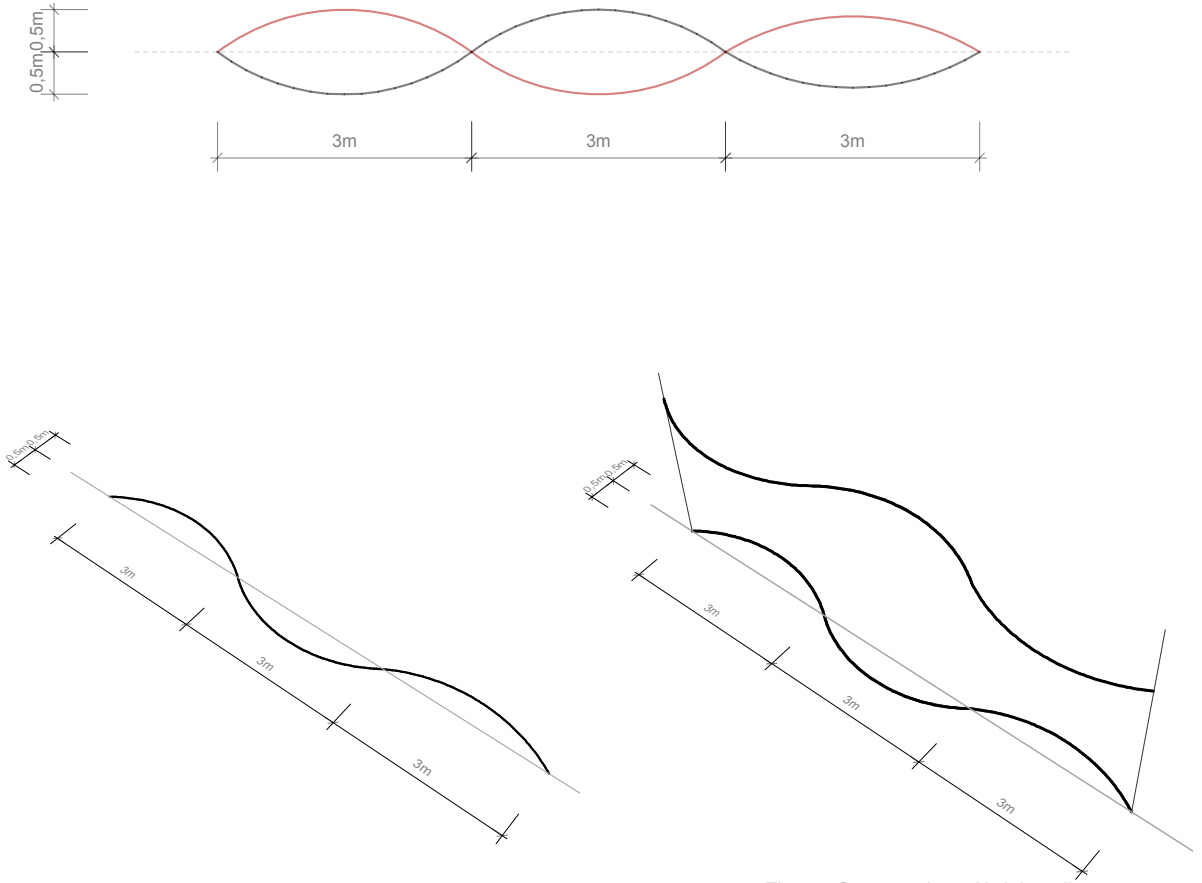


Fig.8.6 Construction of brick wall

1. Version
Few headers bricks are positioned between five streachers to establish stability

2. Version
Row of headers is above the row of streachers

3. Version
Stiffening anchors (red) are positioned on top of every fourth brick. This version allows placing thermal insulation between two layers of bricks. Third version will be used in a project

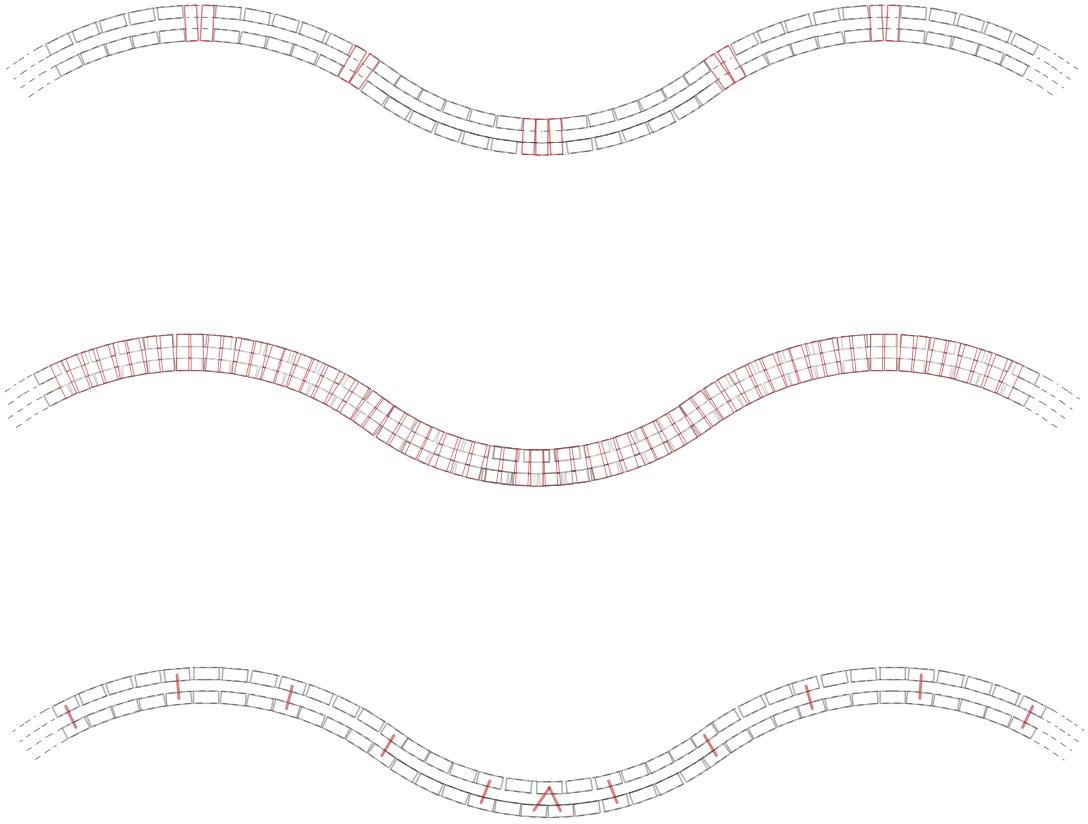


Fig.8.7 Brick wall stiffeners variations

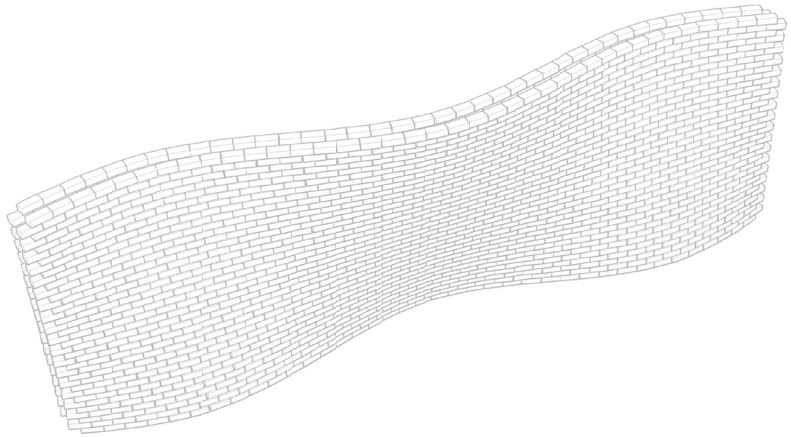


Fig.8.8 Project brick wall shape. Perspective and view from above

9. Project

Fig.9.1 Illustration

9.1 Residental block concept

Selected area as a representative for residental buildings in overal urban concept

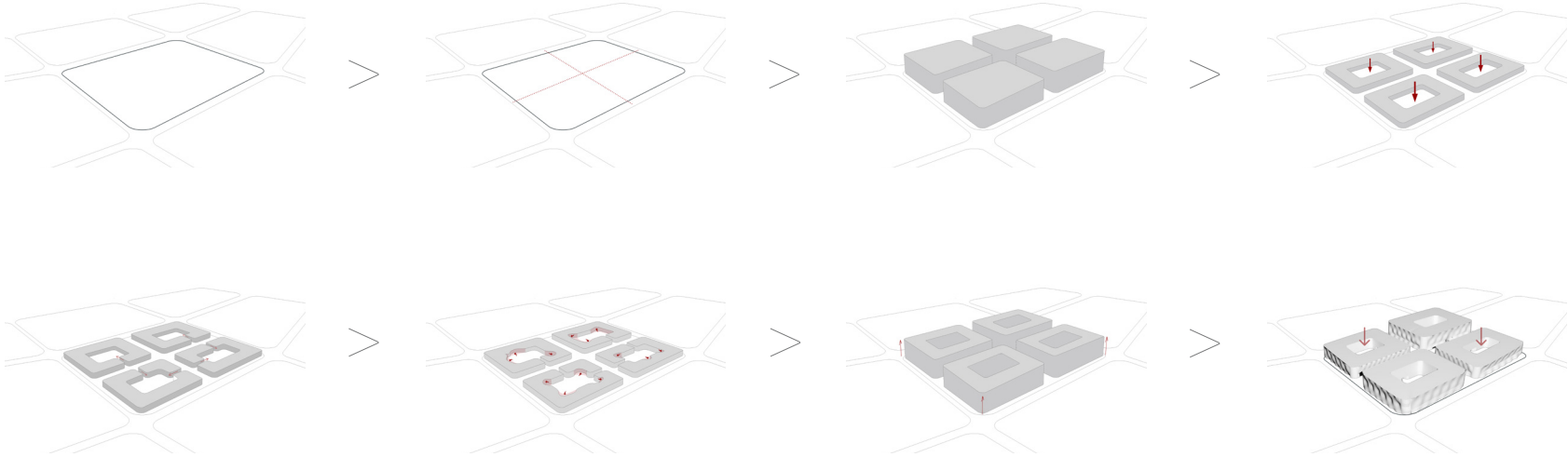
Fig.9.2 Urbanistic concept with selection

1. Selected location

2. Street division for pedestrians and residents

3. Volume of construction boarders

4. Courtyards



5. Passage entrance from a pedestrian road. Level of privacy and cultural aspect

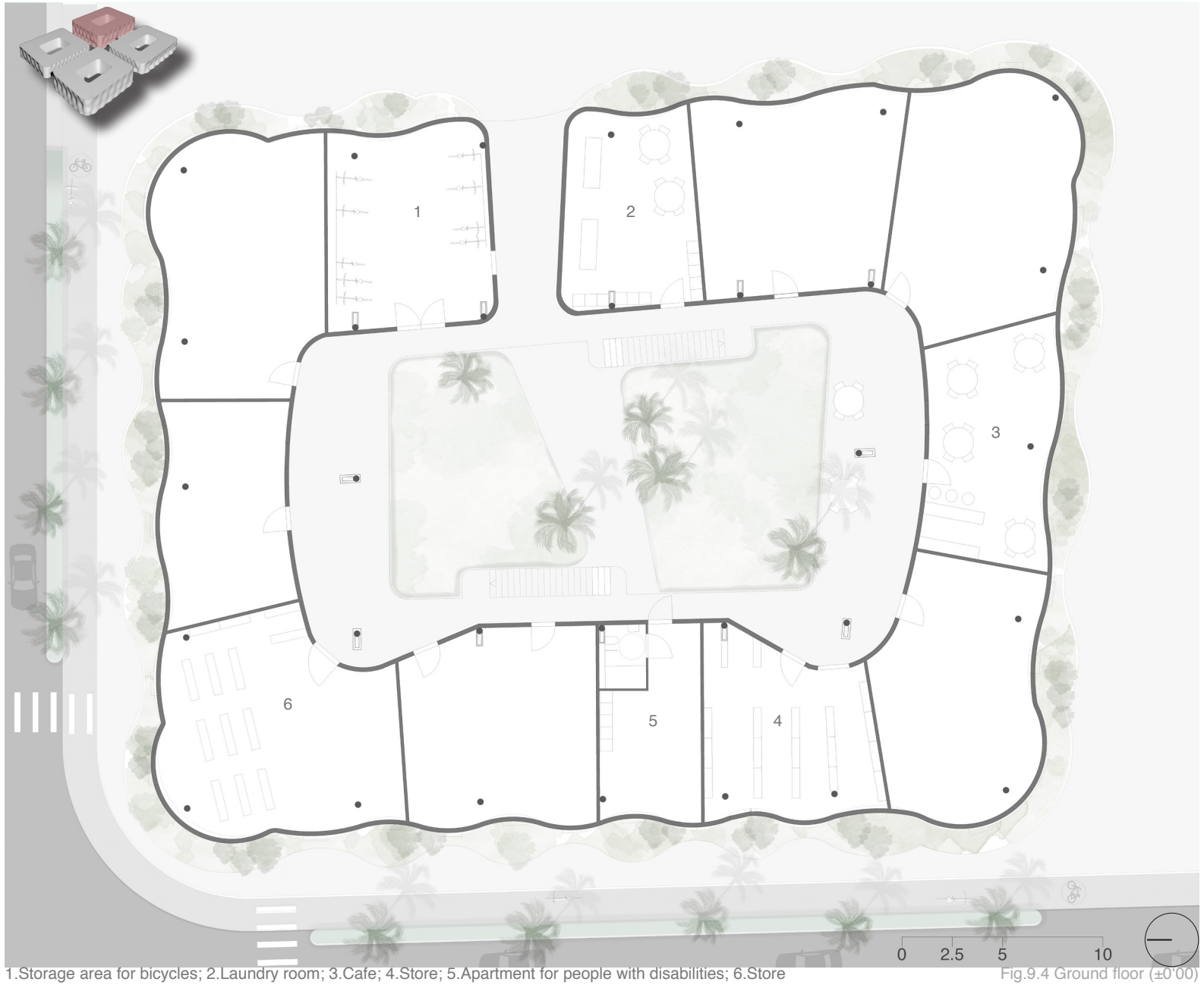
6. Expansion of the inner courtyard on the ground floor level

7. Rise of up to 3 floors hight

8. Waves on a facade. Insolation and masonry. Difference in number of floors

Fig.9.3 Concept explanation

9.2 Floor plans



1.Storage area for bicycles; 2.Laundry room; 3.Cafe; 4.Store; 5.Apartment for people with disabilities; 6.Store

Fig.9.4 Ground floor (±0'00)

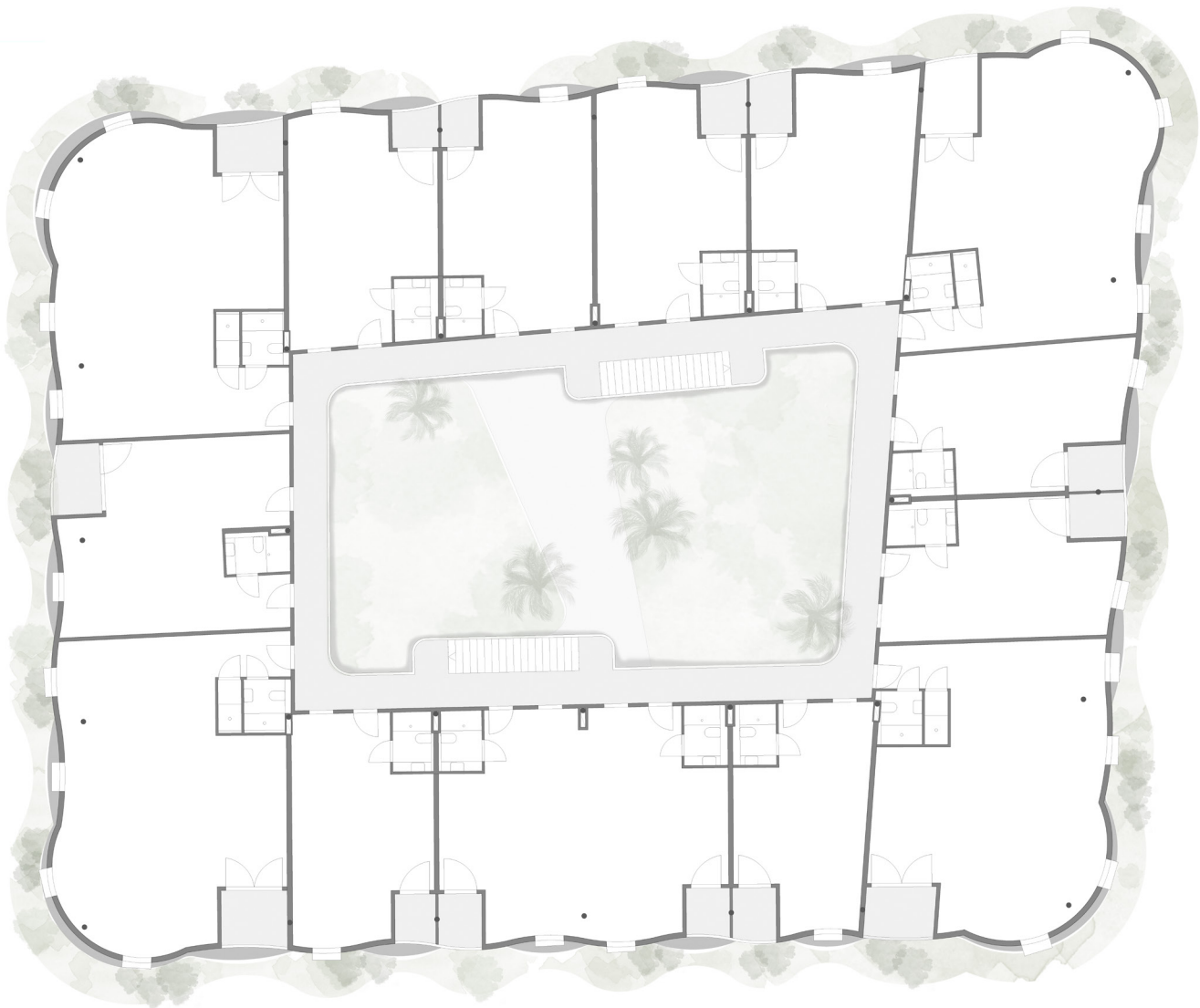


Fig.9.5 First floor (+3‘50m)

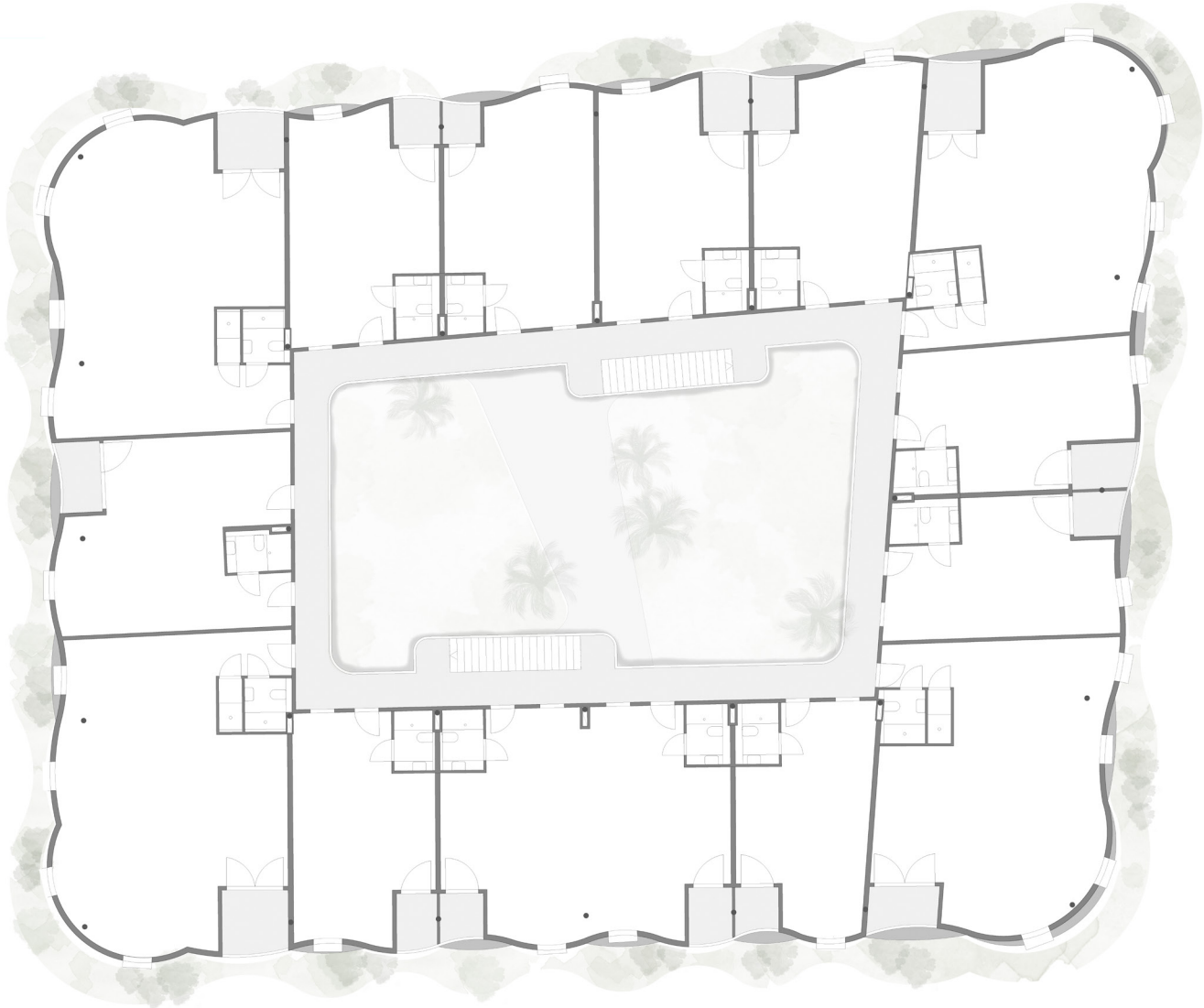


Fig.9.6 Second floor (+6‘5m)

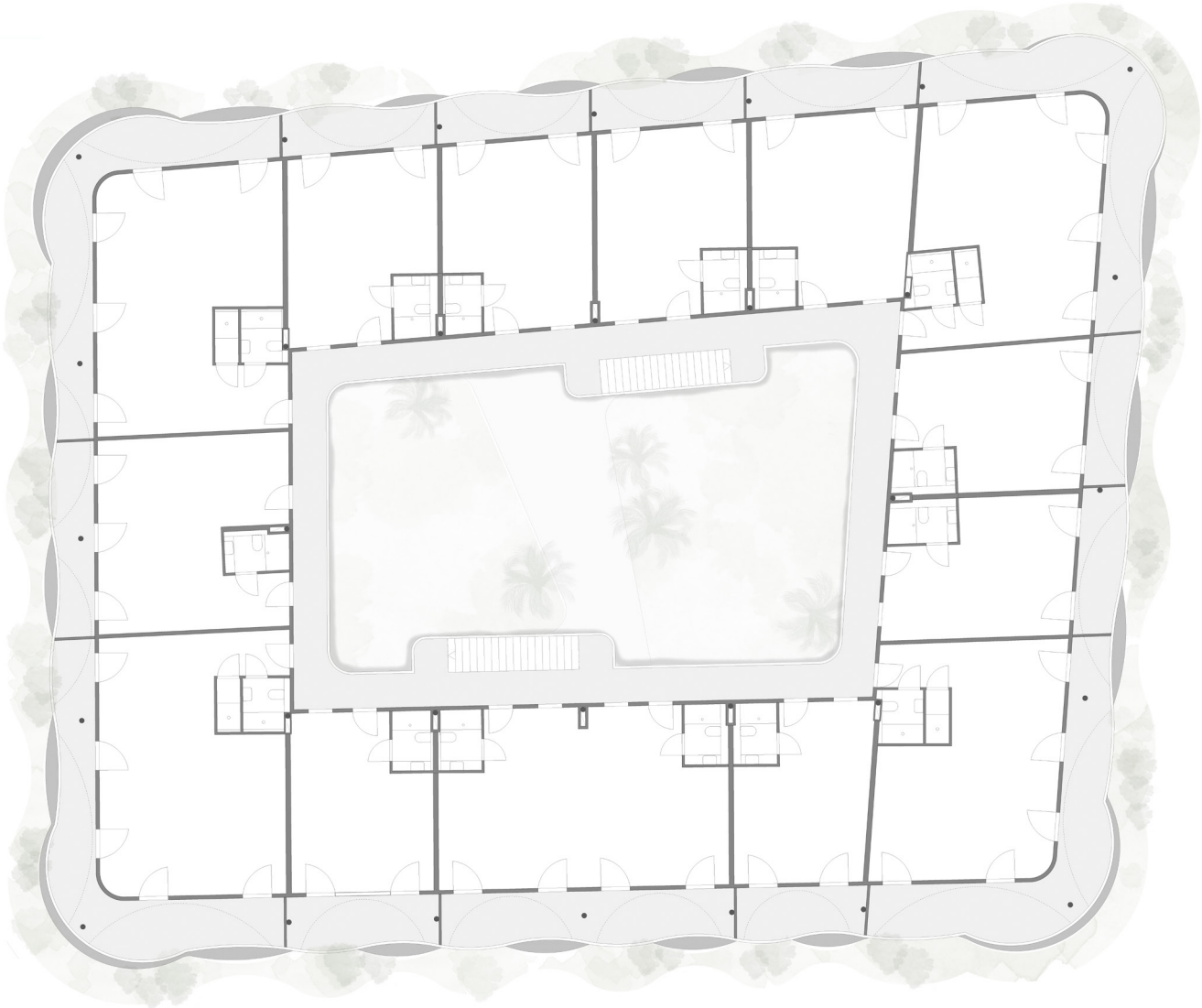
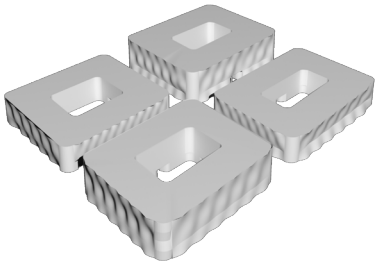


Fig.9.7 Attic (+9‘5m)

0 2.5 5 10

Process of building:



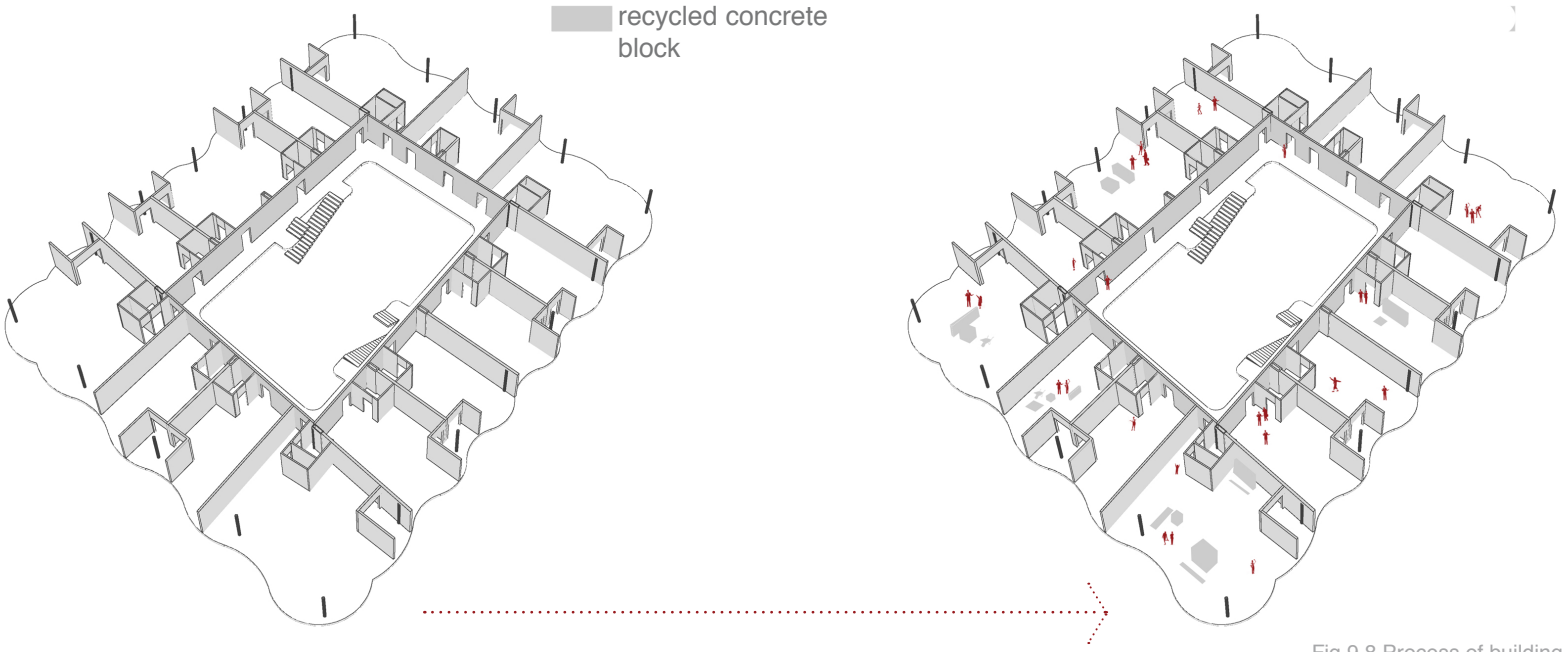


Fig.9.8 Process of building

Every family will get an empty unit with toilet and loggia already installed. Size of the unit depends on how huge is the family and how many members it has. Main constructions are columns and slabs. All dividing walls are built using recycled concrete blocks from the location. Every future owner will decide how to shape their apartment. How many rooms to have, which construction material to choose, where to position their windows and ect. One of the main goals:

- People are active in building their own home.
– Community will help each other in the process
- Feeling of gathering, freedom and self worth.

Shape variations, Groundfloor:

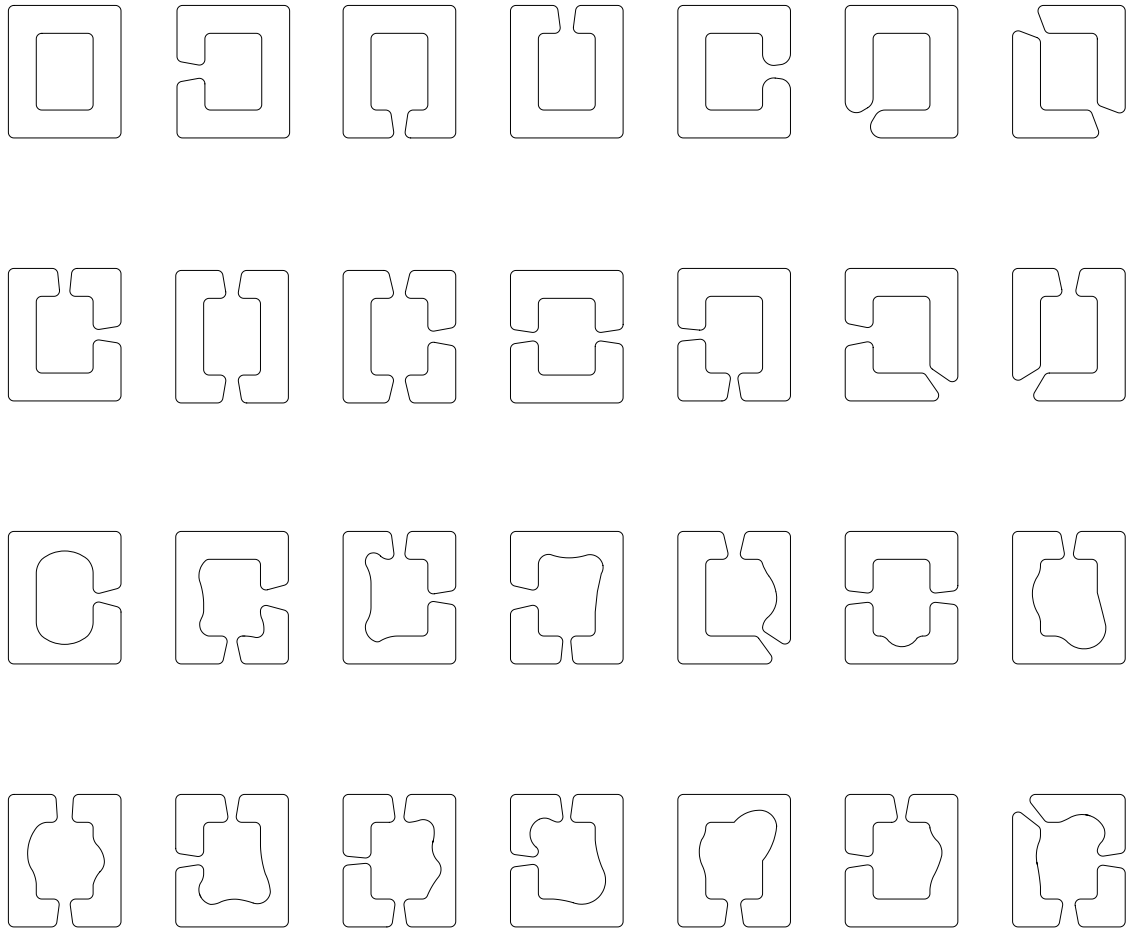
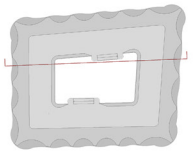
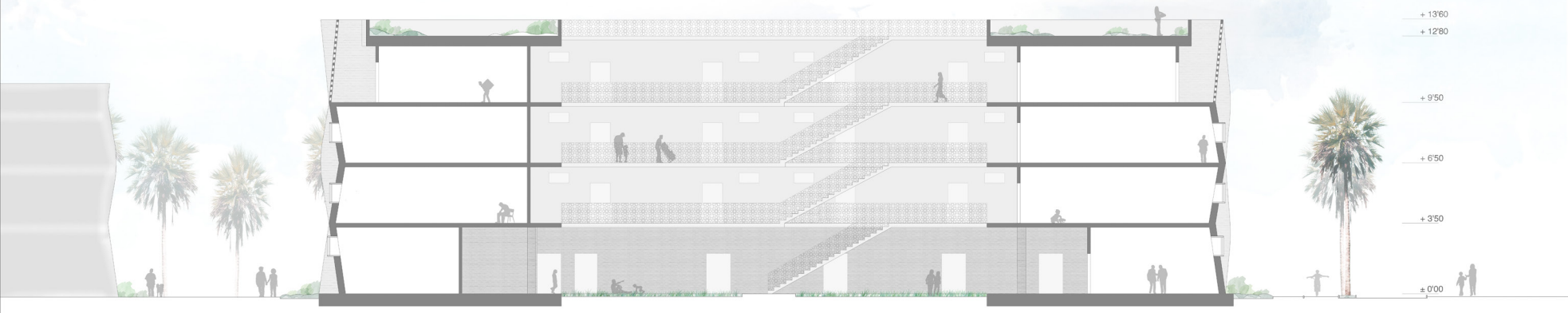


Fig.9.9 Shape variations

9.3 Sections





0 1 3 5 10

Fig.9.10 Section 1

Fig.9.11 Section 2

9.4 Facades

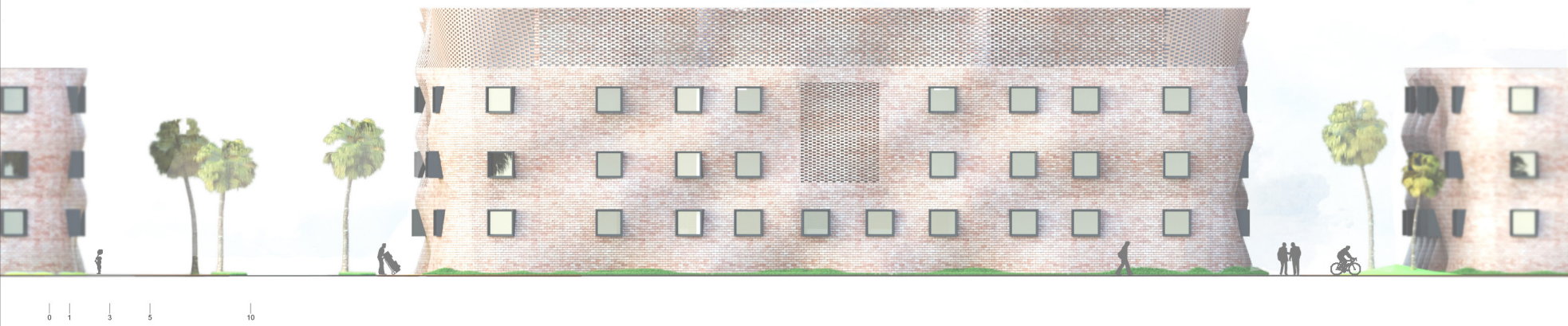
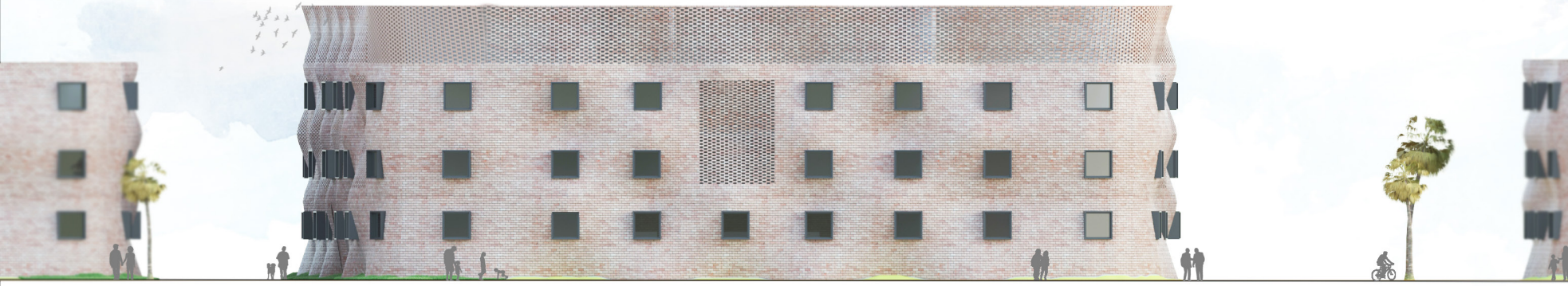


Fig.9.12 South facade



0 1 3 5 10

Fig.9.13 North facade

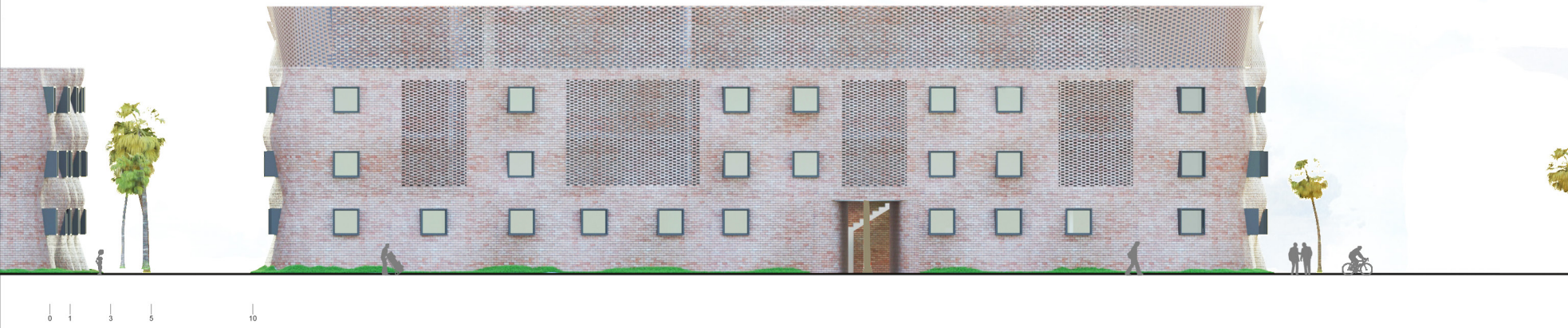


Fig.9.14 East facade

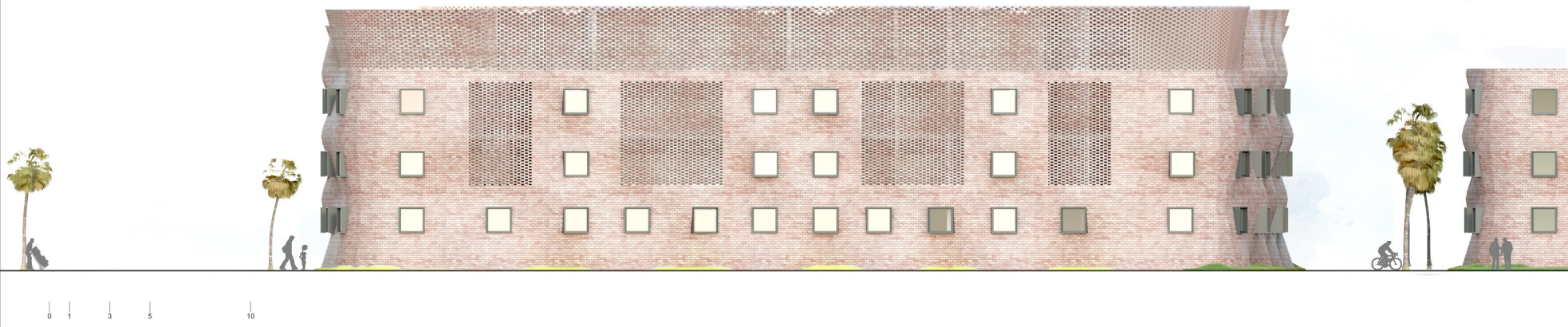
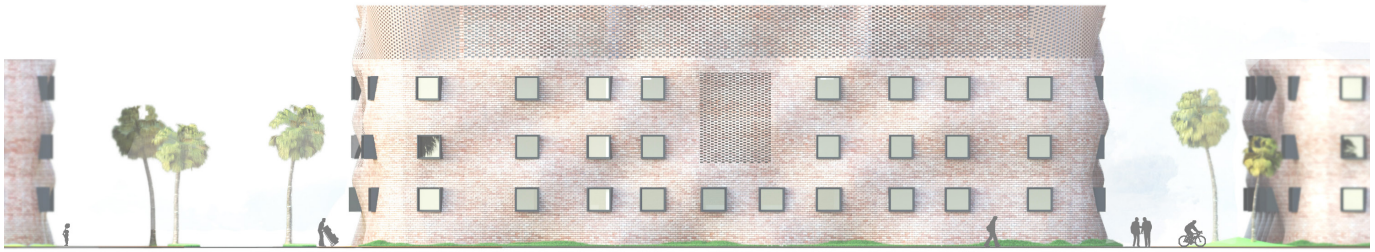
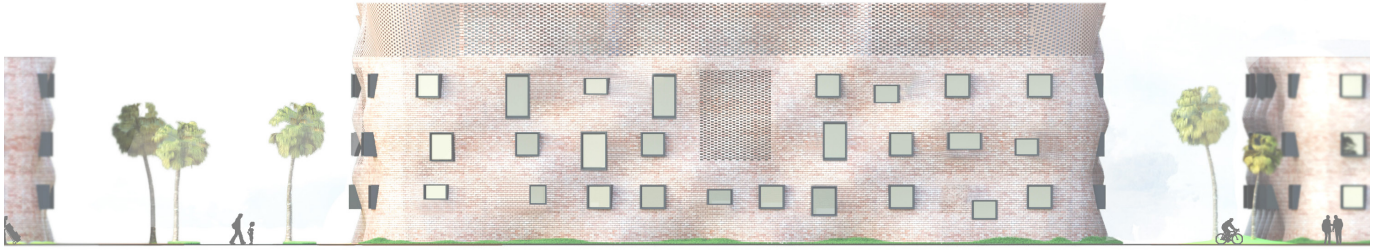


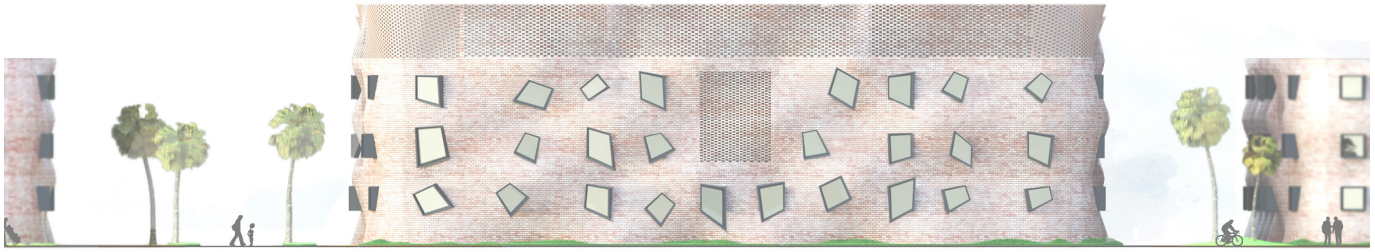
Fig.9.15 West facade



Regular size openings on the facade



Irregular size openings on the facade



Irregular size and blunt openings on the facade

Fig.9.16 Facade versions

9.5 Apartment typologies

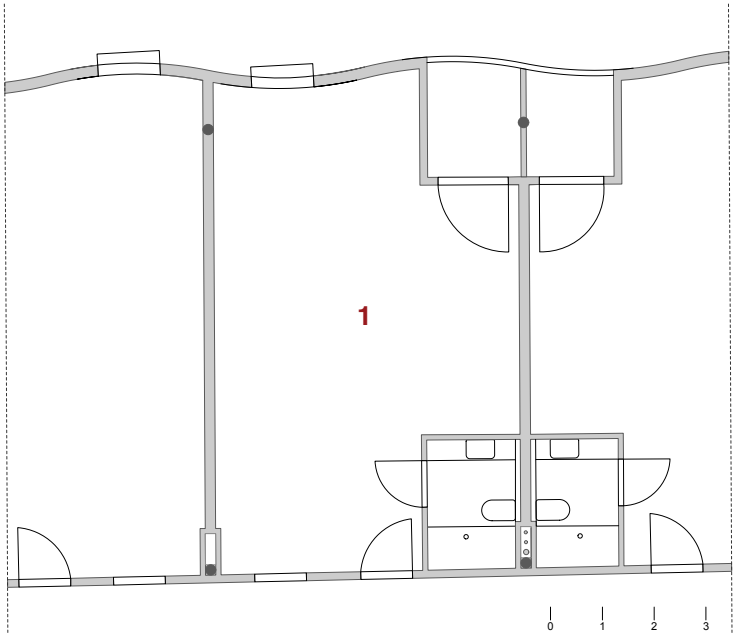


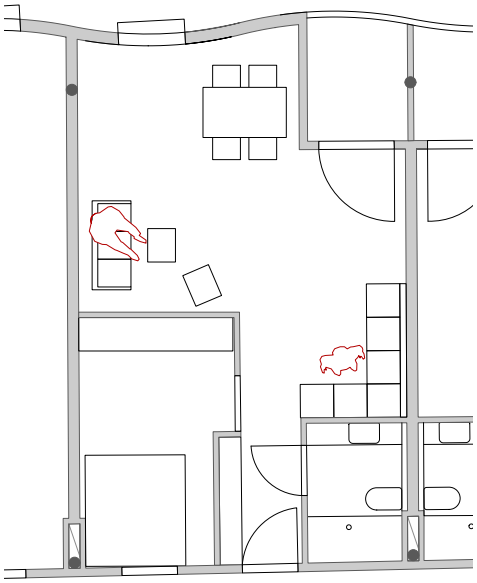
Fig.9.17 Apartment 1

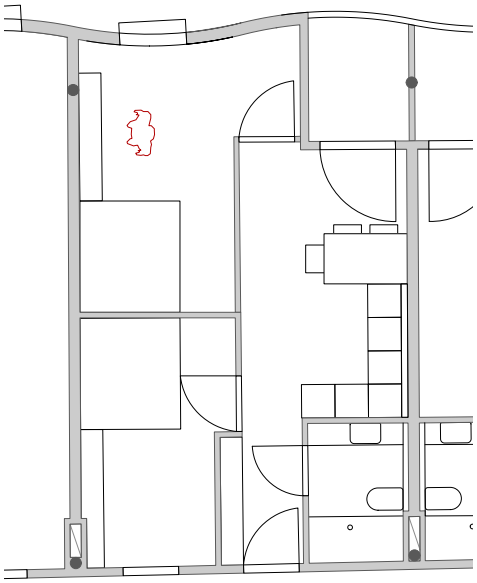
Apartment unit number 1

Concept:
For a disposal new residents will get a wall free apartment, with an area of 56,5 m². Toilet and loggia are instaled as a fix unit.
This apartment unit offers variations up to 2 rooms.

Area= 2,5m²(Toilet)+ 51 m²+3m²(Loggia)
= **56,5 m²**

Variations:
- Studio apartment
- One room apartment
- Two room apartment





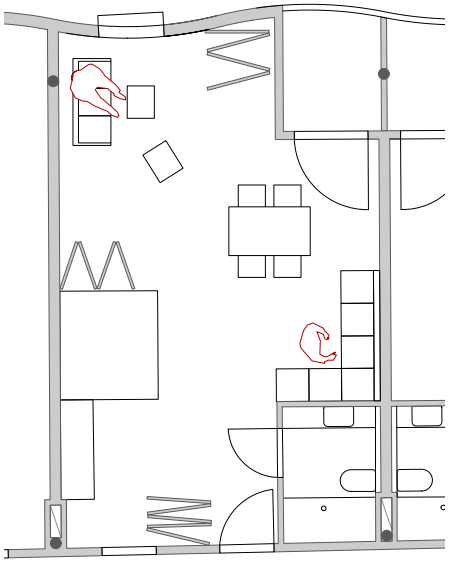
Massive walls

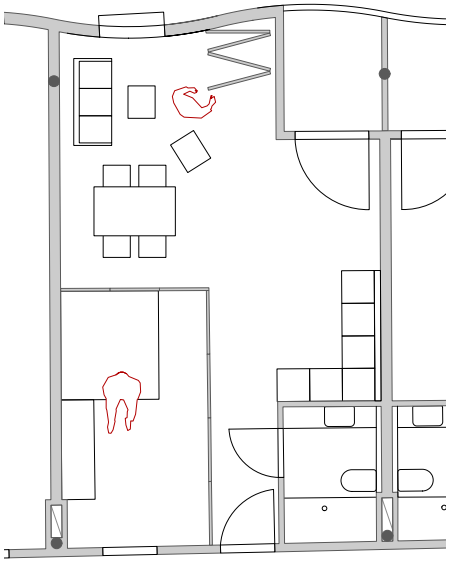
One room apartment
- Living room + kitchen =39,7m²
- Bedroom 11,3 m²
- Toilet 2,5m²
- Loggia 3m²

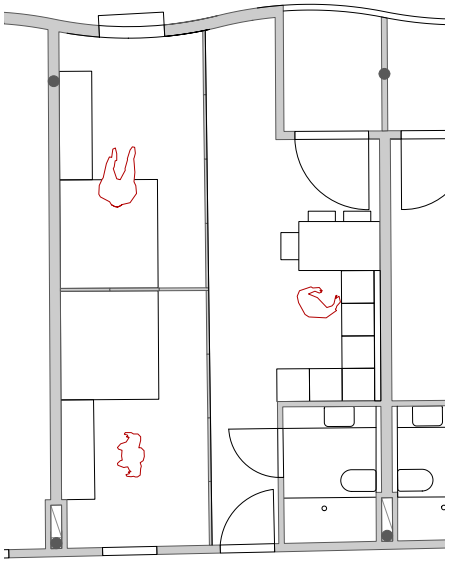
Two room apartment
- Living room + kitchen= 23,8m²
- Bedroom 2x= 11,4m²+15,8m²
- Toilet 2,5m²
- Loggia 3m²

0 1 2 3

Fig.9.18 Apartment 1







Flexible walls

Flexible studio apartment
- Living room + kitchen + bedroom= 51m²
- Toilet 2,5m²
- Loggia 3m²

Flexible one room apartment
- Living room + kitchen=38,5m²
- Bedroom 12,5m²
- Toilet 2,5m²
- Loggia 3m²

Flexible two room apartment
- Kitchen 26,1m²
- Bedroom 2x= 12,5m²+12,4m²
- Toilet 2,5m²
- Loggia 3m²

Fig.9.19 Apartment 1

Fig.9.20 Apartment 1 Visualisation

Empty unit

One room apartment

Two room apartment

Fig.9.21 Apartment 1 in 3D

Step 1

Step 2

Step 3

Fig.9.22 Apartment 1 in 3D

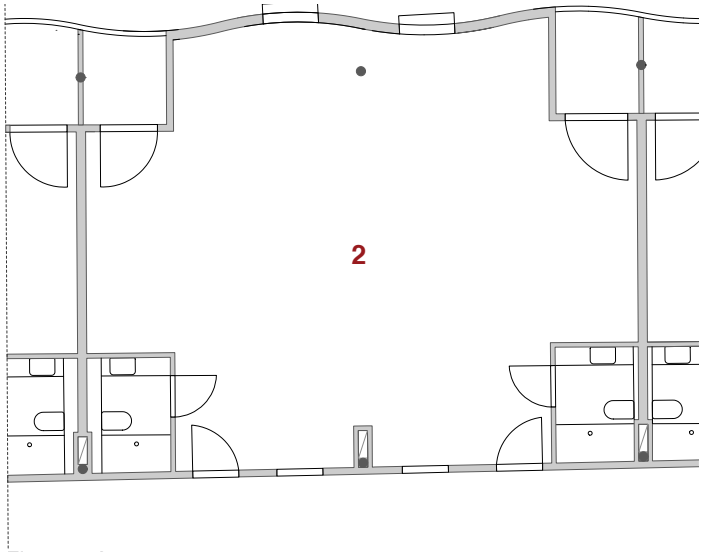
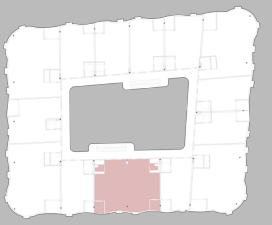


Fig.9.23 Apartment 2

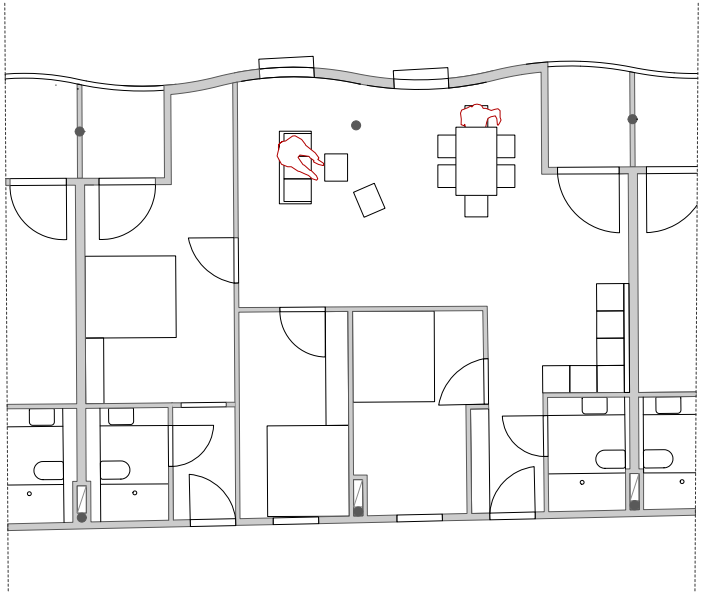
Apartment unit number 2

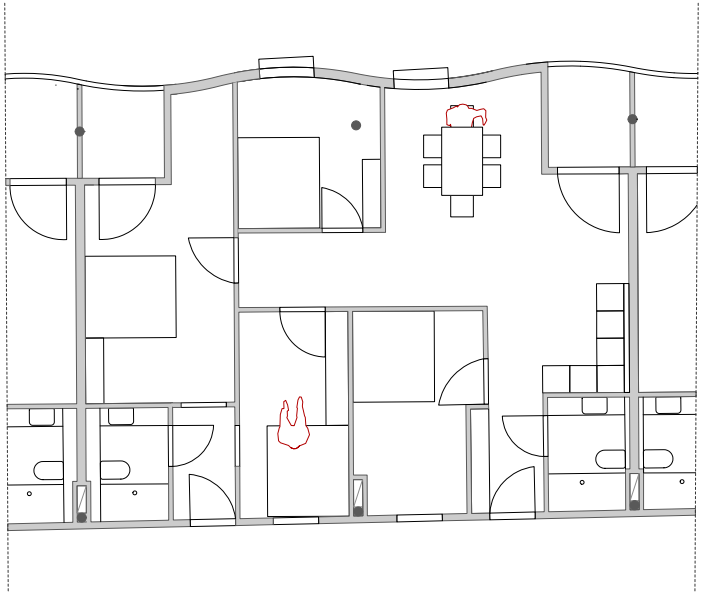


Concept:
For a disposal new residents will get a wall free apartment, with an area of 108,2 m². Two toilets and two loggias are instaled as a fix unit.
This apartment unit offers variations up to 5 rooms.

Area= 5m²(2xToilet)+ 95,8 m²+7,4m²(Loggia)
= **108,2 m²**

Variations:
- One room apartment
- Two room apartment
- Three room apartment
- Four room apartment
- Five room apartment





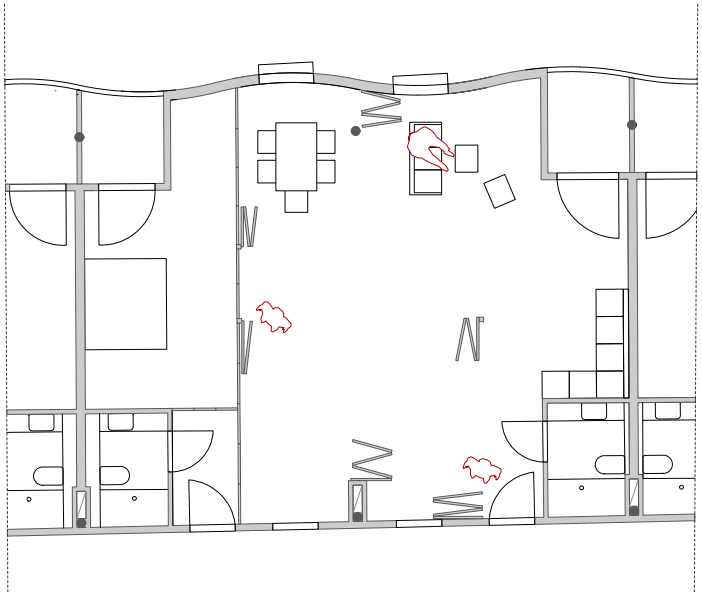
Massive walls

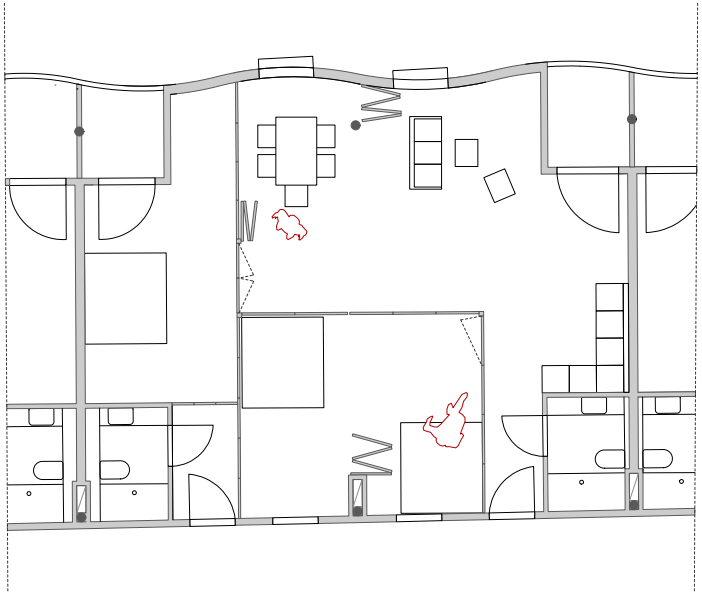
Three room apartment
- Living room + kitchen= 54,1m^2
- Bedroom 3x= 18,6m^2+10,8m^2+12,3m^2
- Toilet 2x= 5m^2
- Loggia 2x= 7,4 m^2

Four room apartment
- Living room + kitchen= 43,9m^2
- Bedroom 4x=18,6m^2+10,8m^2+12,3m^2+10,2m^2
- Toilet 2x= 5m^2
- Loggia 2x= 7,4 m^2

0 1 2 3

Fig.9.24 Apartment 2





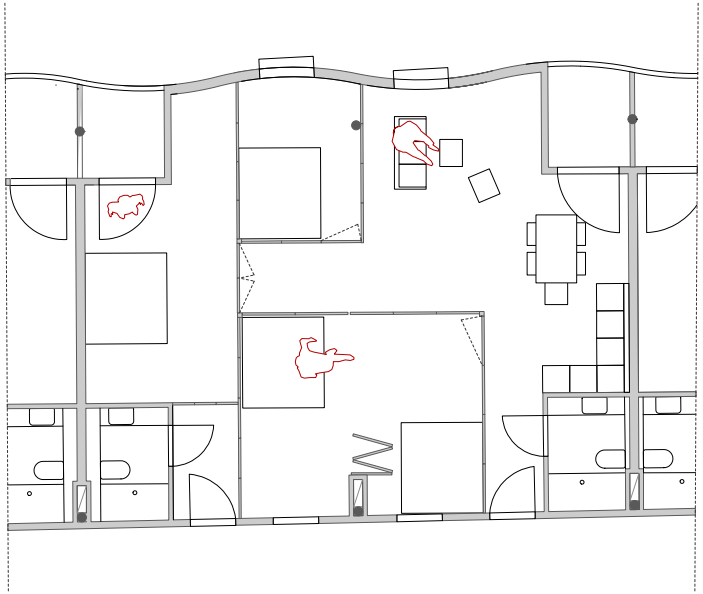
Flexible walls

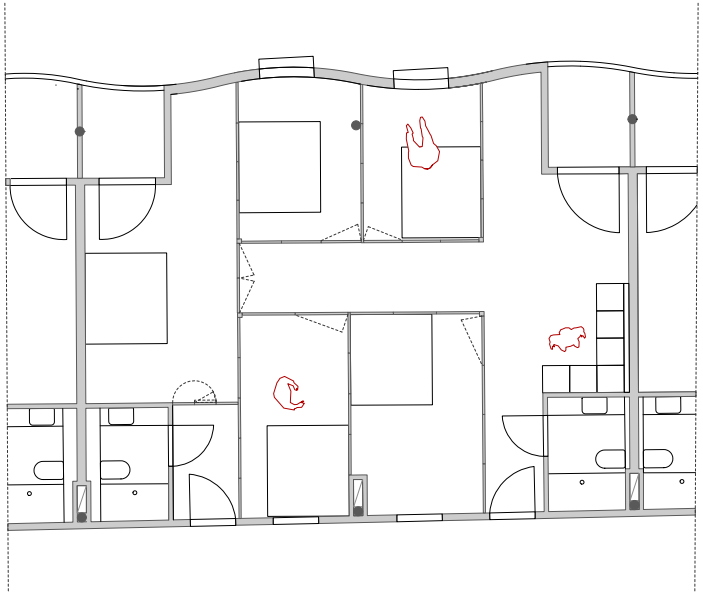
One room apartment
- Living room + kitchen= 77,2m^2 (for gathering events, workshop, office)
- Bedroom 1x= 18,6m^2
- Toilet 2x= 5m^2

Two room apartment
- Living room + kitchen= 54m^2
- Bedroom 2x= 18,6m^2+23,2m^2
- Toilet 2x= 5m^2
- Loggia 2x= 7,4 m^2

0 1 2 3

Fig.9.25 Apartment 2





Three room apartment
- Living room + kitchen=44,7m²
- Bedroom 3x=18,6m²+23,2m²+9,3m²
- Toilet 2x= 5m²
- Loggia 2x= 7,4 m²

Five room apartment
- Living room + kitchen= 33,2m²
- Bedroom 5x=18,6m²+9,3m²+11,9m²+10,5m²+12,3m²
- Toilet 2x= 5m²
- Loggia 2x= 7,4 m²

0 1 2 3

Fig.9.26 Apartment 2

Empty unit

Three room apartment

Fig.9.27 Apartment 2 in 3D

One room apartment

Two room apartment

Fig.9.28 Apartment 2 in 3D

Three room apartment

Four room apartment

Fig.9.29 Apartment 2 in 3D

Five room apartment

Visualisation

Fig.9.30 Apartment 2 in 3D

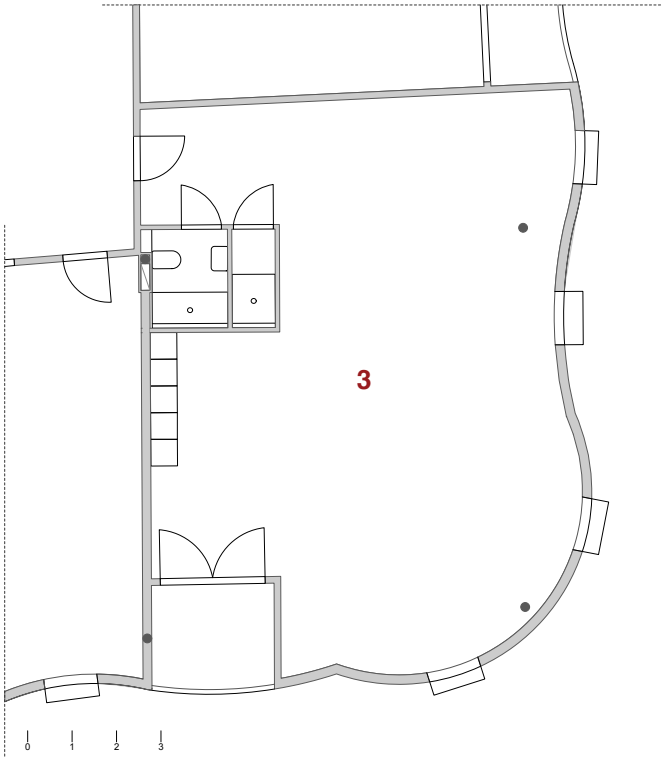
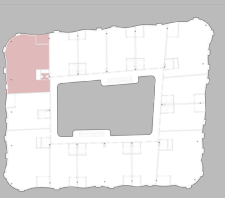


Fig.9.31 Apartment 3

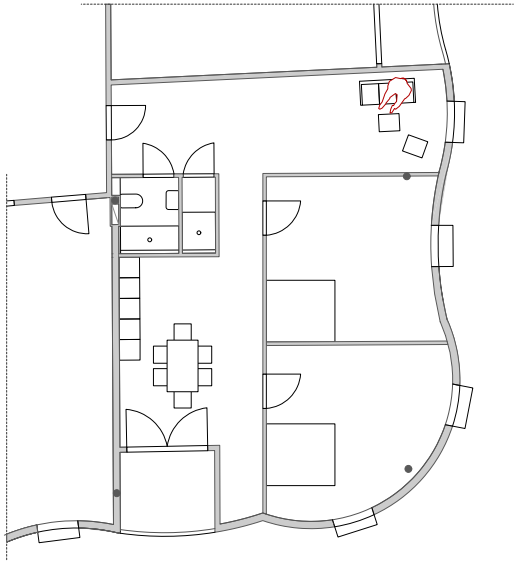
Apartment unit number 3

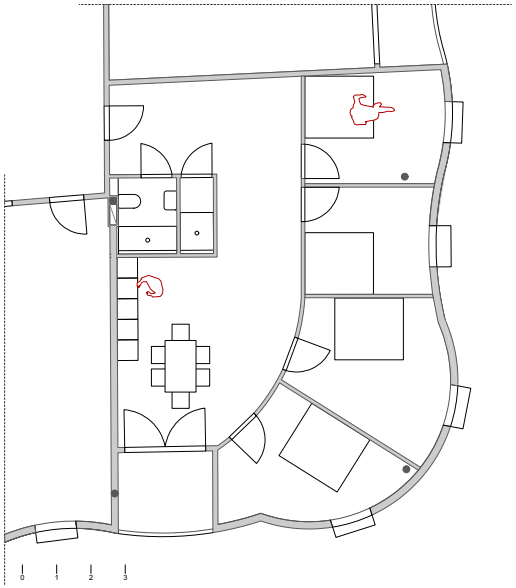


Concept:
For a disposal new residents will get a wall free apartment, with an area of 117,5 m². Two toilet and one loggia are instaled as a fix unit.
This apartment unit offers variations up to 5 rooms.

Area= 5,9m²(2xToilet)+ 105,3 m²+6,3m²(Loggia)
= **117,5 m²**

Variations:
- Two room apartment
- Three room apartment
- Four room apartment



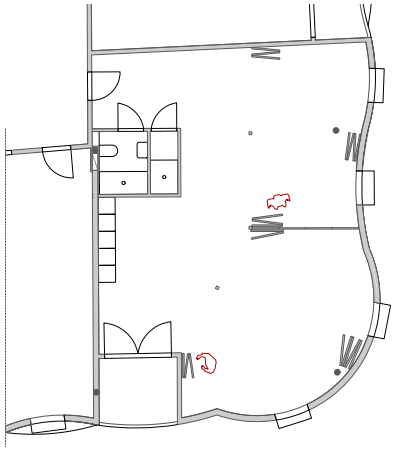


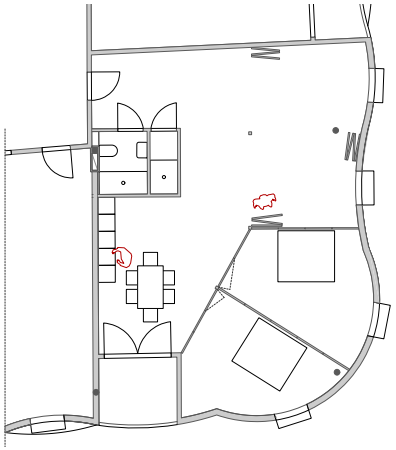
Massive walls

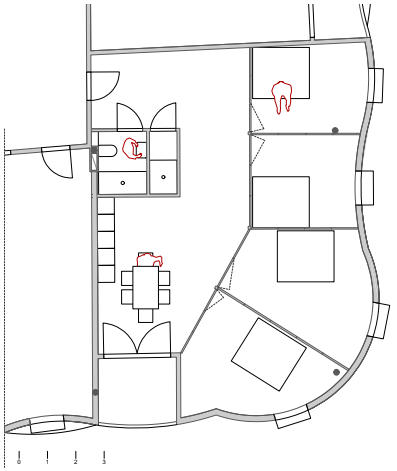
Two room apartment
- Living room + kitchen= 58,9m²
- Bedroom 2x= 23,2m²+23,2m²
- Toilet 2x= 5,9m²
- Loggia 6,3 m²

Four room apartment
- Living room + kitchen= 50,4m²
- Bedroom 4x=12,8m²+11,4m²+16,5m²+14,2m²
- Toilet 2x= 5,9m²
- Loggia 6,3 m²

Fig.9.32 Apartment 3







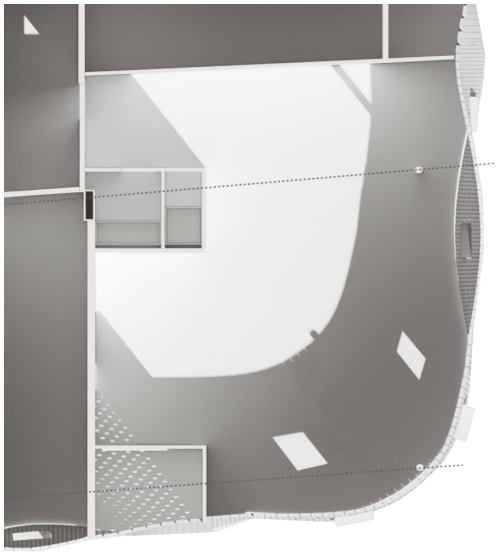
Flexible walls

Studio apartment
- Living room + kitchen=105,3m²
- Free space for people gathering, office, workshop
- Toilet 2x= 5,9m²
- Loggia 6,3 m²

Two room apartment
- Living room + kitchen=71,6m²
- Bedroom 2x=17,6m²+16,1m²
- Toilet 2x= 5,9m²
- Loggia 6,3 m²

Four room apartment
- Livingroom + kitchen= 46,9m²
- Bedroom 4x= 17,6m²+16,1m²+12,1m²+12,6m²
- Toilet 2x= 5,9m²
- Loggia 6,3 m²

Fig.9.33 Apartment 3

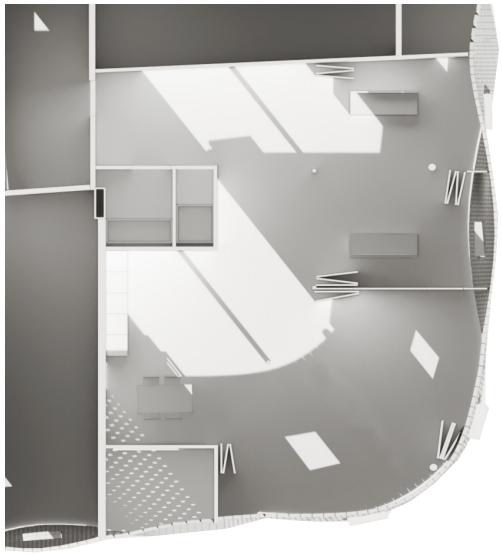


Empty unit

Two room apartment

Four room apartment

Fig.9.34 Apartment 3 in 3D



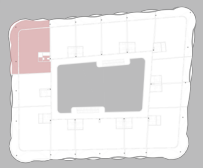
Empty unit

Two room apartment

Four room apartment

Fig.9.35 Apartment 3 in 3D

Apartment unit number 4



Concept:
For a disposal new residents will get a wall free apartment, with an area of 116,4 m². Two toilet and one big roof loggia/garden are instaled as a fix unit.
This apartment unit offers variations up to 5 rooms.

Area= 5,9m²(2xToilet)+ 77,0 m²+33,5m²(Loggia)
= **116,4 m²**

Variations:
- One room apartment
-Two room apartment
-Three room apartment

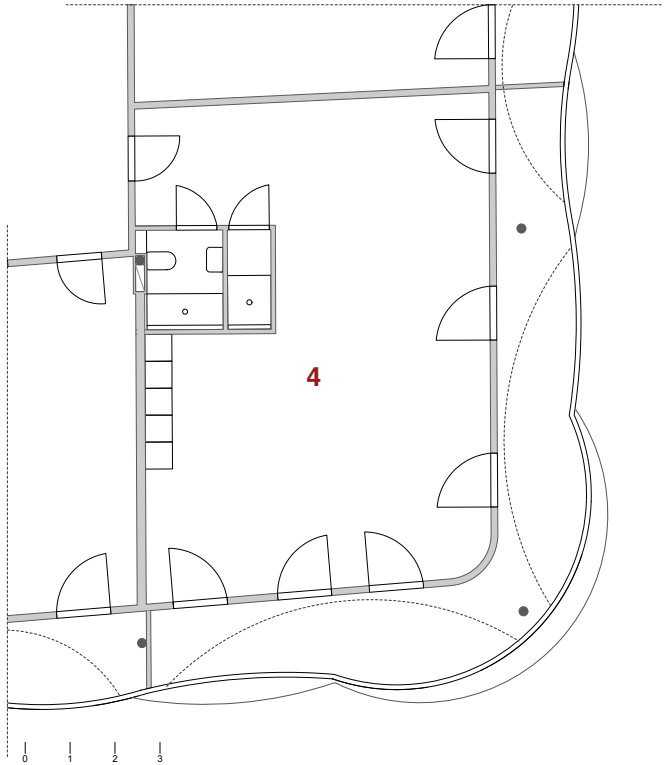
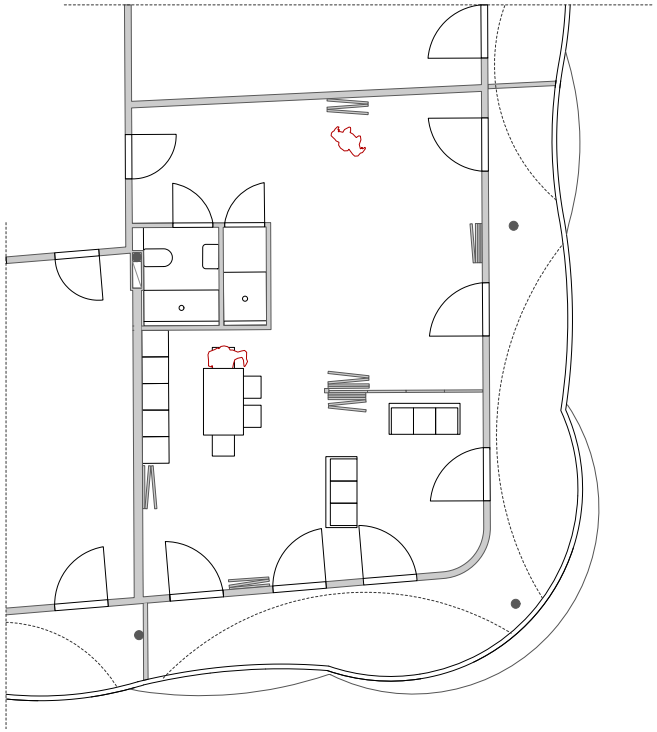
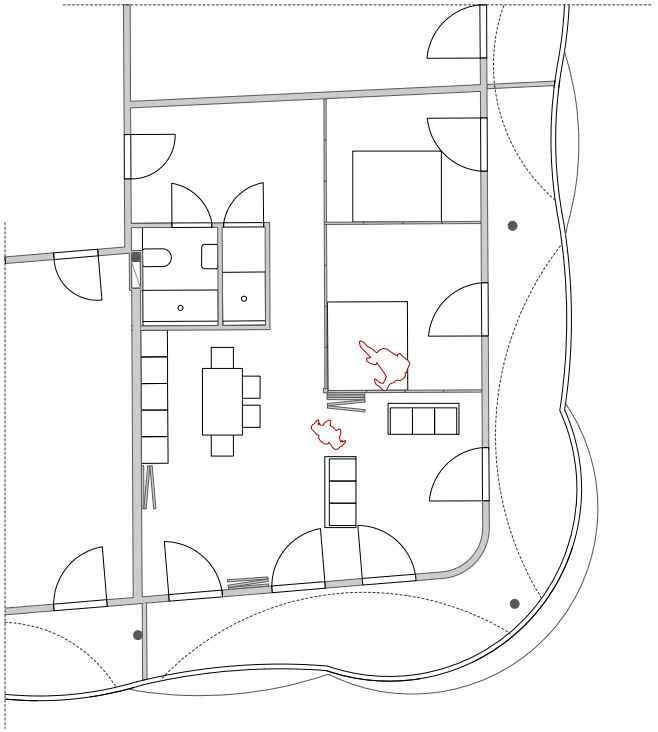


Fig.9.36 Apartment 4





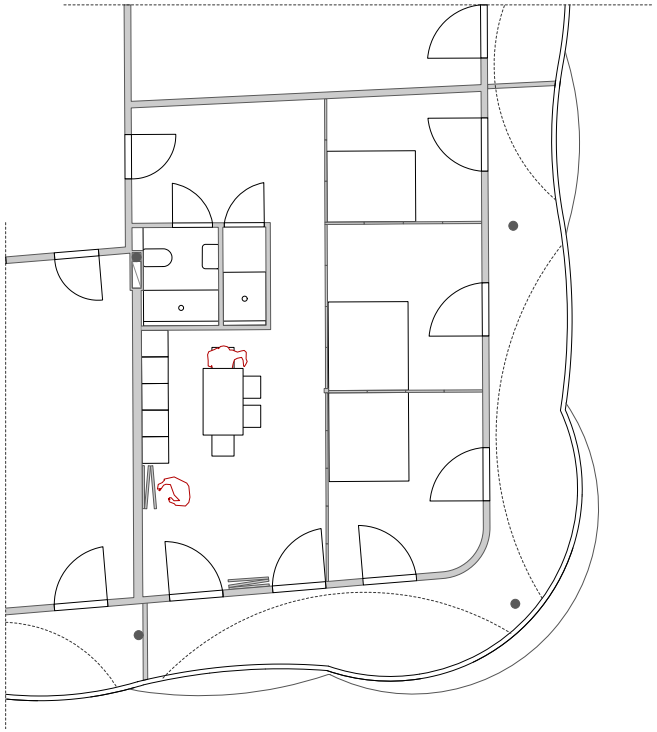
Flexible walls

Studio apartment
- Living room + kitchen= 77m²
- Free space for people gathering, office
- Toilet 2x= 5,9m²
- Loggia 33,5 m²

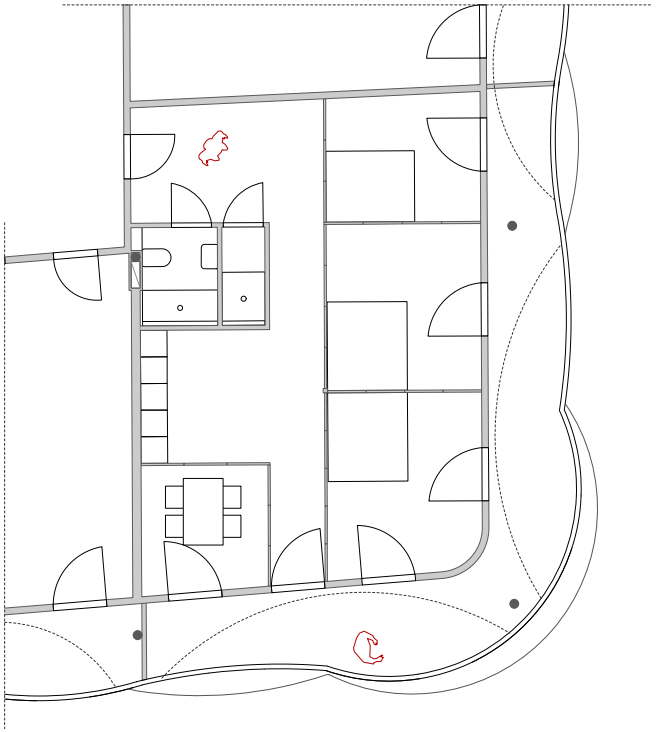
Two room apartment
- Living room + kitchen=54,2m²
- Bedroom 2x= 9,9m²+12,9m²
- Toilet 2x= 5,9m²
- Loggia 33,5 m²

0 1 2 3

Fig.9.37 Apartment 4

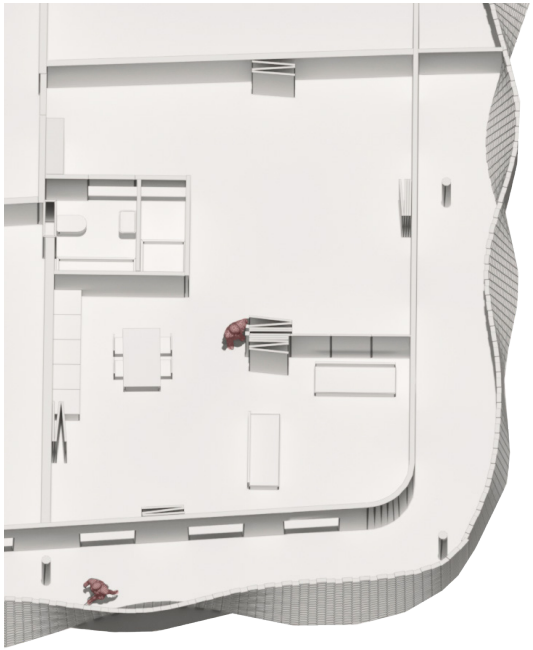


Three room apartment
- Living room + kitchen= 40,1m²
- Bedroom 3x= 9,9m²+12,9m²+14,1m²
- Toilet 2x= 5,9m²
- Loggia 33,5 m²



Three room apartment
- Living room + kitchen + dinning flexible=40,1m²
- Bedroom 3x=9,9m²+12,9m²+14,1m²
- Toilet 2x= 5,9m²
- Loggia 33,5 m²

Fig.9.38 Apartment 4



Studio apartment

Two room apartment

Fig.9.39 Apartment 4 in 3D

Three room apartment

Three room apartment

Fig.9.40 Apartment 4 in 3D

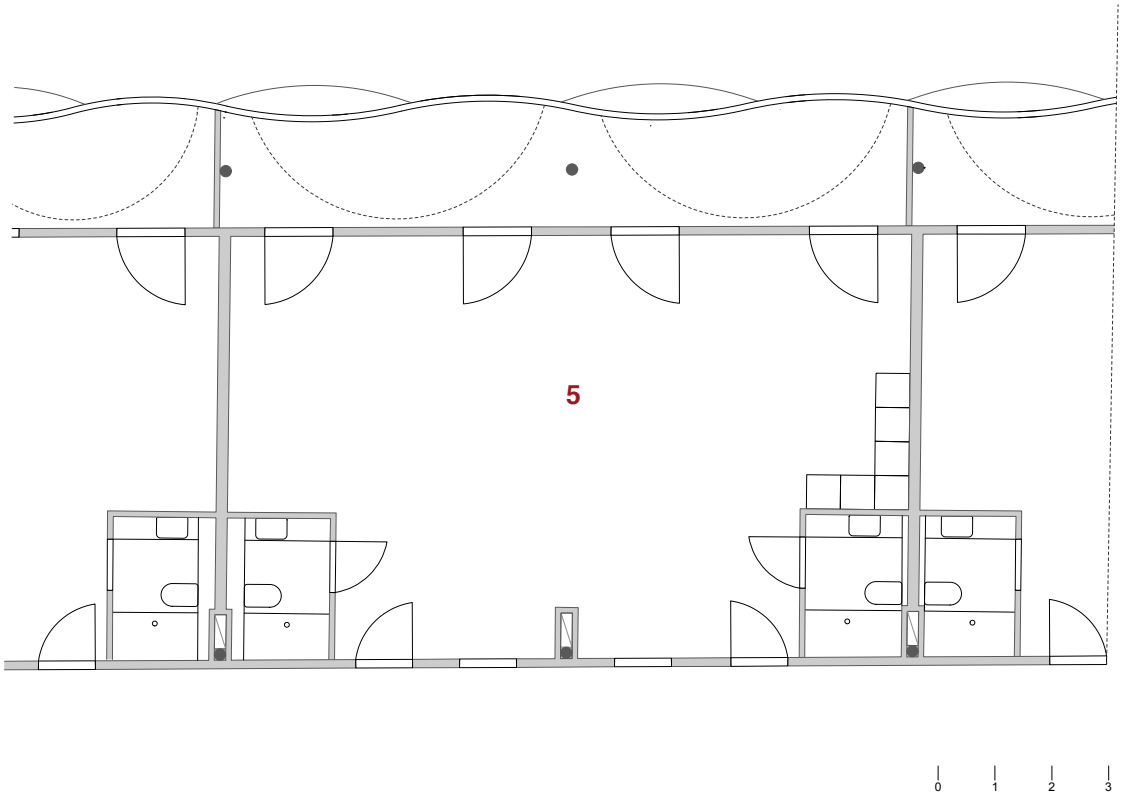
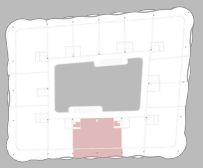


Fig.9.41 Apartment 5

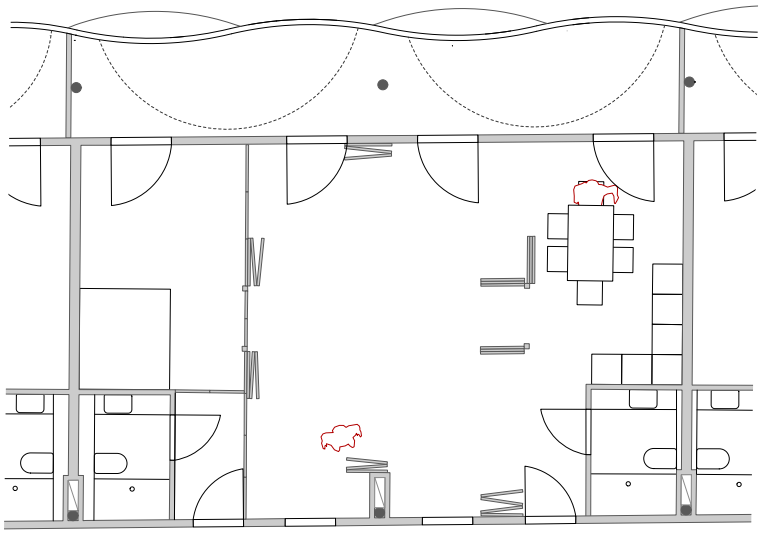
Apartment unit number 5

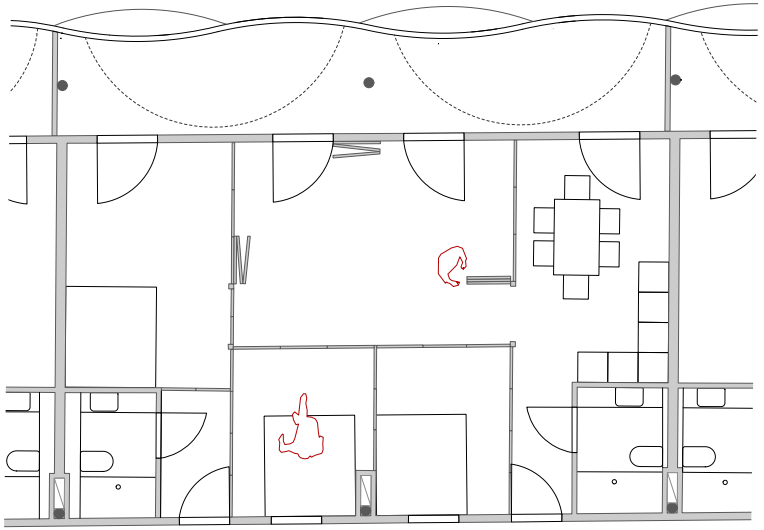


Concept:
For a disposal new residents will get a wall free apartment, with an area of 110,8 m². Two toilets and one big roof loggia/garden are instaled as a fix unit.
This apartment unit offers variations up to 5 room unit.

Area= 7,4m²(2xToilet)+ 78,9 m²+24,5m²(Loggia)
= **110,8 m²**

Variations:
- Two room apartment
-Three room apartment
-Four room apartment
-Five room apartment





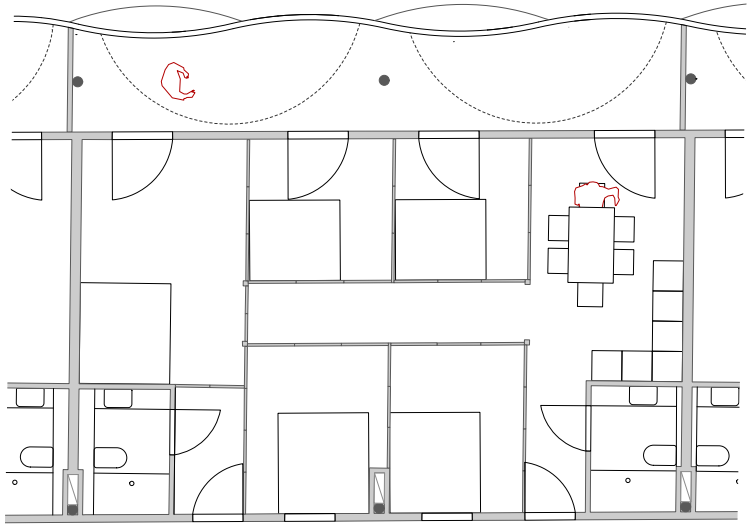
Flexible walls

One room apartment
- Living room + kitchen=60,9m²
- Bedroom 1x= 18m²
- Toilet 2x= 7,4m²
- Loggia 24,5 m²

One room apartment
- Living room + kitchen=43,1m²
- Bedroom 3x= 18m²+9m²+8,8m²
- Toilet 2x= 7,4m²
- Loggia 24,5 m²

0 1 2 3

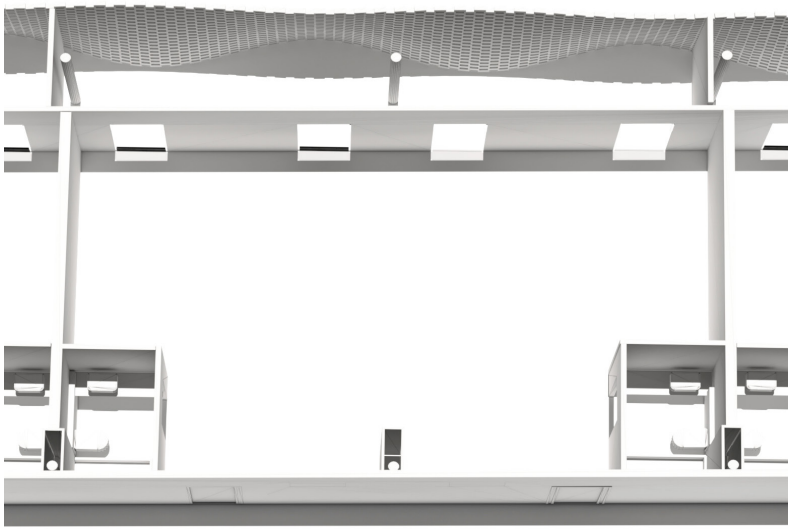
Fig.9.42 Apartment 5



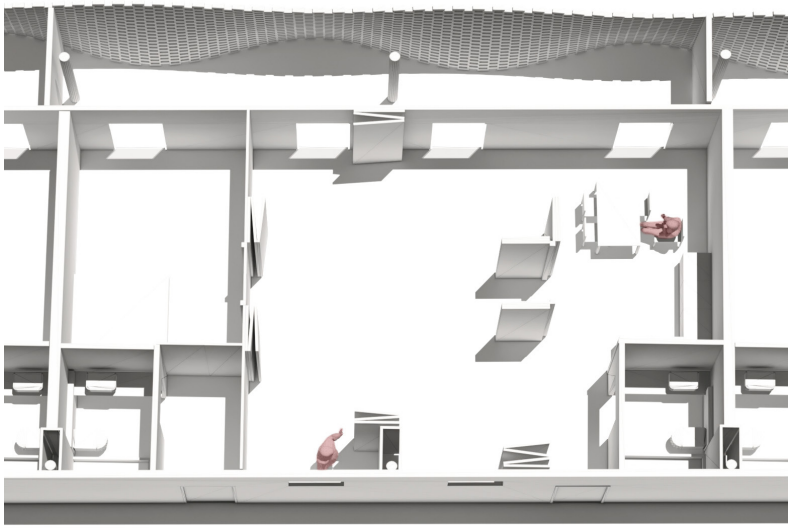
Five room apartment
- Living room + kitchen= 35,7m²
- Bedroom 5x= 18m²+9m²+8,8m²+7,4m²
- Toilet 2x= 7,4m²
- Loggia 24,5 m²

0 1 2 3

Fig.9.43 Apartment 5

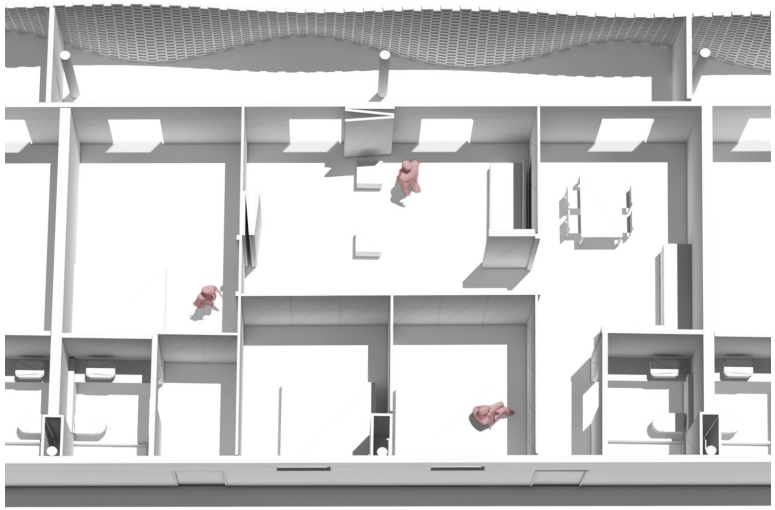


Empty apartment

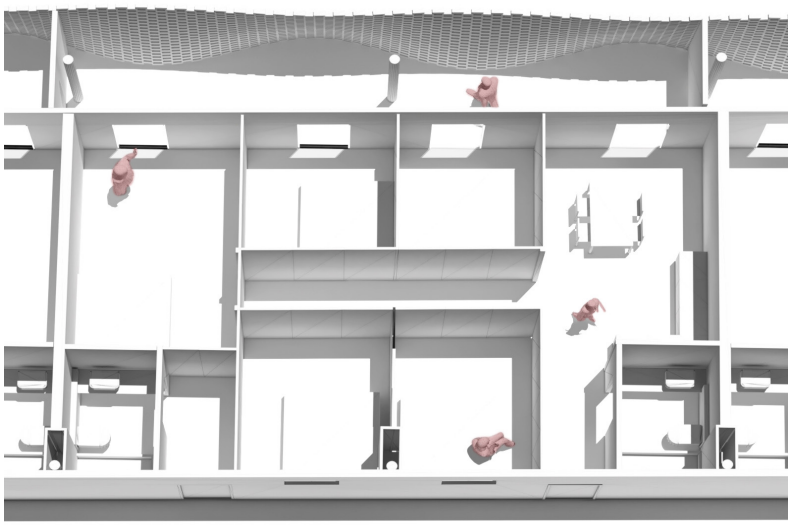


One room apartment

Fig.9.44 Apartment 5 in 3D



Three room apartment



Five room apartment

Fig.9.45 Apartment 5 in 3D

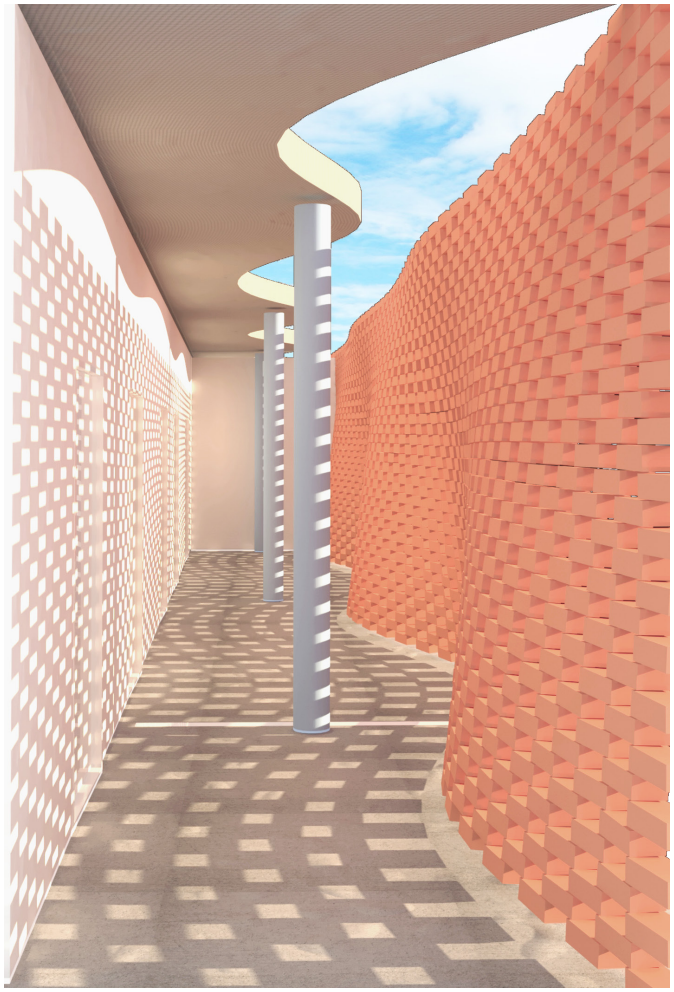


Fig.9.46 Apartment 5 in 3D

10. Construction and details

Fig.10.1 Illustration

10.1 Main construction

6.Facade
(Bricks)

5.Roof
(reinforced concrete roof)

4. Third floor/ loft
(reinforced concrete ceiling
and columns)

3.Second floor
(reinforced concrete ceiling
and columns)

2.First floor
(reinforced concrete ceiling
and columns)

1.Ground floor
(reinforced concrete floor and
columns)

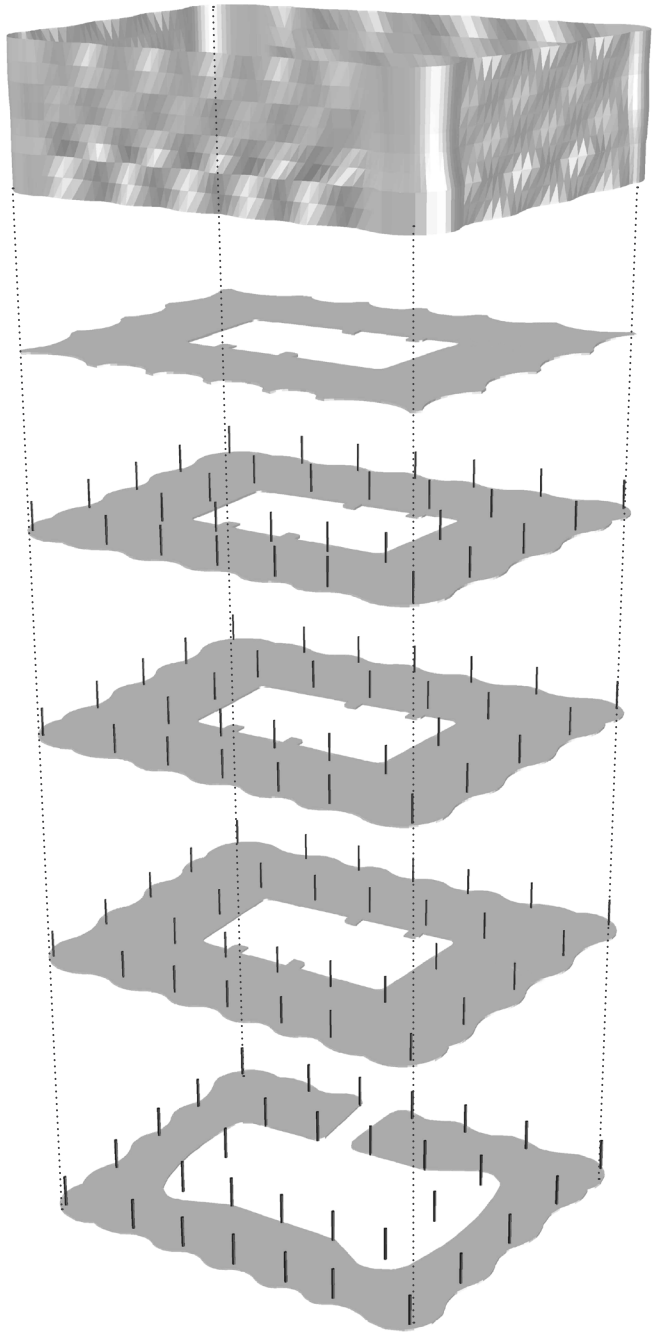
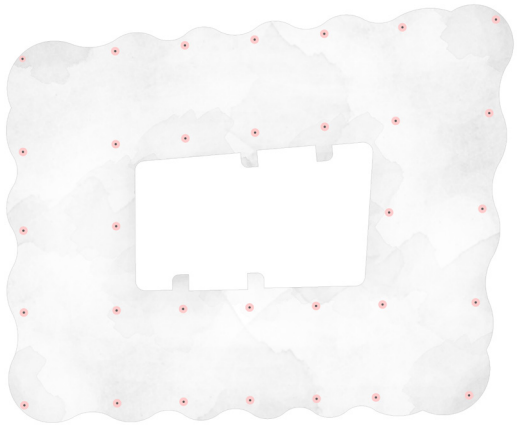
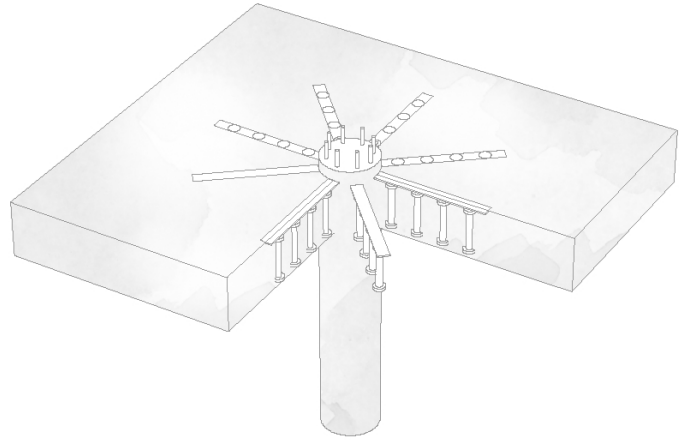


Fig.10.2 Construction



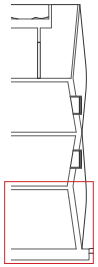
Column position



Floor column detail „Punching construction“ (ger.Durchstanzen)

Fig.10.3 Position of columns, column detail

10.3 Facade section



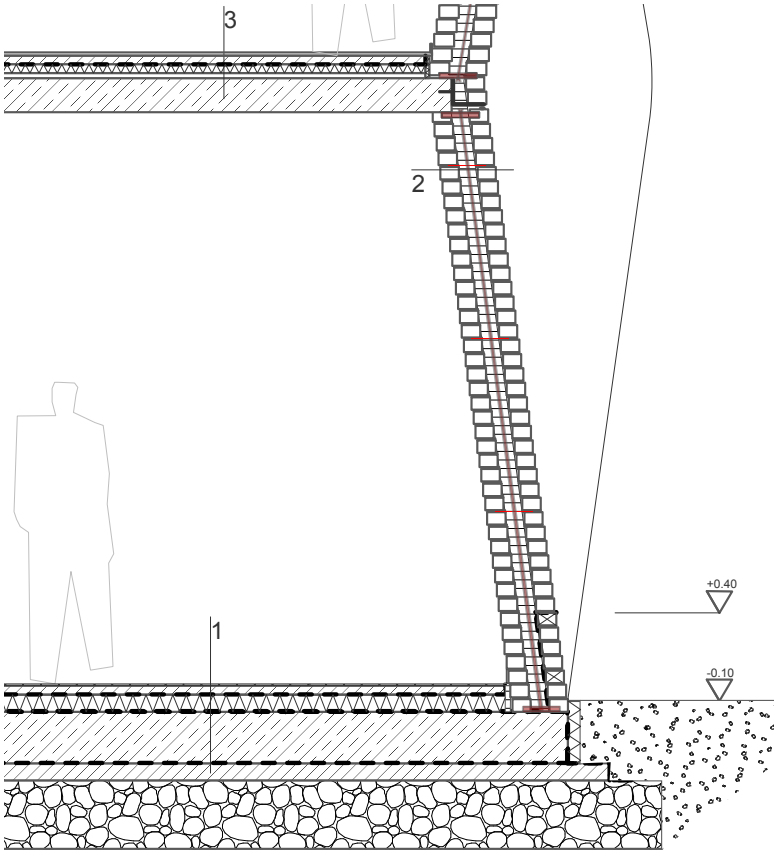


Fig.10.4 Construction detail

1

GF. Floor construction:
- Tiles 1cm
- Screed 5cm
- PE
- Insulation 10cm
- Bitumen waterproof 0.8cm
- Reinforced concrete slab 30cm
- Protection foil
- Layer of soil

1

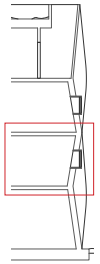
EG. Fußbodenaufbau:
- Fliesen 1cm
- Schwimmender Estrich 5cm
- PE Folie (Trenn- oder Schutzlage)
- Trittschalldämmung 10cm
- Horizontale Abdichtung Sperrschicht 0,8cm
- Stahlbeton Sohlplatte 30cm
- Tren- oder Schutzlage
- Sauberkeitschicht

2

Wall construction:
- Brick 10,6x7,4x22 cm
- Insolation foamed concrete 10cm
- Steel rod Ø1cm
- Brick 10,6x7,4x22 cm

2

Wandaufbau:
- Ziegel 10,6x7,4x22 cm
- Dämmung Schaumbeton 10cm
- Stahlstange Ø1cm
- Ziegel 10,6x7,4x22 cm



3

1.F Floor construction:
- Parquet 1cm
- Screed 5cm
- PE
- Insolation 5cm
- Hight adjusment 3cm
- Reinforced concrete slab 20cm

4

Window:
- Reinforced concrete frame 5cm
- Insolation EPS 5cm
- Aluminium 0,3cm

3

1.OG Fußbodenaufbau:
- Parkett 1cm
- Schwimmender Estrich 5cm
- PE Folie
- Trittschalldämung 5cm
- Niveauausgleich 3cm
- Stahlbeton Decke 20cm

4

Fenster:
- Stahlbeton Rahmen 5cm
- EPS 5cm
- Aluminium 0,3cm

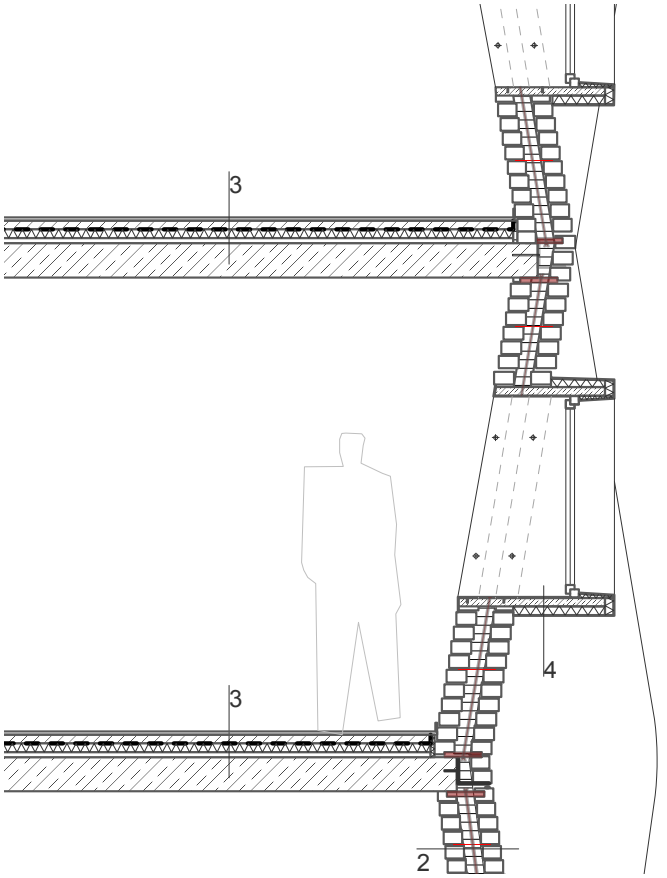
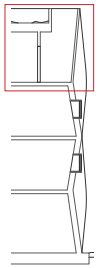


Fig.10.5 Construction detail



5
Floor- loggie:
- Tiles 1cm
- Screed 5cm (2%)
- Protection foil
- Insolation XPS 10cm
- Waterproofing
- Reinforced concrete slab 20cm

5
Boden- Loggie:
- Fliesen 1cm
- Estrich 5cm (2%)
- Trenn -oder Schutzlage
- Wärmedämmung XPS 10cm
- Abdichtung
- Stahlbetondecke 20cm

6
Attic:
- Facade panels 2cm
- Insolation 10cm
- Moisture barrier
- Atic-wall 15cm
- Insolation 5cm
- Silicate plaster 1cm

6
Attika:
- Fassadenplatte 2cm
- Wärmedämmung 10cm
- Dampfsperre
- Atikka-Wand 15cm
- Wärmedämmung 5cm
- Silikatputz 1cm

7
Flat roof:
- Extensive vegetation
- Vegetation support layer 8-10cm
- Fleece filter
- Drainage layer 10cm
- Diffused open roof fleece
- Insolation XPS, 15cm in descent of 2%
- Bitumenwaterproofing 3-Layers
- Reinforced concrete roof slab 20cm

7
Flachdach:
- Extensivbegrünung
- Vegetationstragschicht 8-10cm
- Filtervlies
- Dreinageschicht 10cm
- Wasserableitende Trennlage
- Wärmedämmung XPS, 15cm im Gefälle 2%
- Bitumenabdichtung 3-Lagig
- Tragkonstruktion 20cm

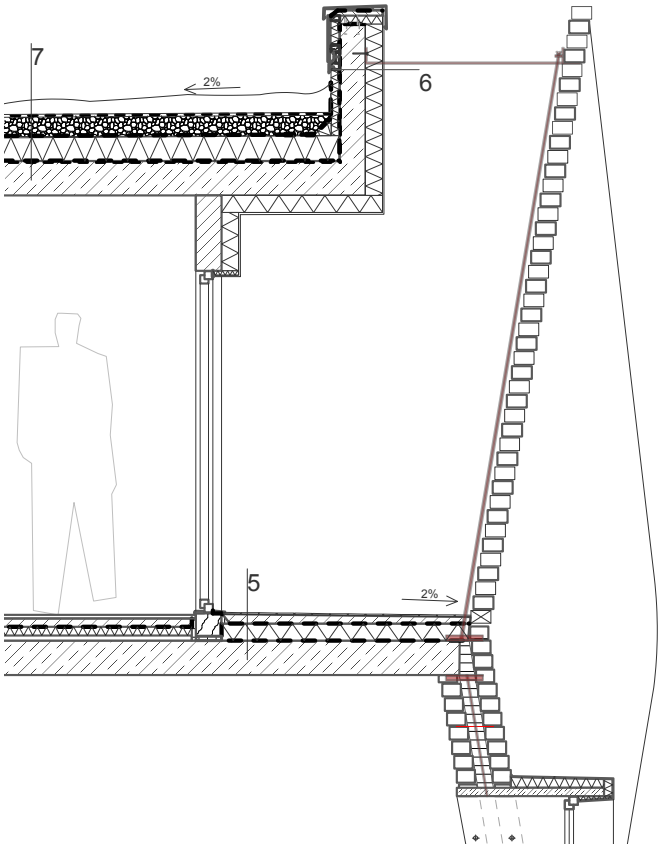


Fig.10.6 Construction detail

10.4 Facade section visualisation

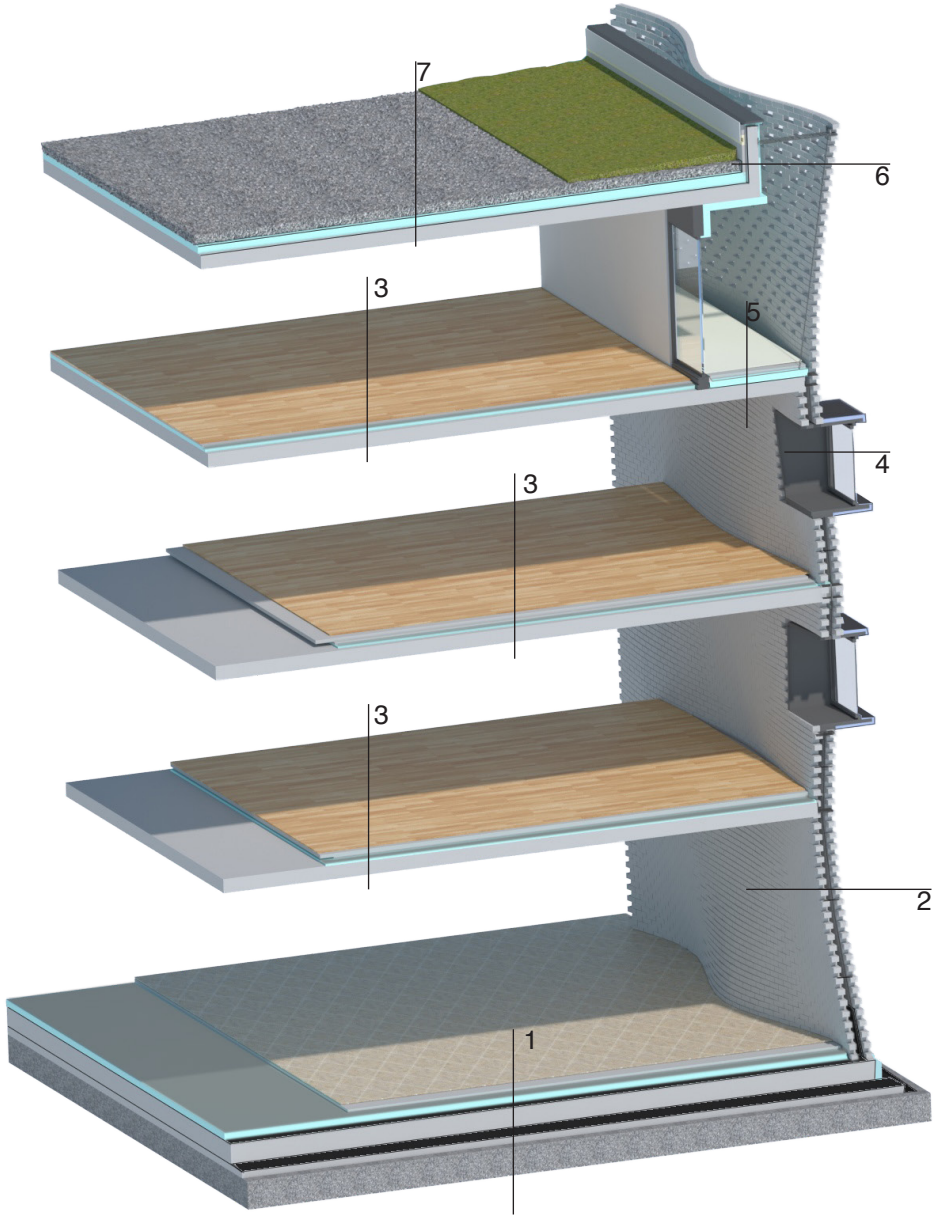


Fig.10.7 Facade section in 3D

Arabesques are a fundamental and specific element of Islamic religion.
As in Islam, worship of statues and animals is prohibited, decoration and paintings of human faces and animals on the buildings are not allowed.
For the project of new residential buildings in Syria, it is planed to implement traditional arabesque decoration on a fence design in courtyard. They could be made from various materials and in different colours.
With simple light colours of surrounding walls in courtyard, arabesque will give a refreshing touch and spirit of tradition.
They can be made as a shadings for a windows and doors.
Thousands of patterns are available and local craftsmen and artists would be in charge of their production.

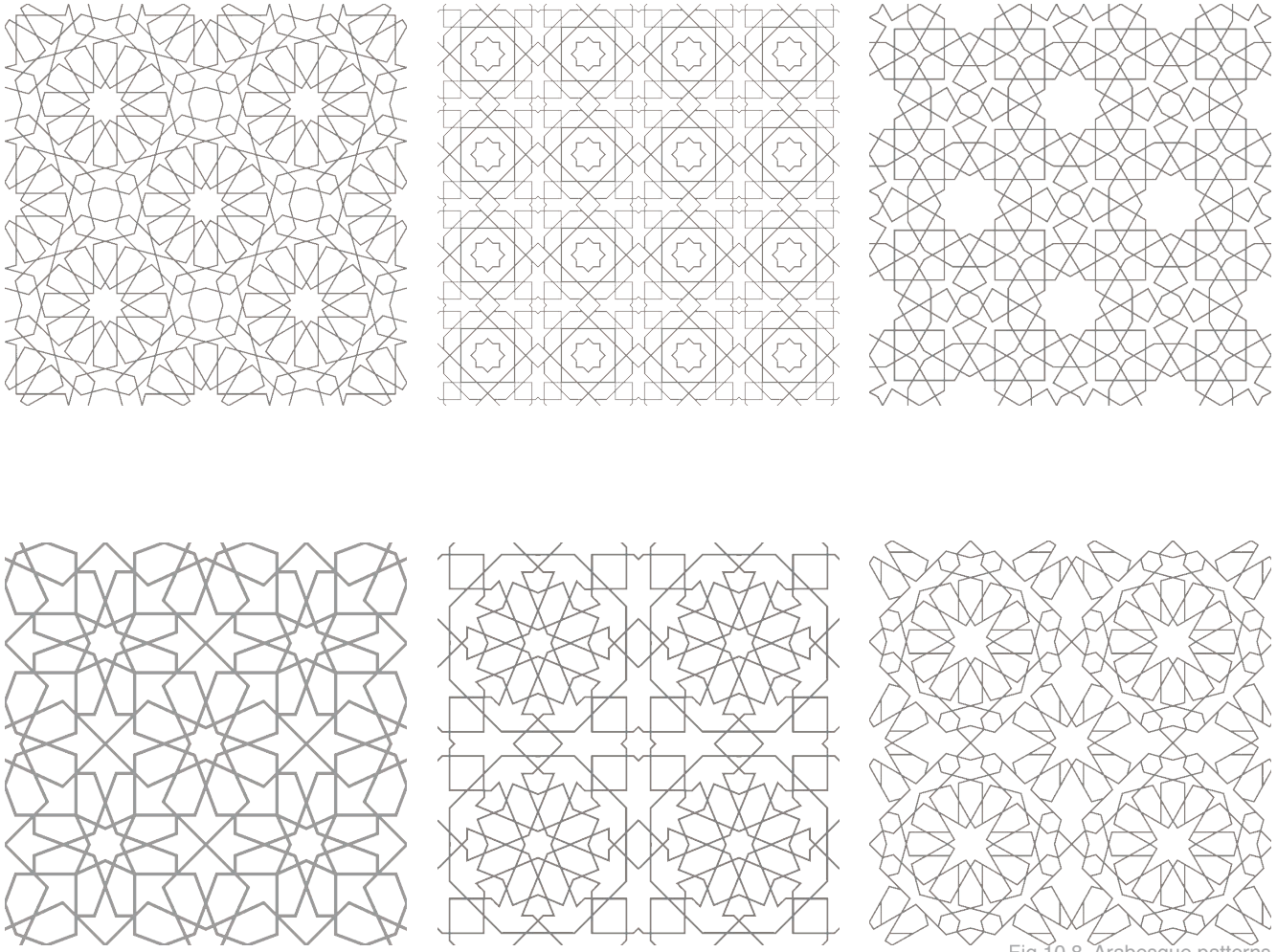


Fig.10.8 Arabesque patterns

11. Visualisation

Fig.10.1 Detail of visualisation- facade

Fig.11.2 Visualisation - regular size of windows

Fig.11.3 Visualisation - irregular size of windows

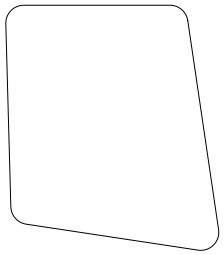
Fig.11.4 Visualisation - courtyard

Fig.11.5 Visualisation- street view. Regular size of windows

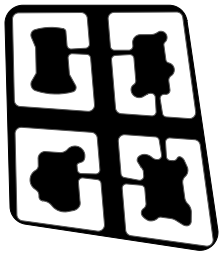
Fig.11.6 Visualisation- street view. Irregular size of windows

12. Calculation of area

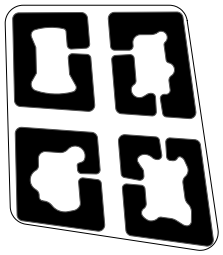
Calculation of area:



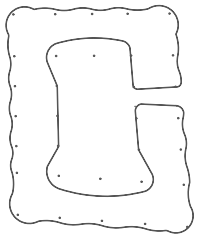
Plot free area:
10.266m^2= 1.02Ha
100%



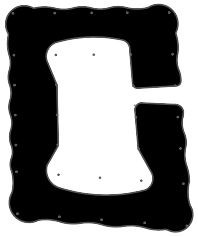
Plot- free area:
5.264m^2
51,3%



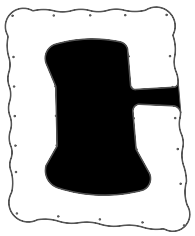
Plot- built area:
5.002m^2
48,7%



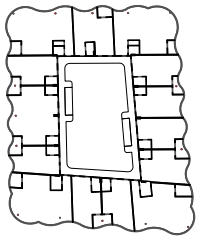
Ground floor- construction:
30,4m^2
3,14%



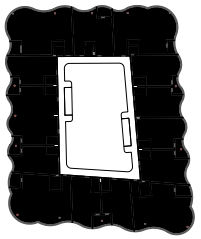
Ground floor- net area :
966,7m^2
96,86%



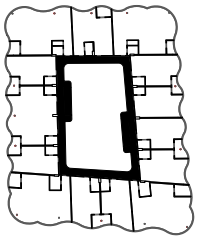
Ground floor :
Courtyard:
546,3m^2



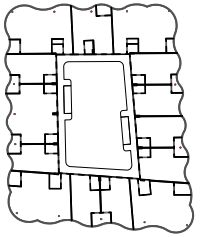
1st floor- construction:
142m^2
22,4%



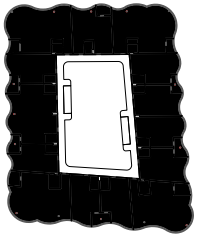
1st floor- net area:
1214m^2
68,14%



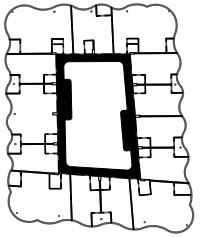
1st floor- traffic area:
128,4m^2
9,46%



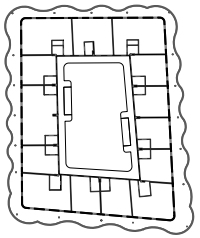
2nd floor- construction:
142m^2
22,4%



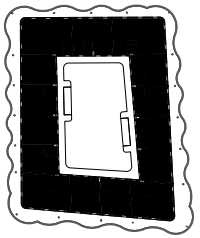
2nd floor- net area:
1214m^2
68,14%



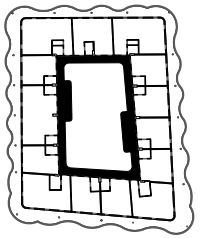
2nd floor- traffic area:
128,4m^2
9,46%



ATTIC- construction:
320m^2
24,1%



ATTIC- net area:
1198 m^2
67,4%



ATTIC- traffic area:
128,4 m^2
8,5%

Fig.12.1 Calculation of area

13. Attachment

Figure list:

Fig. 4.5 Damascus during civil war, January 31, 2014; http://www.bloomberg.com/news/articles/2015-04-05/jihadist-cash-lures-syria-refugees-as-international-aid-dwindles
Edited Irma Hasic- PS
Fig. 4.6 Aleppo; © Irma Hasic, Photoshop
Fig. 4.7 Aleppo before civil war; https://mic.com/articles/87343/then-and-now-photos-show-what-aleppo-looked-like-before-it-was-destroyed-by-civil-war#.LfZLtDBpP
Edited Irma Hasic- PS
Fig. 4.8 Aleppo during civil war (2016); http://www.asianews.it/news-en/Vicar-of-Aleppo-says-Syrian-people-do-not-want-war-which-is-fomented-by-foreigners-36646.html
Edited Irma Hasic- PS
Fig. 4.9 Hama; © Irma Hasic, Photoshop
Fig. 4.10 Hama before civil war; https://en.wikipedia.org/wiki/Hama
Edited Irma Hasic- PS
Fig. 4.11 Hama during civil war; https://en.wikipedia.org/wiki/2015_Hama_offensive
Edited Irma Hasic- PS
Fig. 4.12 Homs; © Irma Hasic, Photoshop
Fig. 4.13 Homs before civil war; https://en.wikipedia.org/wiki/Homs; August 2016
Edited Irma Hasic- PS
Fig. 4.14 Homs during civil war; google maps, image credit; bassam
Fig. 5.1 Refugees illustration; Irma Hasic, Photoshop
Fig. 5.2 Syrian asylum applications from April 2011 to May 2014; results taken from: https://en.wikipedia.org/wiki/Refugees_of_the_Syrian_Civil_War; August 2016; Irma Hasic, Photoshop
Fig. 5.3 Refugees path to Europe; © Irma Hasic, Photoshop
Fig. 5.4 Refugee camp Illustration, © Irma Hasic, Photoshop
Fig. 5.5 Quote, Architecture Competition, Matterbetter.com
Fig. 5.6 Syria in ruins
https://www.reddit.com/r/pics/comments/3yq7a9/the_destructiveness_of_war_in_syria/; August 2016; Edited Irma Hasic- PS
Fig.5.7 Ruins of Syria
http://disquietreservations.blogspot.co.at/2013/07/halla-diyab-syrian-film-maker-and-womens.html; August 2016; Edited Irma Hasic- PS
Fig.6.1 Court yard concept development; © Irma Hasic, Vectorworks16E, Photoshop
Fig.6.2 Insolation concept development; © Irma Hasic, Vectorworks16E, Photoshop
Fig.6.3 Materials and construction illustration; © Irma Hasic, Vectorworks16E, Photoshop
Fig.6.4 Concrete texture; http://magnum.florim.it/en/rex/; Edited Irma Hasic- PS
Fig.6.5 Precast main concrete elements: frame, wall, floor; © Irma Hasic, Vectorworks16E
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Fig.6.7 Types of precast columns; © Irma Hasic, Vectorworks15E
Fig.6.8 Types of precast beams; © Irma Hasic, Vectorworks15E
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Fig.6.10 Different precast elements; © Irma Hasic, Vectorworks15E
Fig.6.11 Types od precast foundation; © Irma Hasic, Vectorworks15E
Fig.6.12 Evolution of drawings. Precast apartment units; © Irma Hasic, Vectorworks15E, Photoshop
Fig.6.13 Evolution of drawings. Concept development and apartment flexibility; Irma Hasic, Vectorworks15E, Photoshop
Fig.6.14 Concept development. Renderings, floor plan, construction; Irma Hasic, Vectorworks15E, Artlantis, Photoshop
Fig.7.1 Sketch; © Irma Hasic, 3DMax16, Photoshop
Fig.7.2 Ruins of Syria; http://photo.sf.co.ua/id154?lang=ru; January 2017; Edited by Irma Hasic-PS

Fig.7.3 Damascus Center; google earth photo; Edited by Irma Hasic- PS
Fig.7.4 Damascus Mosque; google earth photo; Edited by Irma Hasic- PS
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Fig.7.17 Urban concept development (2050); Irma Hasic, 3DMax16, Corona Render
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