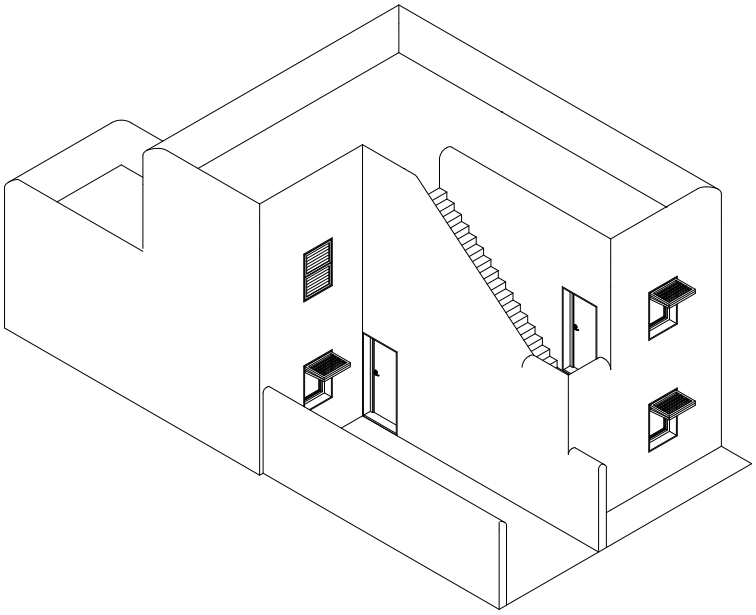
Radical Vernacular

A New Ethiopian Urbanity



Graduation Book

Alex Hewitson

Radical Vernacular

A New Ethiopian Urbanity

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Master's Thesis
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TU Delft Faculty of Architecture
Chair of Architecture & Dwelling
Global Housing Graduation Studio
'Addis Ababa Living Lab'

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Ras Ghemb, Gondar

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1.0

Introduction

Motivation

Since I began my architectural education I have been interested in both socially-minded architecture and the architecture of housing. I attempted to cover both these areas in my bachelor's thesis project at the University of Bath – a home for people living with dementia entitled Dignity + Domesticity. Having participated in studios and design projects covering a diverse range of topics during my master I wished to return to these topics of social architecture and housing for my graduation project. Since my education has been in the UK, Germany and the Netherlands, most lectures and design assignments have focused on issues concerning the Global North (especially Europe and the US). My choice of the Addis Ababa Living Lab studio was strongly motivated by my desire to study the issues concerning architecture, and particularly dwelling, in the Global South. The most rapidly developing economies in the world , and the most rapidly urbanizing cities are all in the Global South. This means not only that these rapidly developing economies will likely experience significant growth in the construction sector, but also that many of the urban challenges facing architects in the future will occur in these countries. Ethiopia is a prime example of a country whose economy is developing rapidly and with a high rate of urbanisation. Additionally, the country and its capital, Addis Ababa, naturally have their own specific challenges. To this end, I chose the Addis Ababa Living Lab as my graduation studio in order to learn about these general and specific challenges and to attempt to tackle some of them through my research and design.

2.0

Site Information

2.1 Ethiopia

Ethiopia, located in the Horn of Africa, is the world's most populous landlocked country (with a population of around 110 million). Along with Liberia, it is one of only two modern-day African nations never to have been colonised. Scholar K.V. Ram highlights some of the reasons for its continued survival through the centuries:

Its geographical characteristics (and the locations of its dynamic settlements).

The inherent strength and solidity of its national consciousness, both in its culture and religion.

The quality of its leadership.

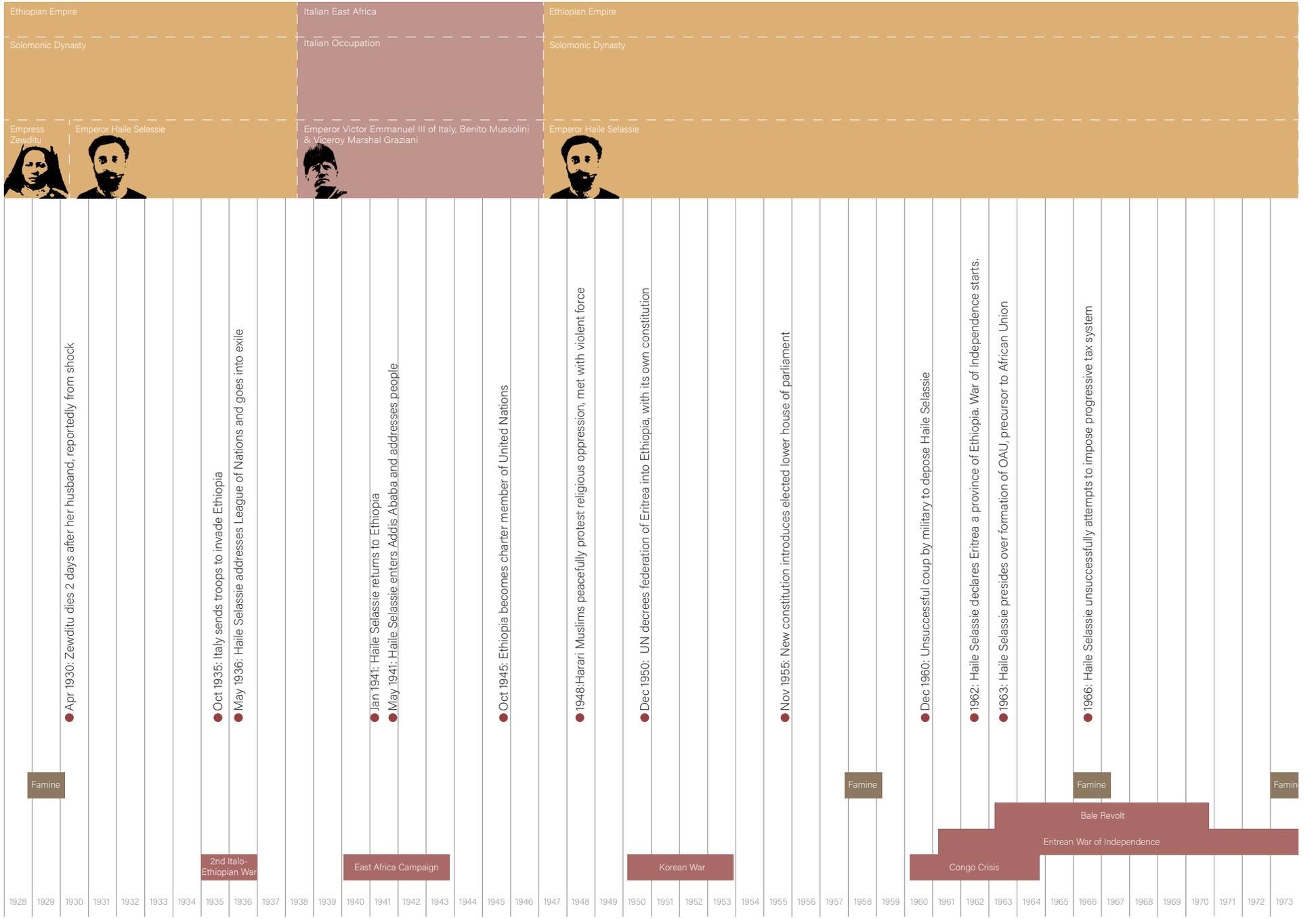
The determination of Ethiopian people to preserve their independence and its rich ethnical diversity. (Ram 1977).

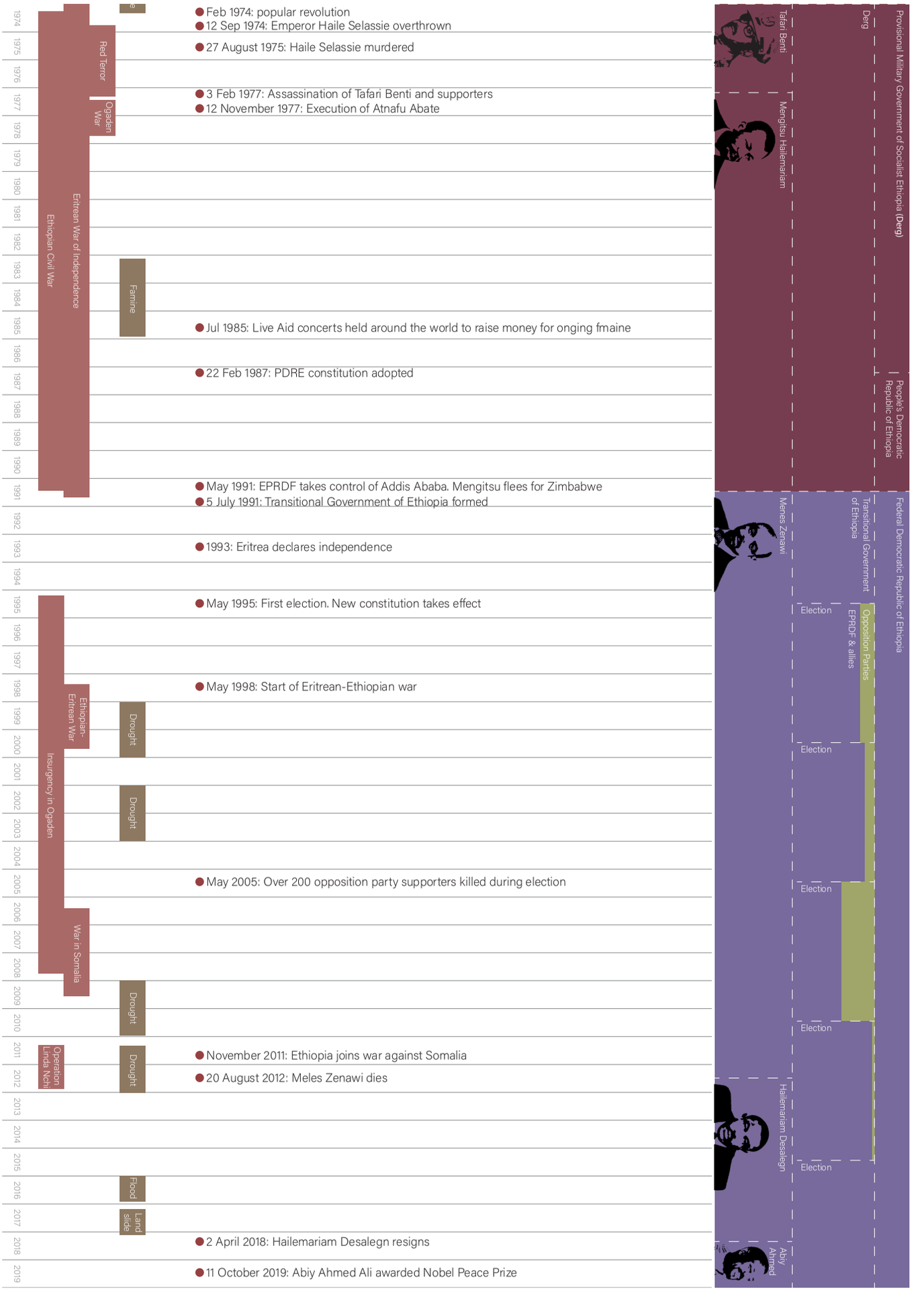
The Imperial line that ruled Ethiopia for centuries traces its history back to the Biblical King Solomon, a story that is recounted in the Kebra Nagast. This dynasty was ended with Emperor Haile Selassie, considered to be the returned Messiah in the Rastafarian religion, whose reign ended with the popular revolution of 1974. Prior to this, his reign was interrupted by a brief period of Italian occupation in the mid-20th century, during which time he was in exile in the UK.

Following the 1974 revolution, the country was ruled by the socialist Derg (or Dergue) regime, who in turn were overthrown in 1991. Since then Ethiopia has been governed as a federal democracy, with high levels of power granted to eleven individual states and chartered cities. Its current leader, Abiy Ahmed Ali, won the Nobel Peace Prize in 2019 for his role in ending the decades-long conflict between Ethiopia and Eritrea.

Left - Bridge to Blue Nile Falls, Bahar Dar

Modern History

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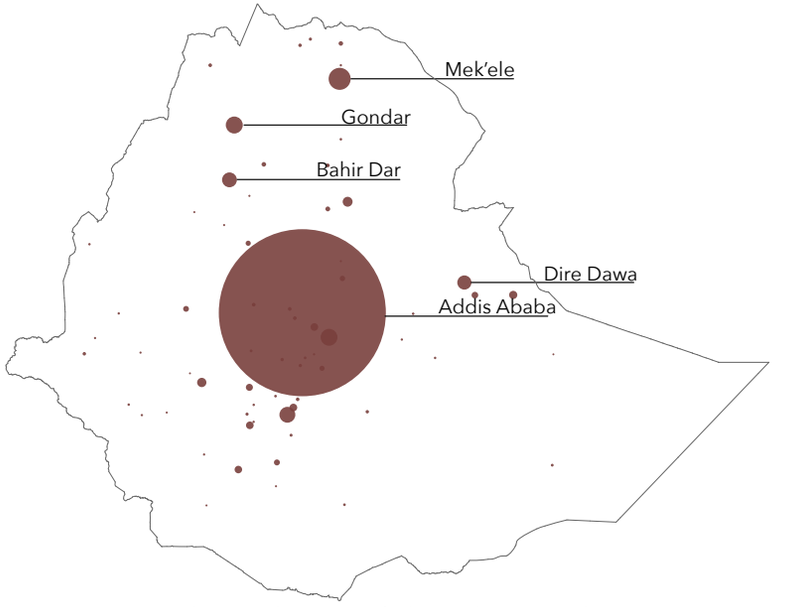
2019
Red Terror
Ogaden War
Eritrean War of Independence
Ethiopian Civil War
Famine
Ethiopian-Eritrean War
Insurgency in Ogaden
War in Somalia
Drought
Drought
Drought
Drought
Operation Linda Nchi
Flood
Land slide
Feb 1974: popular revolution
12 Sep 1974: Emperor Haile Selassie overthrown
27 August 1975: Haile Selassie murdered
3 Feb 1977: Assassination of Tafari Benti and supporters
12 November 1977: Execution of Atnafu Abate
Jul 1985: Live Aid concerts held around the world to raise money for onging fmaine
22 Feb 1987: PDRE constitution adopted
May 1991: EPRDF takes control of Addis Ababa. Mengitsu flees for Zimbabwe
5 July 1991: Transitional Government of Ethiopia formed
1993: Eritrea declares independence
May 1995: First election. New constitution takes effect
May 1998: Start of Eritrean-Ethiopian war
May 2005: Over 200 opposition party supporters killed during election
November 2011: Ethiopia joins war against Somalia
20 August 2012: Meles Zenawi dies
2 April 2018: Hailemariam Desalegn resigns
11 October 2019: Abiy Ahmed Ali awarded Nobel Peace Prize
Provisional Military Government of Socialist Ethiopia (Derg)
Derg
Tafari Benti
Mengitsu Hailemariam
People's Democratic Republic of Ethiopia
Federal Democratic Republic of Ethiopia
Meles Zenawi
Transitional Government of Ethiopia
EPRDF & allies
Opposition Parties
Election
Election
Election
Election
Election
Hailemariam Desalegn
Abiy Ahmed

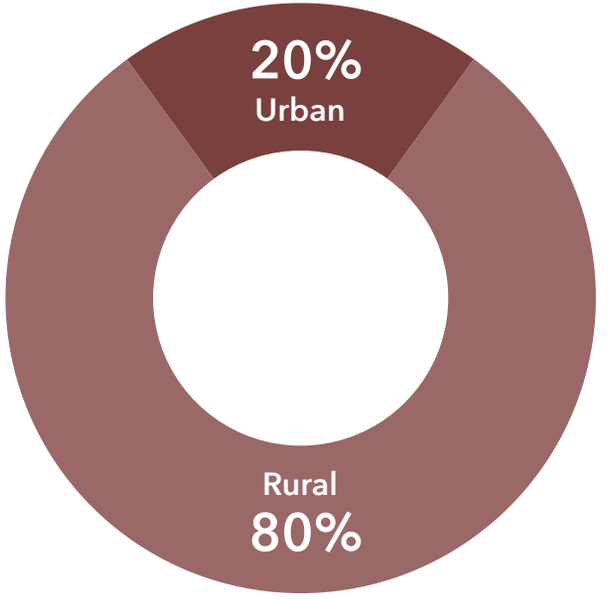
Population Distribution

Ethiopia is one of the world's least urbanised countries, ranking 175th out of 188 on the World Bank's urbanisation metric (World Bank 2019). Of its 110 million inhabitants, 88 million live in rural areas, accounting for 80% of the population.

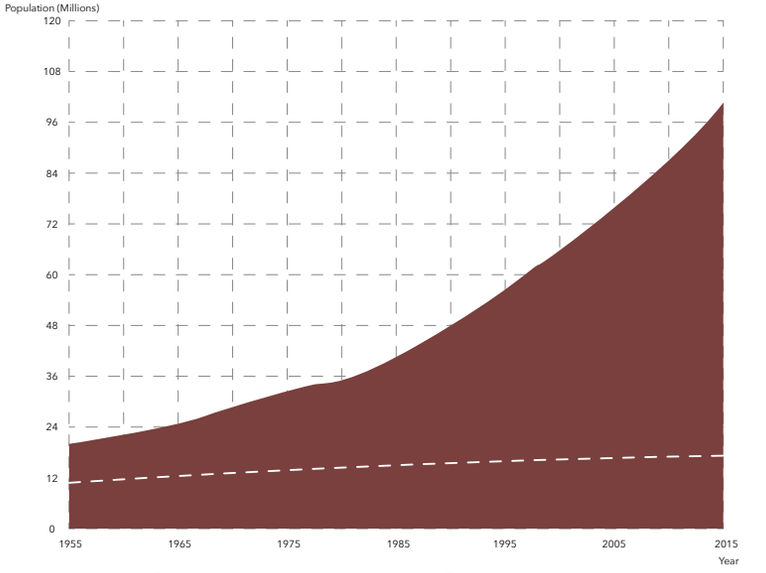
The relatively small urban population of Ethiopia is distributed unevenly, with Addis Ababa being by far the largest city. As of 2016, Addis Ababa had over 3,350,000 inhabitants, accounting for 15% of the country's urban population. In comparison, the second largest city is Mek'ele, with a population of roughly 400,000 (as of 2016), only 13% that of Addis Ababa.



Map showing relative sizes of urban settlements in Ethiopia



Graph showing proportion of rural and urban populations



Graph showing total population of Ethiopia in millions.
Population in The Netherlands is shown below the dotted line for comparison.

2.2 Addis Ababa

Addis Ababa, the capital and largest city of Ethiopia, was founded by Emperor Menelik II in 1889. Previously, the country's capital had been itinerant, moving around the country with the Emperor and his entourage, until it settled in Entoto, close to the current capital.

Addis Ababa is located on a high plateau, 2,400m above sea level, and is the highest African capital. Since the 1970s the city has undergone major development, with hundreds of thousands of migrants choosing to move to the capital from rural areas, many of which were significantly affected by droughts and famines in the latter half of the 20th century.

It is a primate city, with a population far exceeding other Ethiopian cities. A melting pot of all Ethiopian ethnicities and the home of the African Union, Addis Ababa holds a special place not just in Ethiopia but throughout the African continent.

As a rapidly expanding city, Addis Ababa faces a challenge in housing its growing population. Tensions have risen between the city's government and that of neighbouring state Oromia, as recent municipal housing developments have been built on land claimed to be Oromian territory.

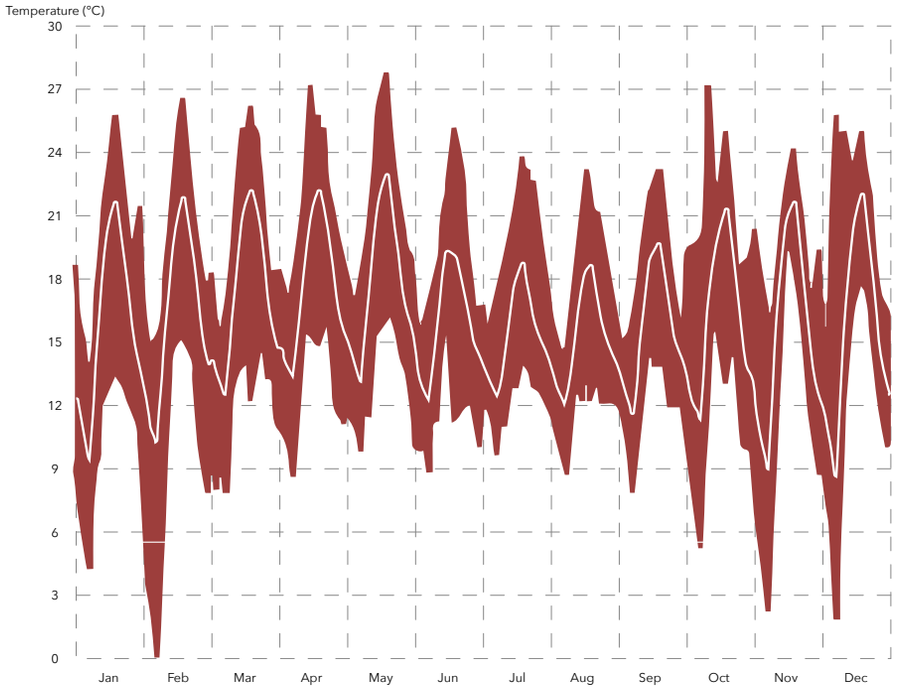
Left - View of Addis Ababa from Lideta Mercado

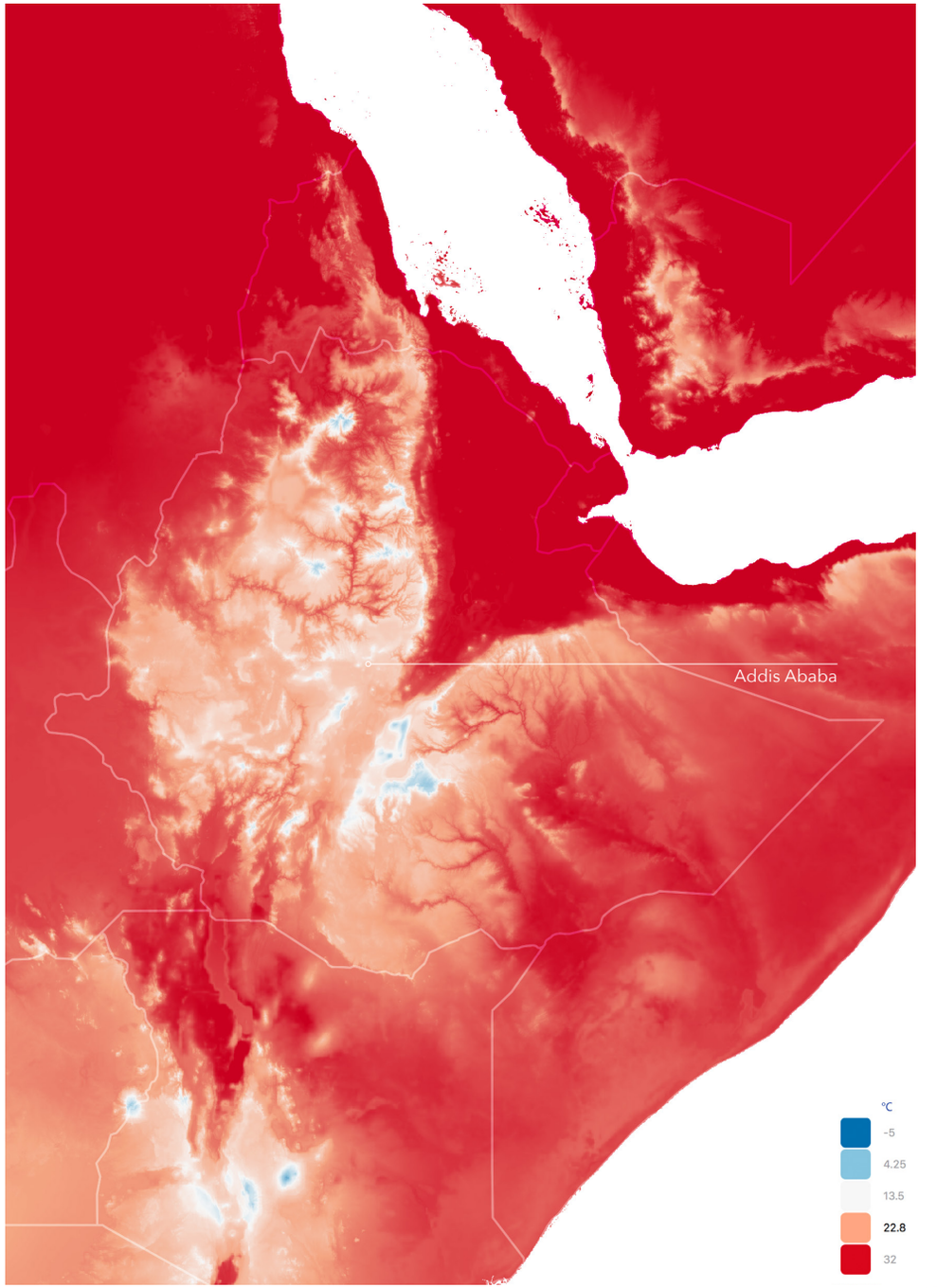
Temperature

Addis Ababa is located in a subtropical highland climate zone, one of several climate types found in Ethiopia. The climate types vary by region, and altitude plays a large role in these differences.

In general, the average daily temperature of 16°C in Addis Ababa does not change greatly over the year, though there is a small dip in the summer months from June to September. The main variation, however, occurs during the daily cycle - the daylight hours (from 6am to 6pm) are warm, whilst the nighttime hours (from 6pm to 6am) are cool.

The graph below shows the temperature range for each month (in red) and an average daily temperature cycle (in white). Opposite is a heat map of Ethiopia, showing average temperatures across the country.

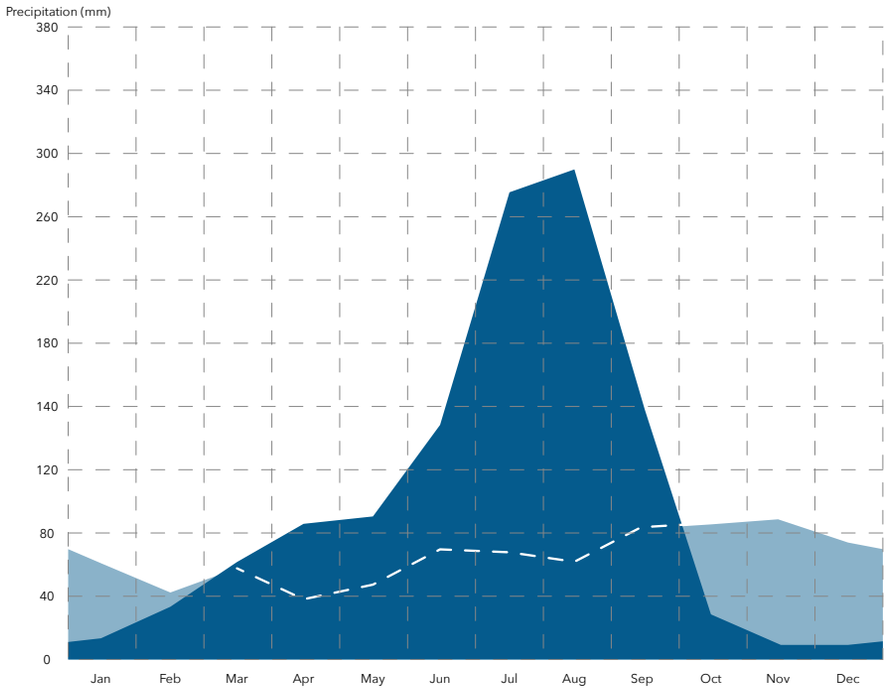


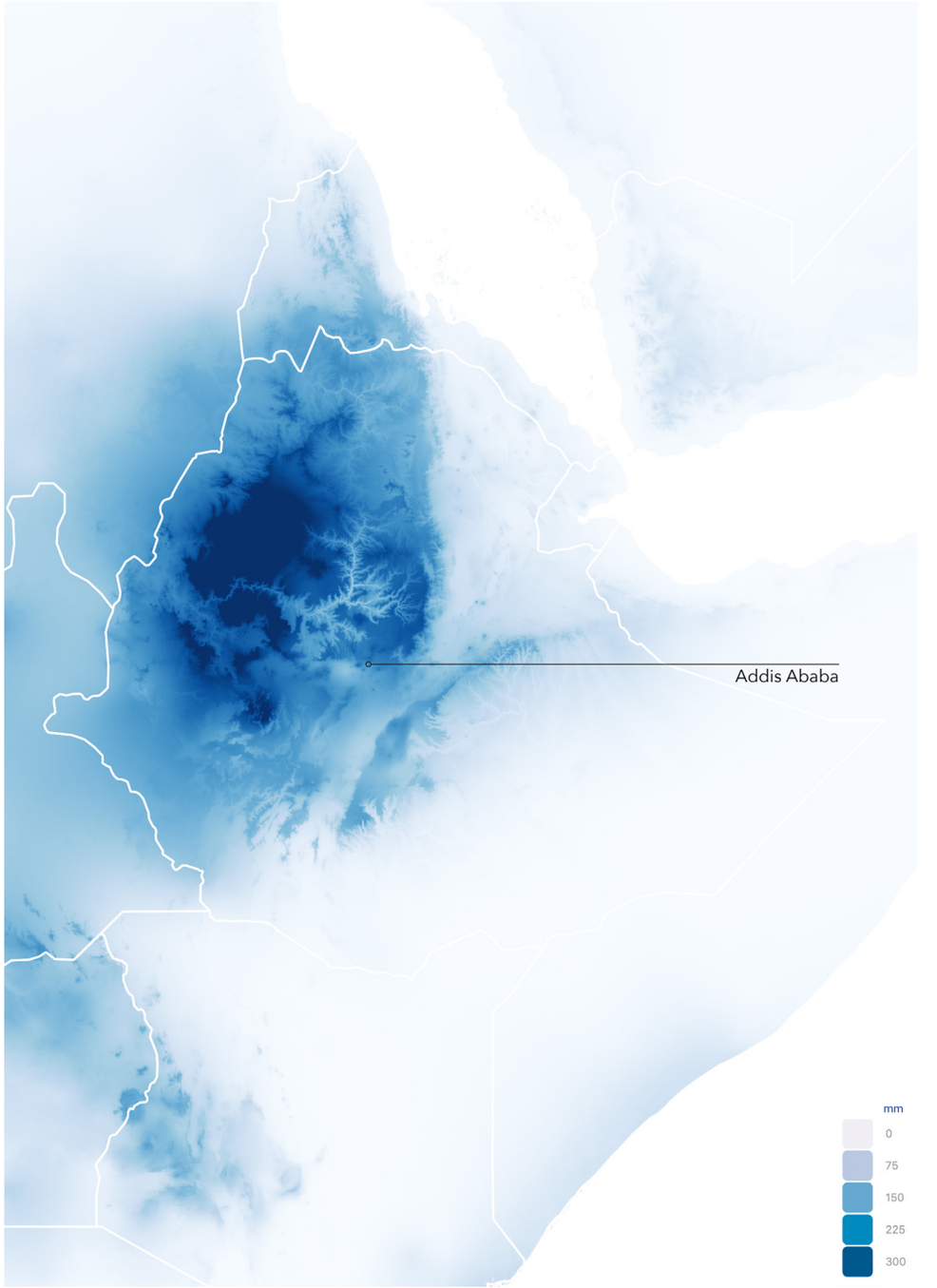


Precipitation

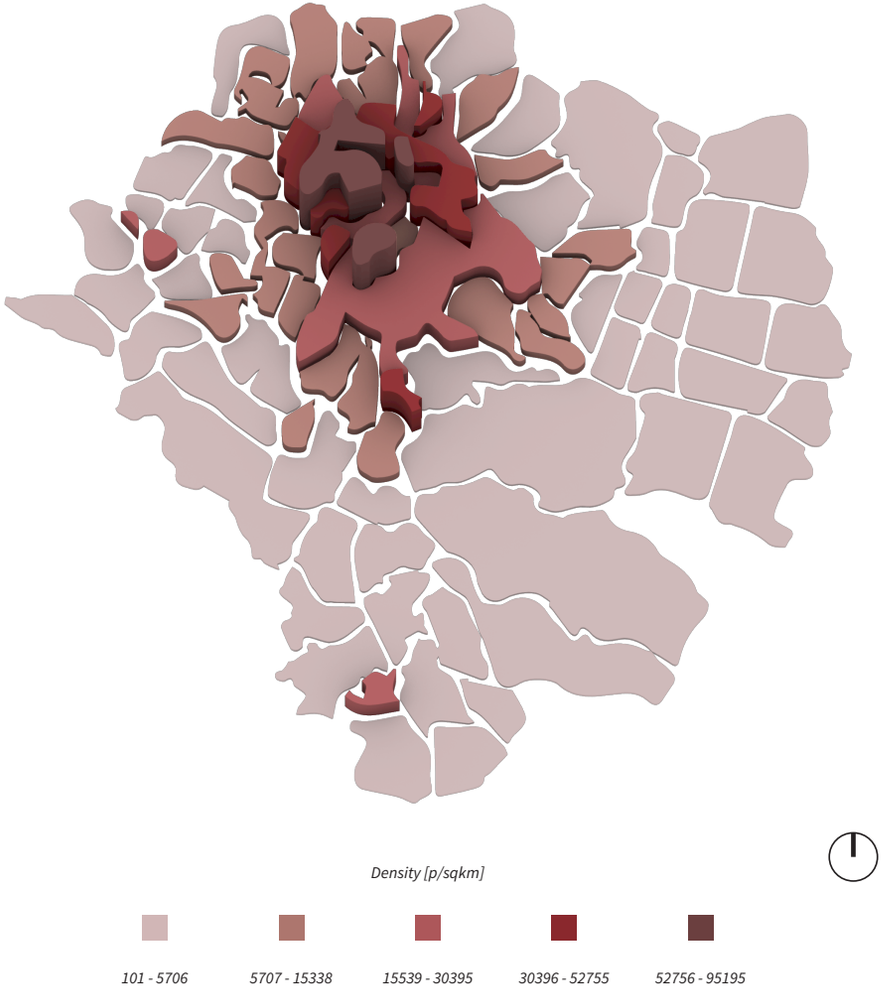
Addis Ababa has two seasons - a wet summer and a dry winter. During the summer months from June to September (when the temperature is also cooler), high levels of precipitation occur, up to 280mm per month.

The graph below shows monthly precipitation for Addis Ababa (dark blue), and for comparison, Amsterdam (light blue). Opposite is a precipitation map of Ethiopia, showing monthly precipitation across the country.



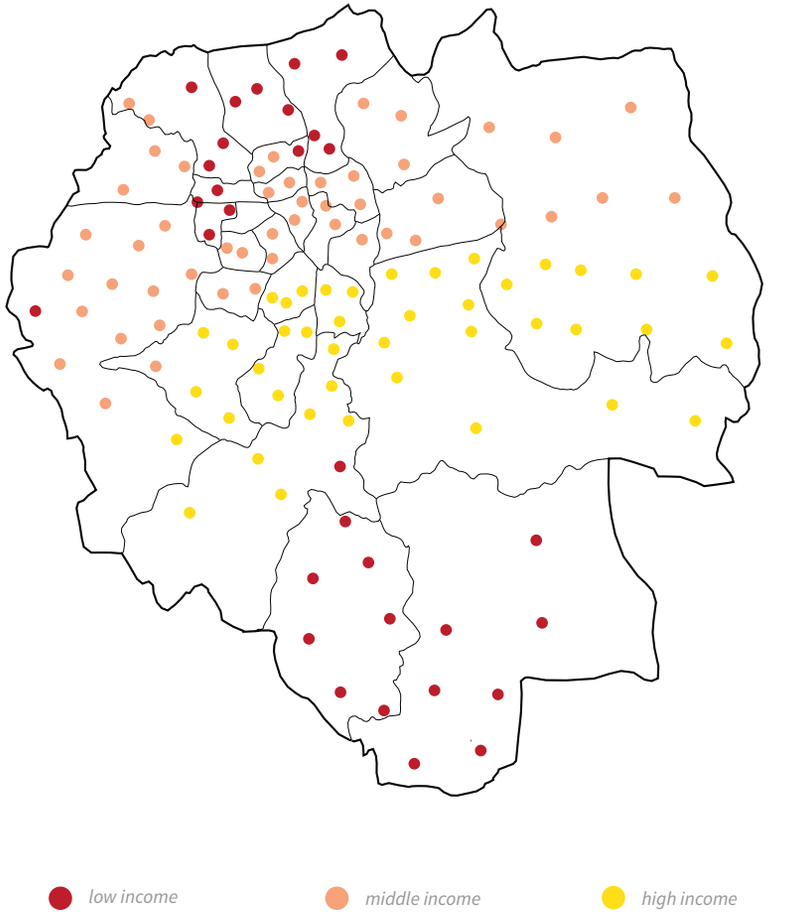


Population Density



Map showing population densities in Addis Ababa

Income Brackets



Map showing distribution of income brackets in Addis Ababa

2.3 Gerji Project Site

The chosen project site is a neighbourhood in Gerji, in the east of Addis Ababa, close to Bole Airport and the National Stadium. Though outside of the inner city, as defined by the extents of the ring road, Addis Ababa's recent and rapid expansion has meant that areas such as Gerji are culturally, if not physically, metropolitan.

The site is owned by the Federal Housing Corporation, a governmental agency tasked with maintaining, administering and developing homes (Federal Housing Corporation n.d.). The site is roughly 12.5 hectares and consists of single-storey, primarily single-family homes, housing mainly middle-income residents.

The site is earmarked for development by the FHC, in accordance with the city's masterplan. This advises a "mixed residential" use for the scheme with an FAR of 0.5 and maximum building height of 35m, with a higher denisty to the south-west edge bordering the commercial road.

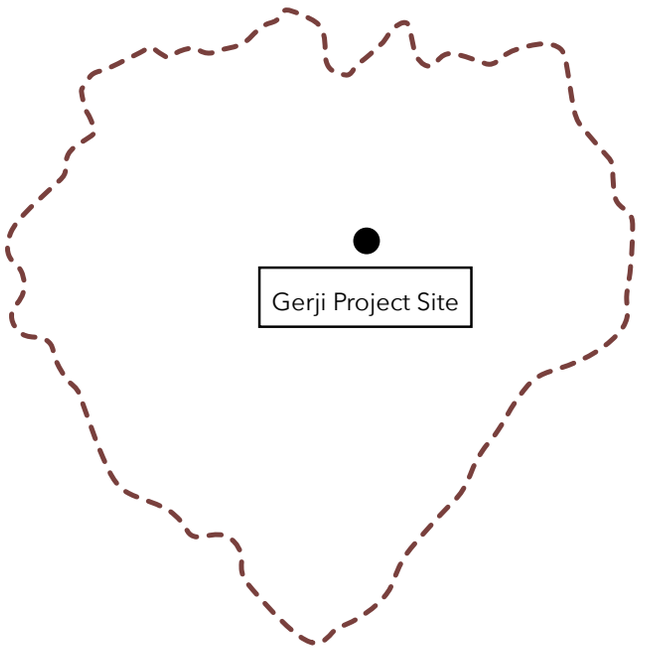
The site is characterised by its suburban atmosphere, which is at odds with its surroundings. The FHC's strict rules in the area prohibit commercial activity, so whilst the site's position would encourage this, it does not currently exist. Dwellings are noticeably private, often enclosed by ,arge fences and gates for security. Private gardens are well-tended and established, whilst public spaces are neglected.

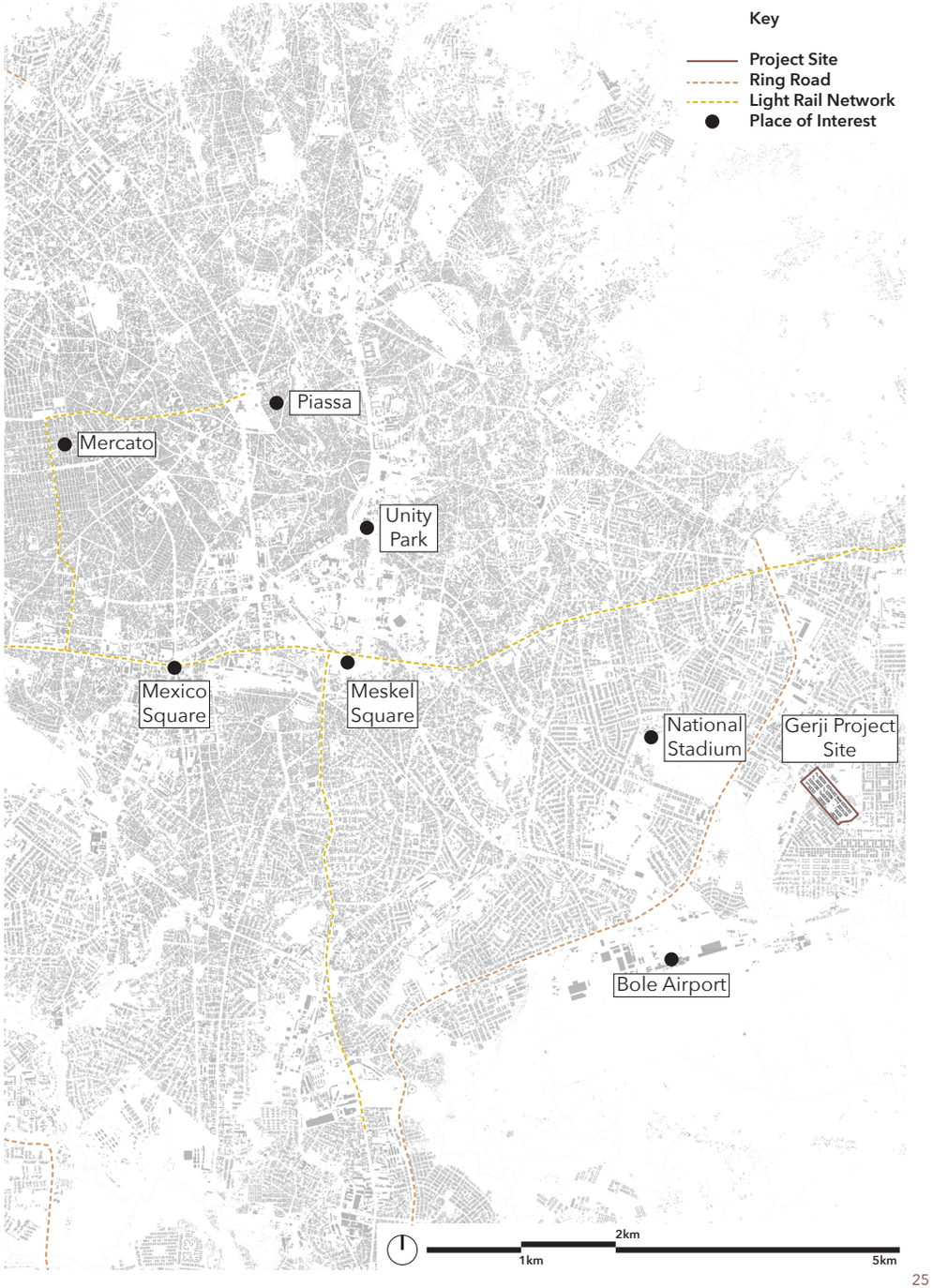
Left - Typical street in project site

Location

Gerji is a neighbourhood in the east of Addis Ababa and in the Bole sub-city. The site is close to the Addis Ababa Ring Road, an important connection in a city that lacks public transport options. It is also roughly 8km from the historical centre of Mercato and Piassa, and 5km from the major interchange at Meskel Square.

The site is bordered by a major commercial road to the north-west, and a second, more major, commercial road to the south-west. Beyond this major road is Adwa Park, which connects the Gerji neighbourhood with Bole and the international airport. To the north-east are Unity University, the Korean Hospital, and a recently re-developed school. To the south-east is the Gerji Condominium development, which was the pilot project for the city's housing programmes.

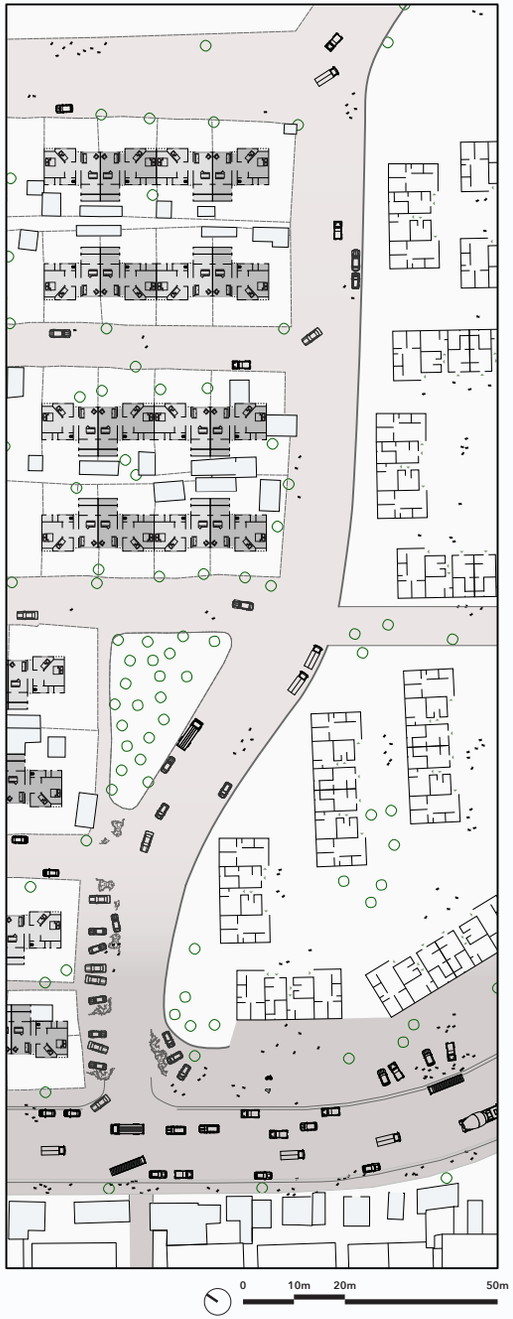




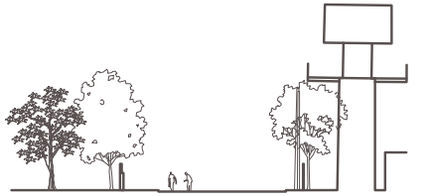
Site Map

Unity University
Korean Hospital
Good News Church
Adwa Park
Nigerian Embassy Apartments
School
Police Station

Ground Plan



Street Sections



Section A-A’

Section D-D’

Section B-B’

Section E-E’

Section C-C’

Section F-F’

Section G-G’

Section H-H’

Site Photographs

Dwelling Entrance

Road to Adwa Park

Neighbourhood Park

Adwa Park

Site Surroundings

Gerji Condominiums (south-east)

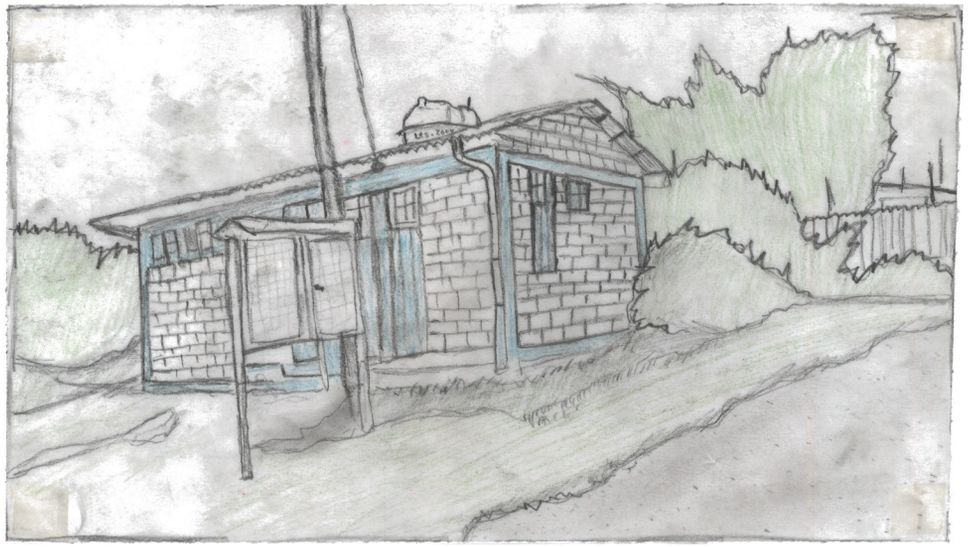
Commercial road (south-west)

Gerji Condominiums (south-east)

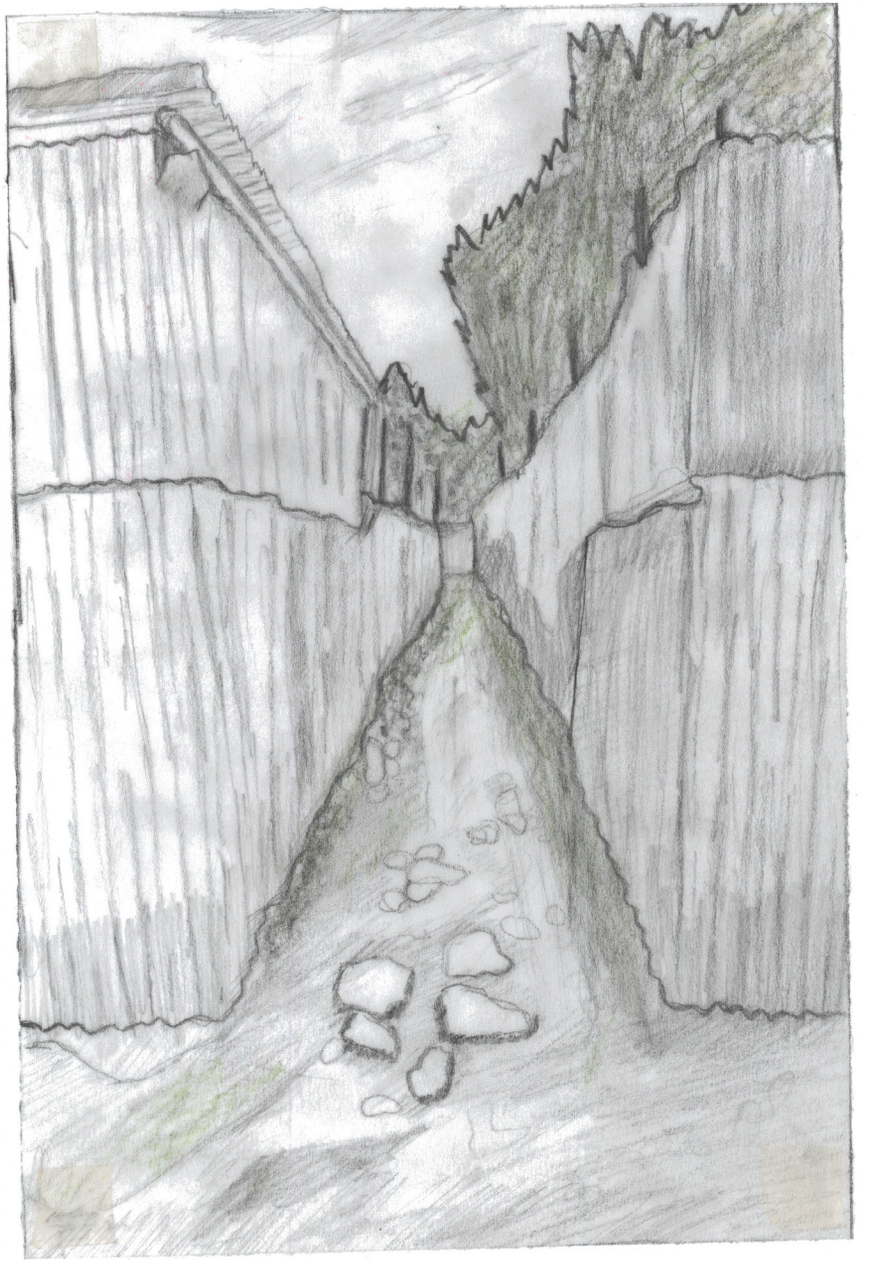
Beside Entrance to Unity University (north-west)

Street Sketches

Commercial Road at South-West Site Boundary



Public Toilets



Typical Alleyway

Existing Buildings

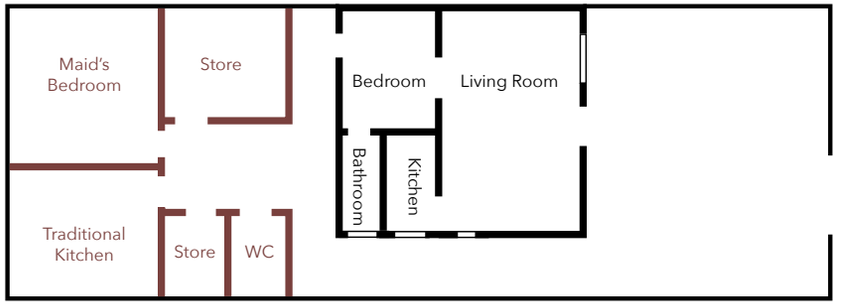
The existing buildings on the site are all single-storey dwellings, which are generally occupied by a single middle-class household. There are, of course, exceptions to this - some households rent out rooms to other families or have built outbuildings or extensions for rental on the informal market.

There are four basic forms of housing on the site - studios, 1-bedroom units, back-to-back 2-bedroom houses, and semi-detached 2-bedroom houses. Most units have been extended over the years, often in an informal way.

Though accurate figures are difficult to establish, it is estimated that 319 individual households live on the site. Some households operate businesses from the dwelling, but as this is prohibited by FHC rules, these are generally not customer-facing businesses.

Typology 1 - Studio

Typology 2 - 1-bedroom



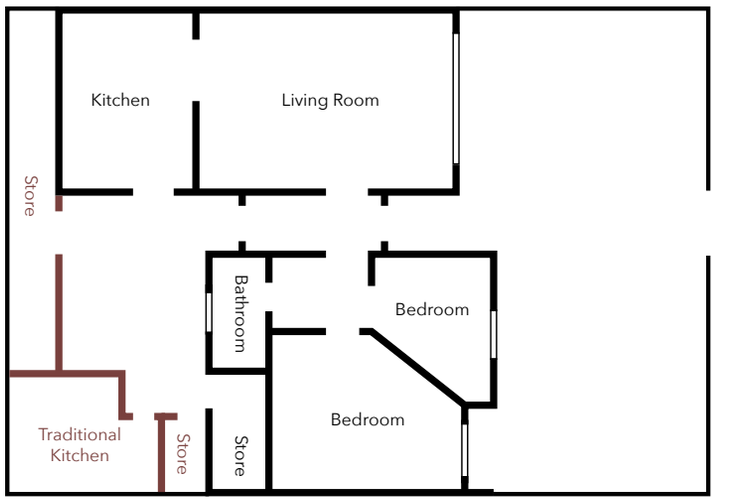
Key

Original Building

Extension

Typology 3 - 2-bedroom back-to-back

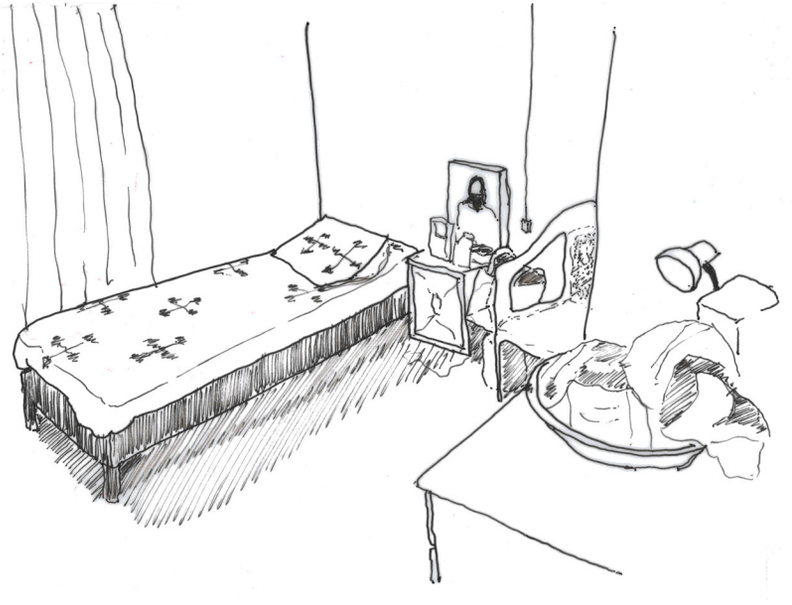
Typology 4 - 2-bedroom semi-detatched



Existing Buildings Sketches

Typology 2, Living Room

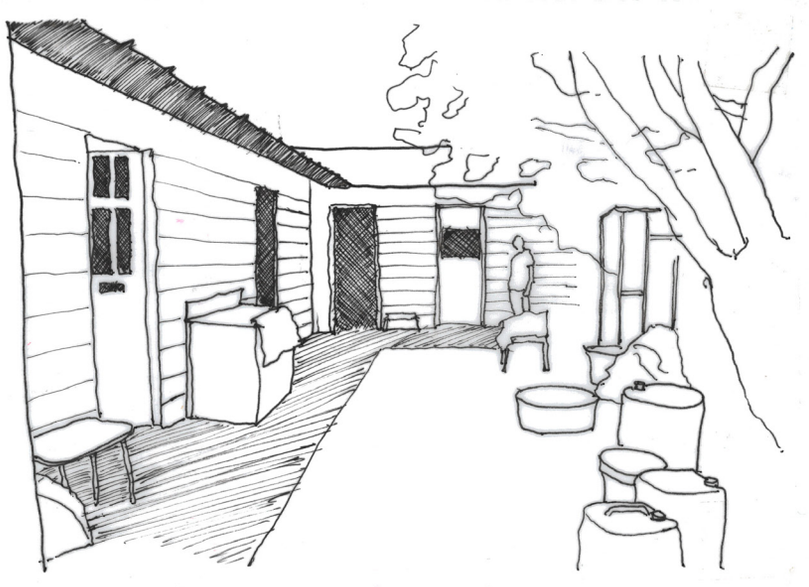
Typology 2, Traditional Kitchen Extension



Typology 2, Bedroom

Typology 4, Traditional Kitchen Extension

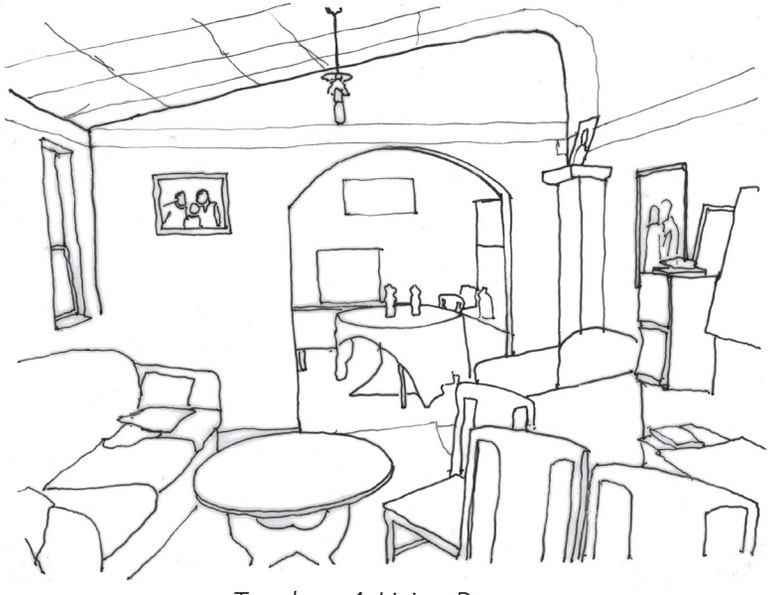
Existing Buildings Sketches



Typology 3, Yard

Typology 1, Bedroom Extension

Typology 4, Living Room



Typology 4, Living Room

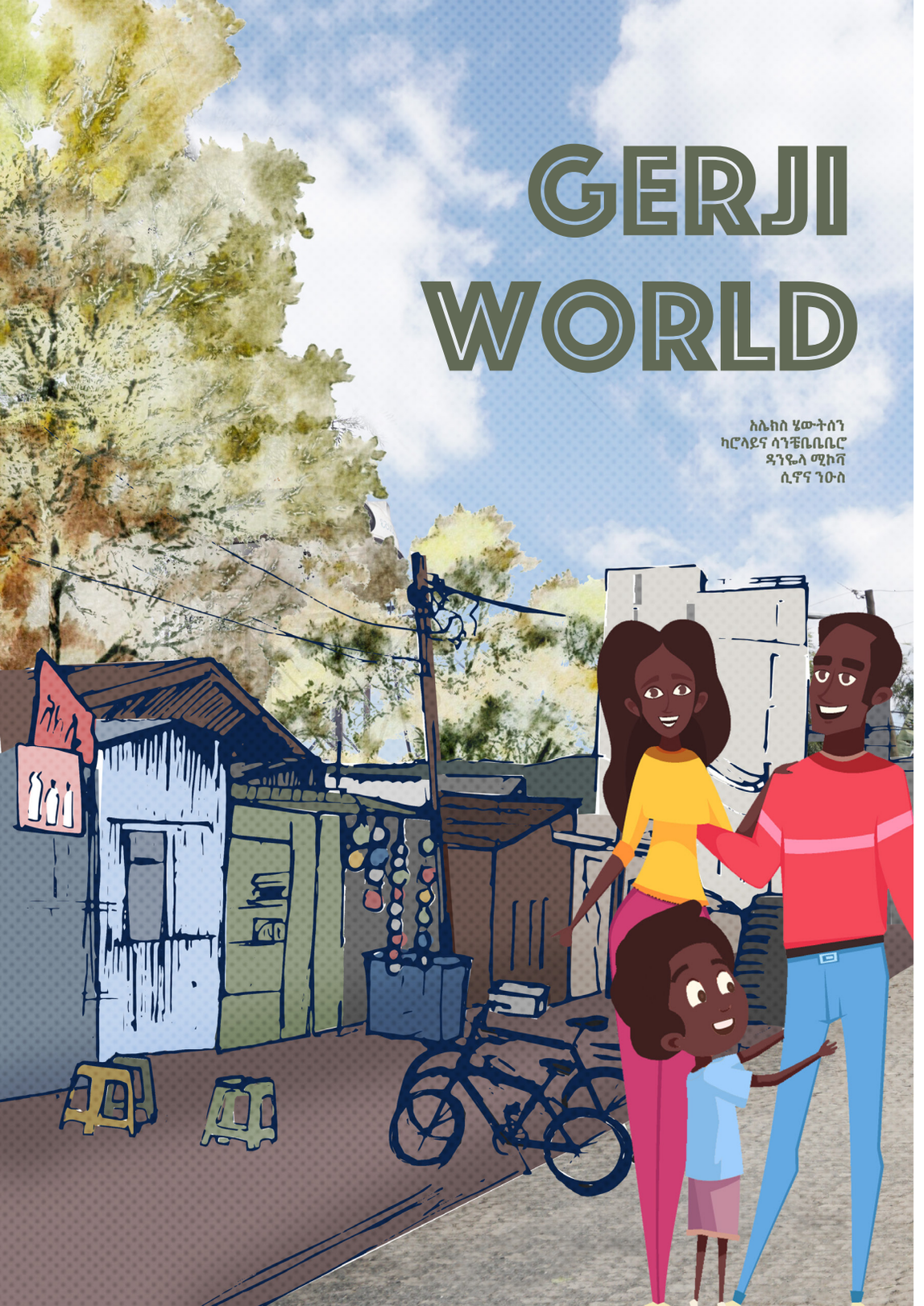
Site Data

Site Ownership:	**FHC**
Tenure:	**Social rental, (sub-rental)**
Function:	**Residential (community)**
Dwelling Units:	**319**
Total Units:	**319**
Dwellings/Hectare:	**25.5**
FSI:	**0.43**

Housing Typology	**Monthly Costs**
Typology 1: (3-person household)	200 Birr - Rent 400 Birr - Electrics 50 Birr - Water
Typology 2: (2-person household)	314 Birr - Rent 320 Birr - Electrics 200 Birr - Water
Typology 3: (10-person household)	400 Birr - Rent 900 Birr - Electrics 100 Birr - Water
Typology 4: (5-person household)	600 Birr - Rent 800 Birr - Electrrics 170 Birr - Water

3.0

Housing & Living Patterns



3.1 Ethnographic Research

A major part of the research for this studio was done in the form of ethnographic research, which was undertaken in groups and culminated in the production of a graphic novel. The research was conducted in various locations across Addis Ababa, and I was involved in research at a site in Gerji, bordering the site of the design project.

The research focussed on the living patterns of people living and working in the neighbourhood. The primary methods used were interviews, sketches, and photographs, which are common tools in architectural ethnography. These were then synthesised and adapted to form a graphic novel, which tells the story of a fictional character, Abiy, and his family and friends. Though the story and characters are made up, they are inspired by real people in the neighbourhood, and the houses and locations depicted are those that were visited in the area.

Within the story the characters are seen going about their daily lives in their homes and in the neighbourhood. Scenes include a coffee ceremony, a traditional custom which is still practiced in many Ethiopian homes; eating traditional injera, a large flat bread eaten with the hands, on which accompanying dishes are served; visiting various local shops including a video shop, where video games can be played and pirated films can be bought; playing football, which is popular among Ethiopian boys and young men; and the Meskel celebration, which takes place on the street in September.

Left - Cover of Gerji World graphic novel

Interviews - Low-rise housing development

Interview 01
1 man, unnamed.

He has been living in the area for 20 years.

Private cooperative housing built under the regime of the Derg.

Usually two typologies of housing - detached and semi-detached.

Houses contain: a living room, outside kitchen and 2-3 bedrooms.

The number of bedrooms might vary. It depends on the cooperatives (groups) people create to be able to build extensions in their houses - often service quarters (ie maid's bedroom).

The combination of the neighbourhood: mostly elderly people, from the Derg regime.

People create unions where they donate money. Important for the unexpected events as weddings, mournings and etc.

Daily routine: in the morning he goes to the church and afterwards drinks coffee once he is home. He visits different churches in the neighbourhood (Monday one church, Tuesday another and so on).

5 people in his household.

Interview 02
1 man, 'Abebe'.
50-60 years old, pensioner.

Unions for men and women (separate) of 10-20 people, called "idir".

Multiple unions in the neighbourhood, which meet once per month to decide what to do if people have problems (financial etc).

Membership of union costs 20 ETB/person/month, which helps to pay for weddings, funerals etc.

Goes to church early in the morning (Orthodox). Each day has a specific meaning so he goes to the church of the appropriate saint.

Comes home and chats with friends.

10/11am drinks coffee with family - they do the full ceremony.

At holiday times people come together on the streets to have a meal together, eg. Meskel celebration. This is an Orthodox celebration, but everyone comes regardless of religion.

Has 3 children. 1 of his daughters has a daughter. They all live together.

Interview 03
1 woman, 'Aneksey Abebi'.
40-50 years old, businesswoman.

Men would follow the woman everywhere she goes! She wanted to move and her husband listened. They have been living in the area since 2003.

Aneskey's husband is from Oromia region and studied Economy in former Czechoslovakia.

Demolished boundary fence of her property to build 5 shops.

Total area of the compound is 220 sqm.

She is on a pension and her primary income is from the rent she receives from the shops.

Her older daughter studies in the University of Jimma in the Oromia region. This daughter is 25 years old.

Aneskey wakes up early in the morning (7am), waits till her younger daughter leaves for school and her husband for work, then she cleans, does the shopping, cooks dinner.

After her younger daughter (adopted, 14 years old, studies in secondary school), comes back at around 4 pm, they clean the house together for a couple hours. After this, Aneskey relaxes on the couch and her daughter does her homework.

Aneskey is quite rich compared with the regular Addis Ababa resident: she has clean, quite spacious house (1 master bedroom, living room and her daughters room, kitchen with storage room and bathroom (shower and toilet) built as an addition to the house.

She built an addition of 5 rooms that are rented as shops and have access from the street. The shops also have their own bathroom, which means the rooms could be rented as living units too.

She is the 3rd child in her family and has various brothers and sisters living in different parts of the world.

She studied in Denmark (her masters), because she could get a scholarship.

She belongs to the Ortodox Church.

Family:
Oldest sister: PhD in Chemistry. Lives in Canada
2nd sister: Deceased. Worked in air force. Lived in Russia.
3rd: Her.
4th: Lives in US. Has kids. Studied at Addis Ababa Uni.
5th: Lives in Gondar. MSc in Engineering. Married with children.
6th: Missionary.
7th-9th: Unknown.
10th: Lives in Norway
All brothers and sisters are protestant but she is orthodox.

She meets with her sisters in Ethiopia often.

Interview 04
1 man, 'Mo'az'.
17 years old, shopkeeper.

Owner of store is Amira, his cousin (not necessarily direct cousin).

10 years in Addis, 7 years working at the store.

Muslim.

Born in Addis, moved away and then came back to finish his education.

8am he opens the store. Works til 2pm, then Amira comes to take over. He then stays with friends in the area
.
Evening is the busiest time for the store.

He's in 8th grade. Normally he studies during the day but he didn't go to school today!

Doesn't want to move to the centre of Addis.

Vegetables he sells are delivered by a guy in the morning.

At home there are 10 people in his household.

There is a WC in the compound of the store.

Interview 05
1 man, unnamed.
50-60 years old, businessman.

He has lived in South Africa for 17 years with his younger daughter. He owns a business there.

His wife owns the shop and stays in Addis Ababa, Ajax area.

When man is in Addis Ababa, he wakes up early and helps his wife in the shop. He comes quite early and wife joins later.

They own a house and have 3 children.

He is not thinking of moving back and would like in the long term to see his family moving to South Africa.

Interview 06
1 woman, 'Asmarah'.
25-35 years old, housewife.

Orginally from Eritrea. Has a child (3ish).

Neighbour also has child, they have playdates at each other's houses.

Takes kid to play at Playzone near Bole. There's nothing here and the streets aren't safe.

Unaware of 'parks' in the area.

An elderly lady (in the front garden) helps her with household chores.

There is enough water and electricity in this area.

Used to live near Gerdeshola.

Area is silent - no sound disturbance.

She is a housewife. Her husband works in US. He supports them, she would love to move out there with him.

Wakes up 7:30am. Kids at school til 2pm, returns around 3pm and does household chores.

School is 2 taxis away, near their old house.

They have lived here 2 months.

Interview 07
1 man, Tamascal.
25-35 years old, business owner at 'Peace Movies'.

3 years living here.

Dream is to travel.

Business is downloading and streaming movies to sell. People also pay to play Playstation.

Studied management at Hawassa University.

Used to work in another shop before setting up his own business.

Raised here since he was 5 years old, and the compound belongs to his family.

Family: 3 people: him, mum and younger brother.

Most customers are guys but he wants to encourage girls to come as well!

Age range of customers: 8-40 years old.

Predictable income and cheap prices - has to be competitive as similar shops exist in the area.

Interviews - Condominiums

Interview 08
1 woman, 'Kijinesh'.
60-70 years old, pensioner.

She has lived in the condominium since 2011 - she got the apartment through the FHC lottery. She wanted to move to the condominium because she previously lived in a shared house and it was crowded.

She enjoys living in the condominium because she has her own apartment and the surroundings are nice. Nevertheless, the neighbours work during the day and she feels lonely if she can not speak with them. She wakes up at 7, eats breakfast and cleans her apartment. She enjoys sitting outside and watching children play.

Her house composition: bedroom/living room (bed is separated by the cupboard shell), kitchen, bathroom. She has a washing machine, which makes her live relatively easy, because she does not need to bring her washing downstairs. Nevertheless, she would like to have an extension (in the gallery in front of her apartment). She would have a kitchen there and move bedroom to the existing kitchen.

She belongs to the Protestant church - most days she spends in the church.

She contributes a lot to take care of the public area in the courtyard of condominiums. All neighbours pitch in and hire a person to take care of the green space.

She used to work in the subcity cafeteria, and the diploma on the wall recognises her service there.

Negative aspect of the condominium: she finds it difficult to climb stairs.

Interview 09
1 boy, 'Ajali Miltassion'.
15-20 years old, school pupil.

His parents bought the place.

They are living in the condominium only for a year.

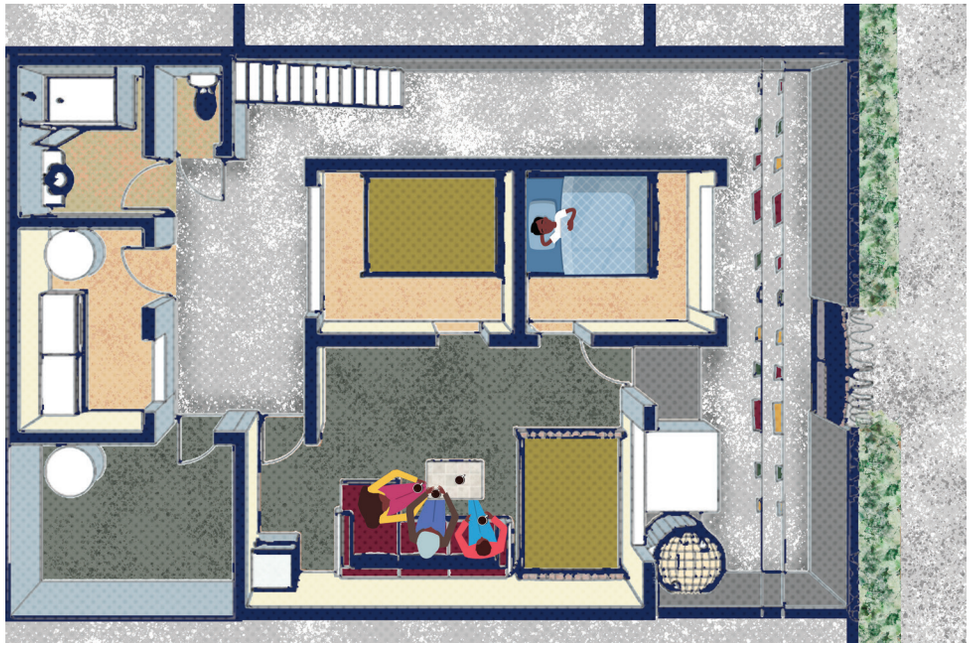
He is in the 11th grade and wants to study in art school. He goes to school in the Bole area. He gets to school with the minivan taxi. It takes 30 minutes to reach school. He goes to school in Bole because there is no highschool in this area.

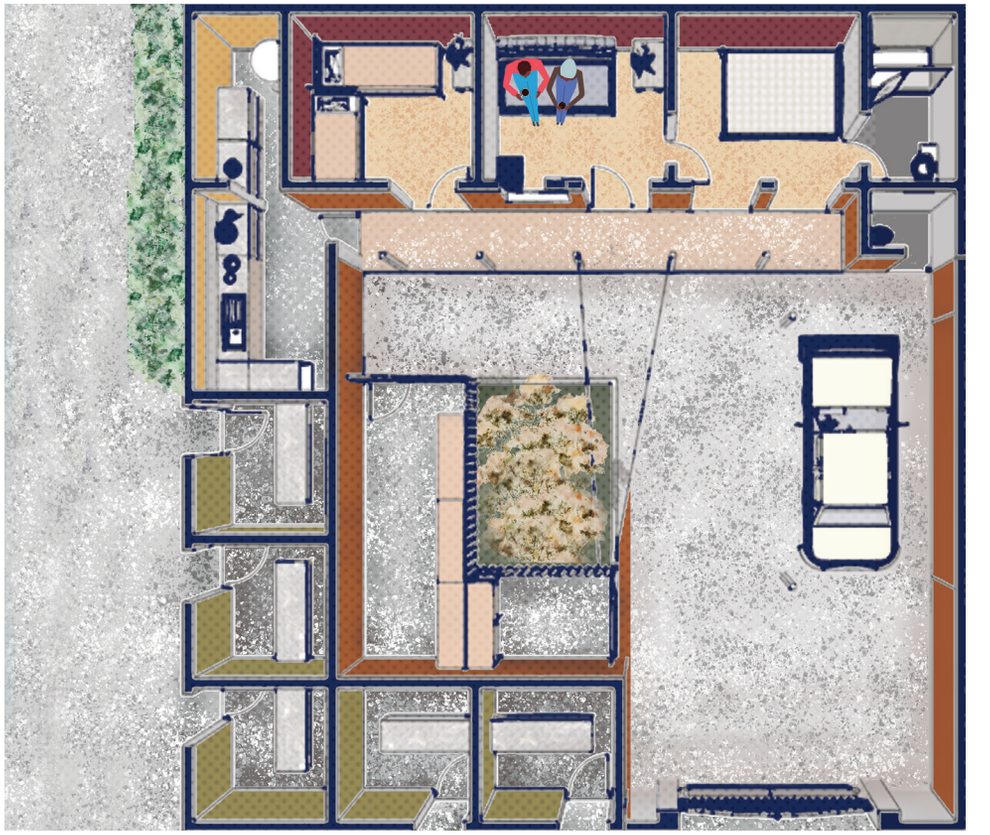
He misses his friends from their previous neighbourhood, so he does not enjoy living here.

Because the family is quite new, they do not know neighbours yet and haven't bonded with them properly. He does not feel the community feeling.

He does not use the playground (small football field), but he sees other children playing there.

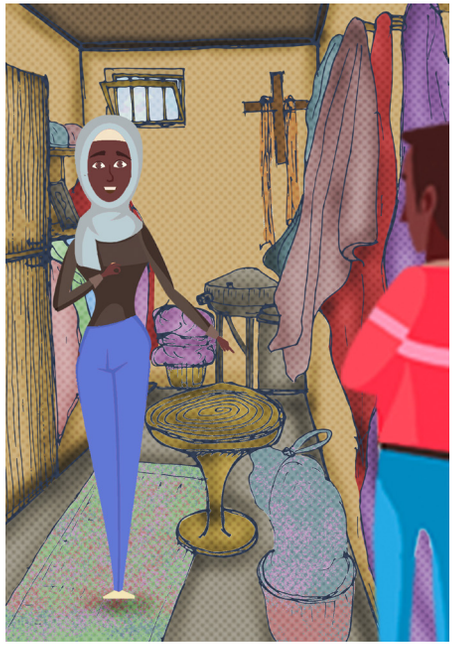
Dwellings





Public Spaces

Food & Drink



3.2 Traditional Housing

Taditional housing in Ethiopia varies from region to region, but is often characterised by a circular plan and a reliance on local materials. Traditional round houses, often made of 'chikka' (a construction system oftimber and earth plaster), are known as 'tukuls'.

Traditional housing can still be found across the country, particularly in rural areas, though rectilinear housing is beginning to replace round housing, in order to make better use of CGI sheets for roofing - in the north of the country, round houses with straw roofs are known as 'sarbet', whilst rectangular hosues with CGI roofs are known as 'corcorobet' (Gutiérrez, Murtagh, and Crété 2018, 26).

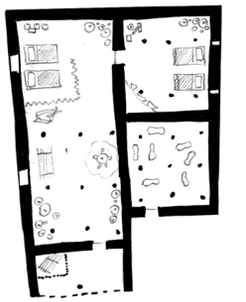
Vernacular housing in Ethiopia can be classified into four categories depending on wall types: timber structure with earth and fibres filling, mainly adopted in the central area of the country, load bearing stone masonry walls with earthen mortar, used in particular in the northern area of Ethiopia, bamboo and thatch walls, in the southern area and wood and mats huts adopted by nomads settlements in the eastern area of the country (Gutiérrez, Murtagh, and Crété 2018, 41).

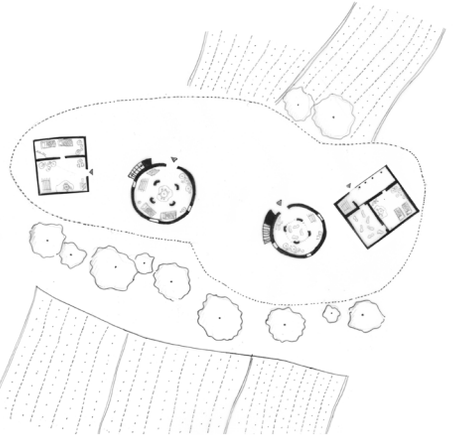
Left - Local Housing near Lalibela, Amhara

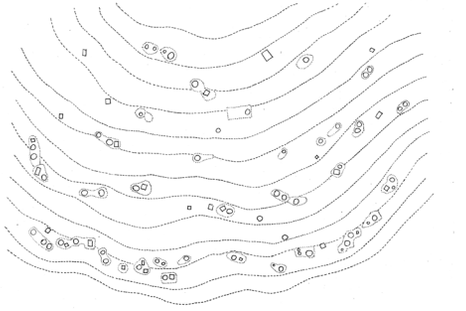
Tigray Region

This region is mainly mountainous and is characterised by drought, earthquakes, and massive stone resources that have been historically used by its inhabitants to build their houses (Gutiérrez, Murtagh, and Crété 2018, 41). Terrace farming is common and deforestation is an important issue. Villages usually are made up of scattered houses forming parishes. Livestock is kept safe in a courtyard with a high stone wall. When the family has several buildings, they usually build stone boundary walls to confine their compound. Roofs are often flat with wide overhanging eaves that help protect the earth and straw-mortar rendered walls from the heavy rains. Exterior stone staircases are common and lead either to the roof, that is used for many purposes, or to the upper floor, which may be used as bedroom, living room or guest room (Gutiérrez, Murtagh, and Crété 2018, 41). The interior space is usually a single room with a fireplace dug in the earth floor. There are some windows and a main door. (Gutiérrez, Murtagh, and Crété 2018, 41).

Image source: Saurel, A. (2011). Farm in Agobo village - Atsbi, Tigray, Ethiopia. [Photography]. Retrieved from https://www.flickr.com/photos/alexsaurel/6339097002/in/photostream/







Benishangul-Gumuz

The region of Benishangul-Gumuz is predominantly mountainous and characterised by a dry climate which is often a cause of drought. Berta and Gumuz are the prevailing ethnic groups in this region. Their life is mainly based on agriculture and they usually live in villages of a few hundred people (Gutiérrez, Murtagh, and Crété 2018, 33). Settlements are subdivided into family compounds containing several buildings surrounded by bamboo fences. Houses are not plastered, thus allowing cross ventilation, which is important in this hot and humid climate. Different uses of interior spaces coexist in the Berta society, but externally all houses present similar attributes: round interwoven bamboo walls with conical thatched roofs crowned by four wooden poles. The history of slavery in this region has had an effect on settlements through the development of fences and labyrinth-like pathways, which helped dwellers to escape and better defend their villages (Gutiérrez, Murtagh, and Crété 2018, 33).

Image source: Fisher, A & Beckwith C. [Untitled photograph of Anuak village] Retrieved from http://nazret.com/blog/media/blogs/pict/MDG--Anuak-Village-in-Sou-008.jpg

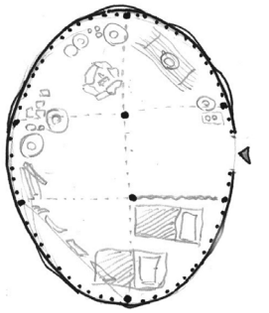
Afar Region

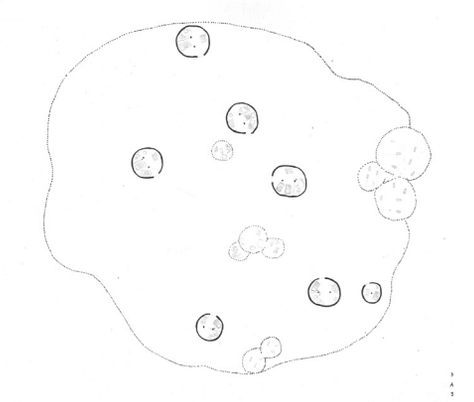
Due to the extreme climatic conditions in the region of Afar, mainly chacarcterised by a hot, sunny and dry climate, tribes are mostly nomads, living in small isolated groups. Camps are surrounded by planted barricades, which protect them from the attacks of wild animals and from theft of domestic animals (Gutiérrez, Murtagh, and Crété 2018, 31).

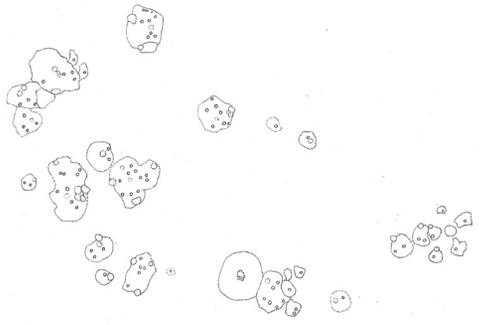
The Afar nomadic huts are oval-shaped and are erected by women. The structure of the hut is demountable, erected by making a domed armature of branches which is bound with palm fibre. Then the covering is made with palm mats (Gutiérrez, Murtagh, and Crété 2018, 31).

Usually huts are grouped in family compound, and in contrast with other regions, these compounds are scattered over a wide area.

Image source: Institute of Nomadic Architecture. (2019). A. [Photography]. Retrieved from https://www.nomads.org/assets/images/-afa4101-1800x1013.jpg





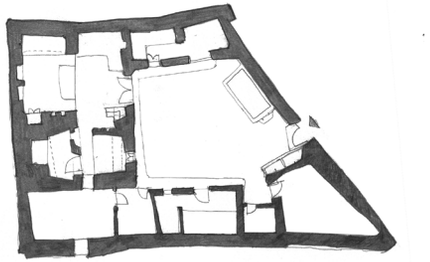


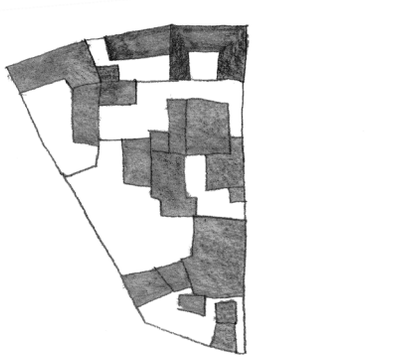
Harar Region

The historic city of Harar is located on a plateau surrounded by valleys and its climate is mainly dry and arid. As a historical trading centre, many buildings are quite unique to Ethiopia, with Indian and Islamic architectural details being quite noticeable within the fortified walls at the centre of the city of Jugol.

Its building typology and its urban structure are unique in the country and are reminiscent of Islamic and Indian traditions (Angélil and Hebel 2016, 50). Two kinds of houses are found in vernacular architecture in Harar: chikka houses and stone, flat-roofed houses. The flat roofed houses are rectangular and often two-stories high, surrounded by a high wall. They have a white-washed or pastel colour exterior which is painted twice a year (Gutiérrez, Murtagh, and Crété 2018, 36). The most common traditional dwelling unit in Harar consists of 3 rooms on the ground floor and service areas located in a courtyard. A second type, called Indian house, is a simple rectangular two-storied building with a wooden veranda.

Image source: Lafforgue, E. (2016). [Multicolored houses in the old town, Harari region, Harar, Ethiopia]. Retrieved from https://www.flickr.com/photos/mytripsmypics/26692603890.





3.3 Condominium Housing

At the beginning of the 21st century, Ethiopia was facing an extensive housing shortage which was affecting all income groups, particularly in Addis Ababa (French and Hegab 2011, 2). Indeed, in 2005, around 80% of Addis Ababa's residential areas were considered "slums", according to UN-Habitat's definition (UN-HABITAT 2007, 28-29).

To cope with the housing backlog, Ethiopia signed a bilateral agreement for technical assistance with the German government in 1999. As a result, together with Germany's official development agency GTZ (German Technical Cooperation), they developed a program divided into three stages: LCH technology (1999-2002); the Addis Ababa Grand Housing Program (2002-2006); and the Integrated Housing Development Program (2005-2010) (Delz 2016, 2-3).

The Integrated Housing Program (IHDP) set several goals, among which were to reduce slum dwellings by 50%, build 150,000-200,000 housing units, create 60,000 jobs, and improve training procedures for the domestic construction sector (Delz 2016, 3). The resulting strategy was to use a standard mid-rise housing block type (Mota n.d., 1), a typology that could be cost-effective and drive densification. This was the 'condominium', a new structure made of reinforced concrete.

The pilot project started in 2005, took place on brown-field in the area of Bole Gerji, achieving a cost of USD 68/m² (French and Hegab 2011, 18).

After the successful pilot project, GTZ reduced their collaboration with the Ethiopian Government, taking an advisory role. Thus, under their recommendation, the Housing Development Project Office (HDPO) was created to have a specific office for housing development (French and Hegab 2011, 13).

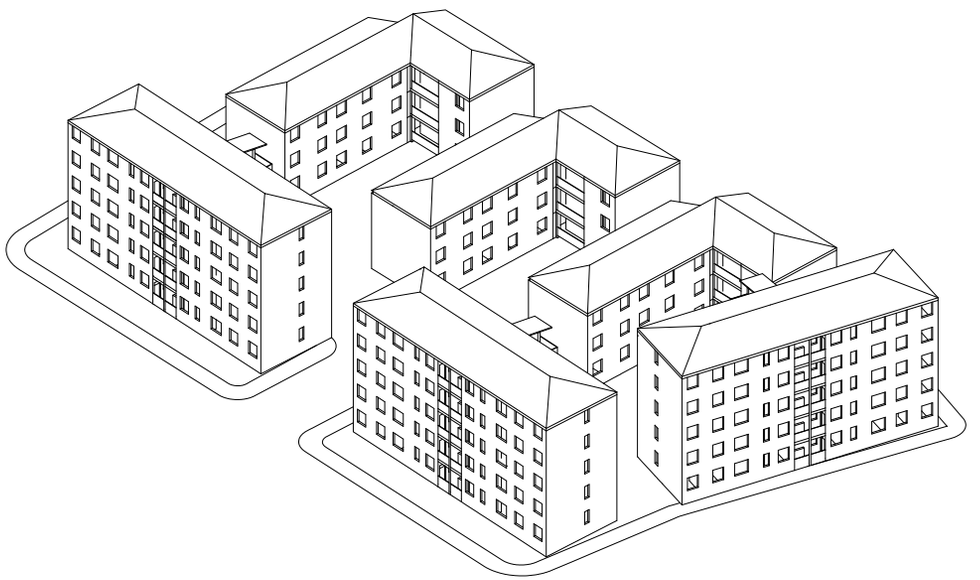
Left - Condominium development, Gerji

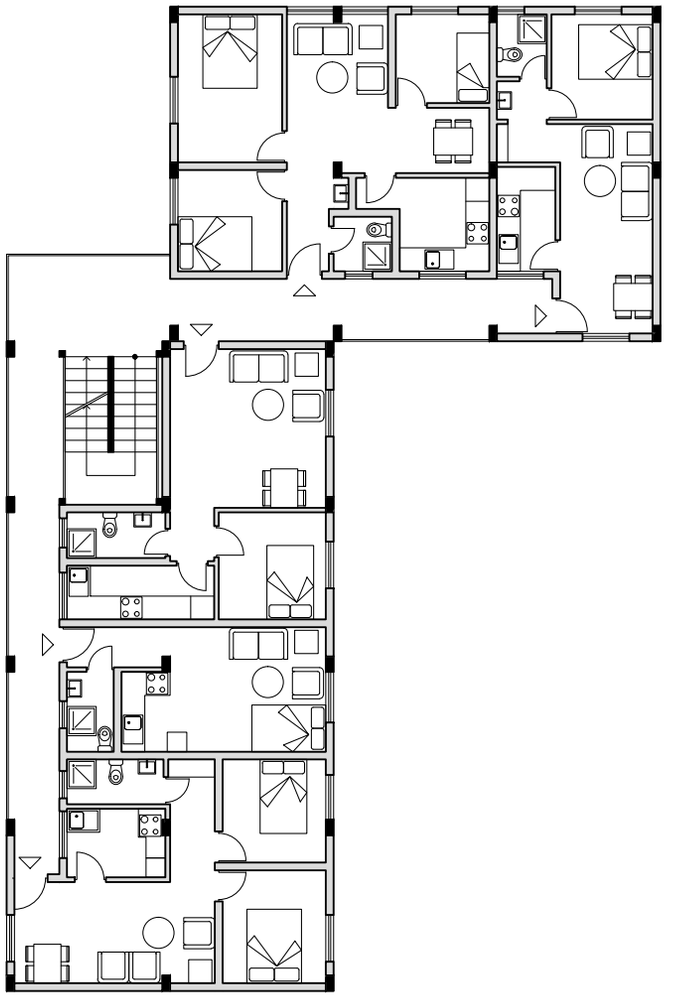
Typology

Condominium blocks are generally constructed using a simple concrete frame system, with concrete blockwork infill walls. Early examples were relatively low-rise (5-6 storeys), but later examples are much higher density, rising to 24 storeys in some places. Blocks are generally rectinlinear, L- or H-shaped.

Apartments range from studios to 3-bedroom apartments, and are accessed in almost all cases via an external staircase and external access deck. High-rise examples are sometimes equipped with elevators (which are legally required for buildings over 5 storeys), however the reality is that these are often not installed due to budgetary constraints and design complexities.

Below is a typical urban layout of a condominium development, where the external space is largely unconsidered. Opposite is a typical floorplan, showing different apartment layouts.





3.4 Kebele Housing

After the nationalisation of the land and housing in July 1975, all dwellings that previously collected less than 100 birr per month were given to the Kebele - the smallest administrative unit in Addis Ababa. Kebele administrations still exist today, and rent out 148,645 housing units, accounting for about 70% of all small houses and sheds in Addis Ababa. Old and new squatter settlements became pervasive in Addis Ababa's built landscape.

The average small house or shed is 24m^2 and houses an average 5.7 persons. Only 7% of small houses and sheds have a private toilet and access to water. More commonly, they share one within a compound or use the communal facilities in the district.

Conditions in kebele housing are poor by western standards, but it is not uncommon for residents to wish to continue living in kebele settlements as the rents are capped at low rates.

Left - Kebele housing, Talian Sefer

Photographs

Kebele Housing, Talian Sefer

Kebele Housing, Gerji

Kebele kitchen, Talian Sefer

4.0

Thesis Statement

Problem Statement - General

Addis Ababa is a city which is experiencing a huge population boom: the city's population almost doubled from 2.38 million in 2000 to 4.59 million in 2019, and is expected to rise to 8.94 million in 2035 (MacroTrends 2019). This has resulted in an acute shortage of adequate housing. Moreover, the overwhelming majority of the city's housing can be classified as "slum" (Alemayehu et al 2018, 2). An estimated 40% of Addis Ababa's residents live in 'kebele' housing (owned by the state and managed on a local level by kebele administrations) (Alemayehu et al 2018, 8), attracted by extremely low rents (often lower than 10 Ethiopian Birr (ETB) per month). However, neither the state landlord nor the tenants are financially able to maintain, let alone upgrade, the dwellings, leading to deterioration (Soressa and Hassen 2018, 99).

The general problem is that the demand for housing severely outweighs the supply, and as such many people live in housing that is, for various reasons, unsuitable.

Kebele housing, Talian Sefer

Problem Statement - Site

Addis Ababa's urban structure developed as a result of various masterplans initiated by different governments since its formation in 1886. Each masterplan has added to the rich tapestry that makes up the city's urban fabric, and has resulted in the formation of a "collage of overlapping 'cities' " (Alemayehu 2018, 23). Due to this complex urban structure, Addis Ababa has developed to become polycentric: although a historical centre exists in the Arada district around Mercato and Piassa, numerous sub-centres of varying sizes can be seen throughout the city. Furthermore, the explosive growth experienced in Addis Ababa has meant that areas which could formerly be considered suburban are now located within, or at the edges of, the inner city.

One such area is Gerji. Within the area of Gerji the Federal Housing Corporation (FHC) owns a site of roughly 12.5ha consisting of single-storey, primarily single-family dwellings. The largest visible demographic is mid-income households, although some low-income households reside in informal or semi-formal extensions within the site. This site is intended to be developed by the FHC in accordance with the city's masterplan, which designates the site to be "mixed residential" with the majority of the site having a Floor Area Ratio (FAR) of 0.5, and a maximum building height of 35m. The boundary of the site at the main road to the south-west should have an FAR of 3.5 to 4.5 and a maximum building height of 70m (Addis Ababa City Planning Office 2017). The site, which was originally developed in the 1980s has a notably suburban, residential atmosphere, in part due to the FHC's prohibition of commercial activity on the plots. This is at odds with the surrounding area, which has a rich mix of commercial, industrial and residential activity, and the differences between the site and the surrounding area have resulted in a hard, clearly visible border. The site is bordered by main roads, giving opportunities for the incorporation of commercial activity at the edges of the site. To the south-west of the site is Adwa Park, which the current development does not address.

The specific problem is that the site's density and usage no longer address the surrounding conditions and its contemporary position within the wider city, and that the FHC's ownership of the site has not permitted organic development.

Problem Statement - Morphology

In his reflection on Naples, Walter Benjamin writes *"As porous as this stone is the architecture. Building and action interpenetrate in the courtyards, arcades, and stairways. In everything they preserve the scope to become a theatre of new, unforeseen constellations. The stamp of the definitive is avoided."* (Benjamin 1978, 165-166). Here Benjamin celebrates the ability of Neapolitan people to constantly adapt and change the built environment which they inhabit, creating an ever changing and dynamic city. This can also be seen in Addis Ababa, where dwellings are frequently adapted by residents to allow for changes in lifestyle, and to make the designed spaces appropriate for inhabitation.

The Integrated Housing Development Program (IHDP) was initiated in 2005 as a continuation of the Addis Ababa Grand Housing Program (AAGHP) in an attempt to address the city's severe housing shortage. The proposed solution was condominium blocks, the demographics of which are mixed – originally intended as replacement dwellings for low-income residents displaced from demolished kebele houses, they are also attractive to mid-income groups, due to the lack of available housing in the city. Thus, low-income groups remain in traditional kebele housing, choosing to rent out their condominium apartments to mid-income tenants as a reliable source of income.

The condominium apartments provide sanitary, modern housing, but do not necessarily address the specific and various needs of the inhabitants. Common problems include lack of accessibility for less-abled residents (elevators are often designed but not installed), poor build quality, and a failure to address the living patterns of the intended residents. Moreover, they allow little flexibility for expansion or adaptation, meaning there is less opportunity for residents to add value (financial or living quality) to their homes.

The specific problem is that the high-rise, high-density solutions to the acute housing shortage advocated and practised by the municipality, whilst alleviating some problems with existing kebele and informal dwellings, do not adequately address the needs and desires of Addis Ababa's residents, and do not allow for adaptation and expansion to meet the needs of residents.

Outside a condominium apartment, Gerji

Condominium housing, Gerji

Problem Statement - Identity

The rapid development of Addis Ababa and its explosive growth in population has created a city which arguably lacks a distinctive style. In recent years the construction of high-rise buildings, such as the currently under-construction Commercial Bank of Ethiopia headquarters (which upon completion is expected to be East Africa's tallest building), have resulted in the certain areas of the city being compared to Dubai (Gardner 2019): a pejorative comparison insinuating that the city has no character of its own.

The condominium developments of the IHDP are broadly context-less, and due to their inhuman scale do not have a positive impact on the lived experience of the city. Originally designed by the German Technical Cooperation (GTZ) (Delz n.d.), the design of the blocks, though varied, bears little relation to either the context of Addis Ababa or the wider context of Ethiopia, in which a wide range of vernacular and historical architectural styles exist.

Furthermore, little attention is given to placemaking within the developments of the IHDP. Richard Sennett notes *"It's possible to give a space character by punctuating it just as one would a piece of writing."* (Sennett 2019, 212). Such punctuation is noticeably absent in the condominium developments – the spaces around the condominiums are (presumably due to budgetary restraints) left undeveloped following the completion of the apartments, and the buildings themselves do not offer any visual clues to aid in placemaking.

The specific problem is that contemporary development in Addis Ababa does not address the context of the city or the wider country, and as such the city is rapidly losing its character.

Research Question

Considering these general and specific problems it is vital to conduct thorough and systematic research in order to develop a proposed solution. Research will address the following problem:

How could the density and living standards afforded by IHDP condominium blocks be matched by different forms of development which…

a) Acknowledge the context of the site, the city and the country?
b) Immediately and appropriately accommodate the various and different living patterns of residents?
c) Provide opportunities for residents to expand or adapt their dwellings as their household incomes and expectations change over time?
d) Create a strong neighbourhood identity?

5.0

Precedents

5.1 Low-Rise, Mid-Density Housing

The references used in the design of this project can be split into three categories, the first of which is low-rise, mid-density housing.

From the outset, the aim was to design a scheme that responded to the specific challenges of Addis Ababa and Gerji, as defined in the problem statement, by keeping to a scale that reflects the vernacular - that is to say low-rise - whilst maintaining a similar density to that of the local condominium developments - 147 dwellings/hectare.

In view of this, several reference projects were chosen which employ similar design principles. Though some of these are located in the global north, they are still useful references for this design project and contain principles that can be adapted to the specific case of Addis Ababa.

Left - Donnybrook Quarter, London
Image Source: http://www.peterbarberarchitects.com/donnybrook-quarter

Donnybrook Quarter

London, United Kingdom
Peter Barber Architects
2006

Peter Barber Architects designed this low-rise, high-density housing scheme in London as a counterpoint to the usual high-rise developments seen in the city. The scheme focusses on the street and public space, aiming to create a community of residents.

The development is plot-based, with standard plots of 8.5 x 12m, and 2 dwellings per plot. At more “important” corners there are “special” buildings, housing a commercial unit on the ground floor, and with a slightly diffrerent expression. The overall density is 130 dwellings/ha.

Though the context of London is markedly different from that of Addis Ababa, this is nonetheless an interesting precedent for relatively high-density, low-rise housing.

Image Source: https://wordpressmdesignhabitatgecollectiuwordpress.files.wordpress.com/2017/12/screen-shot-2017-12-22-at-4-10-29-pm.png (adapted)

Image Sources: http://www.peterbarberarchitects.com/donnybrook-quarter

SOS Children's Village

Tadjoura, Djibouti
Urko Sanchez Architects
2014

Designed as safe space for children, this project provides 15 houses for families in a walled compound in Tadjoura, Djibouti. The project references the traditional North African medina but is constructed of modern materials.

Narrow streets and close proximity of buildings provide shade, and the varied placement of the near-identical units creates the illusion of variety whilst minimising design and construction costs. The public spaces left over from the varied placement of the dwelling units are sensibly sized, and furnished appropriately for the residents, ensuring they are used and not left derelict.

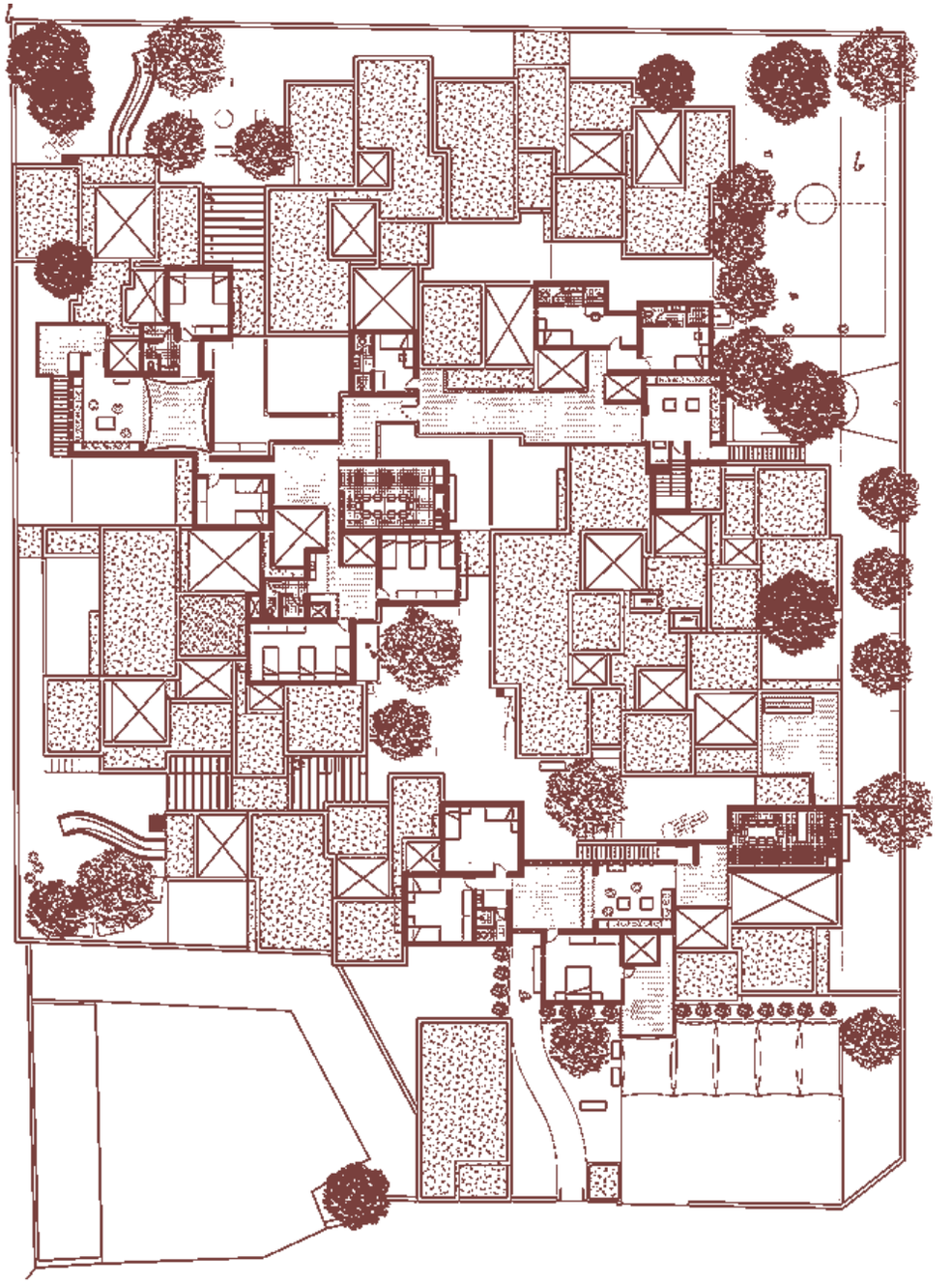


Image Source: http://urkosanchez.com/en/project/19/sos-children-s-village.html (adapted)

Image Source: http://urkosanchez.com/en/project/19/sos-children-s-village.html (top)
https://trendland.com/sos-childrens-village-located-in-hottest-place-on-earth/ (bottom)

Image Source: http://urkosanchez.com/en/project/19/sos-children-s-village.html

Gando Teachers' Housing

Gando, Burkina Faso
Kéré Architecture
2004

Making use of traditional materials, this scheme interprets the vernacular architecture of the region and adapts it in an innovative and climate-responsive way. Community involvement was vital in constructing the project, and much was built by local people.

Barrel-vaulted roofs with alternating roof heights allow ventilation into the dwellings whilst also providing much-needed shading and allowing daylight into the spaces. The roofs are constructed of stabilised earth blocks, which act as a permanent formwork for a concrete structure. This construction method was unknown in the region, but makes use of local materials and labour.

The simple design of the units enables various configurations of houses, and useable external spaces.

Image Source: http://www.kere-architecture.com/projects/teachers-housing-gando/ (adapted)

Image Sources: https://www.archdaily.com/785956/gando-teachers-housing-kere-architecture

Incremental Housing

Quinta Monroy, Chile
Elemental
2004

This housing project by Chilean firm Elemental is a precedent for incremental housing, where the architect has designed a basic unit, or nucleus. Director Alejandro Aravena reportedly argued that the money assigned to the project did not allow for the building of a complete, “good” house, so rather than designing a whole “bad” house, the firm designed “half a good house” which could then be expanded and adapted as the inhabitants financial circumstances improve.

The original scheme appears quite austere, with concrete block facades and little in the way of ornament or colour, however the residents adapted the houses quickly and the result, though arguably not architecturally “beautiful”, is a scheme with variety that has been adapted to peoples’ living habits and patterns.

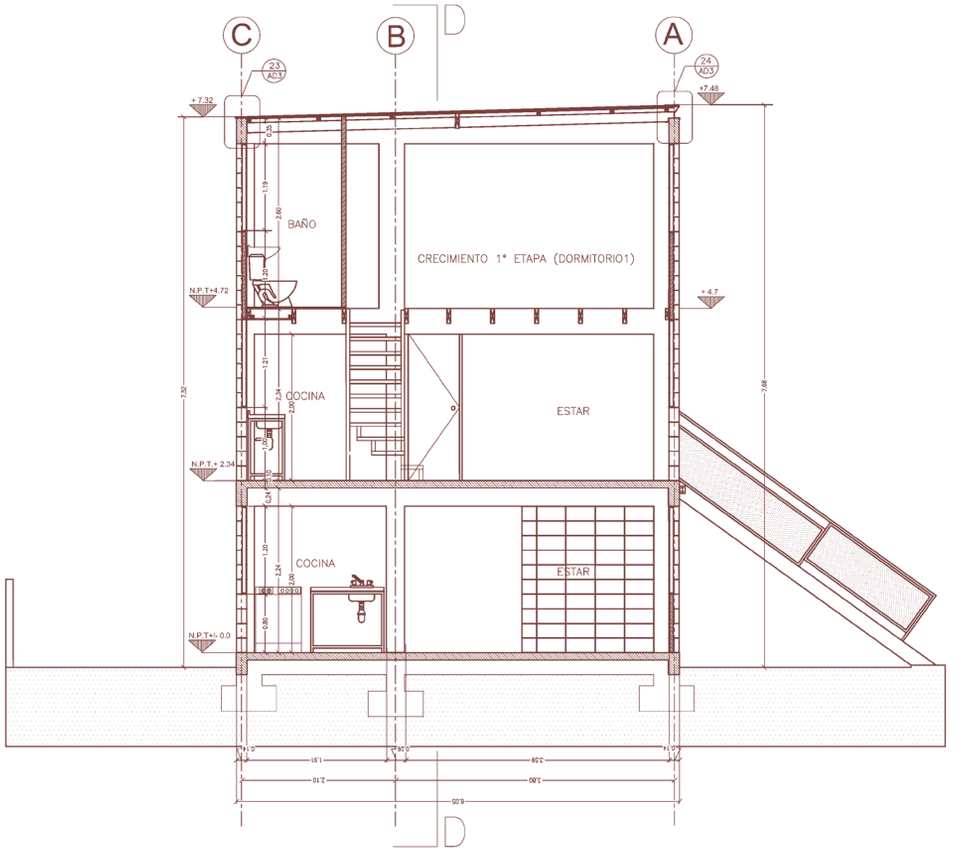


Image source: http://www.elementalchile.cl/en/

Image Source: https://99percentinvisible.org/app/uploads/2016/10/half-houses-completed.jpg (top)
https://oluwaseeto.com/wp-content/uploads/2019/08/Quinta_Monroy_Image-06.jpg (bottom)

Image Source: https://www.archdaily.com/10775/quinta-monroy-elemental

Malagueira Housing

Évora, Portugal
Álvaro Siza
1973-77

In contrast to the common high-rise social housing developments, Siza proposed a low-rise, mid-density scheme for the neighbourhood of Malagueira. The houses follow two basic plans, one with a front courtyard (Type A) and one with a rear courtyard (Type B). From these two basic plans, multiple configurations could be developed, ranging up to a 5-bedroom dwelling unit.

The scheme was designed specifically for low-income residents, and in a similar way to Elemental's later Quinta Monroy scheme, Siza accepted that residents would want to expand and adapt their homes to their own purposes. However, his scheme imposed stricter rules, with additions and openings only being allowed if they followed the scheme. In reality, of course, residents adapted their homes as they saw fit, often flouting the imposed rules.

Image Source: Álvaro Siza, Arquitecto, Lda. , retrieved from: MOTA, Nelson. Between Populism and Dogma: Álvaro Siza's Third Way. FOOTPRINT, [S.l.], p. 35-58, june 2011. ISSN 1875-1490. Available at: <https://journals.open.tudelft.nl/footprint/article/view/731>. Date accessed: 04 apr. 2020.

Image Source: https://barcelonarchitecturewalks.com/alvaro-siza-national-architecture-award-2019/ (top)
https://befrontmag.com/2017/04/13/public-housing-and-a-teaspoon-of-ethics/ (bottom)

Image Source: Álvaro Siza, Arquitecto, Lda. , retrieved from: Mota, N. (2018). A Landscape of Multiplicities: The Production of Subjectivity in Álvaro Siza's Malagueira Neighbourhood. Journal for the Critique of Science, Imagination, and New Anthropology, XLVI(274), 131-247.

5.2 Historical & Vernacular

Ethiopia is home to many historical and vernacular styles, many of which have already been detailed in previous chapters. Here, however, are shown some of the landmark buildings that can be found in Ethiopia, including the rock-hewn churches of Lalibela, some vernacular typologies, and some examples of the 'Addis Ababa Style'.

The historical and vernacular buildings of Ethiopia have been an inspiration for this project from the outset - Ethiopia has a wealth of local construction knowledge built up by centuries of vernacular building, and this should be utilised in order to create a new urbanity for Addis Ababa.

Many of the buildings detailed within this section are those that were visited during the study trip to Addis Ababa and Ethiopia, and these had a particular influence on me during my stay. Since the study trip, it has been the intention to learn from these buildings and incorporate the expertise they have embodied into my design for Gerji.

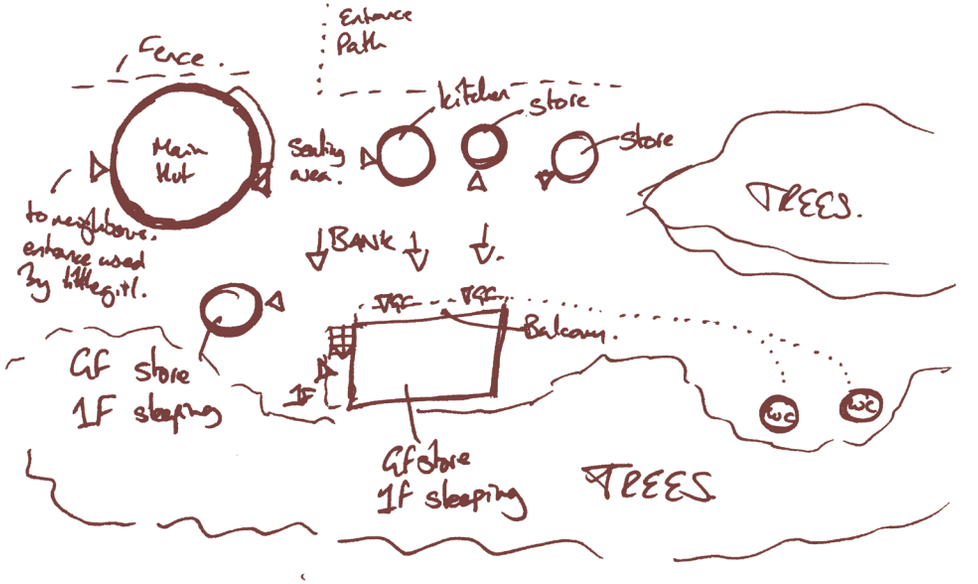
Left - Imperial Palace, Addis Ababa

Family Compound

Ade Medhanialem, Amhara

The family compound at Ade Medhanialem comprises of 8 individual buildings. The primary hut is used as cooking and living quarters for the family and their livestock (2 cows and a donkey). A rectangular, 2-storey building provides accomodation for guests above and store rooms below. Another circular hut has additional accomodation above and a store below. 2 further huts are used for storage, and one as a kitchen. The final 2 buildings are contain long-drop WCs.

The primary building is the most interesting. Arranged around a central fire, at which the mother sits to make injera and coffee, and which the family and animals walk directly through, the building has inbuilt seating and shelving at the edges. The cattle and donkey sleep on the ground floor, with the family above, and finally the chickens in the roof.



“Addis Ababa Style”

Addis Ababa & Various Locations, Ethiopia

The “Addis Ababa Style” is a style originating in Addis Ababa in the early 20th century, influenced by the climatic conditions and local materials of the area. The style is characterised by large, overhanging roofs (generally of thatch or corrugated metal) and wide verandahs and balconies (generally of timber). Ground floors are of a heavy construction, with few and small openings, whilst upper stories are of lightweight construction (often timber) with larger openings (often with little regard for symmetry).

The style was primarily reserved for public and religious buildings, as well as residences of royals and the wealthy elite. Buildings generally were limited to 2 or 3 stories, and have a strong horizontal emphasis, often with a symmetrical plan that has later been added to.

Legehar Train Station

Bitwoded Giorghis Palace

Entoto Mariam Church

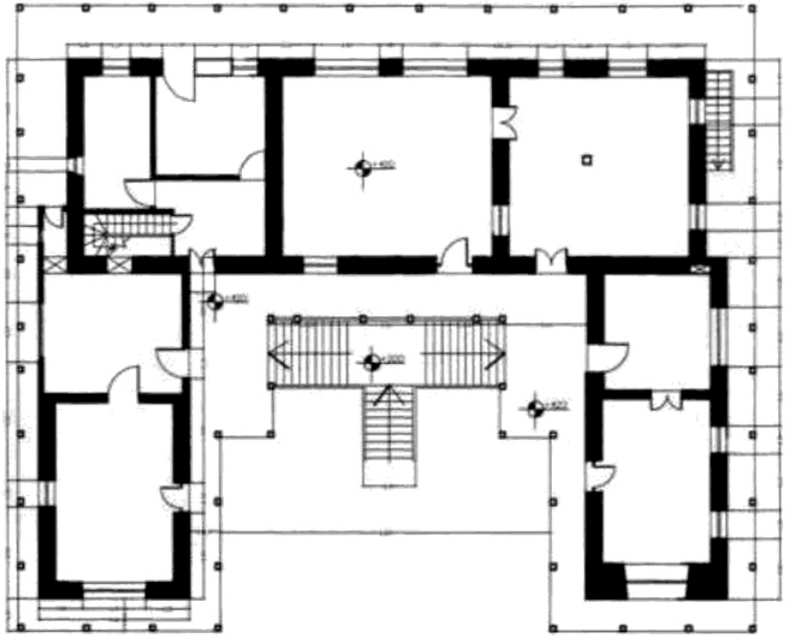


Image source (top): By A.Savin (Wikimedia Commons · WikiPhotoSpace) - Own work, FAL, https://commons.wikimedia.org/w/index.php?curid=67290571

Image Source: Mezgebu, Anteneh. "Addis Ababa Architecture." LinkedIn SlideShare, March 26, 2017. https://www.slideshare.net/antenehmezgebu1/addis-ababa-architecture.

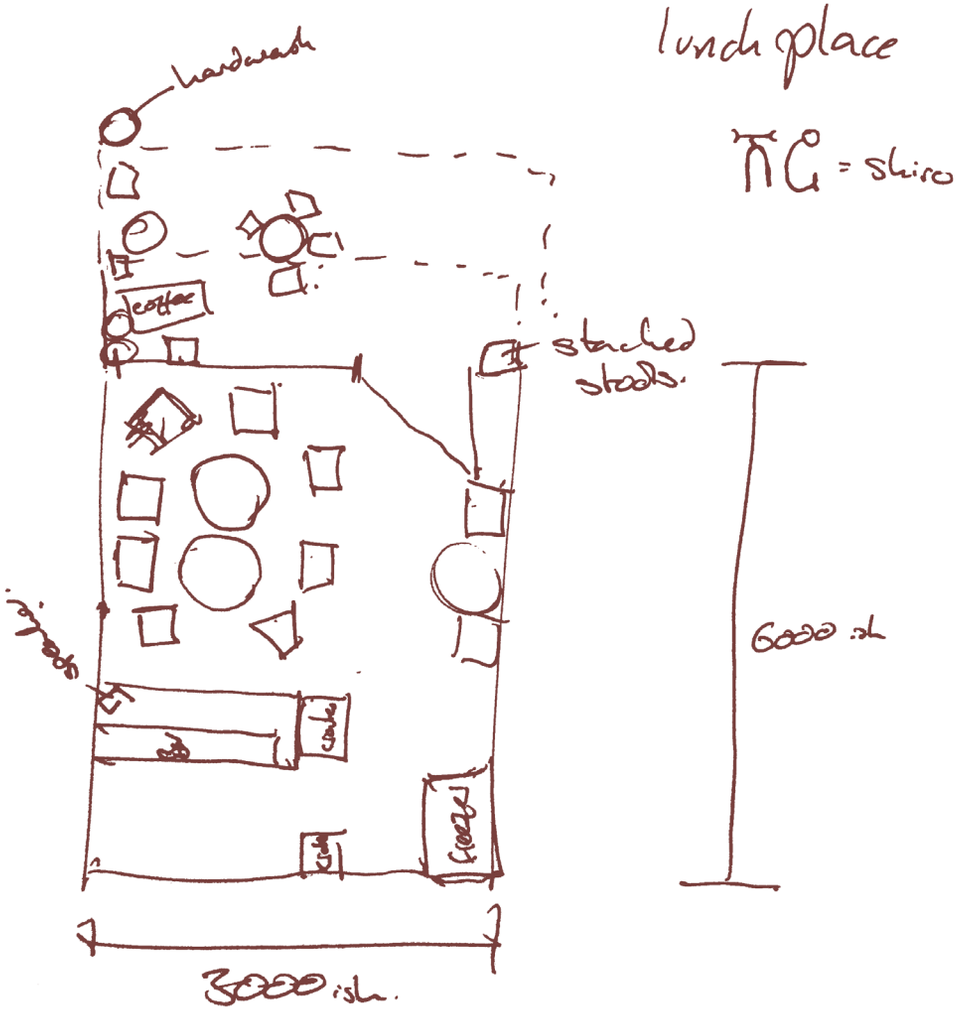
Businesses

Various Locations, Ethiopia

Shops and restaurants in Addis Ababa tend to be small (often little more than 20sqm) but what they lack in size they make up for in signage and colour. Names with puns and references to popular culture are common, as is a loose regard for copyright law.

Shops and restaurants often spill into the street, with displays or seating under tarpaulin roofs. Restaurants always have a hand wash station, with the inevitable bar of rough, blue soap. Businesses are often family run, with the owner employing siblings, cousins, nieces and nephews to run the shops, however opening hours are not late - most places are shut by 8 or 9 pm (2 or 3 at night in Ethiopian time).

Common businesses are coffee stalls, food shops, fashion shops, restaurants, video shops and butchers.



Anchor

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Timonior Tailor

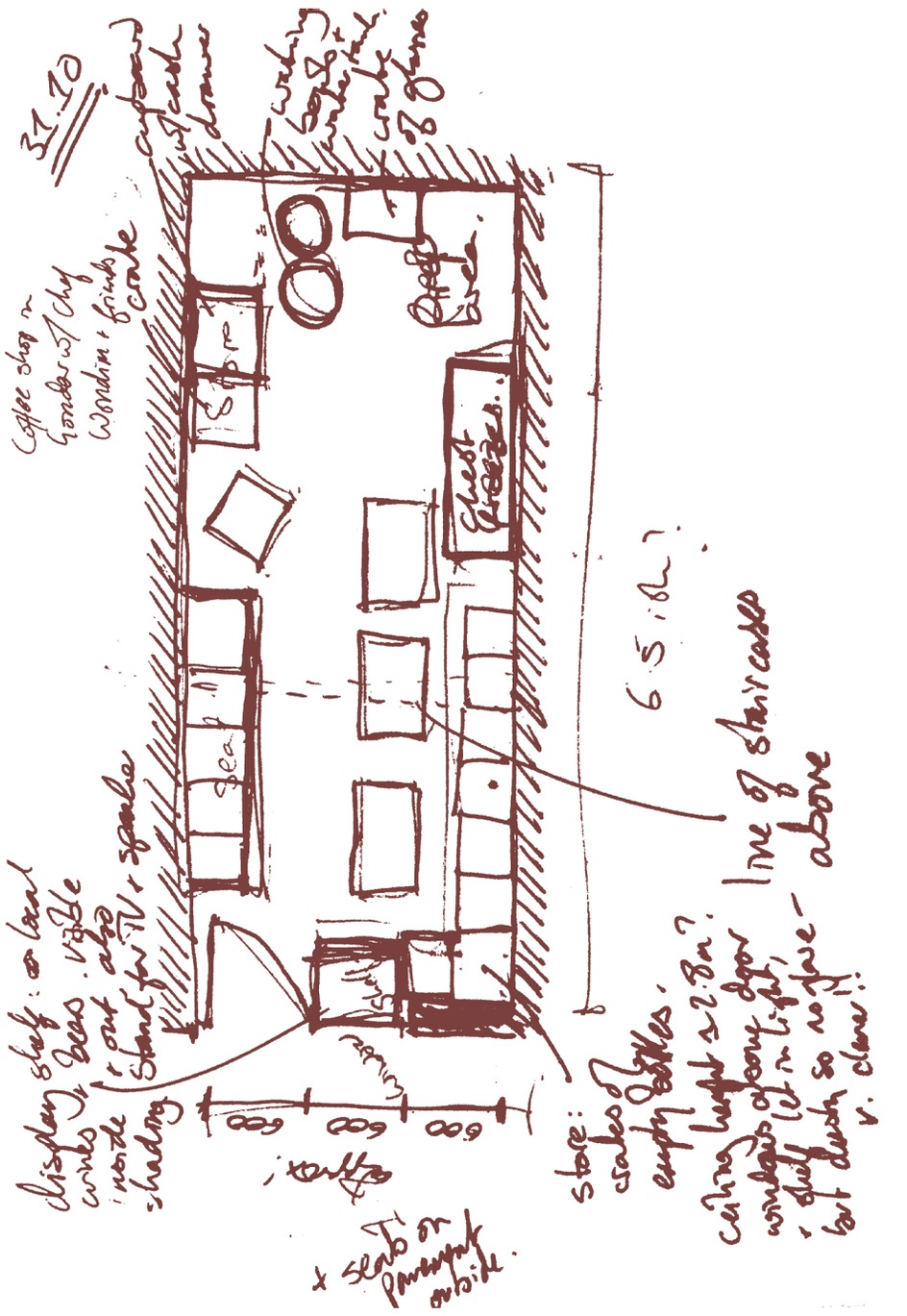
Coffee Stalls

Various Locations, Ethiopia

Coffee stalls and stores in Ethiopia range from the very basic informal stands, little more than a plastic sheet draped between branches, through semi-formal constructions with benches and decoration, to formal shops. They are, however, united by their small dimensions and efficient use of space.

The space required to make the coffee is incredibly small, little more than 2sqm, and most of the area is devoted to seating. The seating is arranged such that people face each other, whether in a circle, a corner, or two facing rows.

Coffee stalls have a classless clientele - people in suits brush shoulders with the poorest of society. They are also a place of business - a businessman friend in Gondar would go to the coffee store every morning, where his associates would come to pay or collect money and arrange future work.



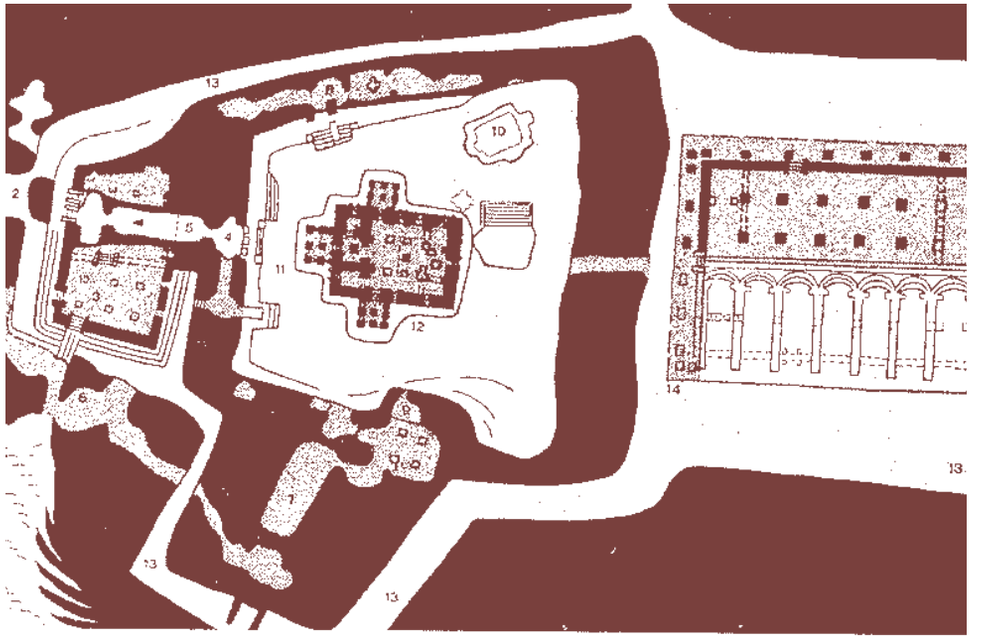
Rock-Hewn Churches

Lalibela, Amhara
7th - 13th Centuries

King Lalibela comissioned the construction of 11 rock-hewn churches in the 13th century. These churches are carved out of the landscape, representing an interesting subtractive, rather than additive, approach to construction.

Despite being carved out of the rock, the architecture is refines, with mouldings and string courses dividing the facades, and ornate windows and niches (with references to traditional timber architecture). Passages, including the 'passage to heaven' lead between the churches.

The colours seen in the churches are particularly interesting. Typically viewed as being red, there are in fact various shades of rock, including deep reds, pinks, yellows and greys. Particularly interesting is how the play of light affects the colour of the rock.



1. Trench.
2. Tomb of Adamo.
3. Biet Golgotha Micael.
4. Crypts.
5. Passage to tomb block.
6. Ancient subterranean passages.
7. Entrance to courtyard of Biet Mariam
8. Biet Mascal.
9. Biet Denagel.
10. Small pool.
11. Courtyard of Biet Mariam.
12. Biet Mariam.
13. Courtyard of Medani Alem and trenches.
14. Medani Alem.

(From Della Corte and Bidder).

Image Source: https://i.pinimg.com/originals/b7/7a/12/b77a12c017d56f60d8fbae1480d5cd5c.jpg

Fasil Ghebbi & Baths

Gondar, Amhara
17th Century

Fasil Ghebbi, or the Royal Enclosure was built in Gondar by Emperor Fasilides in the 17th century as the first semi-permanent royal encampment. Nearby he built the baths, though the actual use of this stucture is unknown (it is not thought that the baths were intended for bathing).

Both the baths and the Royal Enclosure show a diverse rnage of architectural influences, and encapsulate the variety of styles that impacted historic Ethiopian architecture. Notably, the design includes references to both Islam and Judaism, and as well as early Nubian architecture.

5.3 Urban Villas & Palazzine

Urban villas can be found in cities across the globe, and are characterised as detached buildings sited in a private plot or on a park. These buildings are compact and multiple freestanding villas make up a single urban block. Villas may be single-family dwellings (now often converted into multiple dwellings), or multi-household units.

The palazzina is a building type formalised in 1920 in Rome, developed from the earlier "villini", but with the notable distinction of housing multiple households by design, rather than being designed for a single household (with possible adaptation to multiple household use later). The name is an affectionate diminutive of "palazzo", referring to the residential palaces of the rich and royalty. Designers were required to adhere to a set of rules that governed the size and formal composition of the buildings, and as such many common features can be seen.

In practice, palazzine were generally 5-storey apartment buildings with 2 apartments on each upper floor, meaning 8 apartments per building. Apartments were accessed from a single stair/elevator core in the centre of the building, and access cores were variously enclosed or open. In many cases, a separate stair core for domestic servants was included, accessing servant spaces and separate living spaces for staff.

Urban villas and palazzine have been used as a reference for the Type 3 'Pavilion' buildings in my proposal. The Italian background of the palazzine is linked with the Italian influences seen in Ethio-Modernism, which was brought to Ethiopia during the period of Italian occupation from 1936-1941. Though the Italian occupation was short, its influence on Ethiopian architecture, particularly in Addis Ababa, was profound. Furthermore, the typology of the urban villa is a useful reference for the Type 3 buildings, which could be considered as villas.

Left - Finnsbury Park Urban Villas, London
Image Source: https://sergisonbates.com/en/projects/urban-villas-london

Palazzina Salvatelli

Rome, Italy
Gio Ponti & Antonio Fornaroli
1939

Designed in the rationalist syle, this palazzina by Ponti and Fornaroli has two alnost identical apartments on each floor, with a single penthouse on the roof. Rooms are well-dimensioned, generous, and do not steal space from one another.

Windows to the front and rear facades are grouped into bays of 3, with balcony access to the primary street facade. A central core with main staircase and elevator accesses the apartments, and there is a service stair to each side. Service and served spaces have separate circulation, allowing almost complete detachment.

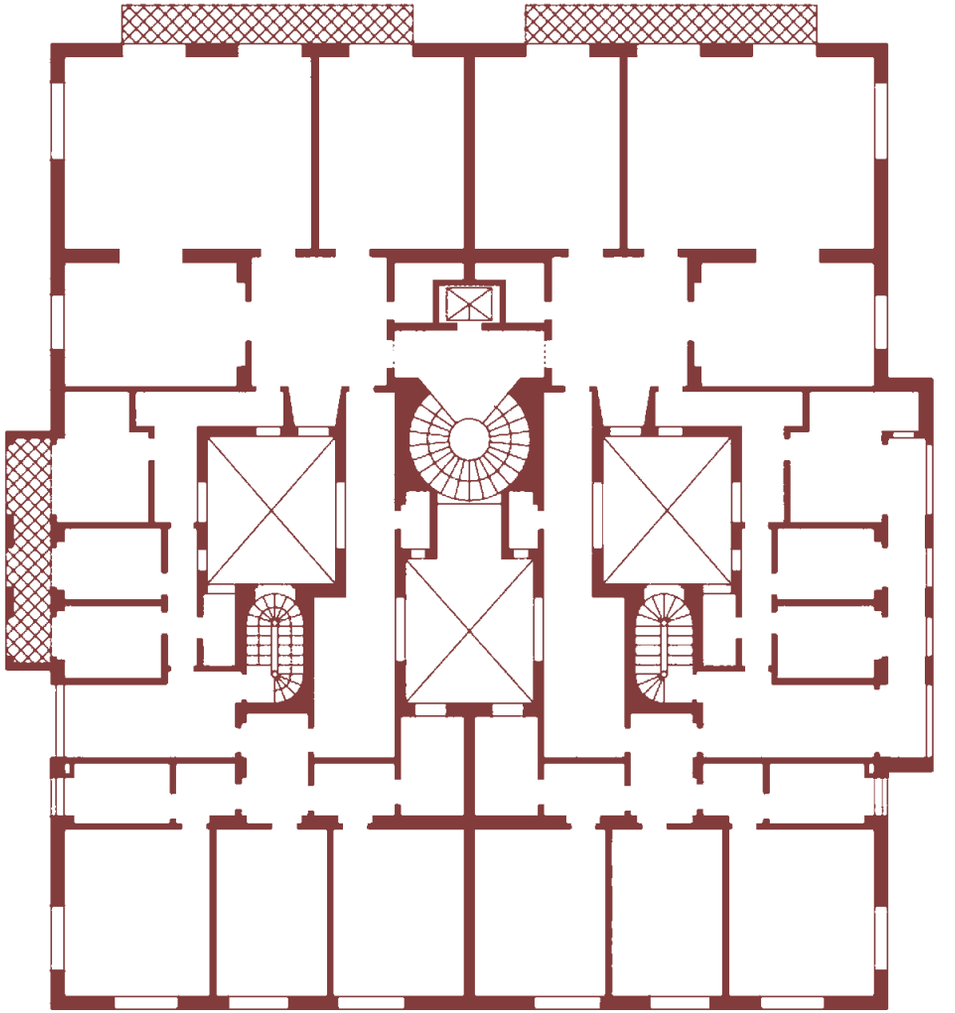


Image Source: https://issuu.com/frankvankessel/docs/the_building_brick_of_rome (adapted)

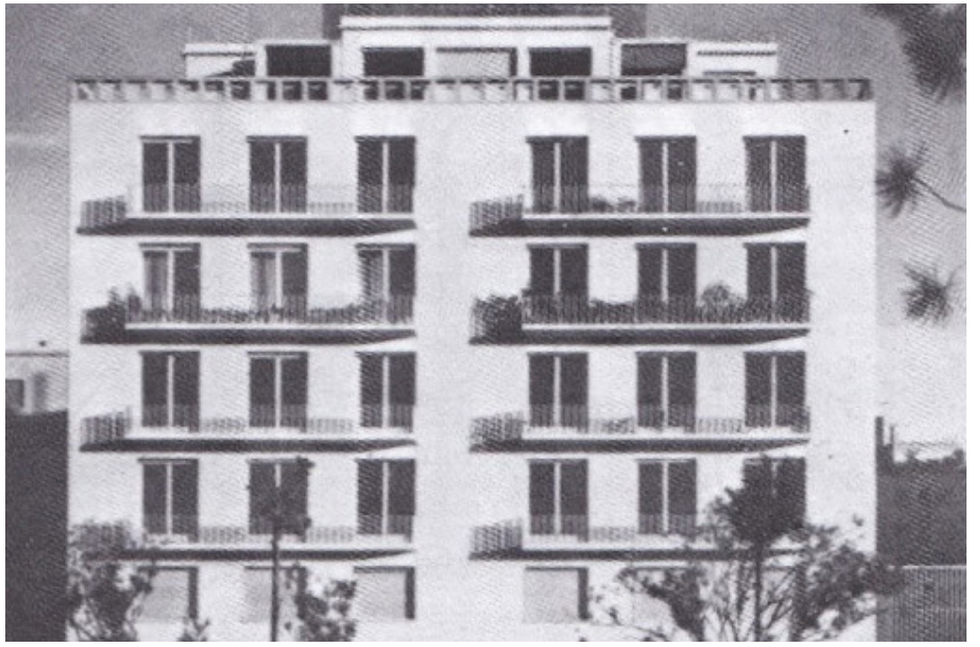


Image Sources: http://www.archidiap.com/opera/palazzina-salvatelli/

Palazzina Via Archimede

Rome, Italy
Ugo Luccichenti
1950-53

With a total of eight storeys, this Palazzina is larger than earlier examples of the typology, however the standard of two apartments per floor accessed from a central core remains. The style is much more expressive than earlier examples, and the symmetry is broken. The primary facade is dynamic and plastic, and hides the symmetry of the service core. Unlike Palazzine Salvatelli and Bornigia, the balconies are not continuous, but rather each room has a separate balcony where required.

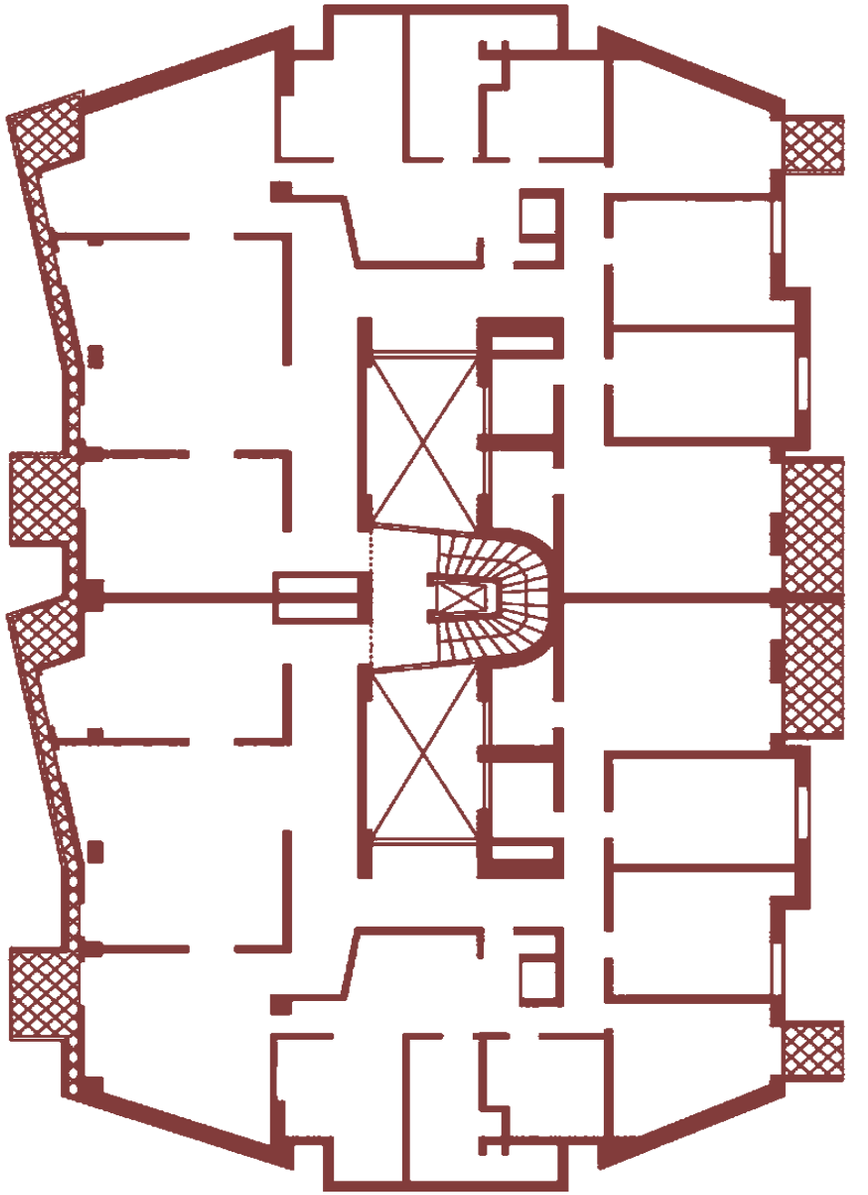


Image Source: https://issuu.com/frankvankessel/docs/the_building_brick_of_rome (adapted)

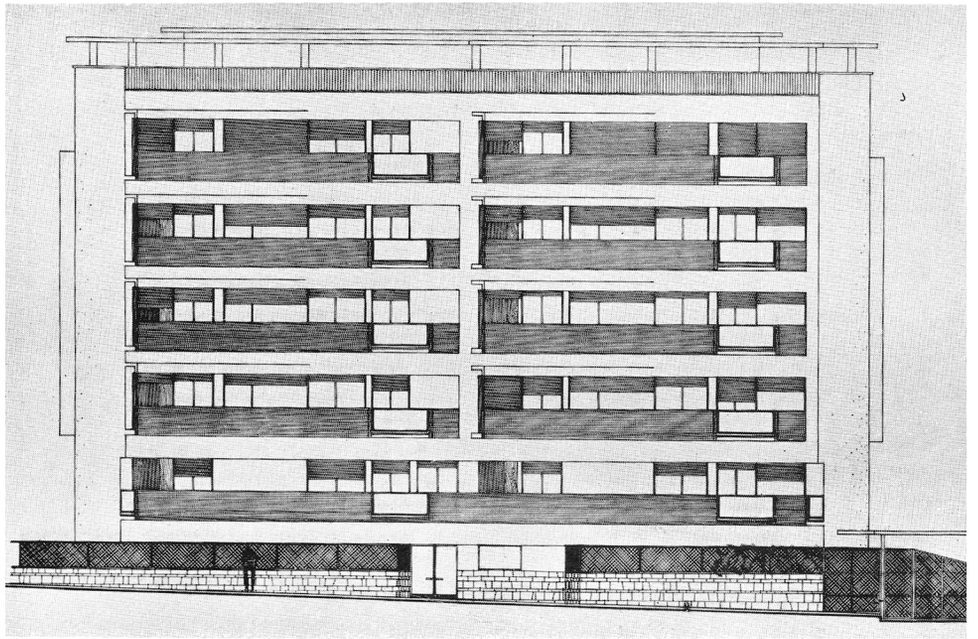


Image Source: http://www.archidiap.com/opera/palazzina-via-archimede-185/

Finnsbury Park Urban Villas

London, UK
Sergison Bates
2008

This group of 3 villas were designed as social housing in a fairly deprived area of North London. The architects state that “unlike much affordable housing, the buildings feel solid and substantial”, and this is evident in the choice of heavy, robust materials and full-height windows. Though not pastiche, and representing an unusual typology for London, the buildings echo features found in period London homes, including bay windows, an elevated residential ground floor, and setbacks.

Typical floorplans in the larger villas have four apartments accessed from a single, central core, whilst the smaller block contains two apartments on each floor. In total, 44 one- to three-bedroom units are provided on the site.

These urban villas could be seen as a re-interpretation of the Palazzina typology for London.

Image Source: https://divisare.com/projects/261453-sergison-bates-architects-stefan-muller-urban-housing (adapted)

Image Sources: https://sergisonbates.com/en/projects/urban-villas-london (top)
https://divisare.com/projects/261453-sergison-bates-architects-stefan-muller-urban-housing (bottom)

Image Source: https://sergisonbates.com/en/projects/urban-villas-london

6.0

Materials & Construction

6.1 Construction Materials in Ethiopia

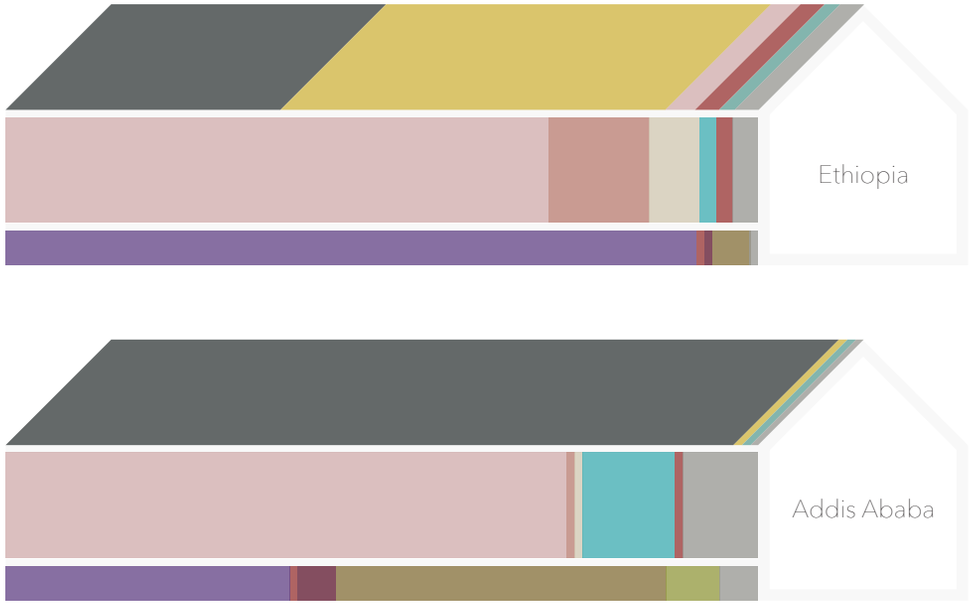
The prevalence of different construction materials in each region is based primarily on the accessibility in the surroundings and the climate in which the building is constructed.

The primary roof construction material in Ethiopia, especially in rural areas (which account for 80% of dwellings), is thatch. 37% of all roofs in Ethiopia are constructed with corrugated iron sheets. However, 98% of all roofs in Addis Ababa are corrugated iron sheets. Other notable materials are plastic roofing (shera) used mostly in the Somali region; wood and mud roofing; and the combination of bamboo and reed. (Central Statistical Agency 2007)

For wall constructions, the combination of eucalyptus wood and mud forming the traditional "chikka" walls account for 73.6% of the building material of all residential buildings in Ethiopia. Wood and mud wall construction is especially common in central and western regions including Amhara, Oromia, Benishangul-Gumuz, SNNP, Gambella, Harar, and Addis Ababa. Wood and thatch as wall materials are predominantly used in eastern regions like Somali and Afar. Plastered hollow block constructions are also common in Addis Ababa, including in the condominium projects, accounting for 13% of the construction materials. Other building materials used less frequently are stone and cement, unplastered hollow block, brick, corrugated iron, and mud brick. Many areas use a combination of the materials for wall building material.

Mud is the most prevalent as a floor material throughout Ethiopia, with a share of 92% of total floor constructions. Addis Ababa is one of the few places where a significant amount of cement floors (almost 40%) are used.

Left - Chikka Wall, Talian Sefer



Construction Materials by share, (Central Statistical Agency, 2007)

Chikka

Chikka is a traditional construction material across Ethiopia, formed of mud and straw applied to a timber frame. The materials are cheap and abundant, and the labour is largely unskilled, and as such it is a cheap and efficient way to build. Due to this, chikka is still used for many buildings outside Addis Ababa.

Moreover, chikka is a durable material. The 14th-century Debre Maryam monastery near Bahir Dar has, according to legend, not needed repairs since construction. Whether or not this is true, that it remains standing and in good shape (unlike many concrete constructions in Addis Ababa) is testament to the resilience of the material. The chikka used at the monastery was mixed for a year to ensure it remained standing for centuries (the usual preparation time is 2-3 weeks).

Chikka construction site, Lalibela

Debre Maryam Monastery, Bahar Dar

Concrete

Concrete is the one of the primary construction materials in 21st century Addis Ababa. Condominium housing uses a concrete frame construction, presumably due to cost reasons. Though practices may differ from those found Europe, and construction site safety standards are certainly lower, concrete construction methods are well-known in Addis Ababa.

However, the quality of concrete construction leaves much to be desired. Even buildings with a high quality of design, such as the Lideta Mercado, have a poor quality of construction, suggesting that concrete may be a poor choice of building material in Ethiopia.

Lideta Mercado, Lideta

Construction Site, Summit

6.2 Material Decision

The construction materials chosen for this project were decided early in the design stage, such that the material choice could influence the design and vice versa. It is my belief that architecture, as a holistic discipline, relies on thorough thinking at all scales at all stages of the project, and that building technology and construction details should not come linearly after the scheme is designed.

To evaluate the various materials available, a SWOT analysis was conducted, looking at the strengths, weaknesses, opportunities, and threats of each of a number of common and potential materials, selected as a result of analysis of the precedent projects and buildings. This was not intended as a pure number-crunching exercise, but rather as a tool through which the qualities of different materials could be exploreds. The materials that performed well in this exercise were then explored further, until Adobe and Laminated Bamboo Lumber (LBL) were decided upon.

Left - Rock-hewn wall, Lalibela

Materials SWOT Analysis

Material	Strengths	Weaknesses	Opportunities	Threats	Scores (/5)					Total Score (/25)
					Environment	Social	Suitability	Durability	Price	
Raw Timber	· Renewable (if sustainably sourced) · Can be locally sourced · Supports government's recent focus on forestry · Local knowledge	· Unsustainable sources can cause environmental degradation · Reports of widespread unsustainable / illegal logging · High financial & environmental cost of transport and cutting · Poor quality of eucalyptus reduces ability to build > 2 storeys · Untreated timber susceptible to insect & water damage	· Benefit to community if local timber used	· Possibility of environmental damage caused by unsustainable logging · Insect and water damage could harm building's lifespan	4	4	2	2	3	15
Processed Timber	· Higher strength than raw timber · Timber can be sustainably sourced	· Unsustainable timber sources can cause environmental degradation · Reports of widespread unsustainable / illegal logging · Glues are generally not recyclable · Production process releases emissions · High financial & environmental cost of production · Unlikely to be locally sourced · Fire risk	· Factory could be set up on site to process raw timber into CLT, which would provide local jobs and support government's focus on forestry · Local eucalytpus timber could be enhanced by processing	· Possibility of environmental damage caused by unsustainable logging · Cost could be prohibitive	2	4	4	4	1	15
Bamboo	· Renewable (if sustainably sourced) · Can be locally sourced · Supports government's recent focus on forestry · Rapid growth · Low cost · Can be resistant to insect damage if soaked before use	· Strength prohibits building > 2 storeys · Despite growing bamboo industry, will require construction training · Invasive species could take over natural forests · Requires land to grow · Fire risk	· Bamboo could be grown in nearby Adwa Park for construction · Opportunity to develop skills and training · Complex root system can help alleviate problems associated with deforestation & desertification	· Possibility of ecosystem damage due to invasive nature · Potential for poor-quality construction due to lack of local knowledge	4	4	2	3	3	16
Processed Bamboo (Laminated Bamboo Lumber)	· Renewable (if sustainably sourced) · Can be locally sourced · Supports government's recent focus on forestry · Rapid growth · Stronger and more adaptable than raw bamboo	· Despite growing bamboo industry, will require construction training · Invasive species could take over natural forests · Requires land to grow · Fire risk · Cost could be prohibitive if large quantities used	· Bamboo could be grown in nearby Adwa Park for construction · Opportunity to develop skills and training · Complex root system can help alleviate problems associated with deforestation & desertification	· Possibility of ecosystem damage due to invasive nature	3	4	5	4	2	18
Chika	· Renewable · Locally sourced · Low material cost of earth · Vernacular material with very good local knowledge · Climatically efficient · Durable if well detailed · Resistant to insect and water damage if built on top of stone plinth	· Strength prohibits building > 2 storeys · Requires regular maintenance · Requires large roof overhangs to prevent rain damage · High material cost of timber	· Benefit to community if local timber used · Earth from site could be used to keep material costs low · Innovative use of material could lead to evolution (rather than revolution) of local construction industry · Ventilation can be easily provided by leaving some wall areas unplastered	· Insect and water damage could limit building's lifespan	5	3	1	3	5	17
Adobe	· Renewable · Locally sourced · Low material cost · Durable if well detailed · Fire resistant · Climatically efficient · Resistant to insect damage	· Little local knowledge · Requires reinforcement if building > 2 storeys	· Adobe mix is similar to chika mix, meaning there is opportunity to draw on local construction practices · Some NGOs have implemented adobe techniques, so possibility to draw on knowledge from these projects	· Potential for poor construction quality due to use of new material	5	4	4	4	3	20
Fired Brick	· Circular material (if well-detailed with appropriate mortar) · Durable · Fire resistant	· Energy-intensive manufacturing process · High material cost	· Factory could be set up on-site to manufacture bricks · Opportunity to train construction workers	· Possibility of money leaving local area if bricks are imported	3	3	4	5	2	17
Stone	· Good local knowledge · Climatically efficient · Fire resistant · Resistant to insect and water damage	· High material and transportation costs · Energy-intensive extraction process · Labour-intensive construction process	· Could be used in limited way as plinth for other construction methods · High labour cost could stimulate local economy · Can draw on vernacular knowledge · Earth mortar could be used to improve sustainability	· Cost may be prohibitive, especially if used in large quantities · Possibility of money leaving local area if stone is imported	3	2	3	5	1	14
Concrete	· Durable · Culturally seen as high-quality, modern material	· Energy-intensive extraction process of cement · Reports of illegal extraction of aggregate · Reports of illegal extraction of sand by 'sand mafia', which causes damage to river beds and banks · Revenues concentrated on large companies rather than local people · Little opportunity for designer to control quality · High cost compared with vernacular methods	· Could be used in limited way as plinth for other construction methods · Pre-fabricated concrete elements could be used to ensure provinence of raw materials and to control quality	· Cost may be prohibitive, especially if used in large quantities · Money likely to leave local area · Limited need for construction workers, further reducing revenue to local community · Quality likely to be low, due to local construction methods and standards	0	1	4	3	1	9
Steel	· Durable · Culturally seen as high-quality, modern material	· Energy-intensive production process · Revenues concentrated on large companies rather than local people · Little local knowledge · Very high cost compared with vernacular methods	· Provinence of materials easily controlled	· Cost likely to be prohibitive · Money likely to leave local area · Limited need for construction workers, further reducing revenue to local community	1	0	3	5	0	9

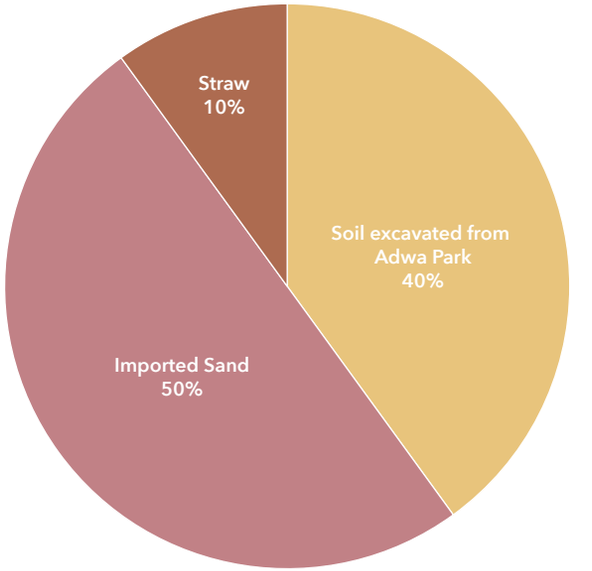
Adobe

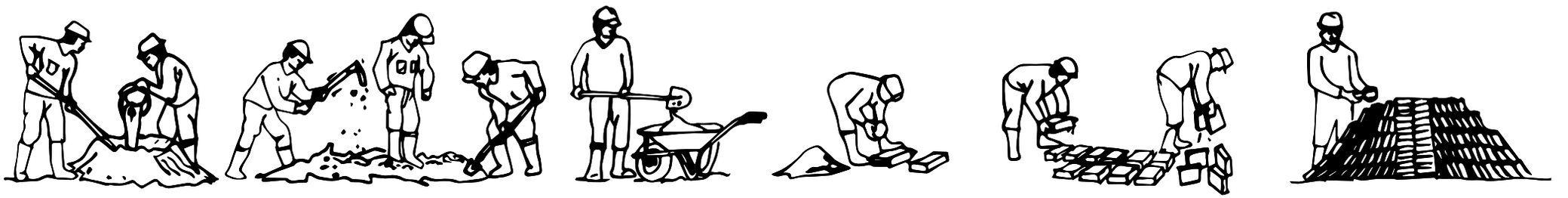
After conducting the analysis of various materials, adobe bricks were shown to be a good all-round choice of construction material. As I believe that architecture and building technology should be thought of holistically, and that each should inform the other, I made the decision to use adobe bricks early in the design stage.

Adobe bricks are a low-tech building material, requiring little investment in machinery, but high levels of labour. In this way, the production of adobe bricks can provide employment opportunities to low-skilled workers.

Adobe bricks are suitable for building up to 3 stories, but can be stabilised to build beyond this height. Equally, they can be used within a solid frame as infill material, reducing the volume of concrete or steel required.

Part of the material for the bricks can be sourced from Adwa Park, however the clay and montmorillonite contents are too high for stable bricks, therefore the bricks must include imported sand and straw, as shown in the chart on the opposite page. Furthermore, manufacture of the bricks can be performed on-site to reduce costs and improve local employment opportunities.



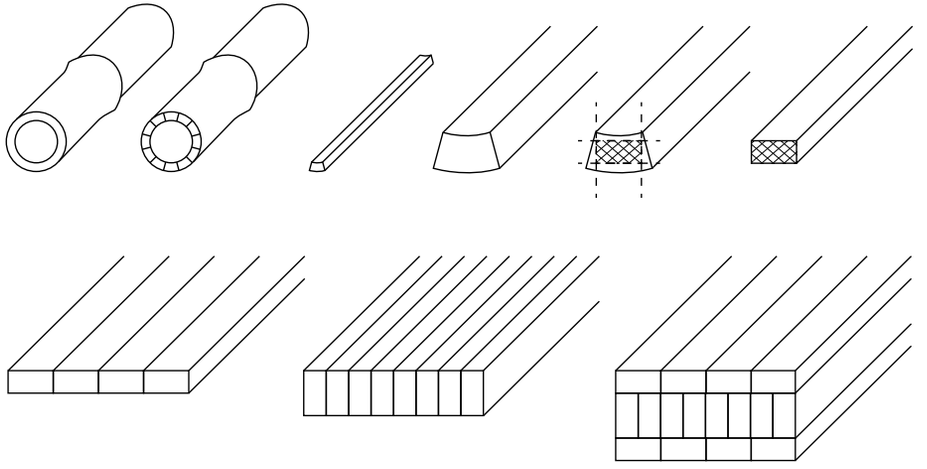


Adobe brick-making, from https://madeinearth.in/topics/techniques/adobe/

Laminated Bamboo Lumber

Adobe bricks, despite being a sensible choice of construction material in Ethiopia, have certain limitations, and lend themselves to heavyweight construction with thick walls. To avoid setting this limitation at the outset of the project, I wanted to decide on a further material for construction.

Ethiopia has scarce timber resources, and as such timber for construction is expensive. Futhermore, much of Ethiopia's woodland is eucalyptus, which is a poor construction material, and imprted timber is very costly. However, Bamboo is grown extensively in Ethiopia, and can be processed to make a cheap, efficient, and sustainable construction material. This can be done using low-tech methods, outlined by Mahdavi (Mahdavi, Clouston, and Arwade 2012). With the adobe blocks, this manufacture could be performed on-site. A proposed location for the on-site factory is noted overleaf.



LBL construction, from Mirmehdi, Mohamad. (2016). The Effects of bamboo species and adhesive type on mechanical properties of laminated bamboo lumber (LBL). 10.13140/RG.2.1.2363.6881.

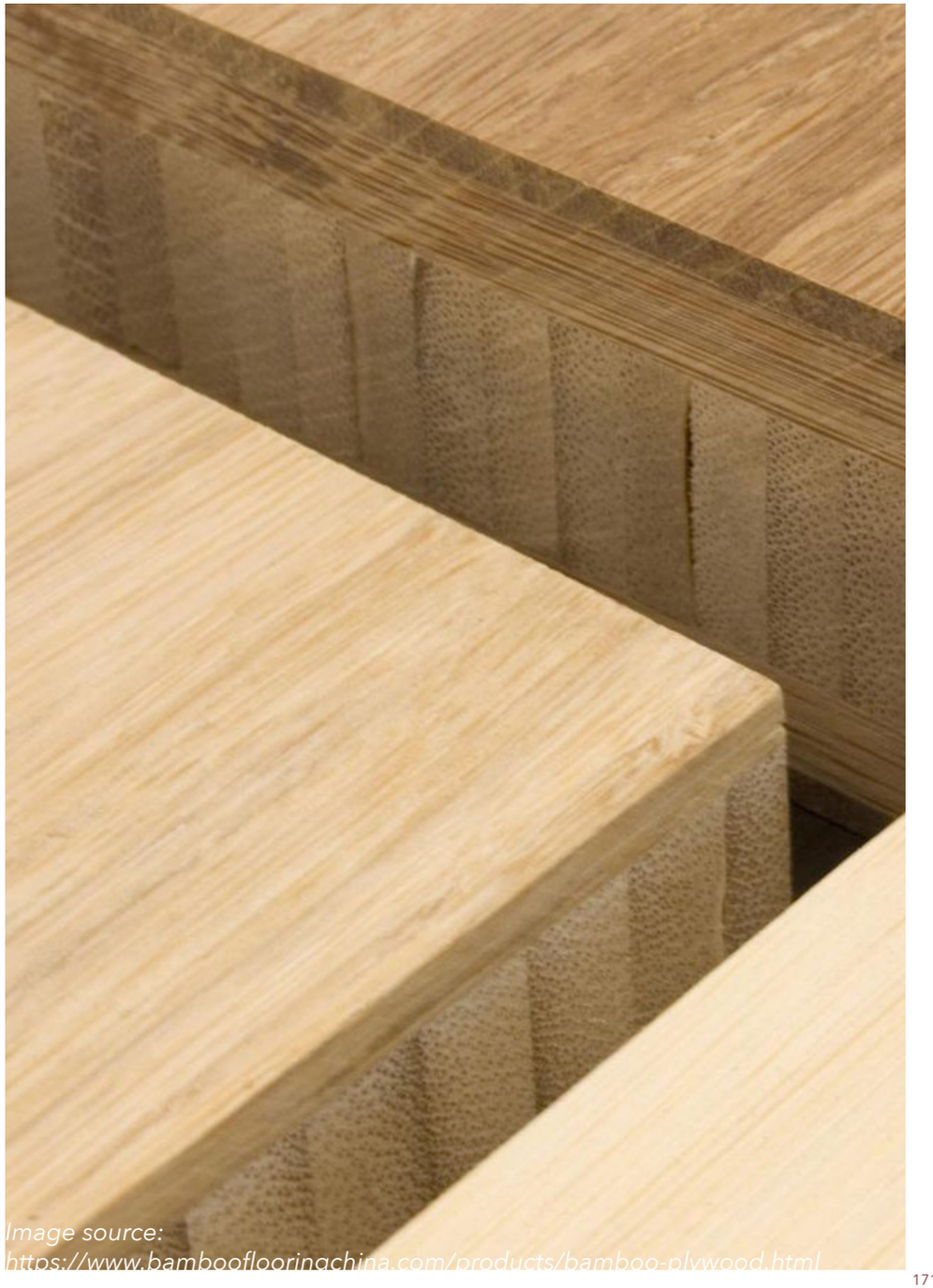
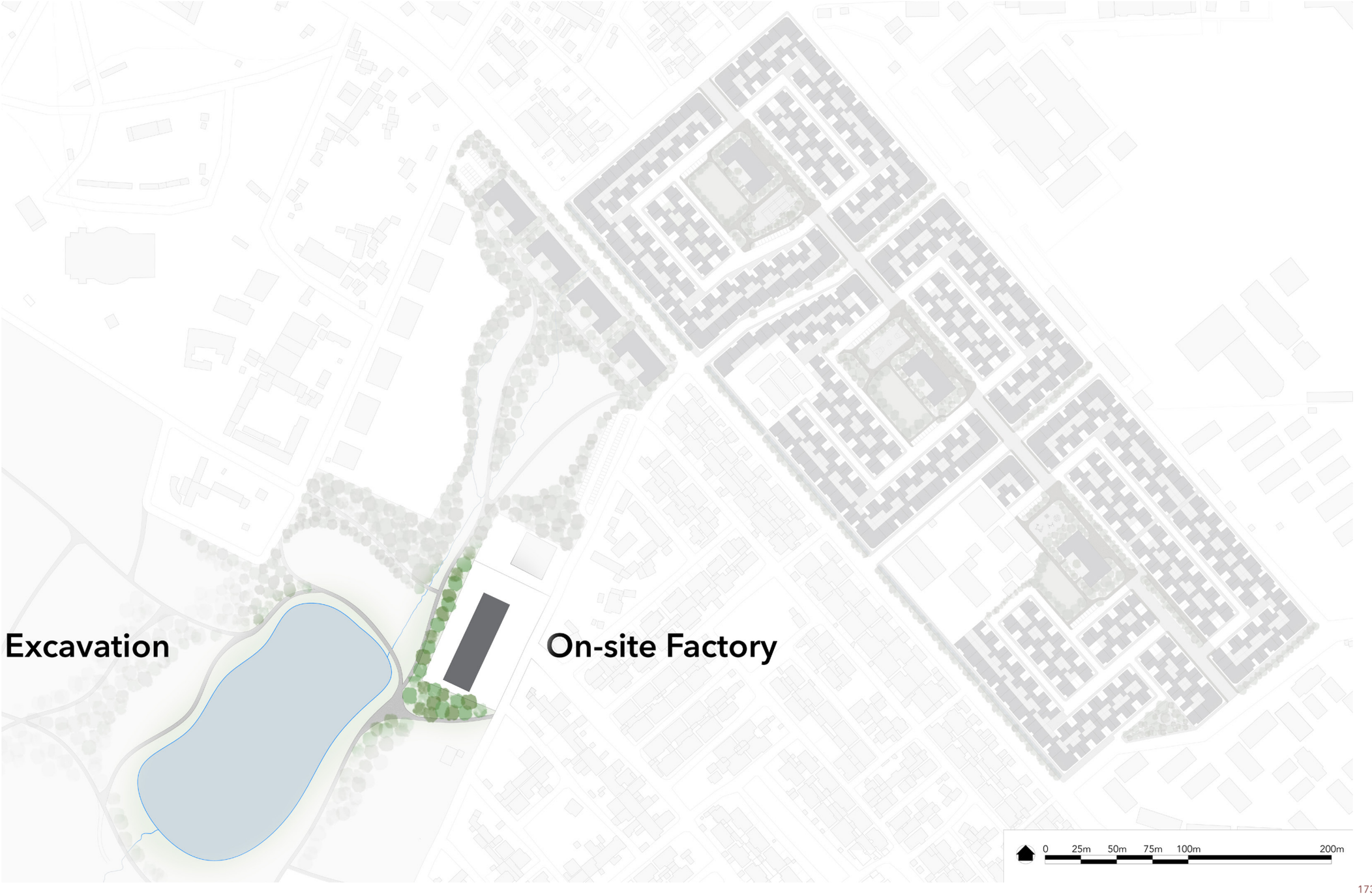


Image source:
https://www.bambooflooringchina.com/products/bamboo-plywood.html


Excavation
On-site Factory
0
25m
50m
75m
100m
200m

7.0

Design Brief

Programme of Requirements

The design assignment seeks to address the problems noted in the problem statement and is drawn from the research conducted.

The site function should reflect the current reality of the area as a sub-centre of Addis Ababa, and diversity and adaptability of function should be encouraged as a step towards resilience. In particular, the site edges that border main roads should have the opportunity be occupied by commercial functions, at least at ground floor level, and the design should address the entrance to Adwa Park to the south-west. Community facilities should be integrated into the scheme, being mindful that the as the population of the site increases, the capacity of these facilities will need to increase proportionally.

Existing buildings should be replaced with feasible low- and mid-rise, mid-density dwellings to be occupied by the existing low- to mid-income residents, as well as new residents in these income brackets. The density should be at least equal to that of the neighbouring Gerji Condominium development, namely 145.79 dwellings/hectare.

Dwellings should immediately and appropriately accommodate the different and various living patterns of low- to mid-income households in Addis Ababa, whilst allowing for future expansion and adaptations of dwellings as household incomes and expectations change over time. In practice, this requires a variety of different dwellings and dwelling types to be offered at the outset, with opportunities given for residents to further adapt these to their own needs in the future.

Micro-entrepreneurship should be encouraged. Dwellings should be designed such that commercial and working spaces can be created, and small businesses can be operated from the home. Moreover, dwellings should offer the possibility for rental income, and should be able to split into multiple units to allow residents to act as small-scale landlords.

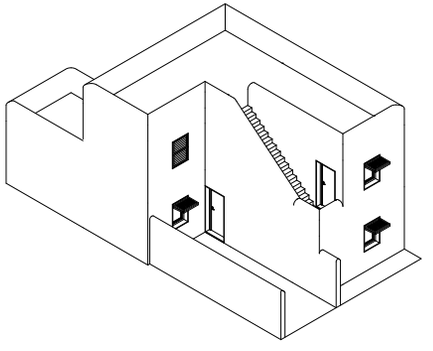
Dwellings and dwelling clusters should be designed in a way that is mindful of context, not only the immediate context of Gerji, but also the context of Addis Ababa and Ethiopia as a whole, reflecting the demographic make-up and changes experienced in the city.

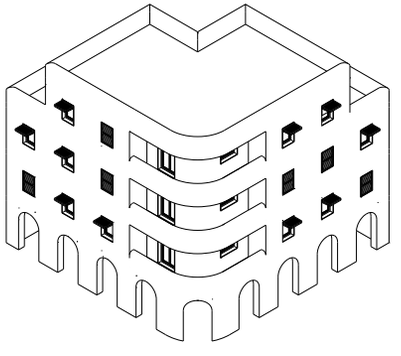
Material choice should be informed by local customs and expertise, as well as availability of resources, and choices should be made that prioritise the use of local labour and techniques, to aid social sustainability, ongoing maintenance and placemaking. Furthermore, sustainability should be incorporated into the design, to embed the project's role in helping to promote Addis Ababa as a 21st-century city.

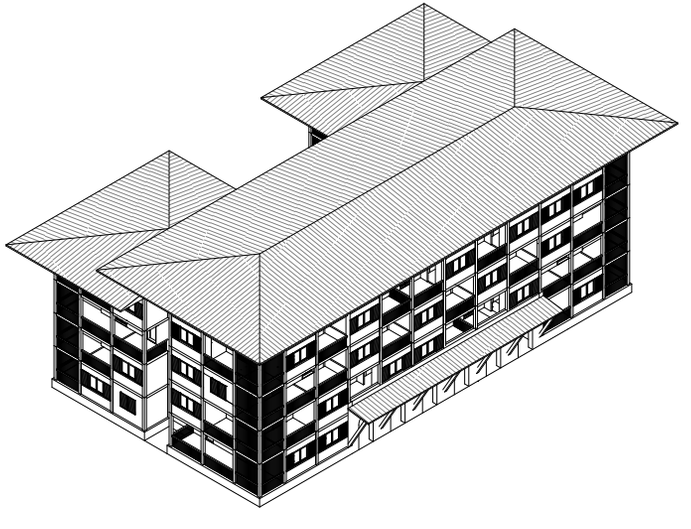
The scheme will be designed in a way that is appropriate, feasible using the current technologies and with the current level of development in Addis Ababa, informed by local customs and traditions, contextual and of its place, and conscious of the lifestyles and desires of local residents. Nonetheless the design should be contemporary and striking. The proposal will draw on vernacular styles and methods, and will adapt them in a radical way to develop a new Ethiopian urbanity.

8.0

Proposal







Left - Three typologies

8.1 Introduction

The proposed scheme consists of three typologies - a standard plot, “Type 1”, a corner plot, “Type 2”, and an urban villa, “Type 3”. These three buildings make up the constituent parts of the scheme.

The proposal is designed as a prototype for redevelopment in Addis Ababa. Although the urban design refers to the specifics of the site and Gerji, the buildings could be replicated throughout Addis Ababa with little alteration. Together they provide a range of options for the various and different living patterns found in Ethiopia.

Type 1 is the most basic of the three typologies, and is a small building that can contain between 1 and 4 individual units, both commercial and residential. It is flexible enough to be offered for sale, and is simple enough to be appropriate for the rental market.

Type 2 is a larger building, suitable for co-operatives and small-scale landlords. Furthermore, its slightly larger height makes it useful in placemaking on an urban level. It signifies and entrance into the scheme, and marks ‘special moments’.

Type 3 is much larger, more towards the scale of the earlier condominium developments. Despite being a large apartment building, it refers to historical Ethiopian styles and is much more adaptable and flexible than those currently being built.

8.2 Managerial Strategy

The site is currently owned by the FHC, who rent out dwellings to residents. Thus, the FHC has control of both the land and the buildings, and is able to impose strict rules on extensions and adaptations made to the dwellings.

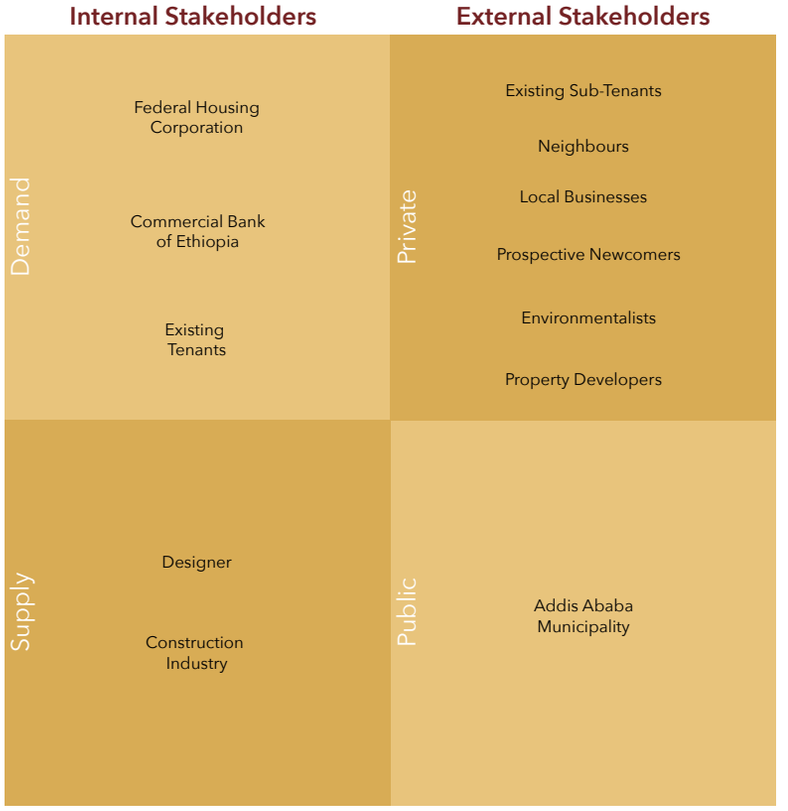
In order to fund the development of the proposed scheme, it is necessary to raise capital. Furthermore, ethically it is considered necessary to include the existing residents as stakeholders within the new scheme. A specific strategy was created especially for the existing residents. The managerial strategy proposed began by looking at the stakeholders involved in the development, and creating a stakeholder map to look in more detail at their concerns.

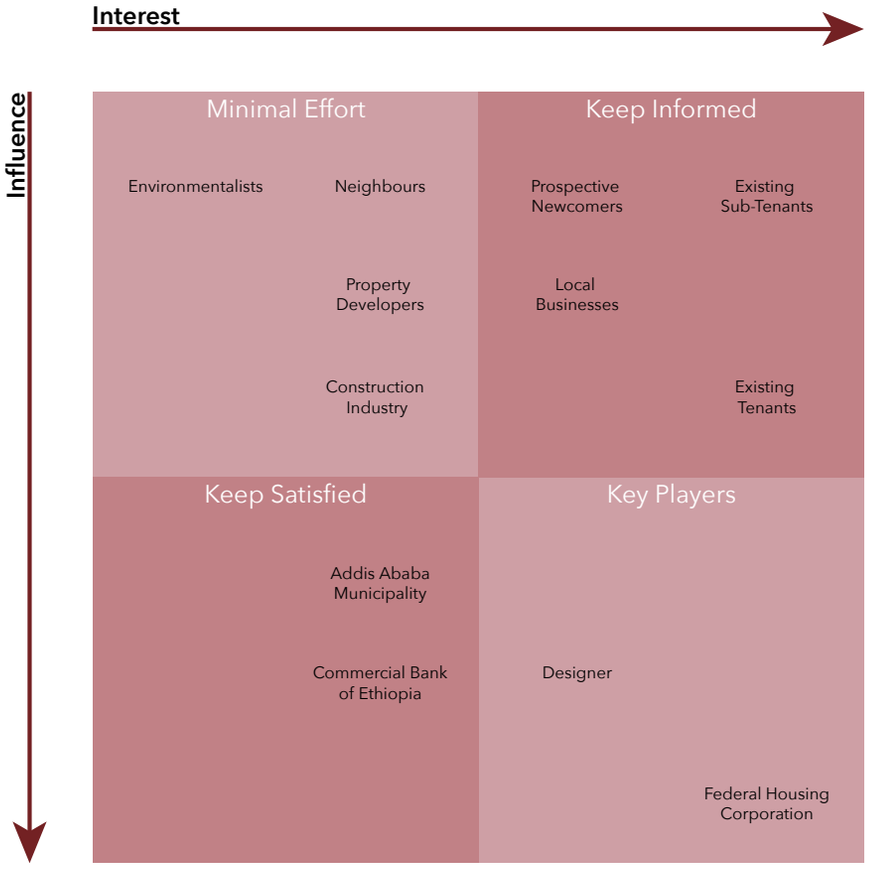
The proposed strategy is a mixed tenure scheme, whereby the FHC retains ownership of the entire site, and some dwellings are rented and some leased. In this way, capital can be raised through the selling of the leases, however the FHC is able to impose rules on who is able to purchase these leases. Type 1 properties will be a mixture of rental properties (existing residents) and leasehold properties (existing and new residents). Type 2 properties will be sold as leasehold to co-operatives and small-scale landlords. Type 3 properties will be exclusively rental properties (new residents).

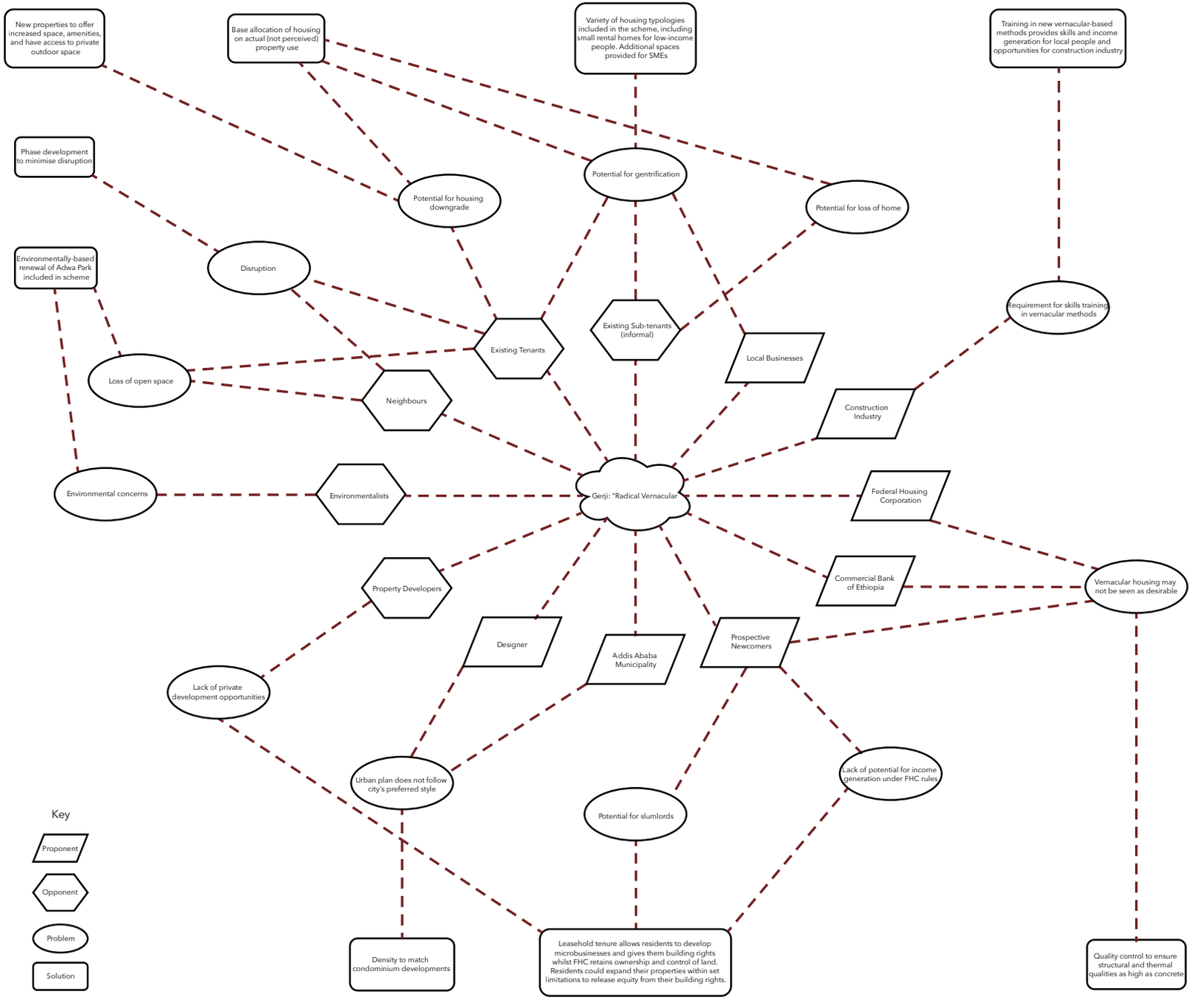
The Type 3 properties located on Adwa Park will be developed in conjunction with the municipality, who is the landowner of this portion of the site. The rental income will be split between the municipality and the FHC. Type 3 properties within the main body of the scheme will be rented out at market rates, including the commercial units. The income from the commercial units will be used to subsidise the social function space. Finally, a ground rent from the leashold properties will fund the maintenance of the external spaces.

Left - "Participatory Design", Gerji

Stakeholder Mapping






New properties to offer increased space, amenities, and have access to private outdoor space
Base allocation of housing on actual (not perceived) property use
Variety of housing typologies included in the scheme, including small rental homes for low-income people. Additional spaces provided for SMEs
Training in new vernacular-based methods provides skills and income generation for local people and opportunities for construction industry
Phase development to minimise disruption
Potential for gentrification
Potential for housing downgrade
Potential for loss of home
Environmentally-based renewal of Adwa Park included in scheme
Disruption
Requirement for skills training in vernacular methods
Existing Sub-tenants (informal)
Existing Tenants
Local Businesses
Loss of open space
Neighbours
Construction Industry
Environmental concerns
Environmentalists
Gerji: *Radical Vernacular
Federal Housing Corporation
Commercial Bank of Ethiopia
Vernacular housing may not be seen as desirable
Property Developers
Designer
Addis Ababa Municipality
Prospective Newcomers
Lack of private development opportunities
Urban plan does not follow city's preferred style
Lack of potential for income generation under FHC rules
Potential for slumlords
Key
Proponent
Opponent
Problem
Solution
Density to match condominium developments
Leasehold tenure allows residents to develop microbusinesses and gives them building rights whilst FHC retains ownership and control of land. Residents could expand their properties within set limitations to release equity from their building rights.
Quality control to ensure structural and thermal qualities as high as concrete

Existing Tenants

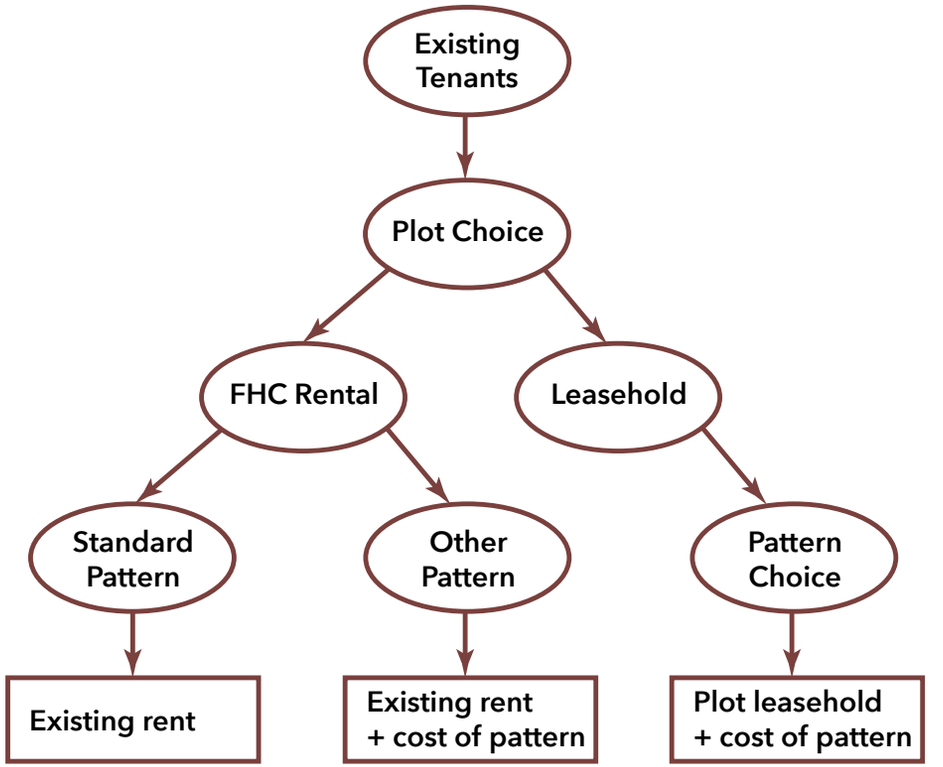
An ethical decision was made at the outset of the project to ensure the existing residents are able to be housed in the new scheme. Existing residents have a relatively low rent compared with many households in Addis Ababa, however they are mostly mid-income households.

From the outset the aim was to provide an option that allowed residents to continue to pay their existing rent, but also offer options that offer them opportunities to increase their living spaces or purchase leaseholds, that would increase their rental contribution.

Therefore, a standard pattern was created for existing families, Type 1B (which can be seen later in this chapter), which proivdes a similar standard of accomodation to that of the most common existing dwelling typology (Typology 4). Existing residents are able to choose their own plot (in the appropriate phase of development) and move into a new Type 1B dwelling whilst continuing to pay their existing rent.

However, if residents wish to have a larger home, or indeed a dwelling that offers spaces that could be used for commercial purposes or sub-rental, they would pay market rate for the cost of construction for this pattern, followed by their existing rent.

Existing residents would also be encouraged to purchase a leasehold, which would provide a larger cash injection to the FHC. For this they would pay the leasehold cost for the plot and the cost of the construction of the pattern at a rate lower than the market rate.



8.3 Urban Scheme

The urban design is based on a number of separate factors and principles:

1. Roads, broadly, are aligned to the direction of the prevailing wind, which comes from the south-east. Thus, the streets are cooled by the air movement.

2. As the FSI is higher, surface run-off will be increased, and (particularly in the summer) this could lead to problems.
Water runs down the main streets into a channel at the foot of the site. This drains to a stream which flows into a newly-created lake in the adobe excavation pit.

3. The site is split into three separate neighbourhoods. As the density in the proposed scheme will be much higher than the existing, the aim was to split the site into three equally sized areas, each of which has a population that allows a community to thrive.

4. These neighbourhoods are linked by a 'social corridor', which contains community functions and shops, located in Type 3 buildings. These are supplemented by outdoor community functions and a pedestrian path along this corridor.

5. Parallel to this corridor is the existing commercial road. The proposed scheme addresses this by providing options that include space for commercial function that can be built, for example, along this road.

6. Adwa Park is considered to be part of the site. Four Type 3 buildings will be built on the park, containing apartments and commercial units. These will be built in conjunction with the municipality, who is the landowner. Furthermore, the park is used as an excavation site for the adobe bricks, and will be landscaped following the completion of the project.

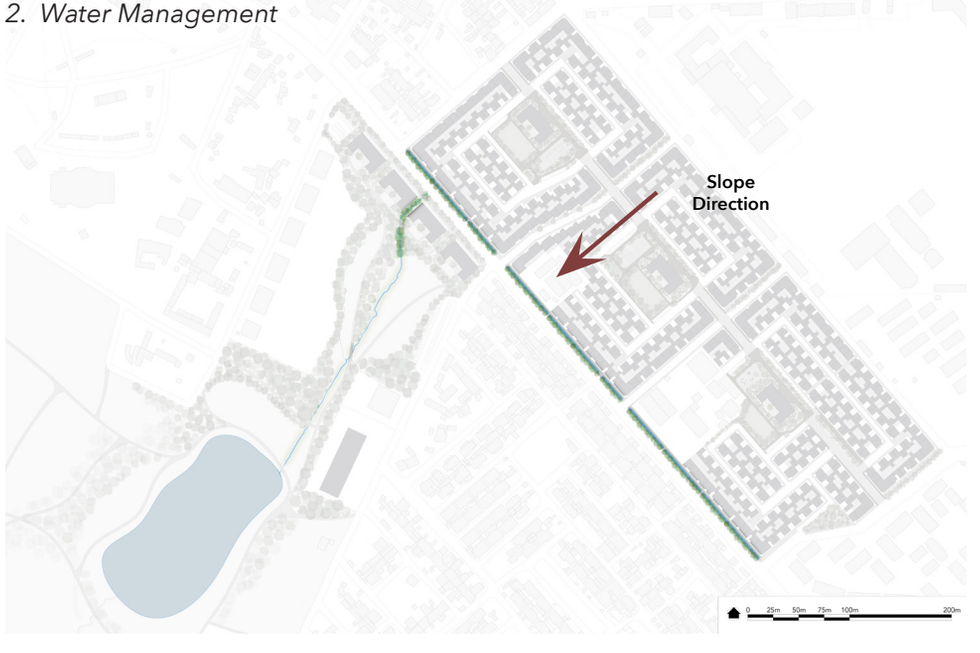
Left - Urban scheme fragment

0
25m
50m
75m
100m
200m

Urban Scheme Principles

1. Wind Direction

2. Water Management



3. Three Neighbourhoods

4. Social Corridor

5. Commercial Road

6. Adwa Park

Site Data

Existing

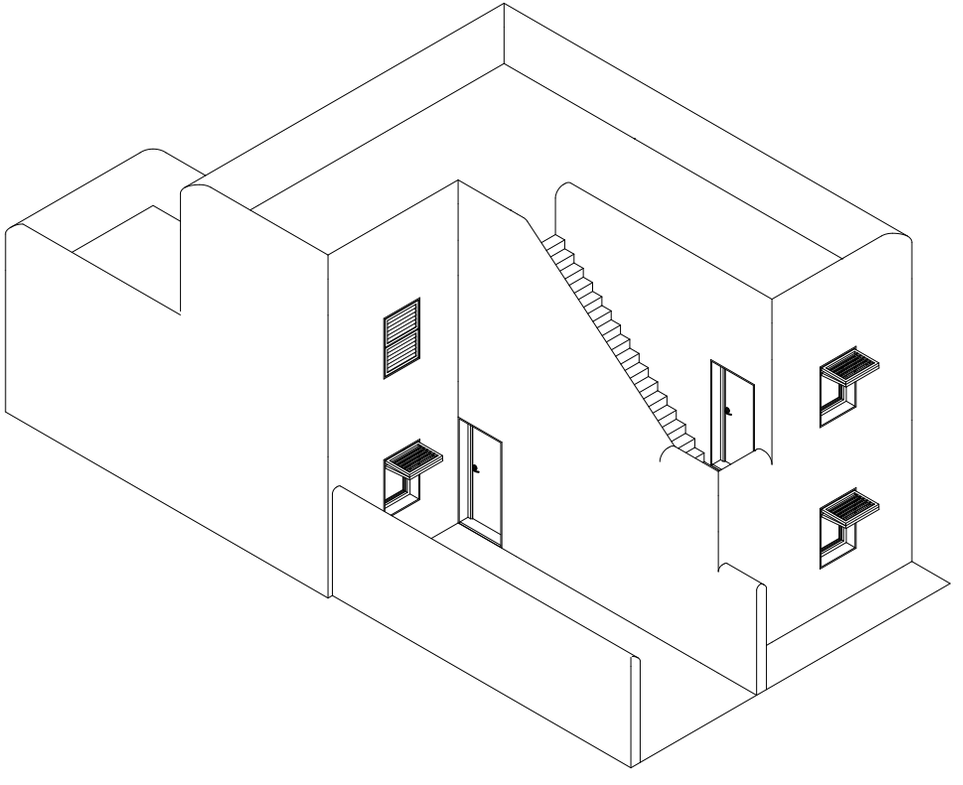
Site Ownership:	FHC
Tenure:	Social rental, (sub-rental)
Function:	Residential (community)
Dwelling Units:	319
Total Units:	319
Dwellings/Hectare:	25.5
FSI:	0.43

Proposed

Site Ownership:	FHC
Tenure:	Social rental, Private rental, Sub-rental Co-operatives, Leasehold
Function:	Residential, Commercial, Community
Dwelling Units:	1800 (est.)
Total Units:	2000 (est.)
Dwellings/Hectare:	151 (est)
FSI:	1.8

Neighbourhood Scale

Construction Phasing



8.4 Type 1

Type 1 is the main building block of the scheme. This type consists of nine different variations, or patterns, which are all built upon a standard base unit, or nucleus. These range from Type 1A, a three-bedroom single-family home, to Type 1I, which is a corner unit with a commercial space and three separate dwellings.

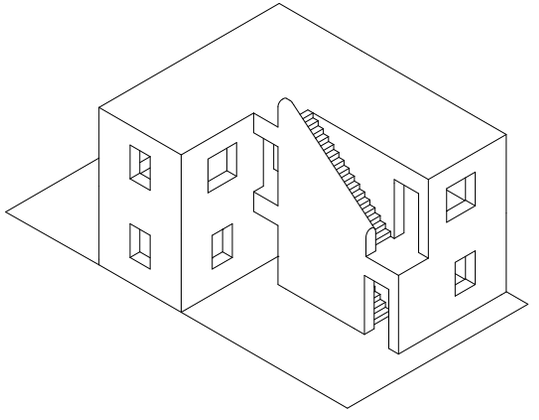
Type 1 units are all built on a standard 7m x 14m plot, and there are options designed to turn corners to enhance the streetscape. These have the added benefit of offering separate access to different dwellings.

Type 1B is the standard offer for existing residents, although it is expected that many existing residents would upgrade their choice to allow for more flexibility.

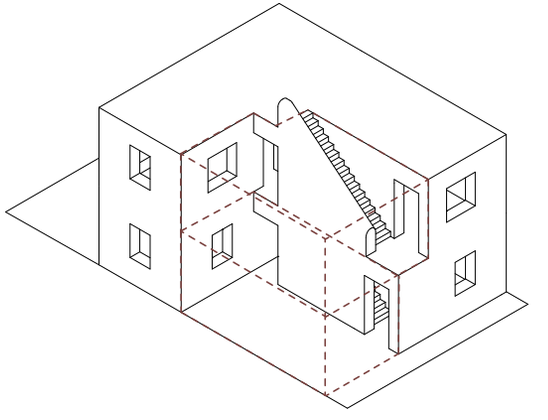
Initially a nucleus would be constructed on each plot, and once tenants / leasholders have chosen their plot, the pattern would be constructed prior to them moving in. Furthermore, patterns are designed such that they can be changed following this, so a Type 1B could, at a later date, be extended and adapted to create a Type 1D. This gives residents the flexibility they likely desire.

The management strategy leaves the FHC with ultimate control of the site, so they are able to create rules regarding expansions and adaptations. It is envisaged that residents would be required to follow the patterns given to create permanent changes to their homes, however lightweight structures would be allowed, offering the optino for residents to build lean-to spaces to house, for example, ventilated traditional kitchens.

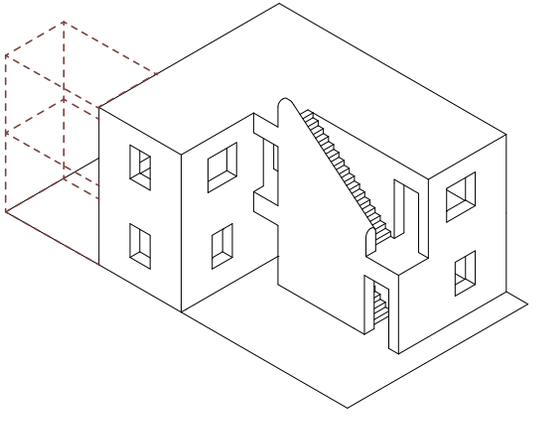
Extension Opportunities



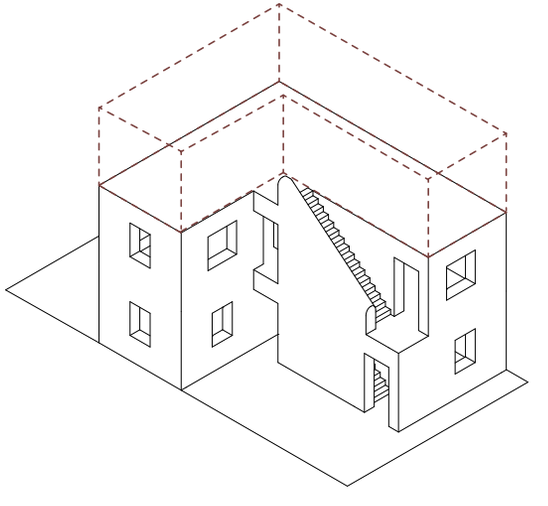
Nucleus



Front Extension

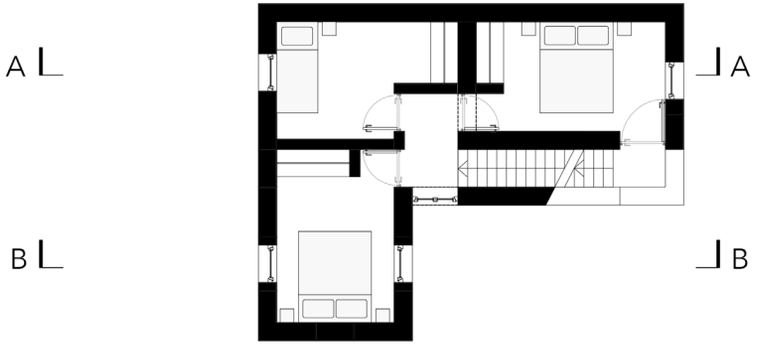


Rear Extension

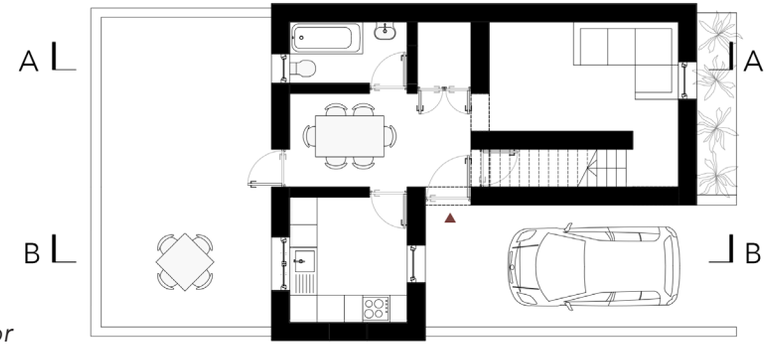


Top Extension

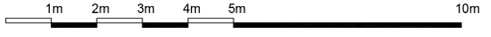
Type 1A

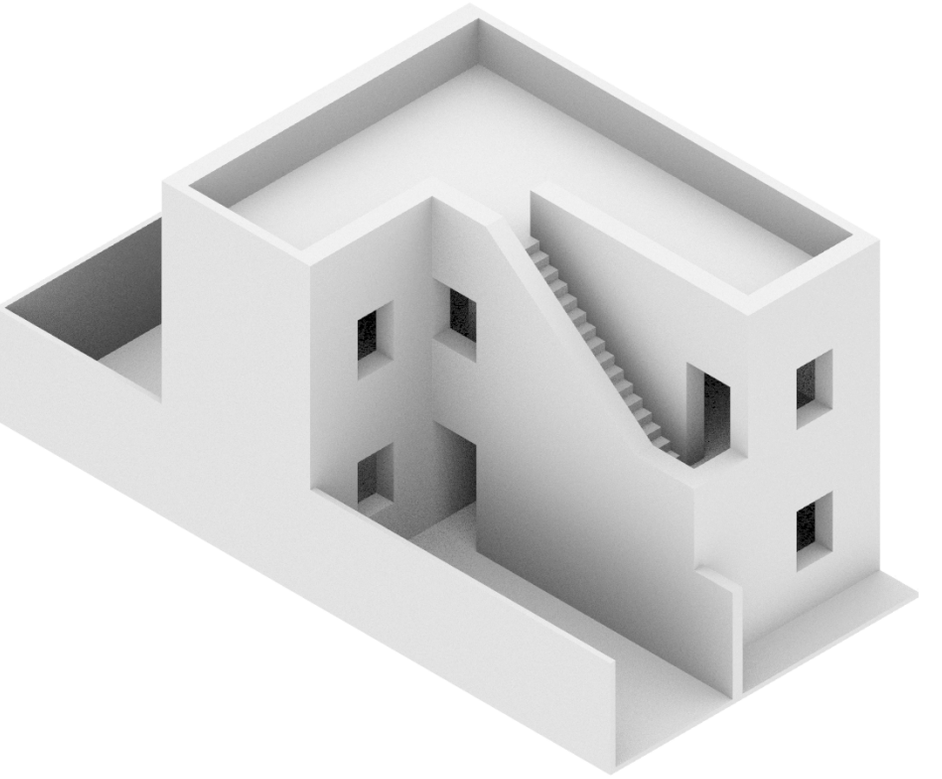


First Floor



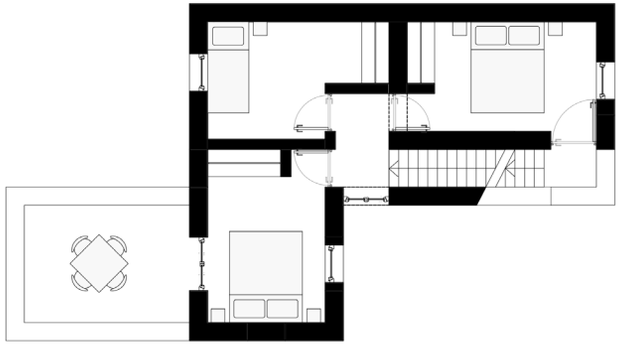
Ground Floor



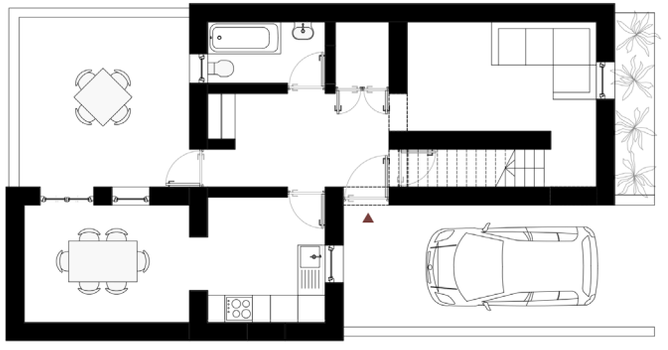


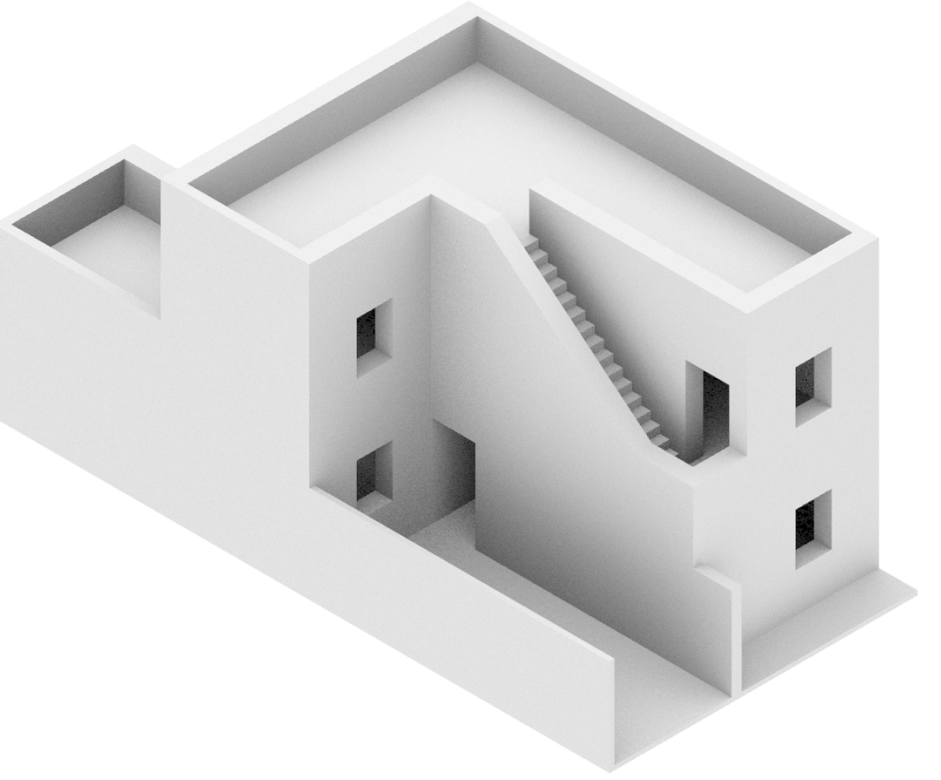
Type 1B

First Floor



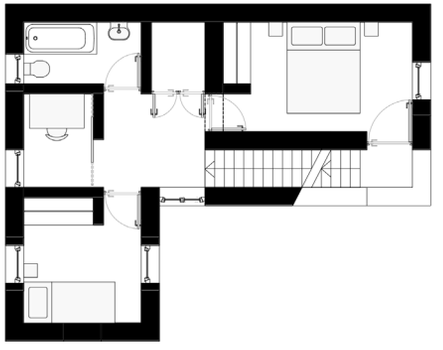
Ground Floor



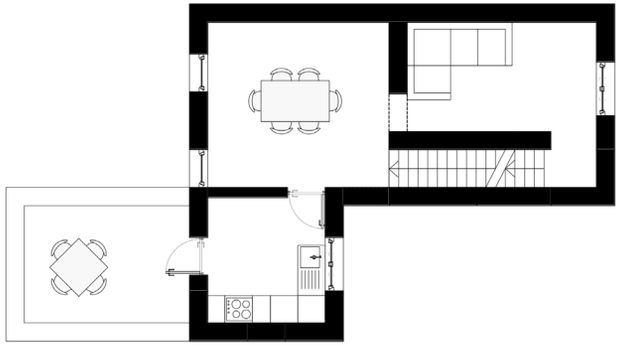


Type 1C

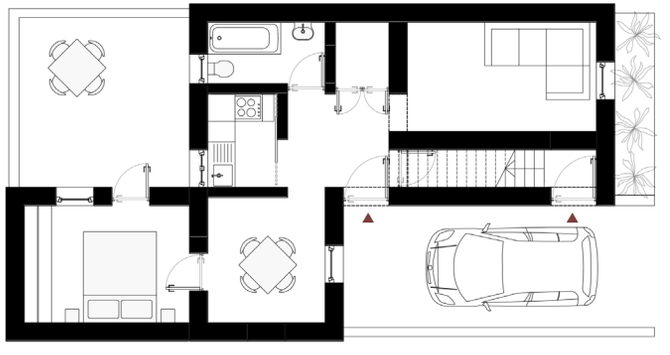
Second Floor

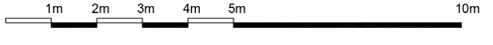


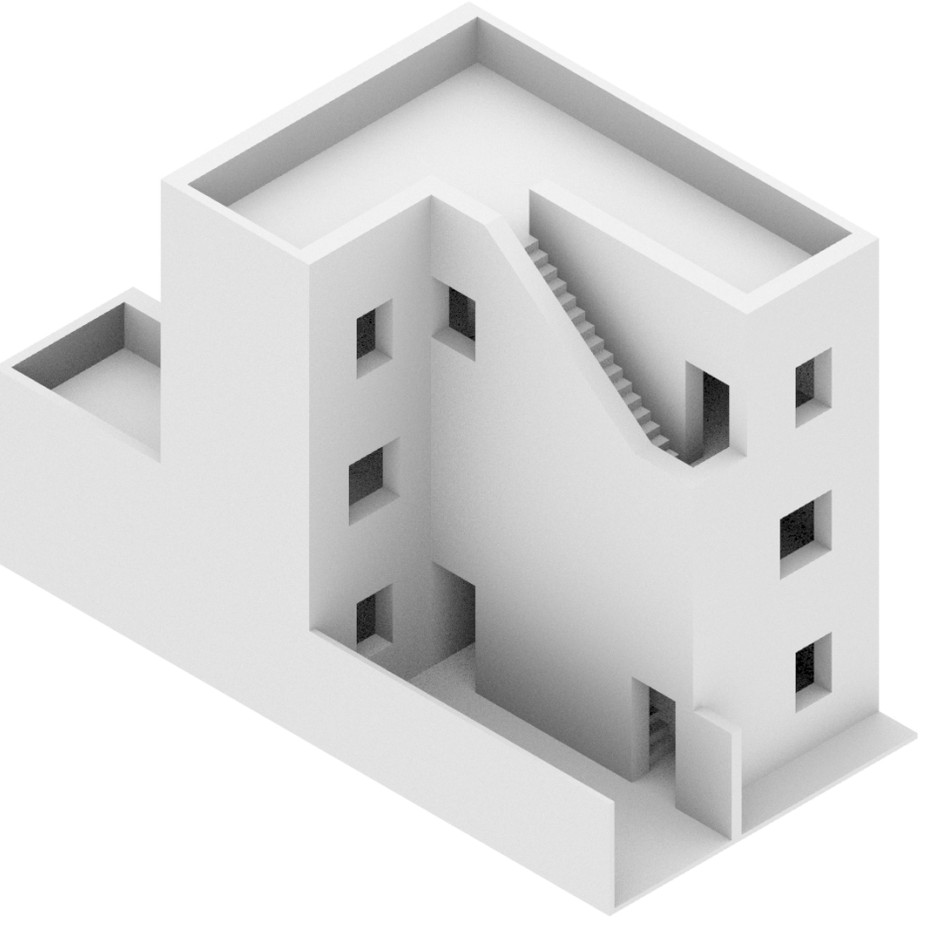
First Floor



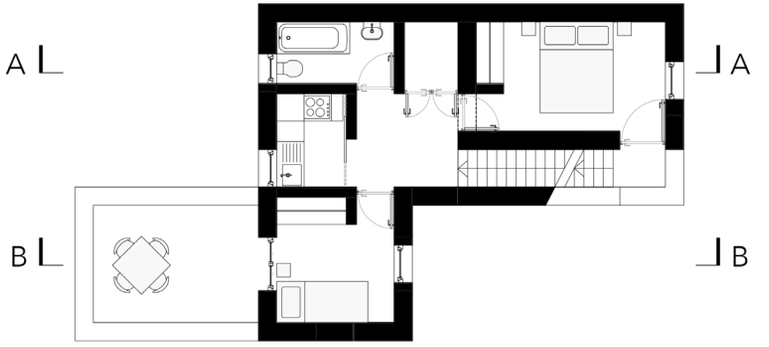
Ground Floor



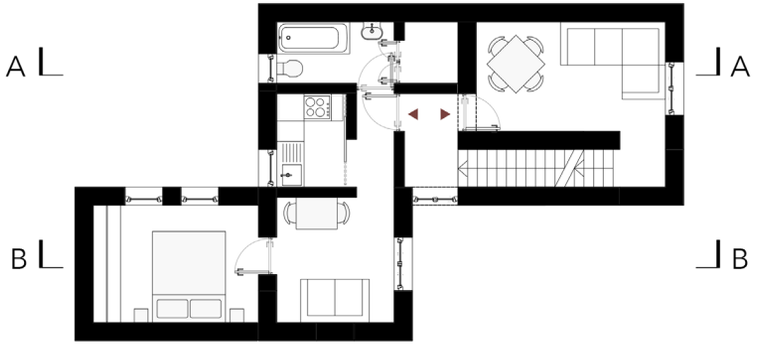




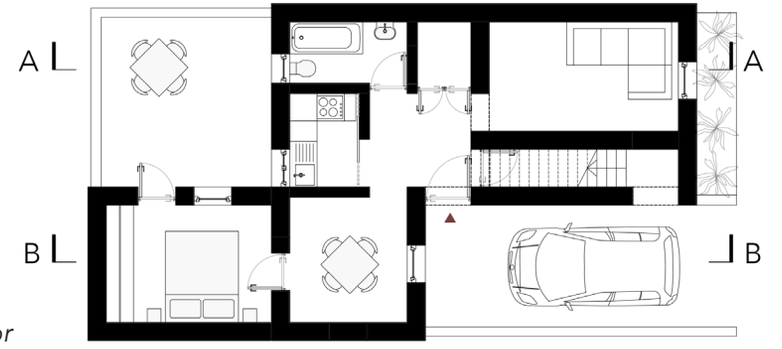
Type 1D



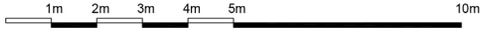
Second Floor

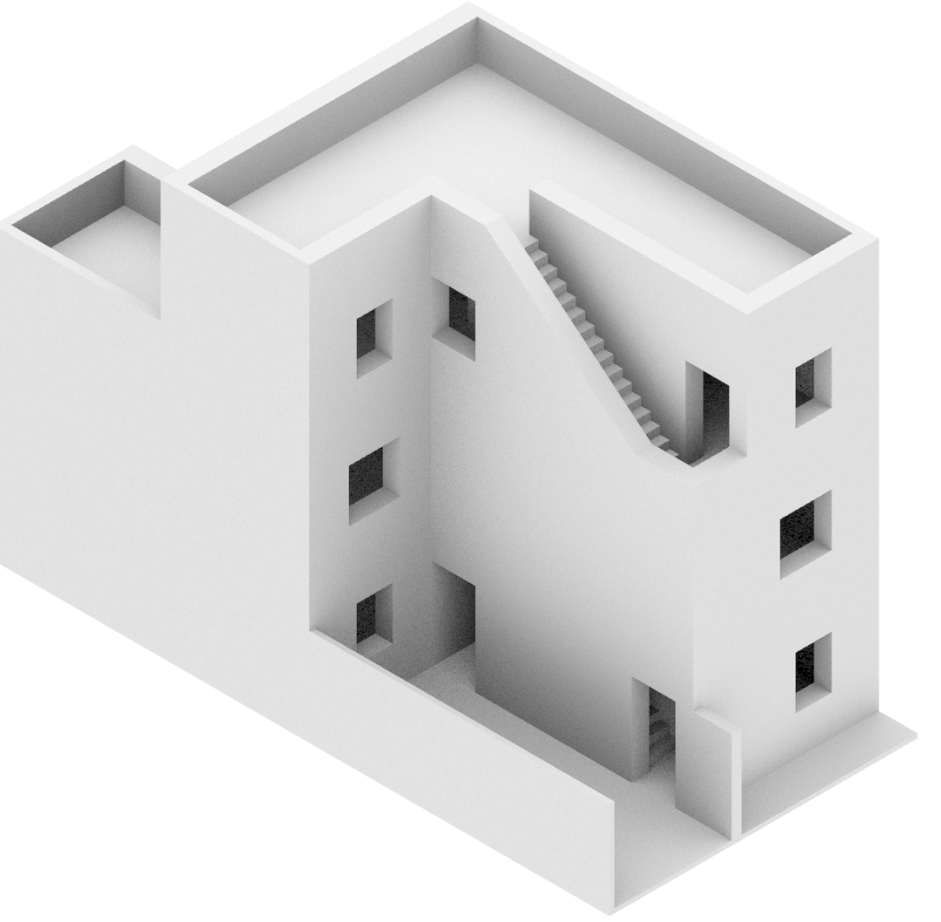


First Floor



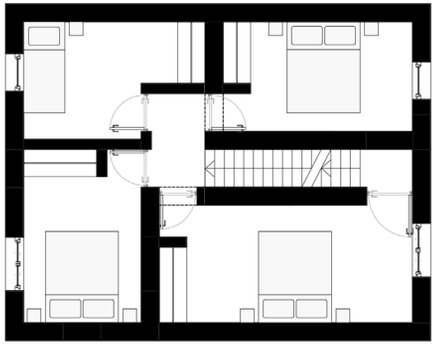
Ground Floor



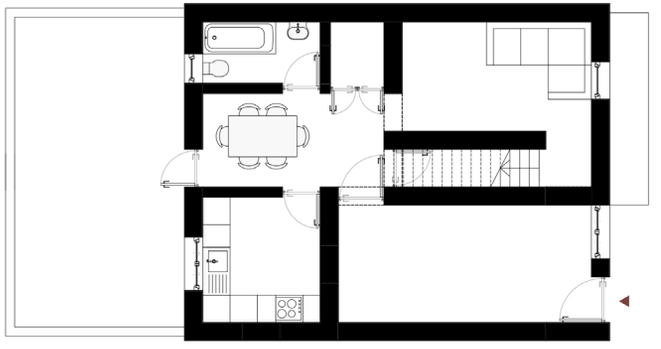


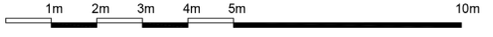
Type 1E

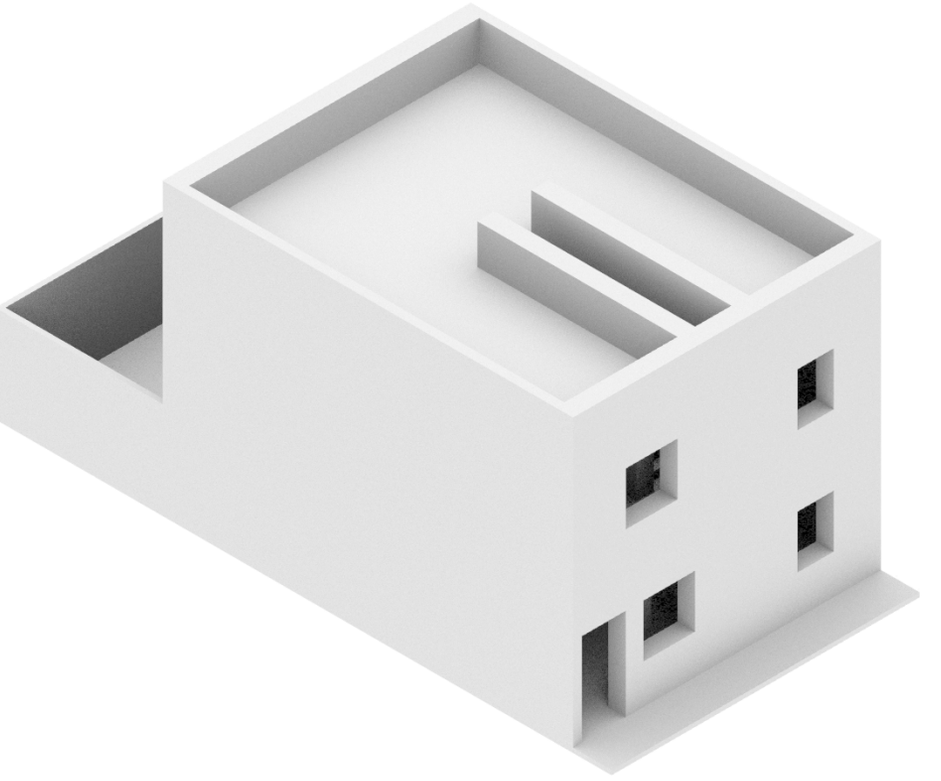
First Floor



Ground Floor

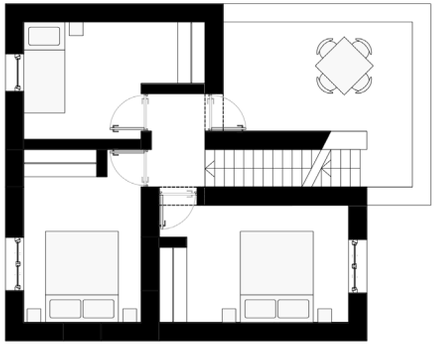




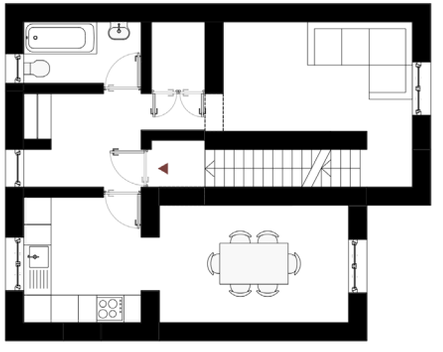


Type 1F

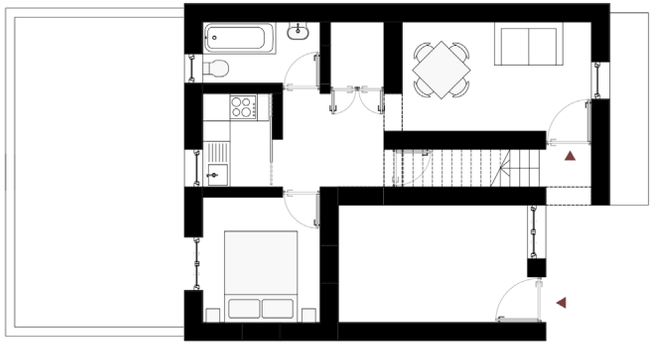
Second Floor

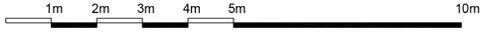


First Floor



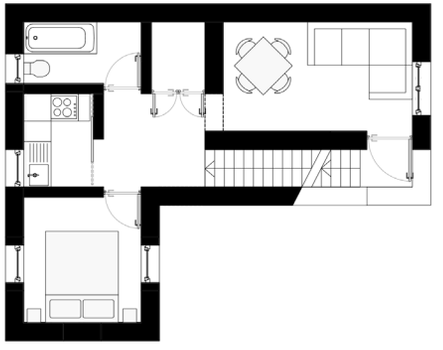
Ground Floor



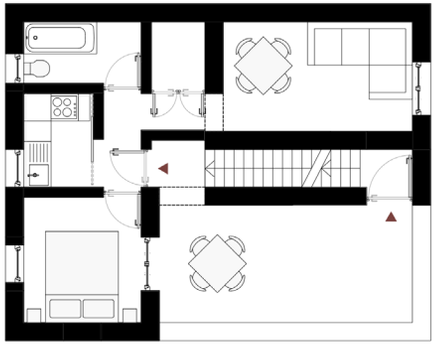


Type 1G

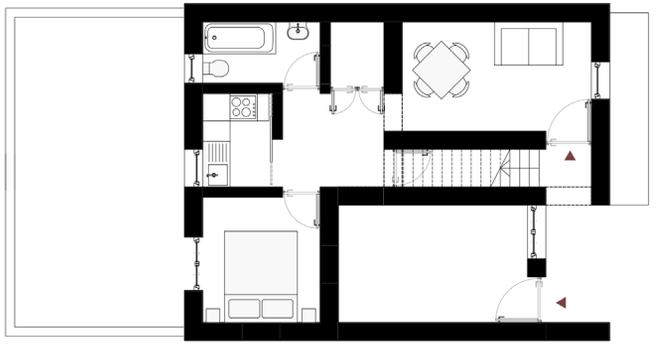
Second Floor

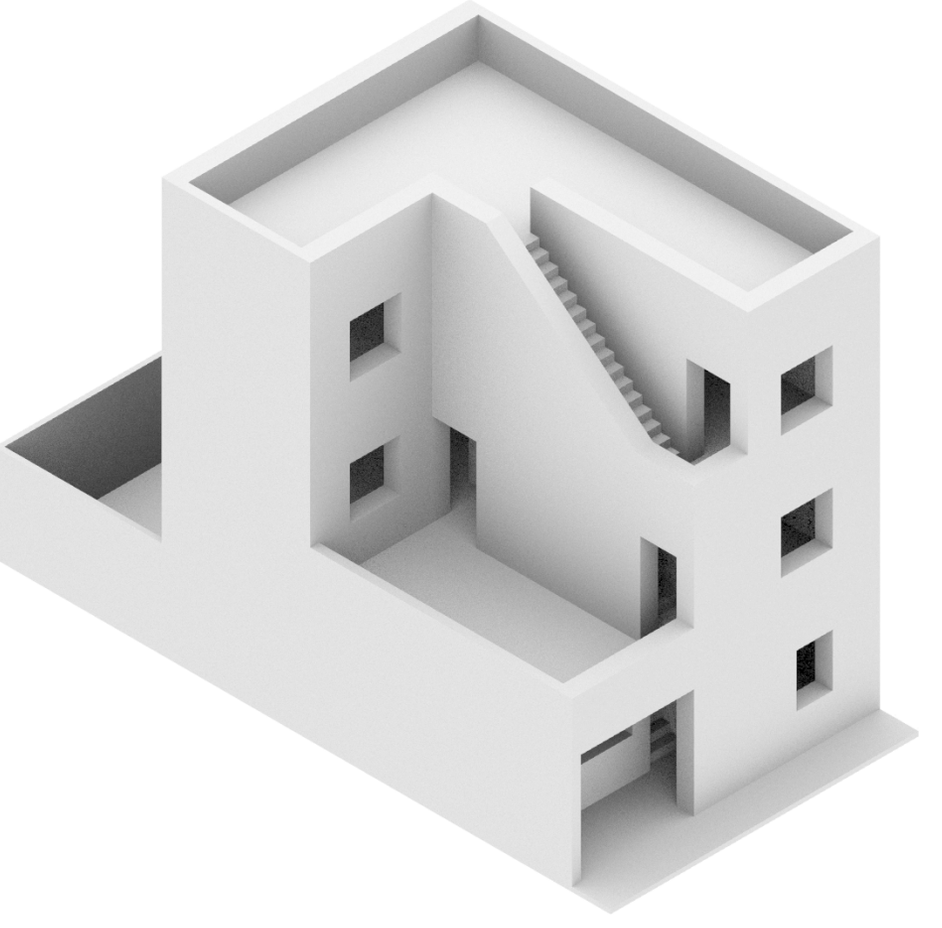


First Floor



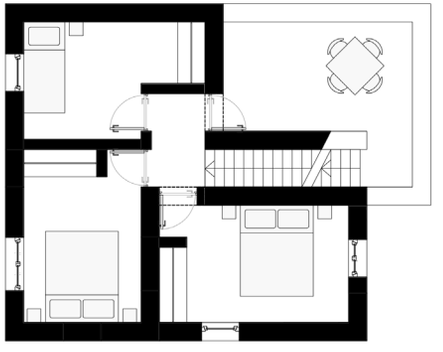
Ground Floor



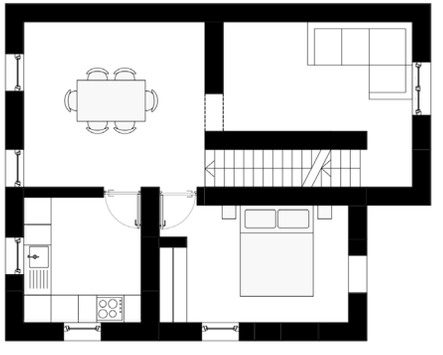


Type 1H

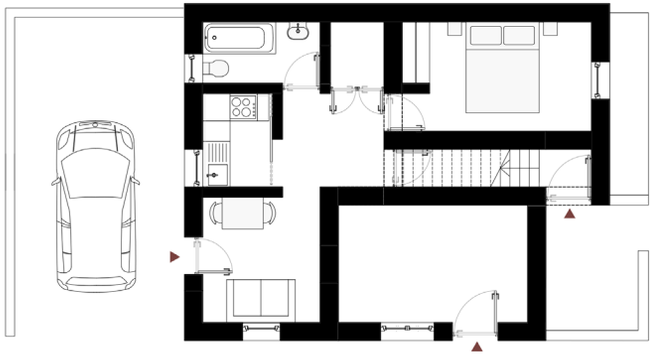
Second Floor

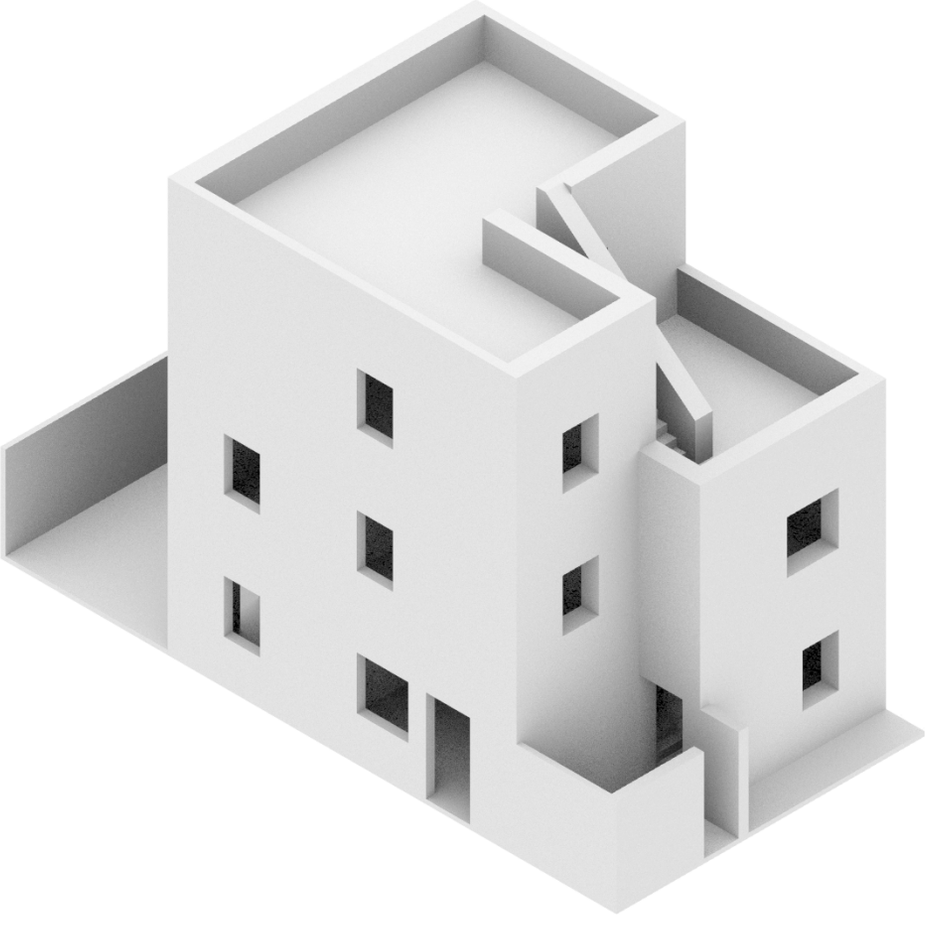


First Floor



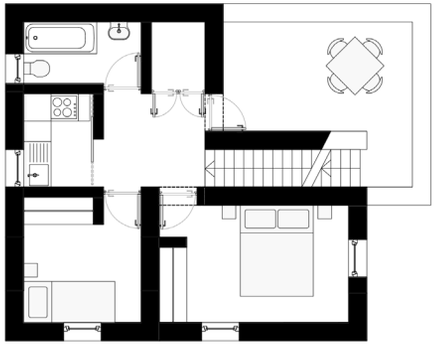
Ground Floor



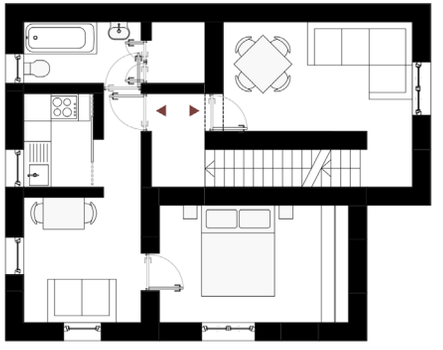


Type 1I

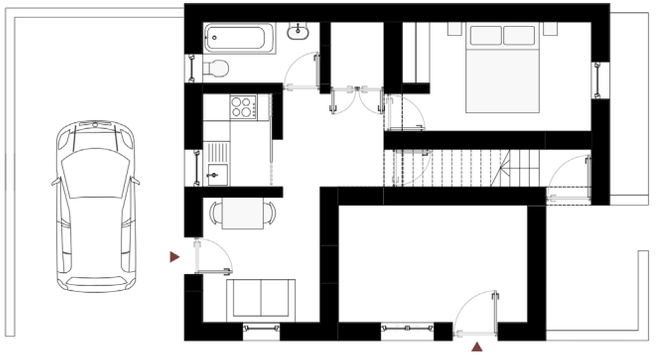
Second Floor

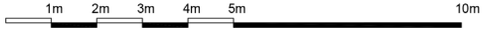


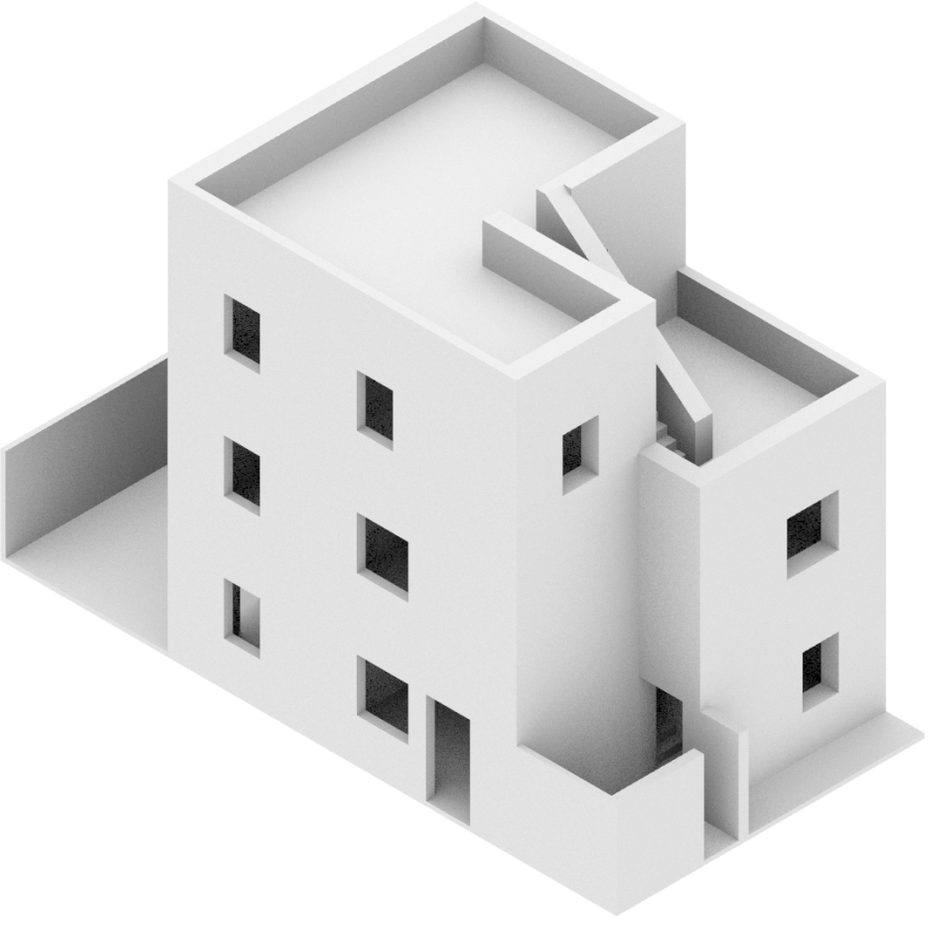
First Floor



Ground Floor



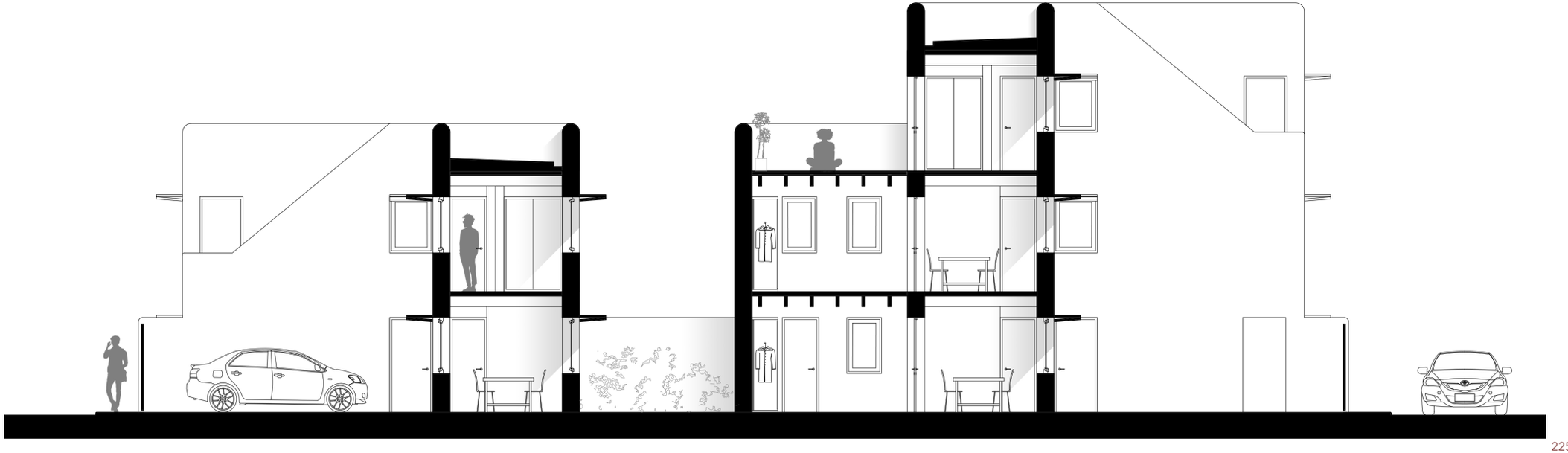




Section AA

Type 1A

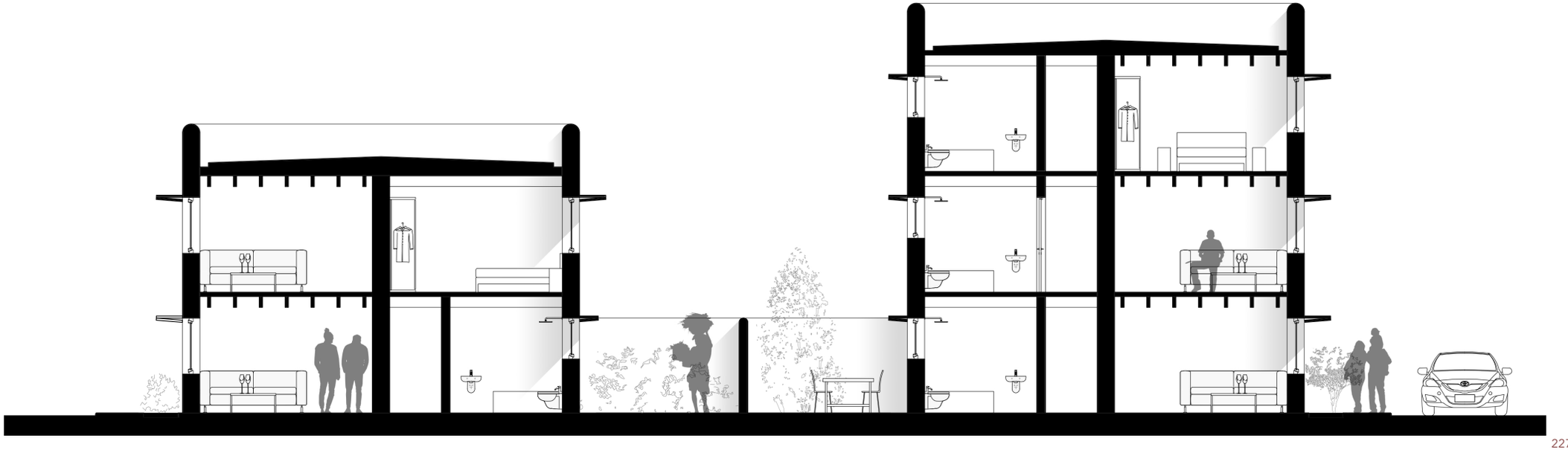
Type 1D



Section BB

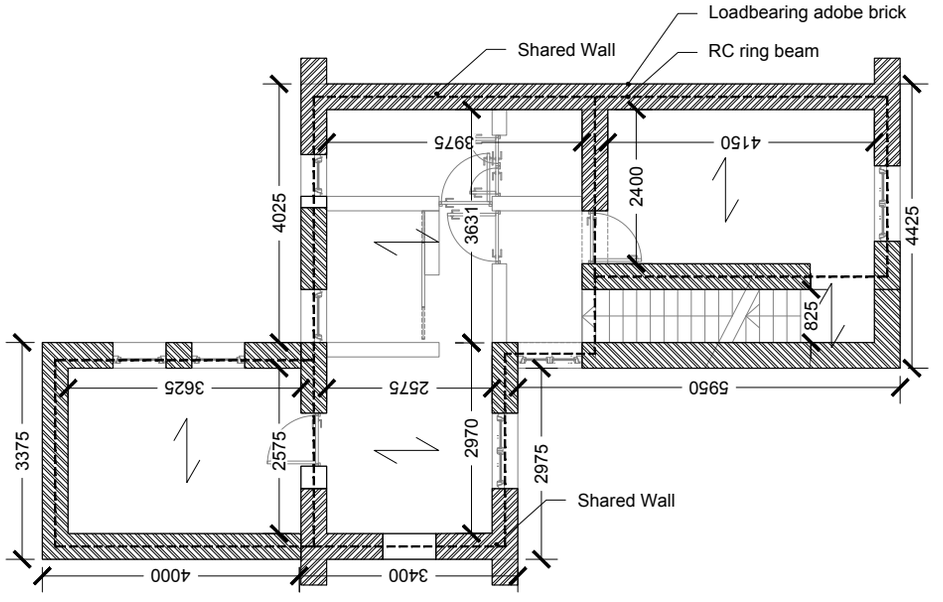
Type 1A

Type 1D

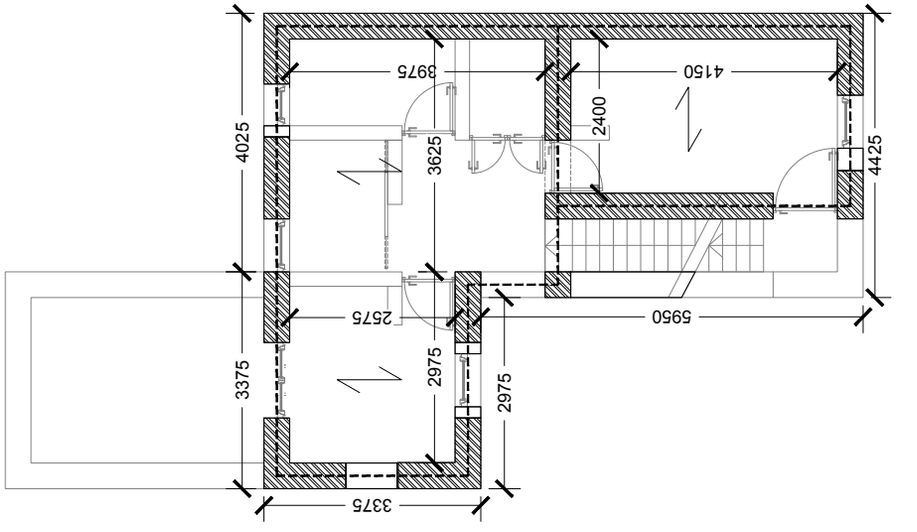


Structural Plan - Type 1D

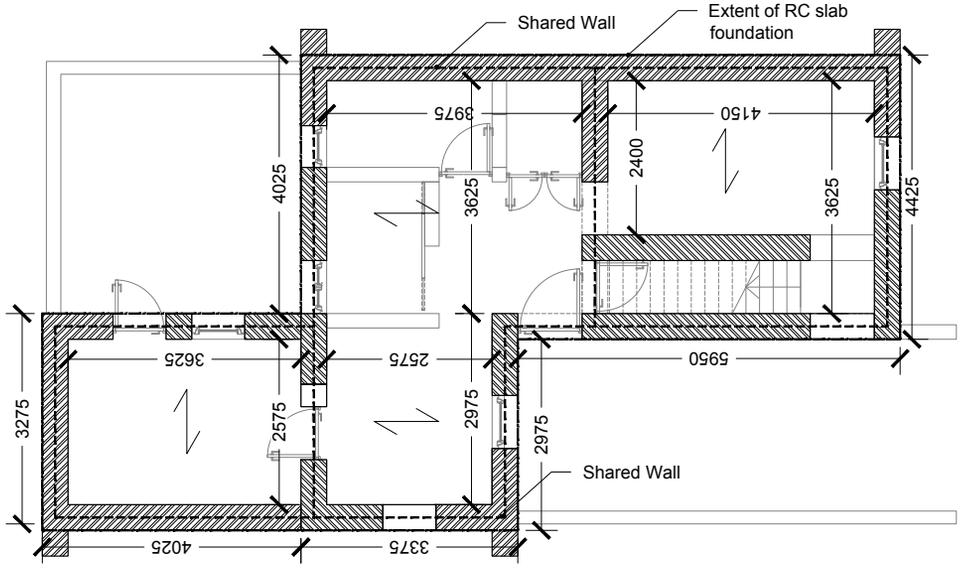
First Floor



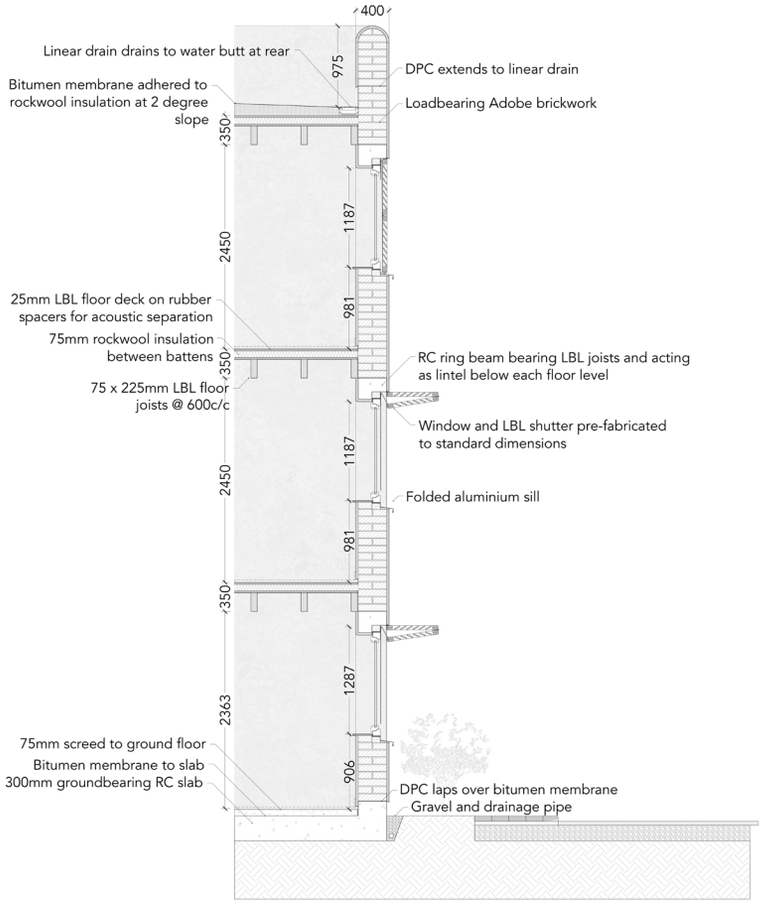
Second Floor

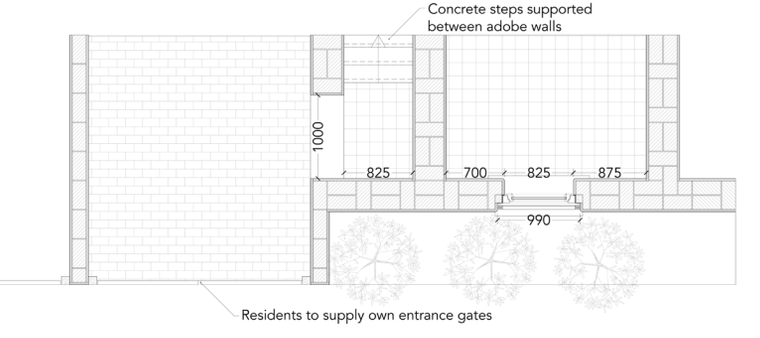


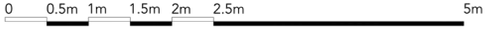
Ground Floor



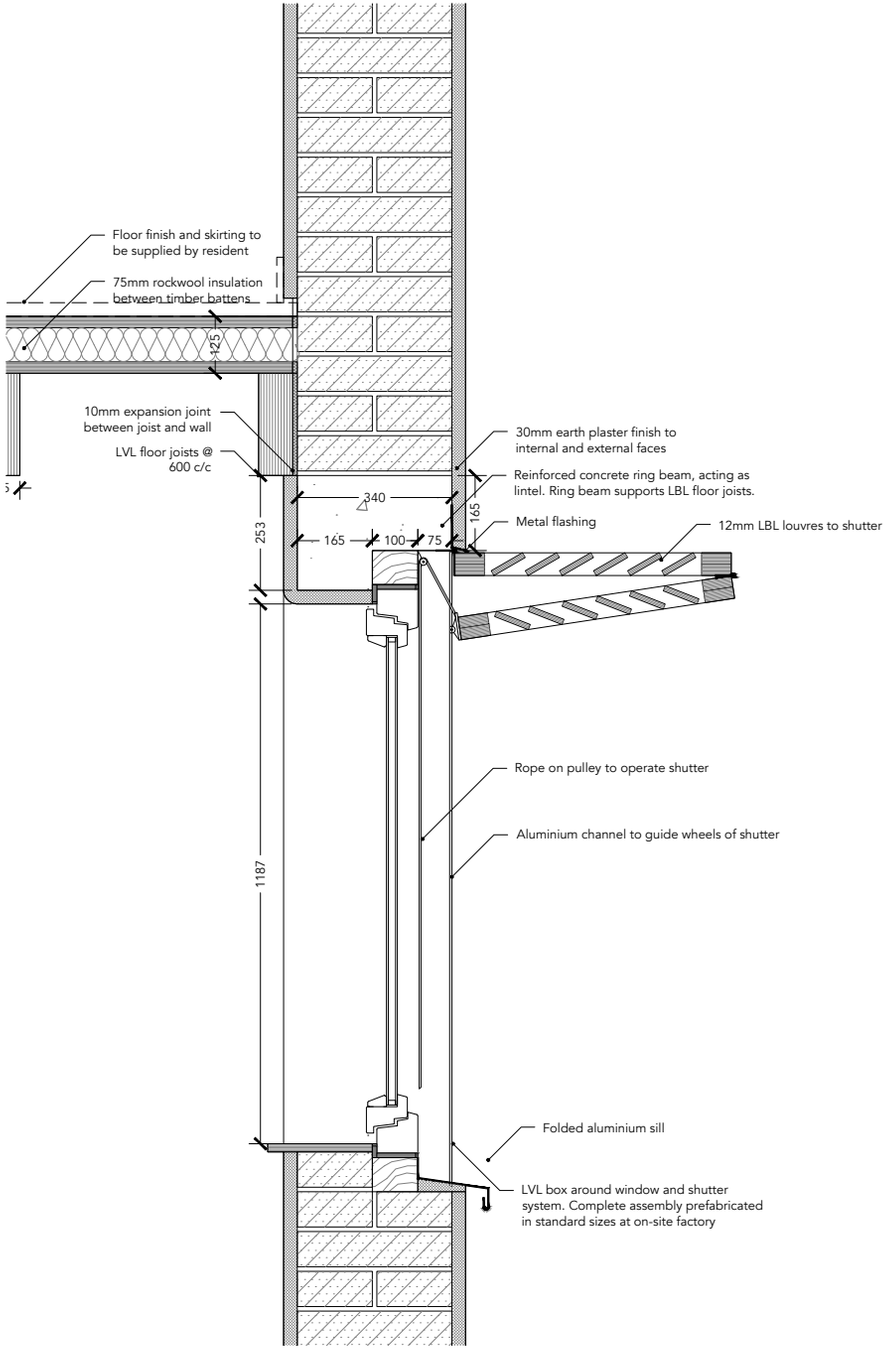
Facade Sections - Type 1D



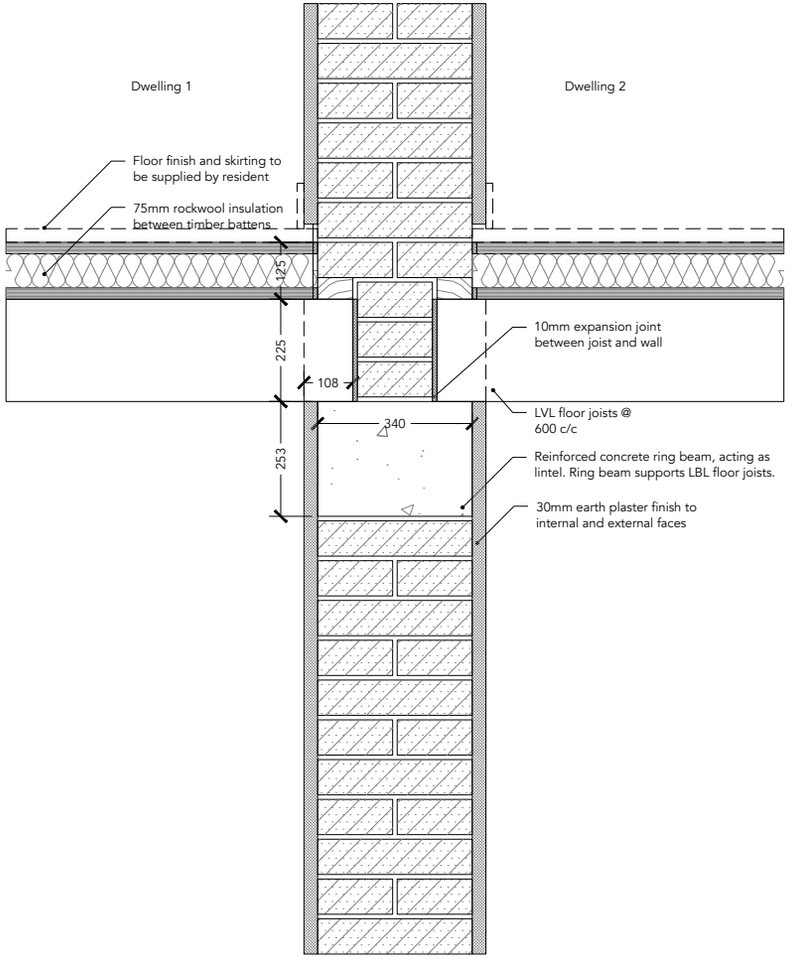


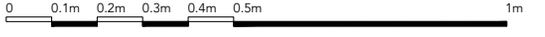


Window Detail



Joist Connection

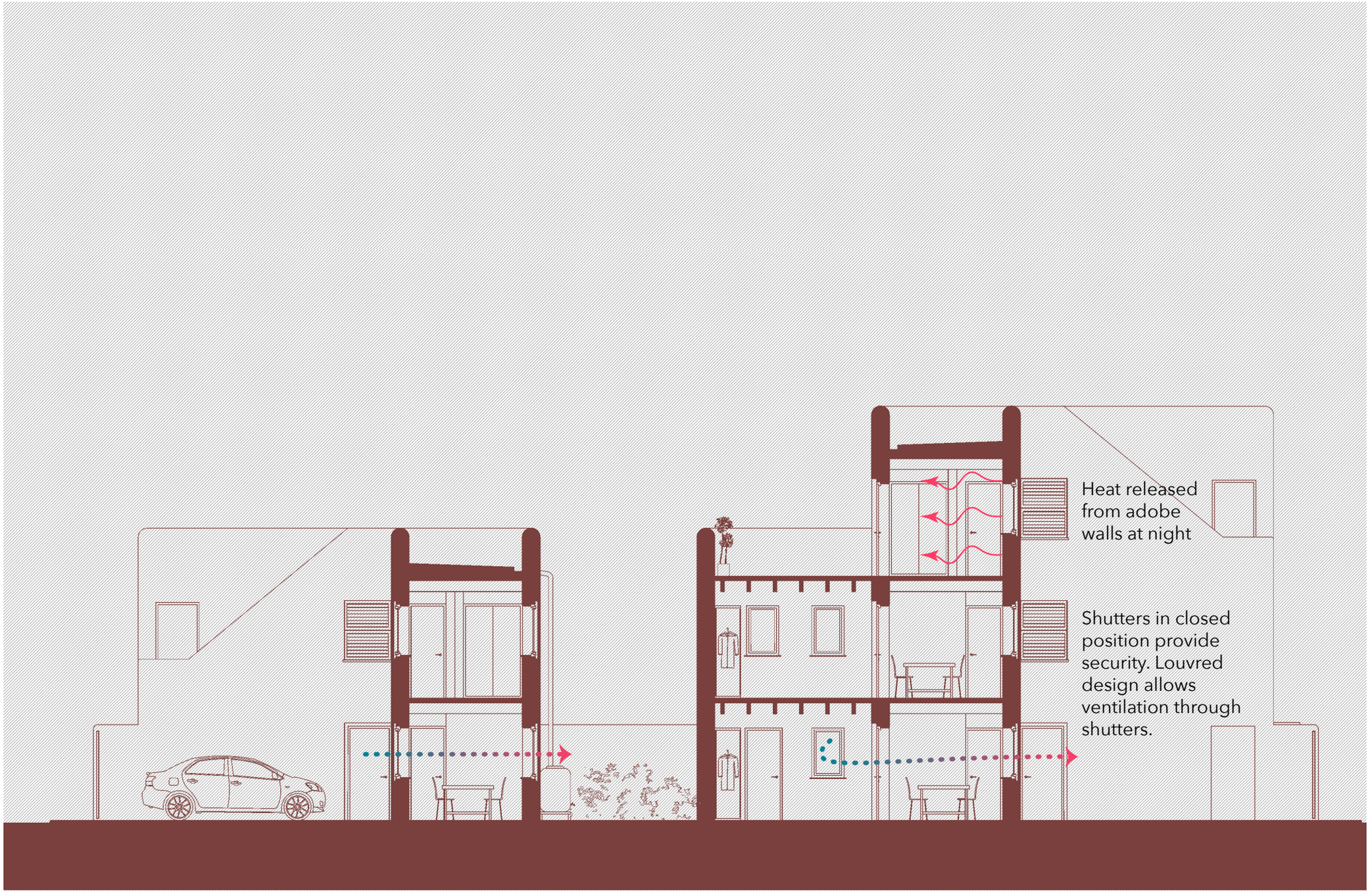




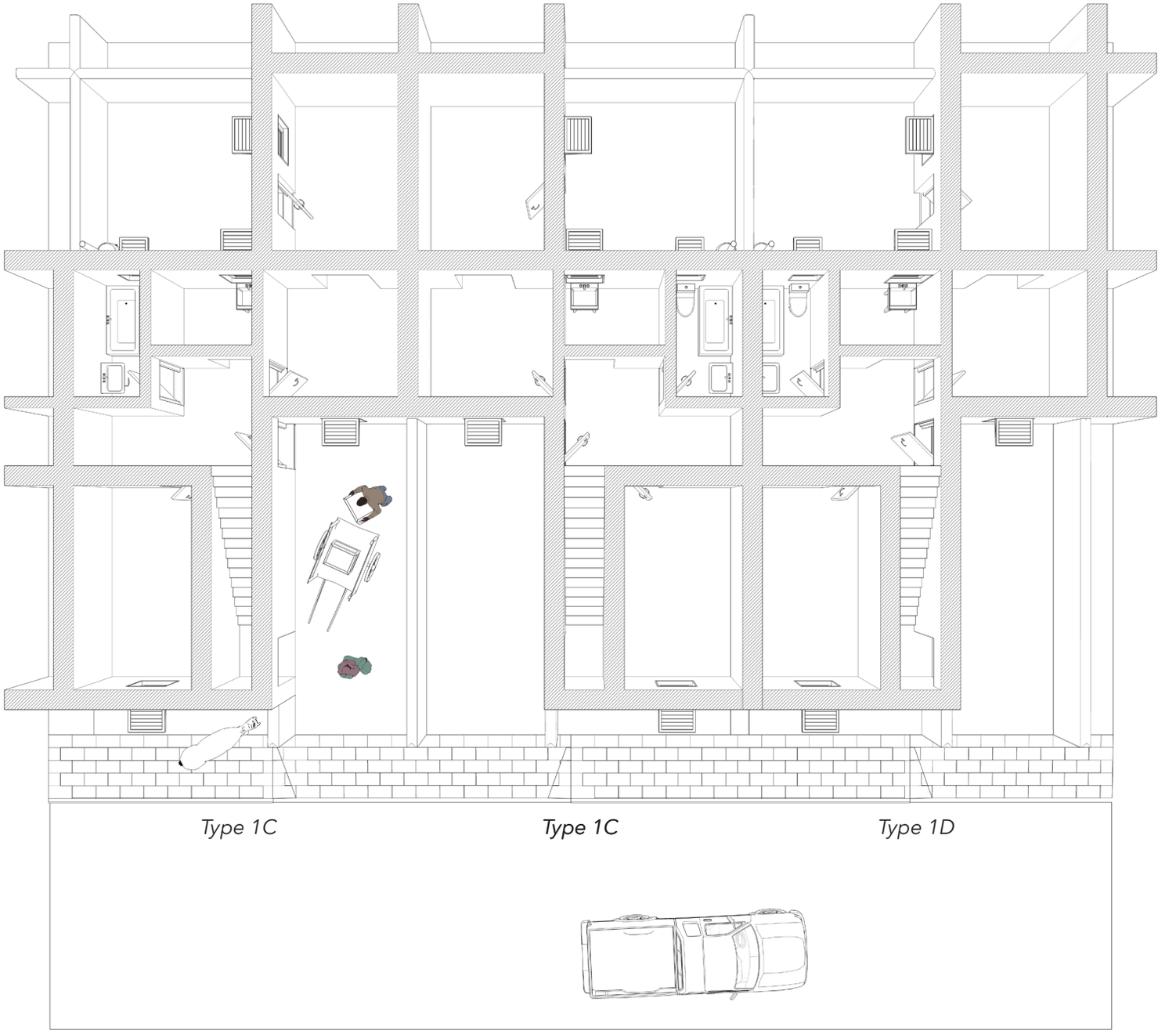
Climate - Day

Rainwater flows off rounded walls and 2° sloped roof, through downpipe and into private storage tank for use
Sun warms adobe walls (with high thermal mass) during day
Shutters in closed position provide total shade
Shutters in open position provide some shade
Cross-ventilation to all units (aligned with prevailing wind)

Climate - Night

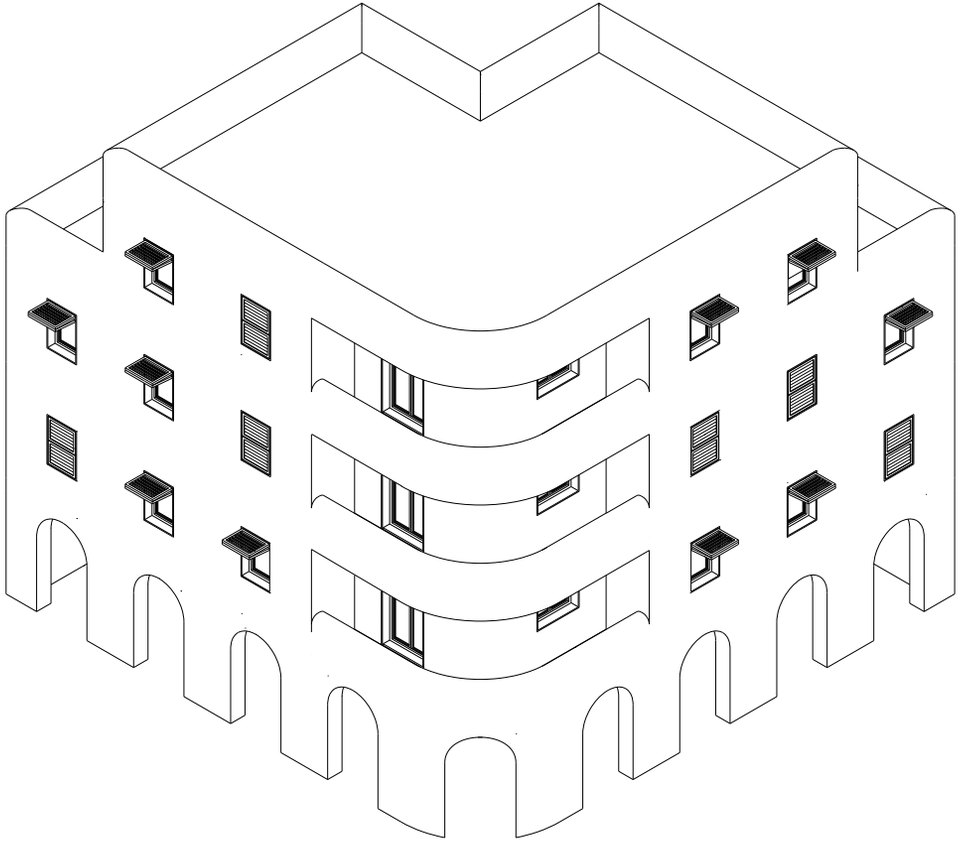


0 Years



1 Year

5 Years



8.5 Type 2

Much in the style of Peter Barber's Donnybrook Quarter, this scheme has 'special' buildings located at significant corners. In this case, that is the corners at which the scheme is entered from the surrounding roads, and the 'special' buildings are Type 2.

Type 2 units occupy a plot twice the size of Type 1, that is 14m x 14m. They are aimed at co-operatives and small-scale landlords, who buy a unit and decide on the exact configuration themselves.

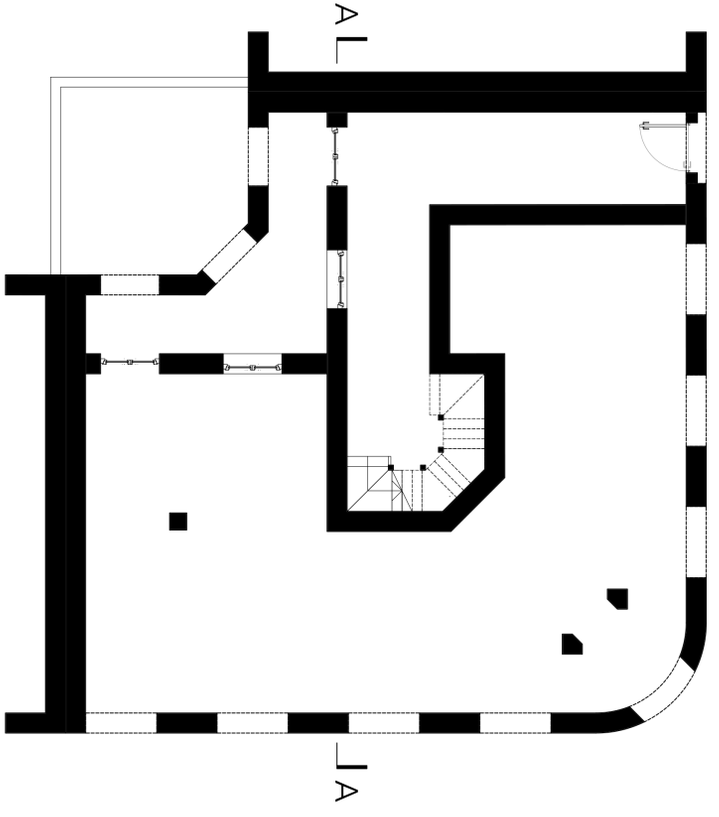
The ground floor contains space for commercial units, which is very flexible, and the entrance to the apartments above. There is also a shared yard.

The first and second floor house two apartments each. These apartments are almost identical, except that one has access to an additional room on the corner. The smaller apartments can be configured as 1-bedroom or 2-bedroom units, and the larger apartments as 2-bedroom or 3-bedroom units. Each of these apartments has access to a small private balcony.

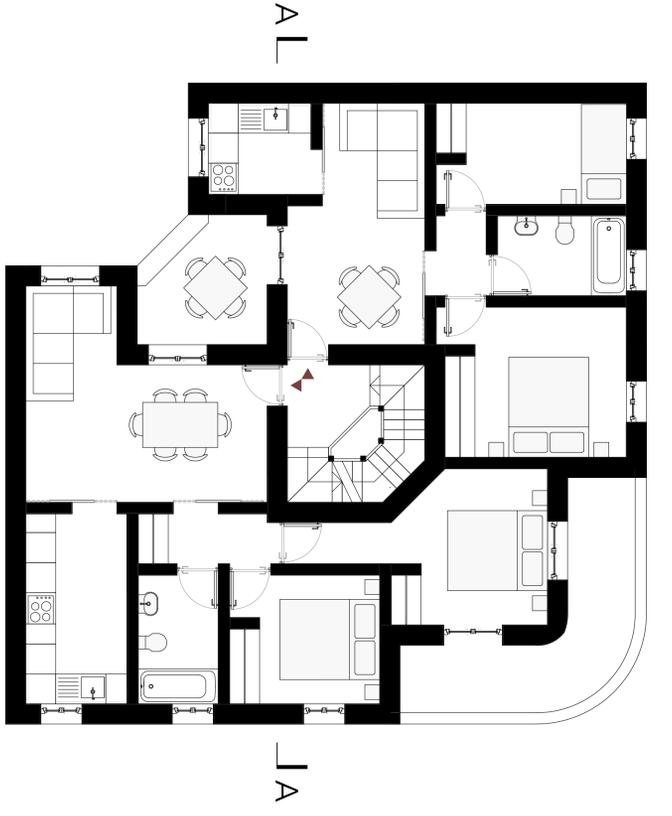
The third floor contains a single 'penthouse' apartment, which has 2 bedrooms. There is also a substantial roof terrace on the third floor and on the fourth floor, shared by the apartment residents.

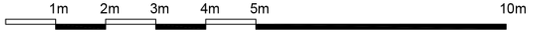
Due to the size of the Type 2 buildings, it is not possible to build these from loadbearing adobe. Thus, they employ a concrete frame, with adobe infill walls. They are structurally separated from the adjoining Type 1 units.

Ground Floor

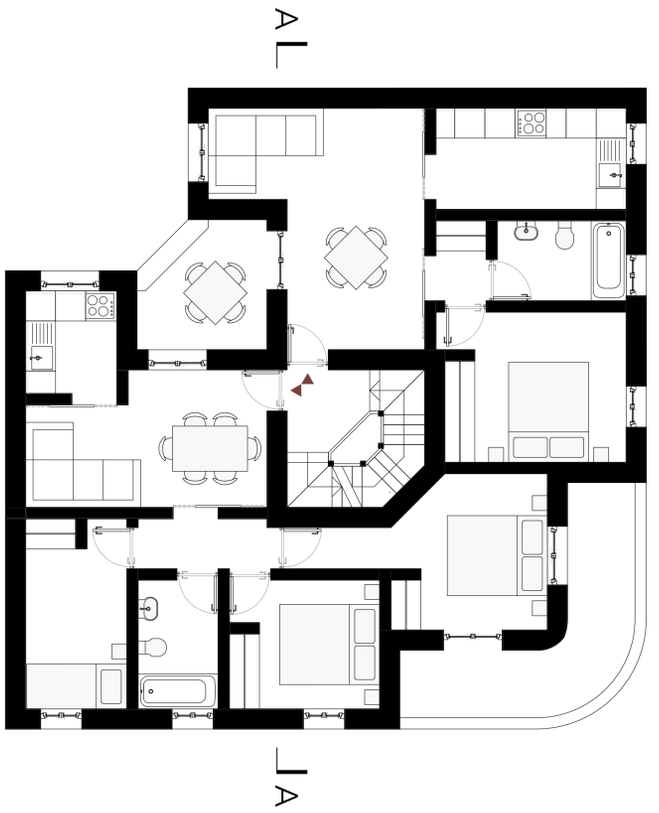


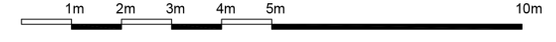
First Floor



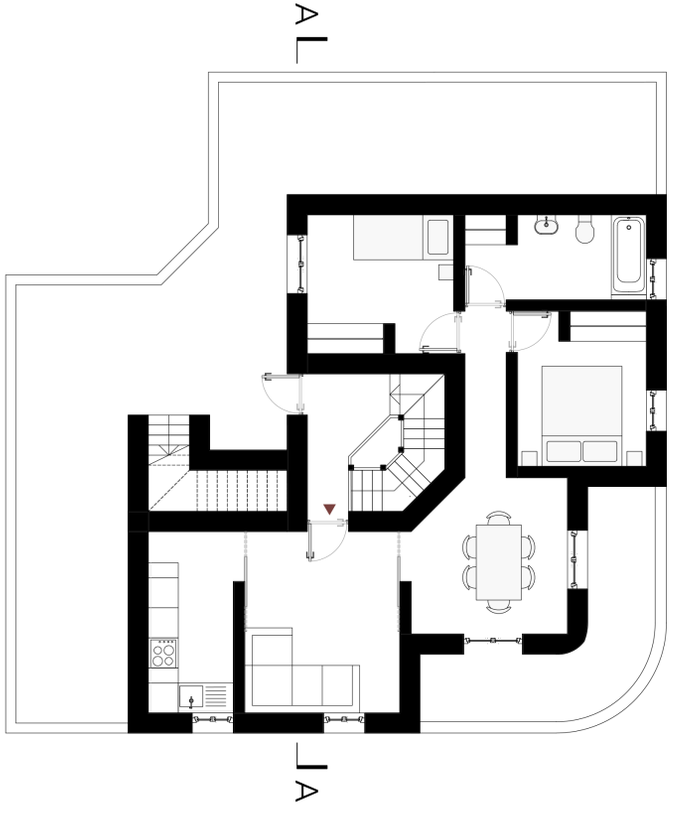


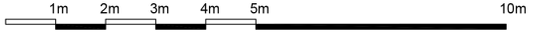
Second Floor



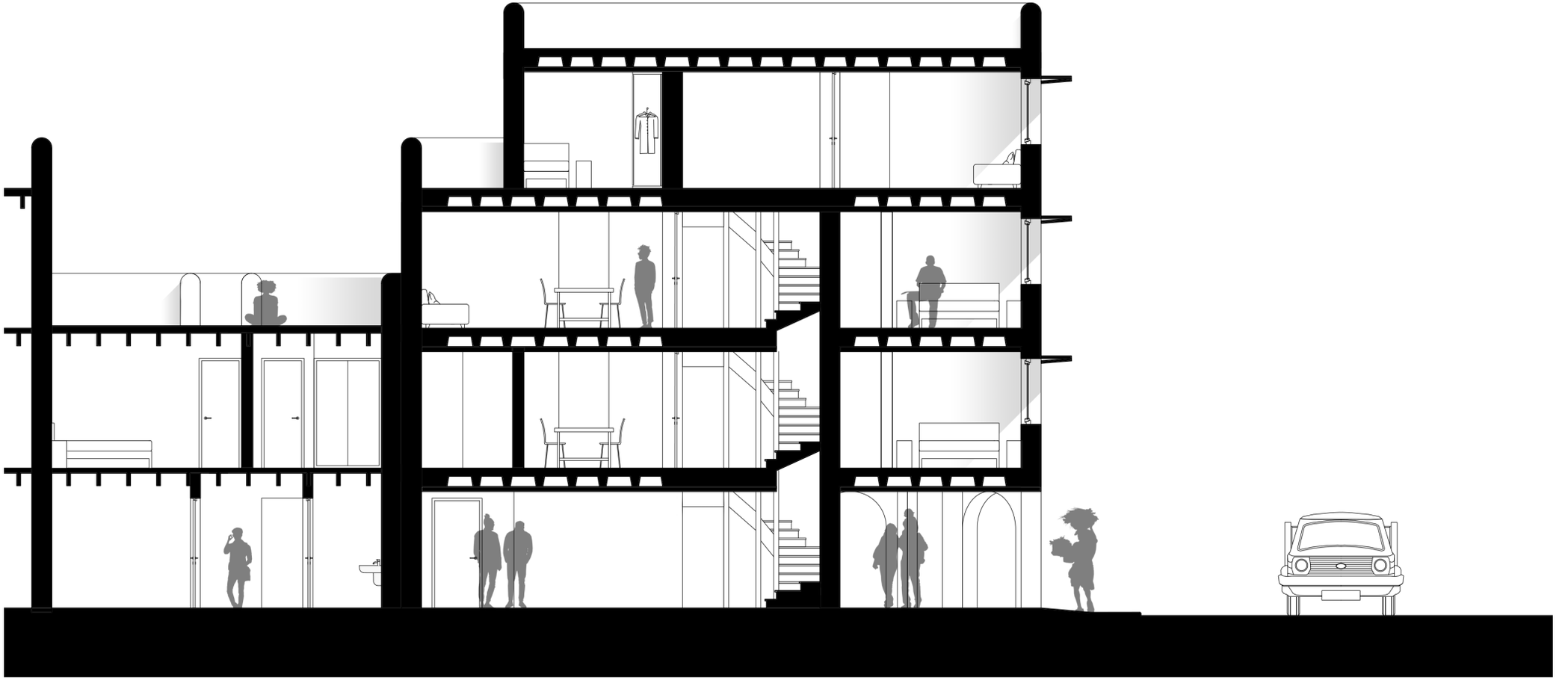


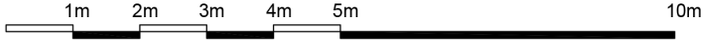
Third Floor



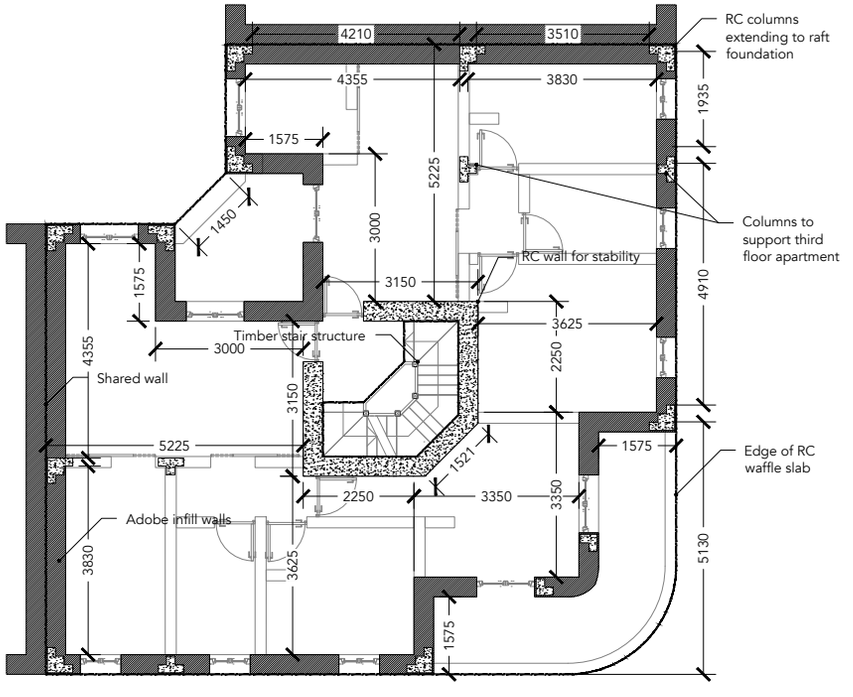


Section AA

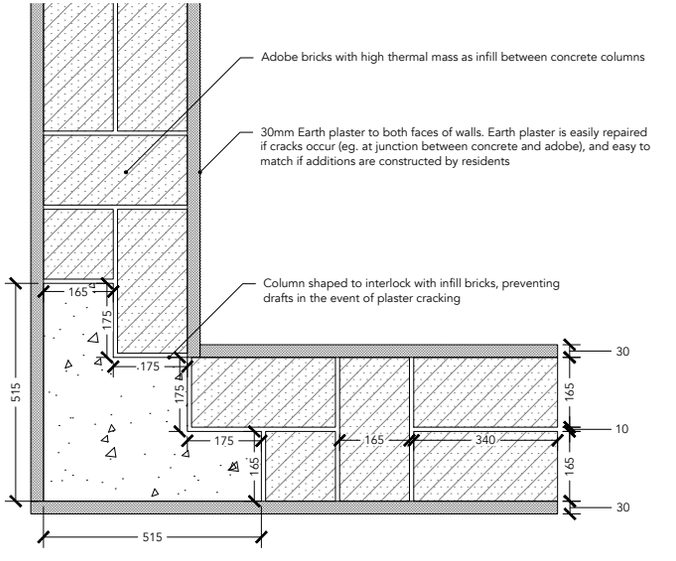


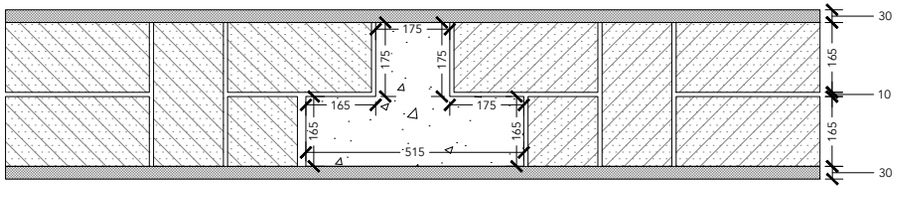


Structural Plan - Typical Floor

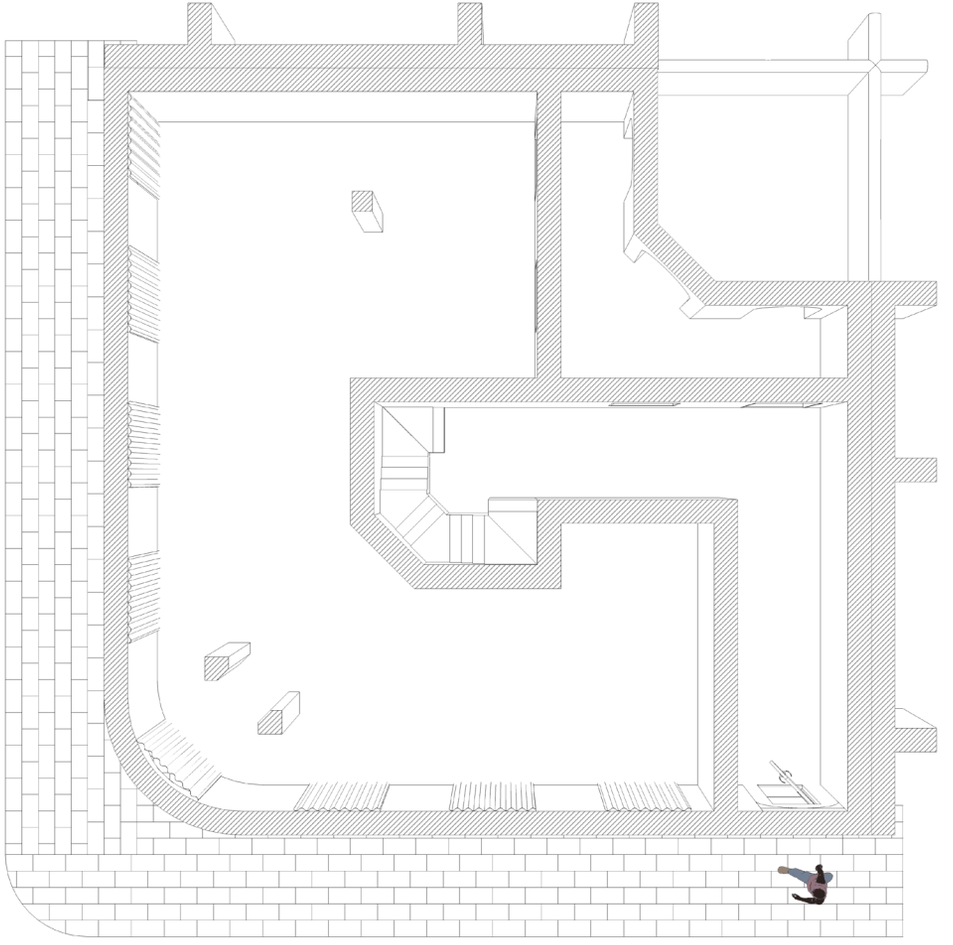


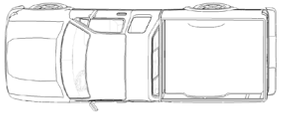
Column Detail



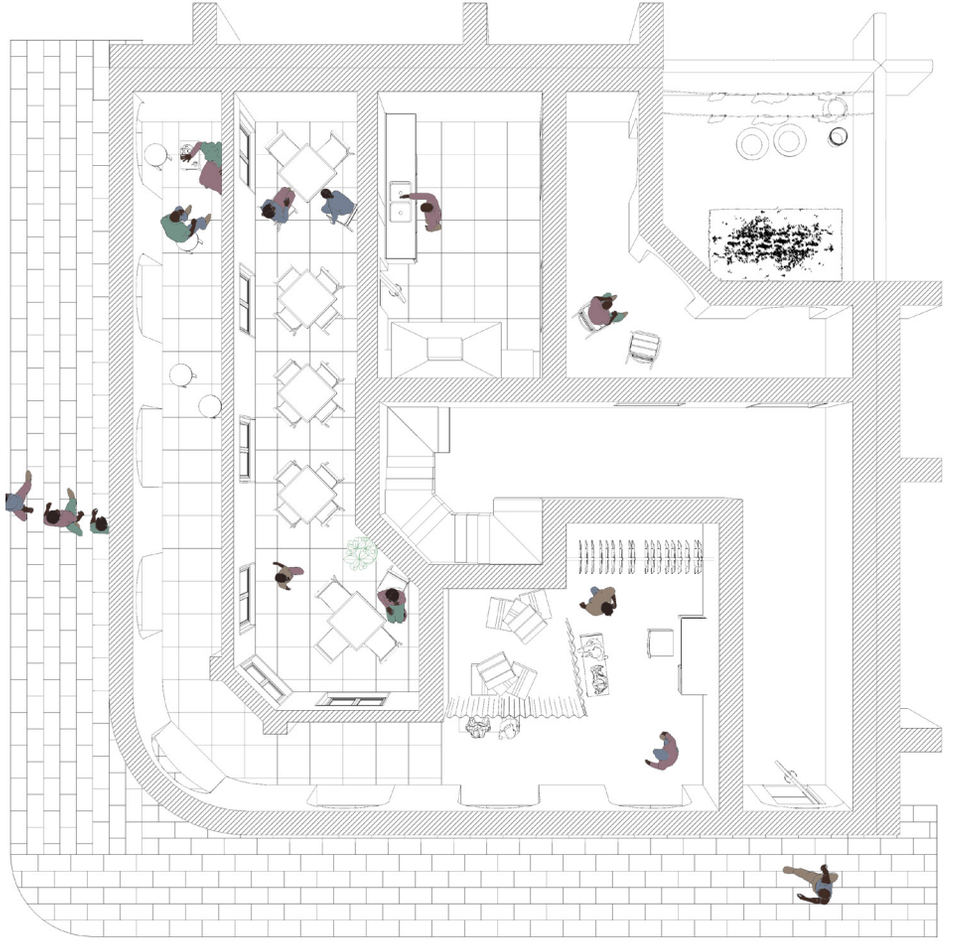


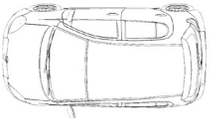
0 Years



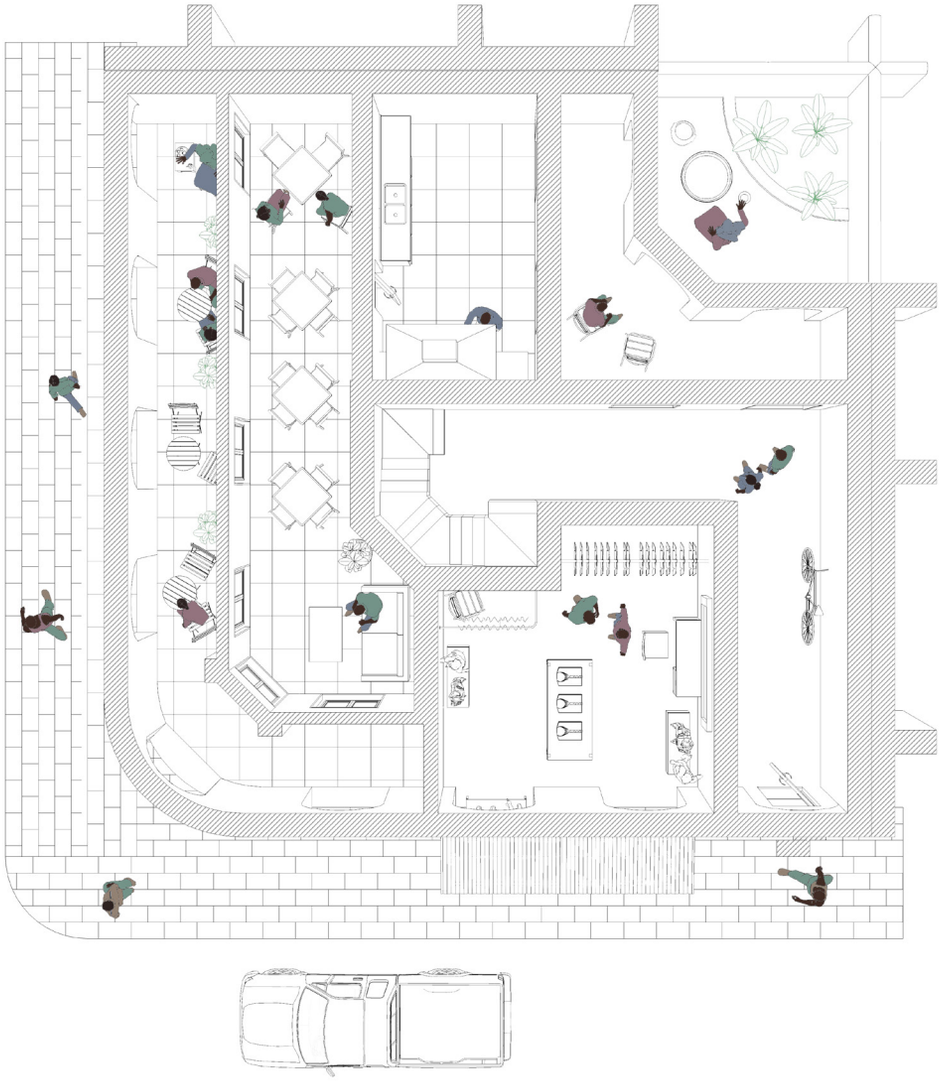


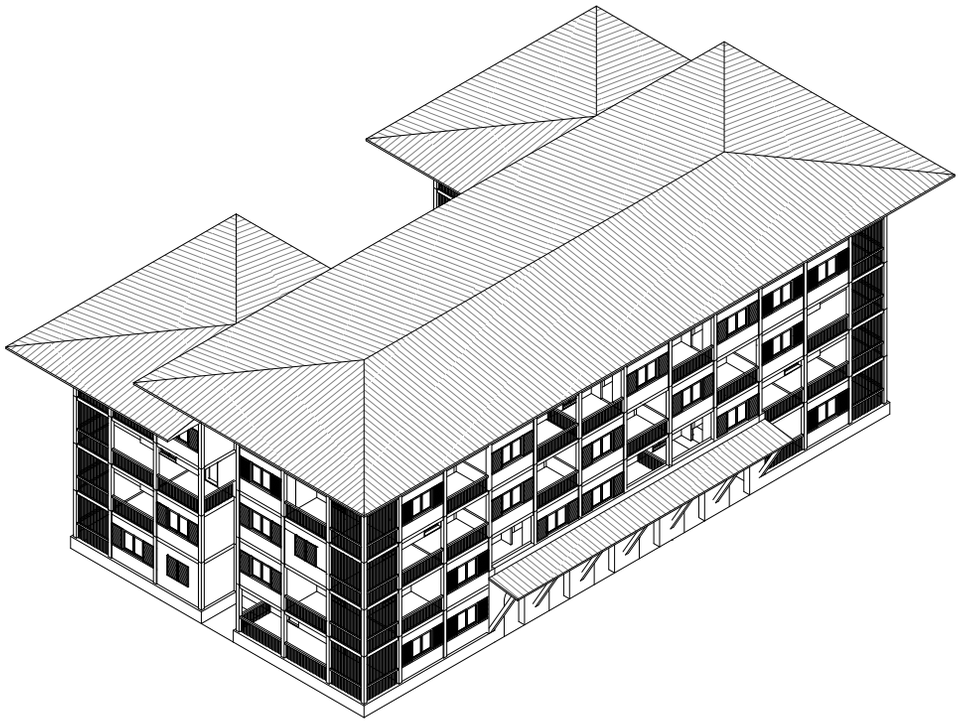
1 Year





5 Years





8.6 Type 3

Type 3 is by far the largest building type in the proposal. It is aimed exclusively at FHC tenants. Heavily inspired by the Addis Ababa Style, it refers to the historical Ethiopian buildings, but is still thoroughly modern. Each building houses 25 dwellings with 9 variations.

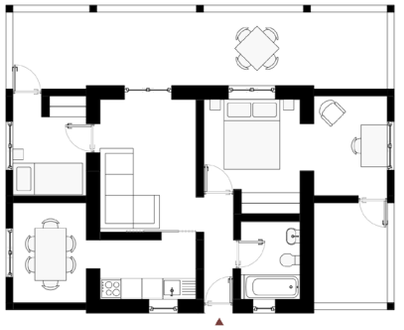
Type 3 buildings are located in two situations within the scheme. The first is along the social corridor - three Type 3 buildings occupy this position. In addition to the dwelling units, these Type 3 buildings also house two large commercial units and a social function (to be decided by the FHC in conjunction with the sub-city administration) - which could be, for example, a kindergarten, a health centre, or a meeting room for the local idir.

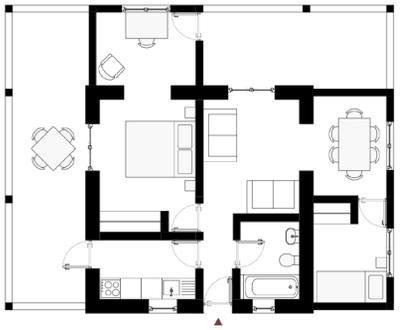
The second situation is along the edge of Adwa Park. These buildings will be built in collaboration with the municipality, who own the land. In exchange for allowing the FHC to develop this land and the land for the factory, the municipality will receive part of the rental income for these units. These buildings do not house a social function, but rather three large commercial units in addition to the dwellings.

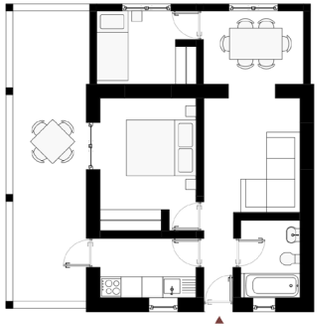
As well as the dwellings, commercial units, and social rooms, Type 3 buildings have an extensive roof terrace, which serves a dual purpose climatically. This, with the private balconies and communal garden, provides residents with a large amount of flexible external space.

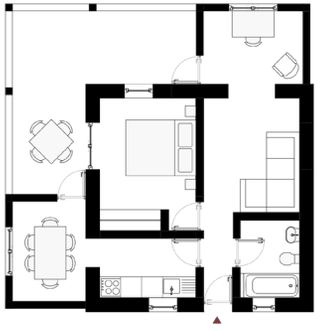
Type 3 buildings consist of a 'heavyweight' (concrete & adobe)core, housing the primary rooms of the dwellings, and a 'lightweight' (LBL) exterior, which acts as a balcony and as additional rooms. There are three situations for dwellings, which can have one, two, or three sides with the lightweight verandah. These three situations can be adapted into nine different dwelling options, as can be seen on the following page.

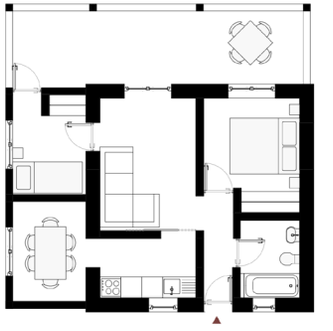
Apartment Options

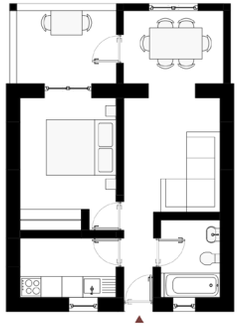


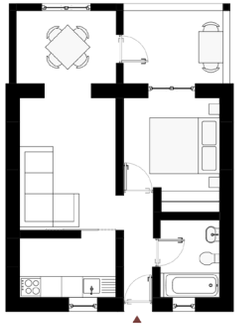




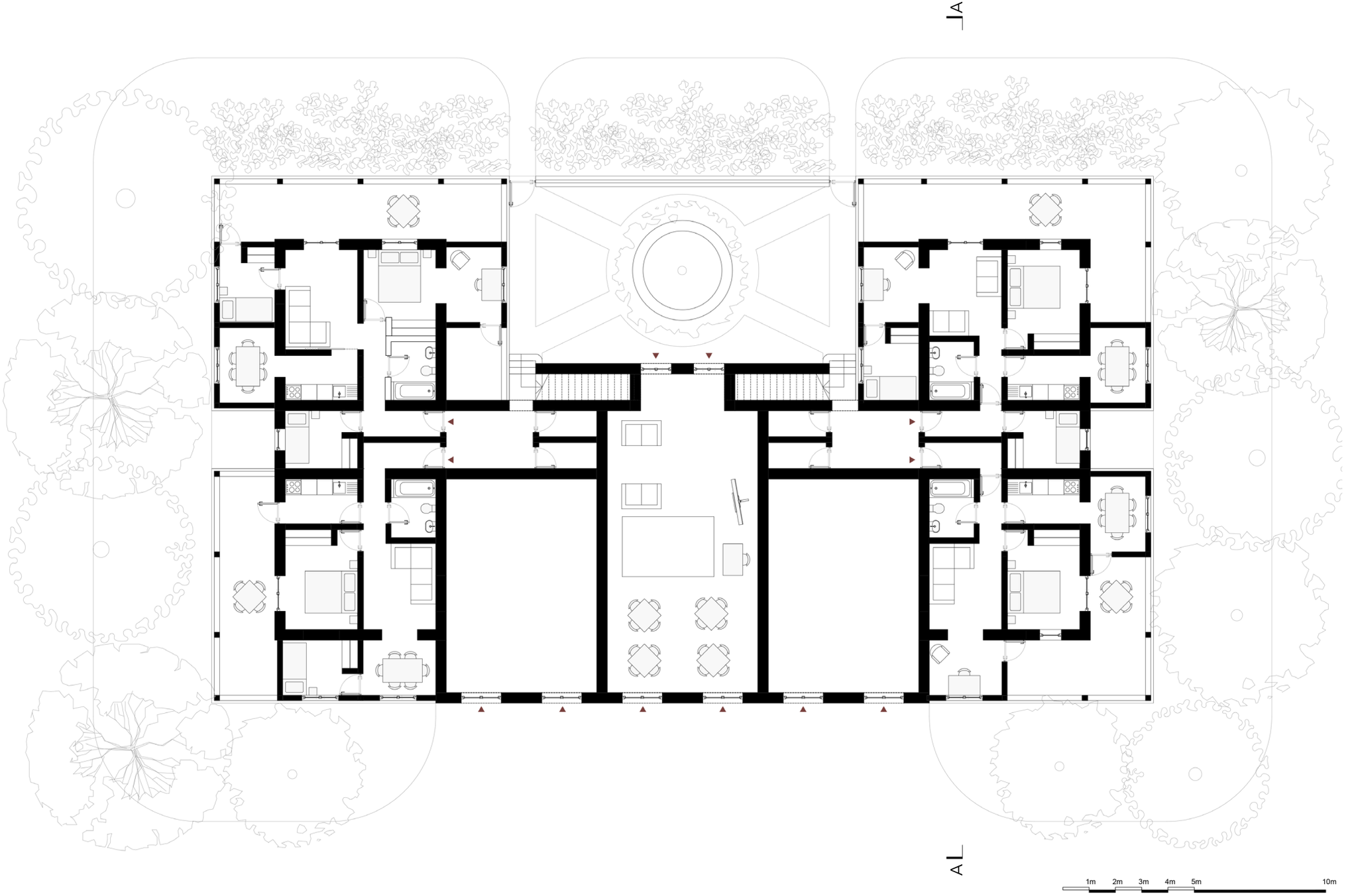




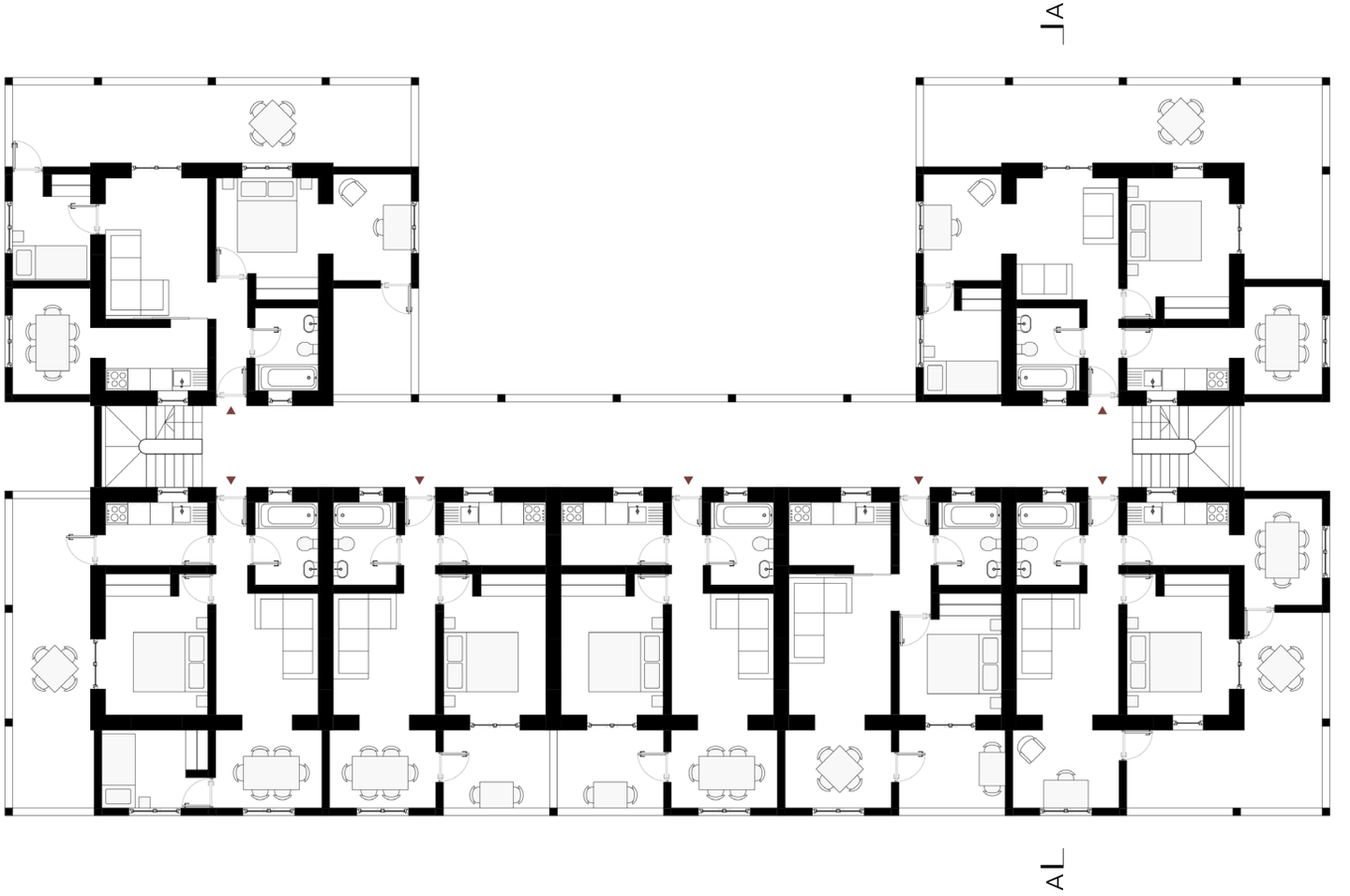




Ground Floor

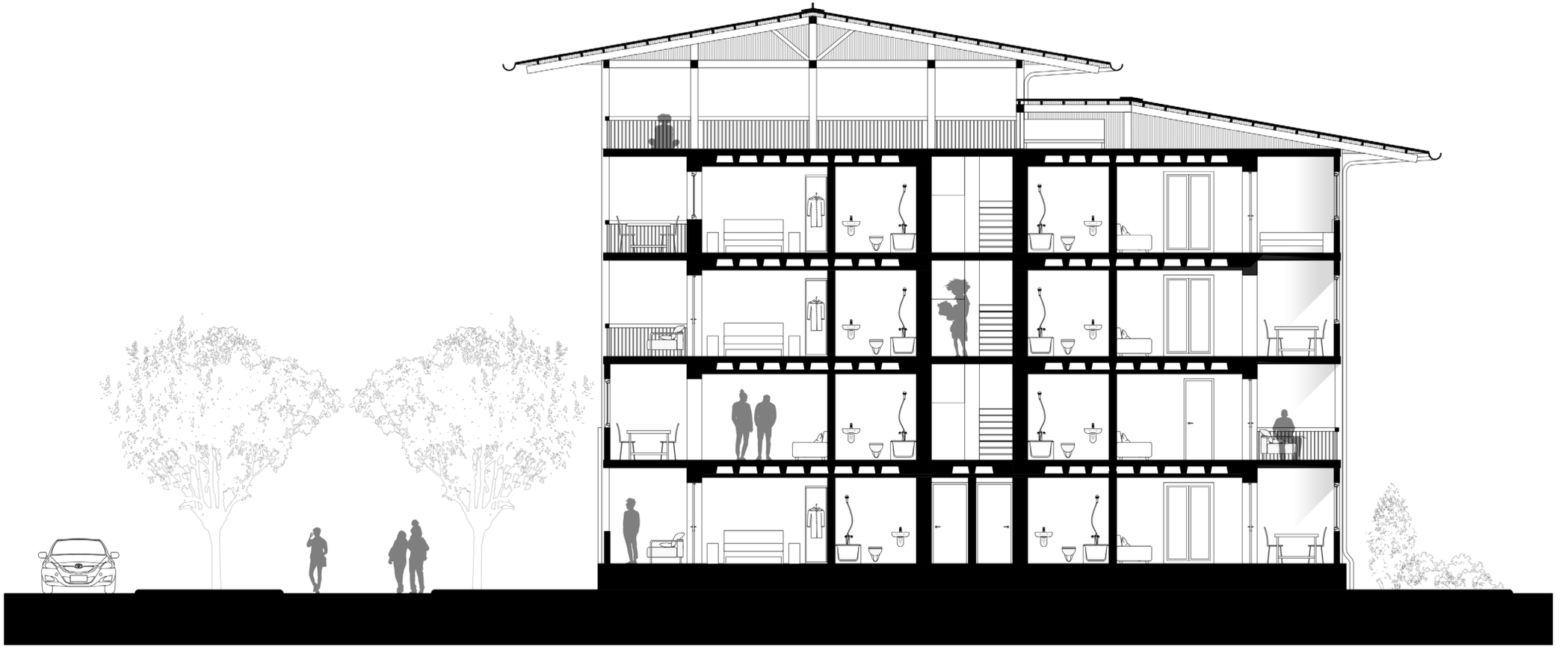


Typical Floor



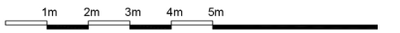
1m 2m 3m 4m 5m 10m

Section AA

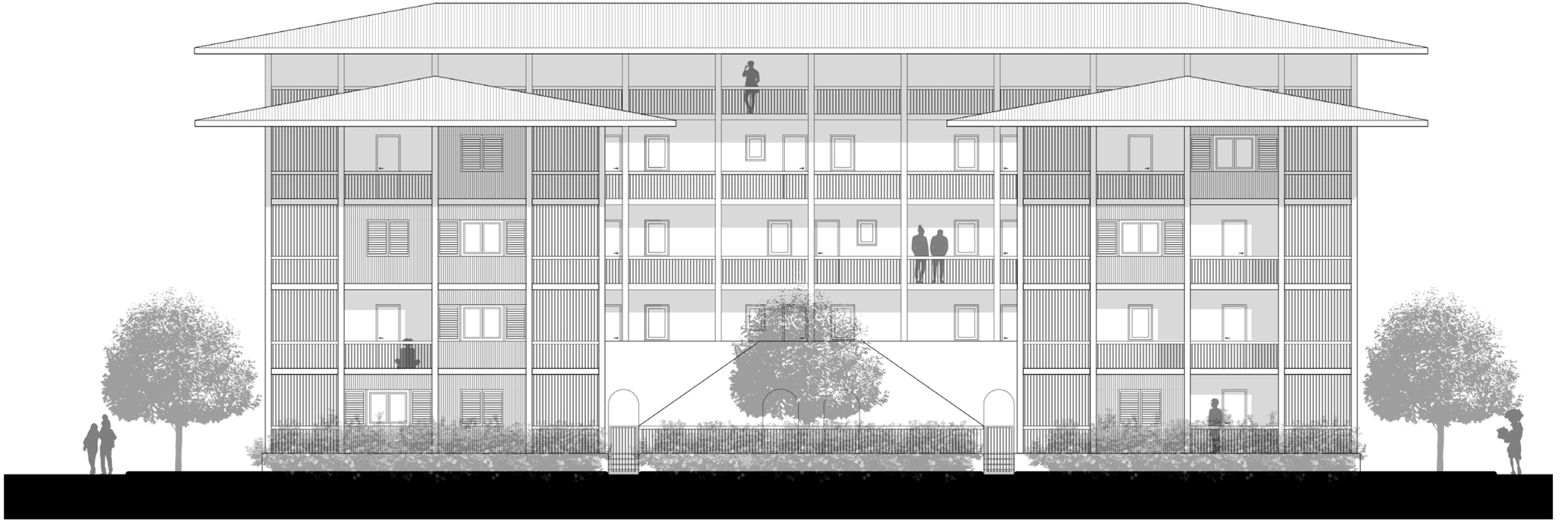


1m 2m 3m 4m 5m 10m

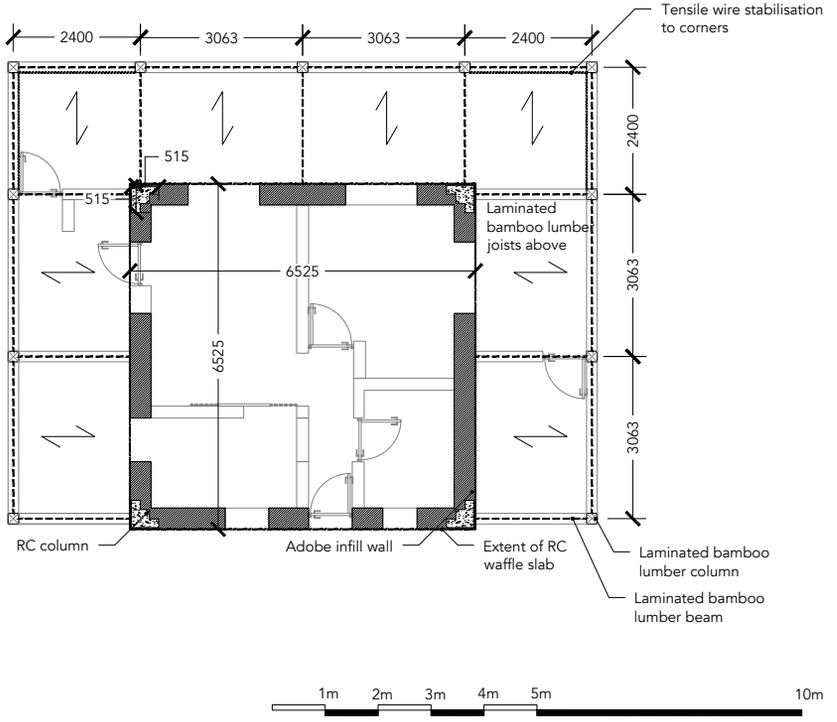
Front Elevation



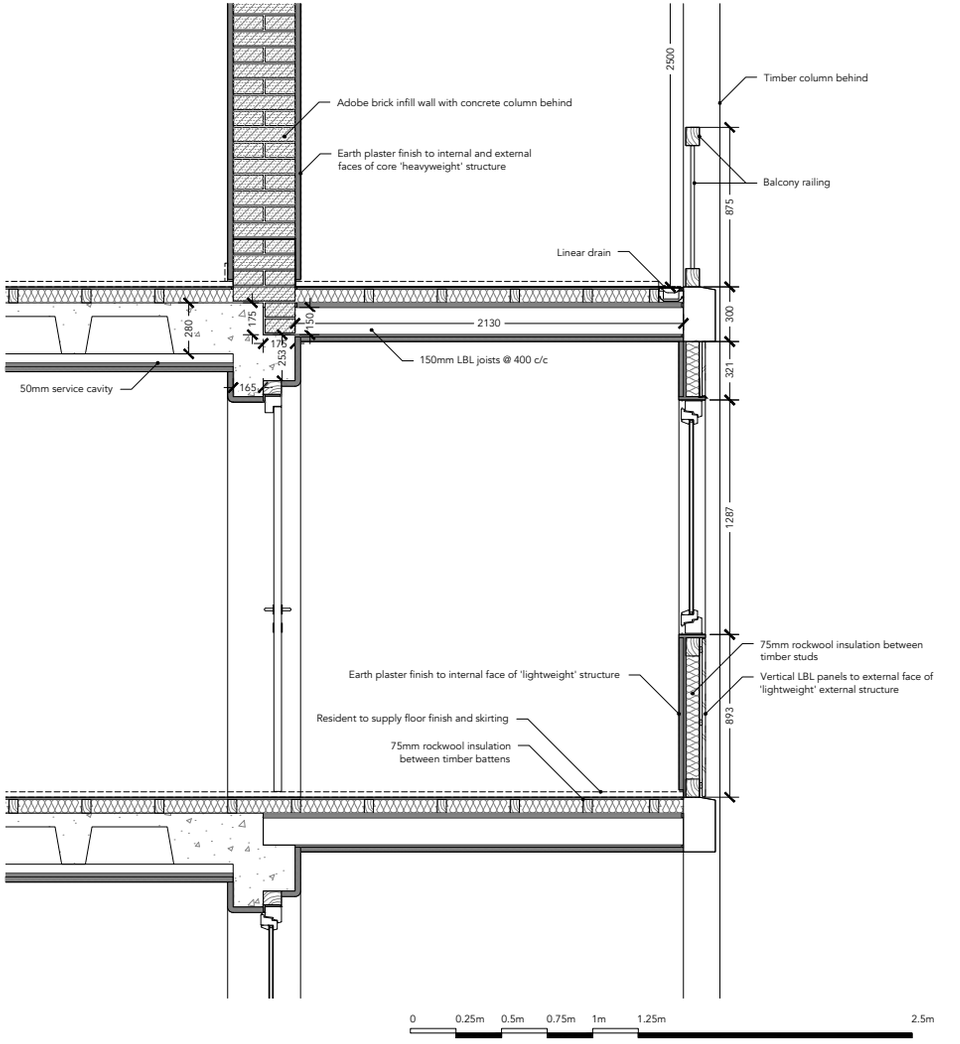
Rear Elevation



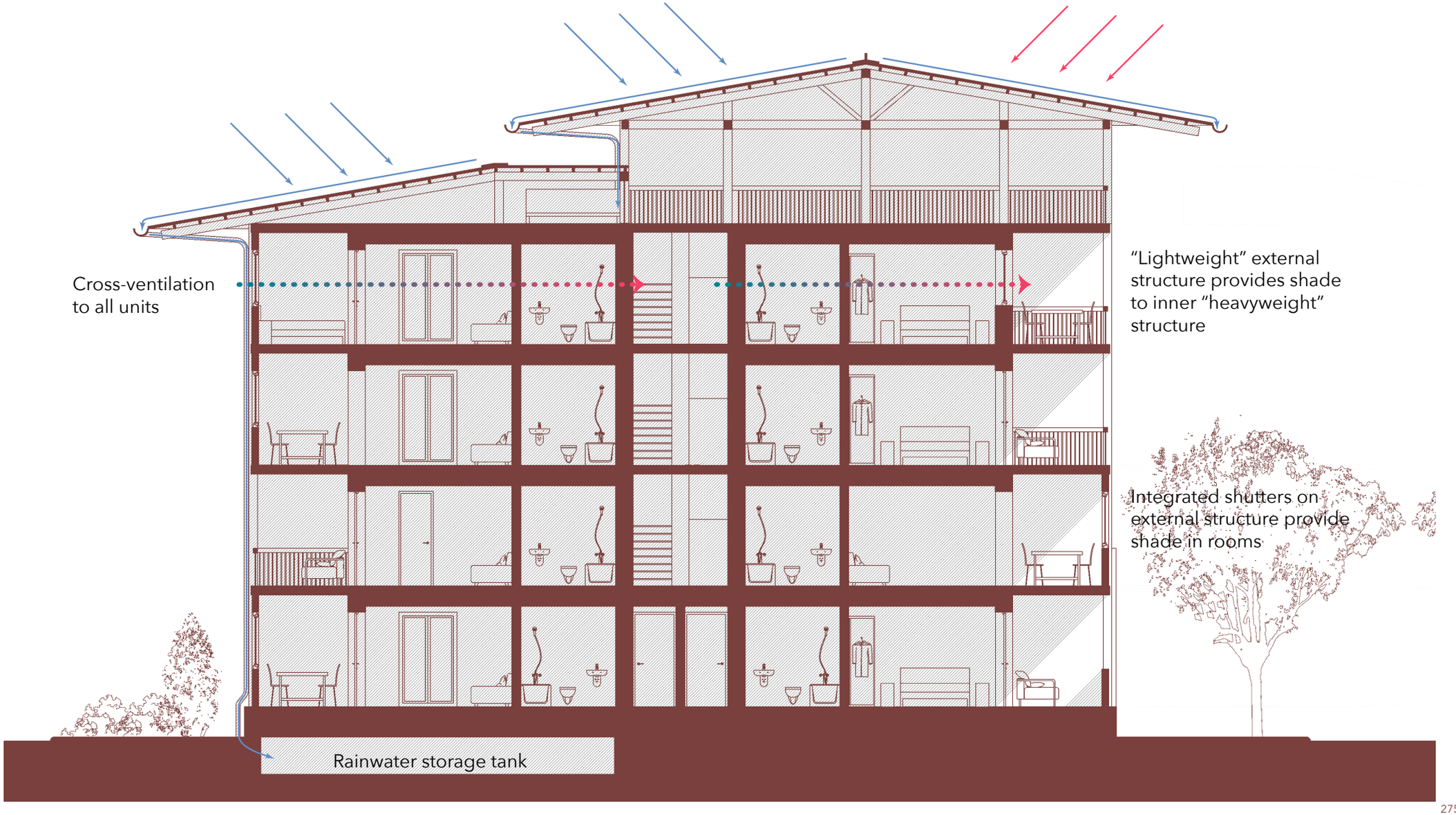
Structural Plan - Typical Floor



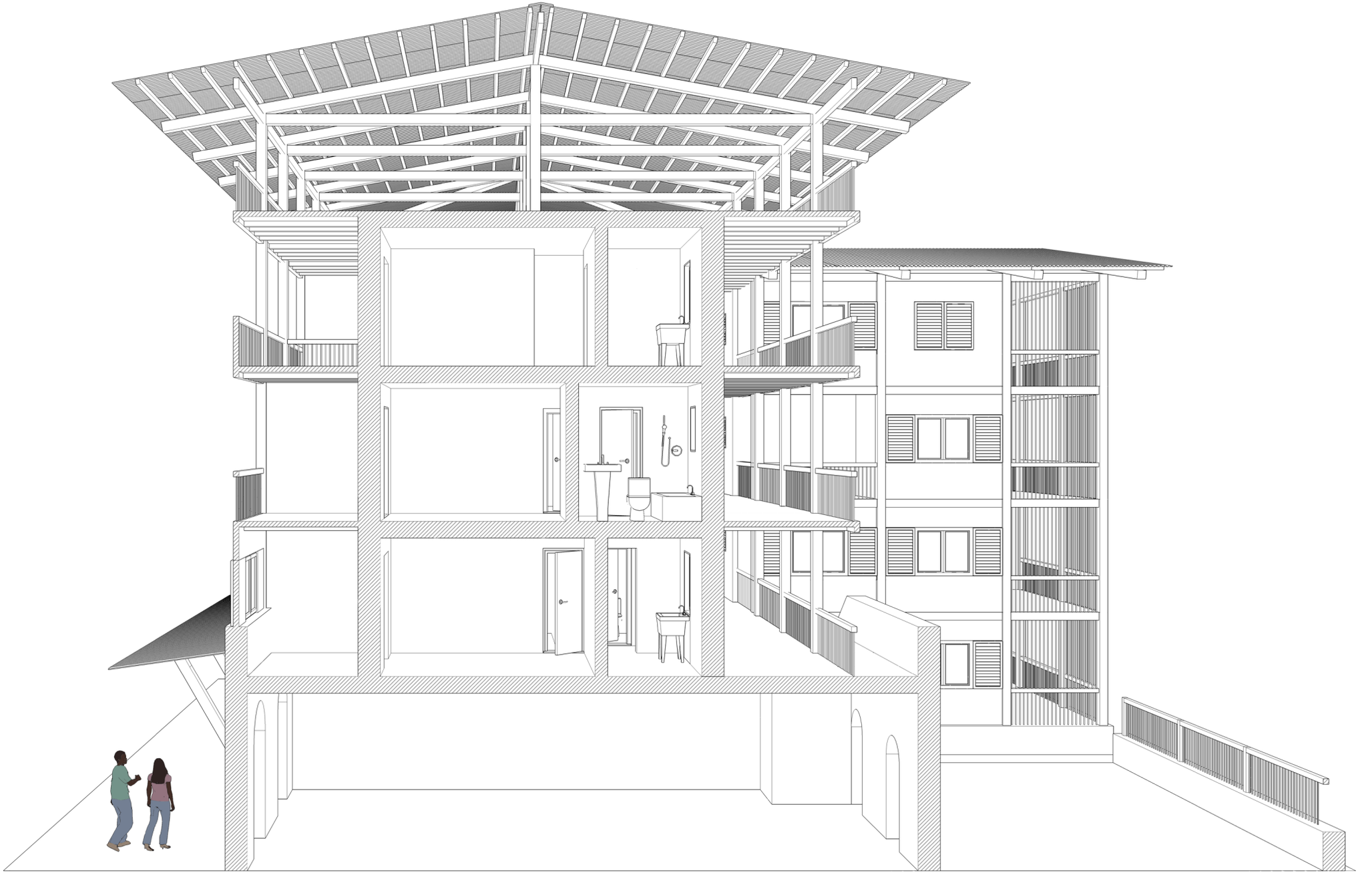
Facade Section



Climate


Rainwater on upper roof collected in storage tank under lower roof for use in rooftop activities (laundry etc)
Disconnected roof provides shaded roof terrace and reduces warming of main building structure
Cross-ventilation to all units
"Lightweight" external structure provides shade to inner "heavyweight" structure
Integrated shutters on external structure provide shade in rooms
Rainwater storage tank

0 Years



1 Year

5 Years

8.7 Visualisations

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9.0

Reflection

Introduction

This reflection paper, prepared as part of the MSc 3/4 Global Housing Studio, provides a critical reflection on the relationships between the research and design phases of the graduation studio, and on the relationships between the outcomes of this studio and the wider context in which they are presented. Furthermore, the paper suggests the extents to which the chosen approaches and methods were successful, and how and why some chosen approaches may not have been successful.

The studio, entitled *Addis Ababa Living Lab*, had the stated aim of *"Creating resilient dwelling clusters for urban resettlement"* (Mota and Mooij 2019, 1). Within the scope of the first half of the studio and its supplementary courses, a number of research tasks were given, which helped to build up a body of knowledge which could be applied in the design task that formed the second half of the studio. The studio, offered by the chair of Architecture and Dwelling, was focussed primarily on dwellings and places of inhabitation, and with the location in Addis Ababa, Ethiopia, there was a strong focus on resilience, adaptability, and affordability.

Moreover, the studio encouraged an interest in living patterns and rituals, with participatory design and visual ethnographic research methods promoted. These methods rely on face-to-face interaction with local people, and focus on their daily lives and lived experiences. Thus, a study trip to Addis Ababa was included within the studio programme, which included opportunities to speak to local residents around the intended project site as an opportunity to conduct ethnographic research.

During the studio I personally became interested in the vernacular building methods found in Addis Ababa and around the country. These informed my design ideas from the outset of the design stage, and this focus has continued throughout the project, resulting in the project title *Radical Vernacular – A New Ethiopian Urbanity*.

Relationship between the graduation topic, the studio topic, the master track and the master program

The topic of my graduation project is closely aligned with the studio topic. Furthermore, despite being a project undertaken within the Architecture track of the Master of Architecture, Urbanism and Building Sciences, it incorporates many aspects of urbanism (which indeed is included in the project title), building technology and building management.

My project is heavily underpinned by a study of vernacular building methods, their benefits and drawbacks, and the cultural connotations with which they are associated. It is my belief that vernacular methods of construction offer the resilience that is referred to in the aim of the studio – local, tried and tested building methods are adapted to the local availability of materials, climatic conditions, construction knowledge, and lifestyle patterns. Indeed, the UNESCO 'INternational Disaster Resilient Architecture' project notes that its purpose is to present an approach to resilient architecture *"by promoting the importance of traditional building knowledge in construction"* (United Nations Educational, Scientific and Cultural Organization. n.d.).

Building methods and people have an intertwined relationship, where both influence the other – for example living patterns may be influenced by the form of the vernacular buildings, which may in turn be influenced by the local availability of materials. More specifically, in a typical family compound in the Ethiopian Highlands, it could be seen that, despite having a number of buildings in the compound, the family all slept in one *tukul* (a form of round, generally earth-constructed home) with their animals. When asked why this was, they explained that the climate of the highlands is warm days and cool nights of around 4-6°C, and that by sleeping in the same building as the animals they could use the heat they generated to keep warm. This living pattern affects the form of the buildings, which are one storey with a high roof and gallery in which the family sleep above the animals. However, this form is also influenced by the local materials – high-quality timber is scarce, and as such the

buildings are constructed with a timber frame stabilised by thick mud plaster, a building system known as *chikka*. The scarcity and quality of these materials means that the building form must be compact, so round buildings are favoured.

The wealth of knowledge that is embodied in vernacular buildings and methods is vital in creating resilience – buildings that were constructed by local people have lasted for centuries and are appropriate for their residents, the very definition of resilient.

This project has been undertaken within the Architecture track of the MSc Architecture, Urbanism and Building Sciences. The programme at TU Delft distinguishes itself from other courses *"in the diversity of directions available"* (TU Delft. n.d.). Despite the focus on architecture, my project has included elements of building technology, urbanism and building management as fundamental aspects.

Through my own experience working for 2 years in a technology-focussed architecture firm, it is my firm belief that building technology should be embedded from the outset of architectural design. This was apparent in my project from the outset, where an early decision to use adobe bricks heavily influenced the form of the buildings, which were designed with small openings, shallow plans, and thick walls to accommodate the material.

The urban approach, which prioritises streets and street-life, drew from Jane Jacobs' theories, including that there must be *"eyes upon the street, eyes belonging to those we might call the natural proprietors of the street"* (Jacobs 2011, 45). Furthermore, the orientation of these streets was chosen to allow wind to flow down the streets, creating a breeze to cool the air and ventilate dwellings during warm Ethiopian days. The symbiotic nature here of urbanism, architecture and building technology was fundamental in this project.

Rural family compound in the highlands, near Mt. Abune Josef. The building on the left is used by the family for cooking and sleeping, and livestock also sleep here. Large animals sleep on the ground, the family (6 persons) sleep on a timber gallery at eaves level, and chickens roost in the roof. The smaller building on the right is used as a kitchen for guests who stay with the family, and for storage. Image source: student's own work.

Elaboration on research methods and approaches taken

The first research carried out for this project was background research into the historical and contemporary conditions found in Ethiopia, and in Addis Ababa in particular. This focused on four main topics – 'Hard Data' (empirical, quantitative data), 'Soft Data' (divided into the topics of history, religion, politics, art and culture), 'Spatial Mapping', and 'Housing'. This general research was vital in gaining an understanding of Addis Ababa.

A study trip to Addis Ababa was organised, which included site visits and a workshop with students from EiABC (Ethiopian Institute of Architecture, Building Construction and City Development). Ethnographic research, focusing on the living patterns of people in Addis Ababa, and especially Gerji, was undertaken. Interviews were conducted with the aid of students from EiABC concerning the daily life of residents. It was important to understand how living practices impacted on dwellings and urban spaces, and vice versa, so photographs and field sketches (including measured plans) of important spaces were also made. Interviews included questions pertaining to participatory design – rather than conduct full participatory design exercises (which would have been time consuming) there were simple questions concerning the design of dwellings and urban spaces included in the interviews. Further work concerning living habits was undertaken with the aim of producing an architectural graphic novel about life in Addis Ababa (in a neighbouring site), which provided useful additional information.

Simultaneously, traditional site analysis was undertaken on location. Due to the scarcity of easily accessible information available about the built environment in Gerji, it was necessary to make detailed sketches and notes about the site and its context, including building heights, programmes and uses, materials, densities and sub-divisions, and roads. This was then supplemented with information including local climate, greenery, and local points of interest that could be found in literature.

Fourthly, research into vernacular architecture and traditional construction materials and techniques was carried out. This was undertaken not only in Addis Ababa, but also during excursions and trips to other cities and rural areas in Ethiopia. Due to the project's title *Radical Vernacular* it was vital to have a thorough understanding of the traditional architecture, and how and why it developed.

Relationship between research and design

The research undertaken in the first stage of the studio was fundamental in developing the design of the project. In particular, the ethnographic research into lifestyles and living patterns, along with the research into vernacular architecture were influential in the outcome of the design stage.

Interviews and visual documentation of the homes of Addis Ababa inhabitants were fundamental in understanding living patterns and values. Due to the differences between culture and cultural practices in Europe and Ethiopia, this process was arguably more necessary in the context of designing for Addis Ababa. However, this degree of separation could be beneficial in approaching the design without prejudice and pre-conceived ideas. Ethnographic research requires looking with a *"naïve state of mind"* and specifically searching out the *"hidden obvious"* (TEDx Talks 2013), which is perhaps easier in a new context.

The process of ethnographic research revealed details which could otherwise have been easily missed. For example, it was clear from the outset that many homes, including those in the condominium developments, have been extended into balconies and terraces in order to maximise indoor living space, however it was only through interviews that the reason for this became apparent. Homes are often extended to allow extra space for sleeping, as household size and composition in Addis Ababa is liable to change not only dramatically as family members migrate to the city from rural areas or move away, but also diurnally as household members leave the house during the day for work and return in the evening. It is not uncommon for multiple generations to live under one roof in a very confined space – in one example 27 people occupied a 2-room house with a total area of less than 30m^2. Nonetheless, external space was considered important, and was used for cooking, washing, and other domestic and income-generating activities.

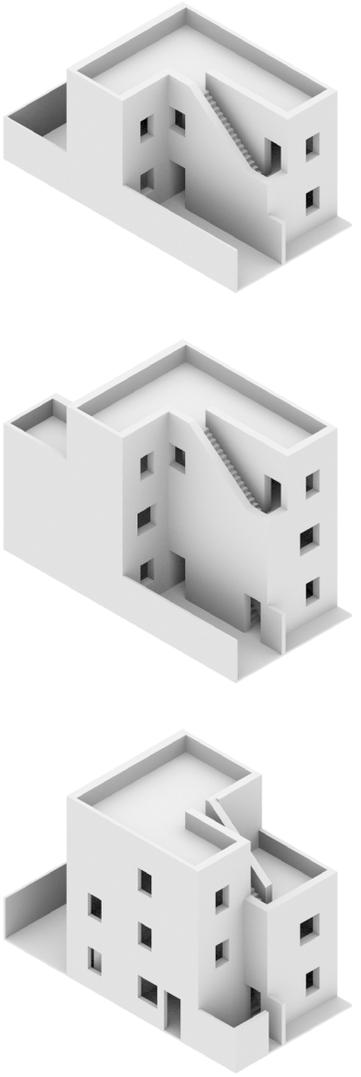
Typical extension to a condominium apartment. This extension houses a kitchen in a narrow space (approximately 1.2m wide), which was designed as an access route. Appropriating this space as a private kitchen has allowed the household to convert the original kitchen into an additional bedroom.
Image source: student's own work

A yard in a kebele compound, Talian Sefer. This external space is used by residents for cooking, drying laundry, and various other domestic and income-generating activities.
Image source: student's own work.

This information then informed the design: from the outset there was an ambition to provide each dwelling unit with an area of external space, but it was also vital that this space should not come at the cost of robust, permanent internal space. The external spaces provided can be used for both domestic and income-generating activities, such as cooking traditional injera for consumption or sale, drying spices, or doing laundry.

It was also apparent through discussions with residents that, although they often had close bonds with neighbouring households with whom they might share facilities, they desired privacy and the sharing of facilities was generally due to a lack of money. Nonetheless, separate households sharing a compound would often share domestic chores such as childcare, and build up a support network. Thus, the design aims to build opportunities for the creation of small communities within compounds, but the compounds themselves are kept private from the outside world. Compounds are small, with at most 6 or 7 households sharing facilities, to develop a feeling of privacy.

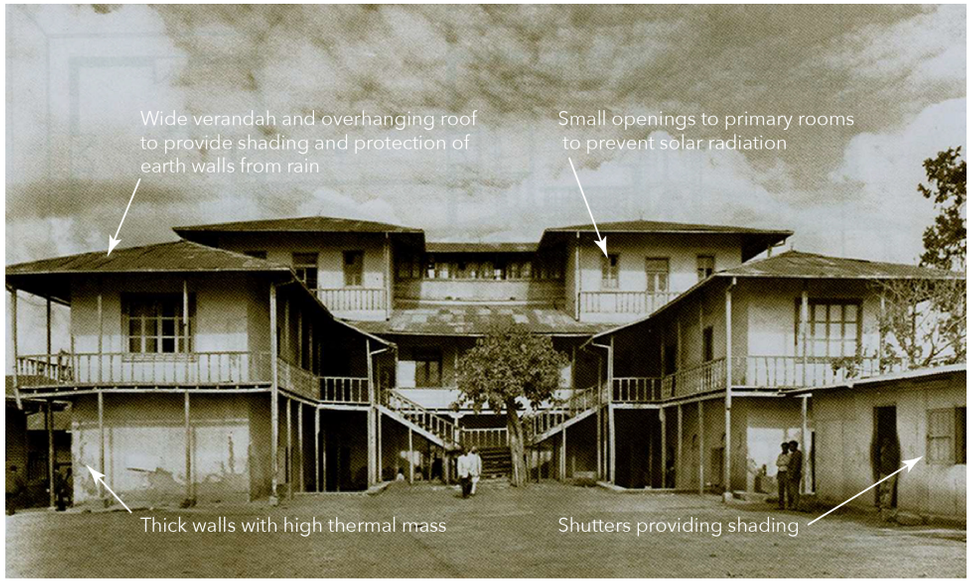
The ethnographic research undertaken was limited in time and scope, and could never provide a full picture of Ethiopian living patterns. However, the interviewees gave a variety of responses and had a variety of lived experiences. These experiences could be collected and sometimes synthesised, in a similar process to the graphic novel, to give a selection of archetype residents, thus providing the opportunity to design for 'real' people, not ideally imagined ones. It was clear from this research process that household composition and requirements were often very different, and that the standardised solutions to the housing shortage in Ethiopia do not address this. Thus, my design provides flexibility – for example a standard Type 1 plot can accommodate one middle-class family in a 3-bedroom home, or 3 households and a commercial unit, or almost any combination in between.



Three variations of a Type 1 building showing the flexibility that this design affords.
Image source: student's own work.

The research into vernacular building methods also influenced the design. At the outset of the project, I intended to use traditional chikka construction within the project, as it could be seen in Ethiopia that many chikka buildings have stood for centuries with minimal maintenance, whereas the poor quality of new concrete buildings will inevitably lead to their demolition in a matter of decades. However, research into the process of chikka construction revealed a number of issues, including that the high amount of timber required for chikka is no longer available in Ethiopia. An analysis of construction techniques and materials showed that adobe blocks were a suitable construction material for many parts of the project, and that the mixture of earth and straw needed for adobe is almost identical to that used in chikka.

Furthermore, vernacular buildings in Ethiopia are adapted to the climatic conditions. Ethiopia's position close to the equator gives the country warm, sunny days and cold nights, with heavy rainfall for 2 months of the year. Wide roofs with large overhangs not only provide shade to the buildings and shade for people on external terraces, but also divert the heavy rainfall away from the earthen walls, avoiding deterioration. Thick walls with high thermal mass absorb heat during the warm days and release it during the cool nights, regulating temperature. These principles were included within my own design.



Bitwoded Haile Giorgis Palace, built in a traditional style. Annotations show how this traditional style is adapted to local climatic conditions. Image source: Mezgebu, Anteneh. "Addis Ababa Architecture." LinkedIn SlideShare, March 26, 2017. https://www.slideshare.net/antenehmezgebu1/addis-ababa-architecture (adapted). Annotations by student.

Elaboration on relationship between the graduation project and the wider social, professional and scientific framework

This studio is part of a joint research project between TU Delft and EiABC (The Ethiopian Institute of Architecture, Building Construction and City Development), a determined output of which is a built pilot project. As such, all projects undertaken within this studio have a close link through the research project to the actual social development of Addis Ababa.

My graduation project in particular was designed to be site-specific to the chosen location of Gerji, being developed in response to local residents' experiences and concerns, as well as being designed to account for site conditions, such as orientation, road networks, and local landmark features. However, the project could nonetheless act as a prototype for a new style of development in Addis Ababa, which could be replicated with adaptations around the city. The adaptability of the buildings would ensure that no neighbourhood was the same, and varying household compositions and lifestyles would provide local variety and differences in the dwellings. Although this is an academic project, I hope to have shown an alternative pattern for redevelopment and urbanisation in Addis Ababa.

Although my project is specific to the site in Gerji, Addis Ababa, the problems which the project is intended to address are common to many rapidly urbanising and developing cities in the Global South, and indeed could be seen to be relevant to some cases in the Global North.

The general problem that the project addresses is that the demand for housing in Addis Ababa severely outweighs the supply, and as such many people live in housing that is, for various reasons, unsuitable. This situation is common to many developing countries, as rapid urbanisation entices people to cities, but the housing stock can not be increased at the same rate as rural-urban migration.

Furthermore, the site's density and usage no longer address the

surrounding conditions and its contemporary position within the wider city, and the FHC's ownership of the site has not permitted organic development. The lack of density that can be seen in the Gerji site is not an isolated case, and this challenge exists in many other areas of Addis Ababa, and indeed in many developing cities (though not all – there are of course cities such as Dhaka where the reverse is true). Again due to the rate of urbanisation, the density at which housing was built in many cities is not appropriate for the contemporary urban conditions.

The high-rise, high-density solutions to the acute housing shortage advocated and practised by the municipality do not adequately address the needs and desires of Addis Ababa's residents, and do not allow for adaptation and expansion to meet the needs of residents. This challenge has existed for decades, and the effects can be seen in the Modern responses to urbanisation in many developed cities, where high-rise, high-density solutions to housing problems created new slums (for example the Smithsons' *Robin Hood Gardens* in London or *Le Vele di Scampia* in Naples). However, as can be seen in Addis Ababa, the response to housing shortages are still similar to the responses implemented in the mid-20th century, and the effects may well be the same. This project intends to show that a similar density can be achieved through low-rise development which may not be fraught with the social issues that have long plagued high-rise residential schemes, and thus offer an alternative solution to the housing crisis, which could be replicated in other cities with similar issues.

Finally, contemporary development in Addis Ababa does not address the context of the city or the wider country, and as such the city is rapidly losing its character. This is a problem of globalisation and can be seen in developed and developing economies across the globe – cities which once had a distinct and unique character now have the same shops, businesses and fashions, and "landmark buildings" by the same starchitects. Though the specific solutions would clearly be different for each city, by using Addis Ababa as an example, this project aims to show that contemporary buildings can still say something about the city in which they are built.

Ethics

The main area in which I encountered ethical dilemmas during this project was in the research phase, particularly when undertaking the ethnographic research, due to the nature of the research and the focus on people's living patterns and their homes.

Issues of privacy were particularly important, especially when discussing personal issues, and as such the names of respondents have been changed to protect their privacy. Children were only interviewed with express permission from their parents, and any images of children remain anonymous. Photographs have been chosen which maintain the dignity of their subjects, in order to avoid "poverty porn".

It was, however, necessary to depict the reality in which people in Addis Ababa live, and thus some photographs show living situations which may be considered "less developed" through the eyes of a European audience. Where this is the case, I have tried to present this material without prejudice, and purely as academic research material.

into account in addition to the views of the proposed client, the Federal Housing Corporation. However, this situation is more complicated due to the large informal economy that operates in Addis Ababa – those residents and businesses which do not have formal authorisation should not be left out of the discussion, and neither should their living situation be destroyed through construction of the project. Thus, during the research, no distinction was made between those residents who had formal tenure and those with informal tenure, and during the design 'actual' figures were used to assess density and populations, rather than simply the formal figures. It is also proposed to formalise the tenure of current informal residents.

Furthermore, in order to minimise disruption to residents, the construction of the project is phased, such that only a minimum number of residents would need to be moved to temporary accommodation.

In practice, it would be necessary to conduct further research into living patterns and habits to assess whether the proposed design achieves the goal of providing appropriate housing for a wide variety of people. Due to the time limits of the study trip, it is possible that the research missed out a certain sector of society that would need to be included in the final proposal. Nonetheless, my project is designed to try to account for a wide variety of living patterns, and as such I would hope that adaptations could be made simply to accommodate additional groups.

10.0

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