

A SAFE PATH HOME: DESIGN

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A SAFE PATH HOME

A gender-sensitive approach to create a symbiotic relationship between domestic life and work life, using public space and the natural environment as the catalysts to bridge the two.

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"Every little girl is brought up to know that she must walk a straight line between home and school, home and office, home and friend or relative's home, from one 'sheltered' space to another."

- Phadke, Khan & Ranade, 2011

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IV. DESIGN

approach

How can a gender-sensitive design of affordable housing enable women to participate more fully in public space?

target group

goal

DESIGN GOALS

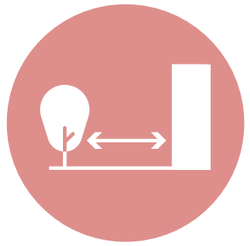
OVERALL OBJECTIVES



PURSUE
HIGH DENSITY



CREATE AN
INCLUSIVE LIFE-TIME
COMMUNITY



RE-IMAGINE
PUBLIC SPACE



INTRODUCE
SAFE + EFFICIENT
CIRCULATION



PROVIDE INCOME
GENERATING
OPPORTUNITIES

DESIGN PRINCIPLES

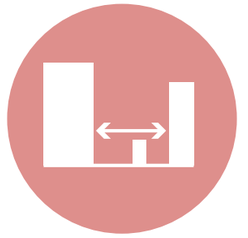
ELEMENTS FOR A GENDER-SENSITIVE APPROACH



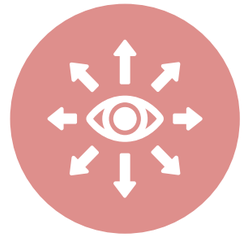
ENCLOSURE



LIGHTING



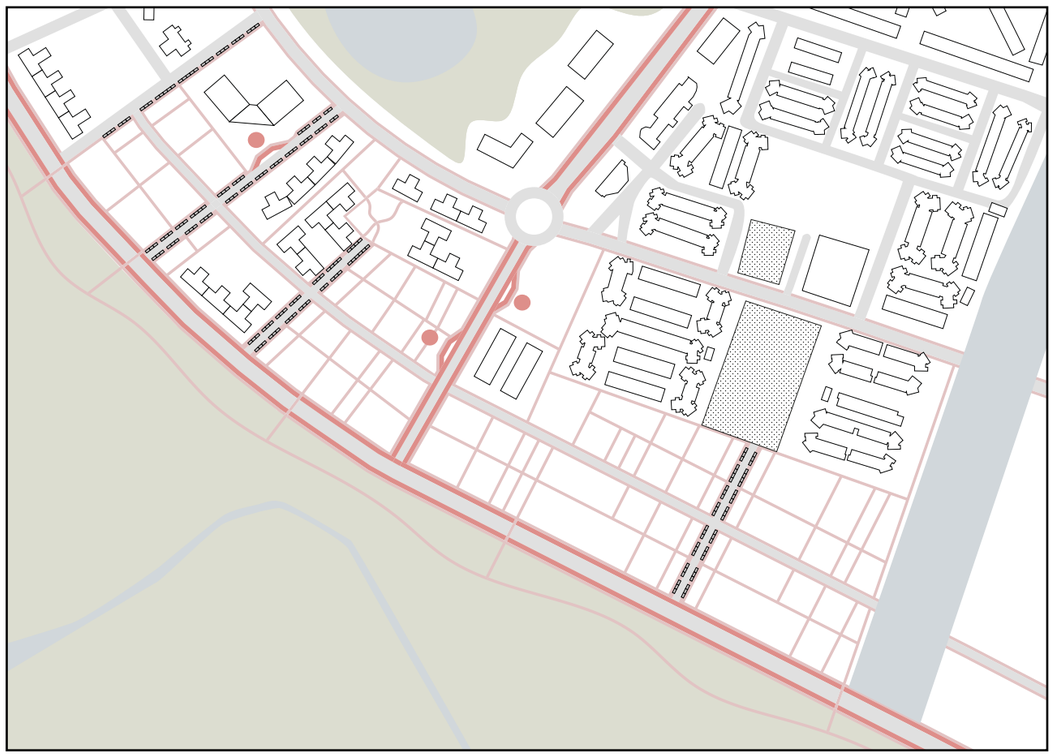
SCALE



VISIBILITY

URBAN STRATEGY

ACCESSIBILITY



For the proposed masterplan, I started off creating a network of defined pedestrian pathways, bus lanes along main roads with 2 new bus stops including public toilets and a commercial spine with a car route running through the plots connecting directly to the commercial units on ground floor.

Vehicular road
Bus lane
Pedestrian road
Road side parking
Bus stop

URBAN STRATEGY

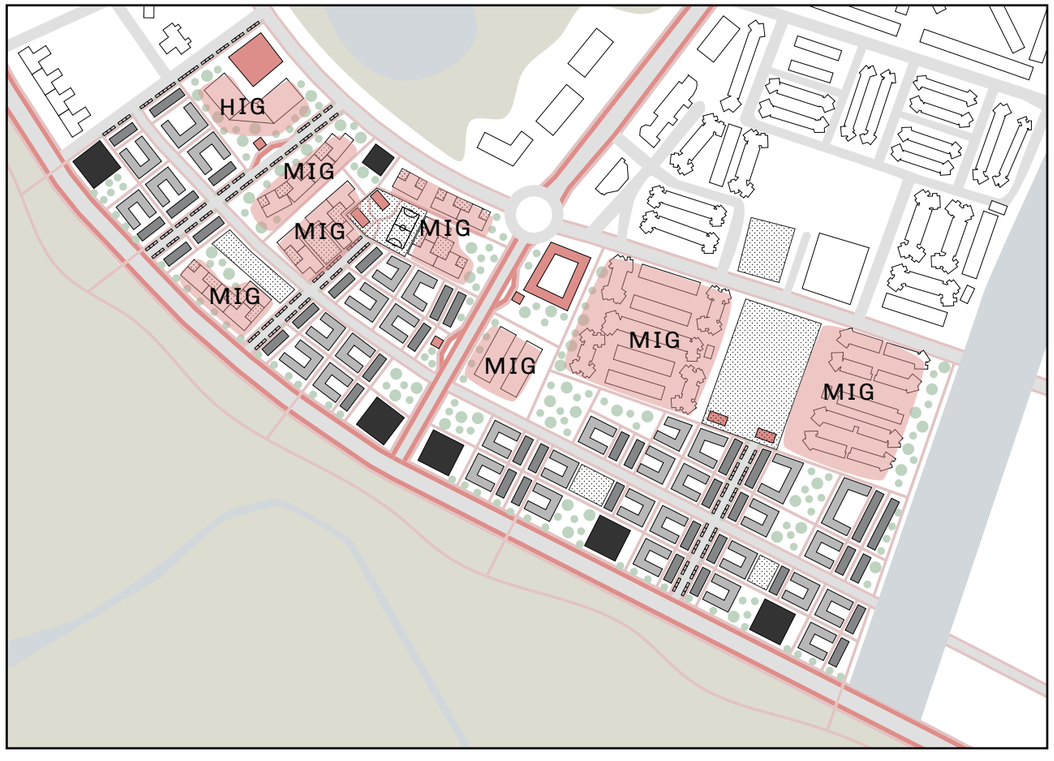
NATURE LINKS



The proposed scheme includes a nature trail connecting the site to the protected mangrove area across the main road. The trail connects via the pedestrian bridges over the main road up through the pedestrian lanes within the site. The mangrove area has been extended all the way up to the main road and the vegetation pockets are placed throughout the scheme creating a symbiotic relationship between nature and built space. This in turn will increase the biodiversity of the area and therefore also the air quality and potentially reduce the surrounding temperature.

URBAN STRATEGY

DISTRIBUTION OF INCOME GROUPS



I decided to place the MIG/EWS and LIG together with a close connection to the commercial lane and then the HIG zones in the dead spaces across the perimeter of the site. The aim is to mix the income groups in a way that the higher priced properties don't lose their value due to the surrounding lower priced properties.

MIG
HIG
LIG

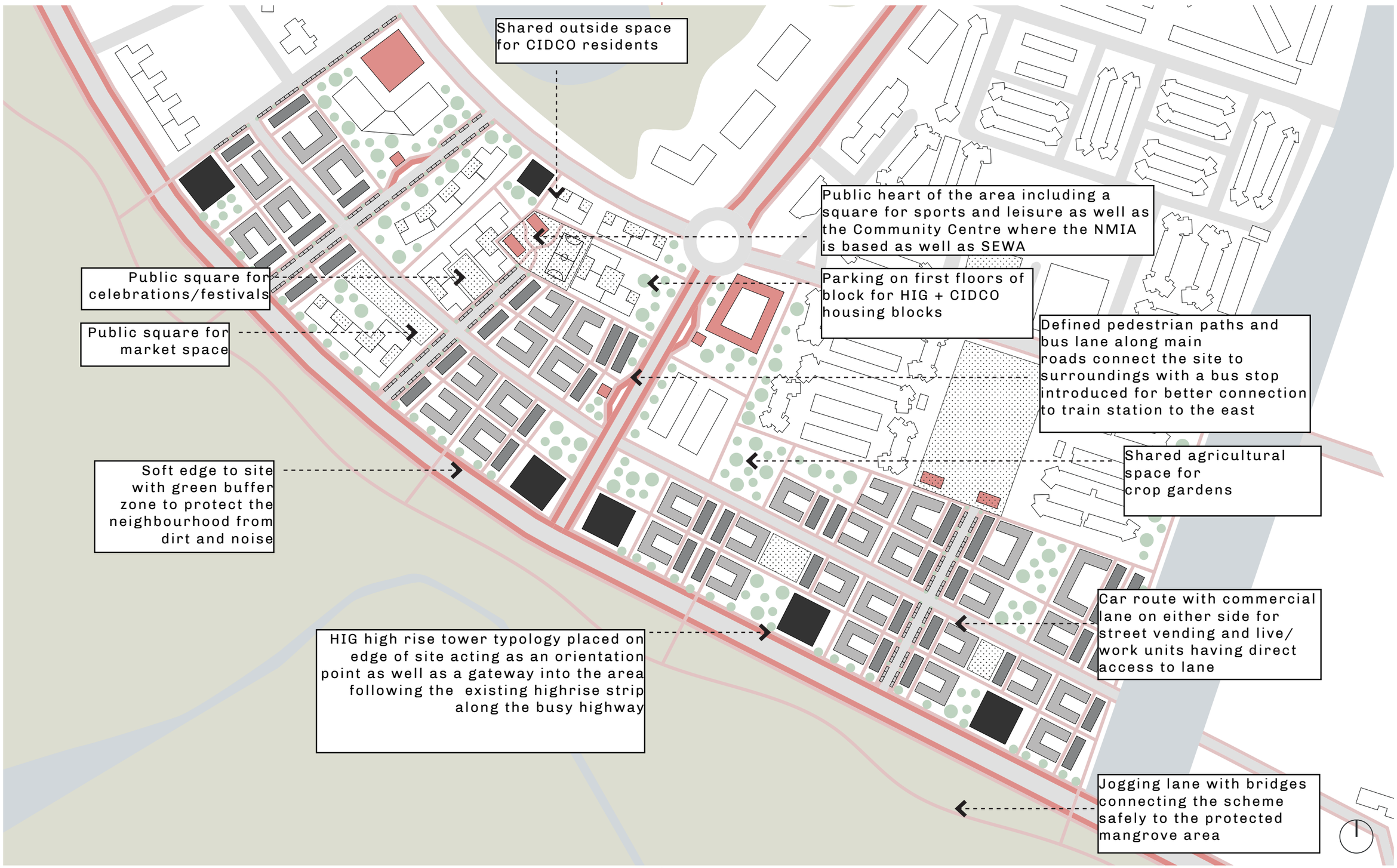
URBAN STRATEGY

MASTERPLAN

Market squares have been placed along the commercial spine throughout and smaller squares for festivities and sports are introduced along with a large area for cricket which was already there. The main squares house a Community Centre where the Navi Mumbai Inclusivity Association (NMIA) is based as well as the Self Employed Women's Association (SEWA). The CIDCO towers are now connected with ground through shared outside spaces for the residents in the dead space between the buildings. Instead of having large closed blocks and vacant land around, I'm opting for open blocks dissolved into smaller elements connected to the outside and larger shared amenities along the main roads of the site such as a school and a hospital. Parking is situated in the HIG blocks and along the perimeter of the site with a green buffer zone to protect the neighbourhood from dirt and noise from the main road.

URBAN STRATEGY

MASTERPLAN



EXISTING SITE

AXONOMETRIC



URBAN STRATEGY

AXONOMETRIC



EXISTING SITE - ZOOM IN

AXONOMETRIC



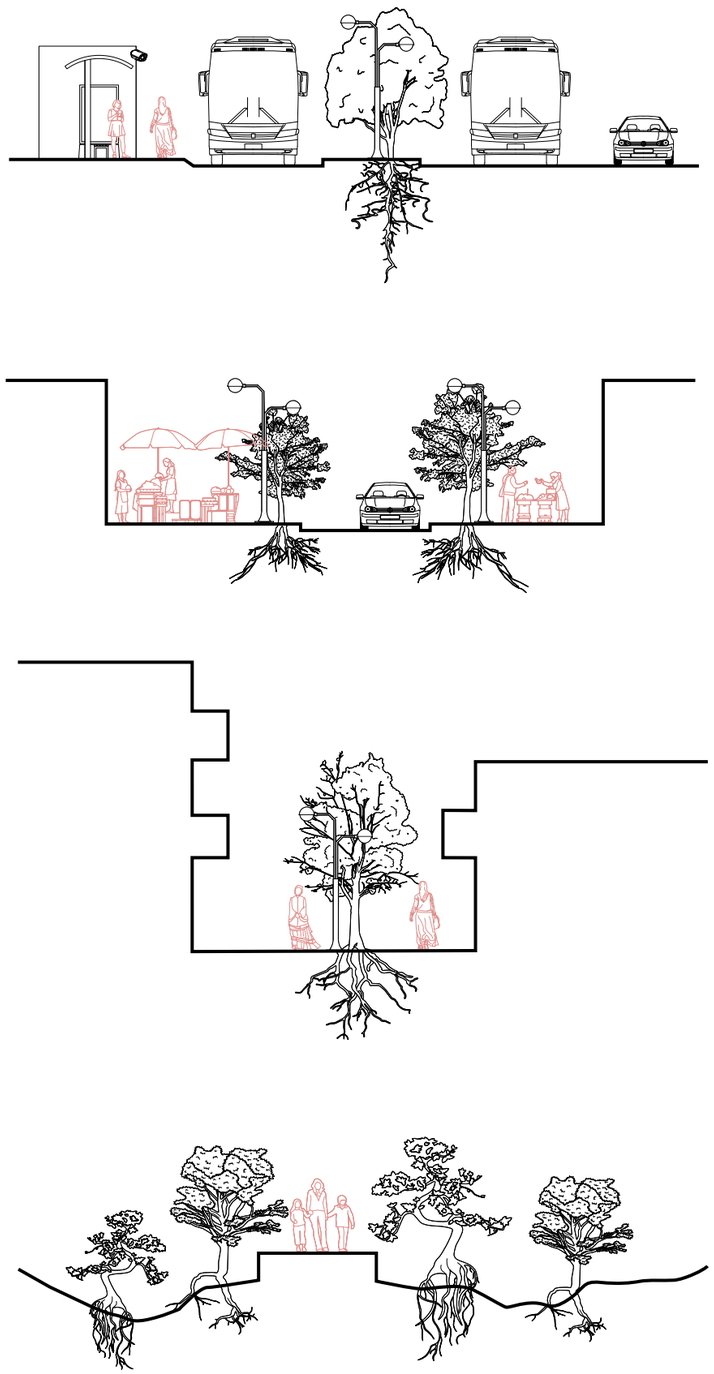
NEIGHBOURHOOD STATEGY

AXONOMETRIC



URBAN STRATEGY

PROPOSED STREETSCAPES



1 URBAN

A pedestrian lane, a bus lane and bus stop will be introduced for better connection to the train station to the east of the site.

Bus stops are mostly occupied by men, therefore to enable women to travel with safety, surveillance systems will be installed along with an information board for way finding as well as public toilets for both sexes and adequate lighting.

This road then becomes multi-modal as opposed to the existing wide mono-functinoal road.

2 NEIGHBOURHOOD

A car road will be introduced to cut through the site with a vending lane on either side of the street. This means the live-work units and commercial units on ground floor level will have direct access to the buy street in the neighbourhood and therefore women with home-based work will be able to sell their goods directly.

3 CLUSTER

Pedestrian pathways through the housing blocks are overlooked by balconies overhead, with good lighting and trees for enjoyable strolls.

4 NATURE

A jogging path/nature trail allows for a leisurely walk through the mangrove area during the day. This trail not only can be used as a recreational tool, but also as an educational one to raise awareness about the importance of natural environment.

COMPONENTS

ELEMENTS OF THE SCHEME

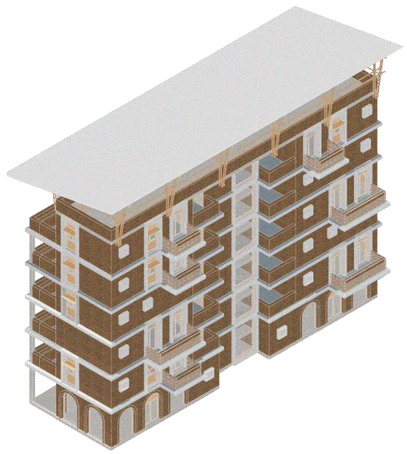


COMPONENT A: LIG + EWS BLOCK

These open blocks dissolve into smaller elements connected to the outside which are demarcated spaces for the inhabitants' amenities, forming a continuous chain of public + semi-public spaces throughout the area. The porous setup hopes to bring a form of intimacy but also lively interaction and a sense of safety.

Apartments + shared amenities + exterior gallery access + commercial first floor + parking along car roads.

Low-rise/Mid-rise block

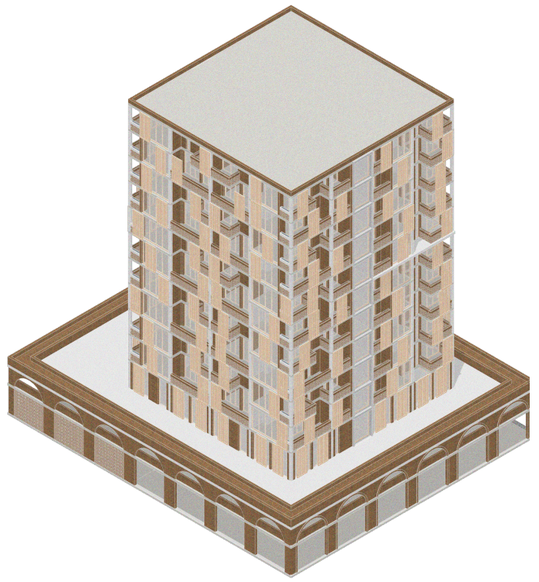


COMPONENT B: MIG BLOCK

This bordering block encloses the LIG + EWS block sharing the courtyard with those blocks, with the aim to encourage social interaction and connection between income groups.

Apartments + shared amenities + interior circulation + exterior gallery access + commercial first floor + parking along car roads.

Low-rise/Mid-rise block

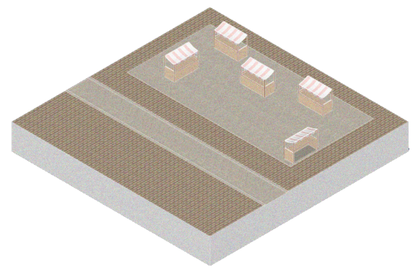


COMPONENT C: HIG BLOCK

This block is the acupunctural element of the scheme being placed in the large open spaces between the existing buildings with enough space around. These blocks are placed on the borders of the site acting as orientating points for pedestrians.

Apartments + shared amenities + internal circulation with elevator + commercial + parking plinth.

High-rise block



COMPONENT D: ACTIVATING SPACE

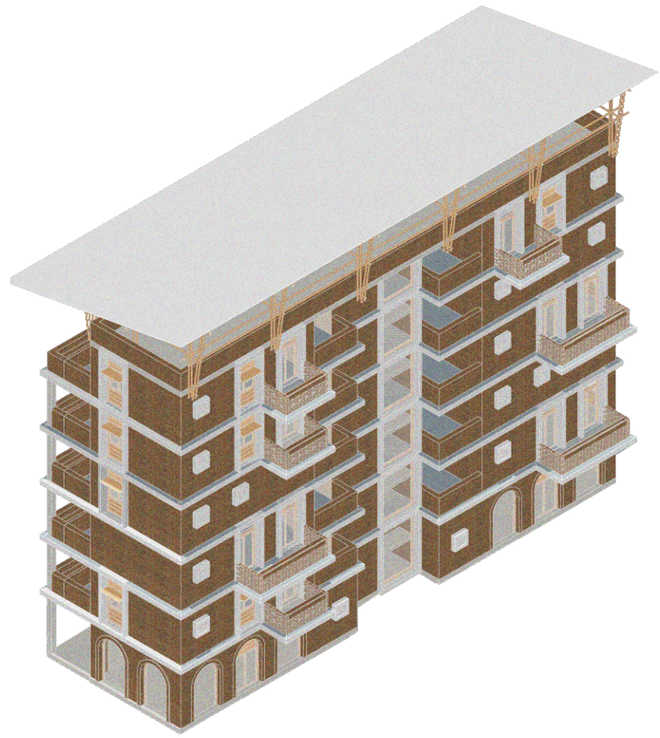
Activating the existing CIDCO towers and engaging them with the public edges by demarcating public amenities in the meaningless open spaces between buildings. By filling the voids on ground level, the spaces between the buildings become welcoming by the marked change in function of each space as well as the identified hotspots for women centric zones.

CLUSTER STRATEGY

LIG + MIG HOUSING



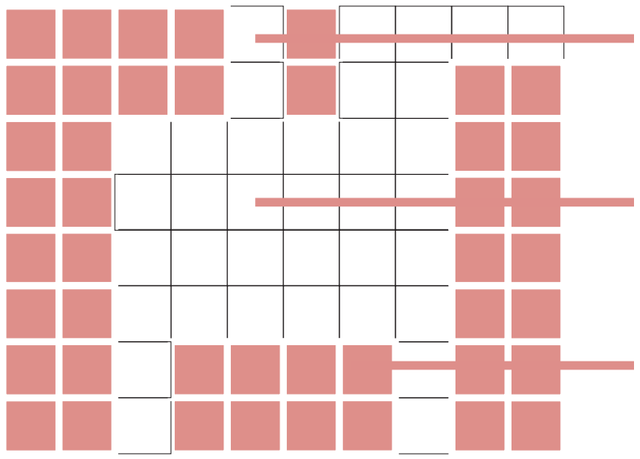
COMPONENT A: LIG BLOCK
TOTAL DWELLINGS: 24



COMPONENT B: MIG BLOCK
TOTAL DWELLINGS: 5-7

CLUSTER STRATEGY

LIG + MIG HOUSING



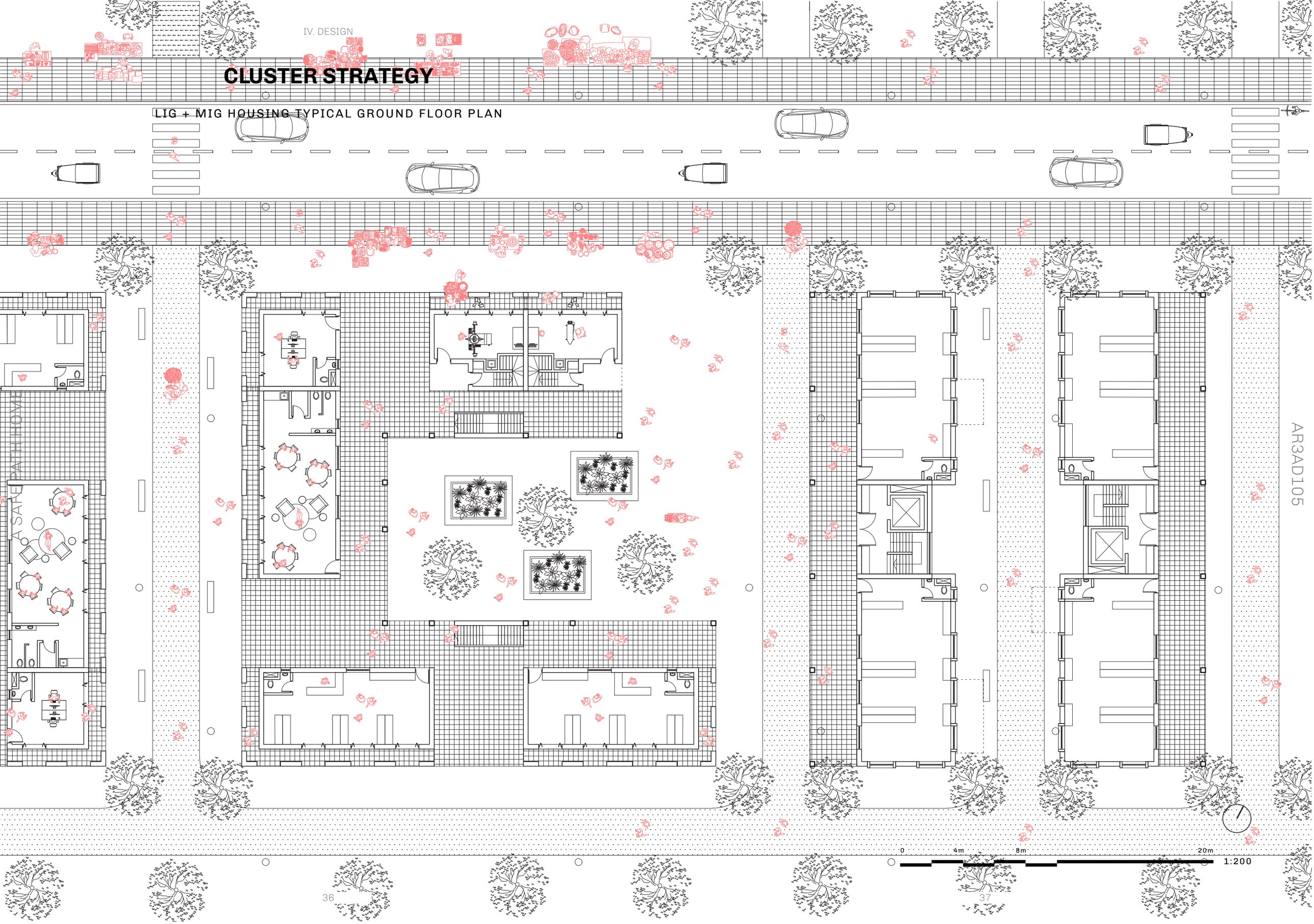
Openings in blocks to make them permeable but still maintaining elements of enclosure and safety

Smaller shared courtyards between LIG/ EWS + MIG sharing open space amenities

Residential units as well as shared amenities found throughout cluster

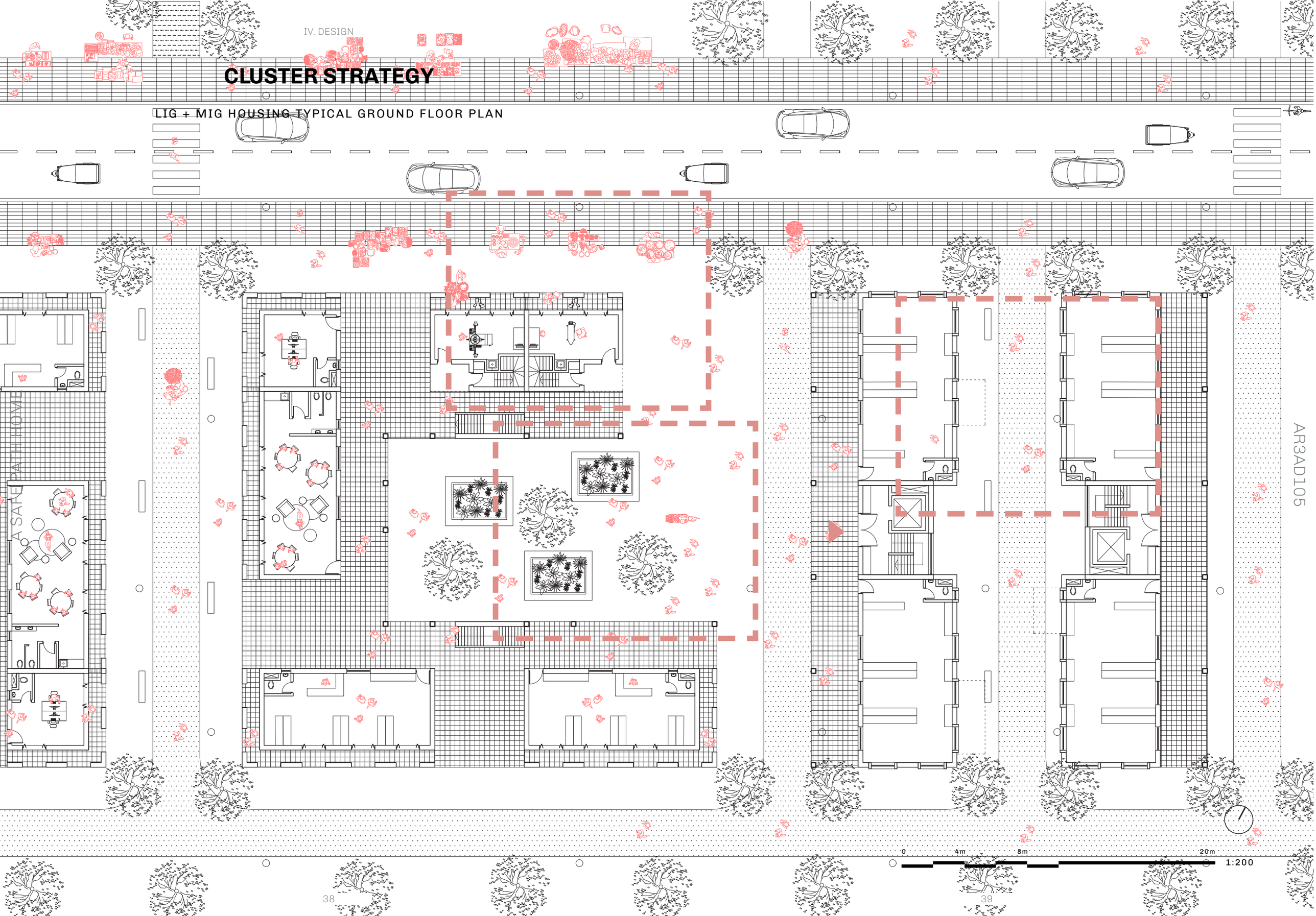
CLUSTER STRATEGY

LIG + MIG HOUSING TYPICAL GROUND FLOOR PLAN



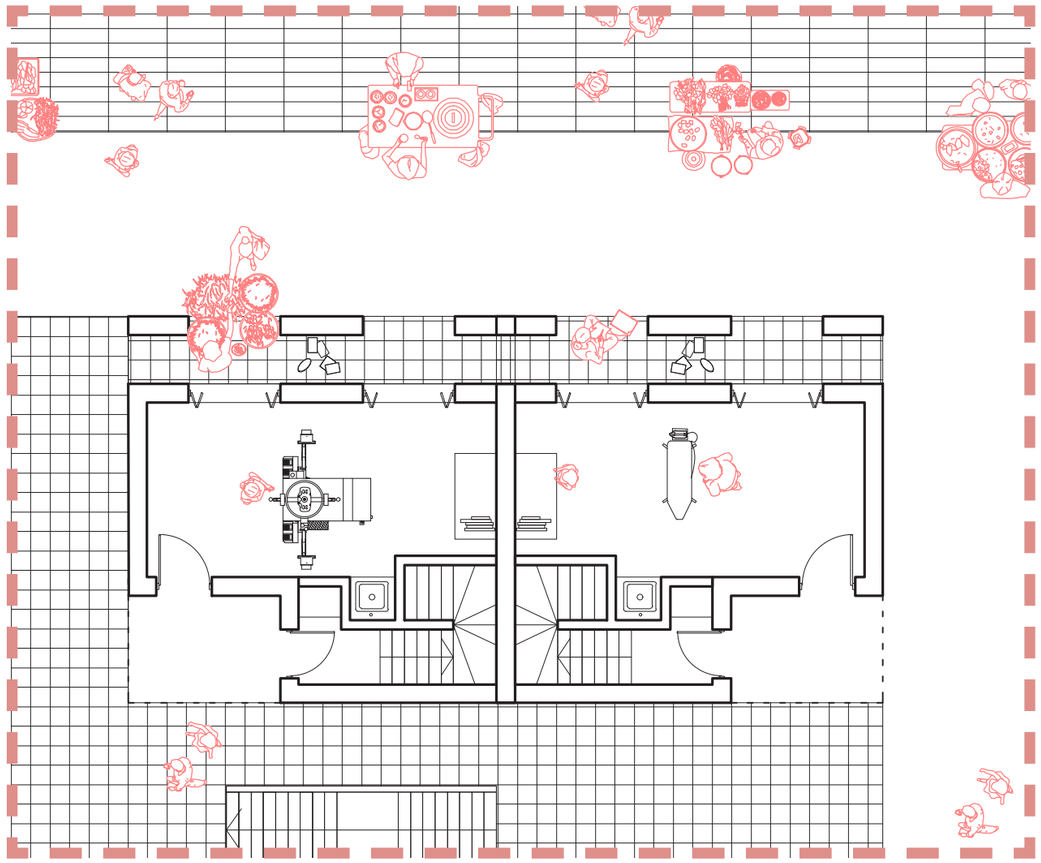
CLUSTER STRATEGY

LIG + MIG HOUSING TYPICAL GROUND FLOOR PLAN



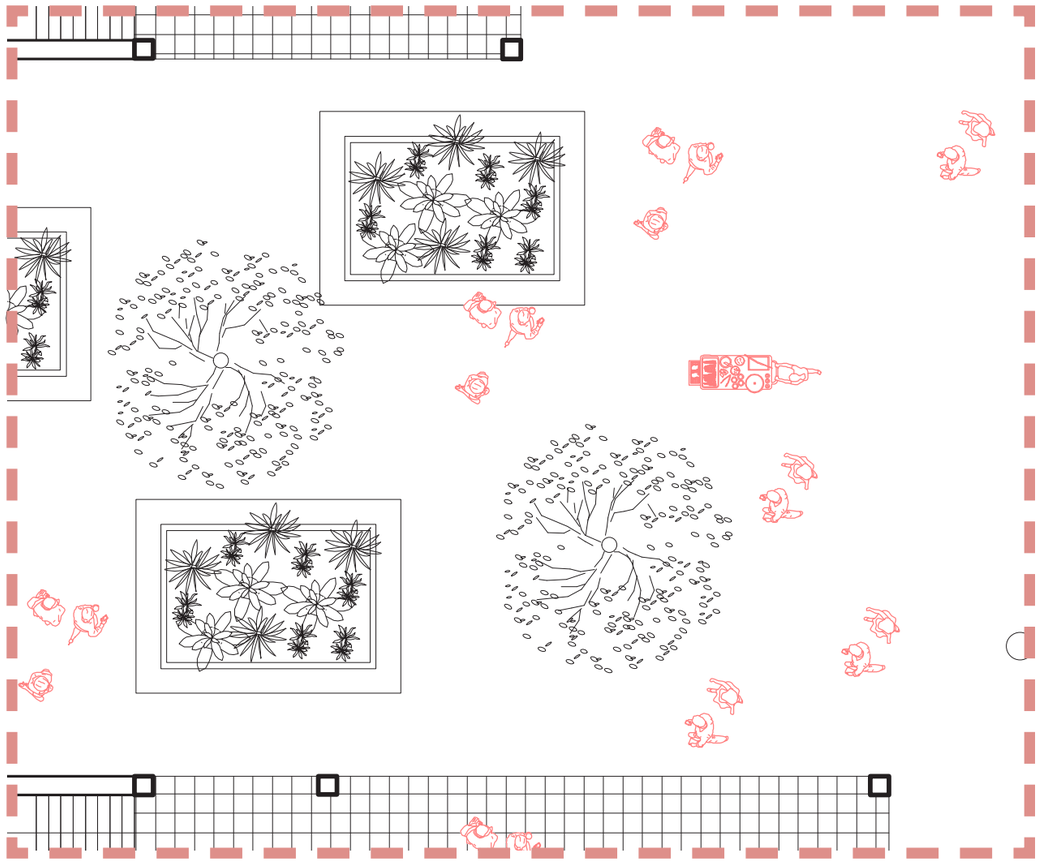
CLUSTER STRATEGY

COMMERCIAL ACTIVITIES SPILLING OUT ONTO COMMERCIAL LANE FROM LIVE-WORK UNITS



CLUSTER STRATEGY

SHARED COURTYARD SPACE BETWEEN LIG + MIG HOUSING BLOCKS

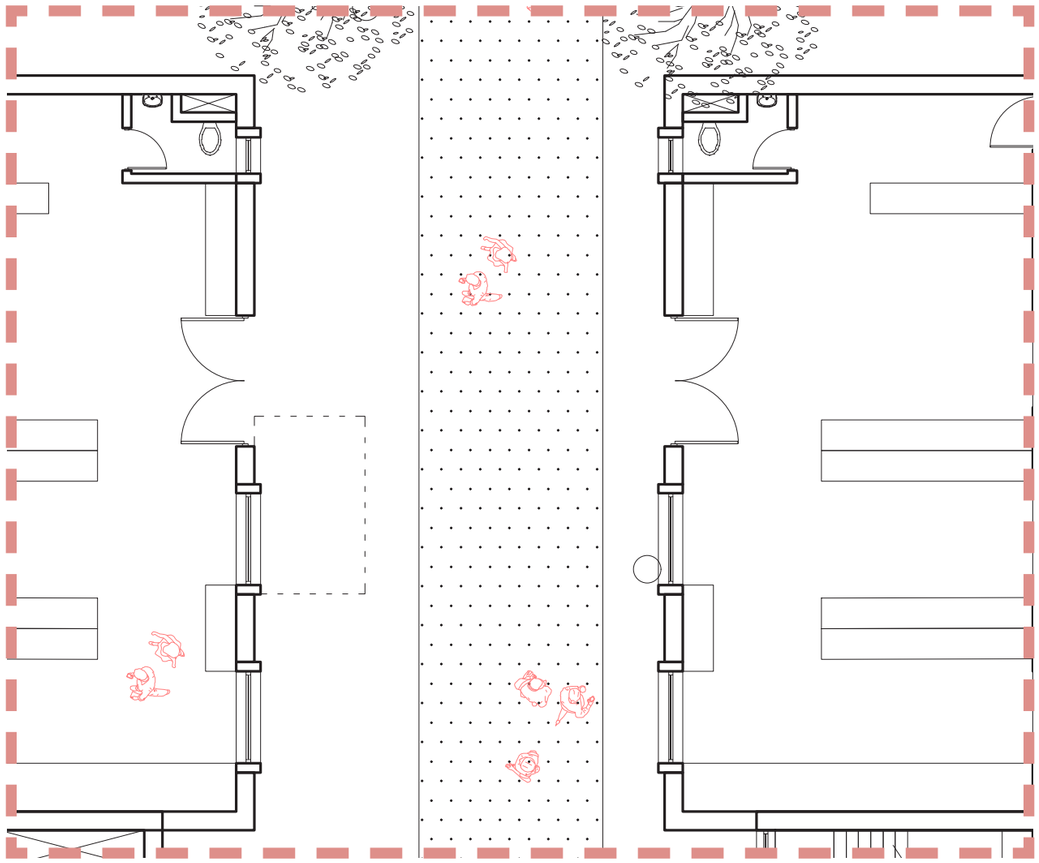


0 2m 4m 10m

1:100

CLUSTER STRATEGY

SPACIOUS STROLLING ACCESS BETWEEN MIG BLOCKS WITH OVERLOOKING BALCONIES



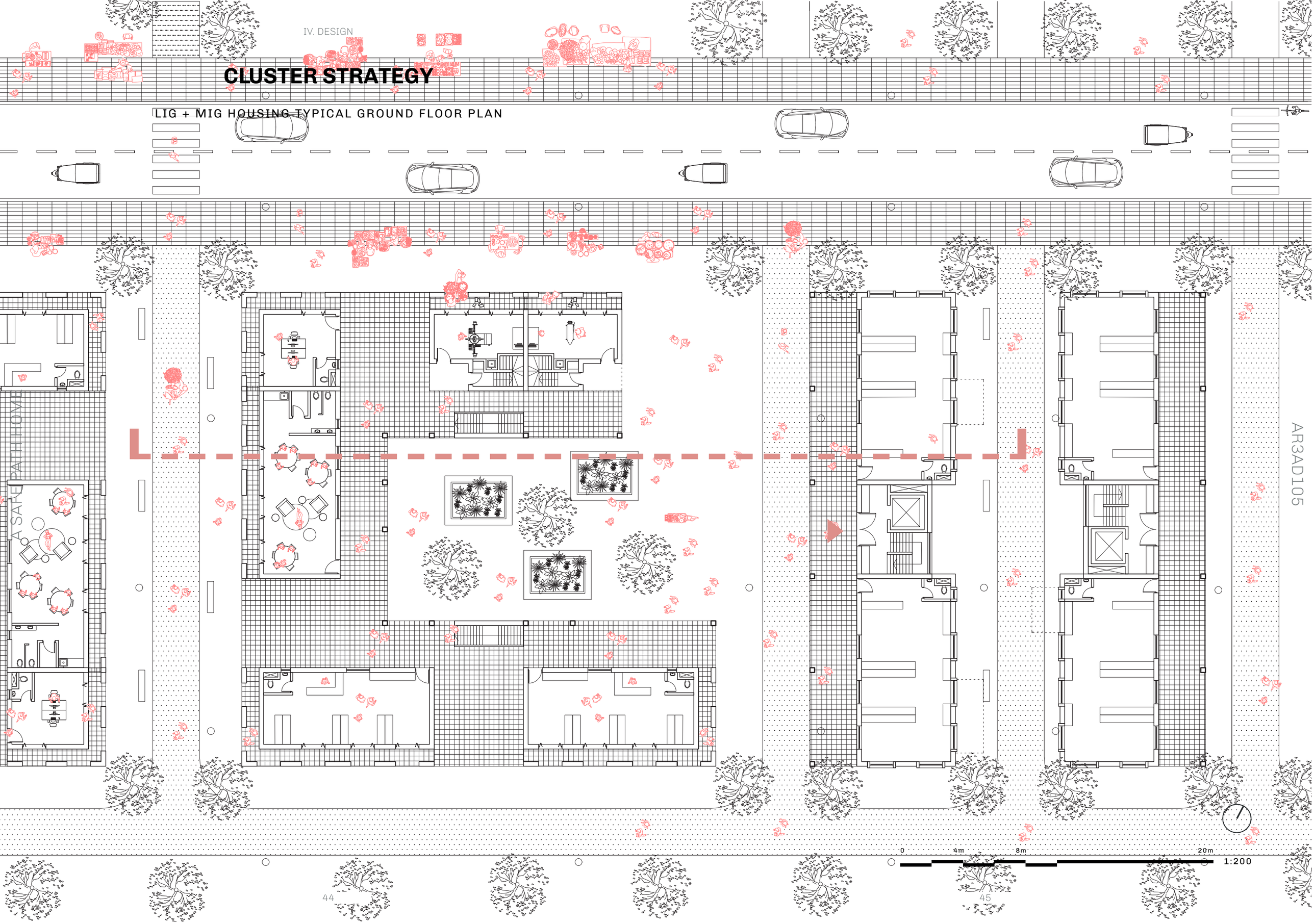


A SAFE PATH HOME

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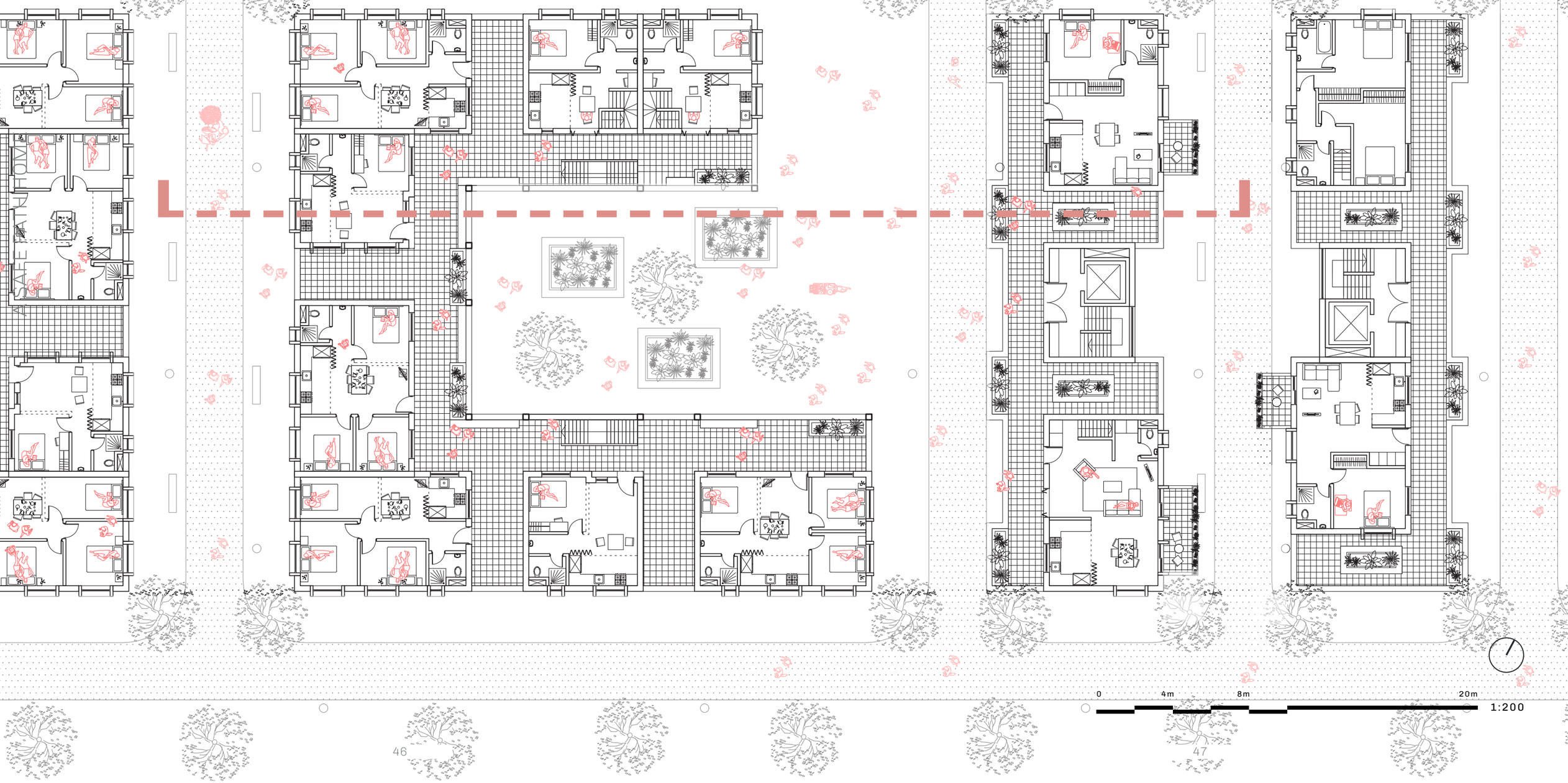
CLUSTER STRATEGY

LIG + MIG HOUSING TYPICAL GROUND FLOOR PLAN



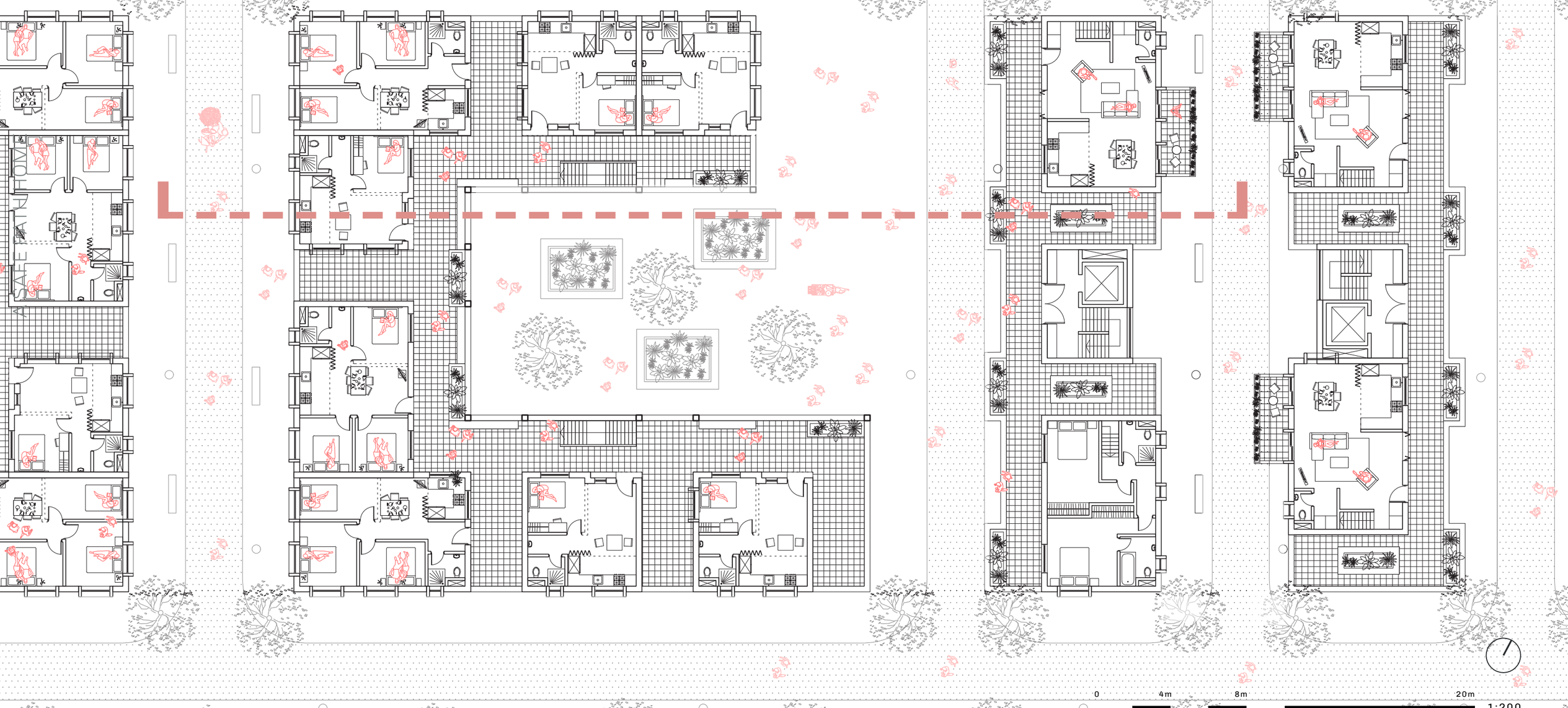
CLUSTER STRATEGY

LIG + MIG TYPICAL FIRST FLOOR PLAN



CLUSTER STRATEGY

LIG + MIG TYPICAL SECOND FLOOR PLAN



CLUSTER STRATEGY

LIG + MIG HOUSING SECTION



CLUSTER STRATEGY

LIG + MIG HOUSING ELEVATION



CLUSTER STRATEGY

LIG + MIG HOUSING SECTION



0 4m 8m 20m

1:200

CLUSTER STRATEGY

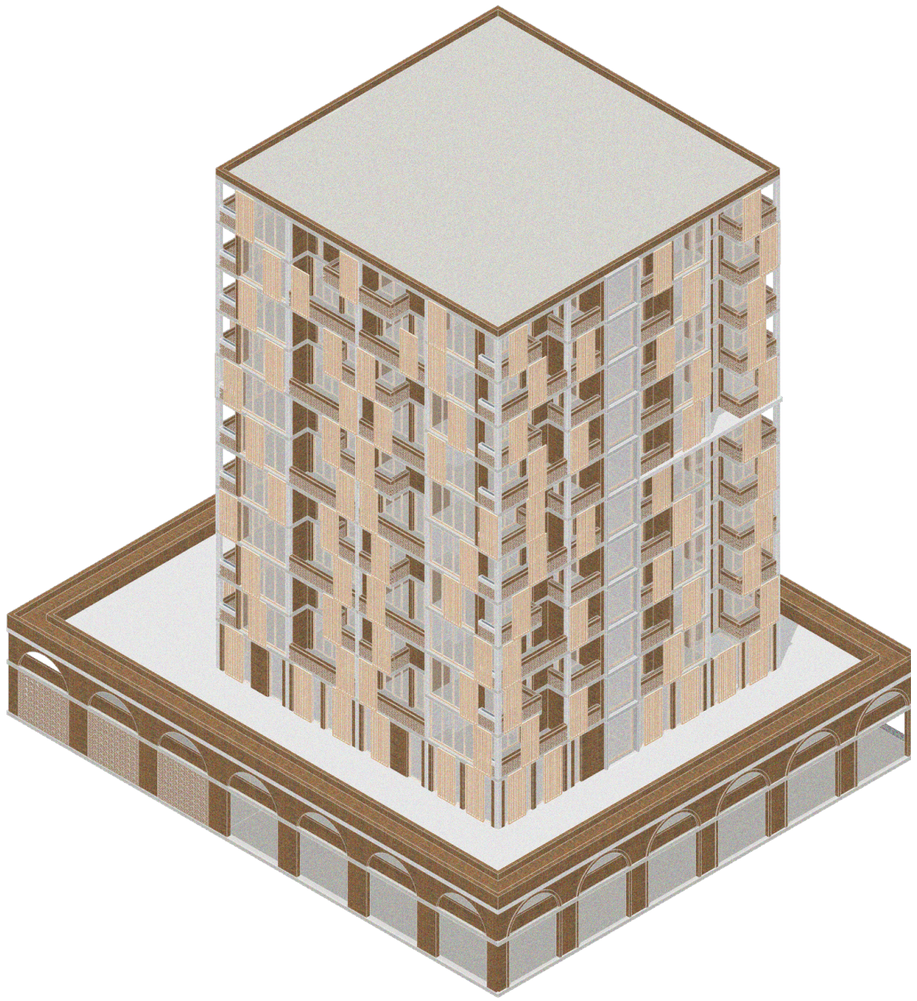
LIG + MIG HOUSING ELEVATION



0 4m 8m 20m 1:200

CLUSTER STRATEGY

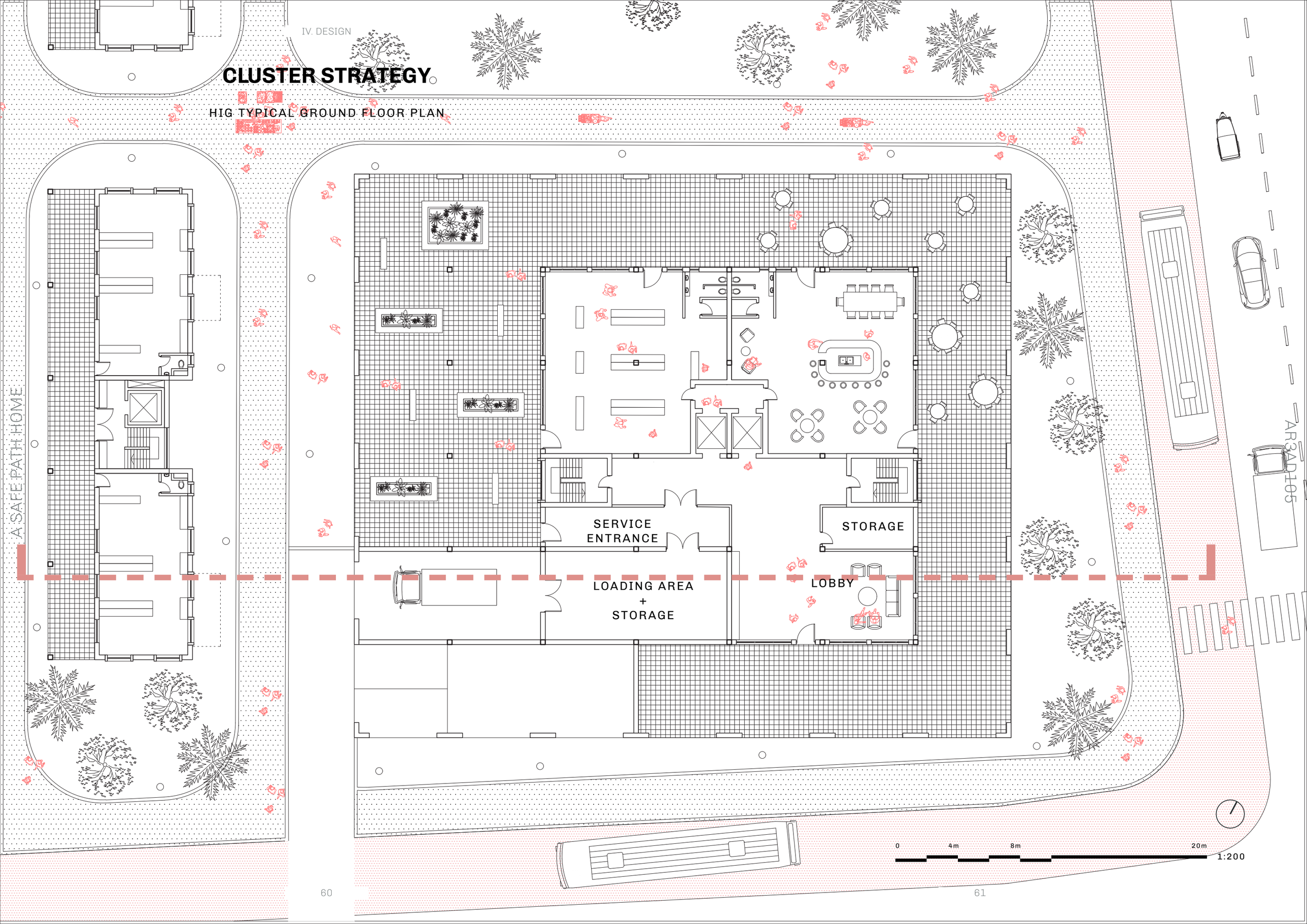
HIG HOUSING



COMPONENT C: HIG BLOCK
TOTAL DWELLINGS: 30
PARKING: 32

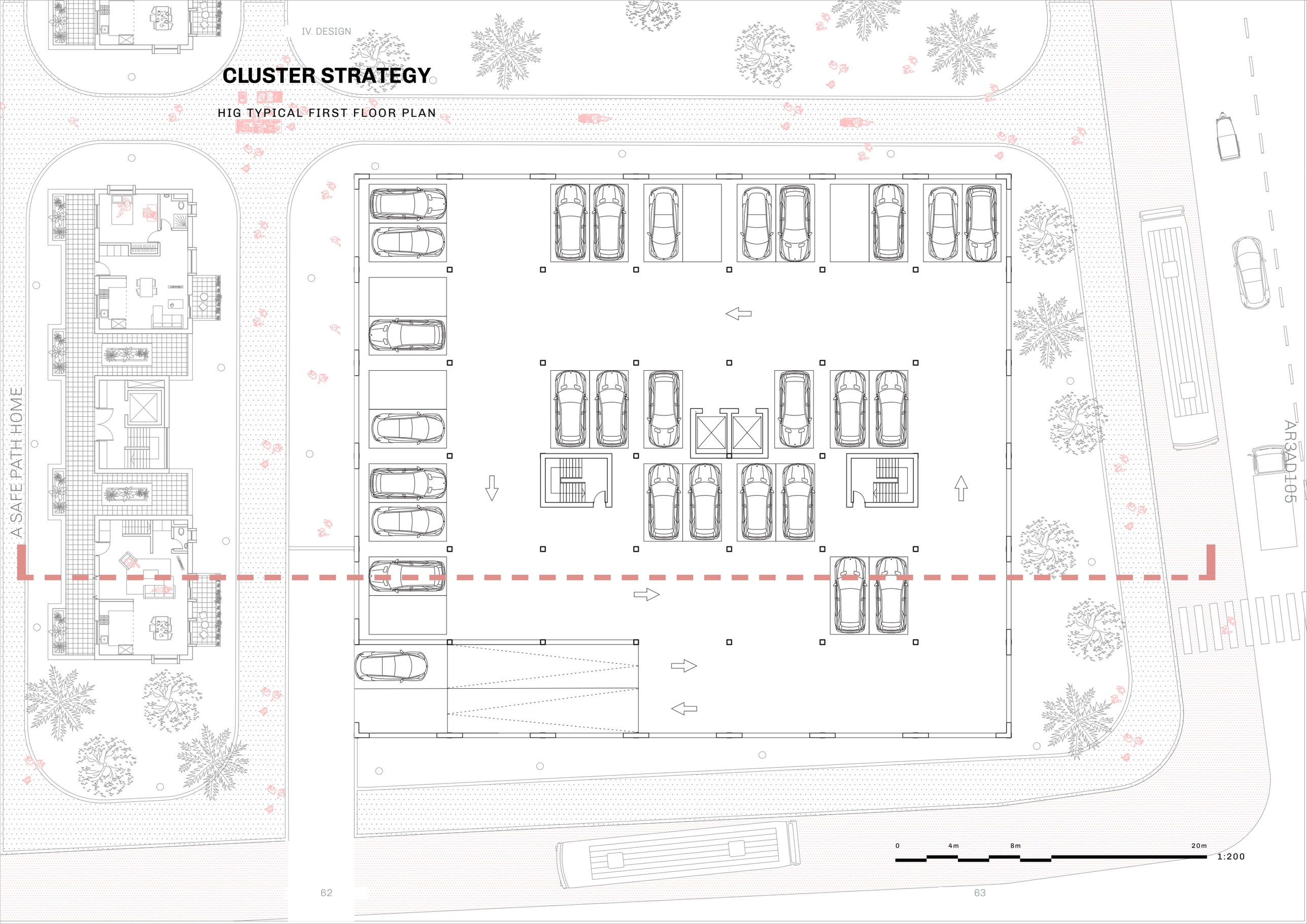
CLUSTER STRATEGY

HIG TYPICAL GROUND FLOOR PLAN



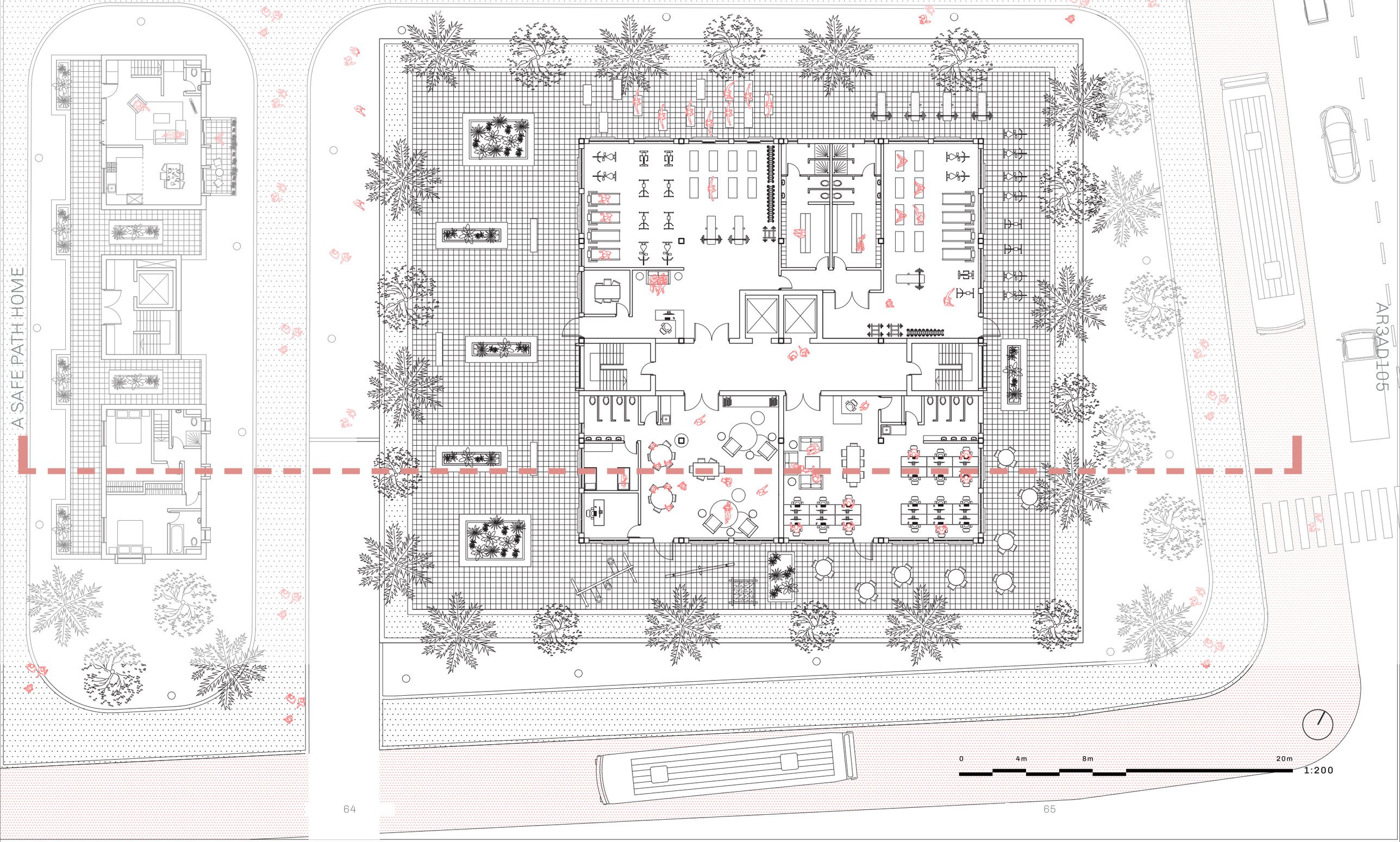
CLUSTER STRATEGY

HIG TYPICAL FIRST FLOOR PLAN



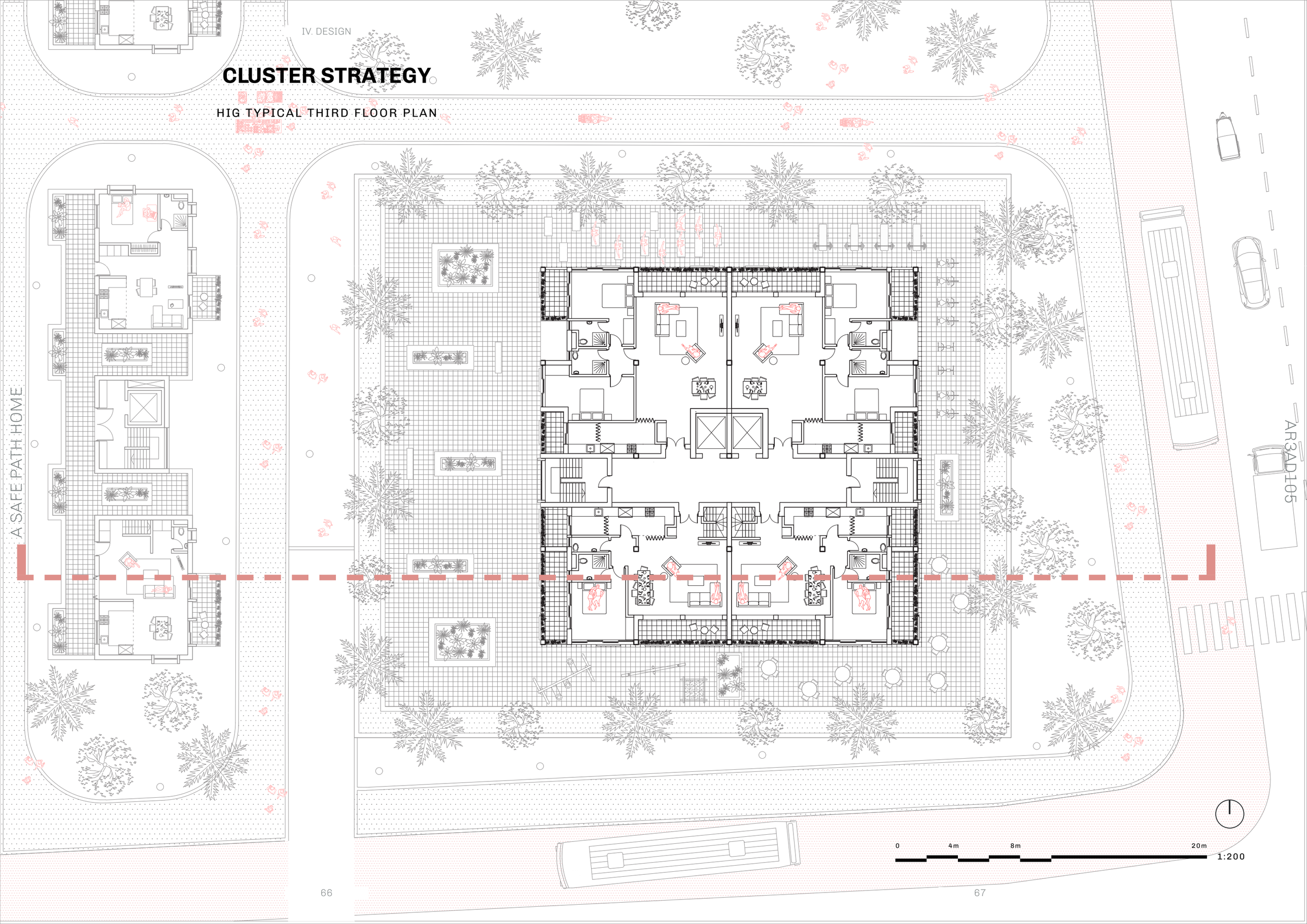
CLUSTER STRATEGY

HIG TYPICAL SECOND FLOOR PLAN



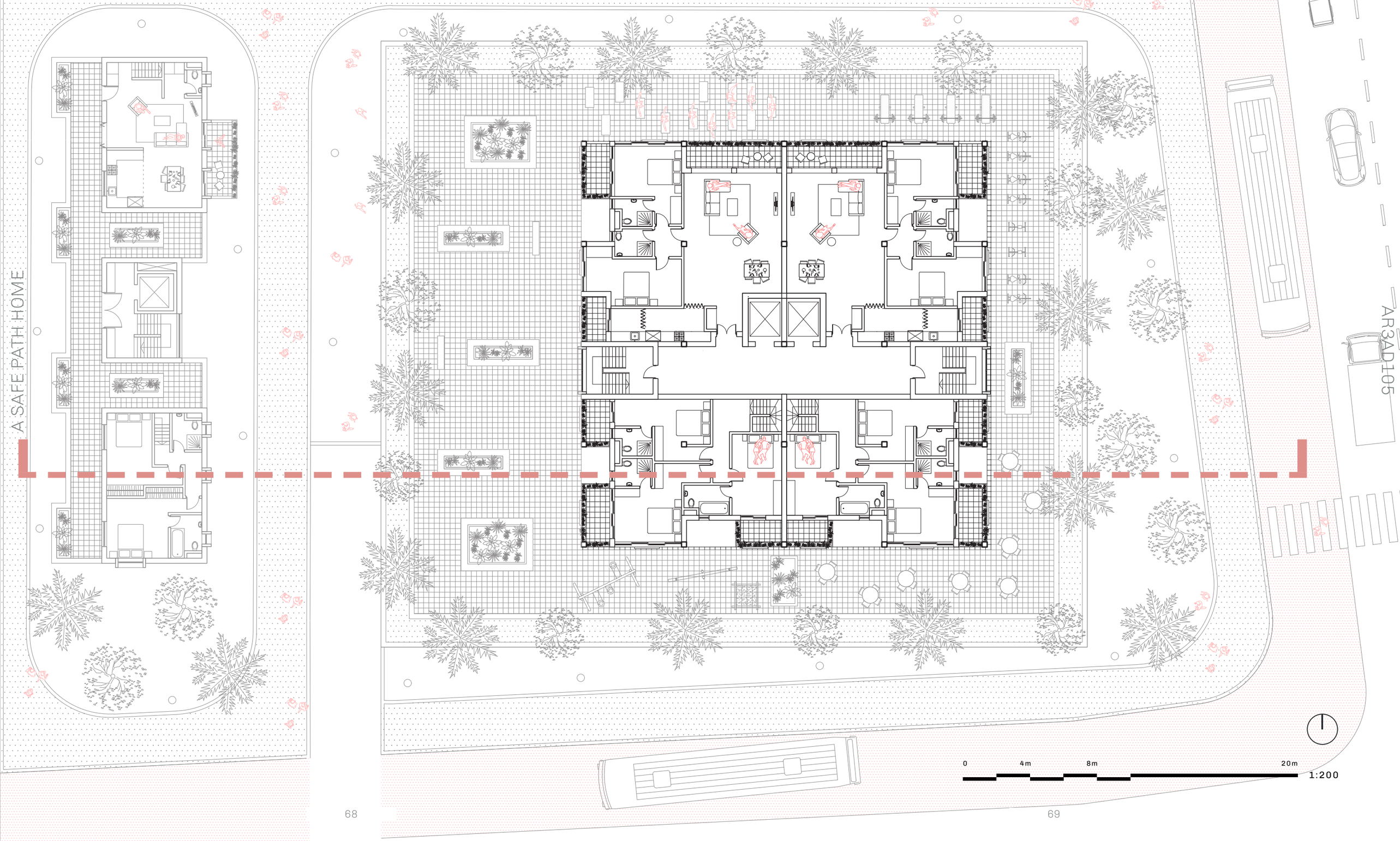
CLUSTER STRATEGY

HIG TYPICAL THIRD FLOOR PLAN



CLUSTER STRATEGY

HIG TYPICAL FOURTH FLOOR PLAN



CLUSTER STRATEGY

HIG HOUSING SECTION



CLUSTER STRATEGY

HIG HOUSING ELEVATION



CLUSTER STRATEGY

HIG HOUSING SECTION

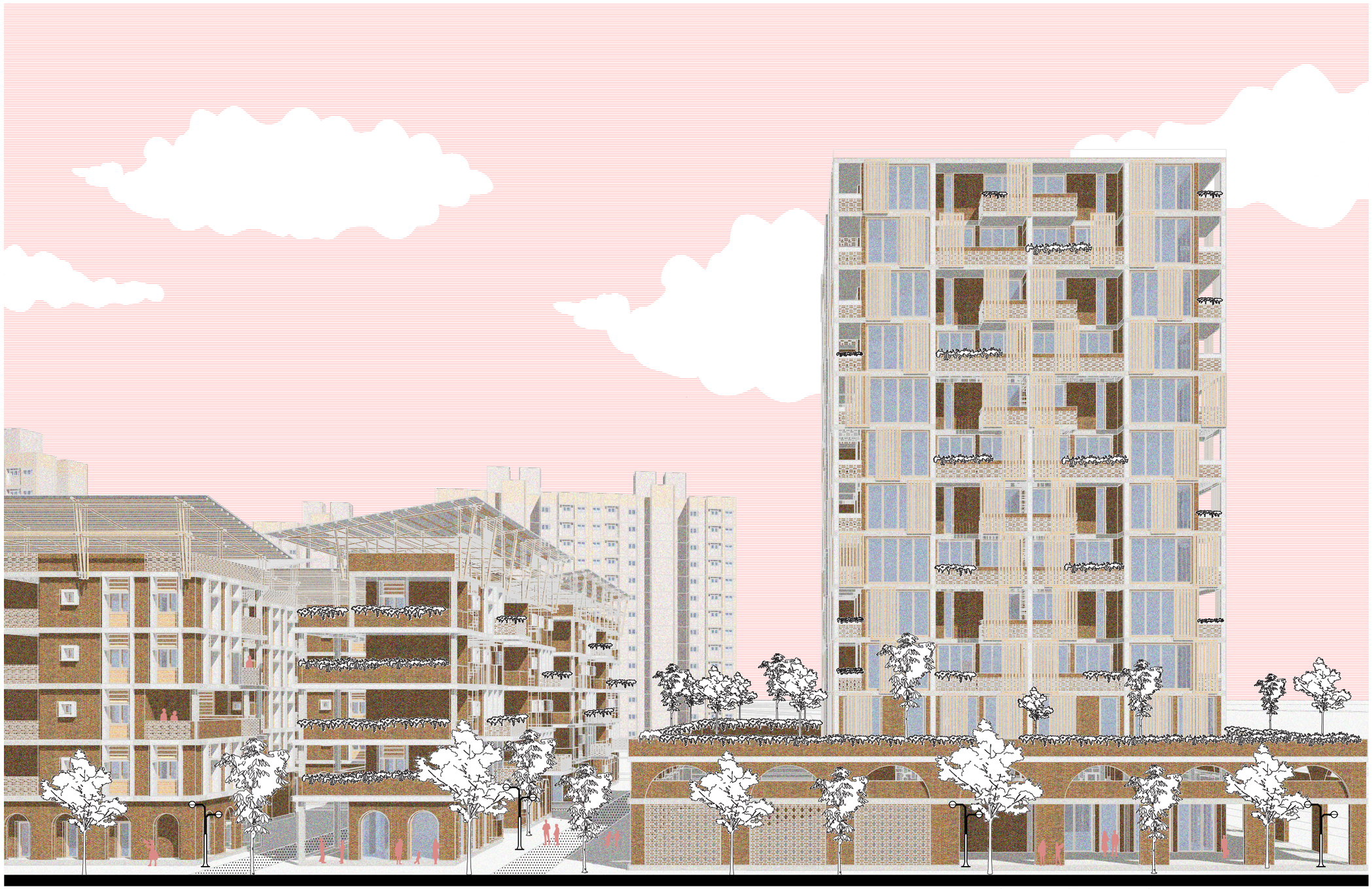


0 4m 8m 20m

1:200

CLUSTER STRATEGY

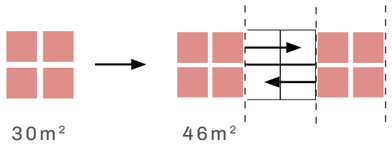
HIG HOUSING ELEVATION



UNIT STRATEGY

DWELLING UNIT NUMBERS

TYPE A: 1bed Studio - Incremental
Starter Home



TYPE B: 1bed Live + Work - Duplex
Home Based Worker



TYPE C: 3bed
Intergenerational Living/Co-housing



Household earnings per annum

Rs 25,000 - Rs 50,000

Area

Max around 60m²

Components

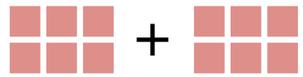
Necessities - bathroom, water + power supply

UNITS FOR LIG

TYPE A: 1bed
Starter Home



TYPE B: 2bed - Duplex
Family home



Household earnings per annum

Rs 50,000 - Rs 75,000

Area

MIGI - Max around 90m²
MIGII - Max around 10m²

Components

1/2/3BHK
Living room, dining room,
kitchen, bedrooms, master bedroom

UNITS FOR MIG

UNIT STRATEGY

DWELLING UNIT NUMBERS

TYPE A: 2bed
Family home



100m²

TYPE B: 4bed - Duplex
Family home



145m²

Household earnings per annum

Above Rs 75,000

Area

Anything above 60m²

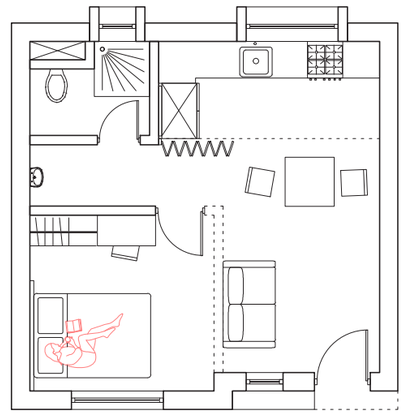
Components

2/3/4BHK
Living room, dining room,
kitchen, bedrooms,
master bedroom, balconies

UNITS FOR HIG

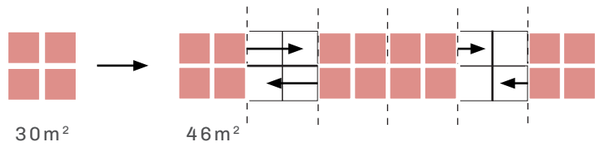
UNIT STRATEGY

UNITS FOR LIG



The starter home includes fixed seating on the deck to encourage community belonging similar to the concept of the 'otla' as well as a visual connection to the entire housing scheme.

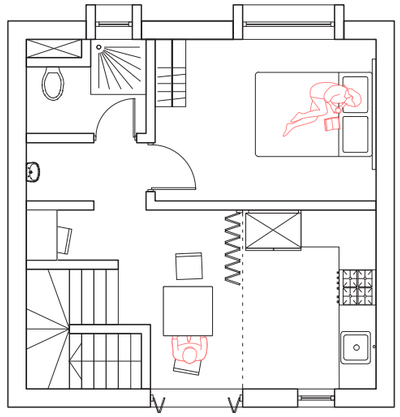
This unit is an incremental unit which can expand along with the owners aspirations.

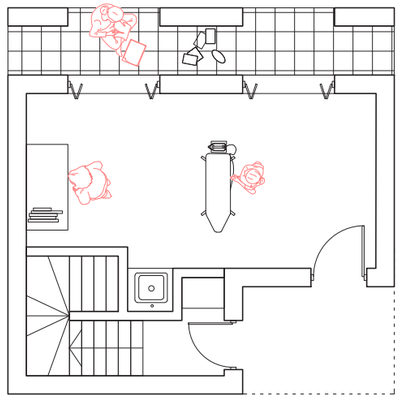


TYPE A: 1bed Studio - Incremental
Starter Home



2





1

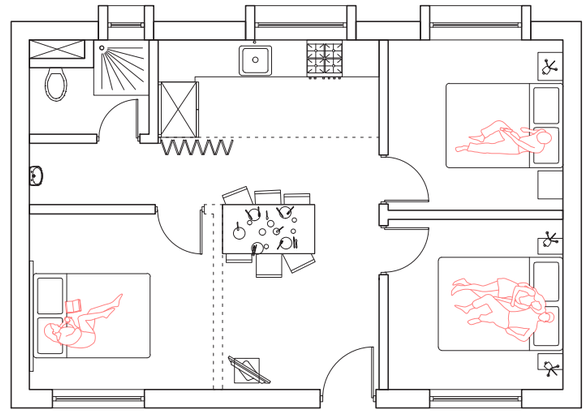
These units are connected to street level for self managed small businesses as well as informal businesses to flourish in the area and take advantage of the connection with the streetscape.

The facade in the front can be opened up and the veranda can be used as a direct selling point.



50m²

TYPE B: 1bed Live + Work - Duplex
Home Based Worker



It is often noted that extended family, live together. This typology accommodates for the whole family or a group of single women living together. There is also the option to open up the entire living space onto the shared gallery to encourage community living.

It is typical to separate the kitchen into a different room, therefore there is the option to put in sliding doors to close it off from the rest of the living space. The aim here is to confront the social construct of the woman being the private figure hidden away in the kitchen and therefore creating a more integrated space that serves several functions at once such as keeping an eye on the kids while doing kitchen chores.



46m²

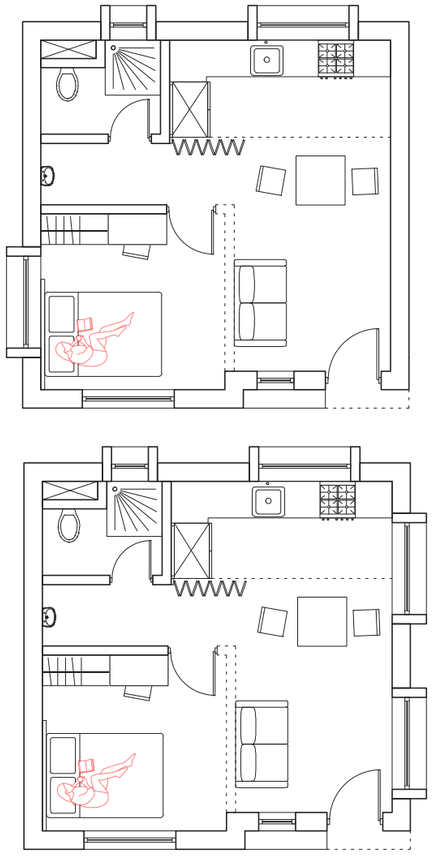
TYPE C: 3bed
Intergenerational Living/Co-housing



1:100

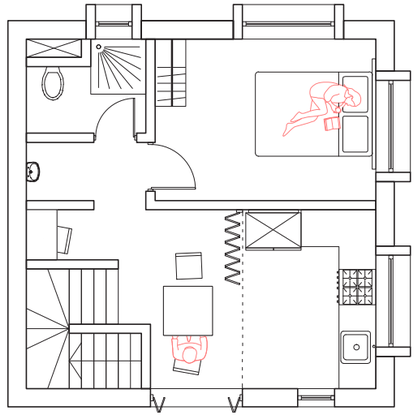
UNIT STRATEGY

UNITS FOR LIG - CORNER ALTERATIONS

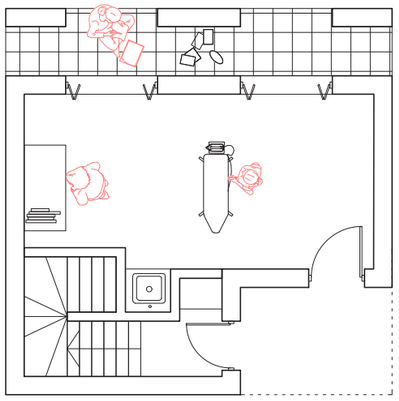


30m² → 46m²

TYPE A: 1bed Studio - Incremental
Starter Home



2



1

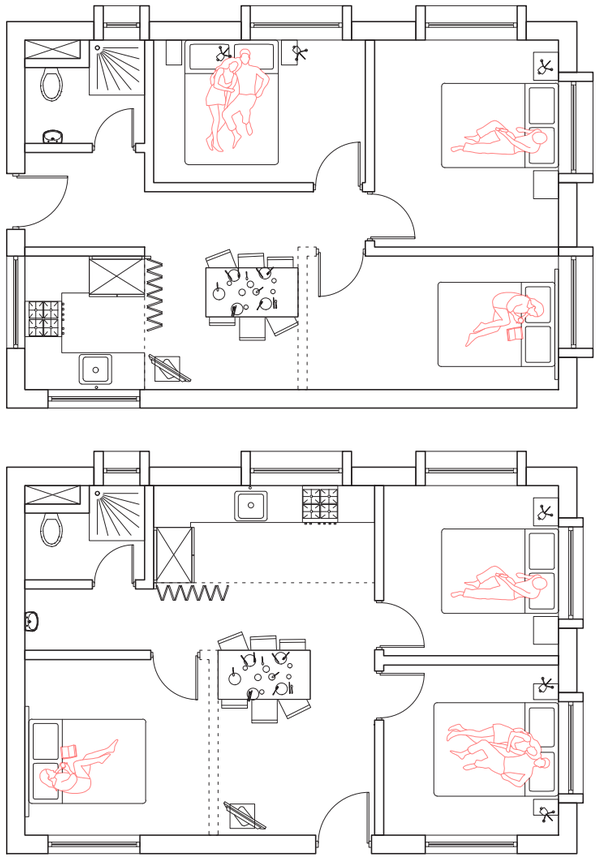
50m² + 50m²

TYPE B: 1bed Live + Work - Duplex
Home Based Worker

0 2m 4m 10m 1:100

UNIT STRATEGY

UNITS FOR LIG - CORNER ALTERATIONS



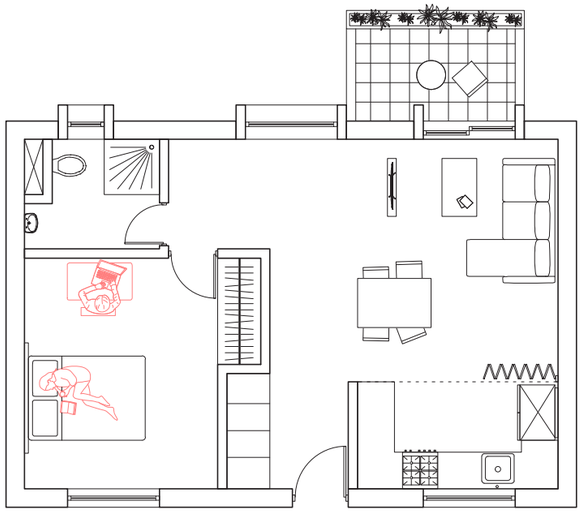
46m²

TYPE C: 3bed
Intergenerational Living/Co-housing

0 2m 4m 10m 1:100

UNIT STRATEGY

UNITS FOR MIG

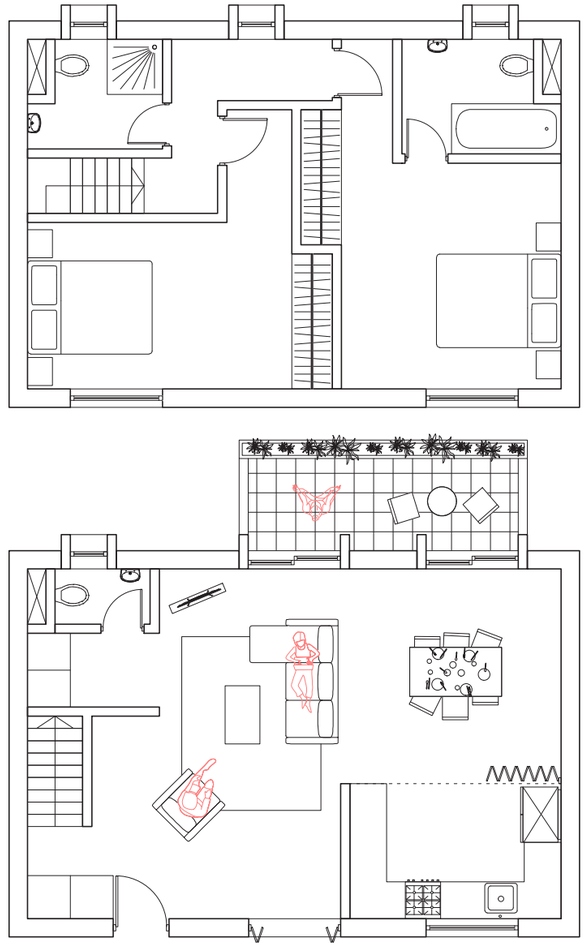


The starter home provides a lot of space for either a couple or a single person that wants a bit more space for themselves.

The balconies overlook the pedestrian streets in the neighbourhood for visual connection and safety and the access to the large front decks encourages social interaction within the block.

50m²

TYPE A: 1bed
Starter Home



2

1

This duplex typology allows for a more luxury lifestyle with larger than normal living spaces, an ensuite main bedroom and a large balcony overlooking the pedestrian street.

93m²

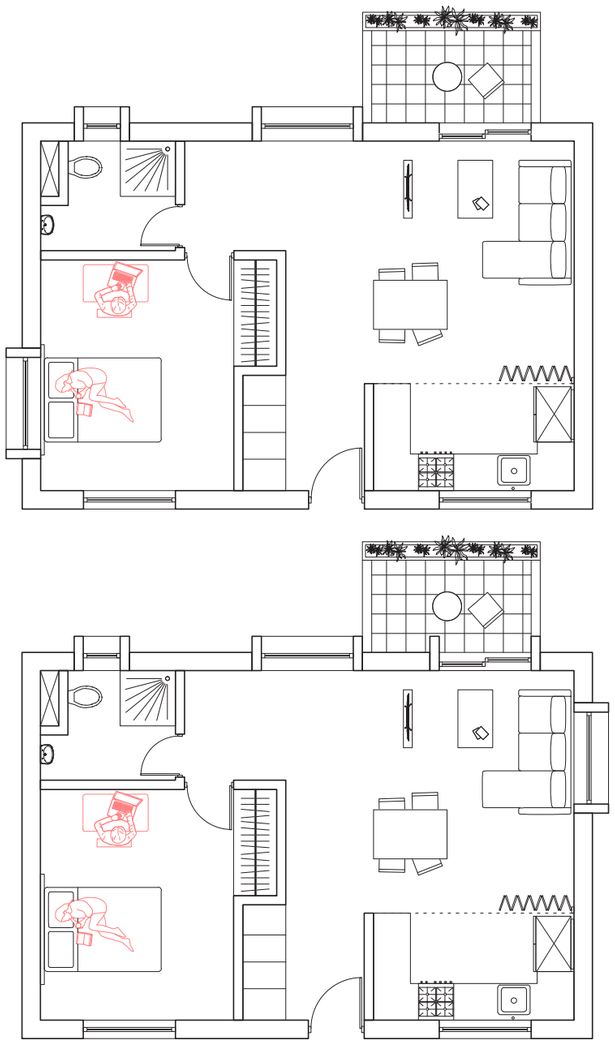
TYPE B: 2bed - Duplex
Family home

0 2m 4m 10m

1:100

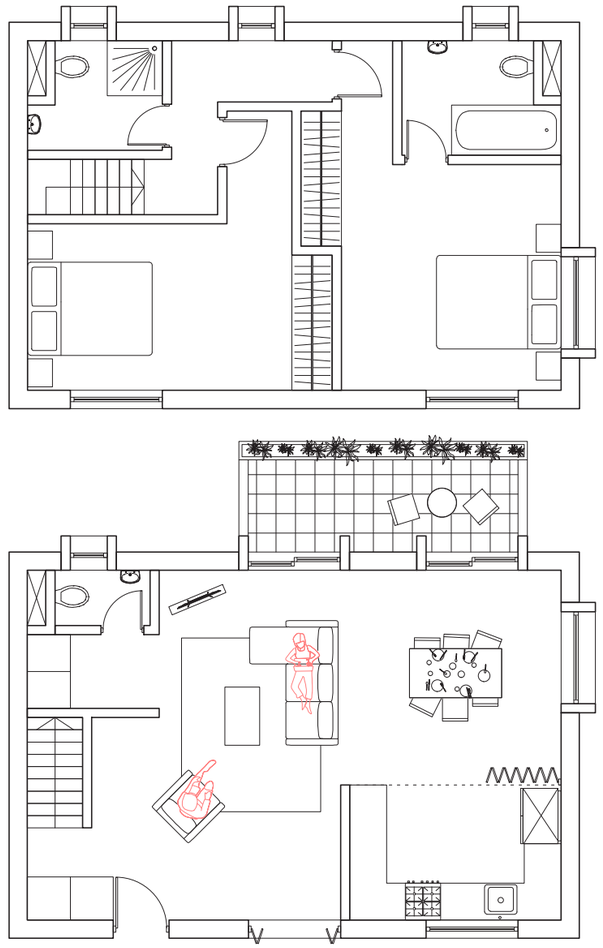
UNIT STRATEGY

UNITS FOR MIG - CORNER ALTERATIONS



50m²

TYPE A: 1bed
Starter Home



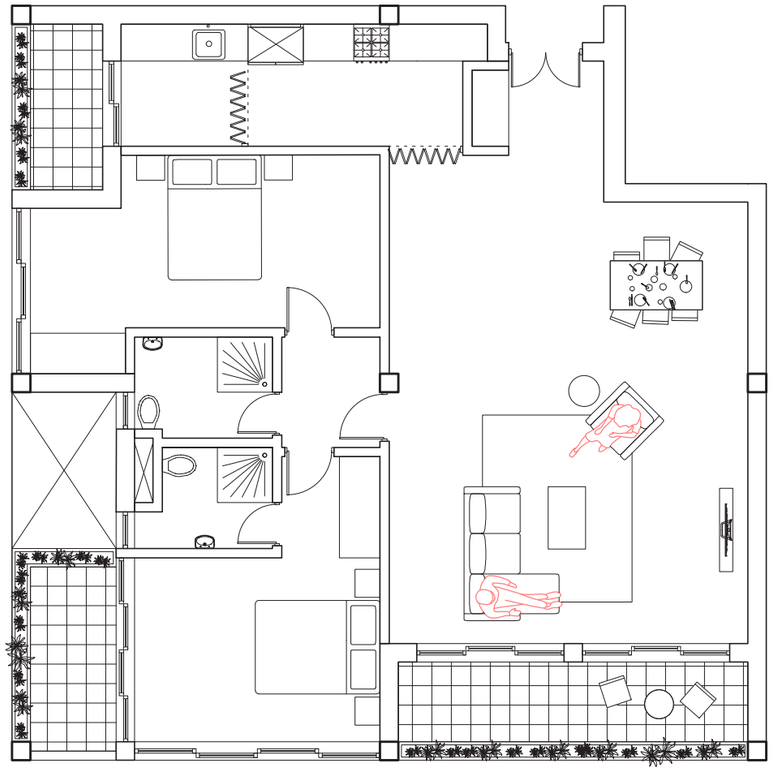
93m²

TYPE B: 2bed - Duplex
Family home

0 2m 4m 10m
1:100

UNIT STRATEGY

UNITS FOR HIG



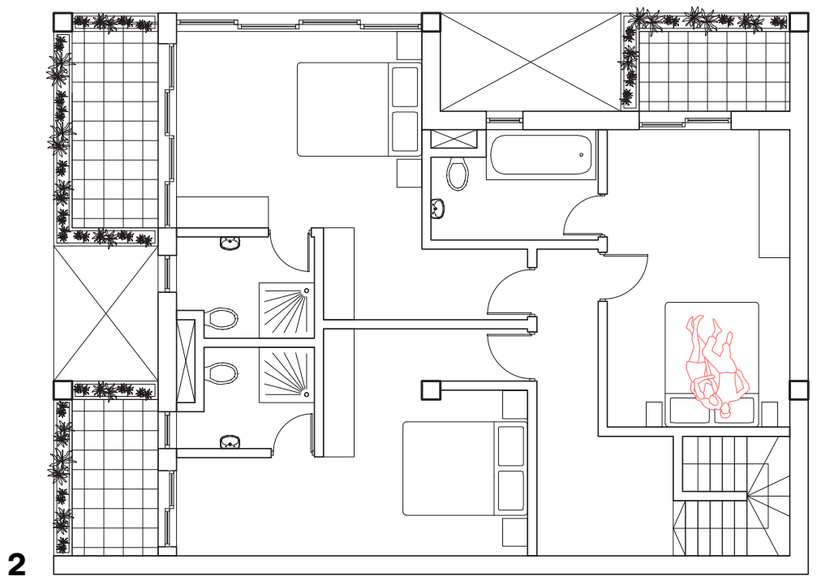
These 2 types of homes focus on providing for the aspirations and luxurious lifestyles of the HIG or even the MIGII. These homes provide large outdoor spaces connected to living spaces as well as private bedrooms allowing for panoramic views. The indented entrances create a more private welcome to the individual units.

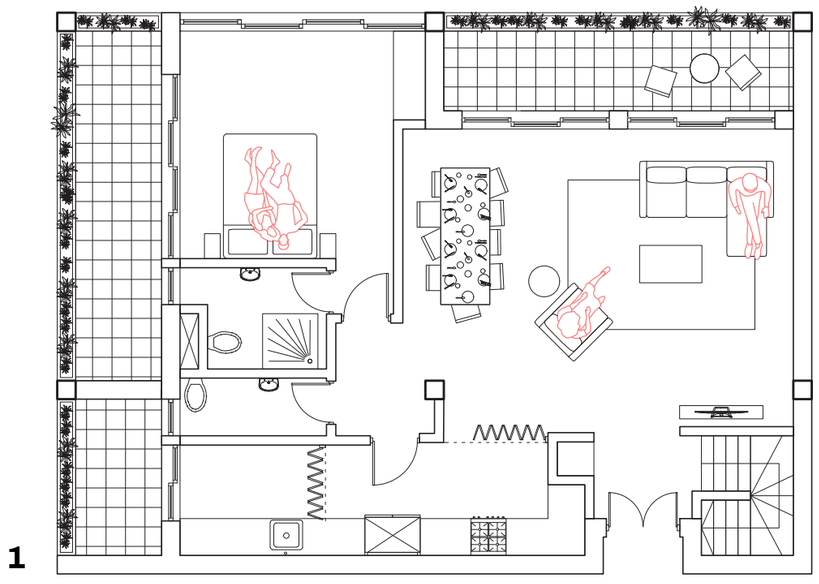
The kitchen is split up into wet and dry which is based on the traditional Indian cooking as well as lifestyle. The dry kitchen connects directly to the living space working better to bridge the whole family together as well as entertaining guests. The dry kitchen is usually located between the living room and wet kitchen as a functional requirement.

The wet kitchen connects to a private balcony for extra space in case cooking extends outside or even for an outdoor resting space for a house cleaner which is most commonly a woman from the LIG.

100m²

TYPE A: 2bed
Family home





135m²

TYPE B: 4bed - Duplex
Family home

0 2m 4m 10m
1:100

FUTURE POSSIBILITY

SHARED GALLERY



FUTURE POSSIBILITY

COURTYARD



FUTURE POSSIBILITY

ROOF



FUTURE POSSIBILITY

MANGROVE TRAIL



FUTURE POSSIBILITY

PEDESTRIAN LANE



FUTURE POSSIBILITY

MARKET



FUTURE POSSIBILITY

COMMERCIAL LANE



FUTURE POSSIBILITY

PUBLIC SQUARE



FUTURE POSSIBILITY

BUS STOP



FUTURE POSSIBILITY

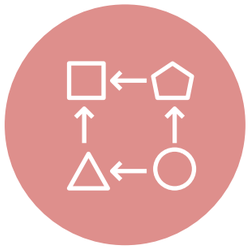
DOUBLE HEIGHT CONNECTION



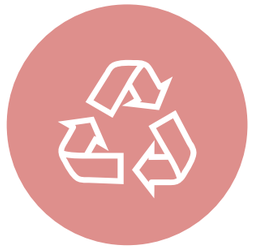
V. BUILDING TECHNOLOGY

KEY THEMES

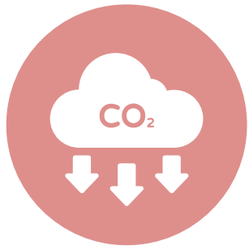
OVERALL OBJECTIVES FOR CONSTRUCTION + SUSTAINABILITY



FLEXIBILITY +
ADAPTABILITY



MINIMIZING
WASTE



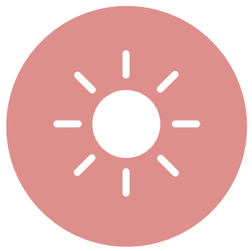
LOW CARBON
CONSTRUCTION



PASSIVE COOLING
SYSTEM



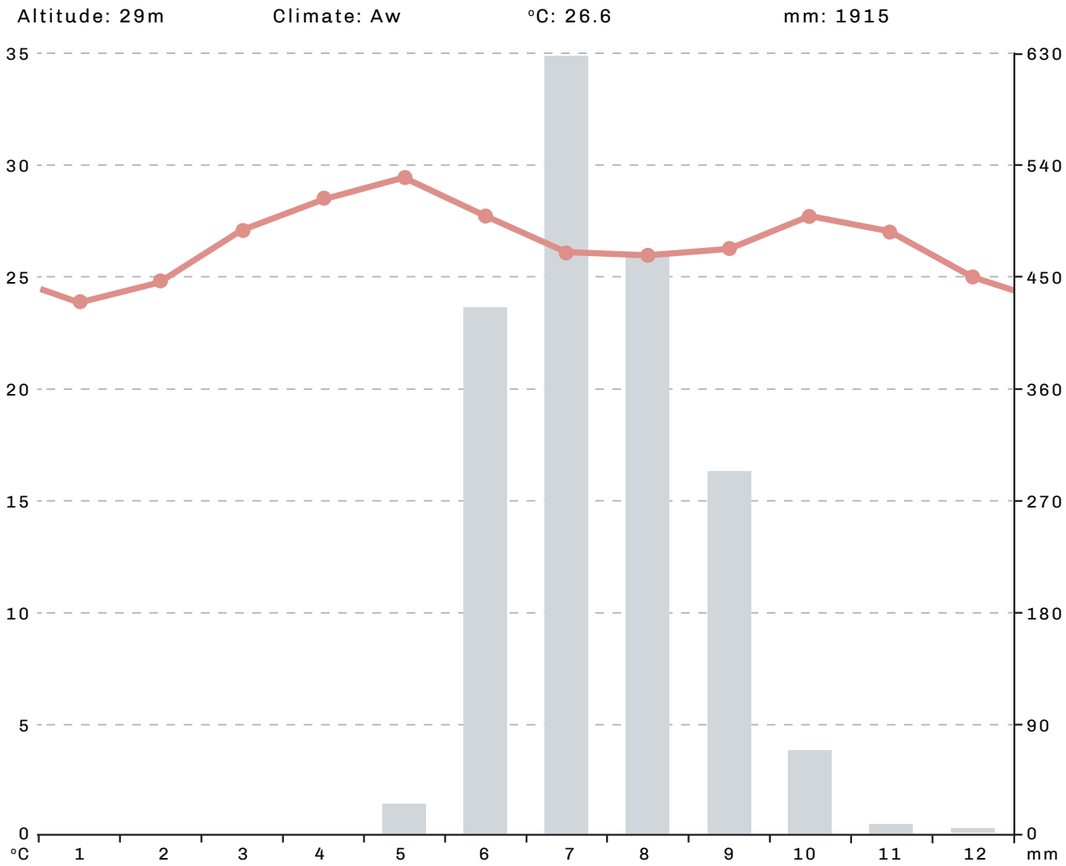
INCREASING
GREEN SPACES



SOLAR
DESIGN

CLIMATE ANALYSIS

GHANSOLI - NAVI MUMBAI

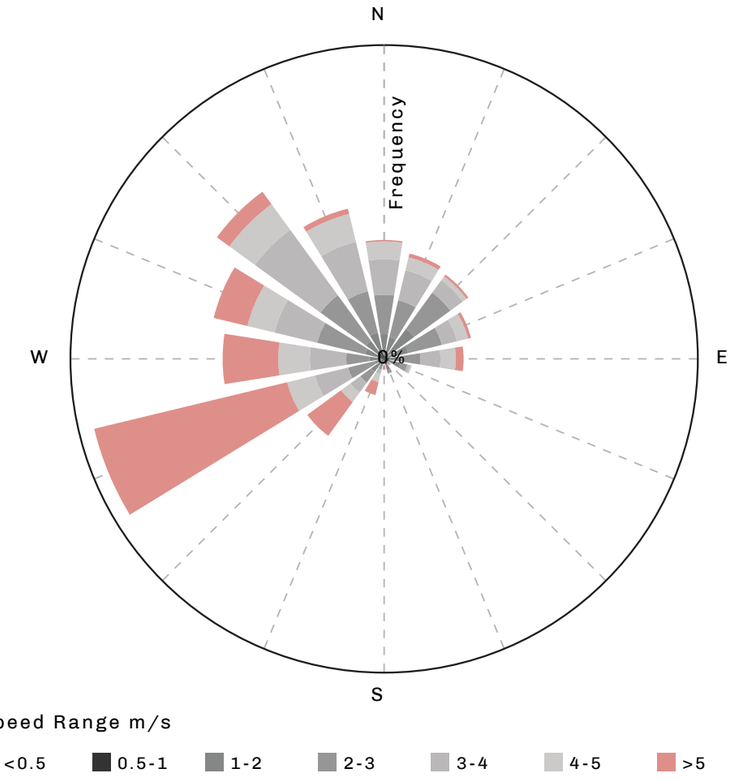


TEMPERATURE + PRECIPITATION

Ghansoli has a tropical climate with a short dry season in the winter months, having little effect on the overall climate. The most rainfall is experienced in the summer months, specifically in July, therefore the risk of flooding is a major factor to take into account.

The average temperature is 26.7°c and stays relatively constant throughout the year with a 5.5°c average difference. Day-to-night temperature swings are more important to keep in mind for comfortable internal environments.

Ghansoli experiences high levels of humidity with an average annual percentage of 71%. On average July is the most humid with January as the least humid month.

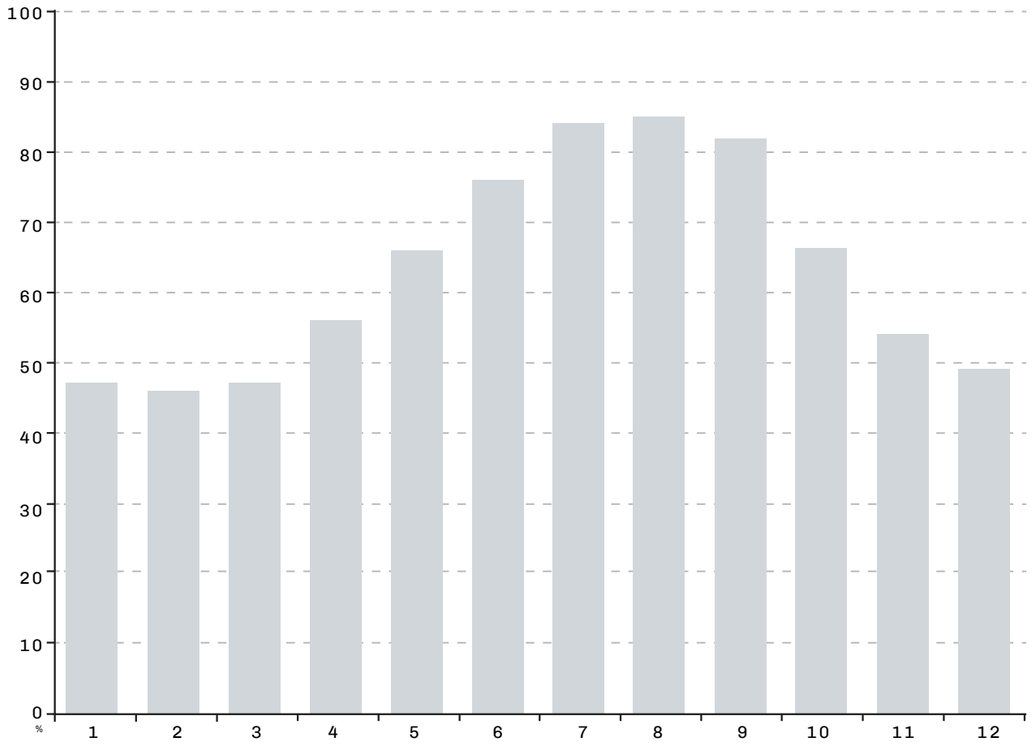


WIND ROSE

The prevailing wind direction in Ghansoli varies throughout the year but predominantly comes from the South West. The orientation of buildings are vital for as much natural ventilation to take place, reducing/eliminating the need for mechanical ventilation if the windows are well shaded and orientated to the prevailing wind direction.

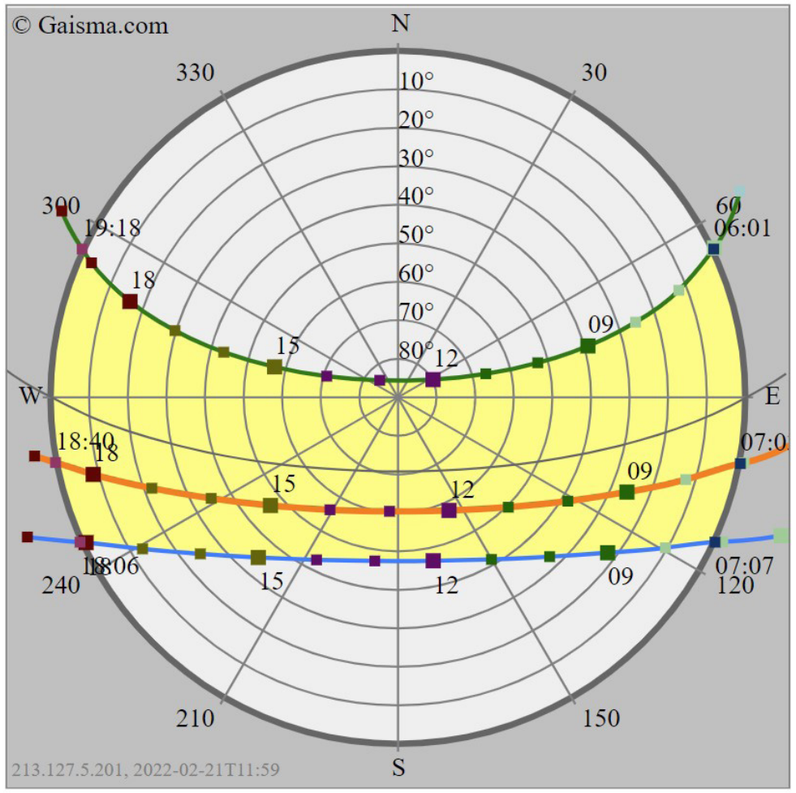
CLIMATE ANALYSIS

GHANSOLI - NAVI MUMBAI



HUMIDITY

Ghansoli experiences high levels of humidity with an average annual percentage of 71%. On average August is the most humid month with a percentage of 85%. Therefore, throughout the year, natural ventilation is necessary to cope with the high humidity levels.



SUN

In the summer months, protection from the sun is vital to reduce solar gain and therefore provide comfortable internal environments. Minimizing the use of glass on the west facing facade could tackle the issue of too much solar gain, using plants as a solar barrier can be effective as well as using light coloured materials and cool roofs with high emissivity.

CHARACTERISTICS OF AREA

TOPOGRAPHY



MANGROVES

The entire western part of the site is covered in dense mangroves. The mangroves are beneficial for the rainwater management of the area since they stabilize the coast line and reduce the chances of flooding. They also provide shelter for a range of wildlife species in the area, acting as a hub of biodiversity.

SOURCE:
https://www.hindustantimes.com/cities/others/1k-mangrove-trees-likely-to-be-cut-for-six-lane-bridge-at-navi-mumbai-101620588014615.html



SOIL TYPE

The soil in Ghansoli is mostly basalt soil which is a clay type that retains moisture. It becomes sticky in the rainy season and cracks when dry. It is also known as black soil or 'regur', best suited for the cultivation of cotton. The soil is rich in calcium carbonate, potash, lime and magnesium carbonate but has poor porous content.

MANGROVES

CURRENT STATE

According to environmental activists in Navi Mumbai, ever since CIDCO started to develop the satellite city in the 1970s there has not been any serious action taken by the authorities (such as CIDCO) to preserve and expand the natural environment, specifically in regards to the mangrove areas. The wetlands and mangrove protection committees have failed to resolved cases of eco damages due to non-compliance from various state departments, including CIDCO.

In recent years, construction waste has been dumped across the dense mangrove stretch bordering Ghansoli along the Thane-Vashi Creek with no action being taken against the perpetrators. The area is also known to attract migratory birds – unfortunately their numbers have declined due to the uncontrolled construction activities and dumping of debris.

In July 2021, the Indian Women Scientists Association (IWSA) in Navi Mumbai carried out a pilot project for the eco-restoration of mangroves. They planted mangrove saplings and aim to raise awareness.

Studies have shown that women play a critical role in managing natural resources on family and community levels and are more affected than men, by environmental degradation and natural disasters such as flooding.

Achieving gender equality and empowering women are critical components of managing climate change and creating a sustainable future.

Women therefore can act as effective agents of adaptation to climate change.

SOURCE:
https://www.mangroveactionproject.org/cbemr/tag/nature-trail/

https://timesofindia.indiatimes.com/city/navi-mumbai/navi-mumbai-wetlands-and-mangroves-panels-have-failed-committee-member-writes-to-chief/articleshow/90669456.cms

https://www.newsband.in/?p=14605

https://www.unep-wcmc.org/en/news/women-and-the-environment--25-years-on

https://opentextbc.ca/womenintheworld/chapter/chapter-11-women-and-the-environment/

http://eprints.lse.ac.uk/3040/1/Gendered_nature_of_natural_disasters_(LSERO).pdf











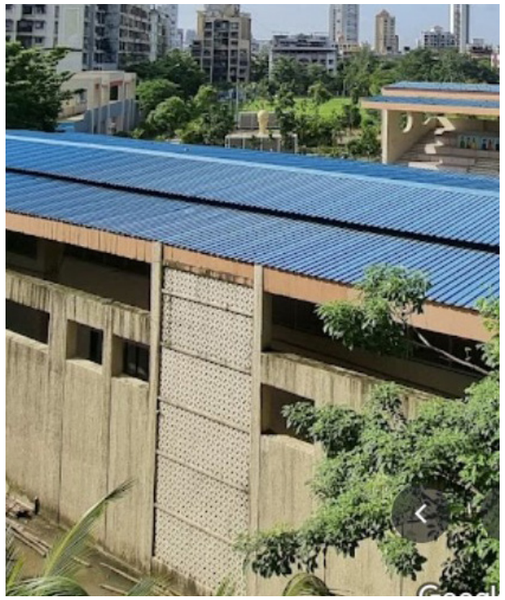






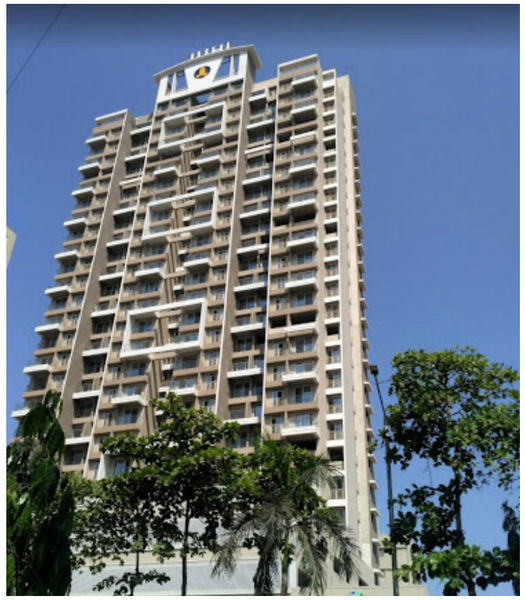
BUILDINGS IN THE AREA

GHANSOLI - NAVI MUMBAI



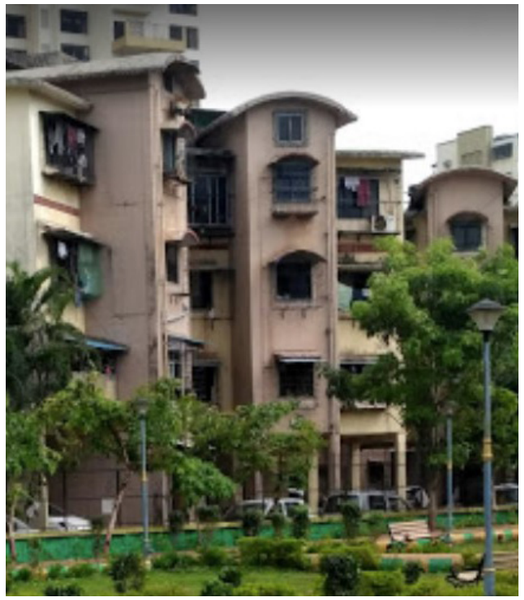






REINFORCED CONCRETE
CONCRETE BLOCKS
CLAY BRICKS









ARCHITECTURAL RESPONSES TO CLIMATE

INDIAN CONTEXT

CHHAJJAS/ PROTECTING EAVE

Chajjas are protective eaves over window and door openings to protect from the sun and rain. They may be sloping, horizontal or all encompassing providing protection all around. They contribute to the reduction of heat entering into the interiors. Sloping overhangs are often used to keep out the heavy monsoon rain.



CHARUPADDI/ VERANDAH

Traditionally verandahs were found at the entrance of the house to receive guests, providing protection from the sun and rain. These spaces were used as an extension of the house for various family activities and social interaction.



SLOPED ROOFS

In the Southern states of India, sloped roofs are built to drain the heavy monsoon rain. These roofs are often covered by terracotta tiles, stone tiles like slate or recently corrugated steel sheets as it is cheap and more readily available.

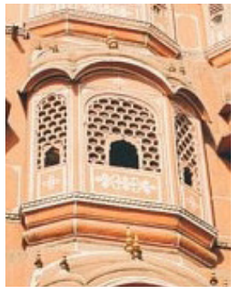


SOURCE:
https://www.thebetterindia.com/250122/ancient-ecofriendly-ideas-techniques-sustainable-homes-traditional-architecture-local-material-cost-india/

Hema Sankalia booklet - CEPT Archives

JALIS/ SCREEN

Lattice screens act as a secondary skin for ventilation, diffused light shade and privacy. These screens are used to let cool air in but keep out harsh sunlight and dust. Jalis are mostly used for privacy purposes in front of bathroom windows and on balconies.



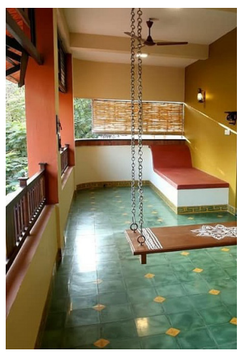
AANGANS/ COURTYARD

Courtyards were traditionally used in the architecture of Indian houses placed in the centre, binding all the functions together surrounded by a covered verandah. This method would provide enough light and ventilation into the house, maintaining thermal comfort. The courtyard is the most flexible place in the design as it is often used for family gatherings, cooking rituals, drying clothes and activities such as playing cricket.



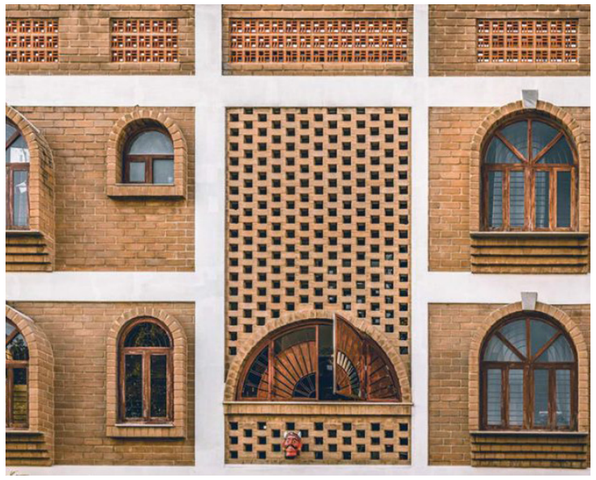
BAITHAKS/ BUILT IN FURNITURE

In traditional Indian homes, some of the furniture would be built in. Often seating would be built in at the front of the house on the verandah to connect people to nature and for the inhabitants to entertain guests. The built in furniture meant it was more durable than other types of wooden furniture, therefore saving on costs.

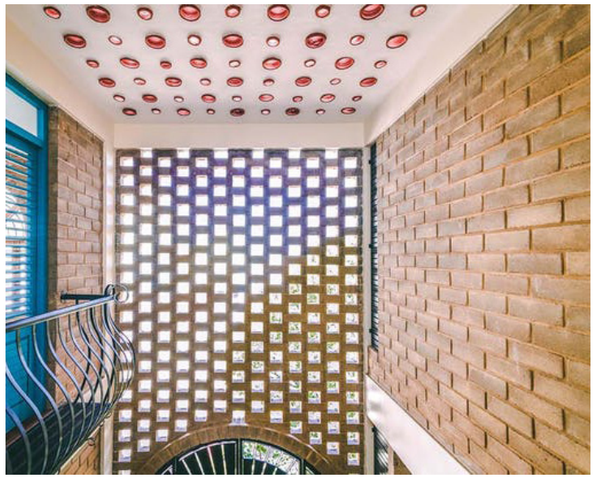


COMPRESSED (STABILISED) EARTH BLOCKS

STRUCTURE









SOURCE:
https://archinect.com/tropicresponses/project/kochar-s-house

http://www.earth-auroville.com/compressed_stabilised_earth_block_en.php

KOCHAR'S HOUSE

TROPICAL RESPONSES, BANGALORE, INDIA

Located in Bangalore, the challenge was to design something that would be suitable for a tropical climate. Durable and eco-friendly materials including: CSEBs, terra cotta, Jaisalmer stone and granite were used.

Earth when processed into compressed earth blocks create a natural and dense building material which prevents water seeping into the centre of the block.

CEBs are made of soil (clay+silt+sand), water and optionally a binder such as lime or cement. A binding material makes the brick more stable, especially regarding swelling and shrinkage. Depending on the nature of the soil, a resistance of up to 3MPa can be achieved.

The stabilization of the bricks allows for higher compressive strength and water resistance. If cement is used for stabilization, the blocks must be cured for 4 weeks. A soil cement stabilized mortar can be used to put the bricks together.

Cement stabilization is better for sandy soils and lime stabilization can be suitable for soils with high soil content. Since the soil on site has a high clay content, lime can be used but in turn will take a longer time to harden for the strengthening of the blocks. The soil with a high clay content should contain roughly 15% gravel, 30% sand, 20% silt and 35% clay. The lime added for stabilization should be between 2-10%.

Walls made up of CSEBs need a reinforced bond beam or a ring beam between floors. If they are not stabilized then they need a plaster finish - stucco/lime/cement. Stabilized bricks can be left exposed. Polycarbonate varnish is used often in tropical climates for extra water-resistance. Foundations footing need to be at least 25.4cm thick with a minimum width 33% more than the wall width.

COMPRESSED (STABILISED) EARTH BLOCKS

PROCESS

CSEBs will be used for the outer walls and CEBs will be used for the inner walls. 6% lime stabilization will be used. The chosen standard brick size 300, 150, 90mm with a 10mm mortar joint, weighing roughly 7kg so people can transport them at ease.

6 Production stages (240 blocks per day):

1. Digging + Sieving - 2-4 people
2. Measuring - 1 person
3. Mixing - 2 people
4. Pressing - 3 people
5. Initial curing and stacking - 1 person
6. Final curing + stacking - 2 people

Total people involved: 11-13 people

Organization of production:

-The block making yard will be located next to the site to reduce the transportation distance.
- A linear organization is the most effective way to set up the different stages.
- Since this technique is low-tech, people in the NaMIA can be involve in the construction work and therefore enhance a community feeling and create jobs for women and men.

Workshops:

-Before construction starts, workshops will be held for the people involved in the construction at the Community Centre.
- The workshops will be held for the CSEBs making and the bamboo roof elements.

SOURCE:
https://archinect.com/tropicresponses/project/kochar-s-house

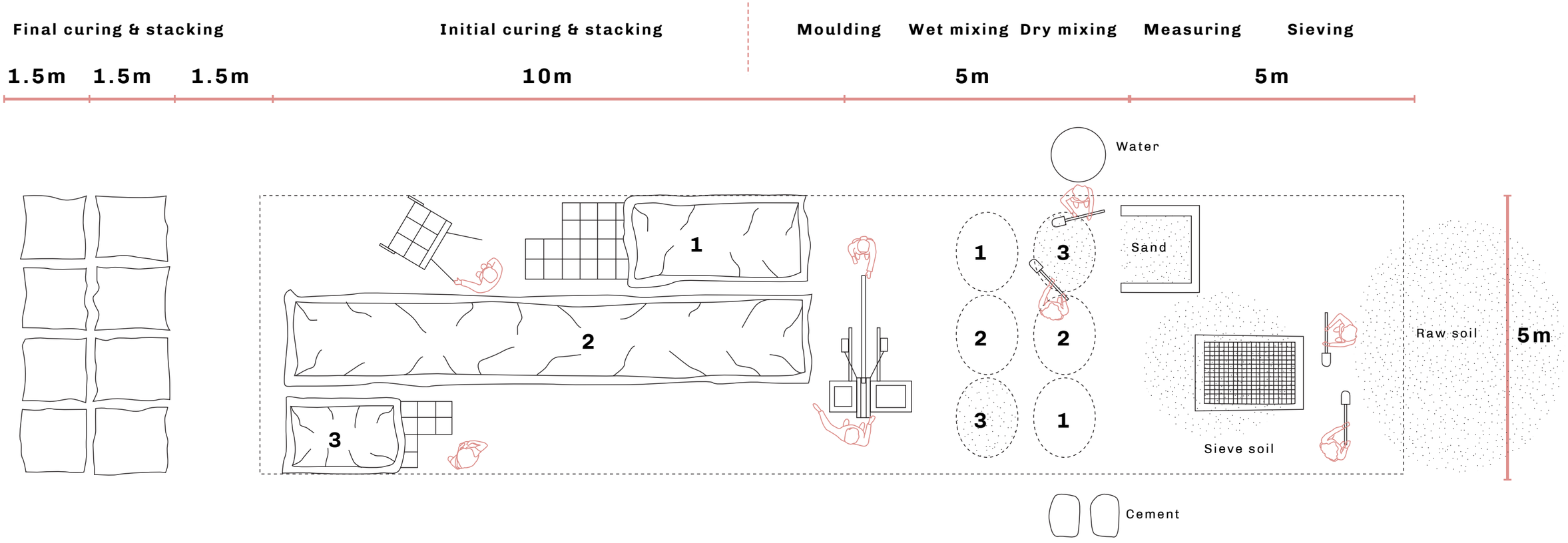
http://www.earth-auroville.com/compressed_stabilised_earth_block_en.php

Advantages:

- Locally sourced - on site
- Biodegradable
- Socially sustainable - job creation opportunity
- Low-tech technique - local community can be involved
- Inexpensive - 40% cheaper than clay fired bricks
- High thermal inertia - reducing heating/cooling costs 10-15%
- Fire resistant, sound proof + pest proof
- Reduces imports - materials and services
- Flexible production scale
- Low-embodied energy - 10.7 times less than fired clay brick
- Low carbon footprint - 12.5 times less than fired clay brick

COMPRESSED (STABILISED) EARTH BLOCKS

PROCESS



SOURCE:
https://archinect.com/tropicresponses/project/kochar-s-house

http://www.earth-auroville.com/compressed_stabilised_earth_block_en.php

EARTH CONSTRUCTION

STRUCTURE









SOURCE:
https://www.archdaily.com/960472/meethi-mishti-nu-mati-ghar-sferablu-architects-plus-naman-shah-architects

https://www.archdaily.com/790646/jetavan-sameep-padora-and-associates

JETAVAN SPIRITUAL CENTRE

SAMEEP PADORA & ASSOCIATES, INDIA

The architects worked closely with Hunnarshala, an institution looking to promote local building traditions and used rammed loadbearing walls of basalt stone dust. Re-purposed wood was used from old shipping vessels for the roof with clay roof tiles made from demolished buildings.

The main concept was to create a new image for what defines the local, using traditional building techniques and materiality appropriate for the context.

MEETHI-MISHTI NU MATI GHAR

SFERABLU ARCHITECTS + NAMAN SHAH ARCHITECTS, INDIA

The house was made to be ecofriendly with a focus on local materials and techniques, upcycling, recycling and ensuring a minimal carbon footprint.

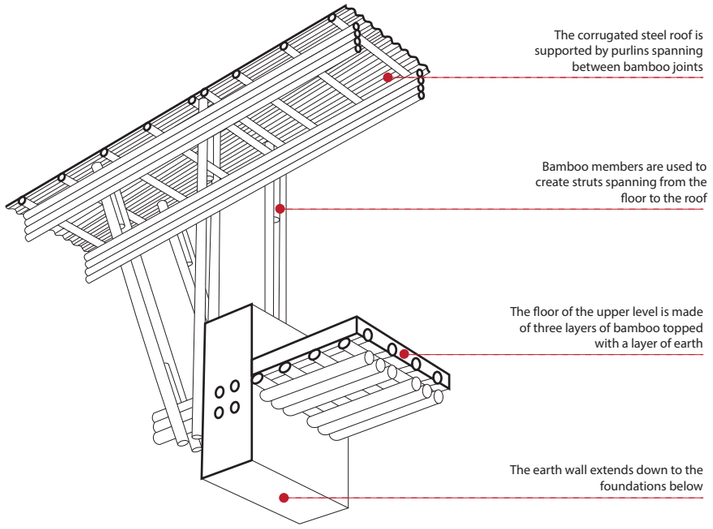
The house is made from the earth of the site with only 6-8% of the cement usually needed for normal construction. The structural walls are made from rammed earth excavated on site. Lime plaster is also used with a traditional recipe from the area.

Stone, brick, mud, wood and lime were the most widely used materials depending on their availability in a particular area in India. Earth is still used today for new builds either with the rammed earth technique and CEB.

The appeal of using earth is due to the low embodied energy since the earth can be directly retrieved from the site, therefore no transportation and intensive manufacturing needs to take place.

BAMBOO CONSTRUCTION

ROOF + REINFORCEMENT











SOURCE:
Architecture Anna Heringer. (2020). METI school. Geraadpleegd van http://www.anna-heringer.com/projects/meti-school-bangladesh/

https://www.thehindu.com/life-and-style/homes-and-gardens/why-bamboo-is-a-great-building-material/article24112886.ece#:~:text=India%20is%20the%20second%20largest,of%20bamboo%20in%20indigenous%20construction.&text=Some%20of%20the%20species%20including,Polymorpha%20are%20ideal%20for%20construction.

METI HANDMADE SCHOOL

ANNA HERINGER, RUDRAPUR, BANGLADESH

With the Meti school, bamboo was used for the light roof structure as well as window frames and shades.

Framework construction of four-layer bamboo beams and vertical and diagonal members arranged at right angles to the building with a corrugated steel sheet for used for the roof covering.

The bamboo slats are natural water repellents, while the corrugated steel roof allows water to disperse into the ground and be absorbed naturally. Additionally, overhanging bamboo elements slow down rainwater runoff and potential erosion.

Bamboo has been used for making traditional homes in the North-eastern states of India. Bamboo was suitable since it is lightweight so the houses were raised on stilts in the flood-prone area.

Bamboo grows in all parts of India apart from Kashmir with Maharashtra containing roughly 16,000km2 of forest area. India is the second largest producer of bamboo in the world and has a rich tradition of bamboo in indigenous construction. Due to its rapid growth cycle and accessibility in India, bamboo is very cheap.

It has a high strength to weight ratio and it is water resistant, therefore can be used for lightweight structures and fixtures such as roofs and window shutters.

Unfortunately, bamboo is not used to its highest potential in India due to the lack of research and the continuous use of conventional materials.

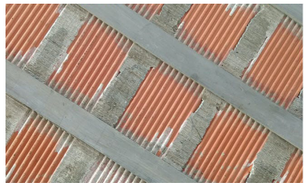
It is a good alternative to for steel reinforcement in concrete beams, floors and columns. Its tensile strength and compressive strength can provides good reinforcement. Although more work is needed for laminated bamboo, it is still cheaper and more accessible than normal wood.

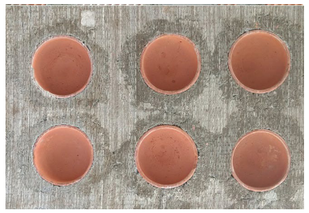
Bamboo will be used in the concrete beams and columns as reinforcement, for the light roof structure as well as laminated for window frames.

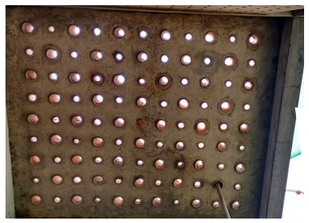
FILLER SLABS

FLOORS + CEILINGS



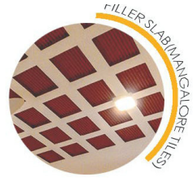


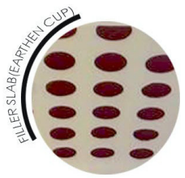












SOURCE:
https://archinect.com/tropicresponses/project/kochar-s-house

https://www.thebetterindia.com/250122/ancient-ecofriendly-ideas-techniques-sustainable-homes-traditional-architecture-local-material-cost-india/

KOCHAR'S HOUSE

TROPICAL RESPONSES, BANGALORE, INDIA

Located in Bangalore, the challenge was to design something that would be suitable for a tropical climate. Durable and eco-friendly materials including: CSEBs, terra cotta, Jaisalmer stone and granite were used. The main element of interest was the way the concrete slabs were used.

In 2019, India was the second largest producer of cement in the world. Housing and real estate are the biggest consumers of the material, accounting for over 60% of the domestic demand. Unfortunately it has a large carbon footprint and is the go to material used in construction in India.

Concrete slabs with light-weight and unreactive clay pots/ clay tiles can be used to substitute the concrete in the lower part of the slab. Different pots can be used since these pots are handmade meaning that the smaller pots can be used along the beams to create better connections at the joints. This technique is a traditional way of building in India with the aim of reducing the use of concrete and creating a more interesting ceiling.

Advantages:

- Can reduce concrete by 32% compared to RCC floor slabs and can save on cement and steel by about 40%
- Cost effective
- Reduces dead weight without compromising the strength
- Enhances internal thermal comfort due to the heat-resistant qualities of the filler materials and the air pocket between the filler materials
- Reduces total embodied energy

Filler materials:

- Earthen frustum
- Earthen cups
- Mangalore tiles
- Bricks
- Blocks
- Waste bottles

Concrete filler slabs with handmade clay pots will be used for the floors of the roof as well as the gallery spaces with thinner slabs as the weight is not necessary.

RECYCLED PLASTIC CORRUGATED ROOFING

ROOF









SOURCE:
https://saahaszerowaste.com/product/corrugated-poly-al-roofing-sheets/

https://www.thehindu.com/sci-tech/energy-and-environment/centre-announces-plastic-waste-recycling-targets/article36973023.ece#:~:text=As%20of%202019%2C%20about%20660%2C787.85,most%20are%20single%20use%20plastic.

https://www.recycle.green/products/waste-tetrapak-recycled-polyal-roofing-sheet-corrugated-3m-x-1m-6-mm

A study found in 2019 that around 660,787.85 tonnes of plastic waste is produced in India annually. 60% is reportedly recycled and nearly 43% is packaging material with a lot of single use plastic. Using recycled plastic for various building components is a smart way to re-use the unwanted waste instead of it piling up into a landfill.

The sheets are sustainably made by re-using Tetra Pak Cartons. These are crushed into small pieces and heated up and pressed into a mould - hot pressed.

Advantages:

- Light weight
- Water resistant + water proof
- Termite proof
- Rust Free - anti corrosion
- Excellent sound absorption - reduces patterning sound from the rain
- Cost effective
- Easy to maintain and clean
- Easy to install - simple and not labour intensive
- Reflects heat and keeps interior cooler by 3-4 degrees compared to galvanized steel sheets
- Durable - 15+ years

The roofing sheets come in a size of 3m by 1m with a 6mm thickness.

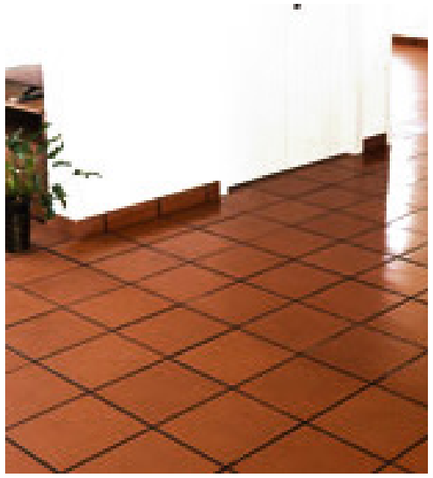
1 roofing sheet = 98kg of Tetra Pak diverted from a landfill.

Recycled plastic corrugated roofing will be used on top of the lightweight bamboo structure as an alternative to metal corrugated metal sheets which can contaminate rainwater.

TERRACOTTA TILES

FINISHINGS









SOURCE:
http://www.icctas.com/ceramic-tiles-industry-in-india.htm

India is the 3rd biggest producer of ceramic tiles in the world. The ceramic tile sector accounts for nearly 60% of the total industry proving the growth potential of this sector. This industry is highly indigenous due to the availability of the raw materials, technical skills and facilities. A study showed that over 550,000 people are employed in this sector with 50,000 people directly employed and the rest informally working. The potential of growth in this sector is huge considering the per capita consumption of tiles in India especially in popular housing projects.

Ceramic tiles are often used in Indian houses for the flooring, walls, worktops and bathrooms. Ceramic flooring works in every area of the house as they are good for keeping the space insulated. Terracotta tiles are commonly used to keep floors cool in summer and warm in winter.

Advantages:

- Durable - can last over 20 years
- Low-maintenance - easy to clean
- Water resistant - resisting high humidity
- Prevents growth of germs
- Job creation opportunities

Simple terracotta tiles can be found in 600x600mm with a width of 15-20mm with a gloss finish.

Ceramic tiles will be used on the floors and possibly some wall surfaces in the kitchen and bathroom.

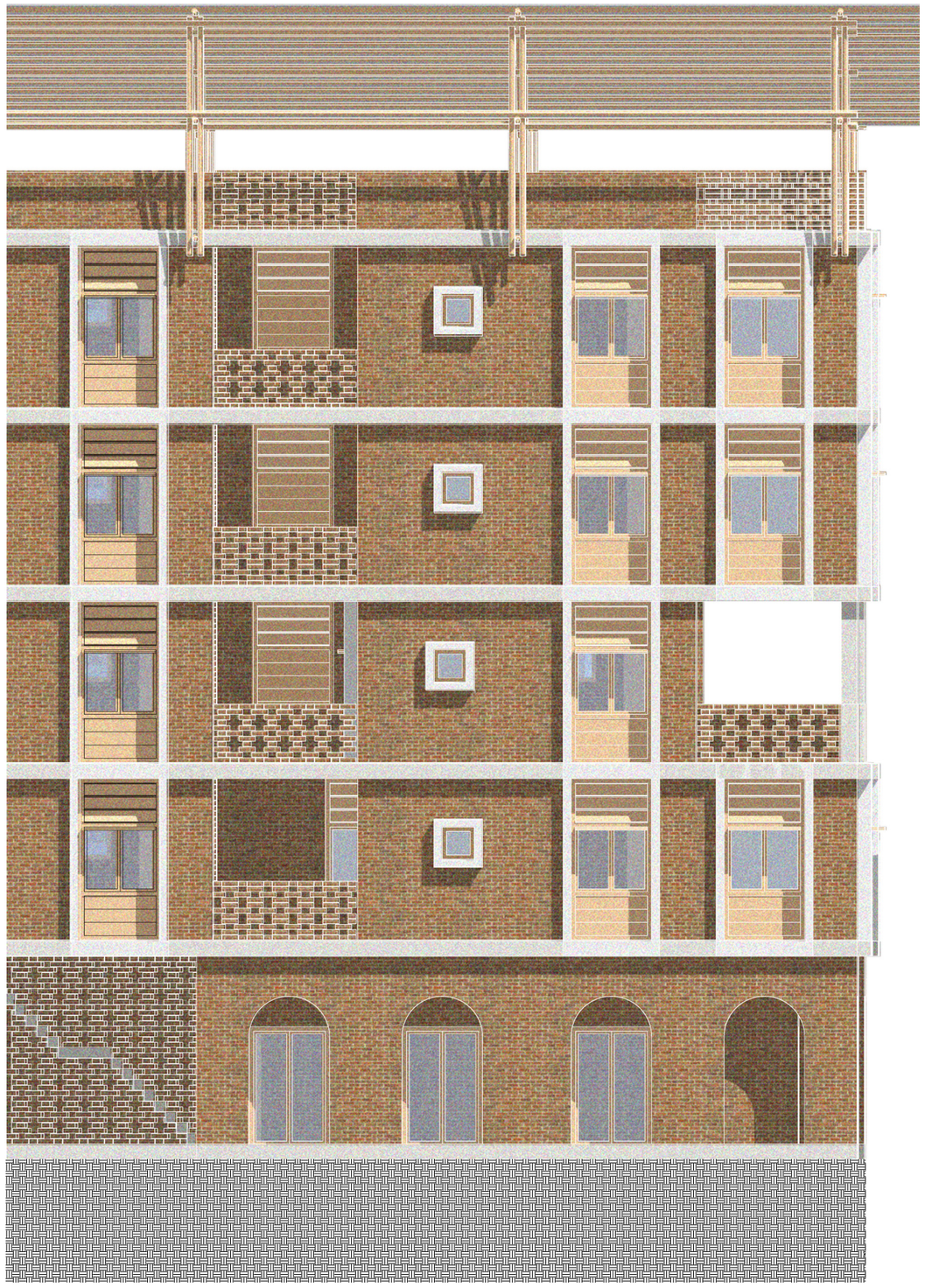
MATERIALITY

SECTION



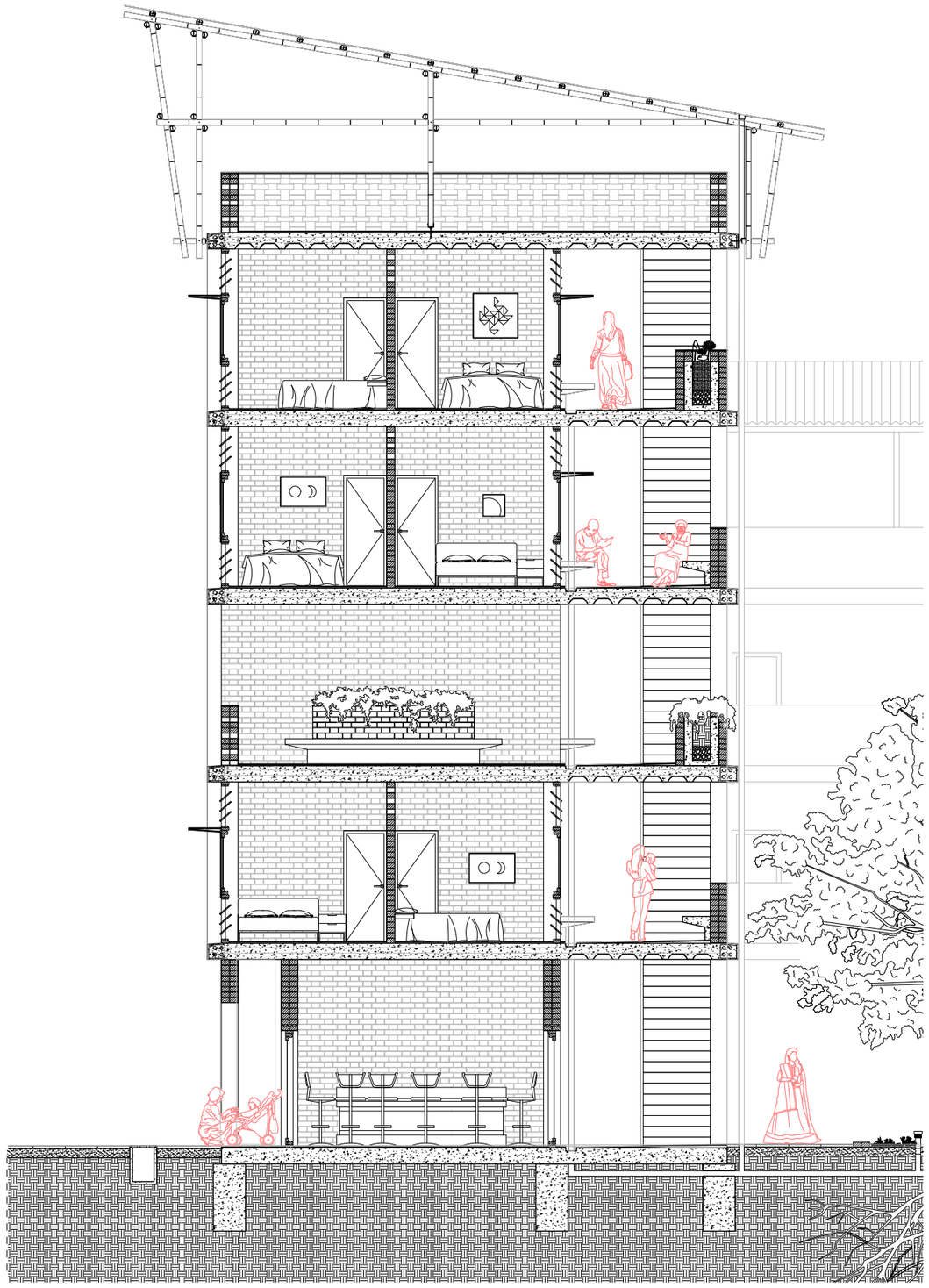
MATERIALITY

ELEVATION



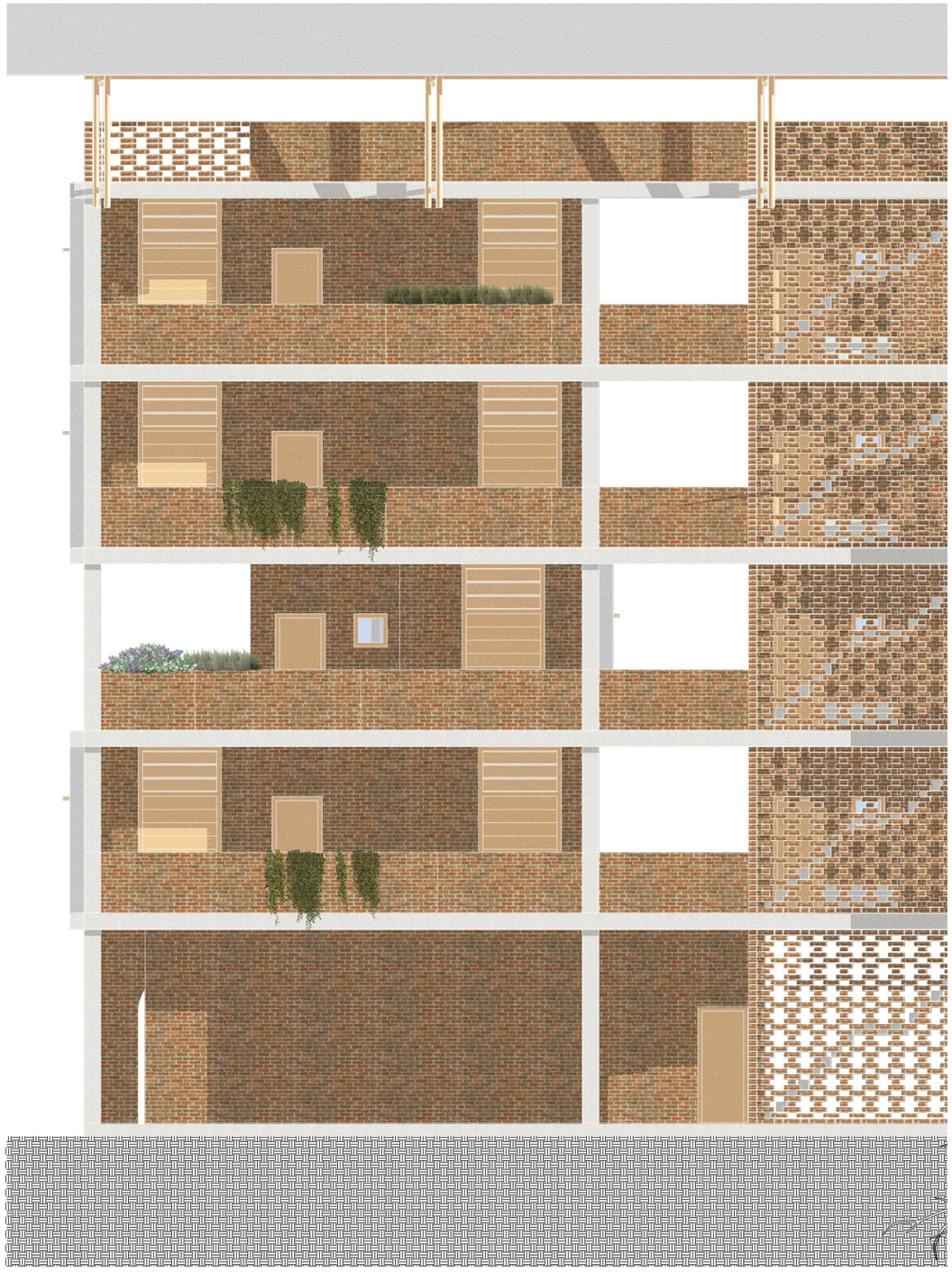
MATERIALITY

SECTION



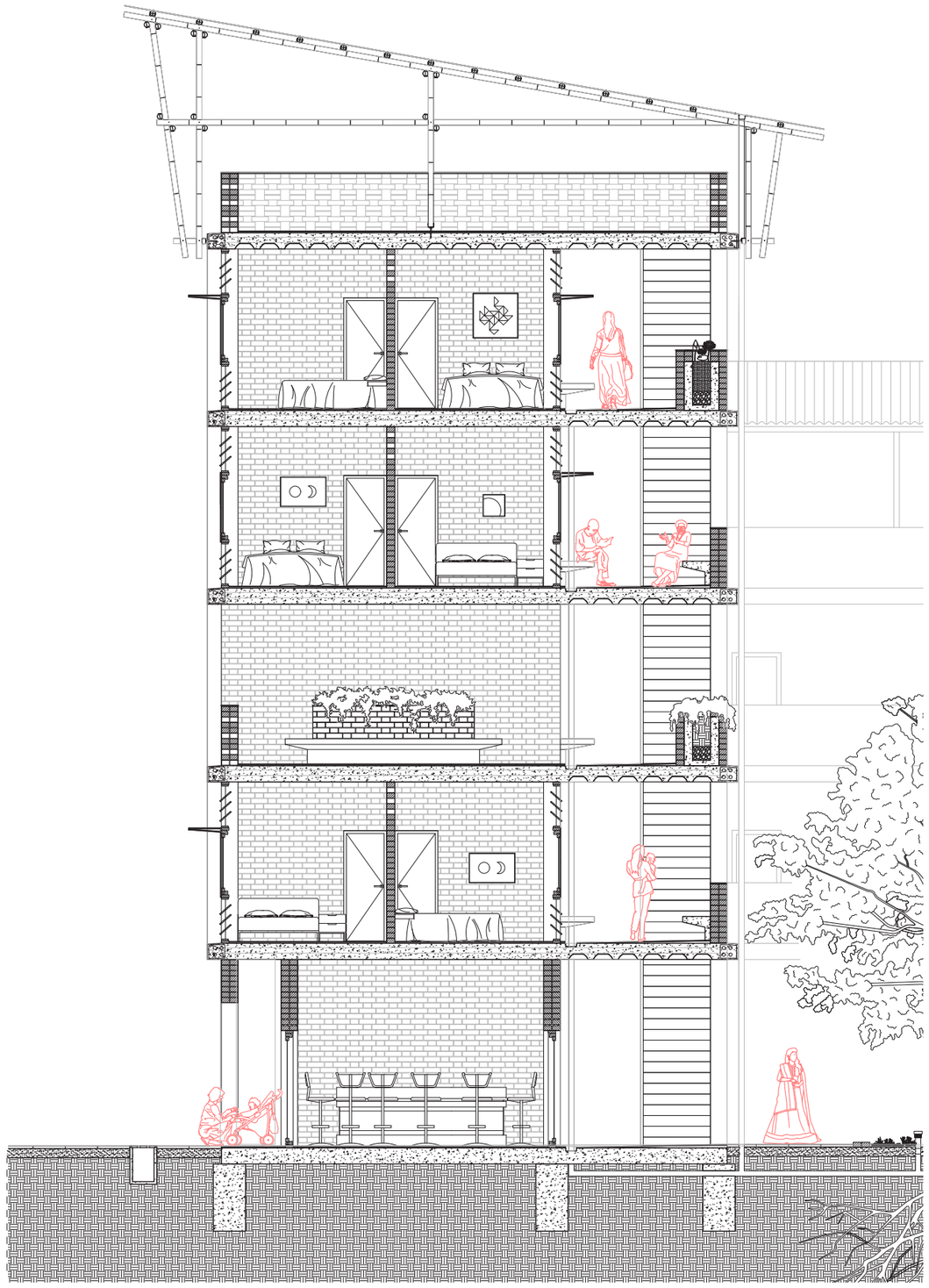
MATERIALITY

ELEVATION



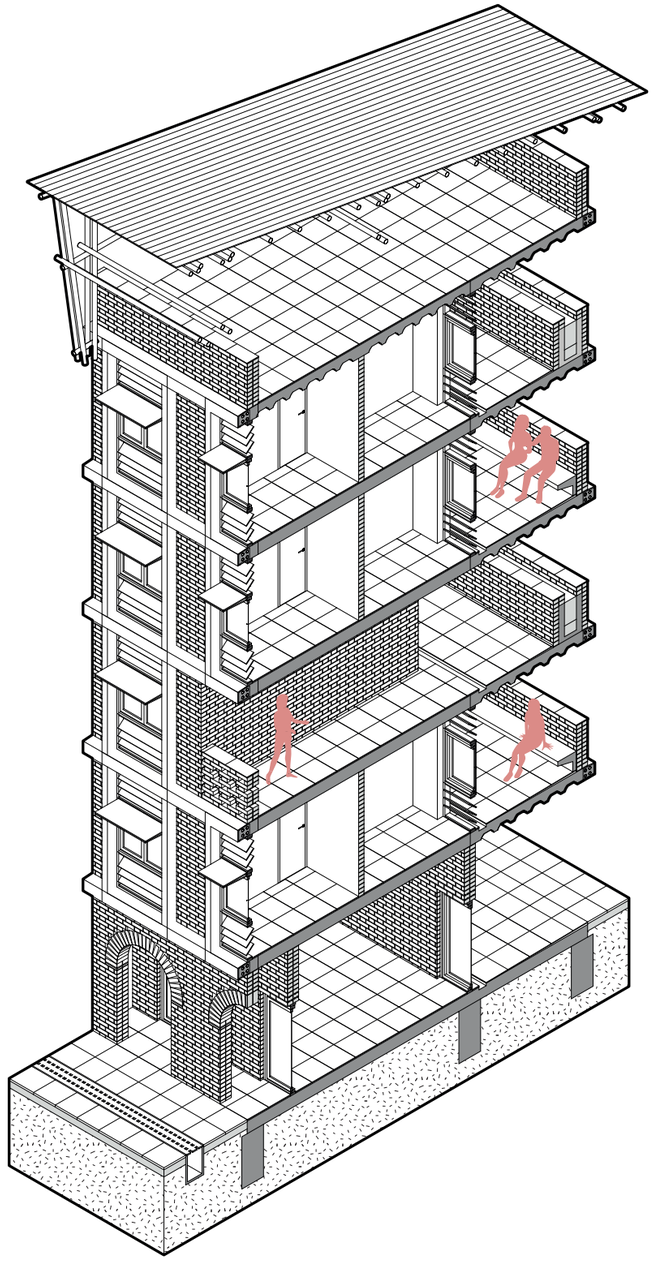
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SECTION



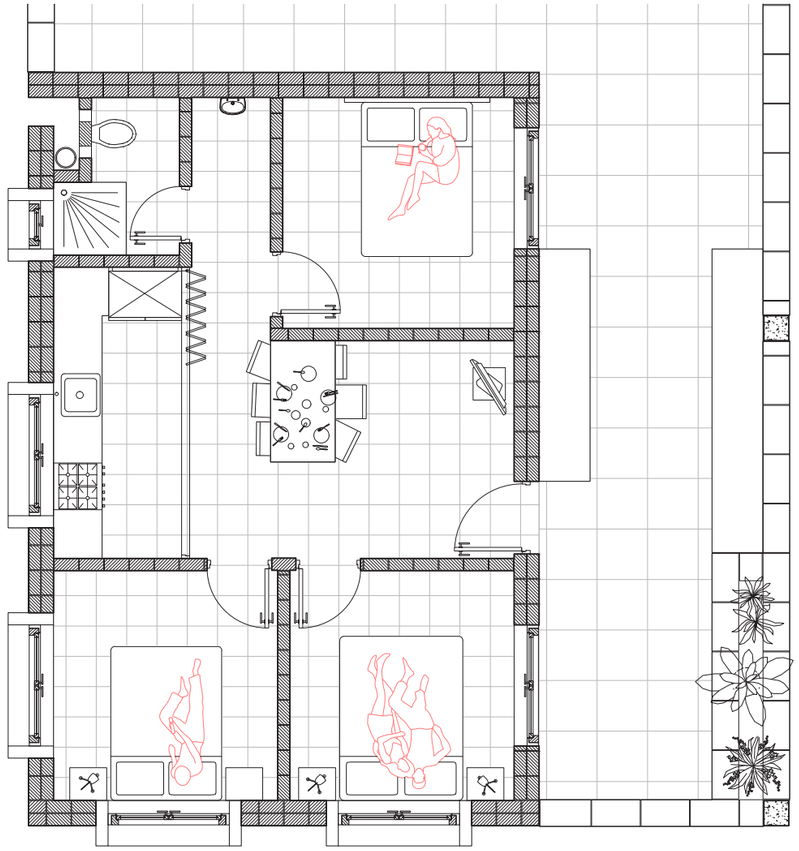
MATERIALITY

3D FACADE SECTION



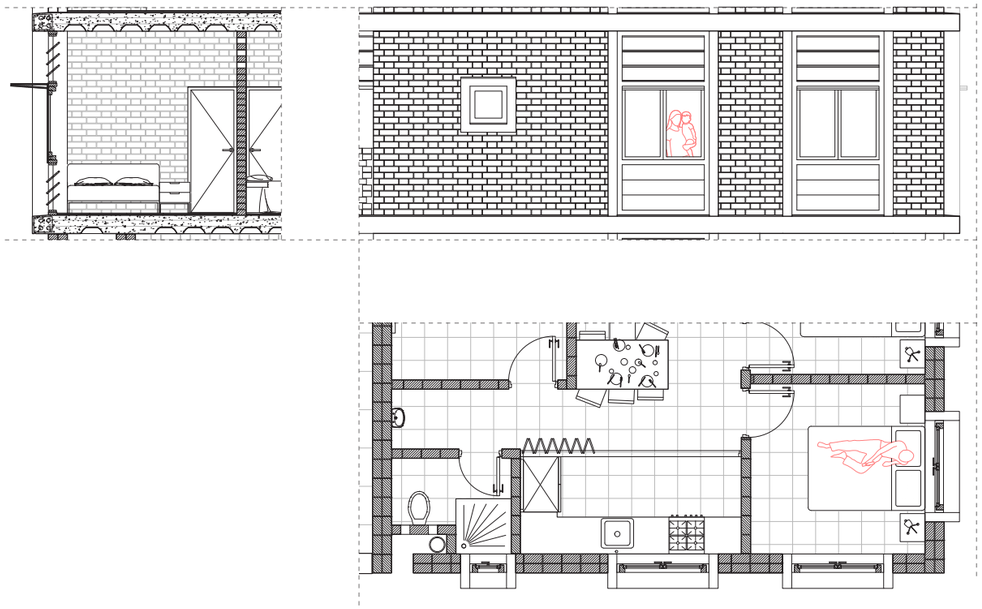
MATERIALITY

PLAN FRAGMENT



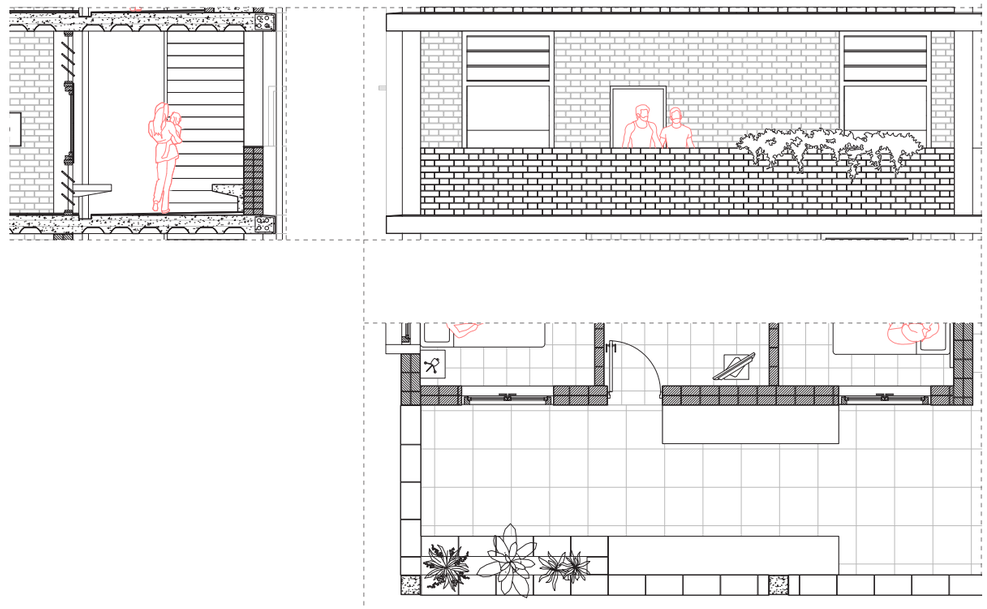
MATERIALITY

OUTER FACADE



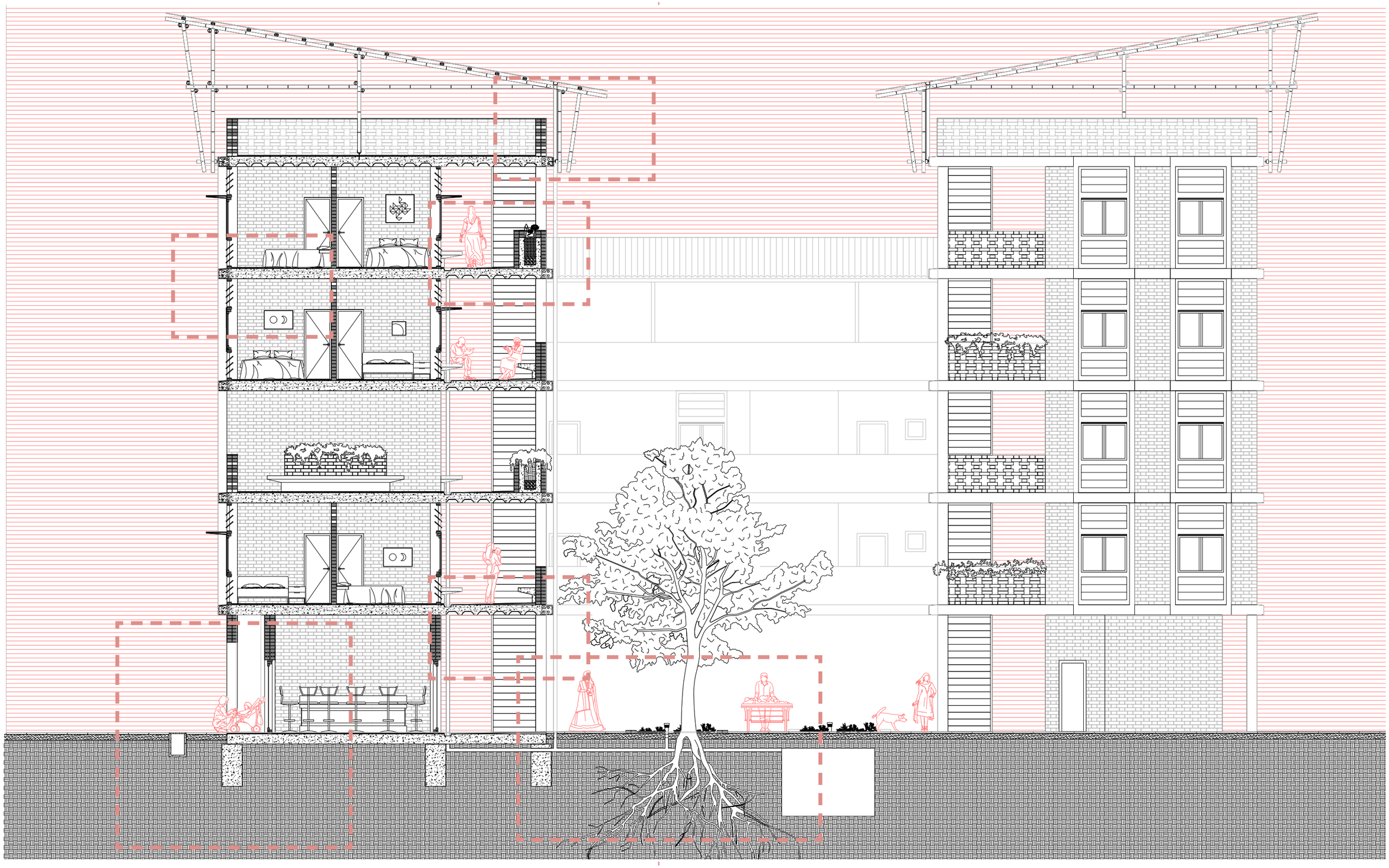
MATERIALITY

INNER FACADE



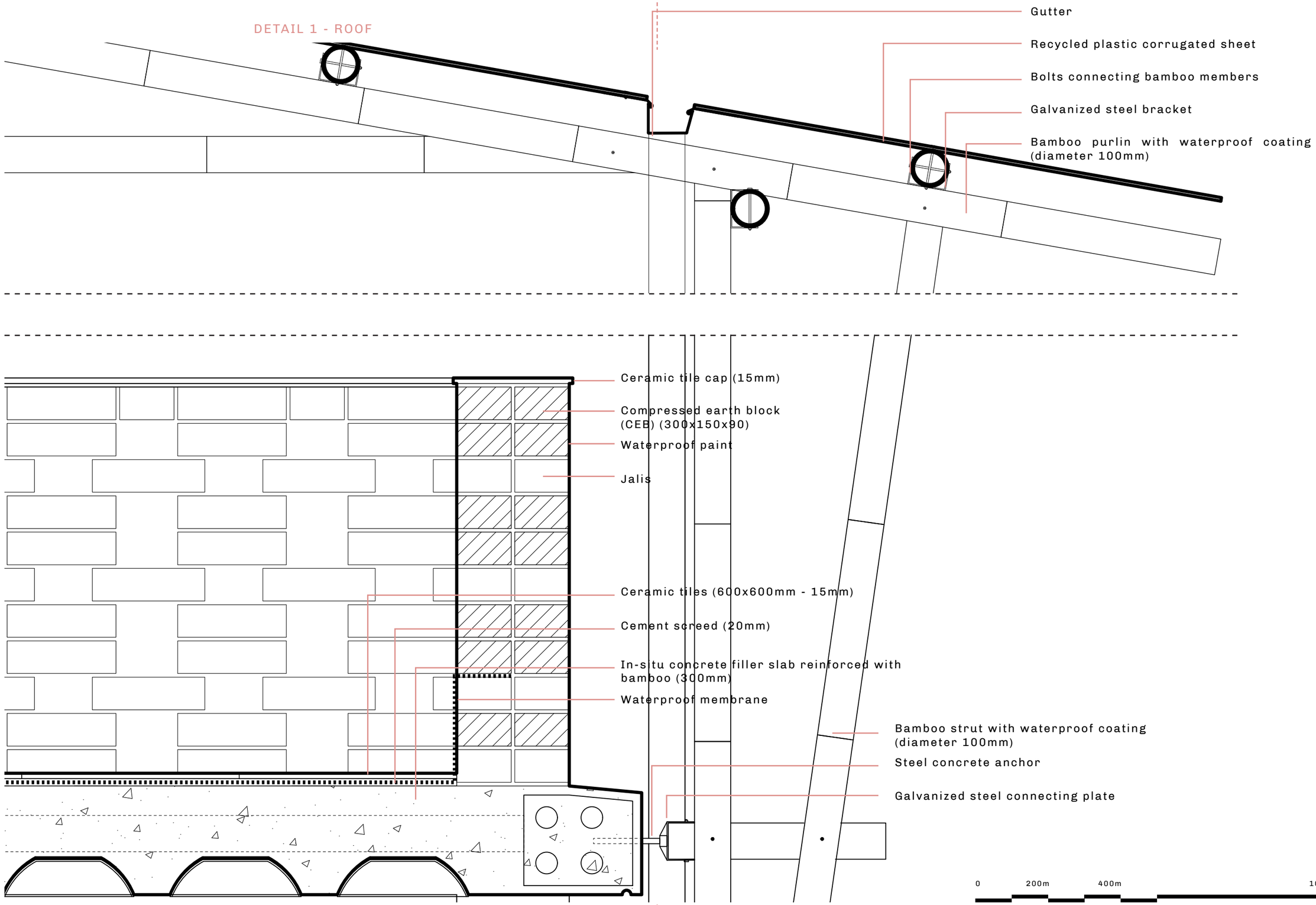
MATERIALITY

SECTION - DETAIL POSITIONS



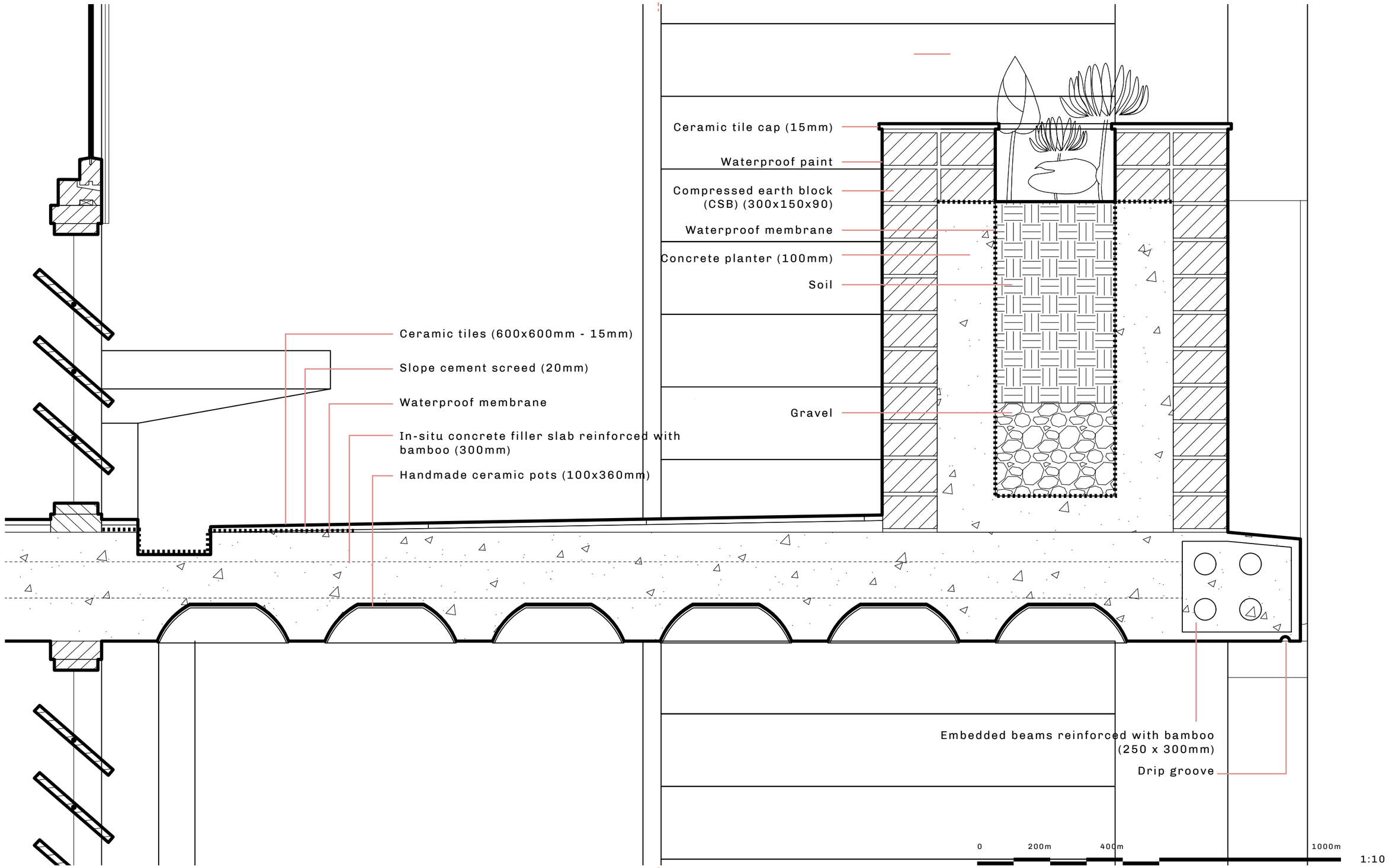
MATERIALITY

DETAIL 1 - ROOF



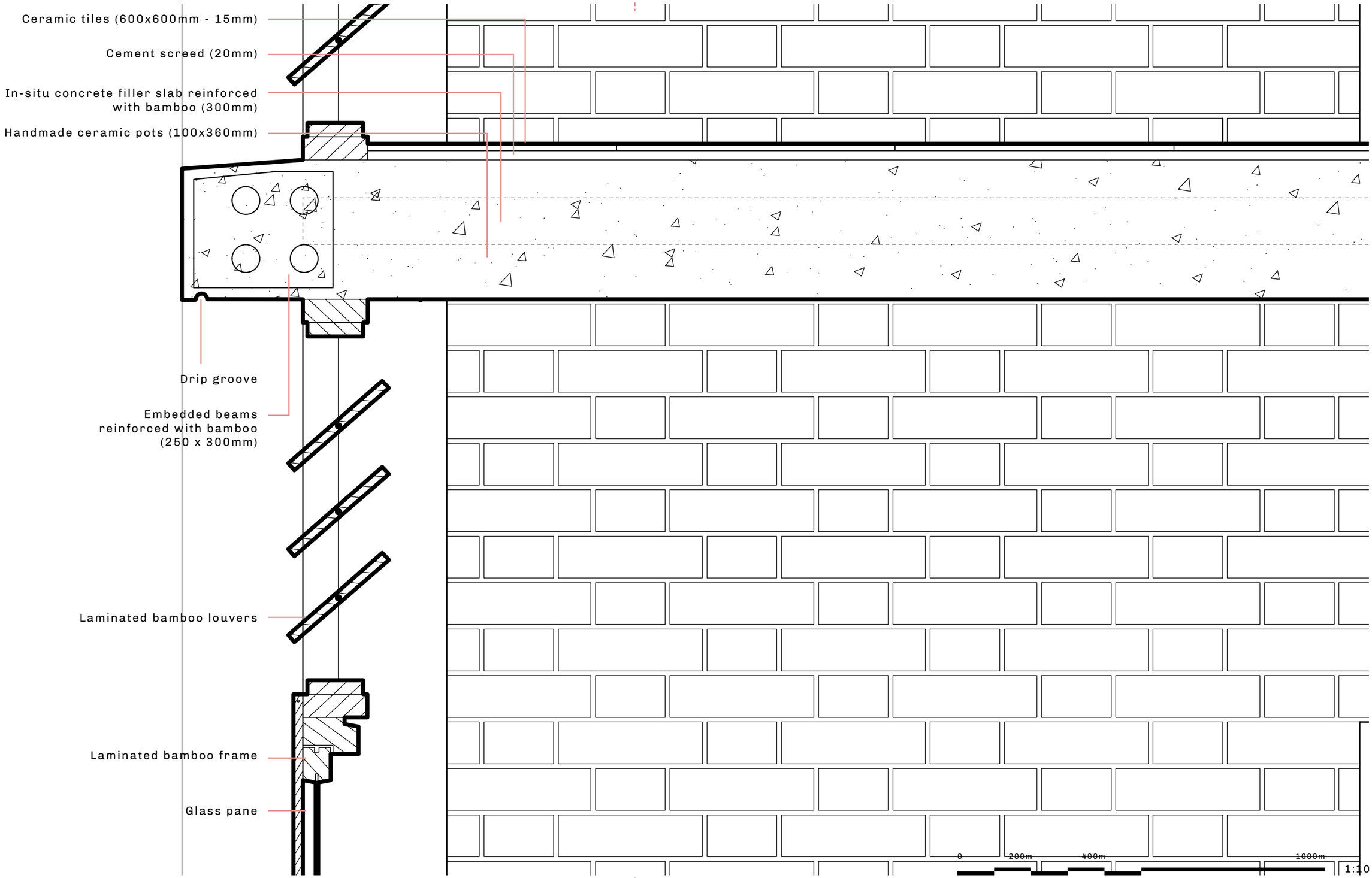
MATERIALITY

DETAIL 2 - GALLERY WITH PLANTER



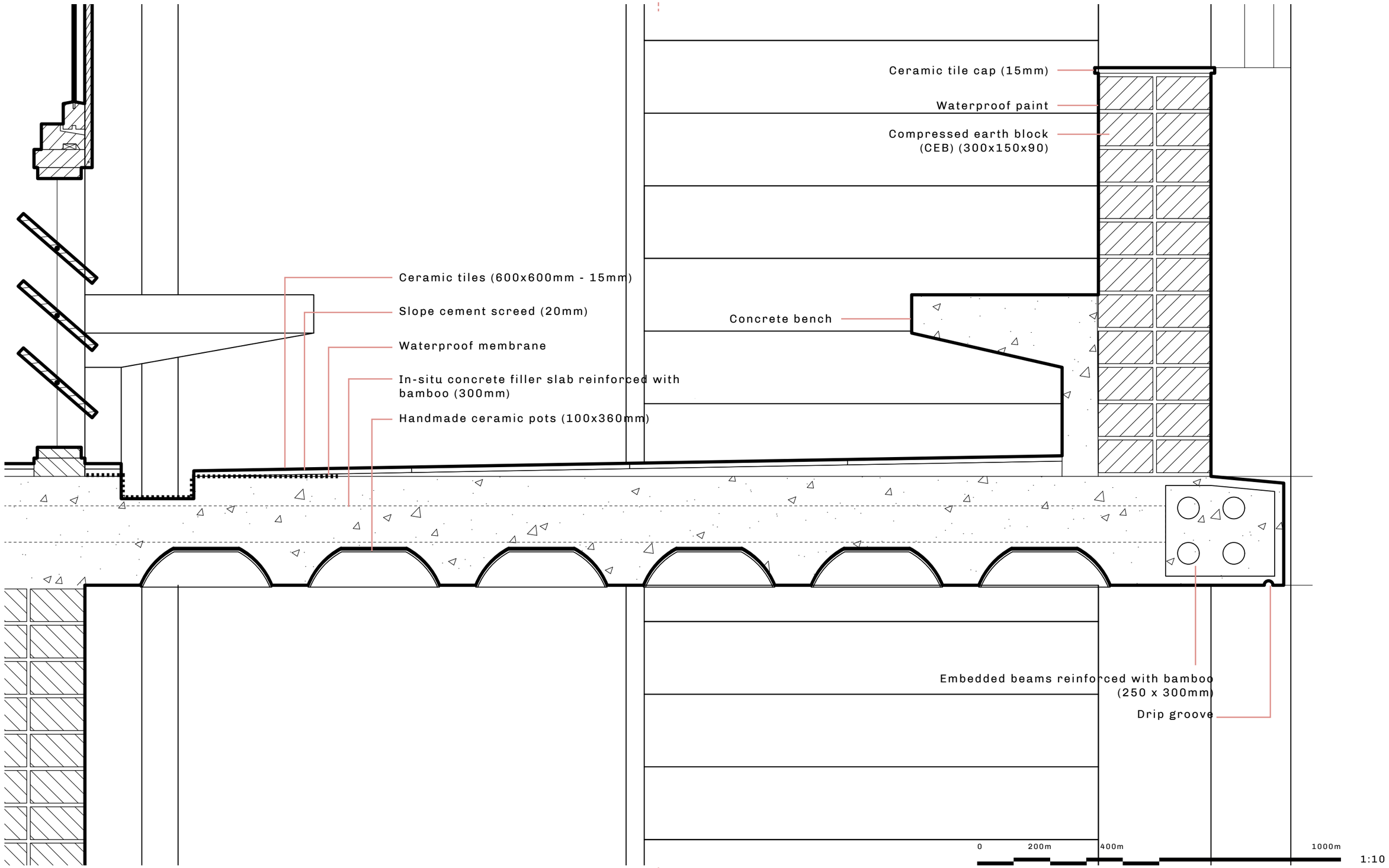
MATERIALITY

DETAIL 3 - TYPICAL FLOOR



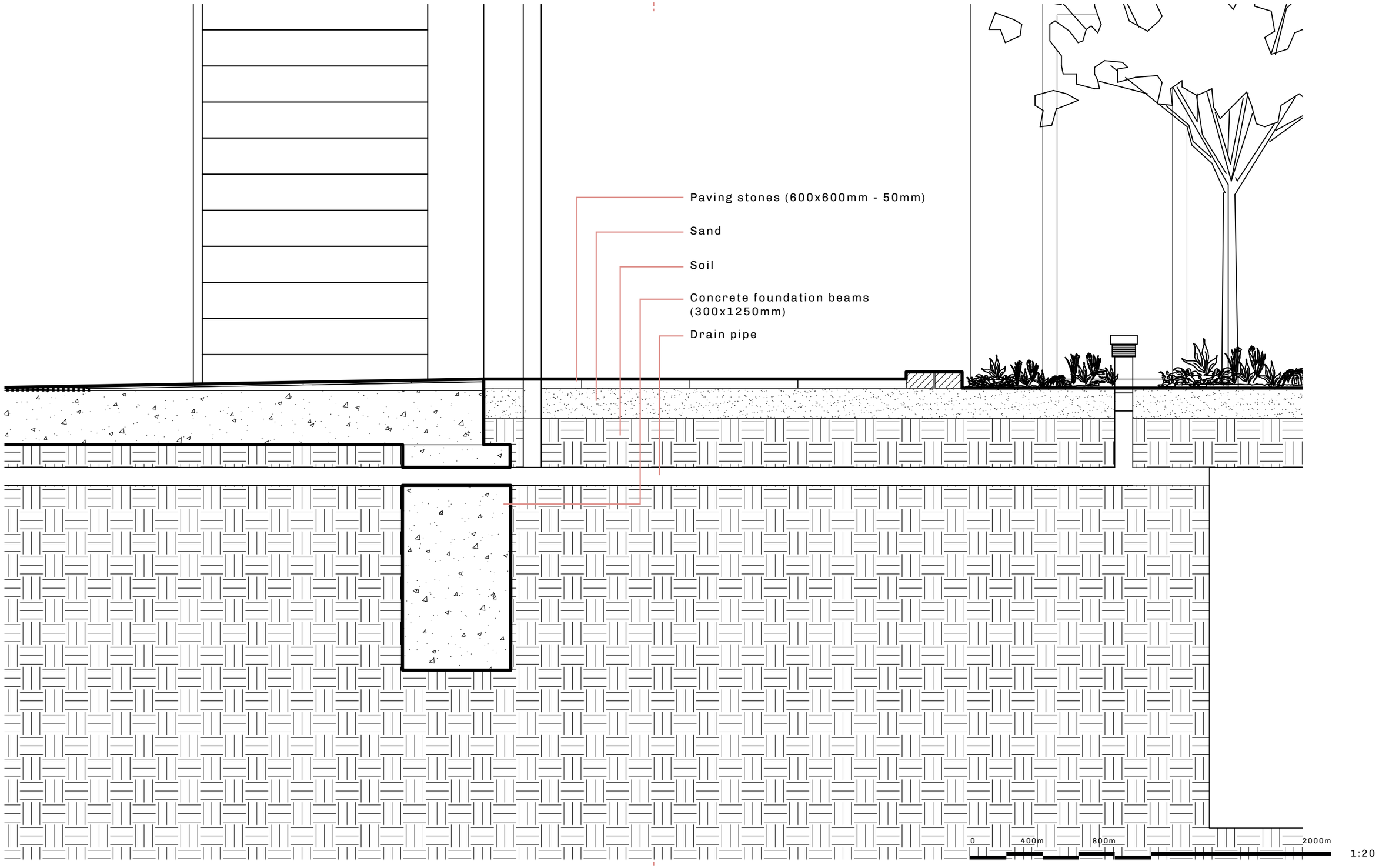
MATERIALITY

DETAIL 4 - GALLERY WITH BUILT IN BENCH



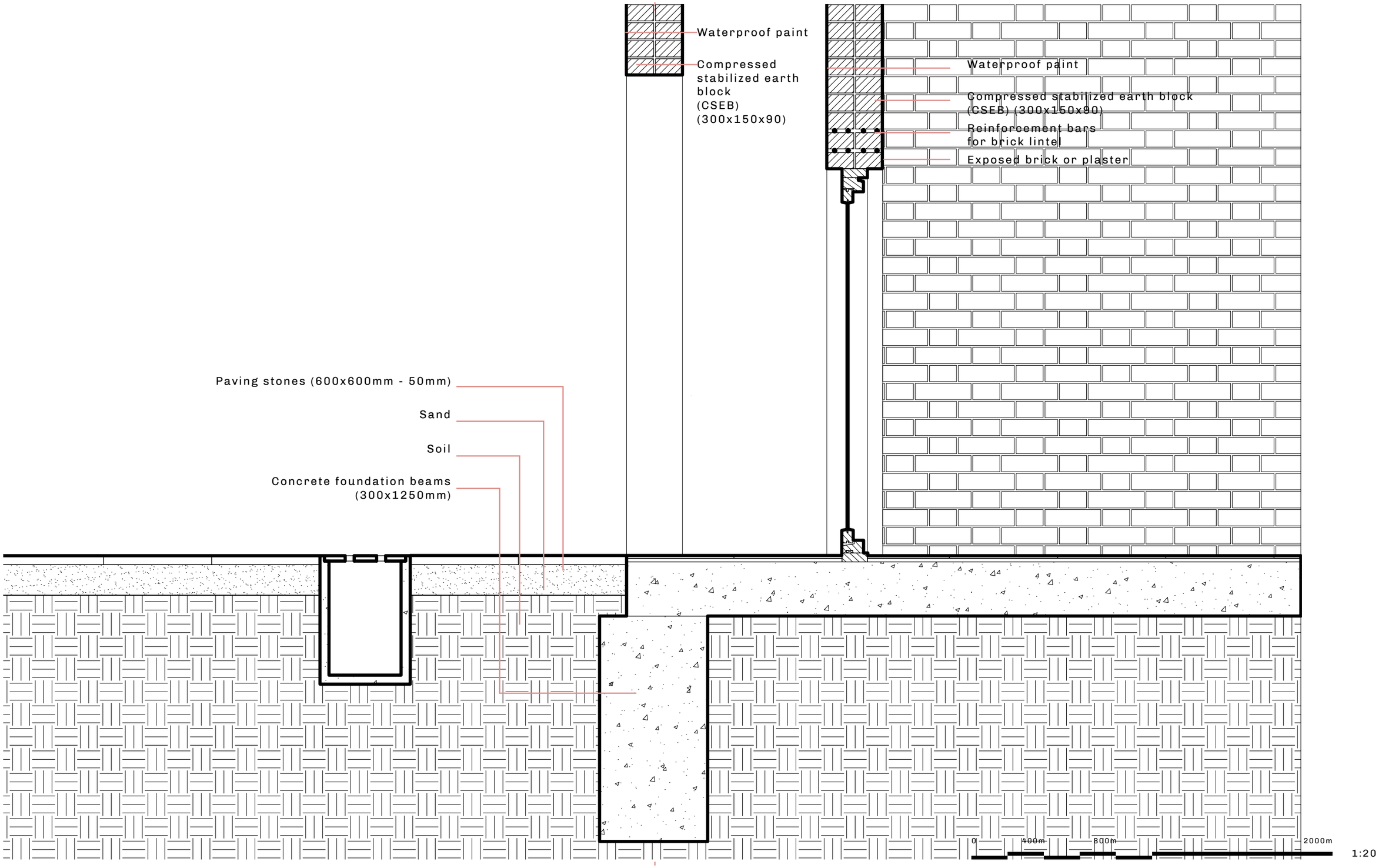
MATERIALITY

DETAIL 5 - FOUNDATION COURTYARD SIDE



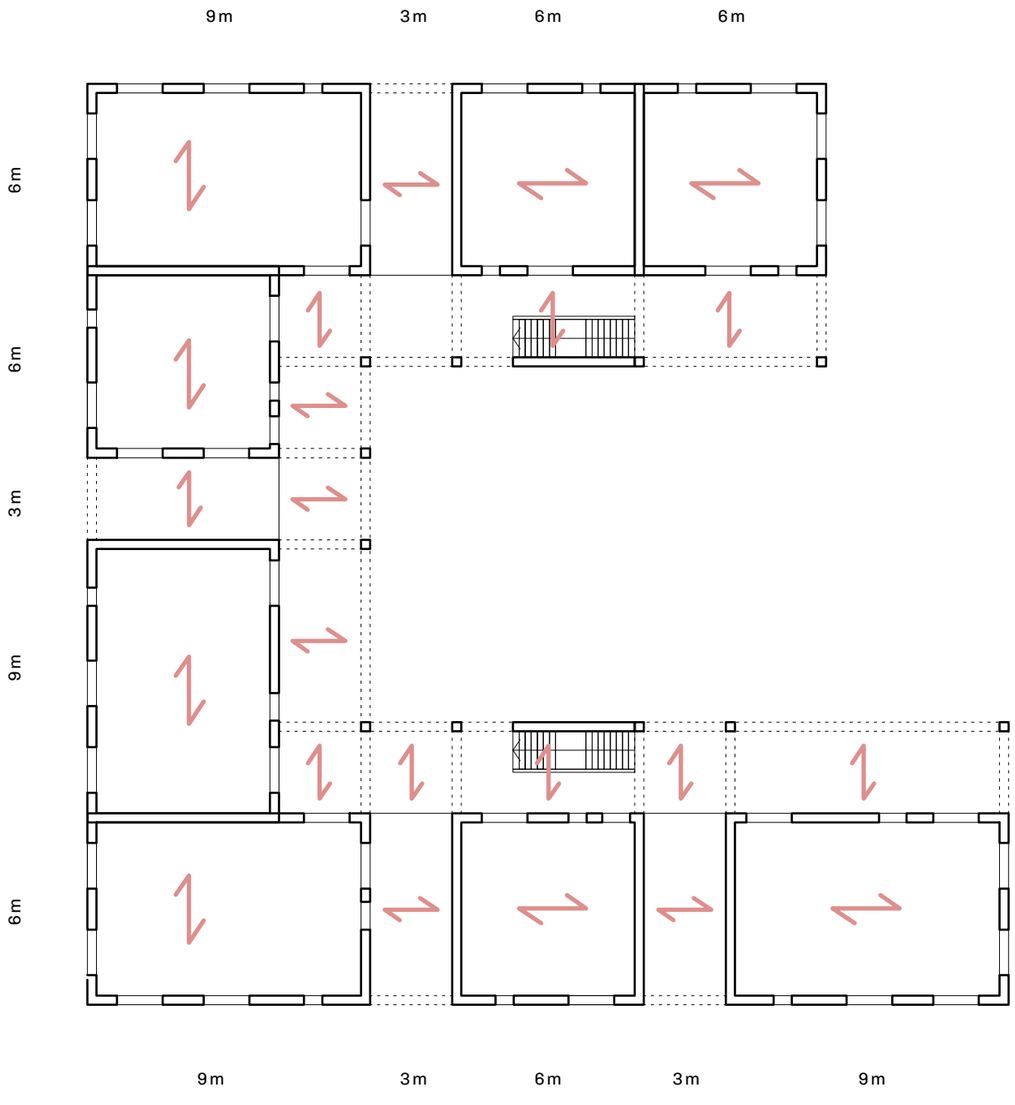
MATERIALITY

DETAIL 6 - FOUNDATION EXTERIOR ARCHES SIDE



CONSTRUCTION

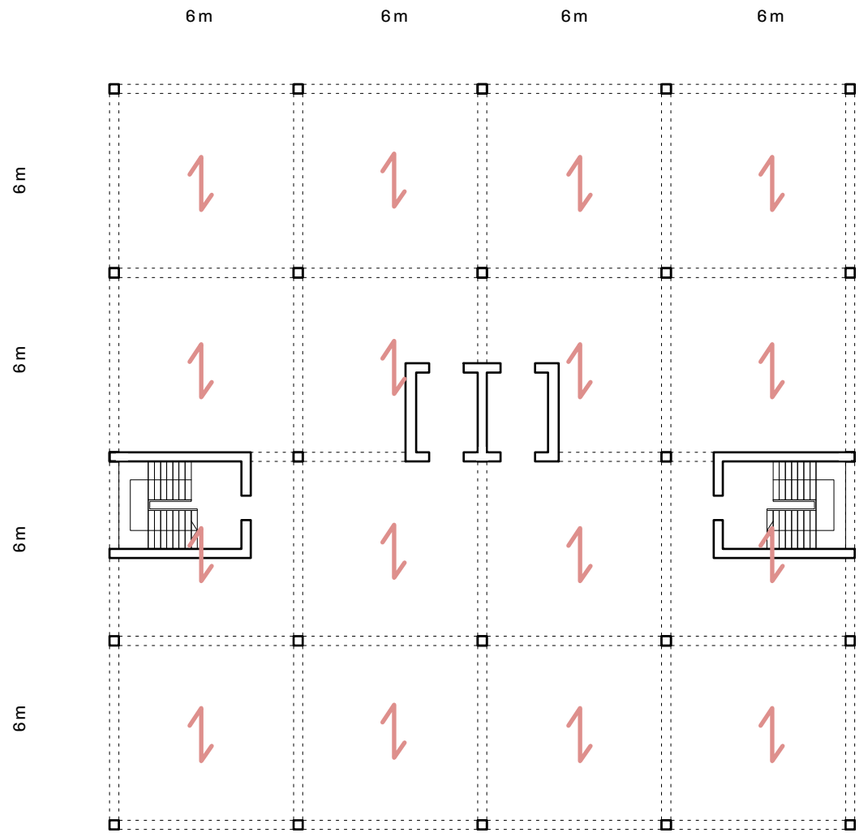
STRUCTURAL PLAN - LIG BUILDING



The building is constructed out of load bearing CSEBs walls, concrete columns along the gallery, concrete filler slabs and embedded beams. Handmade ceramic pots are placed in the form work of the concrete slabs creating cavities in order to reduce the amount of concrete and reduce dead load which in turn reduces the overall embodied energy.

CONSTRUCTION

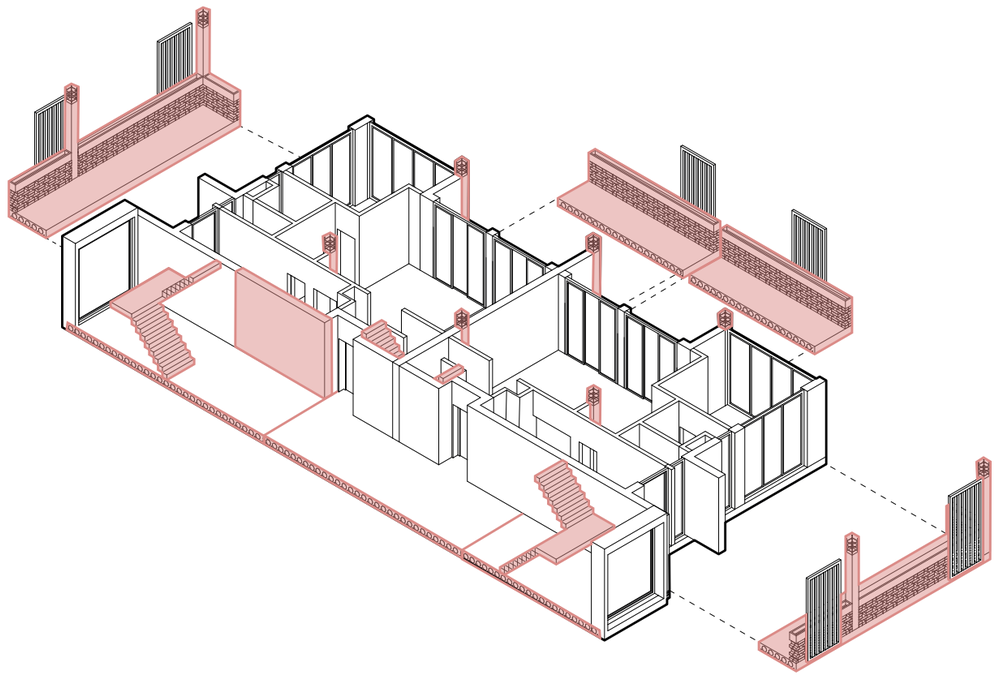
STRUCTURAL PLAN - HIG BUILDING



The HIG building is constructed out of pre-cast concrete columns, beams and pre-cast concrete hollow core slabs. The stairs on both sides as well as the elevator shear walls are also pre-cast concrete wall elements that will guarantee stability.

CONSTRUCTION

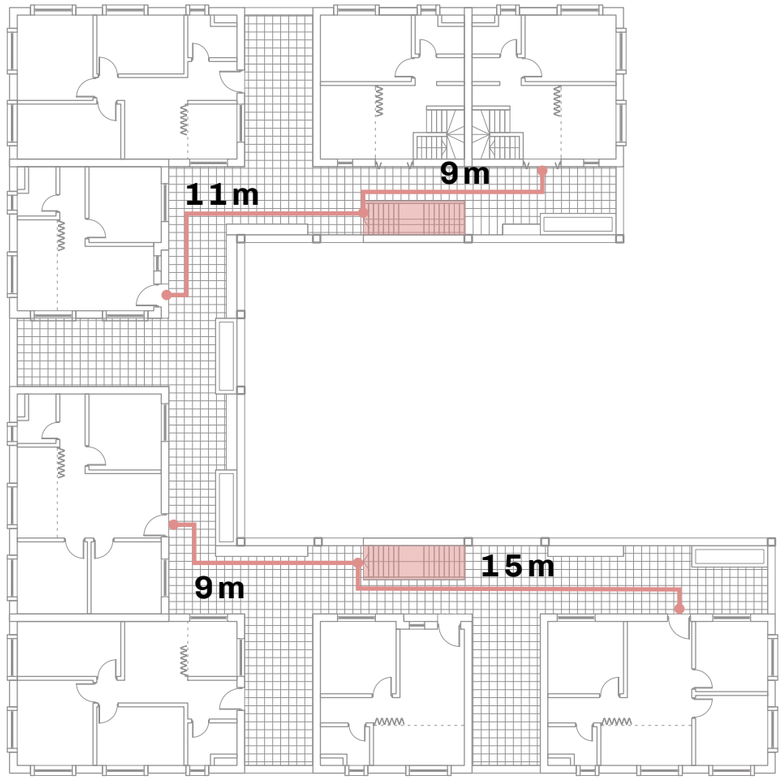
PRE-FAB COMPONENTS OF HIG RESIDENTIAL BUILDING

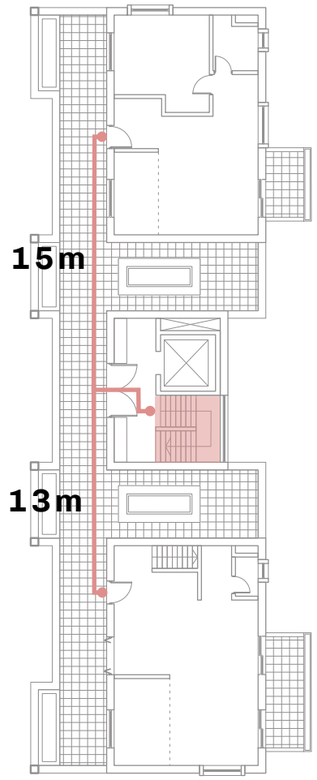


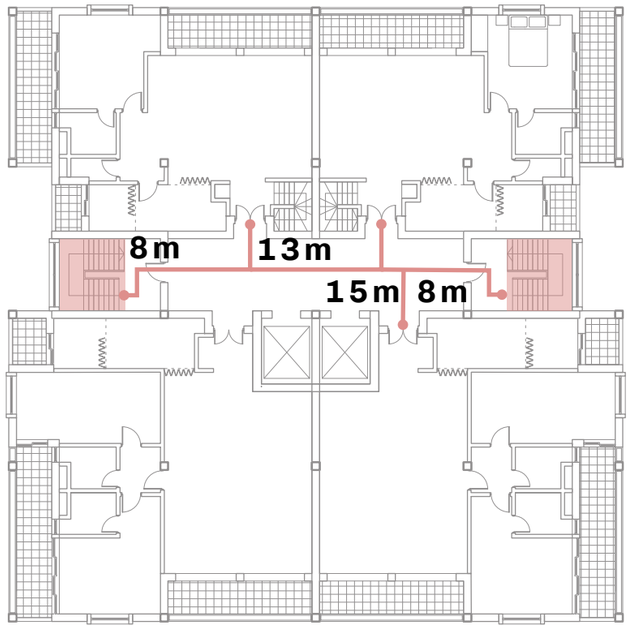
The construction for the residential building will prioritize speed and efficiency for quicker revenue. This means that pre-fab parts will be used throughout which include: the balconies, the concrete stairs, reinforced concrete columns, 9m hollow core slabs as well as 5m wall elements.

SAFETY

FIRE ESCAPE ROUTES



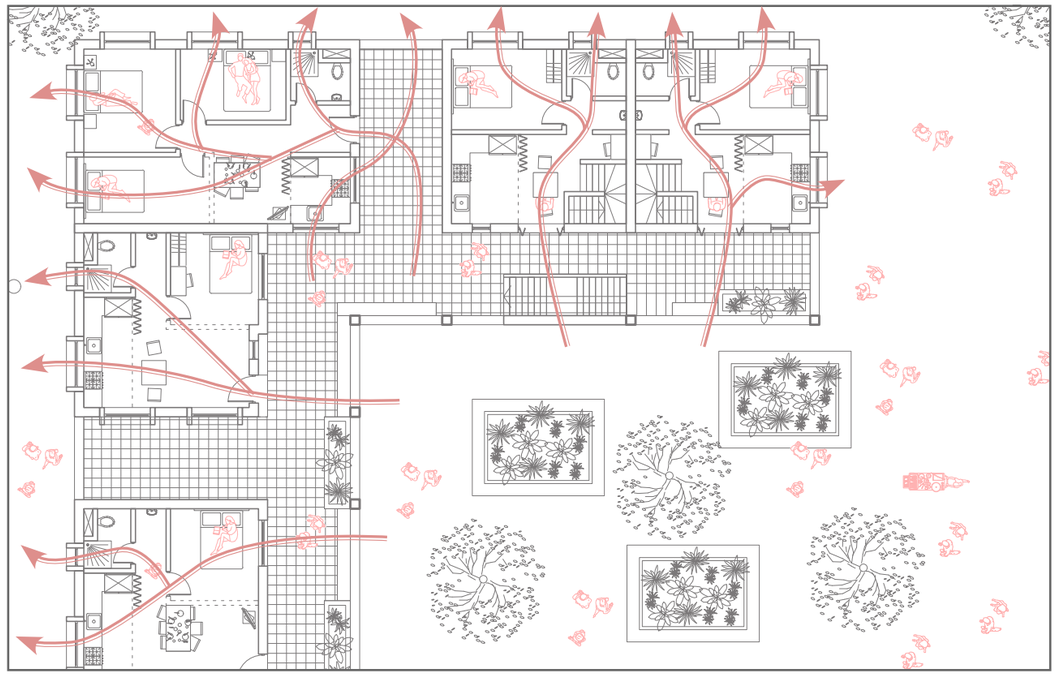




The circulation routes in each typology are designed in accordance with the Indian Standard Code of Practice for Fire Safety of Buildings. In the LIG typology, there are 2 external staircases that can be accessed by all individual dwelling units. External staircases and enclosed internal staircases are approved as sufficient escape routes as long as they have a minimum width of 125cm. The maximum travel distance to an exit for residential buildings should not exceed 22.5m.

CLIMATIC RESPONSE

VENTILATION



Every living unit has openings on at least 2 façades to allow for cross ventilation. The toilets are placed on the external façades for direct natural ventilation and where possible are next to each other and can be serviced without having to access the gallery. Jalis are used in places to allow continuous airflow through the cluster to the courtyard bringing fresh air in. The windows consist of a 3 part horizontal louvre system which can be controlled separately.

CLIMATIC RESPONSE

VENTILATION



CLIMATIC RESPONSE

SUN SHADING WINTER



CLIMATIC RESPONSE

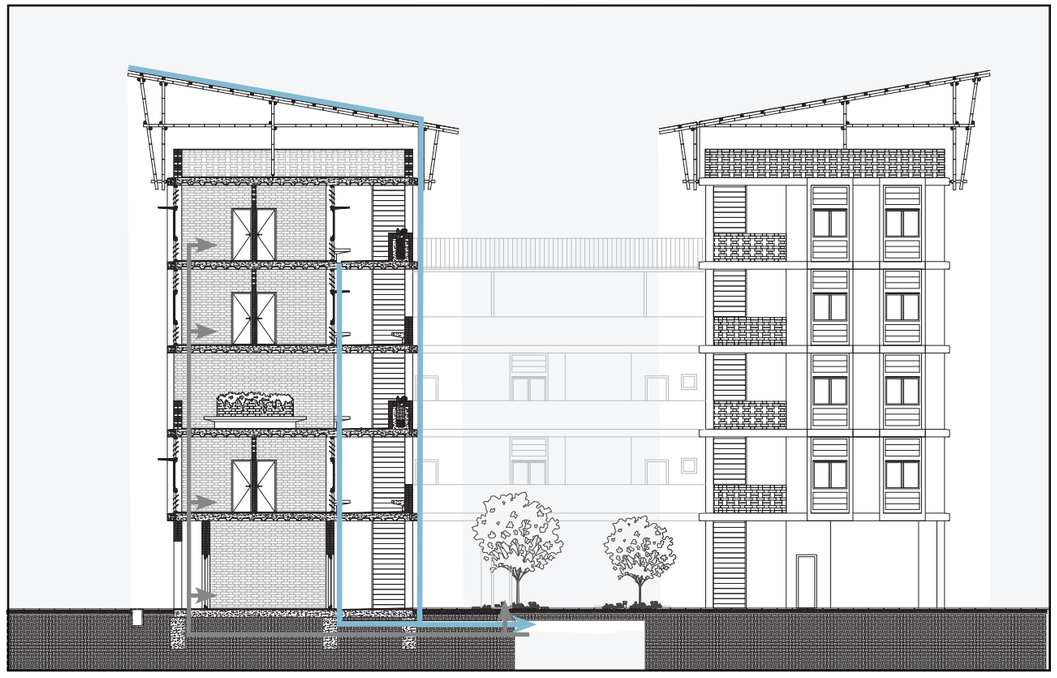
SUN SHADING SUMMER



Solar radiation and direct sunlight is kept at a minimum due to the overhanging roof, the Chhajjas (protecting eaves) on openings found on the external facade as well as the gallery space acting as a buffer zone between inside and outside to help maintain internal thermal comfort. The 3 part horizontal louvre system can be adjusted any time to let air in but keep direct sunlight out both in summer an in winter.

CLIMATIC RESPONSE

WATER MANAGEMENT



Rainwater is collected through the drain pipes which can be stored in the large water tanks below each courtyard.
The roof is sloped towards the courtyard so that the water can travel down to the storage tank or directly to the vegetation in the middle.
Gutters are placed on each gallery which also lead directly to the water storage tank.
With this rainwater harvesting system, the grey water can then be used to flush toilets, wash clothes and water plants.

VI. MANAGEMENT

EXISTING ACTION

LOCAL

National Slum Dwellers Federation

The National Slum Dwellers Federation (NSDF)

The National Slum Dwellers Federation (NSDF), founded in the mid 1970s, is a national organisation of community groups and leaders who live in slums and informal settlements across India.

UNION OF WOMEN FOR EMPOWERMENT
Mahila Milan

MAHILA MILAN (Women together)

“Mahila Milan” in Hindi means “Women Together”. Mahila Milan is a decentralised network of poor women’s collectives that manage credit and savings activities in their communities. Mahila Milan aims to provide a space for women to take on important decision-making roles and be recognised for their contributions towards improving their communities. Mahila Milan was created in 1986 when hundreds of women who lived on Mumbai’s pavements organised to successfully prevent the demolitions of their homes. Today, Mahila Milan has given out tens of thousands of loans to poor women all across the country and has collectively saved millions of rupees.

SPARC

Society for the Promotion of Area Resource Centres (SPARC)

SPARC is one of the larger NGOs in India focused on facilitating the creation of voices of the urban poor in the development of the city. For the past 30 years, the Alliance of SPARC and its two community based social movements, National Slum Dwellers’ federation (NSDF) and Mahila Milan has made a profound difference to thousands of households living under the threat of evictions/demolitions by providing them with the tools they need to engage the state and the city to secure permanent housing. It has also provided around 1000 community toilets in a number of states in India and in general supporting the local people in improving their quality of life.

EXISTING ACTION

THE FEDERATION MODEL - CORE ACTIVITIES









Over the last 25 years, the Alliance has developed the Federation Model, a set of core activities that build the organizational base, capacities and confidence of communities – particularly women – to negotiate for and implement development solutions. These activities are important not only as means to goals, but as ends in and of themselves, simultaneously meeting specific needs and building a foundation for the urban poor's sustained participation in development processes.

Core Activities:

•Setting up Area Resource Centres that serve as a meeting space and base for activities

•Encouraging households to join Savings and Credit programs that build financial assets and local capacity

•Completing community-led Enumerations, Surveys, and Maps to create a powerful informational base for strategizing and negotiating

•Facilitating Peer Exchanges among groups on local, regional and national levels so that communities can learn from each other

•Organizing Housing Exhibitions that showcase affordable solutions and act as a tool for mobilization and dialogue with officials

•Supporting Dialogue and Negotiation with relevant authorities

•Advocating for pro-poor Policy Changes

From 1990 onwards, the Alliance attended exchanges in India and internationally to share their experience of getting organized, of learning to use their own experience to design a core house for themselves, and of planning a settlement design from it.

Initially, women used boxes and cardboard to develop ideas to visually communicate with each other. This allowed them to question the practicality of ideas and explore ways to keep experimenting. The community as a whole usually joined in to air their reflections. Nothing was right or wrong, the focus was on what was needed, affordable, and doable.

EXISTING ACTION

THE FEDERATION MODEL - HOUSING PROJECT TYPES FROM DEMANDS OF NSDF + MAHILA MILAN

MARKET FINANCED HOUSING PROJECTS

Projects that use market subsidy projects that are a part of a subsidy initiative by the Government, or Market financed housing where project costs are recovered through a sale component or Transfer of Development Rights. These are either in-situ or relocation projects.

LOANS PROVIDED TO INDIVIDUALS FOR UPGRADING HOUSING

Collective Loan to MM groups that select households with a history of savings to disburse individual loans. SSNS/ SPARC Revolving Funds are given as collective loan. 1% interest is charged per month.

SUBSIDIZED HOUSING PROJECTS

Projects where a government subsidy program seeks to upgrade the housing stock of slum dwellers. 90% subsidy is primary finance provided by the Government (central, state, city) and 10% Community Contribution.

EXISTING ACTION

LOCAL

POINT OF VIEW
Mumbai

Point of View is an NGO based in Mumbai that builds and amplifies women's voices and removes barriers to voice, speech and expression using media, education, technology and art.
Strategies include creating digital resources, publications and campaigns; building skills, capacities and understanding; producing information and knowledge; and advocating with civil society and policy makers.
There are different programmes focusing on:
Programmes:

-Digitality, Gender and Sexuality.

-Sexuality and Disability.

-Digital Storytelling.

-Internet Democracy.

SEWA
Self Employed Woman's Association

SEWA is a National Trade union set up in 1972 with over 1.5 million poor, self-employed workers from the informal sector across 16 states in India. The main goal is to empower women by providing safe job opportunities and allowing for economic independence.

Their strategy is based on joint action of union and cooperatives. Trade cooperatives provide better income, skill up-gradation, marketing and access to credit. Women's asset ownership if the first step out of poverty.

SEWA offers better paid and regulated home-based work such as cigarette rolling, kite making, incense stick rolling and garment making.

SEWA Centres offer vocational training to young women including traditional skills such as embroidery and tailoring, but also marketing and business skills. Health benefits such as eye clinics and health check-ups are done in the community centres.

SAFE CITY
Mumbai

Safe City was set up under the Red Dot Foundation with the aim to make cities safer by encouraging equal access to public spaces for everyone especially women, through the use of crowd sourced data and technology.

Safe City is a platform that empowers individuals, communities, police and city governments to create safer public and private spaces. With technology they collect and analyse crowd sourced, anonymous reports of sexual violence, identifying patterns and key insights. This data allows citizens, communities, civic authorities, police, researchers and policymakers to create safer spaces by:

-Increasing awareness, transparency and public authority.

-Improving policy and tactical precision with data-led insights.

-Optimizing budgets to more effectively allocate resources.

EXISTING ACTION

GLOBAL

Her City is an urban development initiative contributing to the UN's SDGs which touches upon goal 3: Health and Wellbeing, 5: Gender Equality, 10: Reducing Inequality, 11: Sustainable Cities and Communities, 16: Peace, Justice and Strong Institutions and 17: Partnerships. It was set up by the UN-Habitat (the United Nations Human Settlements Programme) and the independent think tank Global Utmaning (Global Challenge).

The purpose of this initiative is to make methods and tools available to urban actors and cities globally.

The idea is to support cities to scale up and mainstream girls' participation in planning as a part of the long-term strategies to build sustainable cities and societies.

Her City provides municipal professionals, urban actors and local decision-makers with a solid toolbox for mainstreaming youth, gender and socioeconomic perspectives by strategically involving girls and young women in urban planning and design.

There is a lack of knowledge in participatory urban planning and design, particularly in involving vulnerable groups in urban development processes. Research has shown that participatory urban development with girls and young women, local actors, as well as multi-level decision-makers, creates opportunities for more inclusive, equal and sustainable urban development.

HER CITY

The toolbox

Support urban development from a girl's perspective

Guide urban actors to implement projects through a step-by-step methodology

Provide an open and digitally accessible platform for all

Facilitate an ongoing dialogue between professionals and citizens

9 flexible blocks

ASSESSMENT

Block 1 **Stakeholder mapping**

Block 2 **City wide assessment**

Block 3 **Site specific assessment**

DESIGN

Block 4 **Analysing challenges**

Block 5 **Designing ideas**

Block 6 **Recommendations for actions**

IMPLEMENTATION

Block 7 **Action plans**

Block 8 **Sharing results**

Block 9 **Implementation and follow-up**

STAKEHOLDER MAPPING

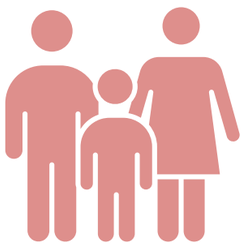
WHO IS INVOLVED?

	Internal	External
PRIVATE	MHADA (Maharashtra housing and area development authority) Commercial Bank of India Existing tenants on site	
PUBLIC		Existing tenants on site Potential buyers Potential renters Local businesses Property developers
DEMAND	Architect/Designer Construction industry Utility companies (gas, light, water) Navi Mumbai Women's Association (NMWA) Her City	
SUPPLY		Municipality of Navi Mumbai CIDCO (City and Industrial Development Corporation)

Influence \ Interest		
	MINIMAL EFFORT	KEEP INFORMED
	Surrounding neighbourhood Property developers Construction industry Utility companies (gas, light, water) Her City	Existing tenants on site Potential buyers Potential renters Local businesses
	KEEP SATISFIED	KEY PLAYERS
	Government of Maharashtra Commercial Bank of India NGOs - SPARC, Mahila Milan, NSDF Municipality of Navi Mumbai	Architect/Designer CIDCO (City and Industrial Development Corporation) MHADA (maharashtra housing and area development authority) Navi Mumbai Women's Association (NMIA)

STAKEHOLDER ANALYSIS

ASPIRATIONS + CONTRIBUTIONS



HIG RESIDENTS

ASPIRATIONS
Luxurious living in an inclusive area
Buy
Access to necessary amenities

CONTRIBUTIONS
Cross subsidizing the project
Hiring EWS + LIG + MIG
Buying goods and services locally

MIG RESIDENTS

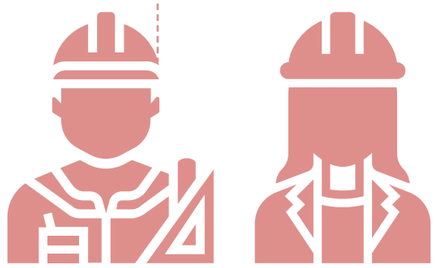
ASPIRATIONS
Inclusive housing
Rent or buy
Access to necessary amenities

CONTRIBUTIONS
Cross subsidizing the project
Hiring EWS + LIG
Buying goods and services locally

EWS + LIG RESIDENTS

ASPIRATIONS
Affordable and inclusive housing
Possibility of incremental housing
Access to necessary amenities
Rent or buy

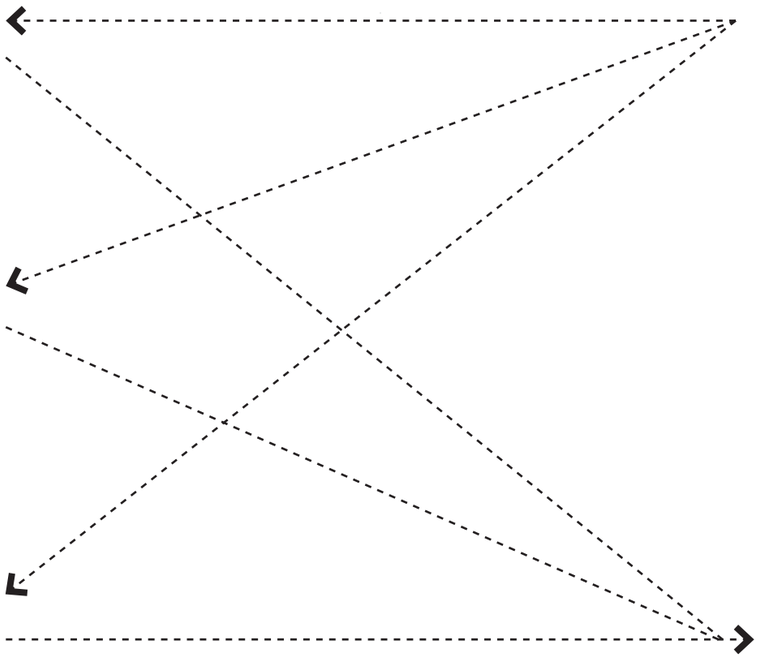
CONTRIBUTIONS
Different types of labour
Running local businesses



ARCHITECT/ DESIGNER

ASPIRATIONS
Investment for project
Participation of residents from all income groups

CONTRIBUTIONS
Creating a gender inclusive design from the urban to the dwelling scale
Creating income generating opportunities
Aiding the NMWA to get organized





CIDCO + MHADA

ASPIRATIONS
Provide affordable housing
Cost recovery on investment

CONTRIBUTIONS
Initial investment of the project
Owning the land

COMMERCIAL BANK

ASPIRATIONS
Gaining interest

CONTRIBUTIONS
Giving loans

LOCAL BUSINESS

ASPIRATIONS
Stable income
Possible growth
Rent or buy commercial units
Local + neighbouring customers

CONTRIBUTIONS
Job opportunities
Renting units - contributing the cross
Subsidization of the project

MANAGERIAL STRATEGY

PARTICIPATORY DESIGN



City and Industrial Development Corporation of Maharashtra (CIDCO) currently owns the site with the recently built residential towers targeted at the EWS and LIG. CIDCO has control over the land and the buildings. CIDCO therefore plays a key role in the management of the project, which will be in charge of leaseholds for the building plots and therefore the main financial provider of the development process.

With CIDCOs current scheme, the average prices of the housing units are between 23,500 and 32,800 euros. EWS households are defined as having an annual income up to Rs. 3,00,000 (Rupees Three Lakhs), which is roughly around 3500 euros. LIG households are defined as households having an annual income between Rs.3,00,001 (Rupees Three Lakhs One) up to Rs.6,00,000 (Rupees Six Lakhs), roughly between 3500 and 7000 euros. This means someone in EWS needs at least 7 year incomes to afford an apartment where the LIG needs anywhere between 5 and 9 years to afford theirs.

CIDCOs current mass housing approach of scattering repetitive stamp-like buildings across Navi Mumbai takes away the identity of the people its housing, not allowing their voices to be heard and disregarding the diverse ways of inhabitation. Therefore it is essential to include citizen participation which is dependent on the central and local authorities with a suitable control system.

Local contractors will be selected to carry out the construction for the HIG and MIG typologies. For the LIG typology, Navi Mumbai Inclusivity Association (NMIA) a community based social group in collaboration with SPARC will be set up and be in charge of the management of the project through all phases, forming the different groups for the construction, responsible of the monthly contributions as well as the



maintenance after the buildings are finished. This will be made up of people from a local construction company, future residents of the LIG homes and a couple of people from SPARC with experience.

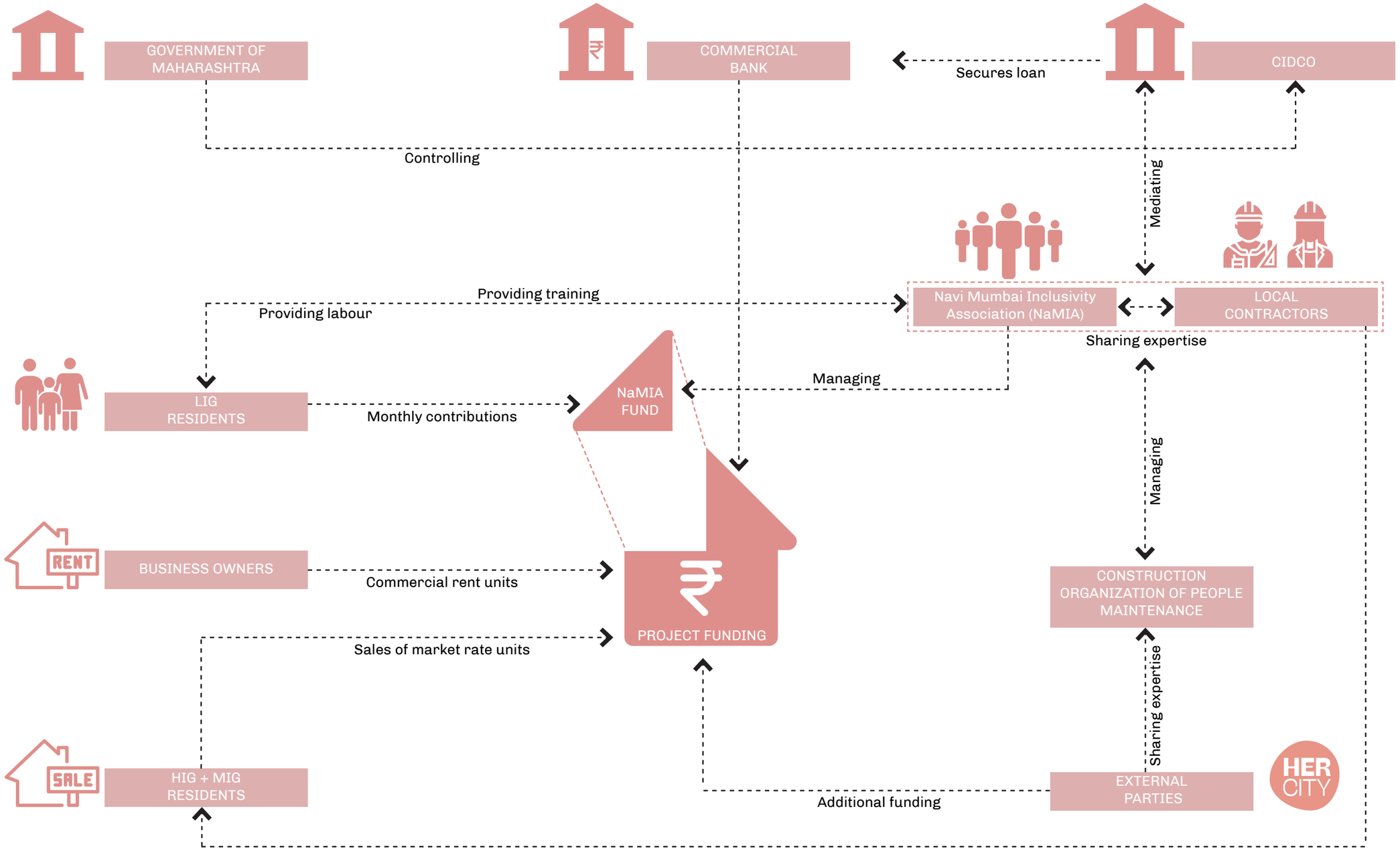
For the LIG typologies, the groups set up by the NMIA will work together to build the housing blocks creating a community network before even moving into the units which will only strengthen the community. Due to the low-tech design and local material choices, the future residents can be involved in the extraction of the materials on site, construction work as well as helping to provide lunches for all the workers on the building site. Local contractors and technical designers will be provided by NMIA.

People from the LIG can join the Navi Mumbai Inclusivity Association (NMIA) which can contribute to the construction work and reduce the costs for CIDCO which lowers the acquisition costs for the residents. As opposed to the current system, there will be social rent options as well as home ownership options to be more accessible for the poorest. A number of units of the MIG and HIG typologies can be sold on the commercial housing market and therefore cross-subsidize the social renting units for the LIG as it will generate a higher initial income for the development. CIDCO could then have a quicker return on the initial investment. The rent of the other units will allow a constant flow of income. The capital acquired from the NMIA will contribute to the funding of the project. The largest amount of funding will come from a loan from the Commercial Bank.

The possibility of external parties could be involved in the scheme such as Her City which could contribute in terms or providing more expertise as well as funding.

MANAGERIAL STRATEGY

POSSIBLE STRUCTURE



DISTRIBUTION OF INCOME GROUPS

TARGET ESTIMATE



EWS + LIG



60%



MIG



20%



HIG



20%



Starter home unit (incremental)



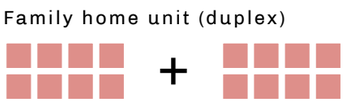
Live-work unit (duplex)



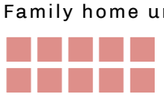
Intergenerational unit (duplex)



Starter home unit



Family home unit (duplex)



Family home unit



Family home unit (duplex)

DIVISION OF FUNCTIONS

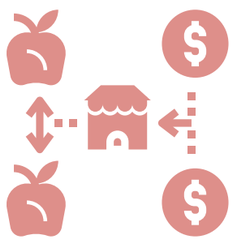
TARGET



SOCIAL INTEREST UNITS
50%



MARKET RATE UNITS
30%



OTHER UNITS
20%

DIVISION OF UNIT TYPES

COMMERCIAL UNITS

WORKSHOPS

NURSERY/CHILDCARE

LAUNDRY SPACES

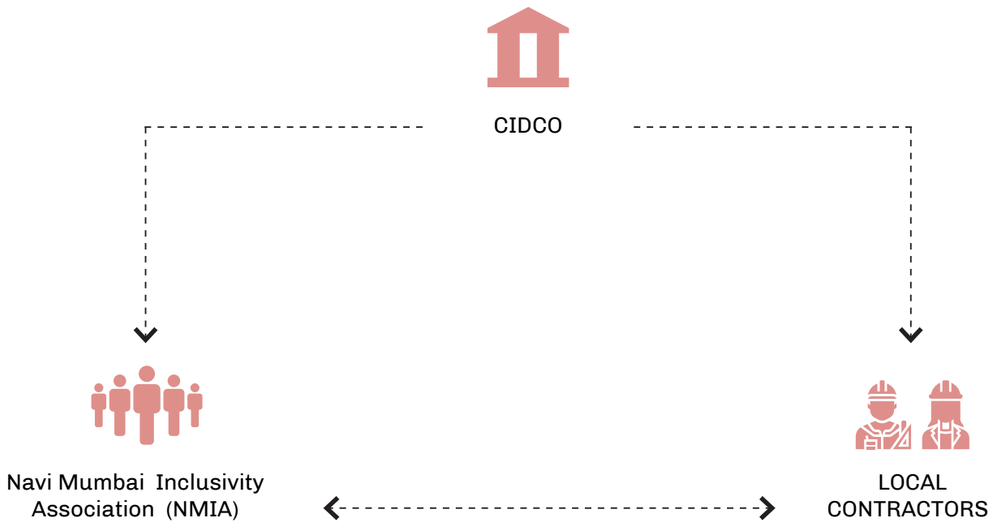
GYM/OUTDOOR SPORTS SPACES

CONVENIENCE STORES

OTHER UNITS (PUBLIC + PRIVATE)

SITE PHASING

PHASE 0 - ESTABLISHING NETWORKS



Before anything can start on site, the Navi Mumbai Inclusivity Association (NMIA) is set up for the area.

The number of potential buyers and future inhabitants of the dwellings is determined.

A network of local contractors is set up under CIDCO in communication with NMIA.

SITE PHASING

PHASE 1 - INFRASTRUCTURE



After the excavation and extraction of the useful soil for the CEBs, the site is divided into clusters and the car roads are built for transporting materials to the site. Each cluster will be set up with the necessary infrastructure. The largest squares in the area will be set.

Once these clusters are formed, the NMIA starts organizing the people involved along with the future inhabitants.

SITE PHASING

PHASE 2 - COMMUNITY BUILDING



In order to manage the project properly, the Community Centre where the NMIA is based is built first. Meetings with local government bodies, contractors and the public can take place here.

NMIA and SEWA will start having workshops in the public heart for the local people to get involved and start creating income generation opportunities even before the project is built.

This includes acquiring a number of manual CEB machines to start the brick making as well as the bamboo roof construction.

SITE PHASING

PHASE 3 - FIRST CLUSTER



In order to review how the project is carried out, a first cluster along the commercial lane will be built. Starting with the HIG typology.

SITE PHASING

PHASE 4 - EXPANSION OF NEXT CLUSTER



The next cluster is built going along the commercial lane, once starting with the HIG typology. A hospital is needed in the area, so this will also be constructed along with the new cluster.

SITE PHASING

PHASE 5 - EXPANSION TO OTHER SIDE OF MAIN ROAD



Another Community Centre is built on the main square of the site across the main road, along with the first small cluster on the border of the site.

SITE PHASING

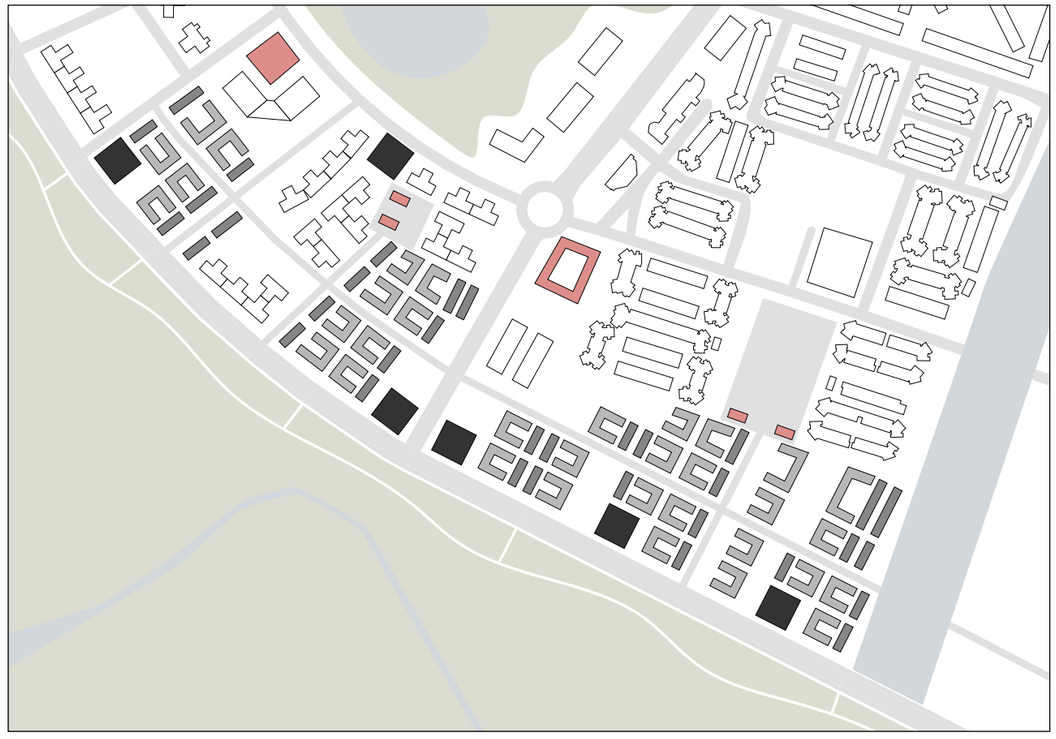
PHASE 6 - EXPANSION TO OTHER SIDE OF MAIN ROAD



The next large cluster is built. With the increase in density, a school is built at the top of the site.

SITE PHASING

PHASE 7 - FINAL CLUSTERS AND GROWING BUSINESS



The final cluster is built. The businesses on ground floor start to flourish and the commercial lane becomes an attraction point of the area.

Landscaping and maintenance is organized by the NMIA.

The protected mangroves are expanded all the way up to the site along with bridges extending into the area connecting to the new nature trail.

NEIGHBOURHOOD OVERVIEW

POSSIBLE NUMBERS

PLOT AREA = 10Ha

TOTAL CONSTRUCTED AREA = 133,950m^2

TOTAL GROUND FLOOR AREA = 8,930 m^2

FSI = 1.3

GSI = 0.09

NO. UNITS = 1,710

DENSITY = 171dw/ha

SITE OWNERSHIP = CIDCO

TENURE = HOME OWNERSHIP

TARGET GROUP = EWS, LIG

FUNCTIONS = RESIDENTIAL

DWELLING TYPES = 1

EXISTING PLOT

PLOT AREA = 10Ha

TOTAL CONSTRUCTED AREA = 197,614m^2

TOTAL GROUND FLOOR AREA = 20,002 m^2

FSI = 2

GSI = 0.2

NO. UNITS = 2,039

DENSITY = 204 dw/ha

SITE OWNERSHIP = CIDCO

TENURE = HOME OWNERSHIP
SOCIAL RENTAL

TARGET GROUP = EWS, LIG, MIG, HIG

FUNCTIONS = RESIDENTIAL, COMMERCIAL, COMMUNITY

DWELLING TYPES = 7

PROPOSED PLOT

TOTAL NO. DWELLINGS = 329

TOTAL CONSTRUCTED AREA = 63,664m^2

TOTAL GROUND FLOOR AREA = 11,072m^2

LIG/EWS DWELLINGS = 192 - 58%

MIG DWELLINGS = 77 - 23%

HIG DWELLINGS = 72 - 19%

ADDED

VII. REFLECTION

THE RELATIONSHIP BETWEEN RESEARCH & DESIGN

Even though the structure of the Global Housing Studio was set up in a way that the beginning phases were focused purely on research, the research ran throughout the entire project along with the constant reiterations of the design. Since we were not able to visit and experience life in Navi Mumbai in person due to Covid-19, research through literature and online sources became vital to my understanding and the development of my project. Social media became a crucial part of understanding the aspirations, lifestyles and challenges that people especially women face in the urban context of India. What was extremely useful were the active people and organizations on social media platforms such as Instagram including these profiles: @peopleplaceproject, @otherwarya, @theswaddle and @anarchytect. I was involved in a few Instagram Live discussions where I asked questions directly which really helped as I received first hand experiences of women living in Mumbai (unfortunately not specific to Navi Mumbai). A big part of my research in understanding the lives of women in India, specifically Mumbai, was the book *Why Loiter? Women and Risk on Mumbai Streets* by Shilpa Phadke which focused on women's safety in urban public spaces. With this book I was able to consider different aspects such as the importance of loitering in your own city and how women can have fun in public spaces. I was able to derive a set of gender sensitive principles from this book which I then implemented into all scales of the design from the urban to the individual dwelling. I was able to contact Shilpa Phadke directly thanks to a good friend of mine, Hersch Reddy, who initially put me in contact with a childhood friend of his from Mumbai who was active in the area of gender, sexuality and women's rights.

THE RELATIONSHIP BETWEEN THE PROJECT, THE STUDIO, MASTER TRACK & MASTER PROGRAM

The goal of the studio, Global Housing: Mixing Navi Mumbai, was to explore different approaches to deal with the housing challenges in Navi Mumbai. The project is supposed to result in an inclusive and affordable housing scheme in a chosen site of Navi Mumbai which can be replicable, covering each scale from the urban masterplan to the individual dwelling and it's materialization. The anthropocentric approach of the studio and placing the inhabitant's experience at the heart of the project from the urban to the detail scale was the reason I chose this studio. The understanding of different types of inhabitation is a crucial part of being an architect in any project and I believe the topic I chose allowed me to consider all the important aspects of how to approach a design. While my graduation topic focuses on a gender sensitive approach, I chose to address gender in terms of inclusiveness and not in a discriminatory way which could marginalize another gender or group of people. Gender equality is relevant everywhere across the world, therefore reconsidering the way we approach architectural design is imperative in order to be more aware than just providing for the able-bodied user with a one-size-fits all design. While design can only do so much, the role of the architect is vital since they have the power to repair and consolidate an existing situation. In order to complete this project all aspects of the project were considered including the environmental sustainability, building technology, the climatic response as well as the social and economic sustainability including a stakeholders analysis. Therefore, developing a long lasting, flexible and inclusive scheme for affordable housing can have a great impact on the social, economic, cultural and environmental aspects of a place.

RESEARCH METHOD, APPROACH & SCIENTIFIC RELEVANCE

In order to approach the investigation and answer my own research questions, a mixed methodology was used throughout the project. As mentioned in the first part of the reflection, a literature review was carried out in relation to my own topic as well as the wider topic of the studio.

Literature Review:

The importance and the definitions related to gender and the built form were looked at through various scholars work in order to establish a theoretical framework. This framework helped define the various lenses that the investigation looked through to provide a means of understanding by applying the concepts and therefore allowing for a design approach to be developed.

Case Studies:

The studio started with group work focused on analyzing housing precedents in Navi Mumbai. In terms of my own topic, there seemed to be very few examples of gender-sensitive affordable housing in Navi Mumbai and in India overall, which means that the investigation looked at positive models from abroad and saw how they could be implemented in the specific context of Navi Mumbai. Even though there is no specific project that focuses on gender inclusivity in India (Sundararajan, 2021), there are grassroots movements and initiatives that were studied which can aided the investigation such as: SPARC and Mahila Milan. These social initiatives were looked at in terms of the opportunities they offer, as well as a means of understanding the challenges that the people face from the lower income groups. The book *How to Build an Indian House: The Mumbai Example* by Sameep Padora was a key part of the research about the different housing typologies found in Mumbai.

Ethnographic Research:

As stated in the first part of this reflection, the trip to Navi Mumbai was not possible due to the Covid-19 pandemic therefore on-site ethnographic research was never carried out. The next best thing was having discussions with people from Navi Mumbai or in general India. I was able to talk to a student at TU Delft originally from Mumbai who had also worked with Sameep Padora. She gave great insights into the different inhabitation patterns of people in the city and more specifically the typical spatial layouts of dwellings. Since the first hand interviews and talks I had wanted to set up in the beginning of the research were not possible, it was at times difficult to find clear information on how people live, especially those from the Economically Weaker Sector. Therefore, I had to rely on online sources and literature a lot more than I would have if I had been able to visit.

Relevance:

Why should a gender-sensitive approach be taken when looking at affordable housing in Navi Mumbai?

For far too long women have been side-lined and excluded from important decisions taken for the development of the cities they live in, job opportunities and in general access to safe public spaces. In India, women are the primary users of their homes and yet still only make up 20.5% of the population participating in the work force as opposed to the 76.1% of men (UN, 2020). It is not feasible to develop a sustainable and inclusive city when gender inequality is still so prominent in the work force which brings with it major barriers to human development.

There are various global and local (grassroots) movements trying to tackle this issue mentioned previously, including the Gender Equality (Goal 5) which is one of the 17 goals set up under the United Nations Sustainable Development Goals (SDGs) (UN, 2021). This goal is based on the fact that women are mostly discriminated against in economic activities throughout the world. This discrimination is fuelled by social exclusion found in social and cultural norms. HerCity is another urban initiative contributing to the UN's SDGs which touches upon goal 3: Health and Wellbeing, 5: Gender Equality, 10: Reducing Inequality, 11: Sustainable Cities and Communities, 16: Peace, Justice and Strong Institutions and 17: Partnerships (UN, 2021). There is enough proof that action is desperately needed to tackle the issues raised in this investigation and therefore we can use the knowledge that is already there, expand upon it and apply it to the socio-spatial design of Navi Mumbai.

Women's economic empowerment is intrinsically connected to poverty reduction since women are likely to invest more of their money into children and their communities (Dixon, 2018). Providing the adequate living and working conditions can increase the participation of women in the work force and therefore trigger growth and development for a more sustainable and inclusive Navi Mumbai.

RELATIONSHIP BETWEEN THE PROJECT & THE WIDER SOCIAL, PROFESSIONAL & SCIENTIFIC FRAMEWORK

As mentioned previously, the goal of the graduation studio was to design an affordable housing scheme which can be replicable. Therefore, the fundamentals of the project are set up in a way that they can be transferable to other parts of Navi Mumbai. Ideally, visiting Navi Mumbai would have provided a way to test whether the project could be suitable for the context. Having discussions with the different women's groups and associations would have provided me with more answers as to whether the project would really work and how they would implement things or change things in order to make a successful project. Since the whole basis of this project is a prototypical approach, it can be adjusted to different context just by using the fundamentals of each scale and therefore be successfully transferred to other sites.

ETHICAL ISSUES & DILEMMAS ENCOUNTERED DURING THE PROJECT

Starting off in the graduation studio was quite challenging since I had missed the first month of the studio work as I had started in a different studio. What triggered my decision to change to the Global Housing studio was the fact that I had completed the Global Housing MSc2 and thoroughly enjoyed the design approach of the studio. Starting another graduation studio made me realise that my interests in the architectural discipline resonate most with the Global Housing studio. I am grateful that my tutors had allowed for the studio switch quite late in the research phase and accommodated me to catch up with the research in a timely manner.

The most challenging part of the studio was understanding the context fully since the visit to Navi Mumbai was not possible. This definitely limited my own understanding of the site and the way people live. On the other hand, the alternative research I had done in order to get a proper understanding of these topics would probably not be carried out if I had been able to visit, so I think as a studio we made the best out of a difficult situation.

Since my target group was women from all of the different income groups, I had to make sure that my design was not purely focused on gender and more in terms of inclusivity. I chose to address gender in terms of inclusivity and not in a discriminatory way which could marginalize another gender or group of people.

CONCLUSION

To conclude, even though this is an academic project, it has definitely developed my understanding of architecture as a pragmatic discipline and made me consider parts of a project that I did not fully take into account in previous academic projects such as stakeholders and material flows. I am looking forward to further develop the project in the upcoming weeks specifically the architectural language of the typologies and key parts of the masterplan. I would like to focus on telling the story of the project from the perspective of a woman from the Low Income Group, showing her path starting in the morning getting out of her bed to her place of work. I would like to achieve a set of images showing how she experiences space from her private dwelling to public space, which could tell the story of how the project could be successful according to my goals and gender sensitive design principles.

Even though my own experience of navigating space as a woman is completely different to those in Navi Mumbai, there are similarities of feeling unsafe especially at night. This topic is very important to me as I believe architecture and specifically the design of public space needs to drastically change in order to accommodate the input of women and other marginalized groups of people. I believe in the end, Shilpa Phadke sums it up perfectly in stating “Women’s access to public space is fundamentally linked to the access to all citizens”((Phadke, Khan & Ranade, 2011).

CURRENT SITUATION

PERSPECTIVE



FUTURE POSSIBILITY

PERSPECTIVE



FUTURE POSSIBILITY

PERSPECTIVE

