

A Framework for Resilient Communities

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*An alternative strategy to the current
affordable housing developments
for the urban poor in suburban Mumbai*



Motivation

The demand for housing to be available, affordable and adequate, is a growing issue worldwide, as the urban population has surpassed the rural population and more people move into the cities. Not only within the developing third world countries, but also in advanced economies such as Norway this demand is difficult to meet.

Following my internship in an architecture office in Oslo, I developed an interest in the housing development there and how the market-driven forces today affect the housing projects and urban environments being built for the future.

Due to this, I decided to focus my history thesis, in the MSc 2, on this subject and to write about the history of the housing development in Oslo and how the liberalization of the economy in the 1990s led to a market-driven housing development focused on efficiency and profit, neglecting the quality of usability and adaptability.

For the choice of my graduation studio, I therefore found the studio of Global Housing: Mixing Mumbai, interesting due to the focus on this issue in one of the most populated cities in the world, Mumbai.

By choosing this graduation studio I wished to learn more about the critical challenges and issues related to affordable housing, than what I had previously learned to know from the housing development in Norway. The studio has further enriched my knowledge by challenging me to investigate the most critical and extreme issues, present within many of the developing third world countries today, such as India.

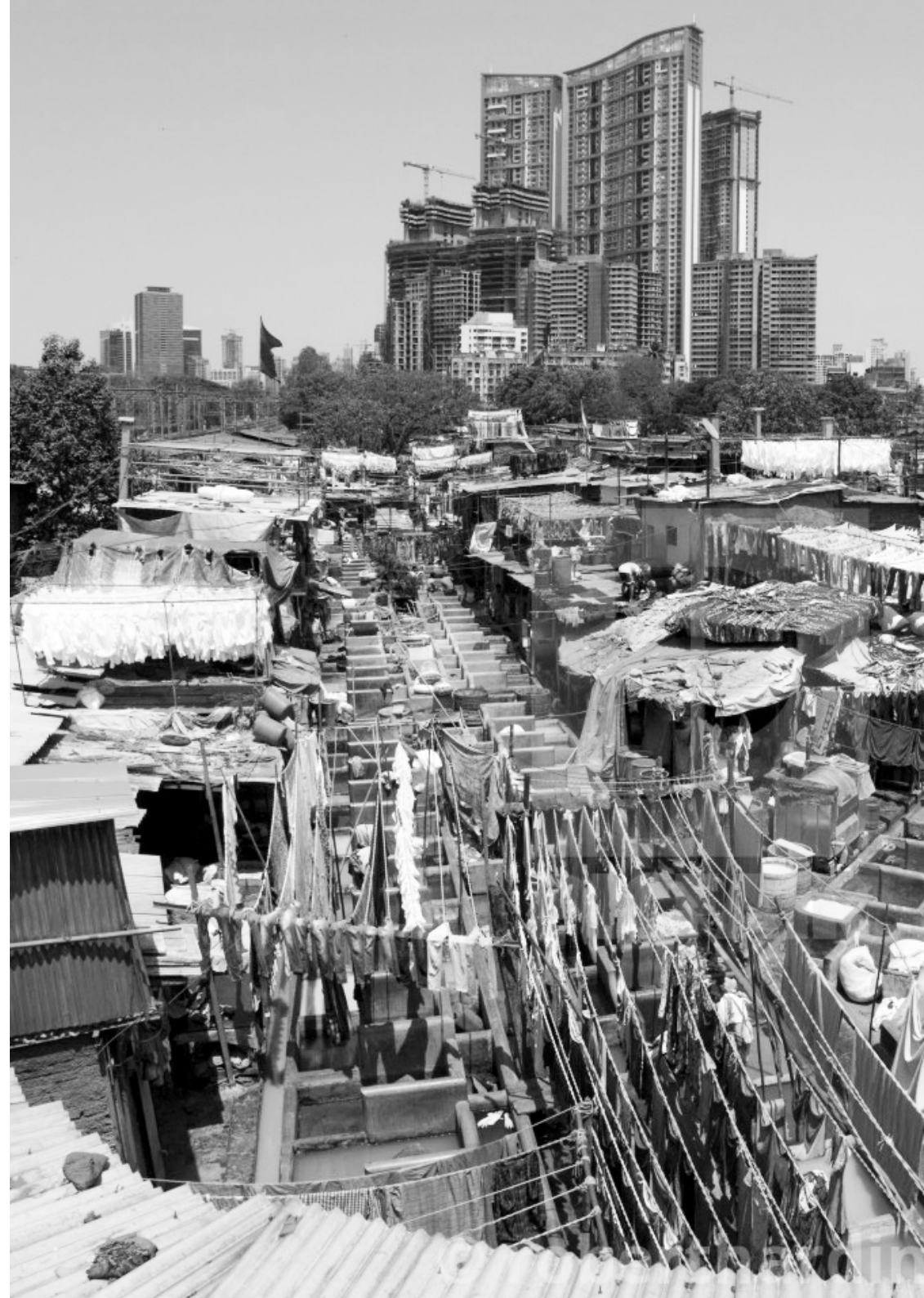
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01 Introduction

In 2008, for the first time, the urban population surpassed the rural population worldwide. By 2025, estimations show that the global affordable housing gap will affect one in three urban dwellers, about 1.6 billion people.

Today, cities in both developing and advanced economies around the world, struggle to meet the demand for affordable housing. As people migrate to cities from rural areas, a constant change in cultural and social needs, challenges the way affordable housing is being built today.



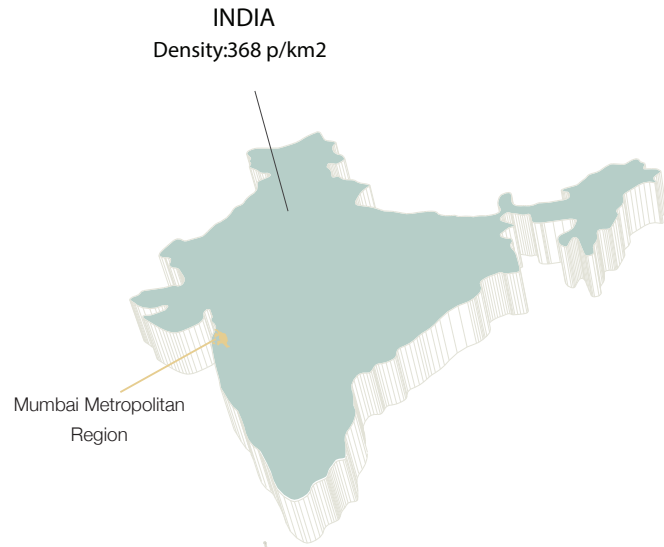
02 Background

India is on its way of becoming the world's most populous country and is expected to have around 1.5 billion inhabitants, by 2030.



Background

Population Density



Population Density

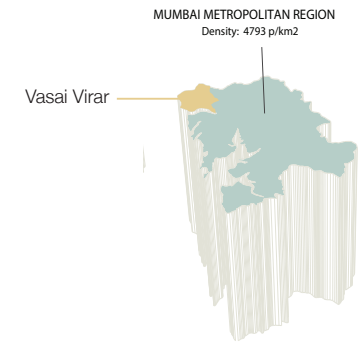
India is currently the world's second most populated country, with nearly a fifth of the world population. India is on its way of becoming the world's most populous country by 2024 and is expected to have around 1.5 billion inhabitants by 2030. The population density in India is above average, ranking it amongst the top 20 most dense countries in the world.

Background

Population Density

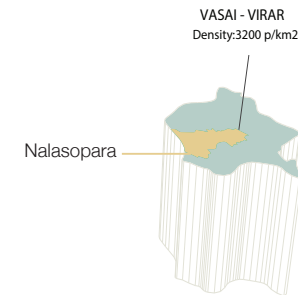
Mumbai Metropolitan Region

Mumbai Metropolitan Region currently has a population of around 23 million and positions itself in the top 15 most populous metropolitan areas in the world. The growth rate in the center of the region has decreased to around 0.4% per annum.



Vasai Virar

The population in Vasai Virar is currently around 1.5 million. There has been a spike in the growth rate from 2012 on with the population increasing by 4% each year.



Nalasopara

Around 30 % of the inhabitants in Vasai Virar live on less than 11% of the total area in the district, within the town of Nalasopara. The population in Nalasopara was around 460 000 during census 2011.



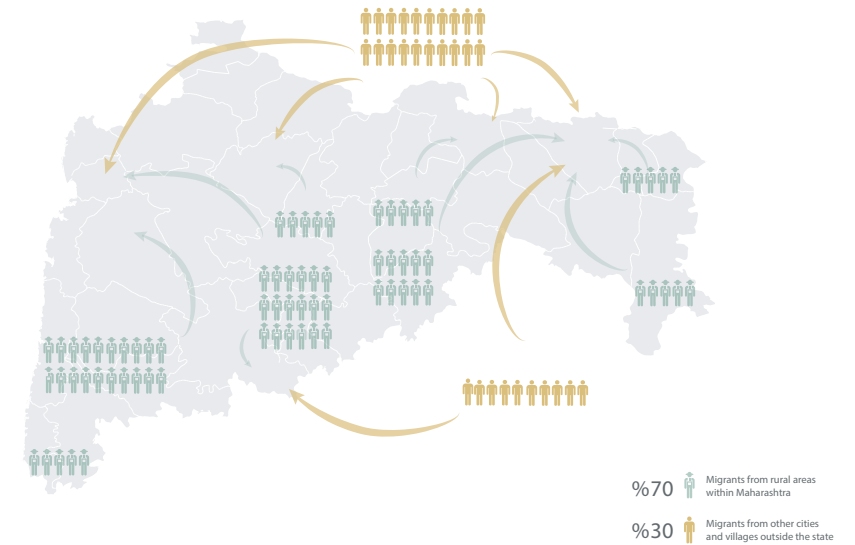
Background Migration



Migration

India as a whole is about 30% urbanized, while the state of Maharashtra is 45% urbanized (MOHUA, 2018). There is a clear trend of southward migration, where people from the less affluent Northern states make their way to more affluent states. The majority of these internal migrants come from rural areas often looking for jobs in the larger cities (Census 2011).

Background Migration



In the state of Maharashtra, the overwhelming majority of migrants moving to the big cities are people from within the state, usually living in rural areas. The other 30% are migrants from other parts of the country (Census 2011).

Background Occupation

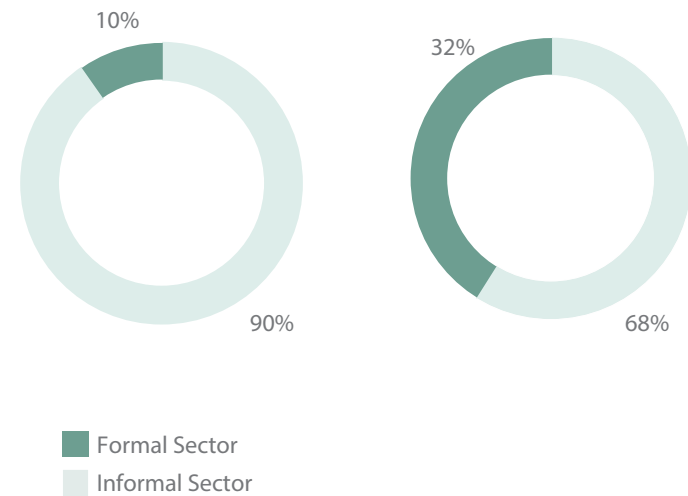


Image: Ghevaria, Kunal.

De-industrialization

In the 1970s, India witnessed a de-industrialization which left the majority of the many textile mills in Mumbai closed. The share of the manufacturing sector employment was reduced from 43.8% to 28.5% between 1971-91. Formal employment could not fill the gaps created by the loss of the manufacturing employment, which multiplied small businesses in the informal sector for generating more jobs.

Background Occupation



Occupation

In 2017, only 10% of India's workforce was registered within the formal sector. The leading contributors of the informal employment are today agriculture, manufacturing, construction and trade. According to the report of the Committee on Unorganized Sector Statistics, the informal economy makes a considerable contribution to the economy in India (Census 2011).

Background Households

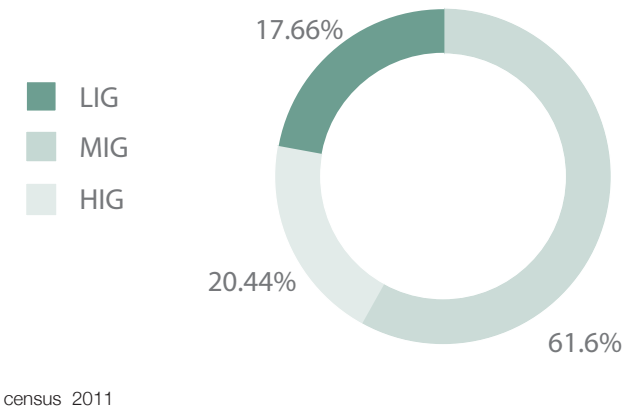


census 2011

Households

The average number of children in India is three per household, while in the Mumbai Metropolitan Region an average household has two children (Census 2011).

Background Income Groups



Income Groups

Out of total 228.4 million households in India at the end of 2010, 20.44 % were high income households, 61.6% were middle income and 17.96 were low income households. Middle income groups are thereby the largest income group in modern India, as well as the largest consumer group for housing. The affordable housing sector is the fastest growing segment in India, and there is a need for a paradigm shift of affordable housing tailored to the aspirations of the middle class living style (Census 2011).

Background

Middle Income Group

Background

Middle Income Group

Middle Income Group

According to a study (2017), the middle class is defined as those living on between \$2 (£1.52) to \$10 per person per day and have broken down the middle class into two - the lower middle (living on \$2-\$4 per person per day) and upper middle (living on \$6-10 per person per day). According to the study, more than two-thirds of the middle class lies within the lower half.

Those who are moving out of poverty are most likely to find their first opportunities in the informal sector, characterized by relatively few barriers to entry. The majority are therefore in sectors with low barriers to entry meaning that in theory anyone can work in them and pull themselves out of poverty. The MIG newcomers therefore include among others carpenters, street vendors, wall painters, drivers and more, according to a separate study of 789 Mumbai households (Research Unit for Political Economy, 2015).





Background

Built Density



Density

Mumbai is the most dense city in India and among the 5 most dense cities in the world. The city is located on a narrow peninsula bound by water, limiting the city's ability to expand. This has led to high-densities and increasing land-values, affecting real estate prices and the availability of affordable housing.

Background

Housing Vacancy



Image: Reuters

Housing Vacancy

The number of vacant properties in Mumbai and the amount of people living in slums has increased. According to estimations, 12 million houses lay vacant in India, while there is an estimated housing shortage of 20 million homes and as per the 2011 census 13.7 million households in Indian cities live in slums.

Background

Market-driven Housing



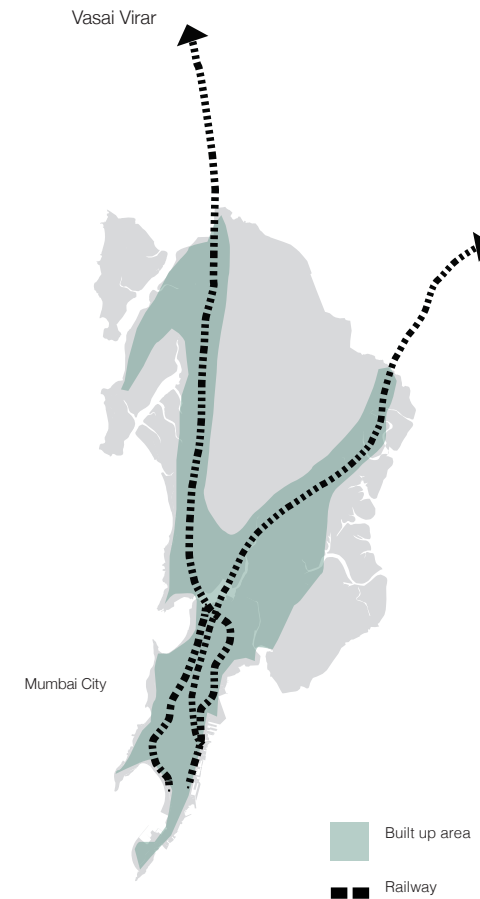
Image: Datta, Arko.

Market-driven Housing Development

During the past two to three decades, since the start of the market-driven housing development, policy making in India has mainly concerned itself with numbers trying to feed the demand and developers have been taking advantage of the housing shortage crisis in order to gain profit. The main purpose has been to house as many dwellers as possible, with the lowest possible investment. In spite of the continuous efforts by the government, slum dwellers are reluctant to move to the houses built by the government due to lack of proper infrastructure and means of livelihood.



Background Urban Development

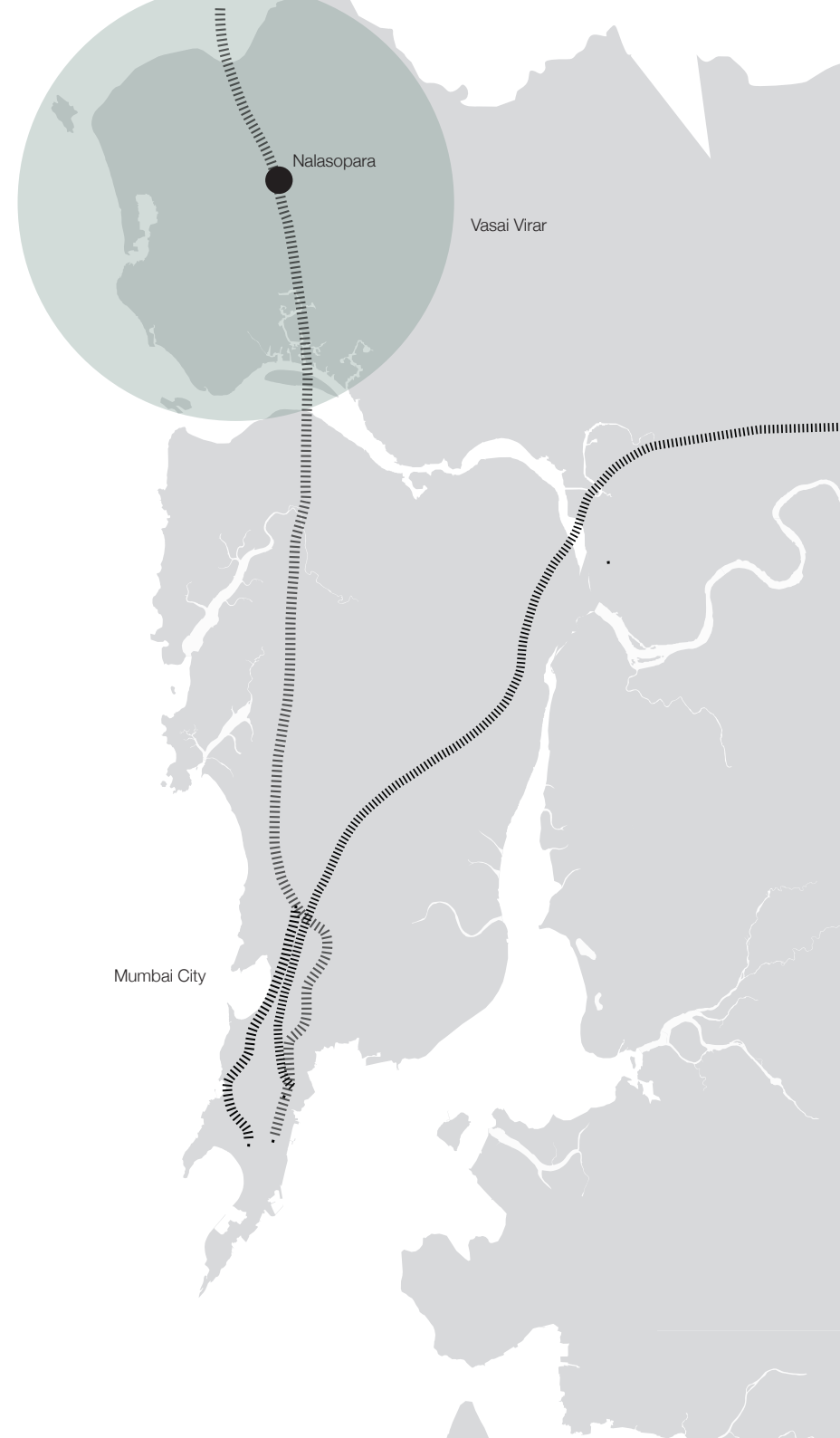


Urban Development

The lack of affordable housing in the Island City, combined with the affordability of public transport, has led to the city's expansion along the railway corridors towards the north. The district of Vasai Virar lies 30 km north of Mumbai city, along the Western Railway track.

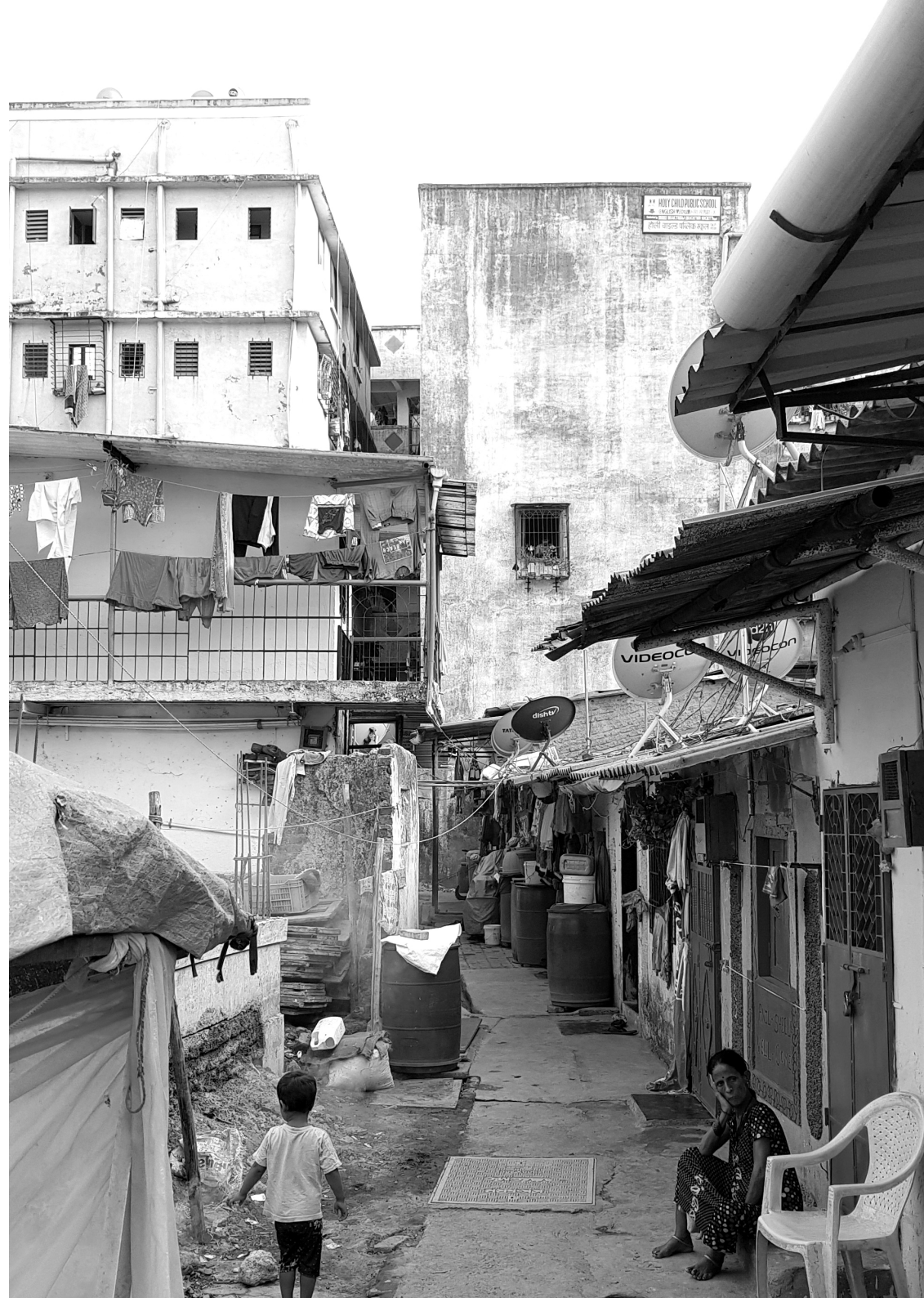
Background

Urban Development



The district of Vasai Virar lies 30 km north of Mumbai city, along the Western Railway track.

03 Problem Statement





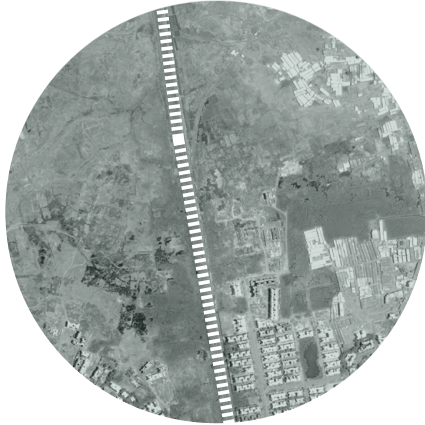
Problem Statement

Market-driven development

In the 1990s, India experienced an economic liberalization. This marked the start of a market-driven housing development and the development of housing for profit. The market-driven housing development, along with the rapid urbanization and population growth, has led to problematic development trends in affordable housing for the urban poor in Nalasopara.

Problem Statement

Previous Development



2002

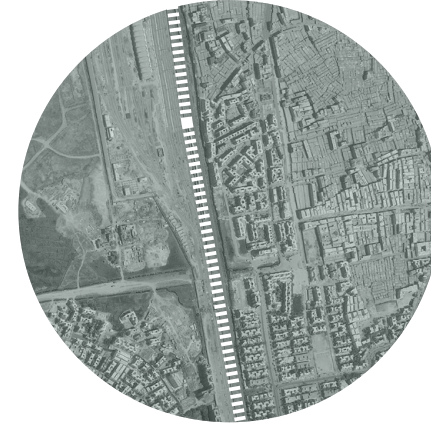


2006

Less than 20 years ago, low-rise Baithi Chawl communities surrounded by green fields, formed the majority of the urban fabric in Nalasopara.

Problem Statement

Previous Development



2011



Today

During the past two decades, Nalasopara, has experienced a rapid urban growth leaving large areas dominated by dense urban developments.

Problem Statement
Previous Development



2002



2006

Problem Statement
Previous Development



2011



Today

Problem Statement
Previous Development



2002



2006

Problem Statement
Previous Development



2011



Today

Problem Statement
Previous Development



2002



2006

Problem Statement
Previous Development



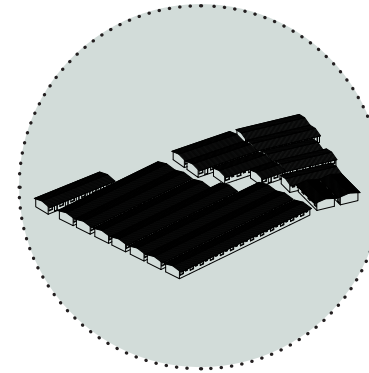
2011



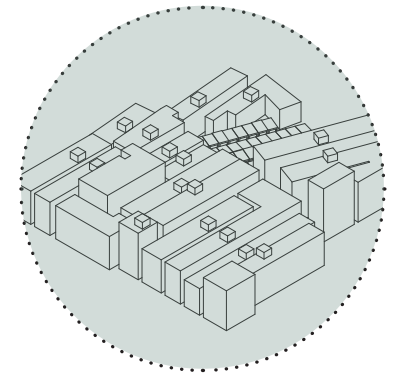
Today

Problem Statement

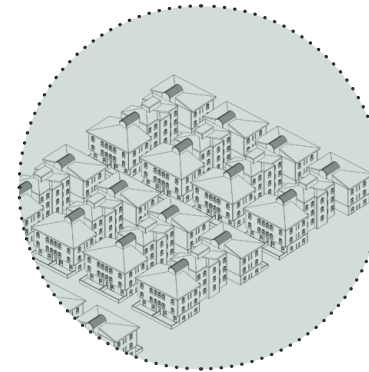
Development Trends



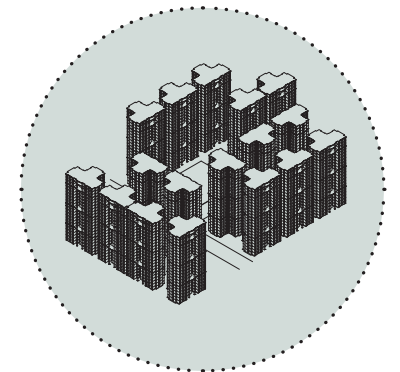
1 Baithi Chawls



2 'Handshake' Chawls



3 Mid-rise Buildings



4 High-rise Buildings

Today, the East dominated by low-rise Baithi Chawls and mid-rise 'Handshake Chawls' and the West, with high-rise and mid-rise developments.

Problem Statement

Baithi Chawls

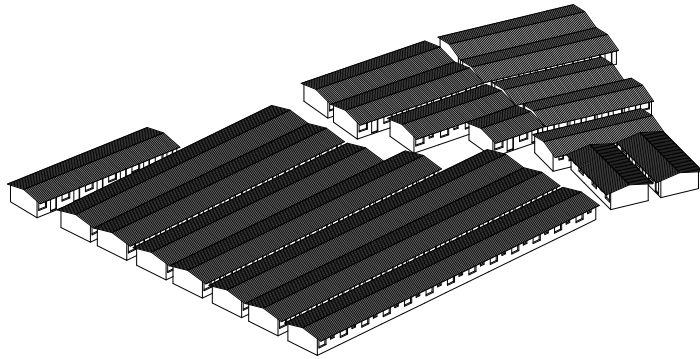


Image: Mixing Mumbai.

1 Low-rise Baithi Chawls

Low-rise developments, like the Baithi Chawls, are small one-roomed houses, attached and organized densely in rows. The rows are twisted and adjusted to fit as many as possible within the area of a plot, ignoring basic infrastructures such as roads and open space.

Shared communal space between two rows of Baithi Chawls.



Problem Statement

'Handshake' Chawls

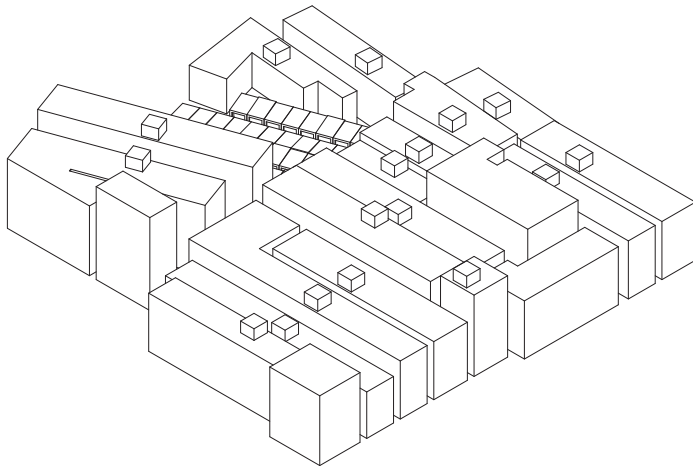


Image: Mixing Mumbai

2 Mid-rise 'Handshake' Chawls

Mid-rise developments, like the 'Handshake' Chawls, are illegal 4-5 story buildings, which have been built in a similar layout as the Baithi Chawls, twisted and adjusted to fit the area of a plot. The 'Handshake' Chawls, have been developed on green fields, as well as replacing former low-rise Baithi Chawls in redevelopments. Similar to the Baithi Chawls, the 'Handshake' Chawls lack basic infrastructure and provide poor living conditions.

Narrow and dark alley in-between two 'handshake' chawls.



Problem Statement

Mid-rise Buildings



3 Mid-rise / Sri Prashta

Mid-rise developments, such as Sri Prashta, are often organized in a repetitive grid pattern with the same block rubber stamped across the area of a plot. The projects are usually developed as 'isolated islands' on green fields with no relation to the existing built context of Nalasopara.



Paved courtyard between two buildings in Sri Prashta.

Problem Statement

High-rise Buildings



Image: Mixing Mumbai.

4 High-rise / MHADA Society

High-rise developments, such as the MHADA Society, is based on an urban strategy similar to the mid-rise, of rubber stamping a singular building type across the area of a plot. These developments are also often based on a stacking system where the same floor plan and unit type is repeated on every floor. The program of the buildings are often only residential leaving the ground floors empty without life and income opportunities. Similar to the Sri Prashta mid-rise project, this type of developments are often also developed as "isolated islands" on green fields, lacking relation to the existing built context of Nalasopara.



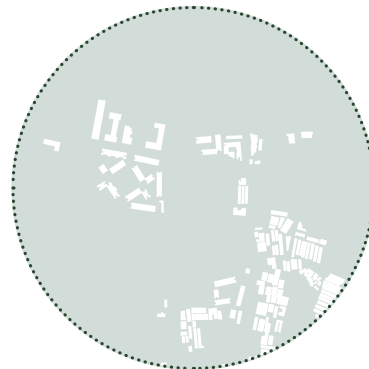
No relation to the ground in MHADA Society.

Problem Statement

Main Urban Problem



Poor infrastructure

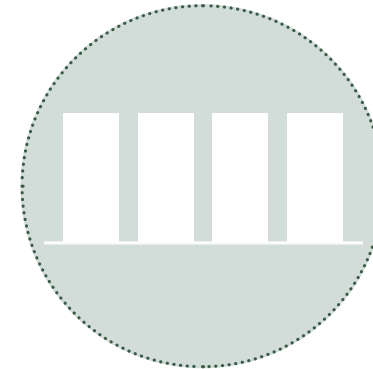


Isolated Developments

The poor infrastructure in the Eastern parts of the town, has led to an extremely dense urban fabric that today suffers from the lack of open space, green areas and defined street profiles. In the western part, isolated developments on green fields have been developed failing to integrate and connect with its physical context.

Problem Statement

Main Building Problem



Buildings Rubber Stamped



Singular unit stacked as
storage Boxes

The buildings being developed today are often uniform with the use of a single typology, which lack diversity and create monotone urban living environments. The buildings are often standardized without any adaptability to different site contexts, such as roads. Units are often standardized, copy pasted and cramped, without the ability to adapt to changing user needs.



Problem Statement

...the main focus has been “on **efficiency** (building quickly and cheaply), overlooking the **resilience** of the new communities.”

Global Housing, course manual

04 Research



Research Question

How to contribute to a change in the current affordable housing development for the urban poor in Nalasopara, by developing a framework for living and resilient communities?

- 1** What are the trends of development in affordable housing in Nalasopara and what problems have they led to?
- 2** What are the patterns of social and cultural practices in Nalasopara today?
- 3** How can elements and spatial components in architecture and urban space be designed for the different social and cultural practices in Nalasopara today, while leaving space for adaptation to future changing needs?
- 4** What are the key aspects to consolidate a resilient community of urban poor in suburban Mumbai?



As designers, we have no control over the people and their activities or needs, however we can make a difference by creating the spaces they inhabit and use in a place. To be able to explore a possible strategy for the research question, the graduation project recognizes the importance of understanding the existing activities and patterns of inhabitation of the people first, in order to create architectural and urban spaces that cater for the various needs.

Patterns of Inhabitation

Nalasopara East

In the research six different themes, relating to patterns of inhabitation, have been investigated:

- 1 Amenities
- 2 Domestic Activities
- 3 Social Activities
- 4 Income Generation
- 5 Building Technology
- 6 Borders



Method: Ethnography

Ethnography is a qualitative research method used to observe social and cultural practices, as well as describing and interpreting your observations. Historically, ethnographic research has been seen as a process of studying a particular place for a longer period of time. However, this can be challenging when there is a limit to the amount of time available for the research.

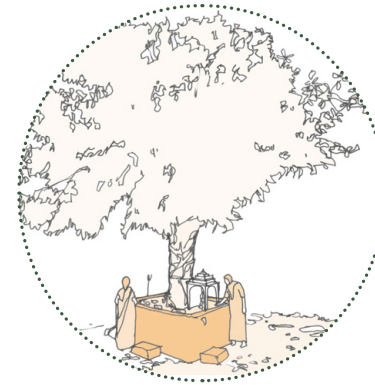
Micro-ethnography is an approach commonly adopted instead. This approach, shares the same characteristics as the long-term ethnographic method, with field research, participant observation, interviews, but focuses more specifically on a site, a community and a certain problem for a shorter period of time.

Visual micro-ethnography is used to present the research visually. As a participant observer, photography, video and interviews, were used to document my observations during the field research. The results of the study were later illustrated by a series of drawings, relating to different themes, accompanied by a title and an extended description. The drawings and texts were finally compelled into a 'Book of Patterns', to be used as a guide for further research and designing.



1 Amenities Main Observation

Apart from the larger amenities like public schools and hospitals there are many smaller ones found locally. Examples relate to religion, education and health and commerce.



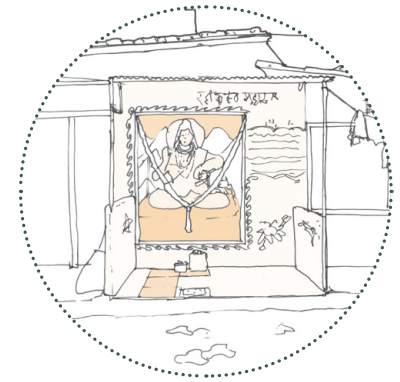
Tree temple



Small Clinic



Local temple



Shrine

2 Domestic Main Observation

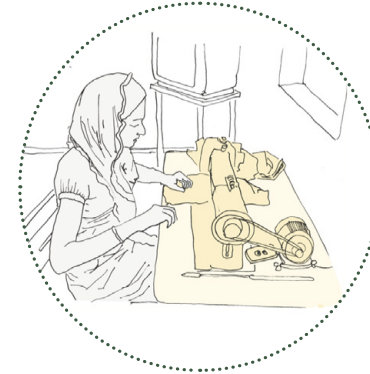
The importance of having adjacent external spaces as an extension of the dwelling. The use of the dwelling as a working environment during the day and a place to sleep during the night.



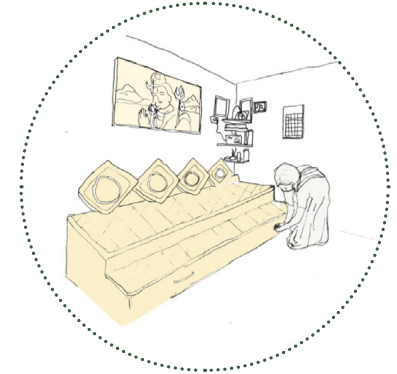
Food preparations



Drying clothes



Day-time



Night-time

3 Social Main Observation

The spatial components and elements that cater for social activities in Nalasopara today are diverse and generic, in the sense that they are not designed to fit a specific function. This often allows more than one activity to occur synchronously in the same space.



The ota



Circulation galleries



Raised plinth



Multipurpose alter



Smaller open space



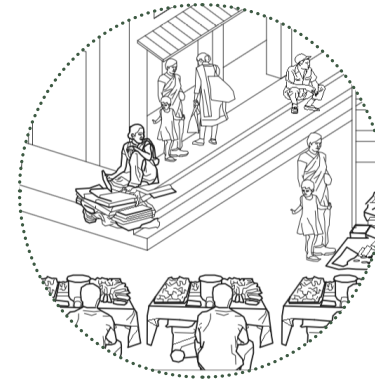
Large open space

Illustrations by Pavlo Gorokhovskiy,
Natascha Lüth, Gonzalo Zylbermann

4 Income Generation

Main Observation

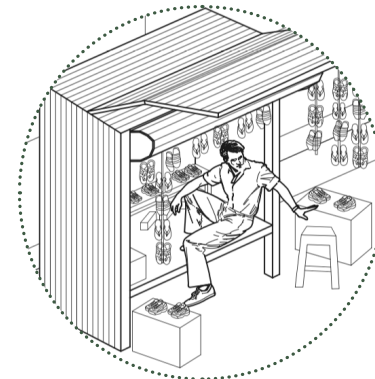
Although many people commute by train to the city of Mumbai to work every day, there are still many activities on income generation present in Nalasopara. These are both informal and formal and can be seen everywhere, from the inside of a private dwelling to the outside on the streets.



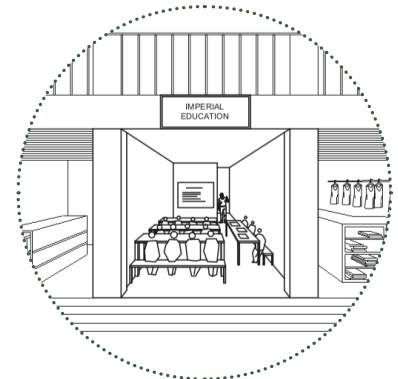
Informal corner



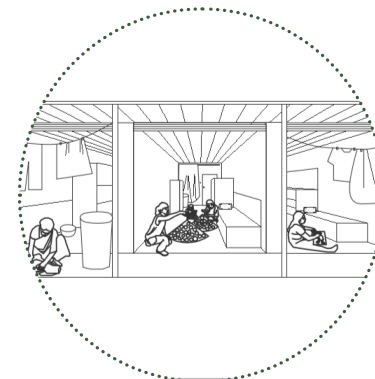
Market



Pop-up stalls



Tutoring and Commercial



Working from home



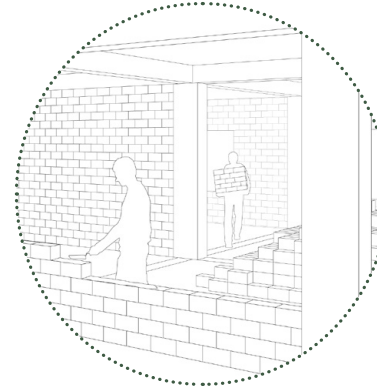
Mixed-use

Illustrations by Jennifer Nam,
Matthew Riches, Biling Yang

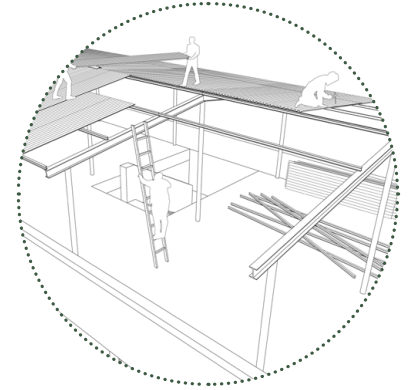
5 Building Technology

Main Observation

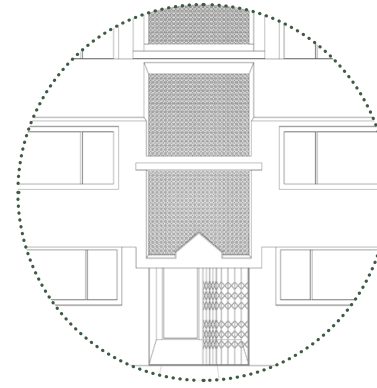
Nalasopara is a town facing rapid construction today. Whether it is for the structure of a new building or the adaptations, the use of local materials and methods are widely practiced.



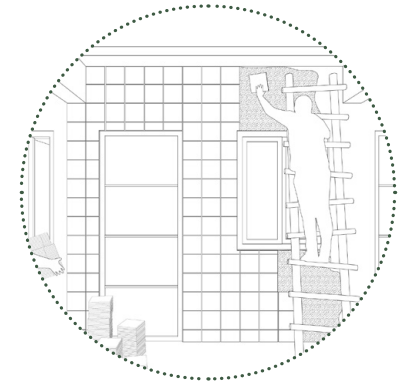
Structure



Roof



Openings

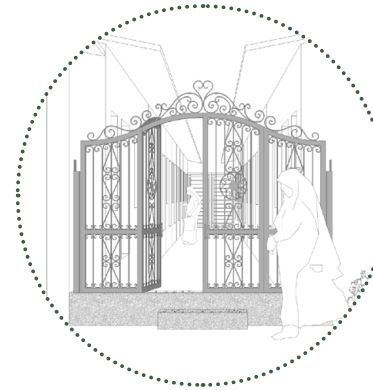


Finishes

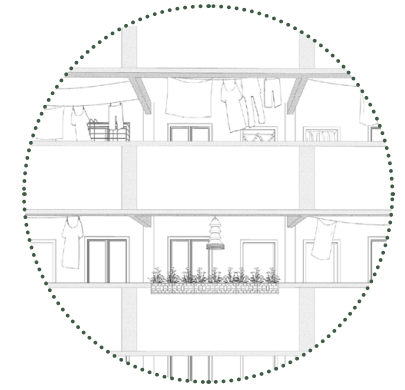
6 Borders Main Observation

Although there are many borders, these are usually left open. They therefore act more as a “marker of territory” than a boundary that closes people off.

Illustrations by Dennis Musalim,
Sijia Wang, Wong Quin Ee Queenie



Society Gate

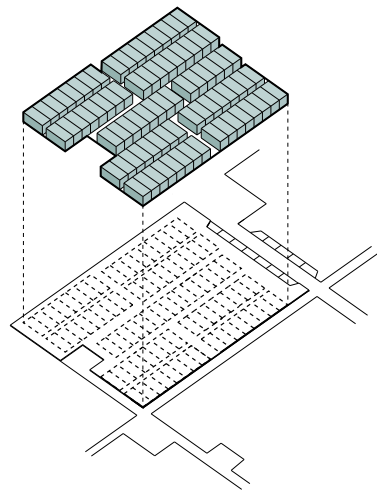


Painted Surfaces



Curtains

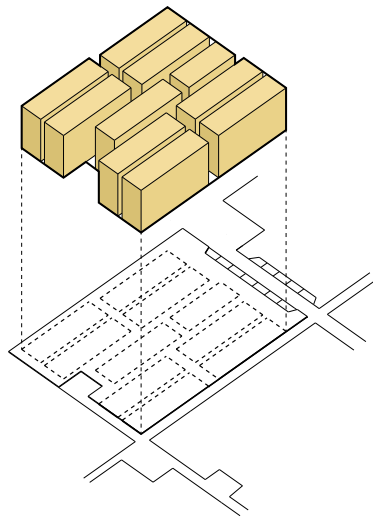
Research
Density



Low-rise / Baithi Chawls

FSI: 0.6

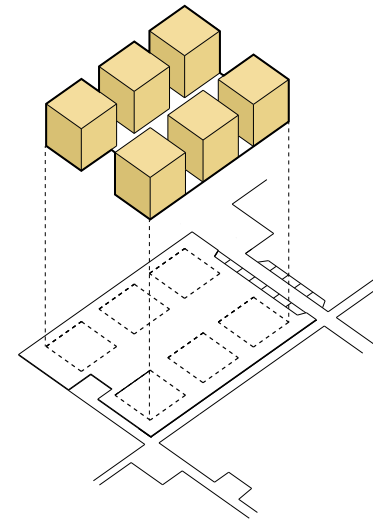
UNITS/hectare: 355



Mid-rise / 'Handshake' Chawls

FSI: 3-4

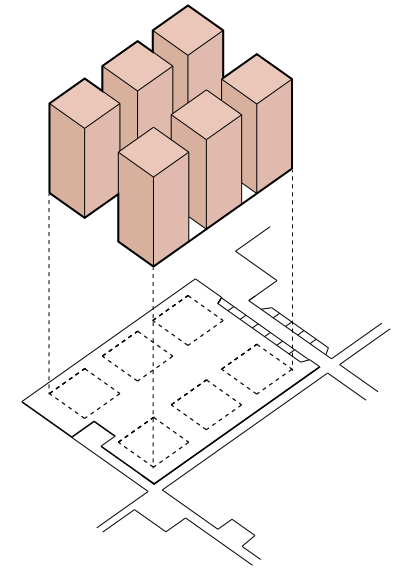
UNITS/hectare: 837



Mid-rise / Sri Prashta

FSI: 1.5

UNITS/hectare: 170



High-rise / MHADA

FSI: up to 5

UNITS/hectare: unknown

Research
Density

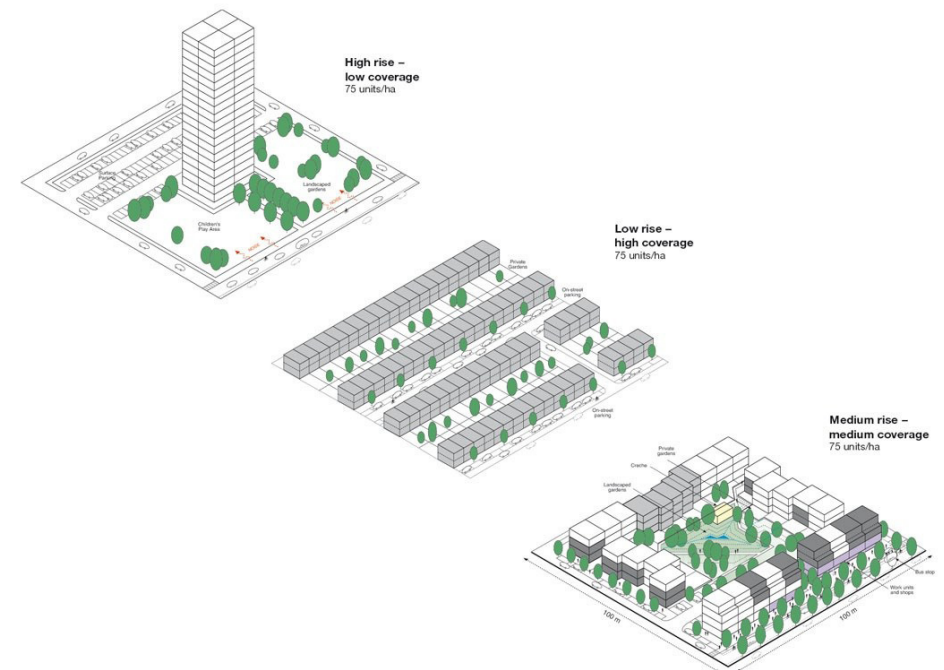
The following density norms, with corresponding category of dwelling units (DU) have been stipulated in the Delhi Master Plan-2021:

- Slum/EWS housing (to 30 sq.m)
- 600 to 900DUs/Ha
- Category I (above 30 to 40 sq.m)
- 500 DUs/Ha
- Category II (above 40 to 80 sq.m) -
250 DUs/Ha
- Category III (above 80 sq.m)
-175 DUs/Ha

(ref. taken from delhi master plan -2021)

Density norms

The recommended density in DUs/Ha varies depending on the unit sizes and thereby the income group that the project aims to cater for. In a mixed scheme an optimum density should therefore try to find a balance between the different categories.



One Density, three forms.

The perimeter/courtyard block is found to provide the best balance between built density and open space.

Community... is defined as “a small or large social unit that has something in common such as religion, values or identity. Communities often share a sense of place that is situated in a given geographical area.”

The Oxford Dictionaries

However, in cities and urban environments today, it is often only the geographical area, the place, that people in a community share due to the rapid urbanization and flows of migration.

Community = people sharing place



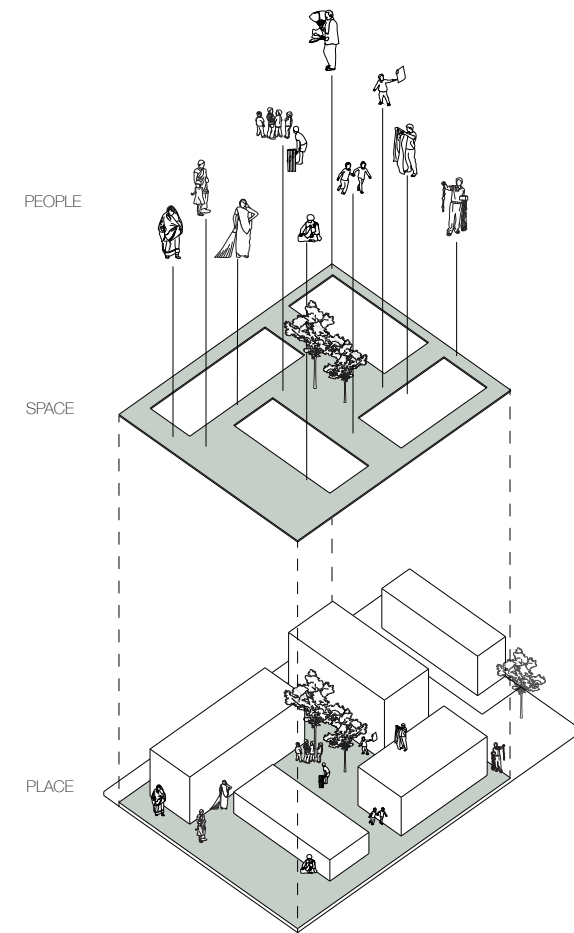
Research
Theoretical Research



In his book 'The Concept of Dwelling', Christian Norberg-Schulz discusses the importance of understanding the qualitative concept of the dwelling in relation to a larger place and states that,

“to dwell means to belong to a given place.”

Research
Theoretical Research



Space, Place, People

A place can be defined by its people and its spaces, and how these two coexist and create place.

Research

Theoretical Research

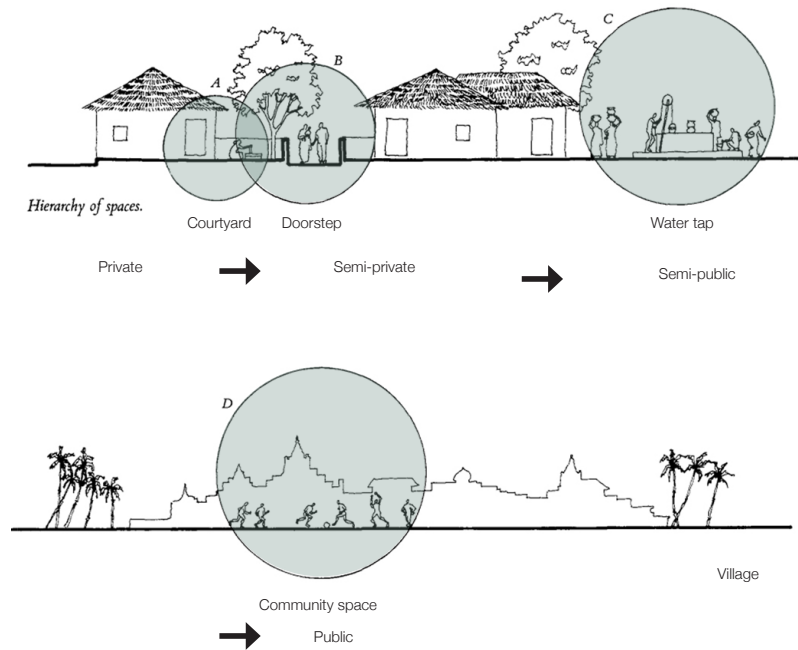


Image: Correa, C. (1989)

Urban Living

Charles Correa explains in his book, 'The New Landscape', that "urban living involves much more than just the use of a small room of, say, 10 square meters. The room, the cell, is only one element in the **whole system of spaces that people need.**" The system, Correa explains, is generally hierarchical, going from the **private to the public** realm.

Research

Theoretical Research

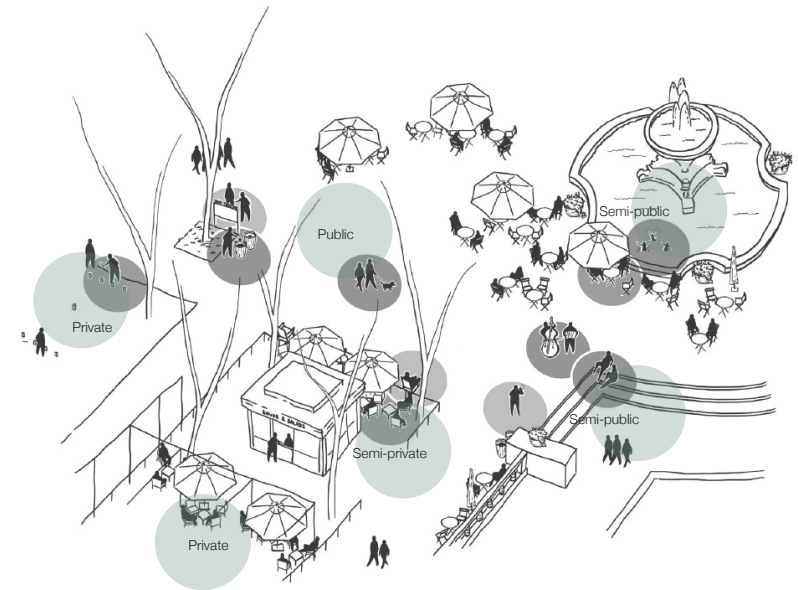


Image: Project for Public Spaces (2018)

In cities today, you most often don't have one single line of spaces within a hierarchal system like shown in Correass diagram, it is more complex. If you take the principle of Charles Correass hierarchy of spaces and compare it to an urban square in a city today , you might find that one person may be somewhere in-between the private realm and the public realm while another is simultaneously, within the private realm. In the city you therefore have a multi layered hierarchal system of synchronous activities.

Research

Theoretical Research

Placemaking

Successful public spaces are used by many different people for many different purposes at many different times of the day and the year. Public space is for buying and selling, or for meeting, playing and bumping into one another. To be successful an urban environment should thrive to create destinations (Project for Public Spaces, 2018).



A destination and its Places

Destinations are needed to give identity to their communities and attract future residents, businesses and investment. A destination can be seen as an amenity or open space and could be a square, a main street or a park etc. All urban environments should have at least 10 destinations where people want to be (Project for Public Spaces, 2018).

Research

Theoretical Research

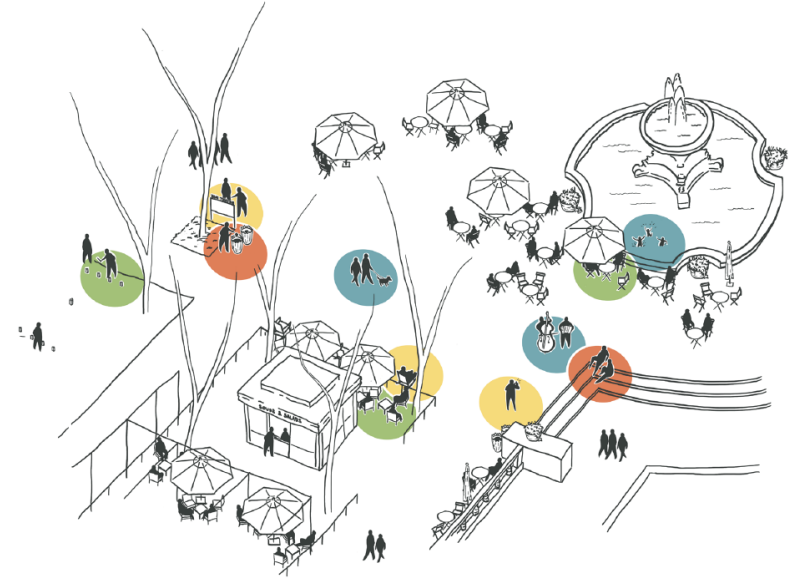


Image: Project for Public Spaces (2018)

A place and its activities

What makes each destination successful is that it has multiple places within it. For example, a square, needs at least 10 places: a café, a children play area, a place to read the paper or drink coffee, a place to also sit, somewhere to meet friends etc. Within each of the places, there should be at least 10 things to do simultaneously (Project for Public Spaces, 2018).



Research

Theoretical Research

A tight fit between form and function is an example of a 'closed' city. As history changes a tight fit might not be fit for the new function.

Rephrased from lecture by Richard Sennett, Rotterdam 2018.

As things change over time, communities must be able to adapt and change with them. Many aspects related to the people, cannot be planned in advance. The graduation project therefore aims at creating architectural and urban spaces that cater for the different activities of the people in Nalasopara today, while allowing for a degree of ambiguity and openness for change, in these activities in the future.

“In Nature, ecosystems have survived over time by adjusting to changing circumstances resulting in a search for equilibrium between two opposing poles, of efficiency and resilience.”

Jan Bredeoord, Paul van Lindert, Peer Smets

“...urban spaces are connected mosaics of green space, biodiversity (including people), non-biological structure, biophysical processes, energy flows, and so on. That sounds a lot like a natural ecosystem.”

David Maddox



Efficiency

“achieving maximum productivity with minimum wasted effort or expense.”

The Oxford Dictionaries



The **structure** of a system.

Resilience

“...refers to the capacity of a system to absorb disturbance and reorganize while undergoing change, so as to retain essentially the same structure.”

Bredenoord et al., 2014



The ability of a system **to adapt** to change.



Resilient Communities

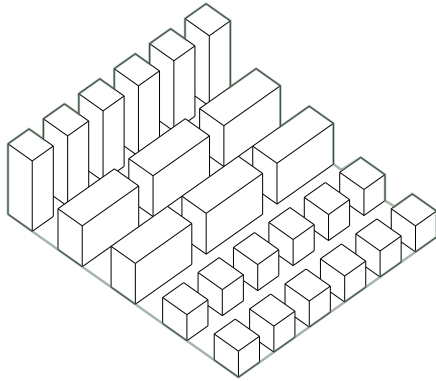
The need of a whole system of spaces, from public to private in a community, to withstand change by adapting to it.

05 Design Hypothesis



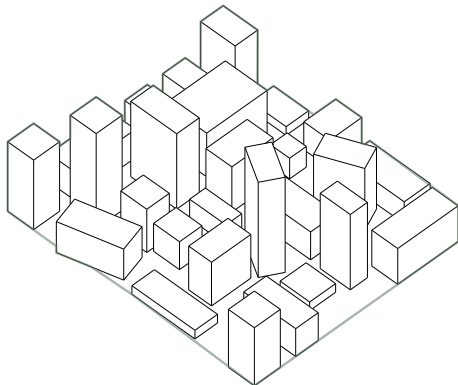
Design Hypothesis

Efficiency // Resilience



Too much Efficiency

*"If the balance between resilience and efficiency is disturbed the system becomes unstable. Too much efficiency will lead to brittleness and **little diversity** resulting in crashes and destruction of the system (Bredenoord et al., 2014)."*

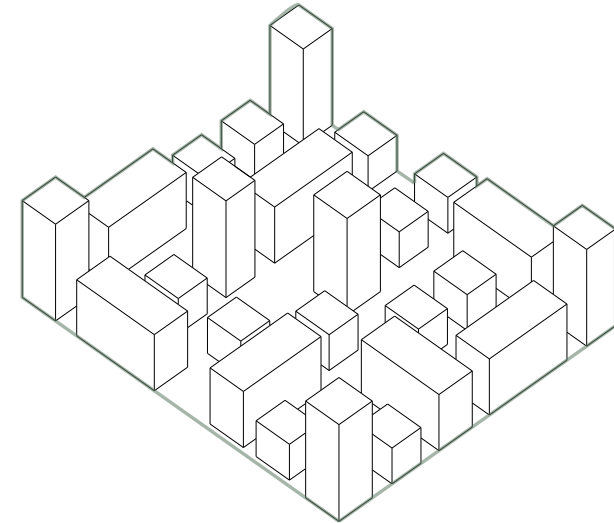


Too much Resilience

*"Too much resilience is characterized by too much **diversity** and a lack of coherence and purpose to growth, eventually leading to little efficiency and stagnation of the system (Bredenoord et al., 2014)."*

Design Hypothesis

Trade-off



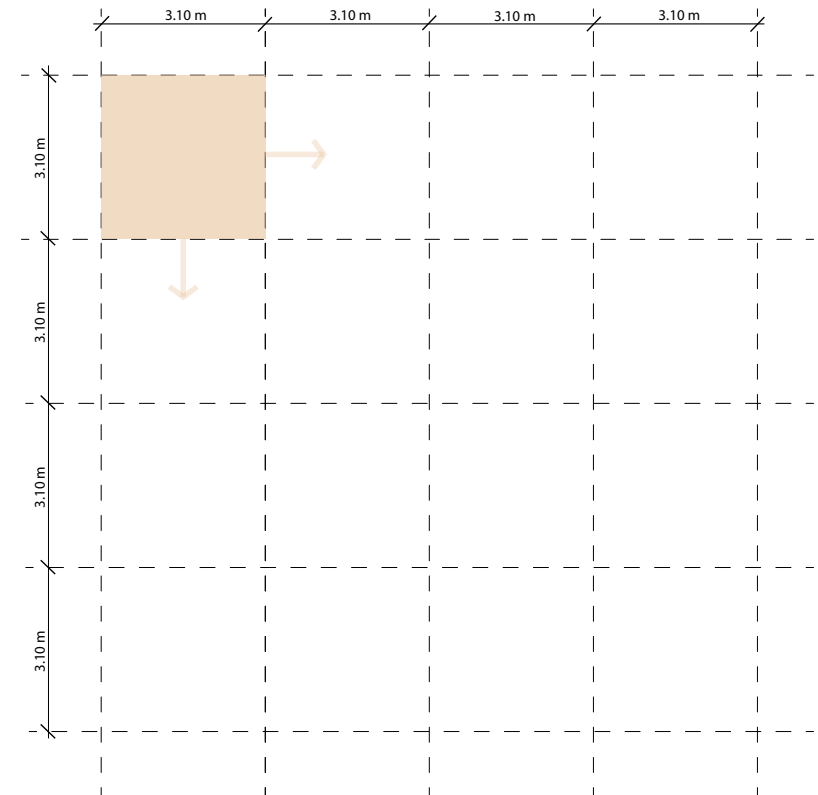
Trade-off

*In nature, "ecosystems have survived over time by adjusting to changing circumstances resulting in a search for equilibrium between two opposing poles, of efficiency and resilience. The healthiest systems have an **optimum balance** between the two extremes, which may be described by the term sustainability (Bredenoord et al., 2014)".*

Key Elements in an Optimum Trade-off

Efficiency ↔ Resilience

- 1 Simple Module
- 2 Reduced Palette of Materials
- 3 Local Construction Methods



3.10 x 3.10 m module

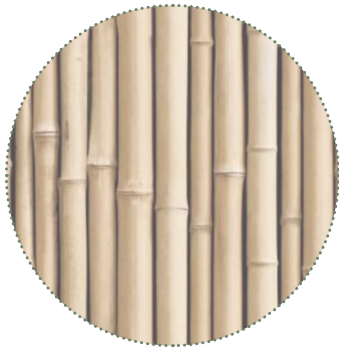
Design Hypothesis
Reduced Palette of Materials



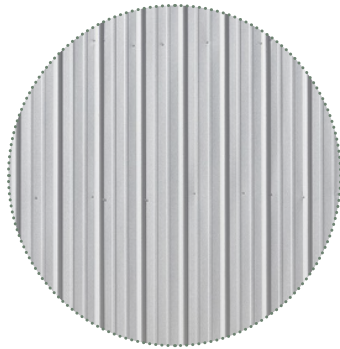
Concrete



Brick

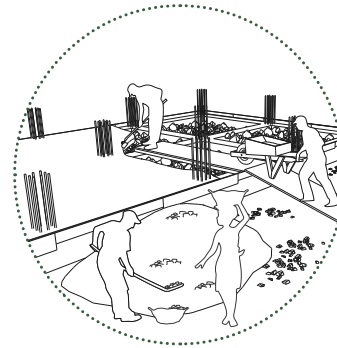


Bamboo

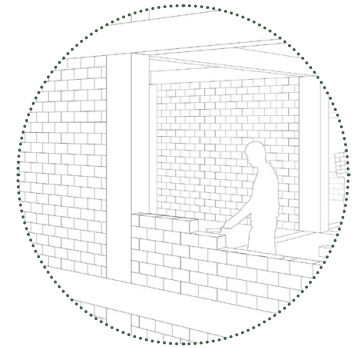


Corrugated Metal

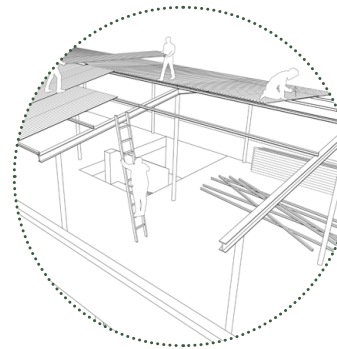
Design Hypothesis
Local Construction Method



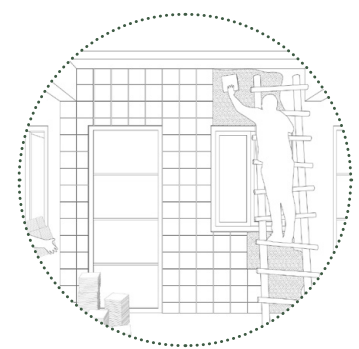
Raised Plinth



Concrete Frame / Brick Infill



Corrugated Metal Roof



Tiled Surfaces

Key Elements in an Optimum Trade-off

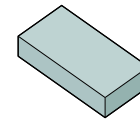
Efficiency



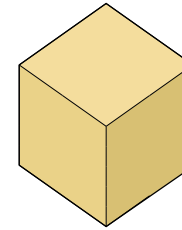
Resilience

Typological mix:

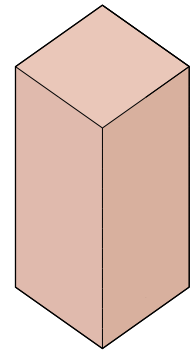
- 1** High-rise
- 2** Mid-rise
- 3** Low-rise



Low-rise



Mid-rise



High-rise

06 Site Analysis





Site Analysis
Previous Development



2002



2006

Site Analysis
Previous Development



2011



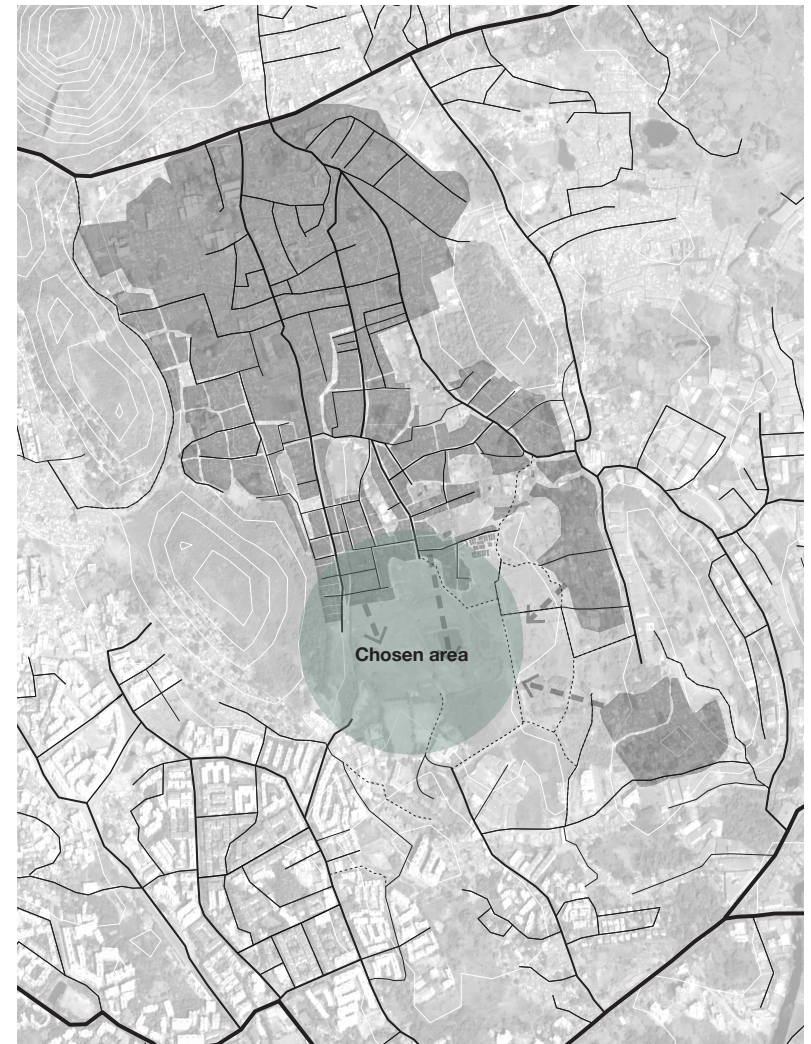
Today

Site Analysis Context



The area has an informal settlement towards the north and east and cooperative and society housing towards the south. There is also an existing school towards the south near the sports field.

Site Analysis Context



By studying the previous development in the area the informal settlement has grown rapidly from the north and is today encroaching upon the chosen area.

Site Analysis

Existing Railway

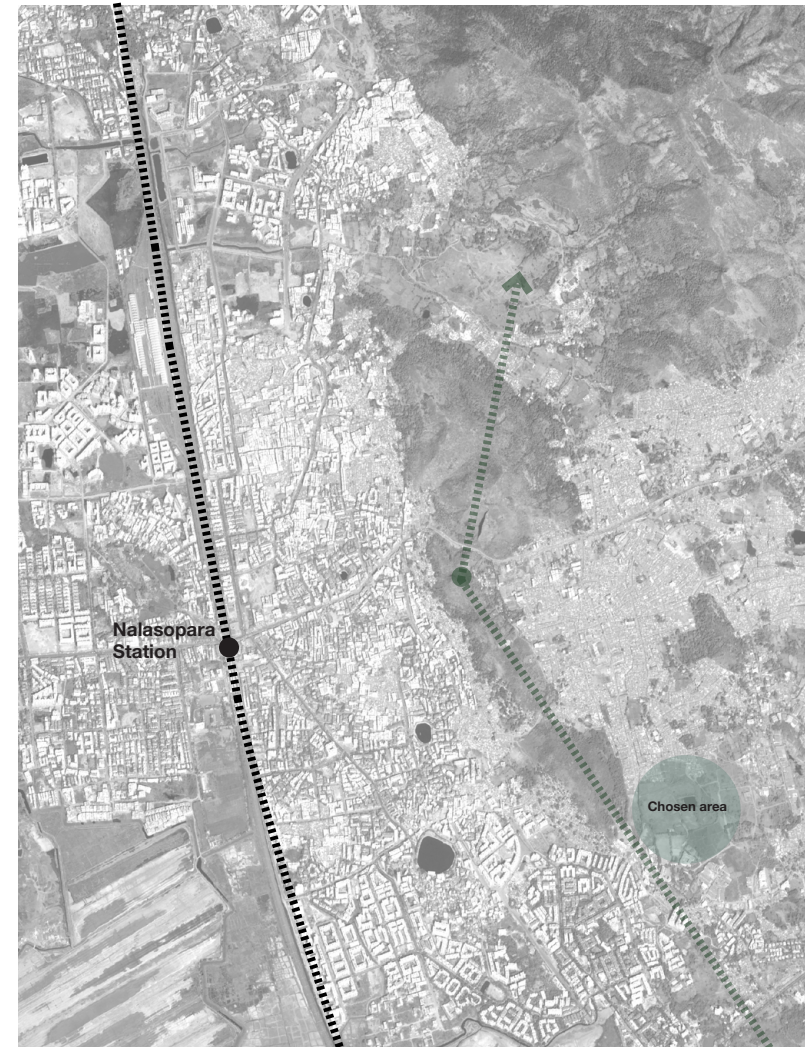


Existing Railway

The chosen area for the project is located in the east of Nalasopara on a greenfield.

Site Analysis

New Railway



New Railway
Existing Railway

A new high-speed railway track connecting Ahmedabad and Mumbai, is expected to be finished in 2022. If we look back at the historical development of Mumbai along the Western Railway track, it can be assumed that the construction of the new railway will bring more people to the area.

07 Design Proposal



Building Strategy

The project proposes the mix of three different housing typologies, the tower, the slab and the row-housing. The three typologies provide the project with three different characteristics and opportunities aiming to cater for the diverse livelihoods of the lower and middle class in Nalasopara today as well as to provide adaptability for change in the user needs in the future.

The tower, gives the project exclusivity rather than density. It is designed with the projects largest units, with only two units per floor. The tower typology has more private space and is accessed to the corner of the courtyard.

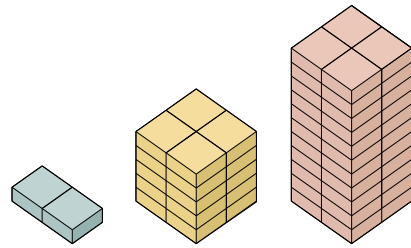
The slab typology provides the project with more density. It is designed with three smaller unit possibilities that are accessed through a shared gallery towards the courtyard. Two to three units share an 'otla' space that is meant to cater for domestic and income related activities, as an extension of the dwelling, making it a social space for everyday activities to occur. The units within the slab typology are also designed with a small private balcony space that has a light partition wall of a single layer of brick and large floor to ceiling opening. This space is meant to serve as a space of opportunity, giving the residents the choice of keeping them as private external spaces or extending the interior space of the unit, by moving the partition wall.

The row-housing, provides the project with a typology that accommodates the greatest transformation through time. The roof structure can be disassembled and reused defining the section as a space of opportunity. This typology has the smallest unit size and is proposed to be built as one storey houses, each with a private central patio.

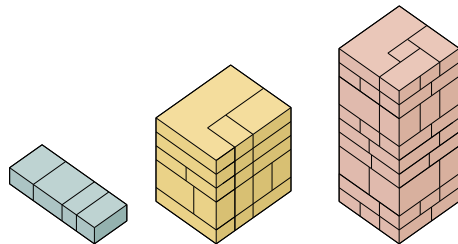


Building Strategy

Based only on Efficiency // Resilience



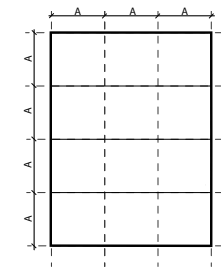
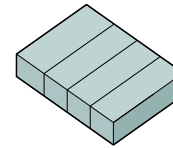
Too much Efficiency
Single unit type



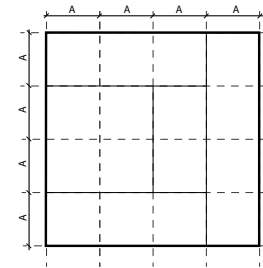
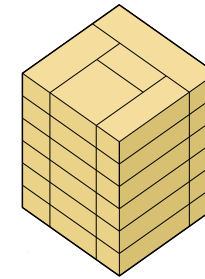
Too much Resilience
Numerous unit types

Building Strategy

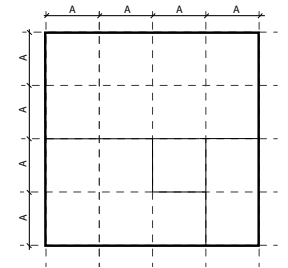
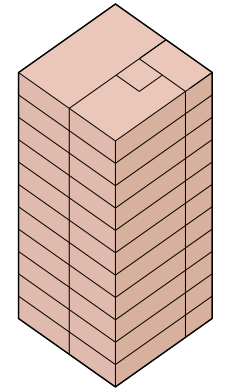
Trade-off



Low-rise / Row-housing



Mid-rise / Slab



High-rise / Tower

Optimum balance

A = 3.10 m

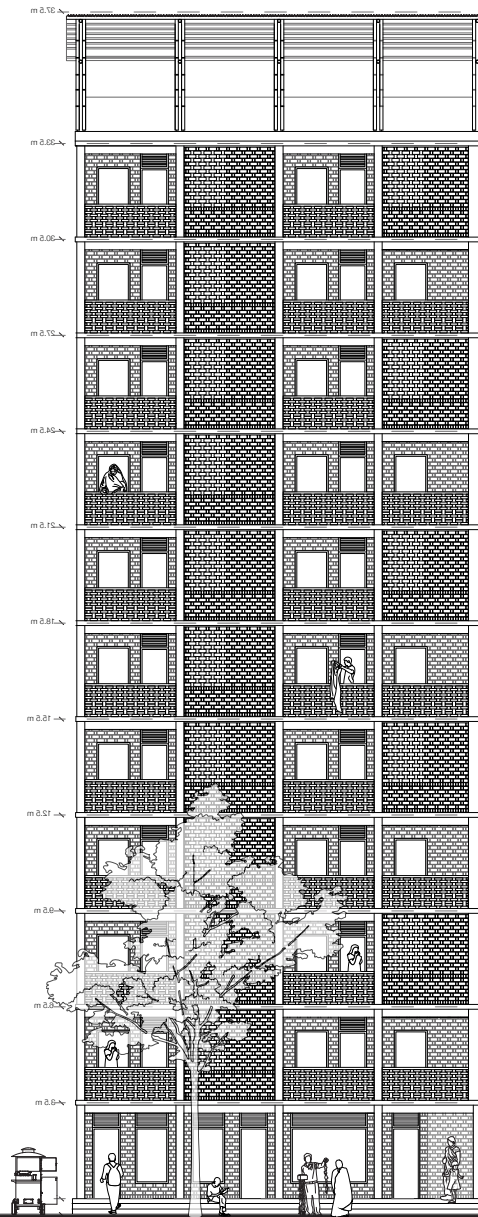
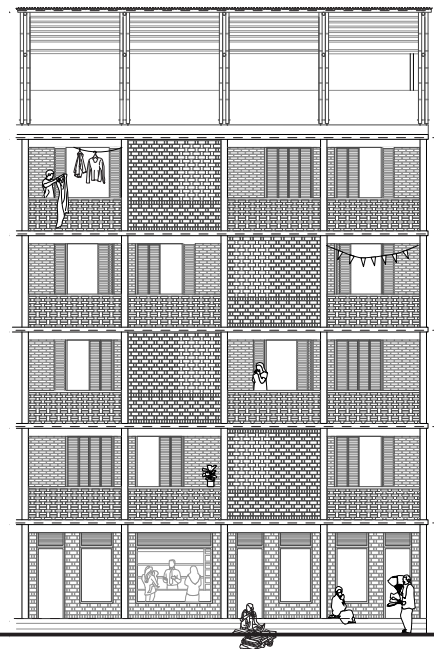
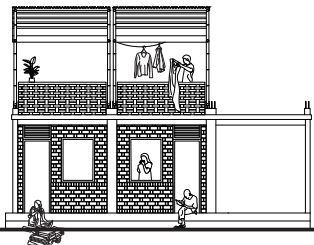
Building Strategy

Typological Mix

HIGH-RISE / TOWER

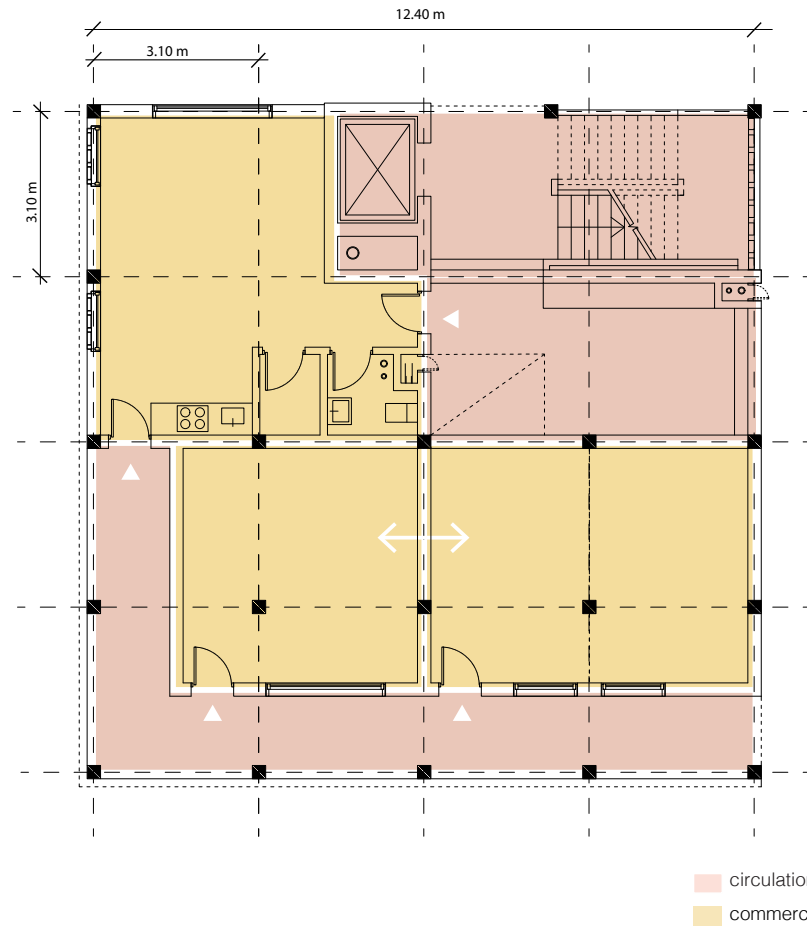
MID-RISE / SLAB

LOW-RISE / ROW-HOUSE



Building Strategy

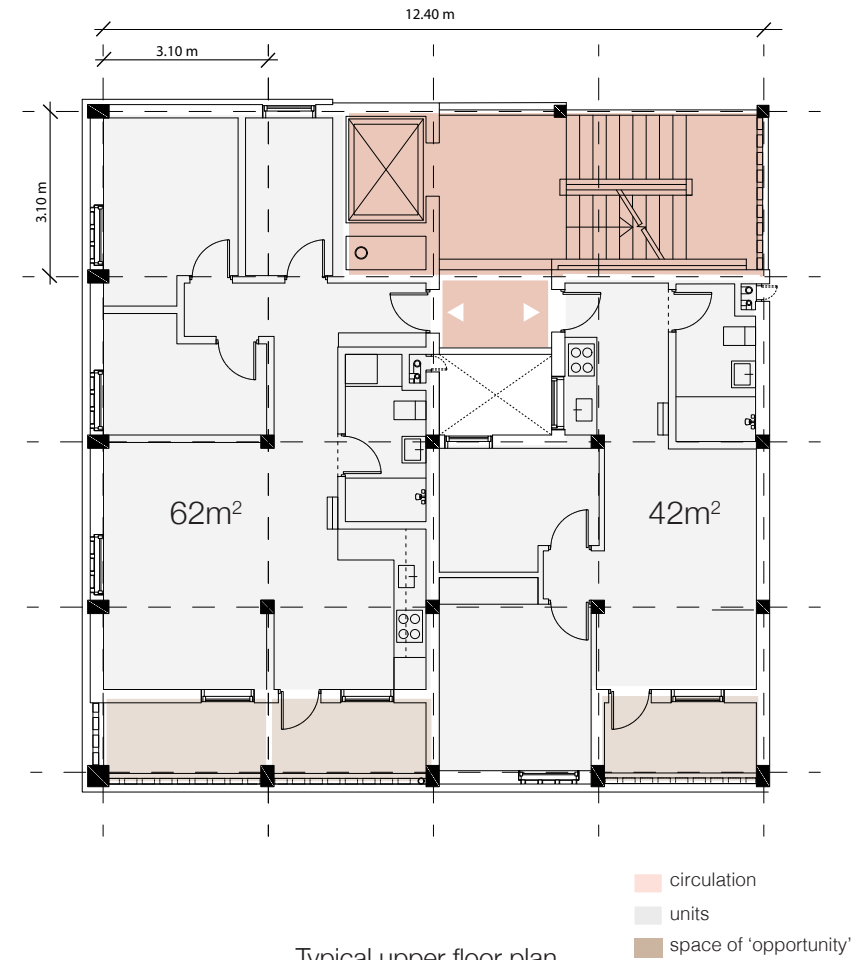
High Rise - Tower // Program



Ground floor plan

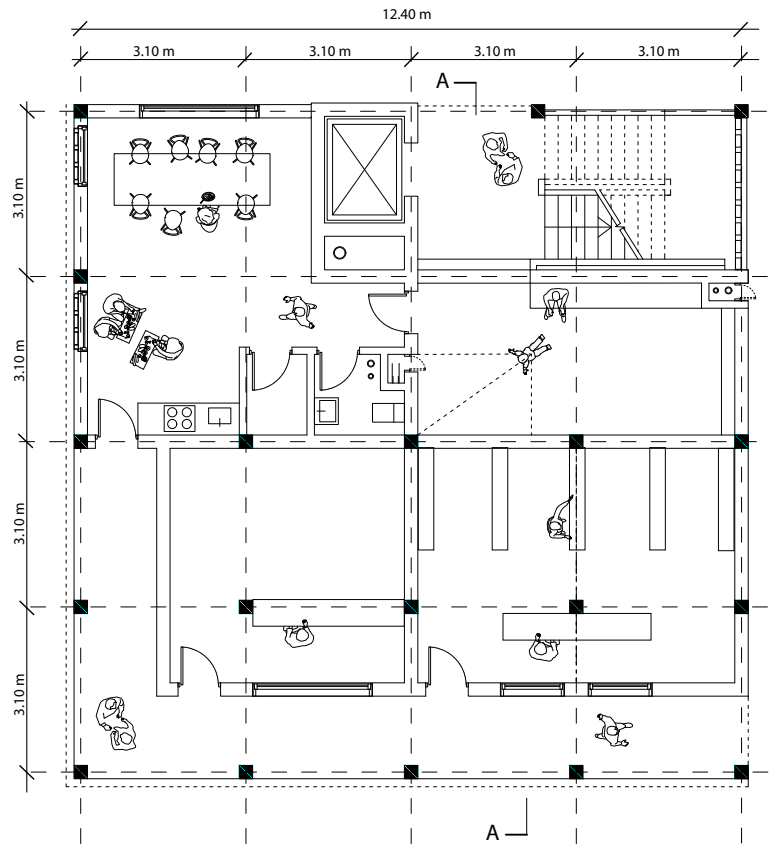
Building Strategy

High Rise - Tower // Program



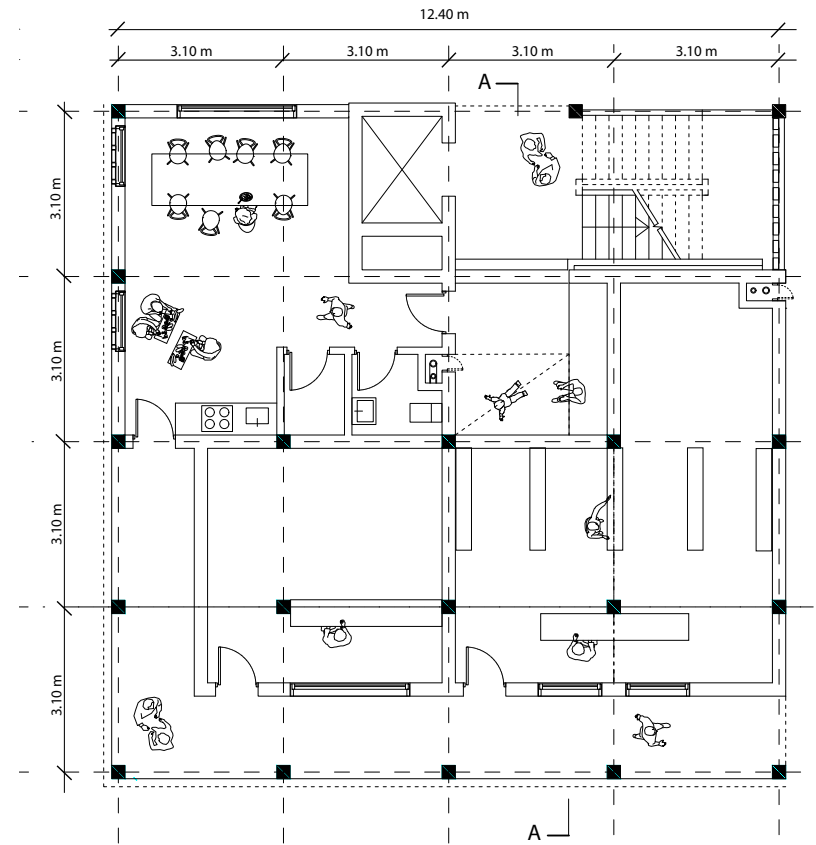
Typical upper floor plan

Building Strategy High Rise - Tower // Plans



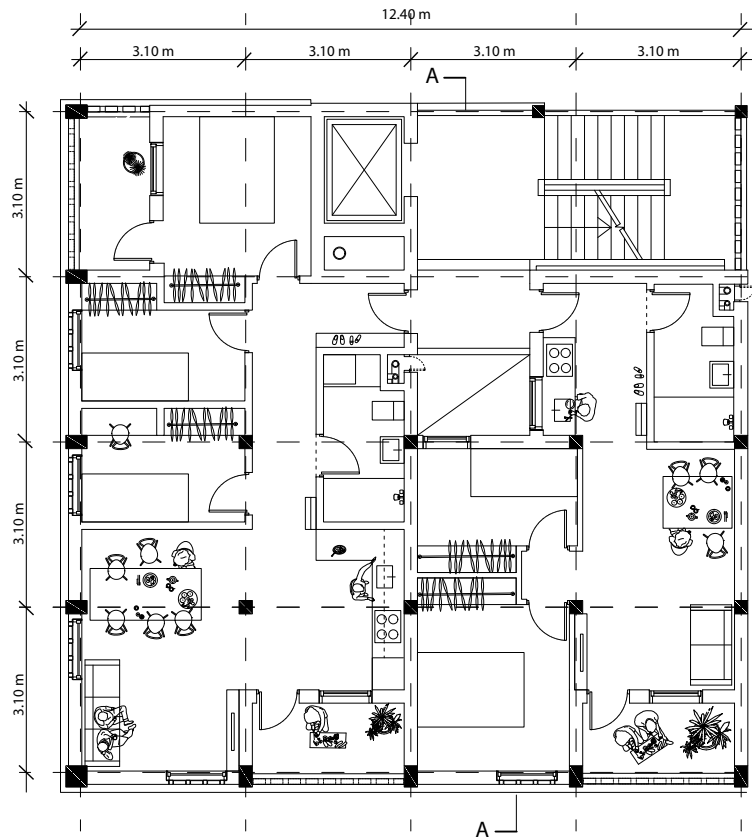
Ground floor plan

Building Strategy High Rise - Tower // Plans



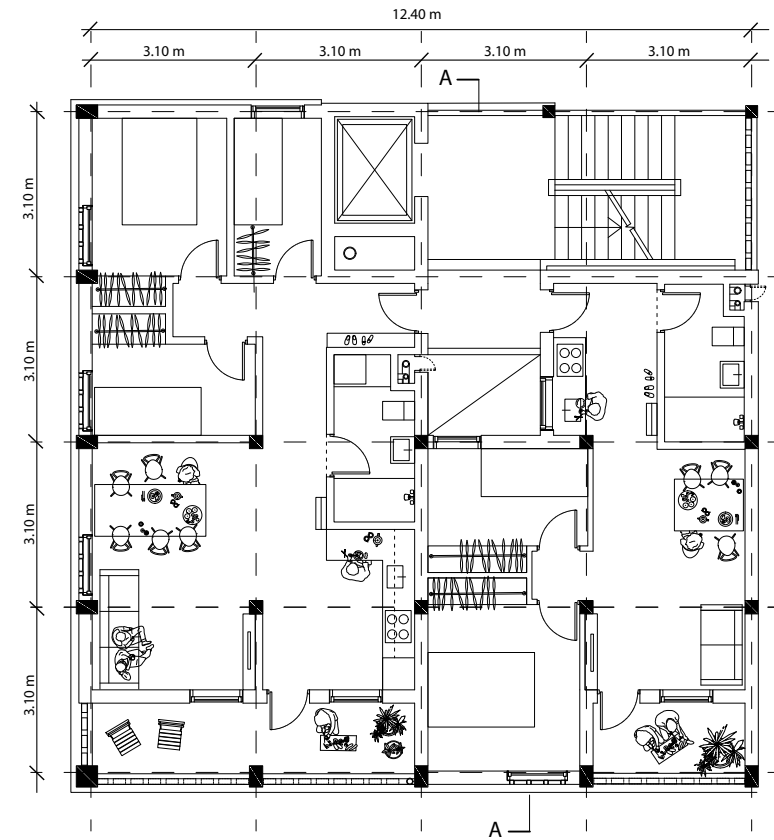
Ground floor plan

Building Strategy High Rise - Tower // Plans



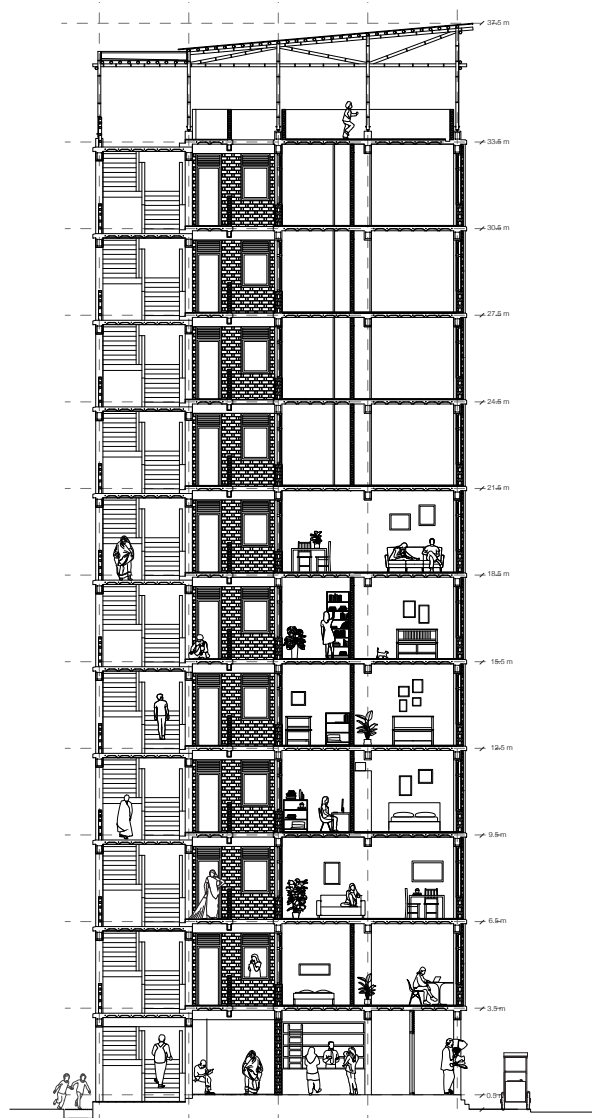
Typical floor plan

Building Strategy High Rise - Tower // Plans



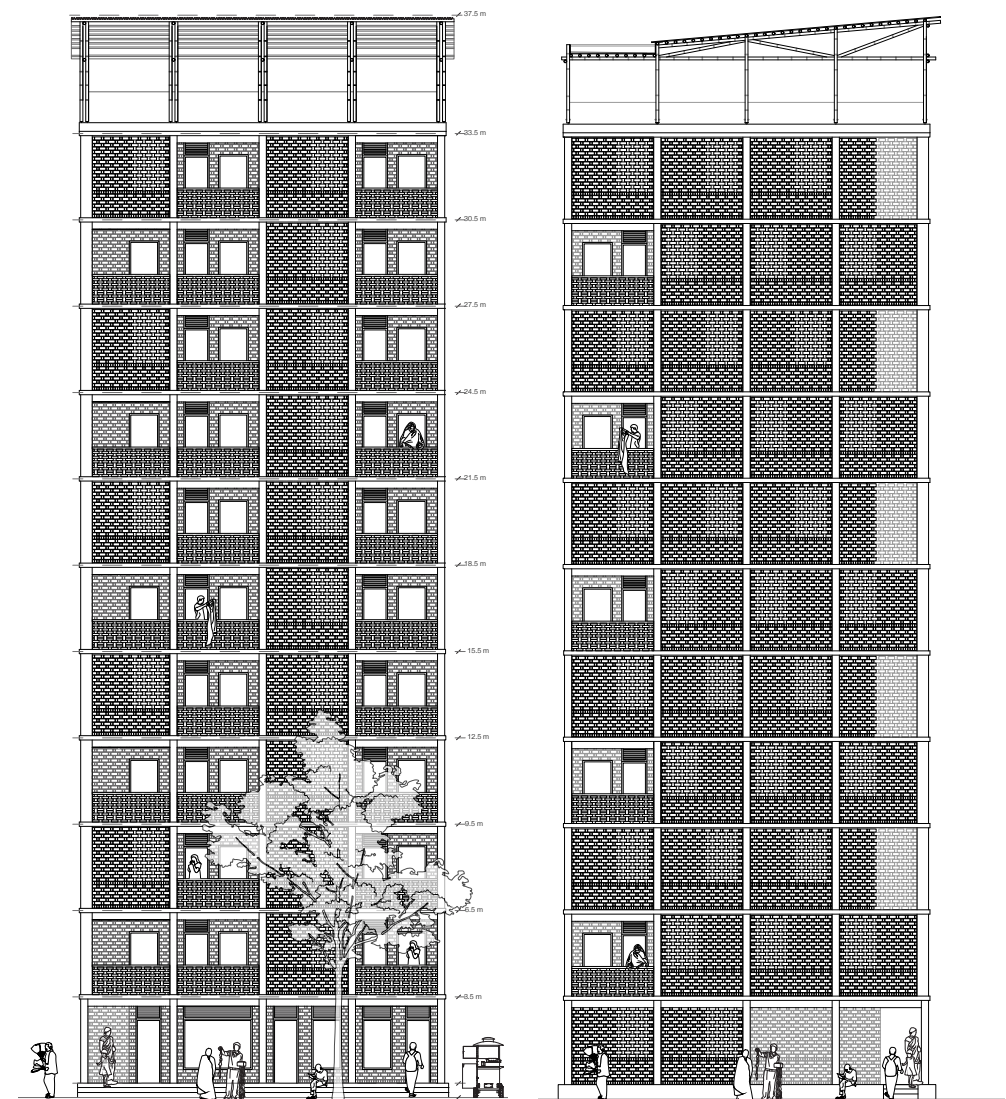
Typical floor plan

Building Strategy High Rise - Tower // Facades-Sections



Section A

Building Strategy High Rise - Tower // Facades-Sections

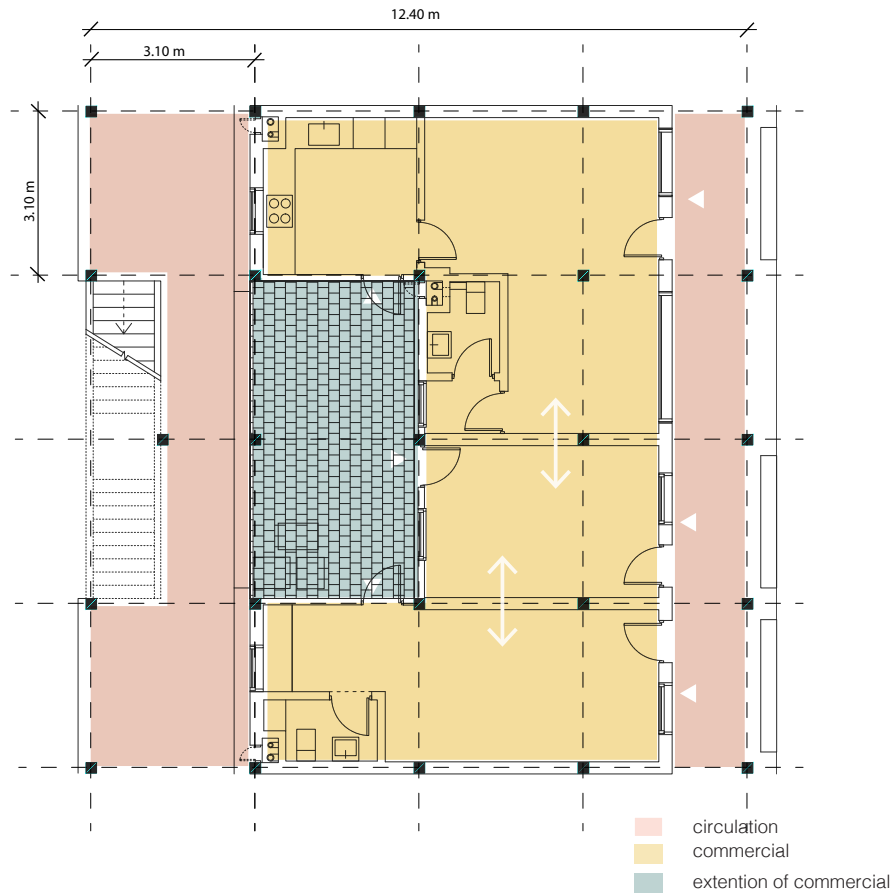


Front Facade

Side Facade

Building Strategy

Mid Rise - Slab // Program



Ground floor plan

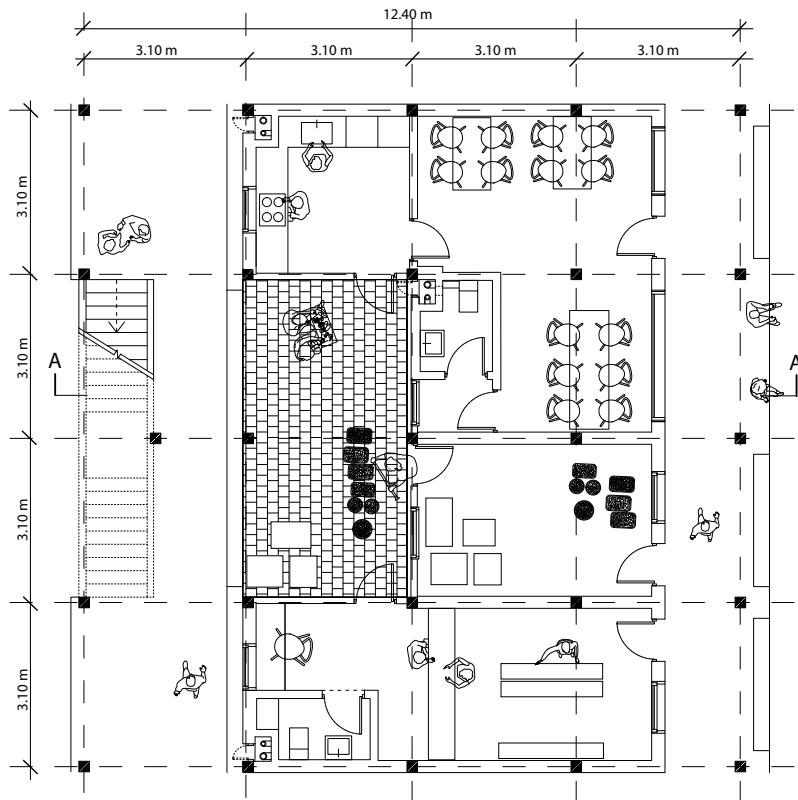
Building Strategy

Mid Rise - Slab // Program



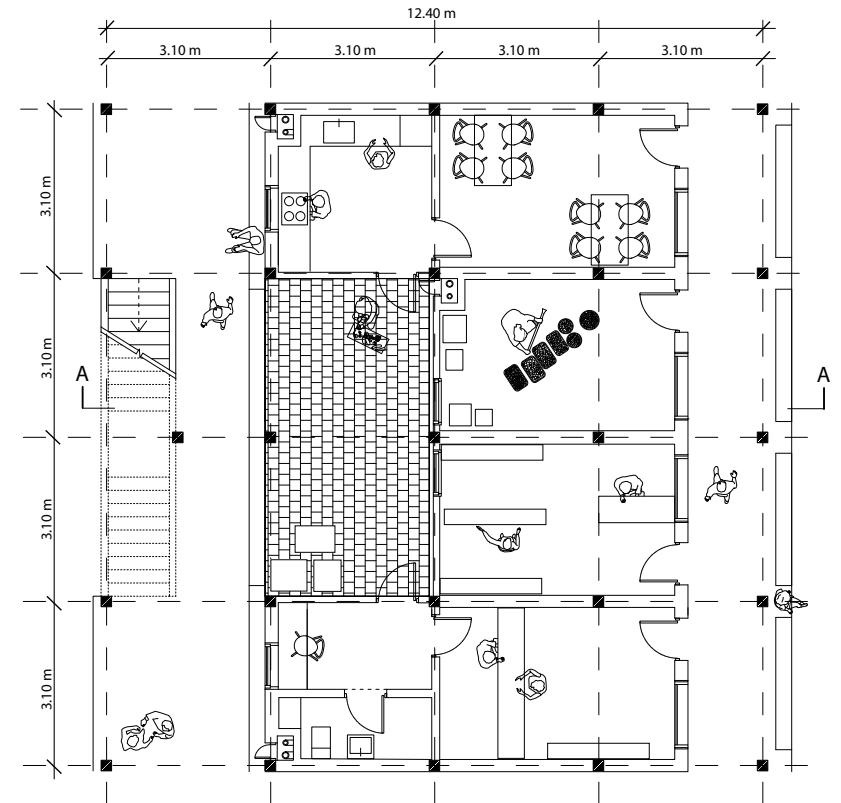
Ground floor plan / mixed use

Building Strategy Mid Rise - Slab // Plans



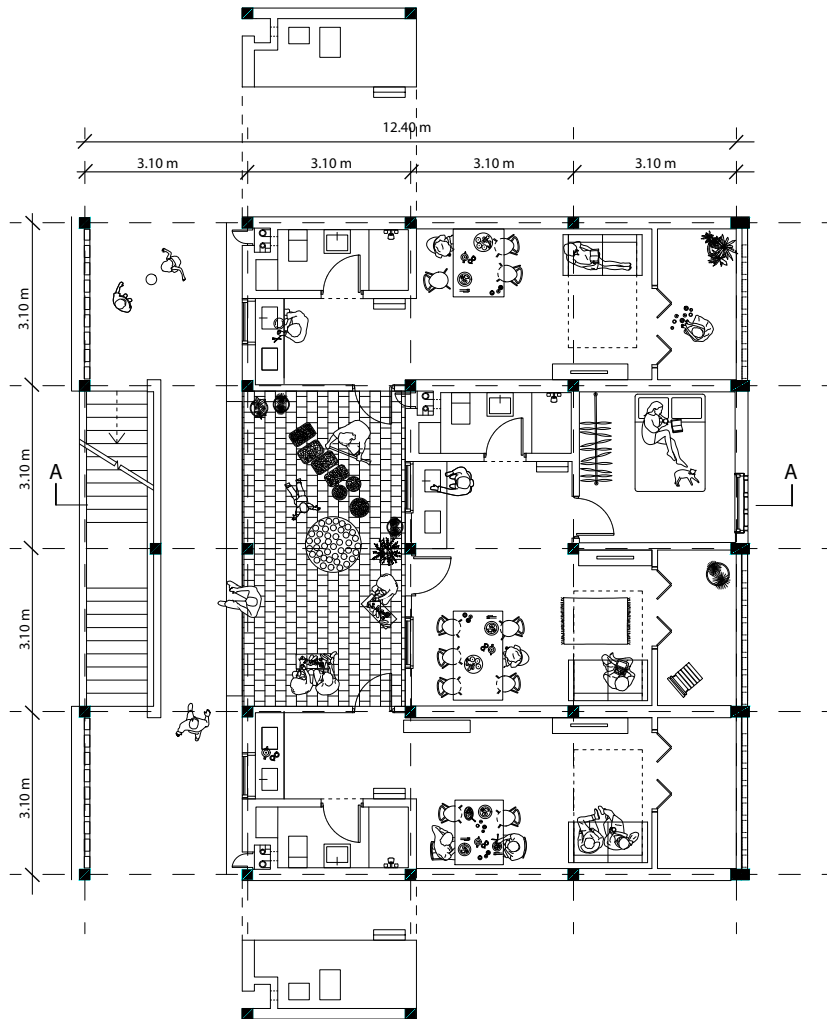
Ground floor plan

Building Strategy Mid Rise - Slab // Plans



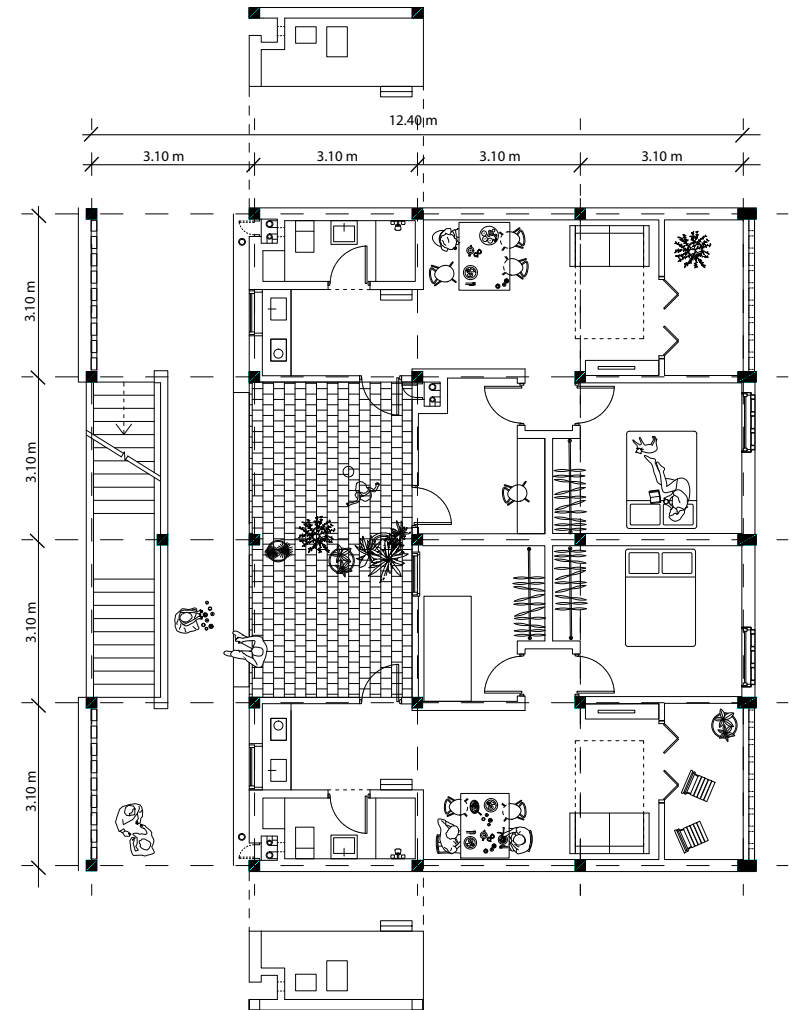
Ground floor plan

Building Strategy Mid Rise - Slab // Plans



Ground floor plan

Building Strategy Mid Rise - Slab // Plans



Ground floor plan

Building Strategy

Mid Rise - Slab // Program

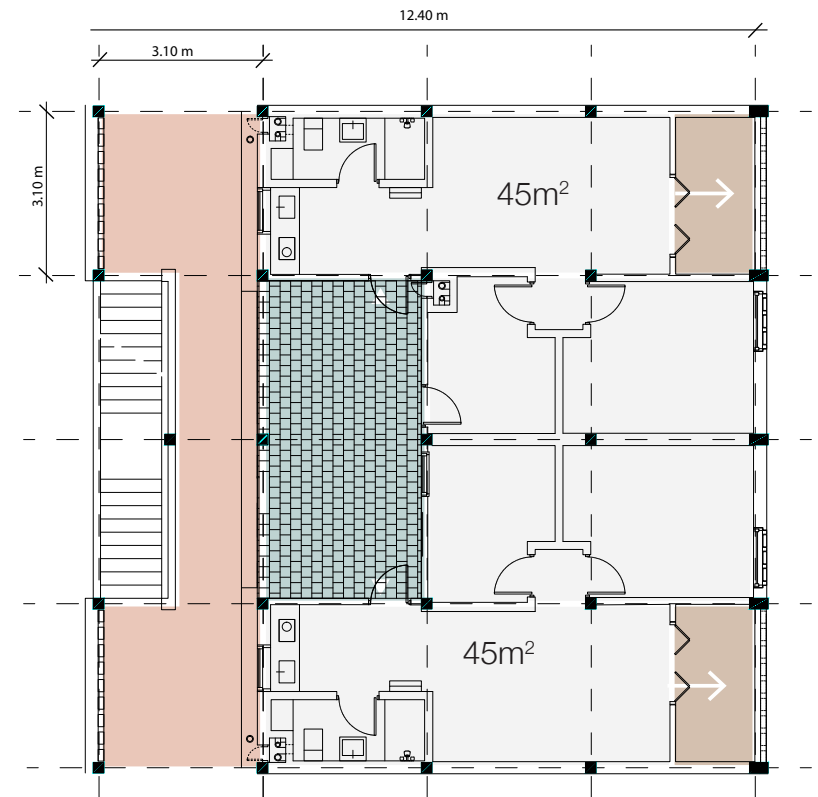


Typical floor plan

- circulation
- units
- space of 'opportunity'
- extension of dwelling

Building Strategy

Mid Rise - Slab // Program

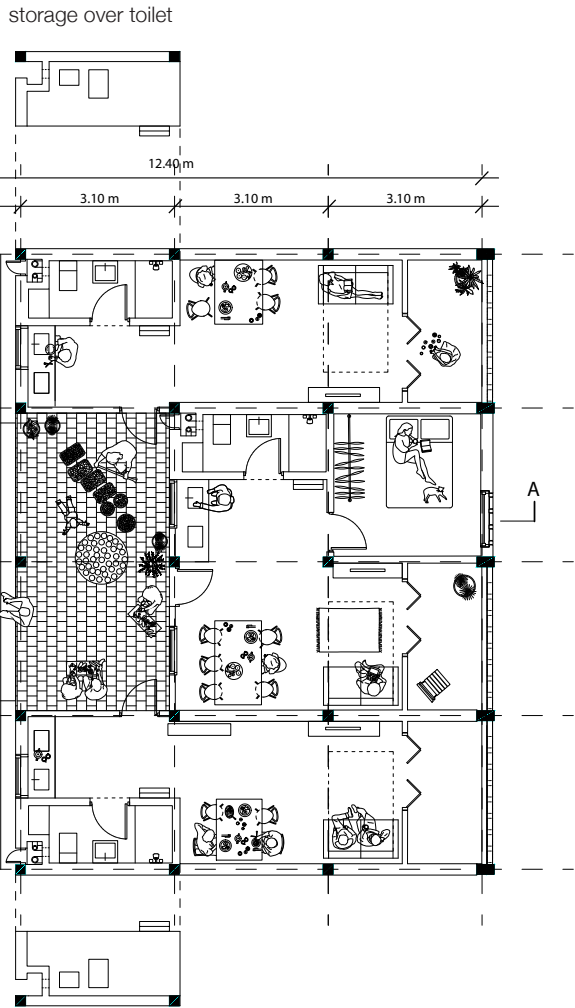


Typical floor plan

- circulation
- units
- space of 'opportunity'
- extension of dwelling

Building Strategy

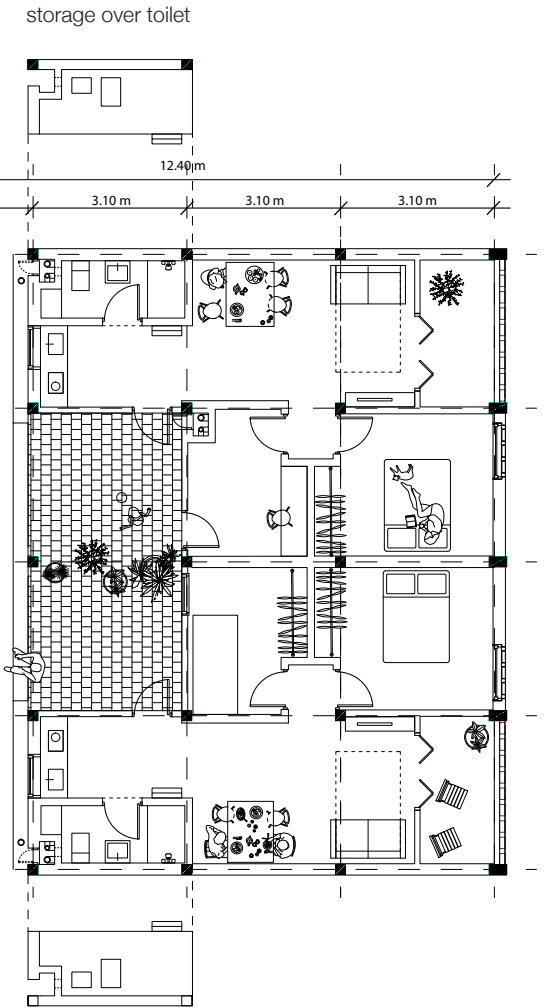
Mid Rise - Slab // Plans



Typical floor plan

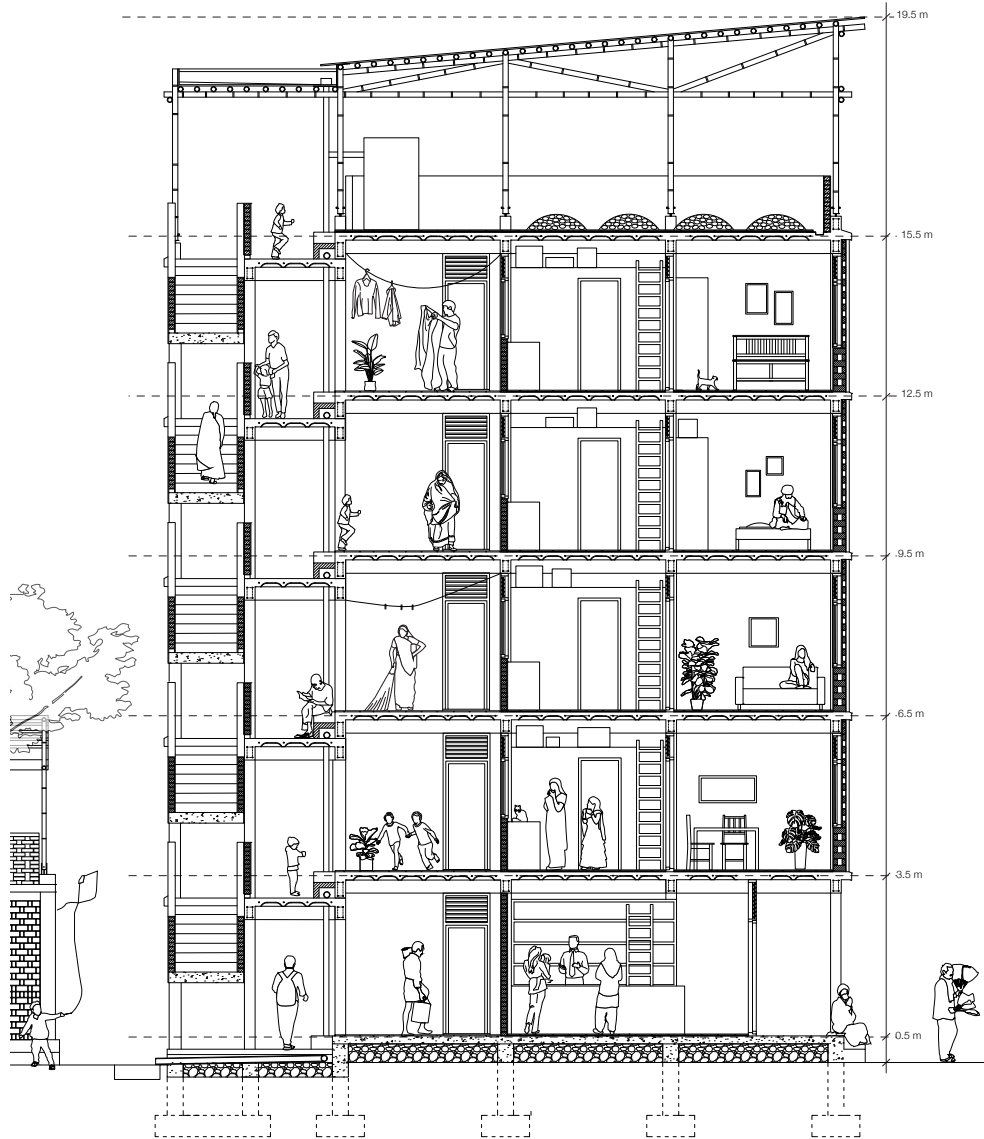
Building Strategy

Mid Rise - Slab // Plans



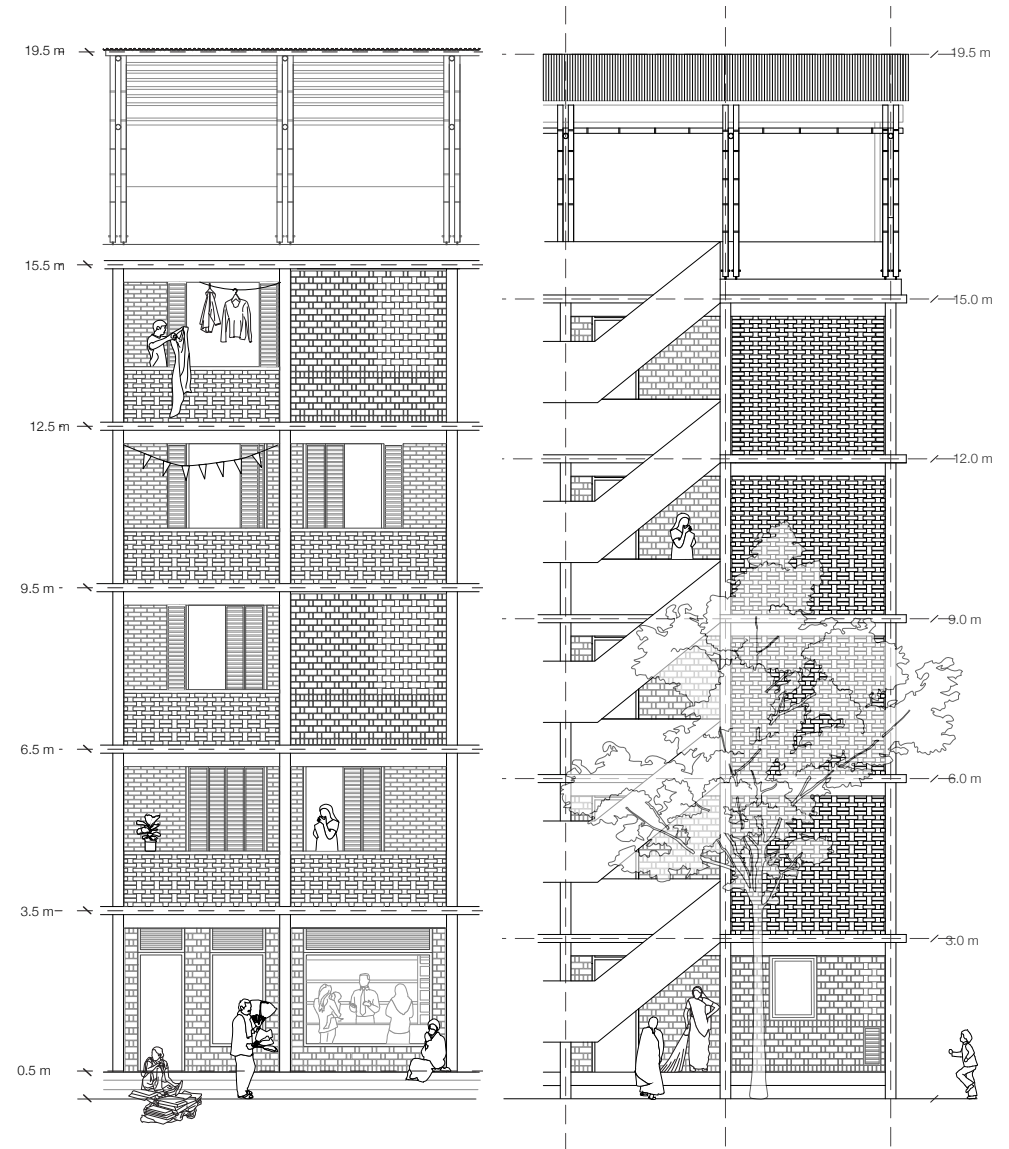
Typical floor plan

Building Strategy Mid Rise - Slab // Facades-Sections



Section A

Building Strategy Mid Rise - Slab // Facades-Sections

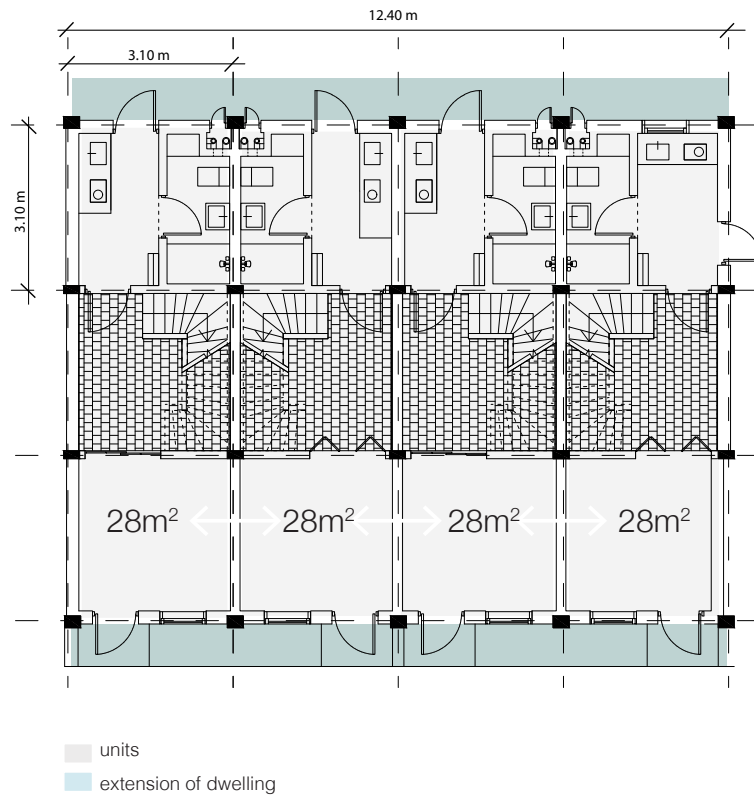


Front Facade

Back Facade

Building Strategy

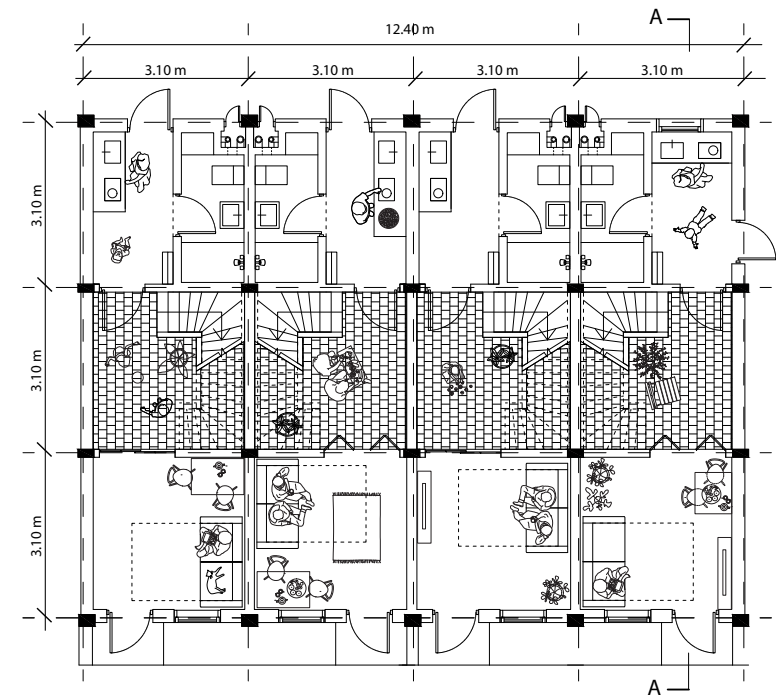
Low Rise - Row-House // Program



Ground floor plan

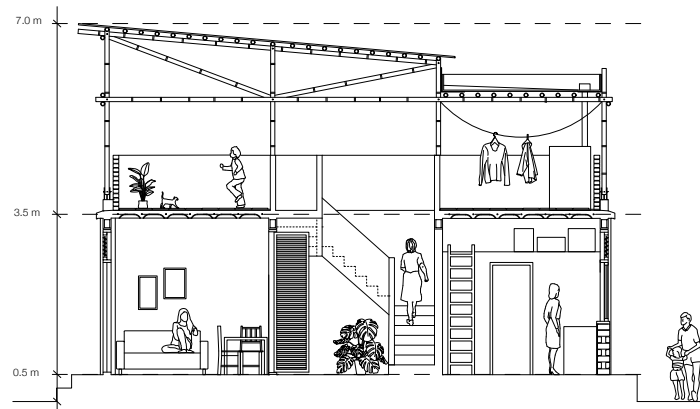
Building Strategy

Low Rise - Row-House // Plans



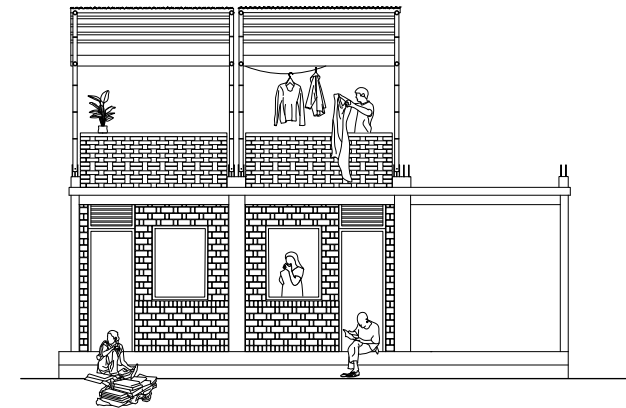
Ground floor plan

Building Strategy
Low Rise - Row-House // Facades-Section

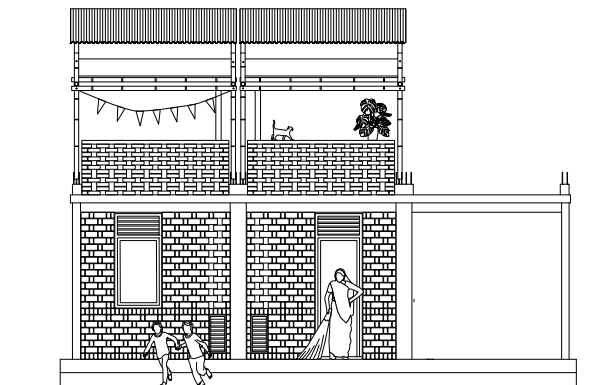


Section A

Building Strategy
Low Rise - Row-House // Facades-Section



Front Facade

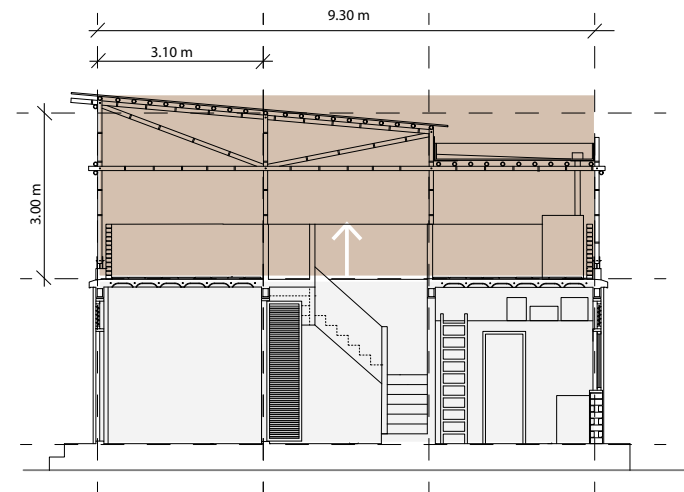


Back Facade



Building Strategy

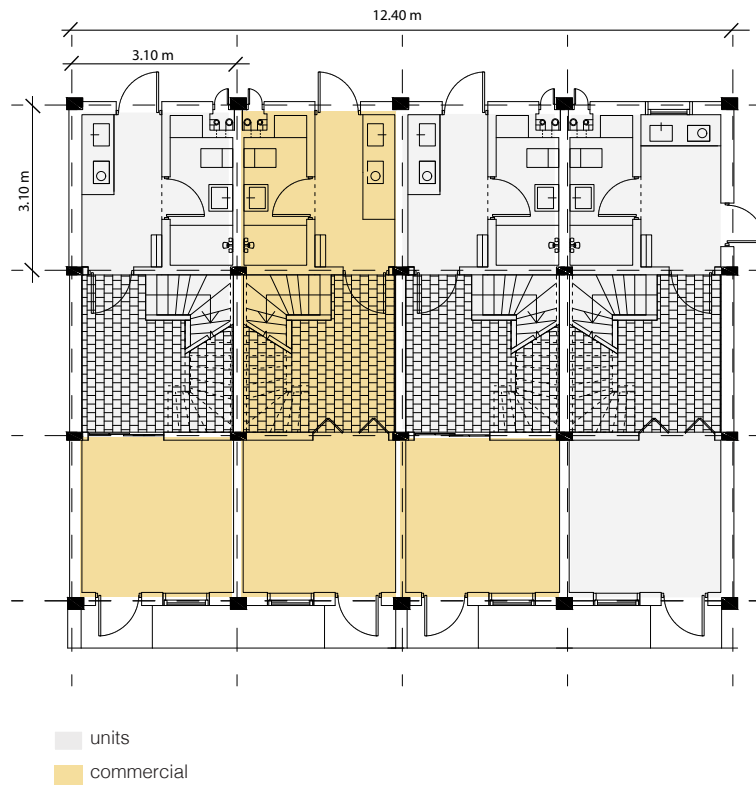
Low Rise - Row-House // Program



units
space of 'opportunity'

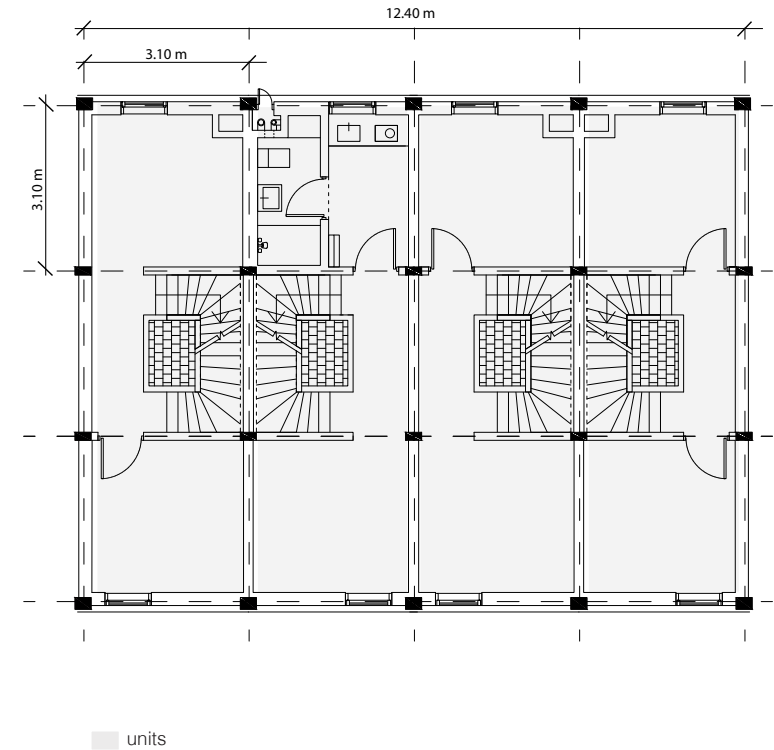
Typical section

Building Strategy Low Rise - Row-House // Program



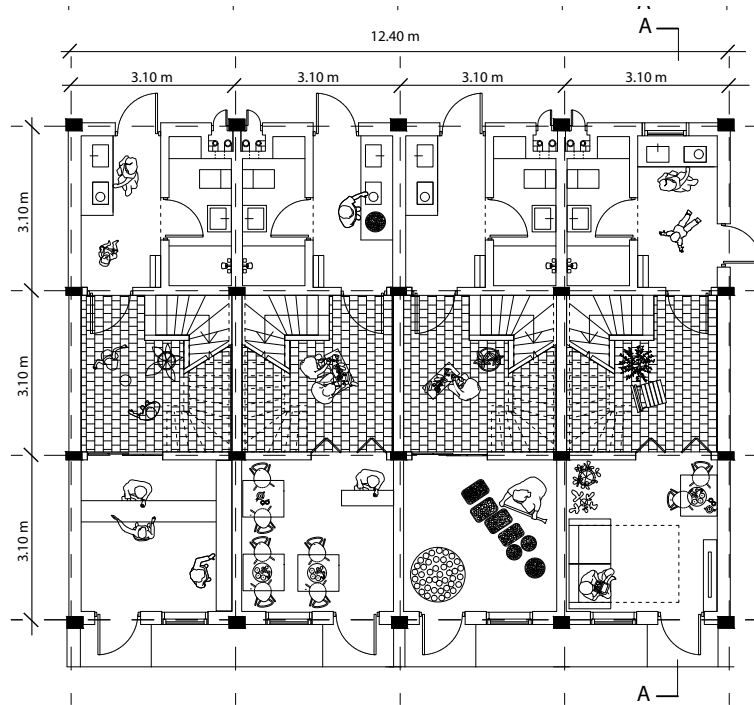
Ground floor plan

Building Strategy Low Rise - Row-House // Program



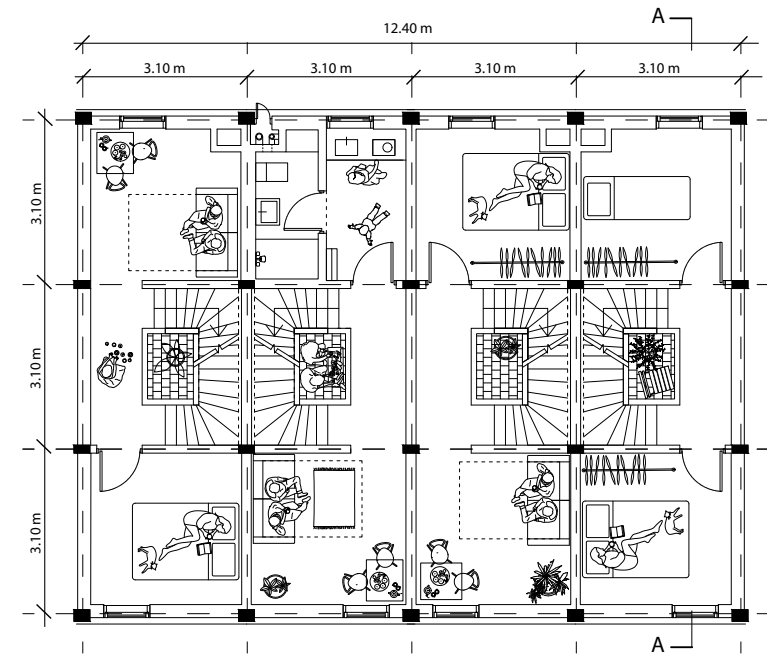
Typical upper floor plan

Building Strategy Low Rise - Row-House // Plans Extended



Ground floor plan

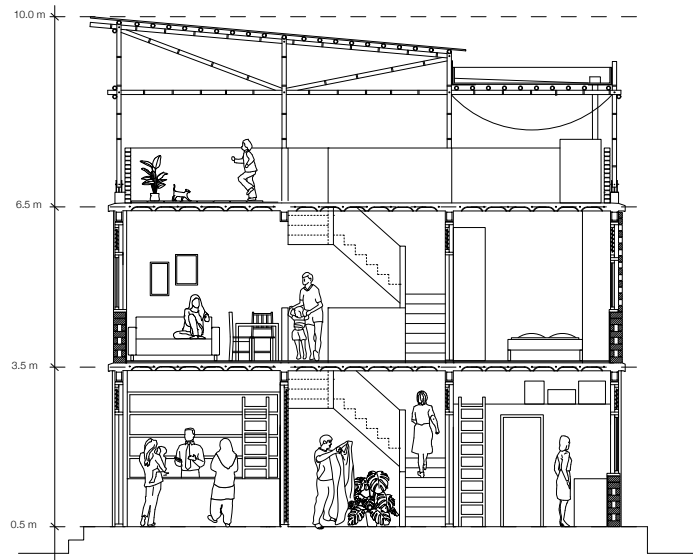
Building Strategy Low Rise - Row-House // Plans Extended



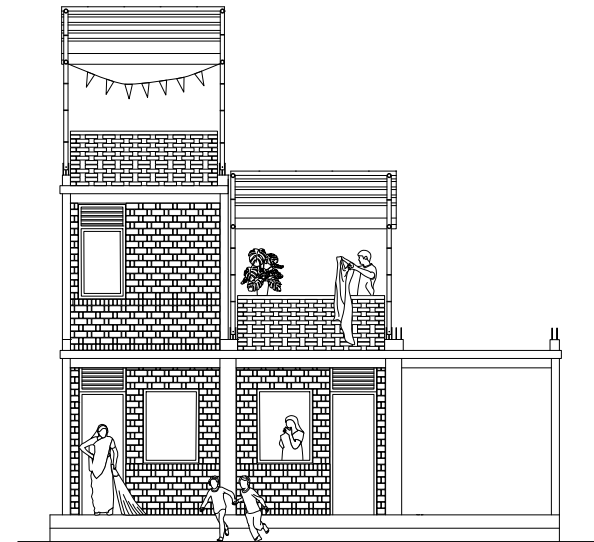
Upper floor plan

Building Strategy

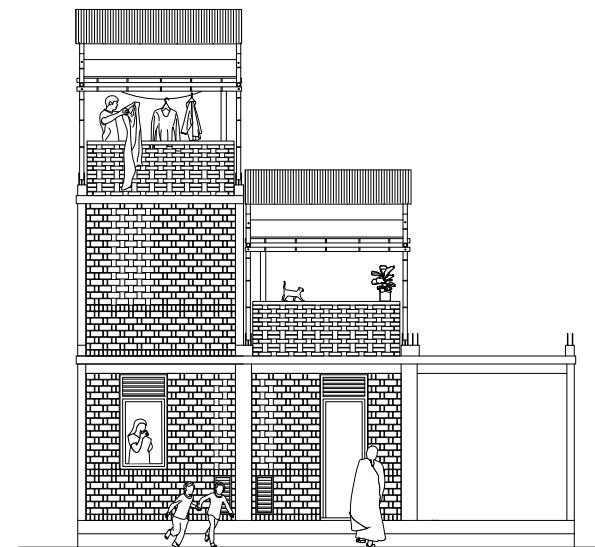
Low Rise - Row-House // Facades-Sections Extended



Section A



Front Facade



Back Facade

Building Strategy

Materiality *(applicable to all typologies)*

Standing Seam Metal / Corrugated Metal

A high quality enameled roofing material that is easy to clean. Corrugated metal sheets can also be used, however most corrugated material is galvanized, which will leach some zinc into the rainwater. A test is then necessary, to see the level of zinc it emits.

Bamboo Roof Structure

India is the second largest producer of bamboo in the world and has a rich tradition of bamboo in indigenous construction. Rapidly renewable, it is seen as an effective and Eco-friendly alternative to wood which can sometimes take decades to replenish. Before using it in construction, it is imperative that bamboo is treated for termite and rot resistance (Mohanram, A., 2018.)

Filler Slab with Clay Pot

Total concrete required in this technology is about 30% less than conventional slab construction. Due to reduced concrete, self weight of the slab is reduced and thus about 40% less steel is required, without compromising strength of the slab. Size of filler material should be such that it fits in bottom half of the slab and structural grid of reinforcement (Earthbound Architecture, 2016).

Rat Trap Bond

For external walls, rat trap is an alternate brick bonding system for English and Flemish bond. This is economical, strong and aesthetic. 25% of the total number of bricks and 40% of mortar can be saved by using rat trap bond. It is simple to build and has better insulating properties (Earthbound Architecture, 2016).

Fly-ash Brick

It is light-weight, has higher strength than clay brick, offers high resistance to sound, has low water absorption and is a good thermal insulator. Combining fly-ash, lime and gypsum, Fal-G technology utilizes an industrial waste by using nearly 2/3rd fly ash by volume of the Fal-G brick. The Fal-G bricks can be used in place of conventional clay bricks, either in load bearing structure or as infill walls (Tara, n.d.).

AAC blocks

AAC typically has one-sixth to one-third the density of conventional concrete, and about the same ratio of compressive strength, making it potentially suitable for cladding and infill. Can use various aggregates, such as fly ash (Cancino, 2003).

Recycled China Mosaic Roof Tiling

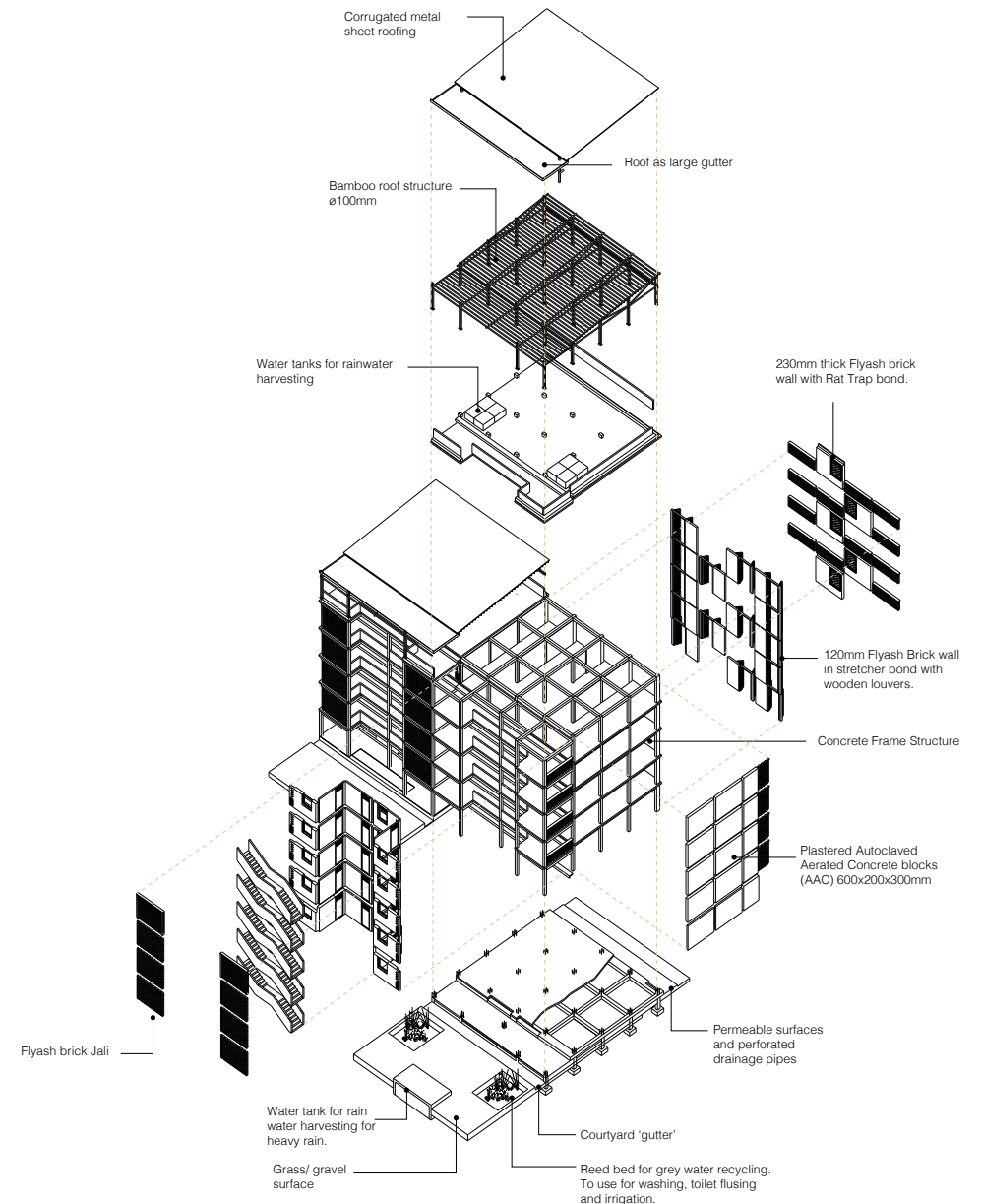
Used as additional water protection on top of the roof slab surface.

Terracotta Tiles

The thermal properties of clay keep the flooring warm in winter and cool in summer.

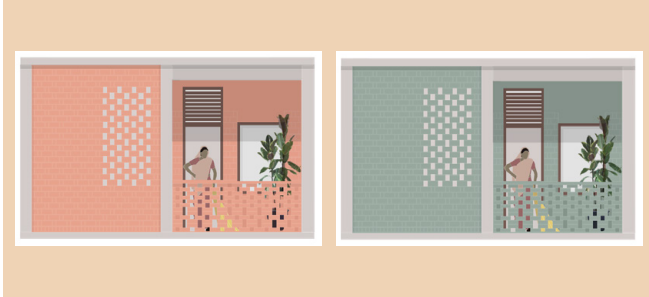
Building Strategy

Materiality *(applicable to all typologies)*

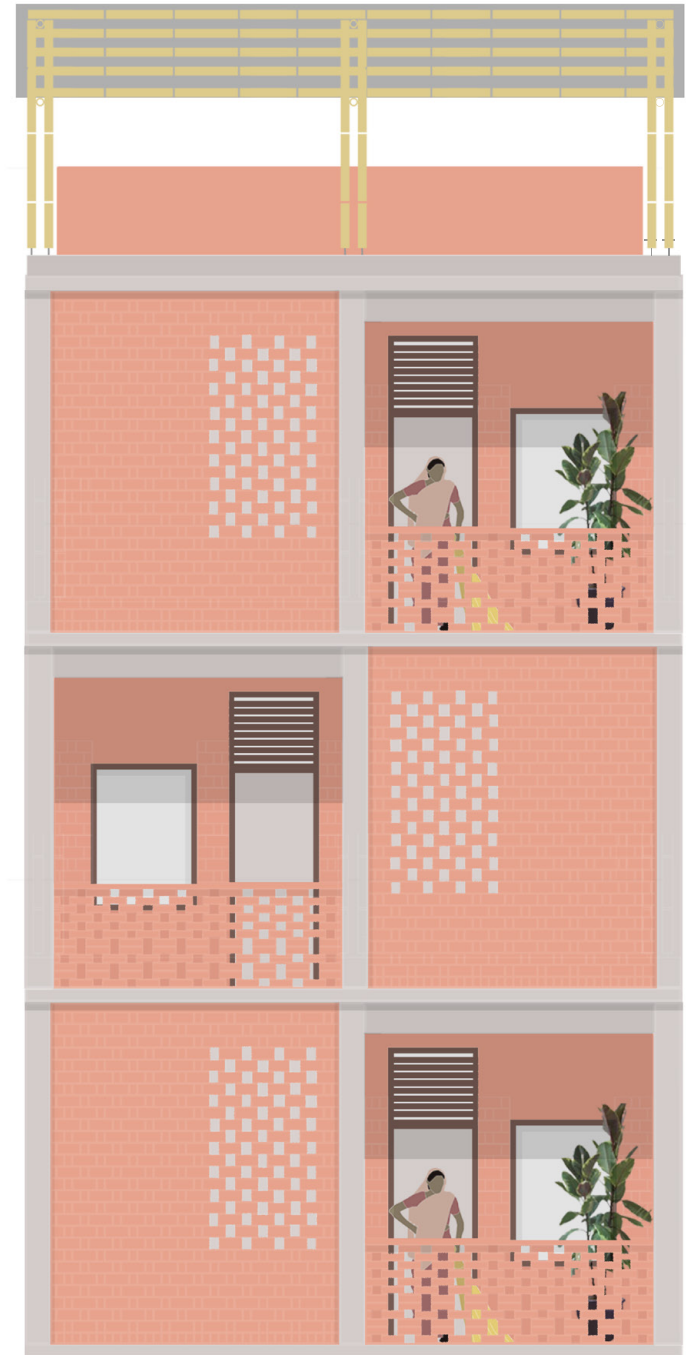


Building Strategy

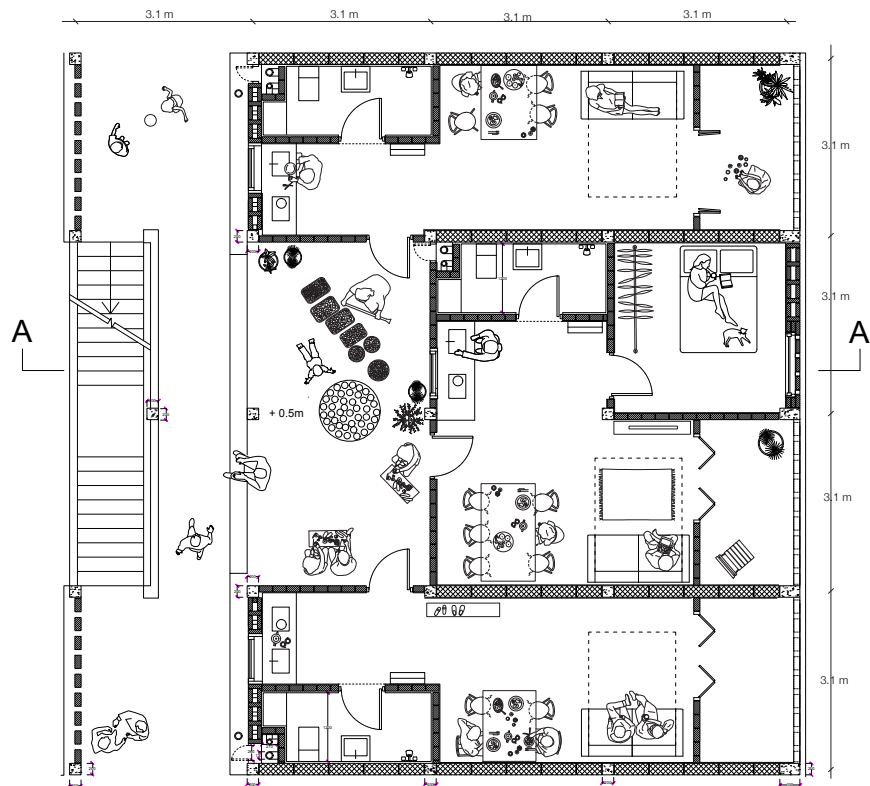
Materiality *(applicable to all typologies)*



The project proposes the fly-ash bricks to be painted. Each typology or cluster could thereby be provided with its own color and identity. And as time goes by, each individual owner might also paint the wall of their unit in a different color.

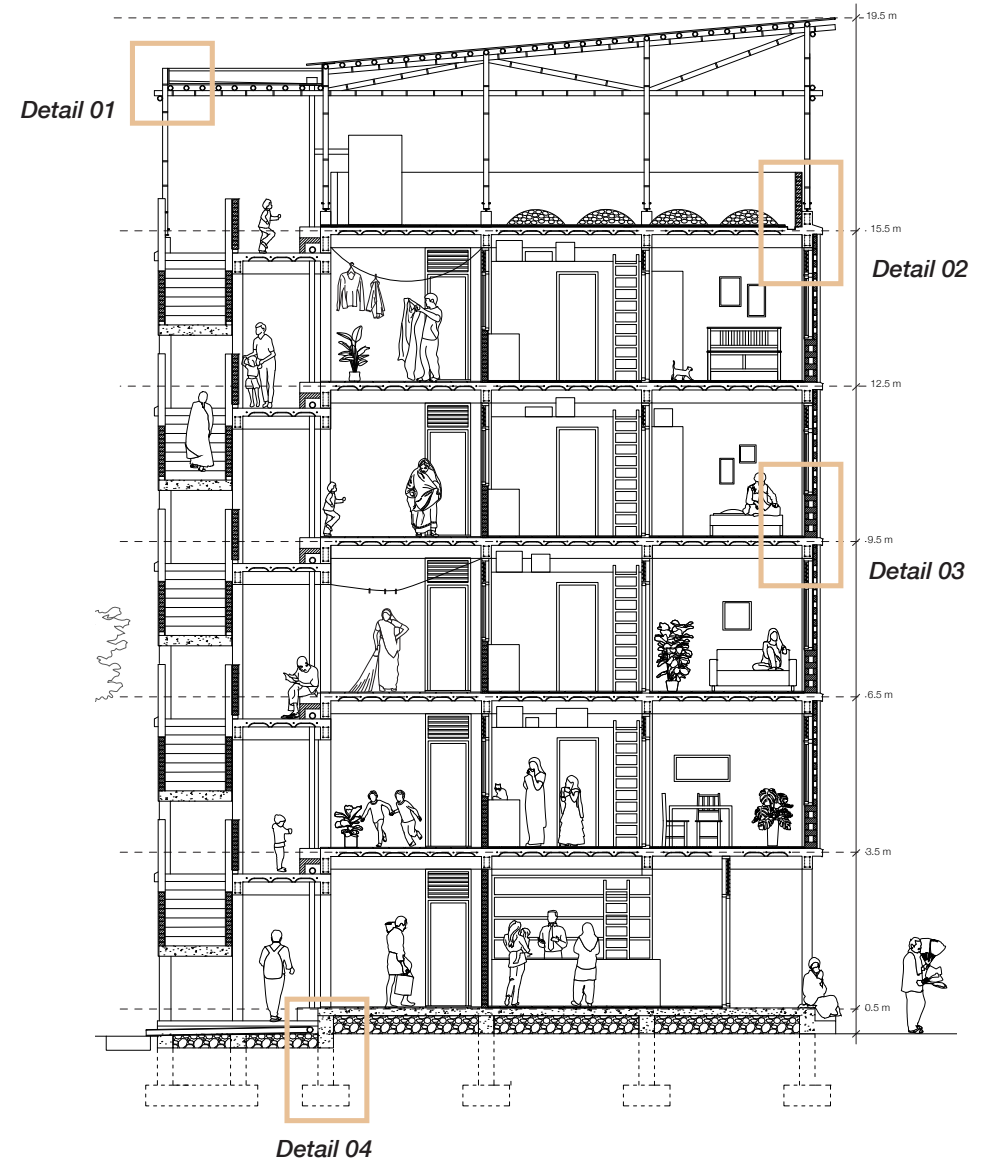


Building Strategy 1:50 Detail



Plan fragment // Slab typology

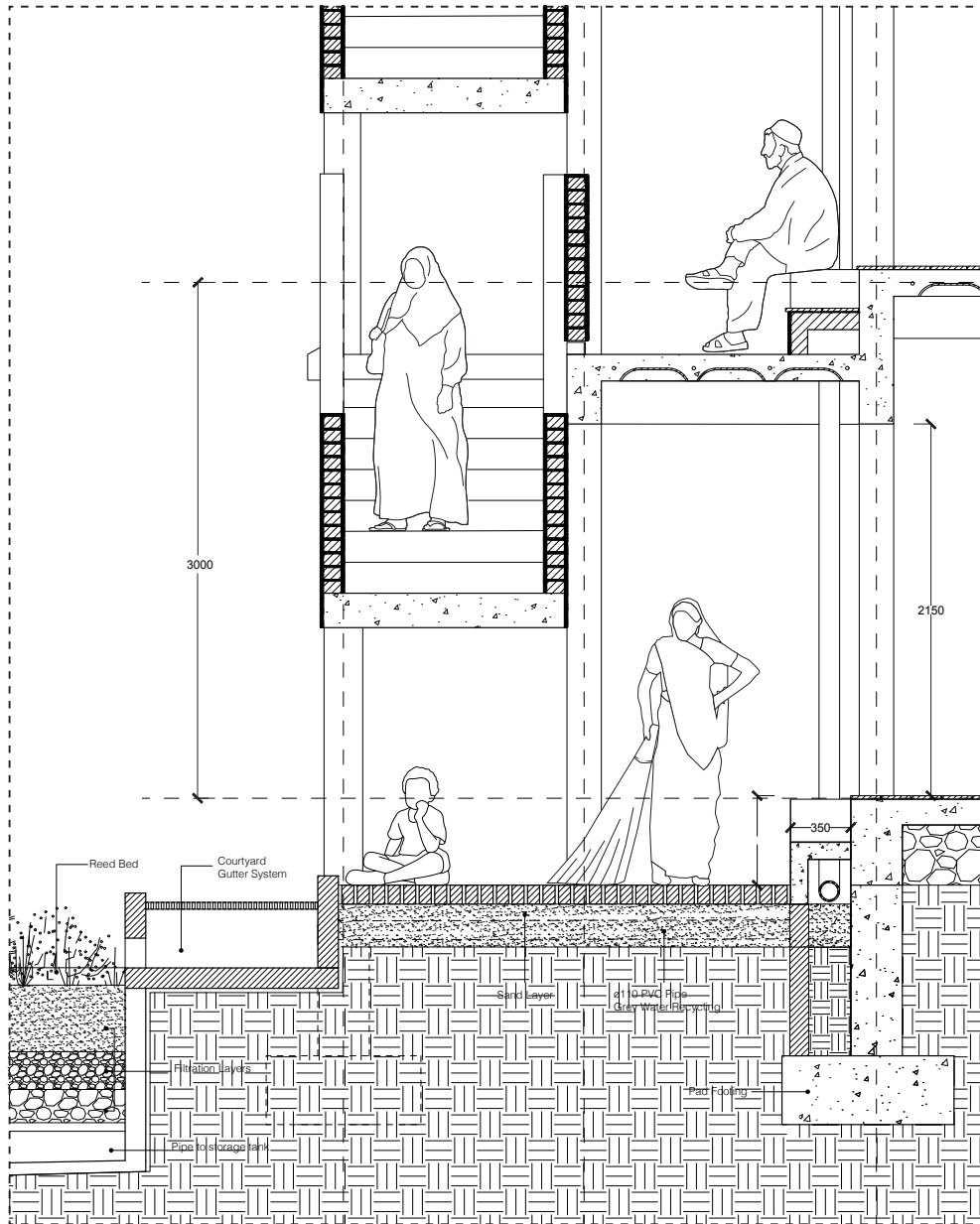
Building Strategy 1:50 Detail



Section A fragment // Slab typology

Building Strategy

1:20 Detail

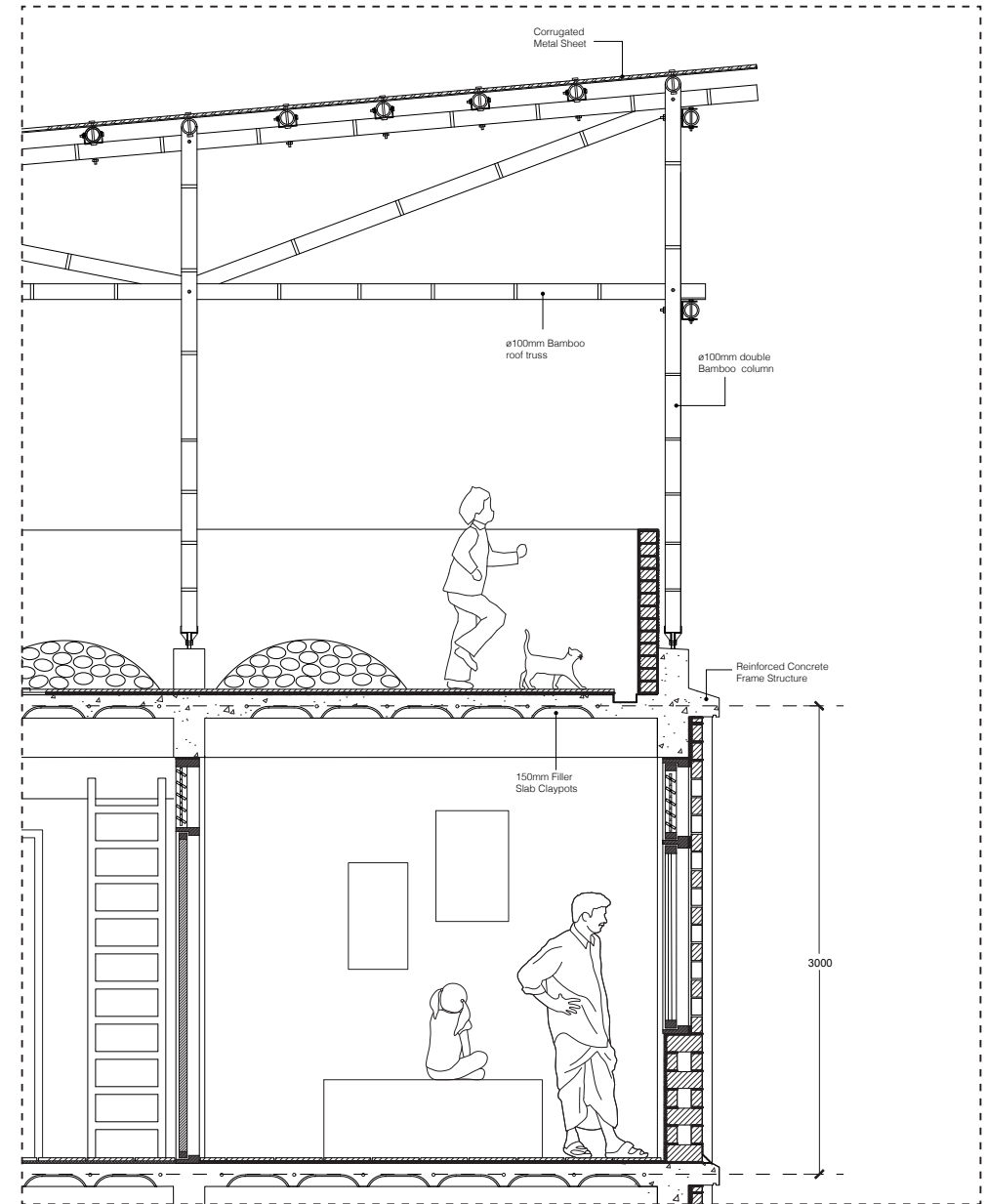


Ground section fragment

166

Building Strategy

1:20 Detail

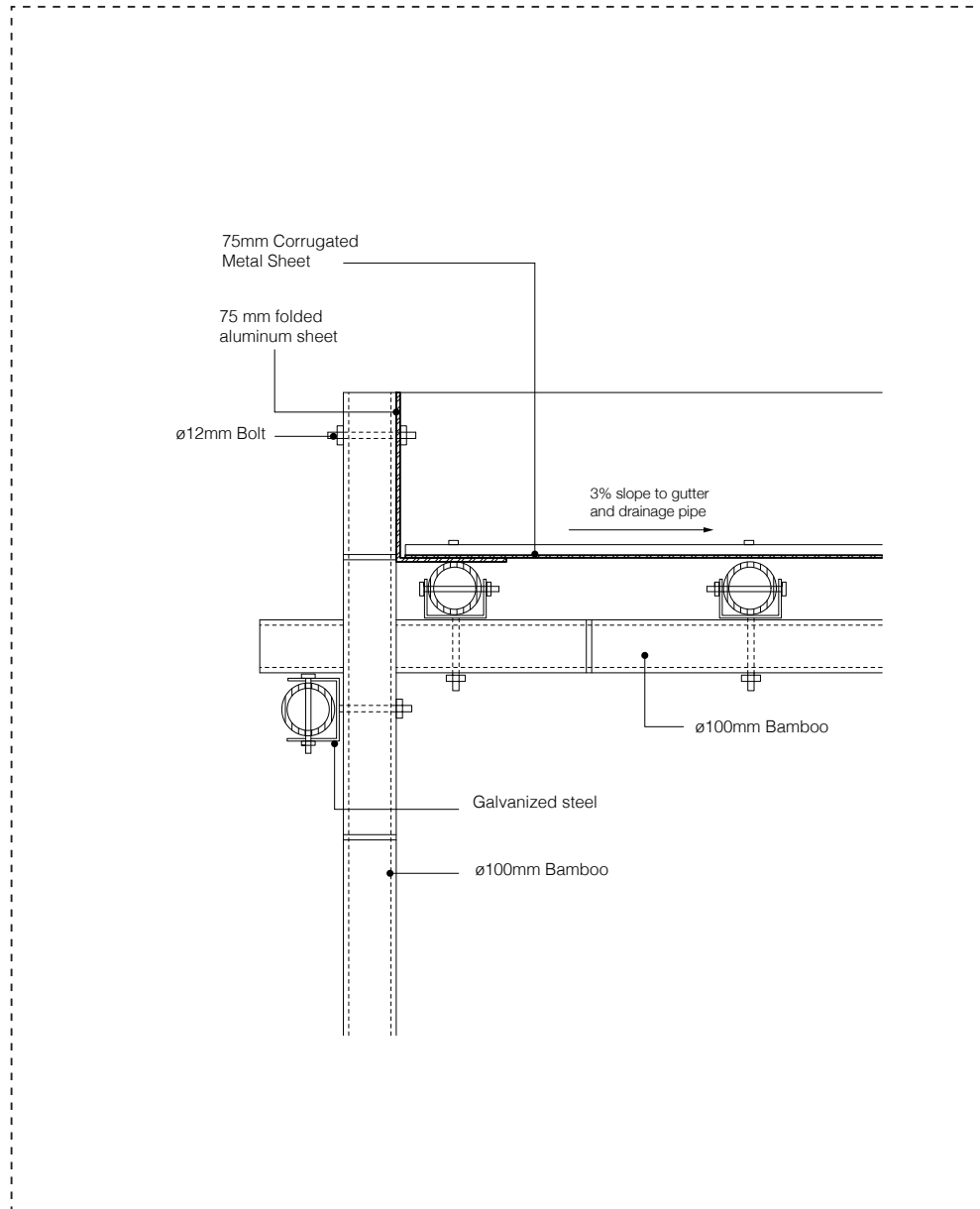


Roof section fragment

167

Building Strategy

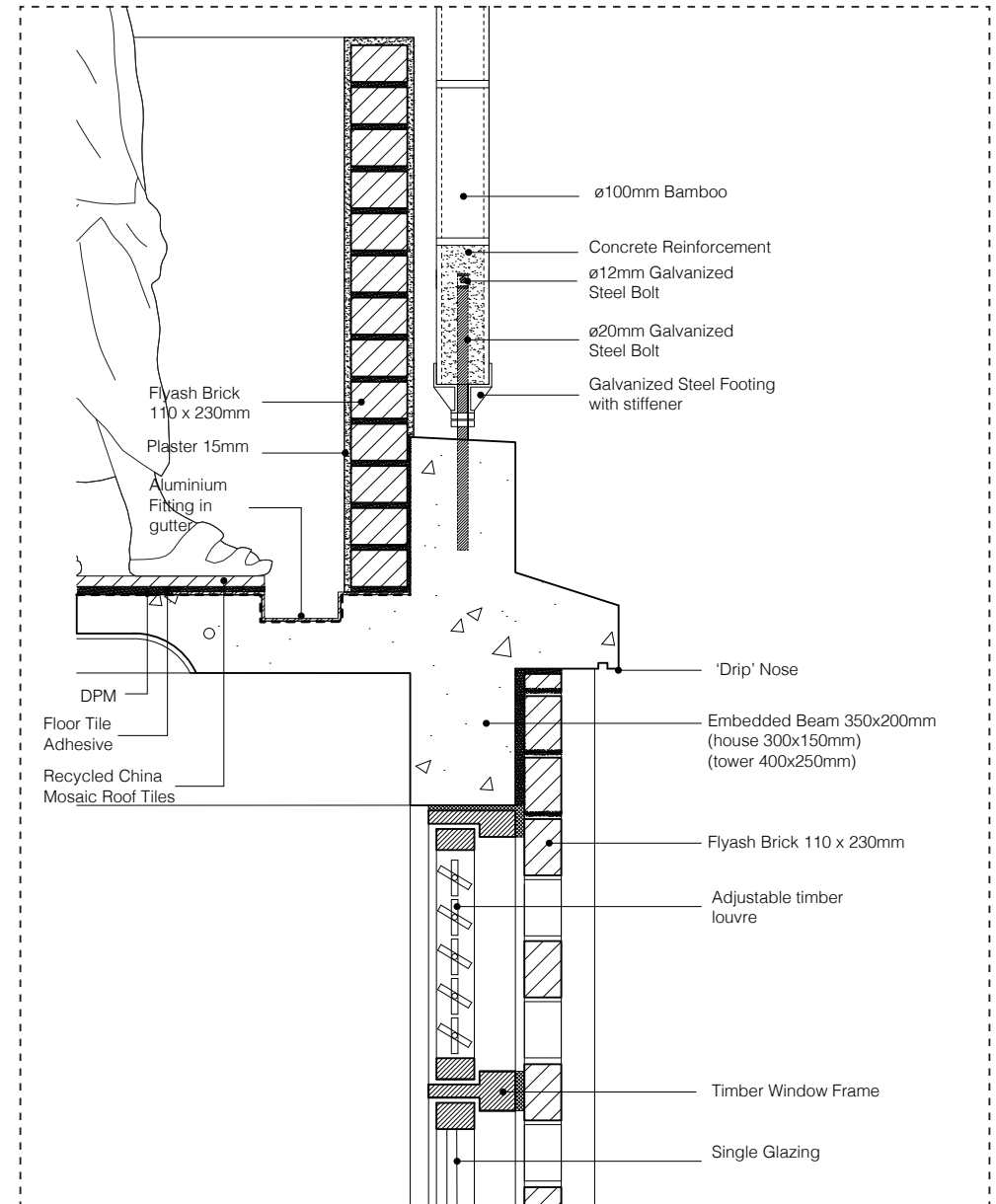
1:10 Detail



Detail 01

Building Strategy

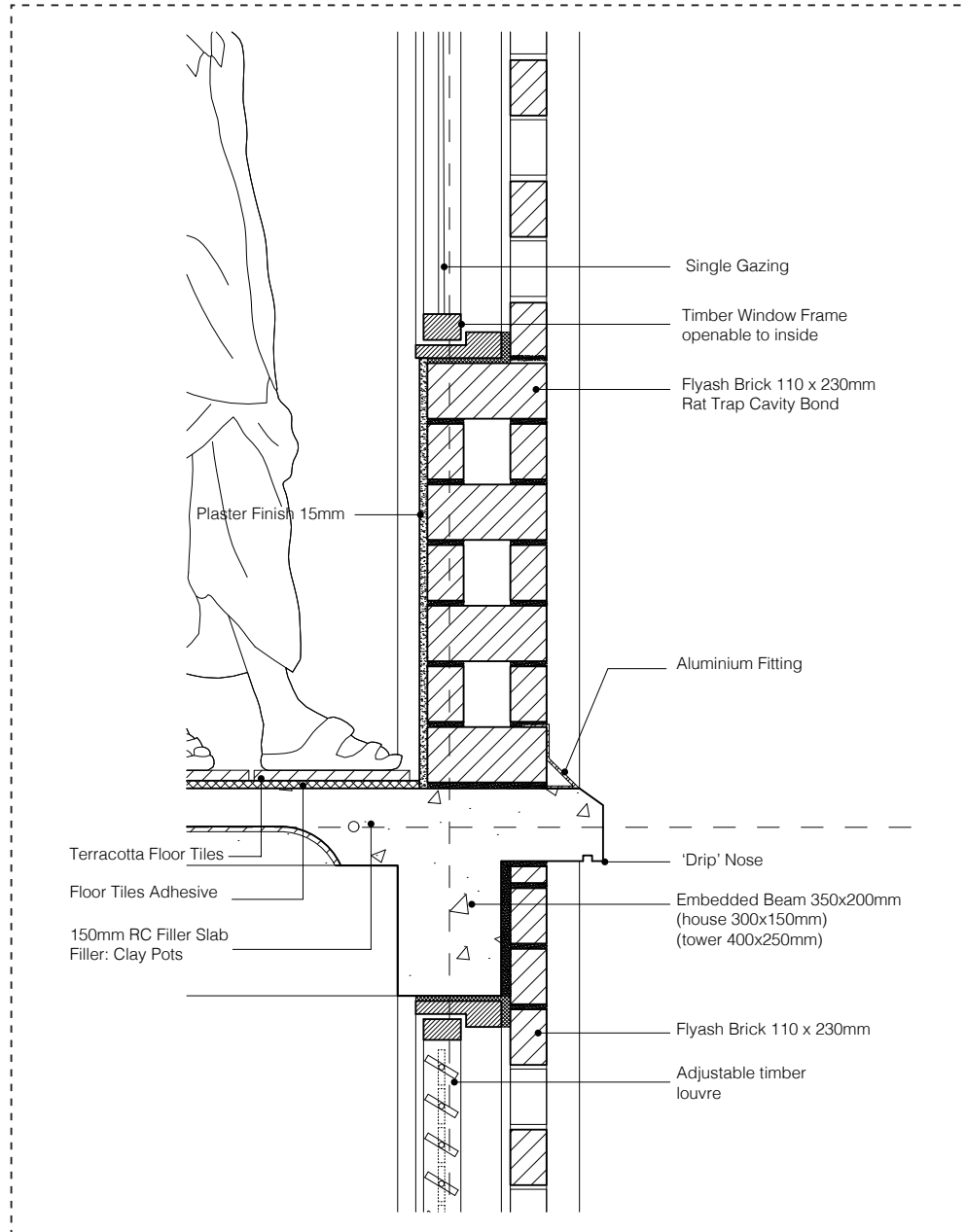
1:10 Detail



Detail 02

Building Strategy

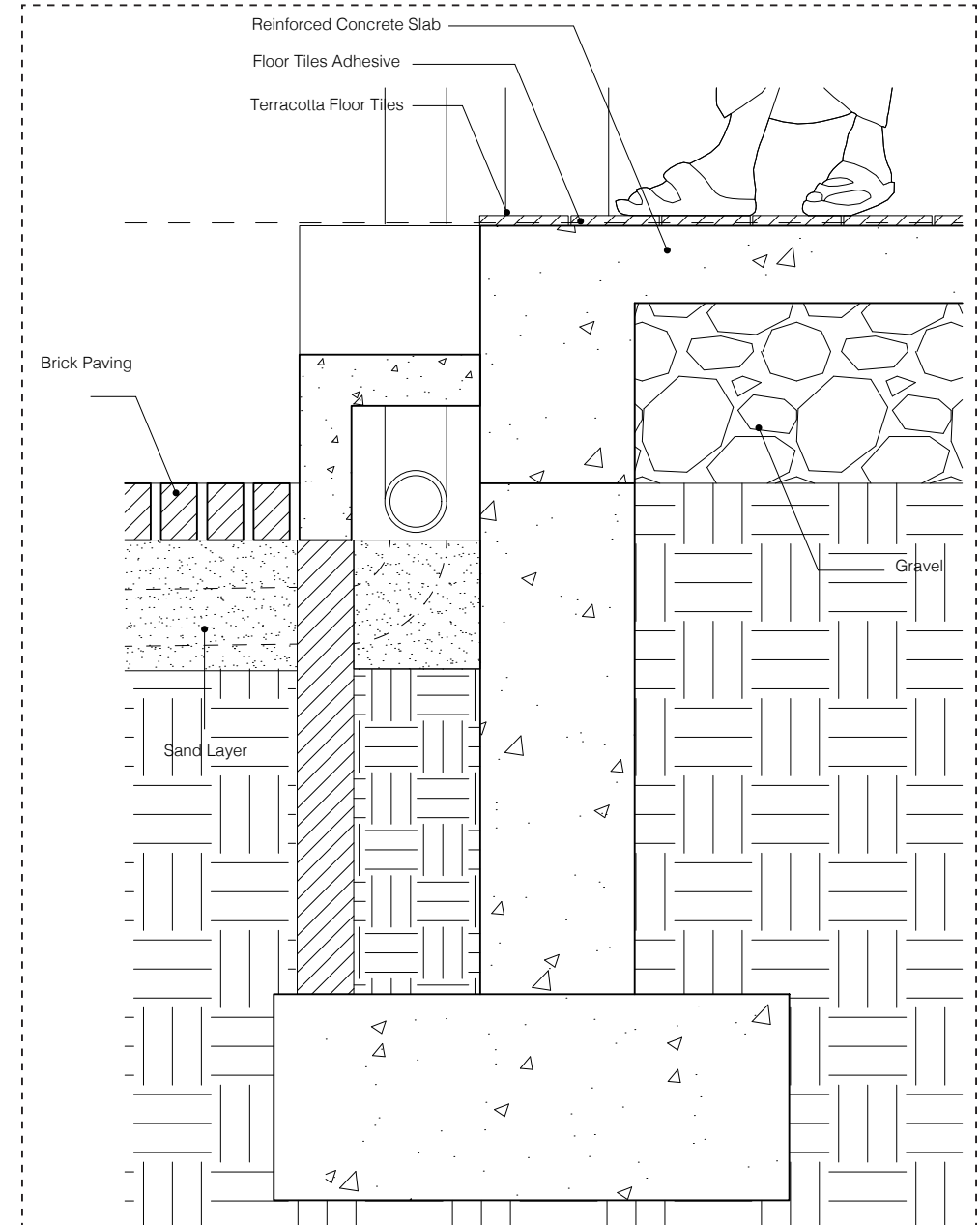
1:10 Detail



Detail 03

Building Strategy

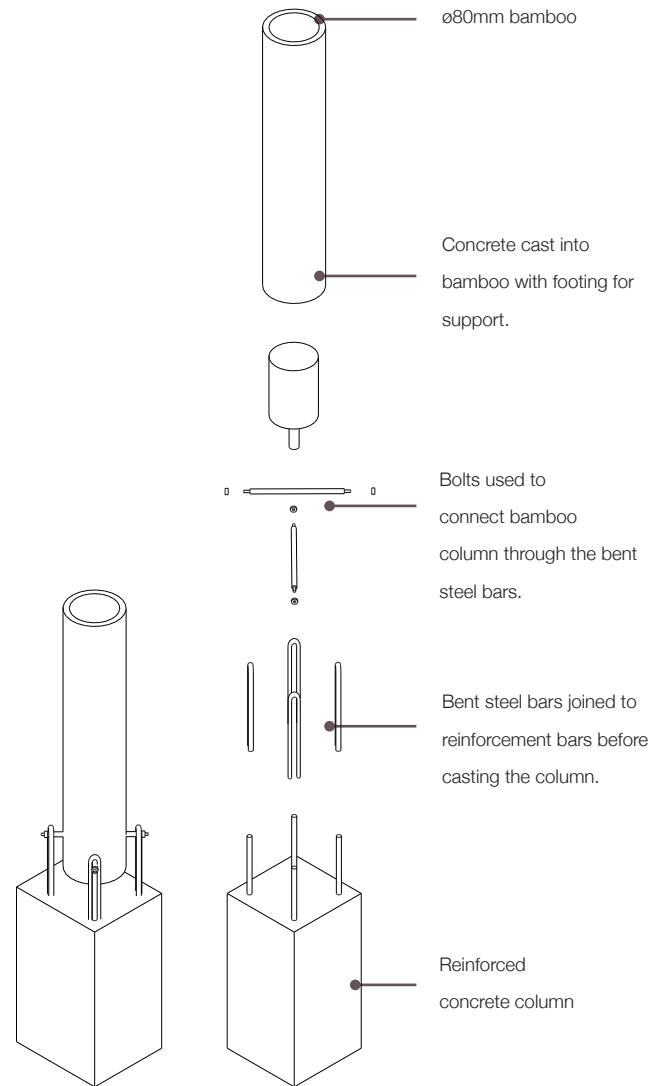
1:10 Detail



Detail 04

Building Strategy

Low-rise Bamboo detail



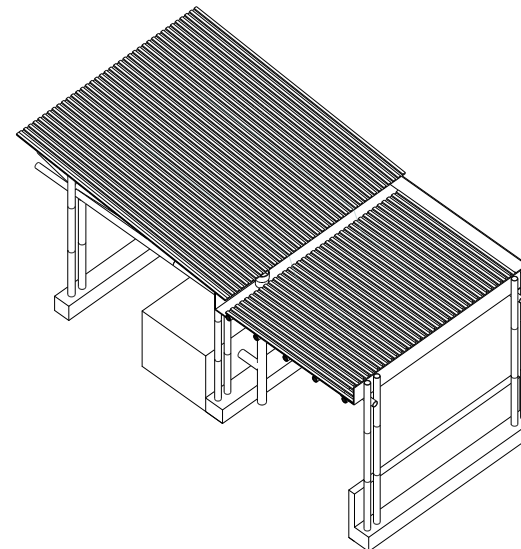
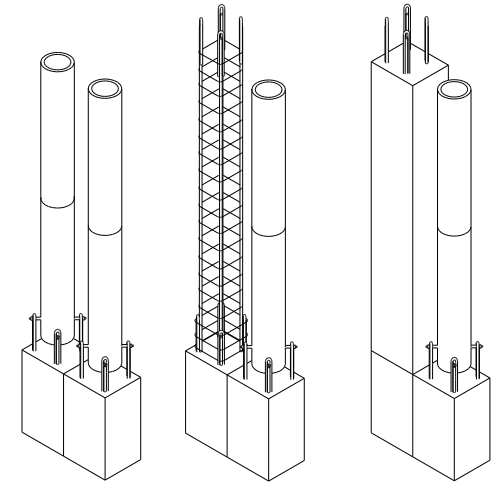
Structural components

Building Strategy

Bamboo extension // Roof Detail

Process of extension

The bamboo columns of the low-rise roof can be disassembled to allow for a new concrete column to be cast for a vertical extension of the house. The bamboo roof can in this way be reused as the row-houses extend and build more floors.

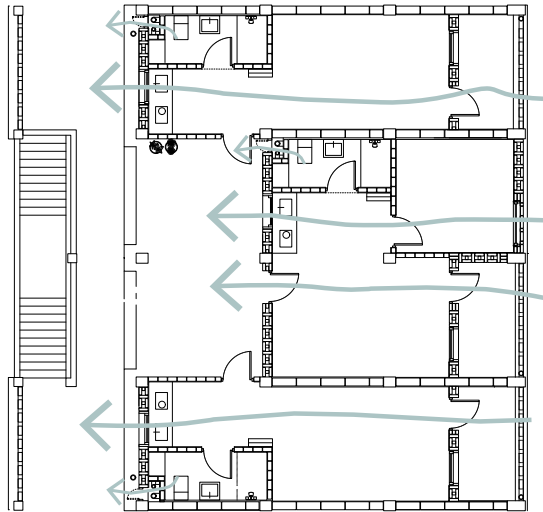


Roof as a large gutter

The roof has been designed in two parts, to allow the roof to perform as a large gutter for heavy rainfall during monsoon months.

Building Strategy

Ventilation

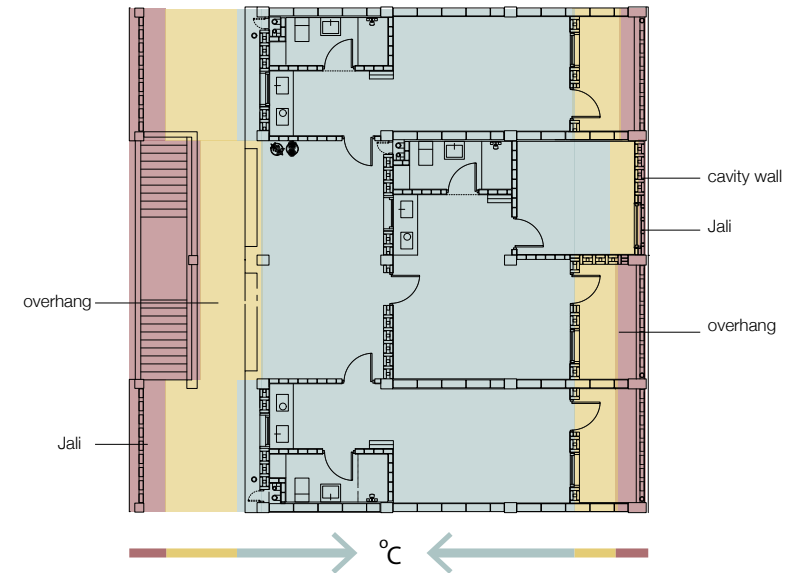


Cross Ventilation

All units have openings and ventilation towards two sides. The toilets are also positioned towards the external facade to allow for natural ventilation.

Building Strategy

Shading and Cooling



Buffer Zones

The building has several buffer zones that help maintain the thermal comfort inside the units. Elements such as jalis, brick cavity walls and overhangs are used.

Building Strategy

Water Management

Grey water Recycling and Rainwater Harvesting

The buildings water management is based on recycled grey water that goes through a reed bed and filtration layer before it is stored for using in toilet flushing, washing and irrigation.

During monsoon the design of the roof shape acts as a large gutter collecting the water before it goes to several water tanks placed on the roof slab. This water is cleaned using UV filtration and connected directly to the dwelling units. When the water tanks on the roof are full the overflow water is taken down to the courtyard gutter system and into the same storage tank as the grey water.

Building Strategy

1:10 Detail

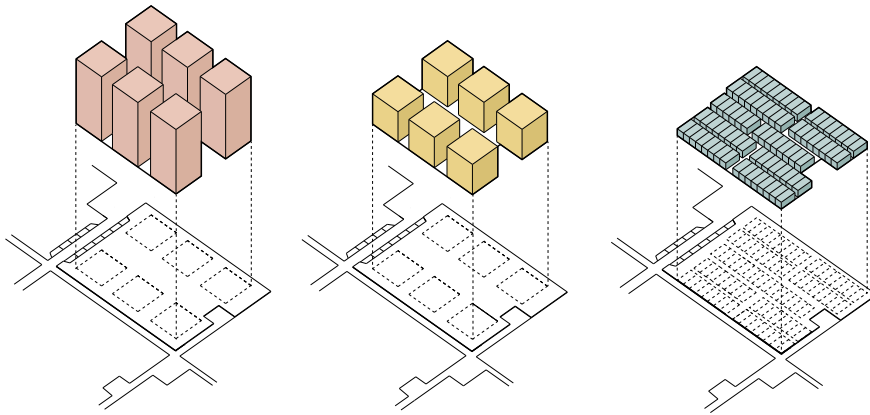


Clustering



Clustering

Based only on Efficiency



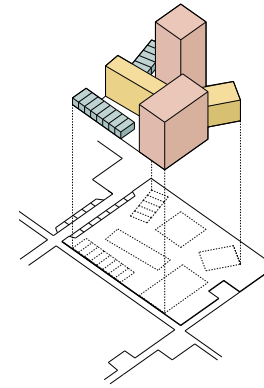
Too little diversity

Too much Efficiency

A strategy based only on efficiency, like we see in the trends of development today, is often defined by islands of one single typology on a plot.

Clustering

Based only on Resilience

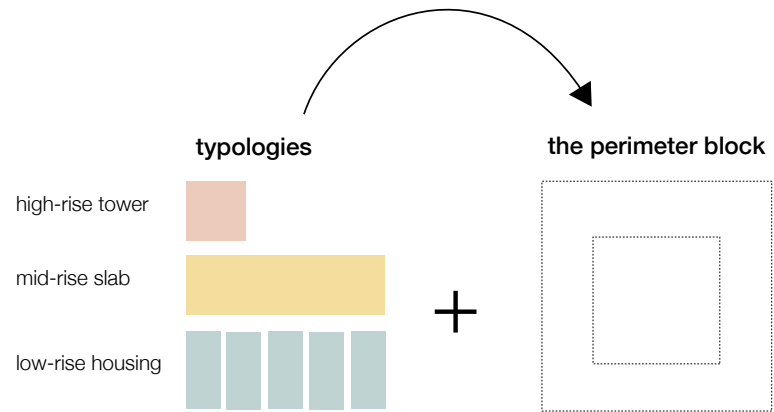


Too much diversity

Too much Resilience

A strategy based only on resilience, would aim for the extreme opposite, clustering the typologies without a structure or set of rules.

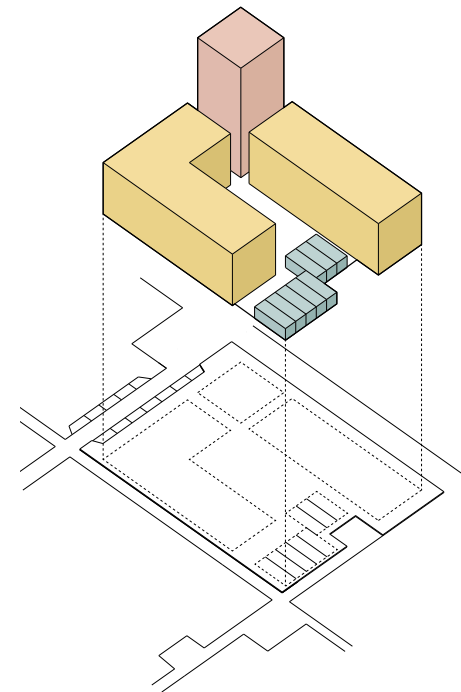
Clustering Strategy



Typological Mix

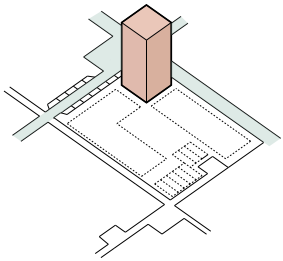
The proposal is based on the aggrupation of the three different housing typologies arranged into courtyard blocks. From my research the courtyard block has the capacity to achieve the optimum balance between green, open and built area.

Clustering Trade-off



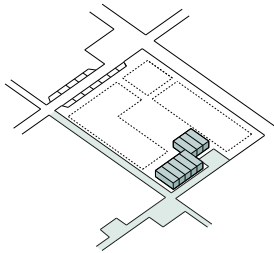
Typical Cluster

Clustering Strategy



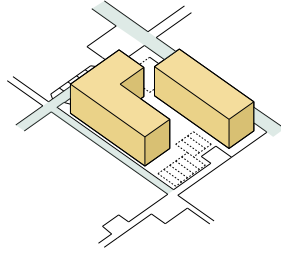
The Tower

The tower is placed on larger roads and squares to define markers in the urban fabric.



The Row-housing

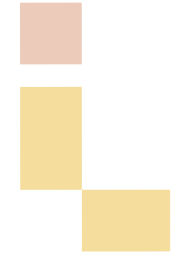
The Row-housing is placed on local roads to create community spaces that relate to the human scale.



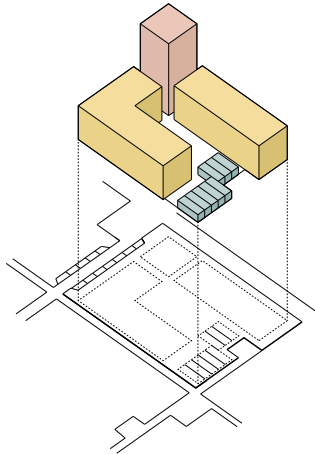
The Slab

The Slab has an adaptable ground floor and is placed on all road hierarchies, acting as an infill in-between the tower and the row-housing the slab defines the shape of the courtyard block.

Clustering Different Possibilities



Clustering Density



Proposal

Plot area: 2680 m²

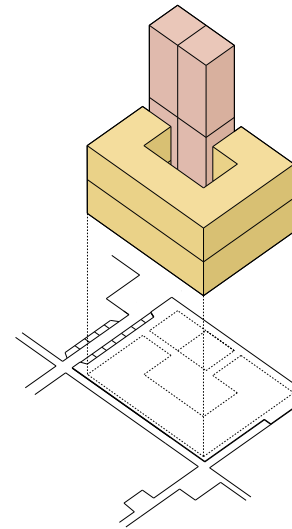
Dwelling units: 116

Optimum Density

With a diversity in unit types, mixed income groups, different typologies and the project's location, the optimum density aims at 300 - 400 DUs/Ha.

For a cluster in this typical urban condition and plot area, the optimum density is 116 dwelling units. Different densities can be achieved by adjusting the typologies used within a cluster. If higher densities are needed, the use of the tower and the slab can be prioritized over the use of row-housing and vice versa. The density can be increased above this level; however, then you start losing qualities embedded in the clustering strategy.

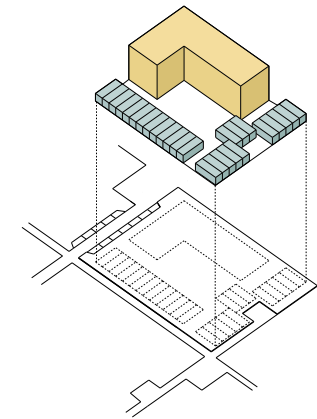
Clustering Density



Maximizing Density

Plot area: 2680 m²

Dwelling units: 268



Decreasing Density

Plot area: 2680 m²

Dwelling units: 84

By mirroring the tower, removing the row-housing and doubling the height of the cluster, the density can increase; however, this would be an operation triggered only by efficiency. The reason for including the tower typology in my scheme is not to densify the cluster, but it's more about exclusivity.

By removing the tower, decreasing the slab and increasing the use of the Row-housing typology, the density can decrease, possibly improving the quality; however, this would leave many people out.



Cluster 1:200 // Typologies





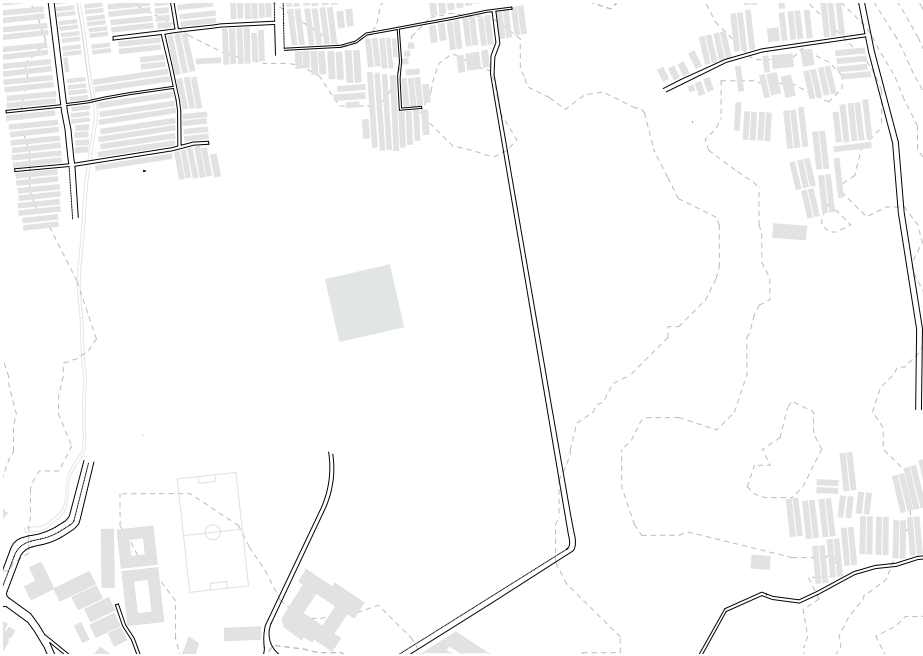
Gluster 1:200

Urban Strategy



Urban Strategy

Existing



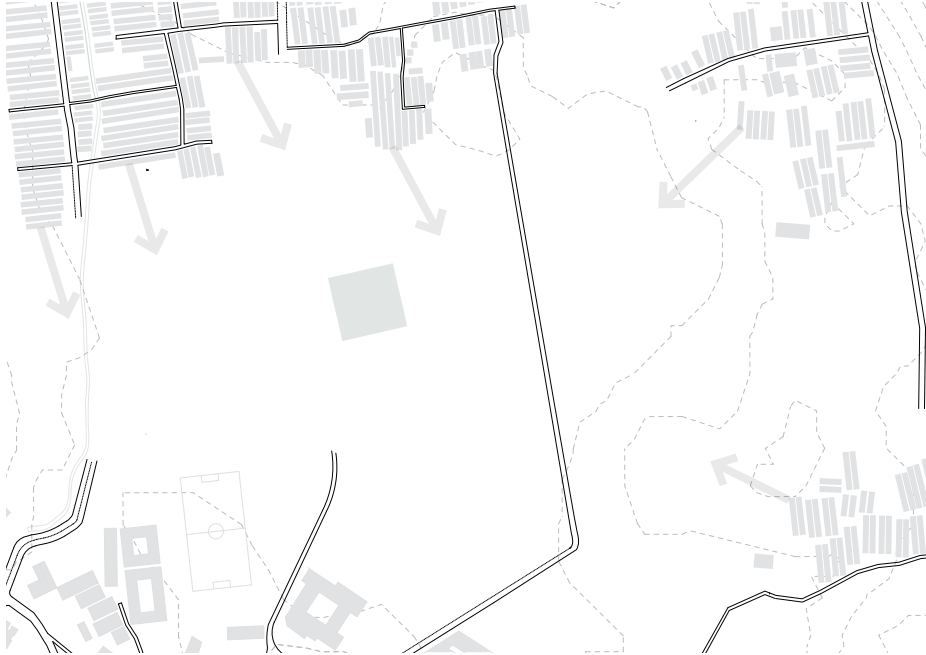
Existing condition

Today the site is a greenfield where none of the current trends of development have happened yet. If nothing is done, the tendency of development in places like Nalasopara is that greenfield sites like this one are going to be developed following the same patterns as the current trends of development.

**What are possible future scenarios
for the chosen site, if an alternative
strategy is not given?**

Urban Strategy

Scenario 1

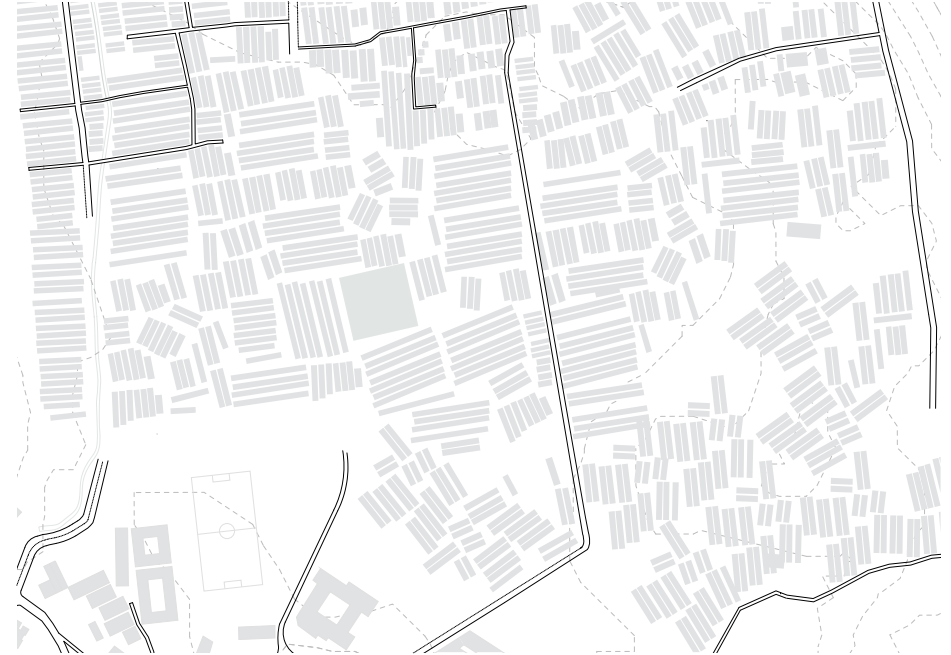


Scenario 1

The informal Baithi Chawls will most likely continue to encroach upon the greenfield, until its all covered leaving an extremely dense fabric without proper roads and structure of open space.

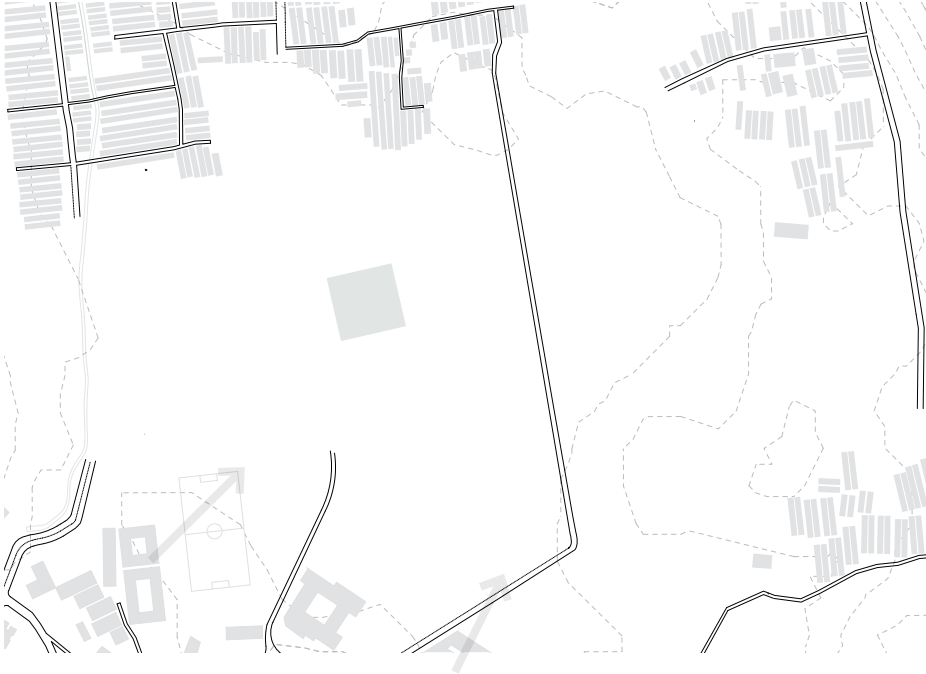
Urban Strategy

Scenario 1



Urban Strategy

Scenario 2

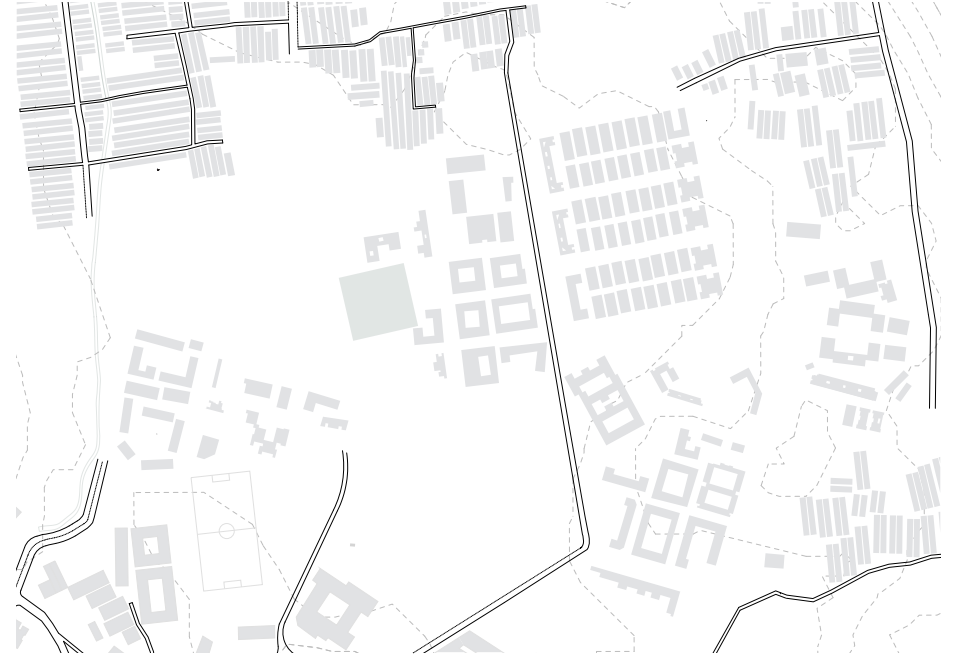


Scenario 2

The second scenario, could be islands of isolated developments, that fail to connect to the existing context, appearing one by one until the site is covered.

Urban Strategy

Scenario 2

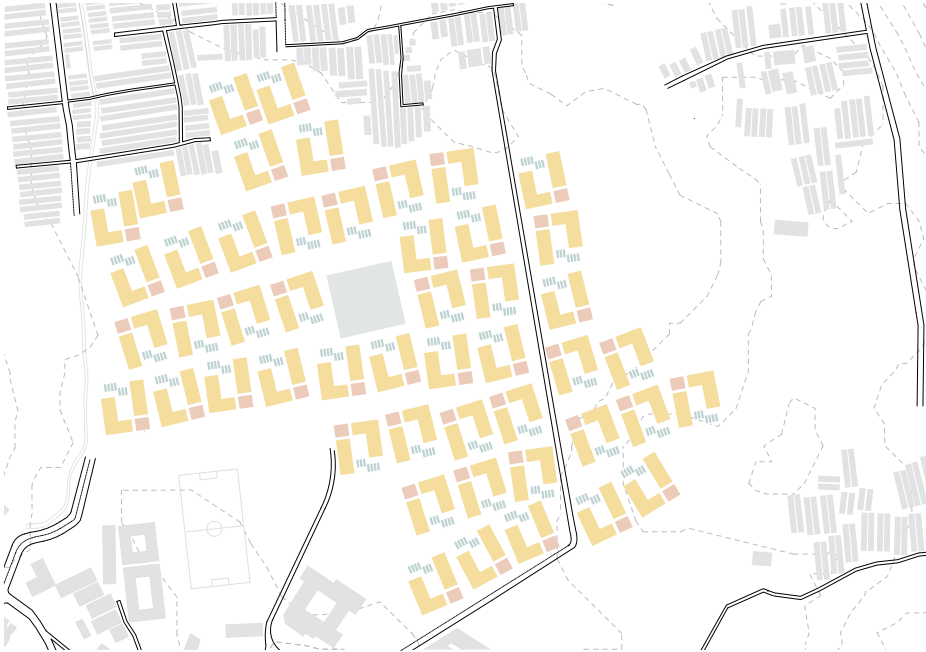


Scenario 2

Examples from previous developments in Nalasopara have been used in this image to illustrate the affect of this scenario that we see happening today.

Urban Strategy

Based only on Efficiency

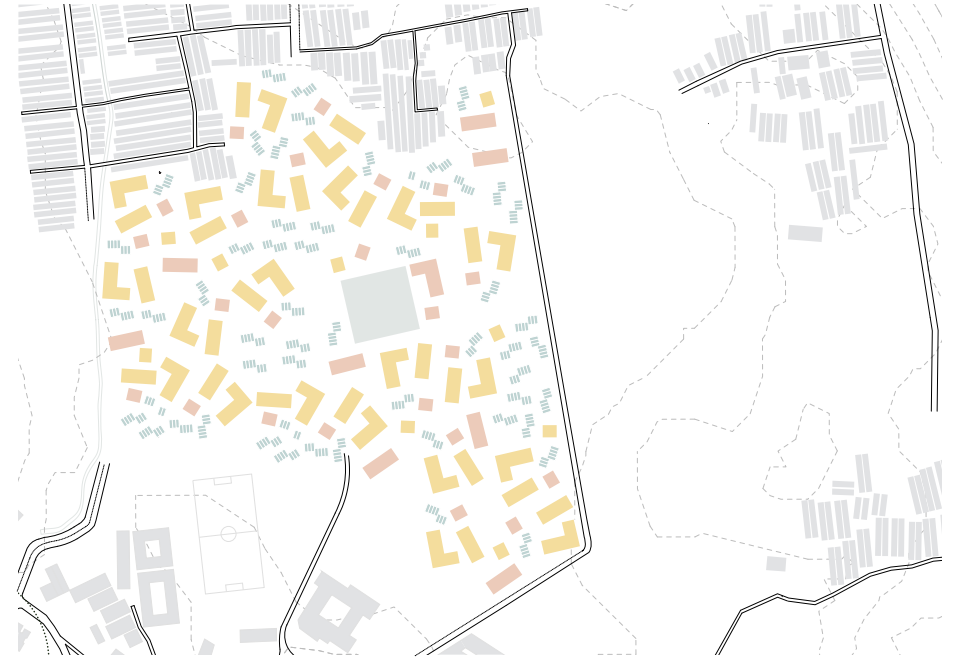


Too much Efficiency

With my projects clustering of the three typologies, an urban strategy based only efficiency, could look something like this, with one typical cluster configuration repeated endlessly, rubber-stamped.

Urban Strategy

Based only on Resilience

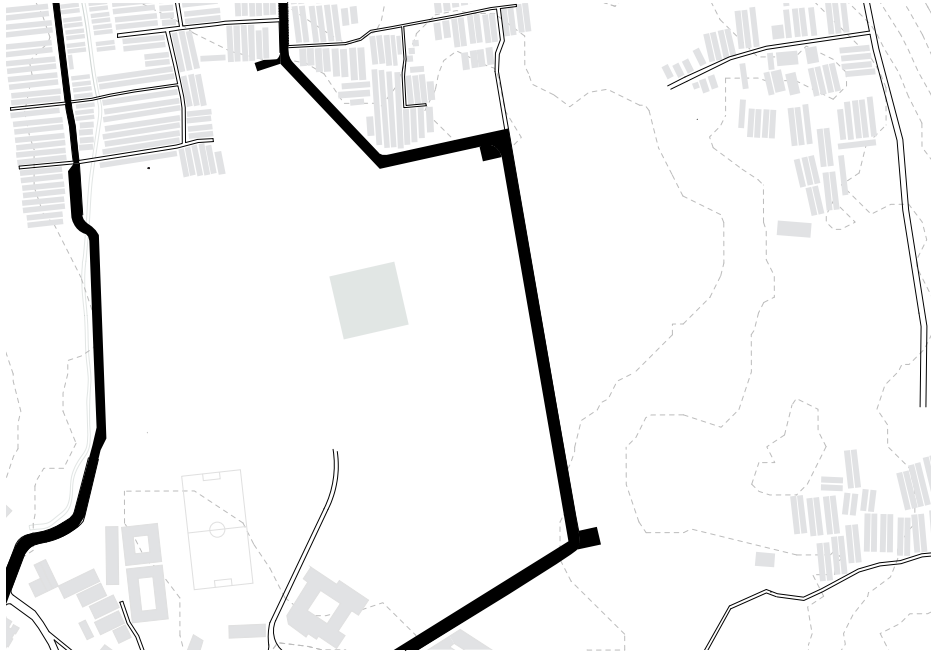


Too much Resilience

For a strategy based only on resilience, the aim would be to create as much diversity and adaptability as possible. However this would lead to too much diversity and a lack of coherence and purpose to grow.

Urban Strategy

Hierarchy of roads // Primary

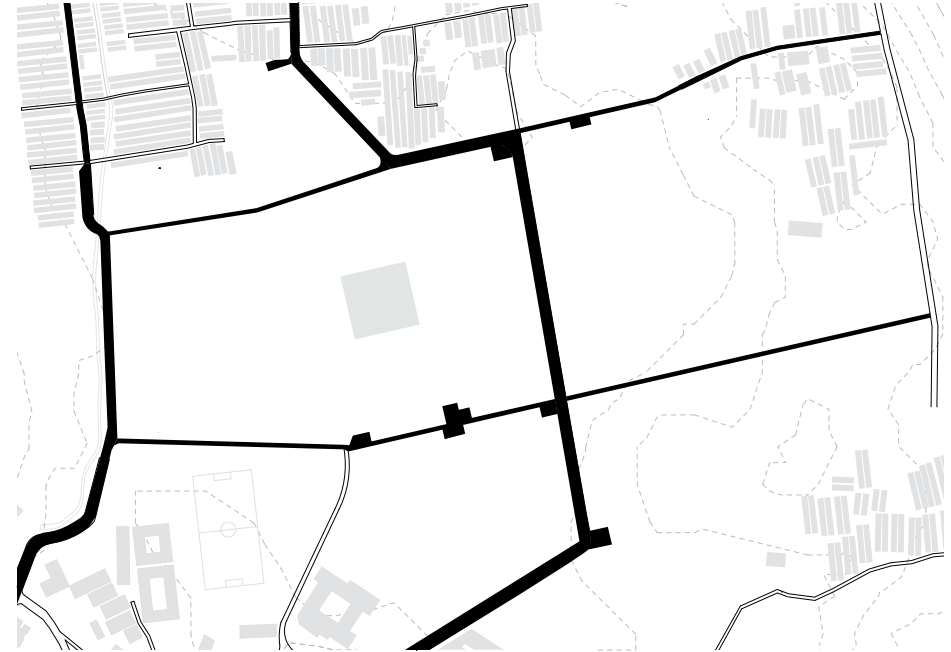


Primary Roads

Primary roads that connect to the existing infrastructure around the chosen area are proposed according to exiting movement through site today. This level of the hierarchy also includes the public transport and is proposed to be impermeable asphalt.

Urban Strategy

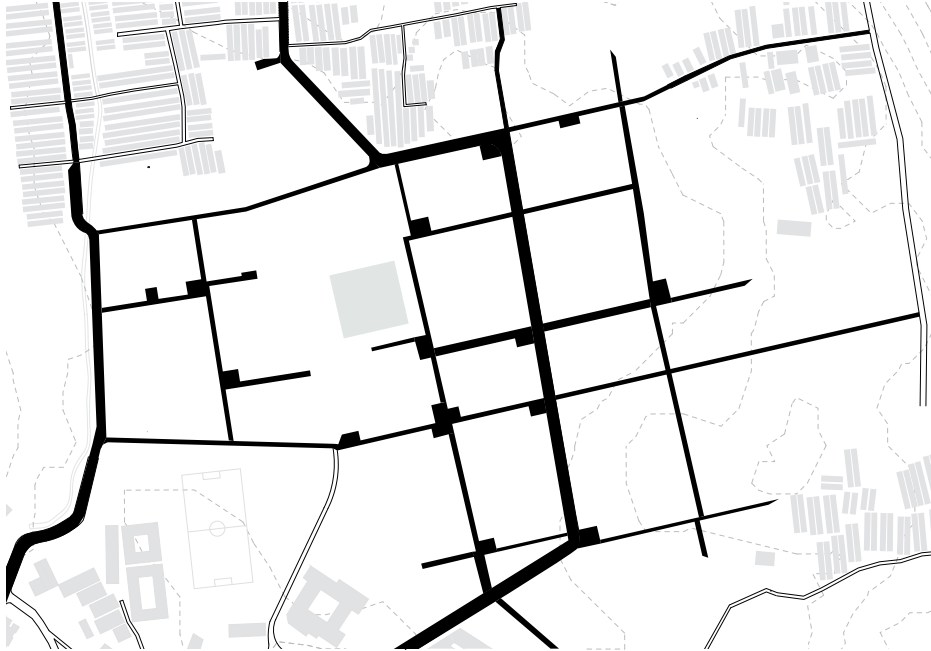
Hierarchy of roads // Secondary



Secondary Roads

The next level of the hierarchy, the secondary roads, act as connectors between the Primary Roads. This level also includes on street parking and is proposed to be impermeable asphalt.

Urban Strategy
Hierarchy of roads // Local 1



Local 1

The third level of the hierarchy has larger local roads accommodating both cars and rickshaws. This level is proposed to be permeable with brick covered surfaces.

Urban Strategy
Hierarchy of roads // Local 2

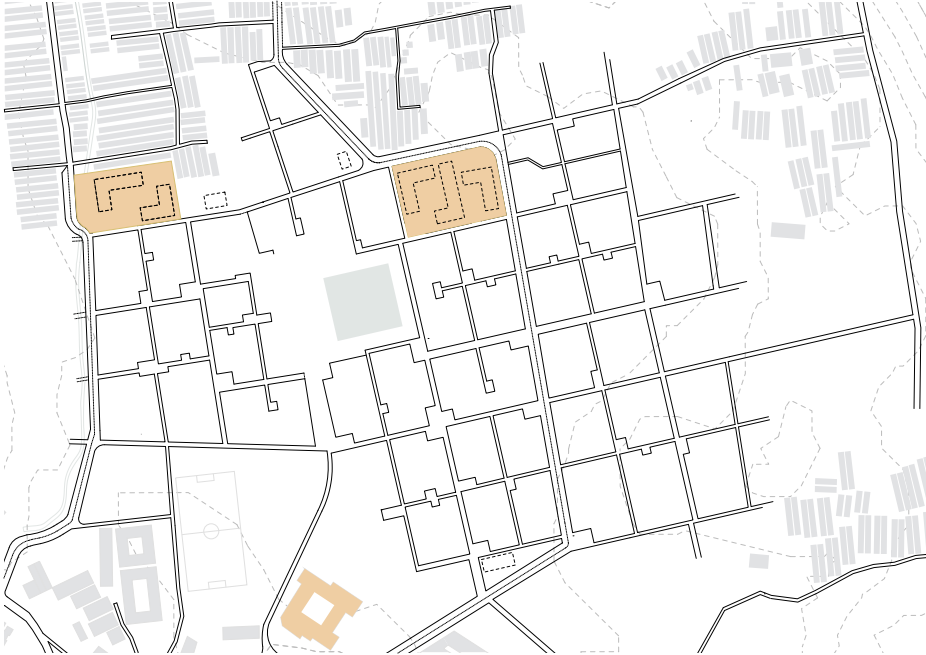


Local 2

The final level of the hierarchy accommodates less traffic as the roads are quite narrow however they allow for single sided vehicular traffic and Rickshaw access. This level of the hierarchy, similar to the third, is permeable with brick covered surfaces.

Urban Strategy

Larger Amenities

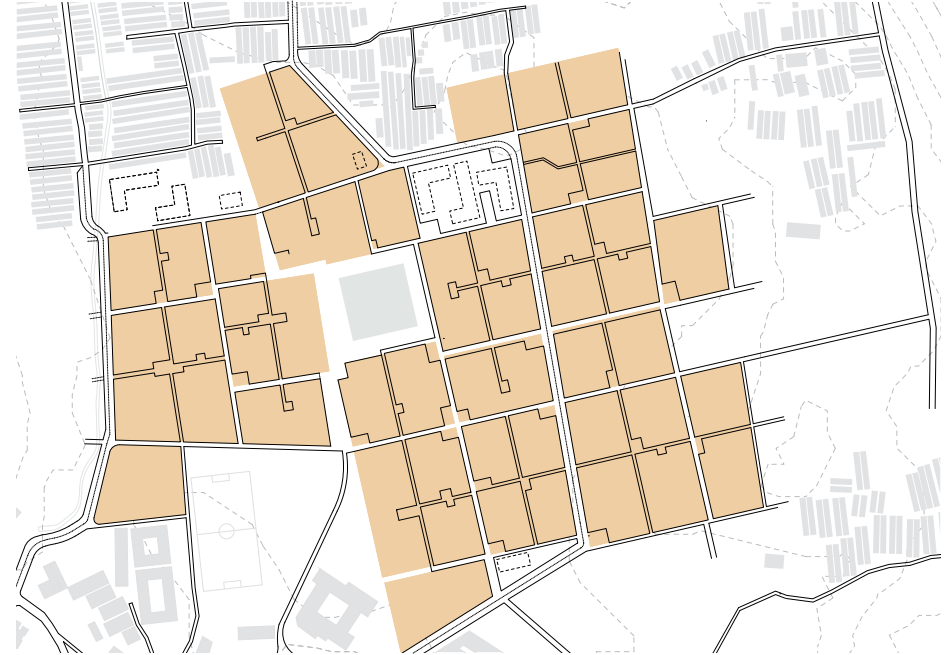


Larger Amenities

Larger amenities like a school and hospital are placed along the primary roads that connect to the existing urban context.

Urban Strategy

Plots



Plots

Plots for development are shaped by the new infrastructure.

Urban Strategy

Tower



Towers

The towers are prominently placed in the intersections of the major roads or around larger squares marking these specific conditions in the urban plan.

Urban Strategy

Row-Housing



Row-housing

The incremental row-housing is positioned on the final level of the hierarchy, in the smaller local roads where all the transformation through time that revolves around this typology can be accommodated.

Urban Strategy

Slab



Slab

The slab typology is finally placed as an infill between the towers and the low-rise defining the shape of the courtyard blocks, giving an optimum trade-off.

Urban Strategy

Clusters



Buildings

The strategy of clustering these three typologies and then organizing them on to the chosen area according to a set of rules, creates a variety of different cluster configurations that give the larger urban plan different spatial qualities.

Urban Strategy

Green areas and open spaces



Green and open space

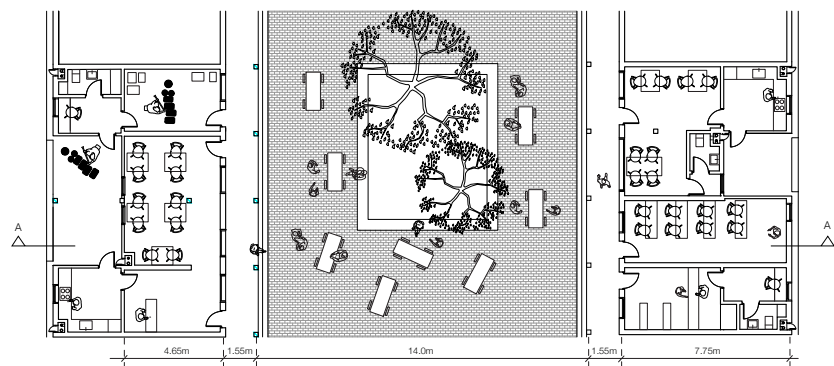
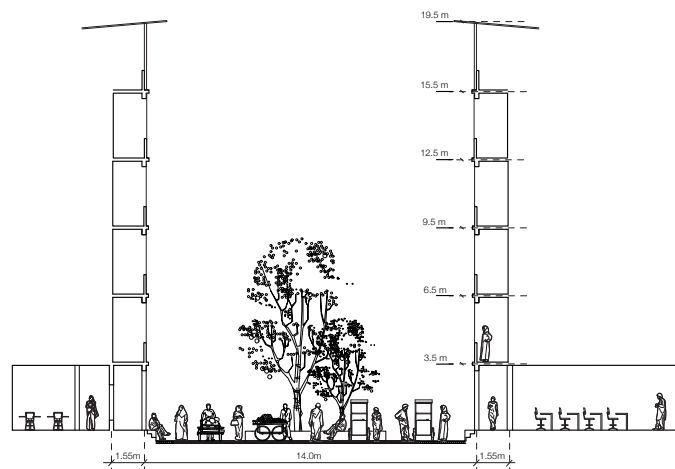
The project proposes the use of courtyard blocks in order to provide the optimum balance between built mass and open space. To cherish the quality of the former green-field and to keep larger part of the area permeable, open and green spaces have been included in the urban plan as a community spine, as well as leaving the courtyards of the clusters green.





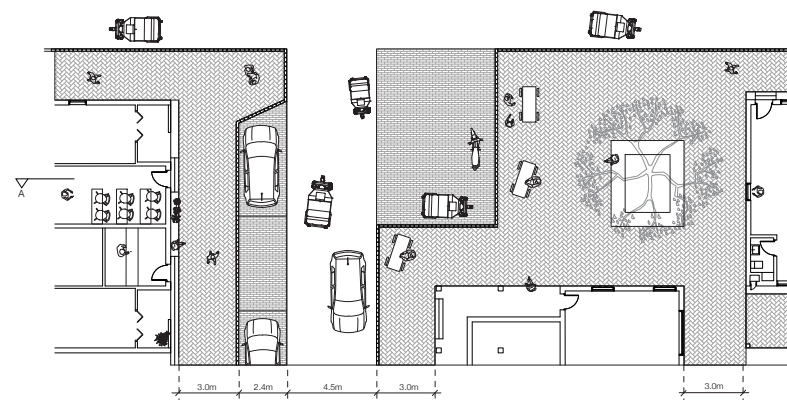
Urban Strategy

Urban Fragment // Community Spine



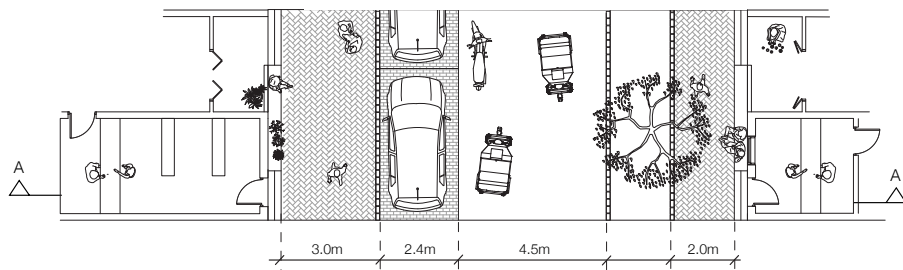
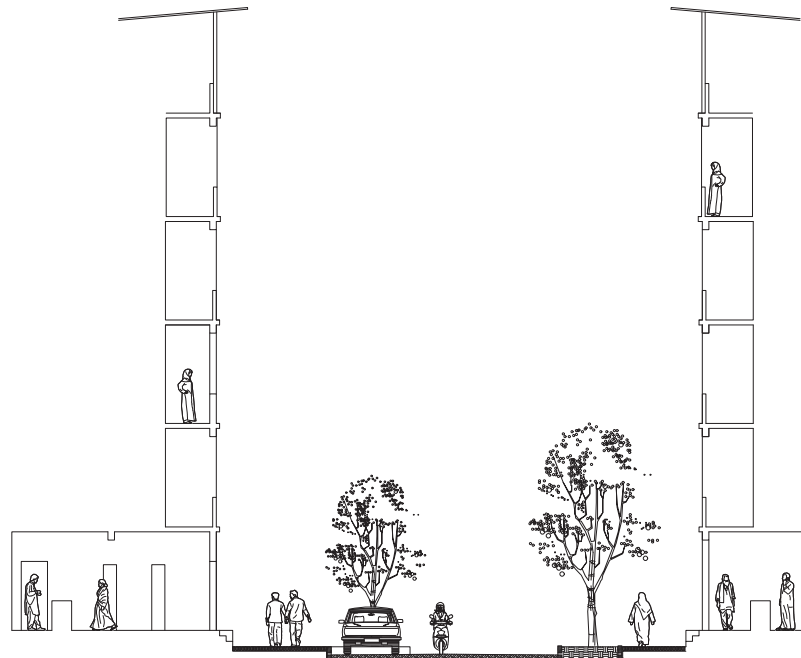
Urban Strategy

Urban Fragment // Secondary Roads

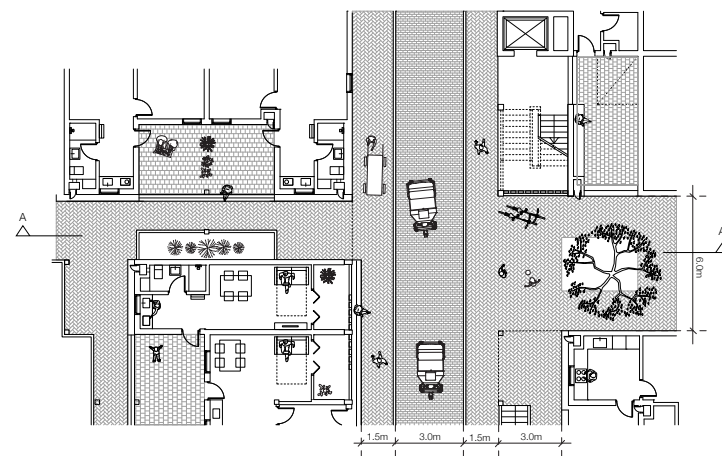
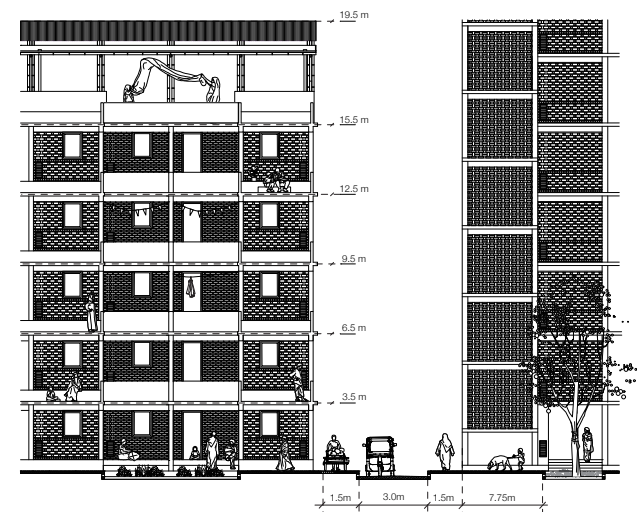




Urban Strategy
Urban Fragment // Secondary Road



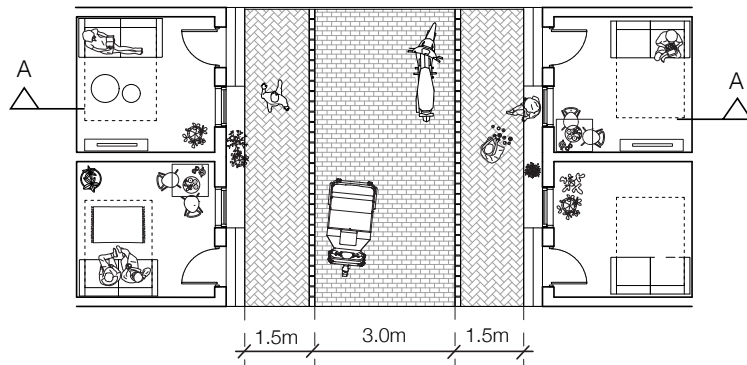
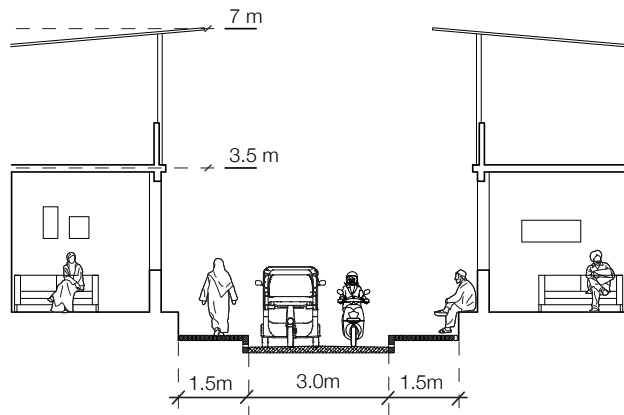
Urban Strategy
Urban Fragment // Corner Blocks





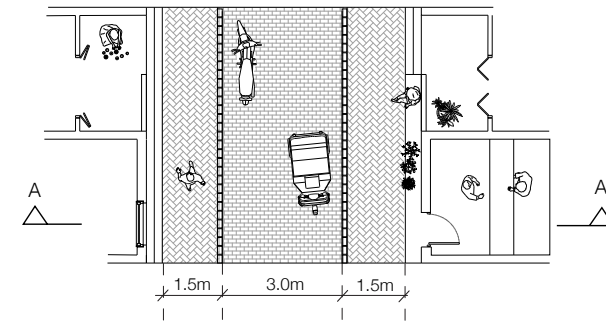
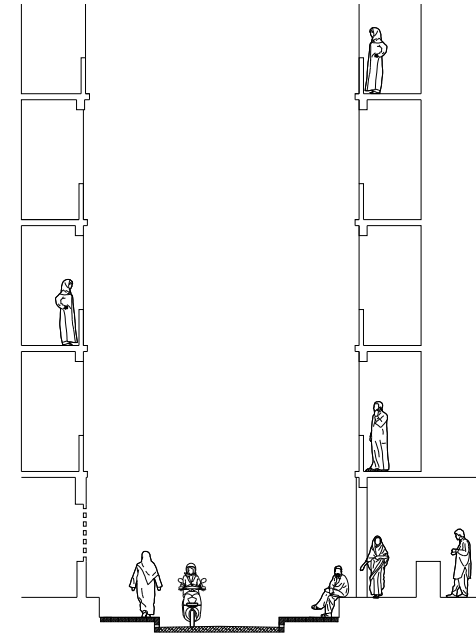
Urban Strategy

Urban Fragment // Local Roads



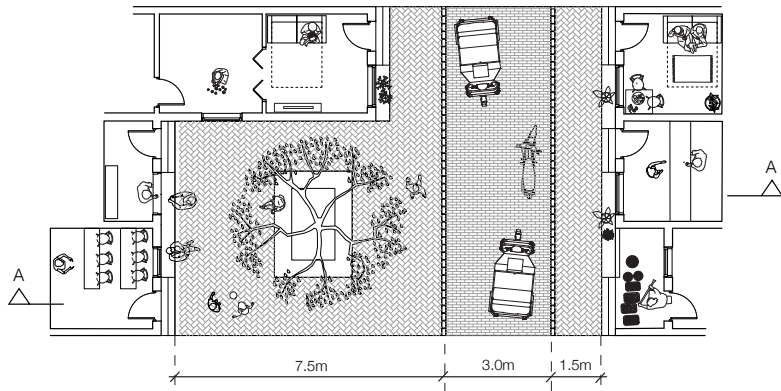
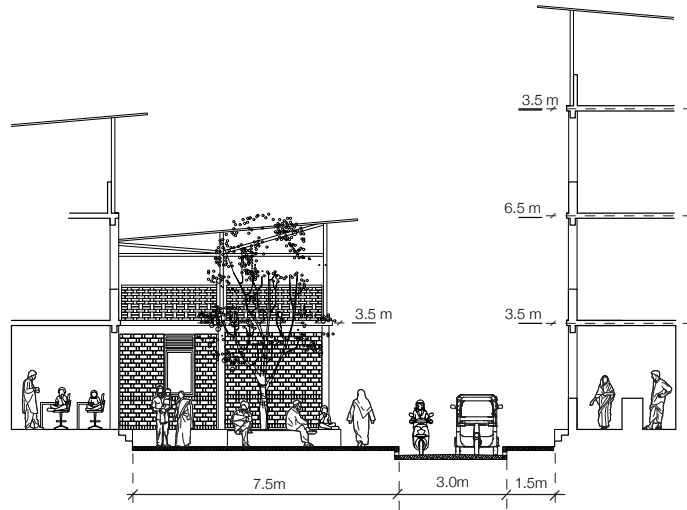
Urban Strategy

Urban Fragment // Local Roads

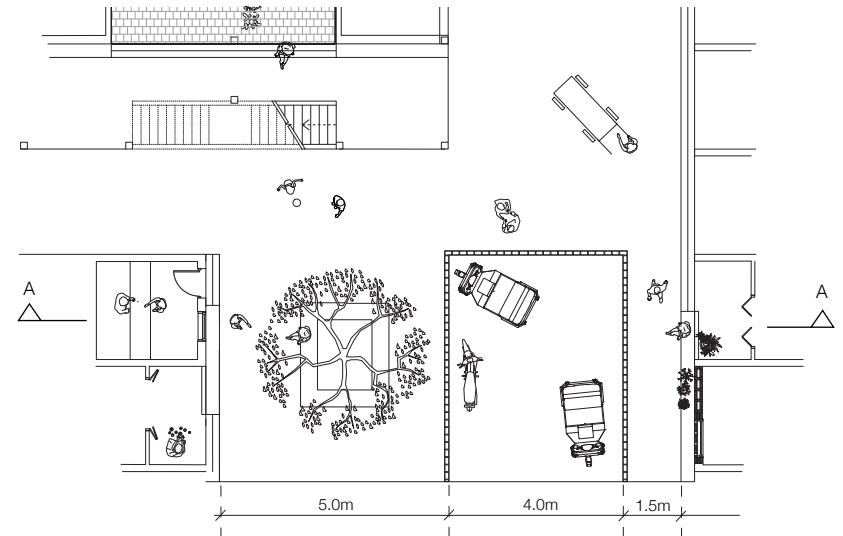
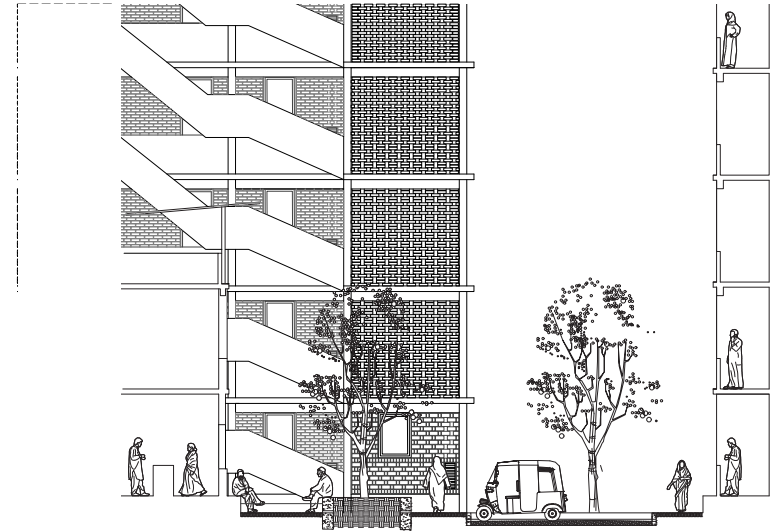




Urban Strategy
‘Urban Fragment // Local Roads



Urban Strategy
Urban Fragment // Local Roads

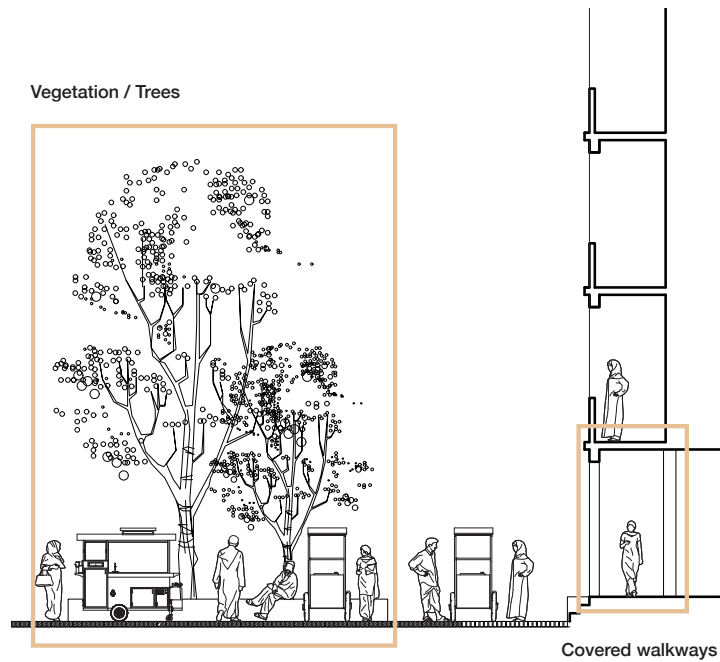




Urban plan 1:500

Urban Strategy

Shading and cooling



In the urban scale shading and cooling is provided by vegetation and trees that shade and evaporate water. Covered walkways connected to commercial units have also been introduced as part of the urban shading strategy.

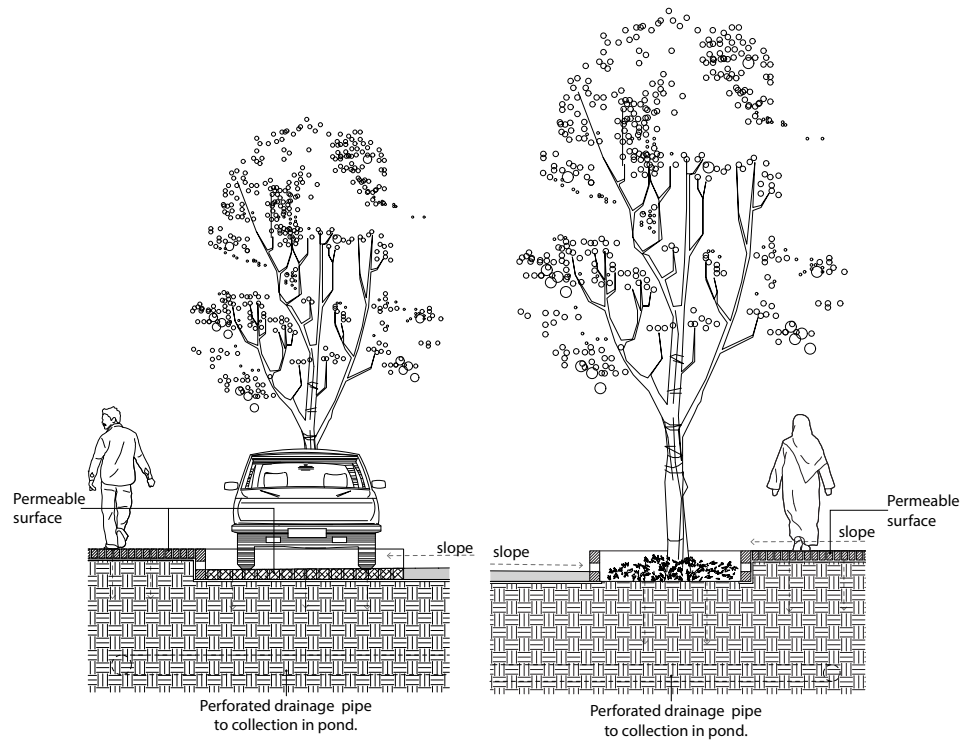
Urban Strategy

Water Management



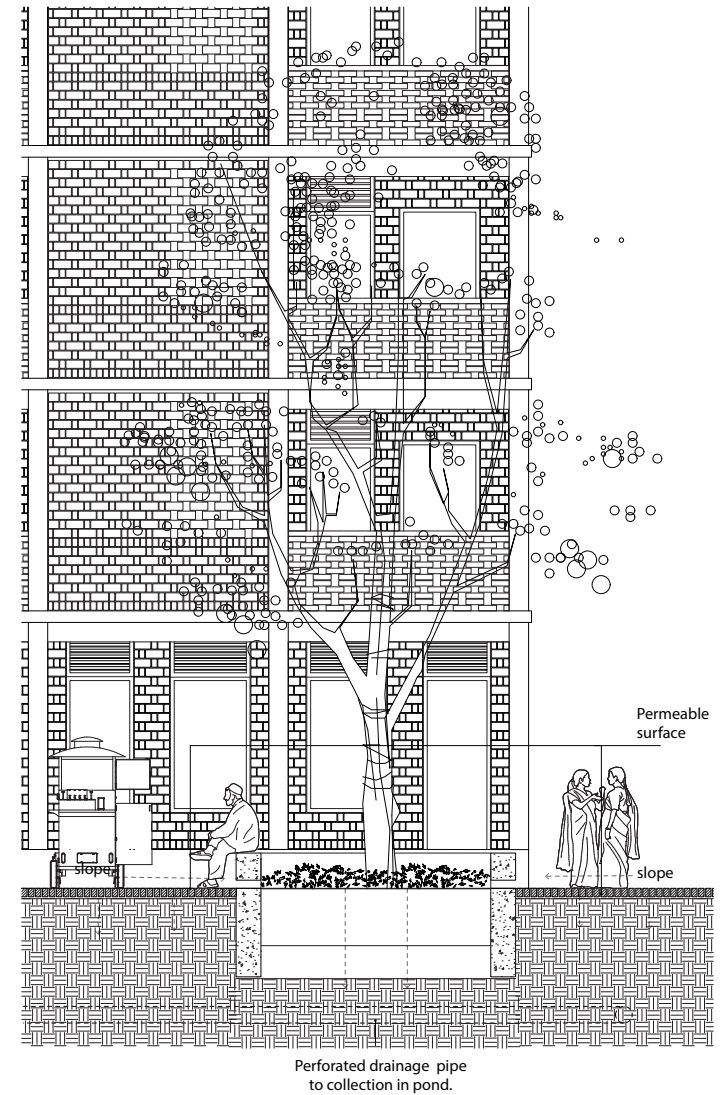
The water management within the urban scale is based on a drainage system that drains and collects in the central pond of the green structure. The project introduces permeable surfaces, vegetation and perforated drainage pipes to cater for this system, as seen on the next following page.

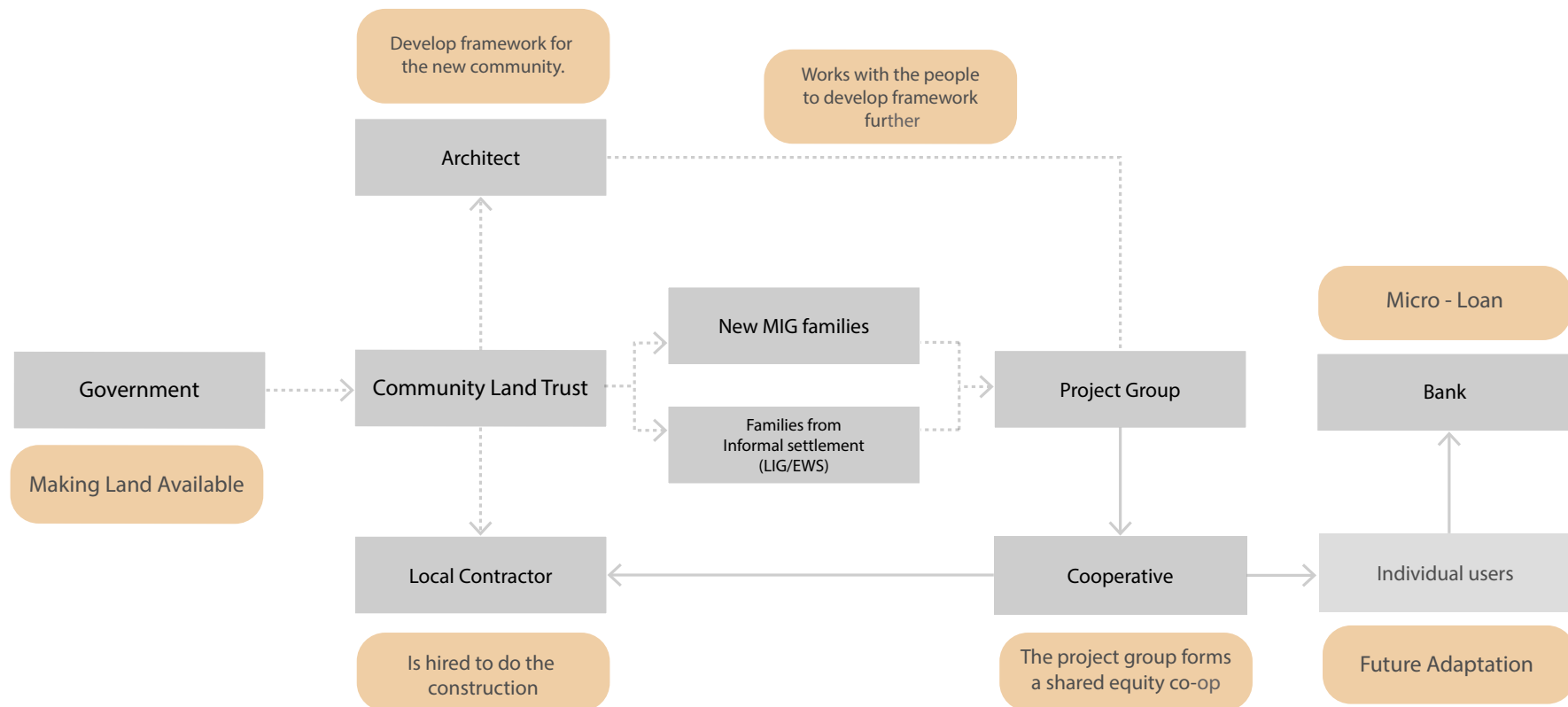
Urban Strategy Water Management



Apart from the larger primary and secondary roads, all surfaces of the urban plan have a degree of permeability from green surfaces of grass to paved surfaces of brick. For more heavy rainfall the less permeable surfaces have been imagined with a slope to direct the water to the more permeable surfaces.

Urban Strategy Water Management





Community Land Trust is a democratically managed non-profit organization that develops, owns and manages land: affordable housing, community gardens, commercial spaces and other community assets on behalf of a community.

The land owned by the CLT is removed from the private real estate market and is community owned, making the housing built on the land always affordable .

08 Atmospheric Impressions









Green courtyard within a cluster



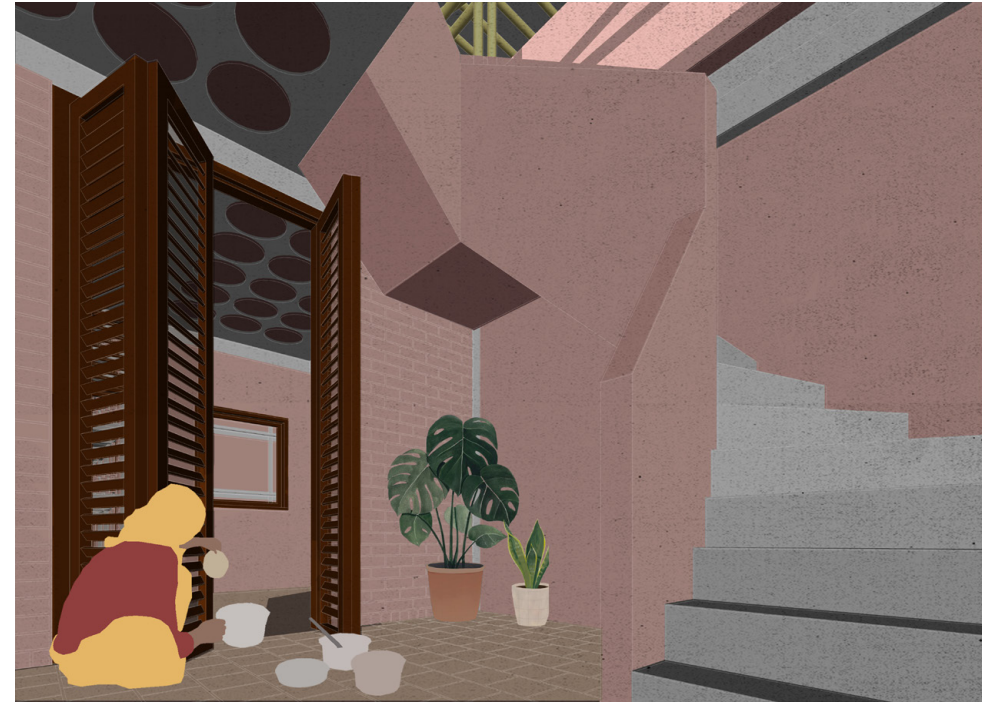
Covered walkway within courtyard



Gallery and shared ota space within Slab



Stairway and shared threshold within Tower.



Internal patio within Row-House



First built: Local roads



Appropriation: Local roads

09 Reflection



The Project

In 2008, for the first time, the urban population surpassed the rural population worldwide. By 2025, estimations show that the global affordable housing gap will affect one in three urban dwellers, about 1.6 billion people. India is on its way of becoming the world's most populous country and is expected to have around 1.5 billion inhabitants, by 2030 (Woetzel et. al, 2014). The studio of Global Housing deals with the question of affordable housing in the Urban Global South and invites you to rethink the current systems of affordable housing production in developing countries, through designing an affordable housing scheme in Nalasopara, a Mumbai suburb. Being one of the top dense cities in the world, Mumbai represents some of the most complex conditions within the global affordable housing issue, which the studio aims to address.

In the 1990s, India experienced an economic liberalization which marked the start of the country's market-driven housing development. In practice, these developmental trends have led to problems, as the main focus has been on efficiency, building quickly and cheap. Today, cities in both developing and advanced economies around the world, struggle to meet the demand for affordable housing and the amount of people living in slums is increasing. At the same time, the statistics show a growing number of vacant properties in India and Mumbai. How can there be a growing vacancy, when India is experiencing a housing shortage and an increasing number of people living in slums?

Since the start of the market-driven housing development, developers have been taking advantage of the housing shortage crisis in order to gain profit targeting middle to higher income groups. As land prices have increased these houses have become unaffordable even to these income groups,

leaving them vacant. Furthermore, policy making in India has mainly concerned itself with numbers trying to feed the demand. The main purpose has been to house as many dwellers as possible, with the lowest possible investment. The urban living spaces developed as a result of this, can in many regards be associated with "storage boxes" instead of being part of living and vibrating communities in the best interest of its residents. Some of the dwellers I encountered on the study trip to Mumbai, were unhappy with the conditions these developments offered and had either planned to move out as soon as the opportunity arose or had already moved back into informal settlements. *"In spite of the continuous efforts by the government, slum dwellers are hesitant to move to the offered affordable houses, due to lack of proper infrastructure and means of livelihood (Bhattacharyya, 2016)."*

If the current affordable housing developments fail to adapt to the different needs and livelihoods of the dwellers today, how can we expect them to be suitable for future user needs? When the migration flow to the city is increasing.

Housing projects being developed in the future, must therefore challenge the previous problematic development trends built on efficiency in the past. In order to do so, Jan Bredenoord, Paul Van Lindert and Peer Smets state, within their book 'Affordable Housing in the Global Urban South: Seeking Sustainable Solutions', that new communities being developed for the future must foster resilience. Resilience is a systems ability to adapt to change. Cities and urban spaces make up, as Charles Correa once said, *"a whole system of spaces that people need (Correa, 1989)."*

"Urban living involves... a whole system of spaces that people need."

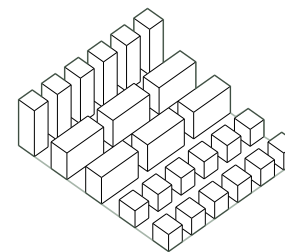
Charles Correa

In nature, Bredenoord and his colleagues explain, *"ecosystems have survived over time by adjusting to changing circumstances resulting in a search for equilibrium between two opposing poles, of efficiency and resilience. The healthiest systems have an optimum balance between the two extremes, which may be described by the term sustainability (Bredenoord et.al, 2014)."* Furthermore, cities and urban spaces can be seen as patchworks of "green

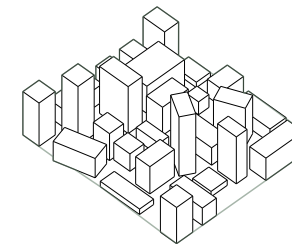
space, biodiversity (including people), non-biological structures (buildings), biophysical processes and energy flows, and are in that way comparable to natural ecosystems (Maddox, 2012)."

The balance between the two extremes, sustainability, can be defined as a trade-off between efficiency and resilience. On the one hand, too much efficiency will lead to little diversity and stagnation in the system, while too much resilience will lead to too much diversity and a lack of coherence and purpose to grow. The goal for future housing developments should therefore be at aiming for an optimum balance between the two. It is upon this background that the graduation project's topic of 'Resilience' and the research question of my project was defined.

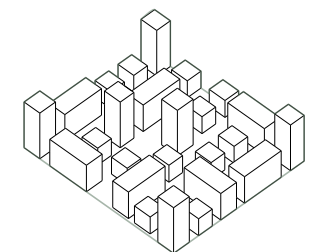
In the following sections of this paper, I will reflect upon the research and design development of this graduation project. Finally, the paper will elaborate on the graduation project's relevance in a wider social context and ethical issues and challenges encountered when designing a housing scheme in foreign contexts.



Too much efficiency



Too much diversity



Trade-off

Method and Approach

The main research of this graduation project can be divided into two phases. The first phase, prior to our visit to India and the second phase, during our site visit to Nalasopara. Due to the complexity of the issues and context addressed within the studio, and the limited time at hand, the studio focuses its research on collective group work. The following section of this essay describes what methodologies were used during each of these phases and why I believe these methodologies were important in the research of this graduation project.

Quantitative Research

For the first phase of the project a quantitative research was done in groups, building up a collective knowledge base about India and Mumbai through different historical periods of time. During this phase of the project, I studied aspects and statistics relating to history, religion, economics, demography, climate and politics. When reflecting back, I realize that starting the project with a quantitative research was important as it defined the intellectual background to my project and formed the basis for further research and development.

Spatial and Typological Analysis

A qualitative method was also used to analyze the urban fabric and growth of Mumbai, in order to understand how the city has developed through time. Finally, the first phase of the project concluded with an analysis of morphological and typological characteristics of different case studies, looking into the urban layout, program, access and circulation, building typology and unit types of housing projects developed around the Mumbai Metropolitan Region.

The housing projects studied, represented a wide range of different types of housing developments and housing typologies, from low-rise incremental housing to high-rise towers. This study was important as it defined and illustrated the previous affordable housing developments and gave references for the development of an alternative.

Ethnography

The second phase of the project was based on a qualitative research during our site visit to Nalasopara. Participant observation and the methods of Visual 'Micro' Ethnography was used to investigate the relation between space, place and people, by studying the practices and activities of the people and the spaces they inhabit in a place, in Nalasopara East. As designers, we have no control over the people who inhabit the spaces we create and their changing needs, however we can make a difference by the way we create the spaces they inhabit and use in a place. To be able to explore possible strategies for a housing scheme in Nalasopara, the graduation studio of Global Housing therefore recognizes the importance of understanding the existing activities and patterns of inhabitation of the people. The knowledge gained through the study of the different patterns enabled me to understand what architectural and urban spaces were needed to cater for the various needs and uses of the people in Nalasopara today. This part of the research was crucial to the development of the graduation project, as it helped me understand the practices and activities within a context and culture significantly different to my own.



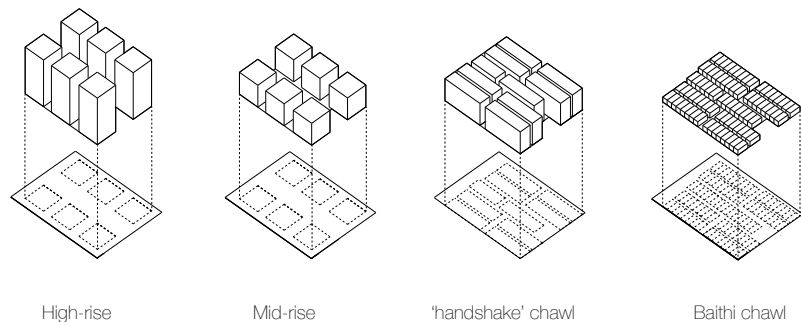
Research and Design

When having to design a housing scheme in a foreign context and for a culture that you know little about, research becomes a very important part of the design process and has therefore influenced both the development and design outcome of this graduation project. In the following section I will try to explain the different parts of the design development in the graduation project, reflecting on how research has influenced the development and the final design outcome.

Problem Statement

When arriving back from the study trip to Mumbai, we were given a few weeks to develop a problem statement. With little prior knowledge about India and Mumbai, the first phase of the project's research really helped form the intellectual background of my project. Using the research collected within our research book, combined with the experiences I had during my visit to the city and some additional individual investigation, I developed an understanding of and awareness to the problems related to affordable housing in Nalasopara and began drawing parallels between the data collected within the group research (politics, economy, housing developments) and the conditions I observed on the study trip.

The analysis of case studies and my observations during the study trip, exposed the current trends of affordable housing development in Nalasopara and the commonly 'copy pasting' of a single and standardized housing typology and unit type to create new communities. Following the trip, I found that the problems I had observed in the current development could be linked back to the developers focus on efficiency and the market-driven housing development. Which again had become a result of India's transition into economic liberalization in the 1990s. I also formed an understanding of the current affordable housing developments lack of adaptability, when observing how these developments fail to cater for the diverse religions, cultures and livelihoods of the people in Nalasopara today. By drawing parallels to the migration and population data collected within the group research, I began to understand the increasing need for the city to be able to adapt to changing user needs and practices in the future. This led to my research on resilience and my understanding of its relation to efficiency and sustainability. The reflection on the first two phases of the project, as well as the additional investigation I did after the trip, helped from the problem statement of the graduation project.



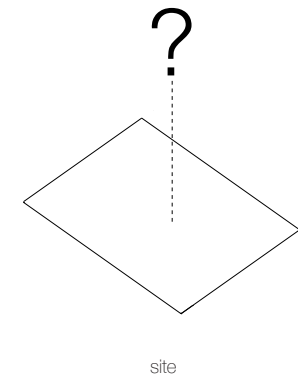
Site Selection

The study of urban growth in Mumbai and the spatial analysis, during the first phase of the research, allowed me to understand the city's growth pattern and how the city had grown and expanded along the railway corridors towards Nalasopara and the northern parts of the Mumbai Metropolitan Region. The knowledge I gained from this research helped me later on in the project when making an assumption for the city's future growth. Furthermore, the historical growth of Nalasopara showed larger areas of green being encroached upon by informal and unplanned settlements during the past two decades. My spatial analysis of the city's growth and assumption for the future, led to the selection of the graduation projects site, in Nalasopara East, on a greenfield near the planned development of a new high-speed railway track.



Research Question

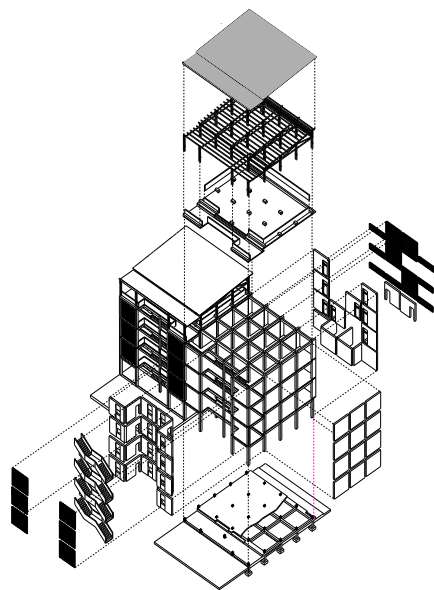
Through the research within the three different phases of the project, I developed an understanding of the current situation and problems in Nalasopara today, the different practices and activities of the people, the meaning of efficiency and resilience and the importance of achieving a balance between the two. This led me further on to the question of 'how' all of this could be implemented into an affordable housing project for the urban poor in Nalasopara. How could this project propose an alternative strategy, to the current development trends of affordable housing, on the chosen site and achieve an optimum balance between Efficiency and Resilience? I had learned to understand the concept of resilience and the need for diversity, but how could this be translated into an affordable housing project and how would efficiency still play a role in this trade-off? These questions later formed the main research question of the graduation project.



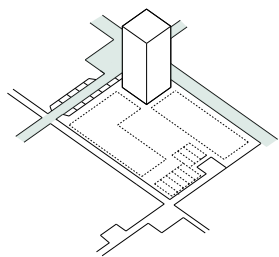
Design Outcome

Using the knowledge I gained during the different research phases and the feedback I got from the tutoring sessions, I developed a design hypothesis in form of a framework. The framework has been refined throughout the design development and is today formed on my understanding of the different aspects necessary to create an optimum balance between efficiency and resilience in an affordable housing scheme in Nalasopara, and thereby aiming to achieve a sustainable alternative to the current housing developments built only on efficiency.

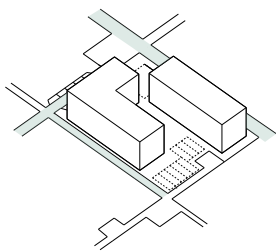
The framework is based on a simple module of 3.1×3.1 , it uses a relatively reduced palette of materials and a local construction method to achieve efficiency in the new housing scheme. Furthermore, resilience, and the optimum balance, is achieved by the way in which these can be combined to create diversity of three different housing typologies, the tower, the slab and row-housing. Each typology provides the housing scheme with different characteristics and opportunities, aimed to cater for diverse livelihoods and income groups in Nalasopara today and their changing needs for the future. The framework, and the research and feedback it is built on, has been the main driver for the development of the graduation project.



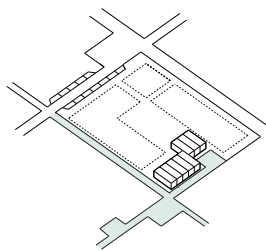
Exploded axo of the slab typology, exposing the module, materiality and construction method.



The Tower



The Slab



Row-Housing

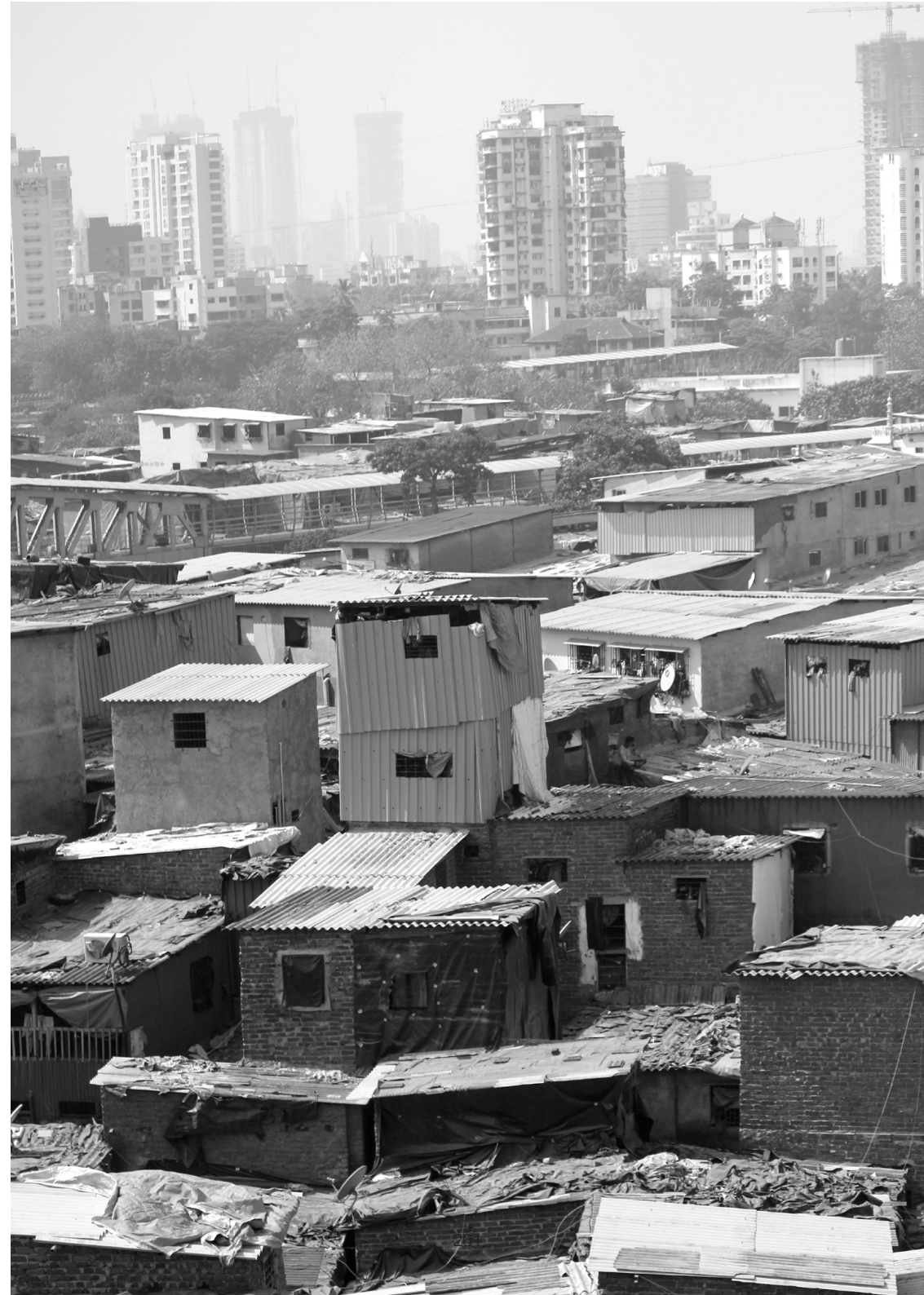


Relevance

The problems caused by a focus on efficiency in the current affordable housing development in Nalasopara, is an example of a problem we today face globally. Not only the developing third world countries, but also advanced economies, struggle to meet the demand for affordable housing to be available, adequate and affordable. By 2025, estimations show that the global affordable housing gap will affect one in three urban dwellers, about 1.6 billion people. As a consequence, the United Nations has defined seventeen sustainability goals.

Most relevant to the topic of the graduation project is the UNs Sustainability Goal 11. As the goal shows, it is important to make cities

that are inclusive, safe, resilient and sustainable. Furthermore, the graduation project also deals with UNs Sustainability Goal 9, which stresses the need for a resilient infrastructure that supports economic development and human well-being. Finally, by developing a sustainable framework that deals with both efficiency and resilience, the graduation project can contribute to achieving the United Nations Sustainable Development Goal 11: Sustainable 'Cities and Communities' and Goal 9: Industries, Innovation and Infrastructure.



Ethical Issues and Challenges

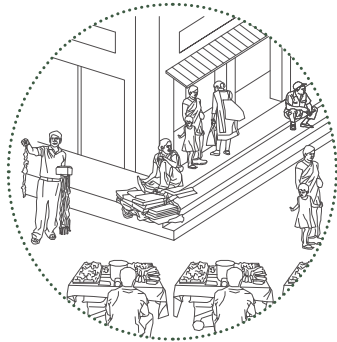
A place, an urban environment, can be defined by its architectural and urban spaces and the people that inhabit and use them and how these coexist and form the place. I learned this through the Global Housing studio's ethnographic approach. Having the knowledge about people and their practices and needs, is therefore essential before trying to design the architectural and urban spaces that coexist with them. In affordable housing in the Urban Global South, this is especially important as it is within these spaces that people spend most of their time often living and working.

As the graduation project is placed in India, I realized early in the process that my knowledge of the culture, the people and their patterns of inhabitation

was limited. Coming from Norway, a country of 5 million people, it was challenging when trying to understand the complexities of India's growing population of 1.5 billion. The study of different patterns of Inhabitation, was therefore crucial to develop an understanding of the context and the people. However, the study also brought forward an ethical dilemma. Is what we observe, really the way people prefer to live? Or is it a forced way of living? As architects we tend to romanticize everything that brings life into a space. But is the image of laundry drying on a clothes line as 'romantic' as we think or is it just a consequence of the lack of private space? Research by observation, should therefore always take into account the background for 'how' and 'why' what we observe is taking place.



The Otila as a social space and an extension of the dwelling.



The street corner forms an informal and ambiguous urban spaces for synchronous activity.



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