ORGANIZING THE UNORGANIZED

TOWARDS EMPOWERMENT OF THE INFORMAL SECTOR
India
Area: 3.287,259 km²
Density: 368 p/km²

Home of 1.339 billion people today

By 2050, population will exceed
1.6 billion people
Mumbai Metropolitan Region

India

Mumbai

Area: 3.287,259 km²
Density: 368 p/km²

Area: 4.355 km²
Density: 4793 p/km²

Top Five Economies of India

Data Source: Planning Commission of India (2014)

BACKGROUND
Data Source: Atlas of Urban Expansion (2011)

Population Growth in Mumbai, India

Population (millions)

0 5 m 10 m 15 m 20 m 25 m


BACKGROUND
demographics vs. employment

POPULATION GROWTH 3%
EMPLOYMENT GROWTH 1%
Population Growth in Mumbai, India

Population (millions)

Data Source: Atlas of Urban Expansion (2011)

Background

Population Growth 3%
Employment Growth 1%
OF MUMBAI’S TOTAL WORKFORCE IS ENGAGED IN INFORMAL EMPLOYMENT

>400M WORKERS IN INDIA IS EMPLOYED IN THE INFORMAL SECTOR
Informal sector is the traditional and temporary economy that will fade away with modern, industrial growth? It is only marginally productive? Informal sector is disorganized and illegal?
**MYTHS OF INFORMAL SECTOR**

- It is only marginally productive?
- Informal sector is the traditional and temporary economy that will fade away with modern, industrial growth?
- Informal sector is disorganized and illegal?

Source: Rethinking of the Informal Economy (Martha Chen)
DOMINANT NARRATIVES OF
"ILLEGALITY"
"POVERTY"
"TEMPORALITY"

LACK OF IDENTITY
ECONOMIC HARDSHIPS
STANDARDIZED DWELLINGS
INFORMAL SECTOR

= 

REALITY OF

It contributes a significant share of the economy, producing up to \( \frac{2}{3} \) of the country's GDP.

Source: Rethinking of the Informal Economy (Martha Chen)
It contributes a significant share of the economy, producing up to two-thirds of the country's GDP.

The informal economy is a permanent phenomenon. It is a feature of modern capitalist development, associated with both growth and global integration.

Source: Rethinking of the Informal Economy (Martha Chen)
INFORMAL SECTOR

It contributes a significant share of the economy, producing up to TWO-THIRDS of the country's GDP.

The informal economy is a PERMANENT phenomenon, a feature of modern capitalist development, associated with both growth and global integration.

Majority of the informal sector is UNORGANIZED due to lack of laws and regulations protecting the workers.

Source: Rethinking of the Informal Economy (Martha Chen)
INFORMAL SECTOR

REALITY OF

It contributes a significant share of the economy, producing up to TWO-THIRDS of the country's GDP.

The informal economy is a PERMANENT phenomenon. It is a feature of modern capitalist development, associated with both growth and global integration.

Majority of the informal sector is UNORGANIZED due to lack of laws and regulations protecting the workers.

The informal economy is as a BASIC COMPONENT of the total economy.

Source: Rethinking of the Informal Economy (Martha Chen)
THE INFORMAL SECTOR
MR. TANAJI
TEA STALL OWNER

AVG. HOUSEHOLD INCOME: ₹20,000
CURRENT RESIDENCE: SAME AS WORK
NUMBER OF OCCUPANT IN DWELLING: 2

ETHNOGRAPHICAL RESEARCH

WORKSPACE:
FRONT ROOM

stories of informal workers
MR. AMARNATH
CONVENIENT STORE OWNER

AVG. HOUSEHOLD INCOME
₹ 30,000

CURRENT RESIDENCE
SAME AS WORK

NUMBER OF OCCUPANTS IN DWELLING
4

ETHNOGRAPHICAL RESEARCH

WORKSPACE:
EXTENSION
(EX. STOOP)

stories of informal workers
MRS. AMITA
HOME-BASED WORKER

<table>
<thead>
<tr>
<th>AVG. HOUSEHOLD INCOME</th>
<th>CURRENT RESIDENCE</th>
<th>NUMBER OF OCCUPANTS IN DWELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>₹ 600</td>
<td>SAME AS WORK</td>
<td>5</td>
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</table>

ETHNOGRAPHICAL RESEARCH

WORKSPACE: FLOOR OR FURNITURE

stories of informal workers
MR. BADRI
BARBER

AVG. HOUSEHOLD INCOME
₹ 20,000

CURRENT RESIDENCE
<1 HOUR DISTANCE

NUMBER OF OCCUPANT IN DWELLING
5

WORKSPACE:
SMALL STALL

ETHNOGRAPHICAL RESEARCH

Fruits and Vegetables

stories of informal workers
MR. JALINDER
NEWSPAPER MAN

<table>
<thead>
<tr>
<th>AVG. HOUSEHOLD INCOME</th>
<th>CURRENT RESIDENCE</th>
<th>NUMBER OF OCCUPANT IN DWELLING</th>
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<tbody>
<tr>
<td>₹ 15,000</td>
<td>1</td>
<td>6</td>
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</table>

WORKSPACE:
VENDOR CART OR FURNITURE

ETHNOGRAPHICAL RESEARCH

stories of informal workers
“Unlike conventional housing, the housing of the poor almost always combine living and working activities”
How can the informal workers’ diverse socio-economic pursuits be achieved by affordable housing which incorporates controlled participation and efficient construction to improve both density and quality?
How can the informal workers’ diverse socio-economic pursuits be achieved by affordable housing which incorporates controlled participation and efficient construction to improve both density and quality?

subquestions:

How can income-generating space and habitable space coexist in low-income housing?

What are the qualities of communal space that can encourage a sense of community and empowerment among the informal workers?
How can the informal workers’ diverse socio-economic pursuits be achieved by affordable housing which incorporates controlled participation and efficient construction to improve both density and quality?
### SITE CONTEXT

**MUMBAI METROPOLITAN REGION**
- Area: 4,355 km²

**VASAI VIRAR**
- Area: 380 km²

**NALASOPARA**
- Area: 43 km²

**Density**
- Mumbai: 4,793 p/km²
- Vasai Virar: 3,200 p/km²
- Nallasopara: 16,700 p/km²

**Mumbai Suburban Railway Line**

**Location of Nallasopara**
MHADA colony
middle class apartments

mid-rise handshake chawls
low-rise baithi chawls
SITE CONTEXT

nalasopara east
urban transformation
SITE CONTEXT

existing building typologies
BAITHI CHAWLS

FSI: 0.75
Units per hectare: 325
People per hectare: 1300

SITE CONTEXT

existing building typologies
SITE CONTEXT

FSI: 3-4
Units per hectare: 1325
People per hectare: 5300
BAITHI CHAWL (EXISTING)

MID-RISE HANDSHAKE CHAWL

PROPOSED

SITE CONTEXT

density scenarios
DESIGN CONCEPT

HIERARCHY OF STREET

HIERARCHY OF COMMERCIAL ACTIVITIES

Source: How the Other Half Builds (Witold Rybczynski)

meaning of street life for informal workers

market street in nallasopara
DESIGN CONCEPT

BAITHI CHAWLS

MID–RISE CHAWLS

INTERVENTION

creating the commercial front
COMMERCIAL FRONT

COMMUNAL BACK

COMMERCIAL FRONT

INTERVENTION

creating the commercial front
Housing for Home-based Production
Housing for Mixed-Occupancy (shopowners and tenants)
Housing for Mixed-income groups

Pavilion-like typologies dedicated to each worker groups

Building typology in different forms that accommodates all worker groups

key improvement criterias:
residential space  yes
commercial space  no
communal space  yes
appropriate density  no

key improvement criterias:
residential space  yes
commercial space  yes
communal space  yes
appropriate density  yes

DESIGN HYPOTHESIS
creating the commercial front
existing baithi chawl unit

new unit type

3 x 7.5m unit
4.5 x 6m unit
3 x 4.5m unit

3 x 6m unit

street alignment
double-sided street alignment
both single and double-sided
varied length and accessibility

SITE CONTEXT

new base unit dimensions based on context
DESIGN CONCEPT

COURTYARD TYPE

3M MODULE

4.5M MODULE

CORNER TYPE

Suggested Unit Area by MoHUPA
EWS: 21-27 m²
LIG 28-60 m²
DESIGN CONCEPT

typology variations

3M MODULE

COURTYARD TYPE

4.5M MODULE

CORNER TYPE
4.5M MODULE

COURTYARD TYPE

3M MODULE

CORNER TYPE

DESIGN CONCEPT

typology variations
3M MODULE

4.5M MODULE

CORNER TYPE

variation
variation
variation
typology variations

DESIGN CONCEPT
DESIGN CONCEPT

3M MODULE

CORNER TYPE

4.5M MODULE

typology variations
3M Module

4.5M Module

Corner Module

Typology variations
GROUND FLOOR

1ST FLOOR

2ND FLOOR

3-4TH FLOOR

21m²

28m²

21m²

28m²

dwelling catalogue

TYPOLOGY
existing site condition
URBAN STRATEGY
**Scenario I: Acupuncture Development**

**Legend**
- 3M Module
- 4.5M Module
- Corner Module
- Staircase
- 1/F Bridge

1. **Social-tied Home-based Workers**
   - Creates 32 units, 19 existing families (+13 units)

2. **Family-tied Shopowners** (shoe seller, sari seller, tailor)
   - Creates 52 units, 30 existing families (+22 units)

3. **Geography-tied Hawkers**
   - Creates 42 units, 35 existing families (+7 units)

4. **Social-tied Families**
   - Creates 12 units, 8 existing families (+4 units)

**Urban Strategy**
Scenarion I: Acupuntural Development

**Legend**
- 3M Module
- 4.5M Module
- Corner Module
- Staircase
- 1/F Bridge

**Scenario I**

1. **1/F Bridge**
2. **Staircase**
3. **Corner Block**
4. **Single Block**

**Development Scenario**
LEGEND

- 3M MODULE
- 4.5M MODULE
- CORNER MODULE
- STAIRCASE
- 1/F BRIDGE

URBAN STRATEGY
URBAN STRATEGY

SCENARIO II: MASTERPLAN DEVELOPMENT

3M MODULE
4.5M MODULE
CORNER MODULE
STAIRCASE
1/F BRIDGE
COMMUNITY GROUND
GREEN POCKETS

sunken green pockets
URBAN STRATEGY

first floor plan

communal plinth
**PLOT 1**

<table>
<thead>
<tr>
<th></th>
<th>EXISTING</th>
<th>NEW</th>
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<tbody>
<tr>
<td>Area</td>
<td>0.27 ha</td>
<td>0.27 ha</td>
</tr>
<tr>
<td>Number of Dwellings</td>
<td>85 units</td>
<td>114</td>
</tr>
<tr>
<td>Total Dwelling Area</td>
<td>1530m²</td>
<td>3812m²</td>
</tr>
<tr>
<td>Expandable space</td>
<td></td>
<td>826m²</td>
</tr>
<tr>
<td>Communal area</td>
<td></td>
<td>664 m²</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>1853 m²</td>
<td>8920 m²</td>
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<tr>
<td>FSI</td>
<td>0.69</td>
<td>3.3</td>
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**PLOT 2**

<table>
<thead>
<tr>
<th></th>
<th>EXISTING</th>
<th>NEW</th>
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<tbody>
<tr>
<td>Area</td>
<td>0.29 ha</td>
<td>0.29 ha</td>
</tr>
<tr>
<td>Number of Dwellings</td>
<td>91 units</td>
<td>86 units</td>
</tr>
<tr>
<td>Total Dwelling Area</td>
<td>1638 m²</td>
<td>3812 m²</td>
</tr>
<tr>
<td>Designated expandable space</td>
<td></td>
<td>592 m²</td>
</tr>
<tr>
<td>Designated communal area</td>
<td></td>
<td>388 m²</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>1984 m²</td>
<td>6639 m²</td>
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<tr>
<td>FSI</td>
<td>0.68</td>
<td>2.3</td>
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</table>

**Increased dwelling space per person (from 4.5m² to 8.4m²~11m²)**

**Creation of designated personal expandable spaces for living & work purposes**

**Creation of communal space to work together**

**URBAN STRATEGY**

**Density calculation**

**URBAN STRATEGY**

** density calculation**
ORGANIZATIONAL STRATEGY

How can the informal workers’ diverse socio-economic pursuits be achieved by affordable housing which incorporates controlled participation and efficient construction to improve both density and quality?
**GOALS**

**AFFORDABILITY**

**EFFICIENCY**

**PARTICIPATION**

---

**WHO PROVIDES?**

<table>
<thead>
<tr>
<th>SPONSORS</th>
<th>USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sponsors decide and sponsors provide</td>
<td>2. Sponsors decide and users provide</td>
</tr>
<tr>
<td>3. Users decide and sponsors provide</td>
<td>4. Users decide and users provide</td>
</tr>
</tbody>
</table>

---

**WHO DECIDES?**

private housing supply

---

**ORGANIZATIONAL STRATEGY**

---

Source: Housing By People: Towards in Building Environments (John F.C. Turner)

current housing development practices in mumbai
**GOALS**

**AFFORDABILITY**

**EFFICIENCY**

**PARTICIPATION**

**WHO PROVIDES?**

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**WHO DECIDES?**

- 1. Sponsors decide and sponsors provide
- 2. Sponsors decide and users provide
- 3. Users decide and sponsors provide
- 4. Users decide and users provide

Potential malpractices lead to delays in the completion of the project and cost escalations.

**ORGANIZATIONAL STRATEGY**

Source: Housing By People: Towards in Building Environments (John F.C. Turner)
GOALS

AFFORDABILITY
EFFICIENCY &
PARTICIPATION

WHO DECIDES?

1. Communicate the constraints
2. Open the decision making process to families
3. Transfer technical knowledge and criteria

WHO PROVIDES?

SPONSORS
1. Sponsors decide and sponsors provide
2. Sponsors decide and users provide

USERS
3. Users decide and sponsors provide
4. Users decide and users provide

Balance of Top-down and Bottom-up Approach

ELEMENTAL’s “Recommendations for a Participatory Design”

1. Communicate the constraints
2. Open the decision making process to families
3. Transfer technical knowledge and criteria

ELEMENTAL: incremental housing and participatory design manual (Alejandro Aravena)
GOALS

AFFORDABILITY
EFFICIENCY &
PARTICIPATION

WHO DECIDES?

WHO PROVIDES?

SPONSORS

1. Sponsors decide and sponsors provide

2. Sponsors decide and users provide

3. Users decide and sponsors provide

4. Users decide and users provide

Balance of Top-down and Bottom-up Approach

controlled participation process

ORGANIZATIONAL STRATEGY

participatory design in housing

Source: ELEMENTAL: incremental housing and participatory design manual (Alejandro Aravena)
GOALS

AFFORDABILITY
EFFICIENCY
PARTICIPATION

AFFORDABILITY

ORGANIZATIONAL STRATEGY

COMMUNITY LAND TRUST: HOW IT WORKS
GOALS

AFFORDABILITY

EFFICIENCY

PARTICIPATION

LAND IS TAKEN OFF THE PRIVATE REAL ESTATE MARKET, PERMANENTLY OWNED BY COMMUNITY LAND TRUST

RESIDENT BUYS THE PROPERTY AT BELOW MARKET PRICE

BUILDING PRICE

LAND PRICE

ORGANIZATIONAL STRATEGY

community land trust: how it works
Community Land Trust

Membership is open to people who LIVE or WORK within their geographically defined areas.

Preserves Locality
COMMUNITY LAND TRUST

LANDOWNERS (CLT members)

BUILDING OWNERS (Residents)

NEIGHBORHOOD NGOS
GOVERNMENT OFFICIALS,
HOUSING EXPERTS

Partnership with local housing & construction agencies
Managing resale of homes based on income eligibility
Providing guidance to prospective buyers
Marketing of affordable housing
Assembling & managing land

Non-profit Organization
Demographically managed

AFFORDABILITY
EFFICIENCY
PARTICIPATION

GOALS

ORGANIZATIONAL STRATEGY

educational activities at LEARN Mahila Kamgar Sangathana (LMKS)
ORGANIZATIONAL STRATEGY

COMMITTEE ESTABLISHMENT

- CLT Members
- Labor NGO
- Trade Union

we have an alternative redevelopment strategy

REDEVELOPMENT INTRODUCTION

- we want to work together!
- we want a better house!

TARGETED BAITHI CHAWL REGIONS

LAND ACQUISITION

COMMUNITY LAND TRUST

- CLT Members
- RESIDENTS
- HOUSING EXPERTS, NEIGHBORHOOD NGOs, etc.

EQUAL GOVERNANCE OF THREE PARTIES

- BUY OFF UNWILLING OWNERS AND ESTABLISH COMMUNITY OWNED LAND

FUNDING:

- Private Donors
- Federal Housing Subsidies
- City owned property
- Community foundations

Mortgage Loan:

- Housing Finance Corporation

stakeholder diagram
**COMMITTEE ESTABLISHMENT**

- CLT Members
  - Labor NGO
  - Trade Union

**REDEVELOPMENT INTRODUCTION**

- We have an alternative redevelopment strategy
- We want to work together!
- We want a better house!

**LAND ACQUISITION**

- Targeted Baithi Chawl Regions

**ORGANIZATIONAL STRATEGY**

- Mortgage Loan: Housing Finance Corporation
- Funding:
  - Private Donors
  - Federal Housing Subsidies
  - City owned property
  - Community foundations

**COMMUNITY LAND TRUST**

- CLT Members
- Residents
- Housing Experts, Neighborhood NGOs, etc.

**LANDSCAPE**

- Scenario I: Acupuncture Development
- Scenario II: Masterplan Development

**EQUAL GOVERNANCE OF THREE PARTIES**
COMMUNICATION OF CONSTRAINTS

I. PROJECT WORKSHOP

- GROUND FLOOR
  - 3M SHOPFRONT
  - 4.5M SHOPFRONT

- FIRST FLOOR
  - EXPANDABLE SPACE
  - CO-WORKING SPACE
  - ENCLOSABLE END UNITS

- SECOND FLOOR
  - RK
  - 1BHK
  - LARGER CORRIDOR

- THIRD FLOOR
  - RK
  - 1BHK
  - 2BHK
  - LARGER BALCONY
  - LARGER LIVING ROOM
  - LEASABLE ROOM

- FOURTH FLOOR
  - RK
  - 1BHK
  - 2BHK
  - LARGER BALCONY
  - LARGER LIVING ROOM
  - LEASABLE ROOM

- GROUND FLOOR
  - 3 x 4.5M PLOT

II. COLLECTIVE SPACE WORKSHOP

- PROPOSALS ON COURTYARD
- DENSITY GOALS

III. ADAPTATION WORKSHOP

- UNDERSTANDING THE LEGAL TOOLS
- APPROPRIATE MATERIALS & CONSTRUCTION
- DECORATION KNOW-HOW

STAKEHOLDER DIAGRAM

COMMUNITY LAND TRUST

- CLT Members
- RESIDENTS
- HOUSING EXPERTS, NEIGHBORHOOD NGOS, etc.
- OWNER OF LAND
- OWNER OF BUILDING

ARCHITECT

we have a design solution using an innovative material!

ORGANIZATIONAL STRATEGY
ORGANIZATIONAL STRATEGY

stakeholder diagram
ORGANIZATIONAL STRATEGY

COMMUNITY LAND TRUST

CLT Members
OWNER OF LAND

RESIDENTS
OWNER OF BUILDING

HOUSING EXPERTS, NEIGHBORHOOD NGOS, etc.

VASAI VIRAR MUNICIPAL CORPORATION

ARCHITECT

CONTRACTOR

GFRG SUPPLIERS & CONSTRUCTION

CONSTRUCTION

CLT

TEMPORARY RELOCATION TO CLT CAMPS

GROUP 1
(20–50 families)

GROUP 2
(20–50 families)

ARCHITECT

OWNER OF LAND

RESIDENTS

RESIDENTS

HOUSING EXPERTS, NEIGHBORHOOD NGOS, etc.

VASAI VIRAR MUNICIPAL CORPORATION

GFRG SUPPLIERS & CONSTRUCTION

ORGANIZATIONAL STRATEGY

stakeholder diagram
DESIGN EXECUTION

COMMUNITY LAND TRUST
CLT Members
OWNER OF LAND
HOUSING EXPERTS, NEIGHBORHOOD NGOS, etc.

ARCHITECT
RESIDENTS
OWNER OF BUILDING

CONTRACTOR

CONSTRUCTION

GFRG
SUPPLIERS & CONSTRUCTION

VASAI VIRAR MUNICIPAL CORPORATION

HABITATION & ADAPTATION

GROUP 1
(20–50 families)

GROUP 2
(20–50 families)

CLT
TEMPORARY RELOCATION TO CLT CAMPS

CLT

COMMUNITY LAND TRUST
CLT Members
OWNER OF LAND
HOUSING EXPERTS, NEIGHBORHOOD NGOS, etc.

ARCHITECT
RESIDENTS
OWNER OF BUILDING

CONTRACTOR

GFRG
SUPPLIERS & CONSTRUCTION

VASAI VIRAR MUNICIPAL CORPORATION

CLT

GROUP 1
(20–50 families)

GROUP 2
(20–50 families)

CLT
TEMPORARY RELOCATION TO CLT CAMPS

COMMUNITY LAND TRUST
CLT Members
OWNER OF LAND
HOUSING EXPERTS, NEIGHBORHOOD NGOS, etc.

ARCHITECT
RESIDENTS
OWNER OF BUILDING

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GFRG
SUPPLIERS & CONSTRUCTION

VASAI VIRAR MUNICIPAL CORPORATION

CLT

GROUP 1
(20–50 families)

GROUP 2
(20–50 families)

CLT
TEMPORARY RELOCATION TO CLT CAMPS

CLT
PAYs MONTHLY MEMBERSHIP FEE TO CLT

CLT MANUAL

ORGANIZATIONAL STRATEGY
stakeholder diagram
**DESIGN EXECUTION**

- **COMMUNITY LAND TRUST**
  - CLT Members: Owner of Land
  - Residents: Owner of Building
  - Housing Experts, Neighborhood NGOs, etc.
  - Vasai Virar Municipal Corporation
  - GFRG Suppliers & Construction

**CONSTRUCTION**

- Architect
- Contractor
- CLT
- Temporary Relocation to CLT Camps
- Group 1 (20~50 families)
- Group 2 (20~50 families)

**HABITATION & ADAPTATION**

- CLT Manual
- Pays Monthly Membership Fee to CLT
- Recruitment of New Residents
- Low Income Resident
- High Income Resident
- CLT
- Maintenance, etc.

**ORGANIZATIONAL STRATEGY**

- Stakeholder Diagram
CONSTRUCTION & CLIMATE

How can the informal workers’ diverse socio-economic pursuits be achieved by affordable housing which incorporates controlled participation and efficient construction to improve both density and quality?
CONSTRUCTION IN INDIA

conventional housing construction
Urban Housing Shortage in India: 18.78 million units

96% of housing shortage pertains to EWS and LIG

Conventional construction materials are energy intensive
glass fibre reinforced gypsum as building material

GFRG
Standard prefabricated panel dimensions

**ELEVATION VIEW**

**PLAN VIEW**

- 3 M
- 12 M
- 0.124 M
External Walls
(with R.C. filling)

Floors

Waist Slab for Staircases

Roof Slab
(unfilled)
Cavities without concrete fill

7+ floors (2-8mm ø)

5-6 floors (2-10mm ø)

1-4 floors (2-12mm ø)

RCC infill to increase load carrying capacity

- concrete infill
- steel reinforcement
The ribs typically span along the shorter direction.

lateral loading

micro beam  M25 concrete  GFRG panel  gauge weld mesh

reinforced gfrg floor panel section
Brick and mortar
Foundation wall
Floor slab reinforced with 10 gauge weld net 150 x 150mm
GRFG Structural and non loadbearing walls
cast in situ columns and beams
reinforced GRFG floor system
GRFG Structural and non loadbearing walls
Floor slab reinforced with 10 gauge weld net 150 x 150mm
Bamboo canopy bolted to concrete floor
Waster repellent cotton fabric roof with water storage tanks
cast in situ concrete eaves and extra beam for water tanks
concrete stairs and with GFRG waist slab and stairwell structure
GRFG Structural and non loadbearing walls
GFRG building system
GFRG building system: structural columns, beams, and GFRG walls
non-loadbearing GFRG walls
building system
GFRG walls & floors cast-in-situ and beams building system
GFRG walls & floors cast-in-situ and beams building system
GFRG walls & floors cast-in-situ and beams building system
GFRG walls & floors cast-in-situ and beams building system
GFRG roof with concrete eaves building system
4.5M MODULE TYPE
ground floor plan

4.5M MODULE TYPE
nonstructural section
1. asphalt road
2. concrete block pavement
3. concrete pavement
4. concrete finish
5. glossy ceramic tiles
6. warm tone ceramic tiles (resemblance to brick)
7. porous brick pavement
MATERIALITY

INLIFE POSSIBILITIES

FRAME
- door & window

RAILING
- balustrade
- brick
- bamboo

PARTITION
- filler wall
- lime sand brick
- brick
- clay jali brick
- bamboo

COVERAGE
- filler roof
- PVC fabric
- corrugated metal sheet
- bamboo

DECORATION
- facade & floor
- ceramic tiles
- paint

DEFAULT MATERIALS
- aluminum
- lime sand brick
- brick
- clay jali bricks
- bamboo

shop opening
- folding door
- sliding door
- shop window

shop
- opening
Lock for sliding shutter bolted into concrete
Concrete plinth beam connected to floor slabs
Concrete pavement
Floor slab reinforced with 10 gauge weld net 150 x 150mm
200mm Compacted earth and/or sand
Brick and mortar Foundation
Plain Cement Concrete (PCC) Leveled work floor

D1.
DETAILS

1:25 section
residential floor

Precast balustrade Cap
mortared to brick

Brick and mortar
Jali balustrade

Drainage gutter
with Strainer
element

Reinforced edge beam

Rain water
downspout ø90mm

Concrete column

D3.

Unit 1 (standard)
39m²

Unit 3 (end)
48m²
Bamboo balustrade fastened on aluminium railing

Aluminium Framework bolted to concrete structure

Bamboo seating element attached to bamboo columns

10 gauge weld net 150 x 150mm

Reinforced edge beam

Floor triangular micro beams (spaced 750mm)

GRFG Panel floor

Unit 1 (standard) 39m2

Unit 3 (end) 48m2

Unit 4.

D4.
Bamboo Purlins Ø 100mm
Bamboo Truss Ø 50m
Bamboo Column Ø 100mm

PVC fabric attached to hex bolts

D5.
DETAILS

Bamboo Columns Ø 100mm

Bamboo column feet cast in situ after securing to L-bracket

Concrete pedestal 350 x 200 x 200

D6.
DETAILED REVIEW

PVC fabric sheets attached to hex bolts

L- Brackets 160 x 60 x 10 secured to anchor bolts

Bamboo Purlins Ø 100mm

Bamboo Beams Ø 100mm

Aluminium Gutter

Bamboo Purlins Ø 100mm

Bamboo Beams Ø 100mm

Stainless steel Hex bolts

D7.

D8.

1:25 section
roof center
GRFG Panel floor

Tiled floor finish and edge skirting

10 gauge weld net 150 x 150mm

Reinforced horizontal tie beam

Floor triangular micro beams (spaced 750mm)

Joint filler

Main reinforcement full wall height
GRFG Panel floor
Tiled floor finish and edge skirting
10 gauge weld net 150 x 150mm
Reinforced edge beam
Floor triangular micro beams (spaced 750mm)
Main reinforcement full wall height

D10.
3M MODULE ROOF PLAN

CLIMATE

STREET SIDE

COURTYARD

SECTION 1:25

Water tank storage
7 x 1000 liters

Rain water used for flushing toilets

Drainage to sewer system

Rain water used for flushing toilets

Rain water used for flushing toilets

Rain water used for flushing toilets

Unit 1 (standard)
39m²

Unit 3 (end)
48m²

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Line Width scale 0.25
Most prevailing wind direction annual comes from North West

Wind passes between the buildings and through the stairwells

Source: windfinder2019
All rooms have at least one window opening.
CLIMATE

high sun orientation

mid sun orientation

low sun orientation

shading

SECTION 1:25

Unit 1 (standard) 39m²
Unit 3 (end) 48m²

 Brick balustrade
 Hatches
 Doors with louvres?
 Backdoor steps
 Appropriation in faint dotted lines

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SPACES & PLACES

communal plinth activity
COMMUNAL PLINTH ACTIVITY

PRODUCTIVE INTERSECTION

SOCIAL CORRIDOR

DECENTRALIZED INDUSTRY

TUTORING

FEMALES WORK AT HOME

INTIMATE WORKING AND LIVING

SPACES & PLACES
IMPRESSIONS

MAIN STREET
after construction
COMMUNAL PLINTH
after construction
“building homes is about creating a sense of belonging, about participatory involvement and about expression of aspirations, relationships and desires”

- Balkrishna Doshi