

DIGNITY HOUSING FOR THE MIGRANT CONSTRUCTION WORKER

Using Architecture and Site Planning as agency to provide essential living spaces and promote sociability in Migrant Labour Communities who live in builder provided housing on construction sites in Navi Mumbai, India. Solutions for betterment will be explored through long-lasting economically viable materials, hands-on, reconstructable homes leveraging labourer's skills and ingenuity.

This thesis examines the transitory living conditions of construction laborers and their families, who typically live on a building's construction site temporarily and face the challenges of continually relocating and living in shelters with little or no access to basic utilities. The objective is to develop architectural strategies to create healthier, affordable, reconstructible and stable living spaces that enable construction workers to meet the demands of unpredictable work locations while improving the living conditions and well-being of their families. The design methodology includes surveying Navi-Mumbai's migrant residents, investigating lightweight concrete and bamboo material assemblies, designing housing units and methods of construction for quick assembly and disassembly, and crafting visual narratives that speculate on the dynamic nature and quality of life that the proposed temporary housing systems would offer. This design research could inform new material strategies and models to better support migrant worker communities.



QUESTIONS

1. How to design and provide a viable, affordable, and healthy housing solution for Migrant Construction workers, which can be assembled, disassembled or reassembled by two people, in 3 to 4 days at a construction site?
2. What kind of materials will be feasible, easy to handle and bear the wear-and-tear of design for deconstruction system?
3. How to make it so affordable so that builders and government entities will embrace and promote it?
4. How to create a cultural identity in the Unit design and site planning?

DEFINITIONS

essential living spaces: with essential spaces for cooking, bathing, sleeping, and living.

constructable homes: Means Kit-of parts, hands on, semi-permanent homes that can be deconstructed, moved, and reconstructed when needed.

promote sociability: Organising of dwellings around common spaces that promote sociability

long-lasting economically viable materials: Using surplus, readily available materials from usual construction sites such as Concrete formed into interlocking, manageable blocks, ACC panels, Form Work Wood Logs etc.

EVALUATION



Fully meet's Criteria



Somewhat meets Criteria



Does not meet criteria

OBJECTIVES

Objectives for this Thesis project are as follows

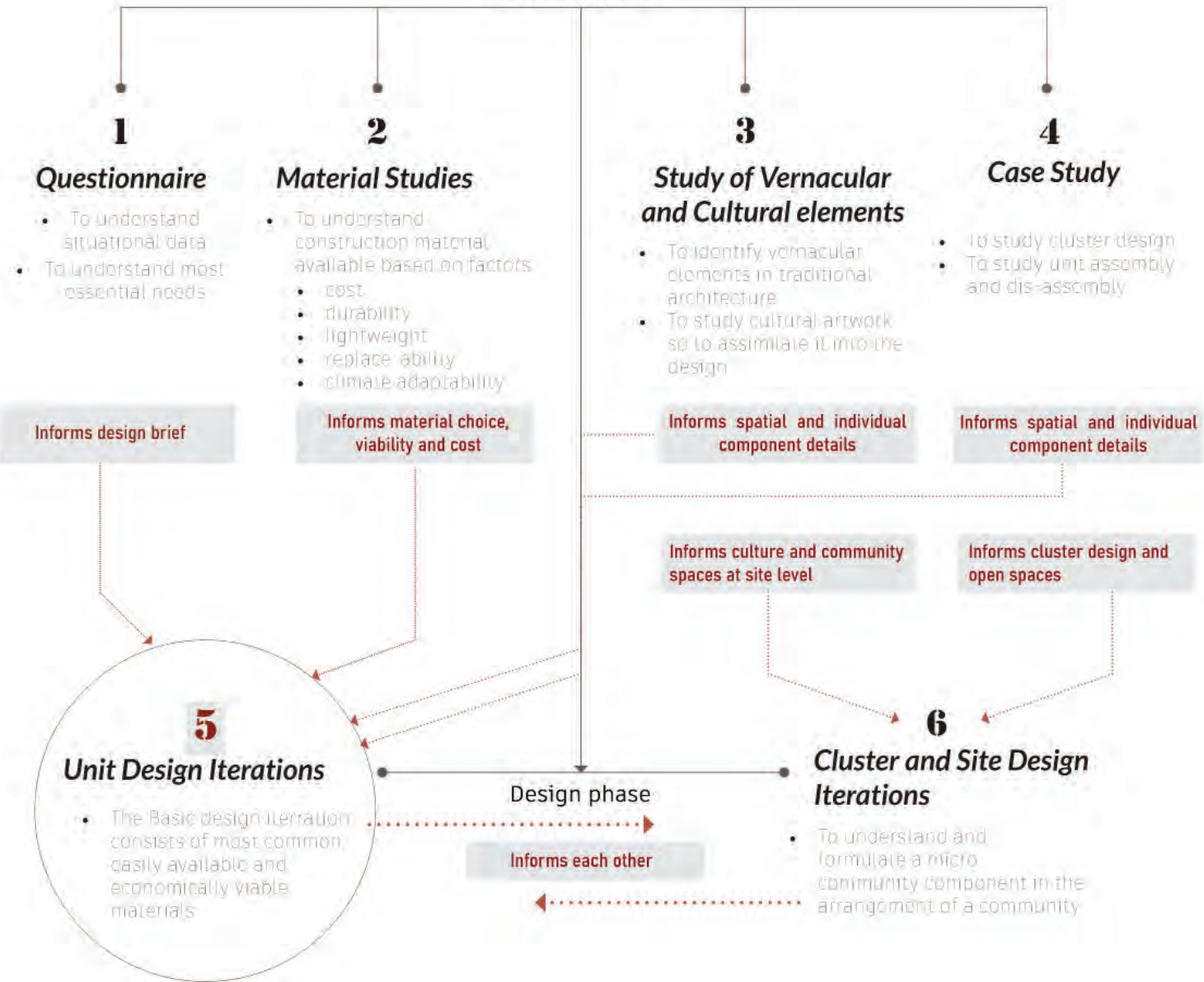
1. To create a safe, sufficient (includes all utilities, bathrooms and kitchen spaces) and dignified housing for migrant construction workers to live in large metropolitan cities on construction sites.
2. To create housing that meets all the basic needs of an individual or family
3. To preserve a Indian rural, cultural identity in the housing design (verandas, courtyards, sloping roofs, earthy look)
4. To adopt passive climate strategies to make the housing climate friendly (the main strategies include wind flow, shading and thermal mass)
5. To create micro-community clusters for 8 to 12 houses
6. To make the housing units assemble, disassemble and reassemble-able by two people, in 3 to 4 days
7. Use prevalent construction material easily available on site or used as scaffolding
8. Avoid factory manufacturing of products

CRITERIA

1	Material
a	Readily available or easy to make on site
b	Low Cost
c	Durable
d	Good for passive cooling
e	Non-Factory made products
2	Method
a	Easily assembled by 2 people
b	Dry jointed
c	Easily replaceable
d	Easily transportable
3	Layout
a	Create micro-community clusters
b	Create larger community clusters
c	Create interaction through verandah spaces
d	Courtyard as personal outdoor spaced for large families
4	Design
a	Create comfortable living spaces (SIZE)
b	Create comfortable living spaces (QUALITY)
c	Create comfortable living spaces (No. of ROOMS)
d	Provide all basic Utilites
e	Encourages passive cooling
f	Incorporates vernacular elements
	Incorporates cultural elements

METHODS

Pre-design phase



AUDIENCE

Governing Authorities



Housing Development Authority of Navi Mumbai



Municipal Corporation of Navi Mumbai



Housing Development Authority of Greater Mumbai

Government entities and Builders together comprehensively affect the location, length and quality of stay for the migrant construction workers whom they employ. They are the greatest influencers in the construction sector. Hence, this thesis seeks a viable, affordable, and healthy solution that builders and government entities will embrace and promote.

Builders & Developers



4



5



6



7



8



9



1

BACKGROUND : Influences with domestic help & construction labour

Personal experiences with migrant workers have influenced and shaped this thesis. Seema is an example of one such migrant worker, a mother of nine she worked as a household help and her husband worked as a construction laborer. This family of eleven were given a small shed like room on a construction site to temporarily occupy until construction was completed, it was made of construction waste and had no utilities. This is a common example of a migrant construction worker's situation, these laborers are temporarily housed on active construction sites for the duration of the project. The makeshift rooms are haphazardly put together with no basic utilities such as drinking water, toilets, or gas and they have to move once the construction project is completed.

This experience has motivated me to use architecture and site planning as agency to improve the living conditions of the Migrant Populations living in large cities like Navi Mumbai.



2



3

Influences of childhood experiences

The south Indian community like any other Indian community, has a strong communal (living) component. Congregation of neighbors is a custom for festival celebrations or life events. But even on a daily basis people spend time together.

Evening walks, daily evening gatherings, children's playtime are common times to meet-up daily. During festivals, sharing of food and friendly visits to neighbors or friends is common.

Here, neighbors and acquaintances feel free to stop by and chat during the day. This is part of the Indian Culture and it has influenced my desire to continue designing for such communities and to maintain this communal spirit that breaks many barriers of religion, caste and social status.



4



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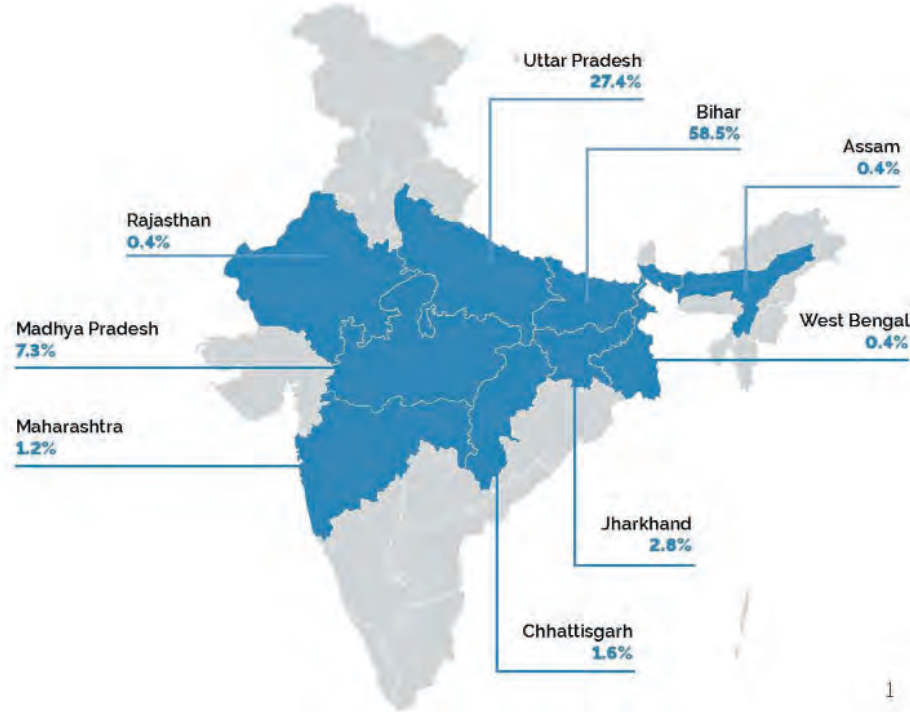


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SITUATION : Migrant Construction Labour



The NSSO (2016-17) puts the number of construction workers in the country at over 74 million. According to the 2001 Census, Of all the interstate migrants in India who move out of the farm sector, construction absorbs around 9.8 per cent, making it the second-most preferred sector for migrant workers after retail.

The Jan Sahas Survey conducted at the beginning of the lockdown (March 27-29, 2020), found that 54 per cent of construction workers support three to five people, while 32 per cent support more than five people.

Because of very poor income these laborers are temporarily housed on active construction sites for the duration of the project. The makeshift rooms are haphazardly put together with no basic utilities such as drinking water, toilets, or gas and they have to move once the construction project is completed.

139 million internal migrant workers (i.e., close to 40 % of US population in comparison) and the number of Migrant construction workers in the country is over 74 million. (i.e., close to 4x times the population of NY state)

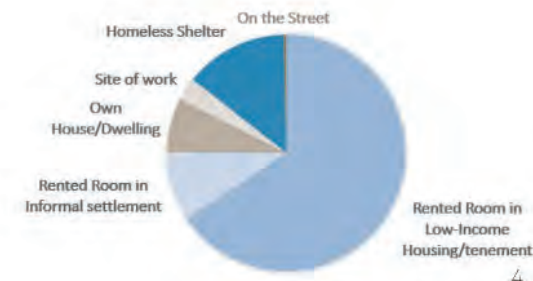


Migrant Worker Crisis

As per the Indian census of 2011 there were about 139 million internal migrants, most of them coming from Central and Northeast India. The majority, about 9.9 Million travel to the Metropolitan cities of Delhi and Mumbai. Over 50% of them travel with their families. In their villages, they are usually Landowners, having their own houses and farms.

Migration is a significant issue in India. Many rural families, mostly farmers find it difficult to sustain themselves in rural India due to lack of work in villages, low incomes, failed crops, lack of irrigation, farmer debt and lack of government support. So, they travel to larger cities to find work. They usually will have to live in streets, along highways and open grounds until they find work.

The daily minimum wage is 1/8 Rs for a day's work and a basic meal at a standard restaurant would be about 2/3rd that price. Therefore, even a small room in a Low-Income building, becomes unaffordable to these people. Other government given housing options are out of city limits, and difficult to access even by daily travel. Hence, most migrants live in informal settlements or tenements.





For this thesis, the site is in Kharghar village, Kharghar, Navi-Mumbai, India.



Navi Mumbai, India 2



Kharghar, Navi-Mumbai 3

This site is being developed by the local authority CIDCO (City and Industrial Development organization). It consists of nearly 1200 units in three categories of housing. The site also consists of a space for labour housing, ready-mix concrete plant, and a construction yard. The workers on-site have been living on this site for approximately 12 years.

SITE & LOCATION

How does labour housing fit into a usual construction site in Navi-Mumbai?

(Tropical Climate)

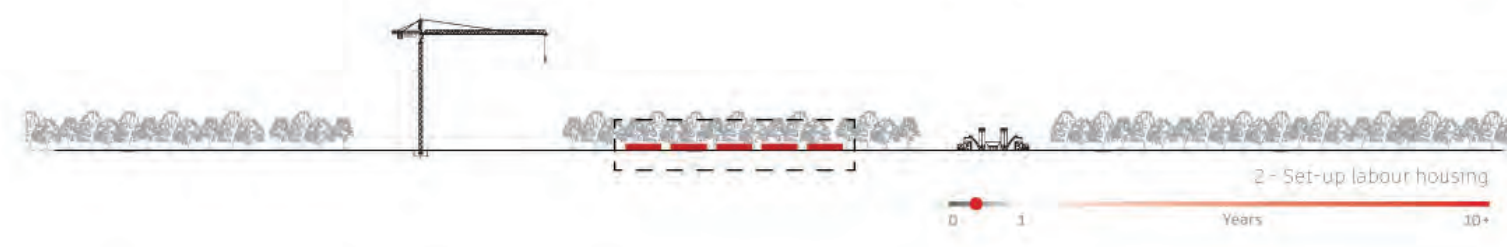
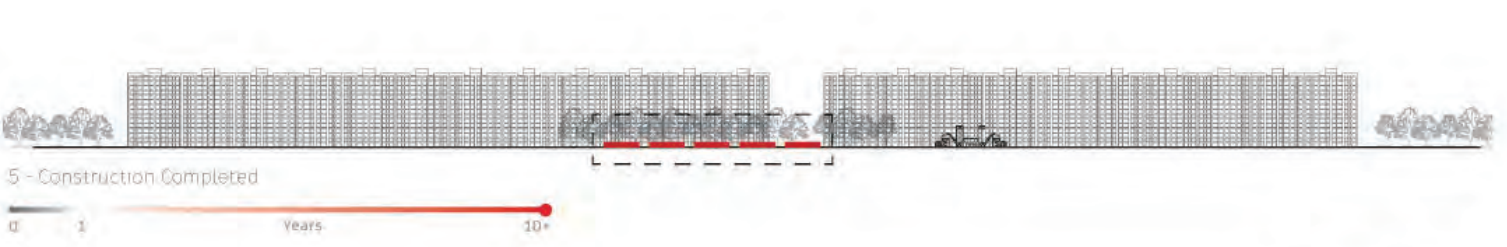
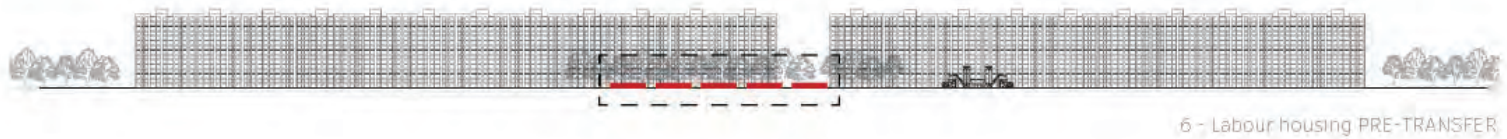
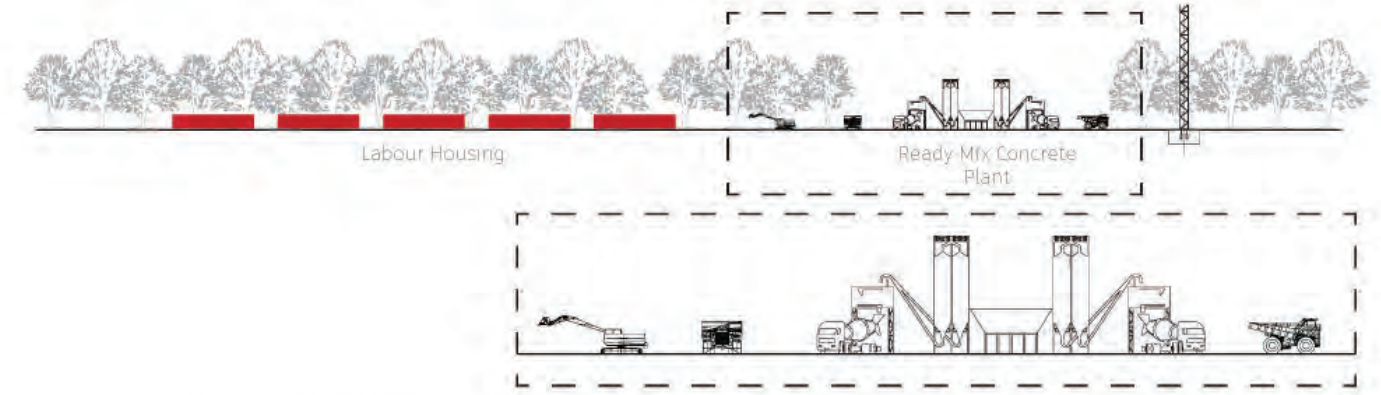


Buildings 4

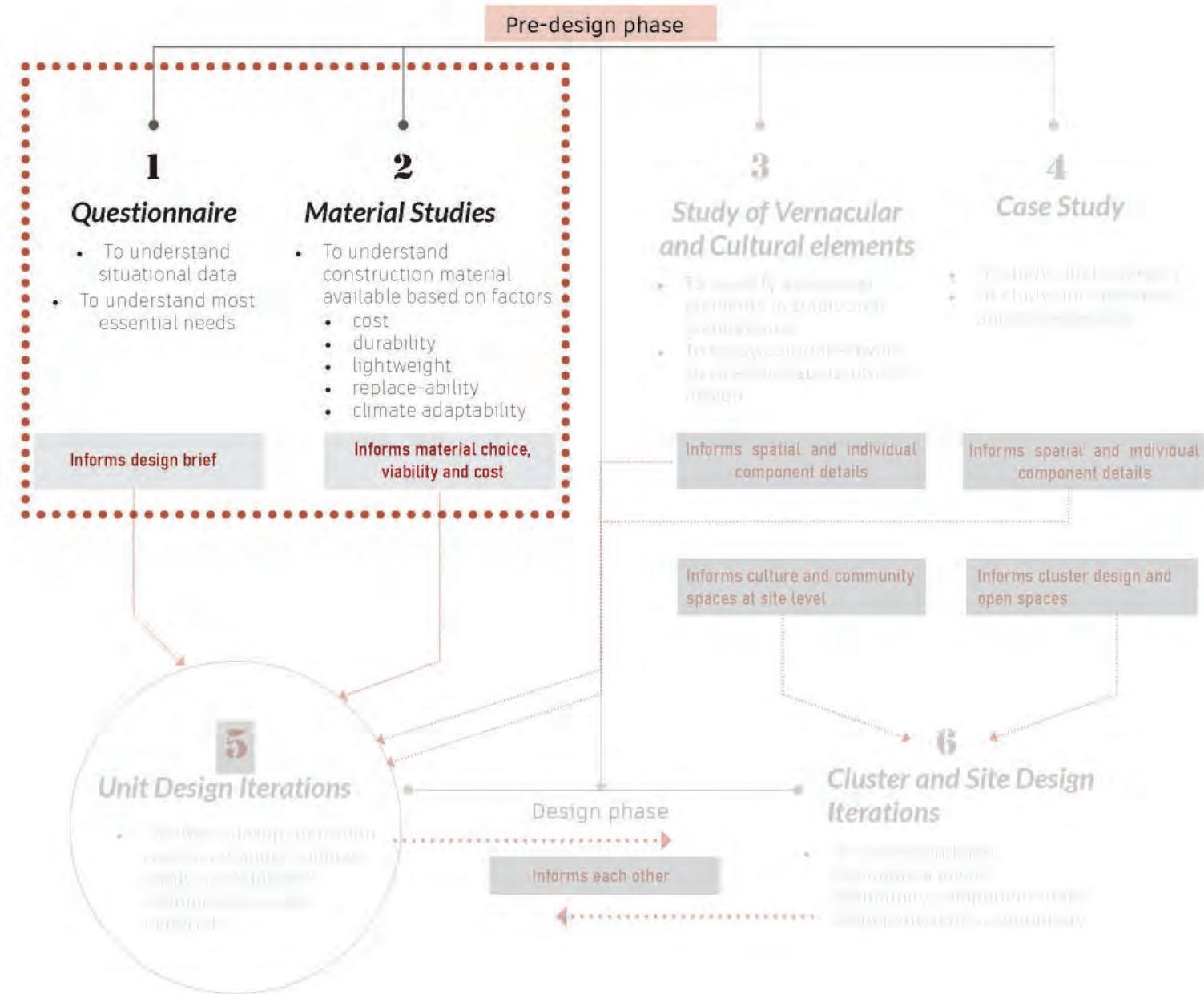


PROJECT LIFE-CYCLE

- What is the life-cycle of a typical construction site in Navi-Mumbai with regard to construction labour housing?
- How can the Ready Mix Concrete Plant be leveraged to create blocks for the labour housing?



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RESEARCH METHOD 1: FOR SITUATIONAL DATA (QUESTIONNAIRES)

CRITERIA INVESTIGATED : # 4 a-d

How can I verify the assumptions made regarding living circumstances of a person or family in the Khargar labour housing regarding type of housing, number of rooms, migrant status, utilities provided and term of stay?

From this survey, What would be the most essential needs of the resident Migrant worker?

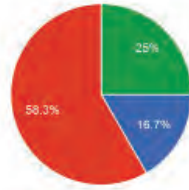
- A house that has all basic utilities

- A space that can comfortably house the whole family

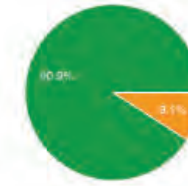
1. Which builder camp do you live in?



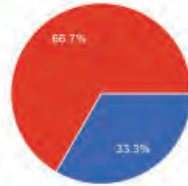
2. How many people live in the camp?



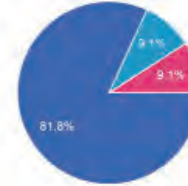
3. Where are you from?



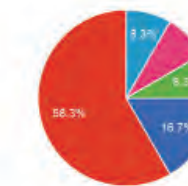
4. Does everyone in this camp work for a builder company?



5. If not, what work do they do?



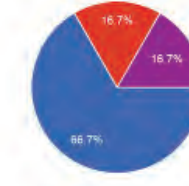
6. How many years have you been living in this camp?



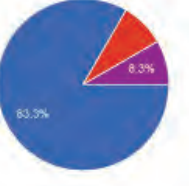
7. Do you live with your family?



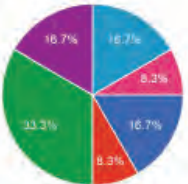
8. How many people live here in your family?



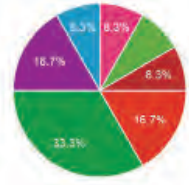
9. Why did you leave your village and come here to work?



10. What kind of house do you have in the village?



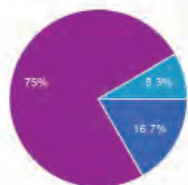
11. What kind of room or house do you have in the camp?



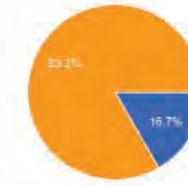
12. How many rooms do you or you and your family live in?



13. What kind of facilities do you have in the room?



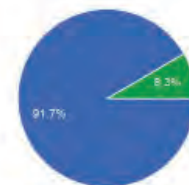
14. How do you get water?



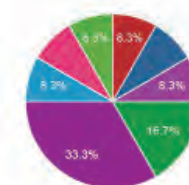
15. Is there electricity in your room?



16. Why don't you rent a room in a building?



17. What amenities do you want in your room?



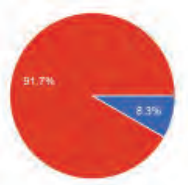
18. If you were given a chance to make a room here, how would you make it?

Pure family rakhe jo jaisa
Full family k liye
Hum usme shuchalay anghar, rasighar, yaha sub banayenge

19. In what other way do you think your room can be built by the builder?

Acha Ghar
Bakka Ghar bana hai
Jo
Bakka ghar ho
Acha
Hum jese chaye
Acha Ghar hoga
Achhe se accha bane bas hum yahi chahte he

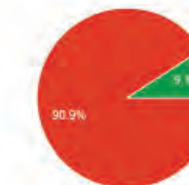
20. Do you have space for children to play?



21. How do you do festivals community gatherings and events?

Kabhi kabhi
Jada ter nhi banate hai
Kabhi kabhi
Nhi kar pate hai
Ghar me karte h aur church me jaate h
Nhi kar the paise nhi ho pure
Paise nhi hore
Chaha kaot bhi tyohaaf ho hum sub milke manate he khushi se

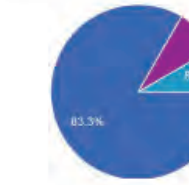
22. Do you have room for it?



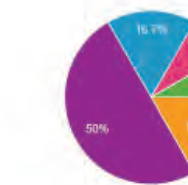
23. Do you think there should be such a place in the camp? Why?

Uld, young, sab ho hai jaliye
Family hote hai young bachhe
I laa,aki bacho ko kelne ke liye
jara ka jaga milega aur hume b
loi b tevar banane ka
vese b itre kam jra me kuch b
nhi kar pate
Young log rakhte bachhe rakhte
Isliye
Family hote hai, bache bane log
Ha hona chahiye kunki hum
garbo ko bhi acchi se aachi
suvidhaye mile ye hum
chahte he
Bachha rakhte hai family rakhte
hai

24. How long do you think you will continue to stay in the camp?



25. How many more years will you live here?



26. If given a chance, why would the builder support better housing for the workers?

Builder ko payeda hoga
Ha, hote. Aisa moka mile toh
Builder help ki toh acha hi
hoga.
Pata nhi pr builder help ki toh
acha hai
Pata nhi
Wo paise ke liye karega
Builder ko profit hoga
Pata nhi karre Toh acha hai
Sab kuch agar majdur aur
builder ke sahmat se hoga to
jara milega

RESEARCH METHOD 2 : MATERIAL STUDY

What materials are most commonly used on a construction site in India?

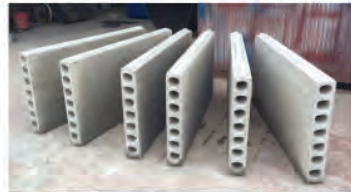
What would be the cheapest and most durable materials readily available on site?

Which materials would be easy to replace on site if broken or damaged?

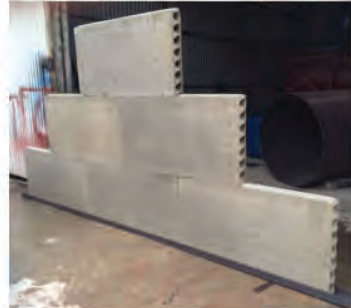
Which materials are good for passive cooling systems in this climate type?

Which materials are easy to handle and require least manufacturing intervention?

Cellular Lightweight Concrete (CLC) OR Foam concrete



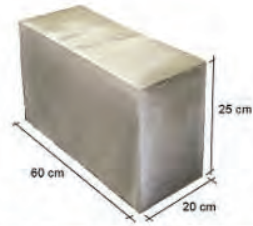
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Pre-Cast Panel Specification
Dimensions: 1200 x 500 x 100 mm
Weight: 38 kg

Foamed concrete (CLC) panels can be used to build partition or non-load bearing walls. These pre-cast panels have hollow cores to reduce weight and gooves so that they interlock. They are made from 950 kg/m³ foamed concrete so they have plenty of strength, but due to the hollow cores the overall density of the panel is 633 kg/m³. Since the panels are bigger than blocks, it is much quicker to construct a wall with the panels.



3



4

Foam concrete has very low (0.11 W / mK) thermal conductivity with its homogeneous and smooth structural properties. This feature provides high thermal insulation.

Foam concrete is highly sound insulated.

Foam concrete is light and robust.

Foam concrete does not burn.

The water absorption of foam concrete is low.

Autoclaved aerated concrete



5

AAC is one-fifth the weight of concrete. Is available as panels and blocks. AAC wall panels are typically used for cladding, but can also be loadbearing. AAC floor and roof panels are also available. Can be used for loadbearing structures up to 3 storeys, and AAC panels can be used for cladding. Has medium thermal mass and provides very good thermal insulation. Is relatively easy to work with but can also be easily damaged. Specific construction techniques are required. AAC used externally should be coated with a vapour-permeable, water-resistant finish. Render to blockwork must be a proprietary mix compatible with the AAC substrate.

Basic Cost List:

8" X 8" X 8" Hollow Concrete Block(regular) : 45 Rs

12" X 24" X 8" Cellular Lightweight Concrete : 35 Rs

24" X 8" X 8" Autoclaved Aerated Concrete Block : 100 Rs

8" X 4" X 4" Terracota Blocks : 48 Rs

1" Bamboo ((5')) : 8-10 Rs/ piece increases with diameter and height

8'x4'x10" Fibre Cement Board : 900 Rs/ piece

Terracota Panels and Blocks



6

BLOCKS AND BLOCKWORK

Low Density Units



7

Unfired blocks manufactured from clay and sometimes incorporating straw may be used for non-load-bearing partition walls. Blocks (typically 500 mm X 250 mm and 450 mm X 225 mm X 100 mm thick) may be tongued and grooved or square edged, but only the horizontal joints require fixing with a thin layer of cellulose-based adhesive or clay mortar. Blocks are easily cut to create architectural features, and are usually finished with a skim coat of clay plaster although they may be painted directly. Internal walls are sufficiently strong to support shelving and other fixtures. Unfired clay block walls are recyclable or biodegradable and have the advantage of absorbing odours and stabilising internal humidity and temperature by their natural absorption and release of moisture and heat. A 100-mm-thick wall gives a 45 dB sound reduction and 90 minutes' fire resistance.

Bamboo Panels



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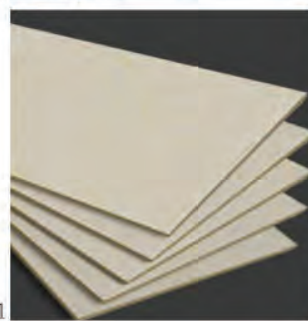
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As a natural composite material with a high strength to weight ratio, bamboo is ideal for use in construction. Its tensile and compressive strengths compare well against conventional materials such as steel and concrete, although its mechanical properties will vary with the species.

Fiber Cement Board



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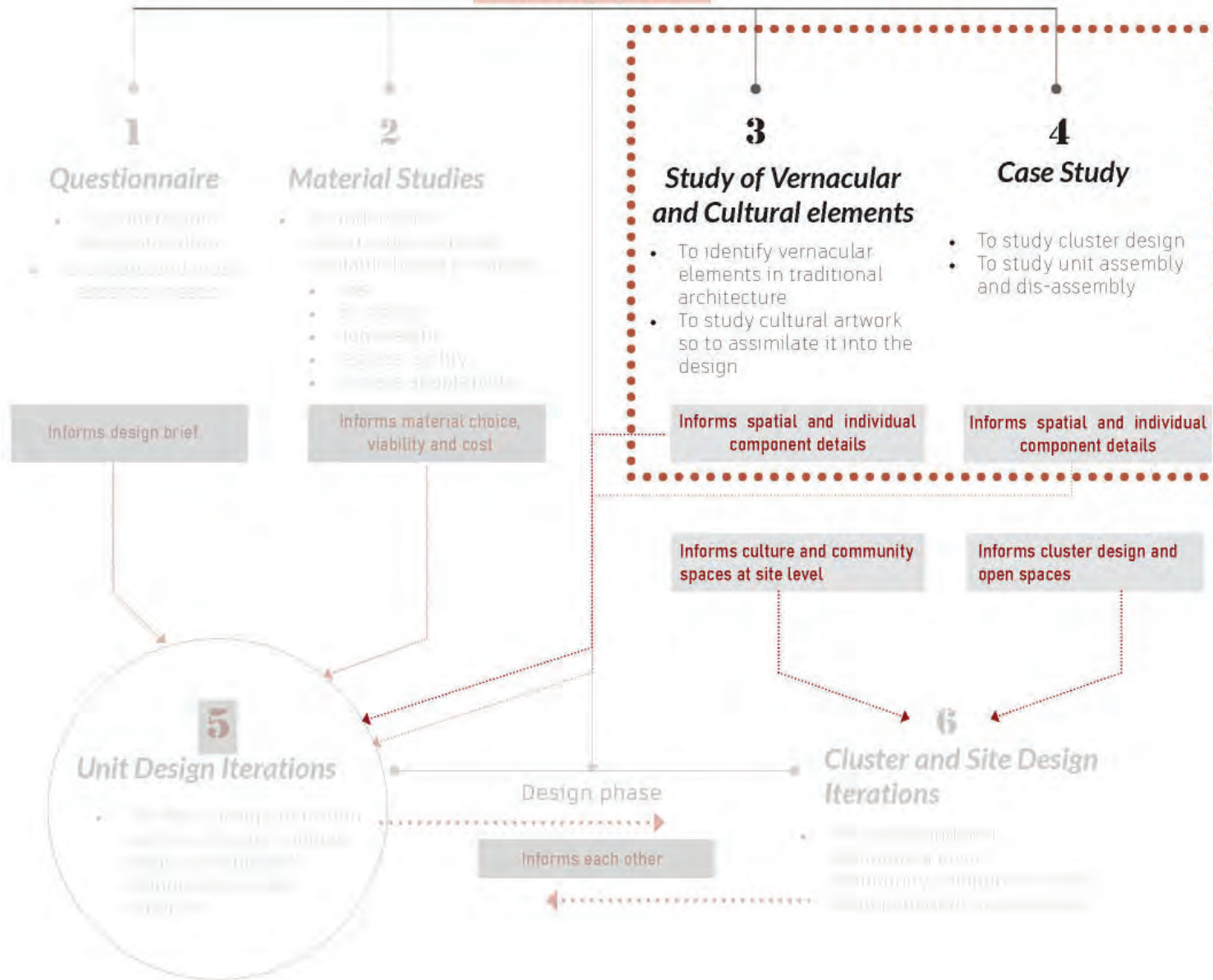


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Fiber cement siding ("fibre cement cladding" in the United Kingdom and "fibro" in Australia) is a building material used to cover the exterior of a building in both commercial and domestic applications. Fiber cement is a composite material made of cement reinforced with cellulose fibers.

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Pre-design phase



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RESEARCH METHOD 3 : STUDY OF VERNACULAR AND CULTURAL ELEMENTS

CRITERIA INVESTIGATED :# 4 e and 4f

How can the most common vernacular architectural identities be incorporated into the design?
How can cultural identities be incorporated into the design?

Folk Art



Courtyard



Veranda



Sloping Roof



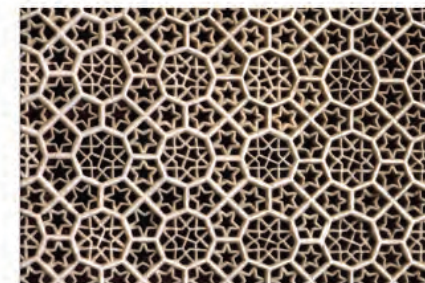
Indian Handicrafts/Painting



Traditional Patterns & Colour



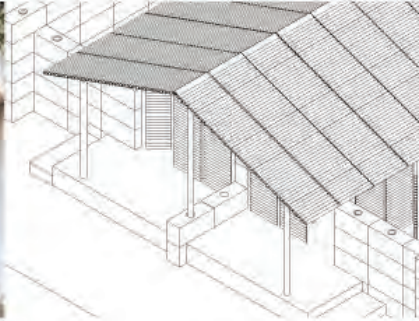
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DESIGN : INCORPORATING VERNACULAR AND CULTURAL ELEMENTS

CRITERIA INVESTIGATED : # 4 e and 4f

Veranda

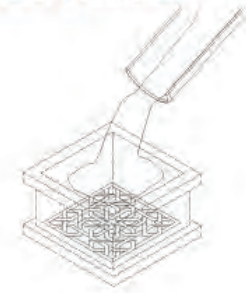


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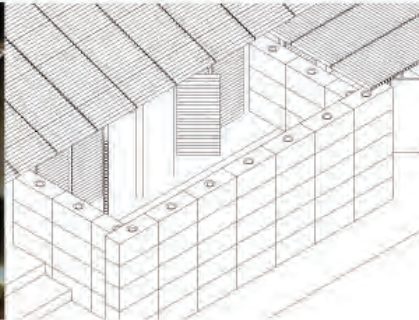
User Autonomy is encouraged to mix- and match patterns or colours to create a dwelling unit of their liking within given parameters.

This self-customization will create a greater sense of identity and belonging for the user. It will also create a neighbourhood setting with artistic enterprise and cultural personality.

Pattern imprint in block mould can have atleast 4-6 variations

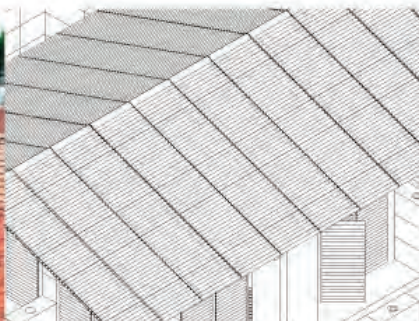


Courtyard



2

Sloping Roof



3

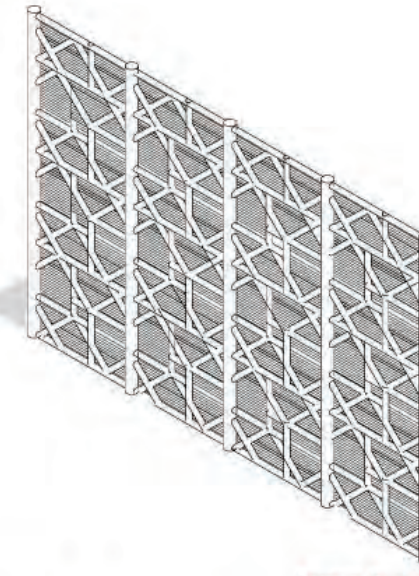
Pigmented concrete in block moulds can have atleast 4-6 variations in colour



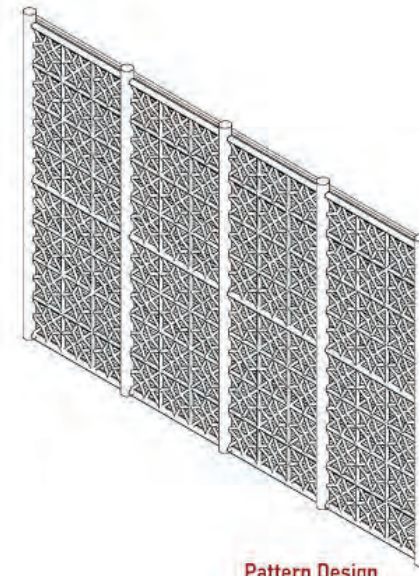
Screen Partitions



Pigment Color

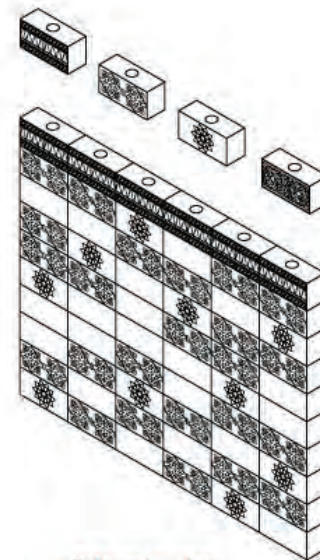


Pattern Design

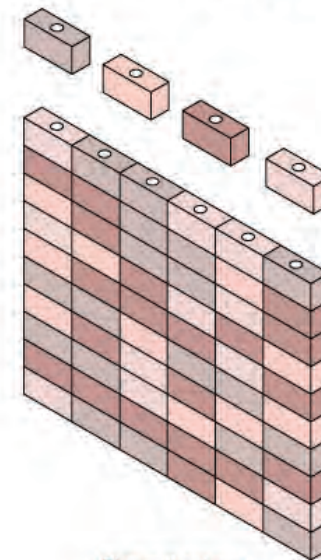


Pattern Design

Block Wall



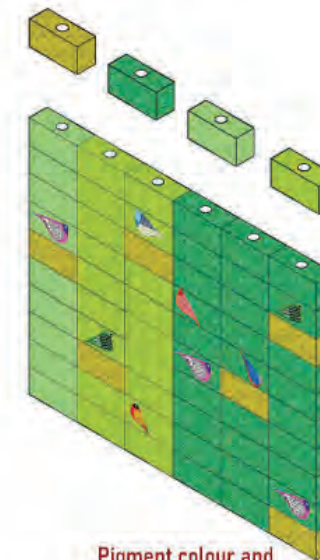
Pattern Imprints



Pigment colour



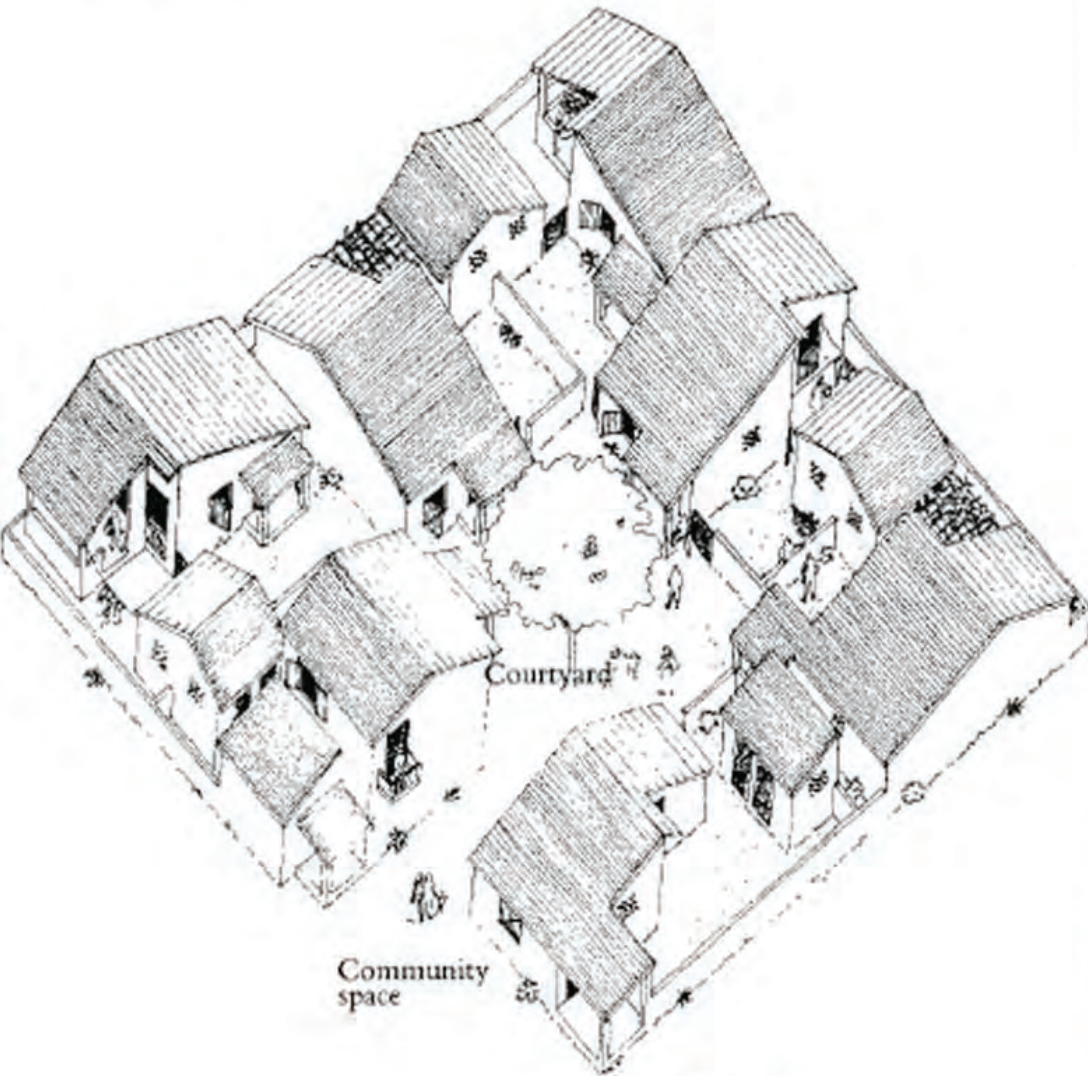
Pigment colour and Pattern stamping



Pigment colour and Pattern stamping

RESEARCH METHOD 4: CASE STUDY ON CLUSTER PLANNING

Belapur Housing



Type A units.

The overall development is low-rise high density, in-keeping with most of Correa's other low-cost housing projects. There are five types of dwellings designed according to plot size, the smallest being just a single room with a toilet, and the most elaborate a two-storeyed tenement. The houses have no common walls, but the toilets of two neighbouring dwellings do, for ease of plumbing services.

Here, too, Charles Correa ingeniously uses his trademark hierarchical open spaces to create a sense of home and community. The smallest open space is the individual yard of each house. Seven dwellings are grouped around an intimate courtyard of about 8m x 8m.

Three such clusters come together around a larger space of about 12 m x 12 m. Three of these clusters combine around the largest community space of 21m x 21 m. The community spaces open out to a seasonal stream (nallah) flowing through the centre of the site which also carries the stormwater during rains.

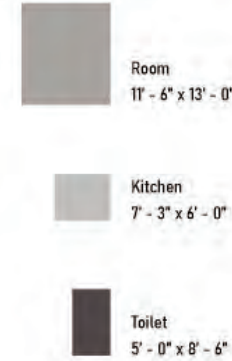
<https://www.re-thinkingthefuture.com/case-studies/a3735-belapur-housing-by-charles-correa-a-sense-of-home-and-community/>



Analysis of size and composition

CRITERIA INVESTIGATED : # 3

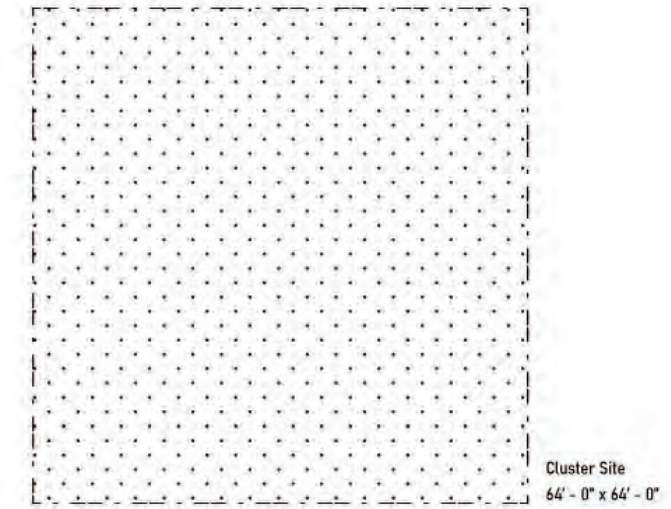
Basic Unit Spaces



Basic Site Unit

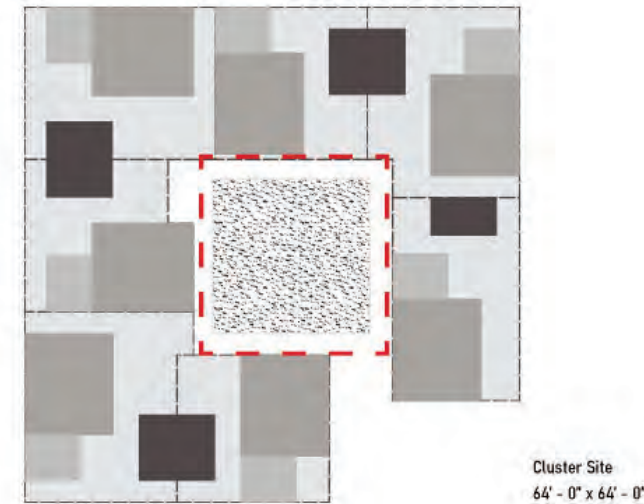


Basic Cluster Site



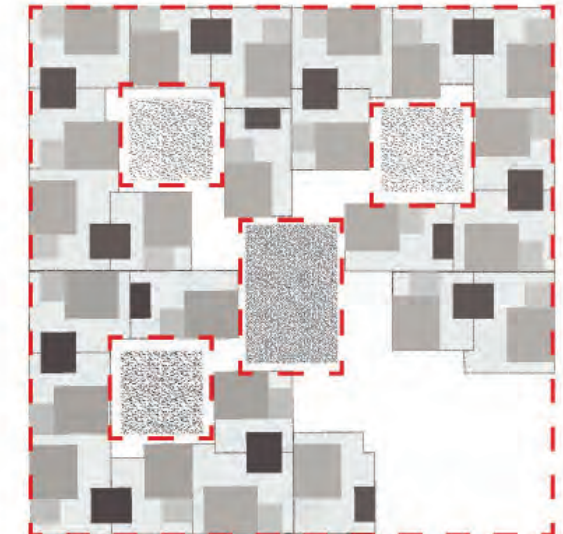
Micro-Cluster

Basic Cluster format - 1



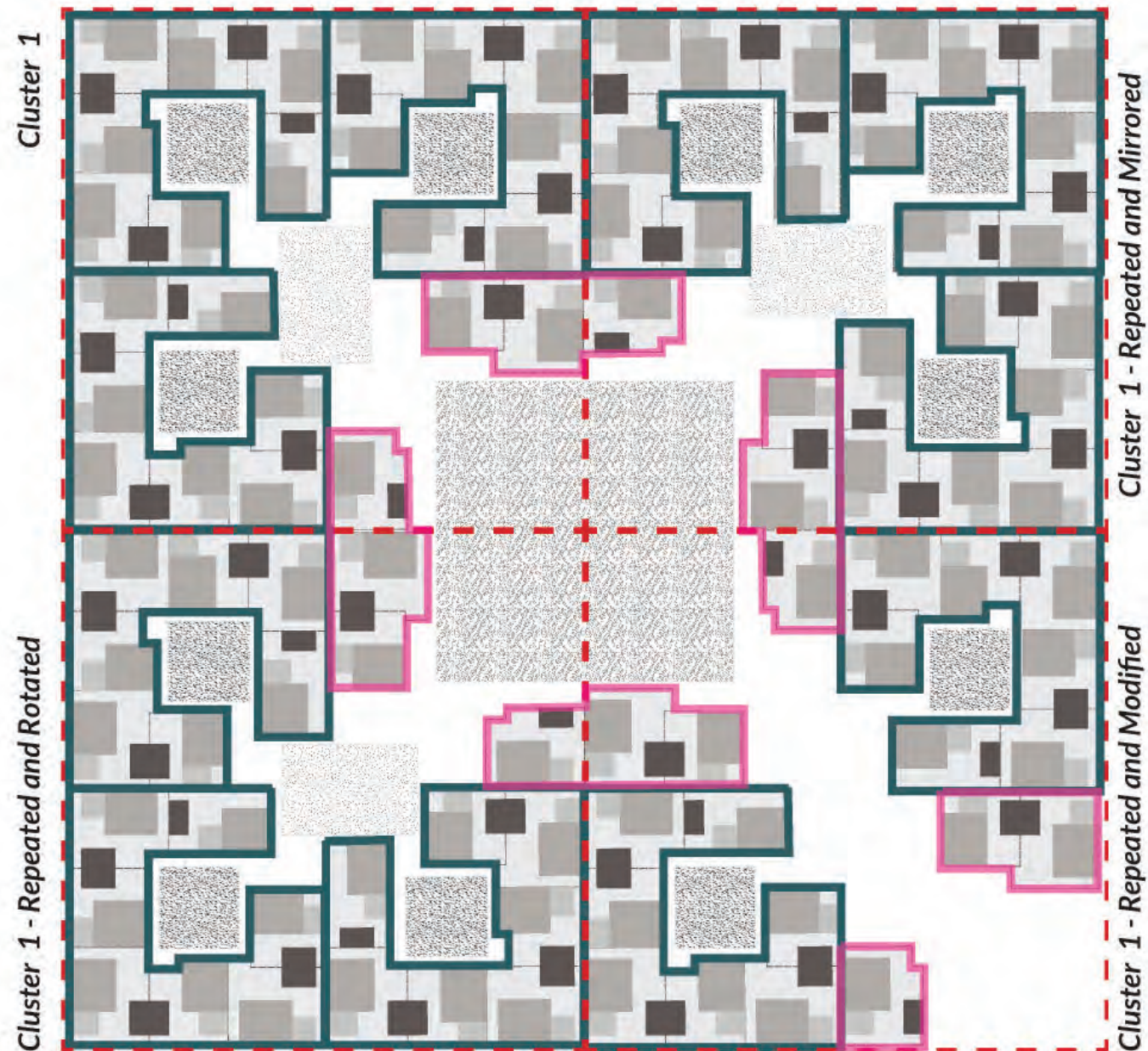
- 7 Units per cluster
- 1 central common open space
- 1 Common Entry

Cluster format - 2



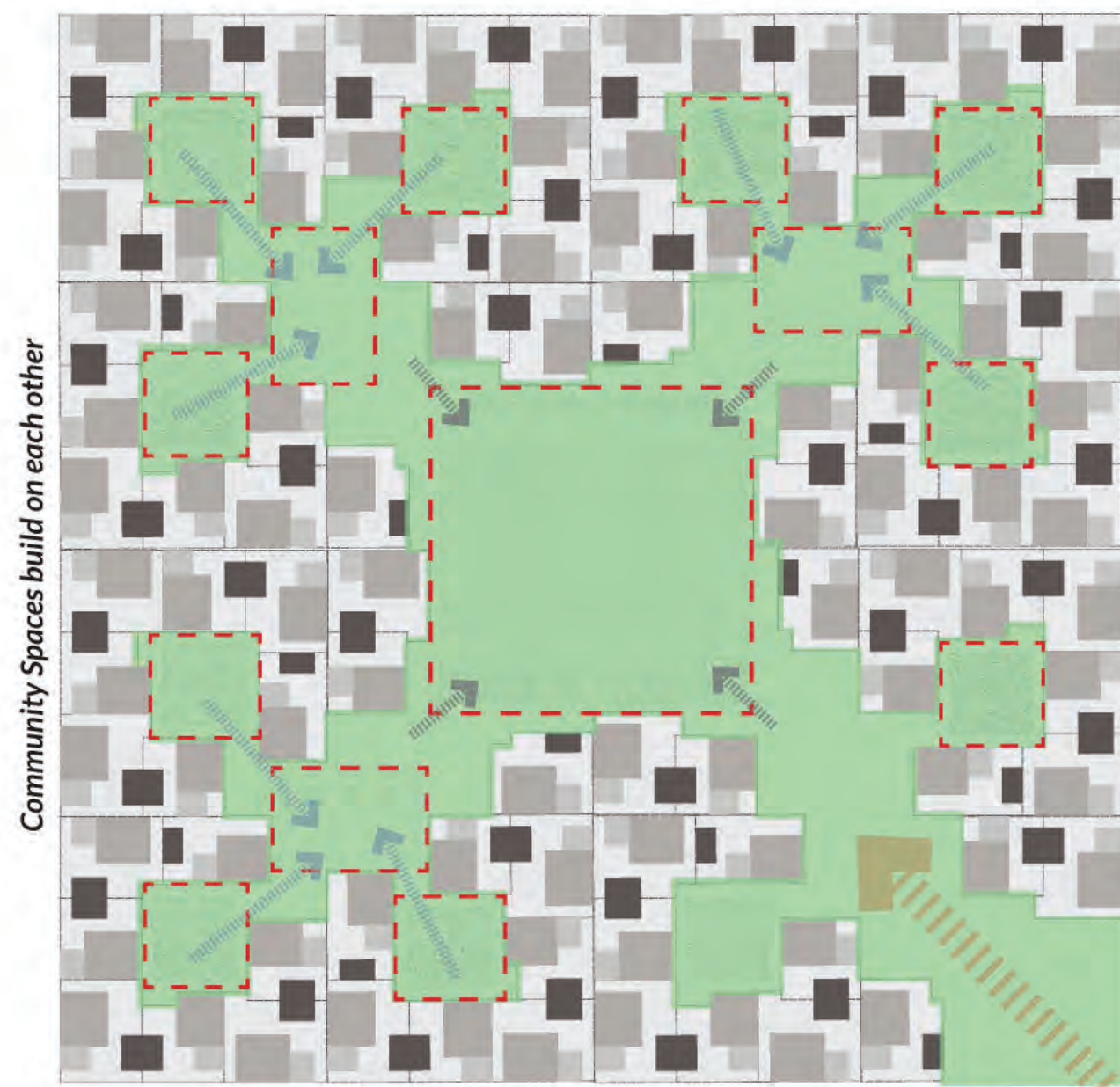
- 7 Units per cluster
- 1 central common open space
- 1 Common Entry

Macro-Cluster



Additional units added to each cluster

Micro to Macro-Open Spaces



Main Entry-Exit

RESEARCH METHOD 4: CASE STUDY ON FOUR DAY ASSEMBLY *Pop-Up House / Multi-pod Studio*

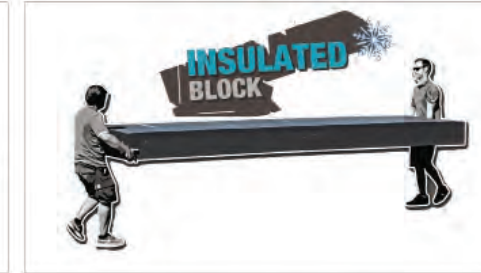
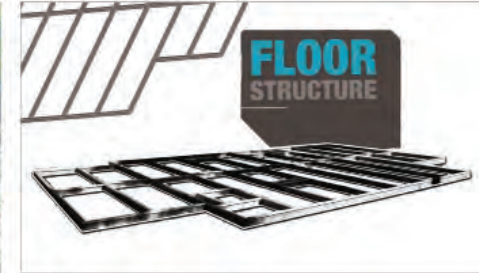
CRITERIA INVESTIGATED : #3

Four days and a wireless screwdriver are all you need to build the structure of a Pop-Up House. The structure, compiled of insulating blocks and wooden panels, delivers affordable thermal insulation like you'd never believe. Heating represents close to 28% of global energy consumption and is also one of the main household costs. Determined to develop solutions, Multipod Studio have patented a unique approach to passive construction that delivers outstanding thermal insulation at an affordable cost. No special tools required, the house is assembled using lightweight and recyclable materials for quick installation. The materials used are inexpensive so the cost remains unbeatable and the thermal envelope created means no additional heating is necessary. The first prototype of this new type of passive house, has bloomed in the pine valleys of the South of France. The Pop-Up house is an innovative concept that aims to challenge passive house construction.

1



2 (All Images)



1. Base



2. Floor



3. Walls



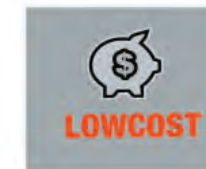
4. Roof & Windows



5. Cladding and finishes



The construction requires no special tools except for a screwdriver since the Pop-Up House snaps together like Lego bricks. The entire building is constructed by assembling insulation blocks separated by wooden boards using long wood screws. This type of assembly allows for a 100 percent removable and recyclable solution.



COMPONENTS OF CONSTRUCTION: ITERATION 1 : CONCRETE & BAMBOO

CRITERIA INVESTIGATED : #2

Why Bamboo?

1. Easily Available and Low-Cost
2. Common Construction Material
3. Flexible, Durable and Recycle-able
4. Low Thermal Conductivity
5. Light Weight
6. Non-Factory produced

Why CLC Concrete?

1. Easy to make onsite in RMC plant
2. Easily available in the market
3. Light Weight
4. Low Thermal Conductivity
5. Non-Factory produced

2'(W)x 2' (L)x 6'(H)



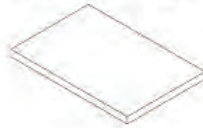
Concrete Footing

2'(W)x 2'(H)x 10"(T)



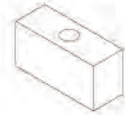
Floor Support

4'(W) x 6'(L) x 4"(T)



Floor Base

2'(W) x 4'(L) x 2'(H)



Concrete Block

6" (D) x 12' (L)



Bamboo Pole

4" (D) x 12' (L)



Bamboo Pole

3'-2" (W) x 2'-9" (H) X 3" (T)

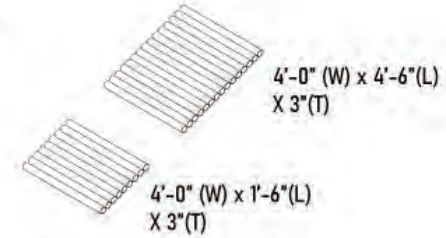


Bamboo Partition panel

3'-2" (W) x 7'-0" (H) X 3" (T)



Bamboo Partition panel



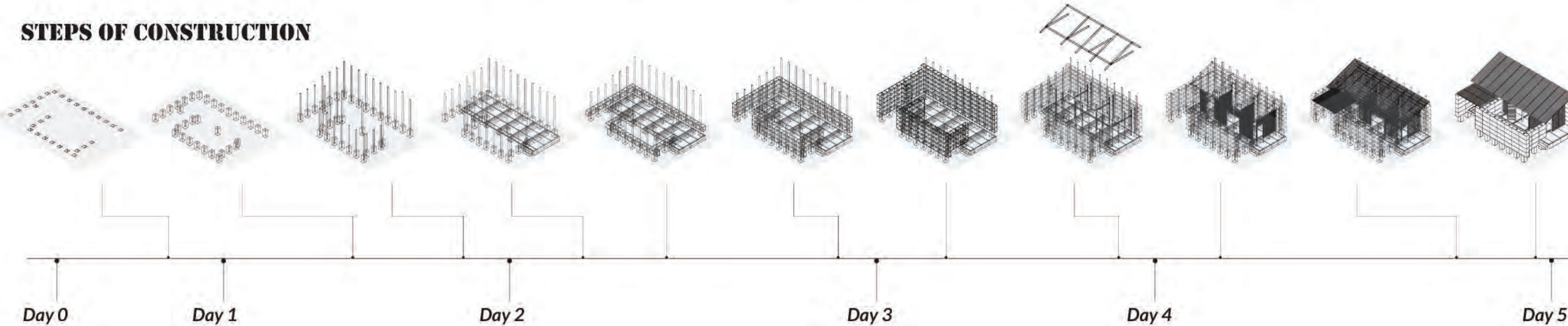
Bamboo Roof panel

1'-6" (W) x 6'-0" (L)



Metal Roof Ridge flashing

STEPS OF CONSTRUCTION



BASIC STEPS OF CONSTRUCTION:

How to make it easy to assemble and disassemble the units ?

CRITERIA INVESTIGATED : #2

Assembly → **1**
Dig pit's for footing

2
Insert footings into the pit
Remove and pack the footings

3
Attach poles to the footings
Disassemble and pack the Poles

4
Dry assemble Floor
Disassemble and pack the floor

5
Dry assemble Block Wall around wooden poles
Remove Blocks and pack

5 Cont'd
Dry assemble Block Wall around wooden poles
Remove Blocks and pack

5 Cont'd
Dry assemble Block Wall around wooden poles
Remove Blocks and pack

6
Assemble frame for wall partitions and roof
Detach all framework and pack

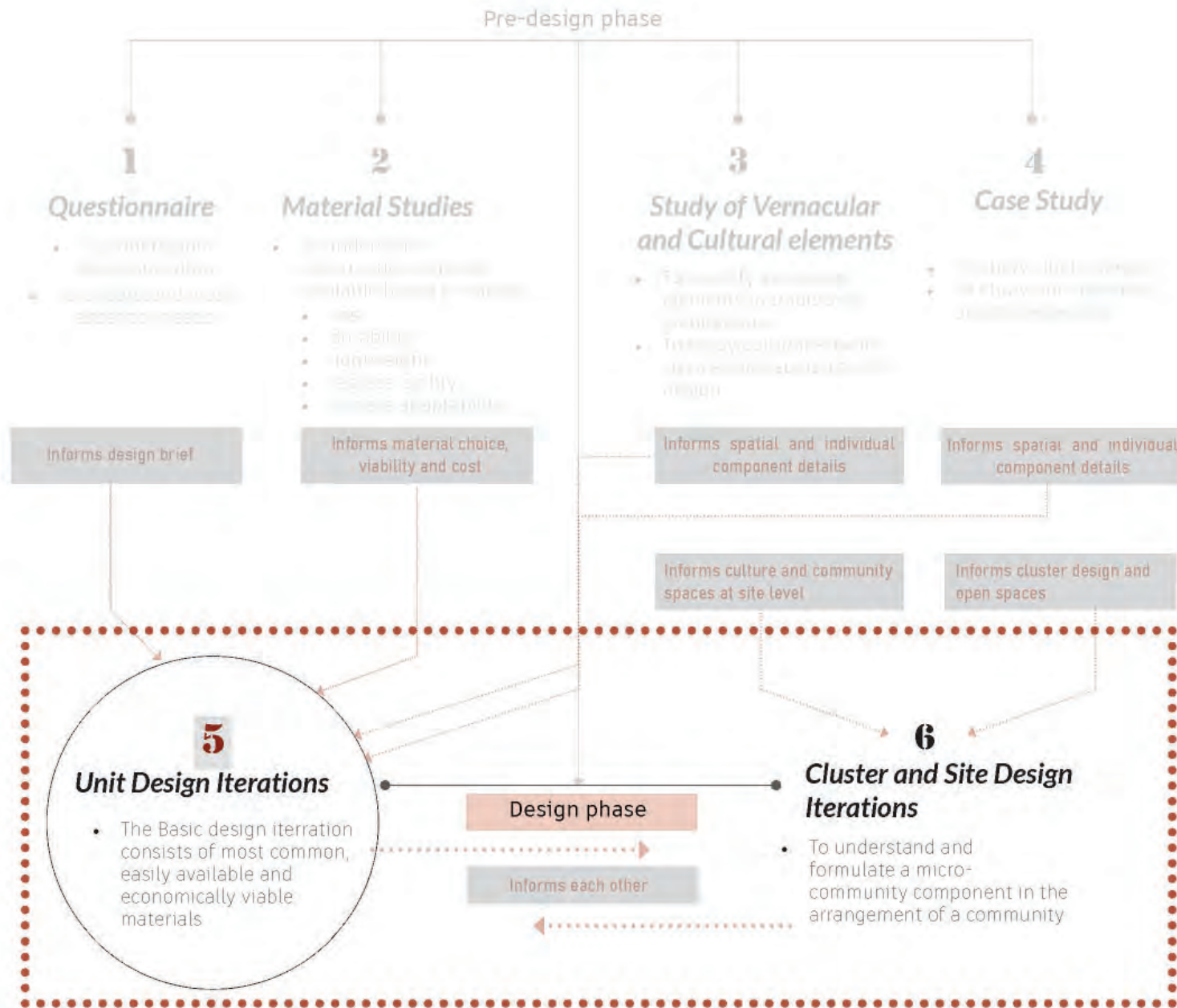
7
Attach bamboo partition panels
Detach bamboo partition panels and pack

8
Attach bamboo roof panels
Detach bamboo roof panels and pack

9
House Completed

← **Disassembly**

METHODS



QUESTIONS

1 How to design and provide a viable, affordable, and healthy housing solution for Migrant Construction workers, which can be assembled, disassembled or reassembled by two people, in 3 to 4 days at a construction site?

2. What kind of materials will be feasible, easy to handle and bear the wear-and-tear of design for deconstruction system?

3. How to make it so affordable so that builders and government entities will embrace and promote it?

4. How to create a cultural identity in the Unit design and site planning?

OBJECTIVES

Objectives for this Thesis project are as follows

1. To create a safe, sufficient (includes all utilities, bathrooms and kitchen spaces) and dignified housing for migrant construction workers to live in large metropolitan cities on construction sites

2. To create housing that meets all the basic needs of an individual or family

3. To preserve a Indian rural, cultural identity in the housing design (verandas, courtyards, sloping roofs, earthy look)

4. To adopt passive climate strategies to make the housing climate friendly (the main strategies include wind flow, shading and thermal mass)

5. To create micro-community clusters for 8 to 12 houses

6. To make the housing units assemble, disassemble and reassemble-able by two people, in 3 to 4 days

7. Use prevalent construction material easily available on site or used as scaffolding

8. Avoid factory manufacturing of products

CRITERIA

1	Material
a	Readily available or easy to make on site
b	Low Cost
c	Durable
d	Good for passive cooling
e	Non-Factory made products
2	Method
a	Easily assembled by 2 people
b	Dry jointed
c	Easily replaceable
d	Easily transportable
3	Layout
a	Create micro-community clusters
b	Create larger community clusters
c	Create interaction through verandah spaces
d	Courtyard as personal outdoor spaced for large families
4	Design
a	Create comfortable living spaces (SIZE)
b	Create comfortable living spaces (QUALITY)
c	Create comfortable living spaces (No. of ROOMS)
d	Provide all basic Utilities
e	Encourages passive cooling
f	Incorporates vernacular elements
	Incorporates cultural elements

DESIGN ITERATION 1: Linear Unit

Minimum BUP Area required for Economically Weaker Section : 300sq.ft to 645sq.ft

Iteration 1 BUP Area : 680 Sq.ft excluding Verandah (higher side)

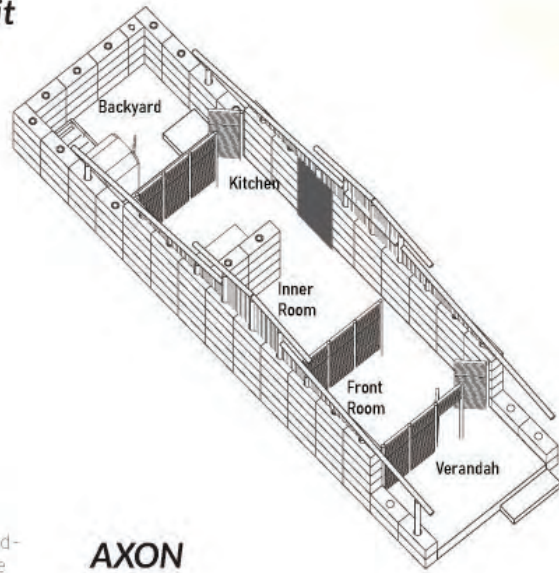
CRITERIA INVESTIGATED : #4



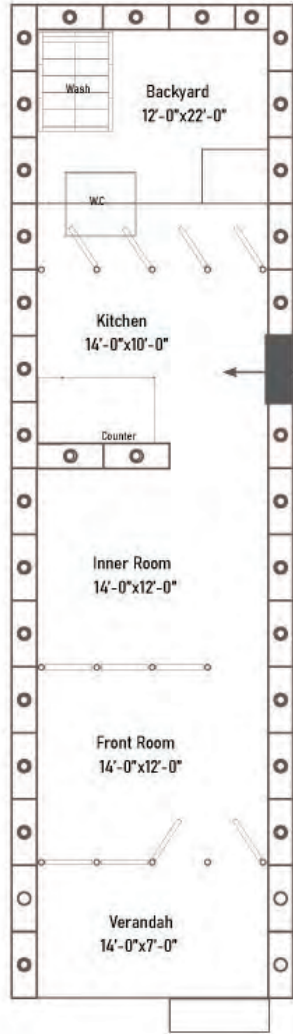
Criteria

1	Material	
a	Readily available or easy to make on site	●●●●●
b	Low Cost	●●●●●
c	Durable	●●●●
d	Good for passive cooling	●●●●
e	Non Factory made products	●●●●●
2	Method	
a	Easily assembled by 2 people	●●●●●
b	Dry jointed	●●●●●
c	Easily replaceable	●●●●●
d	Easily transportable	●●●●
3	Layout	
a	Create micro-community clusters	●●●●●
b	Create larger community clusters	●●●●●
c	Create interaction through verandah spaces	●●●●●
d	Courtyard as personal outdoor spaced for large families	●●●●●
4	Design	
a	Create comfortable living spaces (SIZE)	●●●
b	Create comfortable living spaces (QUALITY)	●●●●
c	Create comfortable living spaces (No. of ROOMS)	●●●●●
d	Provide all basic Utilities	●●●●
e	Encourages passive cooling	●●●●●
f	Incorporates vernacular elements	●●●●
g	Incorporates cultural elements	●●

DESIGN ITERATION 1: Linear Unit



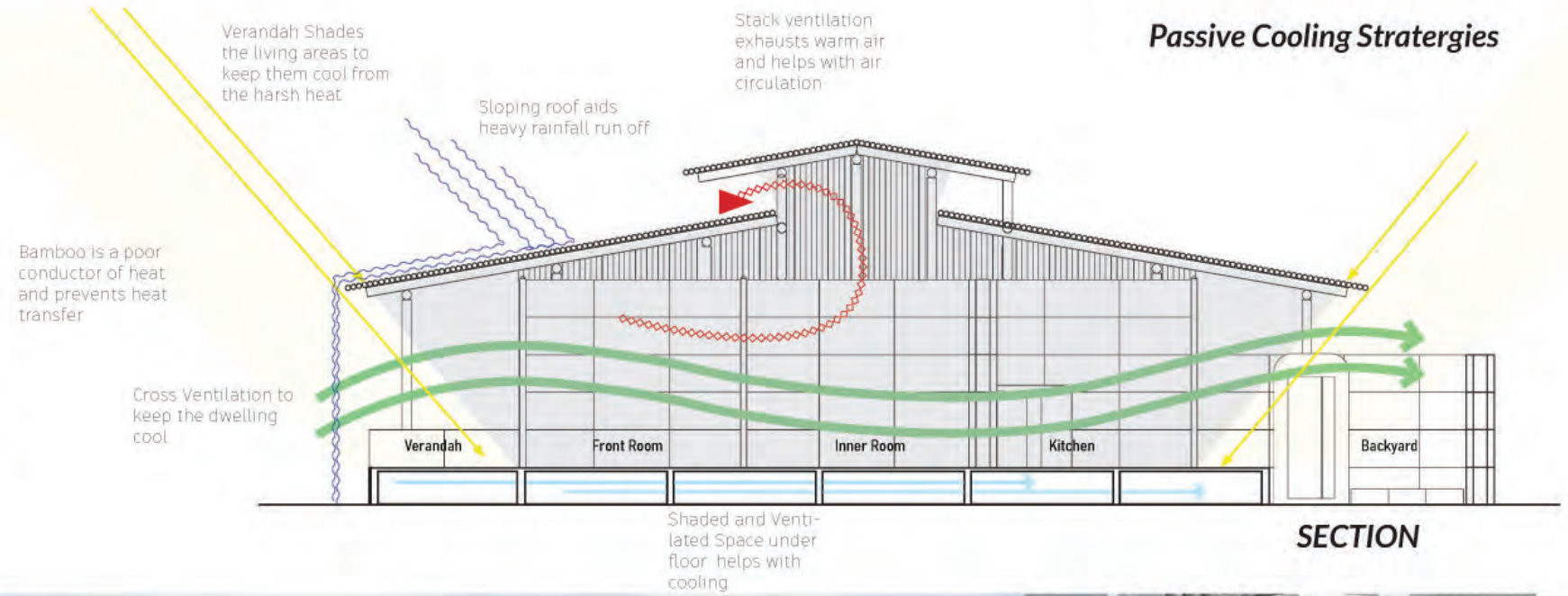
AXON



Remove blocks for additional family space for LARGER FAMILIES

Optional

PLAN

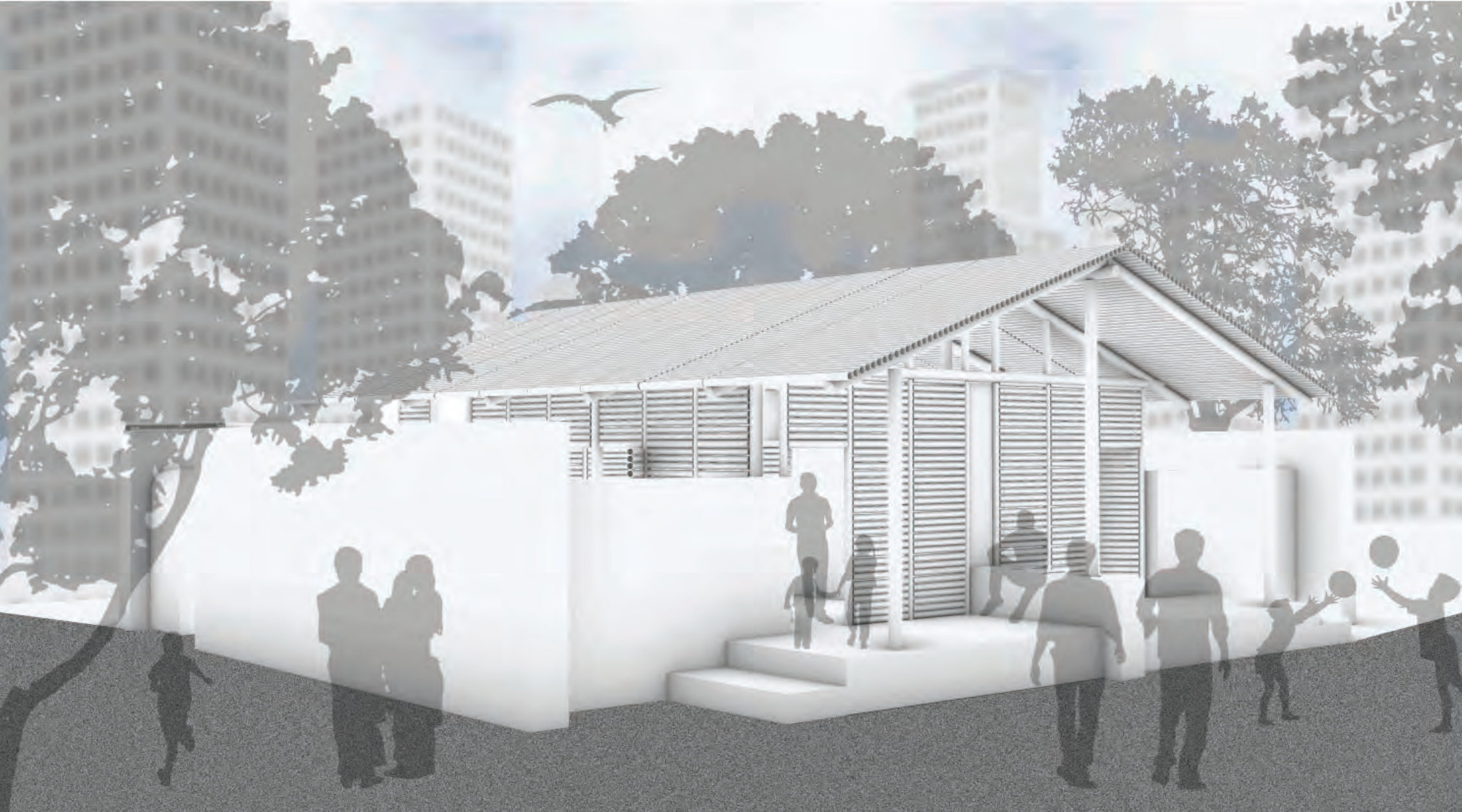


DESIGN ITERATION 2: Courtyard Unit

Minimum BUP Area required for Economically Weaker Section : 300sq.ft to 645sq.ft

Iteration 1 BUP Area : 414Sq.ft excluding Verandah (mid-size)

CRITERIA INVESTIGATED : #4



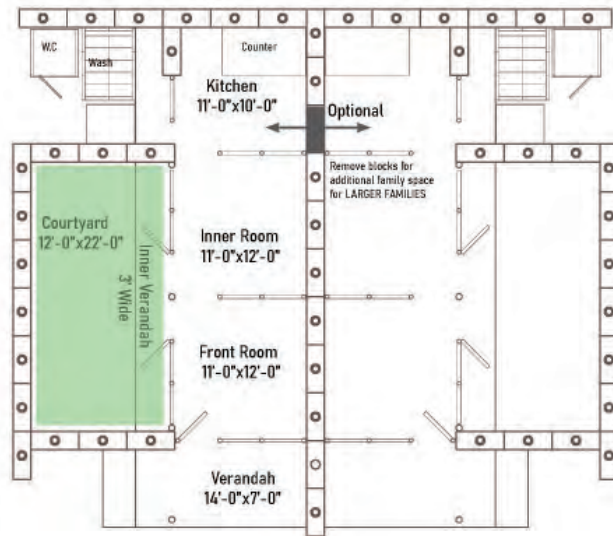
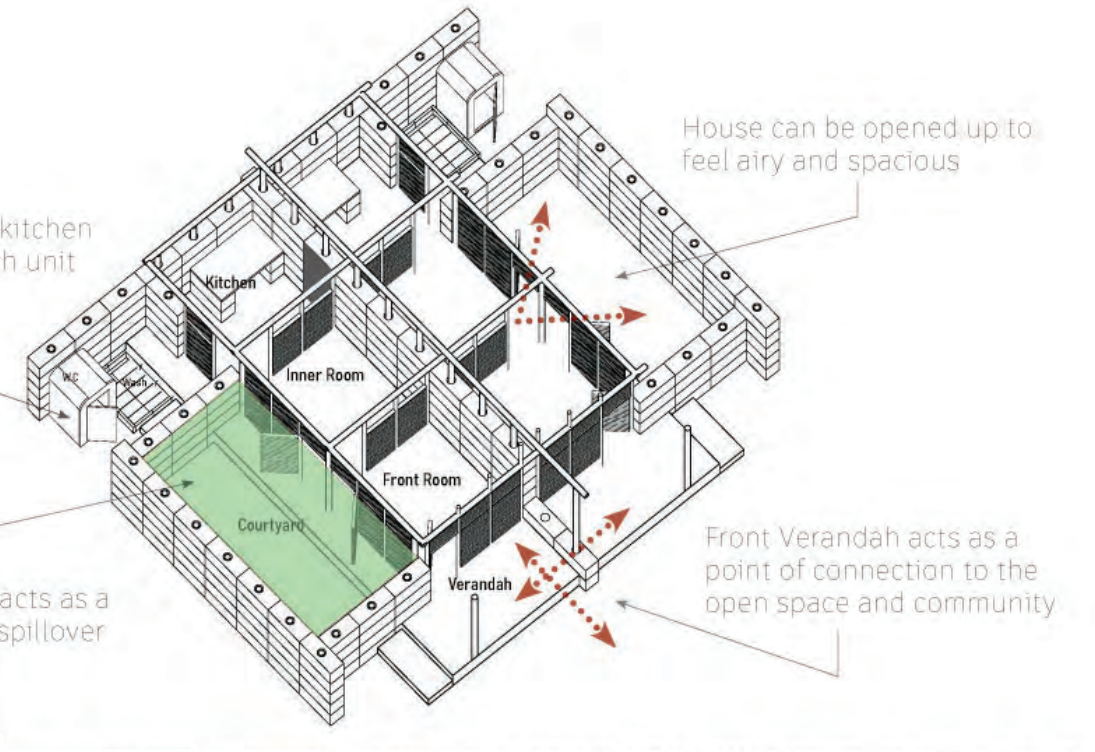
criteria

1	Material	
a	Readily available or easy to make on site	●●●●●
b	Low Cost	●●●●●
c	Durable	●●●●
d	Good for passive cooling	●●●●
e	Non Factory made products	●●●●●
2	Method	
a	Easily assembled by 2 people	●●●●●
b	Dry jointed	●●●●●
c	Easily replaceable	●●●●●
d	Easily transportable	●●●●
3	Layout	
a	Create micro-community clusters	●●●●●
b	Create larger community clusters	●●●●●
c	Create interaction through verandah spaces	●●●●●
d	Courtyard as personal outdoor spaced for large families	●●●●●
4	Design	
a	Create comfortable living spaces (SIZE)	●●●
b	Create comfortable living spaces (QUALITY)	●●●●
c	Create comfortable living spaces (No. of ROOMS)	●●●●●
d	Provide all basic Utilities	●●●●
e	Encourages passive cooling	●●●●●
f	Incorporates vernacular elements	●●●●
g	Incorporates cultural elements	●●

DESIGN ITERATION 2: Courtyard Unit



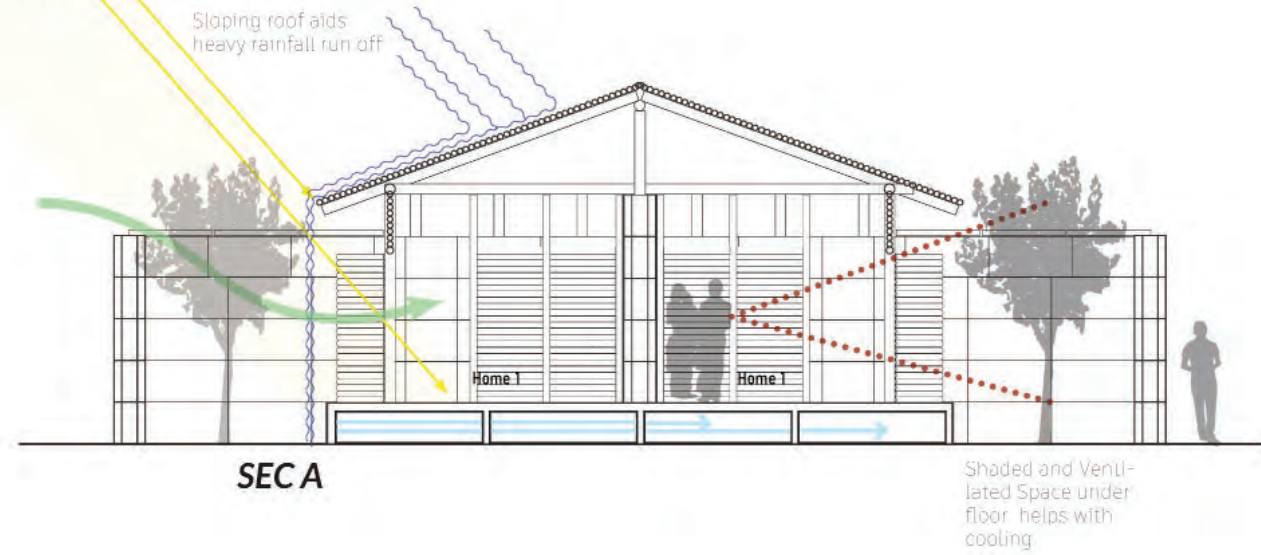
Back Spaces have kitchen and utilities in each unit



PLAN



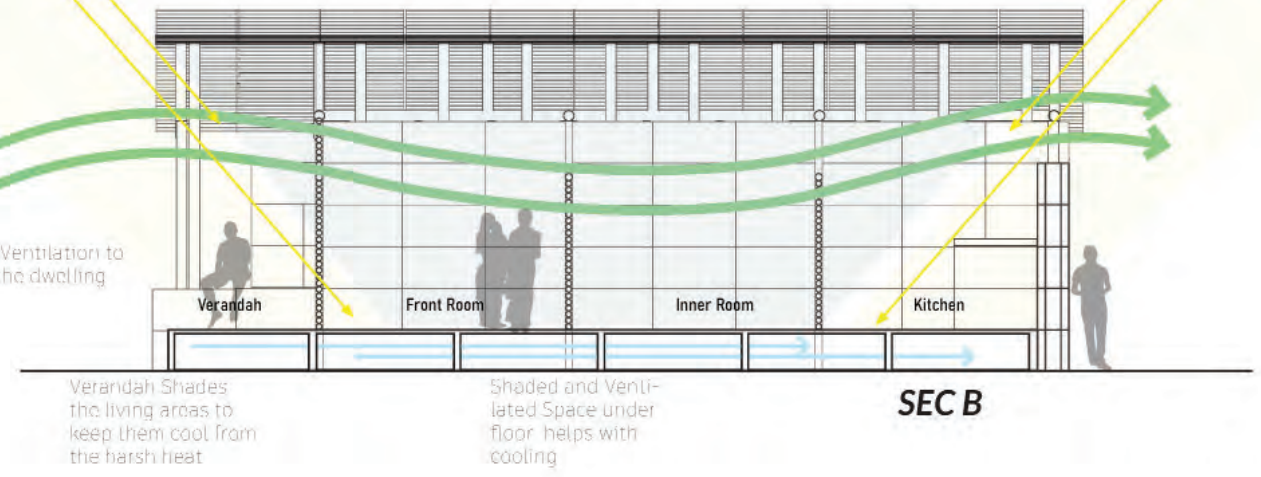
DESIGN ITERATION 2: Courtyard Unit



Passive Cooling Strategies

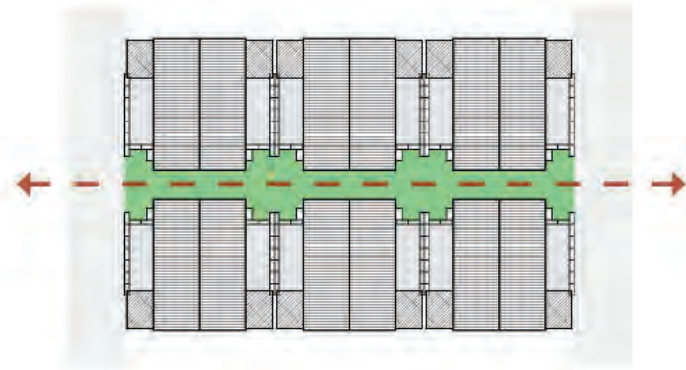
Bamboo is a poor conductor of heat and prevents heat transfer

Cross Ventilation to keep the dwelling cool

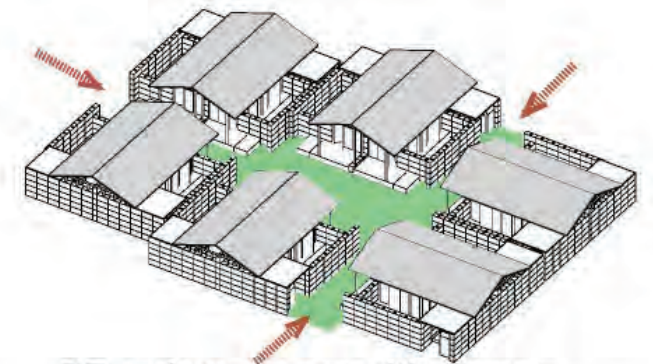
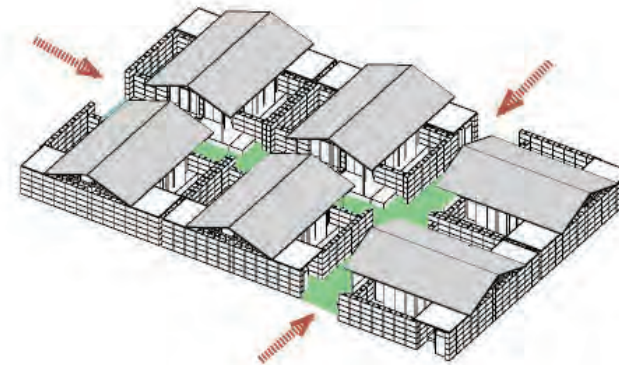
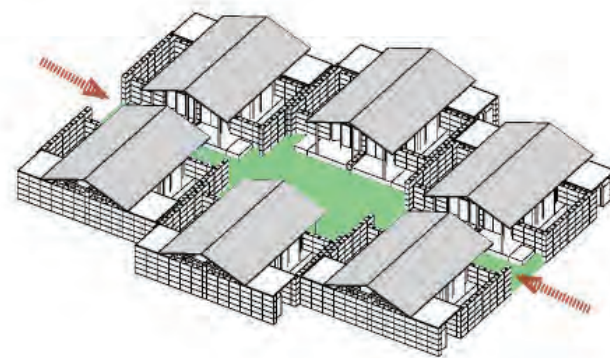
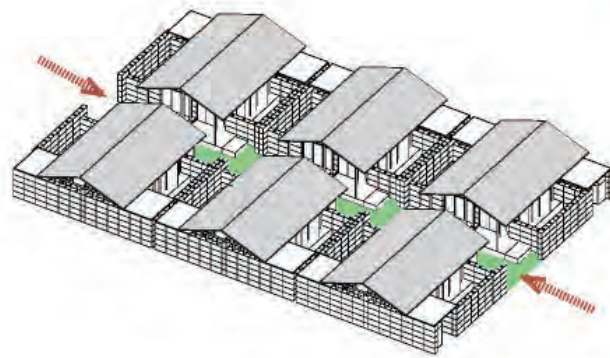
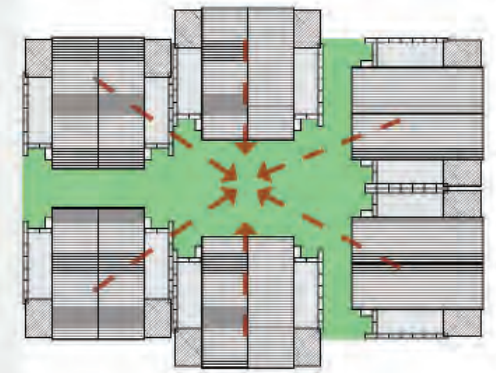
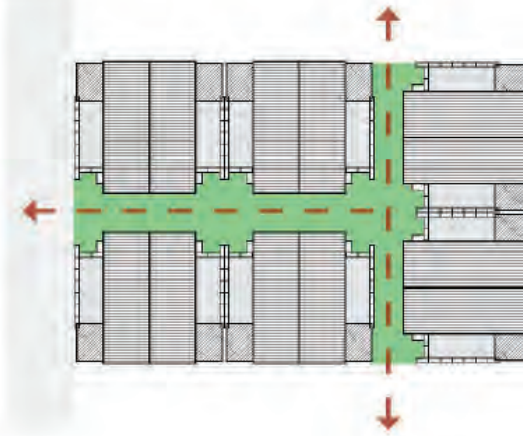
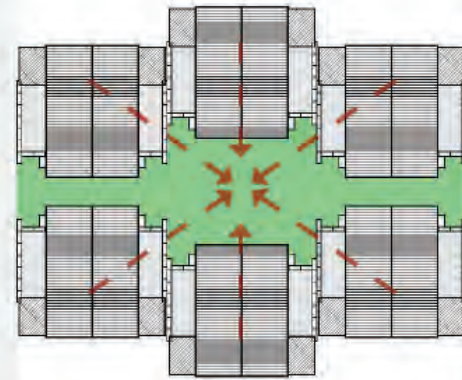


CLUSTER ITERATION: Courtyard Unit

CRITERIA INVESTIGATED : #3



Home 1



Basic Street Arrangement

Positive

- Linear and easy to arrange
- Saves space on site

Not so Positive

- Lacks adequate open space for playing/gathering
- Monotonous
- No Hierarchy
- Thorough way (Less defensible)

Basic Street Arrangement with common open space

Positive

- Linear and easy to arrange
- Saves space on site
- Central open space

Not so Positive

- Thorough way (Less defensible)
- May require more space to arrange on site

T-Type Street Arrangement

Positive

- Linear and easy to arrange
- Saves space on site
- Dead end (Less traffic, more defensible)

Not so Positive

- Lacks adequate open space for playing/gathering
- Monotonous
- No Hierarchy

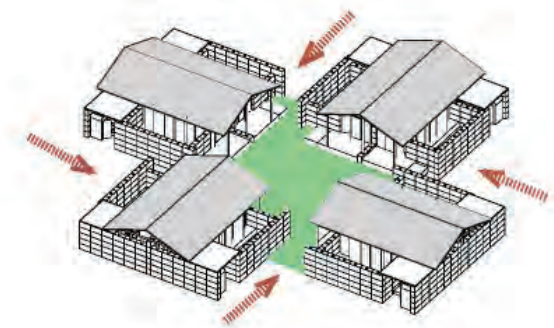
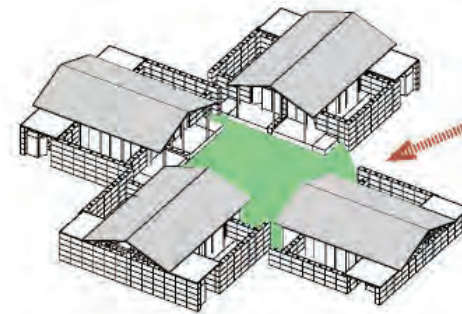
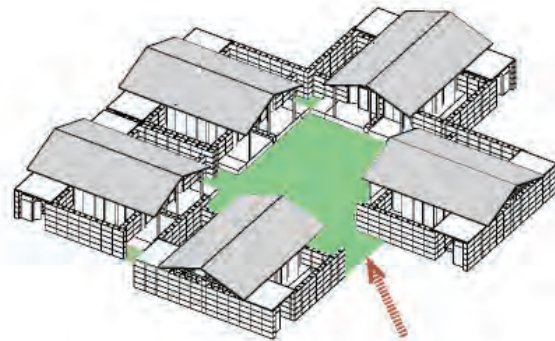
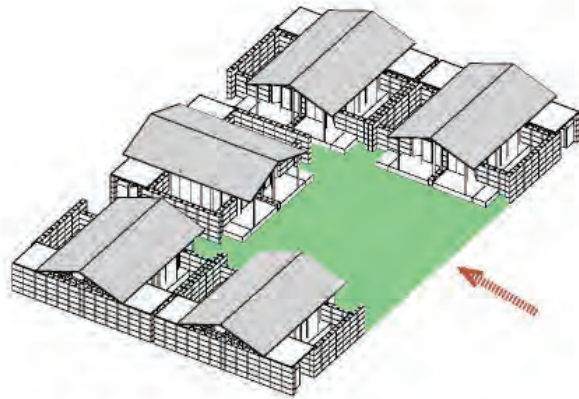
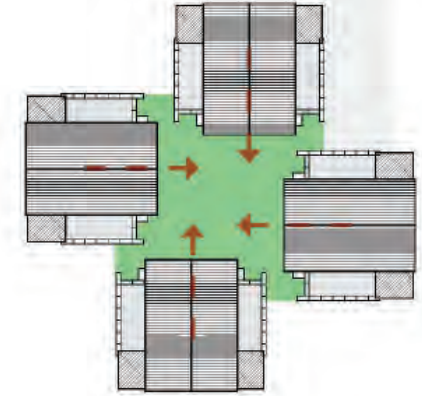
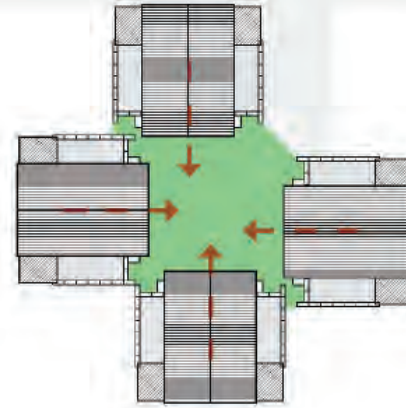
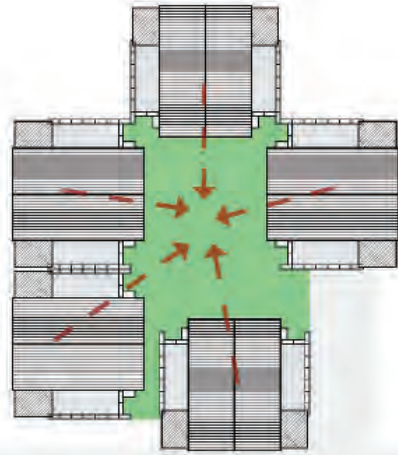
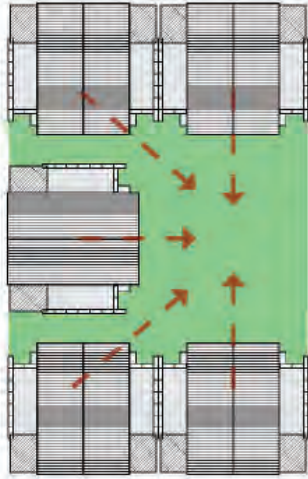
T-Type Arrangement with common open space

Positive

- Linear and easy to arrange
- Saves space on site
- Central open space
- Dead end (Less traffic, more defensible)

Not so Positive

- Thorough way (Less defensible)
- May require more space to arrange on site



C - Shape Cluster Arrangement

Positive

- Easy to arrange
- Central open space
- Dead end (less traffic, more defensible)

Not so Positive

- Not enough enclosure for the open space
- Requires more space to arrange on site

Courtyard Cluster Arrangement

Positive

- Central open space
- Enclosed, single entry (defensible)
- Good Hierarchy
- Clear entry/exit point

Not so Positive

- Requires more space to arrange on site

Courtyard Cluster Arrangement - 2

Positive

- Central open space
- Enclosed, single entry (defensible)
- Good Hierarchy
- Single entry point

Not so Positive

- Requires more space to arrange on site

Courtyard Cluster Arrangement - 3

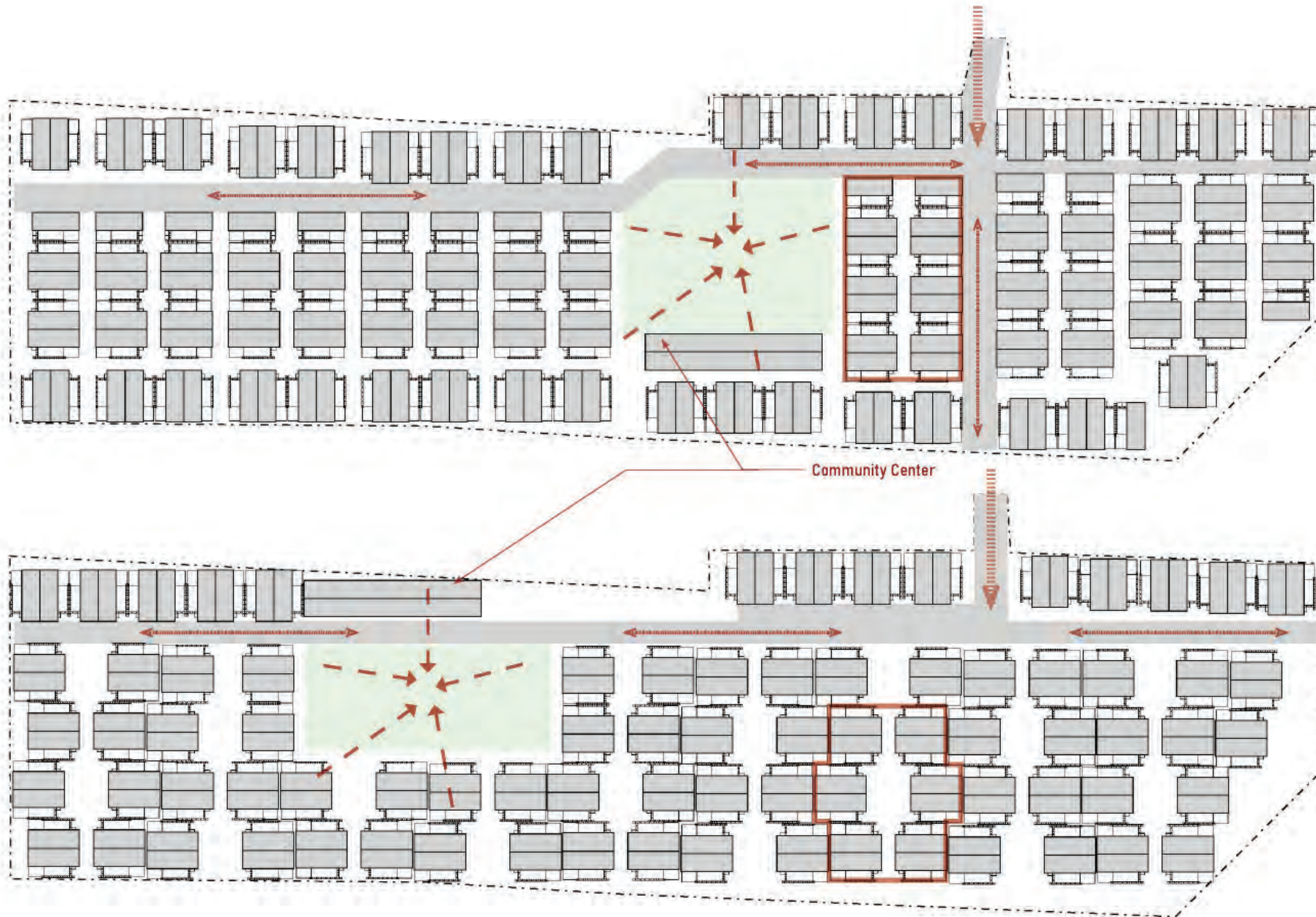
Positive

- Central open space
- Enclosed (defensible)
- Good Hierarchy

Not so Positive

- Requires more space to arrange on site
- Multiple-entry points

SITE ITERATION: Courtyard Unit



Street type Arrangement

Positive

- Linear and easy to arrange
- Saves space on site

Not so Positive

- Lacks adequate open space for playing/gathering
- Monotonous
- No Hierarchy
- Thorough way (Less defensible)

Cluster Arrangement - 1

Positive

- Linear and easy to arrange
- Saves space on site
- Central open space

Not so Positive

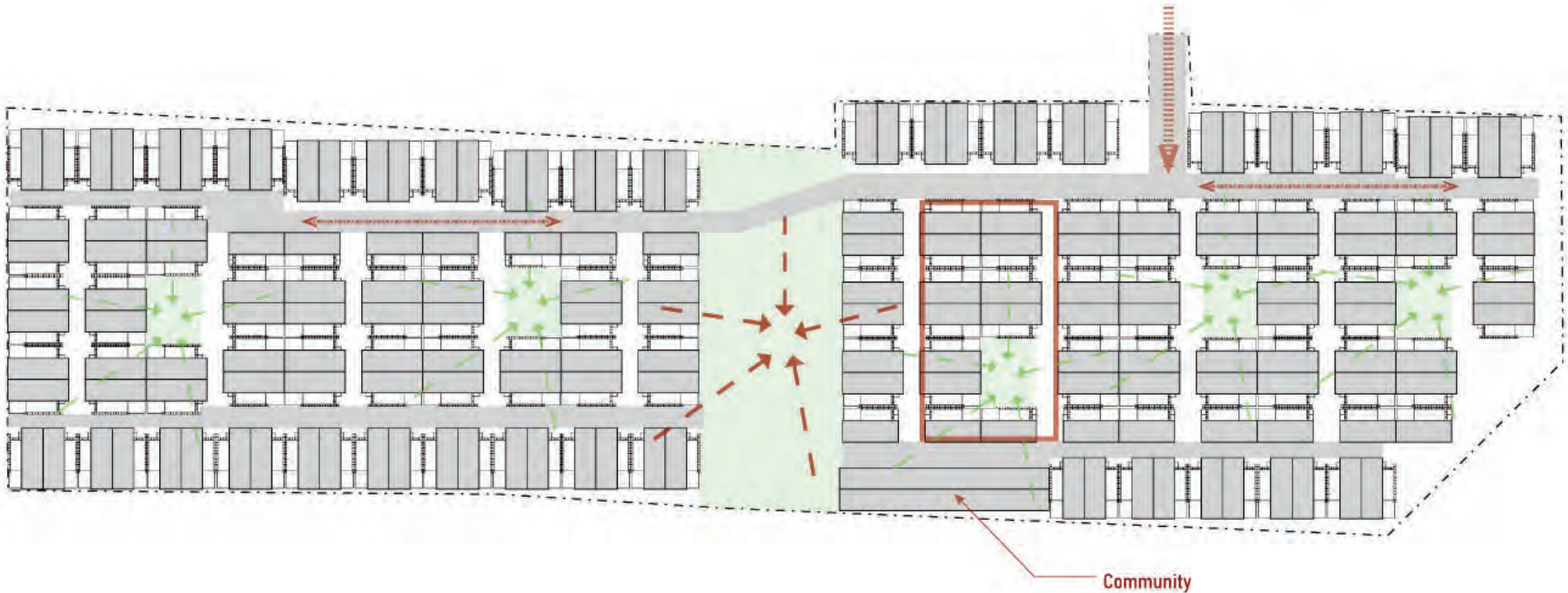
- Thorough way (Less defensible)
- May require more space to arrange on site

SITE ITERATION: Courtyard Unit



Cluster Arrangement - 2

- Positive**
- Easy to arrange
 - Central open space
 - Dead end (less traffic, more defensible)
- Not so Positive**
- Requires more space to arrange on site



Cluster Arrangement - 3

- Positive**
- Easy to arrange
 - Central open space
- Not so Positive**
- Not enough enclosure for the open space
 - Requires more space to arrange on site

12. MADIOGRAPHY

Slide No 4-5	Questions/Objectives/Definitions/Criteria
1	BWI - Building & Wood Workers' International Unions Urge Indian President to Reject Anti-Labour Policies " Accessed April 9, 2022. https://www.bwint.org/cms/news-72/unions-urge-indian-president-to-reject-anti-labour-policies-1851
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