

---

L O W C O S T

H O U S E

D E S I G N S

---

TEMAIKU • SOUTH TARAWA • KIRIBATI

---

Samuel Franklin • Joshua Haddad • Hock Chuan Koe • Paulina Patela • Lauren Wheaton

---



**msd**  
Melbourne  
School of Design

# PROJECT BRIEF

## STATEMENT OF INTENT:

To develop two concept house plans for the proposed greenfield development at Temaiku. The houses must be **affordable, comfortable, adaptable** and **flexible**. The designs will incorporate a hybrid of traditional and modern materials and skills with a focus on *incremental building*. The initial stage will accommodate at least four people with future expansion to accommodate up to eight. The initial stage will cost approximately \$5000 with future increments of up to \$2000, while all stages will encompass flexible options for varying budgets.

## FUNCTIONAL BRIEF:

### INDOOR

- Primary multi-purpose living space
- Secondary smaller spaces for additional private sleeping
- Flexible partitions and/or room dividers
- Indoor cooking area

### OUTDOOR

- Covered outdoor living space
- Covered outdoor cooking area
- Productive garden and landscape scheme
- Car space allocation either on the street or on site
- Wet Block (Donor Funded)
- Waste Management (recycling and compost)

*For the purpose of this project the following assumptions extracted from the Temeiku DLUP and from discussions with government organisations during our fieldwork in Kiribati, have formed the design platform for this project:*

- Every plot will have a street frontage
- Every plot will be serviced with electricity, sewerage and piped water
- Every plot will have a donor funded Wet Block including:
  - Raised Concrete slab
  - Local concrete block shower and WC enclosure with door
  - Support posts, roof and rainwater catchment and storage tank
  - Header tank, hand pump, stainless steel sink, bench, tap and drain
  - WC and septic tank discharging to a combined sewer drain
  - Shower and shower tap
- Plot setbacks of:
  - 2.5m side yard on one side
  - 1.5m side yard on other side (easement)
  - 2.5m rear yard
  - 5m from road frontage
- Site Coverage maximum 50%
- Maximum Height 7m
- Allowable uses:
  - Dwelling House (1 per site)
  - Mini store within front yard
  - Home occupation
  - Church or community purposes
- The current natural ground level of the subdivision will be raised 1500mm with Lagoon dredge
- Adhere to the National Building Code of Kiribati - currently not enforced
- It is assumed that pigs will be kept in proposed central agricultural plots and not on individual residential plots to adhere with section DGI.3 Poultry and other Domestic Animal Houses from the National Building Code of Kiribati

## ISSUES WE ARE ADDRESSING THROUGH DESIGN

*The following list forms the underlying design principles of which the final outcomes aim to address through design (discussed in further detail for each design in 'Design Outcomes'). It must be noted this is by no means an exhaustive list of issues relating to housing but a selection which we have identified as key issues to address in this project.*

### SOCIAL

- Safety, privacy and security
- Household Conflicts
- Neighbourhood connections

### ECONOMIC

- Affordability
- Potential for production of new elements or skills
- Productive gardens
- Affordance of small enterprise i.e. making handicrafts, selling produce, running a small home business

### CLIMATIC

- Passive design for tropical climate including ventilation, shading and cooling systems
- Designing for extreme weather events due to climate change including excessive rain and extended periods of drought

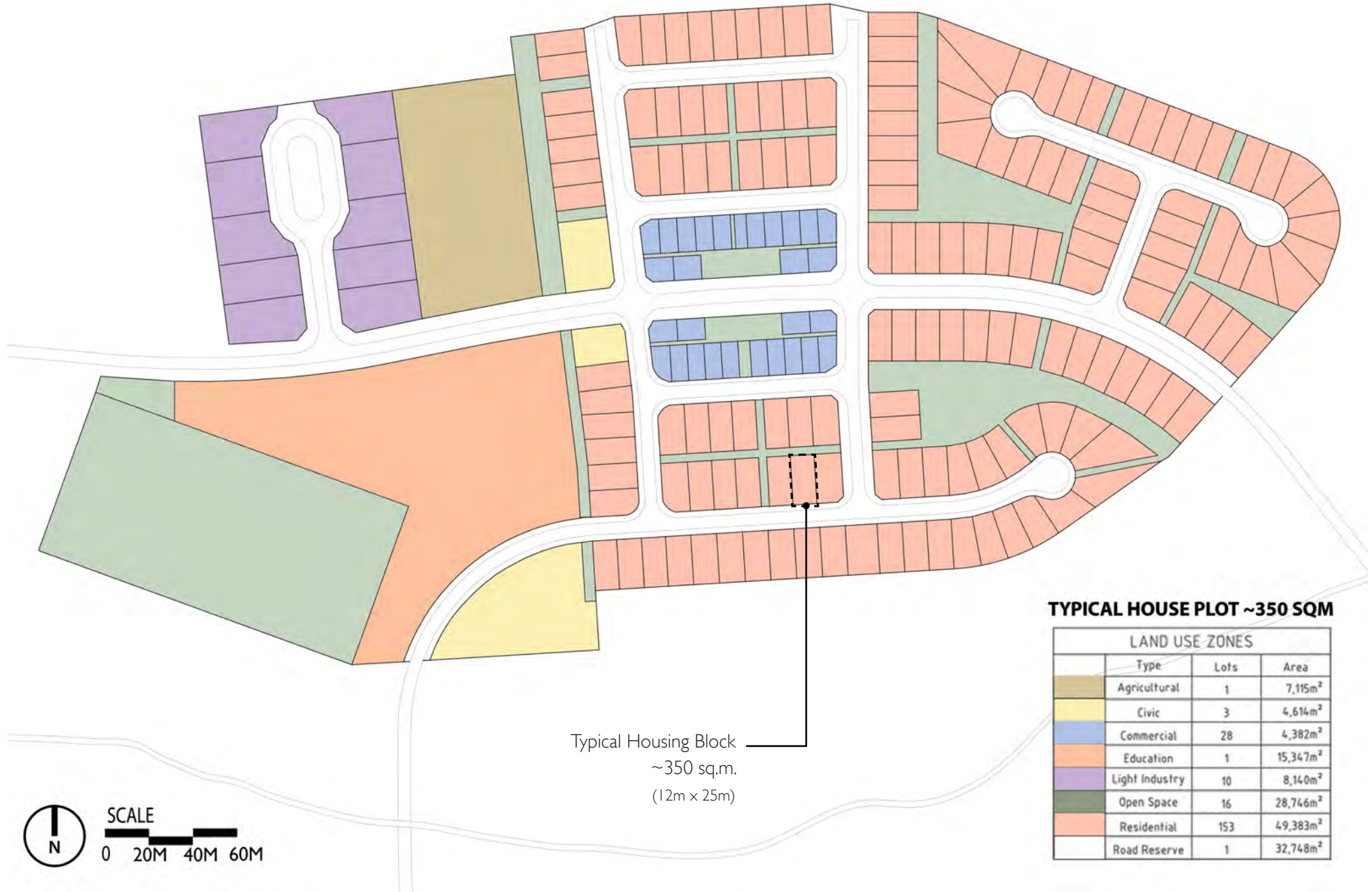
### HEALTH AND SANITATION

- The donor funded Wet Block on each plot addresses sanitation issues for the purpose of this project
- Waste management storage and disposal areas for organic, inorganic and recyclable materials
- Adequate ventilation for prevention of airborne disease

# SITE CONTEXT

# TEMAIKU | CONTEXT PLAN







# TEMAIKU | EXISTING SITE PHOTOS





EXISTING CONDITIONS

# HOUSING | ISSUES & CONCERNS



# BUILDING TYPES

ELEVATED HOUSING (FEMA)



GOVERNMENT HOUSING



MANEABA



STREET MARKET KIOSKS



BETIO SETTLEMENT HOUSING



BETIO SETTLEMENT COOKING HOUSE



SETTLEMENT HOUSING



KIA KIA



SETTLEMENT HOUSING



SETTLEMENT HOUSING

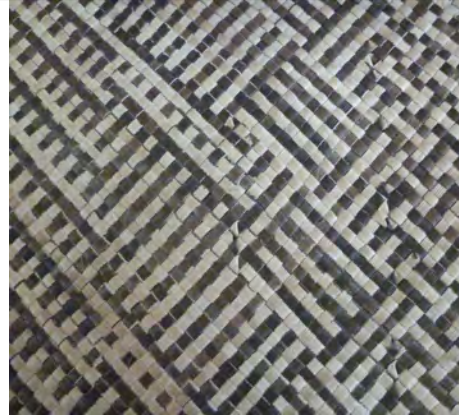


ELEVATED HOUSING (North Tarawa)



# COMMON MATERIALS

WOVEN FIBRES (coconut or pandanus)



COCONUT FENCING



PANDANUS MATS



IMPORTED TIMBER



LOCAL TIMBER (coconut or pandanus)



COCONUT PLANKS



PANDANUS ROOFING & PANELS



STEEL MESH



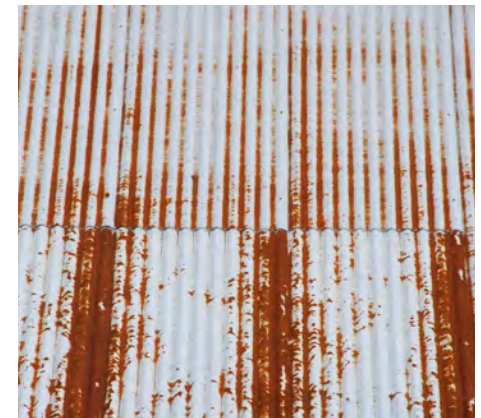
CONCRETE (poured in-situ)



CONCRETE BLOCKS



CORRUGATED IRON



# HOUSING APPRAISAL

# HOUSING APPRAISAL | MATRIX OF CONDITIONS

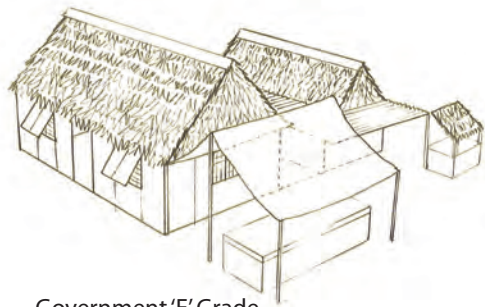
## Existing Conditions

## Desired Conditions

PHOTO	TYPE	LOCATION	OCEAN PLAN LAGOON	SECTION	ROOM FUNCTIONS	MATERIALS	STORIES	PEOPLE	VEGETABLES	PIGS	ROOF TYPE	FLOOR LEVEL	COMMENTS
		Betio Village			1. Living/Sleeping 2. Cooking/Eating 3. Eat/Sleep	Floor: Concrete Slab Roof: Corrugated Iron Walls: Timber Sheet / Metal Sheet Windows: Large Mesh	1	Adults: 4 Children: 4	Cabbage	1	Corrugated Iron	Floor Slab	Private Rooms
		Betio Village Government 'E' Grade			1. Sleeping/Living 2. Cooking 3. Living/Eating 4. Sleeping 5. Toilet 6. Washing Up	Floor: Concrete Slab Roof: Pandanus Walls: Hardboard / Concrete Bricks Windows: Large Mesh	1	Adults: 9 Children: 5	Cassava Sweet Potato	2	Pandanus	Floor Slab	Private Rooms
		Betio Village			1. Living/Sleeping/Eating 2. Cooking 3. Sleeping 4. Store	Floor: Concrete Slab Roof: Corrugated Iron Walls: Hardboard / Timber Sheet Windows: Large Mesh	1 + elevated sleeping room	Adults: 4 Children: 4	Banana Papaya	2	Corrugated Iron	Floor Slab	Private Rooms
		Betio Village			1. Living/Sleeping 2. Cooking/Eating 3. Sleeping 4. Sleeping 5. Outdoor Kitchen	Floor: Concrete Slab Roof: Corrugated Iron Walls: Hardboard Windows: Large Mesh	1	Adults: 8 Children: 4	Cassava	1	Corrugated Iron	Elevated	Private Rooms
		Betio Village			1. Living/Eating/Sleeping 2. Cooking 3. Sleeping/Store 4. Sleeping	Floor: Dirt Floor Roof: Corrugated Iron Walls: Timber Sheet/ Metal Sheet Windows: Large Mesh	half double height + half split level	Adults: 7 Children: 2	Papaya	1	Corrugated Iron	Floor Slab	Private Rooms
		Eita Village			1. Living/Sleeping/Eating 2. Cooking 3. Sleeping 4. Eating/Sleeping 5. Store	Floor: Concrete Slab Roof: Tin / Pandanus Walls: Coconut Timber Windows: Coconut Timber	1	Adults: 7 Children: 1	Cabbage Papaya Banana Pumpkin	4	Corrugated Iron	Elevated	Private Rooms
		Banraeaba East			1. Living/Sleeping 2. Cooking/Eating 3. Outdoor Cooking	Floor: Dirt Floor Roof: Corrugated Iron Walls: Metal Sheet Windows: Open	1	Adults: 2 Children: 4	none	2	Pandanus	Elevated	Private Rooms
		Betio Village			1. Cooking/Eating/Living 2. Living/Sleeping 3. Toilet & Wash	Floor: Dirt Floor Roof: Scrap Metal Walls: Scrap Metal, Sheet, Mesh, Plastic Tarp Windows: Open w/ Curtain	1	Adults: 7 Children: 1	Cabbage Pumpkin Papaya Banana Tomato	5	Pandanus	Elevated	Private Rooms
		Betio Village Government 'E' Grade			1. Living/Sleeping 2. Outdoor Living 3. Outdoor Cooking 4. Toilet	Floor: Concrete Slab Roof: Pandanus Walls: Concrete Block & Hardboard Windows: Shutters & Mesh	1	Adults: 6 Children: 4	none (to be installed)	2	Pandanus	Elevated	More Openings
		Eita Village			1. Living/Television 2. Bedroom/Sleeping 3. Change Room/Sleeping 4. Bathroom 5. Store 6. Cooking/Outdoor Living 7. Outdoor Living	Floor: Concrete Slab Roof: Corrugated Iron Walls: Concrete Block & Hardboard Windows: Large Mesh	1	Adults: 7 Children: 4	Cabbage Pumpkin Papaya Banana Tomato	0	Corrugated Iron	Floor Slab	Open Spaces
		Eita Village			1. Living/Eating 2. Sleeping/Changing 3. Outdoor Cooking	Floor: Dirt Floor Roof: Pandanus / Tin Walls: Pandanus/Coconut /Scrap Metal Windows: Open	1	Adults: 3 Children: 2	none	1	Pandanus	Elevated	Sourcing Traditional Materials

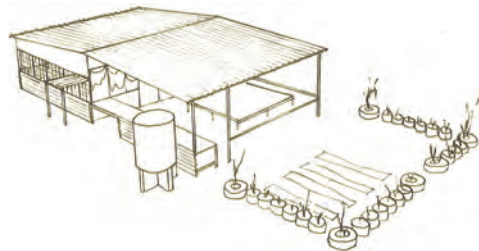


## Existing Conditions

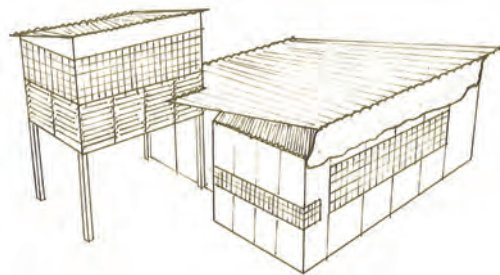


Government 'E' Grade

LOCATION	← OCEAN PLAN → LAGOON	SECTION	ROOM FUNCTIONS	MATERIALS	STORIES	PEOPLE	GARDEN	PIGS
Betio Village			1. Living/Sleeping 2. Outdoor Living 3. Outdoor Cooking 4. Toilet	Floor: Concrete Slab Roof: Pandanus Walls: Concrete Block & Hardboard Windows: Shutters & Mesh	1	Adults: 6 Children: 4	none (to be installed)	2



Betio Village			1. Cooking/Eating/Living 2. Living/Sleeping 3. Toilet & Wash	Floor: Dirt Floor Roof: Scrap Metal Walls: Scrap Metal, Sheet, Mesh, Plastic Tarp Windows: Open w/ Curtain	1	Adults: 7 Children: 1	Cabbage Pumpkin Papaya Banana Tomato	5
---------------	--	--	--	---	---	--------------------------	--	---



Betio Village			1. Living/Sleeping/Eating 2. Cooking 3. Sleeping 4. Store	Floor: Concrete Slab Roof: Corrugated Iron Walls: Hardboard / Timber Sheet Windows: Large Mesh	2	Adults: 4 Children: 4	Banana Papaya	2
---------------	--	--	--	---	---	--------------------------	------------------	---

## Desired Conditions

Cooler interior spaces  
Elevated floors  
Option for privacy

Adaptive spaces  
Productive gardens  
Space for car






































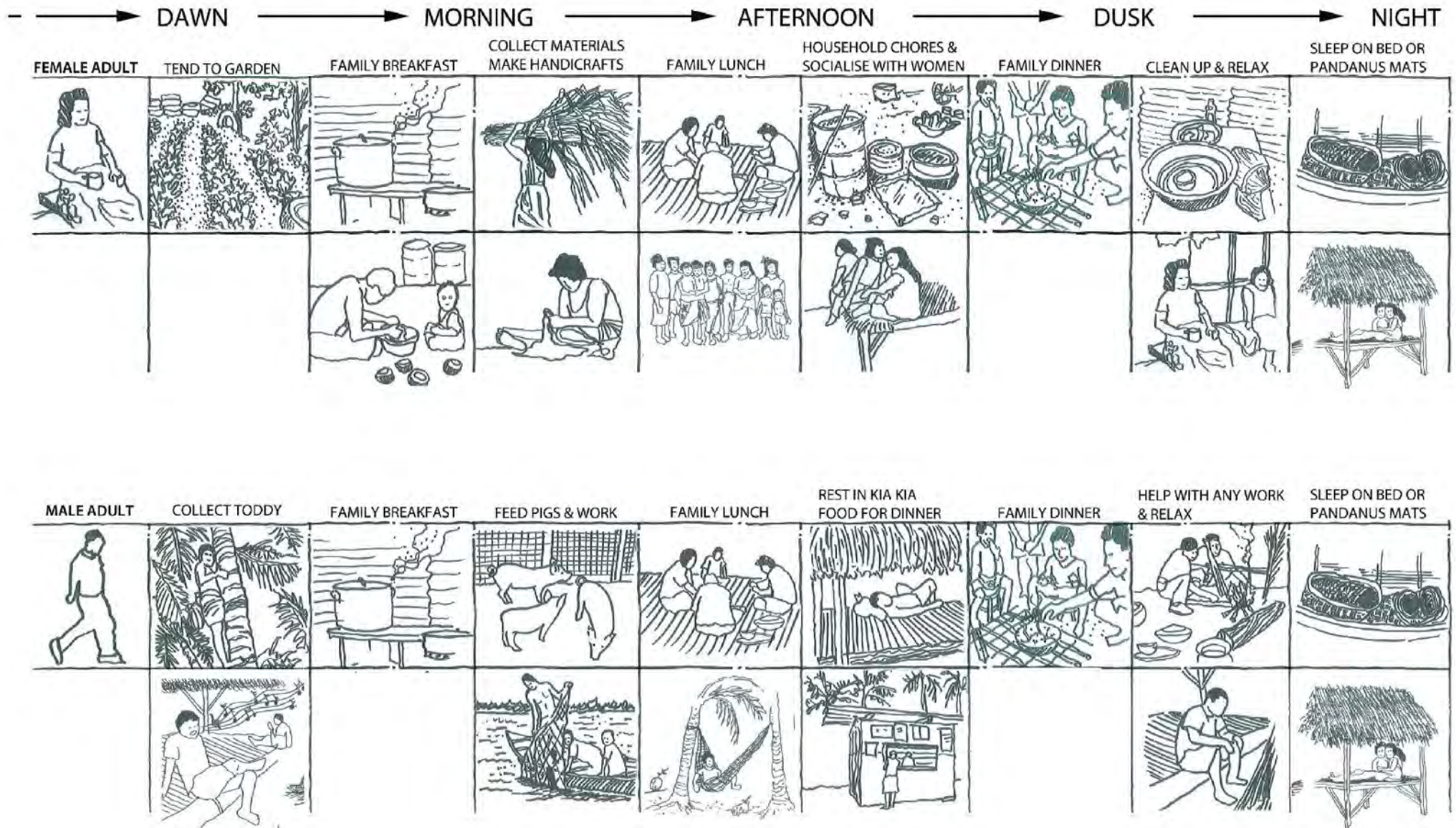




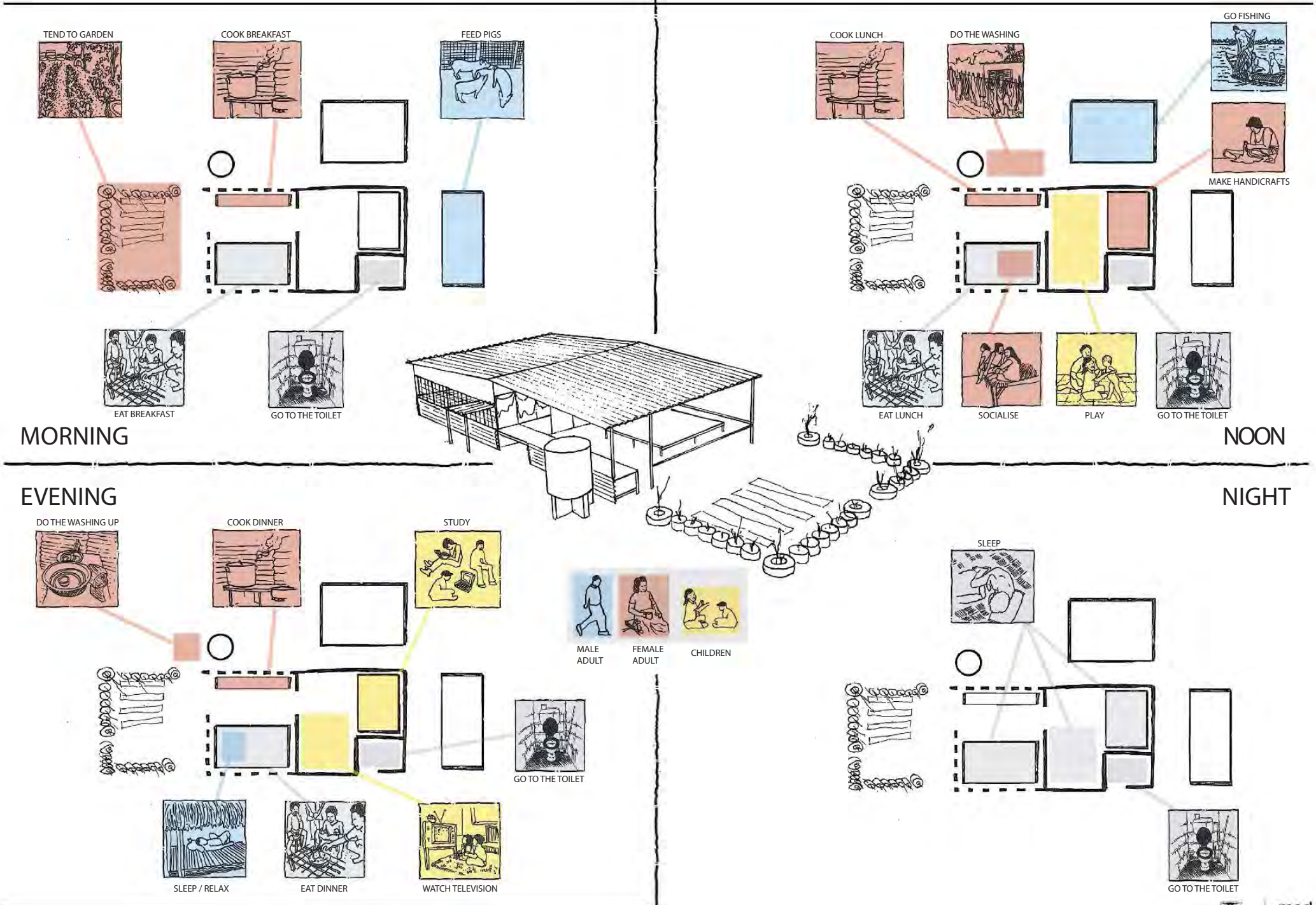
# DAILY NARRATIVES | Common Activities for a Kiribati Family Household

	→ DAWN	→ MORNING	→ AFTERNOON	→ DUSK	→ NIGHT			
<b>YOUNG BOY</b>	REMAIN SLEEPING	FAMILY BREAKFAST	WASH & HELP MOTHER	FAMILY LUNCH	PLAY WITH FRIENDS	FAMILY DINNER	WATCH TV OR PLAY	SLEEP ON BED OR PANDANUS MATS
								
								
<b>TEENAGE GIRL</b>	HOUSEHOLD CHORES	FAMILY BREAKFAST	GO TO SCHOOL	LUNCH WITH FRIENDS	HELP MOTHER WITH CHORES AFTER SCHOOL	FAMILY DINNER	SOCIALISE, DANCE, OR HOMEWORK	SLEEP ON BED OR PANDANUS MATS
								
								

# DAILY NARRATIVES | Common Activities for a Kiribati Family Household

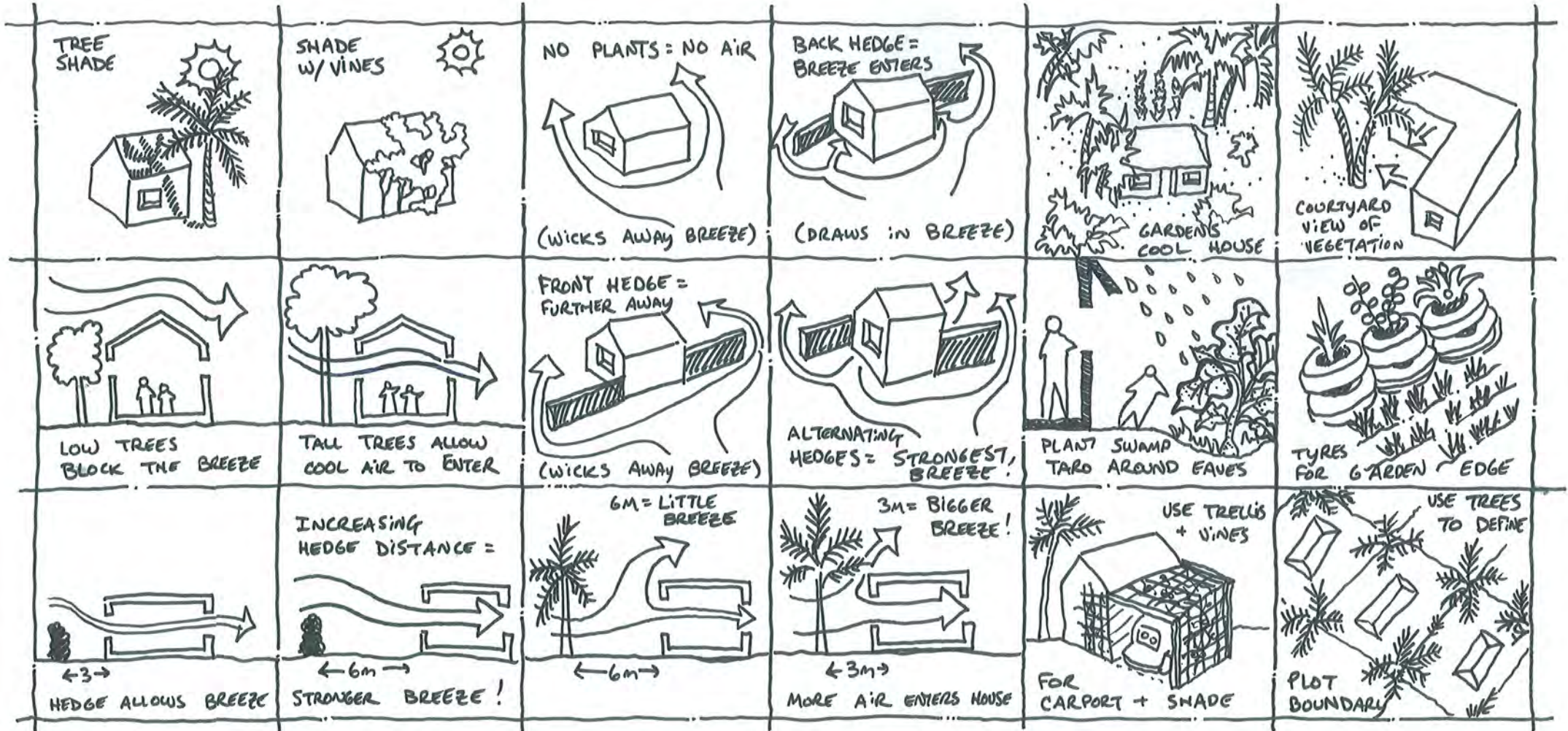


# NARRATIVES | Daily Timeline & Spatial Mapping of Activities for a Typical South Tarawa Household



# LANDSCAPE STRATEGIES

# LANDSCAPE STRATEGIES



(HEDGES PLANTED FURTHER FROM HOME)

(TREES PLANTED CLOSER TO HOME)

LETTUCE



CABBAGE



TOMATO



CUCUMBER



EGGPLANT



PEAS



PAW PAW



COCONUT



BREADFRUIT



BANANAS



# LANDSCAPE | TYRE GARDENS




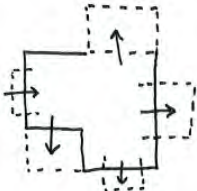
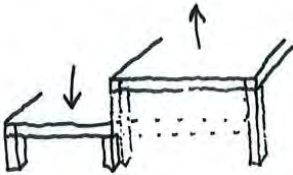
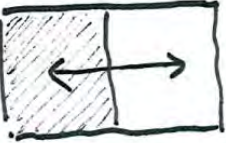





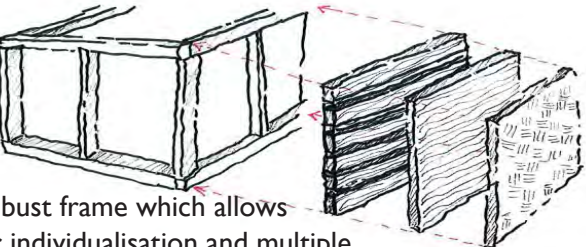
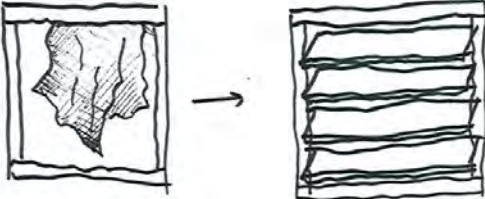


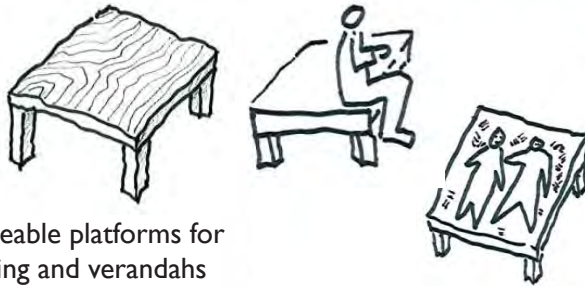
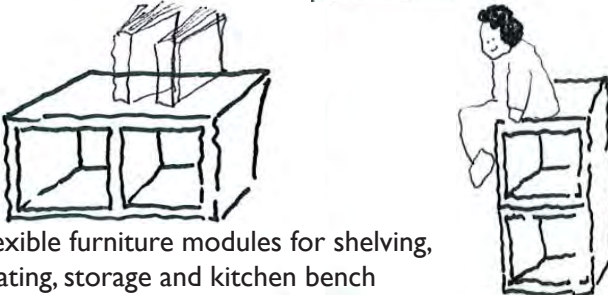
# LANDSCAPE | BOTTLE EDGING





# DESIGN STRATEGIES

# HOUSE PRINCIPLES

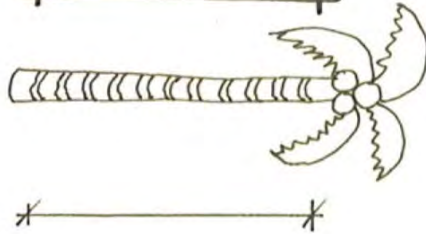
 <p>Large flexible living space</p>	 <p>Push and pull in plan to create niche spaces and thresholds</p>	 <p>Slight shifting of the ground plan</p>	 <p>Balance between indoor and outdoor covered living space</p>	 <p>Elevated sleeping pods, cooler and create space underneath</p>
 <p>Split roof - clerestory to vent heat from inside the house</p>	 <p>Drain roof to sides of property and in two directions to prevent gutter overflow</p>	 <p>Provide safe indoor cooking areas</p>	 <p>Provide both indoor and outdoor cooking spaces</p>	
 <p>Robust frame which allows for individualisation and multiple cladding options</p>	 <p>Replace temporary with permanent materials over time</p>		 <p>Permeable screens</p>	
 <p>Temporary lean to's until can afford to add permanent structures</p>	 <p>Moveable platforms for seating and verandahs</p>		 <p>Flexible furniture modules for shelving, seating, storage and kitchen bench</p>	

# DESIGN STRATEGIES

## Space Sizing

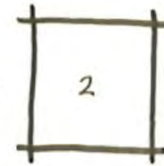
### Primary Space (1)

- multipurpose space able to accomodate many activities
- dimensions from imported & local timber sizes
- = less waste
- = affordability



### Sleeping Spaces (2)

- typical sleeping size space
- dimensions from kia kia, & easily transported

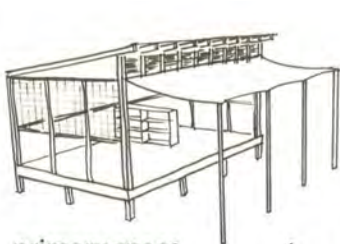


- = versatile
- = efficient

## Wind & Ventilation Diagrams



## Modules



primary space

+



sleeping loft



primary space

+



sleeping pod



cooking



multi-use



## Multi-use Components



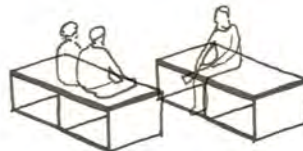
space divider



benchtop



sleeping platform



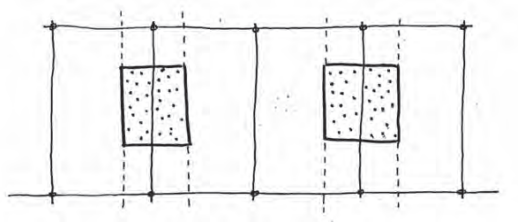
movable seating



activity platform



study platform



Shared spaces over set backs  
 - gathering spaces  
 - shared vegetable gardens

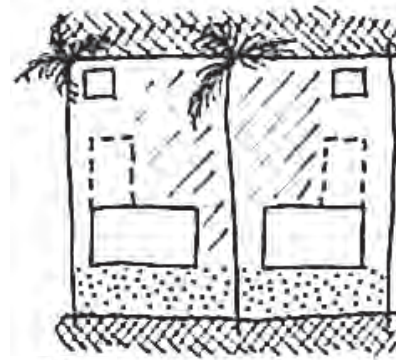


Possibility for neighbours to join communal gathering space



Eyes on the street  
 - visual connections between neighbours

Option 1

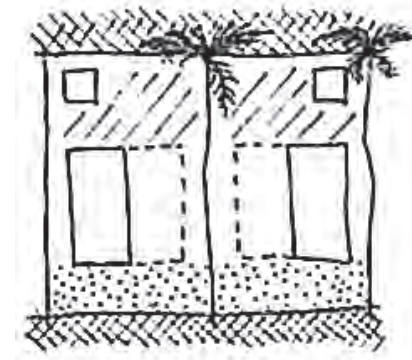


Public

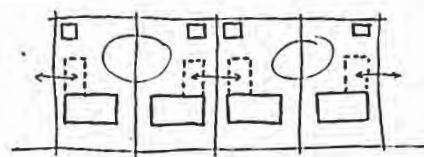
Semi Public

Private

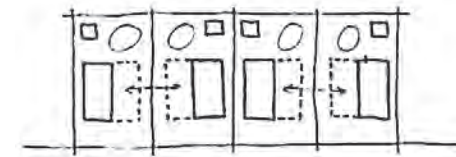
Option 2



Option 1



Option 2



Views through

Courtyard Space

# CLADDING OPTIONS

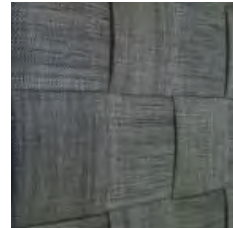
## Non Permeable Cladding



Coconut Timber



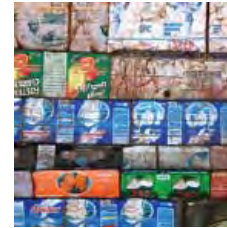
Coconut Weave



Banana Fibre



Fibre Cement



Tin Cans



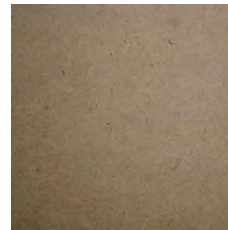
Coconut Veneer



Seagrass Weave



Abaca Fibre



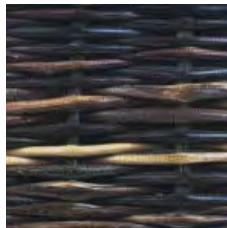
Masonite



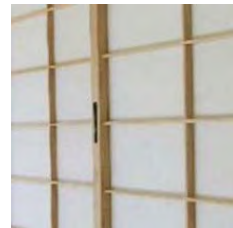
Rice Bag Weave



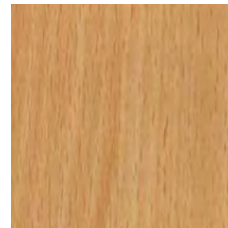
Coconut Shells



Nito Weave



Translucent Screen

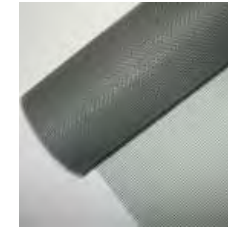


Plywood

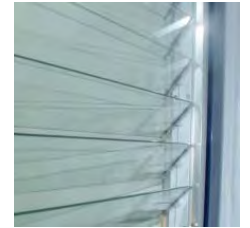


Metal Sheeting

## Permeable Cladding



Fly Screen



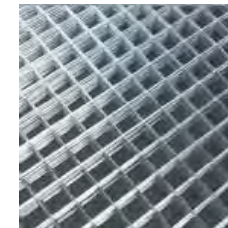
Glass Louvres



Chicken Wire



Timber Louvres



Security Mesh



Coconut Rope

# LOW COST HOUSE DESIGNS | OPTION ONE

YOUNG  
COUPLE

Dad  
TEBWANA

Baby  
TIOTAAKE

Mom  
MARETA

Son  
ERIA

Grandfather  
TANGAROA

Son  
ENERIE

Daughter  
ROOTI

Grandmother  
TUUTANA





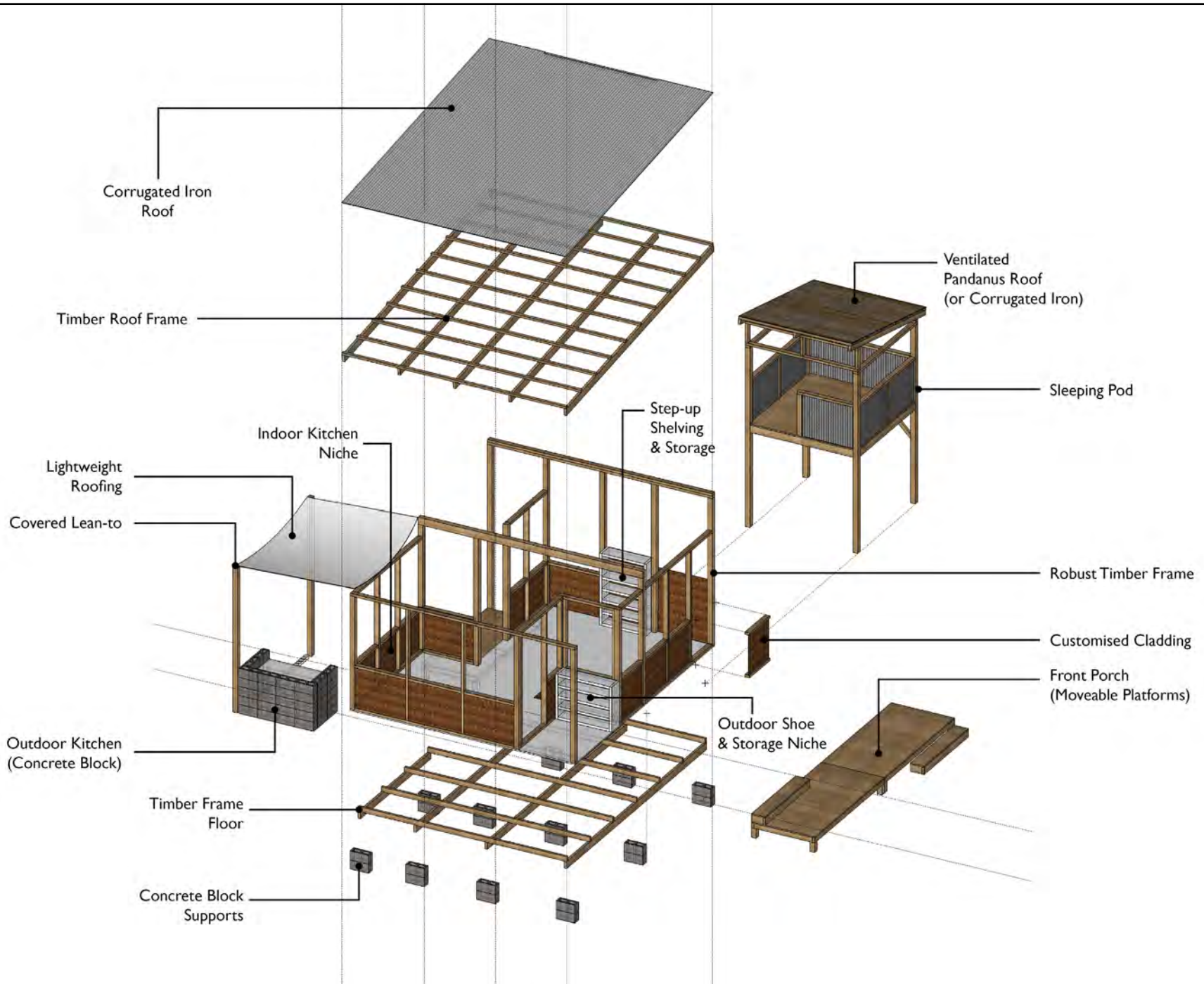
# OPTION ONE | FRONT PERSPECTIVE



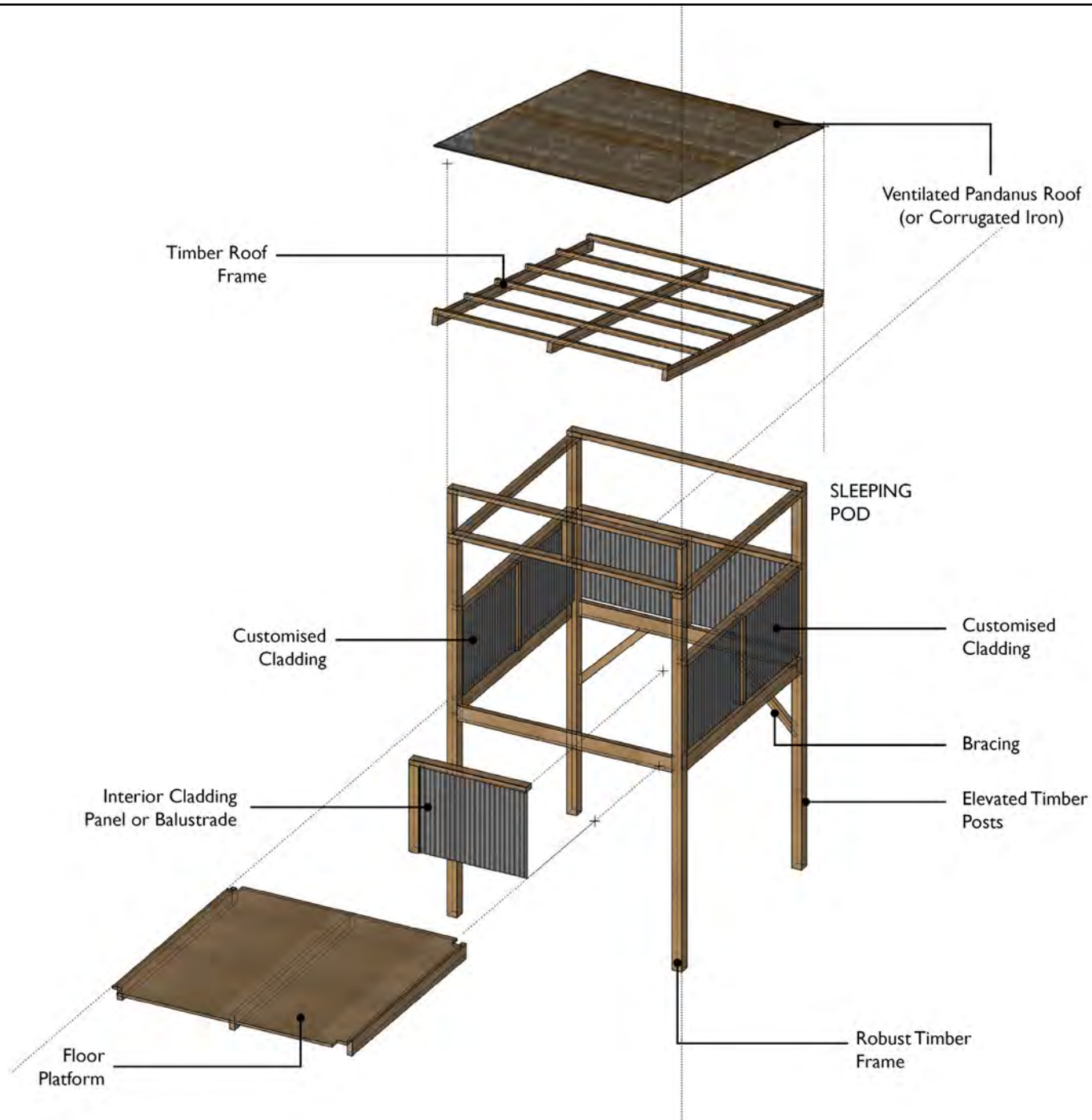
# OPTION ONE | REAR PERSPECTIVE



# OPTION ONE | EXPLODED ISOMETRIC – KIT OF PARTS



# OPTION ONE | EXPLODED ISOMETRIC – SLEEPING POD



# IDENTIFYING KEY SPACES & FUNCTIONS

## OPTION ONE - KEY SPACES

1	2	3	4	G
<b>MULTI-PURPOSE ROOM</b>	<b>OUTDOOR COVERED SPACES</b>	<b>OUTDOOR KITCHEN AREA</b>	<b>SLEEPING ALCOVE/SPACE</b>	<b>GARDEN SPACES</b>
RELAX	RELAX	COOK MEALS	RELAX	TEND TO GARDEN
EAT MEALS	EAT MEALS	EAT MEALS	STUDY	TIDY YARD
SOCIALISE	SOCIALISE	WASHING UP	PLAY	PLAY
SLEEP	SLEEP		COLLECT MATERIALS	COLLECT MATERIALS
MAKE HANDICRAFTS	MAKE HANDICRAFTS		COLLECT TODDY / COCONUTS	COLLECT TODDY / COCONUTS
STUDY	DO THE WASHING			
WATCH TV	TIDY AROUND HOUSE			
	SELL PRODUCE			
	WORKING			

## OPTION ONE - STAGING PLANS STAGE 1



## STAGE 2



## STAGE 3



## STAGE 4



# OPTION ONE | PLAN STAGE I



KEY

- 1 - MULTI-PURPOSE ROOM
- 2 - OUTDOOR COVERED SPACES
- 3 - OUTDOOR KITCHEN AREA
- 4 - SLEEPING ALCOVE / POD
- G - GARDEN SPACES



# OPTION ONE | PLAN STAGE 2



KEY

- 1 - MULTI-PURPOSE ROOM
- 2 - OUTDOOR COVERED SPACES
- 3 - OUTDOOR KITCHEN AREA
- 4 - SLEEPING ALCOVE / POD
- G - GARDEN SPACES



# OPTION ONE | PLAN STAGE 3

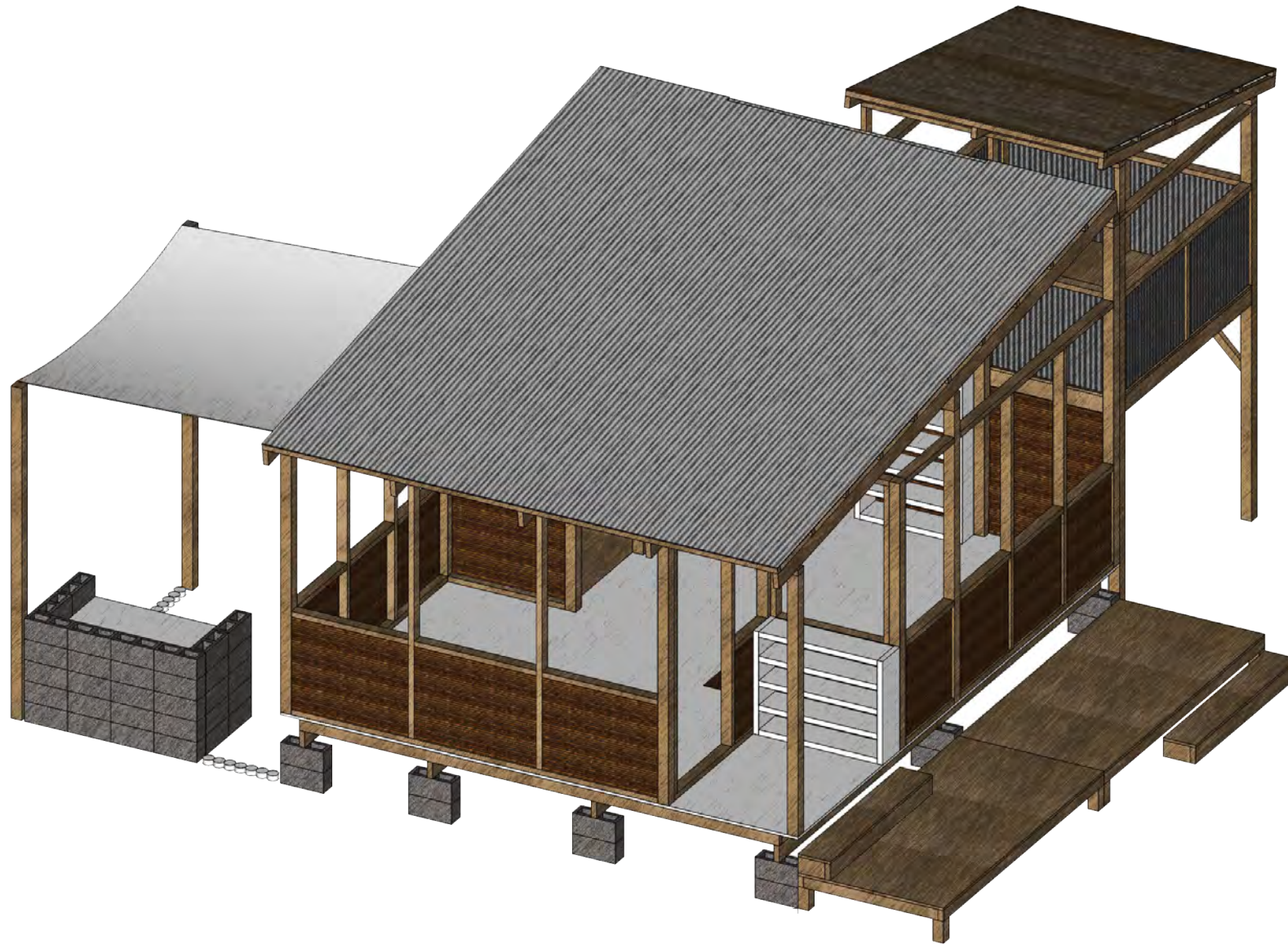


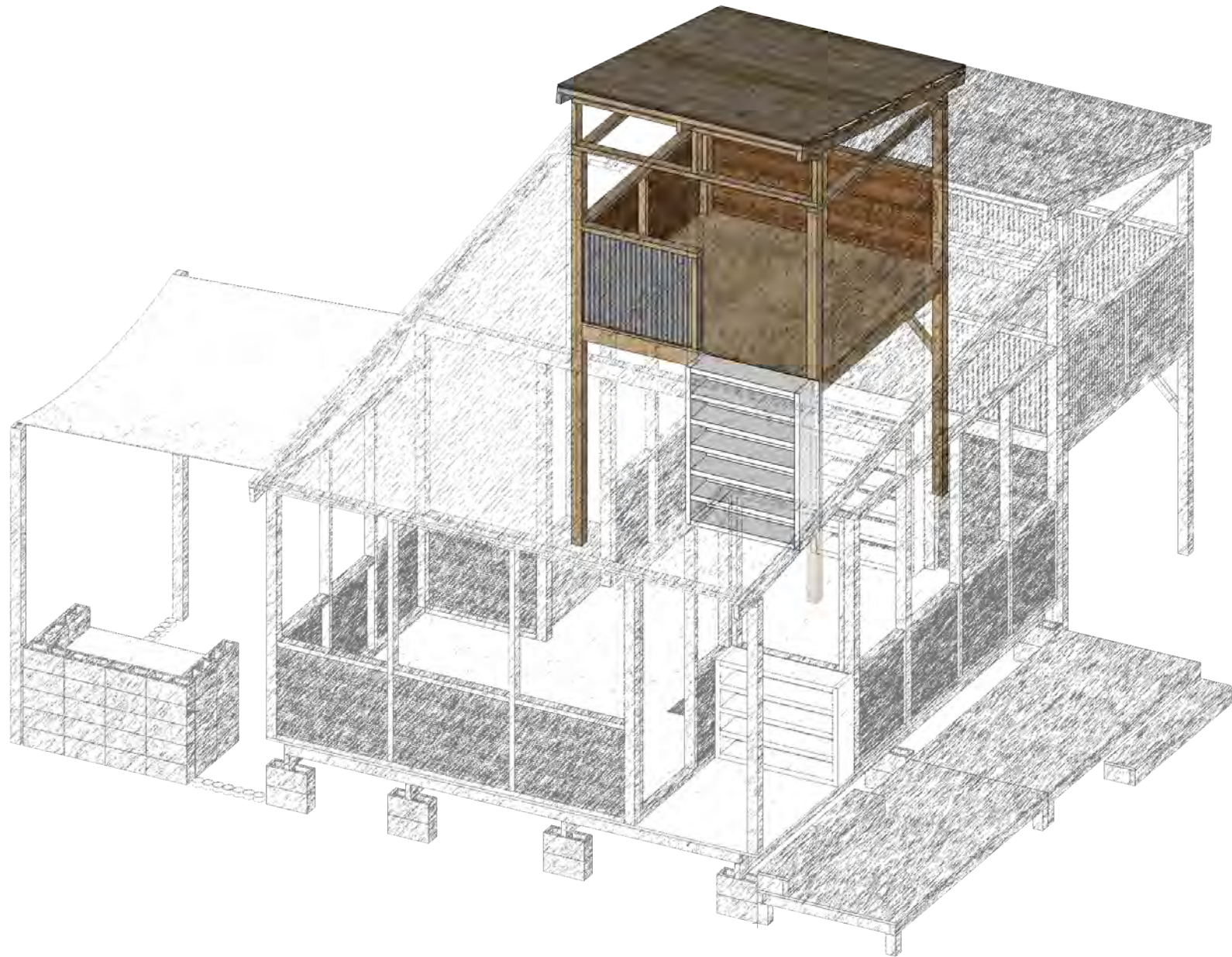


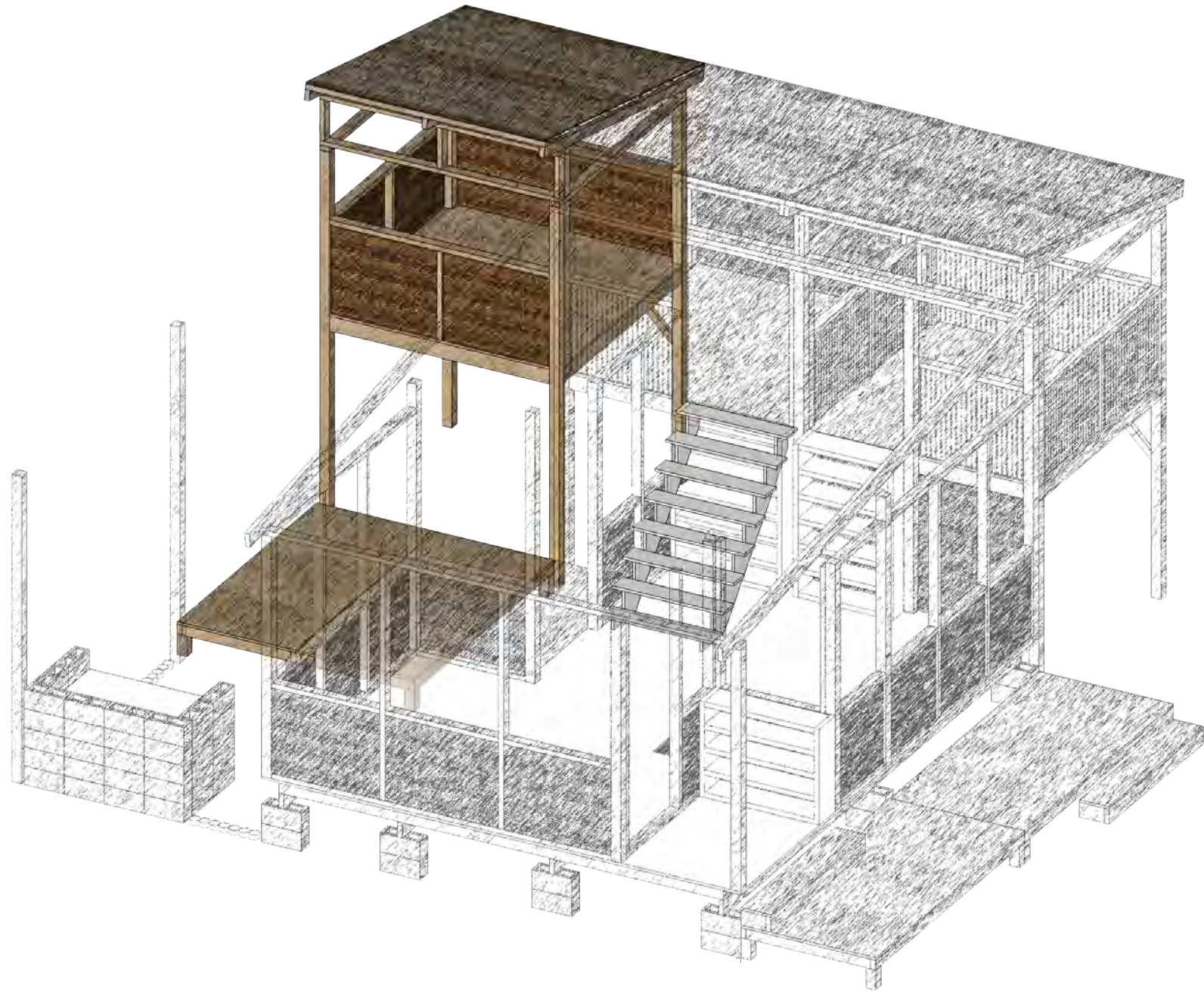
# OPTION ONE | PLAN STAGE 4

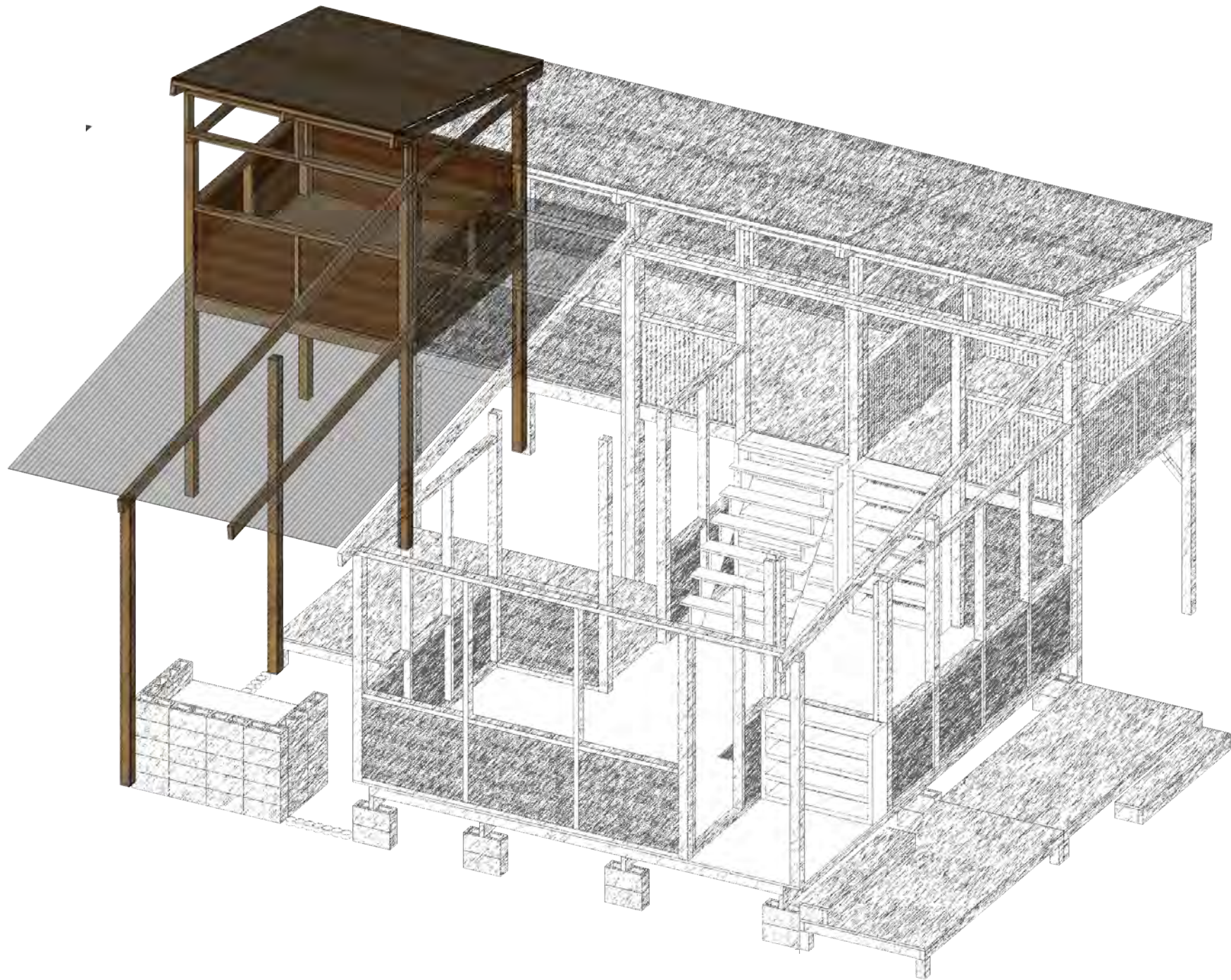


# OPTION ONE | STAGE I - BARE BUILDING

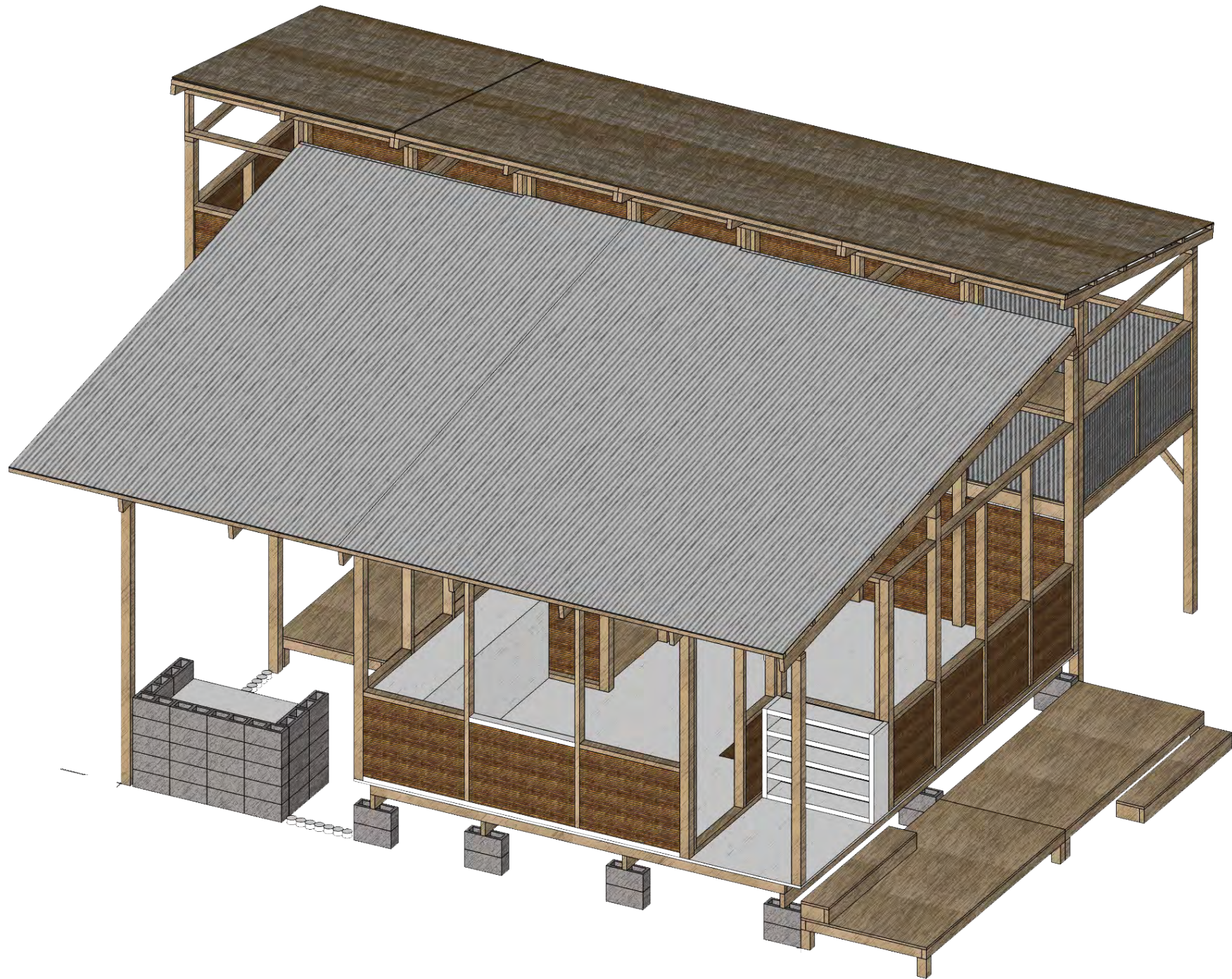




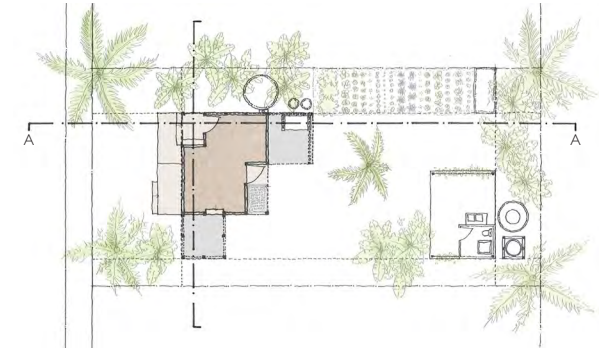




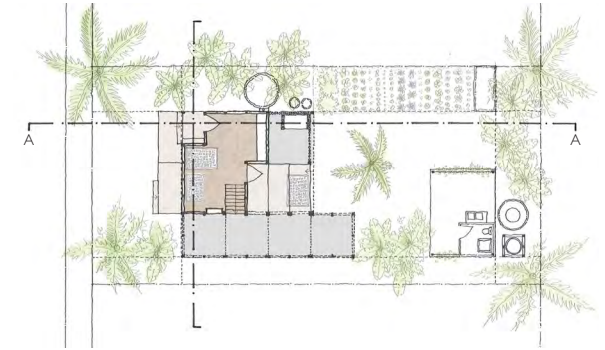
# OPTION ONE | STAGE 4 - COMPLETED BUILDING



# OPTION ONE | LONG SECTION – STAGE I



# OPTION ONE | LONG SECTION – STAGE 4

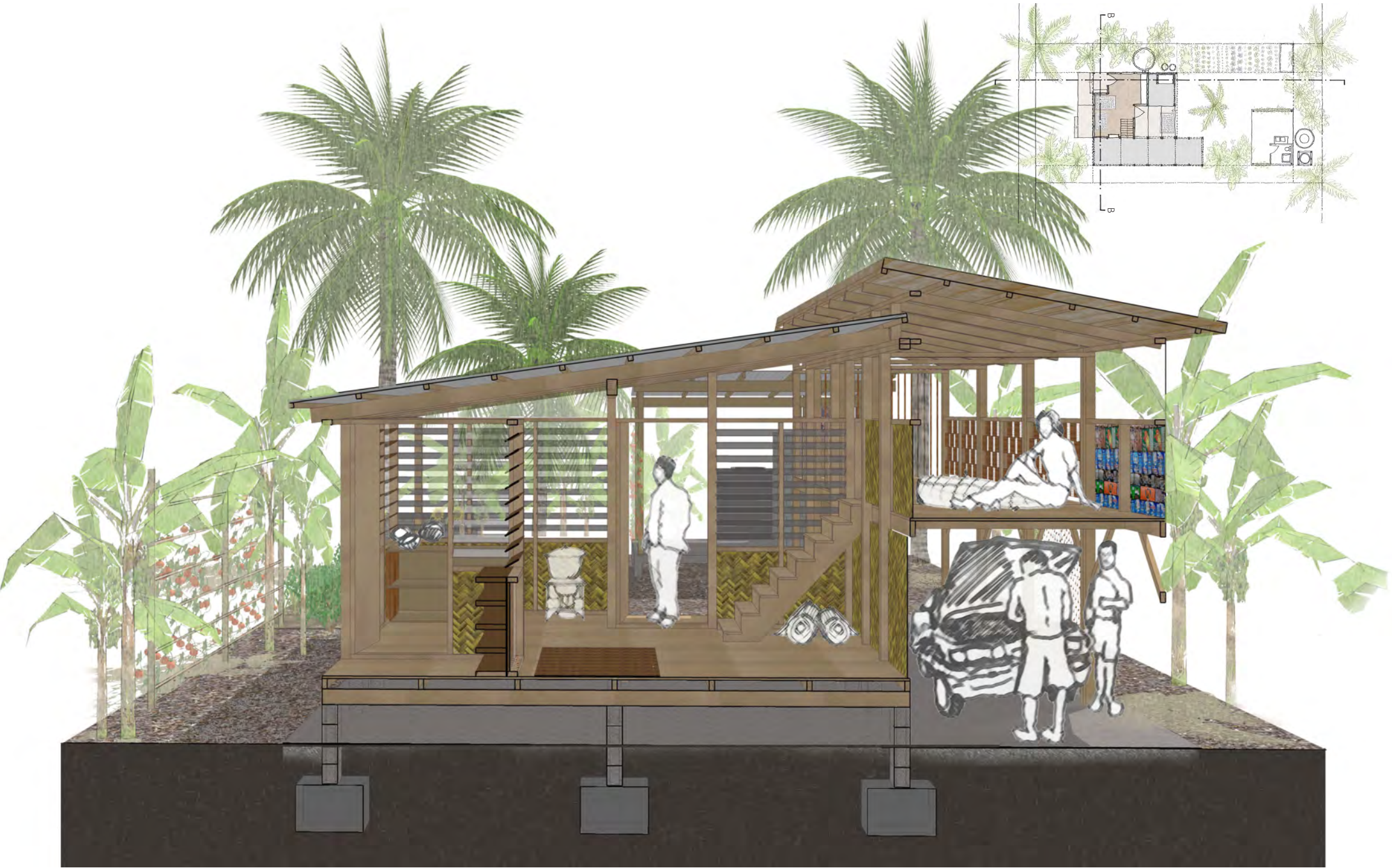




# OPTION ONE | CROSS SECTION – STAGE I



# OPTION ONE | CROSS SECTION – STAGE 4



# OPTION ONE | ACTIVITY STREETScape

---



# LOW COST HOUSE DESIGNS | OPTION TWO

ELDER  
COUPLE

Great Grandmother  
KATARINA

Granddaughter  
ITABERA

Son-in-Law  
BEEN

Grandson  
BAURO

Great Granddaughter  
OERAANG



Great Grandson  
MIIKA

Great Grandfather  
BWEBWENTEKAAI

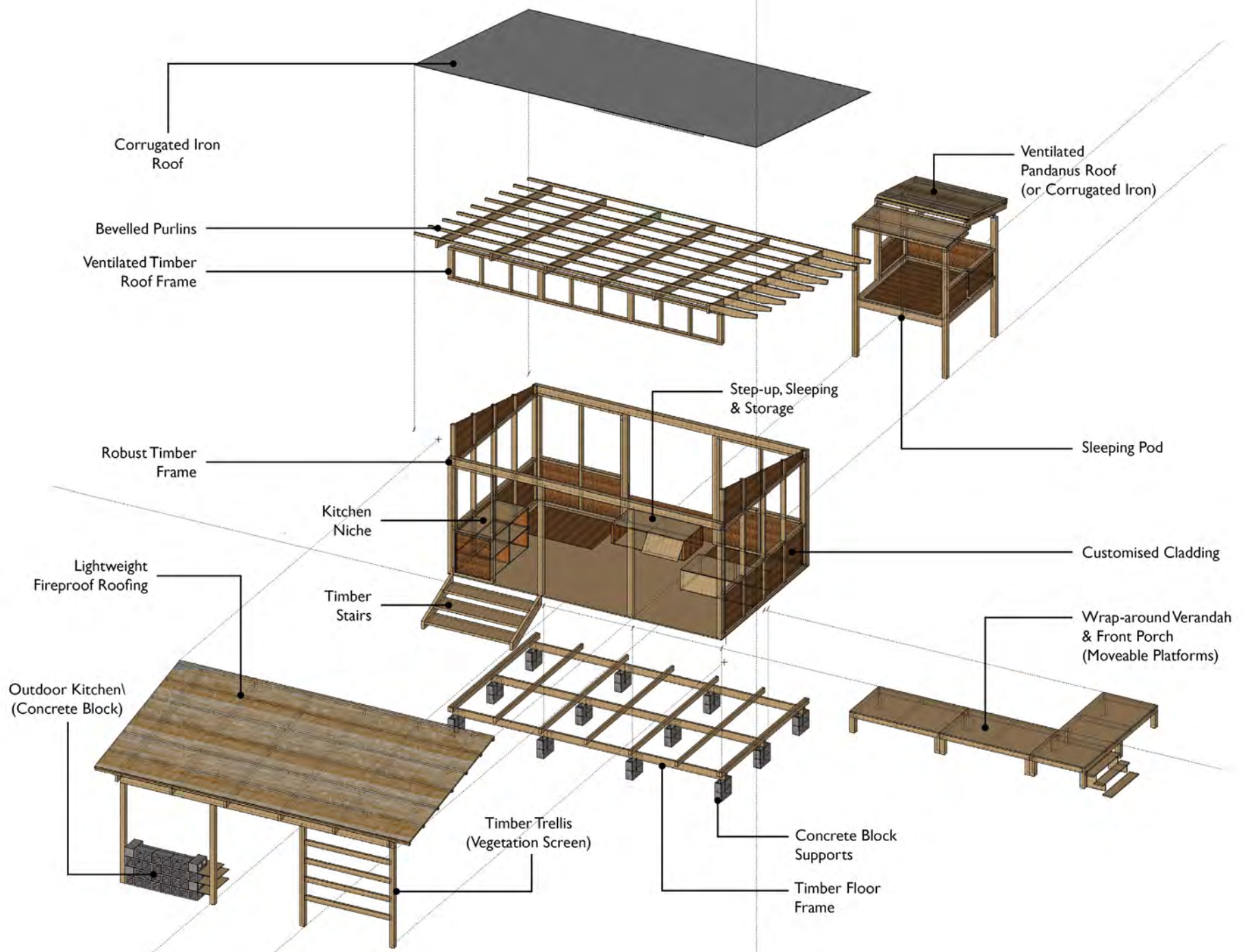
# OPTION TWO | FRONT PERSPECTIVE



# OPTION TWO | REAR PERSPECTIVE

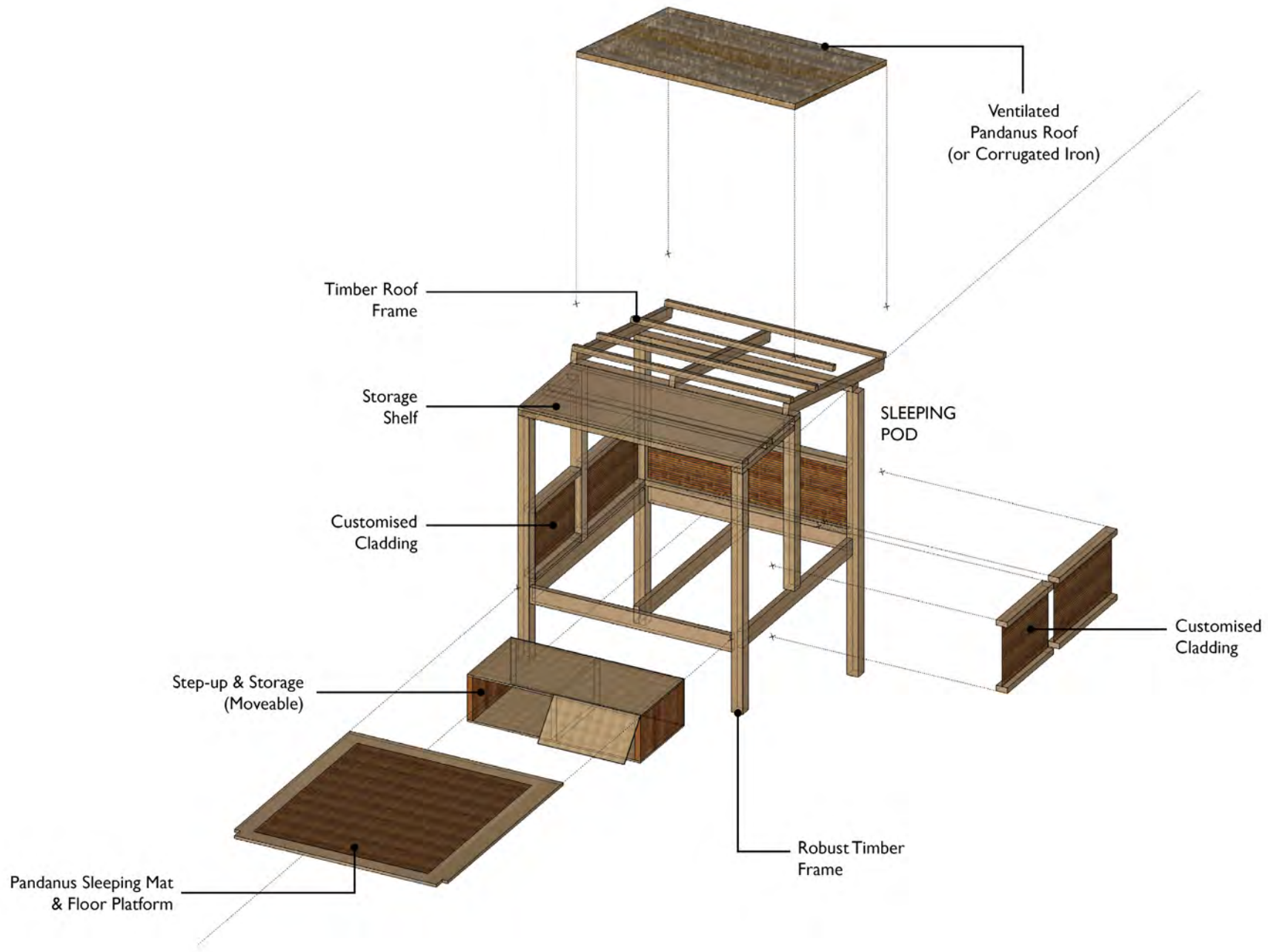


# OPTION TWO | EXPLODED ISOMETRIC – KIT OF PARTS





# OPTION TWO | EXPLODED ISOMETRIC – SLEEPING POD



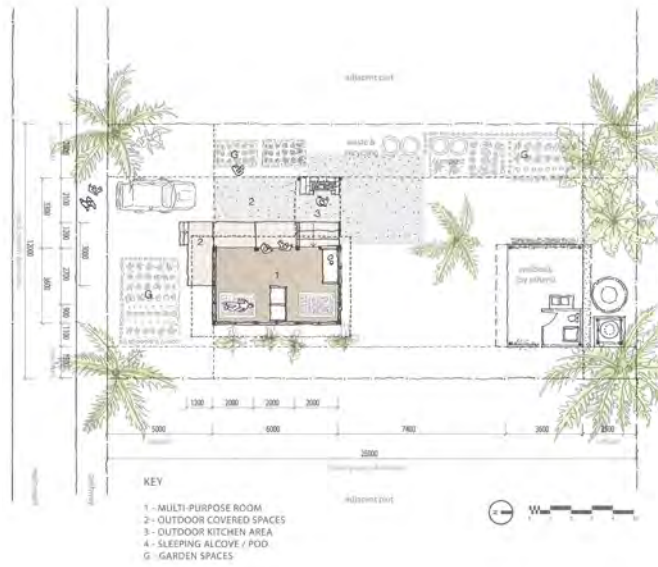
# IDENTIFYING KEY SPACES & FUNCTIONS

## OPTION TWO - KEY SPACES

1	2	3	4	G
<b>MULTI-PURPOSE ROOM</b>	<b>OUTDOOR COVERED SPACES</b>	<b>OUTDOOR KITCHEN AREA</b>	<b>SLEEPING ALCOVE/SPACE</b>	<b>GARDEN SPACES</b>
RELAX	RELAX	COOK MEALS	RELAX	TEND TO GARDEN
EAT MEALS	EAT MEALS	EAT MEALS	STUDY	TIDY YARD
SOCIALISE	SOCIALISE	WASHING UP	PLAY	PLAY
SLEEP	SLEEP		SLEEP	COLLECT MATERIALS
MAKE HANDICRAFTS	MAKE HANDICRAFTS		MAKE HANDICRAFTS	COLLECT TODDY / COCONUTS
STUDY	DO THE WASHING		STUDY	
WATCH TV	TIDY AROUND HOUSE		WATCH TV	
	SELL PRODUCE			
	WORKING			

## OPTION TWO - STAGING PLANS

### STAGE I



### STAGE 2



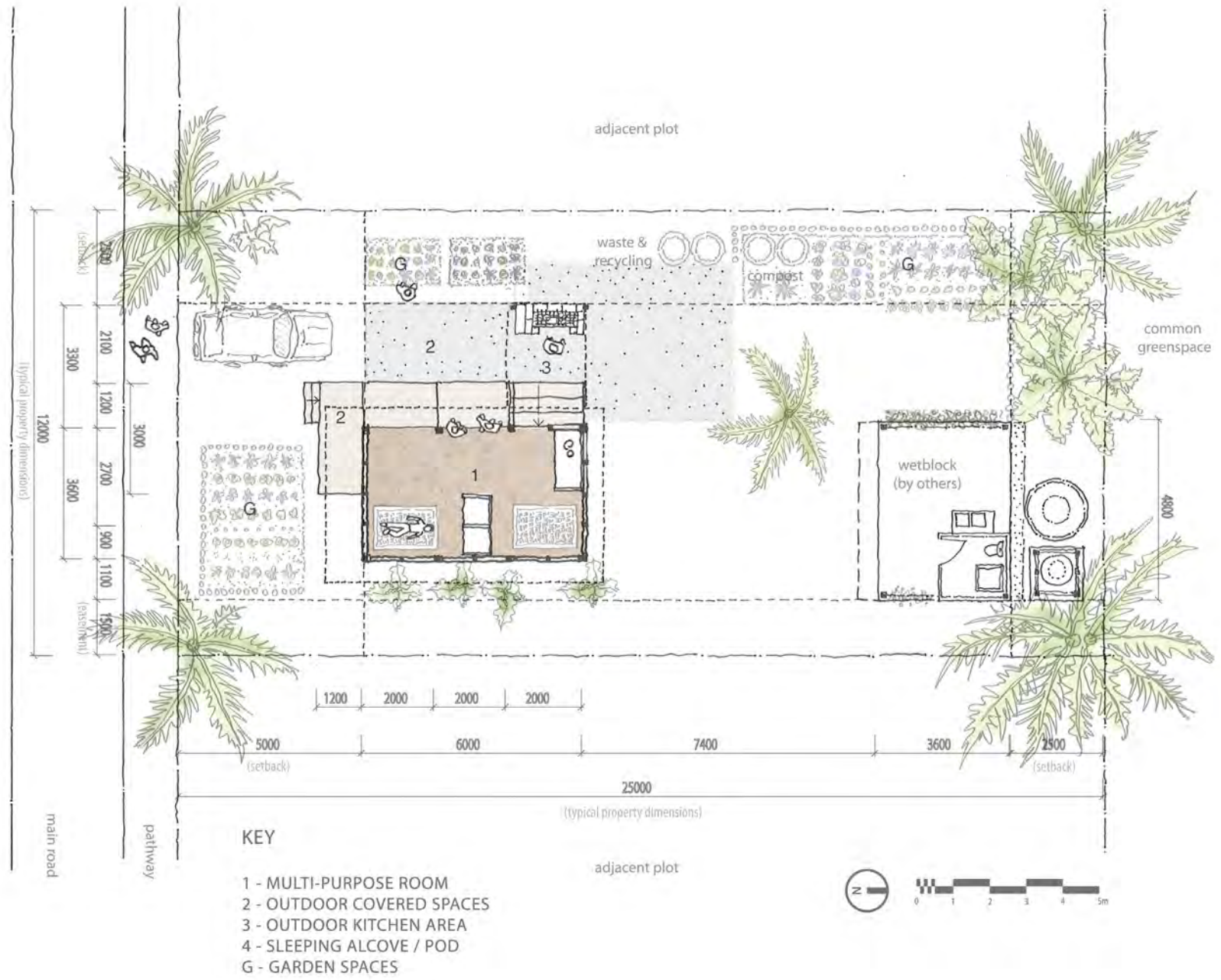
### STAGE 3



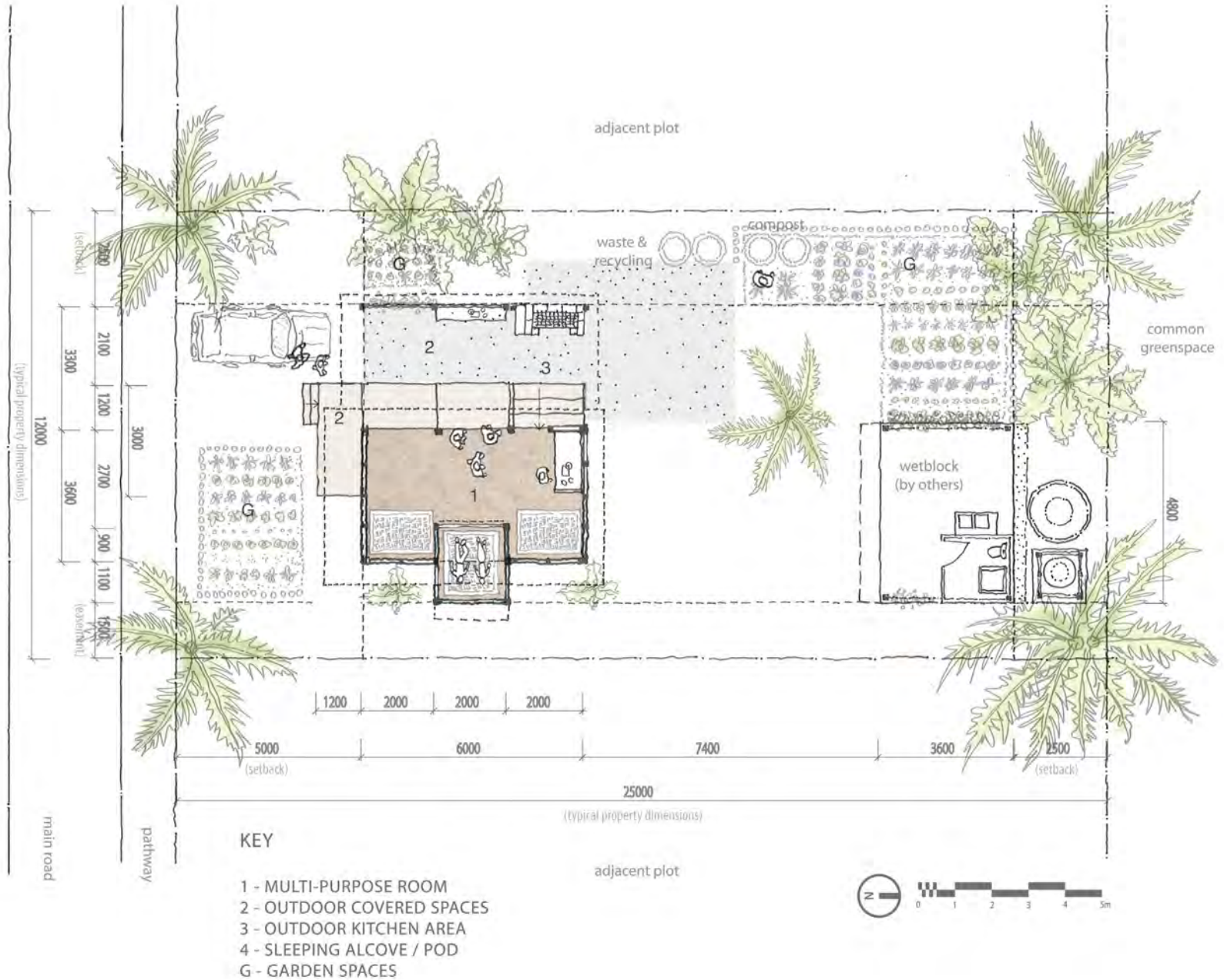
### STAGE 4



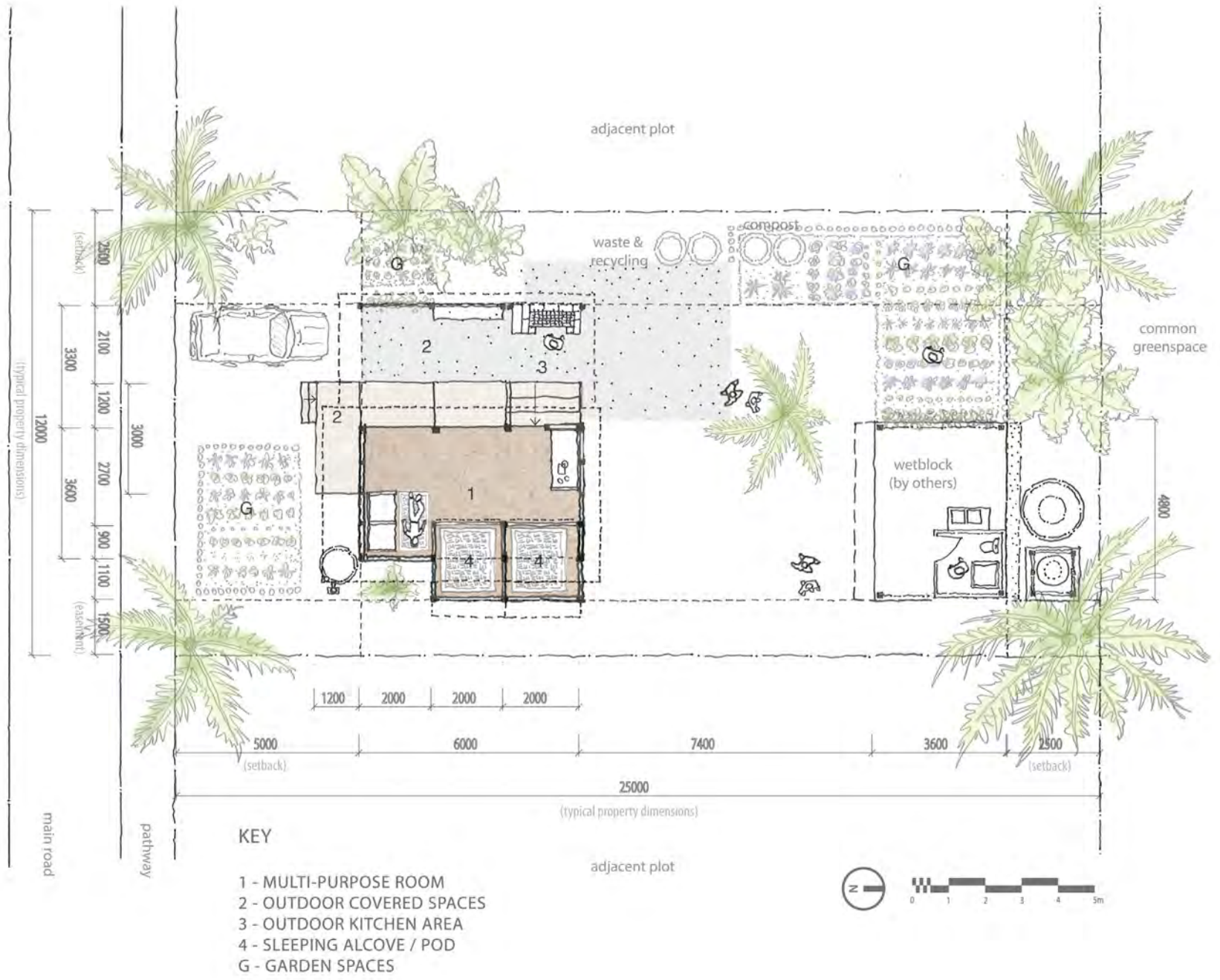
# OPTION TWO | PLAN STAGE I



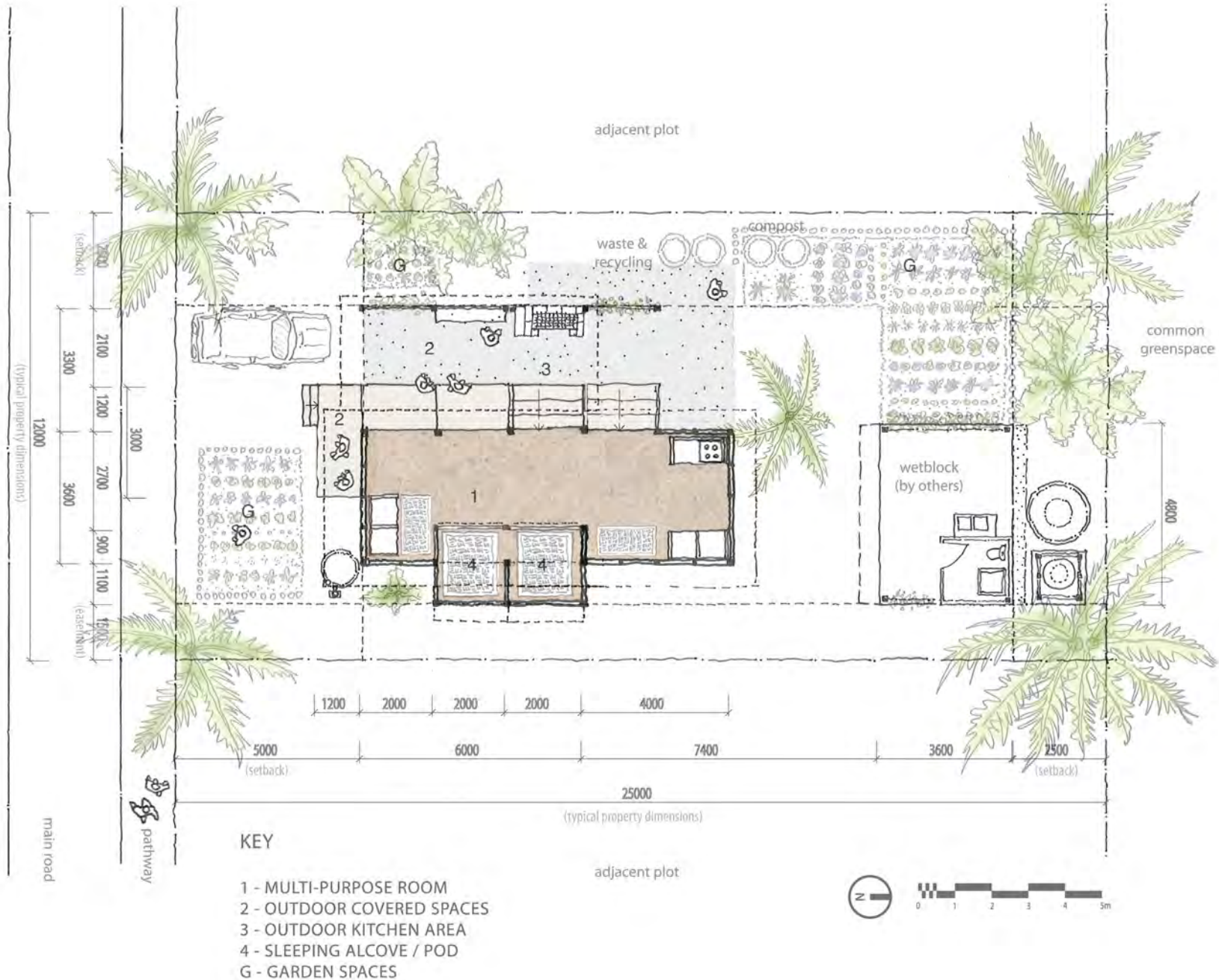
# OPTION TWO | PLAN STAGE 2



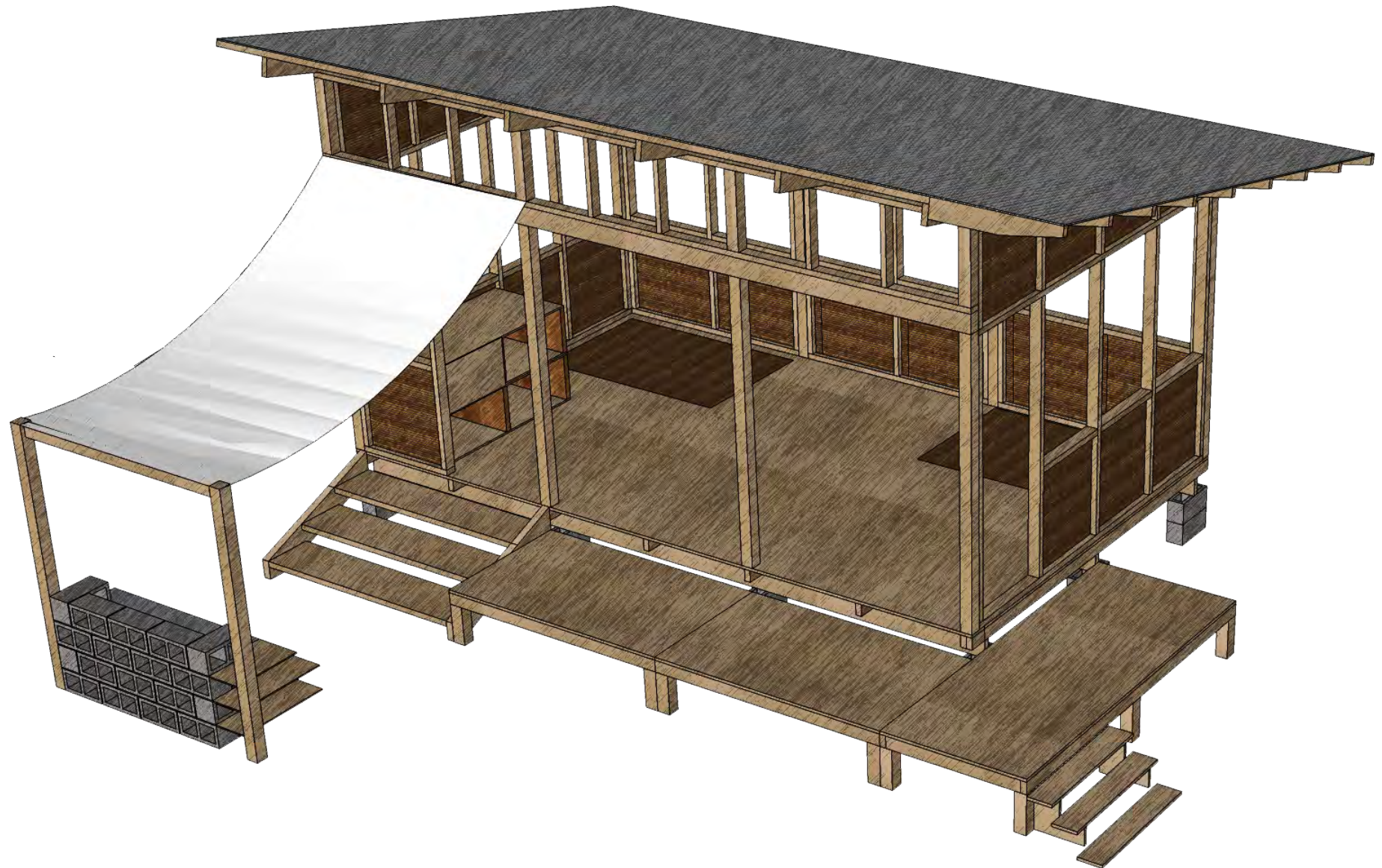
# OPTION TWO | PLAN STAGE 3

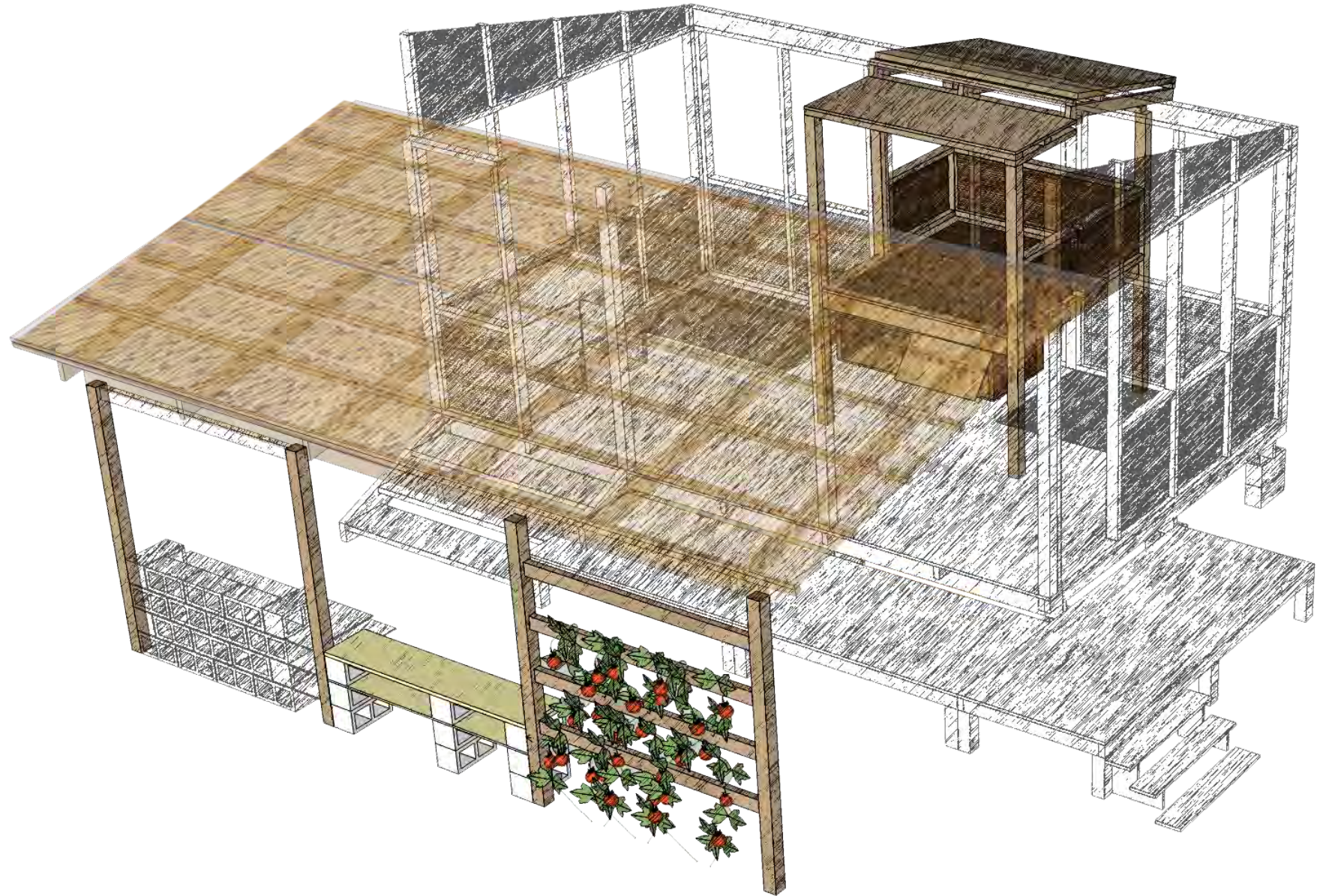


# OPTION TWO | PLAN STAGE 4

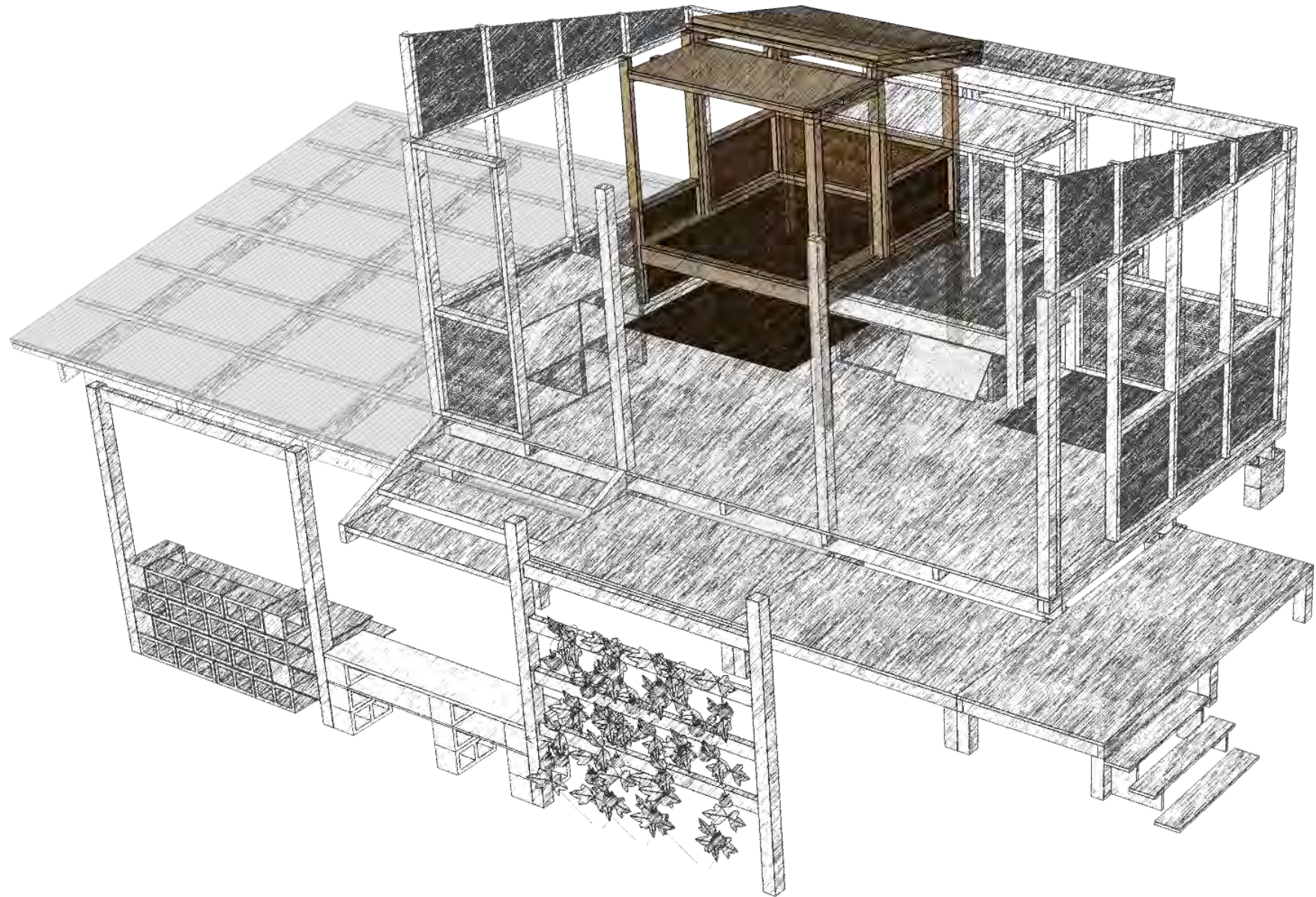


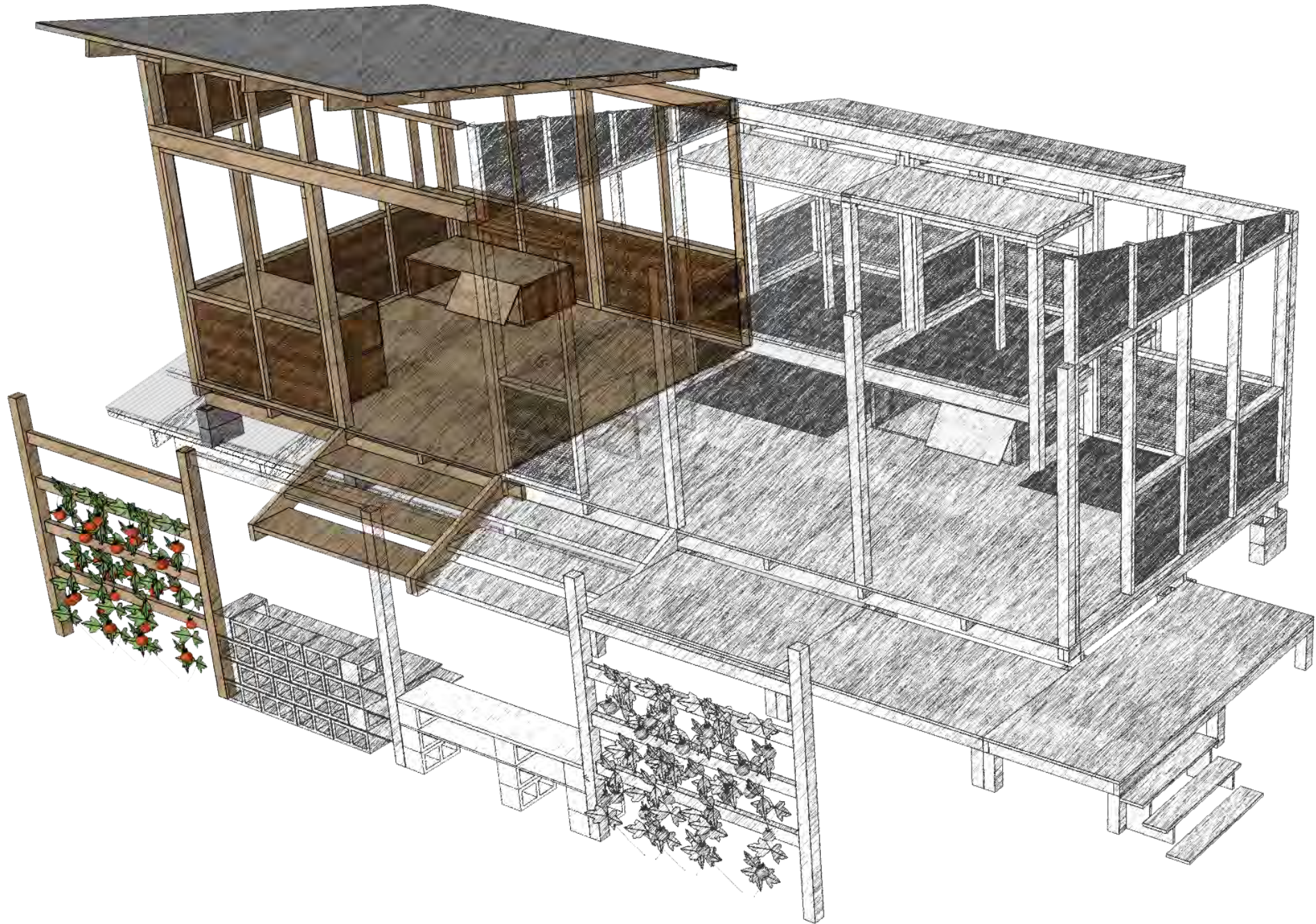
# OPTION TWO | STAGE I - BARE BUILDING



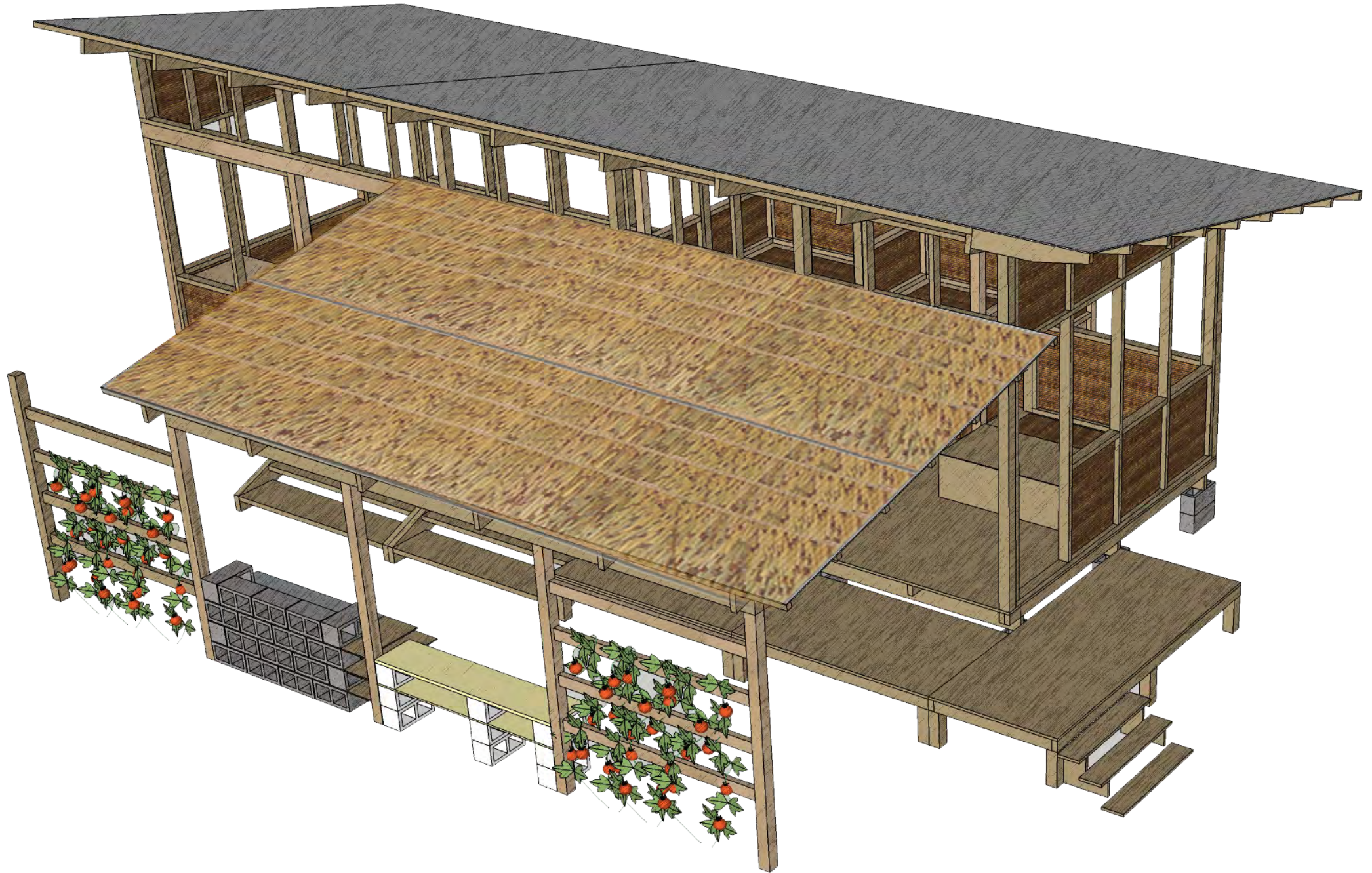




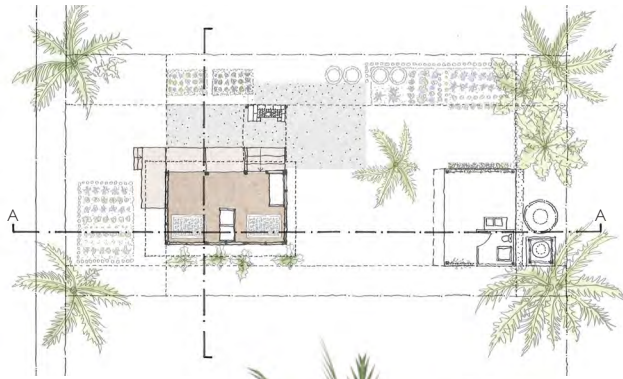




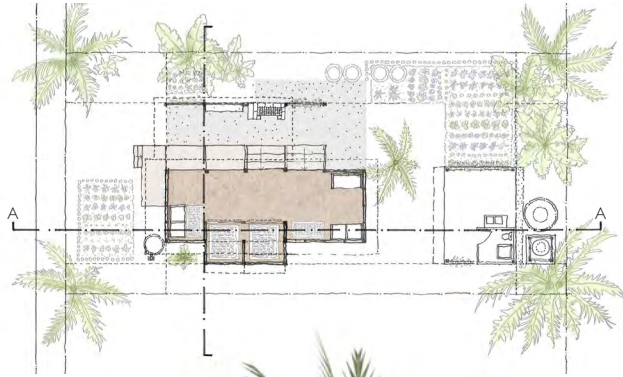
# OPTION TWO | STAGE 4 - COMPLETED BUILDING



# OPTION TWO | LONG SECTION – STAGE I



# OPTION TWO | LONG SECTION – STAGE 4



# OPTION TWO | CROSS SECTION – STAGE I



# OPTION TWO | CROSS SECTION – STAGE 4



# OPTION TWO | STREETSCAPE

---





# LOW COST HOUSE DESIGNS | ANIMATION



OPTION 1



OPTION 2



OPTION 1



OPTION 2

---

KIRIBATI  
TRAVELLING  
STUDIO

---

Melbourne School of Design [MSD]

---

University of Melbourne • Associate Prof. Colleen Butcher-Gollach  
• Prof. Richard Tomlinson • Tutor Ammon Beyerle • 25 July 2011

---