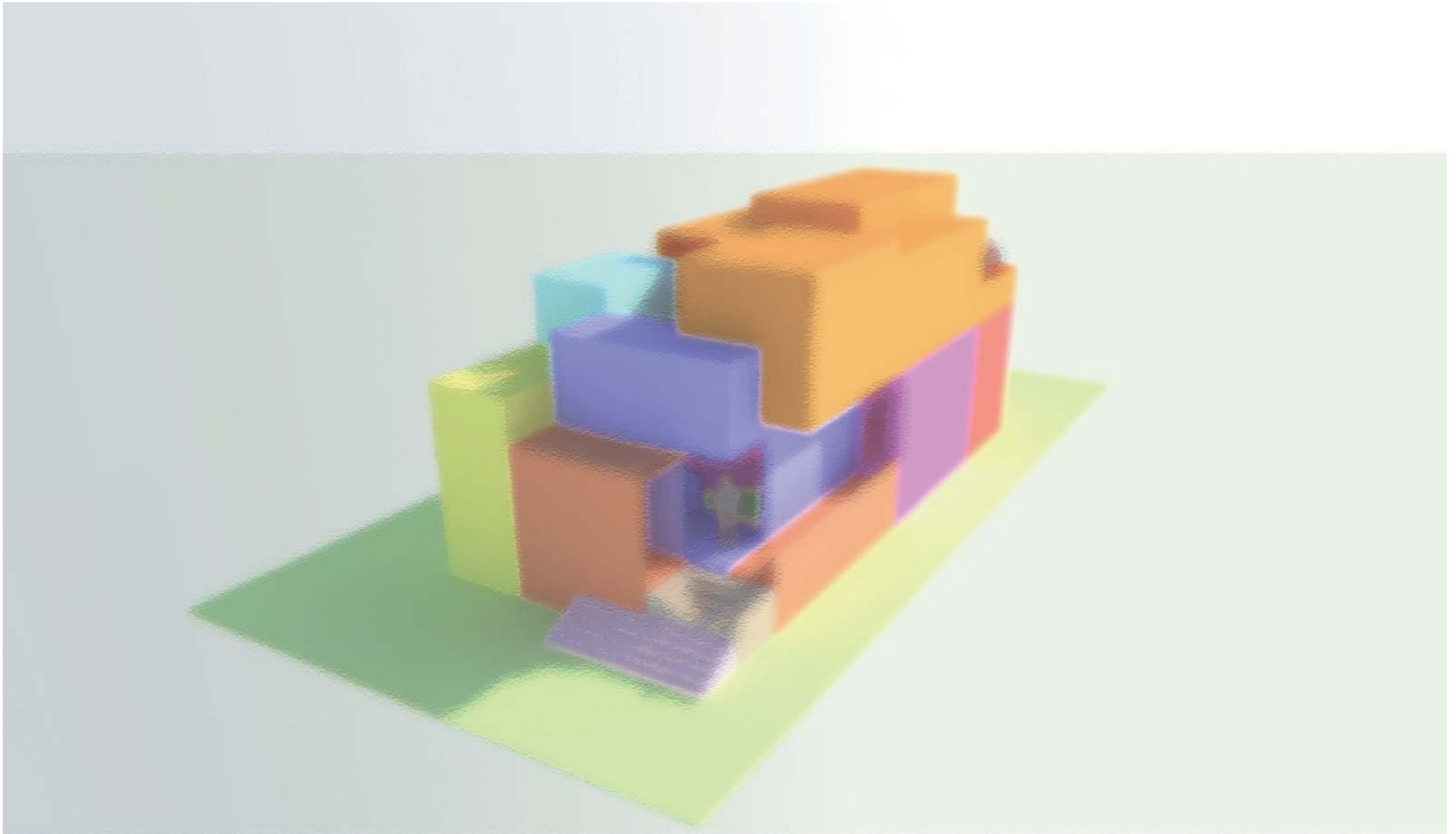# Facilitating Policy:

Redefining Terraced Housing in Malaysia

Suraj Khumar Bala Kumar

1Malaysia Home

S. K. Bala Kumar

Quotes

to inspire the author in the completion of his written thesis and design

"Imagination is more important than knowledge"
Dr. Albert Einstein

"With patience and tolerance, you can walk far in life"
Dr. Janemary Thirusanku

"It does not do to dwell on dreams and forget to live"
J.K. Rowling

"The unconditional love we share for each other is the last remedy to stay united and overcome the conflicting emotions we endure everyday"

S. K. Bala Kumar

Figure 1 Dual Faces of Malaysians - We rejoice despite our adversities

Dedication

Dear *Rainbow Child*, may you and I accomplish the ultimate stages of the Indigo and Crystal Children. Together, we shall fulfil the destinies of every inspiring Star Child, to relieve multi-ethnics from suffering with **unconditional love, tolerance and unity in a peaceful environment**!

Figure 2 My Colours on White   **"Children aren't colouring books. You don't get to fill them with your favourite colours"** *Khaled Hosseini*

Facilitating Policy:

Redefining Terraced Housing in Malaysia

by Suraj Khumar Bala Kumar

A 120 point thesis submitted to the School of Architecture and Design, Victoria University of Wellington, in partial fulfilment of the requirements for the Degree of Masters of Architecture (Prof.)

Victoria University of Wellington, New Zealand

7 March 2016

Abstract

The multi-ethnic tension among the three main ethnics in Malaysia has a great impact on tolerance and political unity. The Bumiputera Policy gives privileges to the Malay ethnicity, which further strains this issue, dividing the nation. Recognising this, the government introduced the 1Malaysia Policy as a possible solution to mitigate this issue to promote equality and attaining unity in diversity. This ultimate purpose is to integrate Malaysians to cooperate in a mutually respectful manner, towards the development of Malaysia.

The inevitable consequences of short sighted government policy, development and westernisation in Malaysia have negatively affected the cultural uniqueness of the three main ethnic communities. In domestic architecture, terraced houses have been a direct translation of western terraced housing. The influences from the West have diverted Malaysia's sense of Asian culture. The objective of this study is to support the aims of this current 1Malaysia Policy, by finding a solution to terraced housing, through the design of the 1Malaysia Home.

This thesis looks at an adaptable home for multi-cultural families to live and practise their unique cultures in a multi-ethnic community. The implementation of this design, is through research on case studies of the respective traditional houses of Malaysia's three main ethnic groups. The main design consideration of this flexible home is through a negotiated spatial organisation, in regards to the aims of the theories that informed the traditional houses.

This study further explores the cluster design of terraced housing in a multi-ethnic neighbourhood community. The traditional programmes of shop house and other multi-cultural activities in Malaysia are reinstated for a common sense of belonging in the neighbourhood, which ultimately preserves Malaysia's unique Asian culture and supports its international branding as *'Malaysia Truly Asia'*.

Acknowledgements

My special thanks to a list of people for their contributions to this journey of 5 years.

First and foremost, I wish to acknowledge my 5th year Masters Architecture Stream Supervisor, ***Shenuka de Sylva*** of the School of Architecture of Victoria University of Wellington, New Zealand for her guidance and direct supervision in providing constructive criticisms and dependable propositions to improve and push my design further throughout the course of this thesis.

My sincere thanks to the ***Public Service Department (PSD) of Malaysia*** for the wonderful opportunity to complete my 3 years of Bachelor Architectural Studies and 2 years of Masters in Architectural Studies (Prof.) in Wellington, New Zealand. Deepest gratitude to my ever so kind, helpful and friendly PSD Officers in the High Commission of Malaysia, Brooklyn, Wellington throughout the 5 years.

I am particularly grateful to ***God*** for the challenges I had to face throughout the 5 years and especially, blessing me with the greatest gift of all, my parents. My diligent father, ***Mr. Bala Kumar Govindasamy*** in collecting data, photographs and road trips for my case studies in Malaysia as well as the practical insights for my design. My lovely and inspiring mother, ***Dr. Janemary Thirusanku*** for constantly reminding me to manage my time well and to work consistently. Thank you for all the great encouragement, support and unconditional love throughout the 5 years of my study.

Lastly, a general thank you to my friends, cousins and relatives, especially, my affectionate grandmother, ***Mary Muniammah*** for her endless blessings and prayers for my success.

Table of Contents

Chapter 1: Introduction

The 1Malaysia Policy is an on-going programme implemented by the Prime Minister of Malaysia, Dato' Seri Najib Tun Razak since 16 September 2010, emphasising on ethnic harmony, tolerance and national unity. Malaysia is a multi-ethnic nation, which values and respects the individual ethnic identities of each community in Malaysia. The 1Malaysia Policy (Figure 3) is an outcome of the previous Bumiputera Policy, which favours the Malays and indegineous people of East Malaysia.

Malaysia's Prime Minister has implemented several housing programmes to promote a multi-ethnic community. One of these programmes is the *Perumahan Rakyat 1Malaysia* (PR1MA) Corporation or the 1Malaysia People's Housing Programme (top of figure 3) initiated by the Malaysian government to develop affordable housing for the middle-income households. This was set up in 2011 to plan, coordinate projects and distribute housing to eligible recipients throughout the nation. Although this programme is implemented under the 1Malaysia Policy, little emphasis is given to the cultural relevance of housing to Malaysian communities. The design is driven from the influences of western terraced housing models rather than the local Malaysian culture. Furthermore, the homes constructed under this programme are designed for families to adapt to the house, but does not allow the house to adapt to the cultural practices of the diverse ethic communities of Malaysia. Thus, the loss of cultural values among Malaysian families today.

A key concept of the 1Malaysia programme is 'People First, Performance Now' (PR1MA 2011). The main objective of all these policy and programmes is to promote equality and attain unity among the Malaysian citizens. The ultimate goal is to achieve development in Malaysia by integrating Malaysians to cooperate in a mutually respectful manner, through the aims of this national policy.

Figure 3 Welfare services offered through the 1Malaysia Policy

1.1 Background Problems

1.1.1 Racial Discrimination

Figure 4 Racial violence amongst Malaysian ethnic communities: Burning of shop houses on the May 13, 1969 Riot

1.1.2 Cultural Significance of Terraced Housing

Figure 5 Loss of cultural significance in contemporary terraced houses in Malaysia

1.1.1 Racial Discrimination

"It shall be the responsibility of the Yang di-Pertuan Agong to safeguard the special position of the Malays and natives of any of the States of Sabah and Sarawak and the legitimate interests of other communities in accordance with the provisions of this Article."

(Article 153, Constitution of Malaysia 1957)

Malaysia is a multi-ethnic country which comprises of three main groups–Malay, Chinese and Indian. Each group has its individual traditions and cultural significance. Differences between the ethnic groups have segregated Malaysians. The privileges the Malay ethnic group possesses under the Bumiputera Policy further divides them from other groups causing disputes and ultimately leading to racial discrimination.

Before Malaysia gained its independence on the 31st of August 1957, the Constitution of Malaysia as the supreme law of Malaysia came into force, comprising of 181 articles. The numerous interpretations of this clause by critics and Malaysians have created unnecessary conflicts and racial distinction among the different ethnicities.

Figure 6 Communist Party of Malaya (CPM)'s Interpretation of May 13, 1969 Riot

Figure 7 200 dead people after the May 13 Riot

The Malays that make up the majority of the population benefits through the implementation of affirmative action policies and discriminates the minority ethnicities (Brant 2009). As a result, the community backlashes leading to race riots such as the 'May 13 1969 Incident' (Kua 2007) (Figure 4, 6, 7, 8 and 9).

The government has attempted to address this issue in order to unite and restore harmony among Malaysians. Over the years, various programmes have been implemented by the government to overcome this problem by being fair and equal to all three races.

One of the recent and effective policies implemented by the government is the 1Malaysia Policy (Figure 3). However, the effective application of this policy is not fully explored in the architectural sector, which can provide great potential to resolve the issue of ethnic differences and celebrate Malaysia's unique multi-cultural identity.

Problem Question: How can architecture act as a facilitator of the 1Malaysia Policy in its aims to unite different Malaysians in a multi-ethnic community, but at the same time being fair and equal to all three races?
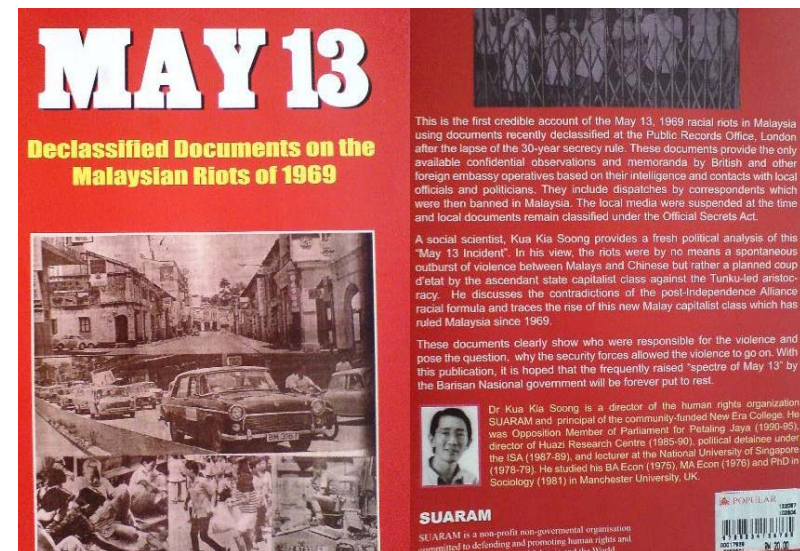

Figure 8 'Huge pillars of smoke rose skyward as houses, shops and autos burned' - Time 2009

Figure 9 Kua's photo book cover describing the May 13 1969 Incident

1.1.2 Cultural Significance of Terraced Housing

Most contemporary housing projects today are designed without consideration of relevance to Malaysian cultures.

The influences of western education and culture has brought about an architecture that is distinctively different to Malaysian traditions of living. Architectural graduates who returned from England and Australia since the end of the 1950s' have been keen to establish 'their new skills and capabilities' (Ismail 48). Consequently, the result has been a loss of Malaysian identity in mass housing developments.

The present terraced housing has minimum reference to the traditional and historic terraced housing and Malay architecture of the country and also the rest of Asia, unlike the widely seen tradition of shop house living. The Western influence of the Victorian Terraced Housing style (Figure 10) is clearly reflected on the design of the local terraced housing of Malaysia today (Figure 5 and 11).

The design of a local domestic architecture should have been the core influence on the design of the terraced housing developments. The environment friendly shop house is a multifunctional type of row house present in Malaysia since the 19th century (Ho, Hassan and Noordin) for families to live and work together in a shared domestic space in a community environment.

Figure 10 Victorian Terraced Houses

Figure 11 Malaysian Terraced Houses

8

The western terraced housing came about to satisfy the need for housing for industrial workers. The minimalist designs of these houses (Figure 12) differ from the simple yet ornate traditions of the Malaysian and Asian shophouses. In addition, the Asian shop houses tend to be arranged in community clusters although isolated by ethnicity.

As a result, terraced houses today (Figure 11, 13 and 14) depict more of the western style of living rather than the original cultural way of living, which shop houses once portrayed.

From a larger perspective, while contemporary terraced housing has contributed to the loss of a sense of togetherness and restricted cultural practices, forcing Malaysians to adapt to this housing. Other issues related to today's terraced housing are illustrated in the following pages.

Problem Question: *How to design a home that adapts to the needs of its occupants?*

Figure 12 Terraced Housing and gardens in Forest Fields, Nottingham UK

Figure 13 Terraced Houses in Grandview, Puchong Malaysia

Figure 14 Terraced houses in Damansara, KL Malaysia

Congestion from the close proximity of terraced houses.

Figure 15 Google map view of terraced houses in Bandar Puteri, Selangor, Malaysia

Figure 16 Crowded dining space

Lack of indoor and outdoor social spaces.

Figure 17 Back lane of terraced houses in Malaysia

Figure 18 Crowded hall to host dinner for guests

Fixed indoor spaces restrict families to hold family functions with ease.

Figure 19 Crammed up dining space for occupants to host guests

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Figure 20 Unconducive internal spaces used for storage and work

Restricted spaces for private home activities and businesses.

Figure 22 Parade of a Malay Wedding at the streets

Absence of private, open spaces to occupy crowds for larger ocassions due to limited spaces.

Figure 24 Night markets affecting the traffic flow

Inadequate designated community spaces.

Figure 21 Businesses pushed outside the houses

Figure 23 'Khatam Al-Quran' Ceremony at home

Figure 25 Public inconvenience at day markets

1.2 Research Question and Objectives

Research Question

How can architecture be utilised to support the aims of a national policy?

Working Question

How can culturally specific domestic architectural traditions be amalgamated in the design of a model for public terraced housing for the 1Malaysia People's Housing Program (PR1MA)?

The aim of this research is to investigate whether a domestic architecture adaptable to the traditions of diverse cultures is able to support the aims of the 1Malaysia Policy. The research explores adaptability in terraced housing, to preserve the local cultures through a 'flexible' home design.

1.3 Structure of Thesis

1Malaysia Home

Inequality
Conflicts from differences
Segregation of ethnics

Westernisation
Development

Racial Discrimination —— **Assessment of current problems** —— Loss of Cultural Significance in current Terraced Housing

Solution - **1Malaysia Policy**

Domestic Architecture

Traditional Indian Courtyard House
Traditional Indian Row House

Indian —— Literature Review + Case Studies —— **Chinese**

Traditional Chinese Courtyard House
Traditional Malaysian Chinese Shop House

Malay
Traditional Malay House

Site Considerations

Product

The Response of Families	Modular Design	Healthy Living Environment	Cultural Considerations	The Response of Community
1Malaysia Home	Application	Air Quality	Adaptable Family Design	Funeral
1Malaysia Terraced Housing		Flooding		Sports Activity
	- Circulation	Congestion	- Malay	Family Outdoor Activity
	- Privacy		- Chinese	Night Market
			- Indian	Cultural Carnival

Final Outcome

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1.4 Limitations

The cultural practices among the three major ethnic groups are vast. This research concentrates on day to day cultural practices – activities or norms within the family and large scale family functions such as weddings, funerals and cultural celebrations traditionally held within the home.

There are diverse types of domestic architecture by the Chinese and Indian ethnic groups. These have been adapted into the context of Malaysia over a long period of time. For the purpose of this research, only the main types of domestic architecture from each group is focused, particularly the shop house and row house traditions. Due to the lack of academic study on domestic Indian houses in Malaysia, similar house types from India are selected to aid this study.

Chapter 2: Literature Review + Case Studies

Figure 26 (right) Malaysia's Cultural Diversity

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2.1 Segregation of Chinese and Indian Communities in Malaysia

Benedict Anderson claims that nations are 'imagined communities' and when present in a single polity, we have a multi-cultural society (160). Ethnic is used to classify Malaysian citizens, shaping the nation's 'imagined community' since colonial times. Back in the 19th century, the three main ethnics were divided under the rule of the British to prevent them from social integration.

The Indian labourers migrated through the *Kangani* system, working in rubber plantation estates (Bhattacharya, Kripalani 15) while the Chinese labourers migrated through the *Kangchu* system, working in tin mining (Trocki 710). Their individual employed systems eventually informed their settlements, affecting their social mobility preventing them from engaging with other ethnics, isolating the three main ethnic communities from one another.

Figure 27 Shop houses along the streets in Little India, Klang

Consequently, the migration of the Chinese and Indian labourers brought about their unqiue cultural significances influencing the architectural development of Malaysia. Rapid economic growth during the British Colonial era, forced these migrants to move into the commercial sector, starting trade businesses. Hence, the arrival of traditional, multifunctional type of row houses (commercial and residential) within individual ethnic community (Figure 27 and 28).

Besides their determination in seeking for political status and economic roles, their culture and customs had given an impact to the local architecture (Hasan, Ho and Noordin). These preserved and restored heritage shop houses have left significant influences on Malaysia's cultural development from the many foreign cultural heritages and legacies that existed in the past.

Figure 28 Shop houses in China Town, Petaling Street

2.2 Facilitating Malaysians through Architecture - Merdeka Square

Merdeka Square is an architectural strategy to facilitate the 'convergence' of multiracial communities and celebrate the new national identity (Figure 29). This reflects Kusno's theory, stating urban design as a 'technique for turning cities into fields of social, cultural and national identity production' (97). This public space not only marks Malaysia's Independence from the British ruling on 31st of August 1957, but symbolises the acceptance of the Chinese and Indian races as Malaysian citizens. Thus, this civic space acts as a medium to converge the unity of three individual ethnic communities as one, advocating 'a sense of belonging' amongst all Malaysian citizens. Hence, reflecting the well-known national identity of the Malaysian society today as a 'plural society' or a 'society with plural features' (Nah 511) through architecture (Figure 26).

Figure 29 (top and right) Panorama view of Merdeka Square, Kuala Lumpur

This communal space has successfully bridged Malaysians all over the country. Nonetheless, domestic architecture has not been fully explored and tested to act as a mediator to enable this. Unlike the Merdeka Square designed at an urban scale, this proposal functions from a smaller scale, to create a new sense of multi-cultural neighbourhood community.

Therefore, this research focuses on studying individual settlement patterns and domestic architecture of each ethnic community in regards to their cultural significances to inform the new domestic discovery that will facilitate the union of this three ethnics.
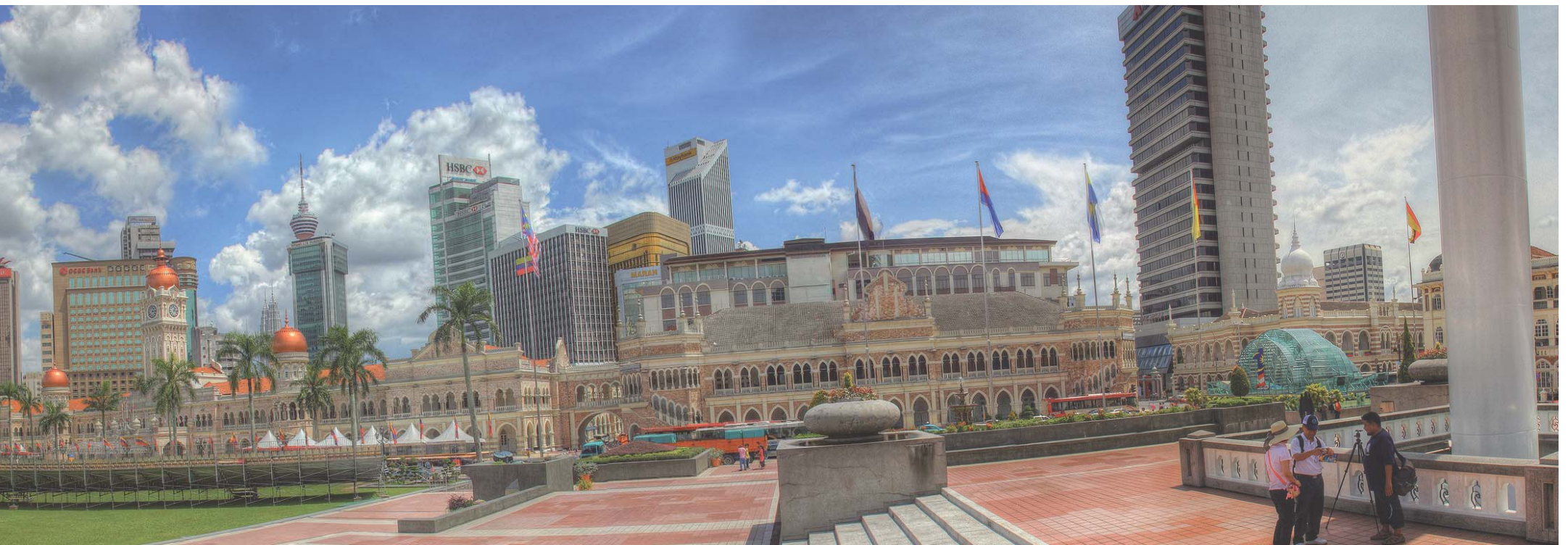
2.3 Malay

Figure 30 (right) A Malay Wedding, 'Bersanding'

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2.3.1 Malay Village

The traditional Malay settlements or *kampung* originated from the migration of an individual Malay family or in a group from the same district in Malay Archipelago (Sahabuddin 2012). Tjahjono states that 'rural settlements have grown in geographically distinctive locations that vary from hilltops, valleys, riverbanks, lowlands, estuaries and coastal areas' with individual areas evolving in a variety of aspects, such as 'economy, social organisation and built environment' (2003) (Figure 31). Most Malay villages were formed around natural resources to cater socio-economic activities. Agriculture and fishing are the main works during the early times of the Malay settlements (Hanafi 1994).
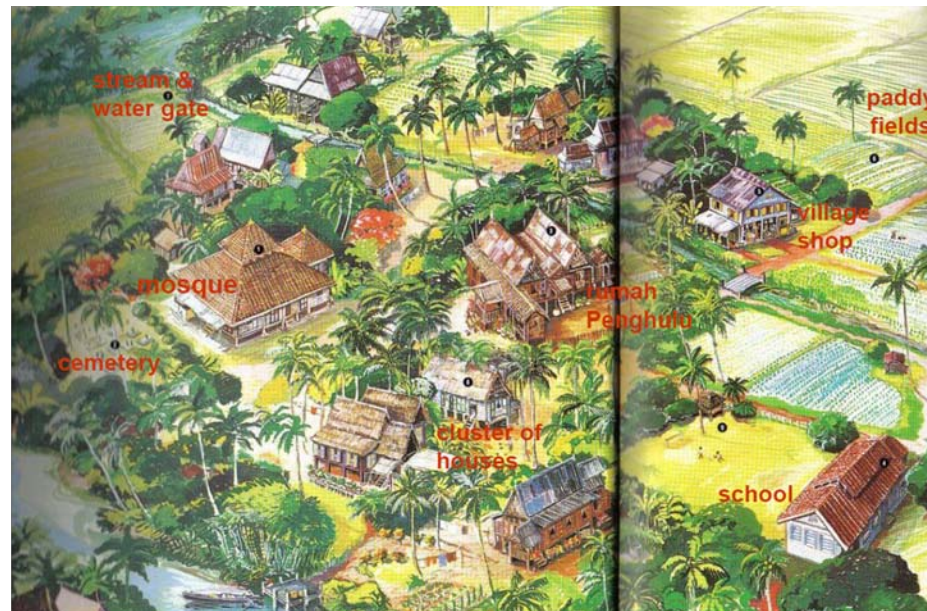

Figure 31 Typical Malay village

The settlement of a Malay village developed from the significance of the communal, religious centre. The random arrangement did not develop according to a proper planning or guideline. Instead, the settlement grew surrounding the mosques, within the audibility of the *azan* (Figure 32). Due to this random arrangement, privacy was minimal as trees and large spaces filled up spaces from one *rumah* or house to the other.

The surrounding villagers practised an open concept with one another and often encountered each other at the centre of the village for religious prayers at the mosque. As a result, no physical boundaries to demarcate the house compounds were necessary as villagers had a mutual respect and understanding with one another.
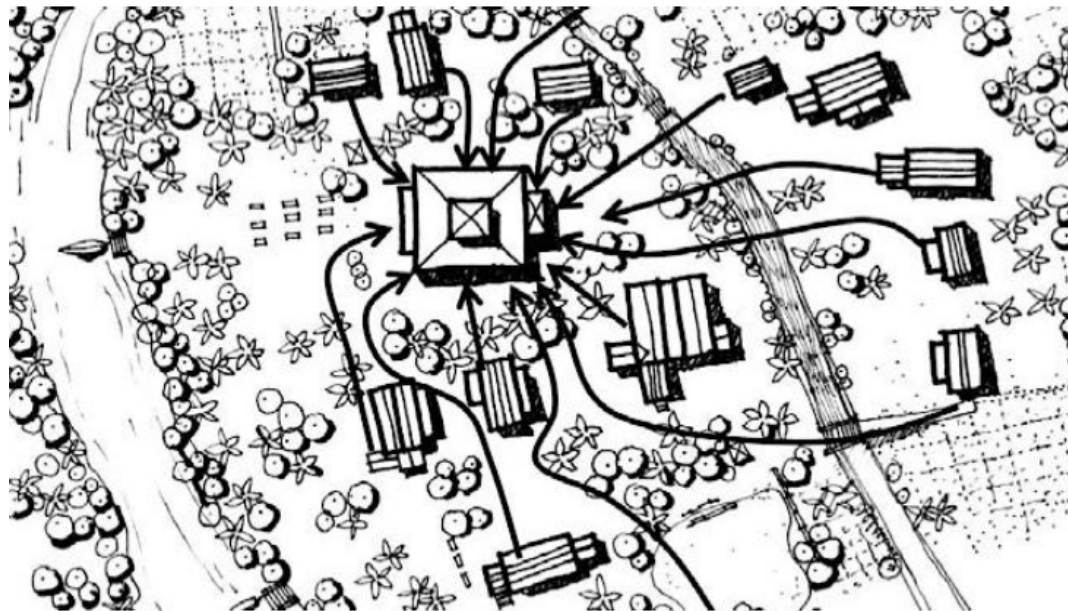

Figure 32 Centric diagrammatic flow of a Malay 'Kampung' environment

2.3.2 Arrangements of Malay Houses

Figure 33 Colourful 'Kampung' Life

Random Pattern

The layout of the traditional houses are arranged randomly. This ensures that 'wind velocity in the houses in the latter path of the wind will not be substantially reduced' (Yuan 1987). The detached houses create ample of external spaces between them to allow circulation of fresh air (Hanafi 1994) and neighbours to socialise (Figure 33 and 34).

As a result, circulation of air is retained as wind is evenly dispersed in a village (Figure 35). Additionally, this arrangement orientates the houses to face Mecca (Figure 36) for religious devotions which minimises areas exposed to solar radiation (Yuan 1987), preventing the house from overheating. This arrangment informs the next pattern.
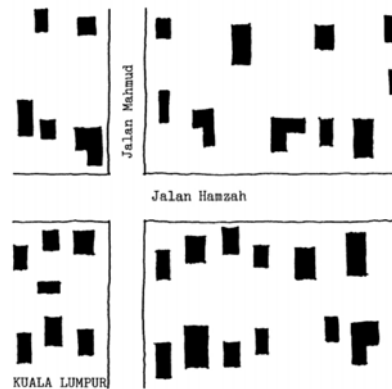

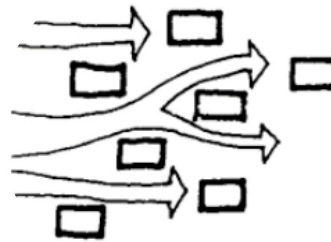*Figure 34 Detached arrangement of traditional Malay houses in the city*

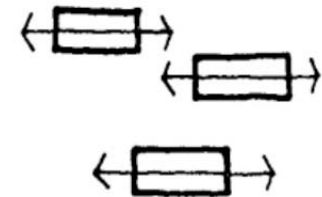*Figure 35 Flow of wind in a random arrangement of a Malay village*

Figure 36 East-west direction

Concentric Pattern

This pattern functions to position each house in a circle to allow a shared and often a larger compound among a few other houses around. The *serambi* or verandah faces the public space (Sahabuddin 2012) to accommodate a communal space for the extended families living around in a cluster (Figure 37).
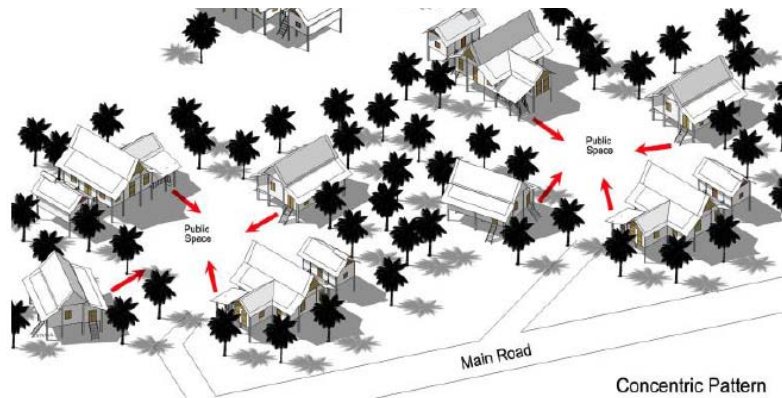
However, this pattern might not be ideal for inhabitants that are not related or prefer to extend their level of privacy than to associate in a shared compound. Consequently, the main planning design consideration today is privacy. Thus, the common and recommended solution, is the linear pattern which is mostly observed in the urban areas (Figure 38).
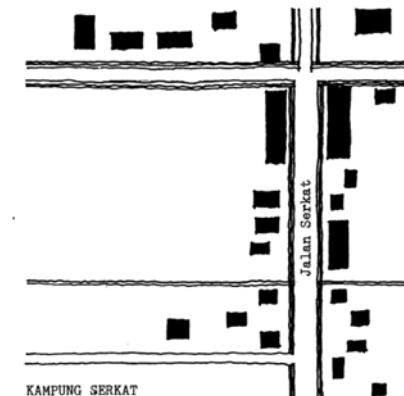

Figure 37 Concentric patterns illustrating Malay houses facing public spaces

Figure 38 Aligned arrangement of Malay houses in a Malay rural setting

Linear Pattern

This systematic pattern functions to arrange the houses in an aligned approach, facing economic resources and transportation links (Sahabuddin 2012) (Figure 39). Housing estate houses today implements this pattern that often 'disregards orientation for minimising solar radiation' and is a 'jigsaw puzzle of fitting the most units into the site within permissible densities' for profit intentions (Yuan 1987).
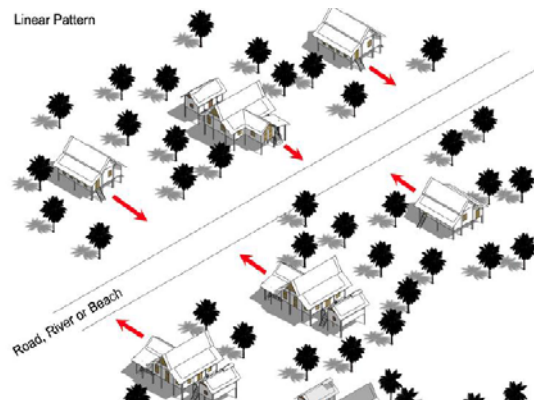
This 'rigid pattern create barriers that lock the passage of wind to the houses in the latter path' (Yuan 1987) (Figure 40), which stresses on privacy for each family. The setback of this pattern creates less open and safe outdoor spaces, which diminishes their social interactions with one another, dividing the communities today (Figure 41).
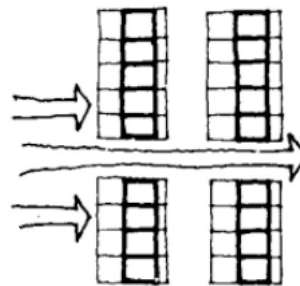

Figure 39 Linear pattern illustrating Malay houses facing economic or transportation links

Figure 40 Flow of wind in a linear alignment of houses
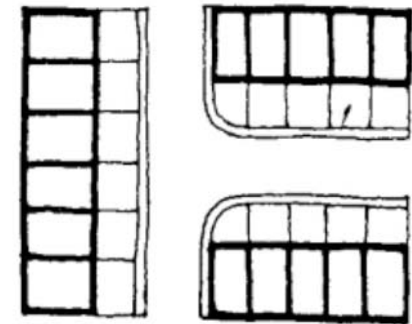
Figure 41 Blocks of houses today in a rigid pattern

2.3.3 Basic Malay House

The main areas
1. *Anjung* (covered porch)
2. *Serambi* (veranda)
3. *Rumah ibu* (main house)
4. *Selang* (passageway)
5. *Rumah dapur* (kitchen)
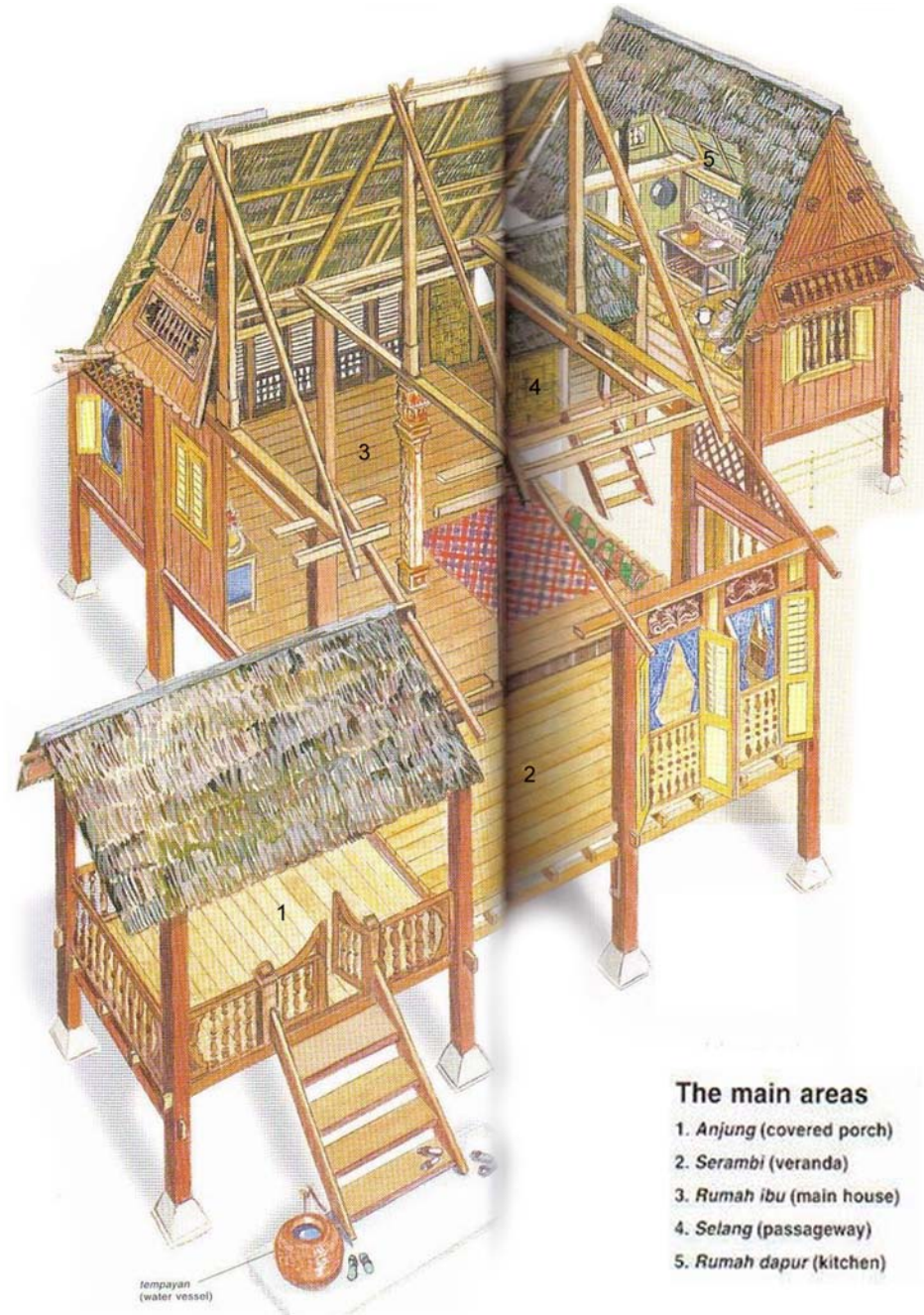
tempayan (water vessel)

Figure 42 Basic Malay house illustrating the 5 main areas

A Malay house has different elements and spaces that are not rigidly fixed in their functions and can be used for any purpose, within certain limitations imposed by the culture (Abidin 29).

There are five basic spatial elements (Figure 42); the first is the *anjung* as an important focal point for the entrance (Lim 76). This sheltered porch is an extension placed perpendicularly to the main axis of the house (Abidin 30). It is the first, sheltered part of the house in the front where visitors are greeted and invited by the owners. This space acts as an interface before entering into the main house.

The second component is the *serambi* or verandah is defined as 'a vestibule just within the front door' (Hilton 143). The *anjung* stated previously, could be classified as a subset of the *serambi*. These two elements are often integrated to make up the front part of the house (Figure 43 and 51).
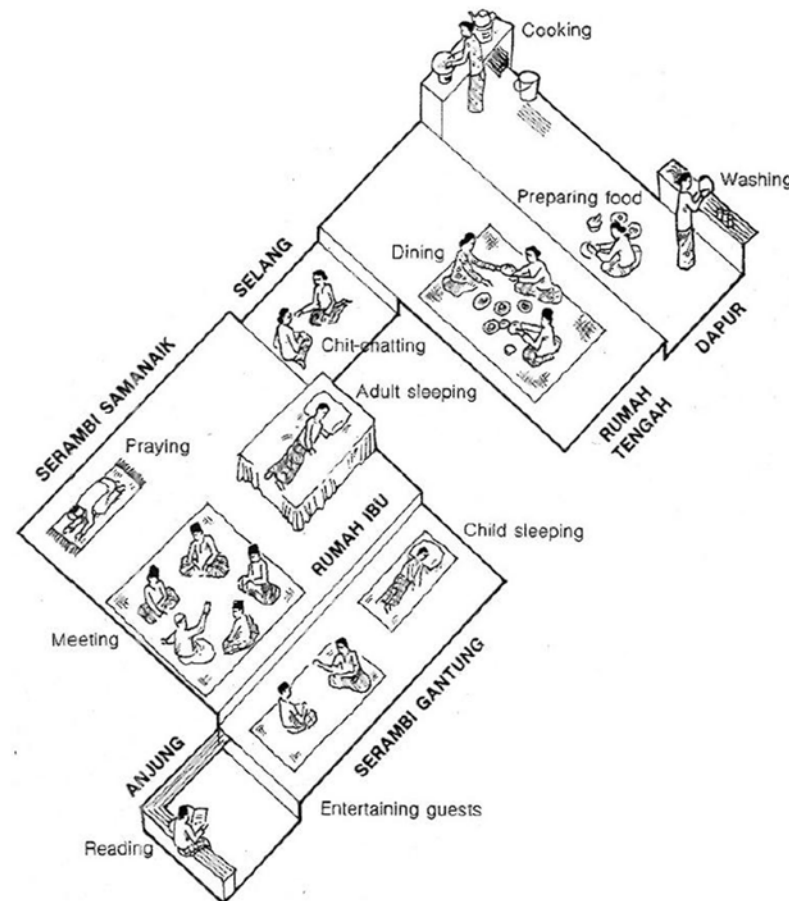

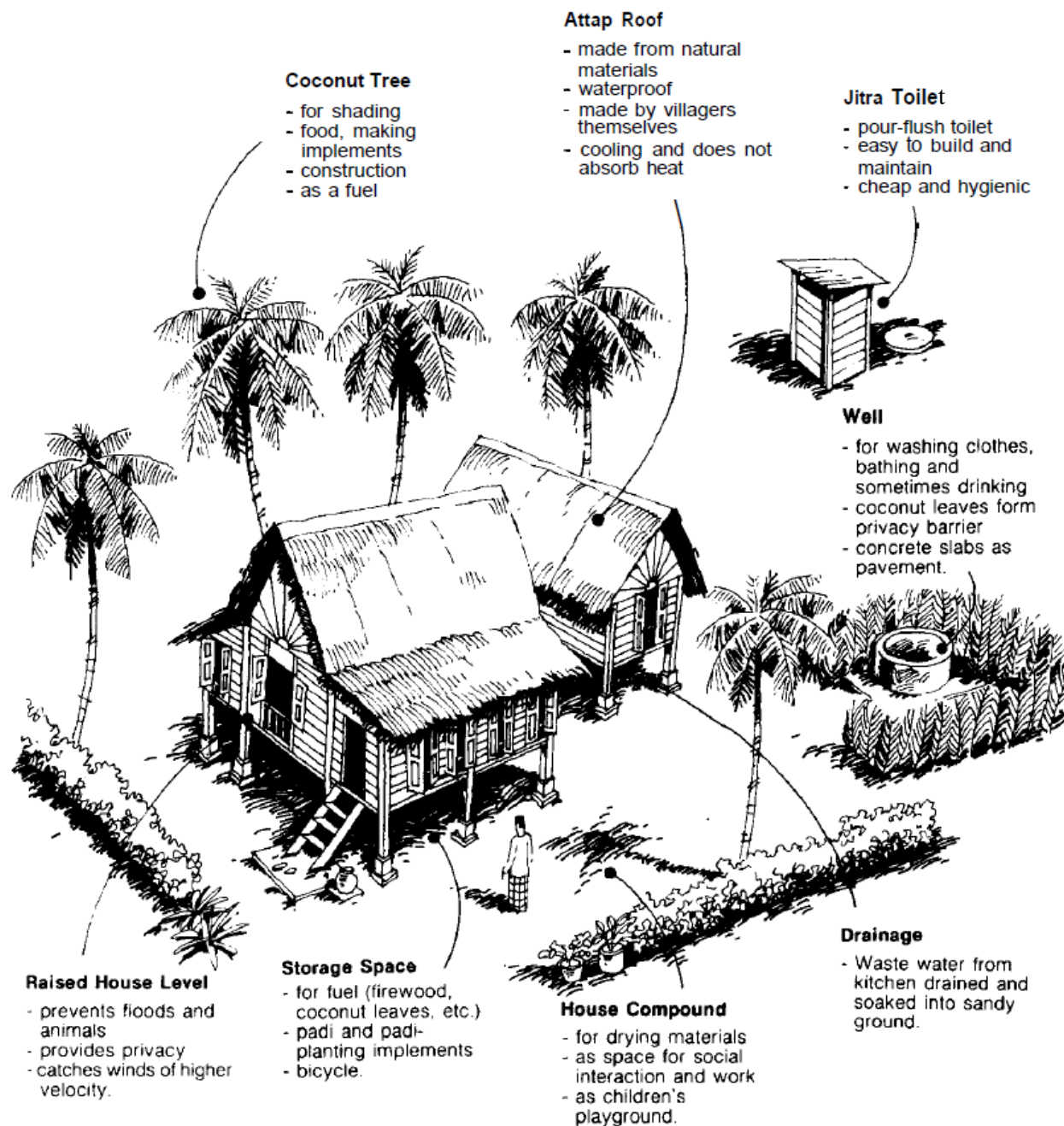*Figure 43 Basic interior spaces of the five main areas*

Coconut Tree

- for shading
- food, making implements
- construction
- as a fuel

Attap Roof

- made from natural materials
- waterproof
- made by villagers themselves
- cooling and does not absorb heat

Jitra Toilet

- pour-flush toilet
- easy to build and maintain
- cheap and hygienic

Well

- for washing clothes, bathing and sometimes drinking
- coconut leaves form privacy barrier
- concrete slabs as pavement.

Raised House Level

- prevents floods and animals
- provides privacy
- catches winds of higher velocity.

Storage Space

- for fuel (firewood, coconut leaves, etc.)
- padi and padi-planting implements
- bicycle.

House Compound

- for drying materials
- as space for social interaction and work
- as children's playground.

Drainage

- Waste water from kitchen drained and soaked into sandy ground.

Figure 44 The external environment of a Malay house

32

The main centred spatial component is the *rumah ibu* or mother of the house (the core house) (Yuan 1987). This space consist of the private generic space for the family where the *bilik* or rooms are placed (Figure 43).

The *pelantar*, *jemuran*, or deck is an outdoor platform with a roof to shelter women entering the house and for drying objects in the sun (Abidin 31). The *selang* or passageway is associated with this deck as the women's entrance (Figure 43).

Dapur or kitchen is the second largest space (Sahabuddin 11) at the back of the house on the lowest floor level and separated from the other living spaces (Lim 77) (Figure 43).

There are two other spatial elements (Figure 44) detached from the Malay house. The *jamban* or toilet and shower spaces are external due to the need to be in close proximity to the pond or well for water supply (Abidin 31). The *bangsal* or shed is an unconventional sheltered, outdoor space for the inhabitants to carry out casual activities such as cleaning and resting (Abidin 31).
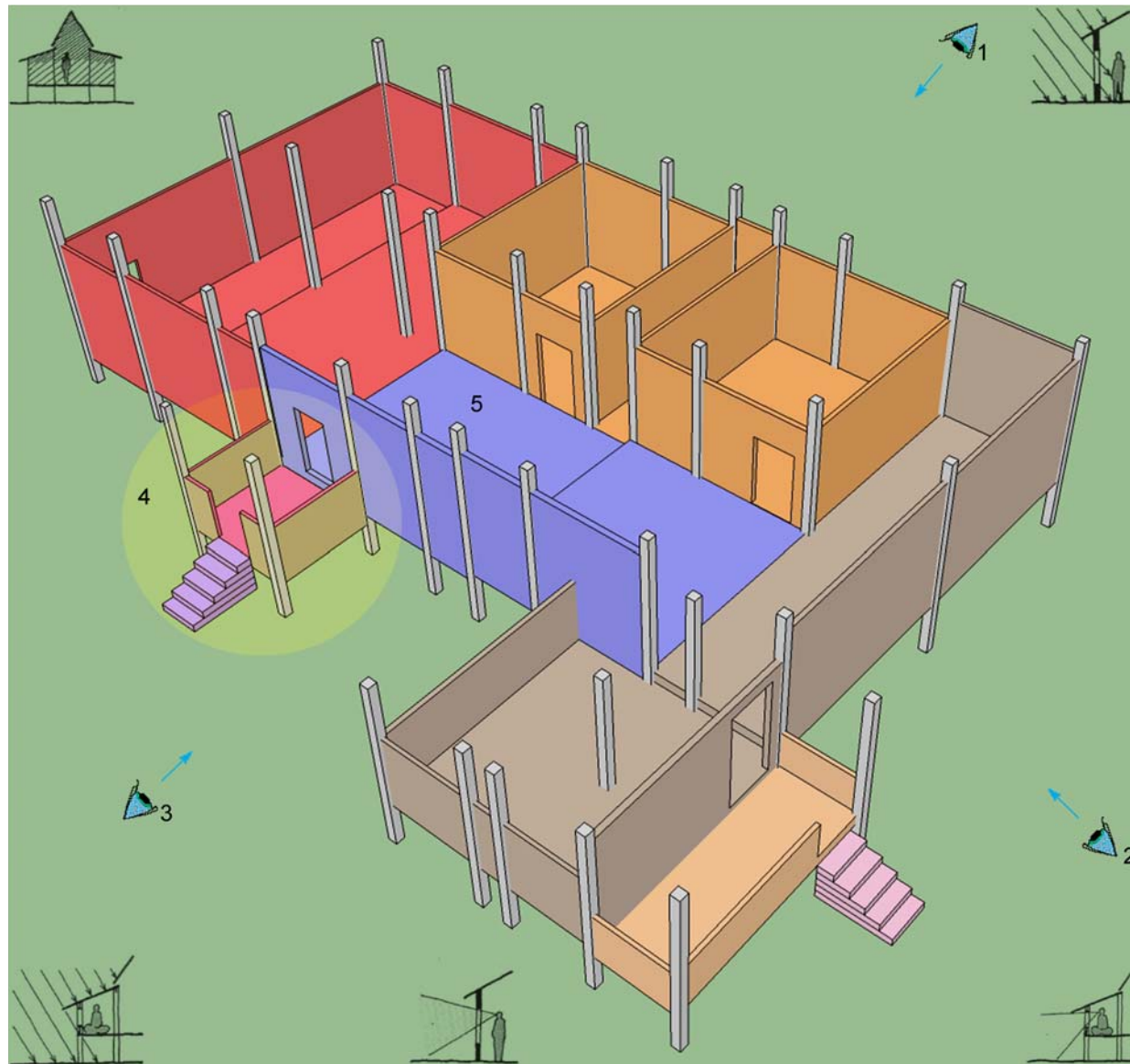
2.3.4 *Rumah Selangor*

Figure 45 Spatial analysis of the 'Rumah Selangor'

There are three basic entrances. The rear entrance or women's entrance is common among the Muslims, separating male and female members of the family and visitors, which is very pronounced and significantly affects the activities in the house (Abidin 31) (Figures 45, 46, 47, 48).
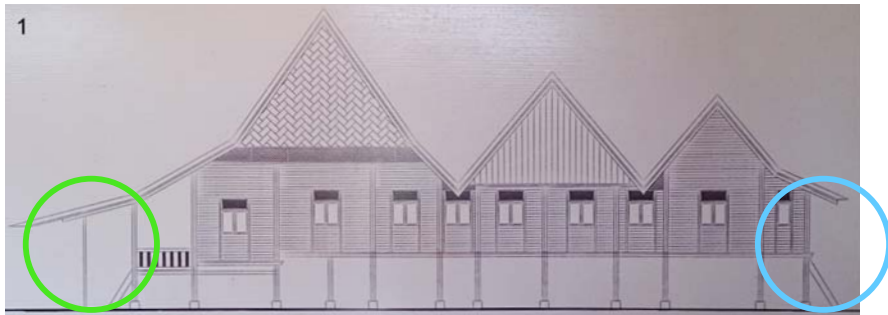
The front entrance is commonly utilised by the men in the past. However, both these entrances are not stereotyped according to gender today. Therefore, both men and women are entitled to use both entrances including the back.

Figure 46 Side elevation of 'Rumah Selangor' highlighting the front (green) and back (blue) entrances

Figure 48 Women's entrance highlighted
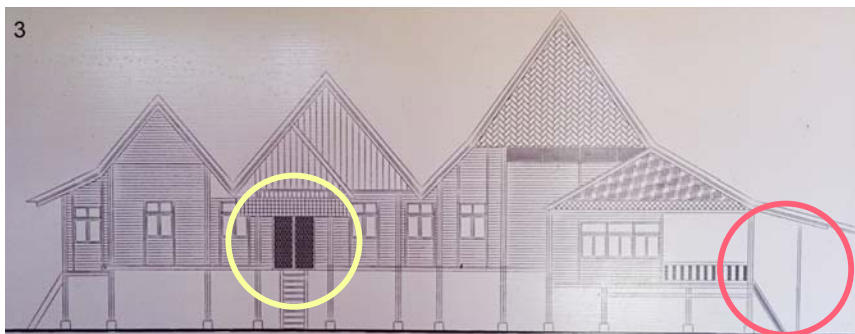
Figure 47 The distinguishable entrances for men (red) and women (yellow)

35

There is a significant rise of levels to the centre of the house (Figure 49 and 50). The *rumah ibu* or the core of the house is of the highest level, symbolising a greater significance to the occupants in the spatial hierarchy of the *Rumah Selangor*. The private bedrooms are located here (Figure 45 and 52). Therefore, this region of the highest level represents a high level of privacy for the occupants.
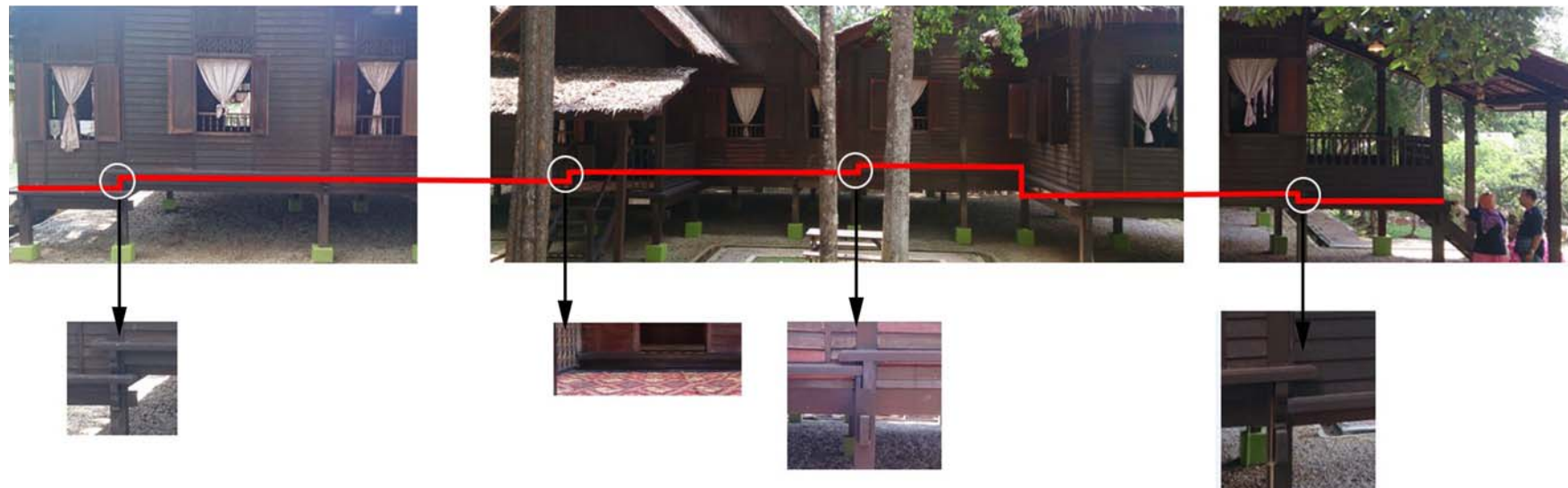

Figure 49 Change in levels at different spatial spaces

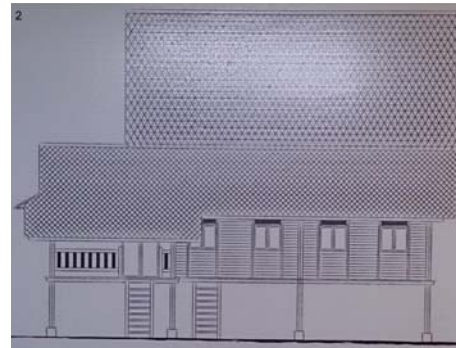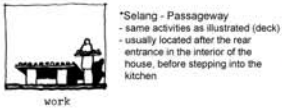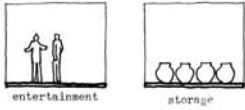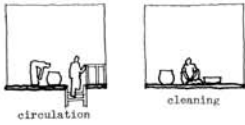Figure 50 Back elevation of the 'Rumah Selangor'

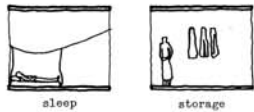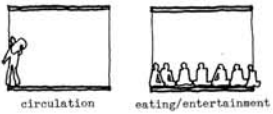Figure 51 Front elevation illustrating the 'anjung' and 'serambi'

Figure 52 Increasing levels (yellow) from the back to the core of the house, 'rumah ibu'

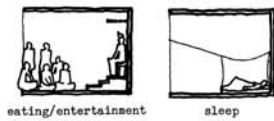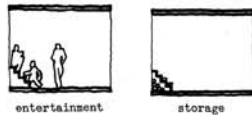Response of Malays families to the spatial functions

Figures 53 (right) Collage of activities and functions of the spatial elements

4. Rear Entrance & Deck

circulation
cleaning

entertainment
storage

work

*Selang - Passageway
- same activities as illustrated (deck)
- usually located after the rear
entrance in the interior of the
house, before stepping into the
kitchen

3. Serambi - Verandah

circulation
eating/entertainment

sleep
storage

work

2. Anjung - Sheltered Porch

eating/entertainment
sleep

1. Main Entrance

circulation
cleaning

entertainment
storage

Outdoor

Bathroom

Rumah Dapur
Kitchen

Serambi
Verandah
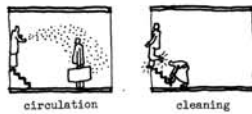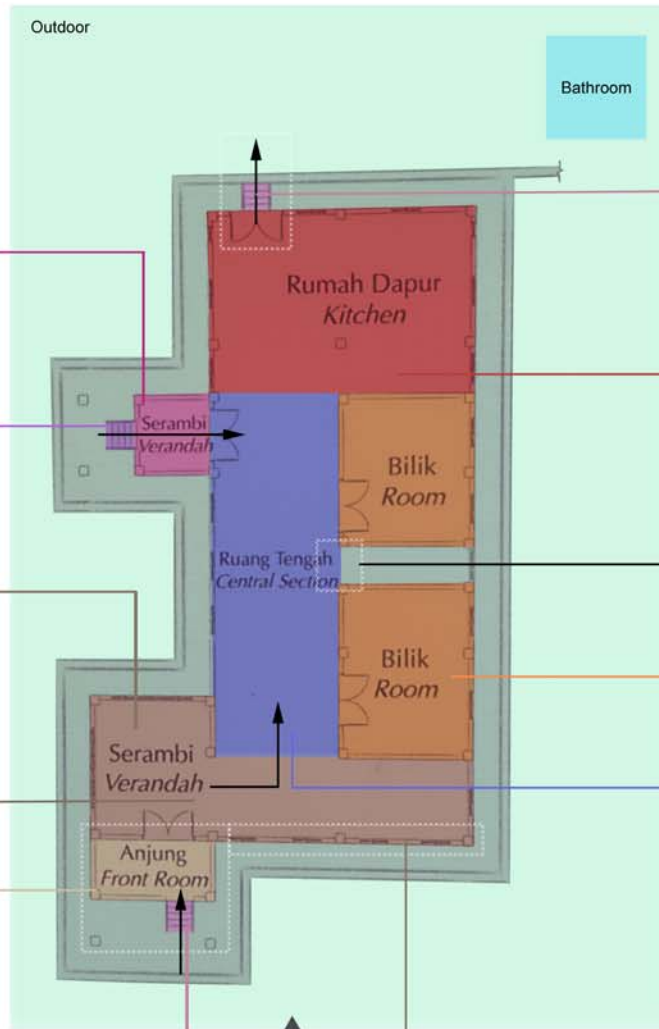
Bilik
Room

Ruang Tengah
Central Section

Bilik
Room

Serambi
Verandah

Anjung
Front Room

6. Rumah Dapur - Kitchen

circulation
cleaning

cooking
entertainment

storage
work

5. Rumah ibu - Main House

circulation
cleaning

eating/entertainment
sleep

storage
work

39
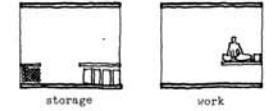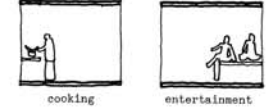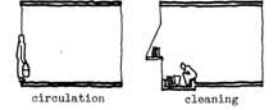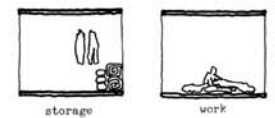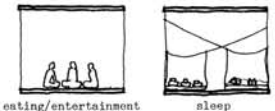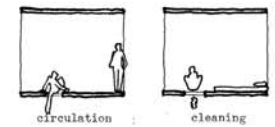
Response of the house to climate

(Adapted from Lim 1987)
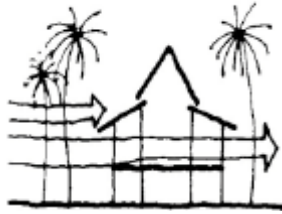
Surrounding trees provide good shade and does not hinder winds at the house levels.
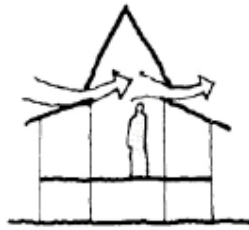
Roof spaces are properly ventilated by the provision of ventilation joints and panels in the roof construction.
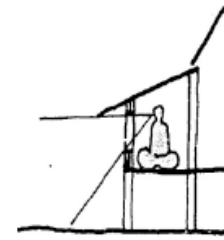
Large roof overhangs and low windows control glare.
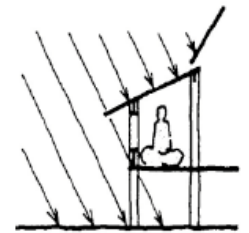
Good protection against rain, good shading, open windows for ventilation.
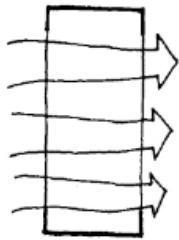
Minimal interior partitions in the elongated open plans which allows easy passage of air and good cross ventilation

Ventilated roof space helps to cool the house

Attap roofing of low thermal capacity gives good insulation against heat

Ventilation through roof joint

Large roof eaves for effective sunshading

Open interior spaces with minimal partitions allow good ventilation in the house

Fully openable windows allow ventilation at body level

Lightweight construction using low thermal capacity materials keeps house cool

Stilted house catches winds of higher velocity

Lightweight construction of wood has low thermal capacity, holding less heat and cools well at night.

Figures 54 Analytical diagram and design sketches illustrated in sections

2.3.5 Variations to the Basic Malay House

RUMAH IBU   SERAMBI GANTUNG   DAPUR   LEPAU   ANJUNG

RUMAH IBU   SERAMBI GANTUNG   COURTYARD RUMAH TENGAH   DAPUR

RUMAH IBU   SERAMBI GANTUNG   SELANG RUMAH DAPUR   LEPAU   ANJUNG
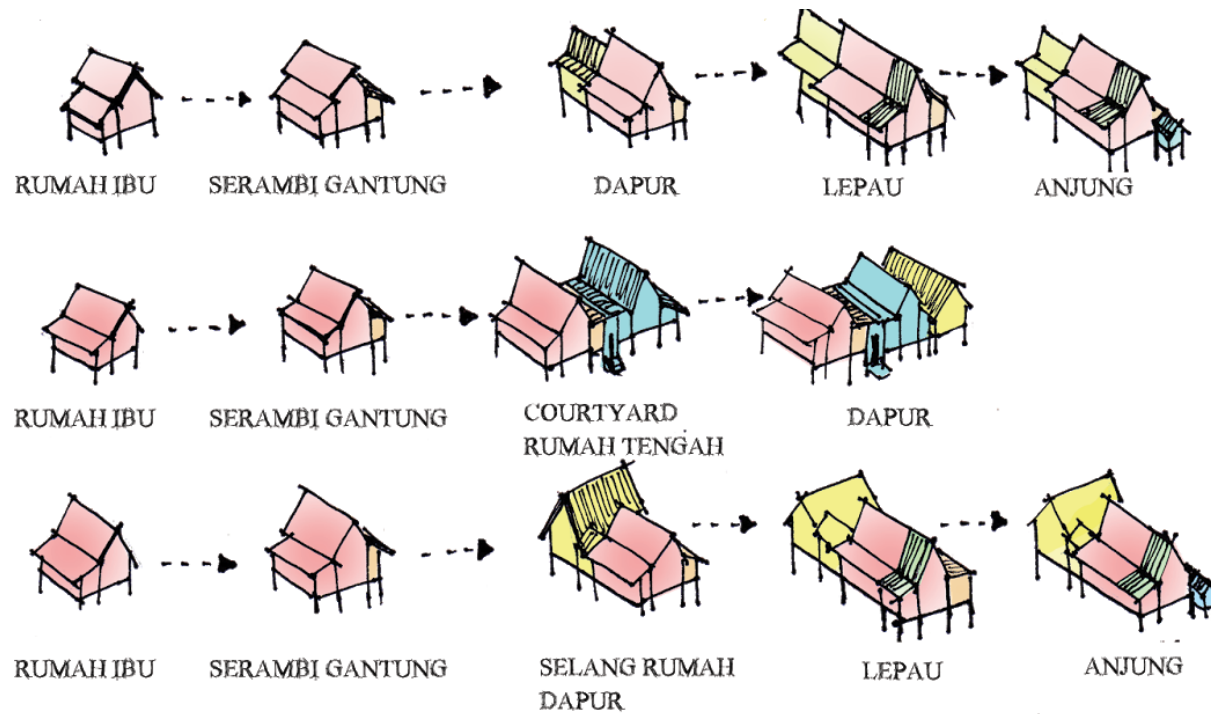
Figure 55 Common additional sequences in a traditional Malay house

The addition possiblities shown bellow are only the basic types. They can be combined in other ways to make the range of house extensions even larger.
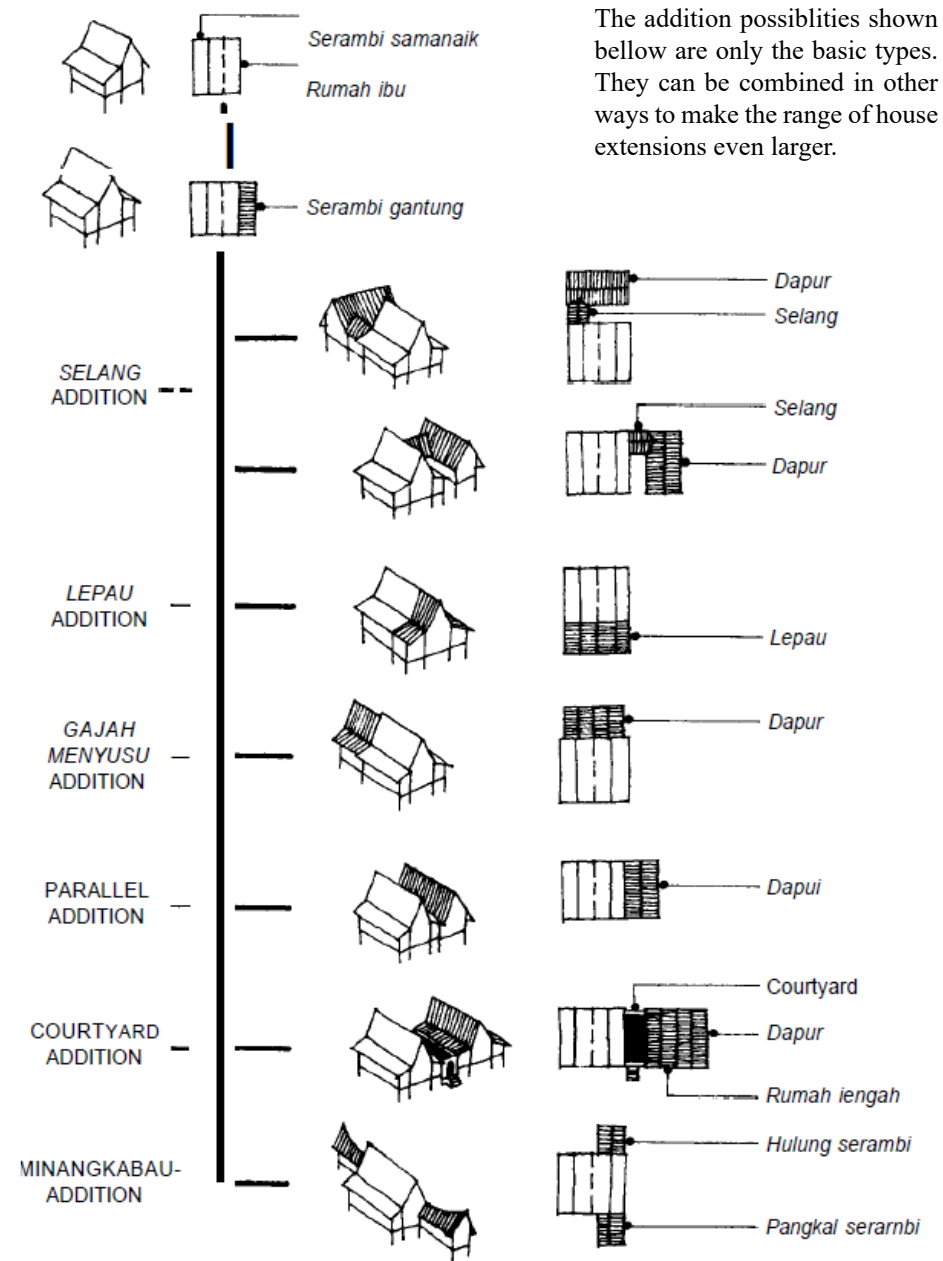
Figure 56 Additional possibilities in a traditional Malay house

43

2.3.6 Spatial Organisations and Relationships - Traditional Malay House

The information extracted from the case studies are summarised into working diagrams by the author.
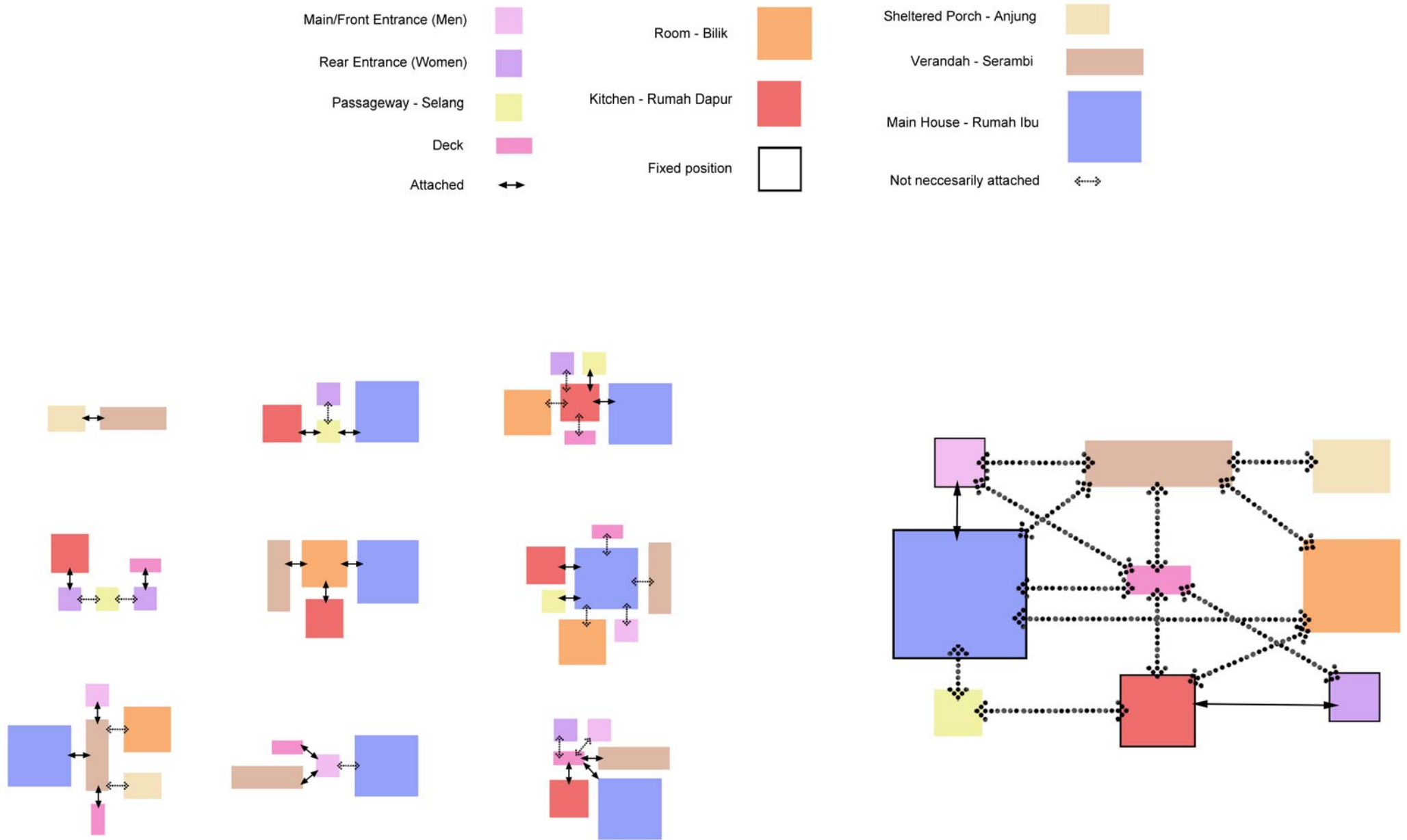
Figure 57 Extraction of information from case studies into working diagrams (Malay)

2.4 Chinese

Liang Sicheng and Lin Huiyin, two of the most famous Chinese architects of the 20th century, spent seven years at 24 Beizongbu Hutong. Until 20 years ago, the building was a perfectly preserved example of a traditional *siheyuan* courtyard house.

Main building
On an elevated foundation, such buildings usually have three to five rooms. Used as bedrooms, a studio and a living room by Liang Sicheng and his wife

Rooms facing the rear
Reserved for guests or as study rooms

Side wing

Wall facing entrance
Decorated with artwork symbolising happiness and prosperity

Main yard

Rear yard

Main entrance

Sources: Beijing Cultural Heritage Protection Centre, Phoenix media, jwb.com.cn

Side wing
Usually contains three rooms

Front yard

Chuihua Gate
Divides the front yard from the inner part of the house and is the only way in

Figure 58 Illustration of a traditional Chinese Courtyard House in China

47

2.4.1 Traditional Chinese Courtyard Houses - Beijing, China

These traditional dwelling typology translates to quadrangles from *Siheyuan* or historical Chinese Courtyard House which is courtyard surrounded by four separate built forms, informing the basic layout (Figure 58). This tight enclosure of a courtyard within a quadrangular building has been a common significant element in Chinese dwellings since the Western Zhou period, between the 11th and the 10th century BC (Knapp 31). This similar enclosed design is reflected on the Chinese settlements in Malaysia but in a larger scale of surrounding shop houses in a defensive settlement, analysed further in 2.4.3 Chinese Compound.
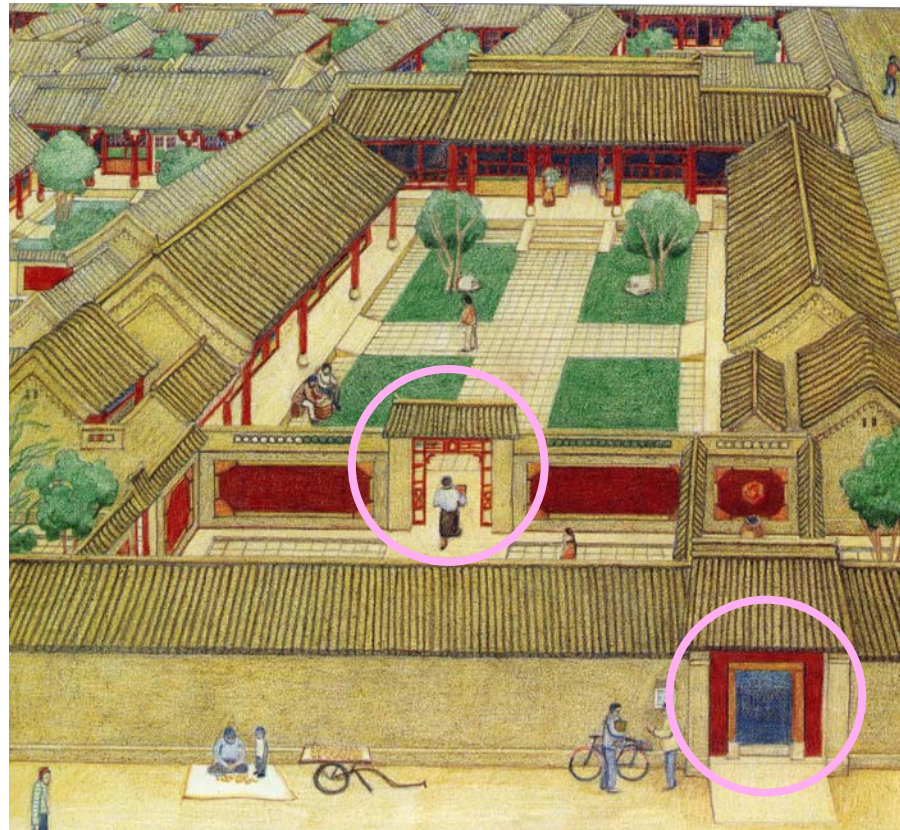
Figure 59 The entrance gates and open courtyard

As the core layout, the house emphasises on the centrality and symmetry. The exterior central courtyard is open to certain guests but is relatively private as the family dwells surrounding this space (Li 21) (Figure 59). Fundamentally, social rituals are practised and domestic functions are held here according to patriarchal relationships sanctioned by tradition (Wang and Ye 594).

The symmetry is acheived through the built forms, highlighting the social hierarchy of spaces for the family and women. Li notes the progressive and increasing level of privacy of the house to accommodate unmarried daughters with access to only family members at the end (21), reflecting the social hierarchy and privacy for the family and women (Figure 60).
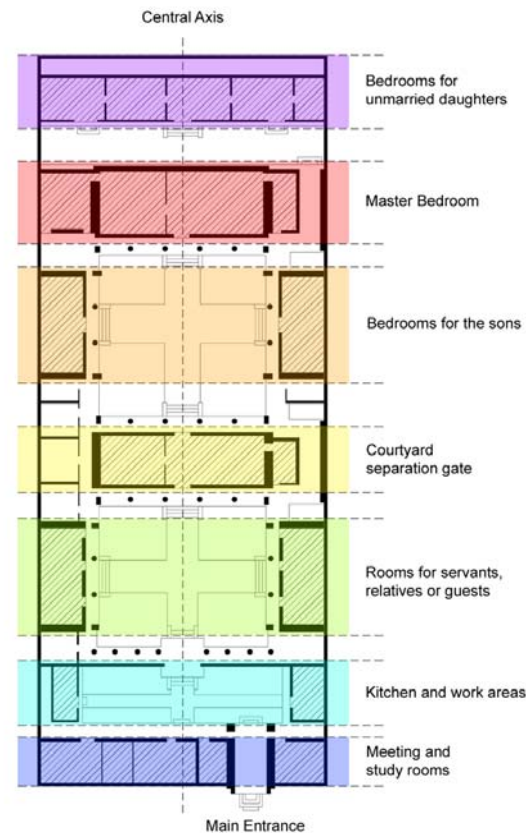
Figure 60 Programmatic diagram of a Siheyuan

49

Privacy

The privacy and access of spaces move linearly, from public to private among outsiders with the occupants when investigated in a traditional courtyard house. The gradual shift from public to private and often back to public are highlighted by the entrance gates (Figure 59), acting as a symbol to psychologically inform the public the house is private after this barrier (Li 21). The spatial transparency of public to the inside private spaces is emphasised by the gate and not the courtyard (Li 21). Additionally, the passageways act as an interface, blurring the separation between the indoor and open spaces (Figure 61).
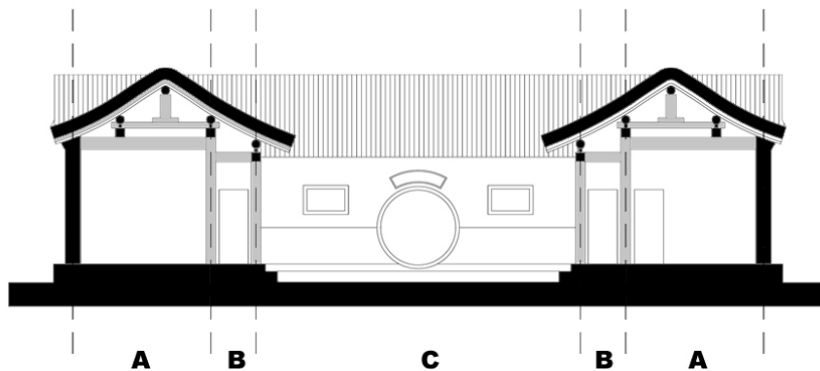
A - Indoor (private)
B - Semi-open (semi-public)
C - Open (public)

Linear

Figure 61 Progression of public and private spaces in a Siheyuan

The privacy and access of spaces among the occupants are studied further (Figure 62). Instead of a linear pattern, the spaces work in a radial configuration. The courtyard acts as an intermediate space between inside and outside and an evident central open space for the occupants to carry out traditional customs and rituals (Li 21).

The spaces function from here in a circular motion to the private bedrooms. The level of privacy increases, as the radius of the different circle spaces extend to the boundaries of the house. The combination of both configurations results in a harmonised balance of privacy between the public and private spaces throughout the courtyard house (Li 21).

Linear

Radial

Combination
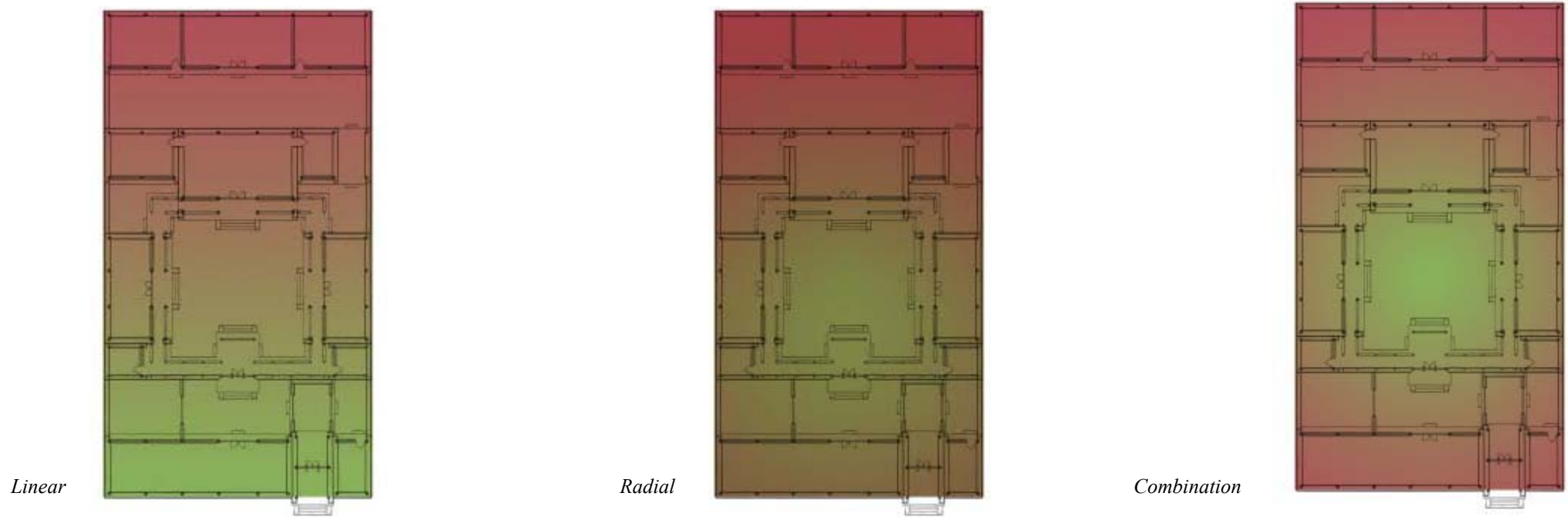
Figure 62 (plans on top and section on the left) Privacy study models highligthed in green (public) to red (private)

2.4.2 Theories

Human Body

The courtyard house is a traditional housing typology established on traditional cultural traits. People's spiritual conducts embody the courtyard house's rich cultural values. The human body theory is a discourse explaining the formation of a courtyard house.

The structure of the human body derives the symmetrical layout based on the cross axis (Li 25) (Figure 63). The centrality of the courtyard indirectly represents the heart of the body while the exterior structures enclosing the house implies the sense of security the skin protects the body from harm (Li and Zhang 105).
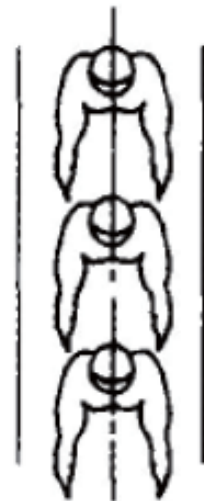
enclosure of
human body
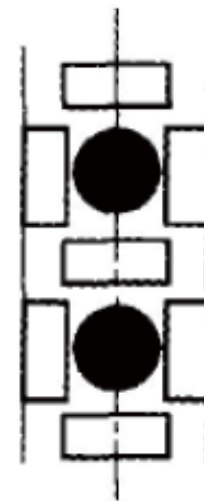
enclosure of
courtyard
house

Figure 63 Enclosure comparison of human body and courtyard house

Confucianism

The main theories are represented by Confucianism and Daoism in these courtyard houses.Confucius mentions *Rite* as the central philosophy highlighting the symmetrical quality of the courtyard houses. The elderly are wise, respected and henceforth, superior to the young, resulting in this current spatial hierarchy of the bedroom for sons first before the elderly (Li 24).

The inferiority of unmarried daughters compared to the significant role of men isolates their rooms to the back for privacy. The geometrical symmetrical structure of the courtyard house is expressed superior in the middle than the inferior sides clearly (Figure 64) (Ou 24). The clarity of the central spaces dominating the house is a physical expression of this ideology.
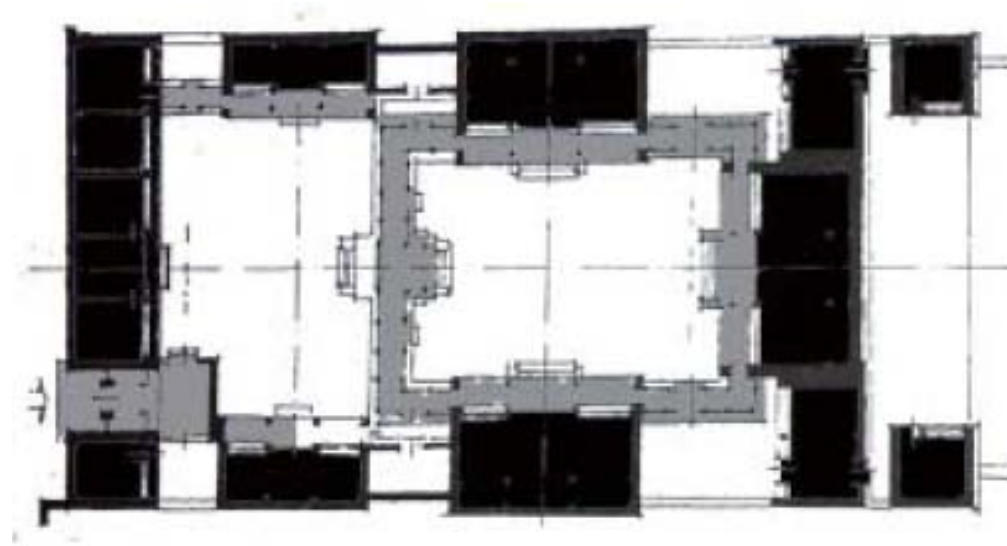
Figure 64 Contrast of spaces (Black - inferior)

Daoism

The concept of duality is emphasised in Daoism: rational and emotional, artificial and natural, dynamic and static, firm and empty (Xue and Zhu 29). The *Yin Yang* Theory suggests that *Yin* and *Yang* coexist and interdepend (Li 24) but adaptable and not fixed (Figure 65). The courtyard articulates the duality of interior and exterior creating a spatial contrast (Lo 2010).

The void where the invisible courtyard exists is *Yin* while the solid visible fragments of the house is *Yang*. This unity of opposites, where the house and courtyard are reciprocal and interchangeable, informs the ambiguity of the traditional spatial distinction (Sun, Wang and Zhang 176).

Figure 65 'Yin Yang' Trigram

Feng Shui

A theory involving the built environment based on Chinese history is well-known as *feng shui*. It is a technique of 'investigating geographical features used in site selection and construction' in the built environment to 'create a harmonious coexistence between humans and nature' (Travel China Guide) (Figure 66). According to Li, *feng shui* is scientific in architectural ecology as it is based on the many years of construction experience (25). The significance of the courtyard and symmetry in traditional Chinese Houses, are informed by this theory.

The interdependent relationship between the building and environment is emphasised by the traditional courtyard houses in China revolving around the five elements. The main building in a courtyard house faces the sun for sufficient lighting and the entrance at the southeast corner to face the predominant wind direction in Beijing for proper ventilation (Figure 67) (Li 25). The position of the fire element on the south and wind on the southeast in the diagram justifies this theory (Figure 68).

Figure 66 Building site in terms of good 'feng shui'

Figure 67 Ideal 'feng shui' building model
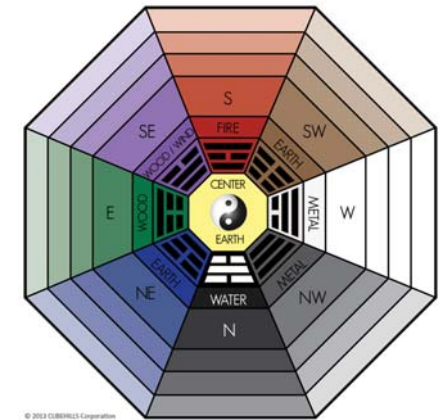
Figure 68 'Feng Shui' Colour Theory

Chinese Shop House

The airwell acts as an internal courtyard. It helps ventilate the house and also lights up the rear section which has windows opening onto the airwell.

The jack roof is an elevated roof segment above the main roof. It allows hot air to escape through the roof as well as light to enter the upper floors.

The five-foot way at the front of the shophouse is used by the public although it is private property (see box).

The business area is always situated in the front section of the shophouse which opens onto the five-foot way.

The kitchen, bathroom and toilet are located at the rear of the building, adjacent to the dining area. An open drying area may be attached to the back of the kitchen.

The living areas at the rear and on the upper storey of the house are often partitioned into cubicles and sublet to tenants.

Figure 69 Typical Chinese Shop Houses in Malaysia

2.4.3 Chinese Compound - Khoo Kongsi Complex, Penang, Malaysia

Since the rise of British power in the Far East, Penang was a potential island for many settlers especially enterprising traders and established businessmen. During the British rule in the 19th century, *Khoo Kongsi* along with four additional Hakka Clans, were known as the Five Big Clans rooted and formed their congregation practised in respective bases informing the adjoining and protective settlement in the colonial city (Khoo Kongsi) (Figure 70).

This defensive establishment reflects the Hakka's *wei* or enclosure and *bao* or fort resulting in a closely-knit building complex, which informs the 'strong centripetalism and solidarity of the Khoos in the past' (Khoo Kongsi) (Figure 71). The diversity of a migrant society with a colonial, urban and commercial reflects the adaptability of the clan in this settlement in Penang.

Figure 70 Highlighted 'Khoo Kongsi' Settlement
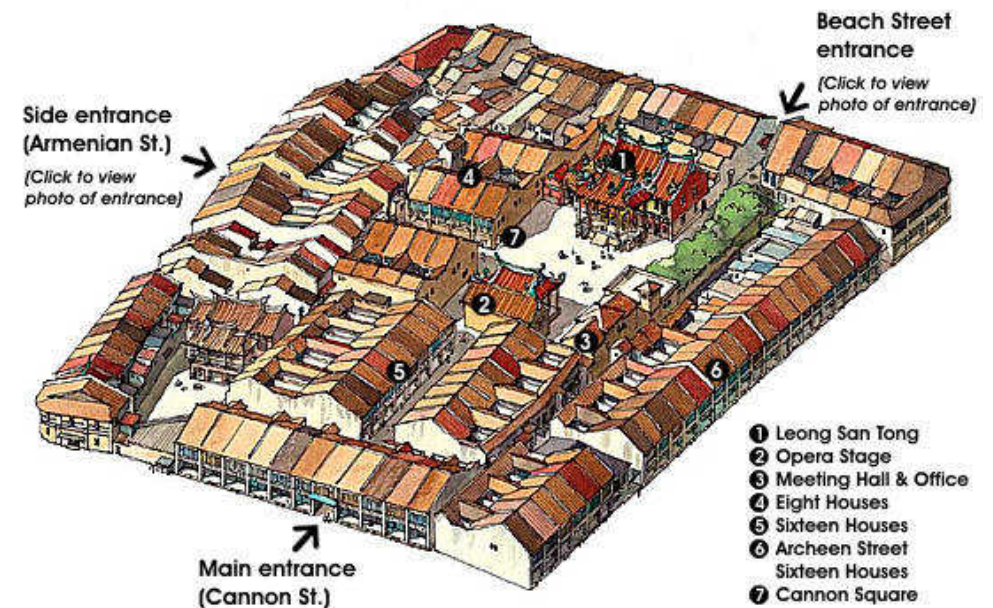
Figure 71 Panoramic view of the 'Khoo Kongsi' Settlement

The Khoo Clan revolves strongly at the protected main clan house in a 'defensive instinct to safeguard the inadequate public security' (Khoo Kongsi). It promotes 'clan solidarity and to foster Confucian core values such as piety and respect for elders' (Tourism Penang). The Canon Square serves as a public space for social and cultural activities at the opera stage, to preserve these traditional values among the villagers and future generations (Figure 71). Surrounding the central region, the sixty two units of terraced and shop houses configure the labyrinthine to appear similar to a village (Khoo Kongsi) (Figure 71 and 72).

Figure 72 Crowded shop houses and terraced houses

2.4.4 Shop House - Penang, Malaysia

The basic elements (Figure 73) and the spatial activities (Figure 69) of a typical shop house are identified from the two illustrations. The adaptation of a traditional Chinese Courtyard House into a Chinese Shop House is analysed in the following case study.

The combination of residential and commercial in domestic architecture resulted in the continuous evolution of shop houses in a variety of styles. However, the traditional arrangement of shop houses in linear blocks linking to the streets sustained, constraining the size and structure of the buildings (Ho, Hassan and Noordin). The rising demands of urban compactness and land values lead to the expansion of these shop
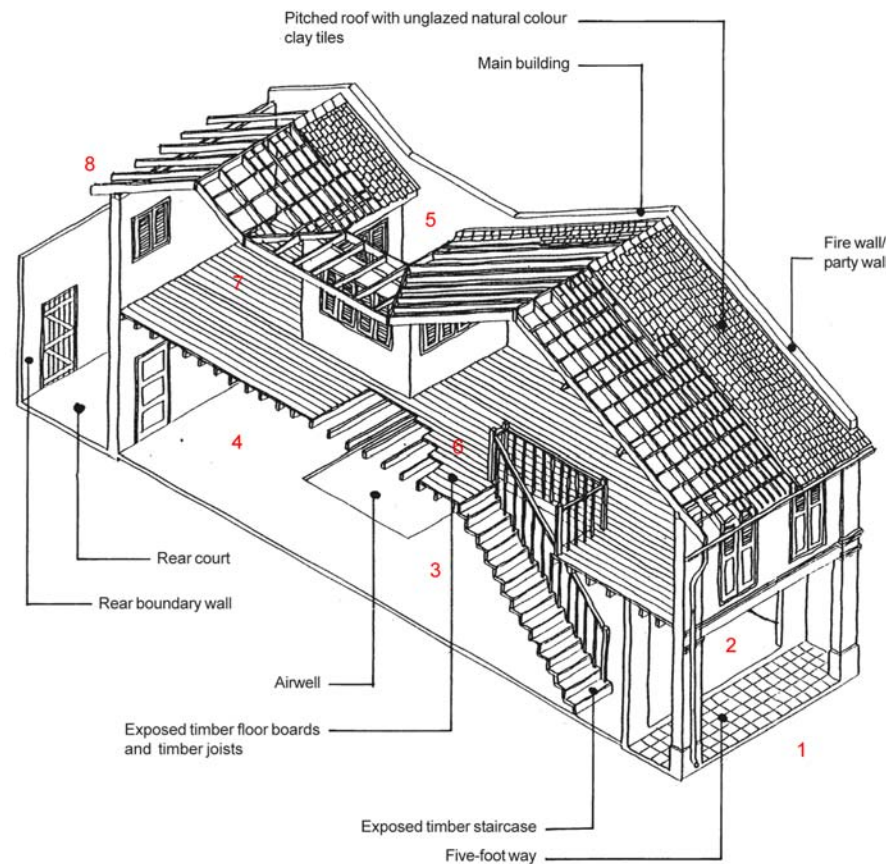
Figure 73 Elements of a typical shop house

houses as the source of economic growth until the 1970s (Ho, Hassan and Noordin). As a result, triple storey shop houses were in introduced which later lead to the conversion of shop houses to the development of high rise commercial buildings (Teh 1987). Today, shop houses are acknowledged as an architectural heritage through careful restoration and preservation by the local government (Figure 74).

Figure 74 Collage of the spatial elements before and after restoration of a shop house

2.4.5 Chinese Shop House No. 140, Lian Huat Company - Penang, Malaysia

Lian Huat Company is a paper trading company in a two storey shop house (highlighted in purple) selling and stocking paper (Figure 75). The additional function for a business to operate within a living environment on a smaller scale land, clearly justifies the separation of the building into two floors, unlike the single floor in a traditional courtyard house.

The ground floor consists of large halls for the business to operate and is utilised for storage throughout the floor, while the first floor comprises of a series of rooms. The open halls give an elevated sense to the shop house allowing the occupants to view the entire shop house from any hallway (Ng, Teh, et al.) because of the linear design of this longitudinal shop houses (Figure 76).

Figure 75 Lian Huat Company

Figure 76 Linear composition of longitudinal shop houses

Due to the small scale and limited land, the private dwelling is forced to the top for the convenience of the owner and his family. Nevertheless, the spatial sequence on both floors are linear (Figure 77), similar to a traditional courtyard house.

The first floor is distinguished from the ground by the walls and partitions, dividing spaces into fixed private rooms. The front air well enhances the visual interaction and communication between the staff downstairs and the owner upstairs at this semi-public space (Ng, Teh, et al.) (Figure 78).
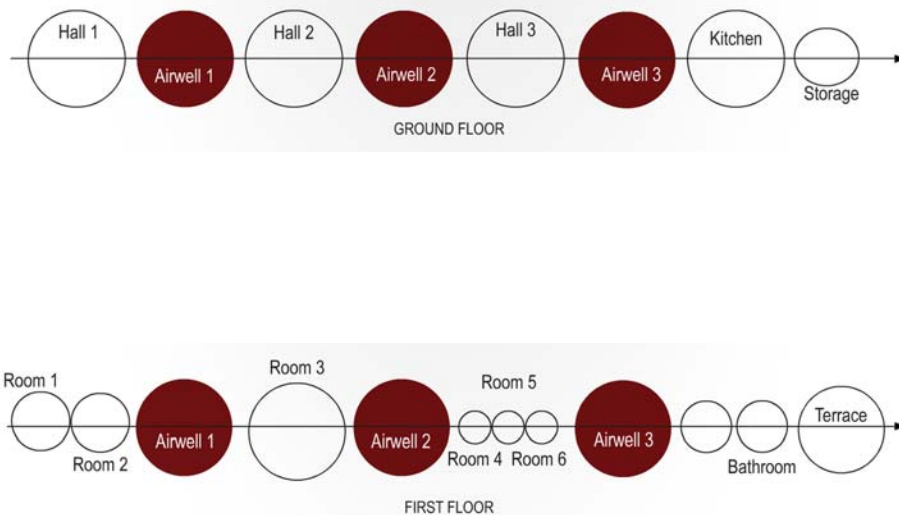
Figure 77 Linear compositions of all the spatial elements

Figure 78 Spatial difference (public to private)

Spaces downstairs from the first hall till the rear court are semi-public where the business takes place between the customer and owner, while the private spaces upstairs are for the occupants to rest and live after business hours.

The functions of these spaces are evidently modified from the traditional configurations to suit the needs of the migrant shop house dwellers in a foreign land. The collages depict the circulation flow from the public, semi-public to private spaces of this two storey shop house (Figure 79).
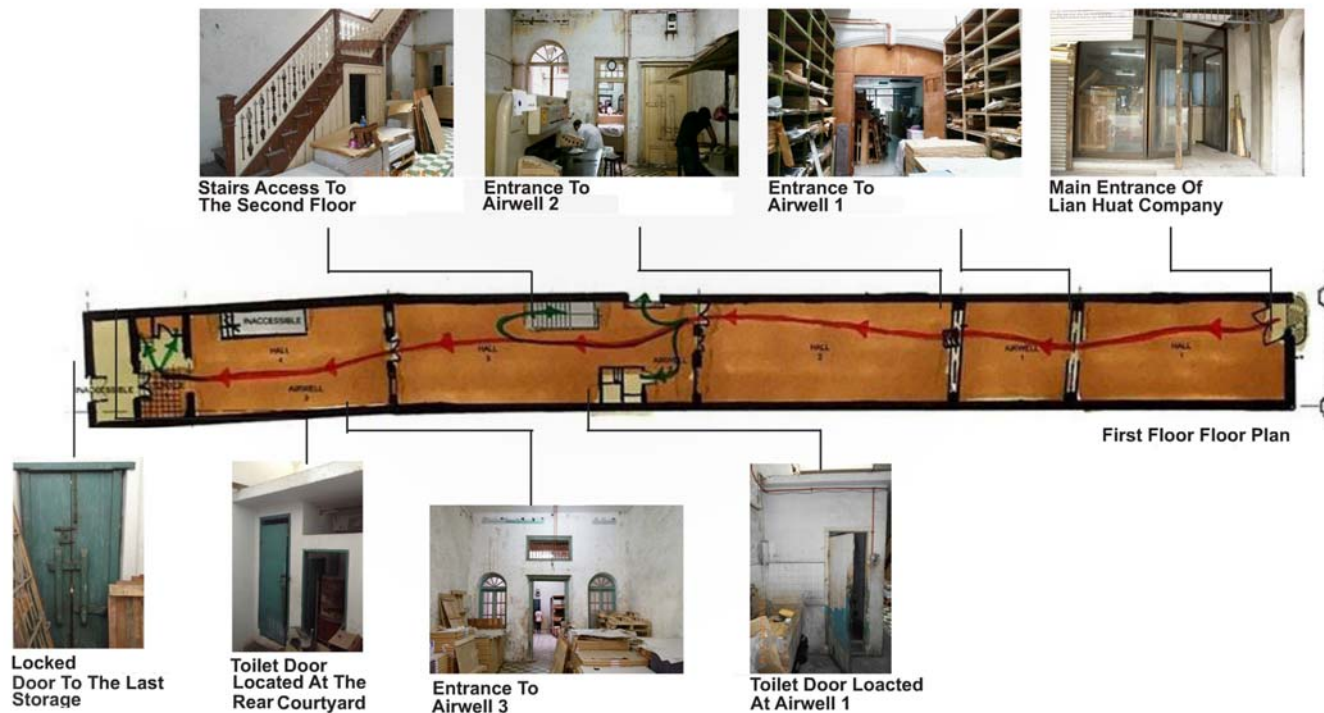

Figure 79 (top and right) Circulation of spaces
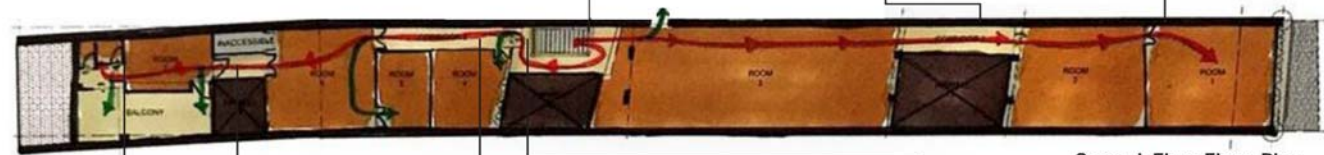
Stairs To The
Second Floor

Walkway That
Connects Second And First Hall

Entrance To The
First Hall

Second Floor Floor Plan

Entrance To The
Balcony

Entrance To
Kitchen At Rear Courtyard

Walkway To
The Rear Courtyard

Door To The
Walkway At The Back

Response to Climate

The adaptation of external courtyards into internal courtyards in a shop house is analysed. Similar to an external courtyard, the central air well opens directly to the sky (blue circle), giving occupants the opportunity to have a private open space such as the hall at the first floor within the shop house (Ng, Teh, et al.) (Figure 80).

Therefore, the air wells are internal courtyards instead of an external space because the buildings adjacent are connected in a row (Figure 76). This adaptation to compromise space and privacy (Figure 82) has reduced the level of indoor thermal and comfort level compared to the *siheyuan* but still fairly acceptable for occupants to adapt to.

EXTERIOR
(FIVE FOOT WAY)

INTERIOR
(AIRWELLS, HALLS, ROOMS)
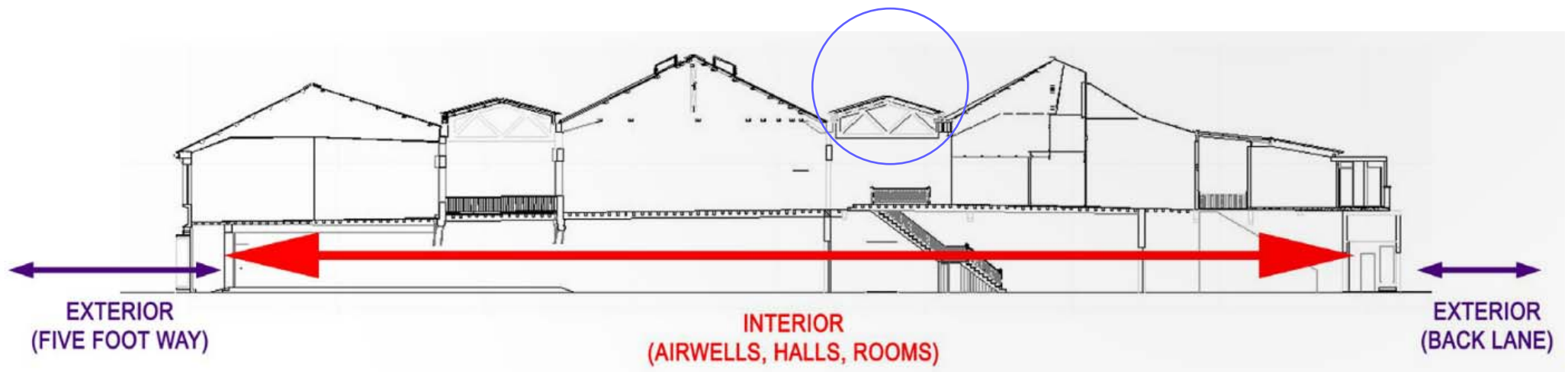
EXTERIOR
(BACK LANE)

Figure 80 Interior and exterior spaces

These two air wells function to allow natural lighting and ventilation (Figure 81). Fresh air flows, preventing the stagnation of the interior air and indirectly removing scent and excessive moisture (Ng, Teh, et al.).

Internal partitions act as openings between rooms to facilitate the air flow throughout the shop house such as lattice screen allowing hot air to escape (Ng, Teh, et al.).
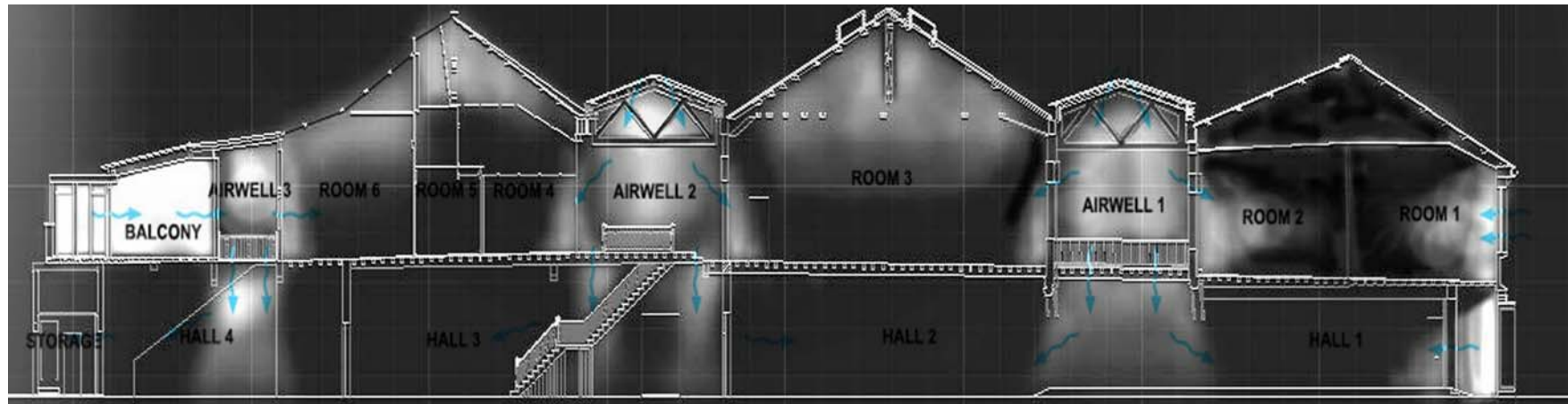
Figure 81 Flow of ventilation and natural lighting

The adjustable louvered windows encourage air flow as well as keeping out the glare (Ng, Teh, et al.). The source of penetration of light is mainly through the air wells to light up the dim spaces of the shop house which radiates stronger at the internal courtyards (Figure 81).

The following blown up axonometric study depicts the different elements and collage of images of this reformed shop house from the traditional courtyard house (Figure 83).
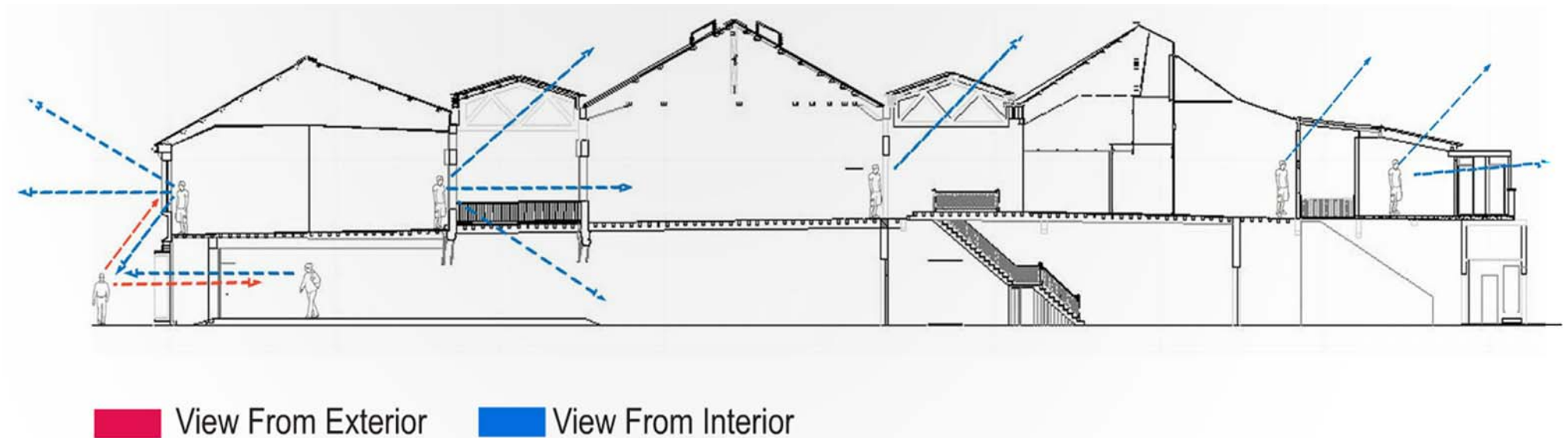
Figure 82 Extent of different views

Figure 83 (right) Exploded isometric study and collage of images of Lian Huat Shop House

LEGENDS :

1. FIVE FOOT WALKWAY
2. HALL 1
3. AIR WELL 1
4. HALL 2
5. TOILET
6. STAIRCASE
7. HALL 3
8. HALL 4
9. INACCESSIBLE STAIRCASE
10. UTILITIES ROOM
11. INACCESSIBLE ROOM
12. ROOM 1
13. ROOM 2
14. CORRIDOR 1
15. ROOM 3
16. CORRIDOR 2
17. ROOM 4
18. CORRIDOR 3
19. ROOM 5
20. ROOM 6
21. CORRIDOR 4
22. KITCHEN
23. W.C
24. TERRACE
25. INACCESSIBLE SPACE
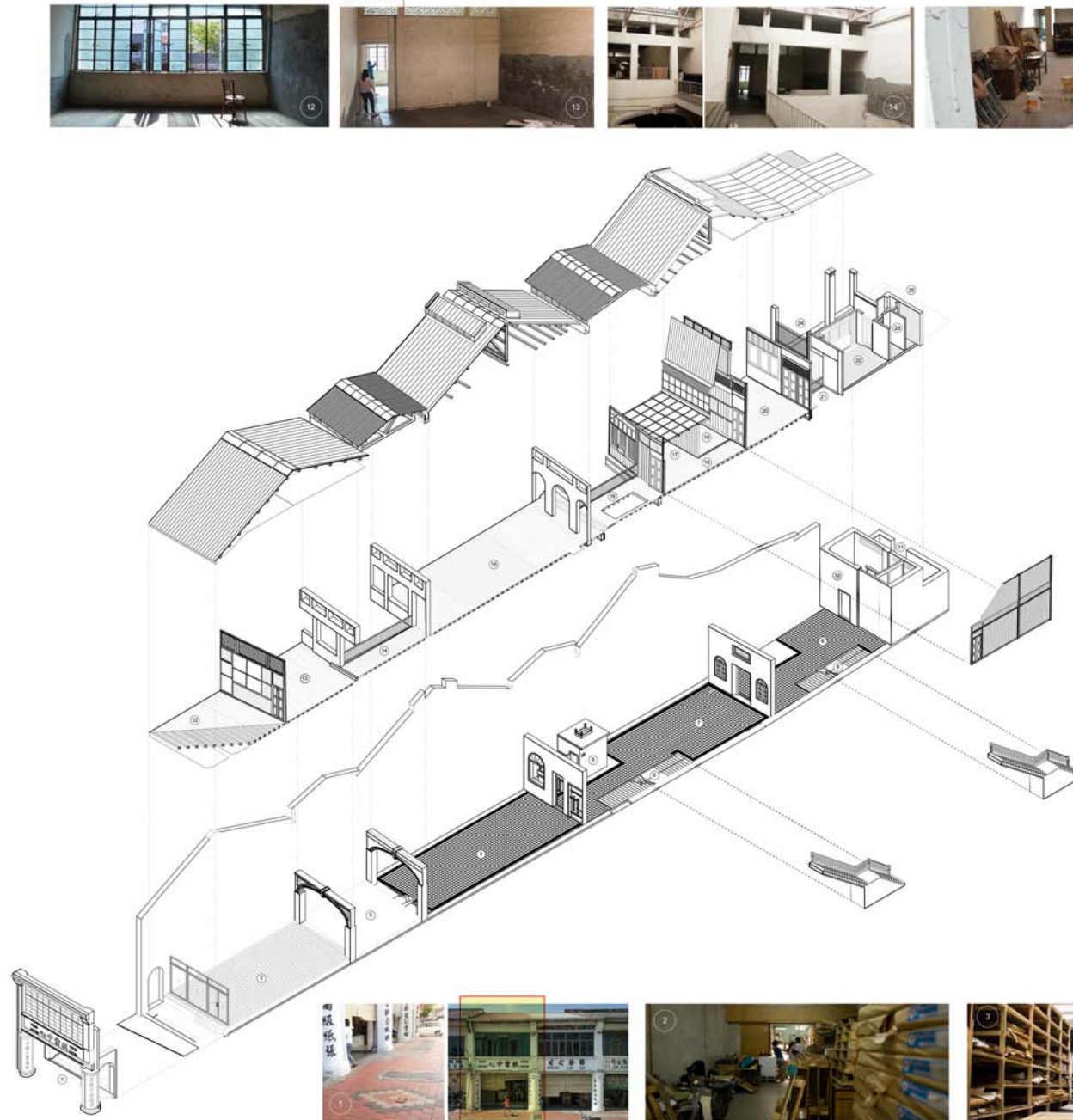
2.4.6 Spatial Organisations and Relationships - Traditional Chinese Shop House

The information extracted from the case studies are summarised into working diagrams by the author.

Figure 84 Extraction of information from case studies into working diagrams (Chinese)

2.5 Indian

Figure 85 The Supreme Trimurti (Lord Brahma, Lord Vishnu, Lord Siva)

2.5.1 Traditional Indian Row Houses - Tamil Nadu and Kerala, India (South)

Agraharams are known as Brahmin houses found in the temple cities of Tamil Nadu and Kerala, in the South of India. This traditional row housing may vary in widths from 2.8-6m but demonstrates social needs, creating an interface between p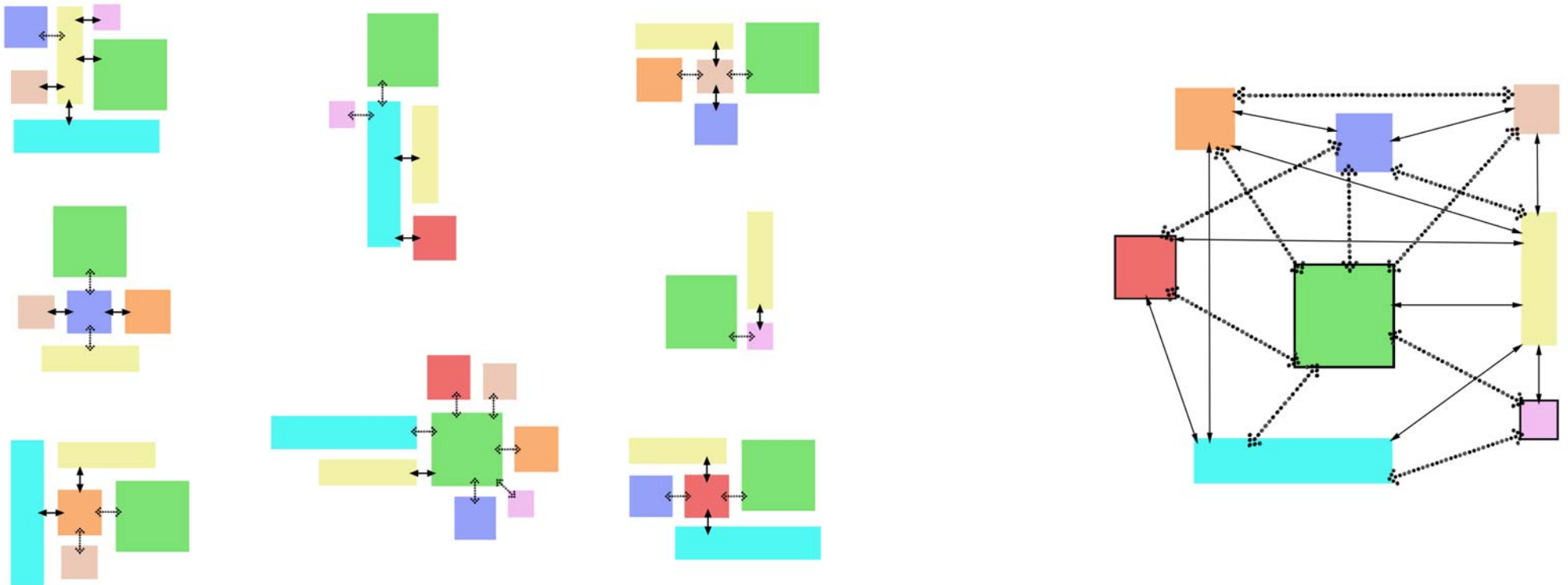ublic and private domains (Sanyal 315). Additionally, this traditional development is of 'legibility and familiarity that fosters security and belonging to a place which achieves convenience in communities' (Sanyal 315) (Figure 86 image and sketch).

In contrast to the matriarchal system, the joint family system eventually lead to a sense of sharing and togetherness amongst the local communities. The current system practised qualities of living together and sharing of private spaces (Rajeev 10). Consequently, this is reflected in the design for family members living under the same roof in *agraharams*.
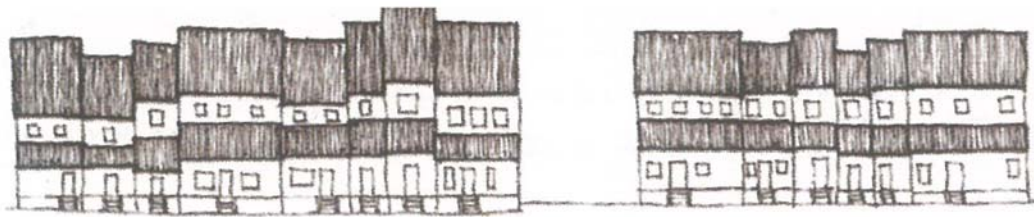
typical street elevations
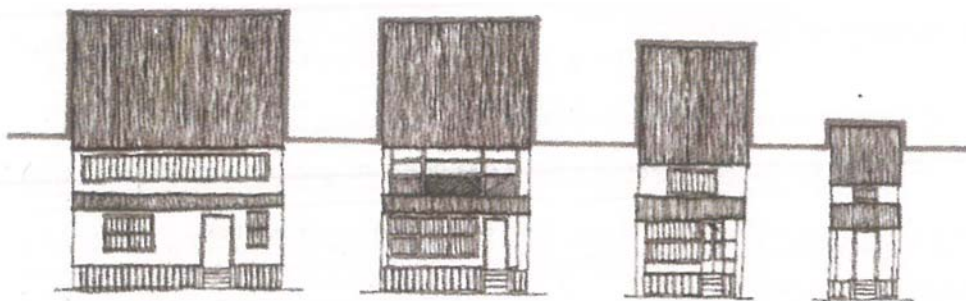
Elevations of the four variants of the Agraharam typology

street sketch

Figure 86 Elevations, image and sketch of 'Agraharams' in Kerala

Due to the humid climate, the incorporation of courtyards is designed to keep the houses cool and use locally available material (Sanyal 315). Good ventilation flows through the 'alignment of the doors while the houses abut each other along their faces to reduce heat gain' (Sanyal 315) (Figure 87). The sitting rooms and inner rooms are ventilated by the courts while the yards in the rear have detached spaces for the cattle and toilets (Sanyal 315).

This introvert settlements lived in a significant culture of sharing and living together especially for festivals. The indigenous agrarian settlements of Kerala lacked gathering places, besides the temple (Rajeev 10). As a result, the narrow streets were open to cater the needs of the Brahmin communities for important religious functions and marriage feasts instead of transportation (Rajeev 10) (Figure 88).

PLAN OF 4 DWELLING UNITS

Figure 87 Axonometric and plan of 'Agraharams' in Kerala

Figure 88 'Durgashtami Navarathri' at Kodunthirapully Village, Palakkad

2.5.2 Bidada Village, Kutch - Gujarat, India (West)

These multi-religion community lives harmoniously together in a settlement but is eventually segregated by respective religion and caste. Unlike the Malay settlers practising the same religion, Muslim, this Indian community in Kutch comprises of more than a one religion group in this community. The non-vegetarian Harijans and Muslims are settled in the 'wind direction away from the village', to avoid the 'odours emanating from flesh and meat preparations' by the rest of the villagers (Udamale 36) (Figure 89). Despite the segregation, the main village squares act to move the villagers from individual dwellings to a communal space, *chowk*. Hence, this network of streets (Figure 90 sketches) not only divides the community to different directions of their private dwellings but assembles them as well.

Figure 89 Sketch plan illustrating various community zones and location of houses
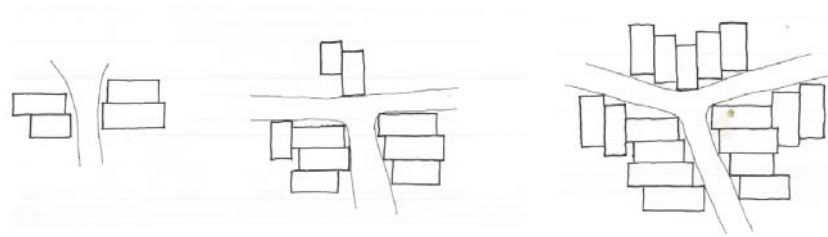
Probable evolution of Y shaped chowks which further form the village settlement
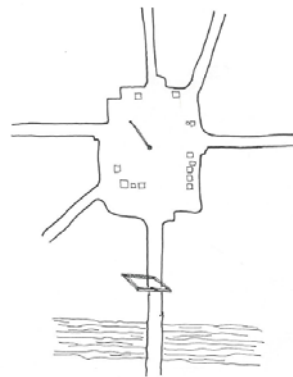
Plan – main village square (Harla chowk)

Overlooking from the main Village Square (Harla chowk) towards a radiating street
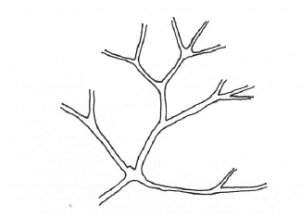
The street network like a water stream
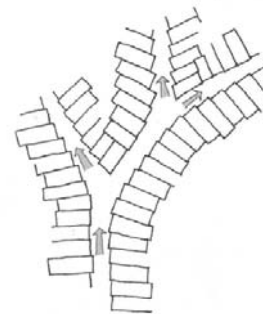
Y shaped branching of streets forming small intersections (squares/chowks) at regular intervals

Figure 90 Simple sketches, illustrations of village square and street branching

The streets are described as a mesh of curvilinear patterns connecting *chowks* (Figure 91 3D study models). These major advantage stated by Udamale, is the channeling of winds throughout the village allowing the breeze to be discreetly felt on any street, justifying the curved street pattern (38).

The staggering by few feets of each row house on opposite sides informs the curvilinear street, providing shade during the day (Figure 91 sketch street and photograph) (Udamale 40).

Model of a street and chowk in Bidada village

Bhojnalaya chowk

The height to width proportion of courtyards and streets provide shade for most part of the day
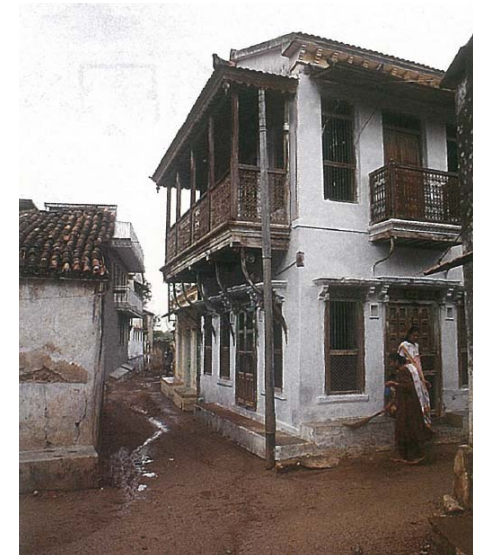
Figure 91 3D Study models, sketch street and photograph

80

The 'alternating courts and rooms, the shifting of door axes' (Figure 92 sketch section and plan) allows the flow of breeze from multi-directions and retains privacy, despite making the streets dynamic and visually interesting (Udamale 40).
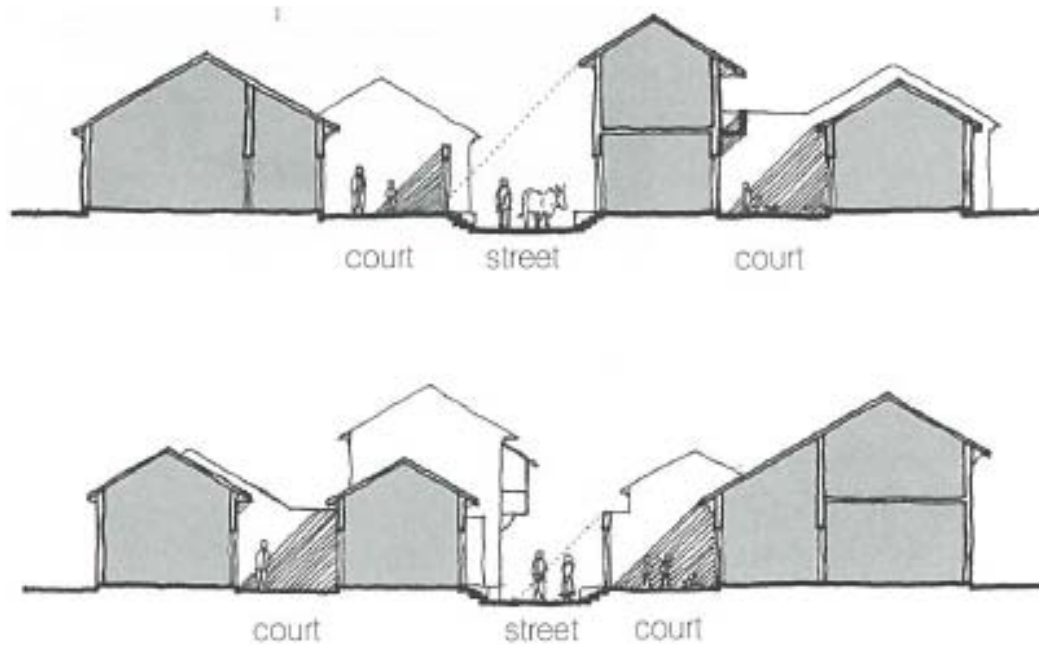
Sketch section: A dense row house typology taking care of light, cross ventilation and breeze
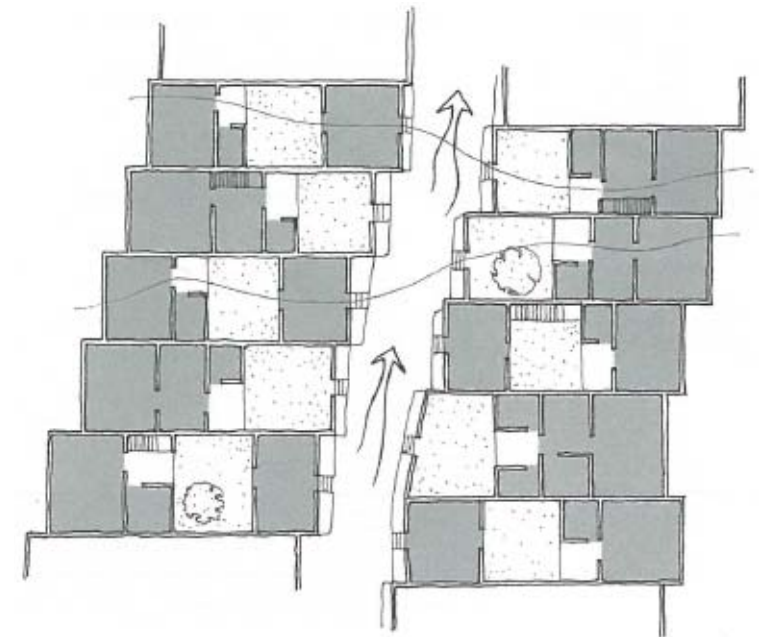
Sketch Plan: The changing heights and with it the streetscape, note the alternating courtyards for ventilation and shade

Figure 92 Sketch section and sketch plan

2.5.3 Analysis of Spatial Organisation
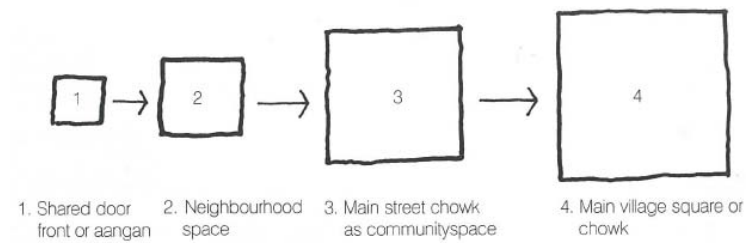
Figure 93 Spatial organisation

Similar to the row houses in Kerala, the curvilinear network of streets play a significant role for the villagers to carry out local festivities. The streets act as a shift in sequence to the public (Figure 93 and 94). 'The composition of intermediate squares (*chowks*) located at regular intervals forming an interlinked network' (Udamale 44) (Figure 94 drawing location of *Temple Chowk*), serve as shared communal spaces and temples for religious practices (Figure 94 photograph). The pattern of the curved street facades reaches a festive mood at night when all the lamps are lit in the front of each row house during the festival of lights, illuminating the entire street through everybody's participation (Udamale 44).

Doorstep (Aangan)

1

2 — Neighbourhood space

3 — Community chowk

4 — Village square/ Bazaar/Maidan

1. Shared door front or aangan
2. Neighbourhood space
3. Main street chowk as communityspace
4. Main village square or chowk

G: Temple chowk

Temple chowk

Bhojanalaya chowk — 3

N

0   10   30   50m
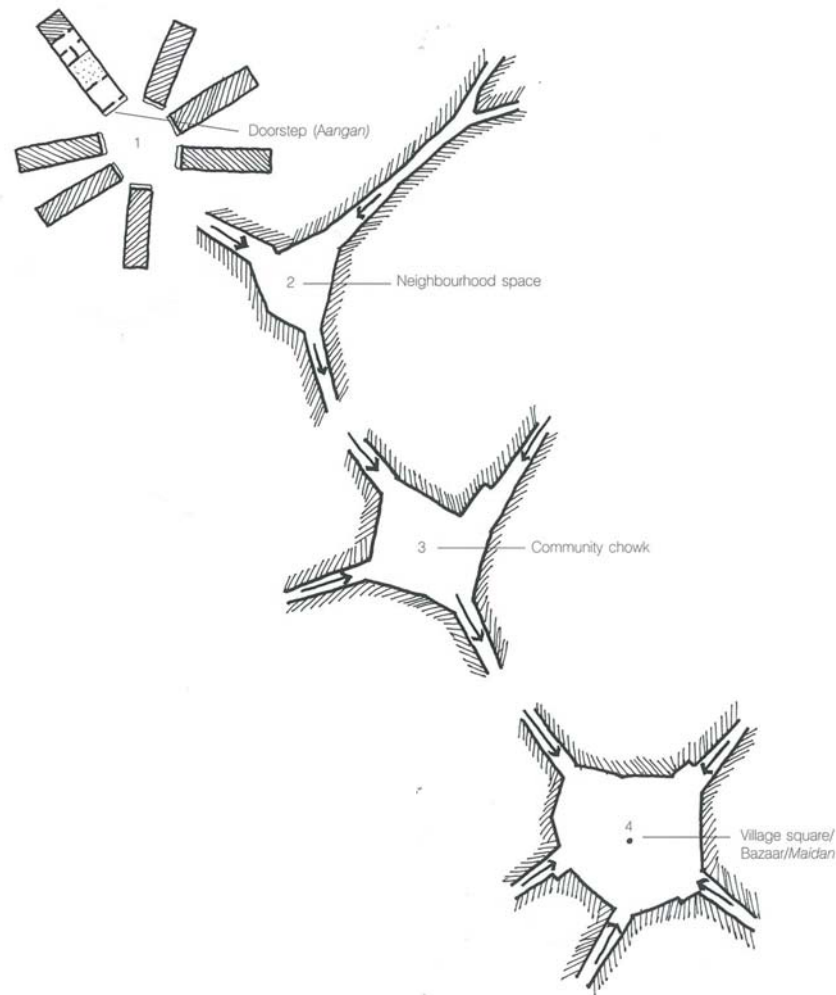
Figure 94 Drawings of the spatial organisation, photograph of Temple Chowk and its drawing location in the system of public spaces of the village

2.5.4 Analysis of Built Form
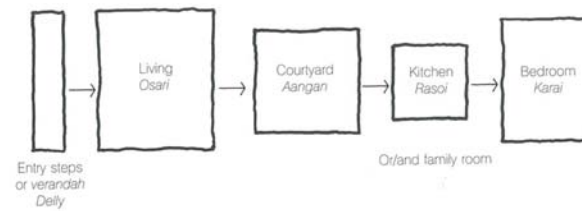
Figure 95 Spatial planning

The village expresses a distinct character from the varying scale of public spaces, the curvilinear streetscape to the planning of the houses. The spatial hierarchy of the community spaces and streets of the village depict a clear transition from the private dwellings to the public spaces. This clarity is reflected in the interior spatial spaces of the houses, in relation to the climate, cultural pattern, social status and living pattern (Figure 95) (Udamale 58).

'The whole composition of the built form expresses a particular lifestyle of the close knit Kutchi people and their society' (Udamale 58) (Figure 97). The variety of traditional houses are categorised into 6 unique types (Figure 96). Types 1, 2 and 6 integrates a distinct courtyard into the house. The first two types are studied and investigated further for the purpose of this research.
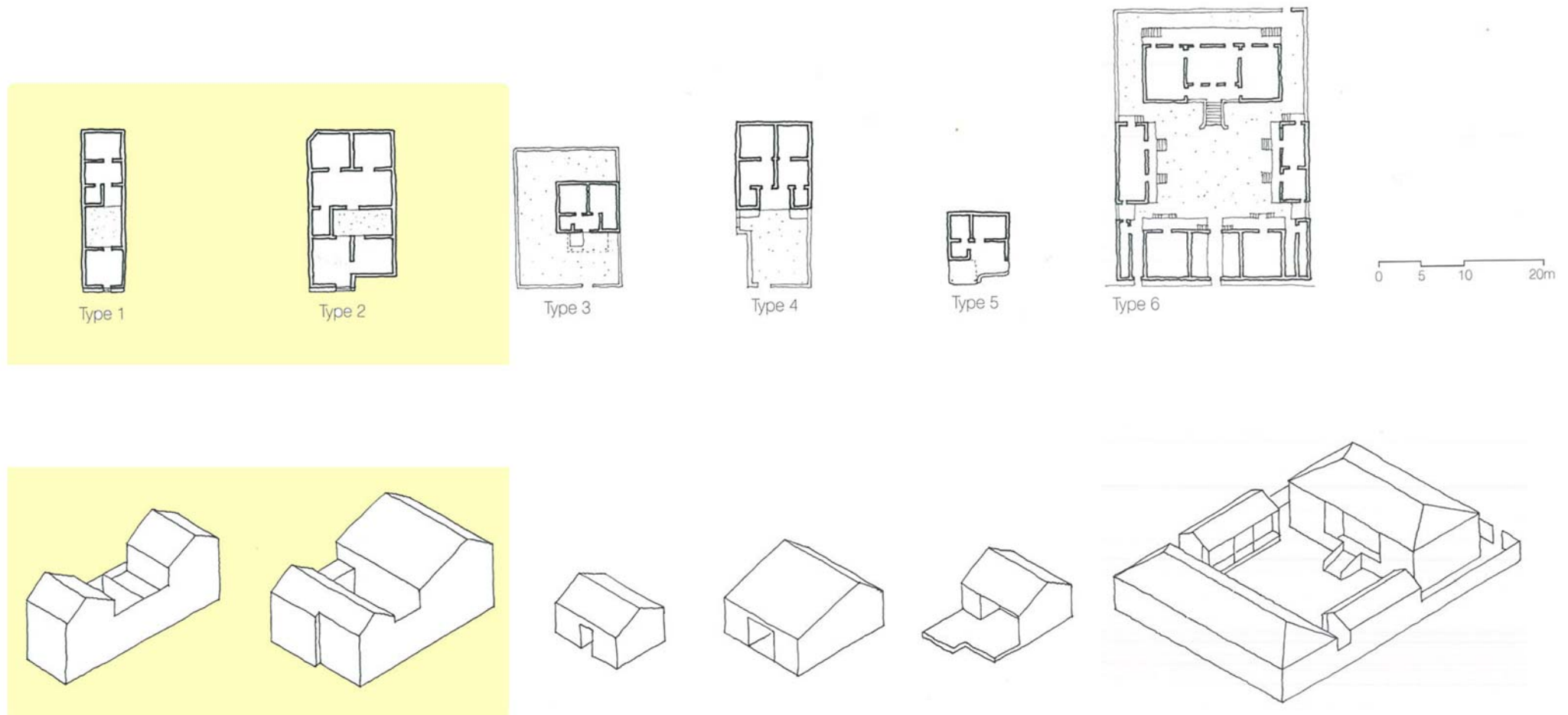
Figure 96 Plans and 3D sketches of the six types of built forms

Lyrical order in composition – architecture of village street
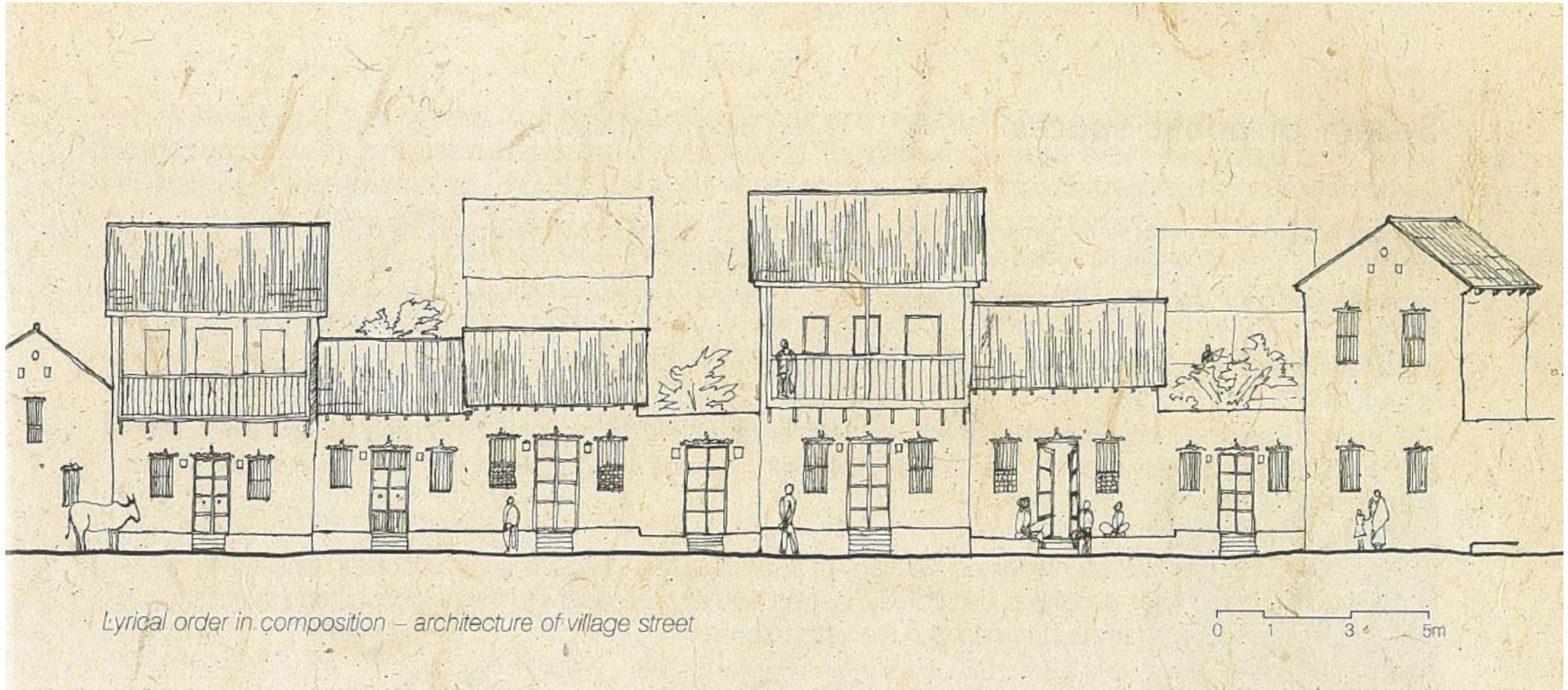
Figure 97 Elevation of Indian Row Houses

House Type 1 and Type 2

House type 2 is a variation of type 1, adapted to the vivid status of the family in terms of scale and sizes of the rooms but with the similar spatial sequence (Udamale 52).

House Type 1

All the spaces and activities are concentrated around the central courtyard but there are only four basic spatial elements to this type of row house (Figure 98). The first element is the *delly* or the small entry steps with the platform *otla* at two levels (Udamale 50) before the entrance.

This sheltered space is not enclosed, which encourages guests to enter the house. This prevents them from waiting outside too long. The *osari* or living room is the hall where the occupants entertain their visitors in this semi-private space.
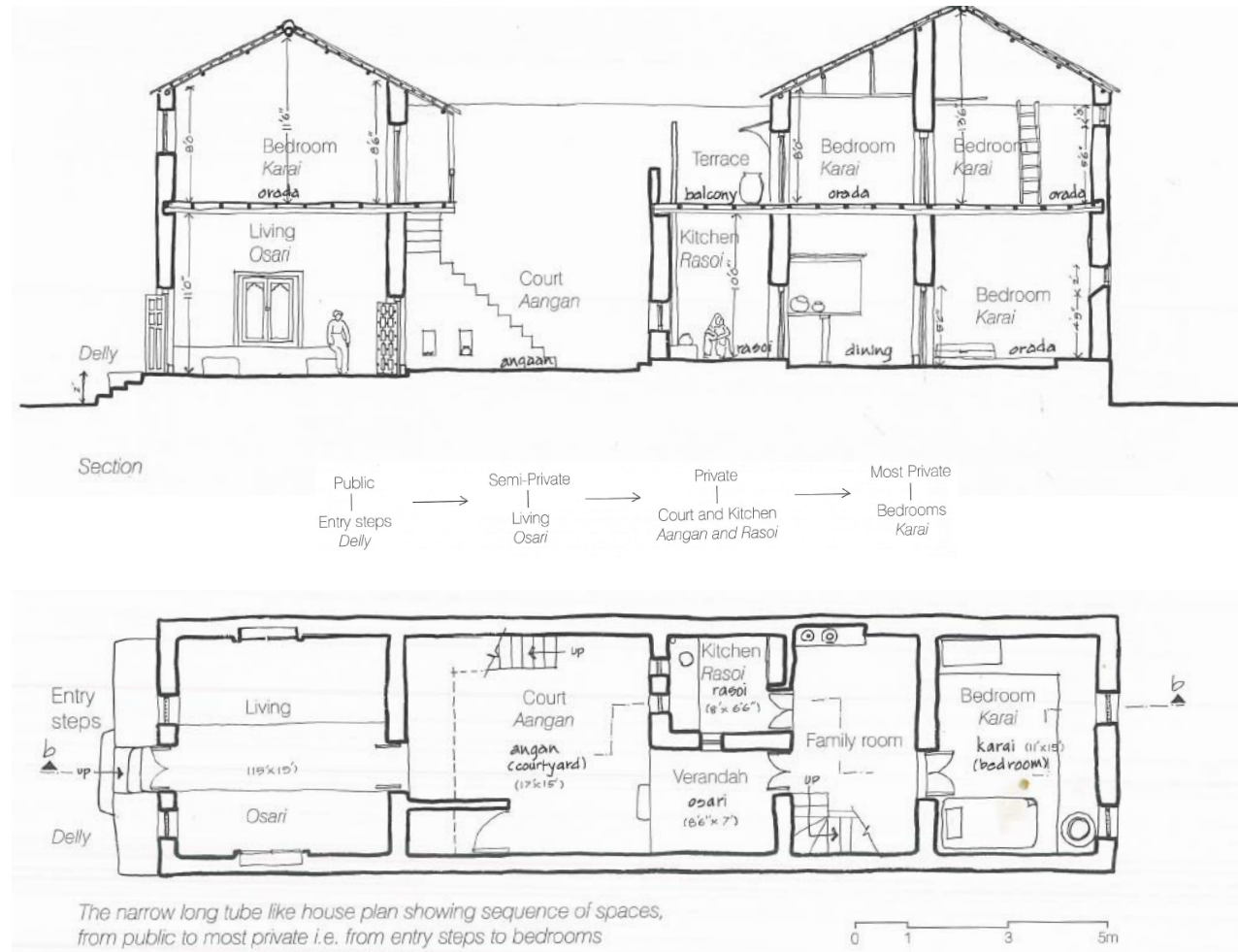
Figure 98 Section, sequence of spaces according to privacy and plan of House Type 1

The centre of the house is the unsheltered court or *aangan* which creates an inner microcosm of the family by bringing nature inside the house to provide sufficient lighting and ventilation for all the rooms of the house (Udamale 50). The court functions ideally for women to carry out their chores here in privacy, as they do not associate socially in public spaces of the house (Udamale 50) (Figure 99 jali and axonometric).

Next to the court, the kitchen or *rasoi* takes up the first zone of the second sheltered portion of the house. The middle room serves as the private dining space for the family. The rooms or *karai* are the most private spaces that take up the end of the first floor and the most on the second floor of the house (Figure 98).
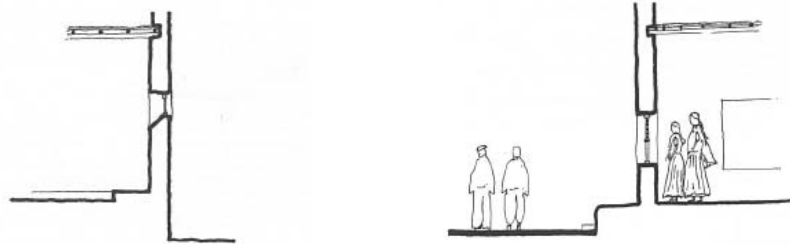
Openings designed for more light on floor surface

Window with perforated metal jali – woman can overlook the street through jali while the passer-by is unable to see inside the house

Overlooking the row house from Bhojanalaya chowk
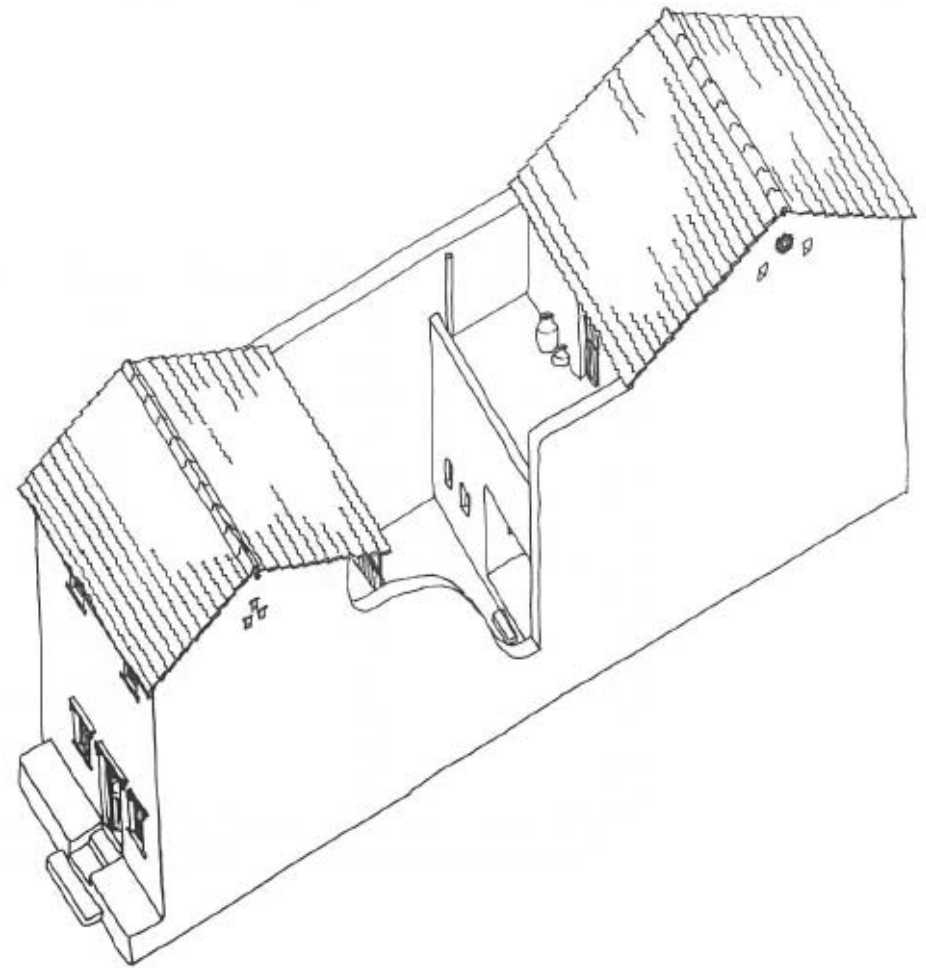
Figure 99 Sketches in section, axonometric and highlighted image of House Type 1 (blue)

House Type 2
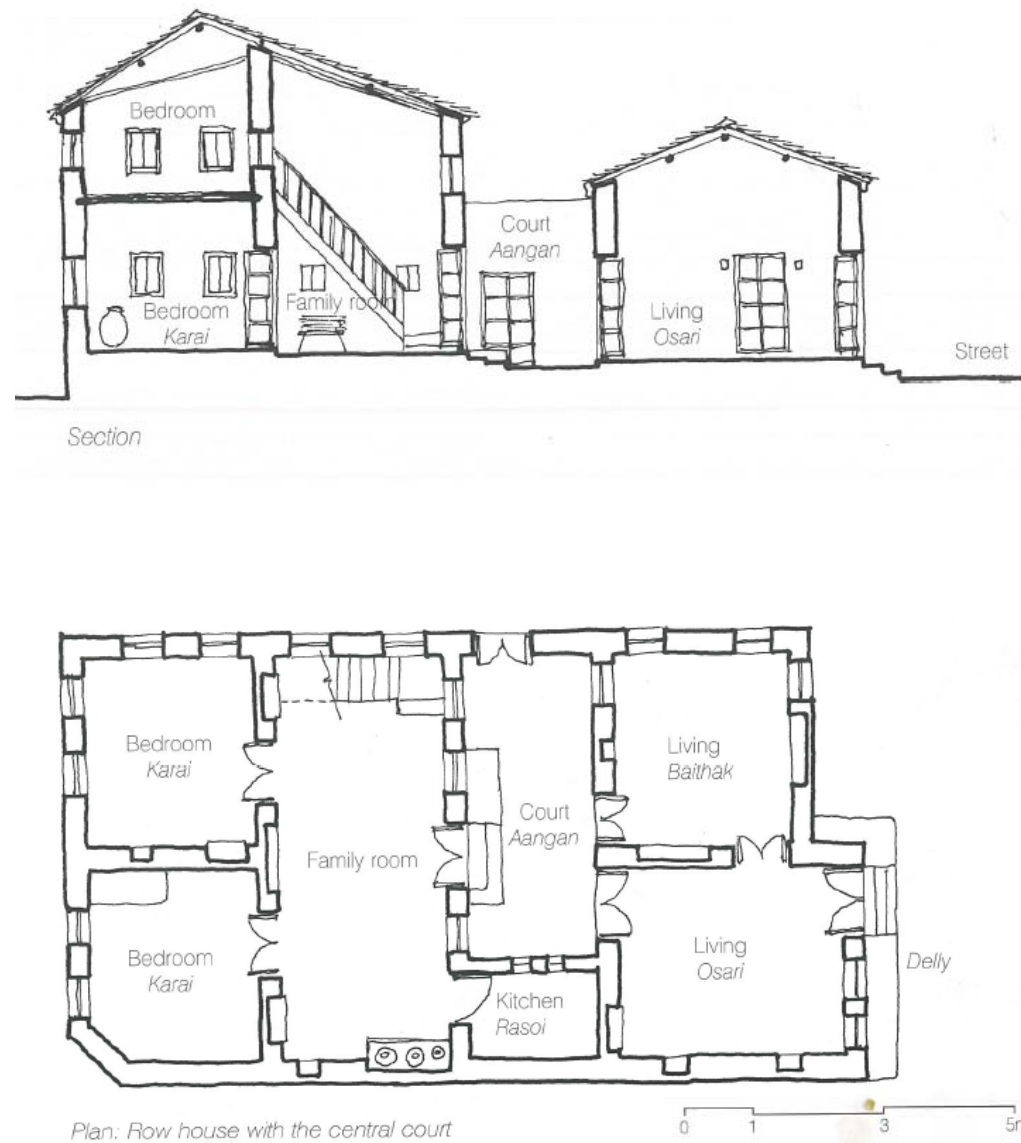
Figure 100 Section and plan of House Type 2

The decorative cornices, entrance door with two stone gadkis and windows with lintels ot the house give character to the street

Paniyara – *the decorated niche to keep water utencils*

Baithak – *the living room*

Figure 101 Images of House Type 2

2.5.5 *Vastu Purusha*

Brahma (Figure 85) and forty four Gods in the Hindu religion defines the metaphysical plan of the *Vastu Purusha Mandala*. The illustration displays how Vastu's body (Figure 102) was held flat against the earth by the Brahma at the centre and the Gods of the eight cardinal directions, outlining this perfectly balanced environment for Hindus, to ensure enhanced health, wealth and happiness (Architecture Ideas) (Figure 103).
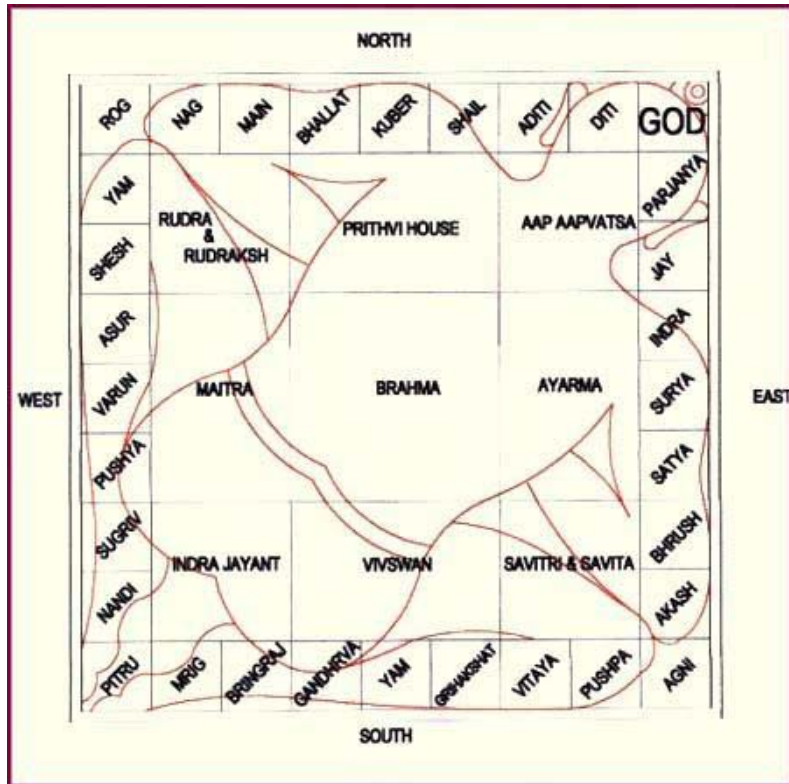
The scientific justification to confirm this idealistic plan to create an atmosphere beneficial to men, is through the architectural study of the house around the 'five basic elements, the earth's magnetic field and the eight directions manipulated' (Architecture Ideas). Architecturally, this is expressed by 'good disposition of the sun, proper ventilation, lighting and privacy to the house' through the central courtyard (Architecture Ideas).

Figure 102 'Vastu Purusha Mandala'

Figure 103 Ideal positions of different rooms (Grid 3x3)

2.5.6 Spatial Organisations and Relationships - Traditional Indian Houses

The information extracted from the case studies are summarised into working diagrams by the author.
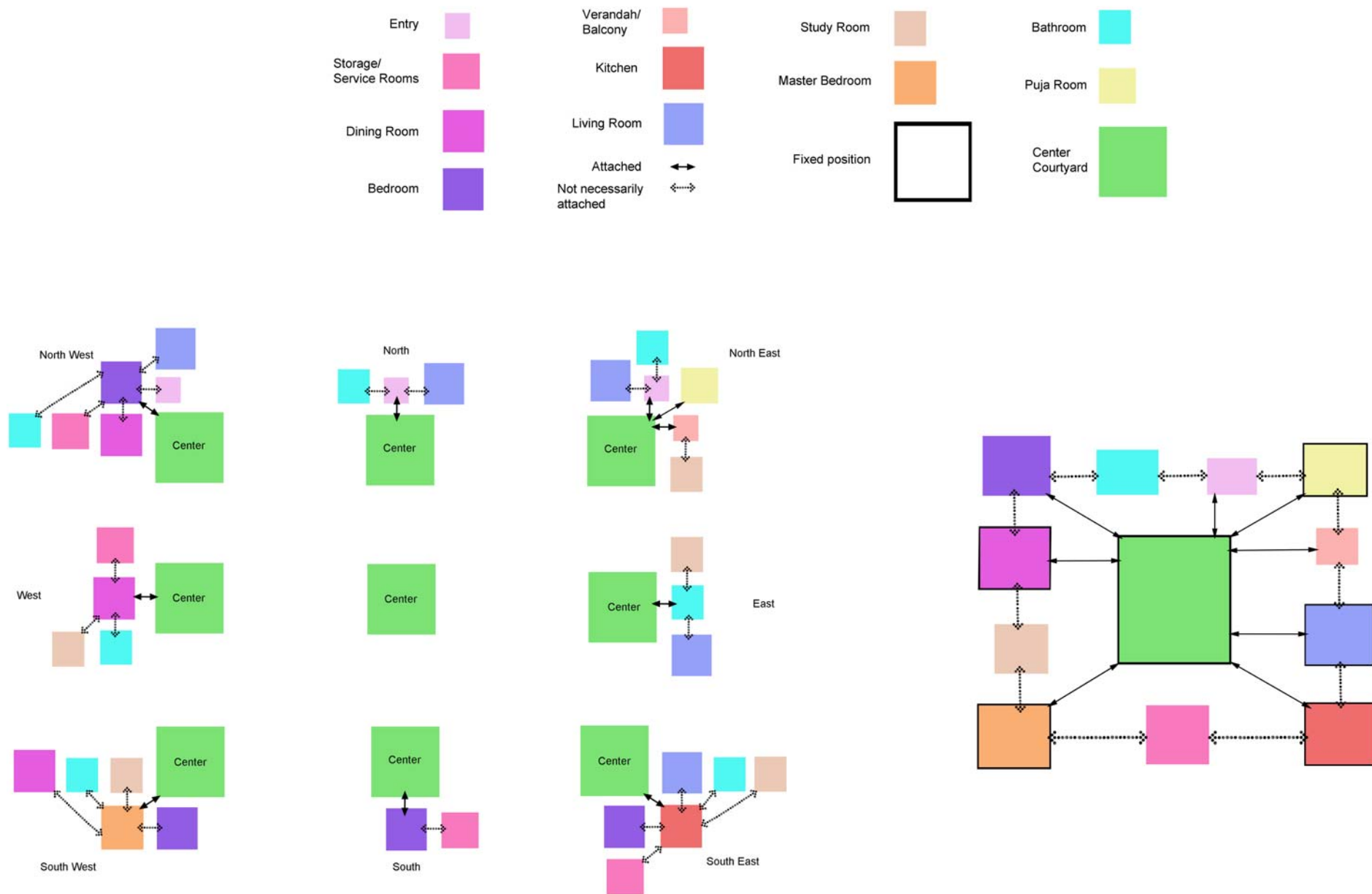
Figure 104 Extraction of information from case studies into working diagrams (Indian)

95

Chapter 3: Site Considerations

Figure 105 (right) Klang Town by the Klang River

Terraced housing is one of the most common housing typology in Malaysia. It is intended that the proposed 1Malaysia Home will eventually be developed into a terraced housing community, which will be implemented by the government throughout the country. Therefore, a single selected site will be ambiguous for this type of housing to be tested on with ease. For the purpose of this research, the site selected possess traits applicable to a variety of similar sites for most housing developers would select from.

The vast site dimensions and proximity to fundamental employment and transport regions are traits exhibited at many housing locations, similar to this selected test site within the suburbs. The site selected aids to visually place the design in an environment catering for a multiracial community, comprising the three Malaysian ethnics – Malay, Chinese and Indian.

3.1 Town - Klang

The state of Selangor consists of nine districts with respective towns. Klang is one of the oldest districts and was the Selangor state capital (Figure 106), administrative centre as well as the tin mining exportation centre, prior to year 1870 (Klang Municipal Council). Kuala Lumpur was officially announced the capital in 1880 by the British colonial government (Figure 106).

In the 1850s, Klang River was dominated by migrant Chinese tin miners who settled at the joining of Lumpur River and Klang River (Ho, Hasan and Noordin). Due to Klang's strategic location, Port Klang is one of the contributors, which led to the progression of this town until today (Figure 107). Over the years, Klang has advanced into a progressive town with many commercial companies (Figure 105).

SELANGOR
Klang

WILAYAH PERSEKUTUAN
Kuala Lumpur

Figure 106 (top and right) Selangor District highlighting Klang (red)
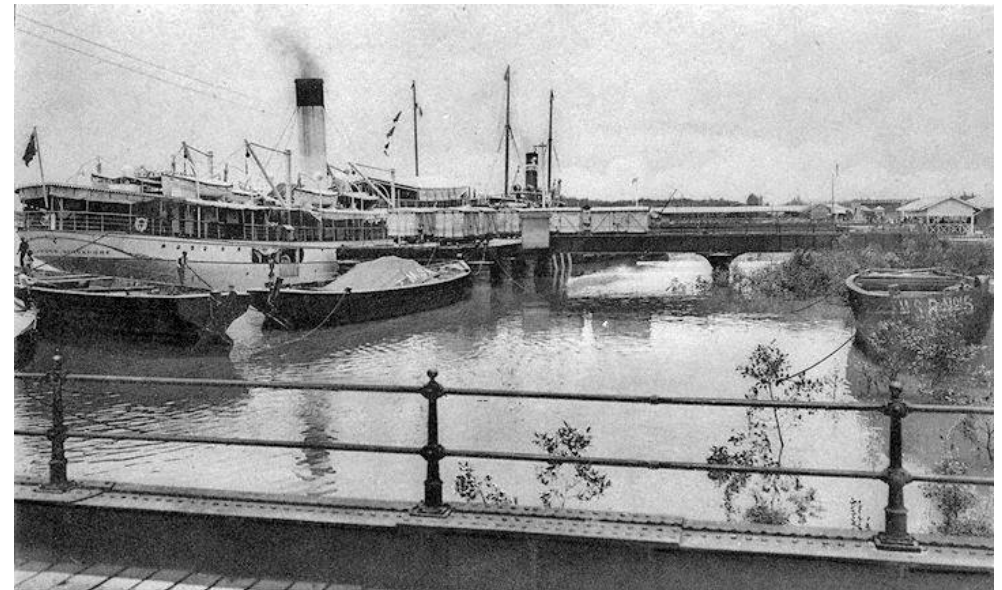
Figure 107 Port Klang known as Port Swettenham back in 1899

Lately, Klang has been associated with a number of housing projects especially terraced housing, catering for the middle and upper class. This proposal caters for the middle income sector, which is currently in demand at this progressive town. The selected site lies over a large unused piece of green land surrounded by developed terraced housing (Figure 111 and 112) in the South region of Klang (Figure 108).

Residential was underdeveloped at this region for some time until the town commercialised and employment opportunities rose from the advancement of neighbouring towns and the city of Kuala Lumpur (Figure 109). Hence, the development of houses in this region to meet the increasing demands.
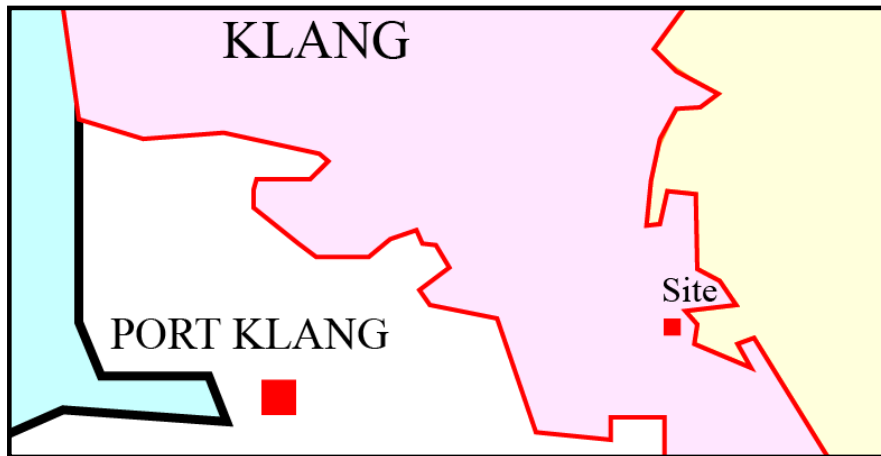
Figure 108 Site located at the South of Klang

Figure 109 Neighbouring districts

This region was mainly industrial from the expansion of the neighbouring district of Shah Alam causing traffic congestion in Klang town. The Federal Highway was the main transportation link from Port Klang to Klang town and towards the city of Kuala Lumpur. Eventually, the new Shah Alam Expressway or KESAS Highway on the south of Klang aided to improve traffic flow by alternatively connecting the public to the neighbouring district, Shah Alam and eventually the capital, Kuala Lumpur bypassing Klang town (Figure 110). Due to the rapid development, the Chinese population dominated Klang town with their businesses while Malays dominated the industrialised neighbouring district of Shah Alam.
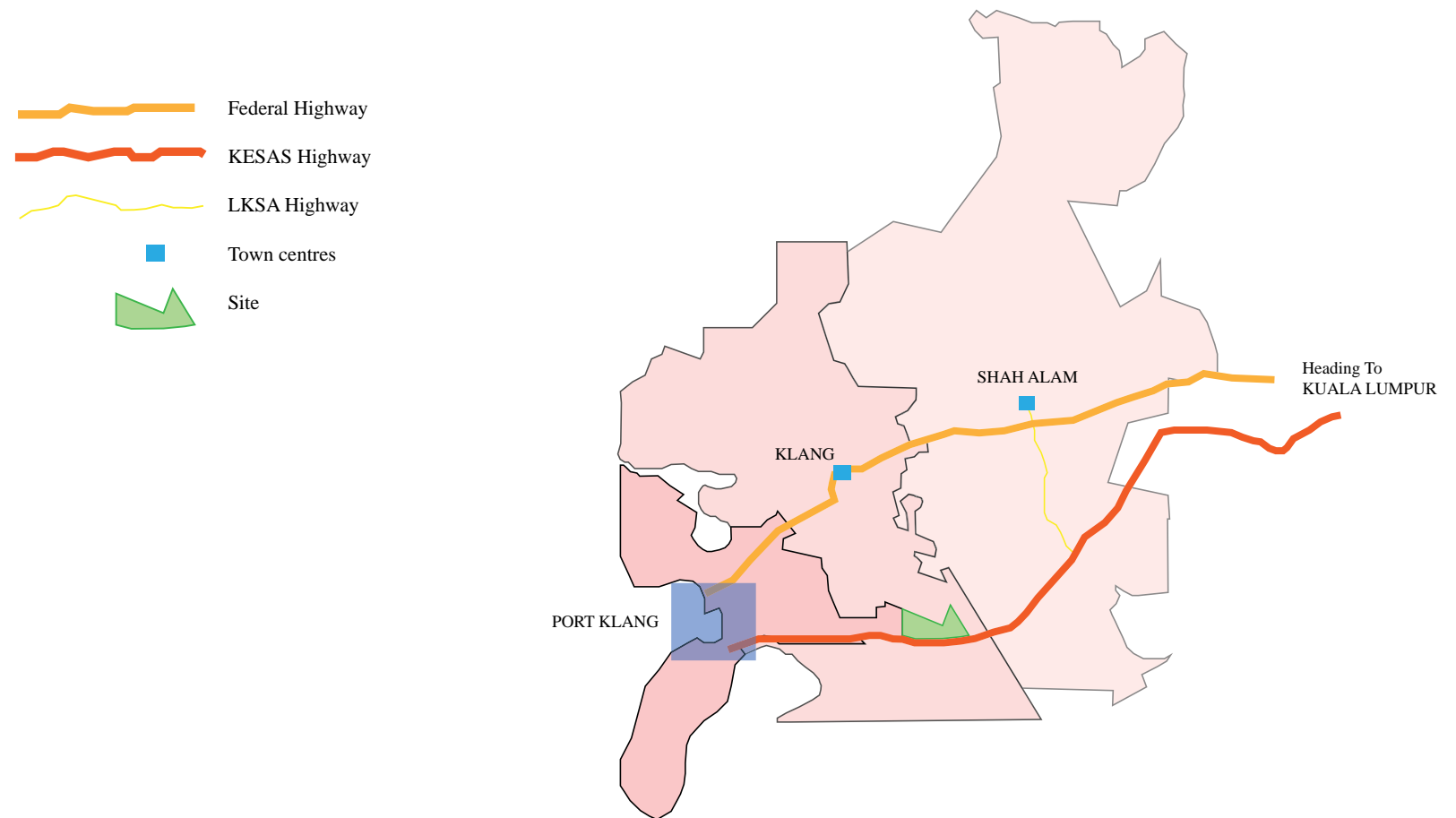
Figure 110 Main transportation links to Kuala Lumpur

3.2 Site

The site offers the opportunity to demonstrate the potential for development of a multi-ethnic community terraced housing here, as well as anywhere in Malaysia. Although, the large site is within Klang, it is situated in between two large ethnic groups; the highly populated Chinese in Klang towards the west and Malays in Shah Alam towards the east (Figure 111).

The minority ethnic, that is the Indians, are scattered roughly the same on both neighbouring districts. On a smaller scale at the site, the terraced houses at the blue regions are dominated by Malays, Indians (yellow) at Taman Sentosa and Chinese (pink) at Bandar Puteri and Bandar Botanik (Figure 111).

Figure 111 Ethnics dominating different regions around the site

The site is addressed in two parts, the first acting as a testing ground for a single unit of a terraced house responding to the surrounding environment. The second is of a larger scale, acting as a test for cluster housing in this broad neighbourhood community, determining the applicability and extent of this design to the surrounding area of similar underutilised green spaces (Figure 112).

The design intention is to bring multi-ethnic communities together in relation to the site and neighbouring districts through terraced housing, reviving this region without seclusion of the three ethnics and providing opportunity for middle-income community living.
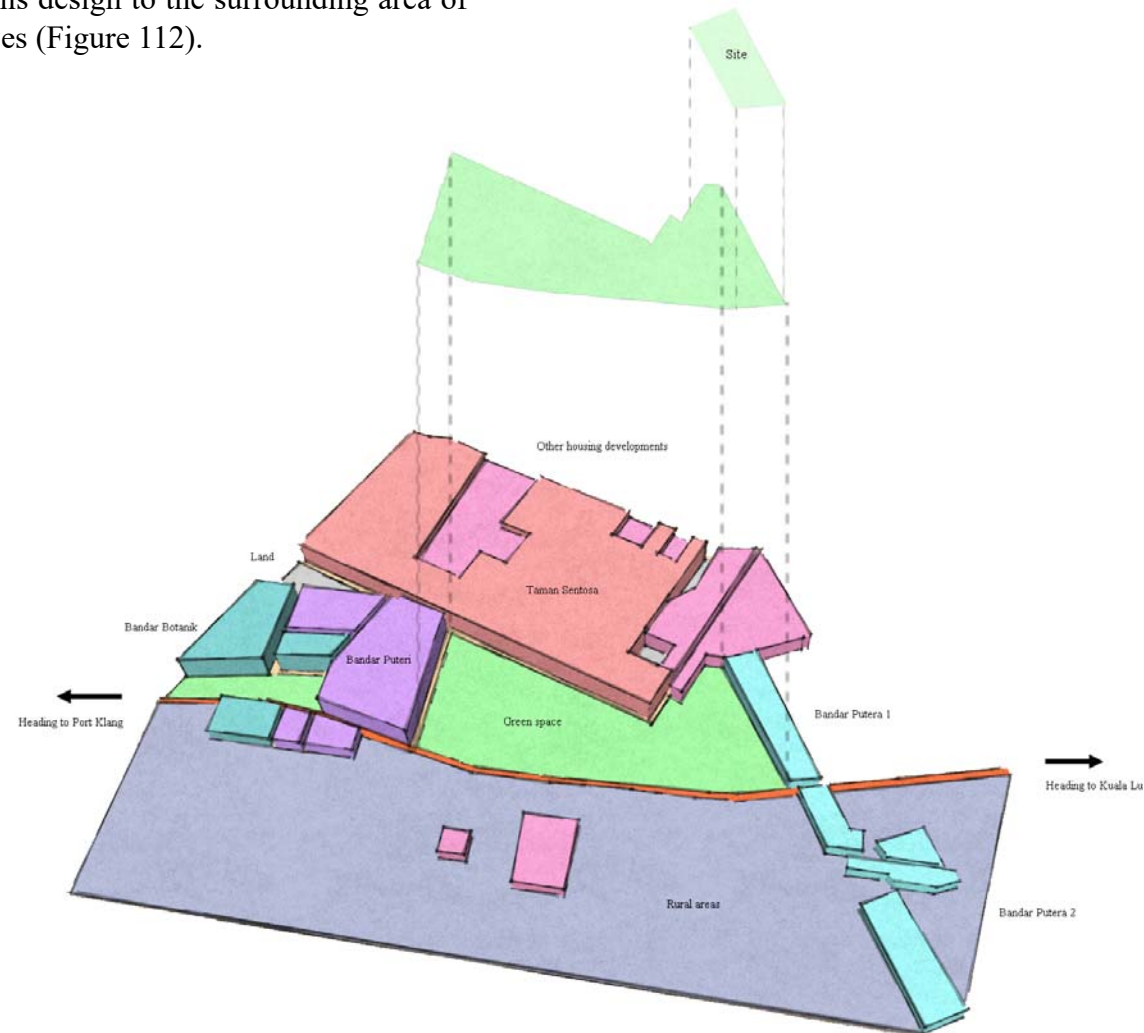
Figure 112 3D diagram of the surrounding site

Chapter 4: Process

4.1 Study of Spatial Elements

The information from the case studies of the three ethnic groups' traditional houses, possess similarities and differences. The courtyard in Indian and Chinese houses associates the women and family's privacy from the public, which is highligted at the deck and separate entrance of the Malay houses. The integration of a central, private space for the family, acknowledges this common traditional design that is absent in terraced housing today.

However, this central space raises conflicts. The open designs of the Chinese and Indian courtyards, are informed by their respective ethnic theories, which integrates nature into the house to maintain a healthy environment for the family, while the Malays emphasise on total privacy for their enclosed central space. The other ethnic addresses the family's privacy to the back or upstairs. Therefore, these similarities and differences are further studied systematically.

4.1.1 Classifying Spatial Elements

The basic spatial elements are classified in a table to study the relationship of spatial organisations from one ethnic group to another. These information is obtained from the summarised working diagrams, at the end of each case study (Figure 57, 84 and 104). The spatial elements are identified and grouped in one column according to each ethnic. Therefore, each spatial element in each column makes up each basic traditional house for the three individual ethnic (Figure 113).

The information gathered is further organised coherently to distinguish the basic spatial elements in the table. The elements with similar functions are arranged in the same row while some are absent. For example, the basic Indian and Chinese houses have a courtyard design illustrated in green, but not in the basic Malay house. Although, the addition of a courtyard to the basic Malay house is possible (Figure 56). Therefore, this table visually exposes the basic similarities and differences clearly, for further analysation to take place in the consequent process.

MALAY	INDIAN	CHINESE
Main/Front Entrance (Men)	Entry	Entry
Rear Entrance (Women)		
Passageway - Selang		Passageway
Sheltered Porch - Anjung		
Deck		
Verandah - Serambi	Verandah/ Balcony	
	Center Courtyard	Main Courtyard
	Puja Room	
Main House - Rumah Ibu	Living Room	Main Hall
	Bedroom	
Room - Bilik	Master Bedroom	Master Bedroom
	Study Room	Study Room
	Dining Room	
Kitchen - Rumah Dapur	Kitchen	Kitchen
	Bathroom	Service Rooms
	Storage/ Service Rooms	

Figure 113 Table classifying the three ethnics

4.1.2 Investigating Spatial Elements

The next part of the process focuses on solving the challenging differences. Some spatial elements are present in a particular ethnic house but not in another and vice versa. Consequently, eliminating those irrelevant to other ethnics are unpractical since the design of this house is for all three ethnics. As a result, the significance of each element has to be carefully considered, especially how and why it is designed for that specific ethnic. Thus, the element may work unconventionally but still retains its functions for the families, when a design solution is to be tested in this process.

After careful analysation, the adaptability of one space to be used for more than one specific function was the crucial key in overcoming this problem. The flexibility of designing this house to create these shared and negotiated spatial elements will allow the families to alter the spaces according to their basic norms and cultural practices.

The diagrams illustrate the basic preliminary ideas (Figure 114) for the initial stages before the conceptual designs are explored. Each spatial element from the traditional houses are linked cohesively to another based on the similar functions of each ethnic.
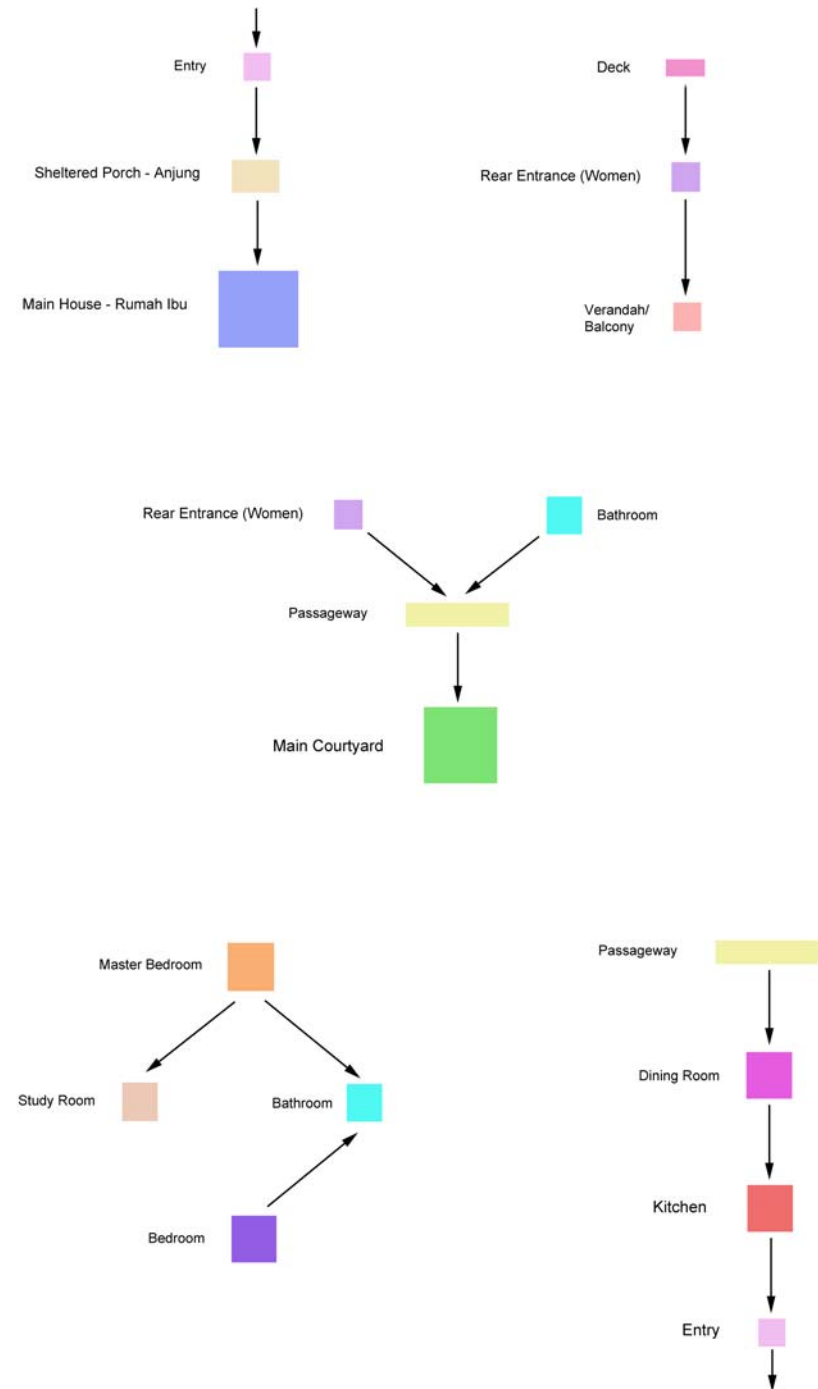
Figure 114 Preliminary spatial ideas

4.2 Conceptual Designs

Figure 115 (right) Collage of conceptual plans and models
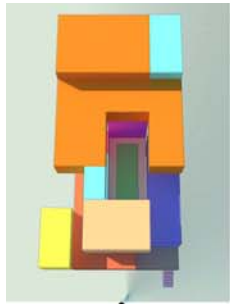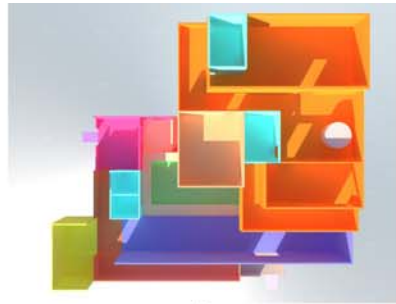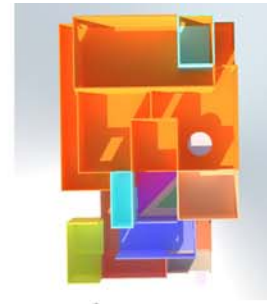
1   2   3   4   5
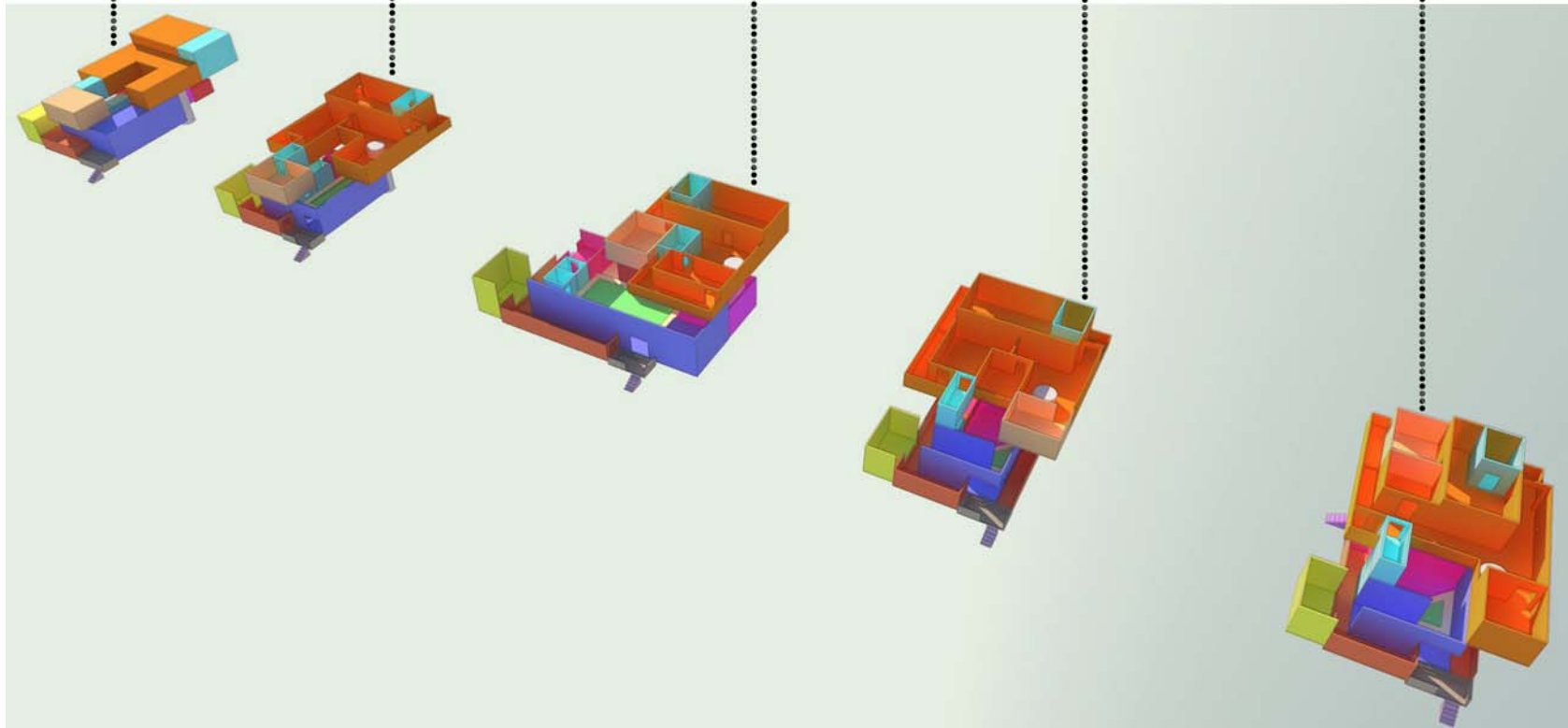
4.2.1 Conceptual Design 1

Through a preliminary combination phase, every spatial element is linked (Figure 116 and 117). The specific zones are identified, organised and altered accordingly on both floors. The subsequent explorations are to attain a final conceptual plan that achieves the goals of adaptability and flexibility.
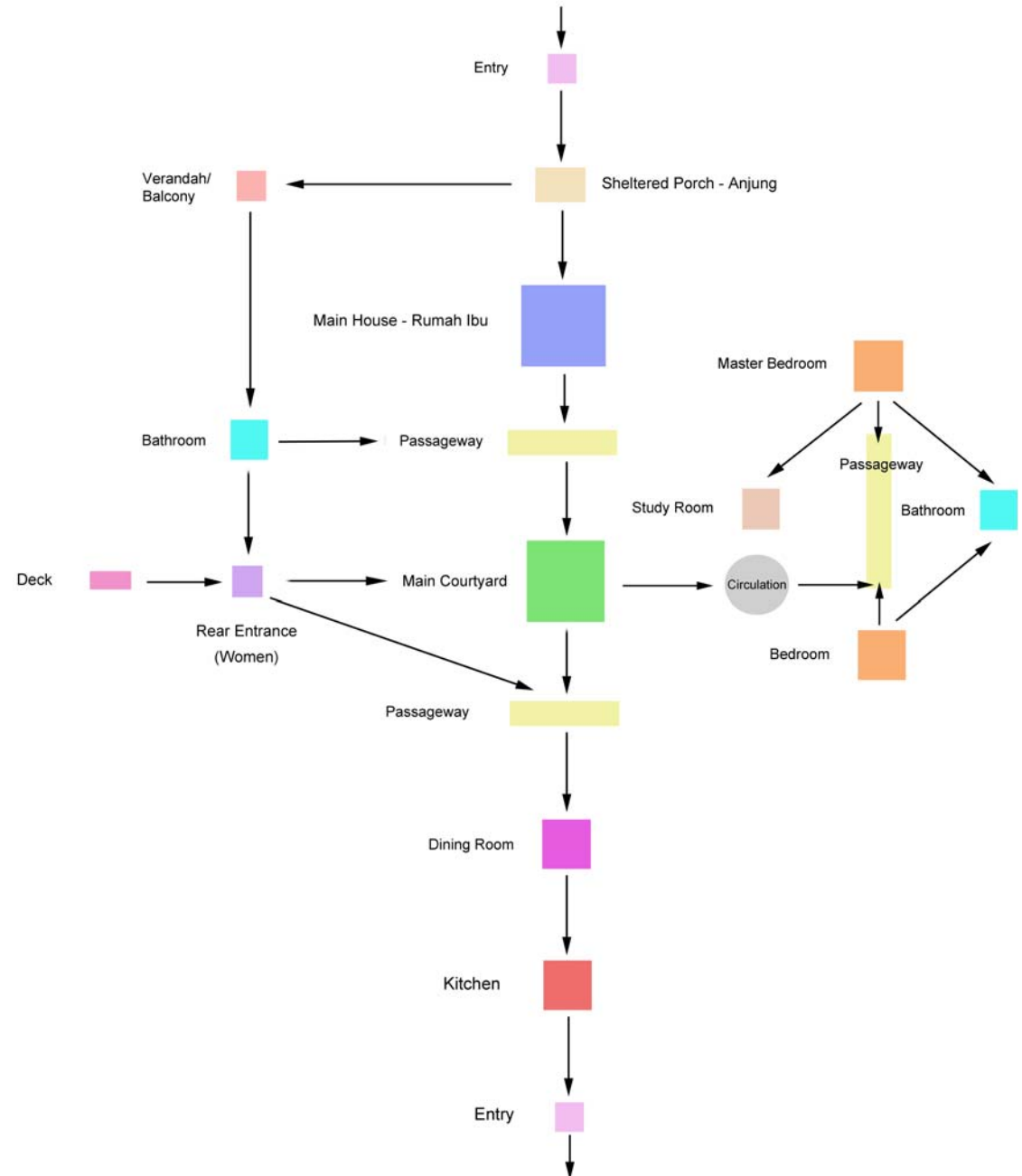
Figure 116 Conceptual explorations 1
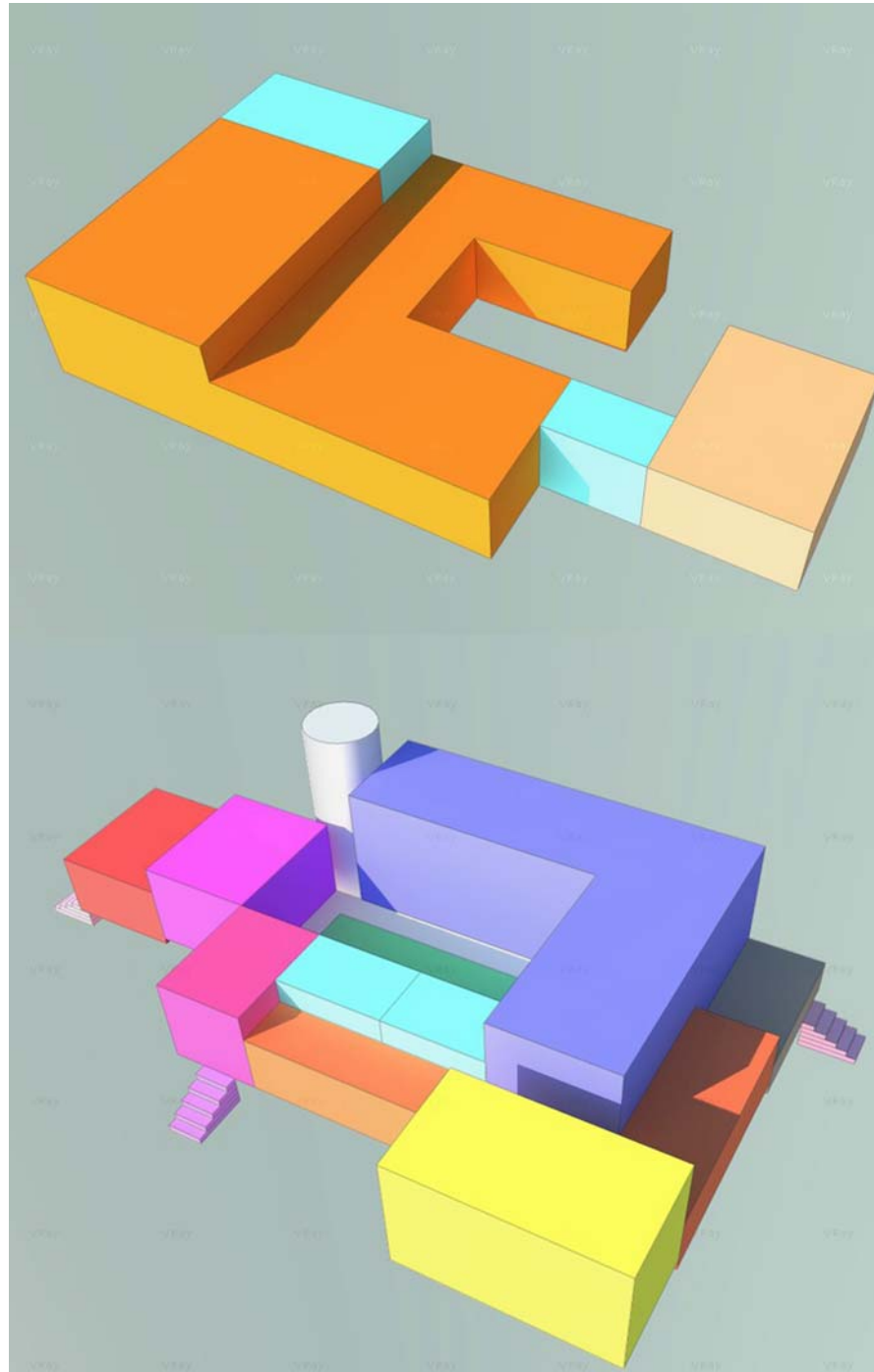
Figure 117 Conceptual models 1

4.2.2 Conceptual Design 2

The spaces are arranged in a linear pattern from the front entry to the back as how a typical shop house would be organised spatially (Figure 118). Spaces are designed to explore the volume this spatial elements could possibly develop further in the later stages.
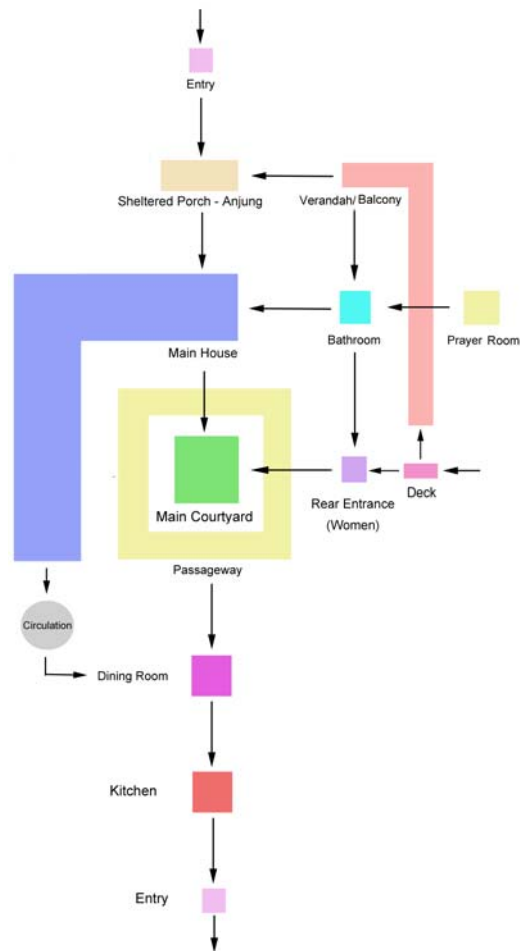
The public and private spaces are identified to maintain different levels of privacy throughout the house. Bedrooms, study room and bathrooms require a greater level of privacy. Hence, the separation of spaces in two distinctive levels (Figure 119).
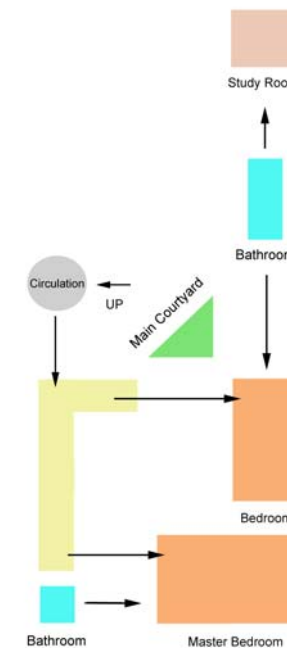
Figure 118 (top and right) Conceptual explorations 2
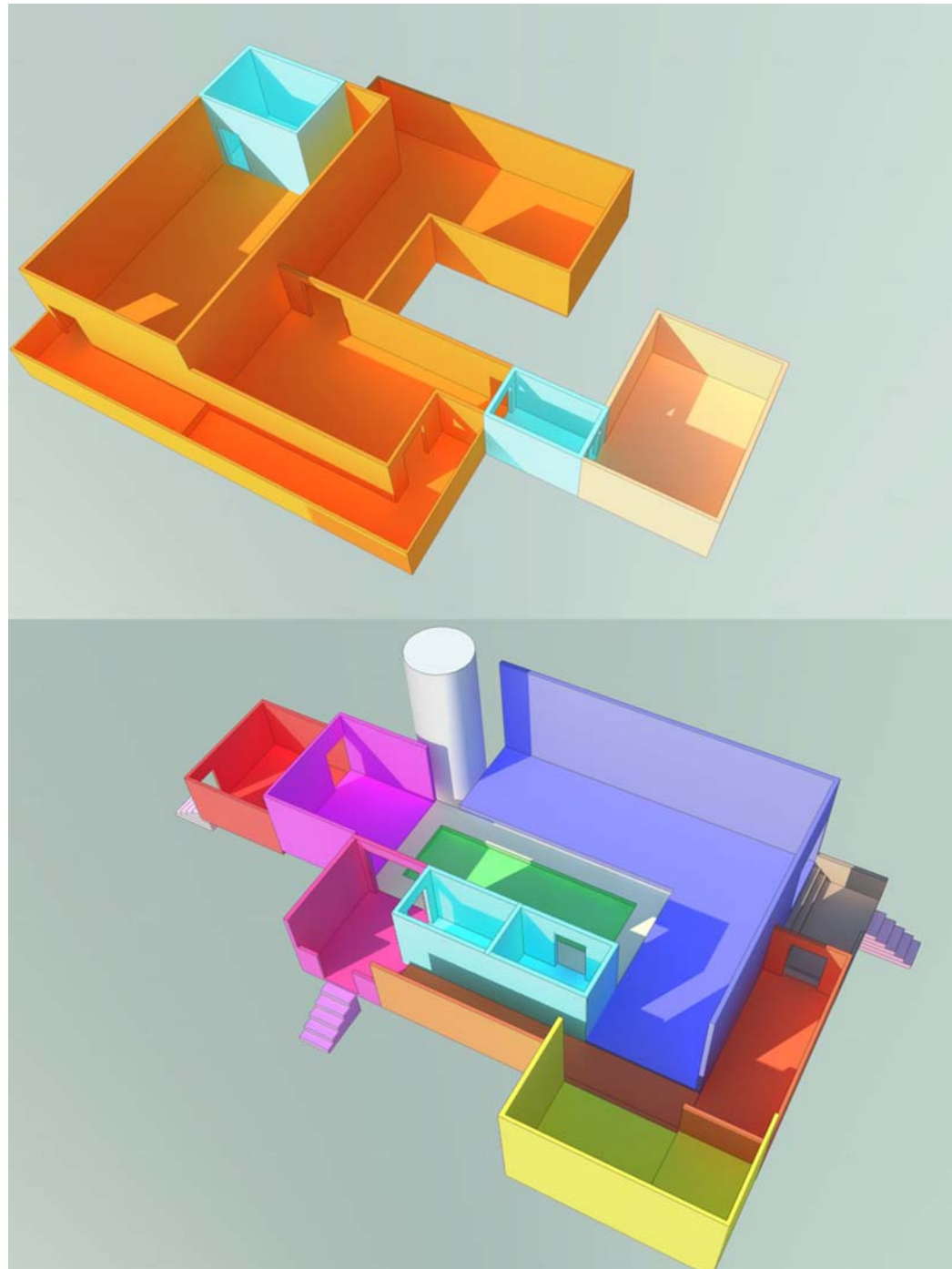
Figure 119 Conceptual models 2

4.2.3 Conceptual Design 3

The distinctive feature of this house (Figure 120) to a typical shop house, is the design of a courtyard instead of an air well. The courtyard has functioned positively in traditional Indian and Chinese houses contributing benefits to the occupants and the house itself. However, they were adapted into air wells in local shop houses, minimising the size and efficiency of an original courtyard.
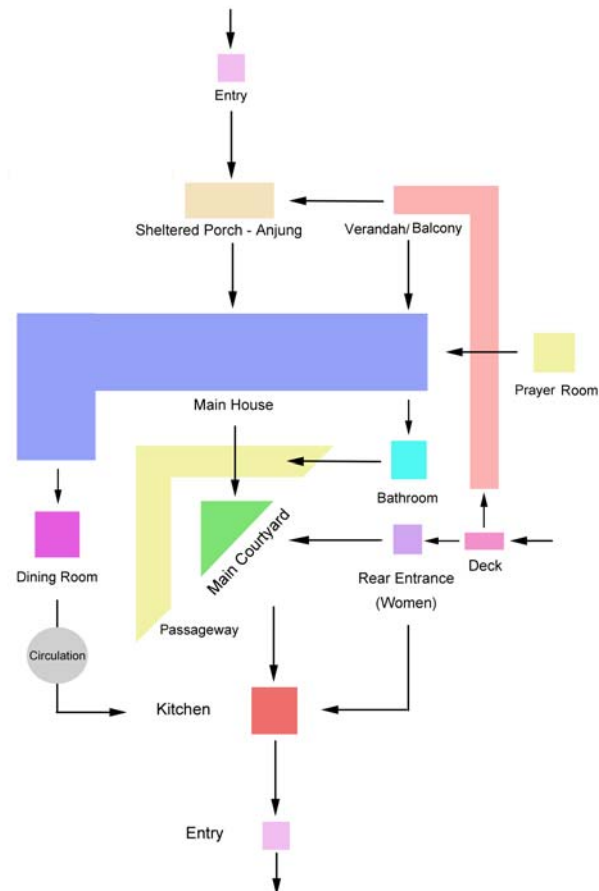
This design takes a step back before this adaptation takes place, to preserve the original courtyard concept to inform this contemporary house. The space proportions are altered to revolve thoroughly around the central courtyard, giving the house a form. The private spaces on the second floor are now isolated towards the back to prevent the courtyard from being blocked, allowing it to function efficiently (Figure 121).
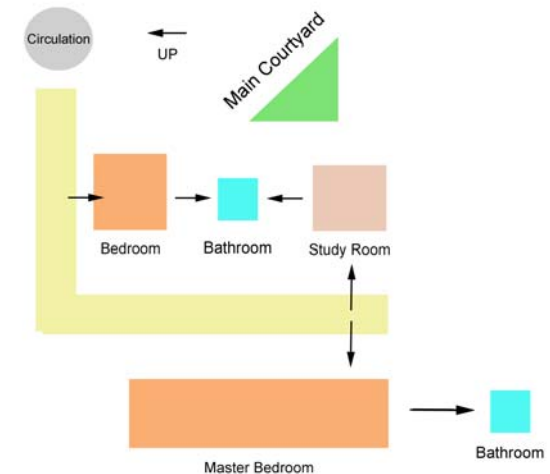
Figure 120 (top and right) Conceptual explorations 3
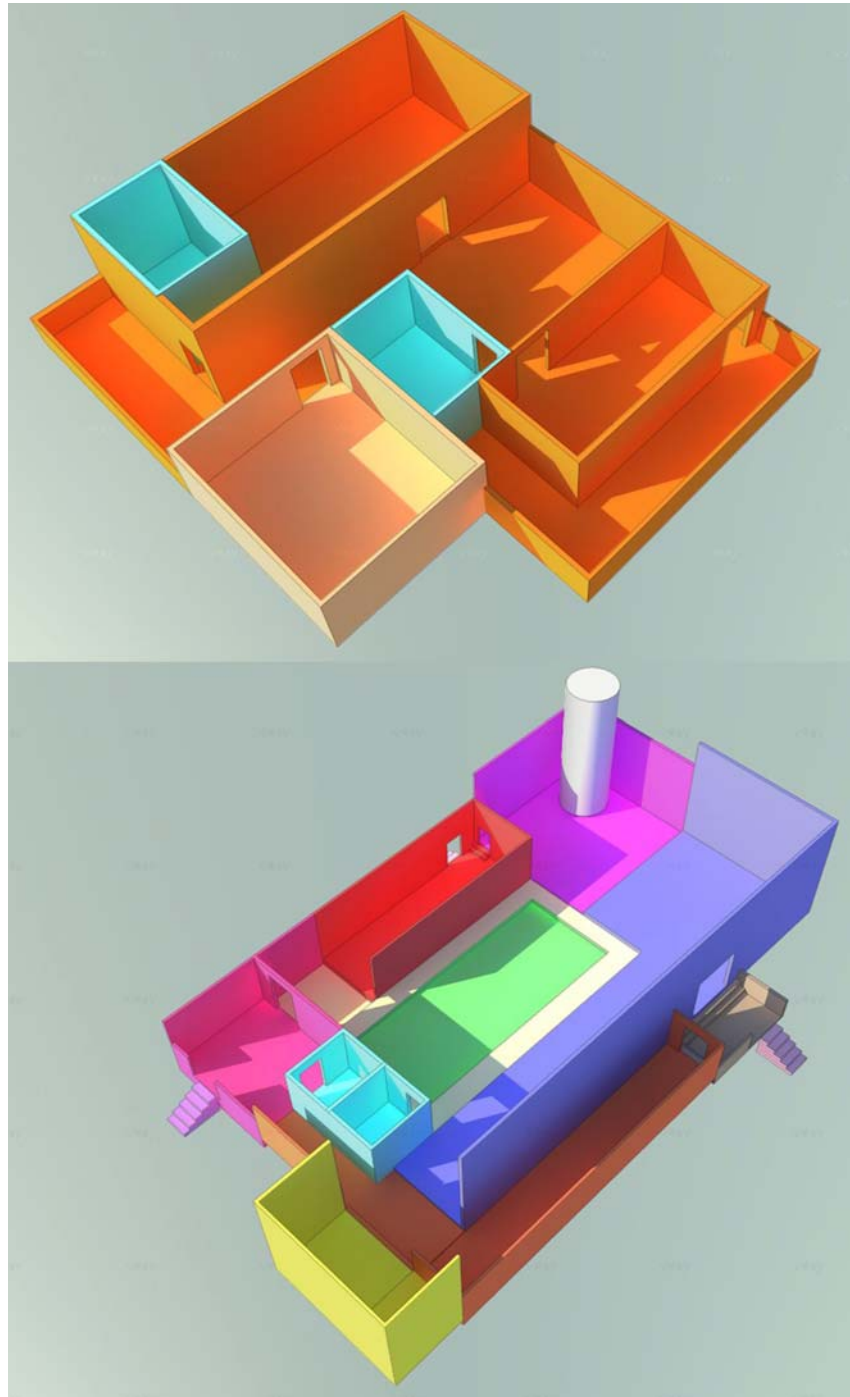
Figure 121 Conceptual models 3

4.2.4 Conceptual Design 4

The last conceptual plan focuses to improve the circulation of the house. The traditional courtyard houses, especially the Chinese, function to connect the passageways around the courtyard to the other spaces. Nevertheless, terraced houses have a limited size to accommodate these large circulation spaces. As a result, verandahs and balconies are designed to negotiate with the other spatial elements instead of an independent space (Figure 122 and 123).
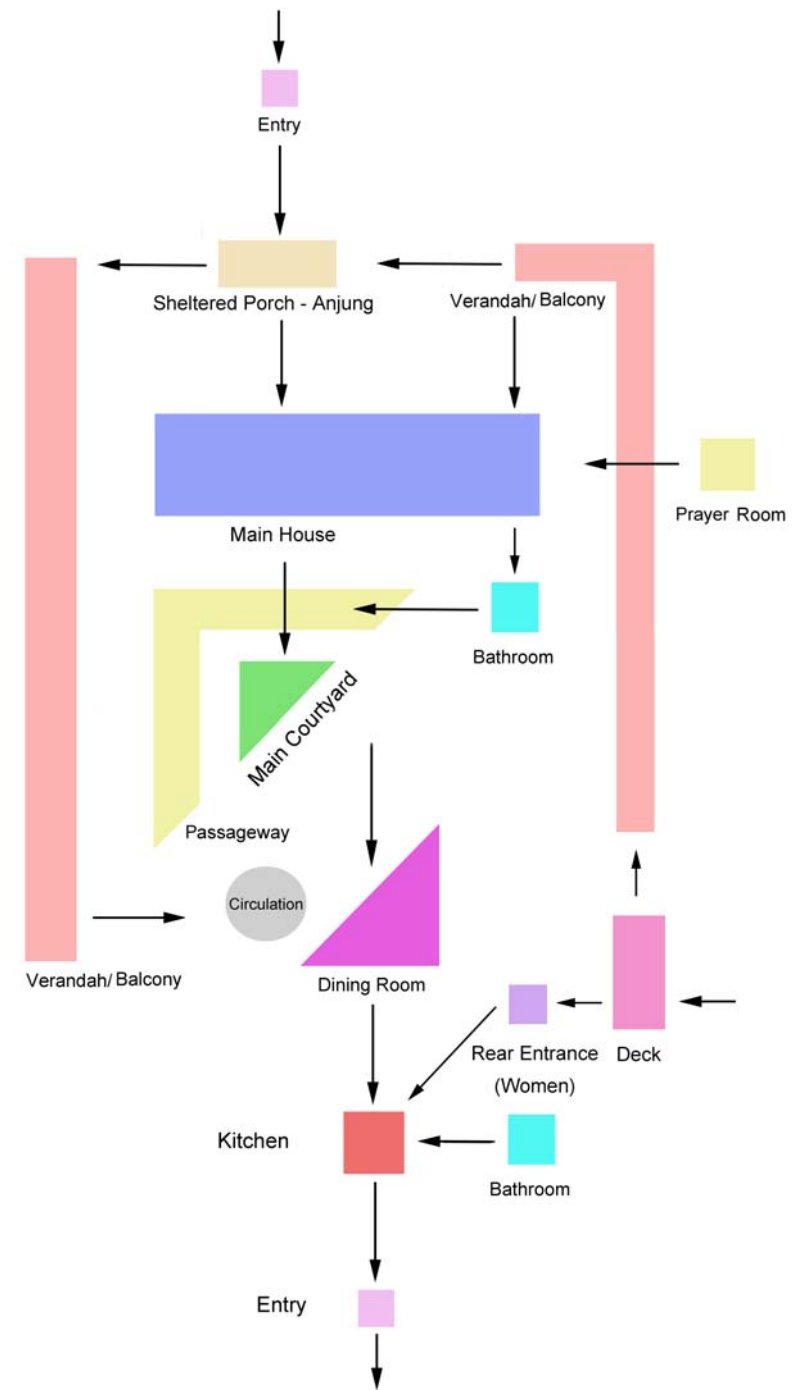
Figure 122 Conceptual explorations 4 - Level 1
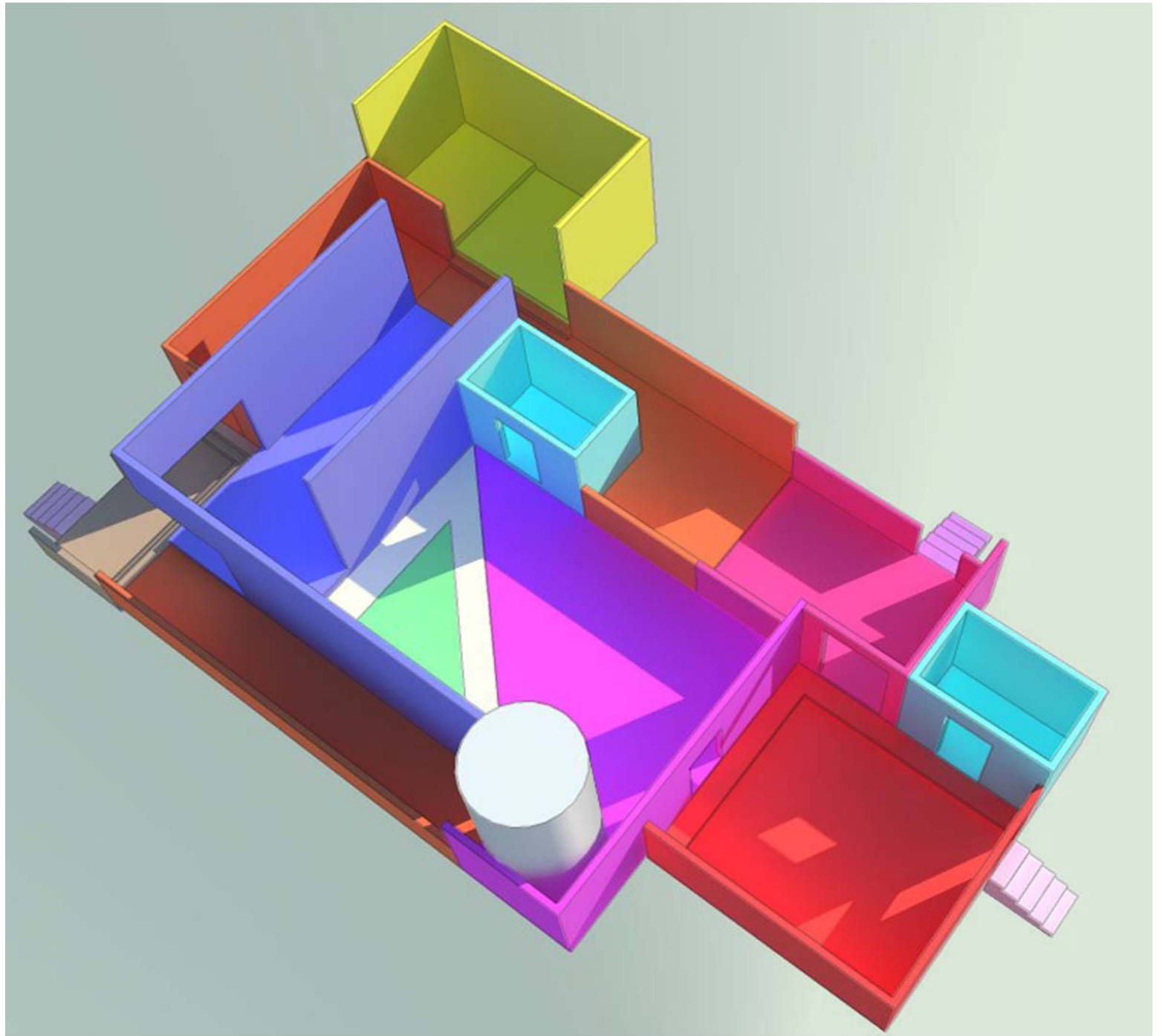
Figure 123 Conceptual models 4 - Level 1

117

These last two options compare the relationship of the study room attached to the master bedroom (just as designed in Chinese and Indian houses) or as a detached room, positioned nearer to the courtyard (Figure 124 and 125). The adaptability of shared spaces for more than one specific function, is the flexibility this new design pushes to achieve. The next stage is to analyse, select and reorganise a final conceptual plan (Figure 127 and 129) to further develop the extent of adaptability of the spaces with one another to inform the house.
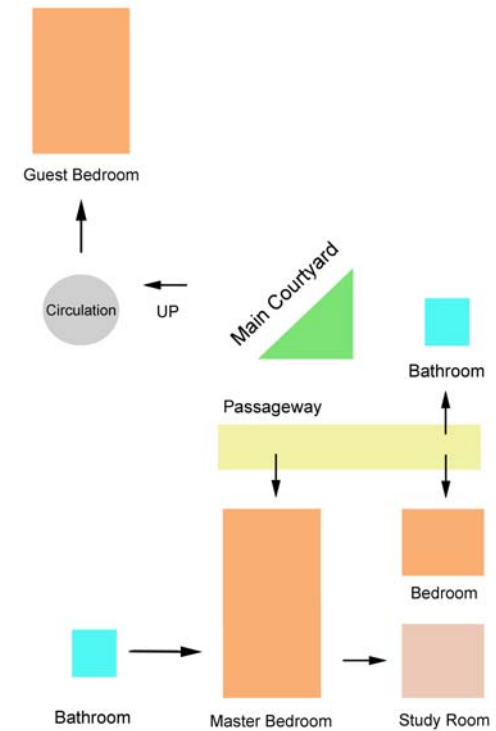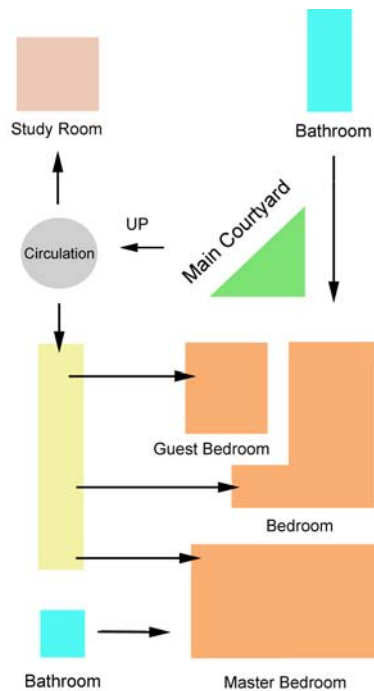
Figure 124 (top and right) Conceptual explorations 4 - Level 2
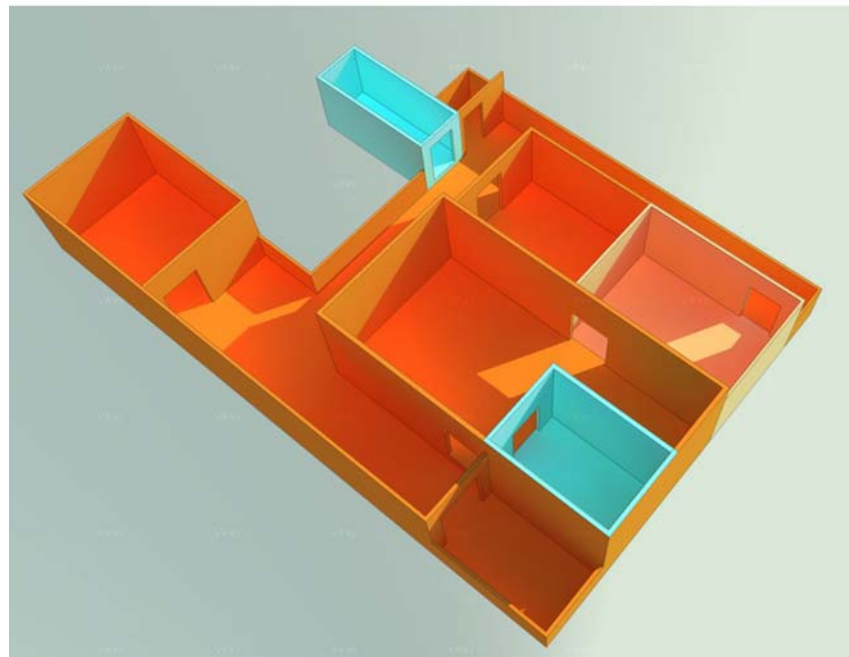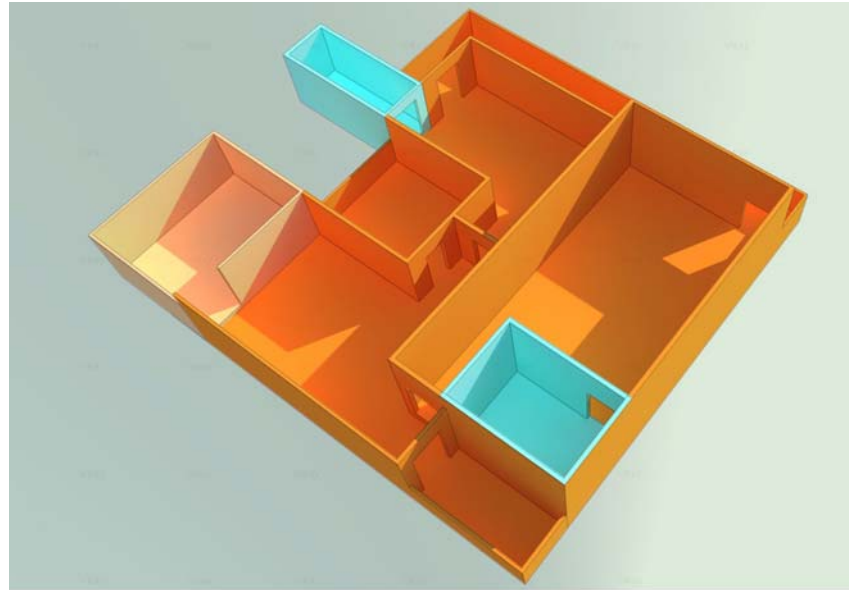
Figure 125 Conceptual models 4 - Level 2

4.2.5 Conceptual Design 5

The verandah functions as part of the main living space to host visitors (Figure 126 - A). This is possibly achieved if occupants are able to control the highlighted wall to suit their privacy and space needs.

The occupants are able to extend the hall to the courtyard for a larger outdoor but private living space (Figure 126 - B). Social interactions take place when neighbours feel invited once a larger courtyard is extended to the verandah.

Occasionally, the deck serves as an exterior space but adapted ocassionally as part of the dining room (Figure 126 -C) to accommodate a large family or public function in the outdoor.

A temporary social space, potentially serves as more than a kitchen to the backyard (Figure 126 - D) for the occupants to interact in community activities with the neighbours.

A

C

B

D
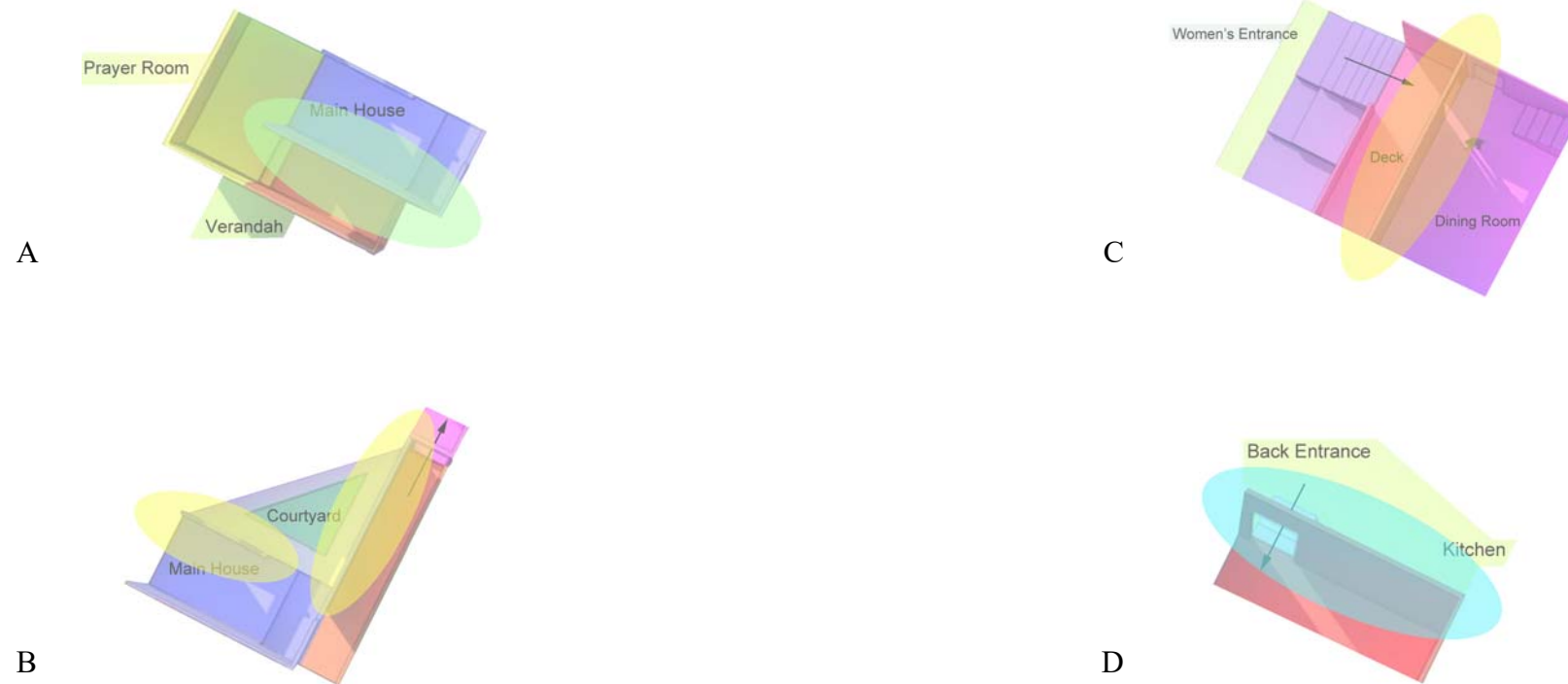
Figure 126 (top and right) Conceptual explorations 5 - Level 1
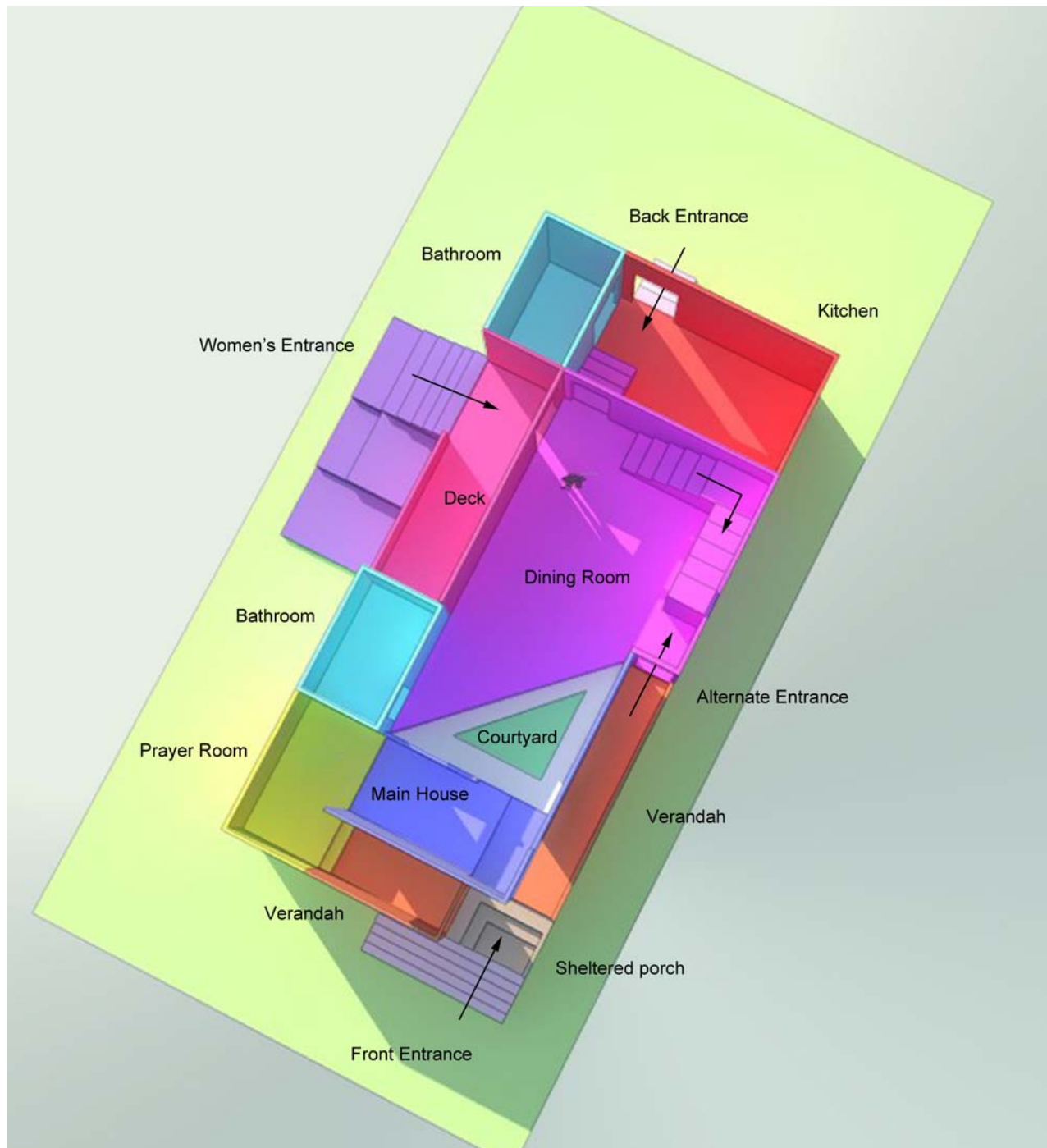
Figure 127 Conceptual Plan 5 - Level 1

121

The circulation space potentially serves to enlarge the study room with the master bedroom (Figure 128 - E). The interior dining space is extended to the exterior courtyard (Figure 128 - F) to accommodate guests during private functions.

Through this flexible design, the family is able to view activites at the courtyard from upstairs and circulate to the bottom conveniently (Figure 128 - G). The master bedroom is large enough for the whole family but in the long term an adaptable, separate bedroom is necessary for the children.
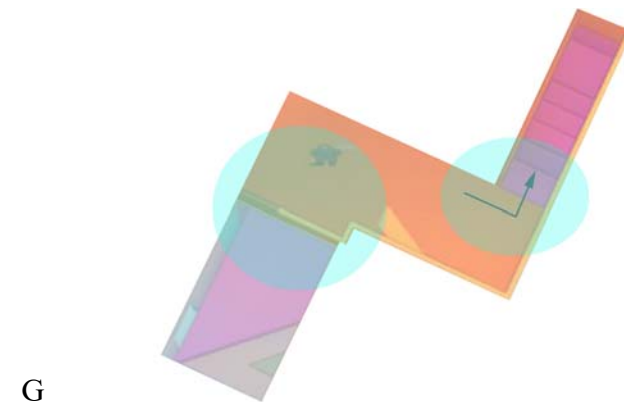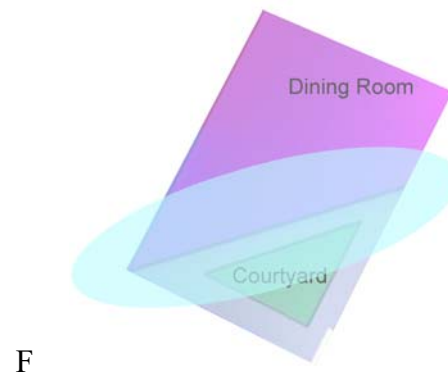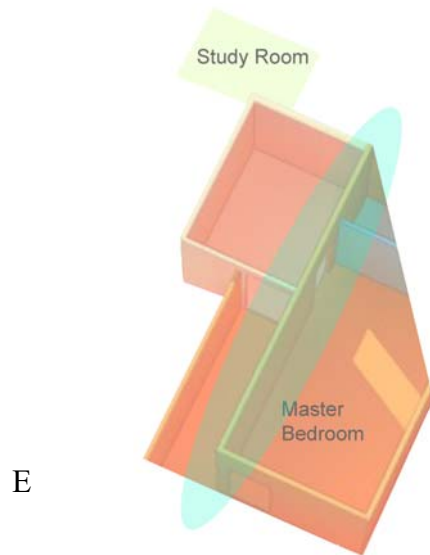
Figure 128 (top and right) Conceptual explorations 5 - Level 2

Study Room

Bathroom

Balcony

Master Bedroom

Bathroom

Guest Bedroom
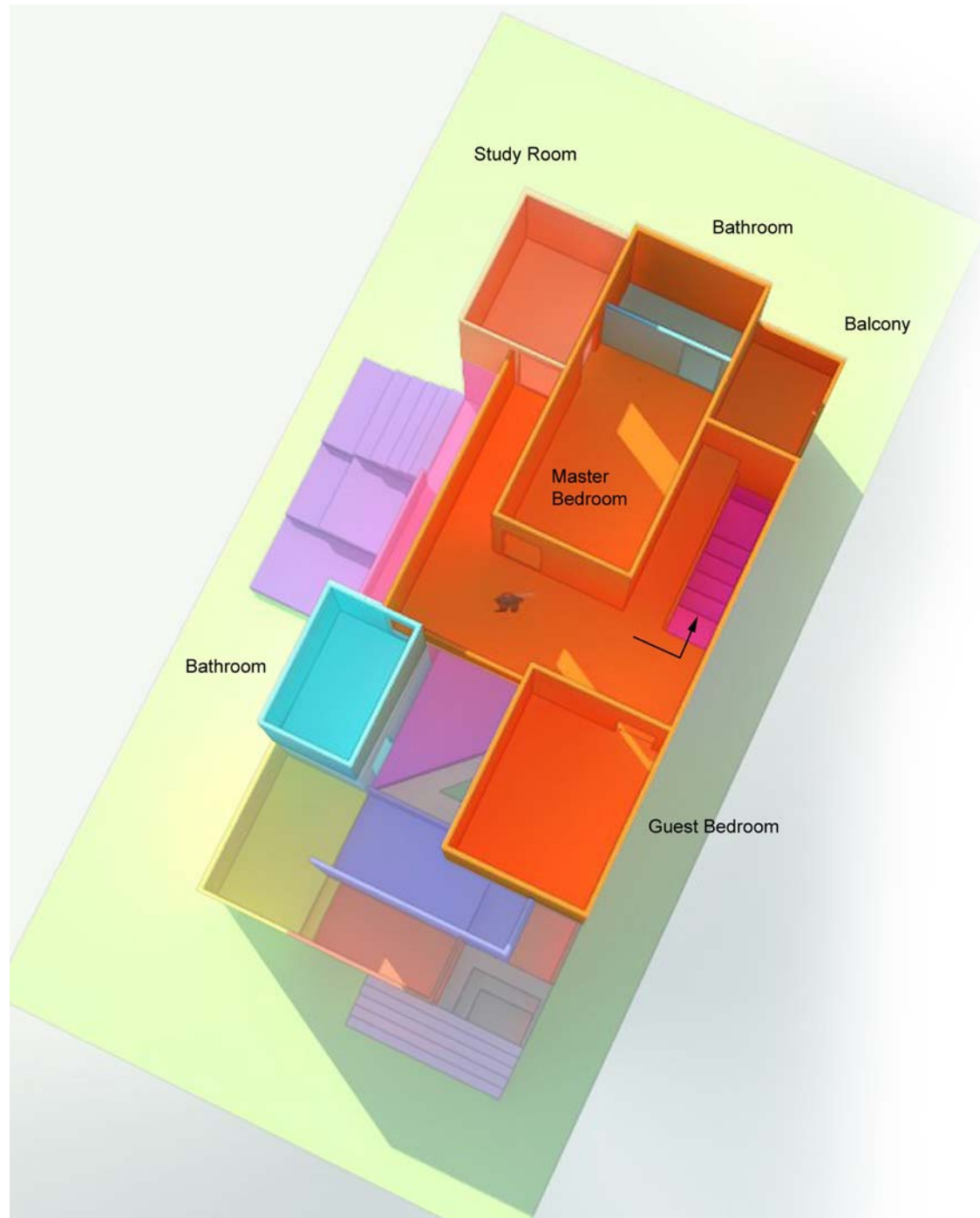
Figure 129 Conceptual Plan 5 - Level 2

123

4.2.6 Working Design

The conceptual plans are translated into working plans and adjusted roughly according to appropriate dimensions of a terraced house (Figure 130).

In a tropical climate, the integration of an internal courtyard raises concerns on hygiene and maintenance. An external courtyard is preferably ideal for this design. Therefore, further revision on the integration of the courtyard is essential to eliminate this concern.

Figure 130 Working plan - Level 1

Light levels and privacy in the front is designed through integration of glazing (highlighted in blue) and plants to enhance the circulation experienced around the courtyard.

In shop houses, the staircase are often integrated with the air well for occupants to circulate in a healthier comfort level. Generally, this design (Figure 131) achieves this factor. Conversely, poor light levels at the stairs forces additional openings to the exterior, as it is isolated from the courtyard.

Figure 131 Working plan - Level 2

The multiple entrances and glazing provides great flexibility for the mobility of the occupants (Figure 132 and 133). However, cost is a consequence to this high level of flexibility to accommodate the variety of spaces. Consequently, the house is more luxurious than a terraced house for the middle income sector.
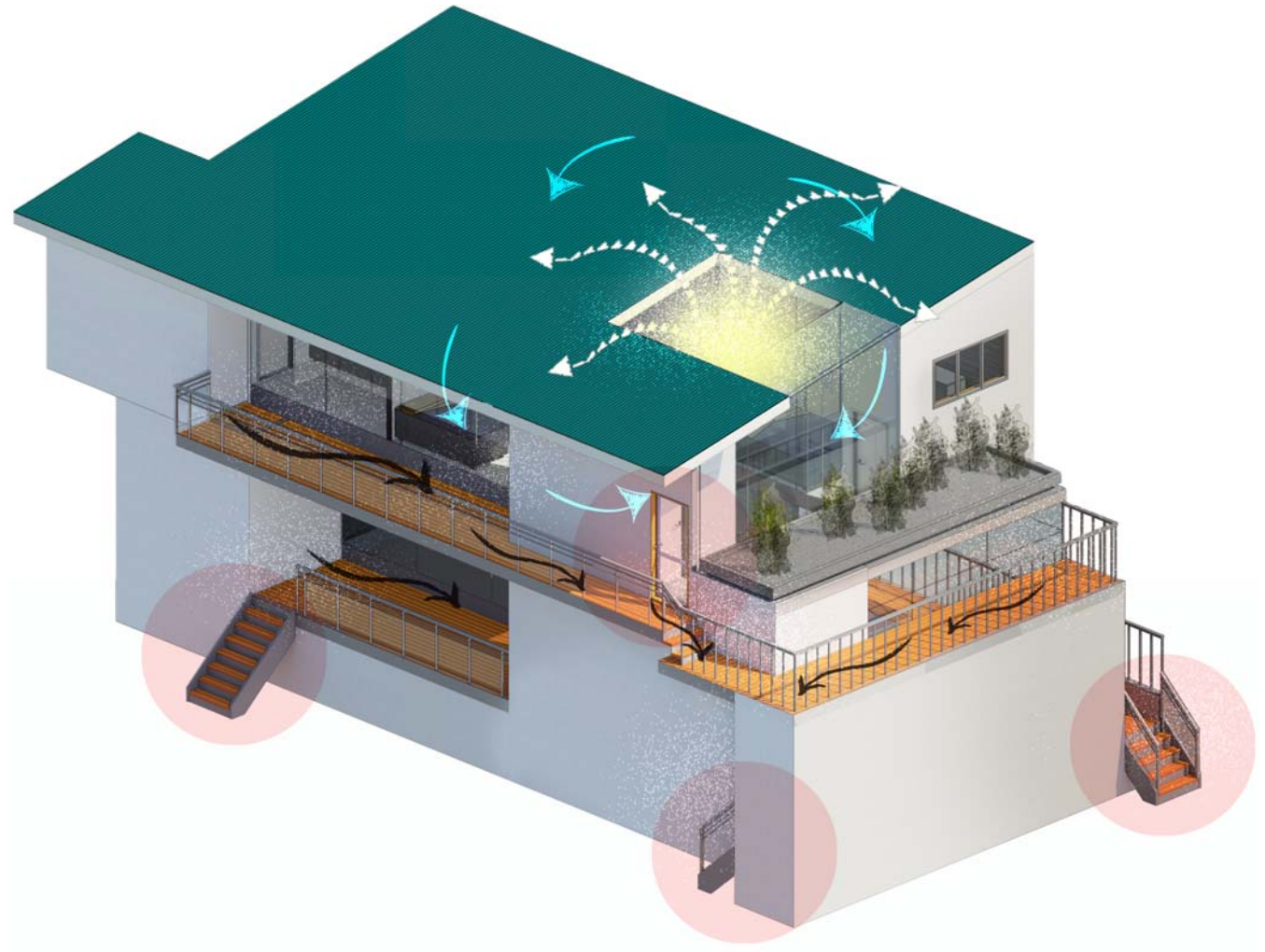
Figure 132 Working 3D design

Thus, this evaluation highlights the inefficency of an internal courtyard and the high cost for flexibility. The design is revised again to integrate an external courtyard instead and to design a medium cost, alternative solution to achieve this level of flexbility.
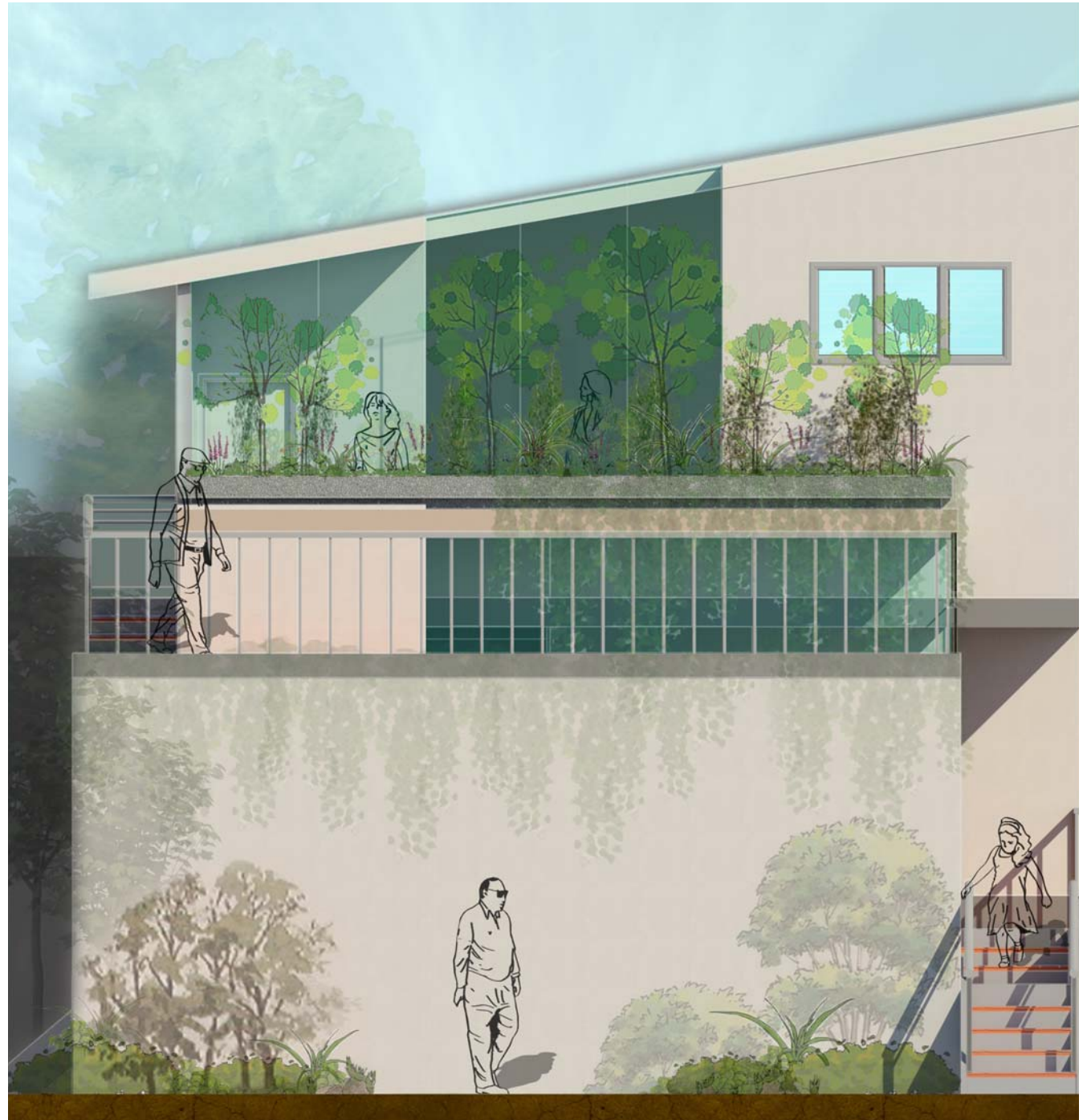
Figure 133 Working design of the front elevation

4.3 Revised Working Plans

The consecutive, optional first level plans illustrate the integration of green spaces or small external courtyards into the house, informing the design of the house.

The house is separated into 3 individual fragments to analyse the associations of the spatial elements closely (Figure 134). The front portion, mainly the living area focuses on the space for occupants to host visitors. The middle portion stresses on the connection of the rear entrance into the family's dining area. The back portion highlights the kitchen to the back entrance.

The extensions of the verandahs and the position of the stairs are altered to test the flow of circulation and to link the three individual fragments together. Combination of the fragments behind creates two distinct fragments instead of three (Figure 135), dividing the occupants from the guest's space. The courtyard in the middle isolates the house, increasing privacy for the second fragment (Figure 136).

Figure 134 Working plan 1 - Level 1
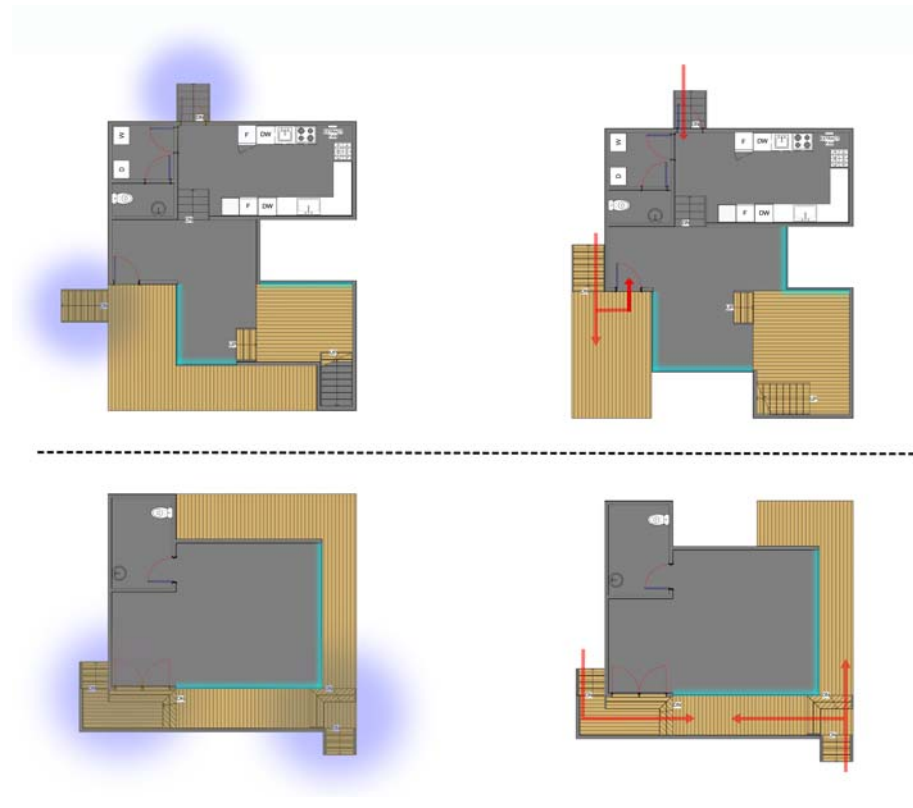
Figure 135 Working plans 2 - Level 1
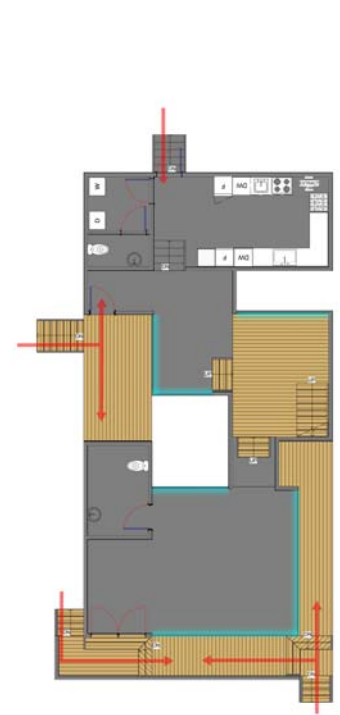
Figure 136 Working plan 3 - Level 1

4.3.1 Explorations of Level 1

The first is an application of the Malay traditional concept, by creating an alternative entrance for the women to the kitchen, instead of just to the middle family living area (Figure 137 - highlighted in red).

Figure 137 Working plan 4 - Level 1

The second exploration alters the laundry space to associate with the washroom and the storeroom as an internal space (Figure 138 - highlighted in red).

Figure 138 Working plan 5 - Level 1

4.3.2 Option 1

Level 1

Room dimensions are altered again according to a typical terraced house, for a family of four. As a result of this adjustment, some spaces are reduced. The dining room is restricted and the family living space is eliminated (Figure 139). This reflection proposes the final working plan, Option 2.

Figure 139 Working plan 6 - Level 1

Level 2

Parents and children's rooms are designed closely to one another for a safe and family environment (Figure 140). However, this does not achieve a suitable level of privacy in level 2, as the study room is attached to the guest bedroom instead of the master bedroom, as organised spatially by the traditional houses.
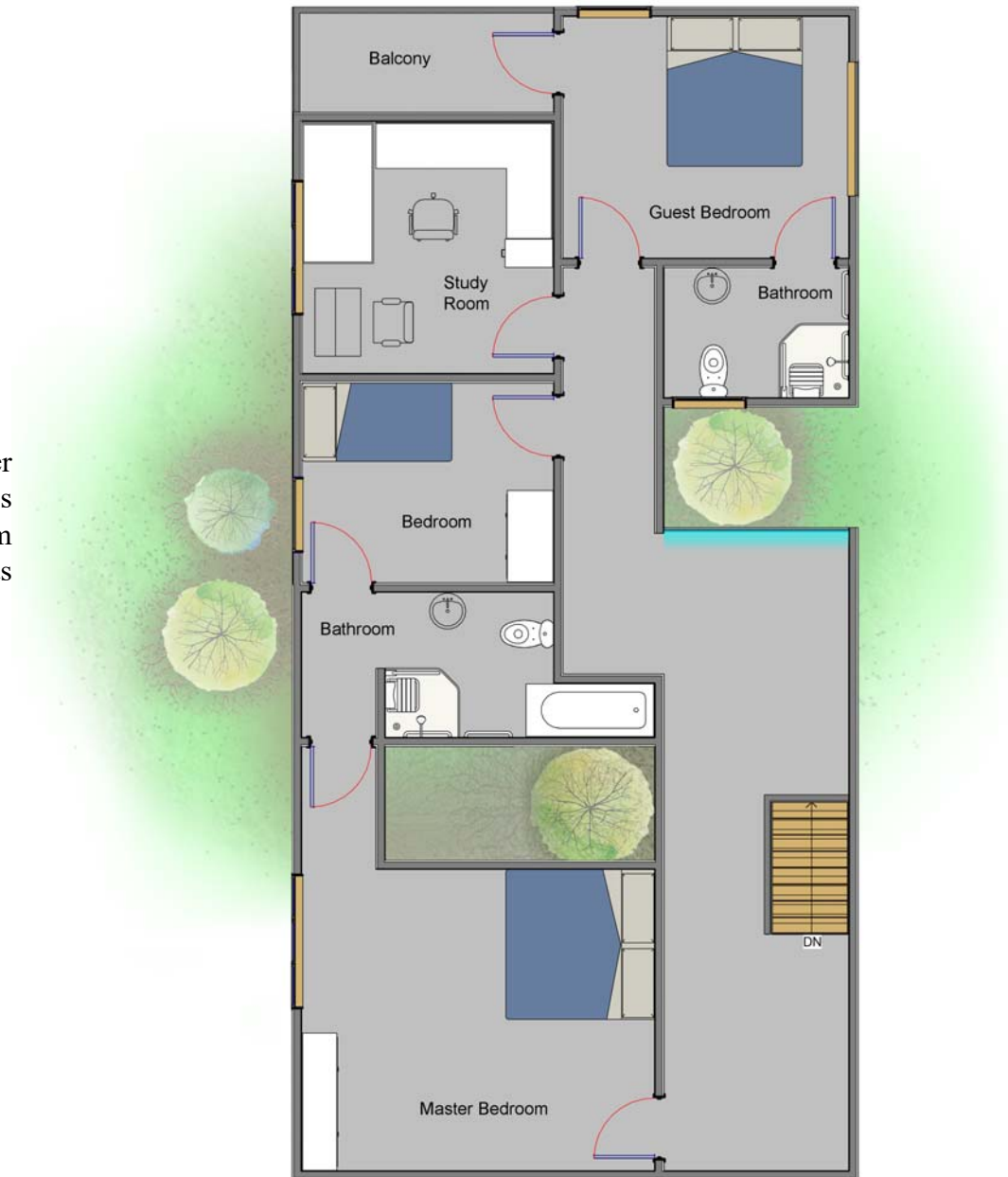
Figure 140 Working plan 1 - Level 2

4.3.3 Option 2

Level 1

The external private courtyard at the middle, informs the design of the house (Figure 141). The reflected neighbouring house ultimately produces a shared courtyard in the middle to accommodate neighbouring families from across the courtyard.

In terms of circulation, ramps at the back and rear entrances are designed for the elderly and disabled. Privacy and circulation to the courtyard is further improved by the folding doors at the decks (Figure 141).

Figure 141 Working plan 7 - Level 1

Level 2

This working plan (Figure 142) isolates the family bedrooms to the back for higher privacy levels. The external private courtyard below, complements well with the open study design in the middle space.

This option is selected as the 1Malaysia Home. The process pursues exploring the relationships with the next-door neighbours and with the neighbourhood community.

Figure 142 Working plan 2 - Level 2

4.4 Cluster Design

The current housing development projects, design houses in a linear pattern to maximise land usage and prevent wastage. This is similar to some of the aligned arrangement of traditional Malay Houses (Figure 39), Indian Row Houses (Figure 87) and the closely-knit building complex arrangement of the Chinese Shop Houses (Figure 71) in the city.

However, this exploration functions to incorporate the random and concentric patterns from the traditional Malay (Figure 37) and Indian village houses (Figure 94). This design strategy is to achieve a greater social interaction among individual household families living closely in a multi-ethnic community.

Figure 39 Linear pattern

Figure 37 Concentric patterns

Figure 71 Panoramic view of the Khoo Kongsi Settlement

Figure 87 Axonometric plan of 'Agraharams' in Kerala
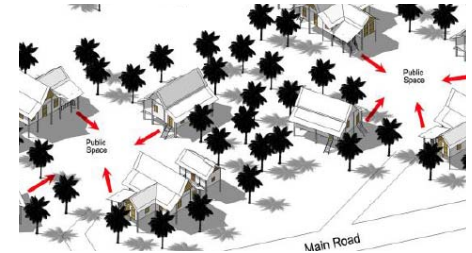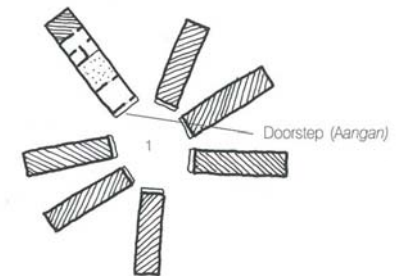
Figure 94 Bidada Village

137
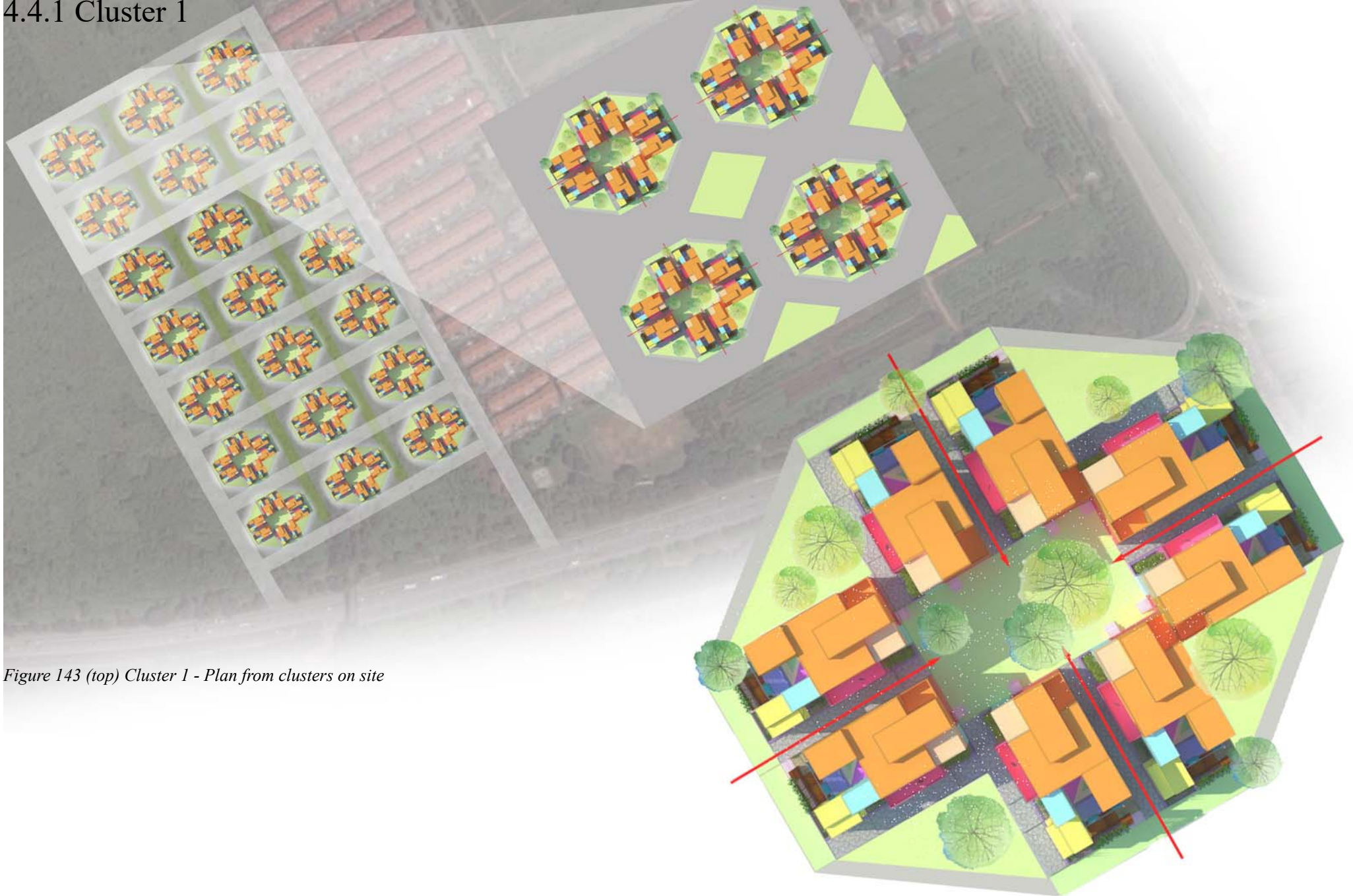
4.4.1 Cluster 1

Figure 143 (top) Cluster 1 - Plan from clusters on site

Figure 144 Cluster 1 - Integrating 8 units in 1 cluster

The terraced houses are arranged as singular houses next to one another. These two single houses are further organised on all four sides to form a closed and private backyard, for eight families to share and host a cultural social event (Figure 144). This cluster of houses are detached in a linear layout as illustrated from the site plan (Figure 143).

The relationship of the individual houses are analysed with the neighbouring houses. The corner triangular green space between two houses, highlights the rear entrances creating a potential communal space for these two families living here (Figure 145). This concept is explored further in the next cluster.

Figure 145 Cluster 1 - Integration of 2 families

4.4.2 Cluster 2

Figure 146 (top) Cluster 2 - Plans of clusters on site
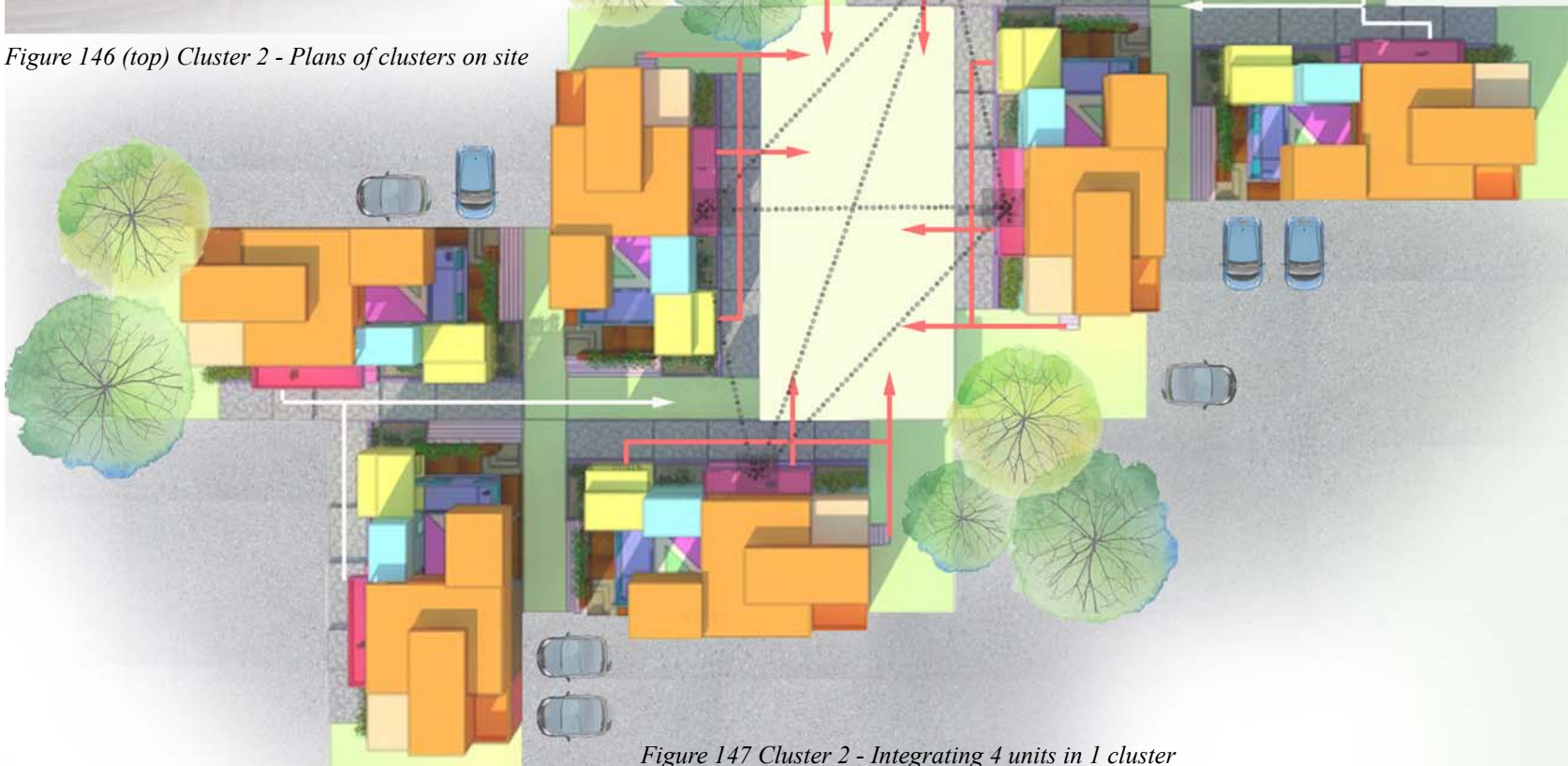
Figure 147 Cluster 2 - Integrating 4 units in 1 cluster

This design is a further exploration of the women's entrance from the traditional houses and first cluster. This design specifically emphasises the rear entrance to inform the design of this arrangement, bringing families from four individual houses together instead of just behind the house (Figure 147).

Houses revolve around a shared central space for cultural, social gatherings to inform this cluster. As a consequence to this arrangement, the level of privacy is affected. The main entrance and the front portion of the house develops a higher level of privacy while the rear entrance opens up to an open community space (Figure 148).
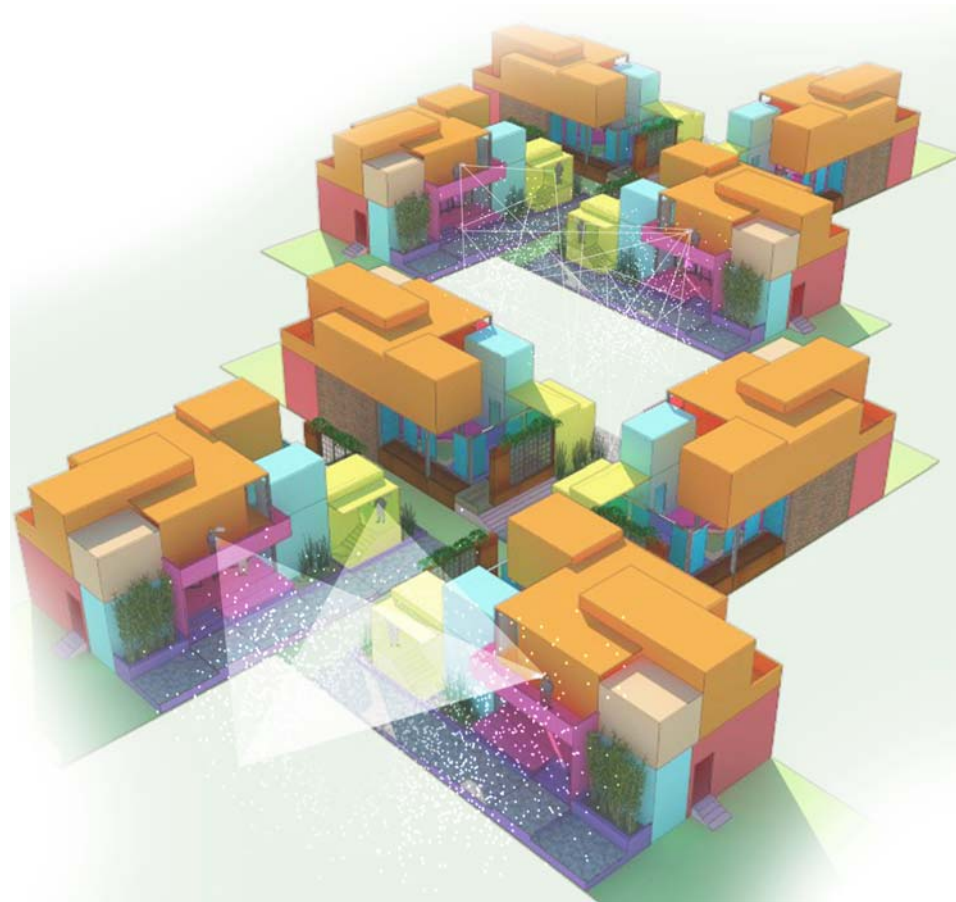
Figure 148 Cluster 2 - Analysis of privacy (distribution of noise and views)

4.4.3 Cluster 3

Figure 149 (top) Cluster 3 - Plans of clusters on site
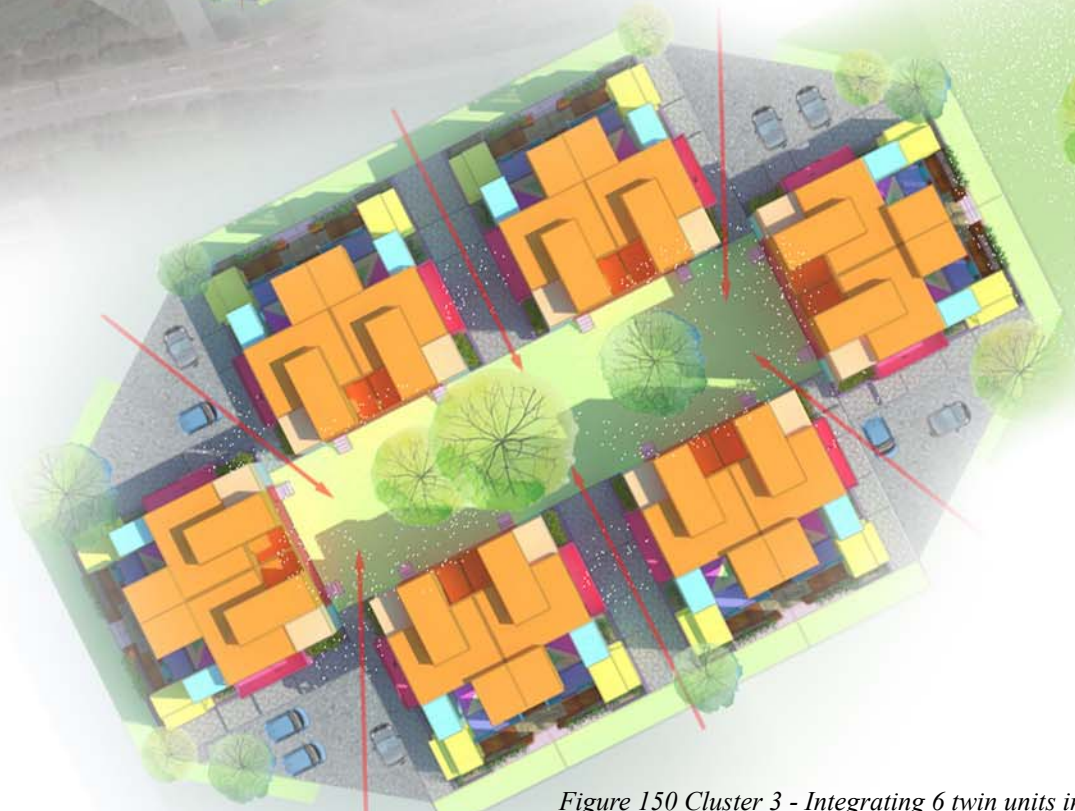
Figure 150 Cluster 3 - Integrating 6 twin units in 1 cluster

This cluster is a modified test and an extension from the first to achieve long term goals. The individual houses are a reflection of the neighbouring units, serving as two individual reflected houses attached together (Figure 150) . Since this cluster has long term expectations, more houses are designed to accommodate more families.

This design strategy, promotes families to reside longer in this twin terraced housing (Figure 151). Therefore, children pursuing their individual families are able to move next-door and live as neighbours with their parents. As a result, traditions and cultures are preserved within the family of all ethnicities for some time.

Figure 151 Cluster 3 - Twin units

Chapter 5: Product

This solution to terraced housing in Klang is seen as a response to suit these individual ethnic families' current cultural needs and requirements of the middle-income households. The design addresses the Malaysian families in two scales.

Firstly, the basic design of a single terraced housing unit that actively addresses the daily norms and cultural practices for a family of four, to inform their unique home. This design strategy provides freedom for the family to modify the house to adapt to their independent choice of ethnic lifestyle in today's contemporary context.

Secondly, the settlement of the cluster terraced houses, attempts to reduce the negative impacts of development and westernisation by seeking to inspire these three unique multi-ethnic families, in a more culturally sensitive, positive neighbourly and healthy living environment. Ultimately, this provides them with the tools to actively promote this terraced housing as a viable solution for the 1Malaysia People's Housing Program (PR1MA).

The Response of Families

'The Response of Families' here refers to the end product of Malaysian Families living in the 1Malaysia Home Design. It has been informed by a flexible process – a home spatially organised in a negotiated manner by the author, in regards to the aims of the theories that informed the traditional domestic architecture from the three ethnics, as the main design consideration. The images potray families being driven into private shared courtyards through the integration of current multi-cultural activities, in a friendly neighbourhood community (Figure 156 and 157).

5.1 1Malaysia Home

The basic house for a middle-income family of four

Figure 3D Final plan - Level 1

Figure 3D Final plan - Level 2

Level 1
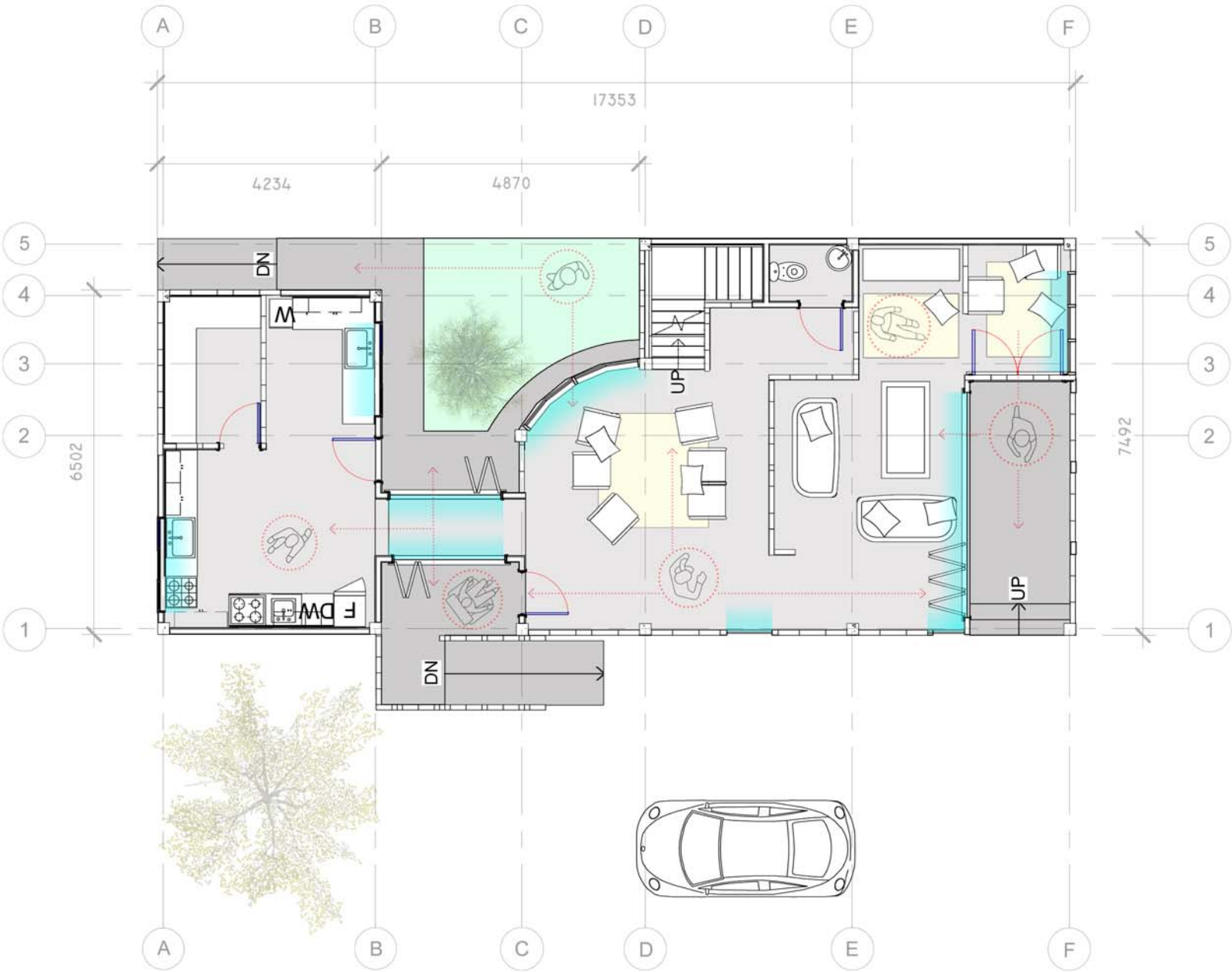
Figure 152 Final plan - Level 1   1:100

148

Storeroom

Kitchen

External courtyard

Dining room

Back entrance

Washroom

Living room

Rear entrance

Front entrance

Figure 153 3D Final plan - Level 1

Level 2
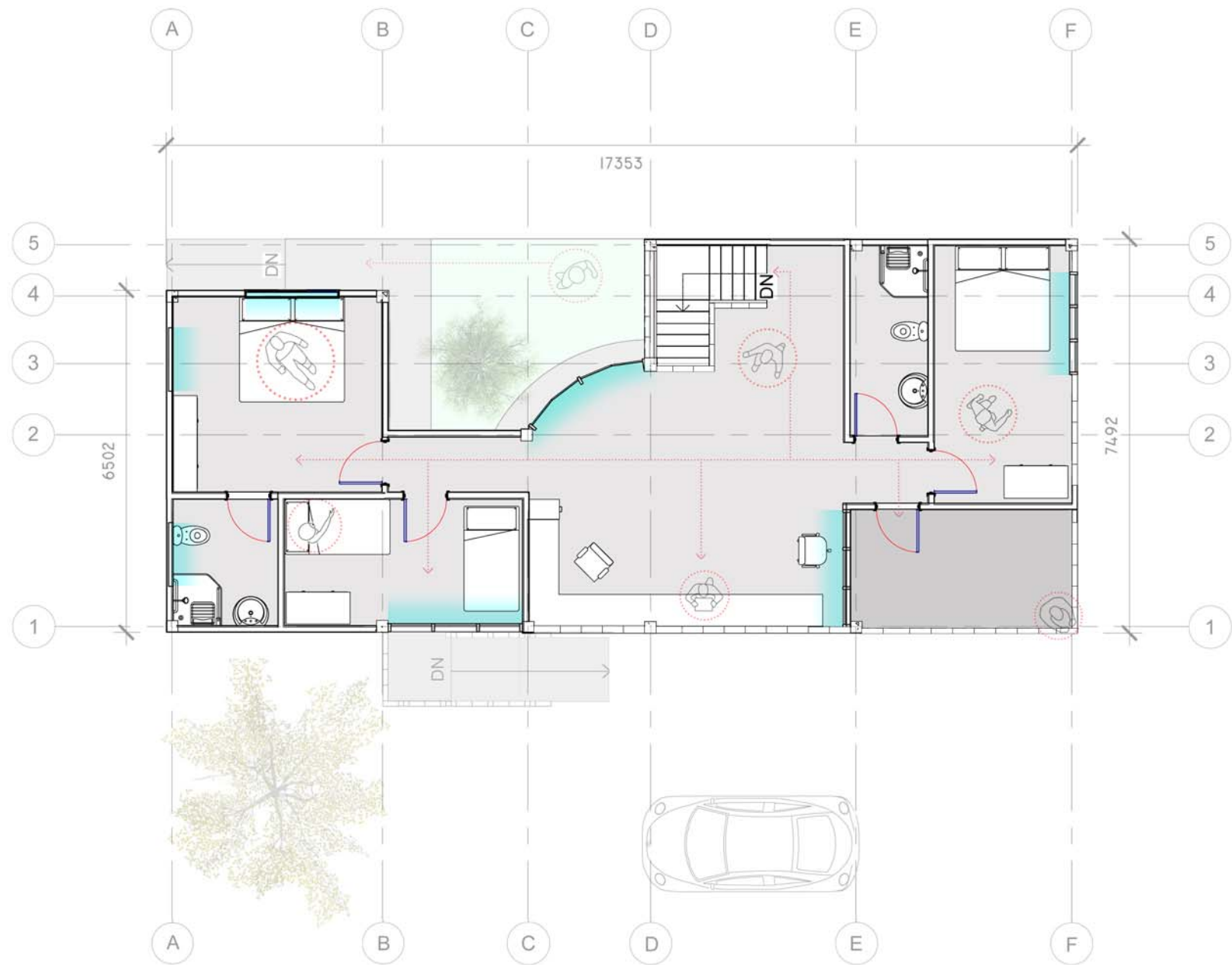
Figure 154 Final plan - Level 2   1:100

Figure 155 3D Final plan - Level 2

5.2 Views of the 1Malaysia Home

The neighbours and customers from the community engage at temporary stalls in the private courtyard during a morning market or *Pasar Pagi*.

Figure 156

View of the external shared courtyard from level 2

For a long term food business programme, the adaptation of a shop as an alternative design to the storeroom beside the kitchen, enhances the community's night market or *Pasar Malam* culture and social experiences.

Figure 157 Back view of the house and external courtyards

5.3 1Malaysia Terraced Housing

This design is an extension of Cluster 3 from **Chapter 4: Process** that has maintained the contemporary linear arrangement of the twin units, but incorporating the concentric layout, creating large outdoor green courtyards. The latest scheme proposes an integration of four Zone A and one Zone B. Therefore, this scheme accommodates 60 units of houses (12 x 4 + 12 = 60) in Cluster 1, which is a part of the entire neighbourhood (Figure 158).

The zones depict the similar closely-knit building complex of the linear pattern Chinese shop houses, which reflect the Hakka's *wei* and *bao* (Figure 71) to inform the strong centripetalism and solidarity of this multi-ethnic community. The detached houses are in a concentric arrangement as traditional Malay and Indian houses. This creates large public courtyards that act as communal spaces, similar to the Canon Square (Figure 71) and *chowks* (Figure 94) for the community's activities to take place.

14 Clusters in one neighbourhood

Zone A
4 (6 x 2) = 48 units

Cluster 1

Zone B,
6 x 2 = 12 units

Chapter 6: Review of the Product

6.1 Modular Design

This design facilitates the spatial organisation of the house to suit the family's style of living in comfort. The system enables families to modify the spaces, achieving a good level of flexibility for adaptation to take place.

The four precast concrete screen blocks (Figure 160) are the essential components. Their shapes are designed to fit into one another to function as walls that are manipulated easily, to enlarge or reduce the size of spaces in the interior and exterior.

I Block

+ Block
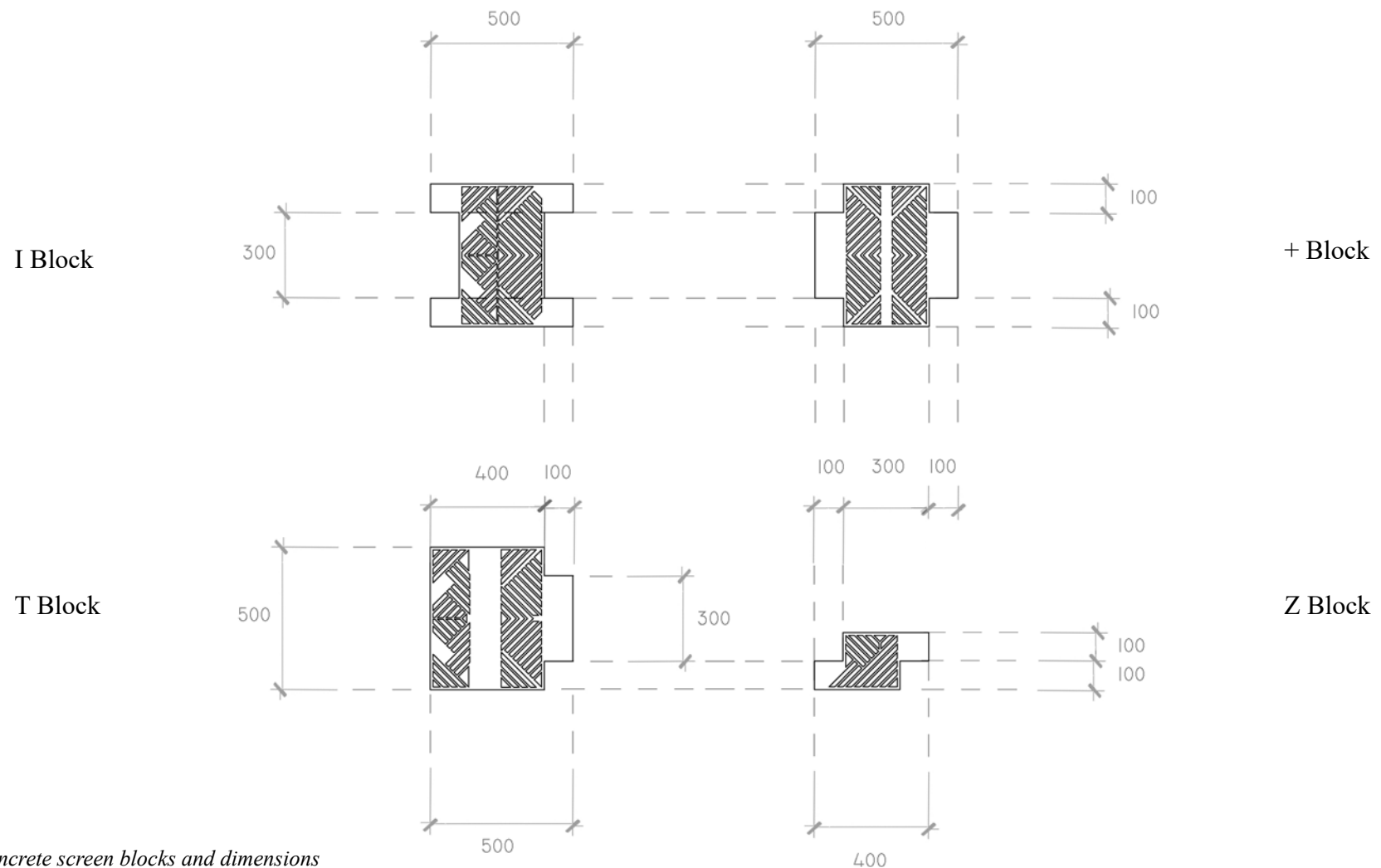
T Block

Z Block

Figure 160 Basic concrete screen blocks and dimensions

Application of the Modular Design

Variation and the combination use of the screen blocks assist the adaptation of the spatial organisation to the family's activities. This seeks to inspire all families to take pride in their unique choice of colours (Figure 157 and 159) and spatial organisation design, as depicted in the proposed subchapter options, under Cultural Considerations.

The first integration of the modular system is with the vertical circulations of the house to cater families with the elderly and disabled, enhancing their visual and mobility experiences throughout their circulation process (highlighted in blue) (Figure 162 and 163).

6.1.1 Vertical Circulations

Figure 161 Vertical Circulations

1:50   *Figure 162 Vertical Circulation - Ramp*

1:50 *Figure 163 Vertical Circulation - Staircase*
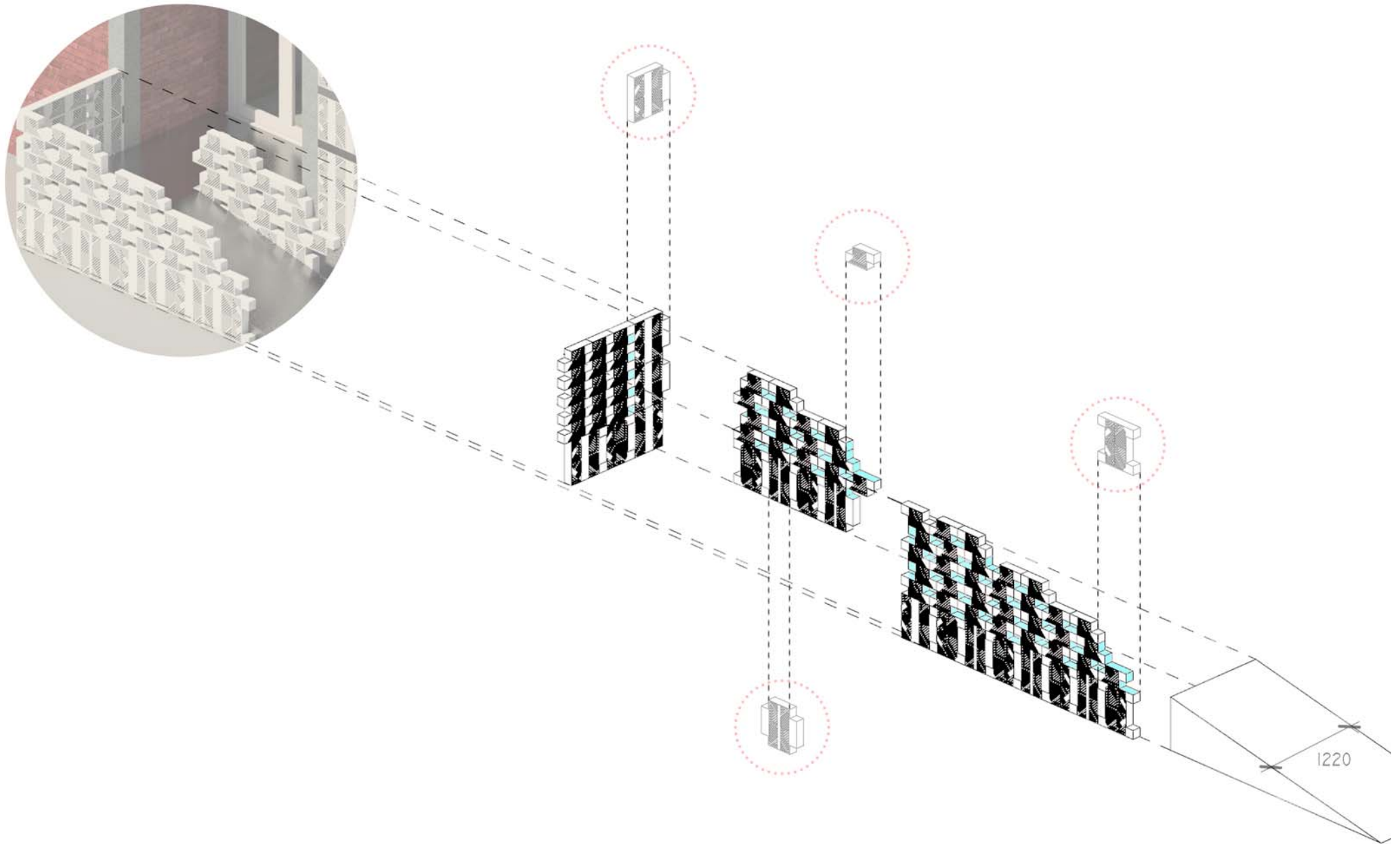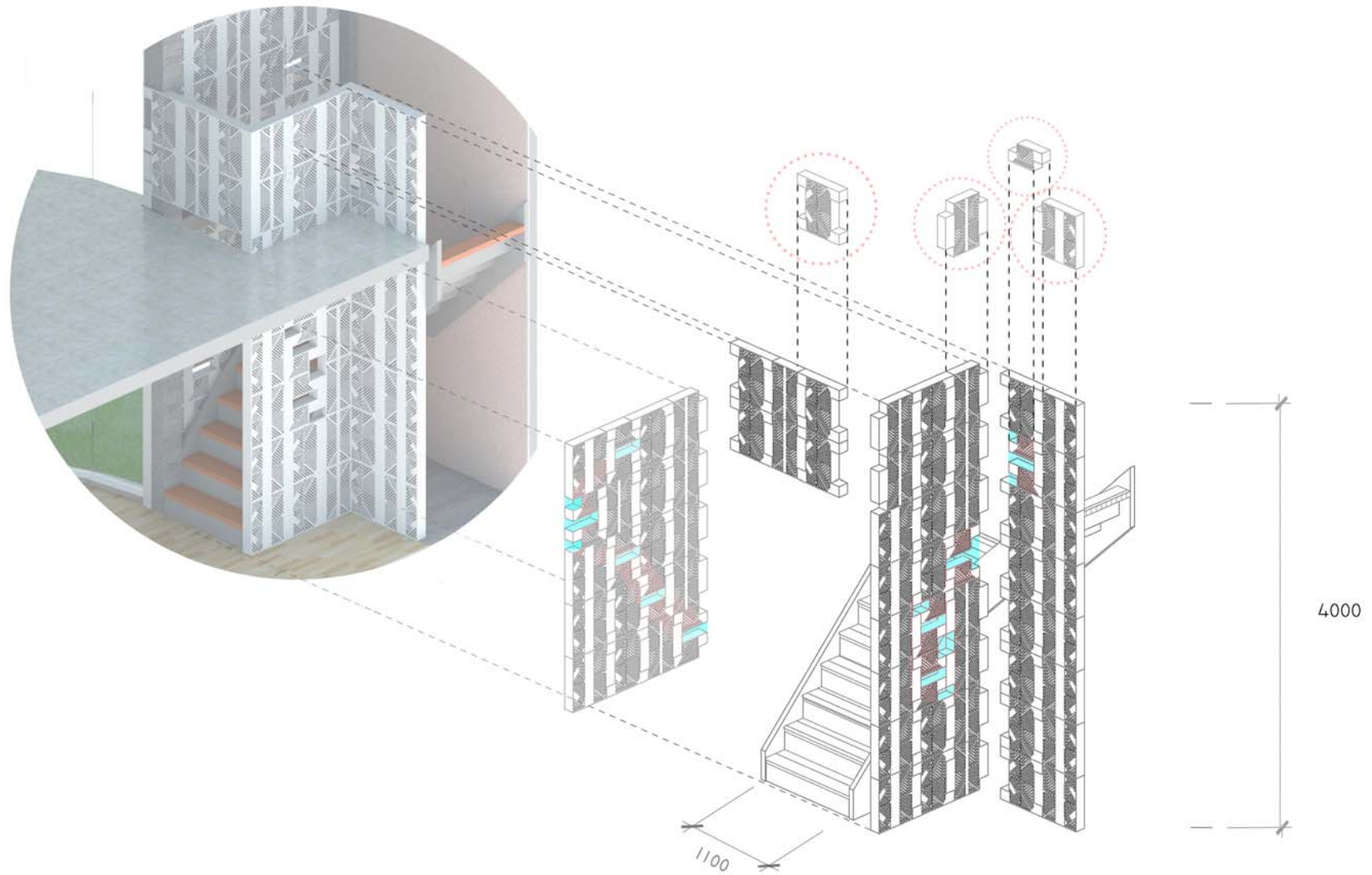
6.1.2 Privacy

Plastered and basic screen blocks are integrated with one another to attain a higher level of privacy for the interior and a variety of aesthetic styles (Figure 164). The moderate sizes of these blocks allow the families to utilise them for more than one function (Figure 165).

Roof Level 5950

Level 2 3450

Level 1 600
Ground level 0

···→ View

▶ Visual scope

▦ Basic concrete screens

▦ Plastered concrete screens

1:100

Figure 164 Visual and privacy between occupants and the public

6.1.3 Circulation + Privacy

Figure 165 Circulation + privacy (For Option 3 - Sikh wedding)
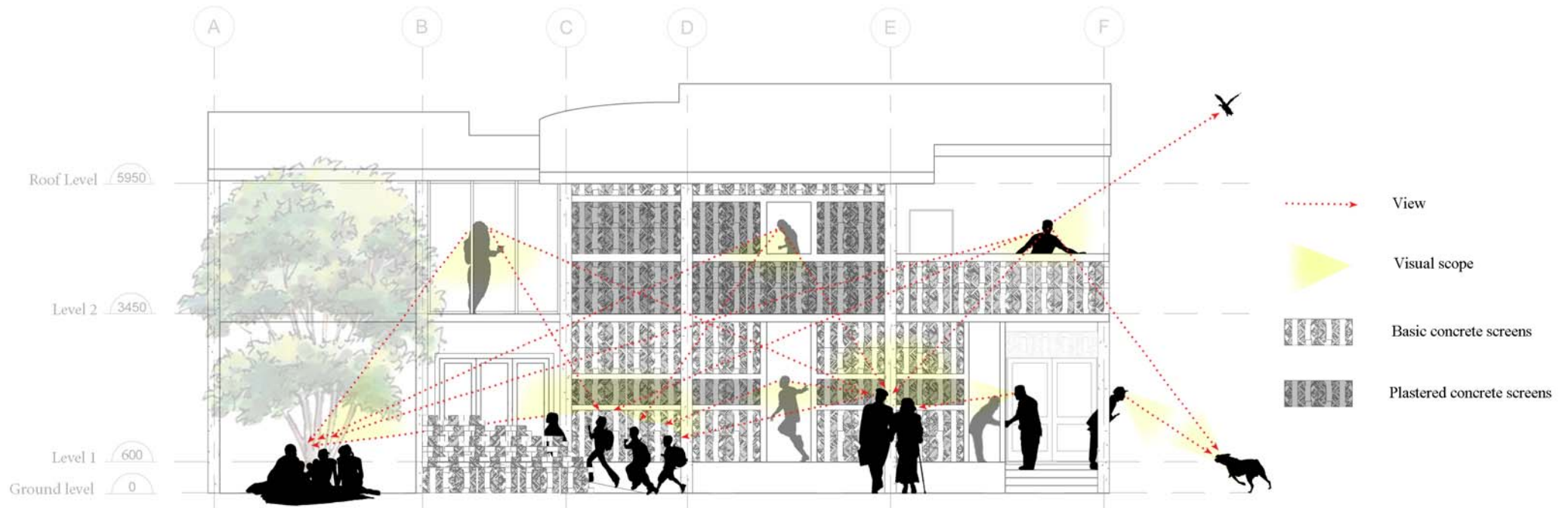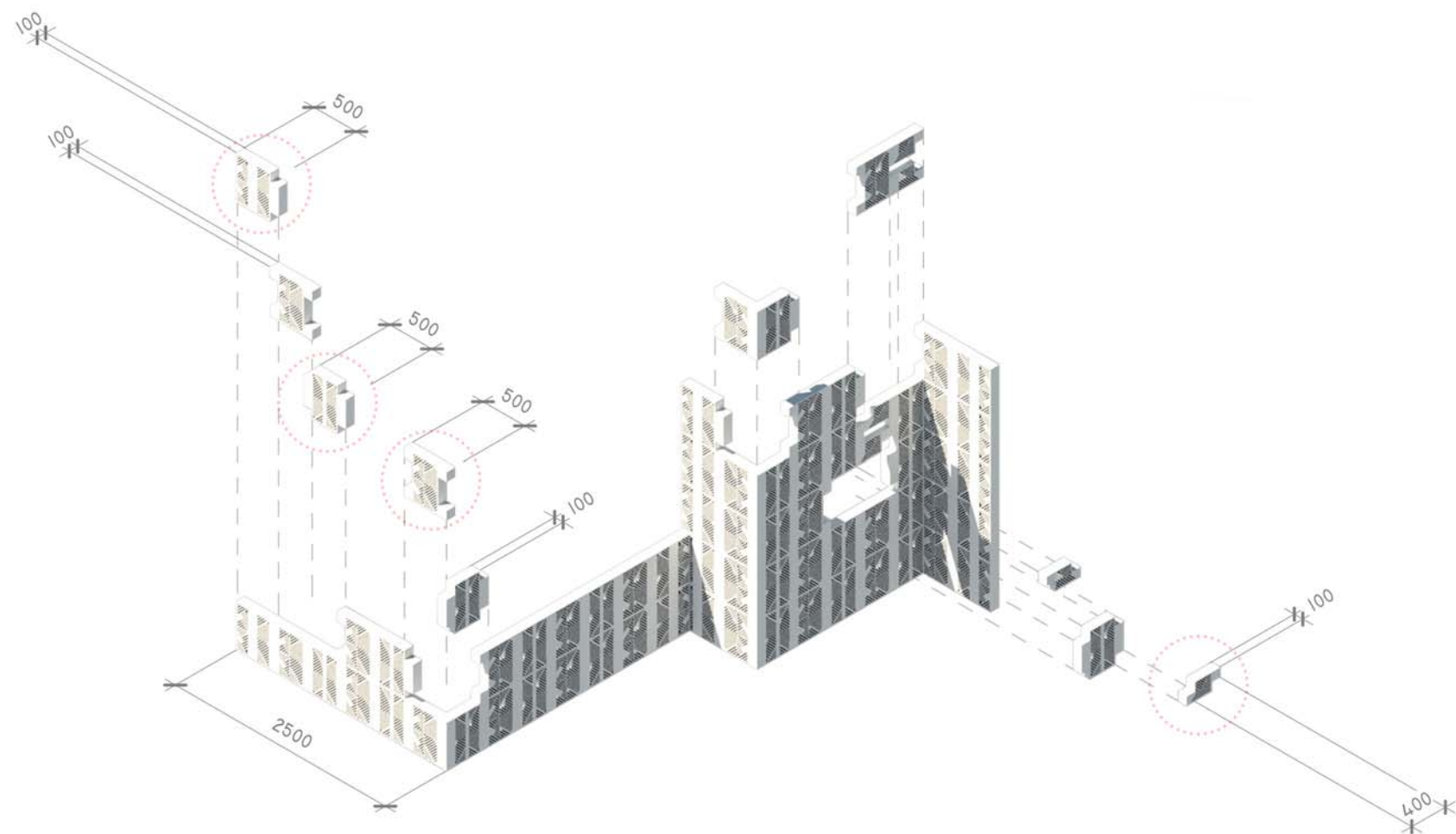
6.2 Healthy Living Environment

The product offers to improve the living conditions of families by minimising the impacts of environmental issues within the current neighbourhood living communities. The proposed design aims to mitigate the identified issues of air quality, flooding and congestion.

6.2.1 Air Quality

The hot and humid climatic conditions of Malaysia has an extreme negative impact on air quality. The rapid development of Klang Town and traffic congestion, as studied in **Chapter 3: Site Considerations** is expected to contribute a high level of air pollution from dust particles, harmful chemical gases and automobile exhaust fumes. This screen block system seeks to attenuate these by filtering, besides its other multiple functions for the family and environment (Figure 166).

Cooling

Drying

Filtration

Protection

Privacy
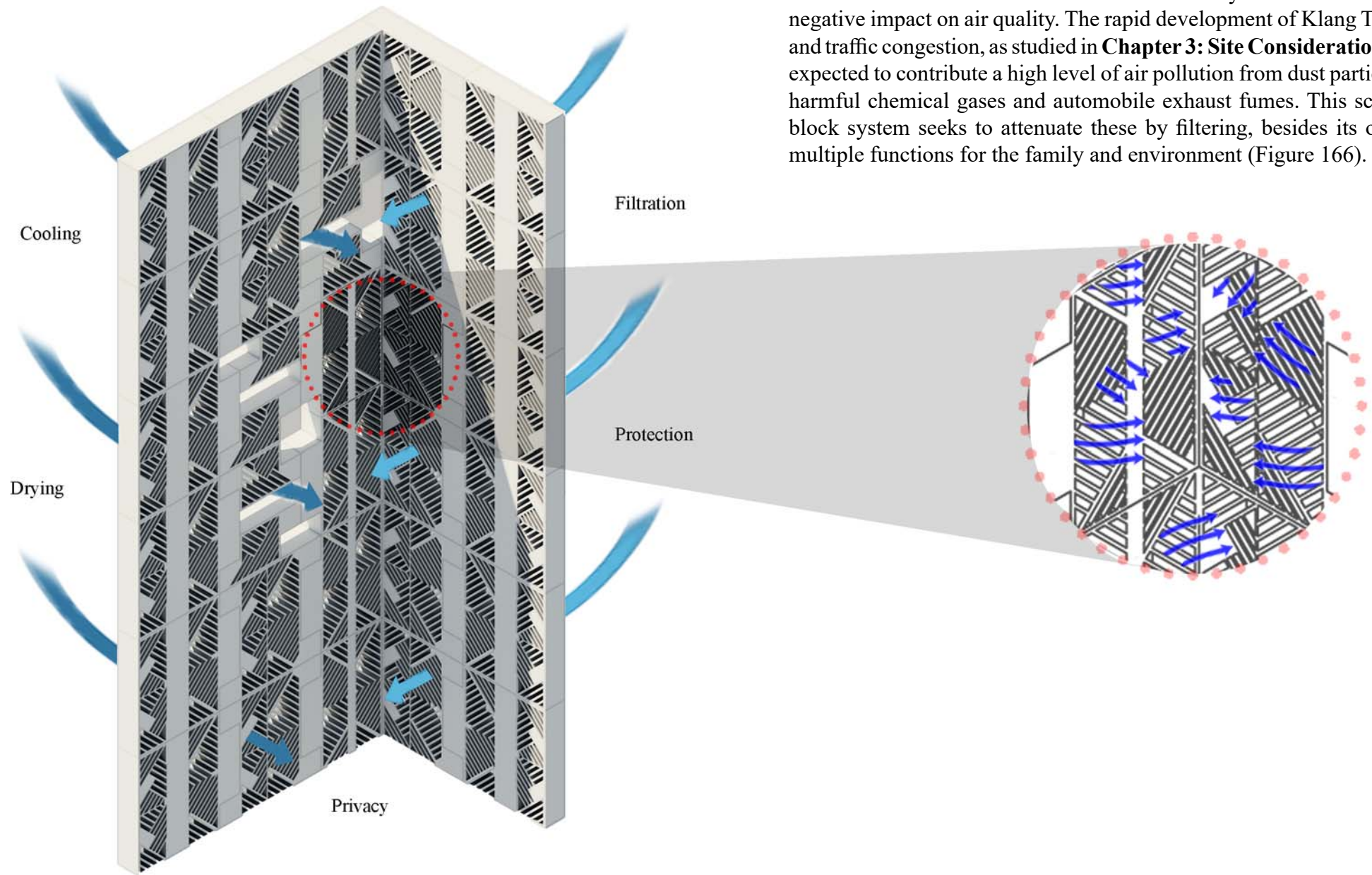
Figure 166 Multiple functions of the screen blocks

The courtyard as the largest open space to the outdoor, is the source of fresh air in this middle zone (blue). The screen blocks and openings to the courtyard, facilitates the channeling of cool air into the house and generates an efficient circulation of air (Figure 167).

The inclusion of public courtyards in terraced housing (Figure 168), generates a consistent flow of air to the private courtyards of detached twin units. As a result, good quality of air is sustained throughout the neighbourhood, by incorporating the traditional concentric pattern with the contemporary linear pattern.

Figure 167 Efficiency of air flow - Individual unit

1:100

170

Hot Air Out

Cool Air In

Cool Air In

Hot Air Out

Cool Air In

Hot Air Out

Hot Air Out

1:1000

Figure 168 Efficiency of air flow - Multiple detached twin units
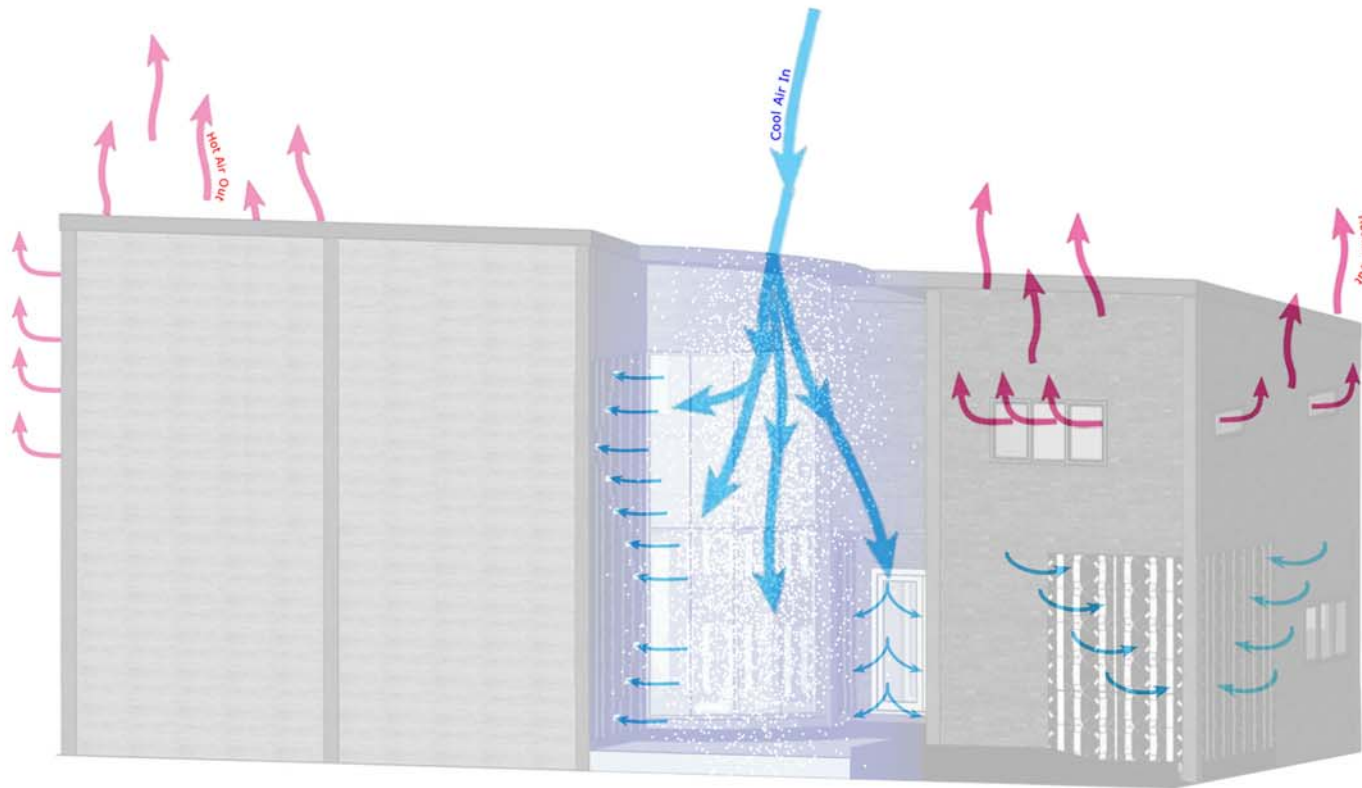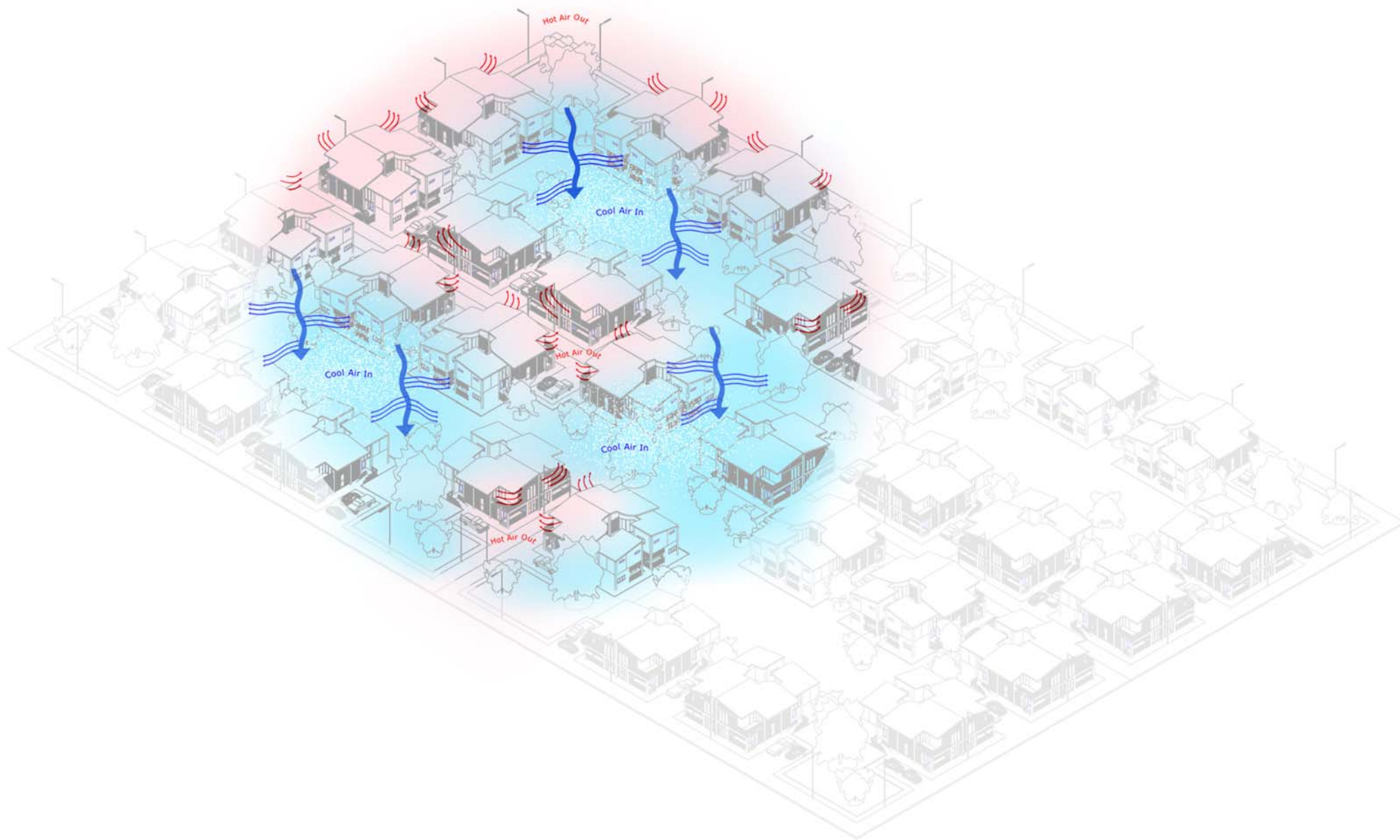
6.2.2 Flooding

Klang Town is prone to flooding due to its low land and close proximity to the Klang River (Figure 169 - light blue). Terraced houses here are prone to devastation through monsoon-driven flooding, damaging homes, promoting pest infestations and diseases. The design strives to reduce these impacts of flooding, for minimal impact on the site.
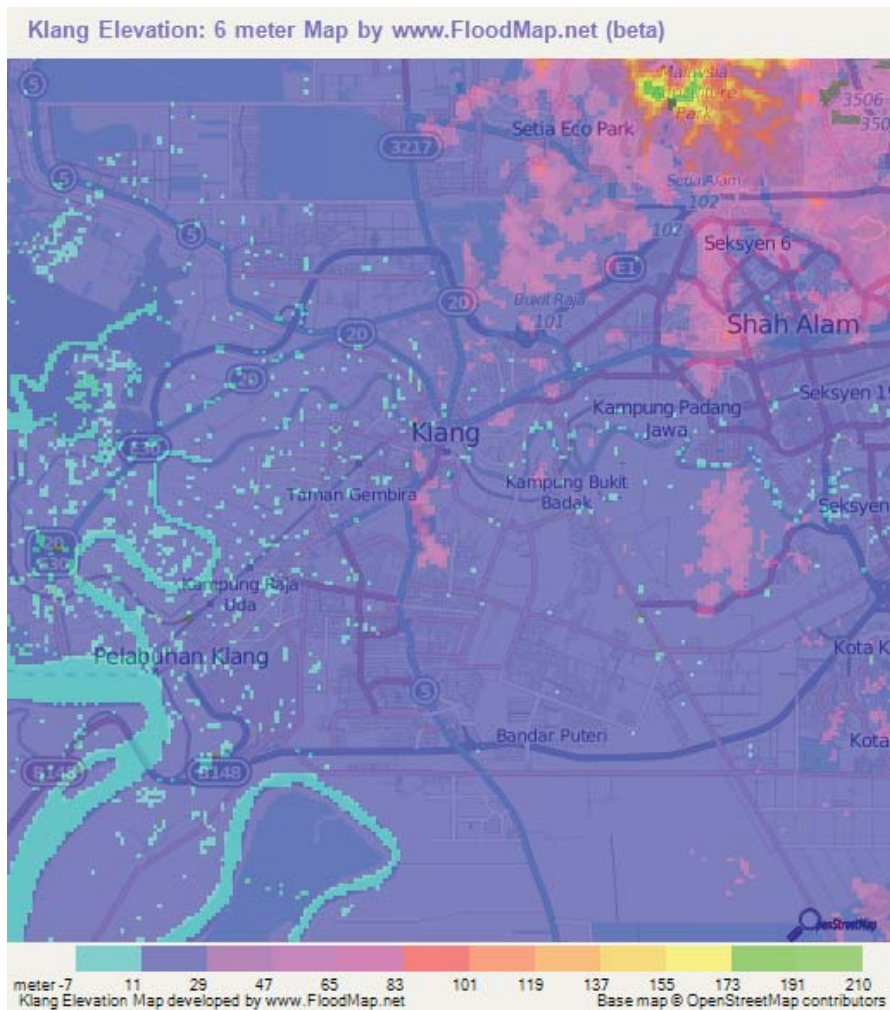
The function of stilts in traditional Malay houses, elevates the floor levels to an acceptable height, which is implemented in this design (Figure 171). The ramps behind the house, drains water from the private external courtyard to the public courtyards to maintain a good level of hygiene for the families (Figure 170).

Figure 169 Elevation of Klang, Malaysia
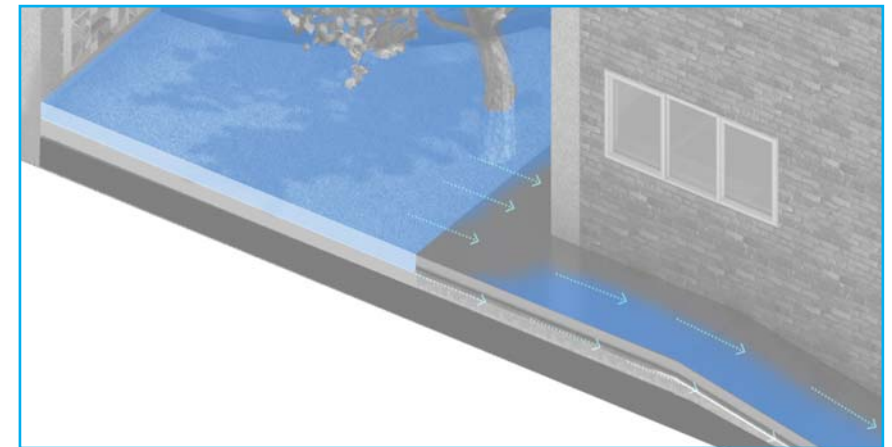
Figure 170 Ramp draining water from the courtyard

Sloping roof to channel rain water below

Rain water collected for domestic living

1 2 3 4 5

Roof Level 5950

Level 2 3450

Level 1 600

Ground level 0

Flood level 500m

Semi-enclosed verandah for families to enjoy the raining experience

Large views for the families to perceive rain and monitor flood levels

Storage tanks to collect water for filteration

1:100   *Figure 171 Elevated floor levels and collection of rain water*

173

6.2.3 Congestion

The close proximity of current terraced housing design has caused inconvenience in a neighbourhood, diminishing their cultural practices, activities, mobility and convenience, as addressed under terraced housing problems, **Chapter 1: Introduction (**pg. 10 and 11).

Hawker stalls to be adapted into the rear entrance

1Malaysia Terraced Houses inhabitation zone

Shop and stalls zone

Flower shop to be adapted into the verandah
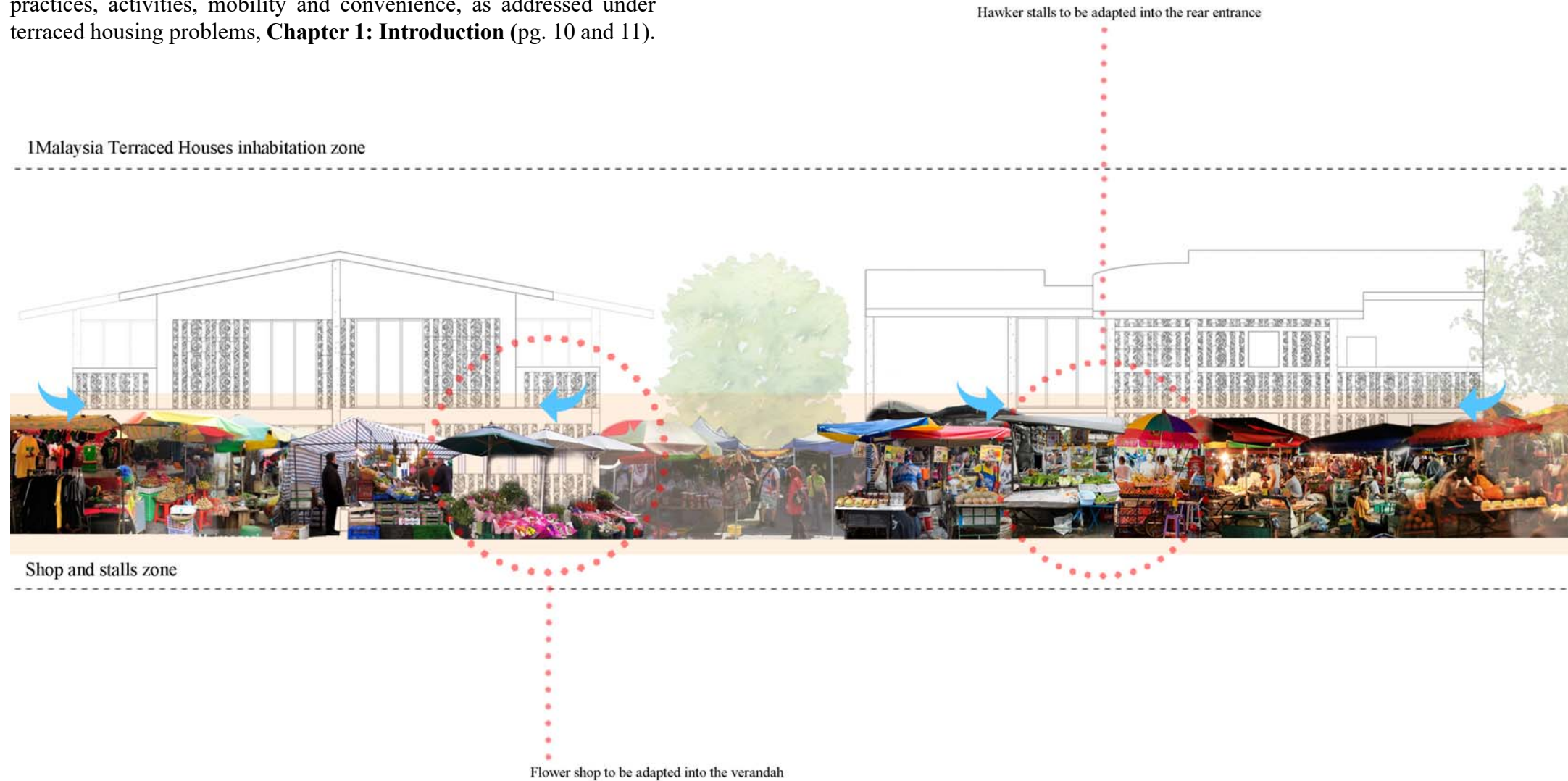
Figure 172 The activities of a 'Pasar Malam' in a multi-ethnic neighbourhood community

A common multi-cultural activity is adapted into a neighbourhood with external courtyards to reduce crowding (Figure 172). The flexible design integrates their activities into the detached twin units, surrounding these courtyards for improved public social interaction while retaining the culture.

Clothing and textile shops to be adapted into the living room

Courtyards to accommodate customer sitting spaces
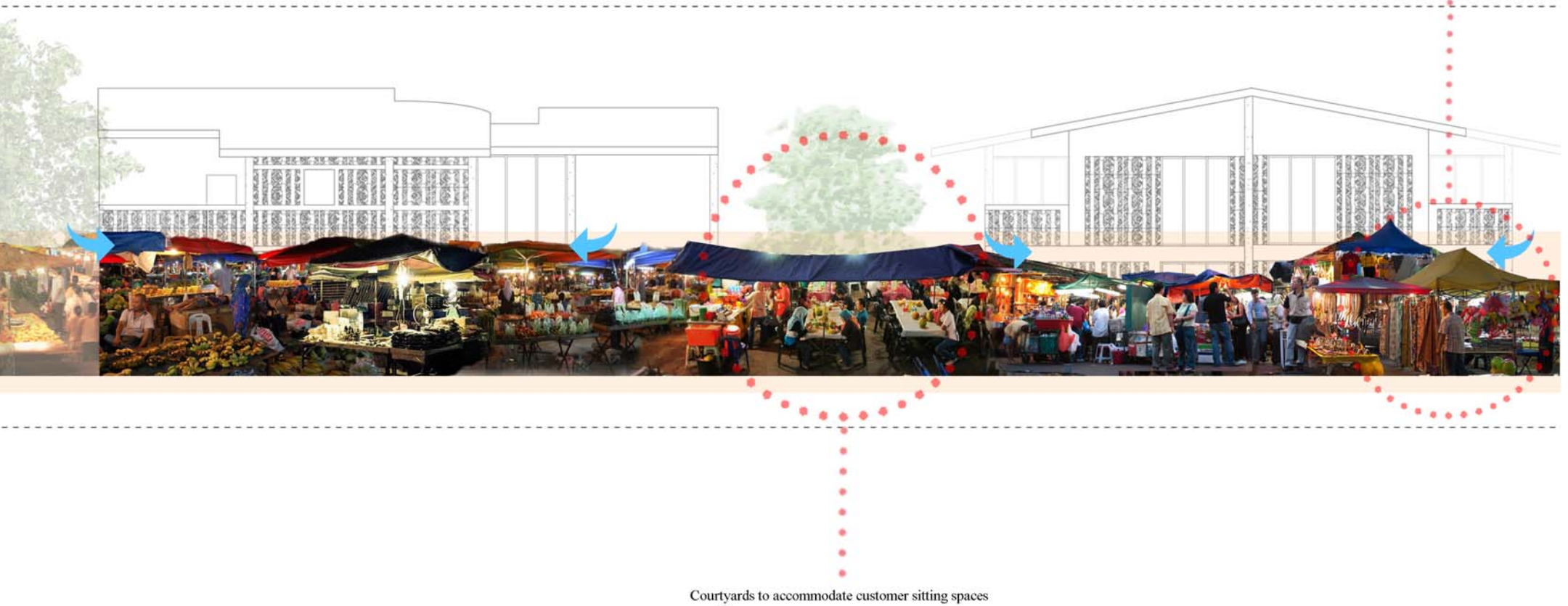
6.3 Cultural Considerations

For the purpose of this research, four options are proposed to illustrate the various flexible ways the house is capable of being modified, to adapt to diverse cultural practices and the daily norms of the multi-ethnic families in Malaysia.

The theories that inform the design of a courtyard revolving around the five elements of nature for a well-balanced environment to the central family zone (white), is highlighted for all three families uniquely (Figure 173).

Malay

Chinese

Indian
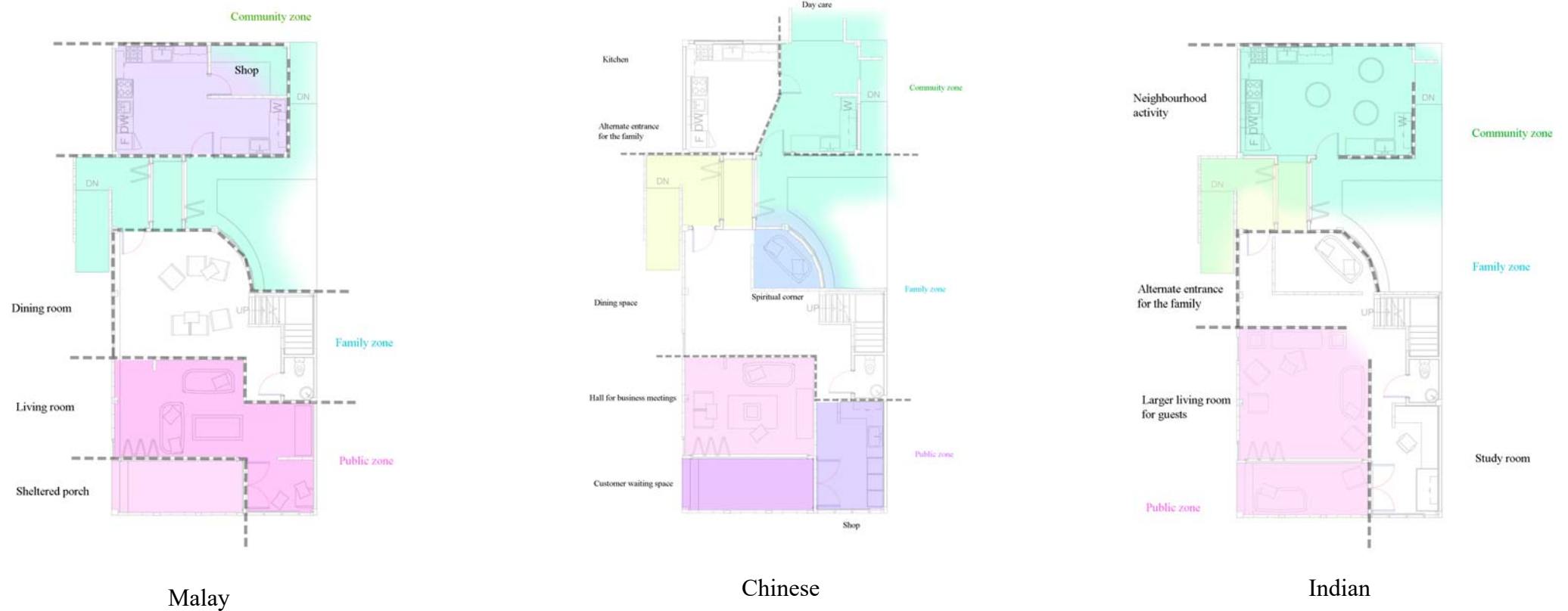
Figure 173 Modifications of the house - spatial plans

6.3.1 Option 1 - Adapting to the lifestyle of a Malay family

Associating *dapur* with the adaptation of a food shop to the storeroom.

P*elantar* and *selang* is adapted into the family space for women to retain their privacy.

Integrating the *rumah ibu* as the family's private space to the courtyard, for reference to the east-west direction of the sun (facing Mecca) for religious devotions.

Anjung to greet and welcome guests into the *serambi*.

Community zone

Shop

DN

DN

Dining room

UP

Family zone

Living room

Public zone

Sheltered porch
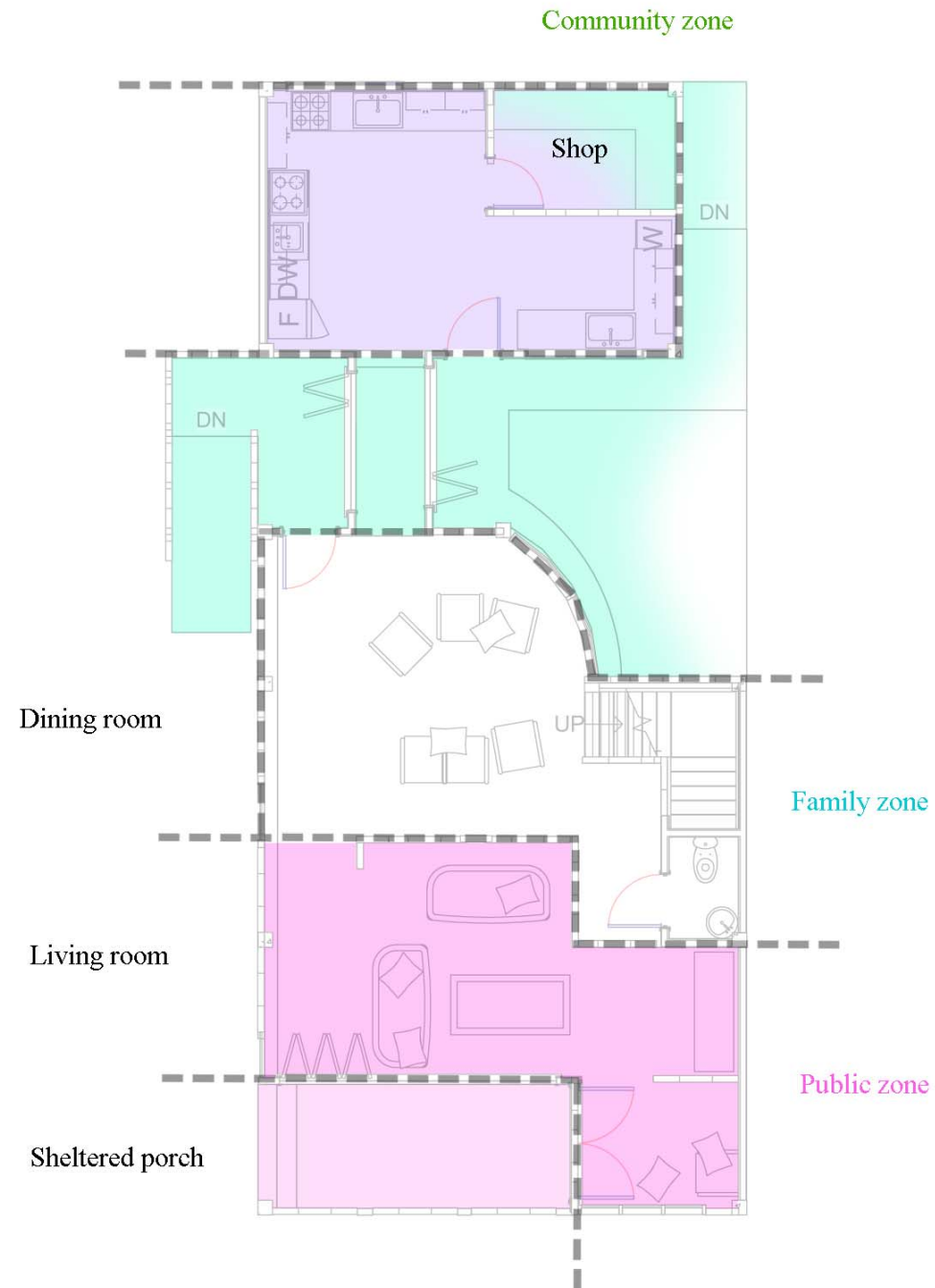
Figure 174 Spatial plan 1 - Malay family

179

The traditional Malay house highlights the activities of a Malay family and the significance of the middle space as the family's private space (Figure 175 and 176).
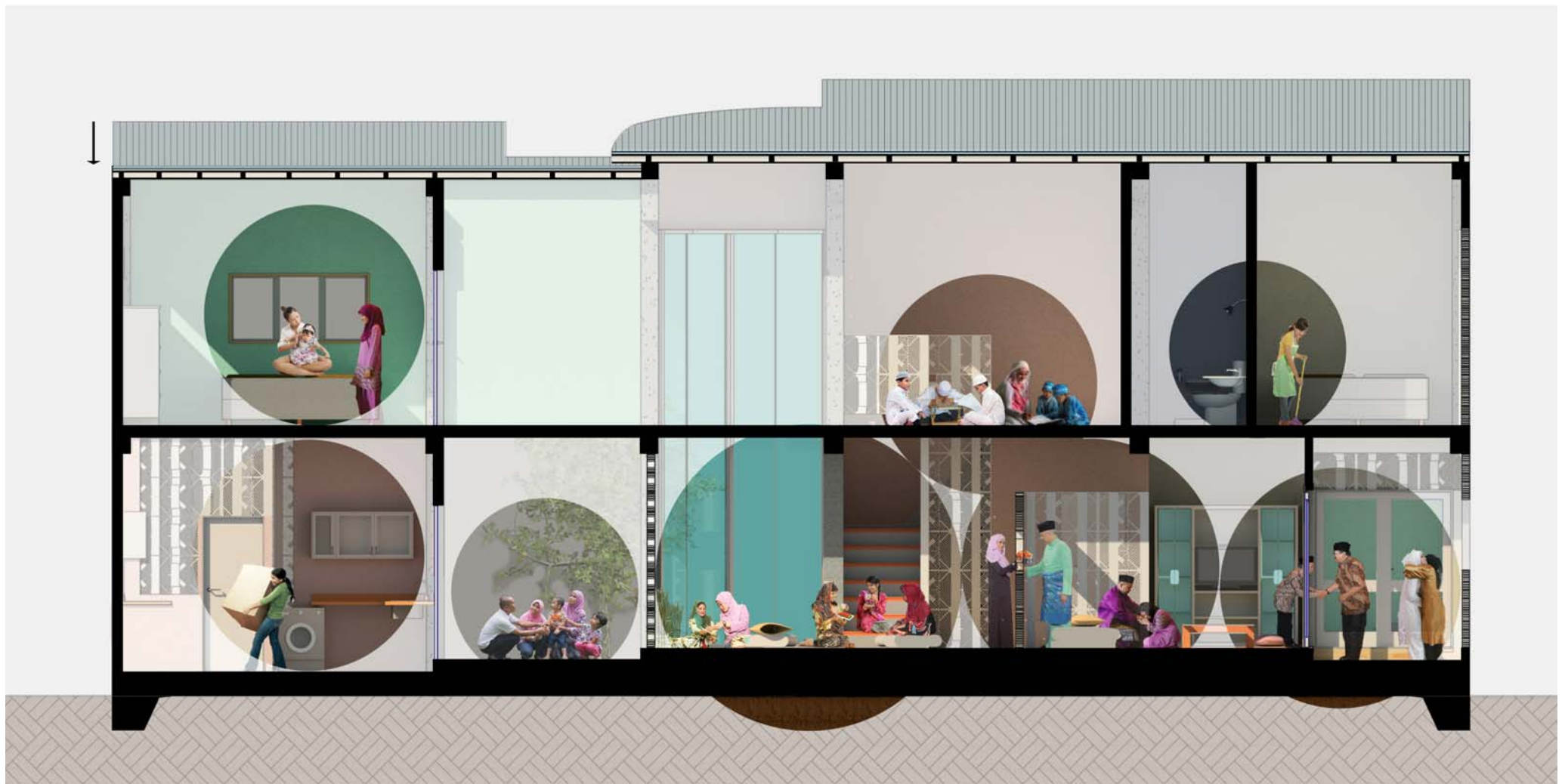
Figure 175 Section 1 - Activities of a Malay family

The external courtyard, serves to facilitate the family's practices to create a safe and interactive atmosphere.

The stairs and ramp to the rear entrance function to enhance the circulation of the family to the central space.

The middle space enables the Malay family to read in private and dine according to their traditional lifestyle.

Figure 176 Section 2 (middle family space) - Activities of a Malay family

The adaptation of the *anjung* as the semi outdoor verandah, and *serambi* as the living room for the family to associate with the public.

Public spaces

Separation at the central space to isolate women from the public spaces.

Higher privacy upstairs for family practices and activities at the *bilik* (praying, reading, sleeping).

Service spaces

Central spaces

Privacy spaces

The significance of the *rumah ibu* in the middle is retained as the family area.
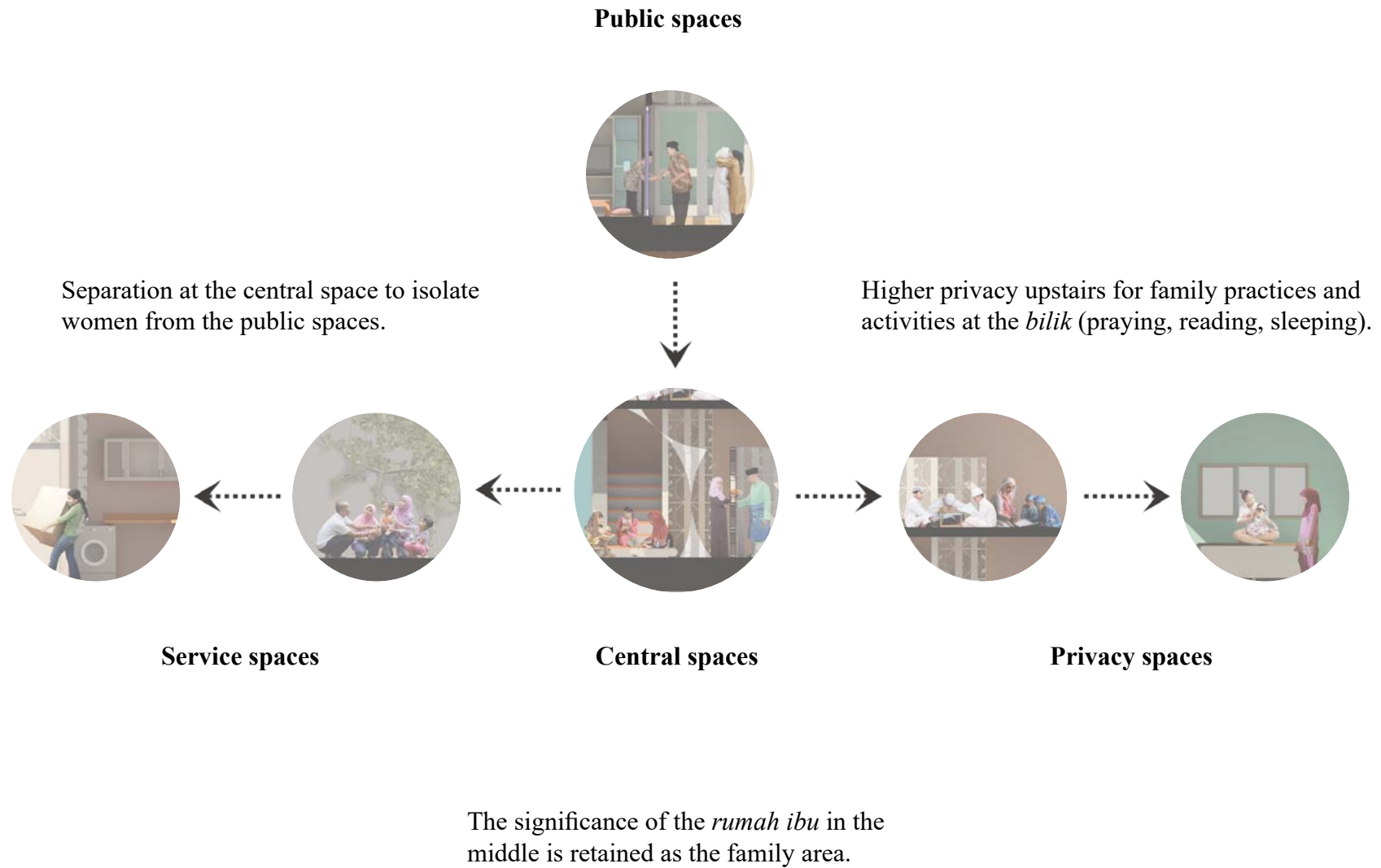
Figure 177 Spatial sequence - Malay family

6.3.2 Option 2 - Adapting to the lifestyle of a Chinese family

Although home and businesses today are mostly kept separate, in Malaysia small businesses run from homes are widely observed. However, the current terraced housing design evolved to a simpler concept from a shop house, splitting the commercial from the residential but without any sense of belonging among the community. This option functions to revitalise the similar environment a traditional shop house once portrayed but in a contemporary terraced housing context (Figure 178).

Neighbourhood day care

Meditation corner

Shop house having a bake sale

Private business meeting

1:100

Figure 178 Option 2 for Chinese family - Level 1

The duality concept, Daoism is emphasised by the interdependent, *Yin Yang* Theory between the spatial distinction of the external courtyards and the house.

The integration of a spiritual corner in the family zone with the external courtyard to the environment, as suggested by *feng shui*.

The spiritual space is located nearer to the courtyard for better lighting, ventilation and away from the noise but still visible enough for the shop's business to flourish.

The central family space expresses superiority than the inferior front and back in terms of spatial hierarchy, highlighting the Confucianism Theory.

Adaptation of a home business to the front of the house, as the design of a traditional shop house is spatially organised.
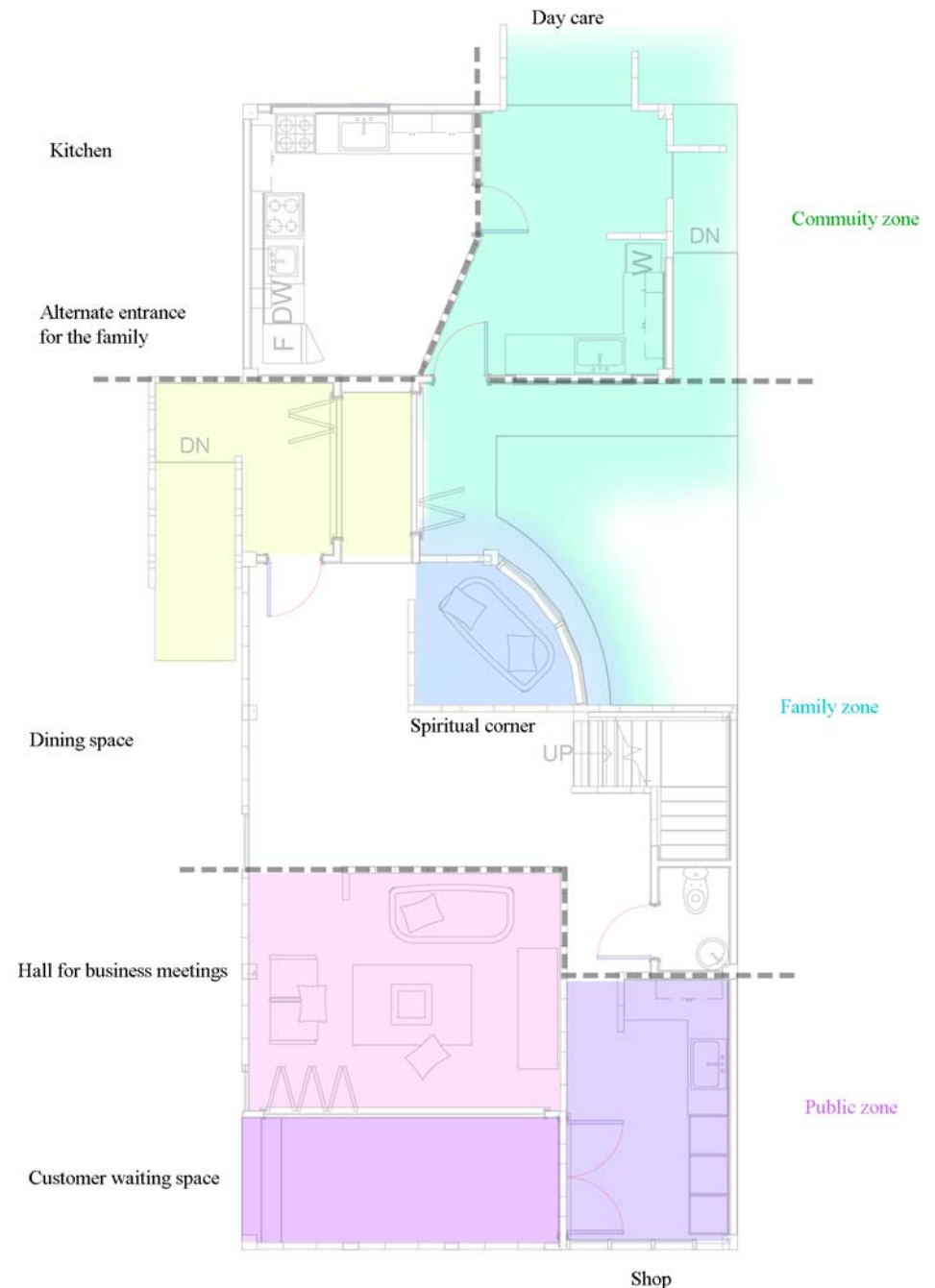
Figure 179 Spatial plan 2 - Chinese family

The spatial arrangement, size of the shop and hall are modified at the front, enhancing the working relationship of the owner with the clients and customers. As a result of this organisation, the living room is relocated upstairs for the family to socialise privately (Figure 180).

The house now serves to cater for temporary community related home businesses such as private home tuition classes at the study space and neighbourhood day care centre at the storeroom. This alteration of the spaces from the initial to integrate home businesses within the house, reinstates the sense of belonging among the community.

Private living room

Tuition classes

1:100

Figure 180 Option 2 for Chinese family - Level 2

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6.3.3 Option 3 - Adapting to the lifestyle of an Indian family

Family functions and cultural festivities are celebrated among an individual family with a small number of guests. However, the design of the current terraced housing limits their movement, forcing them to adapt to the house. As a result, guests tend to crowd the house, which restricts the cultural and spiritual practices of the host.

This option stresses on an Indian family organising private functions or events at home to cater for the comfort of everyone. The strategy to design one space for multiple uses, provides a level of flexibility for both the family and guests, giving them a sense of comfort and preserving their culture. This is achieved by modifying the spaces of the house to adapt to various functions for everyone (Figure 181).

Neighbourhood activity/class

Rear entrance to the
courtyard and middle space

Study room

Higher privacy from crowds

Larger living room
to accommodate crowds

1:100   *Figure 181 Option 3 for Indian family - Level 1*
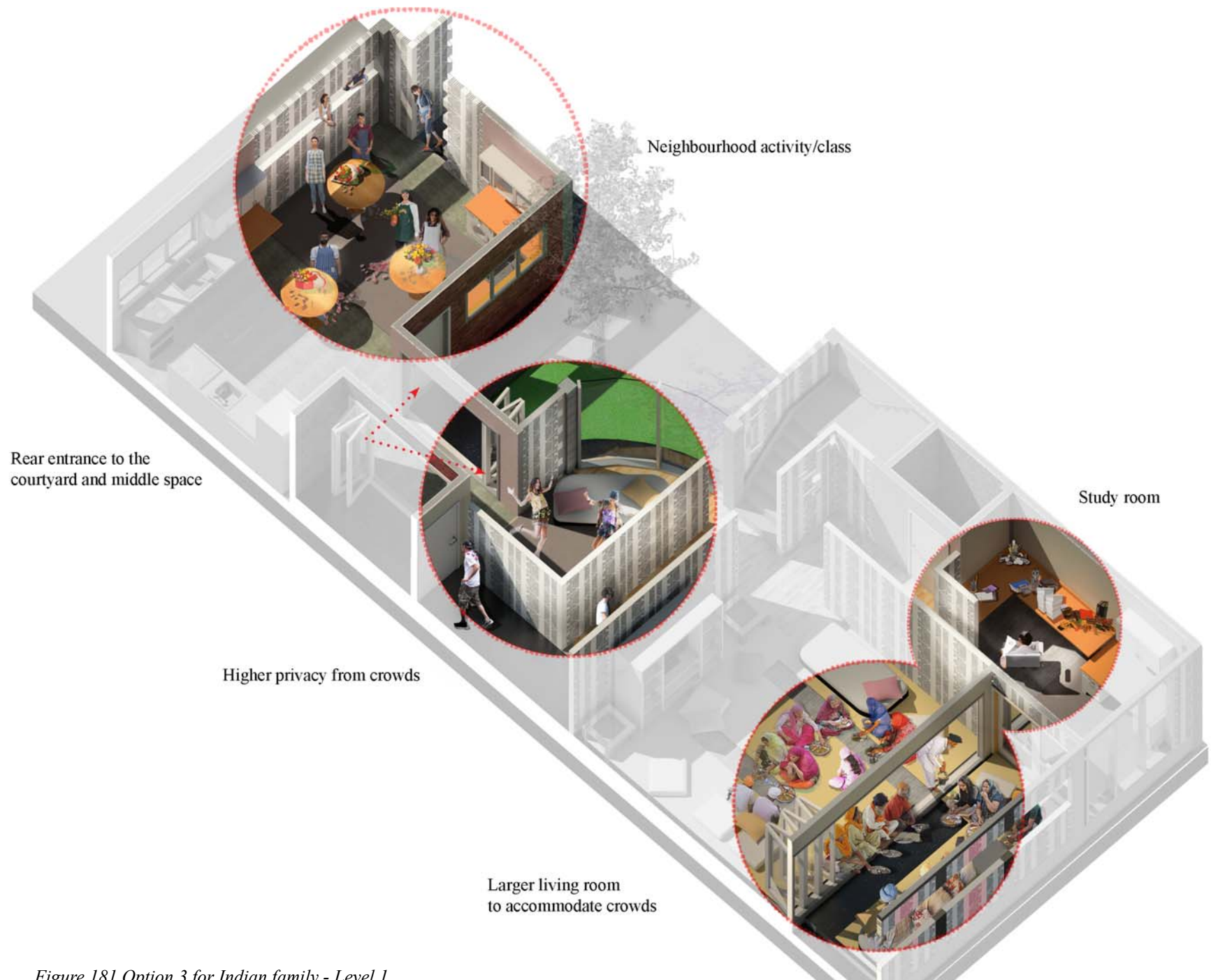
Adapting a neighbourhood kitchen related activity in the *rasoi*.

The design's strategy of having the rear entrance, directs other family members who are not involved, to move within the house without obstructing these private functions.

The *delly* and *otla* are adapted with the *osari* as one integrated space. This multiple function space is now the main entrance to welcome, entertain and dine with guests conveniently in one private space.

Neighbourhood
activity

Community zone

Family zone

Alternate entrance
for the family

Larger living room
for guests

Study room

Public zone
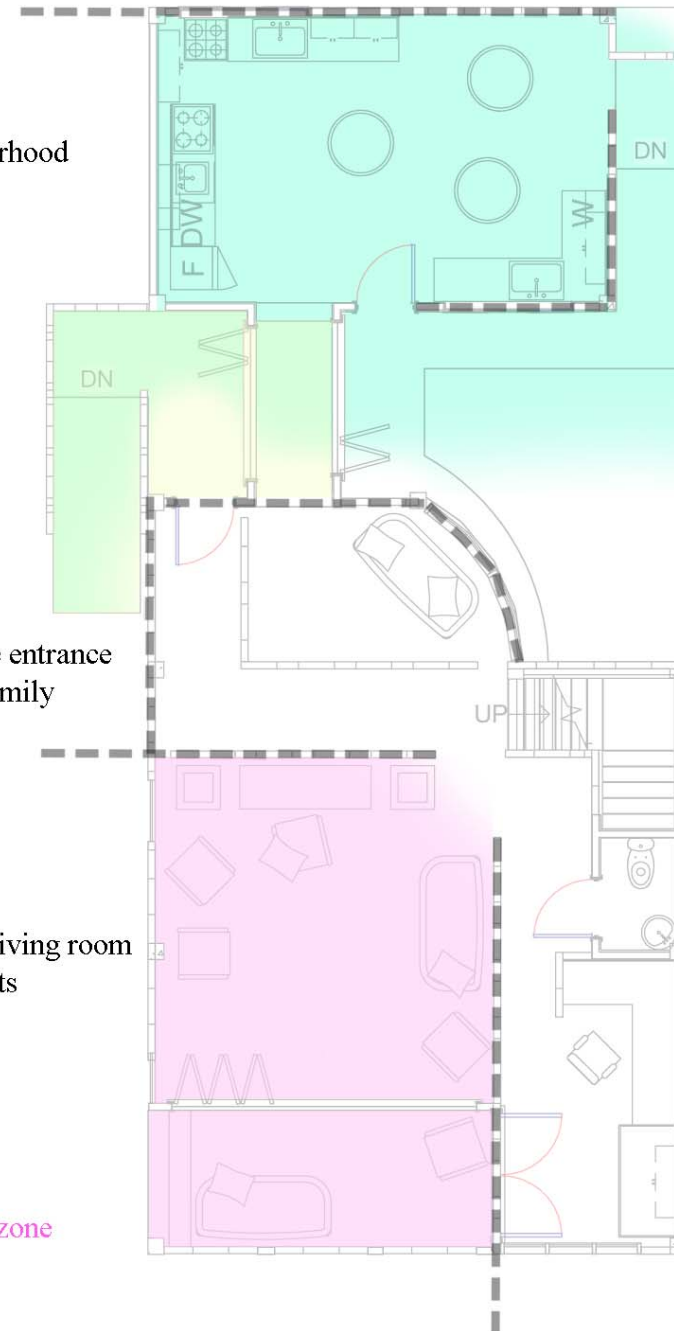
Figure 182 Spatial plan 3 - Indian family

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The prayer room is adapted at the middle space for families to conduct spiritual and cultural practices privately, by the *karai*. The design aims to allow the host to open the prayer room to face the *aangan* as the *Vastu Purusha* suggests for better lighting and ventilation (Figure 183).

This design provides an alternative for families not requiring a prayer room or to accommodate relatives in a temporary bedroom. As a result, the study space is integrated with the bedroom for a mixed use space (Figure 184).
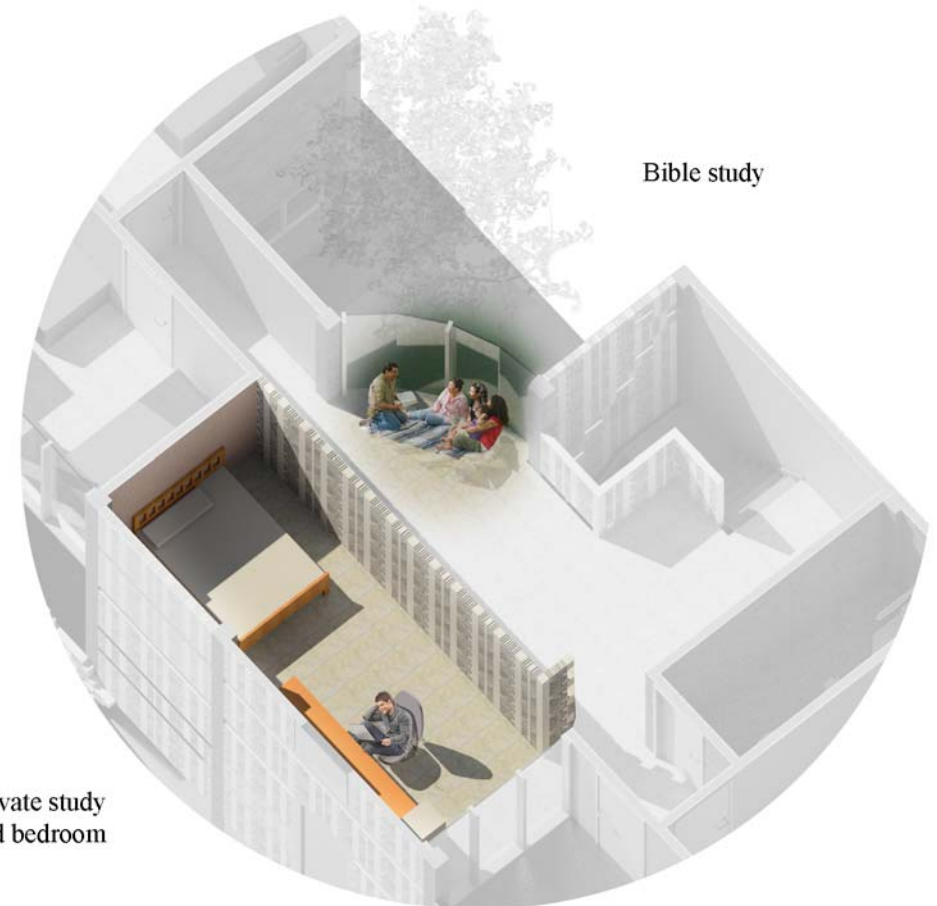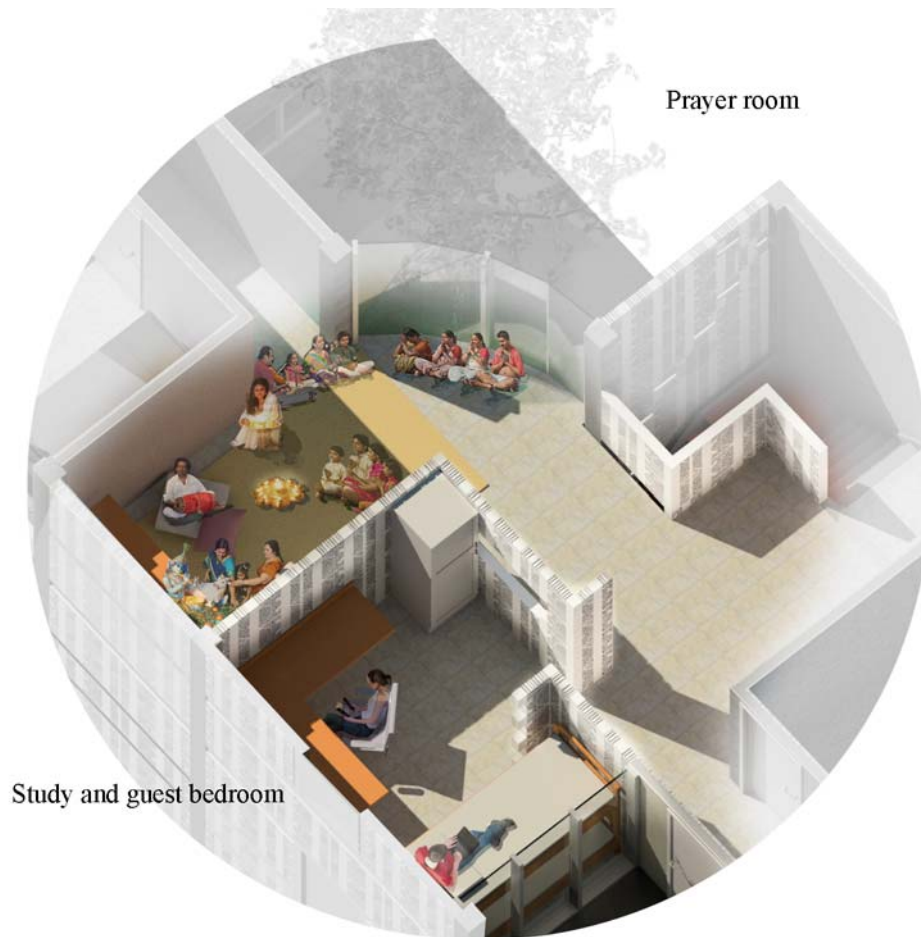
Figure 183 Option 3 for Indian family - Level 2

Figure 184 Option 3 temporary bedroom - Level 2

1:100

6.3.3.1 Adapting to the Malaysian Sikh wedding

The distinct roles of men and women, signifies the Sikh culture. The screen blocks separates their spaces according to a traditional Sikh wedding for the many rituals to take place throughout the ceremony. As a whole, the house not only adapts to the wedding procession for the married couple, immediate family members, relatives and guests, but preserves the distinction of men and women according to the Sikh culture (Figure 185).

Extended family helping out in food preparation

Dance space for family members

Higher privacy for shy women to admire men

Bridesmaids handing out the dowry from the women's space

Bedroom for the elderly and disabled

Men's space

Men singing and greeting guests
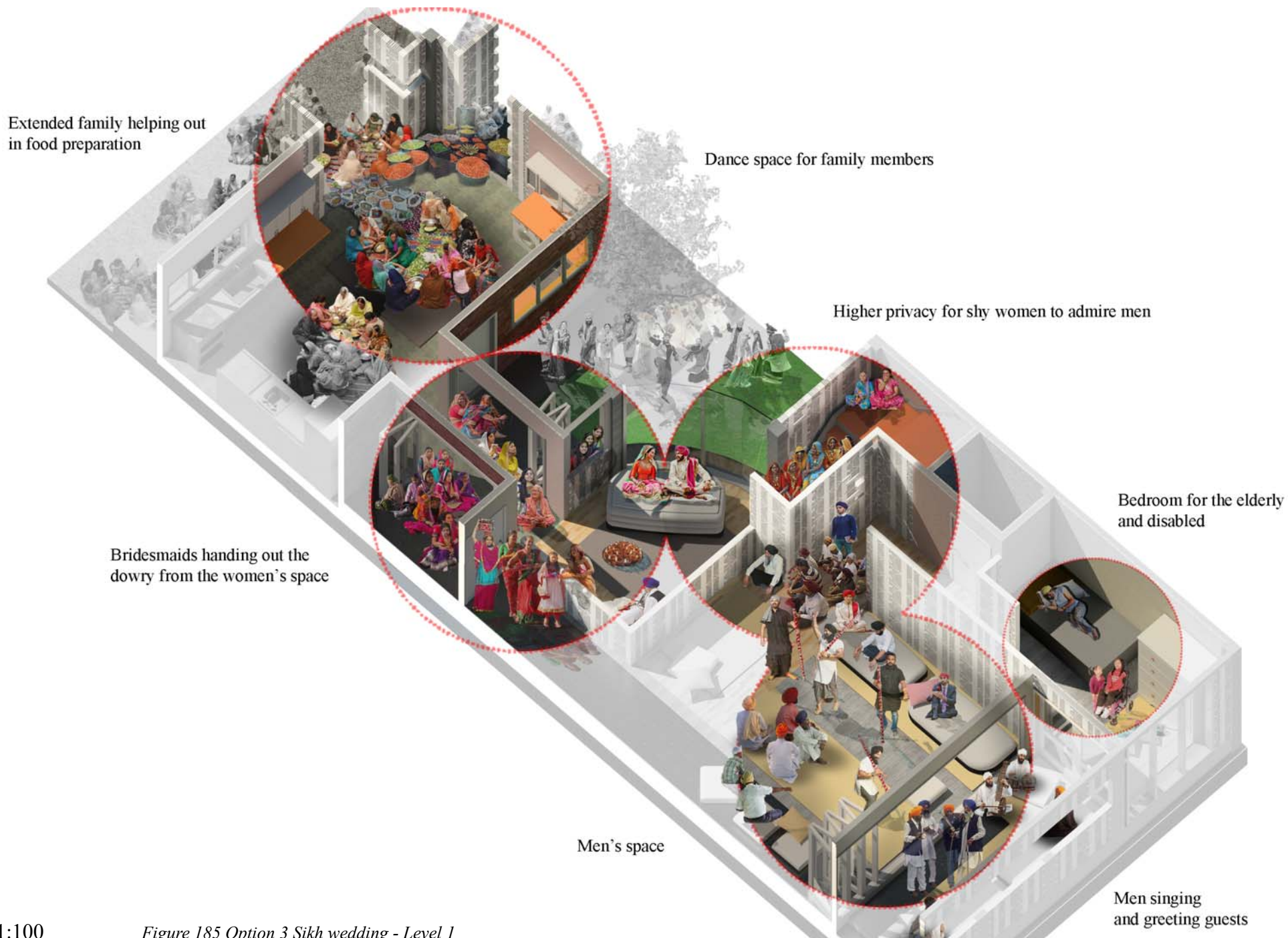
1:100   *Figure 185 Option 3 Sikh wedding - Level 1*

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Boundaries in the middle of the house are arranged to highlight the married couple as the significant people of the day, followed by the priest to conduct the union of these two.

Higher screen walls are assembled, to prioritise privacy for women from the front and for the optional bedroom.

The front living space is opened up to allow more space for men to enlighten the wedding experience while women gather around the rear entrance and kitchen.
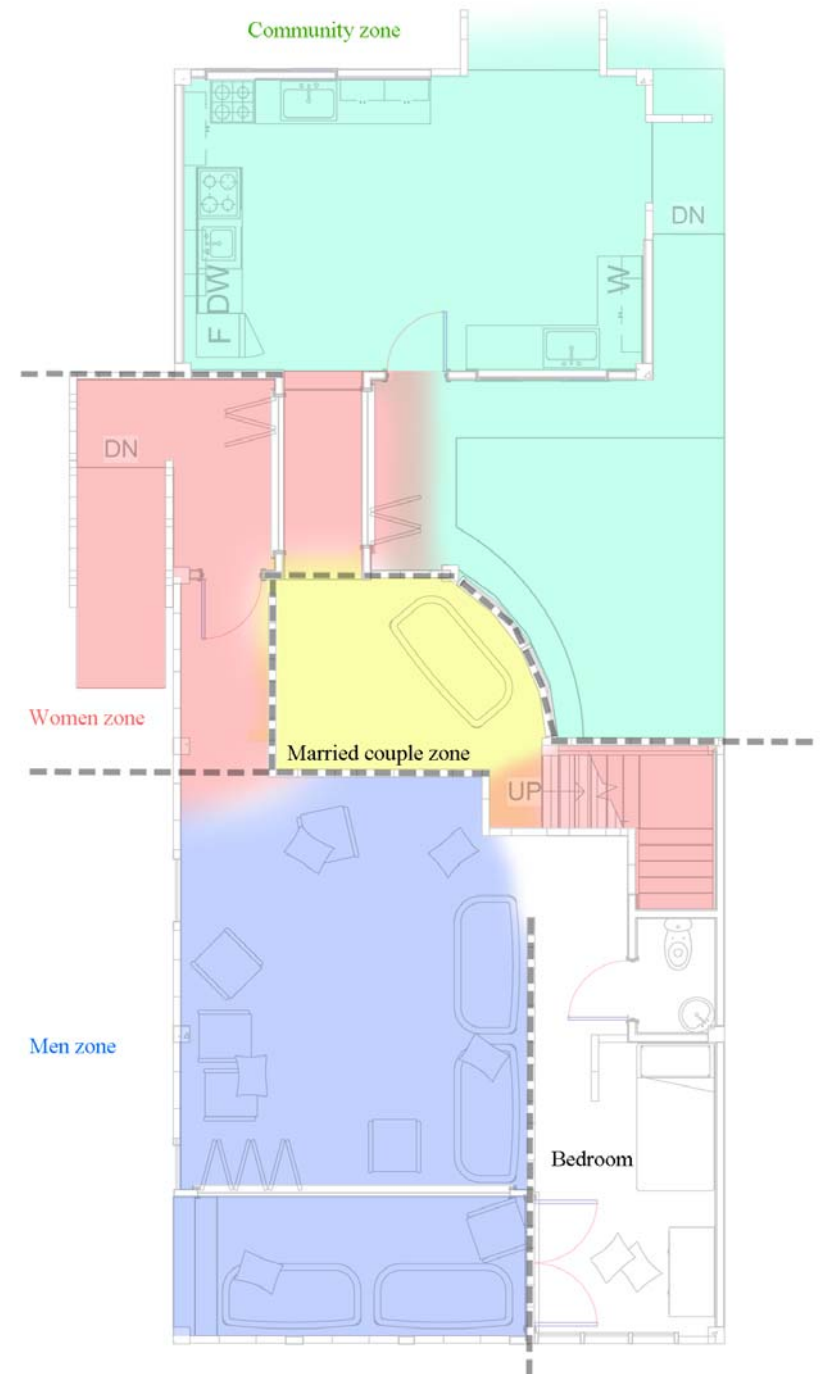
Figure 186 Spatial plan 4 - Sikh wedding

6.4 The Response of Community

The twin terraced housing units from **Chapter 5: Product**, illustrates the relationship of the privately shared, external courtyard between neighbours. The following response portrays a range of associations of cultural practice and multi-cultural community activities between neighbours, to the public external courtyards (Figure 187). The key is to foster relationship bonds between families in a multi-ethnic neighbourhood community, actively promoting the 1Malaysia Terraced Housing under PR1MA.

Small scale activites

Large scale events

5. Cultural Carnival

3. Family Outdoor Activity

1. Funeral

2. Sports Activity

4. Night Market
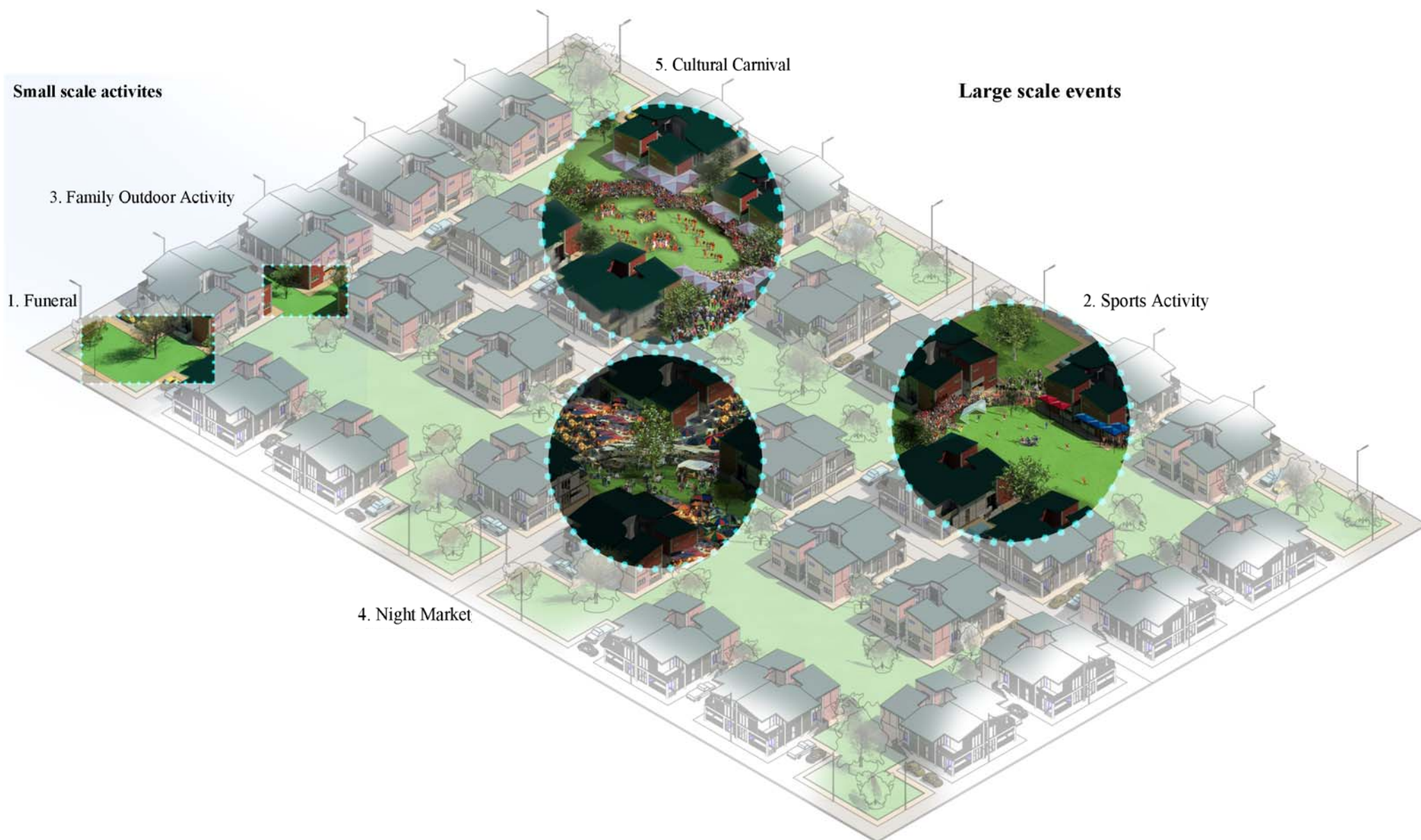
1:1000   *Figure 187 Activities of the 1Malaysia Terraced Housing neighbourhood*

6.4.1 Funeral

Embracing and supporting neighbours in a mutually, respectful and accepting multi-ethnic community

Eulogy by the host

Living room opened up for guests

Funeral procession through the rear entrance

Neighbourhood community paying their respects

Involvement of immediate neighbours
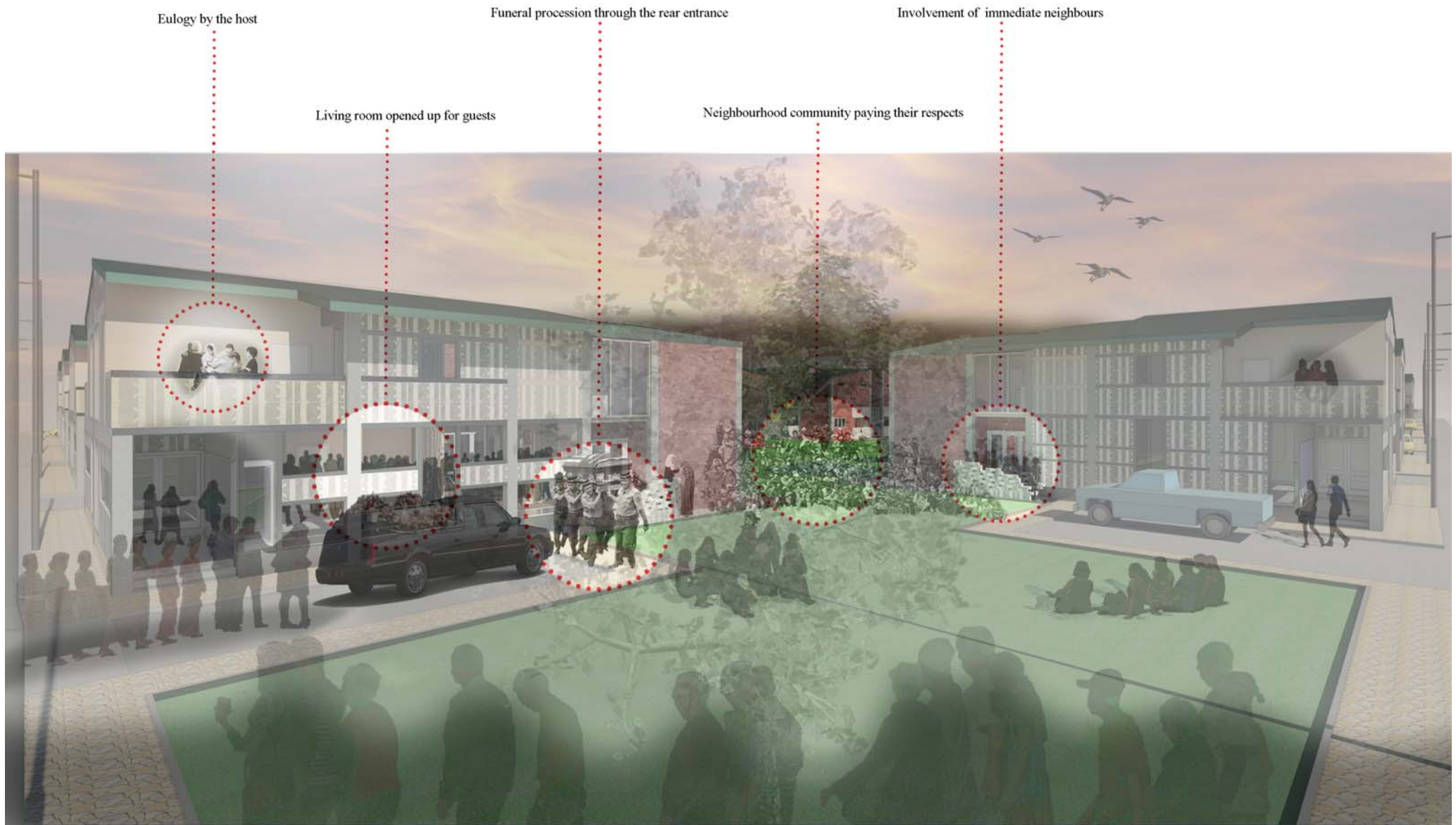
Figure 188 Highlights of a Malay funeral

6.4.2 Sports Activity

Promoting a healthy lifestyle in a friendly neighbourhood communtiy, through an inter cluster sports competition

Figure 189 Football match

6.4.3 Family Outdoor Activity

Advocating a sense of belonging among friendly neighbours in a multi-ethnic community

Figure 190 Motivating families at the rear entrances to participate in outdoor activities

6.4.4 Night Market

Friendly neighbourhood community engaging in a unique multi-cultural activity

Figure 191 'Pasar Malam'

6.4.5 Cultural Carnival

Bridging Malaysian families to create a sense of unity in a multi-ethnic neighbourhood community

Figure 192 1Malaysia Carnival

Chapter 7: Conclusion

Malaysia is a multi-ethnic nation for respecting individual ethnic identities that is essential for its future development. The cultural uniqueness of its ethnic communities has been affected negatively by the inevitable consequences of short sighted government policies and westernisation. The 1Malaysia Policy emphasises ethnic harmony, tolerance and national unity in an attempt to solve these issues and promote national development.

Western influences on architecture, in particular domestic urban architecture has diverted Malaysia's sense of Asian culture. The direct adaptation of western terraced housing models to the Malaysian culture and context is a common problem. Urgent implementation of housing policies aimed at creating new urban communities has seen the widespread adaptation of these western models without much thought for the local context and culture.

This study produces an adaptable home suited to the needs of multi-cultural families. Traditional and culture specific domestic architecture and cultural activities commonly practised in Malaysian homes, inform the design of this adaptable home. The aim of this house is to attenuate the implementation of western terraced housing models in Malaysia and instead introduce a model, more suited to the Malaysian context, culture and the lifestyles of its people.

The implementation of this flexible design, is through research on case studies of the respective traditional houses of Malaysia's three main ethnic groups, followed by a negotiated spatial organisation design process. The study has further explored the adaptable cluster design of terraced housing in a multi-ethnic neighbourhood community. The traditional programmes of shop house and other multi-cultural activities in Malaysia are reinstated for a common sense of belonging in the neighbourhood, which ultimately preserves Malaysia's unique Asian culture.

The clarity in the design direction of this product was recognised through the immersion of culture in the process by the designer. The understanding of the basic spatial elements from the research of the basic traditional houses for each of the family's needs and practices, informed the design. This clarity could be further achieved through the active participation of multi-ethnic families in the process to overcome their cultural differences from their perspective and aid the designer to pursue a credible flexibility of the product.

In this respect, this thesis has focused on developing a domestic architectural model for terraced housing designed with traditional ideals in mind that would support and further the aims of the 1Malaysia Policy. A contemporary architecture that is respectful of diverse cultural needs and is adaptable to promote multi-cultural neighbourhoods with the hope that such neighbourhoods will foster unity amongst diverse ethnic groups and facilitate the developmental goals of Malaysia.

The flexibility of the modular system presented in this thesis, is a solution to middle income terraced housing in Klang, Selangor. This architectural form of dwelling offers an opportunity for further exploration beyond Malaysia, for a multitude of design solutions to better suit the vernacular of specific design locales. In acknowledging this, the ambitions of the project generated through this line of research can become a solution on a wider international scope for countries with multi-ethnic families to adapt to their various cultural practices and common housing issues related to spatial allowance or affordability throughout the world namely in the Asia-Pacific, Middle East, Africa, and others.

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