

# The Floating Village

*Fostering Social Capital in Chinese Migrant Settlements through Mobile  
Architecture*

By

Vincent Woon

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# Abstract

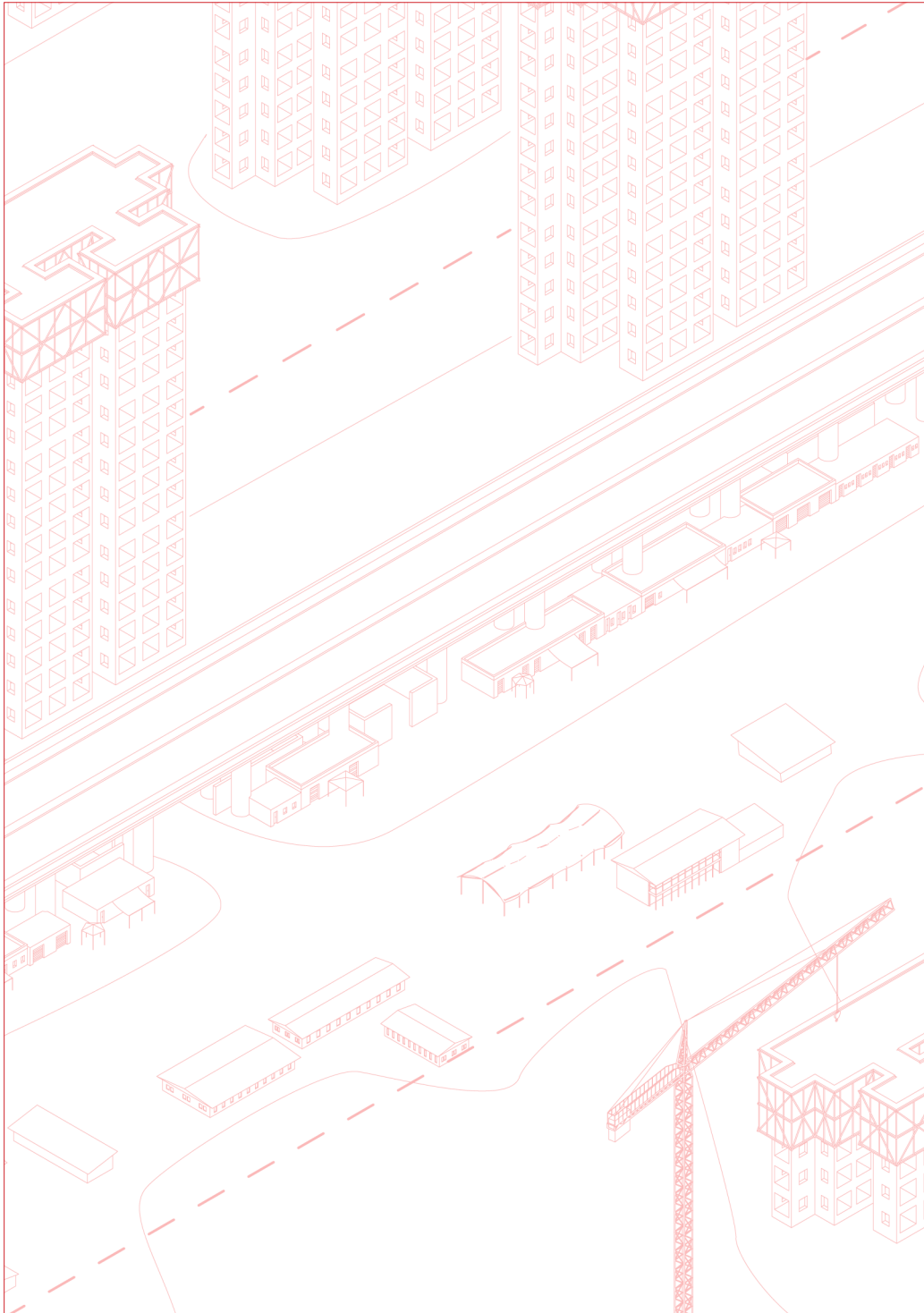
In the past two decades, China has realised one of the fastest and largest rural to urban migrations in the world. The country's urban population has increased by 20% over the last 20 years due to rapid urbanisation and a drastic improvement in urban opportunities. It is projected that by the year 2020 China aims to house 60% of its population in urban areas, resulting in a population shift of over 100 million people. One of the major issues which is presented to rural migrants is the hukou system. Hukou acts as a domestic passport which prevents rural migrants from attaining social benefits within urban areas. This has created an underclass within China's urban areas known as the "floating population".

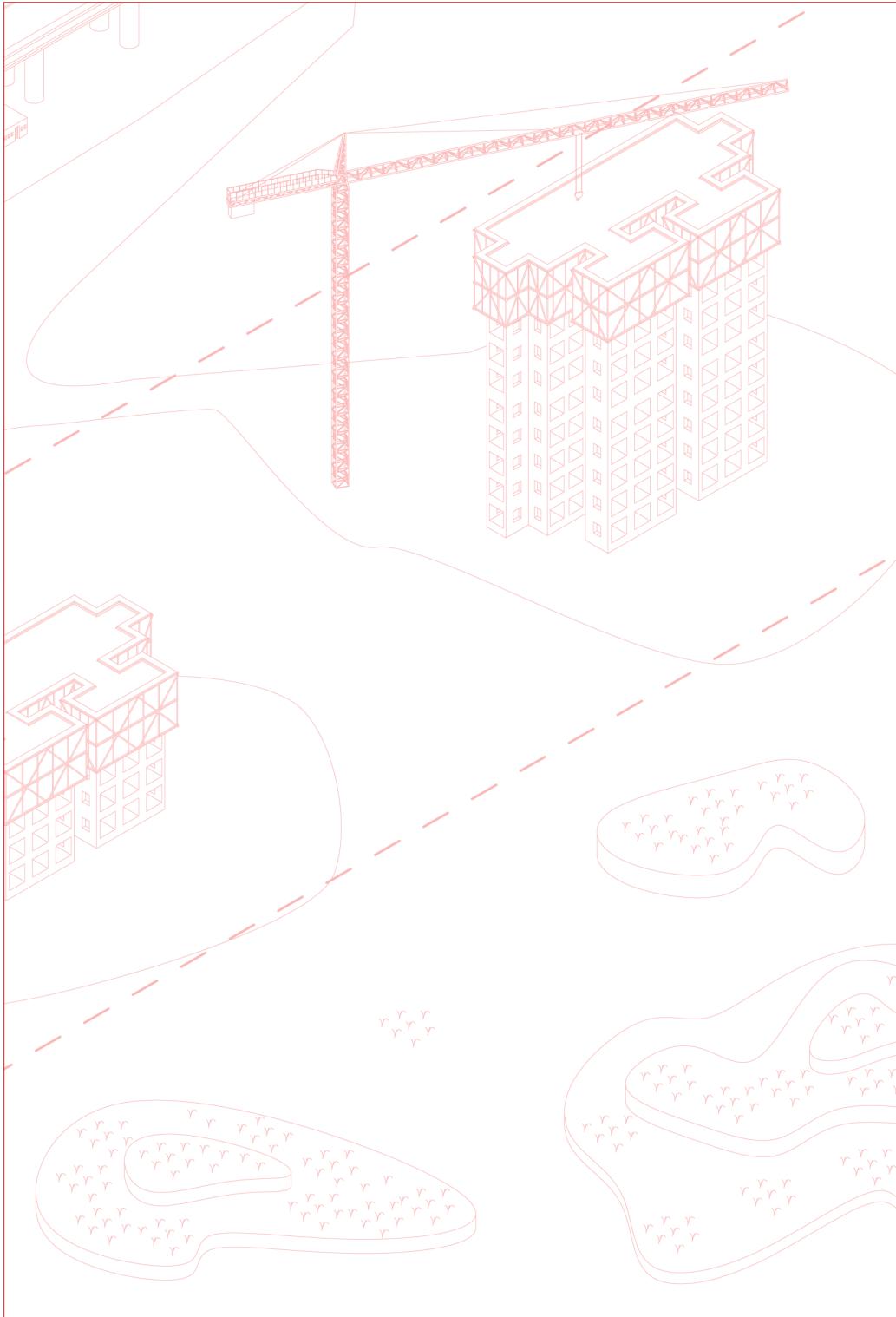
This thesis focuses on the architecture of the "floating villages" of China which accommodate this floating population. The floating village is an informal settlement of migrant workers which develops around construction sites. The village provides services such as food, entertainment, medical care and recycling to the construction workers. However, as a pseudo-urban typology accommodating many of the functions of a town, it lacks one important element: a focused communal area. The absence of deliberately designed a communal space

has led to social tensions within the floating village due to the different cultural origins of the migrant workers. Migrant workers arrive in floating villages without knowledge of urban culture and with no communal support. Varying migrant accents, and traditions, alongside struggles with poverty, creates friction between workers.

This thesis proposes a temporary and portable architectural intervention within the floating village which fosters a positive community. The research of community design is explored through an architecturalisation of Dr Robert D. Putnam's understanding of social capital.







# Acknowledgements

Firstly I would like to thank all the class mates this year and to all those who I have met throughout these five years of study.

Thank you Joanna for your continual support throughout this project, especially during those moments of doubt and confusion.

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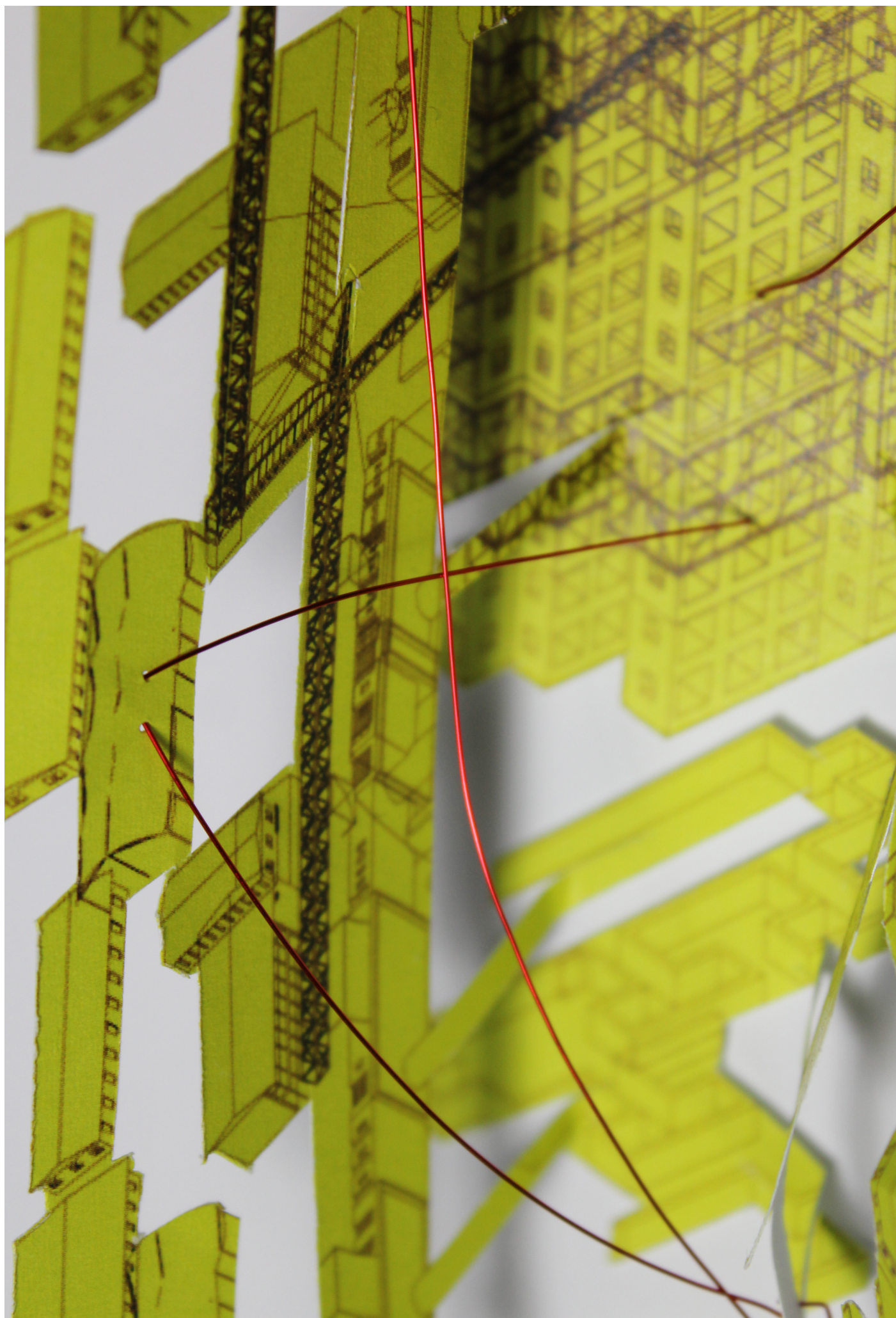
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# Introduction

## Context and Motive

From 1990 to 2010 China experienced one of the fastest rural to urban migrations due to rising urban opportunities and accelerated urbanisation areas (Hulshof and Roggeveen 70). Within these two decades the urban population has risen from 30% to 50%, meaning a mass migration of over 100 million people (Vendel 37). By 2020 China predicts that it will have an urban population of 60% of the overall country (Vendel 37). The mass migration has highlighted many political, social and economic problems of China's integration of rural migrants (Hulshof and Roggeveen 70). These integration issues have developed an underclass of rural migrants who live a semi-nomadic lifestyle; constantly relocating to where work is possible. This underclass of 200 million people has been named the floating population (Liang and Ma).

This thesis focuses on issues with the migrant construction worker settlements, known as the floating villages. The life of the floating village is akin to its residents; acting as a nomadic community moving between construction sites. The deprived nature of the village and the cultural differences between migrants from different regions has created social tensions within the floating village. Current reports indicate migrants of the village experience social isolation, lack of support, depression, and anxiety (Chang, Wen and Wang 279).

The goal of this research is to foster community through increasing positive social capital within the floating villages of China. This is to be achieved through an analysis of bridging and bonding social capital and the exploration of an architectural language of bridging and bonding which will lead to a mobile and temporary architectural intervention.



## Methodology

The research process of this thesis involves:

- The investigation of the social and architectural conditions of the floating villages through design and analytical diagrams.
- Clarification of Robert D. Putnam's idea of social capital and the notion of its architectural language.
- Evidence of architecture reinforcing social capital through, surface, shelter and detail.
- Experimentation with solutions to foster social capital through design iterations which are mobile and temporary, in relation to the conditions of the floating village.

The investigation of the social conditions in the floating village aims to clarify the problems in the site which relate to the lack of community and highlight the need for higher social capital. The architectural research on the site intends to provide information of the conditions which the design solution must provide, alongside possible opportunities for the design to engage with its context. Traditional analytical diagramming is utilised to simplify and focus the information of the site in relation to the research. Design is utilised as an analytical tool as the physical production of a response to the site allows reflection on the design which reframes site problems and design solutions.

The analysis of Robert D. Putnam's, seminal text *Bowling Alone* aims to clarify the definition of bridging and bonding social capital and its positive affects for communities such as the floating village. Analysis of Alex Wall's "Programming the Urban Surface" and Andre Jaques "Sheltering the Rolling Society" provide the notion of an architectural language which communicates Putnam's idea of bridging and bonding through architecture.

The exploration of architectural case studies provide evidence of the practical success of architectural bonding and bridging techniques. The case studies revolve around three aspects of architecture:

1. Surface
2. Shelter
3. Detail

Each aspect aims to provide insight into possible ways in which bridging and bonding can be communicated architecturally. Alongside the communication of bridging and bonding, each case study also highlights certain design aspects which relate to the site and solution. This information will be utilised through design.

The design process utilises sketches, physical modelling and computer modelling as design tools to explore a temporary and mobile intervention.

# Thesis Structure

## ***Chapter Two: Site Analysis***

Chapter two expands on the context surrounding the floating village, analysing the architectural elements of the floating village and the nature of its nomadic lifecycle. This chapter examines the communal problems in the floating village and the sources of these issues.

## ***Chapter Three: Literature Review***

Chapter three introduces Robert D. Putnam's the idea of bridging and bonding social capital and the justification of it as a solution to the communal issues within the floating village. Alex Wall and Andre Jaque's texts are analysed to provide insight on social capital as an architectural dialogue.

## ***Chapter Four: Case Studies***

Chapter Four is broken into three sections:

1. Surface (public space)
2. Shelter (mobile and temporary)
3. Detail (informal modification)

Each section provide examples of evidence to an architectural element which has expressed social capital. Each section also provides insight to the aims of the design research.

***Chapter Five: Design***

Chapter five introduces the archive and the design process. The archive consists of design experiments which occurred during the site analysis period while the continual design explores the design of the temporary mobile structure.

***Chapter Six: Developed Design***

Chapter six describes and analysis the final design and how it achieves the desired aims of the thesis.

***Chapter Seven: Conclusions and Critical Reflection***

Chapter seven analyses the implications of the final design and its role in the context of the future of the floating village and other impoverished communities.





# Site Analysis

## Context

### *Urban to Rural Migration*

Rapid rural to urban migration in China has caused large cities to become a melting pot of different Chinese cultures (World Bank Group 182). The mix of backgrounds is densified within migrant settlements which can be located throughout developing large cities in so-called worker dorms (Hulshof and Roggeveen 65). These cities provide opportunities for better education, services and income however the deprived work and living environment has caused a lack of community development between migrants (Chang, Wen and Wang 280). Rural migrants usually lack stable residency within the cities due to their unstable job security. It is this lack of work security and fickle residency which has led to these minorities being labeled the floating population.

Statistics predict that China will have a migration of over 100 million more immigrants between 2015 and 2020 [Fig 2.1] while the construction industry to house migrants has also been rapidly increasing (World Bank Group 5). The rapid increase of the migrants and its community issues produce an urgent need to address the lack of unity between rural migrants.

Rural areas surrounding developing cities are displaying a noticeable decline in population due to rural migration [Fig 2.2]. This migration is most rapid in cities which have been well established or provide beneficial social services for migrants. The majority of urban migration occurs within provinces, as the political migration system (hukou) allows an easier migration policy for inter-provincial transfer.

This has resulted in three major regions of rural migration [Fig 2.3]:

1. The Chongqing and Chengdu region
2. The Wuhan Region
3. The Nanjing, Changzhou and Wuxi Region

Due to the high rural to urban migration in these areas, they hold the highest amount of construction worker settlements, known as the floating villages.



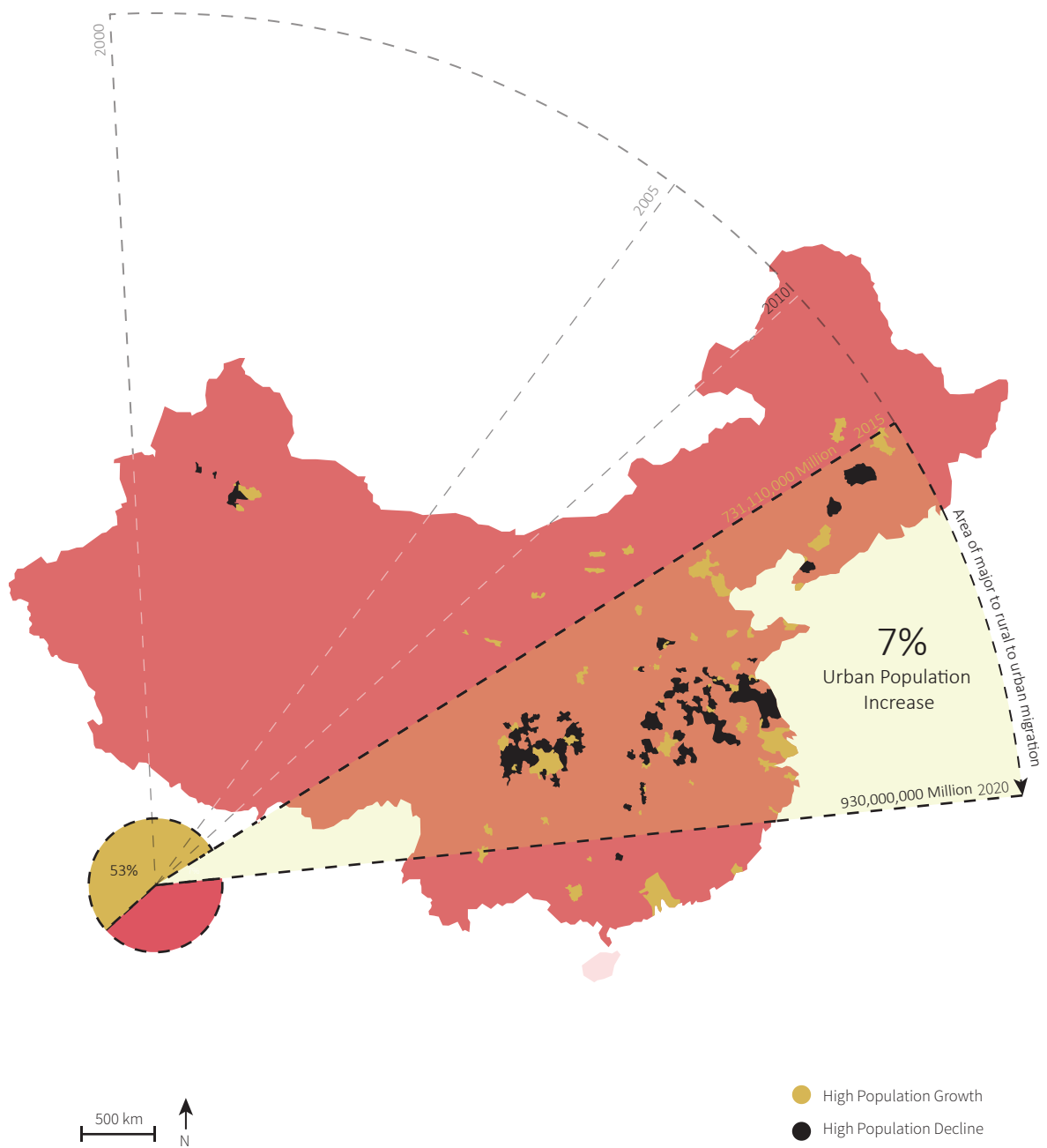
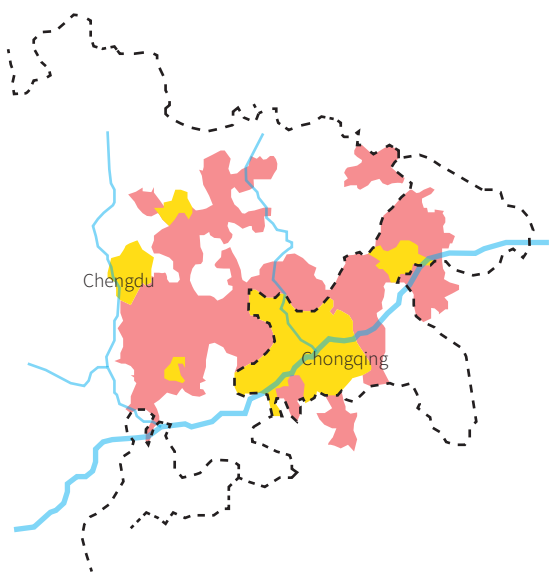
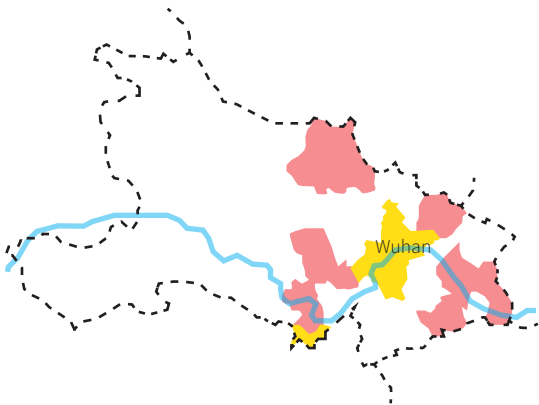


Figure 2.1. Map of urban population growth and declination areas in China from 2015 to 2020

Chongqing - Chengdu



Wuhan



Nanjing - Changzhou - Wuxi

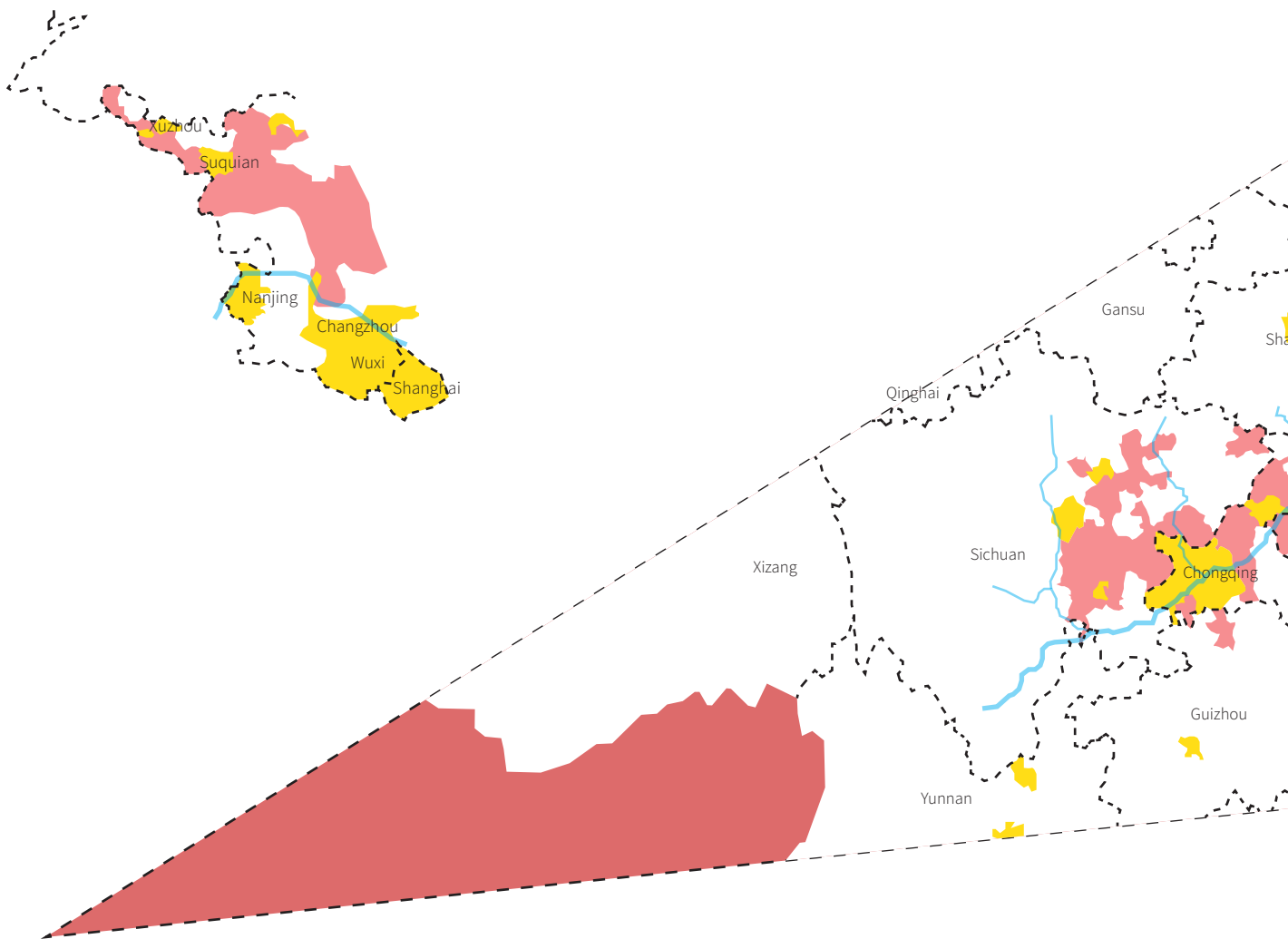
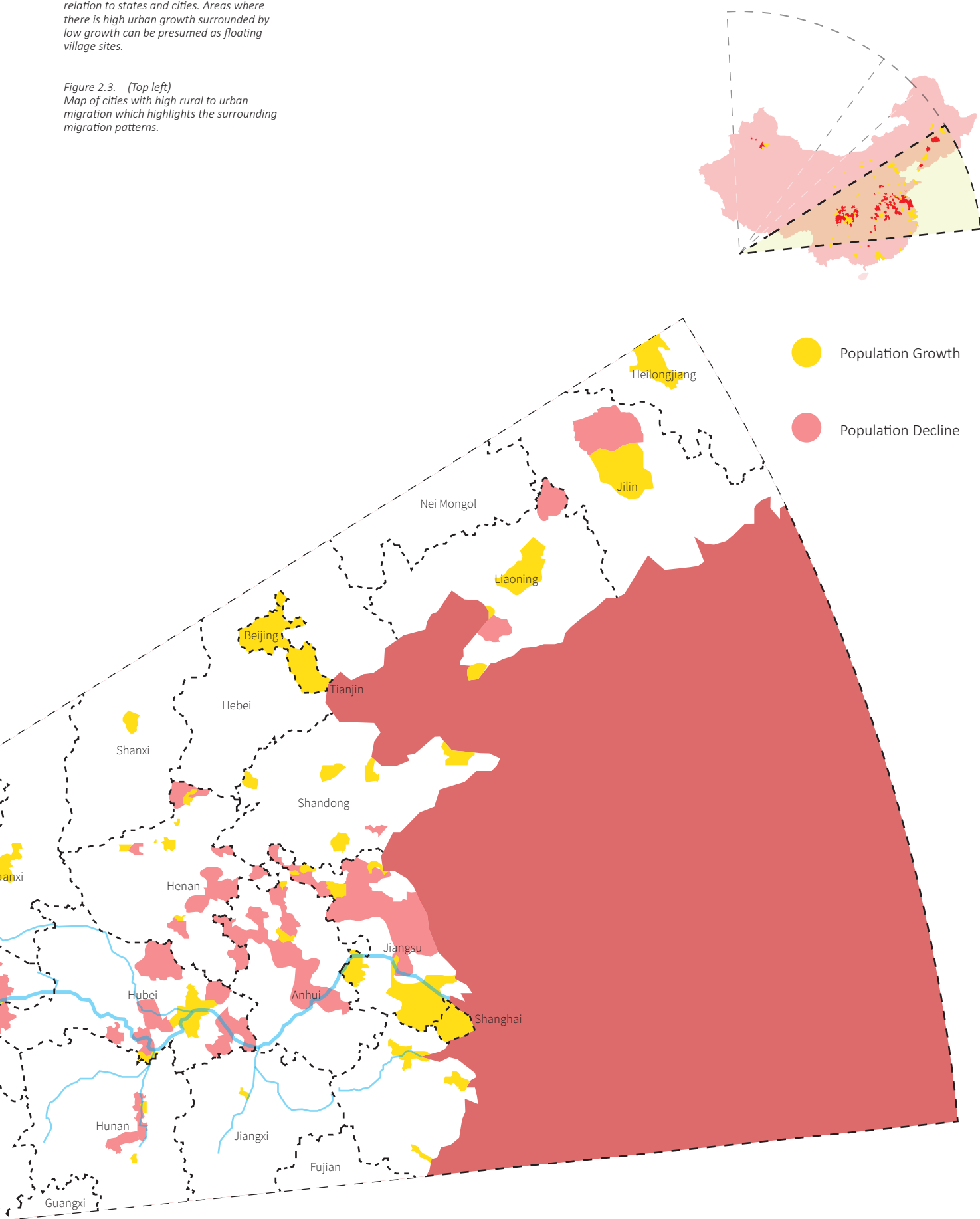


Figure 2.2. (Bottom right) Detail map of urban population growth in China in relation to states and cities. Areas where there is high urban growth surrounded by low growth can be presumed as floating village sites.

Figure 2.3. (Top left) Map of cities with high rural to urban migration which highlights the surrounding migration patterns.



## The Floating Village

### *The Migrant Settlement*

The floating village has been documented by Michiel Hulshof and Daan Roggeveen in their book *How the City Moved to Mr Sun: China's New Megacities* in which they describe their daily experiences of the village and record the perspectives of the migrants working at a floating village in Chongqing [Fig 2.4]. Hulshof and Roggeveen note that there are hundreds of floating villages in each city of China which are found in unusual areas and informally developed to surround a deprived working area (Hulshof and Roggeveen 66). Other sources of migrant text and experience also document experiences with a community surrounding migrant workers (Chen, Stanton and Kaljee 24). Hulshof and Roggeveen's recorded floating village catered to a construction population of over 800 and also included citizens of the village (Hulshof and Roggeveen 67). The majority of citizens who were not construction workers were migrant entrepreneurs who provided a range of services to the construction workers. These include:

- Cinema
- Barber
- Local market
- Restaurant
- Pub
- Mar Jong lounge
- Medical centre

*Figure 2.4. Hulshof and Roggeveen's recordings of the floating village*  
*Source: How the City Moved to Mr Sun*

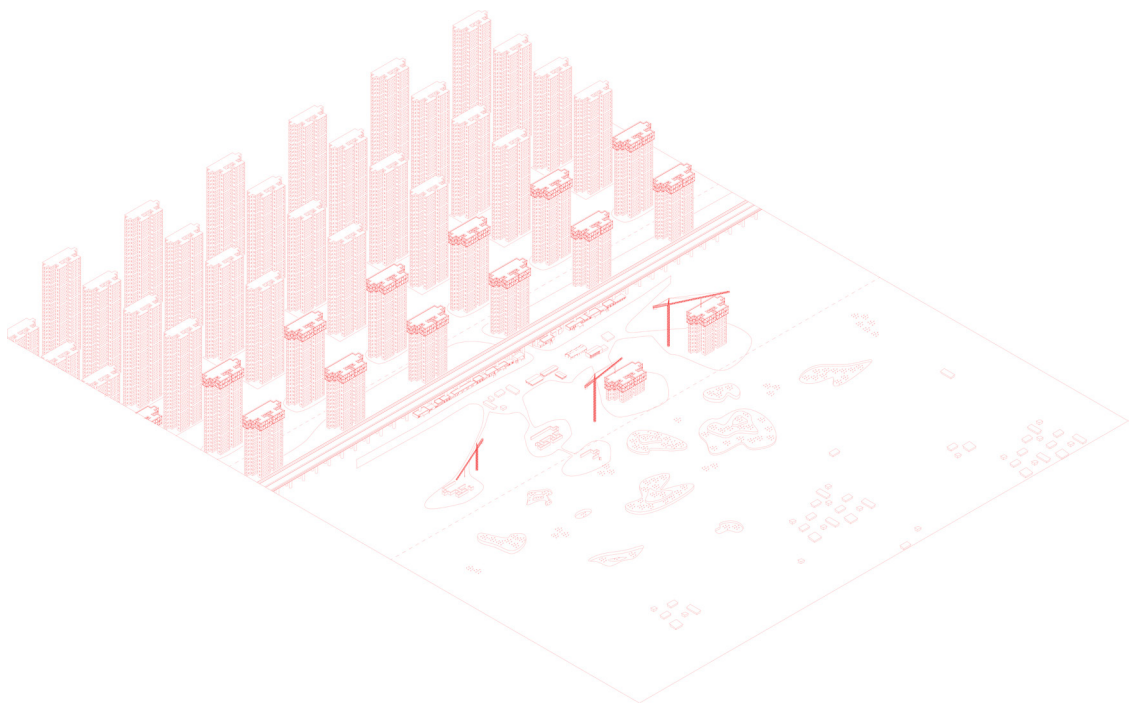
The life of these villages range from less than one year to two years, with its economic maintenance relying on the demographics of the construction workers (Hulshof and Roggeveen 66). The development of the floating village can begin before the construction workers arrive. Levelled and bare constructions sites are used as farming grounds for rural migrants, or as a public space. As construction workers arrive the migrant entrepreneurs erect temporary markets, cafés and entertainment. Depending on the size of the construction work and population of the workers on site some migrant entrepreneurs will invest in some inexpensive permanent structures to house their businesses. In Hulshof and Roggeveen's recorded floating village, the entrepreneurs created informal markets and buildings by using a highway overpass for shelter. As construction is almost complete, elements of the floating village are removed in place for the permanent elements of the original construction. Finally, once construction has concluded and the workers have left, the village vanishes and relocates to another construction site in search for more workers to cater for.

These construction zones are usually isolated from the surrounding urban areas and are highlighted by the blue roofing of the construction workers housing quarters.

The lifecycle of a floating village site can be broken into three parts [Fig 2.5]:

1. The urban farm
2. The floating village
3. The developments

Each section of the site contains different demographics and activities alongside the changing landscape of the site. These next sections further describe each part of the floating village.



*Figure 2.5. Isometric of a metaphorical representation of the floating villages in China.*

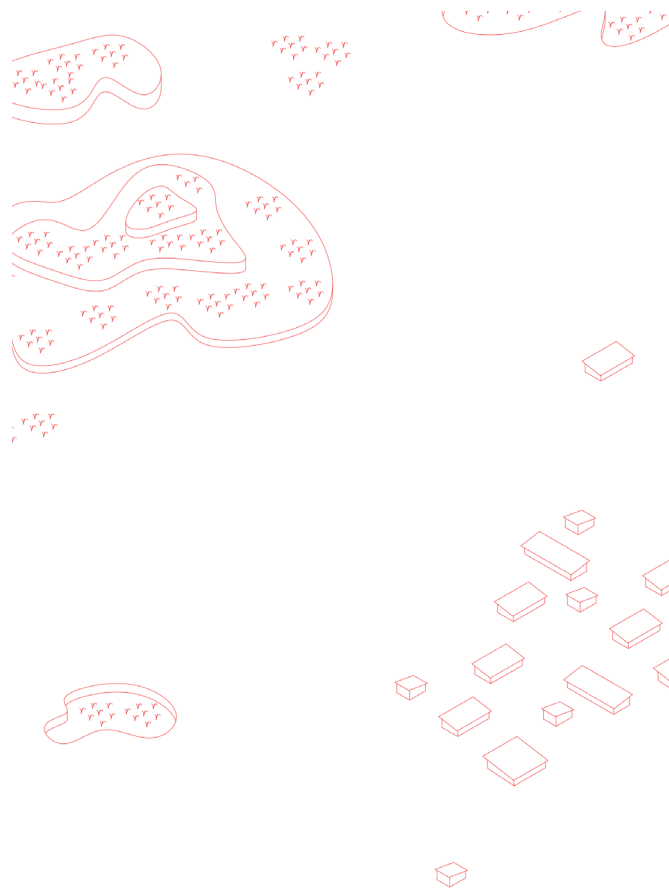


Figure 2.6. Isometric representation of the urban farming section.



## Urban Farm

Urban farming is completed by rural migrant workers [Fig 2.6] who are unable to adapt to the urban workstyle. These migrants use landscaped areas of construction as a site to grow their crops. The landscape is also utilised as an informal park by the surrounding neighbourhood, with locals arriving with seats and children playing in the landscape.

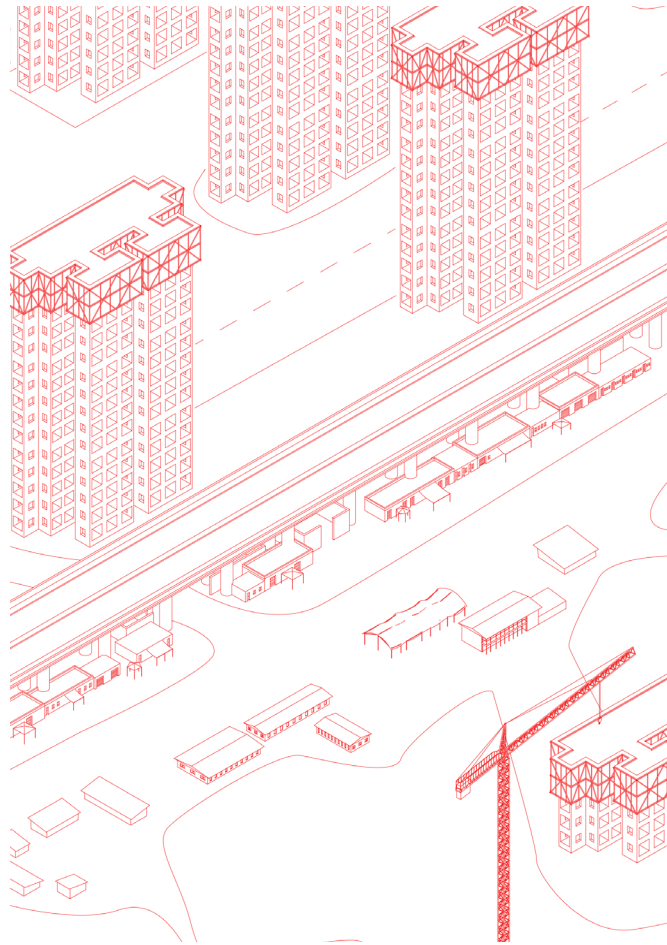
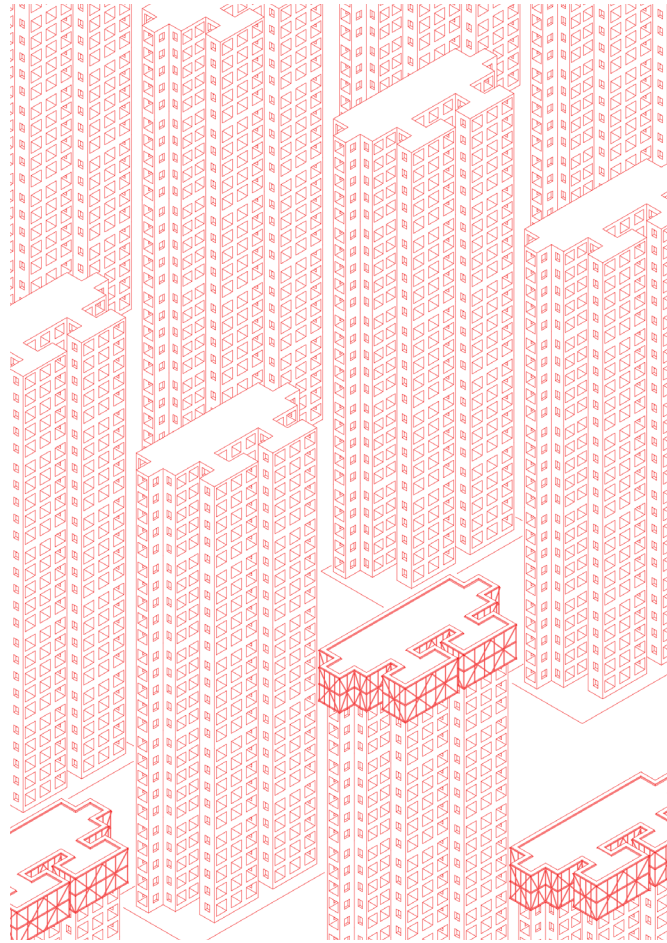


Figure 2.7. Isometric representation of the urban farming section.

## Floating Village

Once construction begins, the urban farmers are no longer able to utilise the site for farming. The arrival of migrant construction workers and their dorms means the arrival of migrant entrepreneurs (Hulshof and Roggeveen 66). If the development is large and construction takes a few years some entrepreneurs will invest in creating a semi-permanent stand for their business while others will utilise surrounding infrastructure such as an underpass as cover [Fig 2.8].



*Figure 2.8. Axonometric of completed apartment developments.*

## Developments

Once construction has been completed the migrant construction workers move to the next site for work. The departure of this demographic also means the departure of the migrant entrepreneurs as their customers have left. Completion of construction also includes the demolition of a semi-permanent structures made by the entrepreneurs.

Once construction is complete the new tenants of the apartments arrive. These are mainly composed of China's new middle class.



Figure 2.9. (Top) Aerial images of floating villages in Chongqing.  
(Bottom) Figure ground map of the floating village.

Source: <http://map.qq.com/>

## Blue Roof Homes

### *The Migrant Dorms*

Within every floating village are the blue roofed, dormitory typology [Fig 2.12]. These flat packed dormitories house the migrant workers on the site. The mass produced components and quick assembly highlight the impermanence of these structures and their occupants. The main goal of these dwellings is to house as many workers as efficiently as possible while creating a building which leaves a miniscule impression on the final site.

Their design, layout and construction are important as they signify the formal construction techniques which all migrant workers can utilise [Fig 2.15]. Their components also provide insight to parts of the floating village which may be reused informally for other structures.

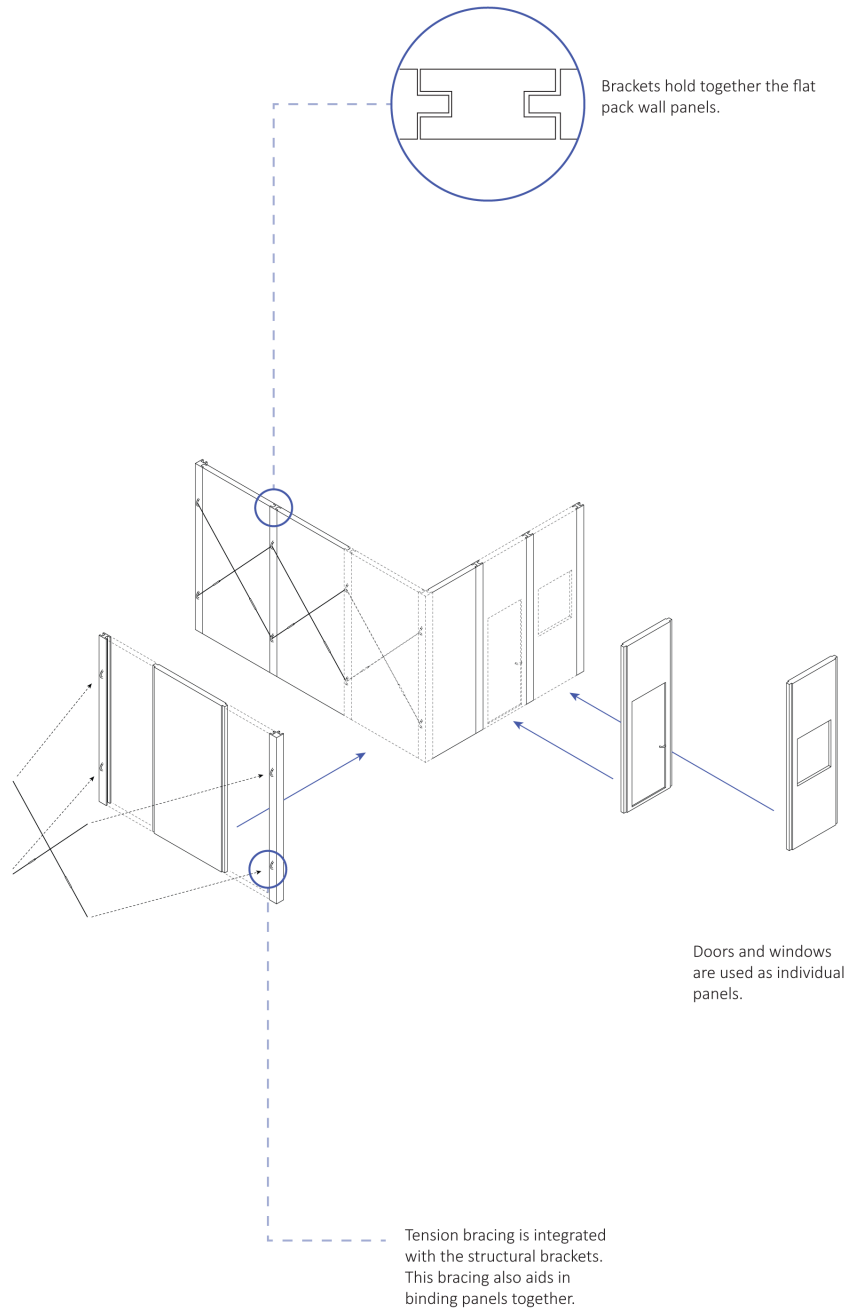
*Figure 2.10. Images of migrant living droms in Chongqing*

*Source: <http://map.qq.com/>*





Figure 2.11. Detailed exometric displaying the flat pack components of the blue houses and their assembly.



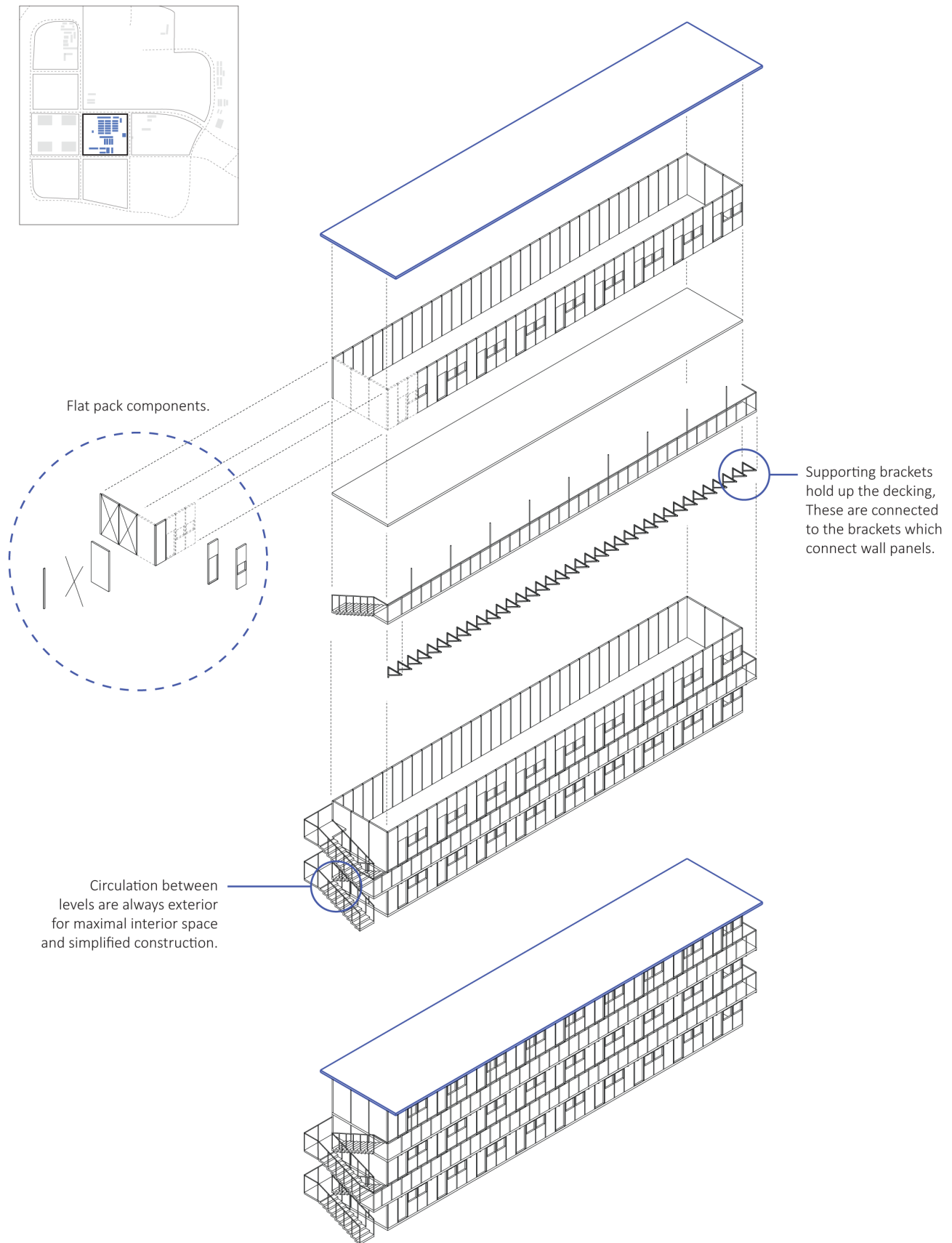


Figure 2.12. Exploded axonometric of a blue house in Chongqing displaying its main components

## Community Issues

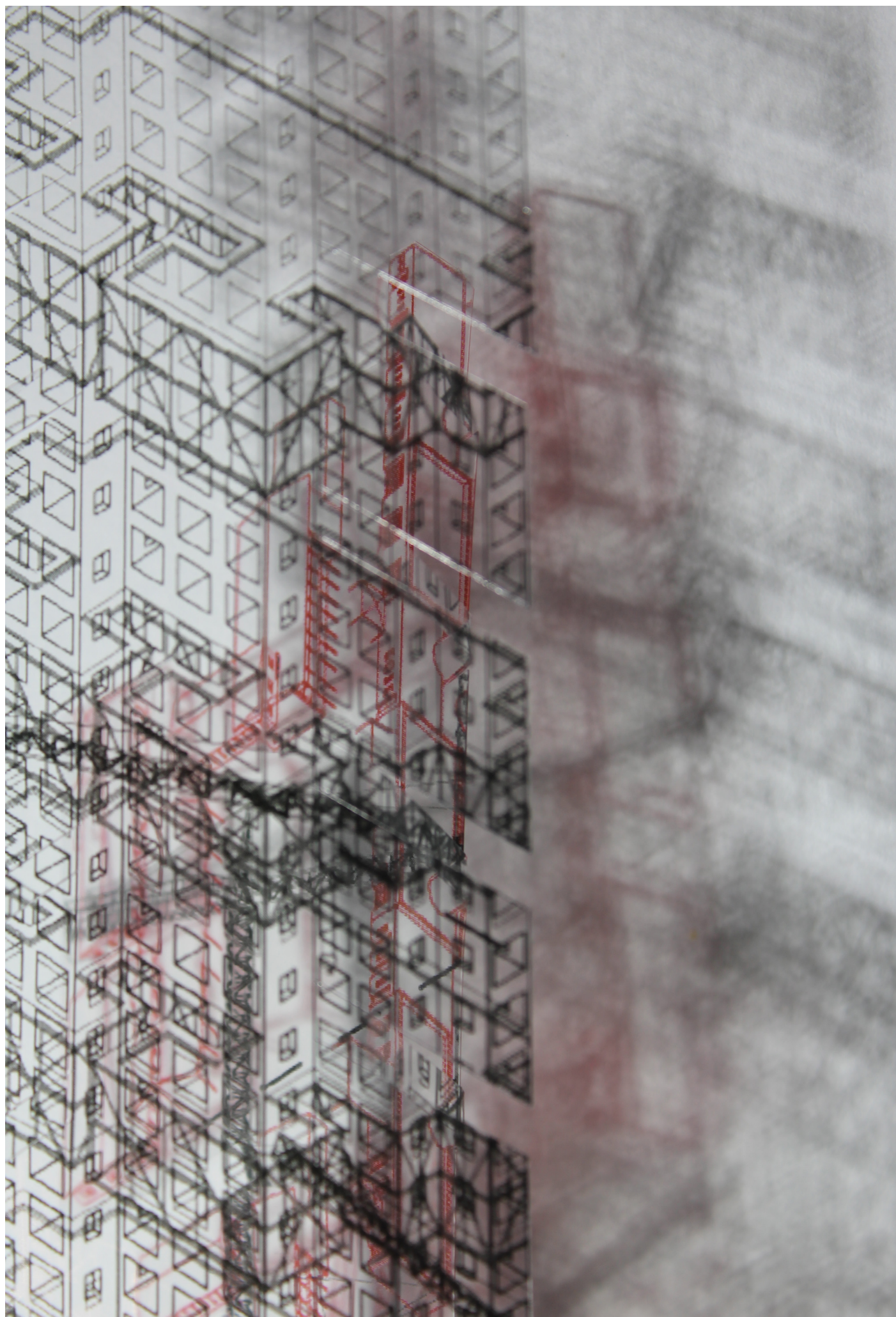
The informal design of the floating village provides a discouraging lack of community which leads to villagers valuing privacy with closer acquaintances (Gaetano 271). Alongside the informal designs, lack of community development, the village's isolation in the peri-urban and inner city regions creates forced community isolation and a lack of integration with the outer urban society (Chen, Stanton and Kaljee 24). Studies have found that migrants who settle in self-enclosed enclaves based on cultural origins have initial benefits but disadvantages in the long run. Relationships between rural-to-urban migrants can provide reduced costs and risks associated with migration and job searching (Chang, Wen and Wang 275). This social network provides migrants resources such as initial housing and employment however this closed community may also place constraints on the migrant's development in urban areas in the long run due to spatial and social segregation from the larger society (Chang, Wen and Wang 279). Migrants who solely depend on the relationships of old friends and family often suffer from frustration, sadness, hopelessness, helplessness, anxiety, stress and depression due to these contacts not being readily available in the city (Chen, Stanton and Kaljee 28). A lack of relationships within the village leaves migrants with no psychological and social support (Chen, Stanton and Kaljee 29).

Hulshof and Roggeveen's village was reported to have a positive community, however it had an informal catalyst of bridging social capital which was the overpass. The overpass provided a large sheltered public space which gave structure to the informal development of the floating village and a platform for social interaction.

The majority of the floating villages lack sufficient opportunities for interpersonal interaction (Chen, Stanton and Kaljee 24). By developing interactions with other migrants or the local urban community, residents are able to provide themselves the opportunities for better social support, or economic job opportunities. Relationships between migrants and urbanites has a correlation with the migrant being more satisfied with income and work environment.

The major architectural issues of the floating village are its isolation from the surrounding urban area and the lack of a public space or platform which provides the infrastructure for the floating village to develop social interactions.





## Literature Review

This literature review is divided into two main sections, social capital theory and social capital architecture. The social capital theory section will explore the work of political scientist, Robert D Putnam's perspective of social capital and its benefits to communities. Putnam's work is analysed due to his major contributions to the understanding of social capital in the 21st century. The social capital architecture section focuses on three elements of architecture: surface, shelter and detail. Each element is accompanied by texts which identify methodologies to express social capital with the built environment. The aim of this literature review is to define the social capital theory which will be utilised in this thesis, highlight its relevance in solving community issues in the Chinese floating village, and transcribe its theory into an architectural language which can be utilised in the design process.

# Social Capital Theory

*Defining Social Capital*

*Bridging and Bonding*

*Social Capital in Chinese Communities*

*Social Capital as a Solution*



## Defining Social Capital

In Robert D. Putnam's seminal text *Bowling Alone: The Collapse and Revival of American Community* he explains that social capital is the connections between individuals and the social networks, norms of reciprocity and trust worthiness that arise from them (19). There are multiple understandings of social capital however Putnam and other theorists acknowledge that the core idea of social capital is that social networks have value (19).

## Bridging and Bonding

One critically important aspect of social capital is the distinction between bridging (inclusive) and bonding (exclusive). Putnam explains that “some forms of social capital are, by choice or necessity, inward looking and tend to reinforce exclusive identities and homogenous groups (22).” These interactions which are developed in more exclusive contexts are known as the bonding dimension of social capital. Examples of these are ethnic organisations and religious recreational groups. Simply put, bonding is a kind of sociological superglue which reinforces interactions between individuals who have similar aspects to themselves (23). This form of social capital is good at reinforcing certain reciprocity and providing psychological support for less fortunate members of the community however extreme reliance of bonding interactions can produce negative effects (22). An excess of bonding can isolate communities and foster radical ideologies due to lack of empathy towards general social norms.

Putnam describes bridging social capital as networks which “are outward looking and encompass people across diverse social cleavages (22)”. Bridging acts as sociological grease, and reinforces interactions between individuals who have major differences from themselves. Examples of bridging are youth service groups, the civil rights movement and ecumenical religious organisations.

Most bridging and bonding interactions occur simultaneously and the idea of bridging and bonding should not be thought of as separable interactions but rather interactions on a slider, with some interactions being more oriented to one aspect. Many groups simultaneously bridge and bond, for example a church group will bond through religious belief and bridge between socio-economic backgrounds. The balance of these interactions is critical in the development of a positive community; a quality which the floating village currently lacks.

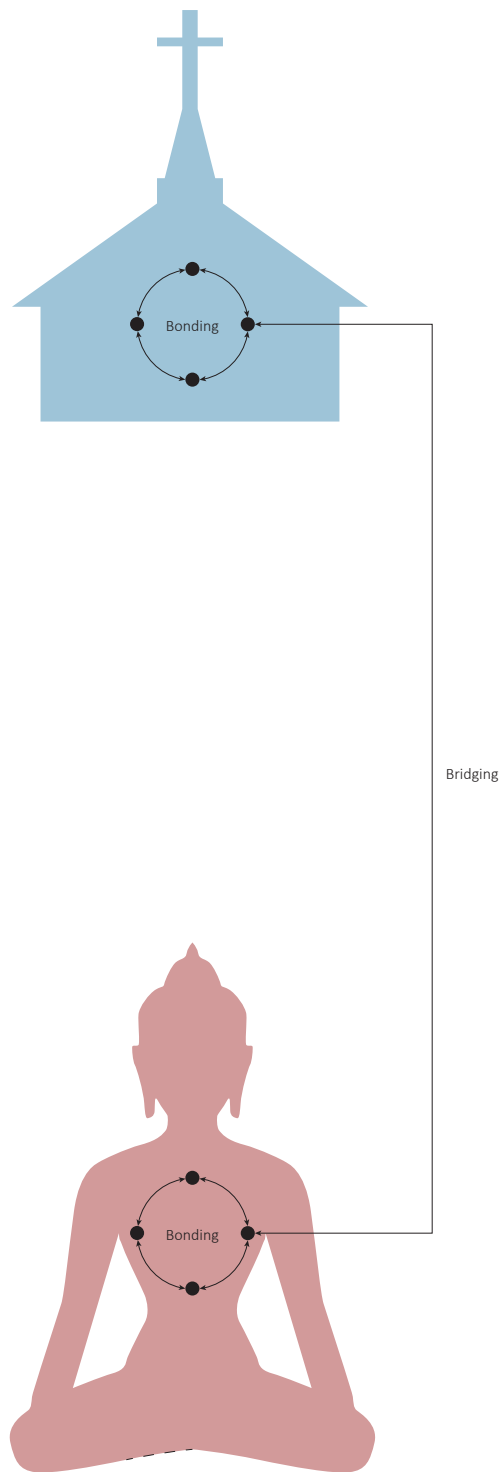


Figure 3.1. Metaphorical diagram of religious bridging and bonding

## Social Capital in Chinese Communities

Researcher Kuang-Chi Chang's text "Social Capital and Work among Rural-to-Urban Migrants in China", and Xinguang Chen's text "Social Stigma, Social Capital Reconstruction, and Rural Migrants in Urban China" provide evidence of social capital theory's relevance in China. Chang's research explains that "migrant social networks generate social capital, or resources embedded in social structure that can be investor and utilised by individuals to attain their ends (275)." Chen's research explains that most migrants depend on family and old friends as the main resources when looking for information regarding jobs, housing, transport and healthcare (28). The rural migrant's use of close relationships demonstrates the importance of bonding networks to develop social capital in Chinese culture. This over reliance of bonding social capital leads to many of the community issues alongside stress, and depression.

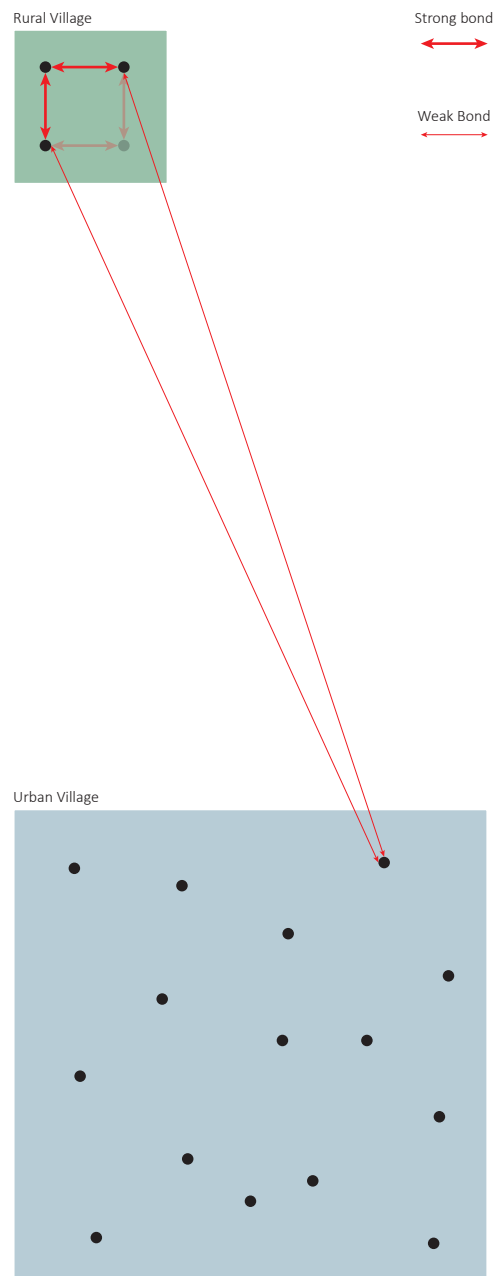


Figure 3.2. Metaphorical diagram of social networks in urban villages.

## Social Capital as a Solution

The rebalance of bridging and bonding networks can act as a solution to strengthening community in the floating village. For example, strengthening bridging networks between rural migrants of different backgrounds can create a community of constant psychological and social support to solve issues of stress, anxiety and depression. Bonding networks provide initial resources when migrants settle in urban areas, however bridging networks are able to help with continual urban resources. Putnam explains the specific importance of bridging and bonding social capital in deprived communities:

“poor people (by definition) have little economic capital and face formidable obstacles in acquiring human capital (that is, education), social capital is disproportionately important to their welfare (Putnam 318).”

Bridging networks enable rural migrants with maximal resources despite their deprived environment. These networks can give rural migrants information about opportunities and risks in the city. Social capital is also related to helping maintain physical health which is beneficial in the floating village due to the high amount of construction accidents and the lack of safety.

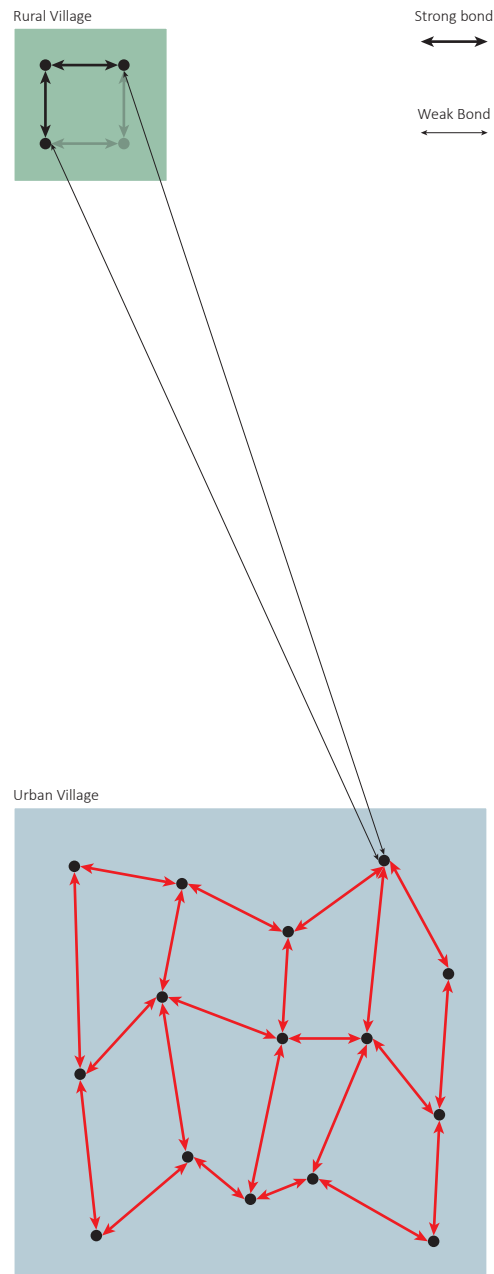


Figure 3.3. Metaphorical diagram of urban village social network solutions.

# Social Capital Architecture

*Surface*

*Shelter*

*Detail*



## Surface

Landscape architect Alex Wall, suggests the idea of the urban surface being able to communicate bridging and bonding in his essay “Programming the Urban Surface”. Wall argues that the urban landscape is a dynamic platform which composes spectacle and everyday programs along its plane.

“Here, the term landscape no longer refers to prospects of pastoral innocence but rather invokes the functioning matrix of connective tissue that organises not only the objects and spaces but also the dynamic processes and events that move through them. This is landscape as active surface, structuring the conditions for new relationships and interactions among the things it supports (223).”

The urban surface’s ability to mould relationships and interactions demonstrates an affinity to bridging and bonding as a social process. Wall specifies six methods of designing towards an active surface; three of which are highlighted as specific methodologies to crafting bridging and bonding:

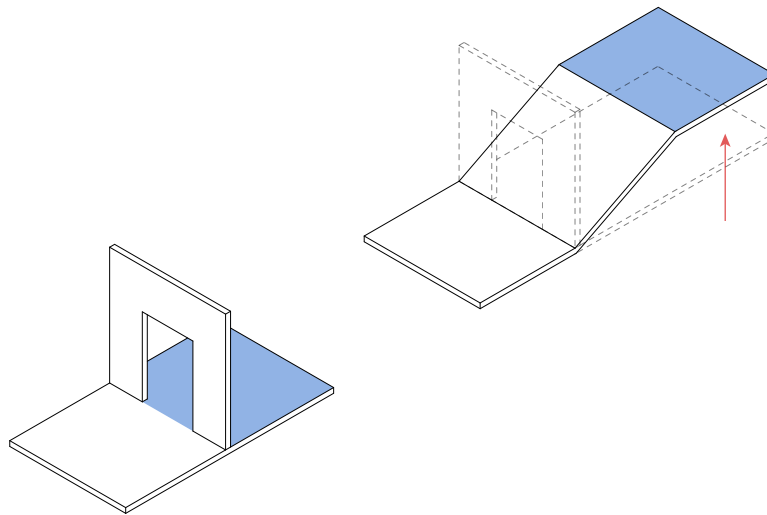
1. New Materials
2. Folding
3. Non-programmed use

By developing new and synthetic materials, the designer is able to cultivate a diverse demographic of users and provoke new activities along the urban surface. The introduction of a synthetic or new material creates equal spatial ambiguity among all demographics which invokes interpretation and participation of utilising the space in the public realm. This act of public participation across diverse demographics and reinforces bridging relationships.

Wall describes folding as the emphasis of a smooth geology which joins spaces in one continual surface (245). The erosion of partitions between spaces increases informal and formal interactions between individuals. The removal of barriers increase bridging relationships, however they conflict with the privacy required to develop of bonding relationships.

Non-programmed use is described as “equipping the surface with services and furnishings which can be modified by the public” (245). The modification of these services “enables a diverse and flexible range of uses.” The flexibility of uses increases the density of possible programs which also increases the demographics which can use a space. This overlap of users increases bridging interactions.

### Folding



### Non-programmed Use

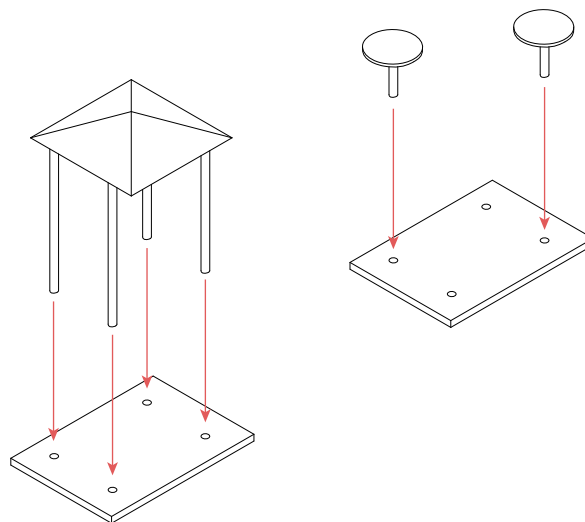


Figure 3.4. Axonometric diagrams explaining (top) Folding and (bottom) non-programmed use.

## Shelter

Alex Wall's ideas in *Programming the Urban Surface*, and their relation to bridging and bonding can be continued in the design of shelter. Principles such as non-programmed use, folding, thickening, impermanence all provide bridging and bonding in architecture through the increase of programmatic and demographic overlaps. Methods which create these overlaps in the shelter can be described as:

1. Programmatic Density
2. Continuity
3. Informal interactions

Programmatic density relates to Wall's ideas of non-programmed use and impermanence. Wall explains the importance of impermanence

"Needs and desires can change overnight, and city administrators must be able to respond quickly without massively overhauling entire tracks of land (245-246)."

By providing more programs through the shelter it allows an interaction between the surface, making the uses of the landscape more dynamic and malleable. The shelter acts as another layer upon the surface which provides architectural conditions to foster more programmatic possibilities. The densification of uses creates a range of overlap between programs as they all can utilise the same space overtime. This overlap increase informal interactions and interactions between demographics when programs switch from one use to the other.

Continuity relates to Wall's idea of folding, and creating an uninterrupted surface. By reducing the visual interruption of structure supporting the shelter it creates a higher chance of interactions and possibilities of programs along the surface.

Informal interactions relate to Wall's idea of movement which he describes as the facilitation of circulation systems (246), however within the floating village the main circulation system is walking. By reinforcing circulation areas through shelter such as shading which can increase informal interactions. The increase of informal interactions creates bridging as it fosters meetings with pedestrians without a formal programmatic commonality.

## Detail

Detail expands on Alex Wall's ideas of non-programmed use with Andres Jaque's documentation and manifestation of the rolling society. In "Sheltering the Rolling Society: A Post-Typological Urbanism of Non-Familiar Shared Homes" Jaque's records the typologies of Eastern Europe's Rolling Society; a society akin to the floating population. This architecture is an assemblage of generic components which results in an unfamiliar apartment dwelling which performs specifically for its inhabitants. Jaque's explains that it is the architecture's synthesis of the unfamiliar which fosters commune in this society:

"The rolling society is not solely vulnerable to weather, personal integrity or property maintenance, but also to social exclusion disconnection and operational outdated. Within the Rolling society, shelter means the rapid obtainment of relational capital. Shelter here is not the familiar interior protecting dwellers from the outside, but rather the place where one encounters otherness and builds up association within it (86)."

The participation of modifying shared space leaves contributions to the overall community showing a shared participation. Jaque's specifies nine distinct architectural attributes which help create the rolling society; three of which are focused on creating bridging and bonding:

1. Performative / Counter-typological
2. Overlappable / Additive

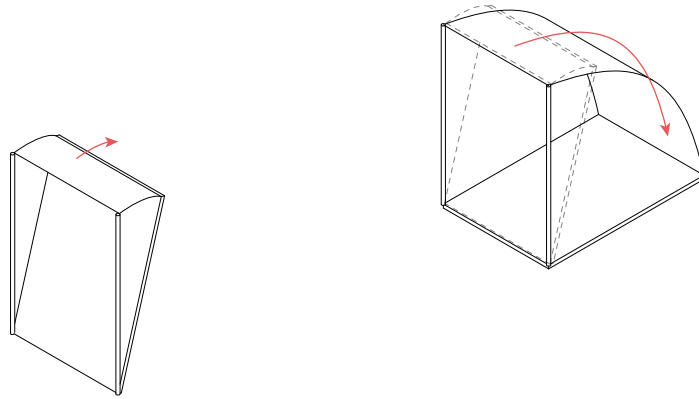
*Figure 3.5. Andre's Jaques  
documentation of the Rolling Society*

Performative modifications refer to the folding and unfolding adaption components to the changing programmatic conditions. The interaction with these systems create participation of molding space for other users. The use of these components creates bridging or bonding through participation of space modification.

Overlapping and additive describe the method of continual piling of components, in modification. This layering of components does not require them to fit together, or precision. Jaque's explains that layers which precisely fit together create cohesion which creates a space of familiarity, an opposition to the rolling society. The act of overlapping creates bridging and bonding through creating a sense of place, even if the place is one of unfamiliarity. Unfamiliarity produces spatial equality for all demographics.



Performative / Counter-typological



Overlappable / Additive

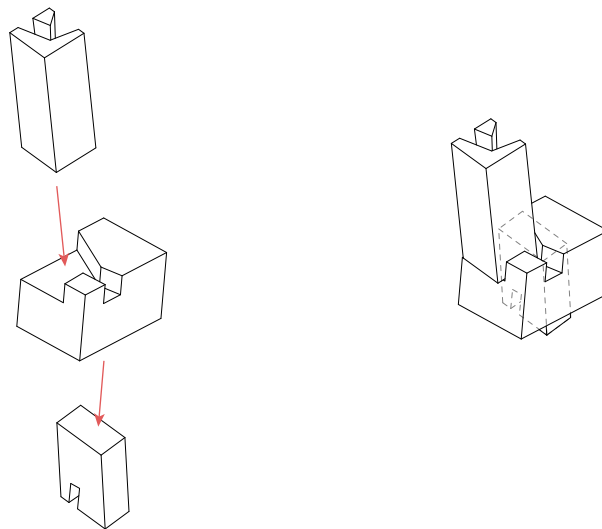
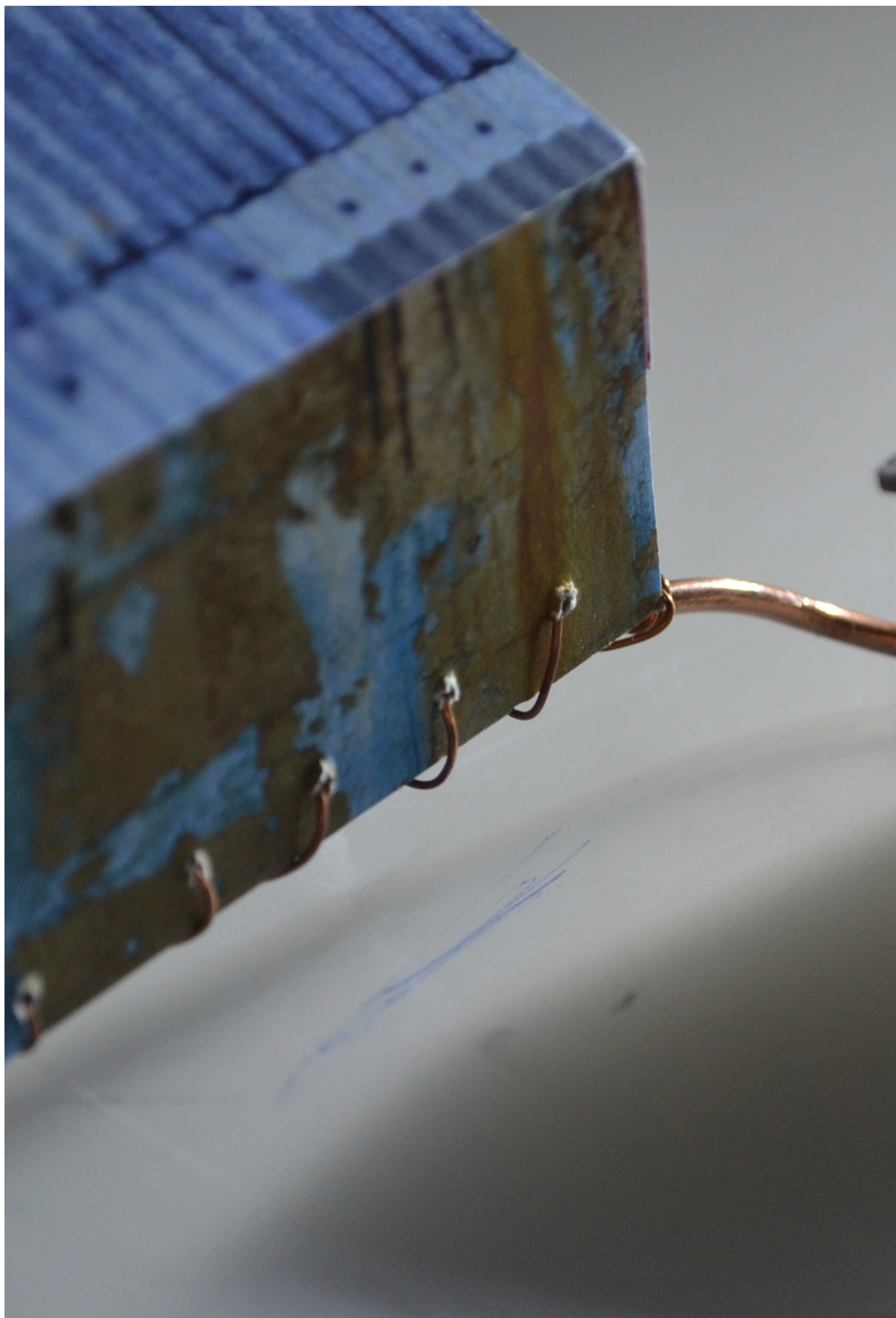


Figure 3.6. Axonometric diagrams explaining (top) Performative and (bottom) Overlappable.



# Case Studies

This project review presents architecture which facilitates bridging and bonding between people. These case studies are divided into three sections which each present an architectural scope and methods to communicate bridging and bonding. These three sections are:

1. *Surface*
2. *Shelter*
3. *Detail*

The sum of these analytical sections acuminate produce a set of methods and examples of bridging and bonding through physical fundamentals of architecture. Each section also explores a specific aspect in relation to the aims of this study. “Surface” explores public space, “Shelter” explores mobility and temporality, and “Detail” explores informal modification. These elements relate to the context of the floating village, its movements, community and structure. Alongside the programmatic aims of the case studies they also each expand on their respective literature analysis.



Surface

## Schouwburgplein

West 8 Architects  
Rotterdam, Netherlands  
1996

The Schouwburgplein is an urban public space constructed above a carpark. The surface of the space is composed of a variety of materials include timber, steel and rubber. Because of its location above a carpark, services such as lighting are integrated within the surface which can highlight paths or events. The centre of the public space hosts a herringbone timber flooring pattern while the perimeter of the site displays an alternative timber pattern for pedestrian circulation and seating. The rest of the surface is composed of steel grates. The design also holds a unique lighting system which can be controlled by the public to enable an accessible public performance experience.

*Figure 4.1. Schouwburgplein timber herringbone (middle),  
and steel section and underground lighting (bottom)*

*Source: <http://www.west8.nl/projects/schouwburgplein/>*

Through the use of different materials, the Schouwburgplein demonstrates bridging and bonding via public space by providing surfaces which could appeal to different demographics for different uses. The different potential uses of each material allow a variety of demographics to informally collide on the same public plane. This increases the amount of bridging interactions while reinforcing bonding interactions within each material zone.

The introduction of services within the floor also provides more options of programs which can be integrated with the public space. This interaction of public space can create a better sense of social capital through user investment into pre-existing services.



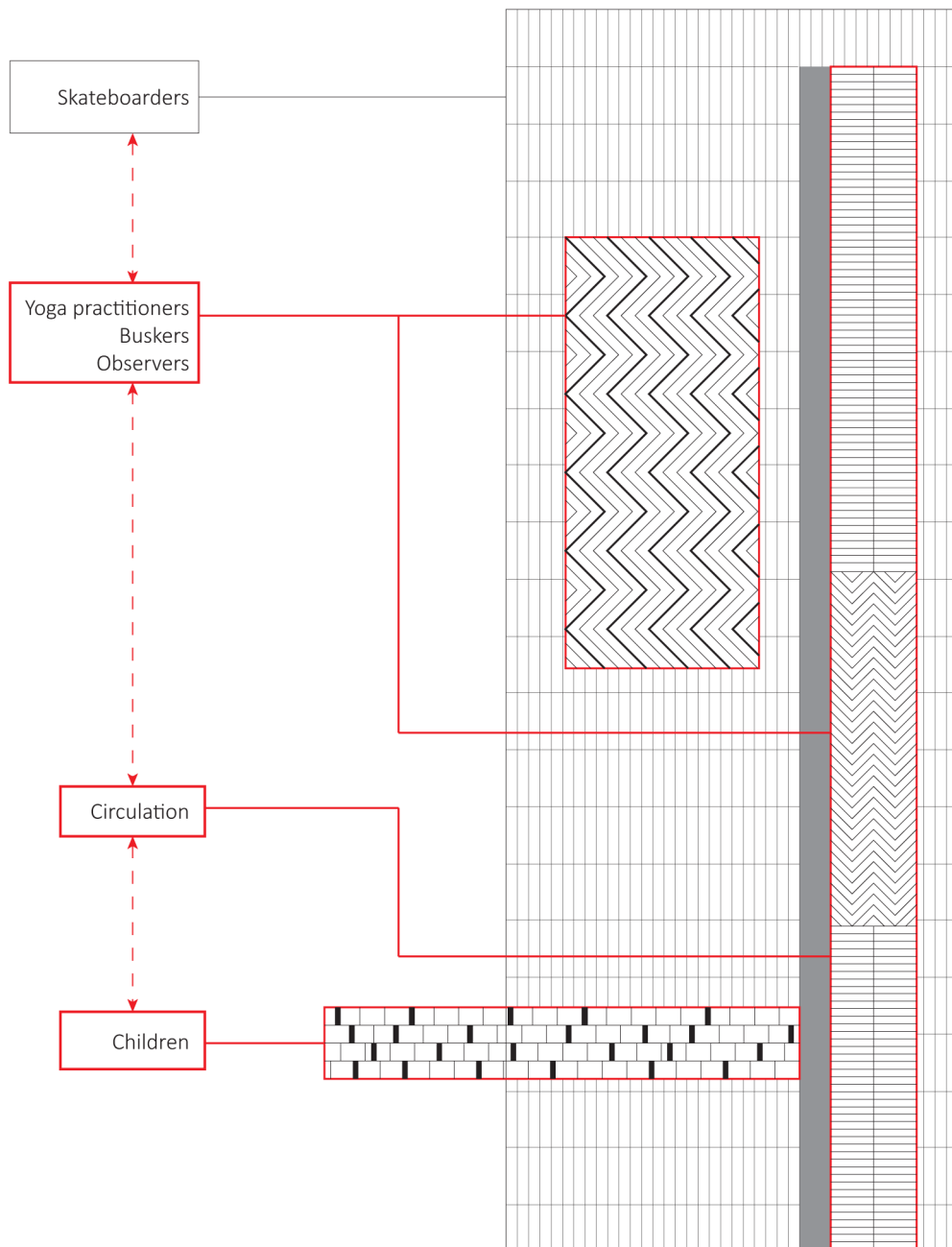


Figure 4.2. A plan view diagram demonstrating the demographics of each surface section and their interactions

## Superkilen

BIG, Topotek 1, Superflex  
Copenhagen, Denmark  
2012

The Superkilen is a half mile long urban space sited in an ethnically diverse neighbourhood within Denmark. The design is composed of three zones which each facilitate a collection of programs:

- The red square: market, culture, sport
- The black square: urban living room
- The green park: sport, play

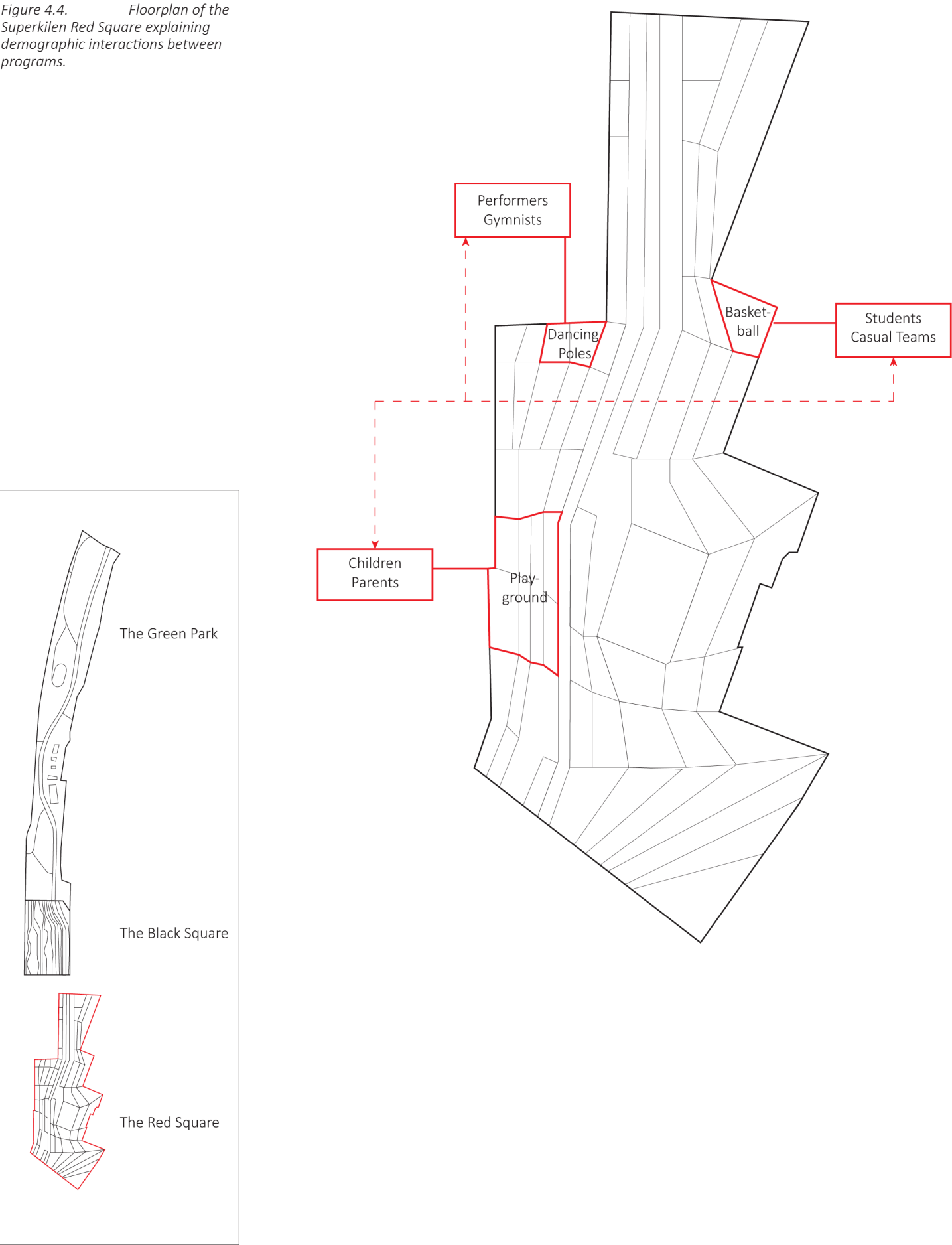
Each zone presents a different landscape narrative which is communicated through a combination of synthetic surface materials, colours, patterns and topography. The red square provides different surface types to host its cultural programs. The black square's programs revolve around its urban furniture. The green park focuses on sports and traditional green field programs such as picnics and recreation.

*Figure 4.3. Superkilen red square (top), black square (middle), and green park (bottom).*

*Source: <http://www.big.dk/#projects-suk>*

The surface of the Superkilen is similar to the Schouwburgplein in relation to bridging and bonding through diverse programming by via a range of surfaces and materials. However, it's the Superkilen's creation of a synthetic contemporary landscape alongside global everyday motifs which amplifies bridging and bonding. The ambiguity of the synthetic landscape provides an equal sense of place to all demographics which enables bridging to occur between demographics. The overlaying of ambiguous and certain create a network of free flowing bridging and bonding within the park.

Figure 4.4. Floorplan of the Superkilen Red Square explaining demographic interactions between programs.



## Yokohama International Passenger Terminal

Foreign Office Architects (FOA)

Yokohama, Japan

2002

The Yokohama International Passenger Terminal acts as a docking station and a public urban space. The major design aspect is its continuous surface which weaves from its interior spaces to its exterior urban park. This uninterrupted floor acts as a circulation scheme which organises spaces through weaving its timber surface up and down and alternating heights. The timber surface also continually changes throughout the surface by changing its decking pattern which hints towards appropriate programs.

Figure 4.5. (Top) arial photograph of the Yokohama International Termina, (bottom) perspective photograph of the terminal deck.

Source: <http://www.archdaily.com/554132/ad-classics-yokohama-international-passenger-terminal-foreign-office-architects-foa>

The terminal's use of a continual surface plane which weaves along different altitudes acts as an example of surface bridging and bonding. The use of an uninterrupted floor plane throughout different levels allows for seamless flow between programs, uninterrupted by structure or partitions. This seamless visual and pedestrian experience creates a higher number of interactions between people which in turn acts as a bridging mechanism. However, the various height of planes along each level provides a level of isolation for activities by hiding programs or events visually and providing a hierarchy of spatial arrangements. This slight isolation of areas creates areas for bonding.



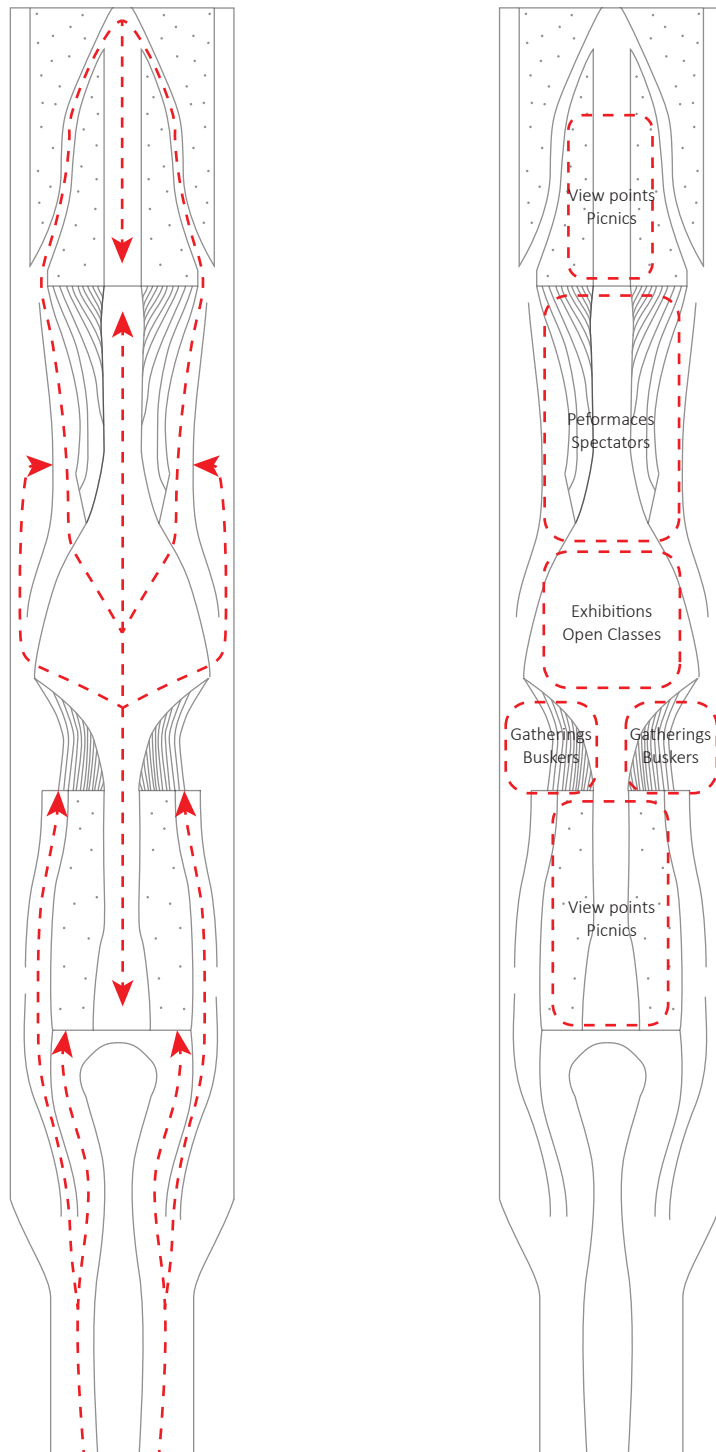


Figure 4.6. Diagram showing the floor plan of the Yokohama Terminal and its programs and circulation



# Shelter

## BWM Guggenheim Lab

Atelier Bow-Wow  
New York City, Berlin, Mumbai  
2011 - 2013

The BMW Guggenheim Lab is a mobile and temporary teaching facility. The design of the lab features a black box shelter with an open ground floor underneath. The structure of the box and its supports are comprised of carbon fibre components. Within the raised box are electric services and storage for furniture.

The shelter's ability to store a variety of furniture and provide electronic services allows it to cater to a range of programs and events. By increasing the density of applicable programs under the shelter you heighten the probability of interactions between the different demographics of each program. The overlap in demographics and programs under the shelter can allow individuals to create bridging networks.

By injecting program from the shelter onto the surface using 'urban furniture' and electronic services, the surface is inclusive and flexible. The lack of partitions on the ground floor invites users under the structure whether it be for shelter, circulation of exploration. The method of program implementation in the shelter maintains a free ground plane.

Figure 4.7. Guggenheim Lab New York installation  
Source: (Top) <http://www.bow-wow.jp/profile/2011/BGLn/index3.html>  
(Bottom) <http://www.bow-wow.jp/profile/2011/BGLn/index.html>

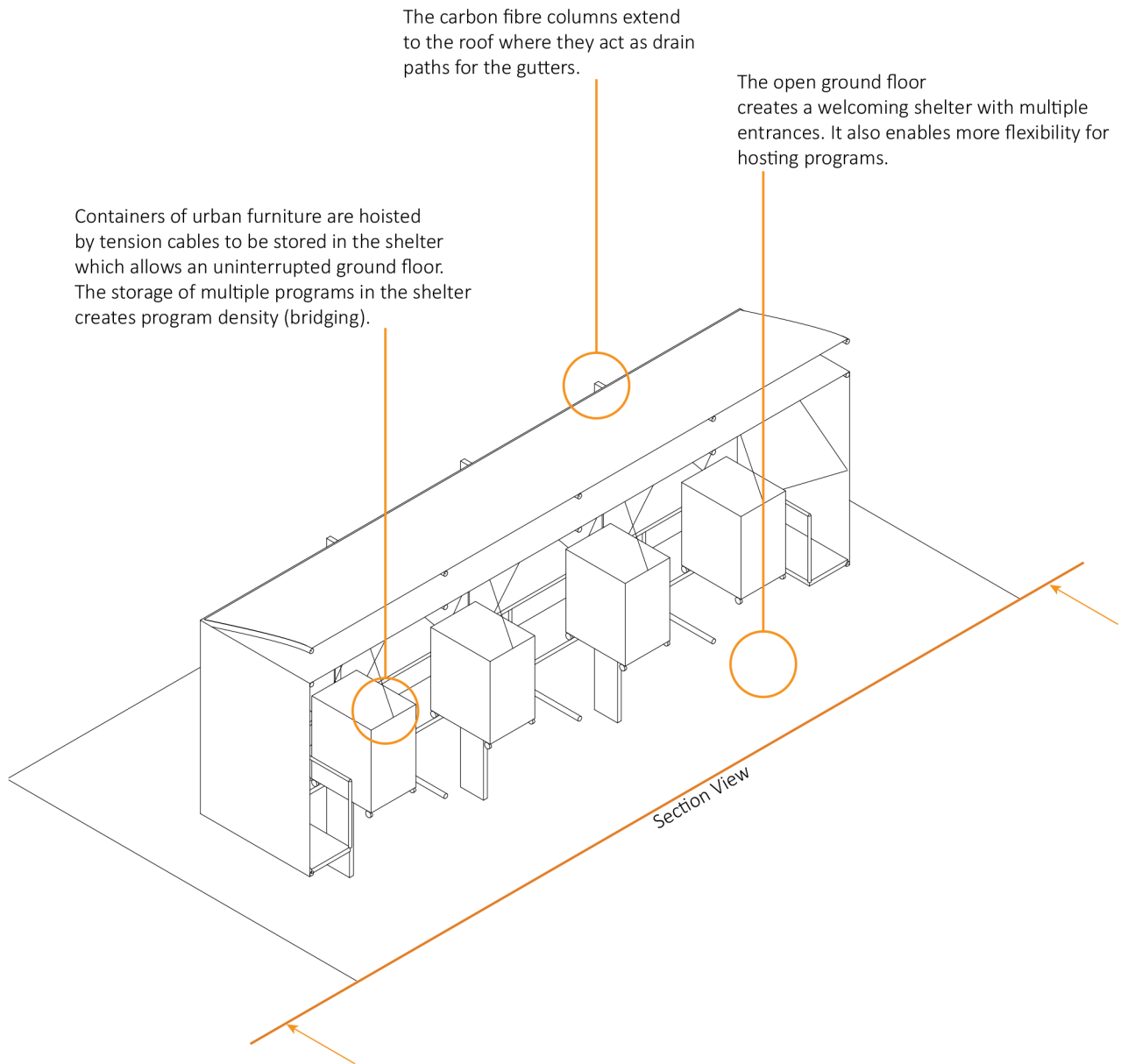


Figure 4.8. (Top)  
Axonometric section explaining components of the Lab.

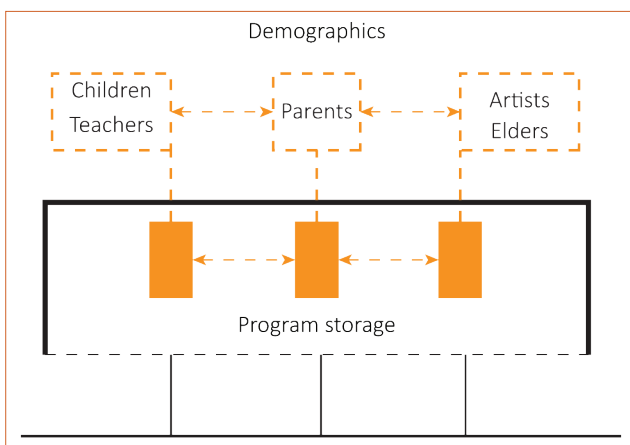


Figure 4.9. (Bottom)  
Section diagram illustrating demographic interactions in the Lab

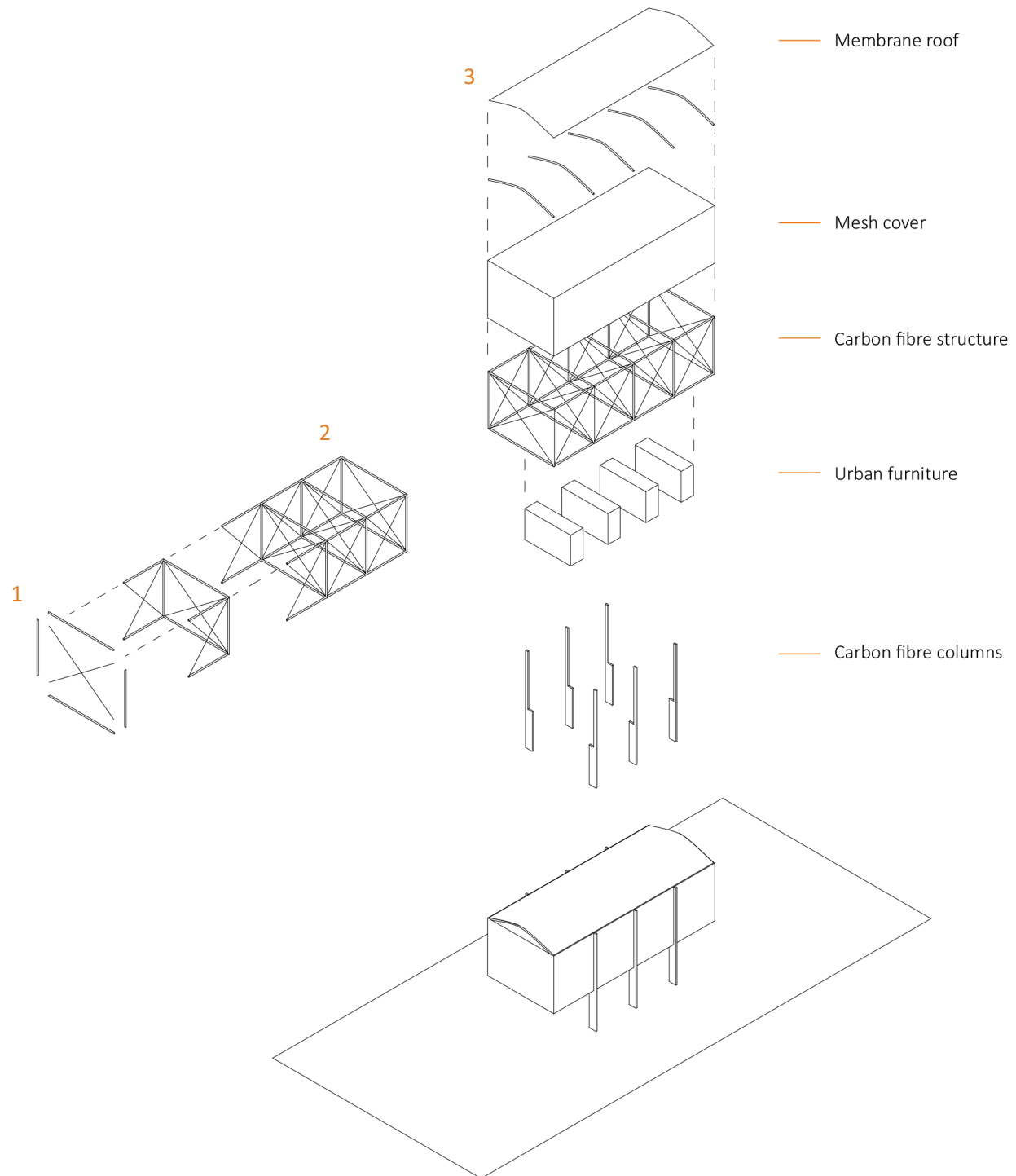


Figure 4.10. Exploded axonometric displaying the components of BMW Guggenheim Lab alongside the construction process

- [1] Flat pack frames are assembled on site
- [2] Frames are connected to create the shelter structure
- [3] Roofing and mesh are layed onto the shelter while the shelter is placed onto the supports

## Ambient 30 60

UMWELT

Santiago Metropolitan Region, Chile  
2014

Ambient 30 60 is a temporary pavilion structure composed of 22 structural frames. Each frame hosts an event or artwork while also supporting the roof. The roof is composed of a membrane which connects the space between each 'frame' and creates a microclimate of shading, managed humidity and water cooling.

The shelter produces a contrast between program and circulation by only shading the spaces between programs. This process highlights the programs through natural lighting while encouraging interactions among frames. The structure of the shelter is light and visually unobtrusive which increases visual engagement. This increase the chance of informal meetings under the shelter. These two points demonstrate how Ambient 30 60 is a bridging shelter rather than a bonding shelter, however the natural lighting and openings over the programs do slightly encourage bonding.



*Figure 4.11. Ambient 30 60 installation (top), event (middle), and transportation (bottom)*  
*Source: <http://www.archdaily.com/495904/ambient-30-60-yap-constructo-2014-umwelt/>*

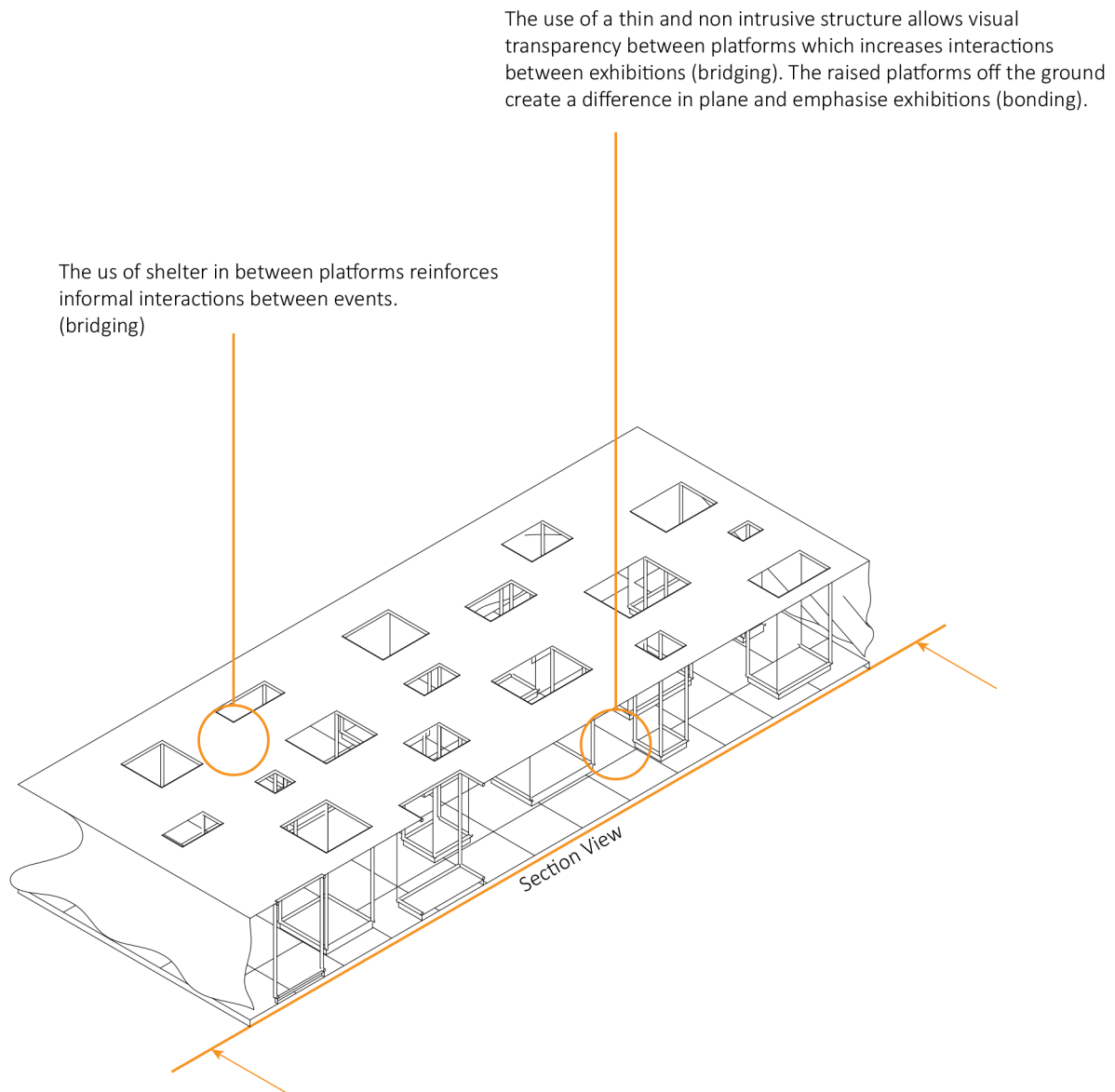


Figure 4.12. (Top)  
Axonometric section explaining  
bridging and bonding components  
of Ambient 30 60.

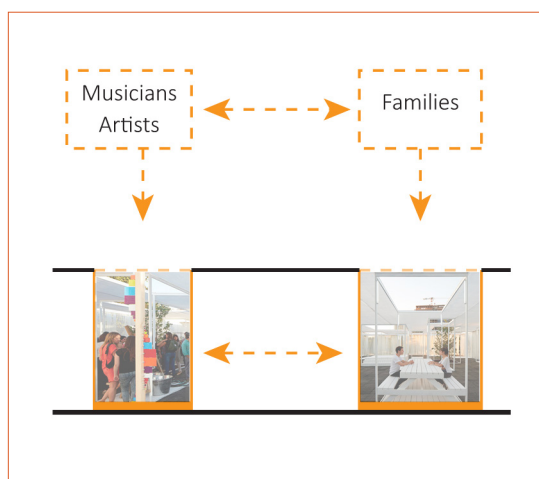


Figure 4.13. (Bottom)  
Section diagram illustrating  
demographic interactions in  
Ambient 30 60

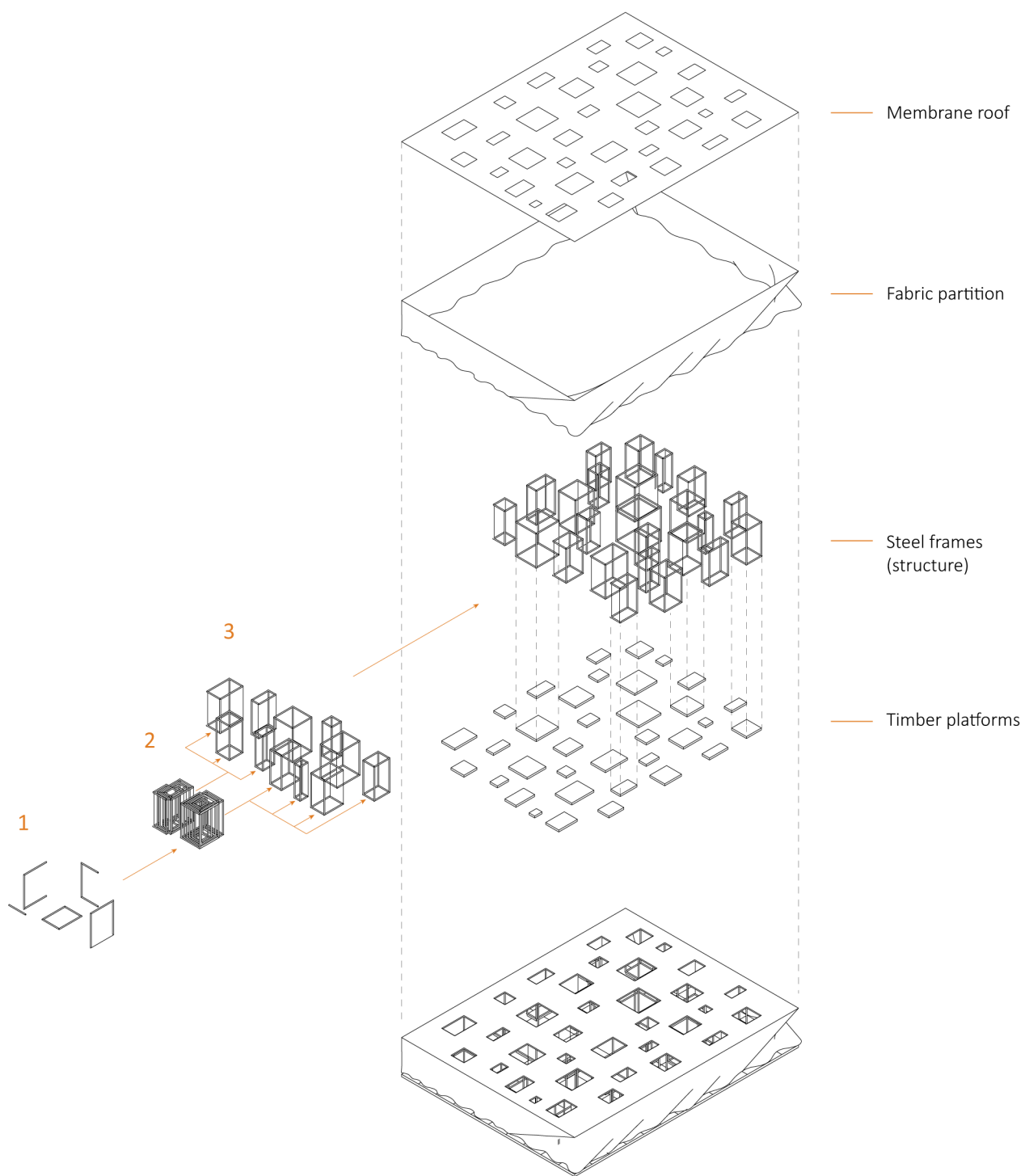


Figure 4.14. Exploded axonometric displaying the components of Ambient 30 60 alongside the construction process

- [1] Frames are assembled offsite
- [2] Frames are packed for transport
- [3] Frames are expanded onsite



Detail

## Rolling Architecture

Andres Jaques  
Eastern Europe

The Rolling Society is a record of Eastern European apartments which house mobile families temporarily. Within these homes, each family makes modifications which customise the house into a personal space [Fig 4.14]. These modifications include installation of mass produced products such as fabrics for curtains, plastic shading blinds, and aluminium windows. Many of these components were not developed in the context of the smaller residential housing.

It is this informal modification of the traditional apartment through contextually incoherent objects which creates an unfamiliar space; one which is not restricted by spatial norms. The modification by generic components creates an ambiguous sense of place which acts as an open platform for bridging between residents.

Each modification of the apartment acts as a performer, folding, revealing, and evolving. The modifications provide a state of activity and interaction which creates opportunities of bridging and bonding. These components provide the opportunity to enable for privacy or engagement. Rolling doors can be shut, or customised curtains can display their transparent layers for semi privacy [Fig 4.15]. Each modification evokes the language of bridging and bonding within the apartments.

*Figure 4.15. Live exhibition of the Rolling Society design by Andres Jaque*

*Source: <http://andresjaque.net/>*

*Figure 4.16. Models of Andres Jaques  
Architecturalisation of the Rolling Society*

*Source: Volume 46: Shelter, Sheltering the Rolling Society, Andres  
Jaque, 92.*



*Figure 4.17. Exploded axonometric of the Rolling Hut detailing its components.*

*Source: Volume 46: Shelter, Sheltering the Rolling Society, Andres Jaque, 91.*

## The Bastard Chairs / Sitting in China

Michael Wolf  
China

This project is a photographic record of chairs throughout China by Michael Wolf. These chairs have been informally constructed from everyday components. Wolf's goal was to highlight the character of these everyday chairs, as their assemblage builds upon a dialogue of the chair's history. The records also highlight the intricate Chinese techniques of informal construction.

The bastard chairs place perspective on the informal construction in China's impoverished areas. They demonstrate the certain techniques of solutions and approaches to an incomplete object. Through analysis of each chair's construction [Fig 4.19] Wolf produces a consistent language of rules such as wrapping, stacking, and subtracting [Fig 4.20]. An object which has a distinct void can be completed by wrapping or stacking another component in place.

Similar to the rolling society, the bastard chairs help create an unfamiliar space by the bringing together of contextually isolated objects in the public realm. The use of the Bastard Chairs creates a public space which is more free and open for bridging, at the level of the small scale detail.

*Figure 4.18.        Photos of the bastard chairs*  
*Source : <http://photomichaelwolf.com/#bastard-chairs/>*

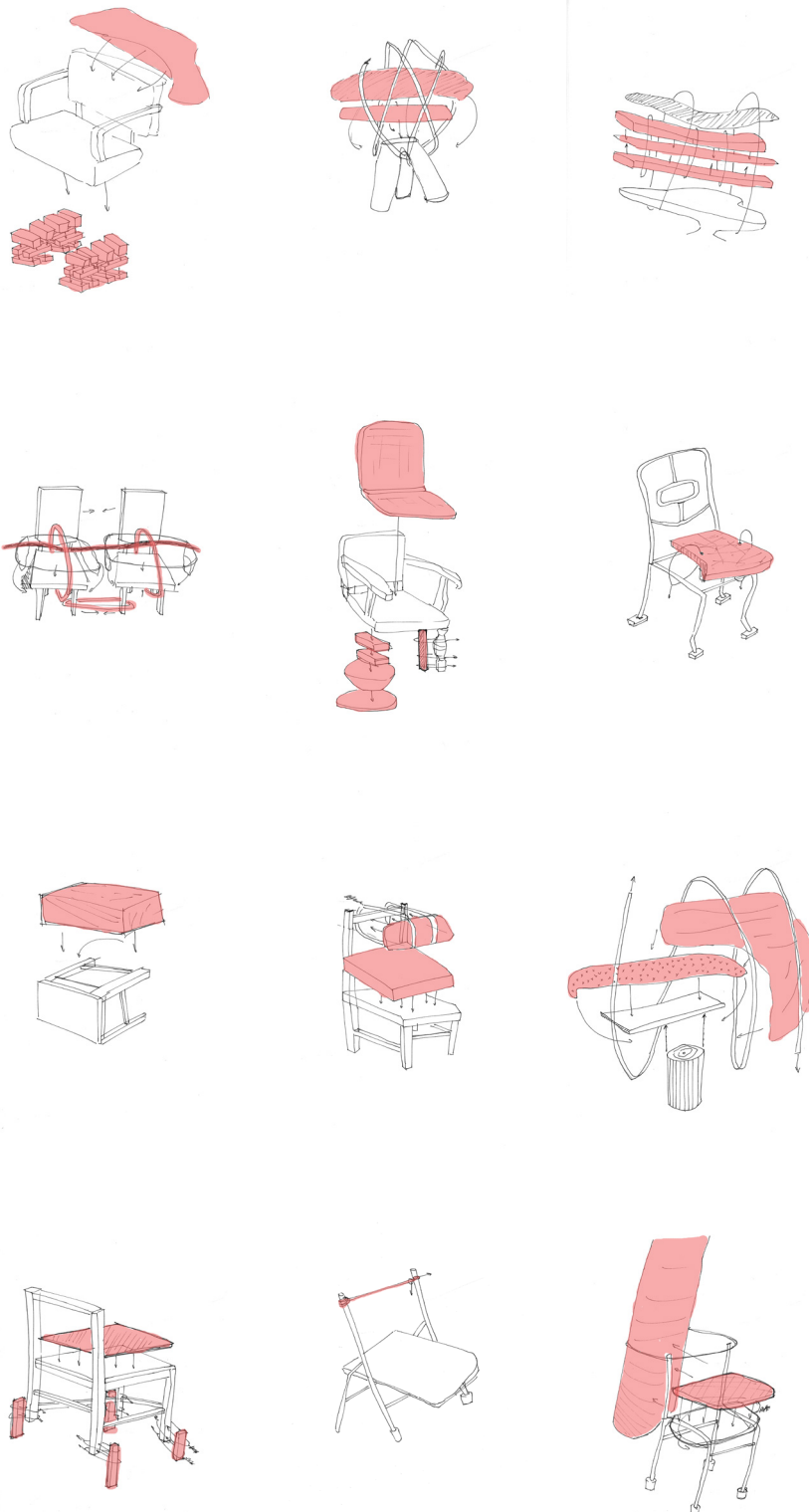


Figure 4.19. Sketches of the construction of the bastard chairs.

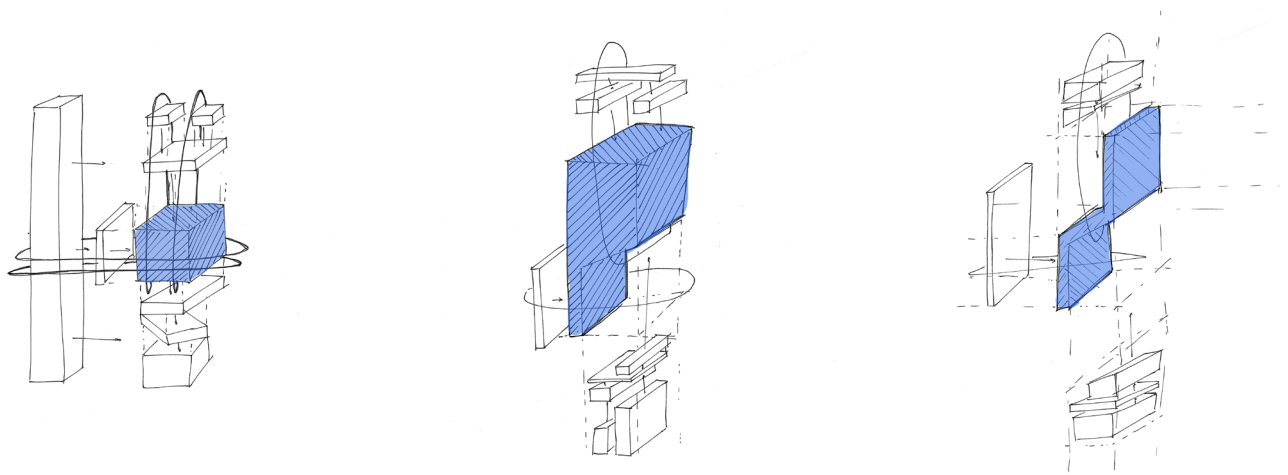
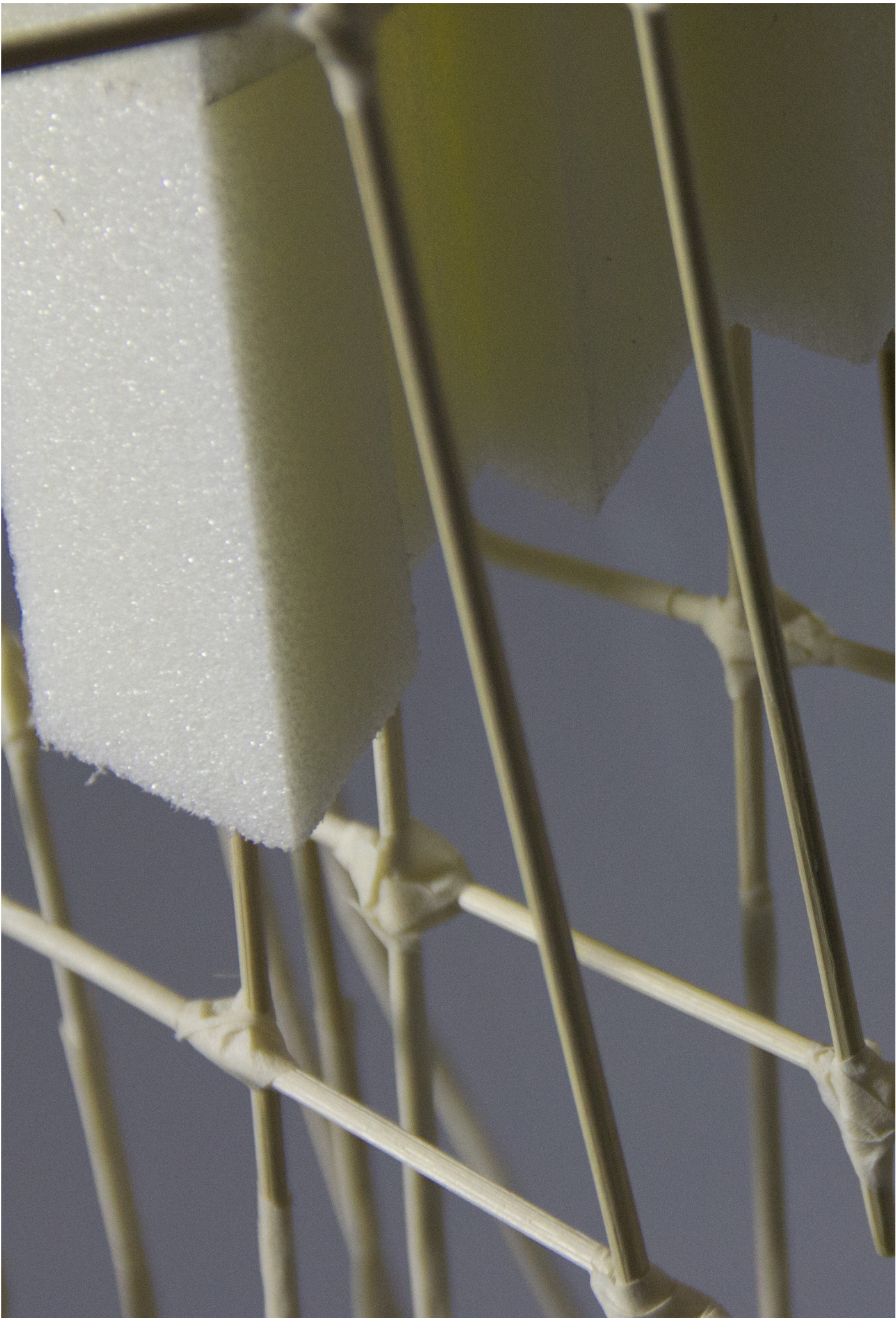


Figure 4.20. The construction of the chairs as a design language.





# Design



## The Archive

The archive is a series of design responses to the site, readings and case studies relating to the floating village and its context within China. Some responses are narrative based, expressing novel ideas which communicate problems within the floating village, while others are solution based, acting in response to the pragmatic issues of migrant life. The use of the archive is to develop a coherent understanding of the site and its surrounding socio-political context.

The importance of the archive as a design methodology is its role in reframing design problems. Kees Dorst explains the importance of framing and reframing in “The Nature of Design Thinking”. Dorst explains that the design problem during the design process is not stable but changeable: “This process of interpretation and re-interpretation through framing is a crucial part of design creativity, it allows design to take flight and move into truly new territory. The early solution proposals that drive the problem evolution show what solutions could realistically be achieved (135).” The reframing of thesis problem statements is a crucial part to the development of a design-led thesis; especially during the preliminary design process.



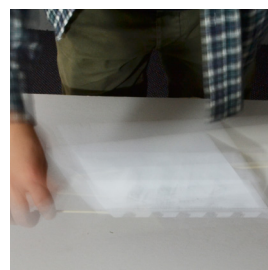
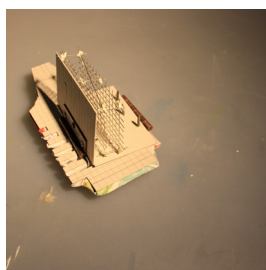
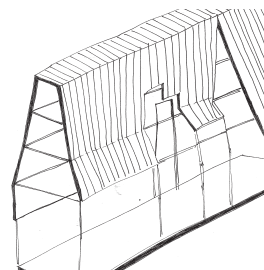
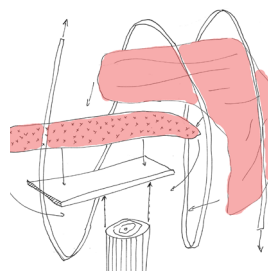
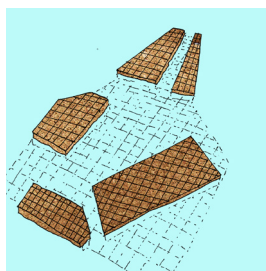
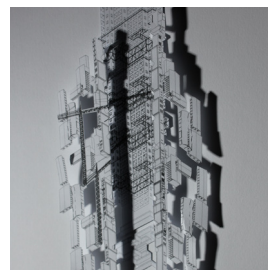
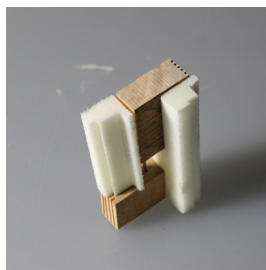
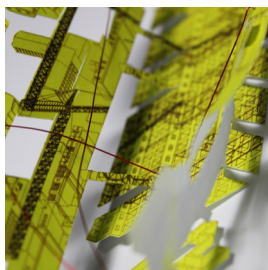
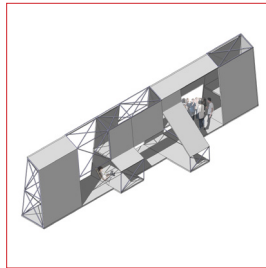


Figure 5.1. Sections of the archive

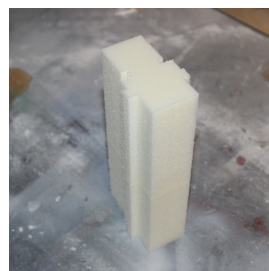
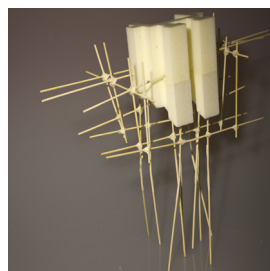
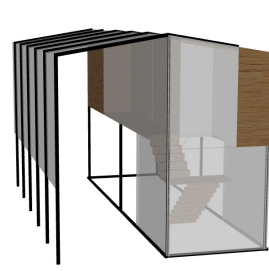
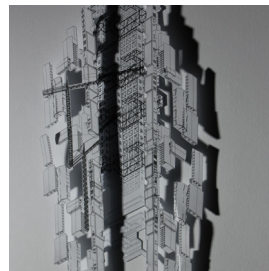
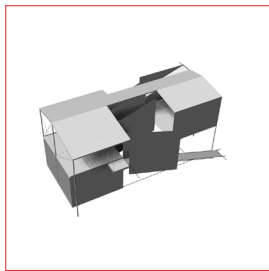
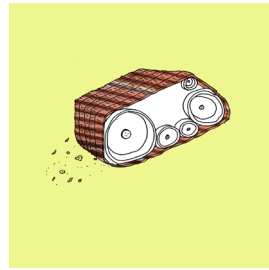
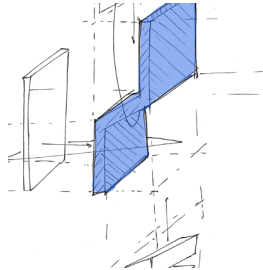
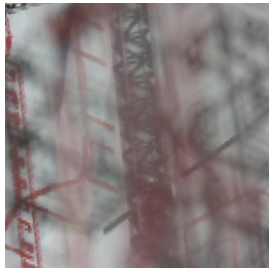


Figure 5.2. Sections of the archive continued

Each design response utilises a range of mixed media, physical modelling, sketch modelling, digital modelling, drawing and collage. Each medium allows further exploration and communication of solutions and understandings of the problem framing of the design. The collection of these interventions allows a range of interpretations and gradual clarification of what the design problem is. The problems explored in the archive surround the context of the floating village; these issues include:

- Rapid urbanisation of China
- The role of migrant workers in the Chinese economy
- Rapid rural to urban migration
- The Chinese middle class dream
- The architectural fantasies of China
- The informal nature of Chinese settlements

Each exercise reframed the design problem, refining the research proposition and suggests solutions to the issues which surround the floating village. Each process looks at alternative methods of approaching these issues not only design wise, but communicating and interpreting through different media.

## The Floating Population

Inspired by Archigram's famous "Floating City," (1964) and by iconic photographs of American high-rise construction workers, this design proposal [Fig 5.3] is a collage responding to the floating population and temporary construction villages of China by reinforcing their nomadic lifecycle. The design utilises a blimp as a vehicle for village which allows the floating population to move from site to site, relocating to where work is available. This allows villages to have a stable amount of amenities and people within the architecture.

Each floating village vessel hosts migrants from a specific province. This is identifiable by vessel colour. Because floating villages host migrants of similar backgrounds it provides a positive sense of social capital as strong intra-relationships are quickly developed. The communal similarities within the vessel allow the village to efficiently relocate back to its origins for festive events like Chinese New Year or to pick up more rural migrants who wish to work in the city.

This use of iconic imagery in the collage was to represent the socio-political issues which surround the floating village and the floating population.



Figure 5.3. Collage design and representation of the floating village

## Modes of Travel

These sketches and physical models continued to focus on designing towards the floating village's nomadic nature. These transportable iterations introduce, ground and naval interventions due to the rise Chinese automotive industry and the expanding Pearl Delta river cities like Chongqing, Wuhan and Nanjing.

The cladded track [Fig 5.4] is a mobile tank with a fully covered tracking system which would allow it to traverse the harshest areas of construction and underdeveloped terrain. The exterior shell would then disassemble into a cladding or shelter for the inhabitants of the floating village to reassemble into their buildings. Within the tank would hold resources for members of the village such as furniture and stock.

The floating platform [Fig 5.5] is a ship which can submerge itself to provide pathways for boats along the Pearl Delta River. The platform itself provides a square grid with services along its surface for the village's informal interventions.

These initial designs focused on the embrace of the nomadic lifestyle of the village, however more focus was required in emphasising bridging and bonding.



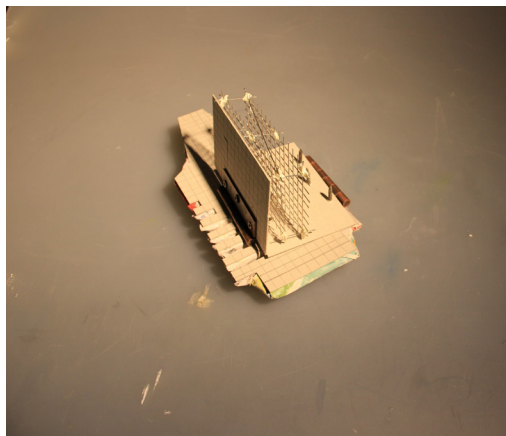
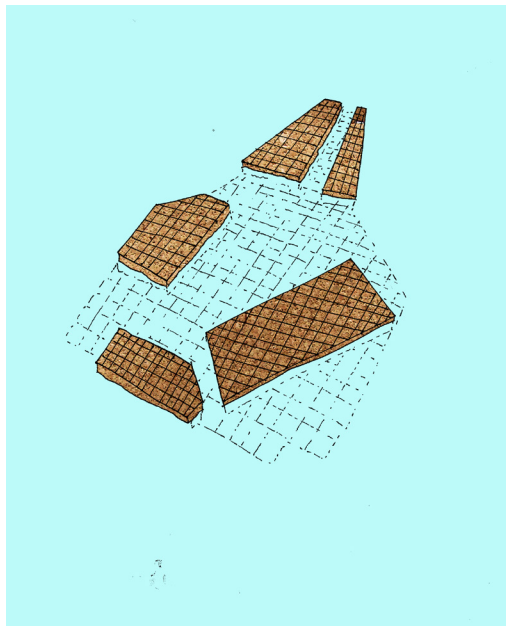
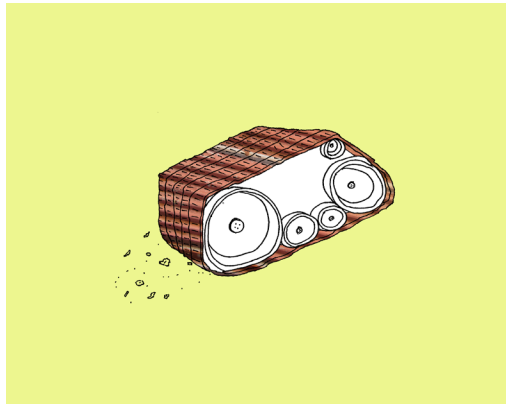


Figure 5.4. (Top) Mobile tank sketch

Figure 5.5. (Middle, bottom) The floating platform ship sketch and physical model

## Narrative design of the Floating Village

These drawings and models acted as narratives which communicated the architecture and process of the village. The models aimed to communicate and explore a better understanding of the conditions which occurred within the floating village.

[Fig 5.6]

This model is a composition from the idealised vision of the site. It aims to demonstrate the changing conditions of the site over time by using the vertical axis as time and the ground plane axis to display the change of the built environment. As the diagram continues vertically, the construction image develops while the floating village arises around the site. Once the building is complete the village disappears at the top. The image was to communicate the process which occurs on the site as a vertical dense condition. The aim was to look at the opportunity of developing a denser floating village which could respond to the changing conditions of the site.

[Fig 5.7]

These models were cut from the collage representation of the village [FIG 5.6] and aimed to further communicate the relationship between the floating village and the construction site through transparency, hierarchy and lighting/shadows.

[Fig 5.8]

This model was an interactive rotating model which represents the changing processes by which the village is constructed.

[Fig 5.9]

This model was a response to the construction methods which surround the method and a metaphorical model of the floating village.



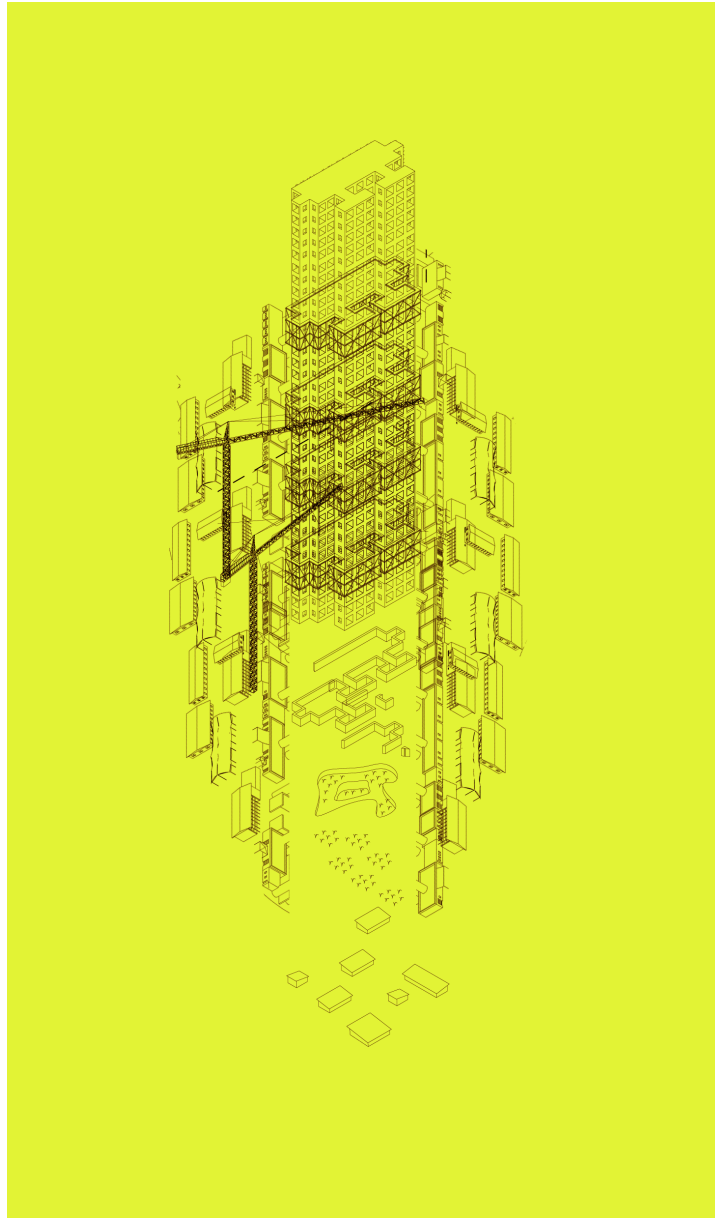


Figure 5.6.  
village

*Collage representation of the lifecycle of the floating*

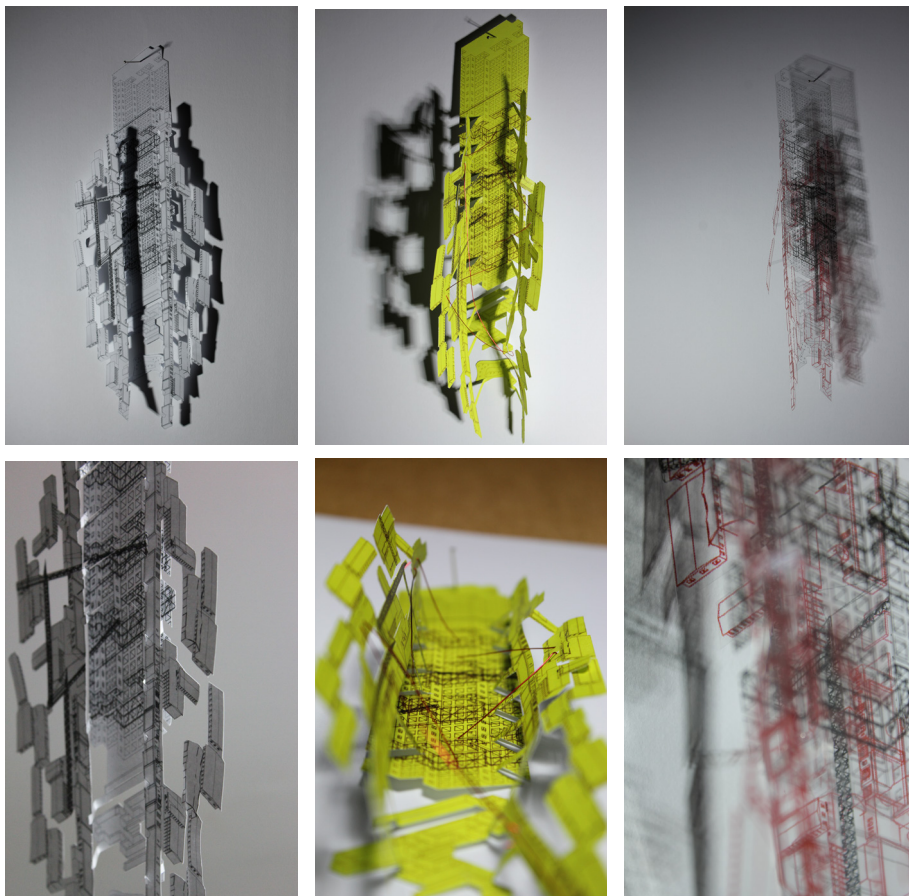
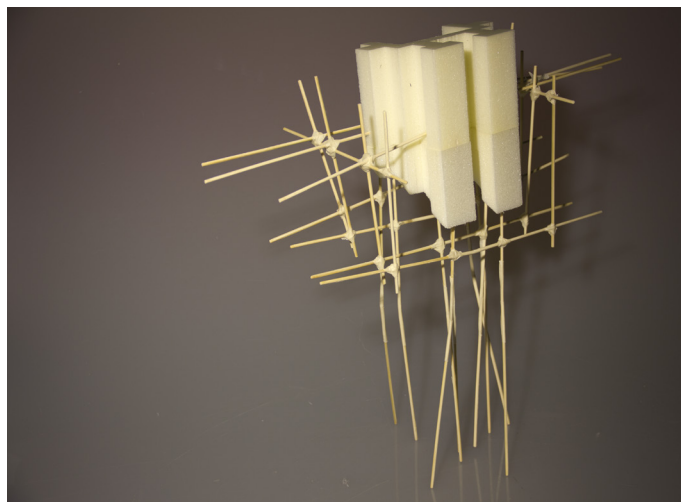
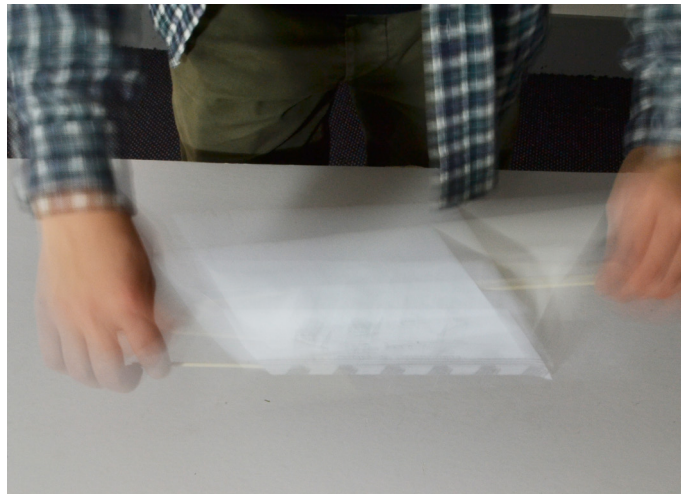
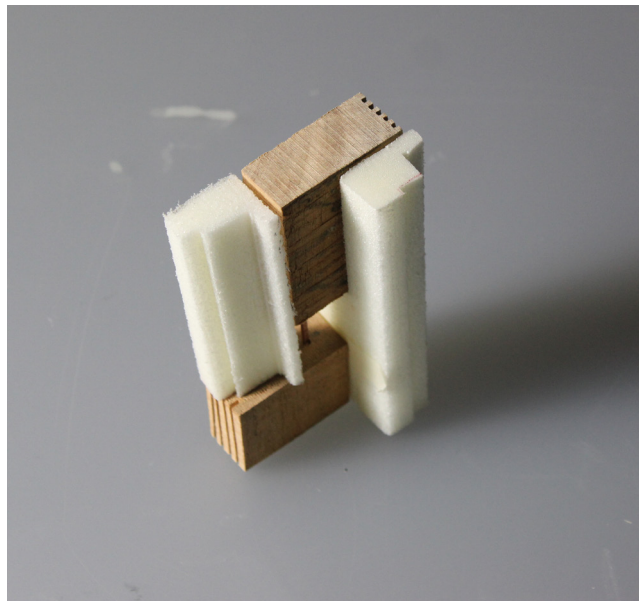
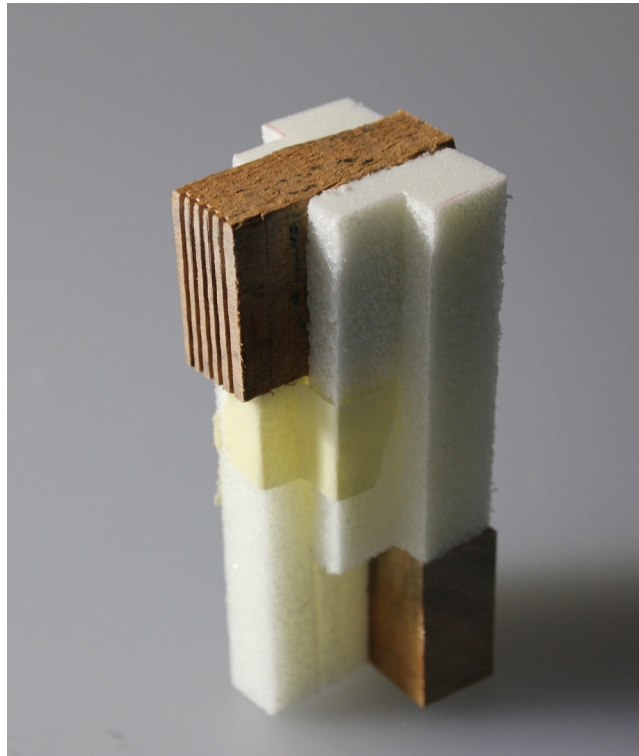


Figure 5.7. *Reconstruction of the collage within the floating village as a physical model*



*Figure 5.8. Representation of the floating village as a interactive model (top) and a metaphorical model of the floating village*

*Figure 5.9. A metaphorical model of the floating village and utilising its informal construction techniques of binding for bamboo scaffolding*



*Figure 5.10. Rules of the bastard chairs applied as architecture to the surrounding tower typologies*

## The Informal Towers

These models of Informal towers were developed by uniting the informal architecture of the floating village and with Michael Wolfs Bastard Chairs/Sitting in China. Informal architecture is a major aspect of the floating village, contributing to its development and visual dialogue. Michael Wolfs the Bastard Chairs/ Sitting in China acts as a catalogue of informal compositions within China. The design of the informal towers aimed to remake the architecture of the urban tower block via the informal processes of wrapping, stacking and removing.

The process of the design involved an analysis of the construction of each chair in order to develop and understanding and language of the construction process. The language of stacking, wrapping and subtracting was formed and these rules were applied to the surrounding building typologies as a case study.

This design was a continuation of the construction methods of the floating village [Fig 5.10]

## Preliminary Design

### Temporary Shelter

These design experiments continue with the embrace of the village's nomadic lifecycle by using a temporary and mobile structure similar to shipping container architecture. The porosity of these structures are explored as methods of bridging and bonding through partitions.

The initial sketch of the temporary shelter [FIG 5.11], provides an open floor ground plan which is visually hidden by various levels of the overhanging shelter. These shelter modules provide varying levels of privacy. More private areas allow bonding, while more open areas allow bridging.

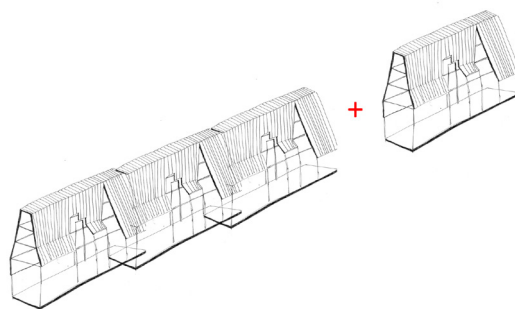
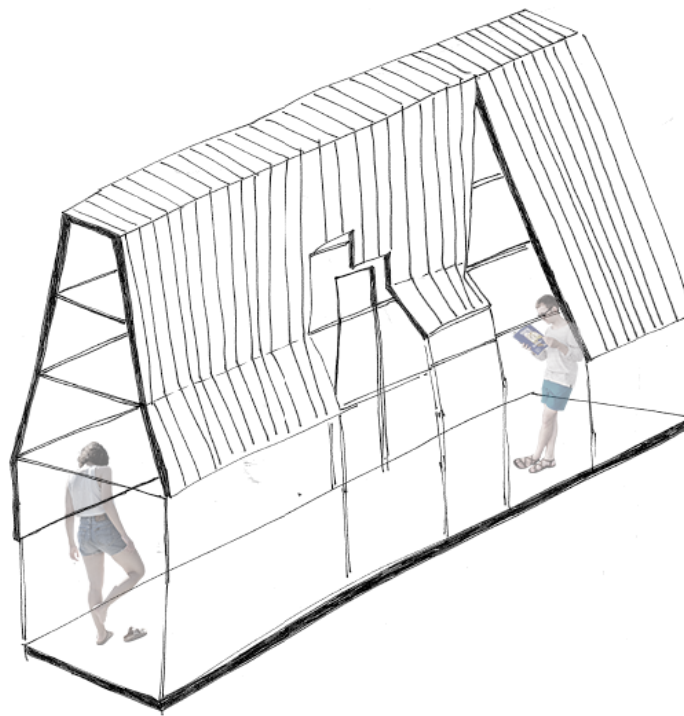


Figure 5.11. Sketch of initial temporary design

## Fragmented container

The next iterations were done by computer modelling in order to explore more detailed construction possibilities for the container.

This iteration [FIG 5.12] proposes a custom made container with moveable partitions, able to be opened or closed making the state of privacy within the structure to become a more dynamic and interactive process. This in-turn allowed bridging and bonding to become a more involving and adaptive process as users can decide whether they want the structure to bridge or bond.

The design is composed of seven parts, each with a unique structure which facilitate niche programs. Each parts specific conditions help bonding to occur for users of these programs as each part isolates a program from the rest of the shelter.

The next iterations of this container [Fig 5.13- 6] explore possibilities of construction and porosity.



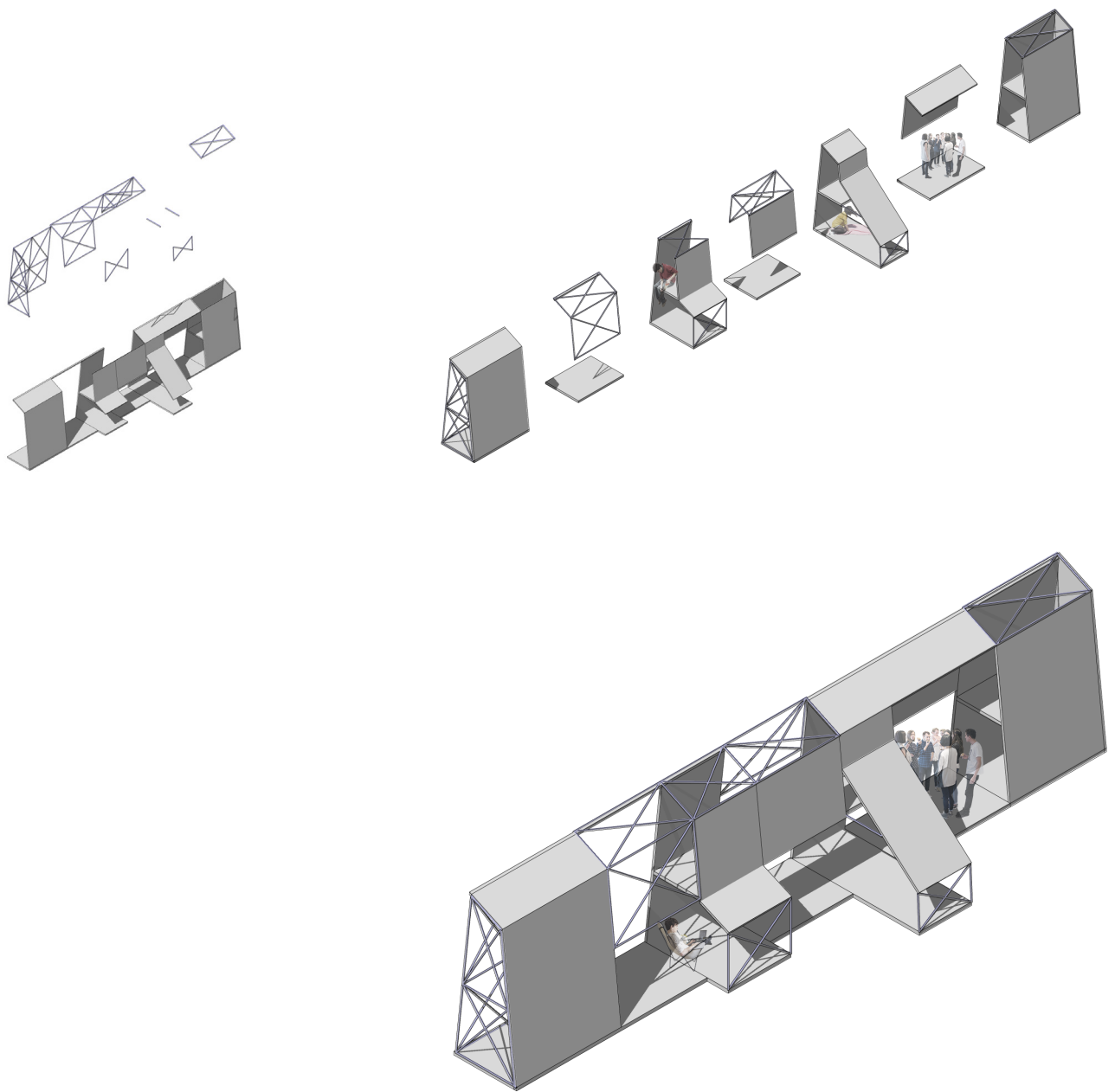


Figure 5.12. (Top right) Seven parts of the custom container

Figure 5.13. (Top left) Exploded axonometric of the container showing the framing components

Figure 5.14. (Bottom) The fragmented container

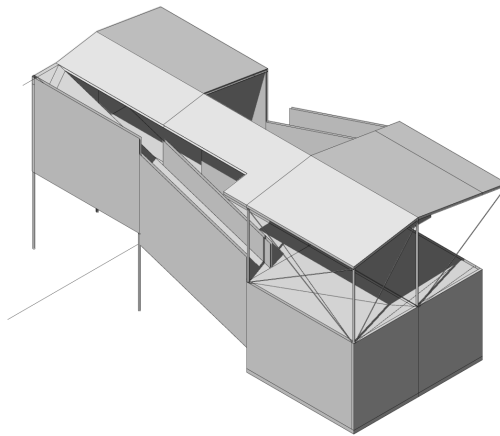
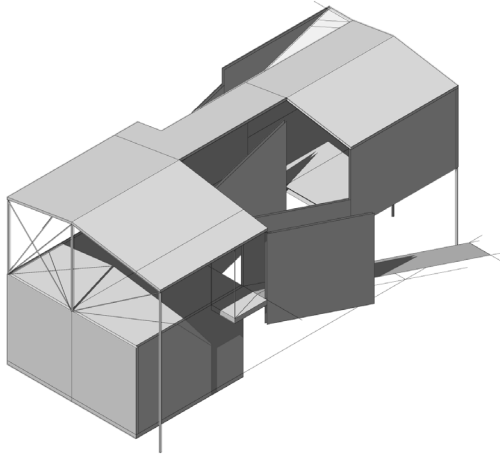


Figure 5.15. Further development of the shelter

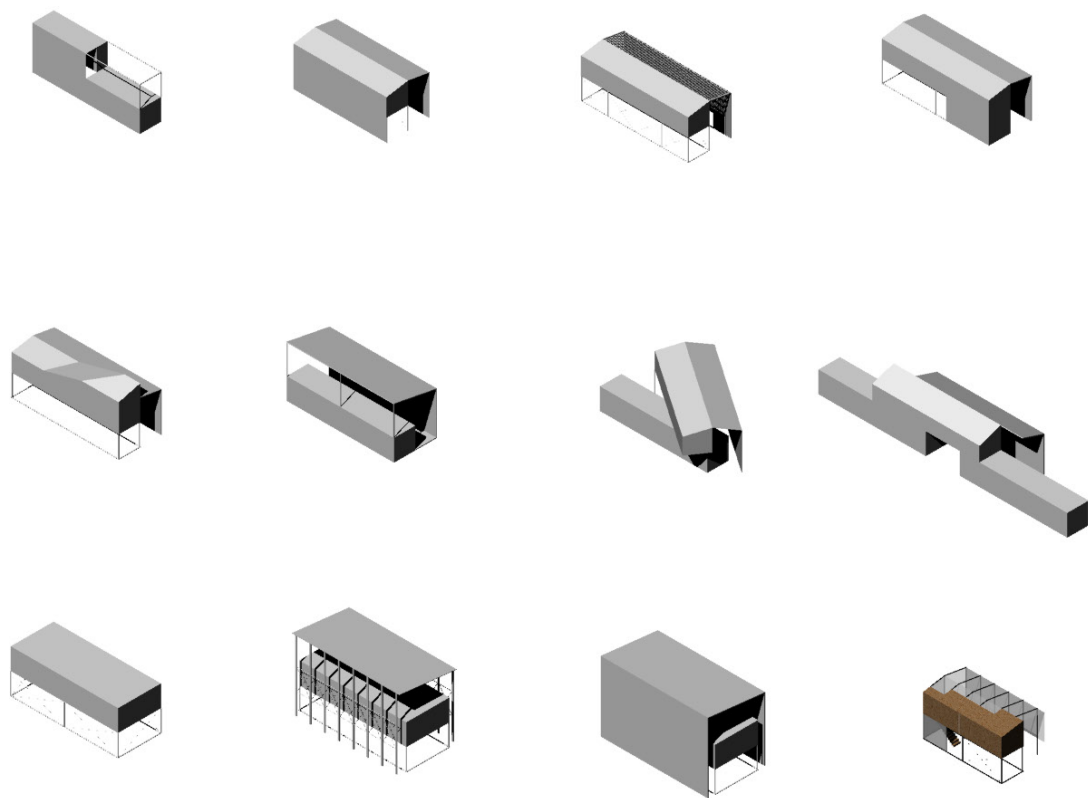


Figure 5.16. More iterations of the shelter

## Container to Platform

These three designs changed the design idea from a mobile container module to smaller modular parts such as surfaces. The design phase documents a change in thinking about the applications of bridging and bonding in temporary design and the limitations of container based community design for the floating village.

[Fig 5.17]

This design continues the idea of the container into a module which had an exterior shelter and flooring. The idea begins to incorporate Alex Wall's ideas of a multi programmable surface with the orange floor having slots for pop up shops or supports for tents. The circular fronts act as an open platform for a market under the shelter or other events while the surrounding stairs can be used as seats transforming the circle into a cinema.

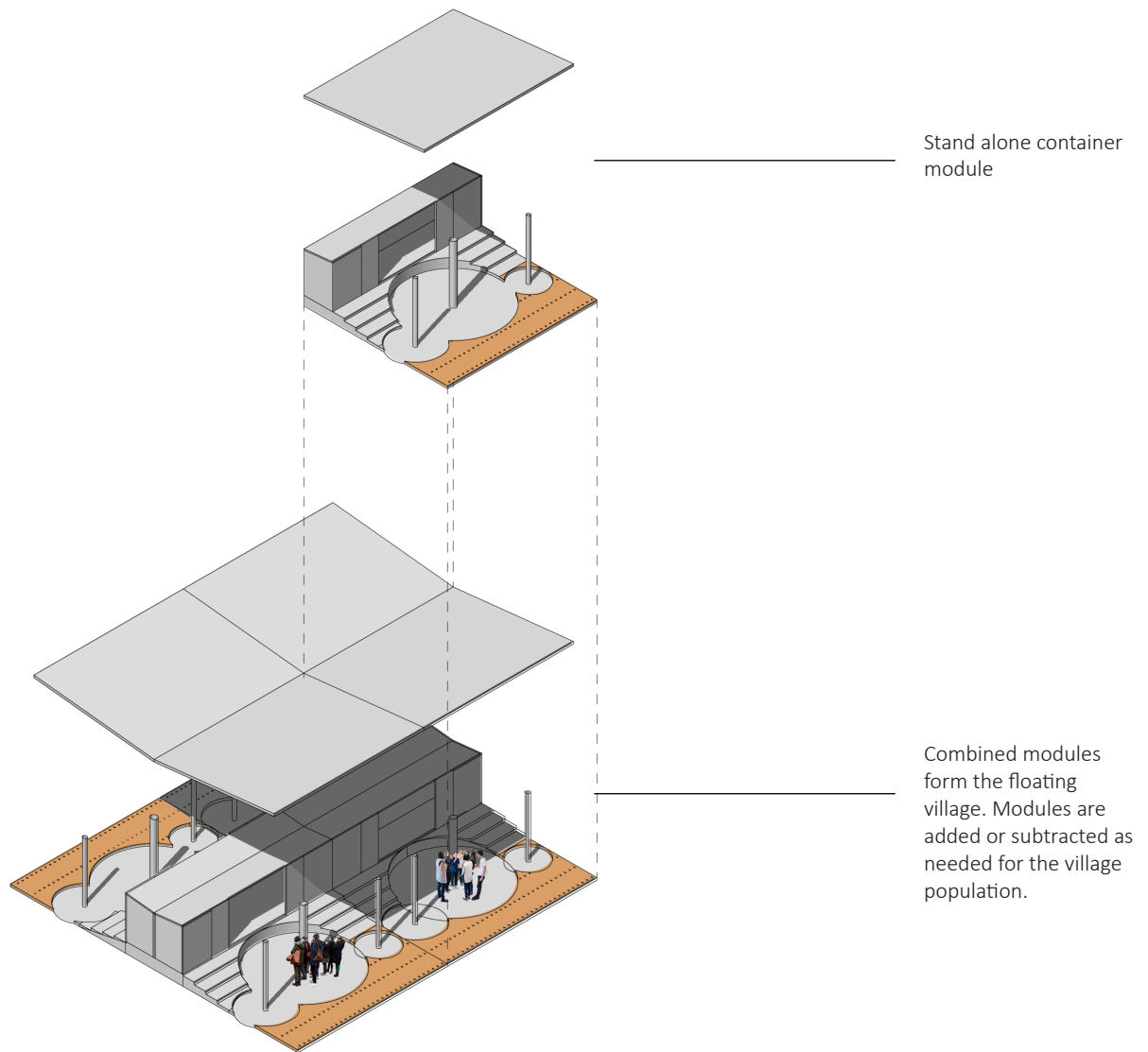


Figure 5.17. Shelter as a component

The container system offered a portable solution however as a large sized module it lacked customisability and adaption to the multiple sites of the floating village. This design [Fig 5.18] changes the idea of a container to a flat packed platform where there are smaller components which build up into multiple levels and surfaces. The circular steps and floors are used as circulation and centralising events or meetings. The mix of circulation and meeting zones would increase the changes of interaction by bridging and bonding.

The orange, yellow and red all represent a varying material surfaces which can be utilised for certain programs or attract certain demographics. The attraction of certain people to these zones aims to increase bonding.

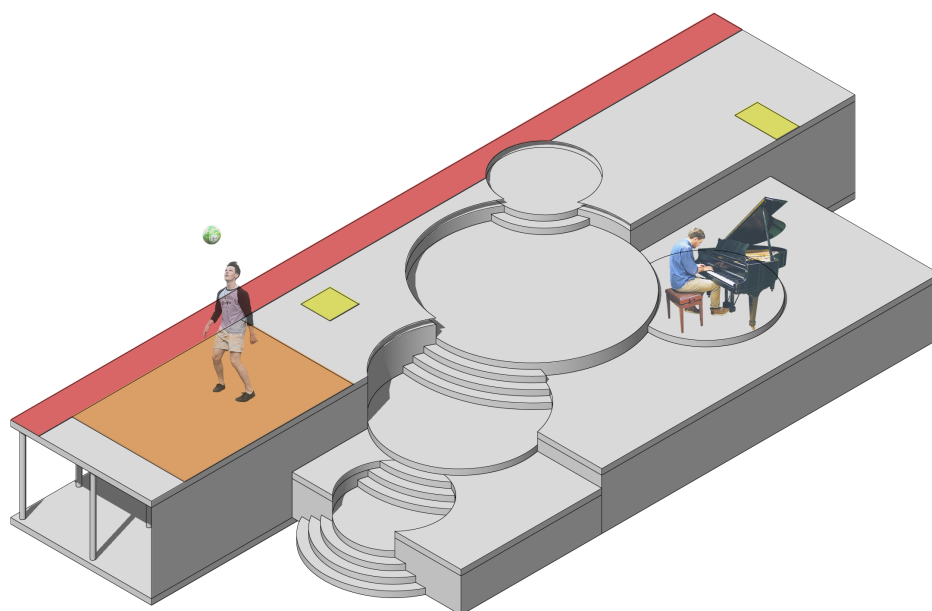


Figure 5.18. Temporary surface

[Fig 5.19]

This design reintroduces containers, however they are smaller containers for flexibility of placement around the floating village. The flat packed platforms further explore possibilities of overlapping and composing the surface. A flat packed shelter is also introduced to provide more diversity to the architectural conditions. The layering of these platforms alongside the combination of overlapping shelter and container programs/partitions can facilitate the informal collisions of demographics creating bridging networks while each plot of program can create bonding areas.

The circular surface modules are removed because of the geometry's difficulty as a seamless and continuous joining module.



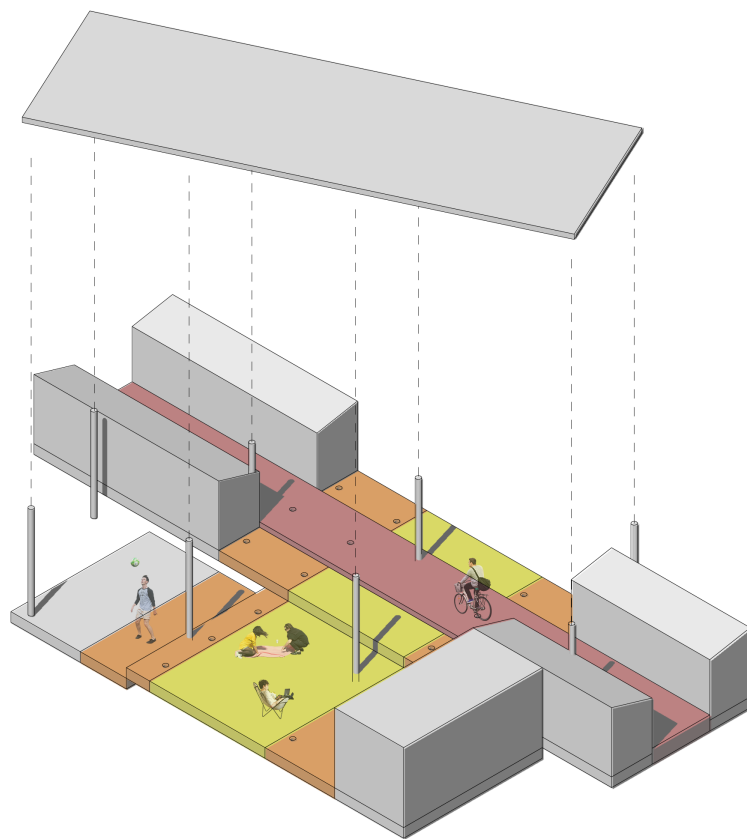
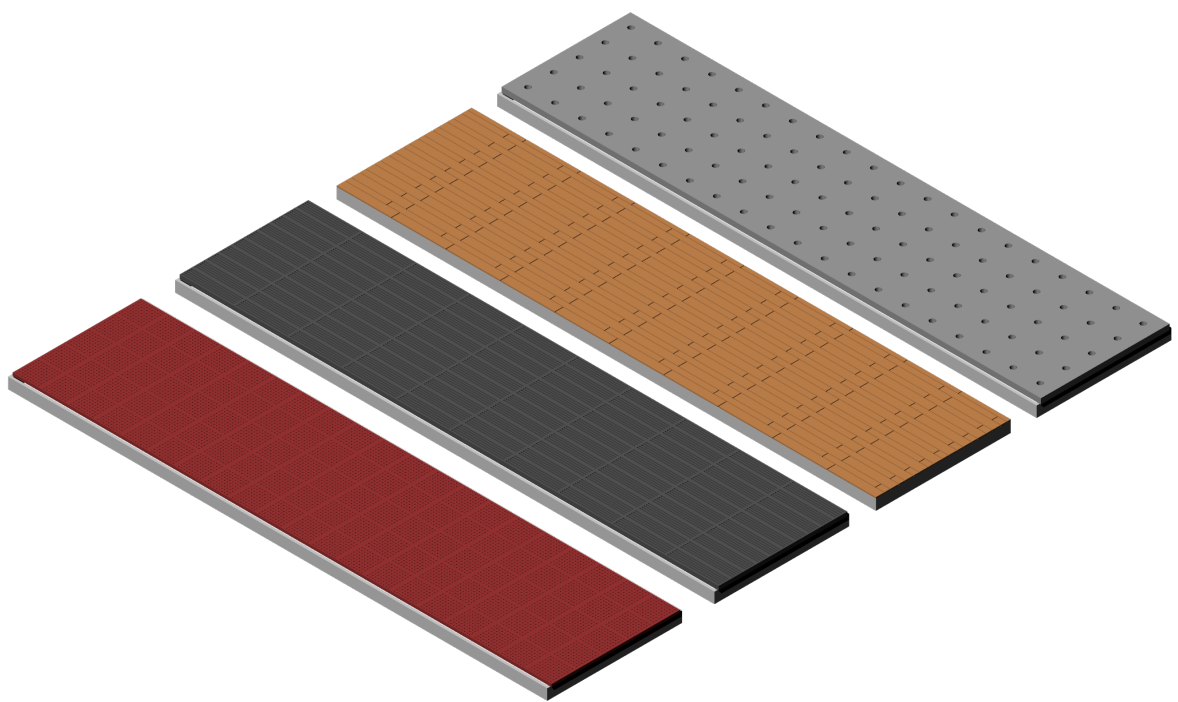


Figure 5.19. Temporary surface



*Figure 5.20. Four initial platforms: rubber (red), steel grate (dark grey), timber planks, and steel*

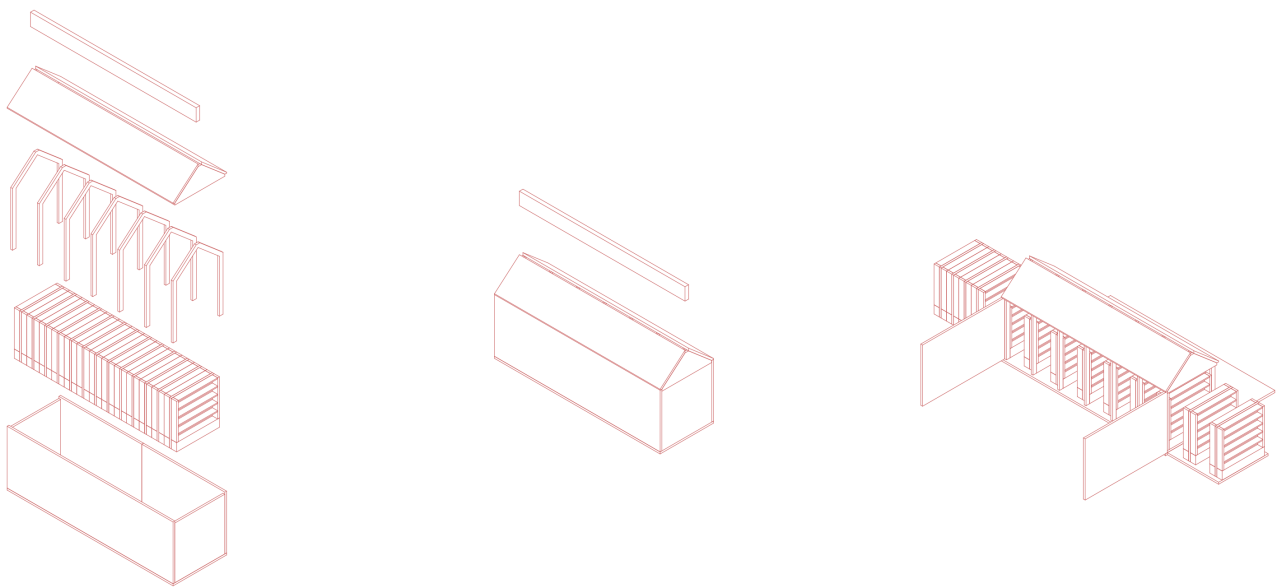
## Platform and Shelter

After the design of the platforms and shelters, more development went into the dimensions and compositions of platforms which could be added to the design. These initial platforms take their ratio of dimensions from the blue roofed living dorms on the site of the floating village. Each platform acts as a tile which allows for flexibility of surface composition on site. The aim of this platform type was to create an adaptable surface type which maintained relations with its surrounding site dimensions. These surfaces appeal to certain demographics and programs which can increase the bonding on specific areas, while the continuous plane of these surfaces allow a bridging to occur.

Further development of the smaller containers [Fig 5.21] explored the programs within them. This iteration demonstrates a container which hosts the library which is composed of stacked bookshelves which expand and open up with the container. As the container opens up to reveal its program it controls the viewing shafts of the shelter, providing a sense of privacy and increasing bonding areas.

The use of these containers as supports for the flat packed shelter was also introduced. this would decrease the amount of structure needed and therefore reducing visual interruption which would increase chances of interactions visually.

These platform modules and small containers were then tested on two villages in Chongqing.



*Figure 5.21. New container typology which acts as a support for the roofing as well as an open library*

## Site One

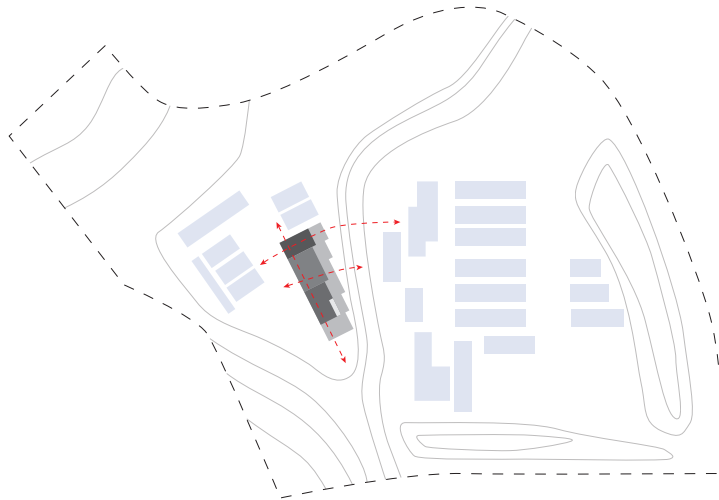


Figure 5.22. Site plan

Site one's village was split into two by the topography. The design intervention is placed between the separation of the village in order to create an area of unification. The platforms are arranged to form along the slope of the topography. The material arrangement of the surfaces provides areas for circulation, seating and a marketplace. The smaller containers are arranged around the perimeter of the shelter for support while opening and closing the surrounding shelter by partitions.

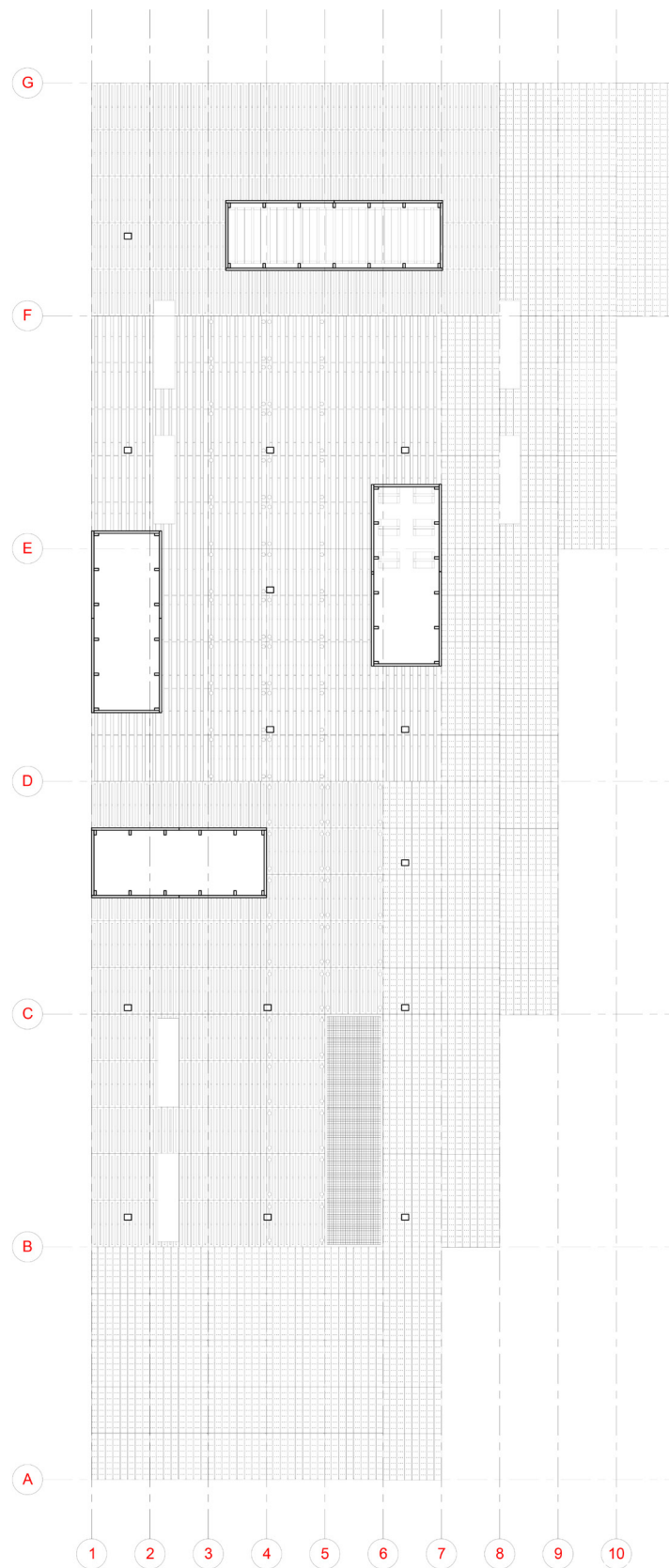


Figure 5.23. Floorplan

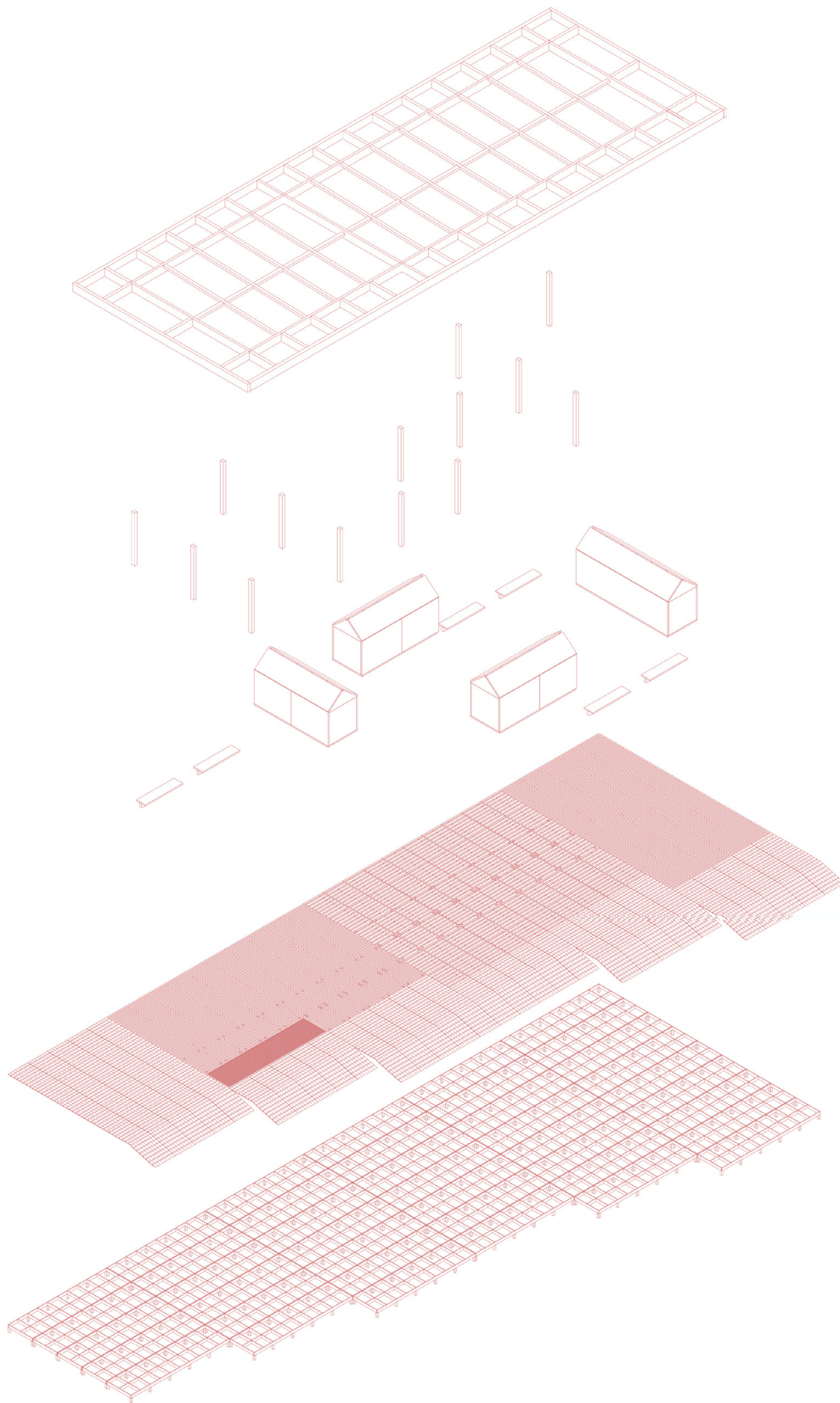


Figure 5.24. Exploded axonometric of a platform alongside containers and shelter



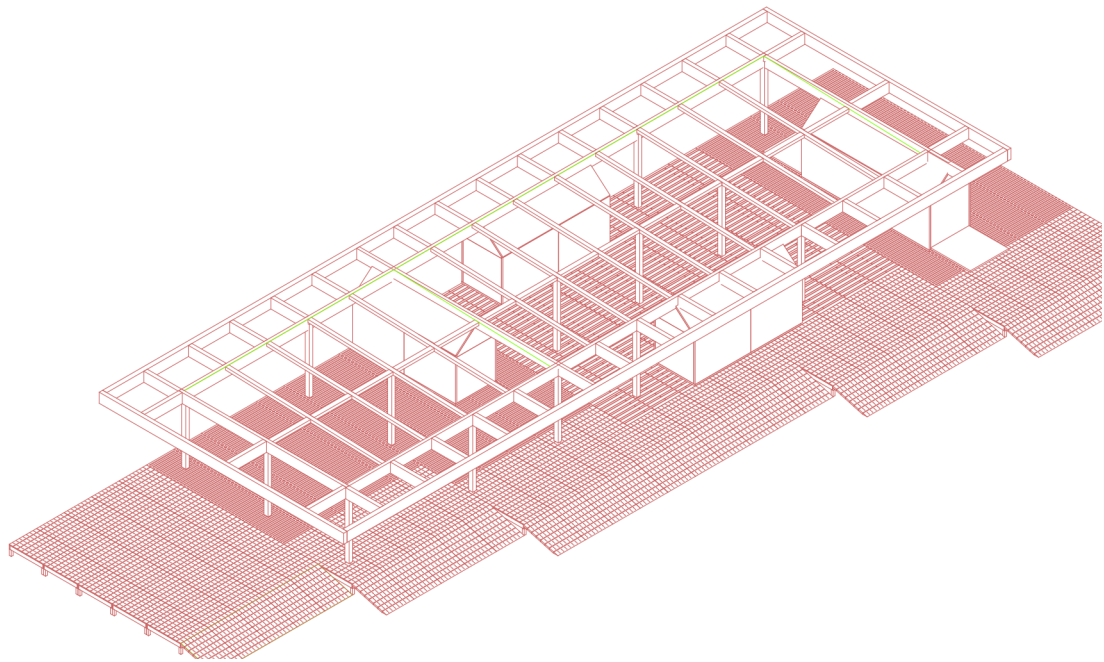


Figure 5.25.      *An axonometric of a proposed structure*

## Site Two

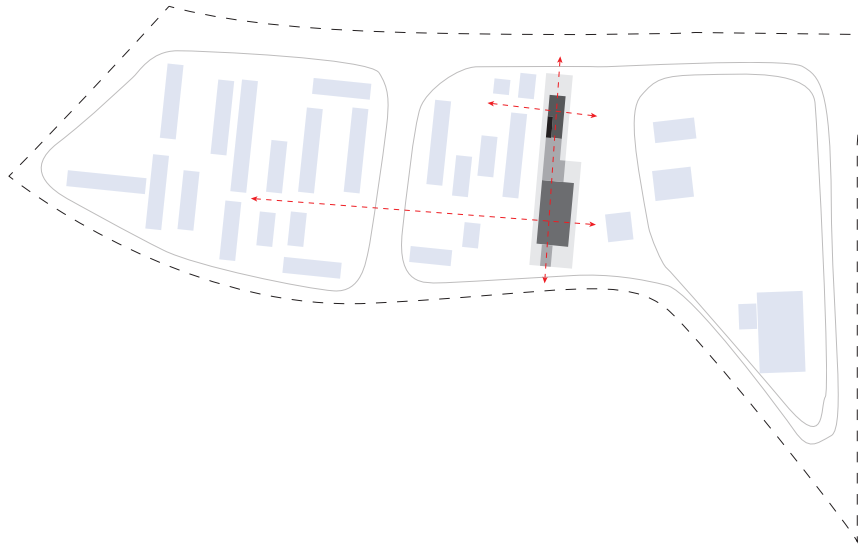


Figure 5.26. Site two

Site two consists of blue roof dorms which run vertically in a nonlinear pattern. The intervention is a long and linear surface composition which blends with the surrounding urban morphology. The timber surface is used along the transport axis intercept of the village to make a welcoming entrance. The containers are offset from the main pedestrian axis in order to make a pocket of privacy which can be increased or decreased by opening or closing the container partitions.

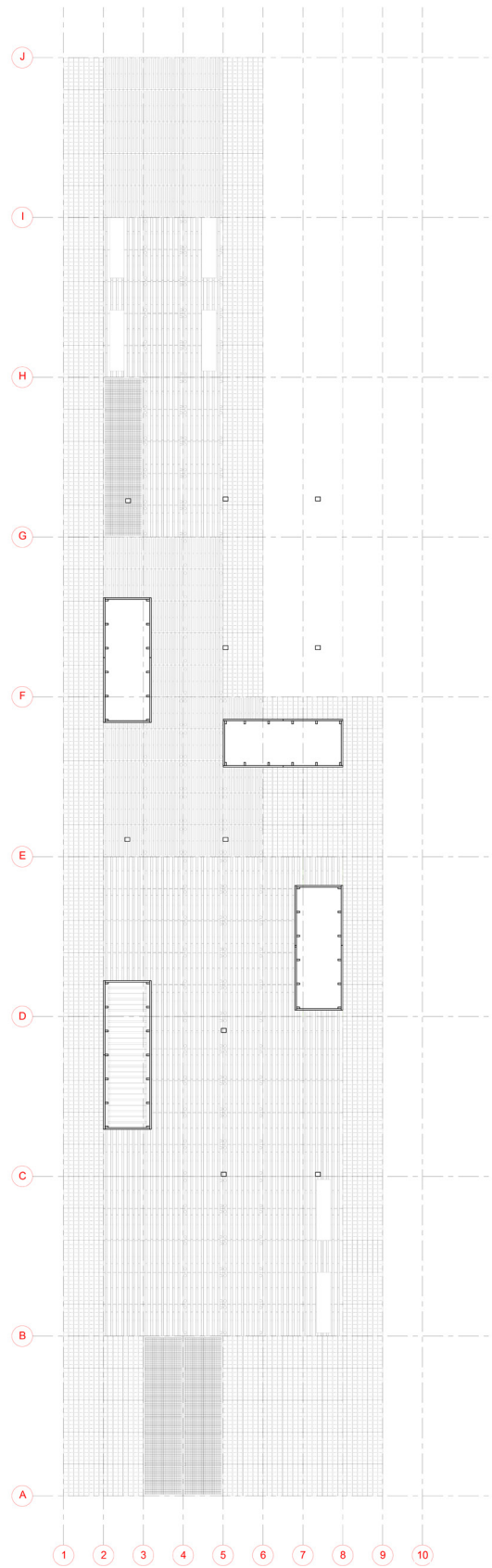


Figure 5.27. Floorplan

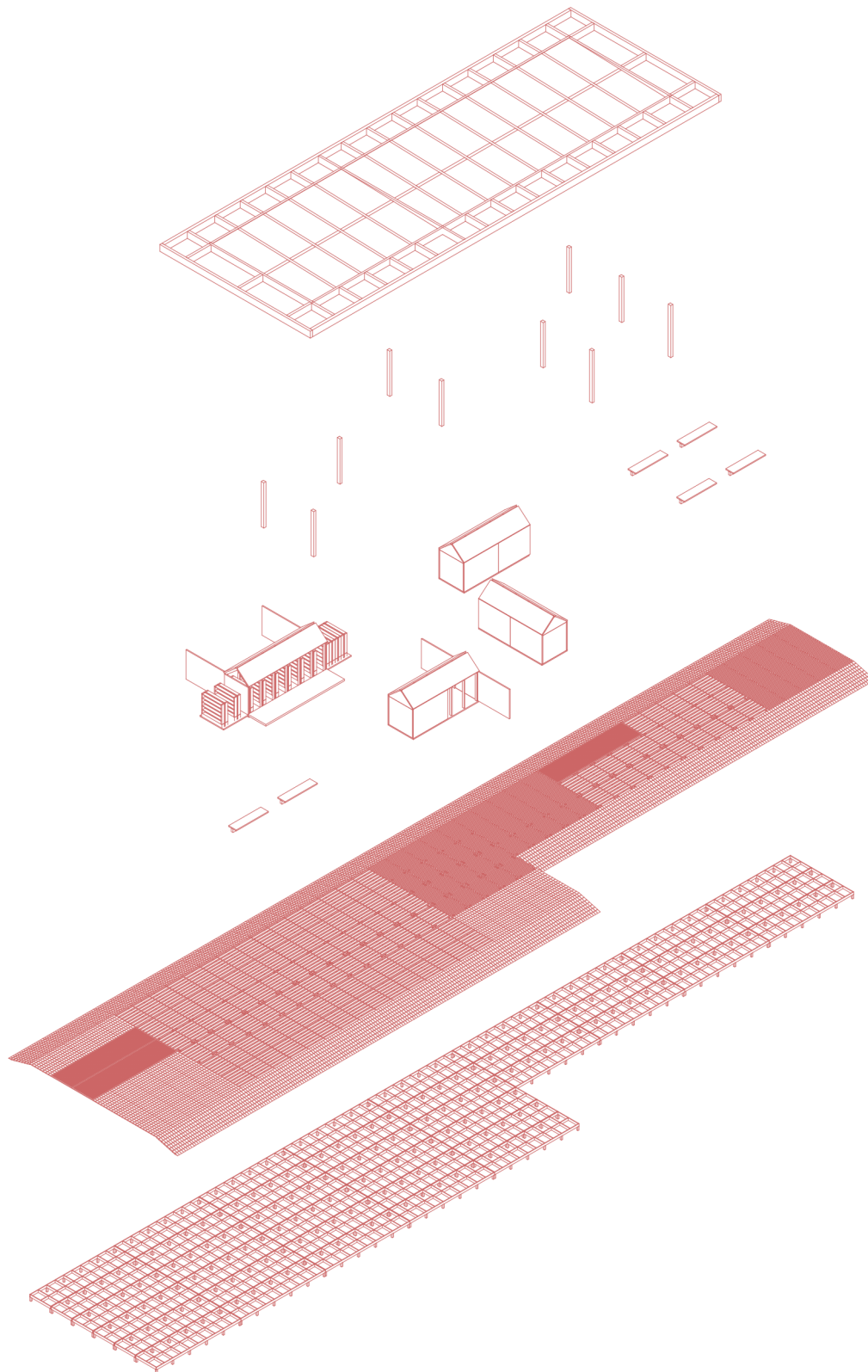
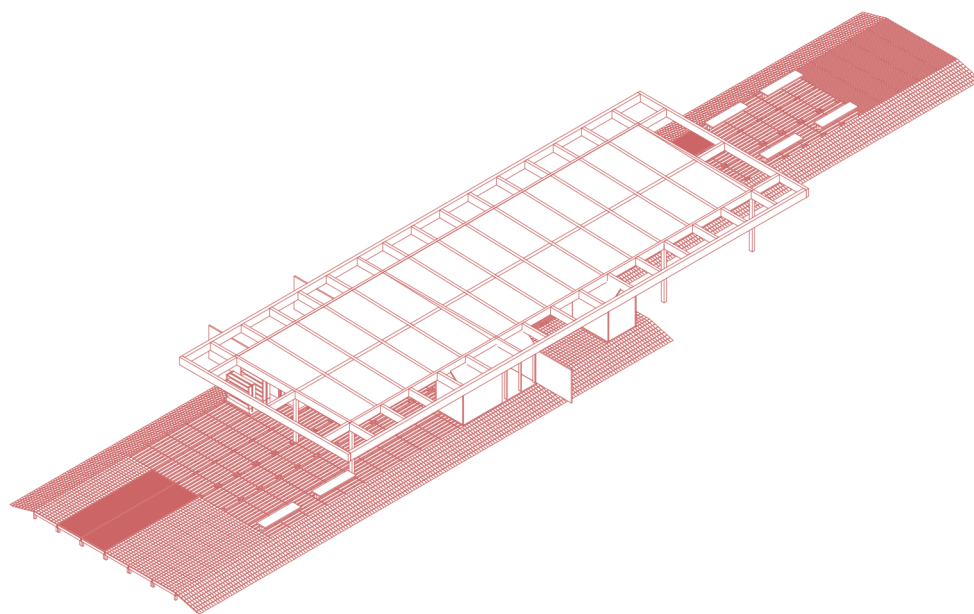


Figure 5.28. Exploded axonometric of the second site adaption



*Figure 5.29. Isometric of the second site adaption*

## Physical Modeling and Reconstructing

These paper sketch models explored the use of the surface and shelter. The shift to physical modelling allowed a different design perspective. The use of paper modelling allowed quick edits through cutting and folding.

The initial paper sketch model [Fig 5.30] was a remake of the site one digital model. The model was then reviewed, cut, folded and reformed into a new model [Fig 5.31]. This model introduced varying surface heights and specific openings in the shelter for lighting. The change from a single plane surface to a continuous surface with varying heights allowed more isolation of certain planes. This would increase the possibilities of bonding, while the continuous surface would still enable bridging. The previous model with only one plane lacked bonding as the partitions of the containers were the only isolating matters. This also allowed the removal of the containers in the remake model.

Lighting in the shelter also became placed in more specific places, highlighting areas which need more lighting and providing a larger range of conditions for more programs. The increased lighting could help facilitate open markets or performances.

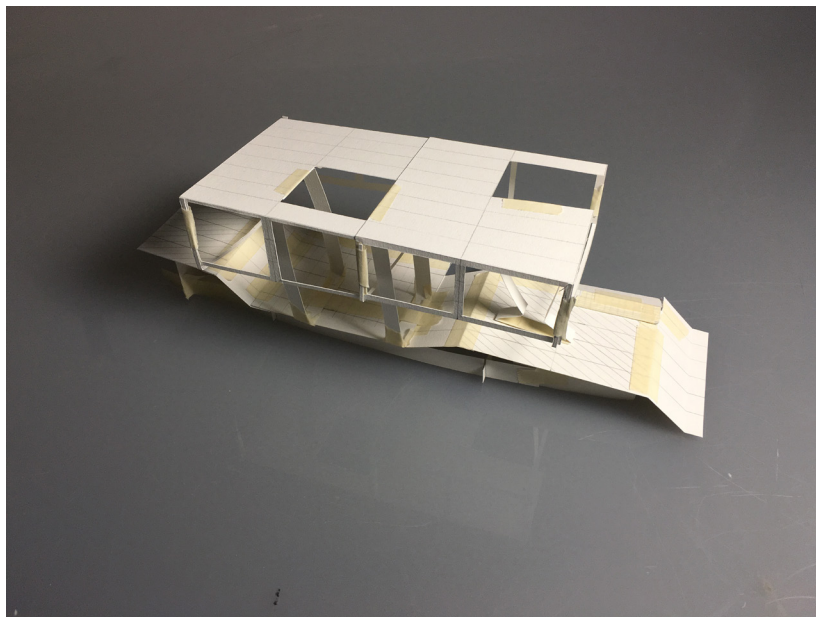
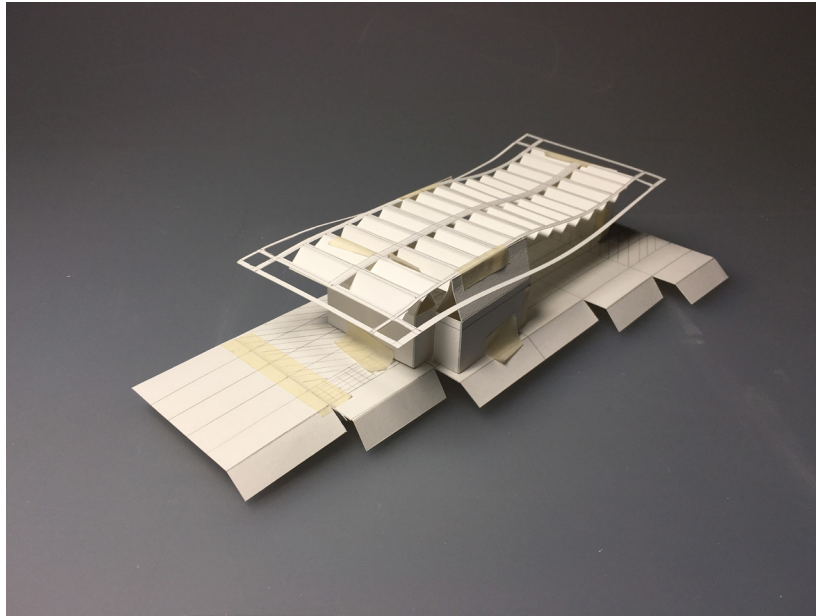


Figure 5.30.  
model

(Top) Remake of site one iteration into a paper

Figure 5.31.

(Bottom) Rectonstruction of the site one model

The next iteration [Fig 5.32] focused on the components of lighting in the shelter of the design. The design introduces lighting tunnels and depth to the shelter for storage of urban furniture. The intensity of the light could be changed to the users need, providing more diversity in programs and adaptability. The control of lighting in a public space increases the participation of constructing the built environment as the shelter's lighting becomes a performative piece of architecture.

The shelters extra depth also allowed storage for furniture or services. This would increase the density of programs along the surface as required amenities could be placed and stored quickly changing the use of the space. This increase in program possibilities would increase the demographic use of the space and facilitate more bridging.

The varying surface height planes were made to be slightly less exaggerated, while still providing a clear difference in plane heights. This would increase accessibility of these planes and reduce the amount of structure required to construct these platforms.



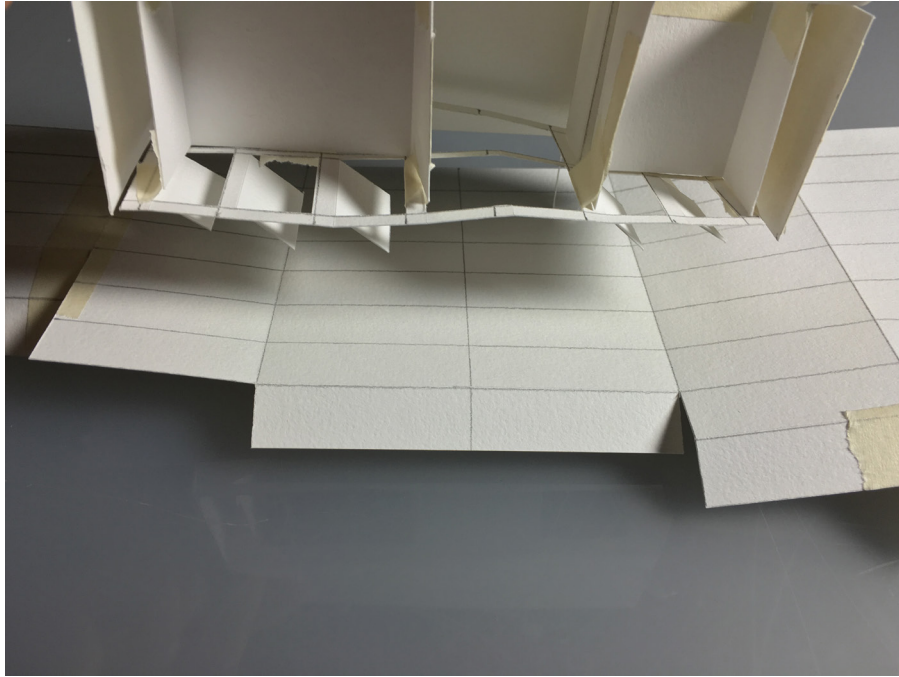


Figure 5.32. (Top) Section of the shelter lighting

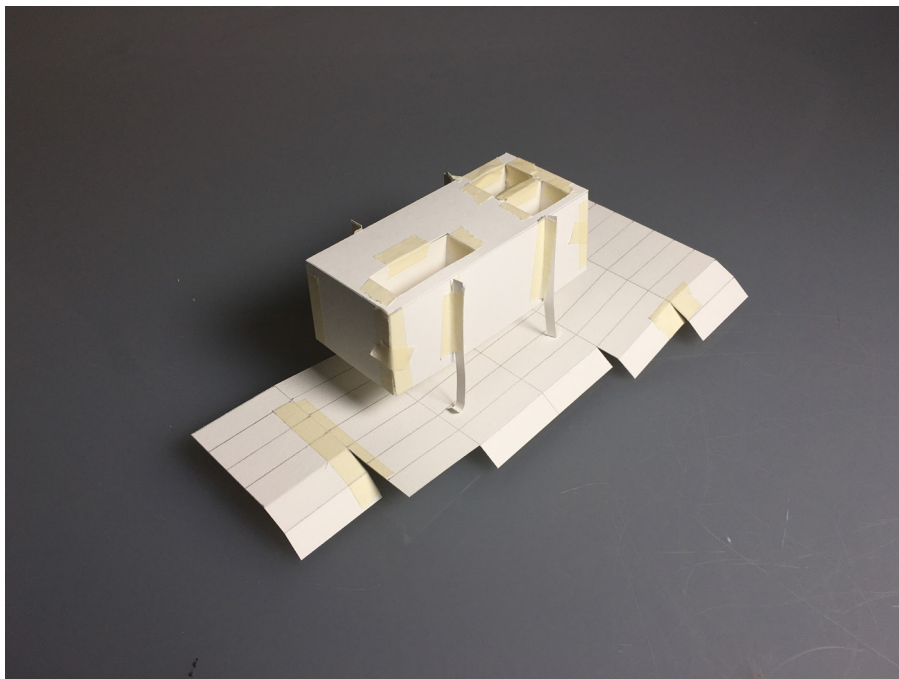


Figure 5.33. (Bottom) New shelter iteration

This model [Fig 5.34] altered the dimensions of the surface modules and the form of the shelter and its performative details.

The surface modules were changed from 1.5m x 5m to 1.5m x 4m. This would increase the flexibility and adaption of the modules for fitting around the sites.

The shelter introduces a module frame which has the same dimensions as the surface modules. This increases control of the space by synchronisation of the aligning surface and shelter conditions. lighting could open up and highlight surfaces such as the timber flooring for a performance, or close and shade a mesh surface for napping and relaxing under shade. The alignment of surface and shelter modules further define areas of program and bonding zones. Lighting modules in this design were placed along the lowest surface platform to provide a welcoming entrance to the structure.

The perimeter coverings of the shelter became more performative by allowing them to move, increasing the surrounding shading or attaching to the surrounding blue dorms.

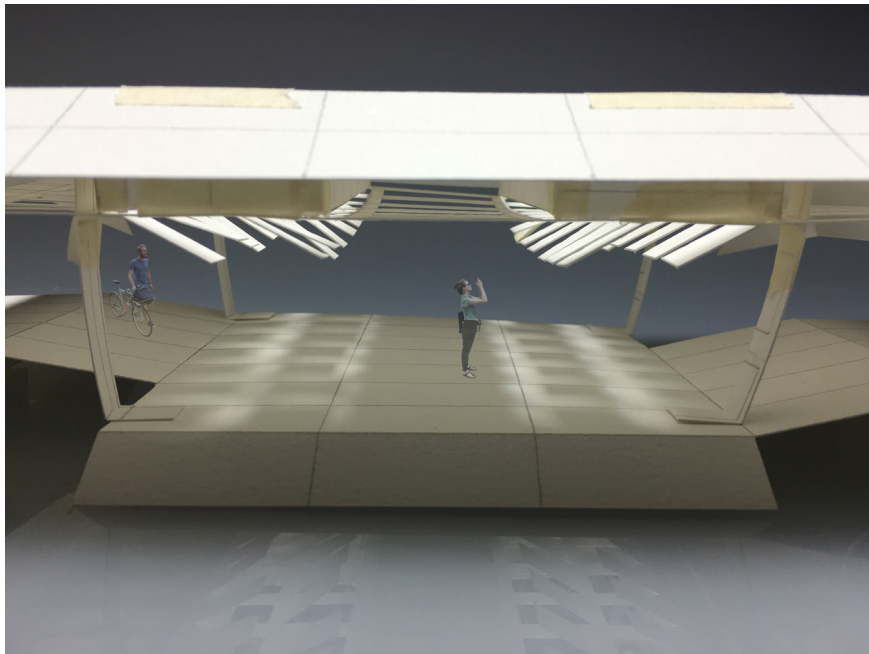
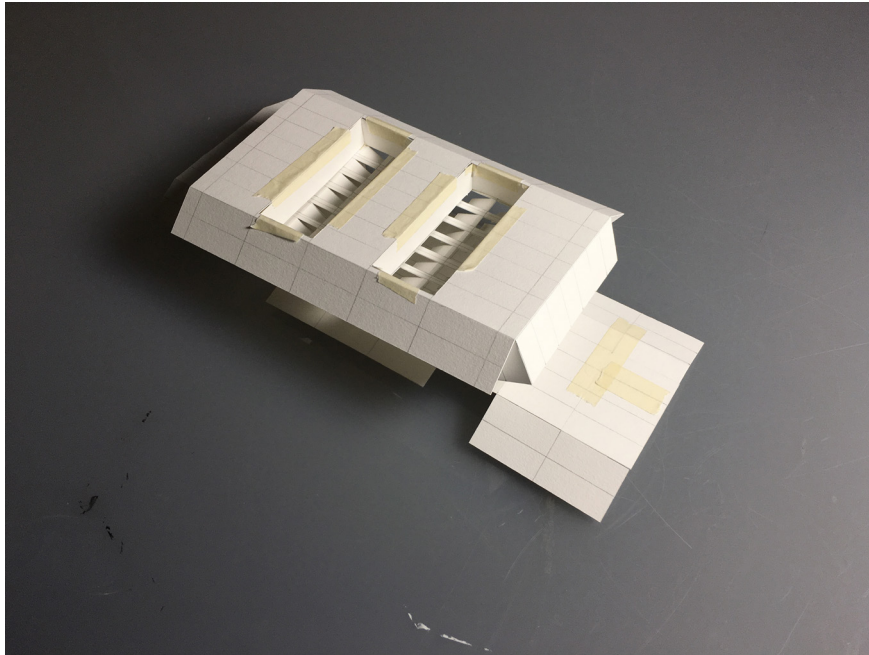


Figure 5.34. (Top) Shelter module with expanding perimeter

Figure 5.35. (Bottom) Shelter perspective view, highlighting the natural lighting system

## Computer Models

The last physical paper model was reproduced as a digital model and reintroduced into the site to explore more details of the construction in the design. These models, in particular explored the roofing types and the framing structure of the shelter.

The first shelter iteration featured a curved roof which was held by steel rods in tension. This was inspired by the construction of the BMW Guggenheim Lab roofing. However, the next iteration utilises a more common single sided slanting roof, as this method could be more commonly constructed with straight plane components.

Figure 5.36.  
module

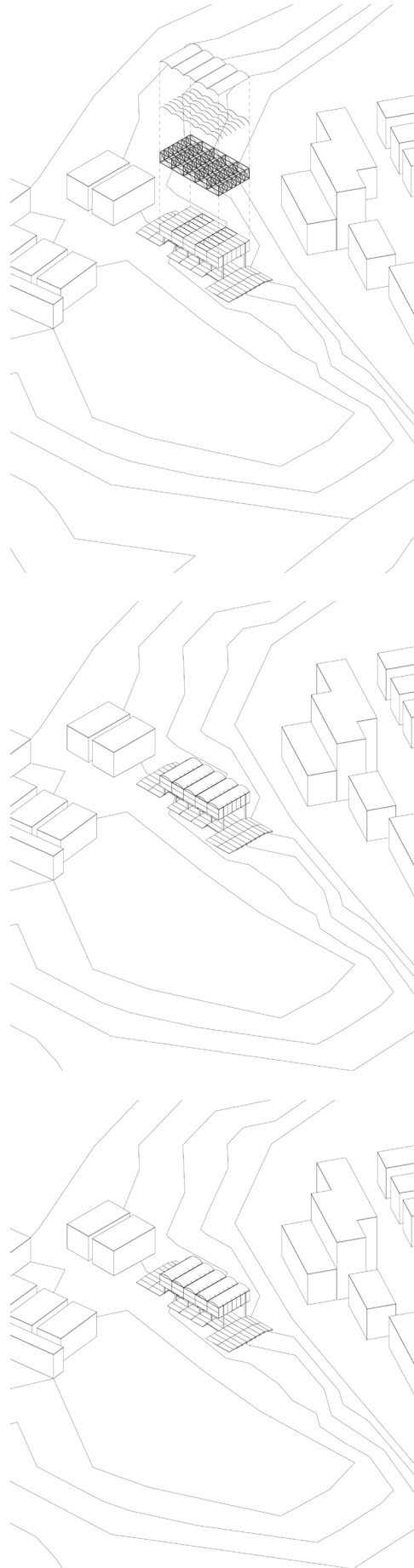
(Top) Exploded curved roofing

Figure 5.37.  
roof

(Middle) Isometric of curved

Figure 5.38.

(Bottom) Single sided pitch roof



## Surface Module Structure

These computer models and sketches explored the details of the construction in the surface modules.

The initial module was a square 1.5m x 5m which change to a 4m length. The internal structure features perforations which allow for wrapping serves to the surface structure or the wiring for surfaces underground.

The next module created a slanted perimeter which would allow drainage from a permeable flooring. This slant would also allow the surface flexibility for creating slopes which connect from varying platform heights. The supports would fold out from the surface.

Module three used a column support system, with each column able to adjust its height independently. This would allow the module to adapt to a range of terrains, an aspect which the fold out supports could not achieve due to their fixed structure.

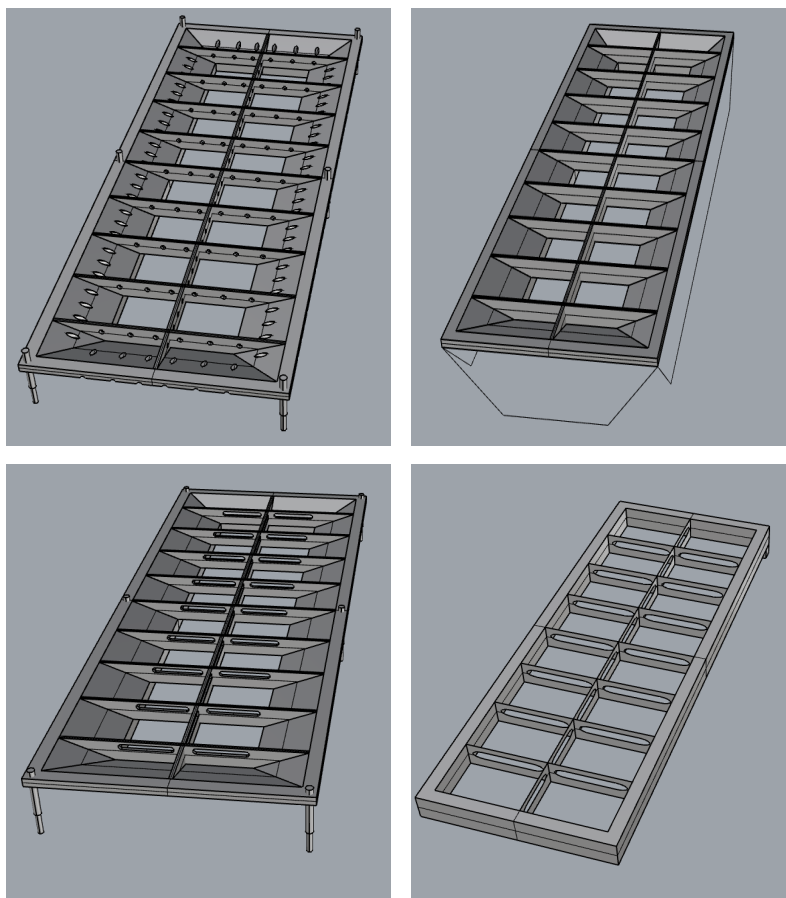


Figure 5.39. Surface module iterations

## Shelter Module Structure

Digital modelling was utilised to develop the details of the shelter module as a more accurate medium of design, while sketching was used to convey fast construction ideas.

The framing consists of individual components joined by brackets and tension bracing. The use of individual components allows the continuation of the structure, adding or subtracting modules when needed. The framing also includes a guttering system which connects to the columns and vertical supports of the framing while the gutter itself is bolted and stacked on top of the frame.



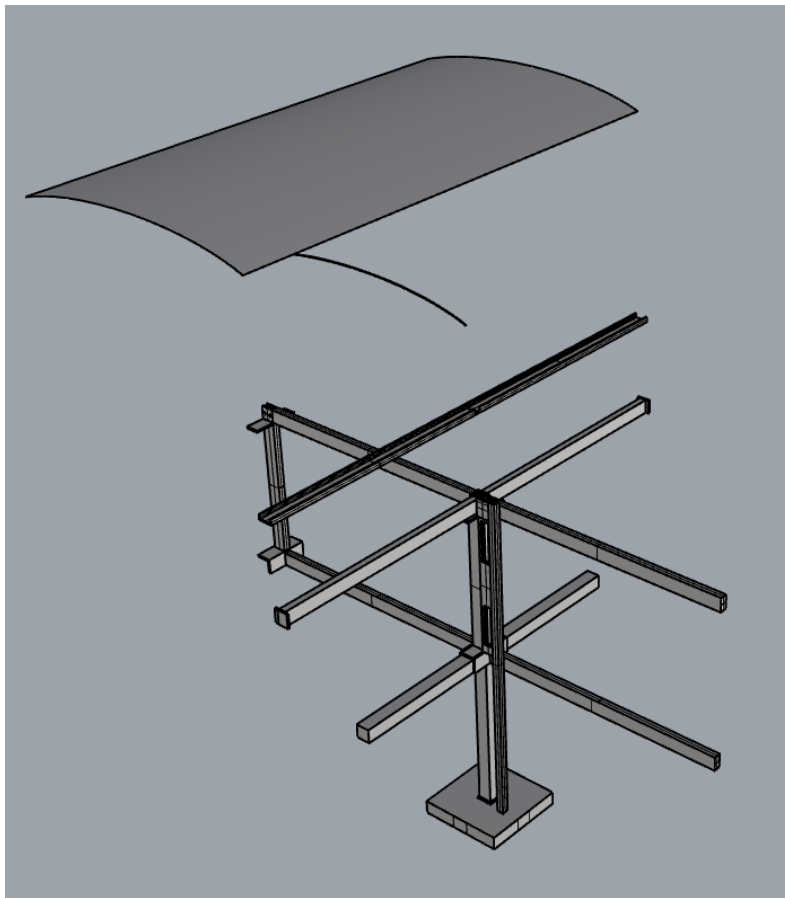


Figure 5.40. Initial shelter module digital model

The developed design describes the developed modules and their utilisation in three floating villages in the three major growing urban areas of China:

1. The Chongqing Region
2. The Wuhan Region
3. The Nanjing region

The testing of these major regions are fundamental to the designs effectiveness in a range of floating village morphologies and surrounding topographies while effectively fostering bridging and bonding.

# Developed Design

*Modules*

*Chongqing*

*Wuhan*

*Nanjing*



# Module System

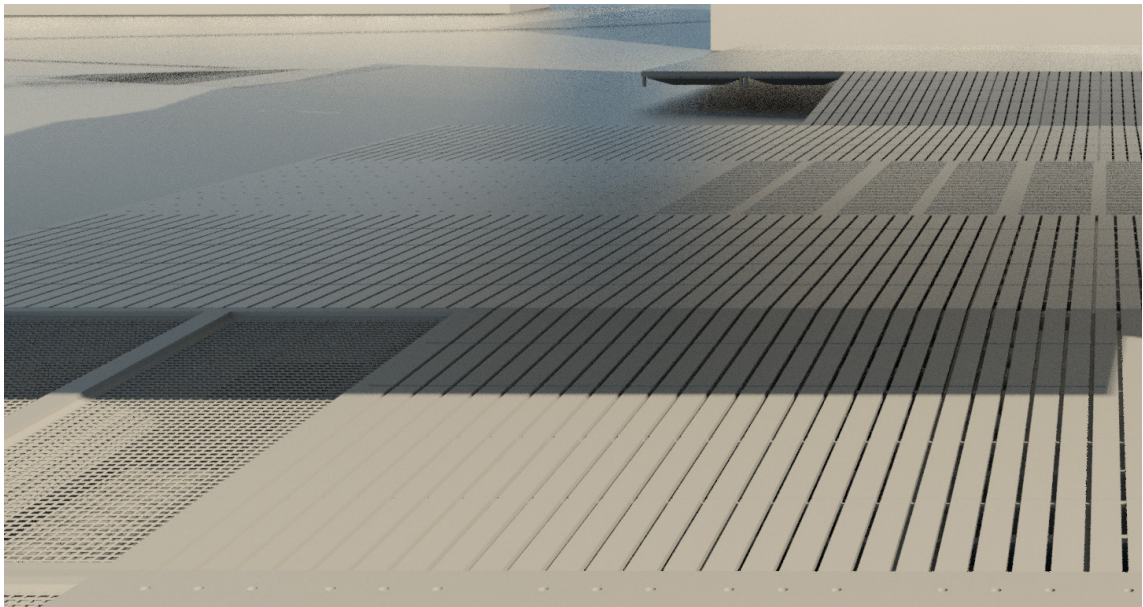


Figure 5.41. *Initial surface render*

## Surface Modules

The surface modules provide specific flooring for activities. When modules are joined together they comprise a certain area which can provide bonding. The use of modules allows customisation of the surface to suit a sites topography or urban morphology. The floating village surface can expand and shrink to suit the amount of occupants of the site.

Each surface module has a specific flooring material which is suitable for certain programs. These surfaces can serve for a multiple of programs creating overlaps in demographics which provide bridging.

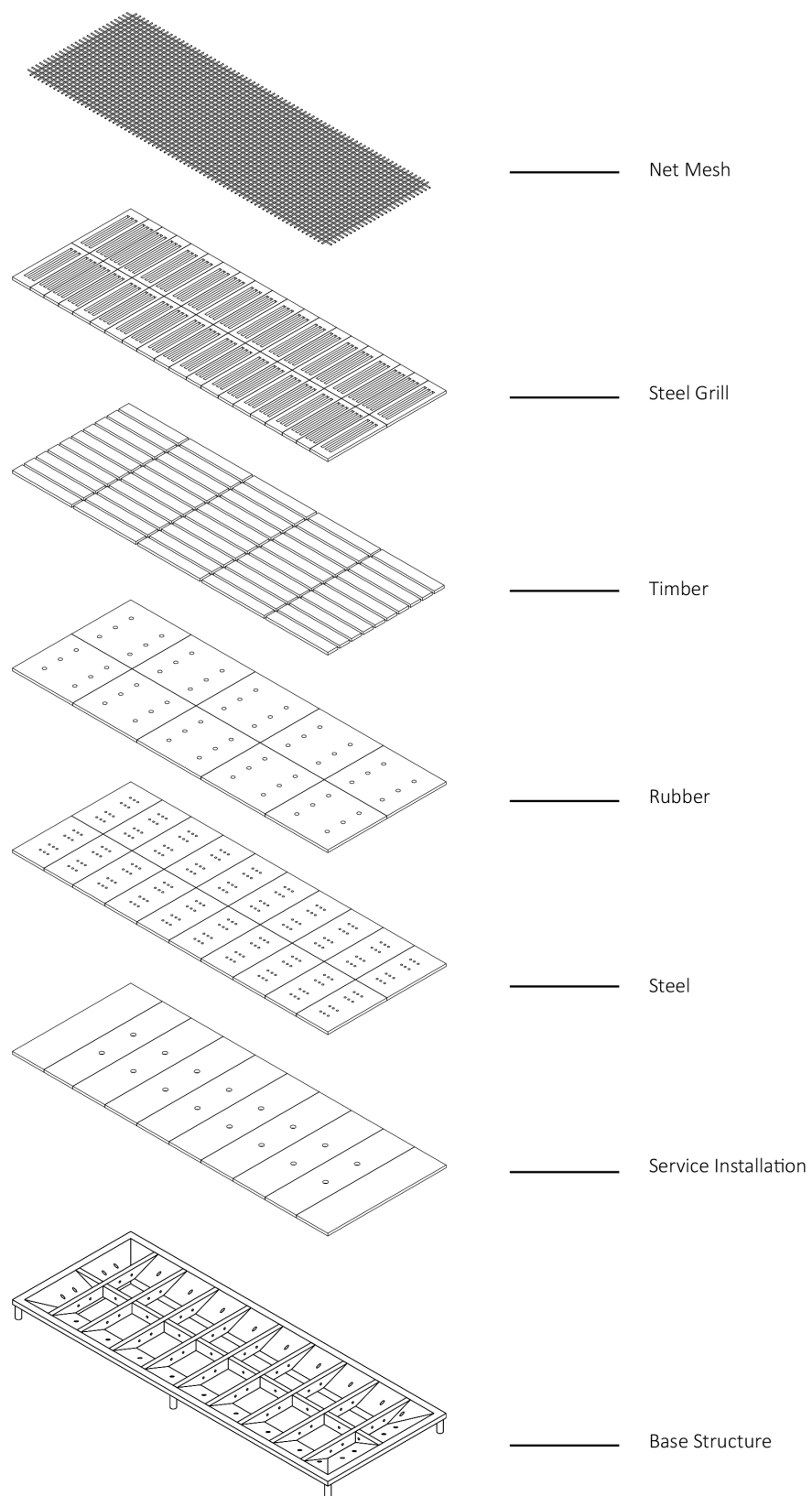
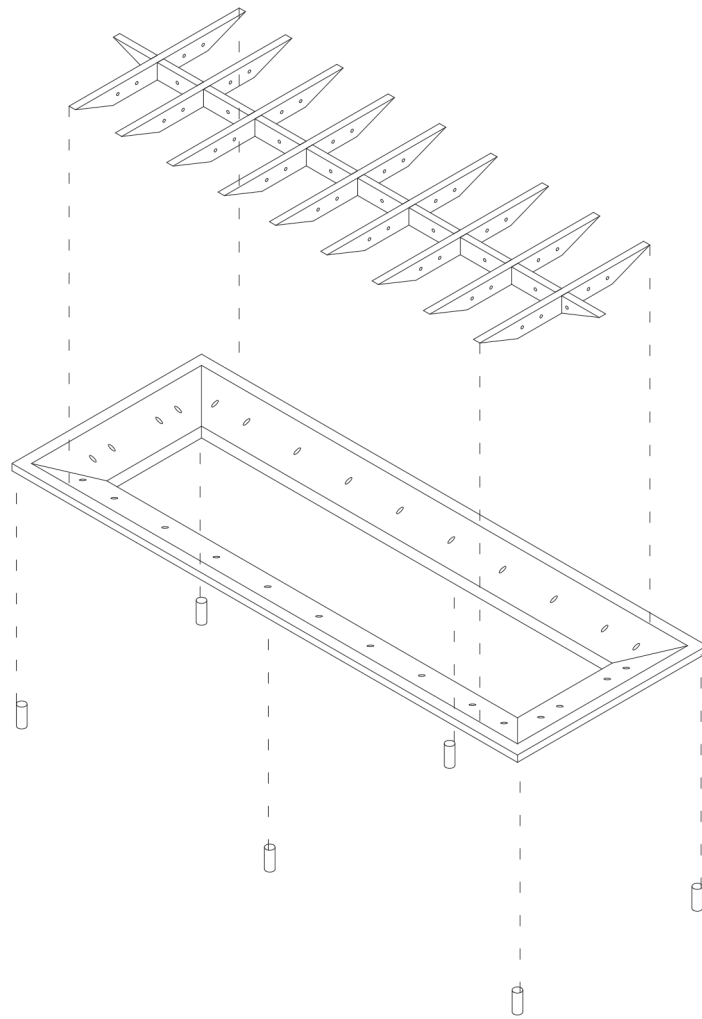


Figure 6.1. Surface material types





*Figure 6.2. Surface module structure and components*

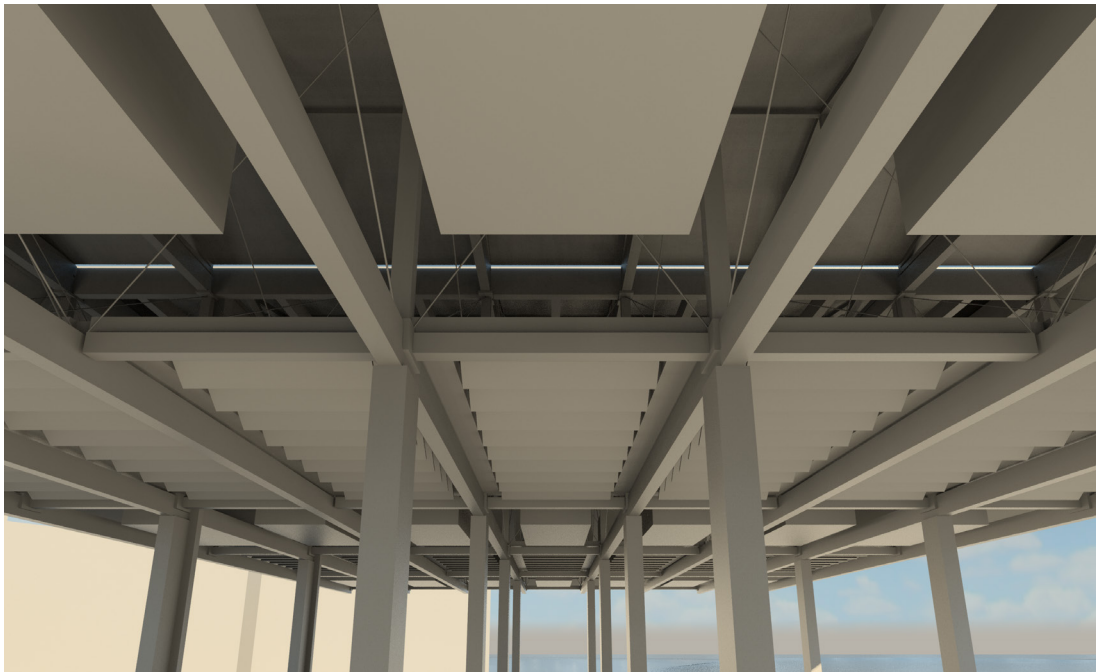


Figure 5.42. *Initial shelter render*

## Shelter Systems

The shelter system works alongside the surface system as a set of flat packed components which can be customised for the size and morphology of the construction sites. Each shelter system provides control over natural lighting and shading in informal spaces. The control over lighting conditions highlights certain areas for bonding while the sheltering of spaces in between the lighting provides a safe space for informal meetings.

The space within the shelter also allows for a storage system which increases the density of applicable programs along the surface. The more overlaps in programs leave higher demographics interactions when programs shift and change creating bridging bonds.

The perimeter of the building expands to attach with surrounding blue dorm structures to create a seamless shelter from the dorm to the public space.

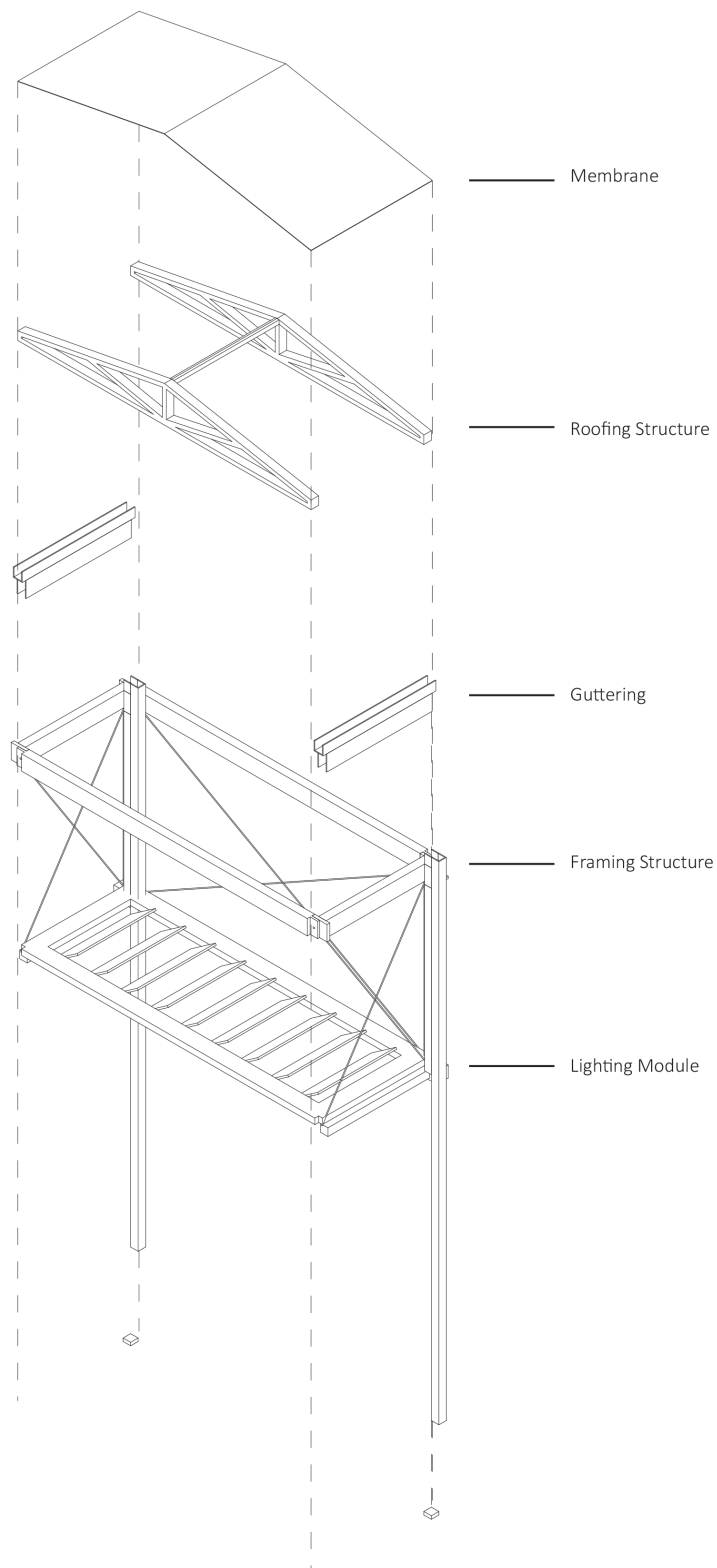


Figure 6.1. Lighting shelter module and construction

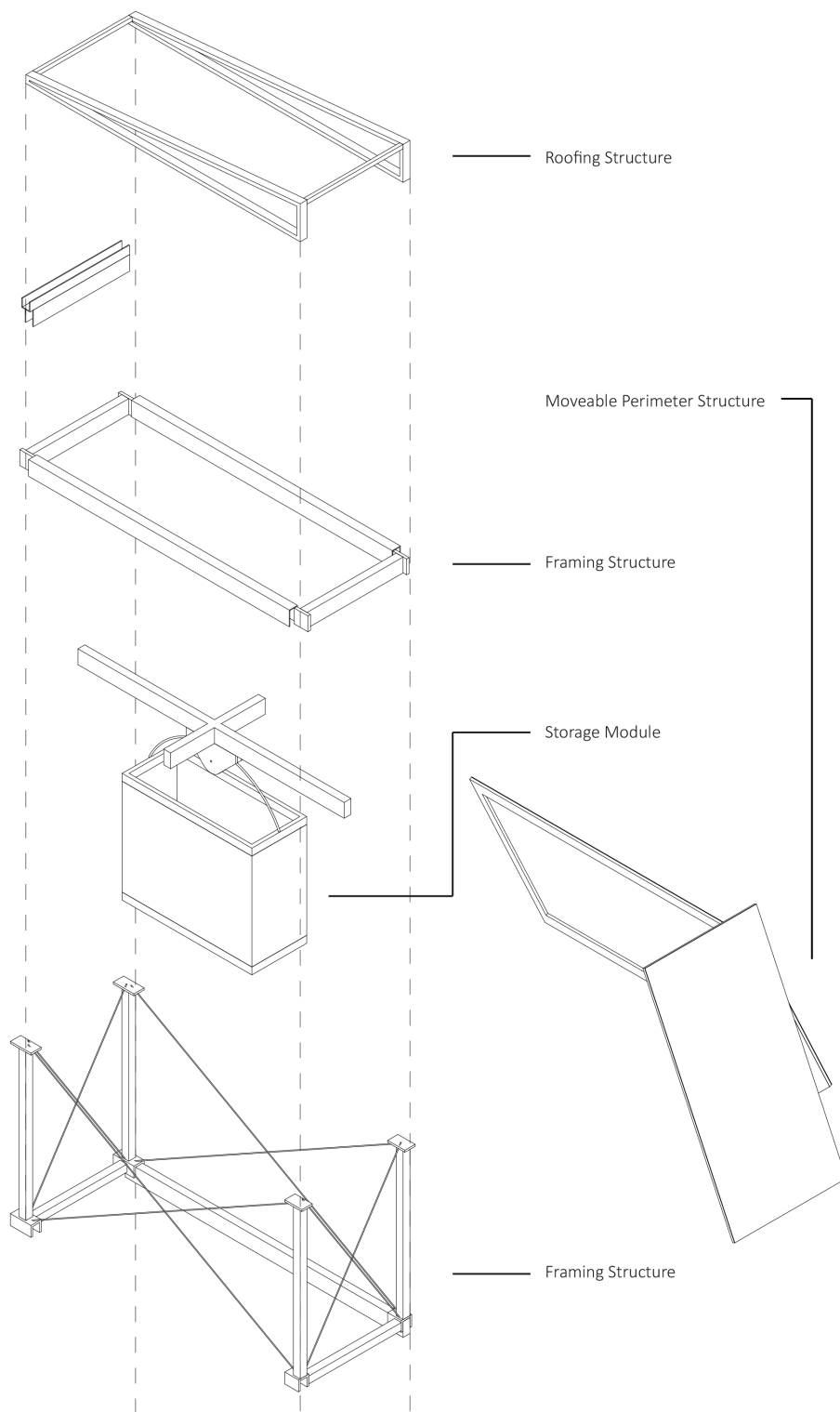


Figure 6.2. Storage shelter module and construction

# Chongqing

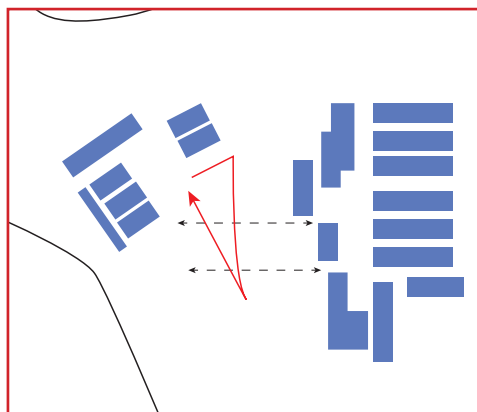


Figure 6.3. Lighting shelter module and construction

Source: <http://map.qq.com/>

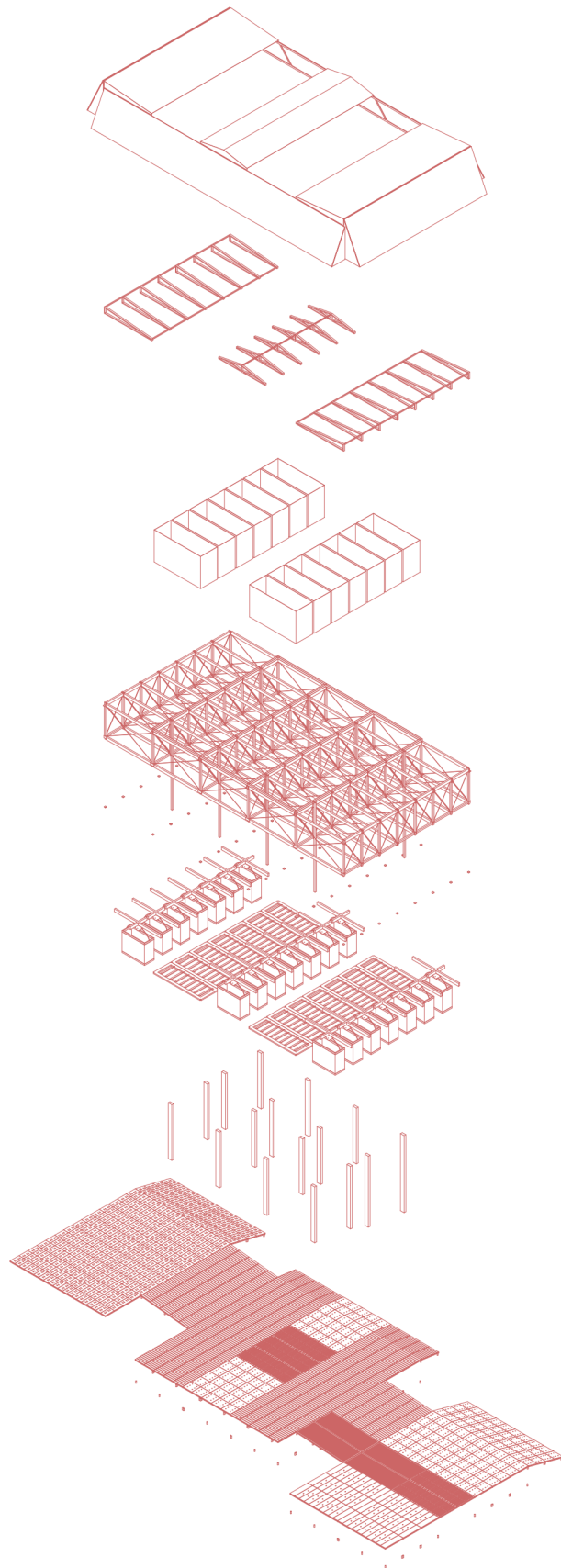


Figure 6.4. Exploded axonometric of Chongqing intervention



The Chongqing floating village site is composed of two separate settlements separated by topography. This separation is utilised as an opportunity for the floating village development to unify the settlements. The surface modules are used to overcome the topography and bridge the two villages. The surface arrangement results from the surrounding urban morphology and topography.

The design is composed of three main platforms which run along the sloping topography. These platforms demonstrate bridging and bonding through:

- The unification of the two settlements through a continuous surface (bridging)
- The isolation of surface types through various heights along the topography (bonding)
- The incorporation of storage of services above the service installation surface which allows a range of programs and demographic interaction (bridging)
- The use of natural lighting modules to highlight the timber surface (bonding)

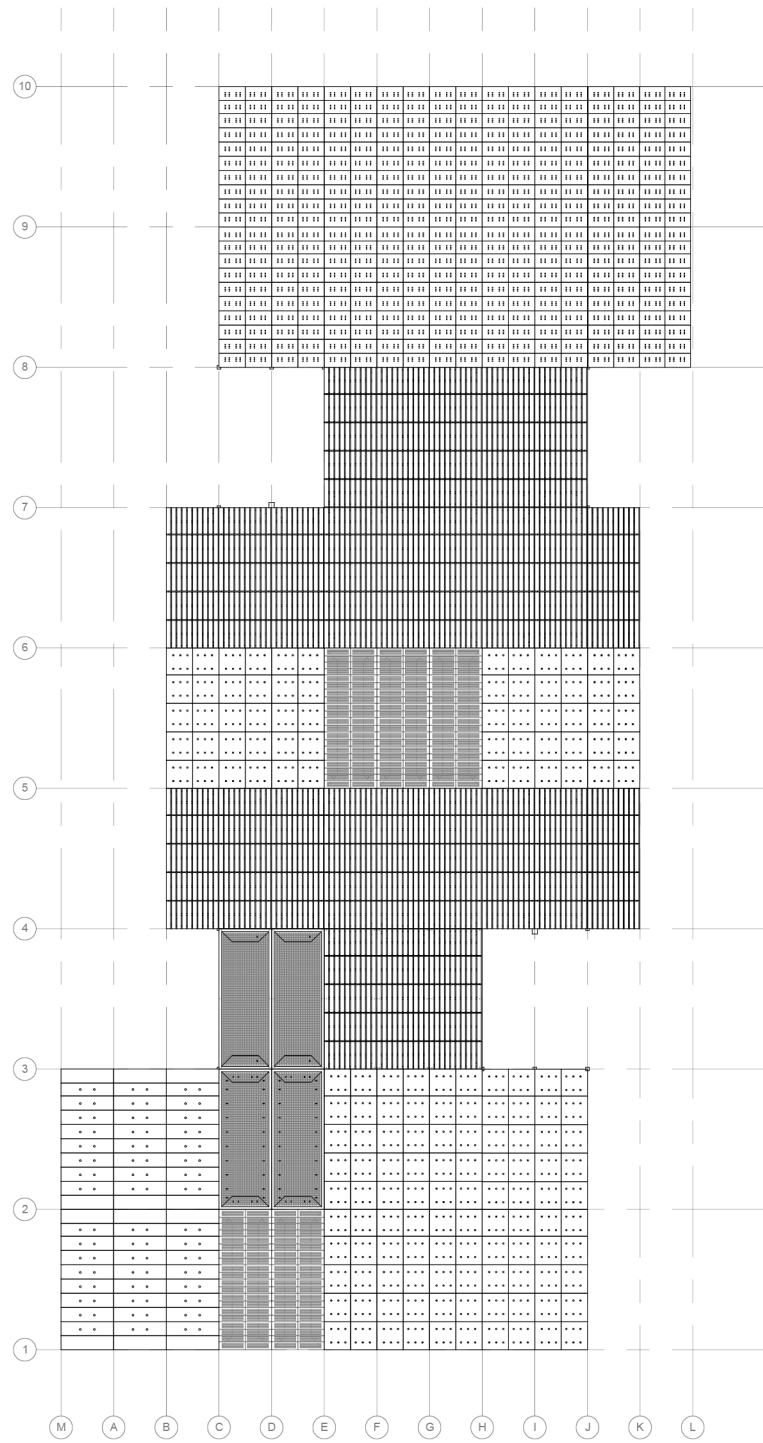
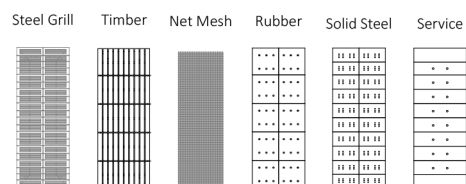


Figure 6.5. Floor plan of Chongqing intervention



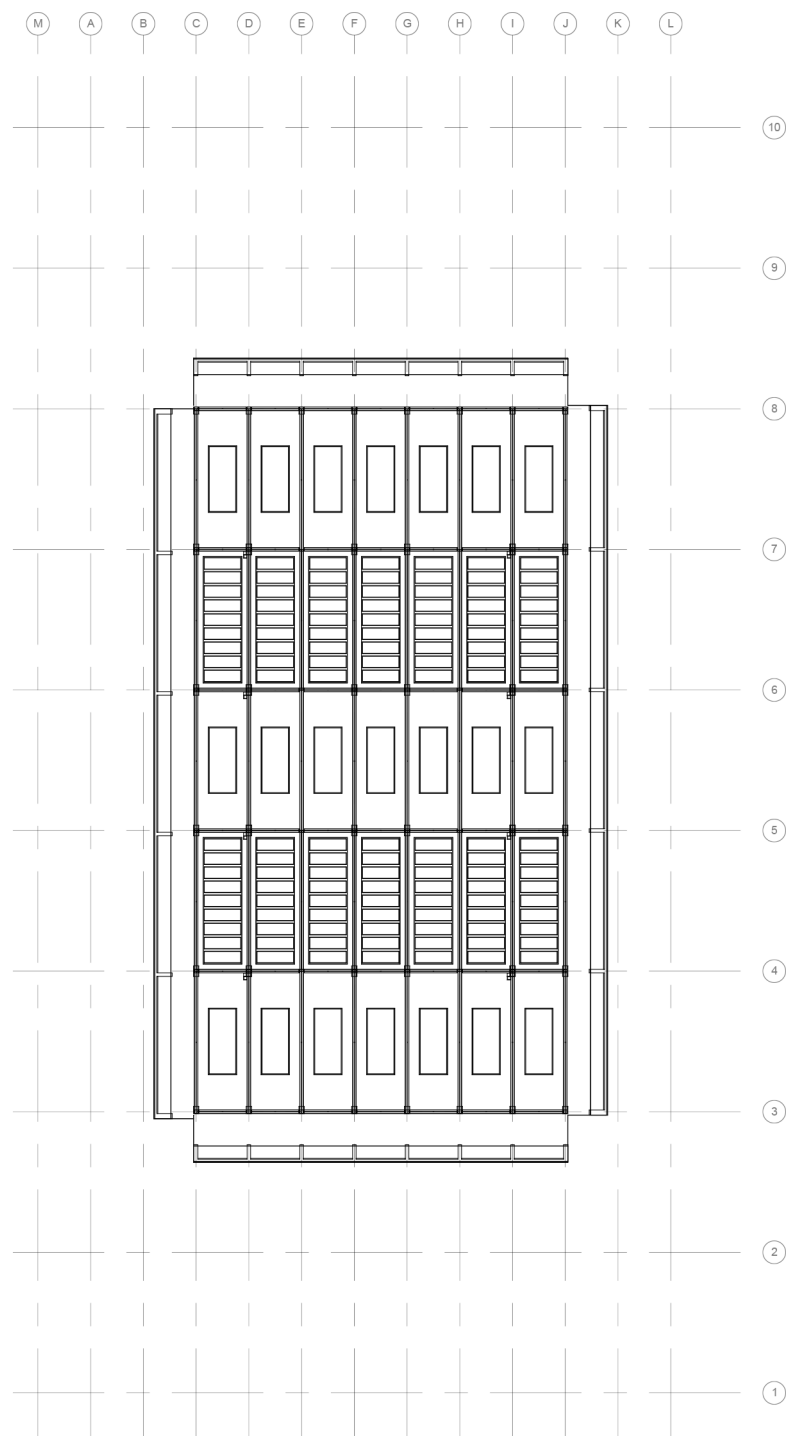
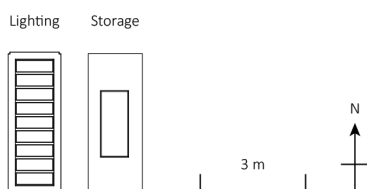


Figure 6.6. Roof plan of Chongqing intervention



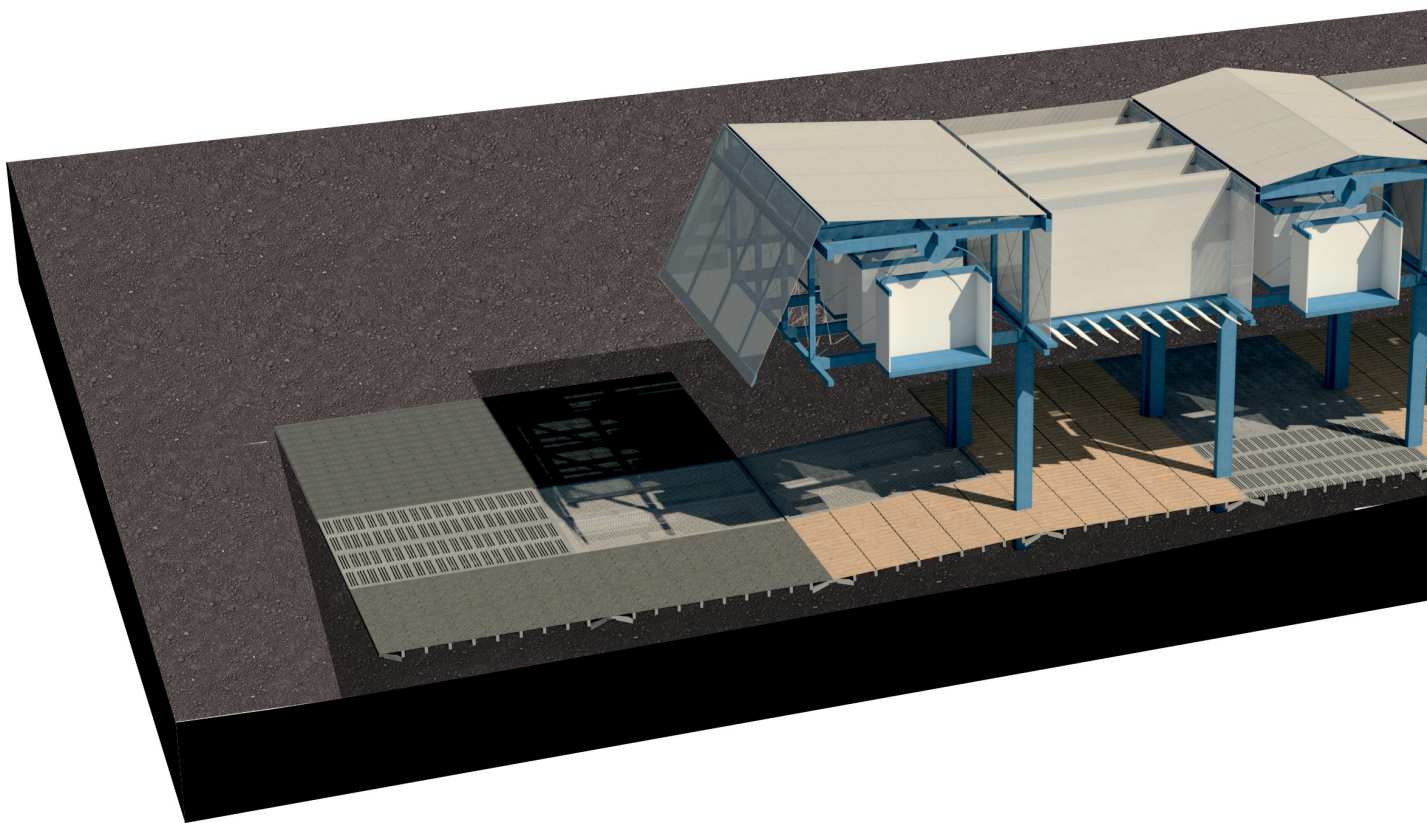
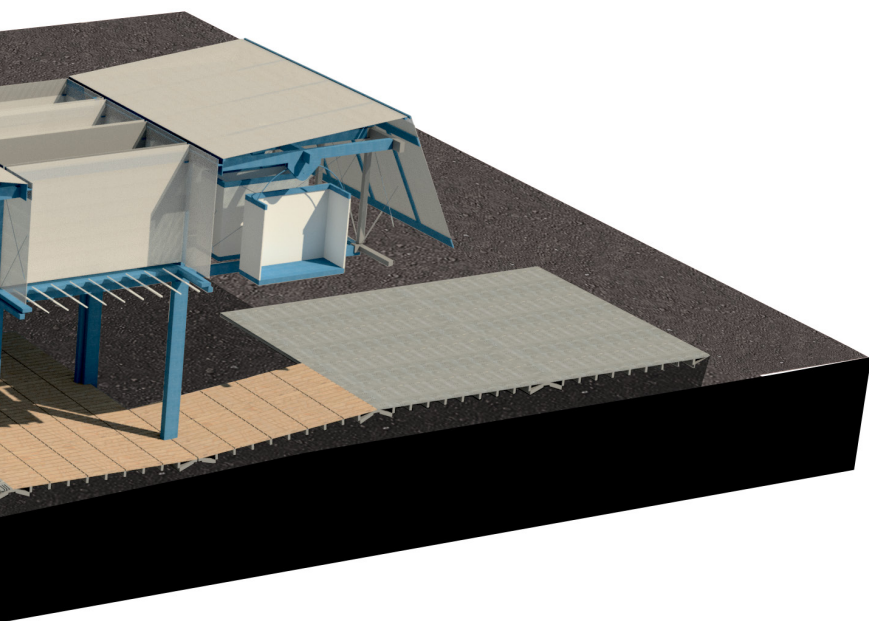


Figure 6.7. Section of Chongqing design



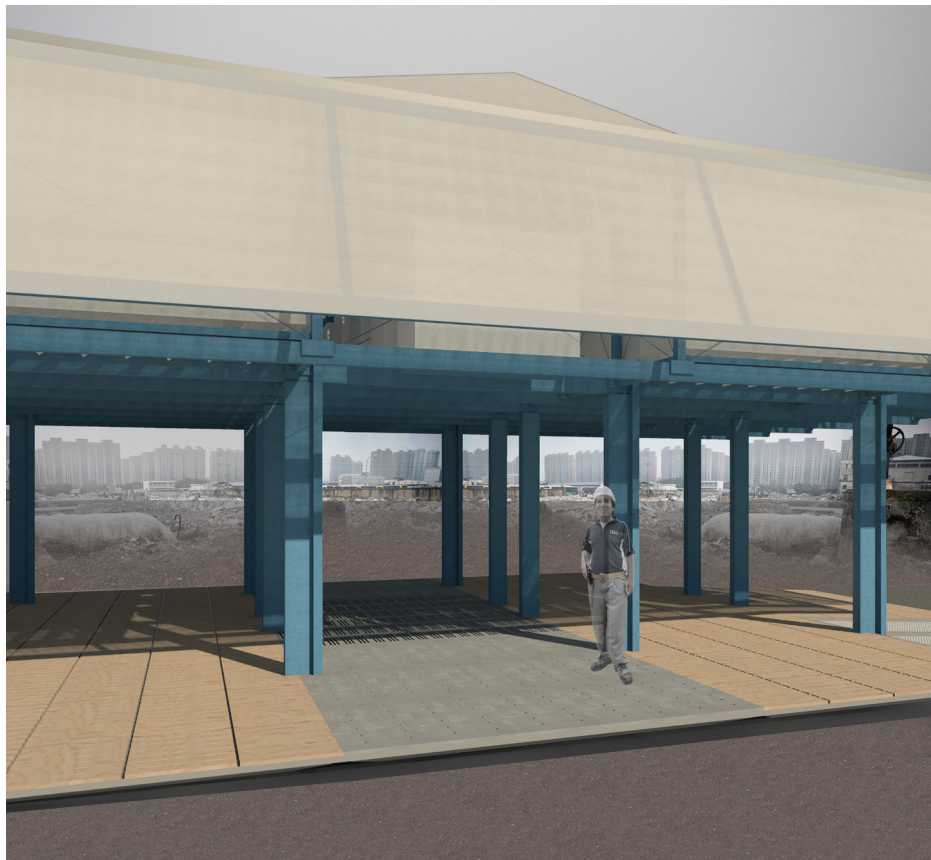


Figure 6.8. *Render of Chongqing design*



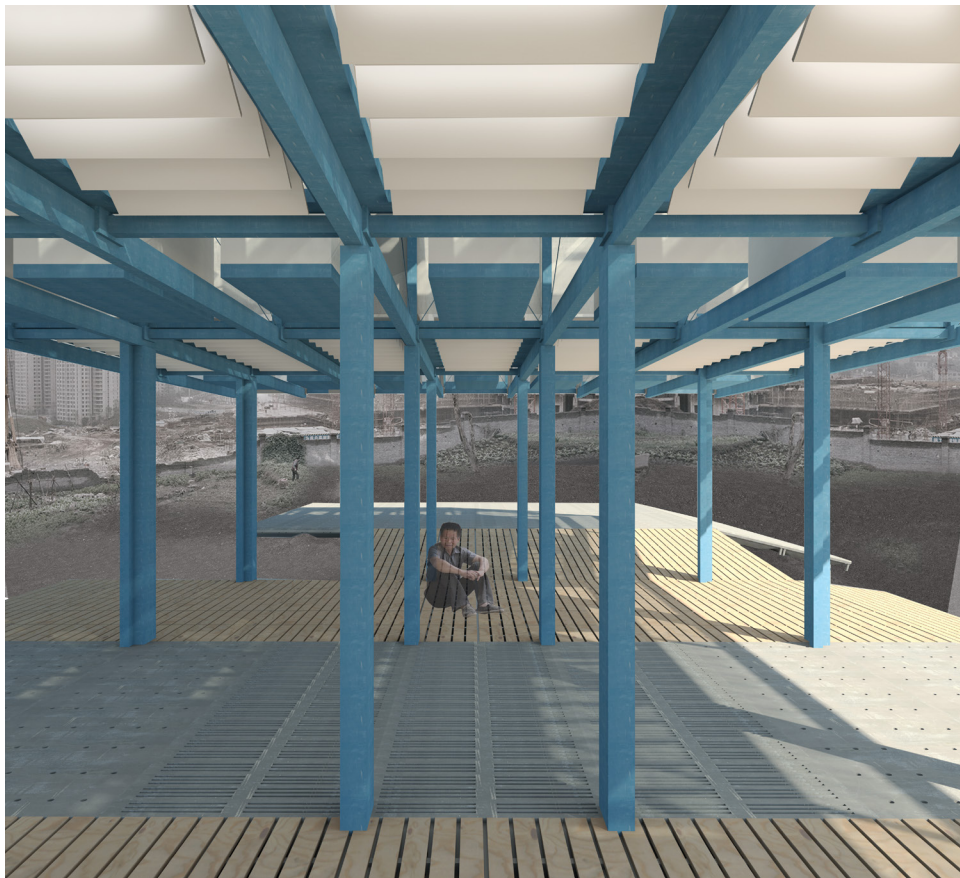


Figure 6.9. Interior render of Chongqing design

Wuhan



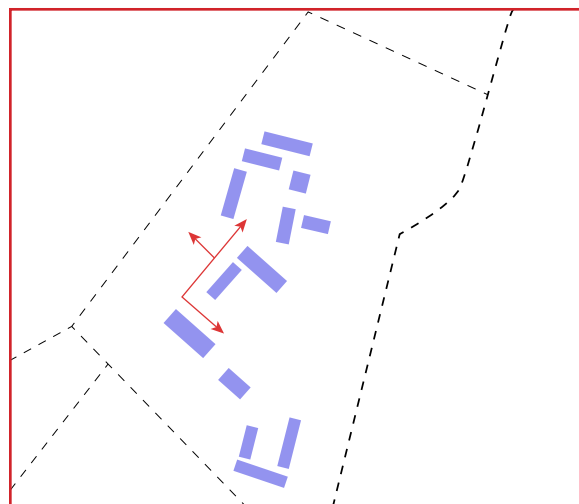


Figure 6.10. Site plan of Wuhan site

Source: <http://map.qq.com/>

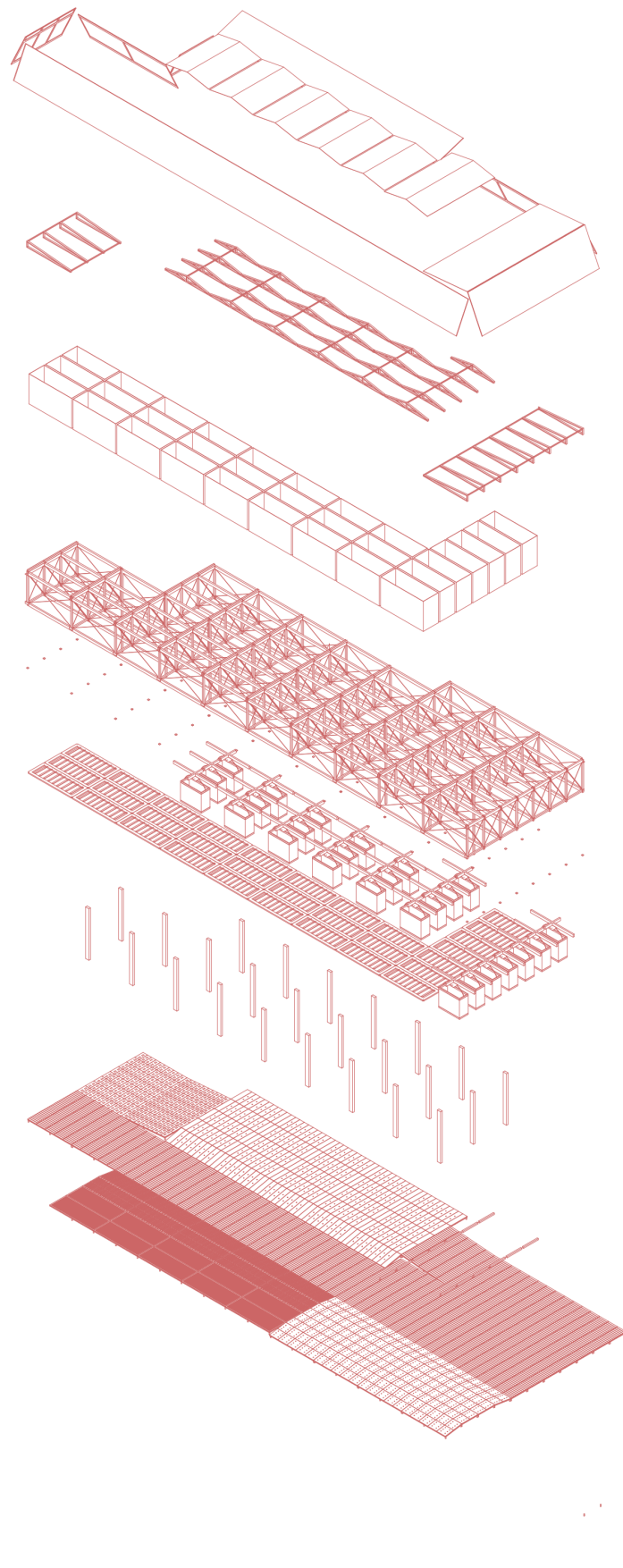


Figure 6.11.  
intervention

Exploded axonometric of the Wuhan

The Wuhan site is another disjointed site however it is separated by building orientations which face internally. The design reconnects the two settlements by joining their central zones through the surface and shelter. The surface features a timber walk way which directly links the two sites while steel surfaces surround this pedestrian path. The steel surfaces are utilised for areas such as markets as the aligning shelter modules allow for storage of services.

The design demonstrates bridging and bonding through:

- The pedestrian walkway between two settlements with a continuous timber surface and aligning lighting modules (bridging/bonding)
- The provision of shelter surrounding the timber walkway to encourage informal gatherings (bridging)
- The raise of platform height around the perimeter of the walkway to isolate the circulation from other spaces (bonding)
- The contrasting steel materials to the timber walkway to highlight a difference in spatial uses (bonding)

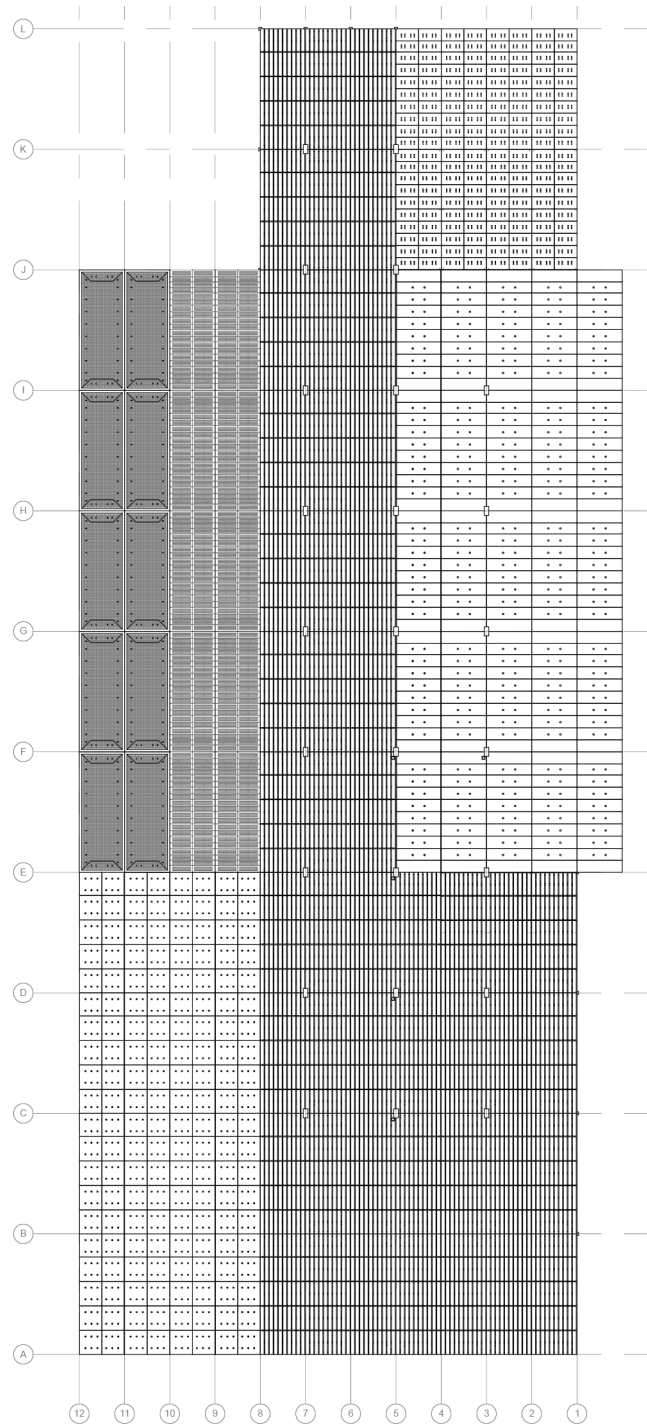
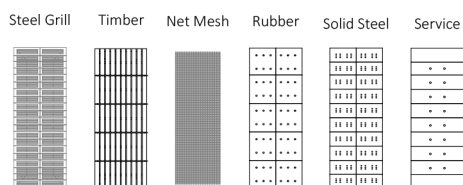


Figure 6.12. Floor plan of Wuhan intervention



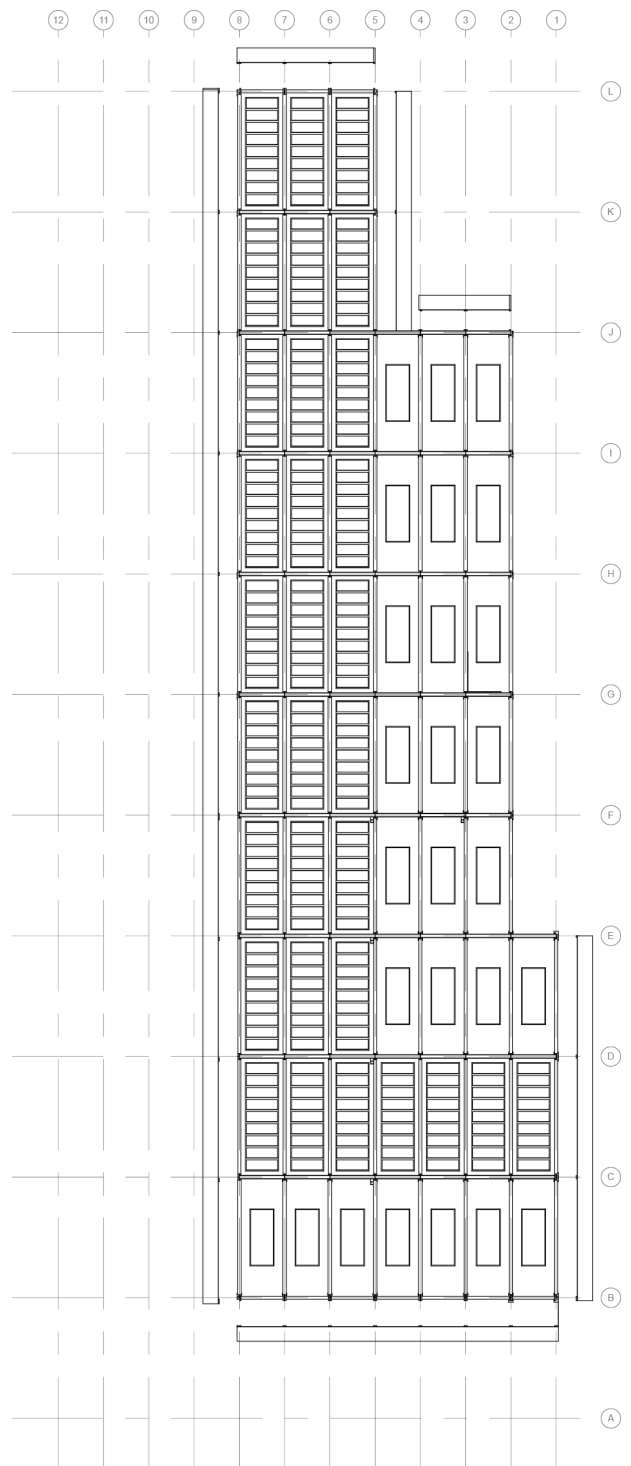
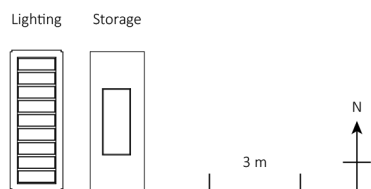


Figure 6.13. Roof plan of Wuhan intervention



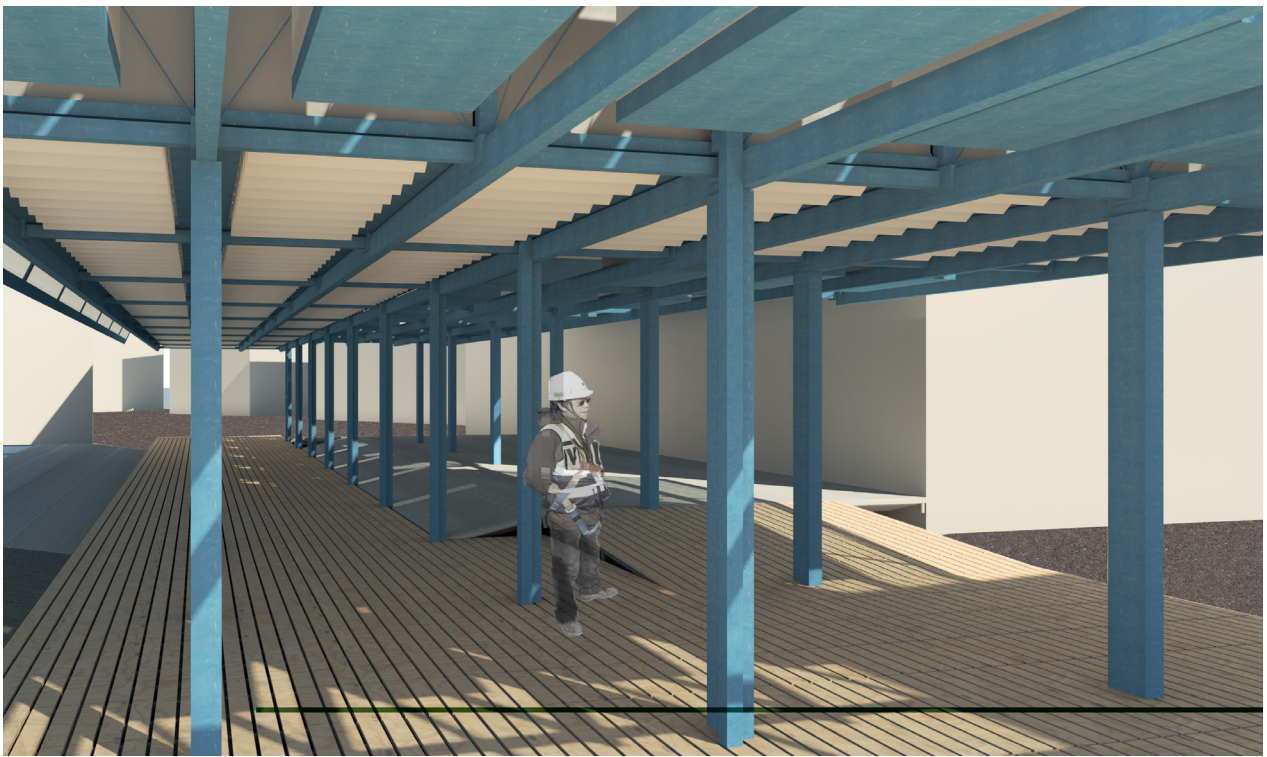


Figure 6.14. Interior render of the Wuhan design





*Figure 6.15. Render of the perimeter interacting with the surrounding blue roof dorms.*

Nanjing



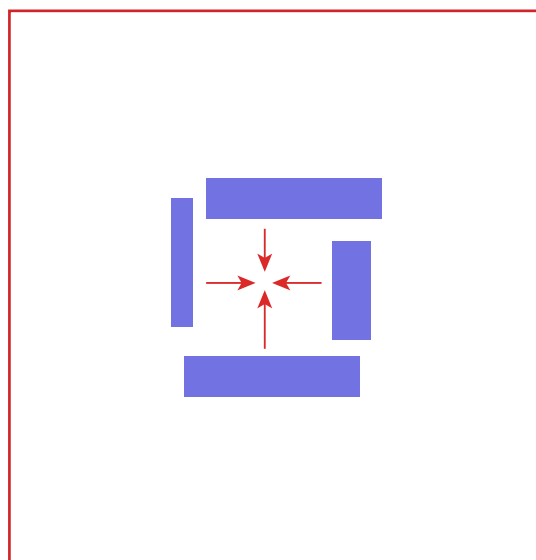


Figure 6.16. Site plan of the Nanjing site

Source: <http://map.qq.com/>

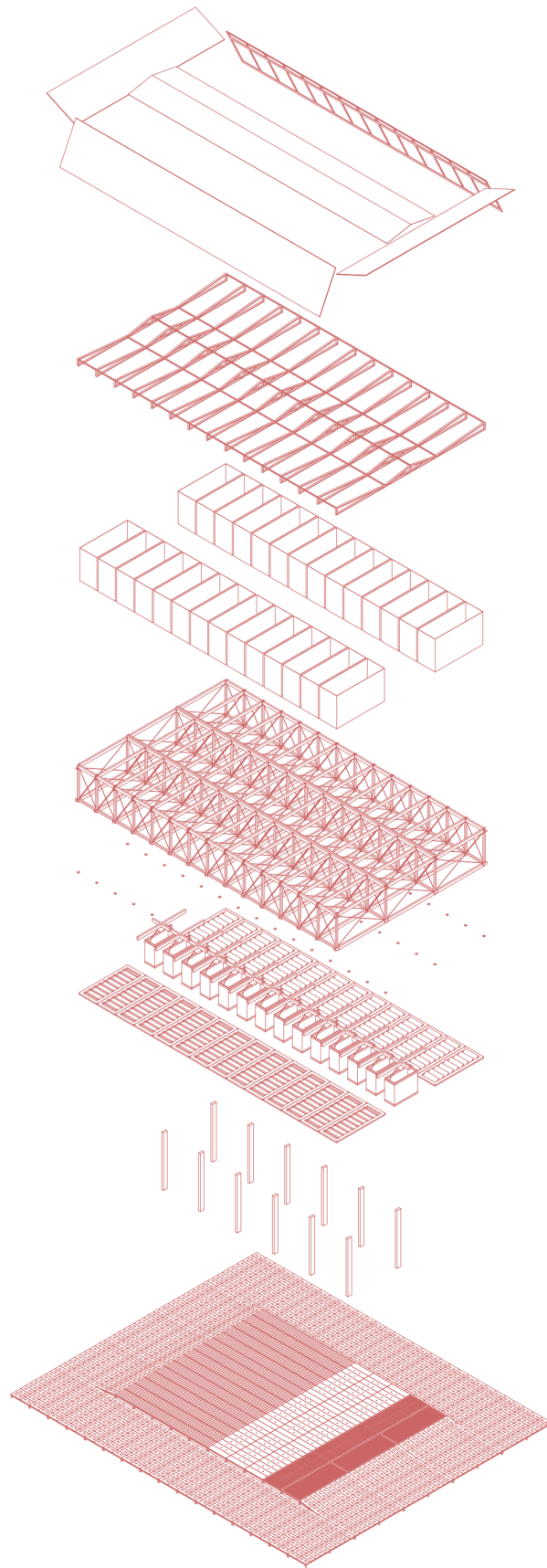


Figure 6.17. Exploded axonometric of Nanjing intervention

The Nanjing site holds 4 dorms which all face internally. The design of this intervention is a central surface and shelter with a raised central square. the central square mainly consists of a timber surface to contrast with the surrounding steel surfaces along the perimeter of the design. This highlights the central point of the village, which is also emphasised by the aligning lighting modules. Storage runs along the entire surface allowing a range of activities to occur.

The design demonstrates bridging and bonding through:

- The centralisation of the internal courtyard and surrounding buildings by using a continuous surface (bridging)
- The raised platforms at the centre of the site, communicating a differentiation of spatial use (bonding)
- The use of a continuous steel surface around the courtyard to emphasise circulation (bridging)
- The use of lighting modules along a range of materials to multiply conditions for programs (bridging)

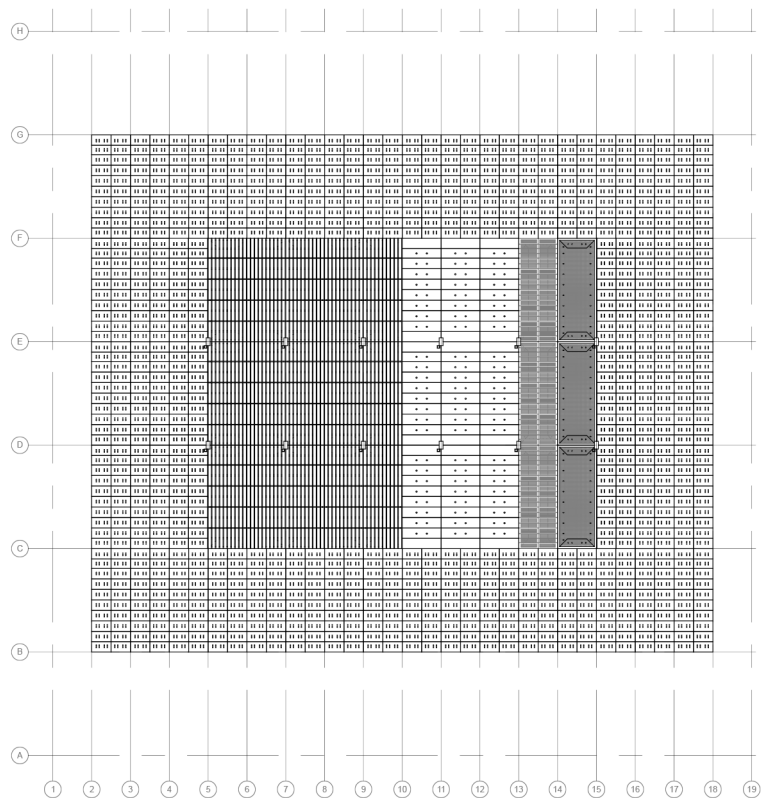
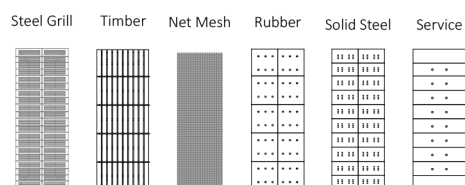


Figure 6.18. Floorplan of the Nanjing intervention



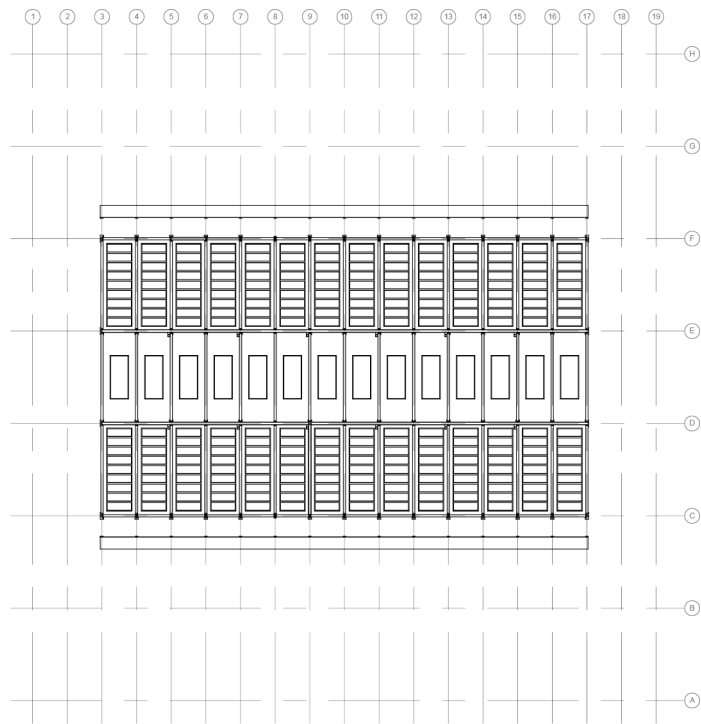
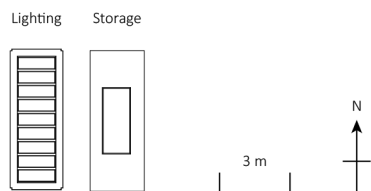


Figure 6.19. Roofplan of the Nanjing intervention





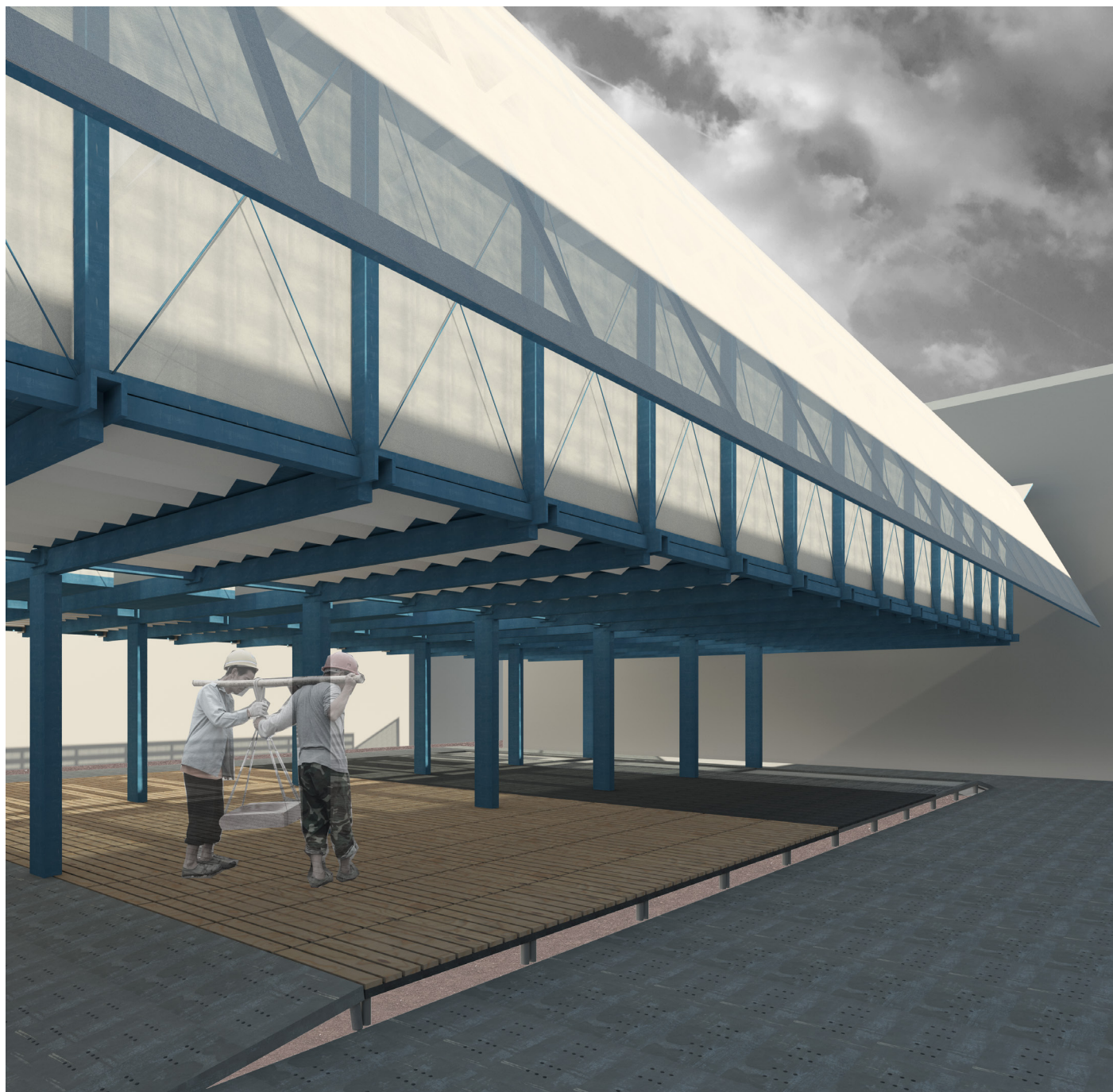


Figure 6.20. *Render of the Nanjing design*





## Conclusion and Critical Reflection

The three design interventions demonstrate possible methods of fostering bridging and bonding social capital through architecture as a means to resolve community issues in the floating village. The floating village and its inhabitants have displayed community issues due to conflicting cultural backgrounds, and an impoverished surrounding. The rapid urbanisation in China will see the increase of these villages and their communal issues. These three design interventions were tested in the three fastest urbanising areas of China in order to demonstrate the design system's adaptability to a range of floating village conditions in the most common sites.

The developed design achieves bridging and bonding through:

#### Surface

- The use of a continuous surface with no partitions which increases informal interactions (bridging)
- The use of multiple surface materials which appeal to a range of demographics and provide a range of programs (bridging)
- The use of varying surface heights to achieve isolation of certain areas (bonding)

#### Shelter

- The use of lighting to highlight specific areas of use (bonding)
- The use of storage to increase the density of programs which increase the interactions between possible users (bridging)

#### Detail

- The use of performative components such as controlled natural lighting and expanding shelter perimeter which modifies the public space. (bridging)
- The use of stacking and wrapping as an informal means of construction and modification in the surface system which creates a sense of communal unfamiliarity (bridging)

This research has demonstrated that Robert D. Putnam's bridging and bonding sub theory of social capital can be expressed and fostered through architecture. These are applied by increasing a spaces capacity for program, demographic, informal interaction, and sense of place. All aspects of the architectural intervention demonstrate these attributes as a method of foster social capital. The control of bridging and bonding associates with the control over interactions between programs and demographics. Bridging requires an architecture to increase interactions while bonding requires architecture to control interactions to a certain common ground (material surface, program, etc).

Limitations within this study were the utilisation of Robert D. Putnam's idea of bridging and bonding and social capital. Other ideologies of bridging and bonding were not utilised as Putnam's theory was to be a constant in the architectural testing. Aspects of bridging and bonding such as overlapping and wrapping, from Michael Wolfs study of informal Chinese construction may only be applicable to the floating village due to its context within China. It is unknown if other cultures accept these methods as bridging and bonding methods. All architectural expression of bridging and bonding was required to be transportable and temporary due to the floating villages nomadic life cycle.

Other potential applications of the study could be the design of permanent community centres where there are various demographics which require social capital to be fostered. Other nomadic and impoverished societies such as refugees or Eastern Europe's rolling society may also benefit from a temporary, or mobile community centre. Refugee camps can consist of a range of cultures which is similar to the conditions of the floating village.

Topics such as urban dweller and migrant conflicts could extend the study beyond this scope could explore bridging and bonding between rural migrants and the surrounding urban dwellers, as there have been reports of conflict between the two demographics.



## Bibliography

Chan, Anita. "The Culture of Survival: Lives of Migrant Workers through the Prism of Private Letters." Link, Perry, Richard P Madsen and Paul G Pickowicz. *Popular China: Unofficial Cultural in a Globalizing Society*. Lanham: Rowman & Littlefield Publishers, Inc, 2002. 163- 188. Print.

Chang, Kuang-Chi, Ming Wen and Guixin Wang. Social capital and work among rural-to-urban migrants in China. 4 October 2011. Web.

Chen, Xinguang, et al. Social Stigma, Social Capital Reconstruction, and Rural Migrants in Urban China: A Population Health Perspective. 2011. Web.

Dorst, K. 2010, 'The Nature of Design Thinking', DTRS8 Interpreting Design Thinking: Design Thinking Research Symposium Proceedings, Design Thinking Research Symposium, DAB Documents, Faculty of Design, Architecture and Building, University of Technology, Sydney, pp. 131-139.

Gaetano, Arianne. "Gender and Citizenship Inequality: The Story of Two Migrant Women." King, Martin. *One Country, Two Societies*. Harvard University Press, 2010. 265-286. Print.

Hulshof, Michiel and Daan Roggeveen. "Building the lagrest city in the world." Hulshof, Michiel and Daan Roggeveen. *How the city moved to mr sun: China's new mega cities*. Martien de Vletter, SUN, 2011. 64-83. Print.

Jacobs, Jane. *The Death and Life of Great American Cities*. New York City: Vintage Books, 1961. Book.

Jaque, Andres. "Sheltering The Rolling Society." Volume (2015): 86-91. Print.

Kipnis, Andrew. *Chinese Modernity and the Individual Psyche*. New York: Palgrave Macmillan, 2012. Web.

Putnam, Robert D. *Bowling Alone: The Collapse and Revival of American Community*. New York City: Touchstone, 2000.  
Vendel, Saskia. "PUC: People's Urbanity of China." Mars, Neville and Adrian Hornsby. *The Chinese Dream: A Society Under Construction*. Rotterdam: 010 Publishers, 2008. 30-89. Print.

Vendel, Saskia. "PUC: People's Urbanity of China." Mars, Neville and Adrian Hornsby. *The Chinese Dream: A Society Under Construction*. Rotterdam: 010 Publishers, 2008. 30-89. Print.

Wall, Alex. "Programming the Urban Surface." Corner, James. *Recovering Landscape: Essays in Contemporary Landscape Architecture*. Princeton Architectural Press, 2001. Print.

World Bank Group. *Urban China: toward efficient, inclusive, and sustainable urbanization*. Washington DC: World Bank Group, 2014. Web.

Wu, Weiping and Piper Gaubatz. *The Chinese City*. Oxon: Routledge, 2013. Print.

Zhang, Li. "Urban Experiences and Social Belonging among Chinese Rural Migrants." Link, Perry, Richard P Madsen and Paul G Pickowicz. *Popular China: Unofficial Culture in a Globalizing Society*. Lanham: Rowman & Littlefield Publishers, Inc, 2002. 275- 299. Print.