



XINMIN ZHUANG

# SELF-RENEWAL

## A PROTOTYPE DESIGN FOR URBAN-VILLAGE HOUSING

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Self-renewal: A Prototype Design for Urban-village Housing

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## ABSTRACT

Urban-village is one of the phenomenon causing by the rapid city expansion in China. It normally happens in urban-rural fringe where villages, involved in the rapid urbanization, has been engulfed by urban features, and gradually become a 'village' within a city. And facing the market of resident from migration worker, new graduated, villagers replaced their farmlands and housing-sites to multistory housing earning living from rental business. Rooted in the gap of management, urban-villagers maximum their occupancy of building plot. Hence, it is famous of its complex living environment consisted of extremely high density neighborhood.

To the city, urban-village is a critical but controversial topic of urban renewal. Since the previous mode of urban-village redevelopment had generated issues likes property transaction, which is costly to just in economic term but in social aspect. Along with public's awareness of rights and interests increasing, Guangzhou Municipality is now promoting an alternative strategy - 'Micro- transformation' (similar to integrative transformation in Guangzhou Urban Renewal Plan description). This new mode is encouraging 'self-renewal' by villagers and village collective, aiming at upgrading living environment for long-term development and decreasing potential social conflicts. Yong-tai village is one of the ongoing projects, where village collective and its cooperator are improving the public space and infrastructure. But as a main element, villager housing is still lacking of design guidance if villagers are also willing to taking action in this 'self-renewal'.

Thus, the aim of this thesis is to explore a prototype for Yong-tai urban-village housing. Followed the selected indicators, the prototype will provide villagers a design guidance for living environment improvement, and shows the potential benefits for its implementation in larger scale.

Keywords: urban village, villager housing, prototype, urban renewal, China



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## I INTRODUCTION



## Who are we & how we work?

## 1 About the thesis:

### 1.1 The author

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Master Programme:

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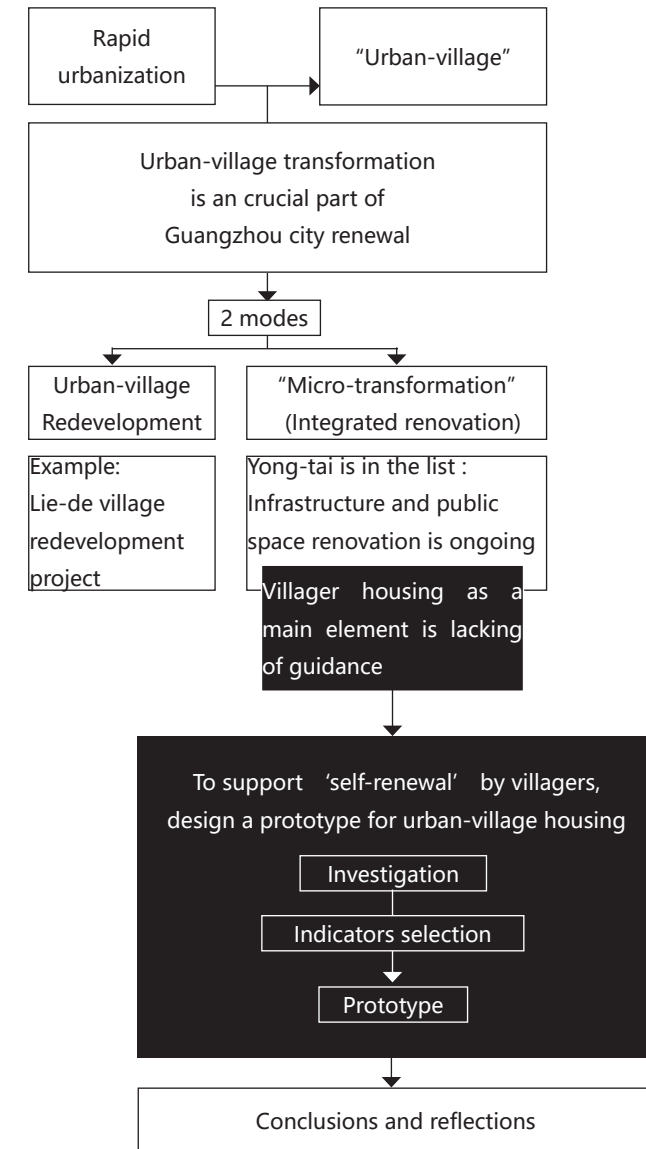
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Xinmin has bachelor degree with four-year studying of landscape architecture in China, and is now a master student in the programme - Design for Sustainable Development (MPDSD) of Architecture Department in Chalmers University of Technology. With knowledge and training acquired from studios Design and planning for social inclusion, Architectural heritage and urban transformation, Sustainable building competition, etc., Xinmin has learned skills of sustainable urban planning and design and also gained valuable experiences of multidisciplinary teamwork cooperated with architect and civil engineer.

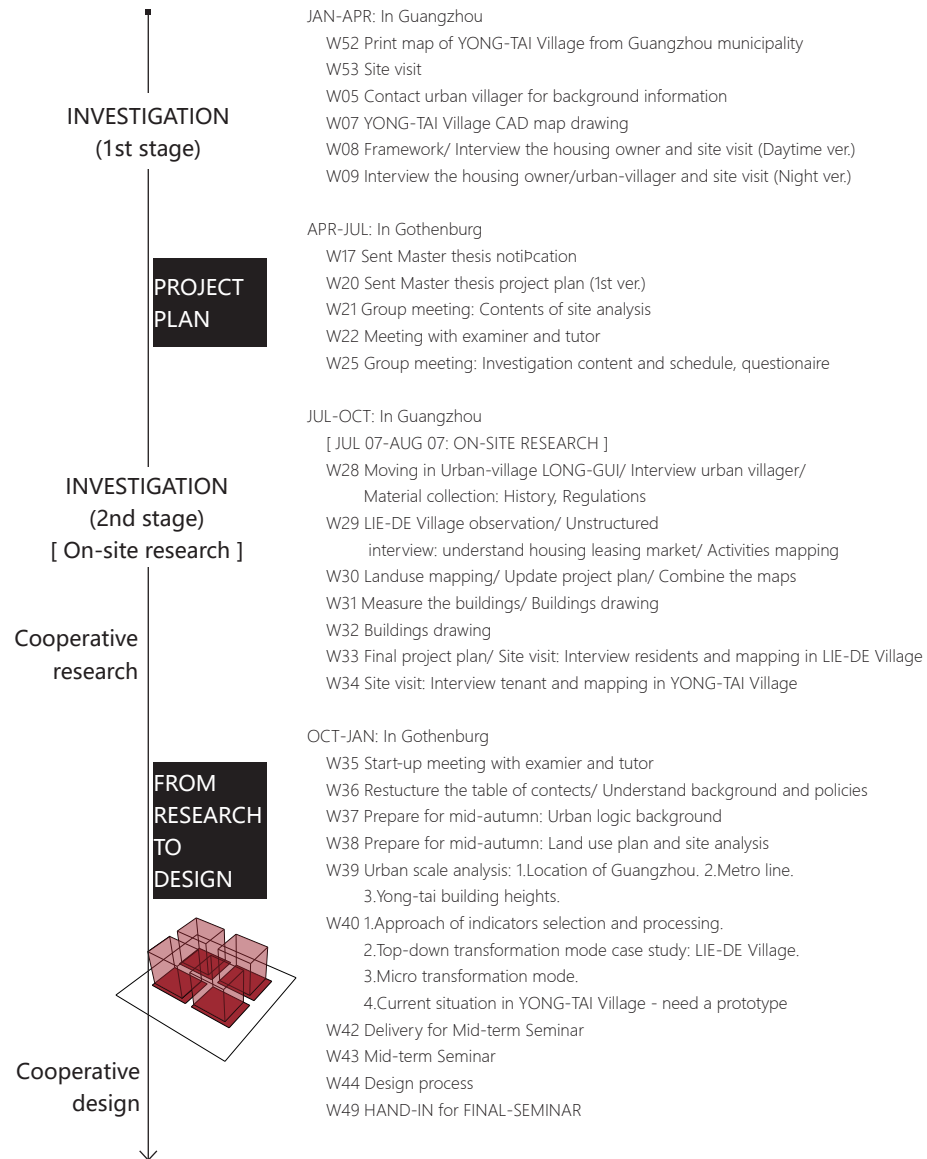
### 1.2 Method





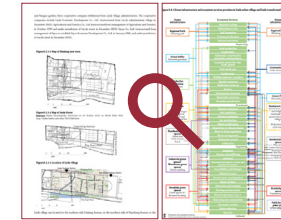
## 1 About the thesis:

### 1.3 Process



## 2 Cooperative research & cooperators

### COOPERATIVE RESEARCH

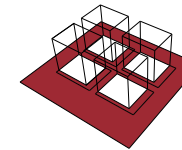


Green Infrastructure of Urban Village Transformation - A Case Study of Liede Village, Guangzhou

The author: ZHANG Weijun  
Supervisor: Dr. WANG Yu,  
Professor Rolee ARANYA

The Nordic Master Programme:  
Sustainable Urban Transitions  
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### COOPERATIVE DESIGN



City Adaption/ Mitigation Strategy, A Proposal for Urban Village Micro-transformation Project regarding of the Green Infrastructure in Guangzhou

The author: HUANG Huiyan  
Supervisor: Gertrud Jørgensen

Master Programme:  
Landscape Architecture  
University of Copenhagen  
Denmark



## II BACKGROUND



What is the context & issue?



### 3 Site analysis:

#### 3.1 Rapid urbanization in Guangzhou city

From  
Gothenburg  
SWEDEN

To  
Guangzhou  
(Canton)  
CHINA



Figure 3.1-1. Location of Gothenburg and Guangzhou (Google map, 2016)

Guangdong  
Province



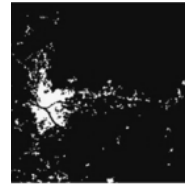
Figure 3.1-2. Map of China, showing the location of Guangdong province (National administration of surveying, mapping and geoinformation, 2008)

Guangzhou  
City (Canton)

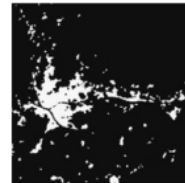


City centre

Figure 3.1-3. Administrative map of Guangzhou and city centre, 2015



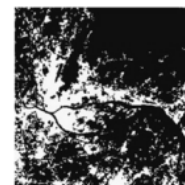
1979



1988



1995



2002

Figure 3.1-4. Remote sensing monitoring and driving force analysis of urban expansion in Guangzhou city, China. (MA, Y., & XU, R., 2010)

#### 3.2 'Urban-village' in Guangzhou city

##### 3.2.1 'Urban-village' phenomenon

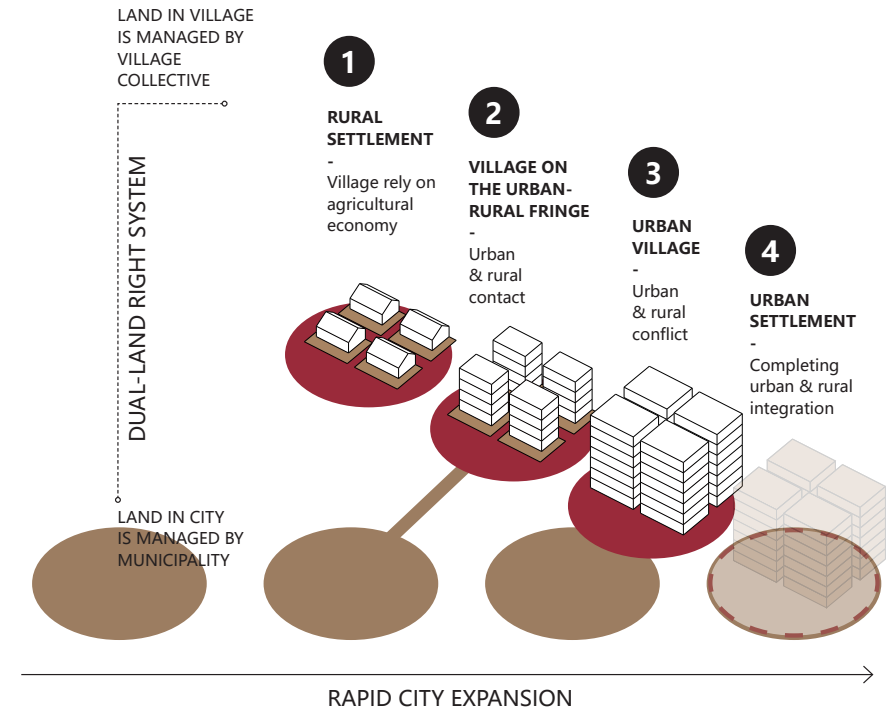


Figure 3.2.1-1. The forming process of urban-village

Urban-village is a phenomenon like the other city plots due to the dual-happening in some rapid expanding cities in China. Guangzhou is a typical example. On the growing urban-rural fringe, village involved in the rapid urbanization, has been engulfed by urban features, and gradually become a 'village' within a city. But since village land is still owned and managed by each village collective, it is not so easy for municipality to manage

the rental market demand, villagers maximum the building occupancy for earning living by rental business. Without clear guidance, this type of settlement has gradually become a extremely high dense one with complex living environment. It thus become a crucial topic of Guangzhou city renewal (Zhang, W. 2017)<sup>10</sup>.

To show with more information about the urban-village forming process, four examples have been chosen, here are their locations.

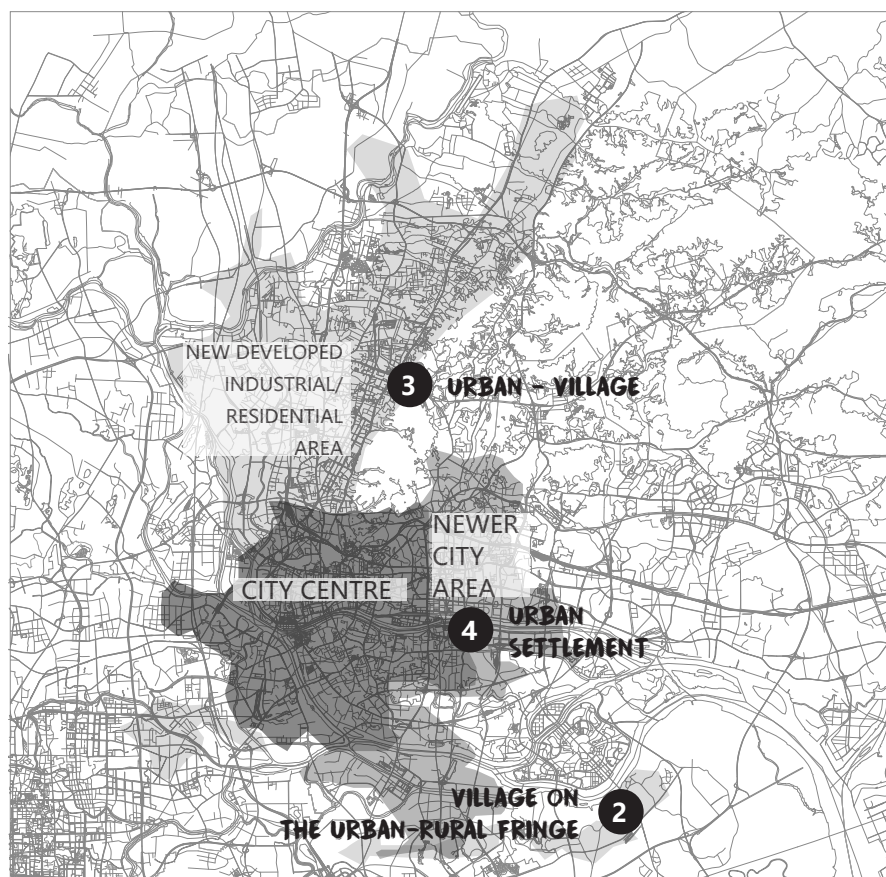
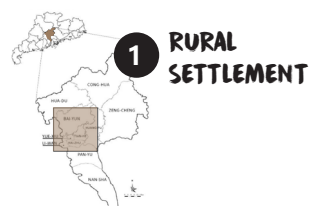
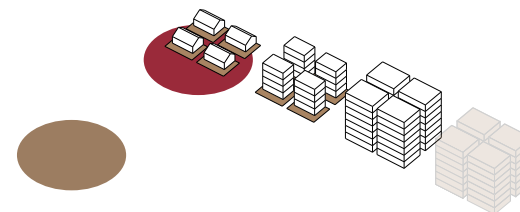


Figure 3.2.1-2. Locations of four examples

## 1 RURAL SETTLEMENT



In the first stage, village is located far from city centre as a traditional rural settlement with less population and low building density. Villagers in this stage are relying on agricultural economy (Al, S. 2014)<sup>3</sup>.



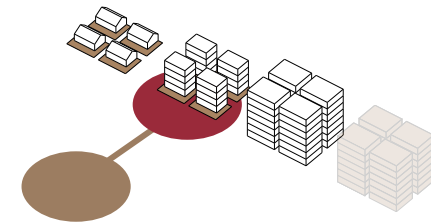
Figure 3.2.1-3. Cong-hua, Guangzhou, 2016





Figure 3.2.1-4. Nan-cun village, Guangzhou, 2016

## 2 VILLAGE ON THE URBAN-RURAL FRINGE



When city expands and contacts with village, the forming process of urban-village starts. City 'comes' to village and let it become a part of urban-rural fringe. Cheap land like farmland that owned by village collective has been easily rent out for other constructions like factories, warehouses, automobile 4s stores, etc. Without farmland, villagers start to earn life by rental business - they rebuild their housing property dividing more rooms to rent out for factory workers, new graduated, and other new comers who ask for affordable rental apartments (AI, S. 2012)<sup>4</sup>.



Figure 3.2.1-5. Village housing has been rebuilt as a multi-story one for rental business

### 3 URBAN - VILLAGE

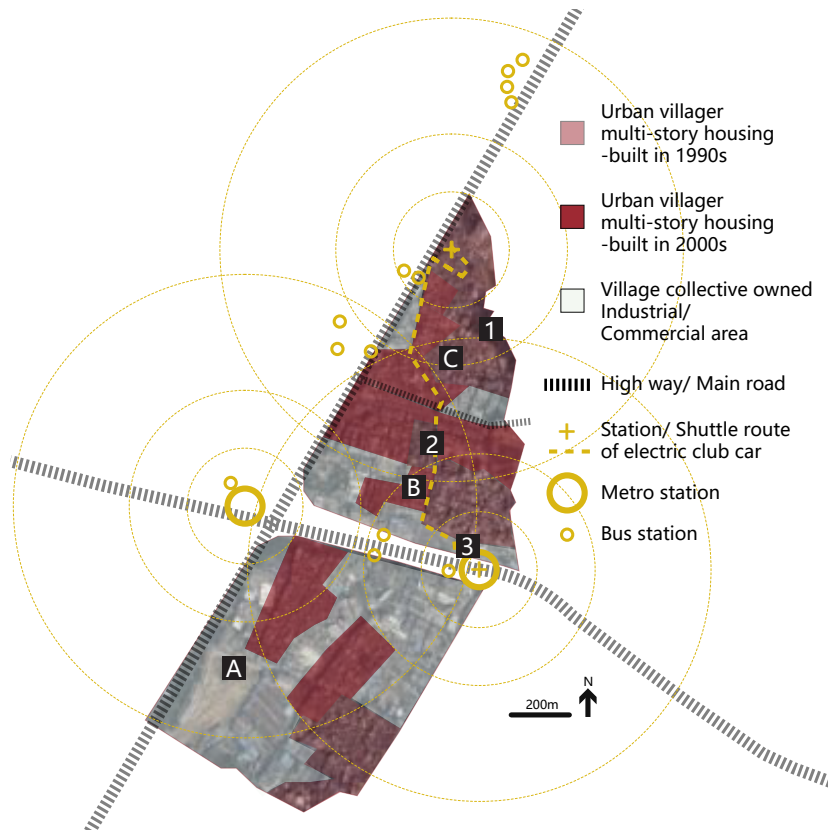
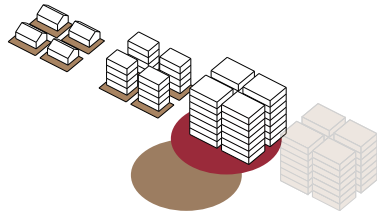


Figure 3.2.1-6. Mapping of Yong-tai village

Gradually, village has been involved as a part of city but still operated by village collective due to the dual-land right policy (Al, S. 2014)<sup>3</sup>. Rooted in the gap of management, villagers maximize their occupancy of building plot and keep adding floors till exceed the permitted building area and building height. Without consideration of living environment, it is famous of a complex living conditions with high building density. And Yong-tai village as a typical urban-village is where this thesis will focus.





01



03



05



02



04



06

- 01. Existing village ancestral temple
- 02. Highway divided village into pieces.
- 03. Villager housing is rebuilding.
- 04. Pipes are installed outside the housings.
- 05. Waste is collected outdoor.
- 06. The closeness in-between buildings.



07



09



08



10

- 07. Vehicle is controlled due to the limit space.
- 08. Electric club car shuttles bringing residents to metro station.
- 09. Main streets have lively atmosphere.
- 10. Room on the ground floor are rent out to be food stores, restaurants, barbers, etc.



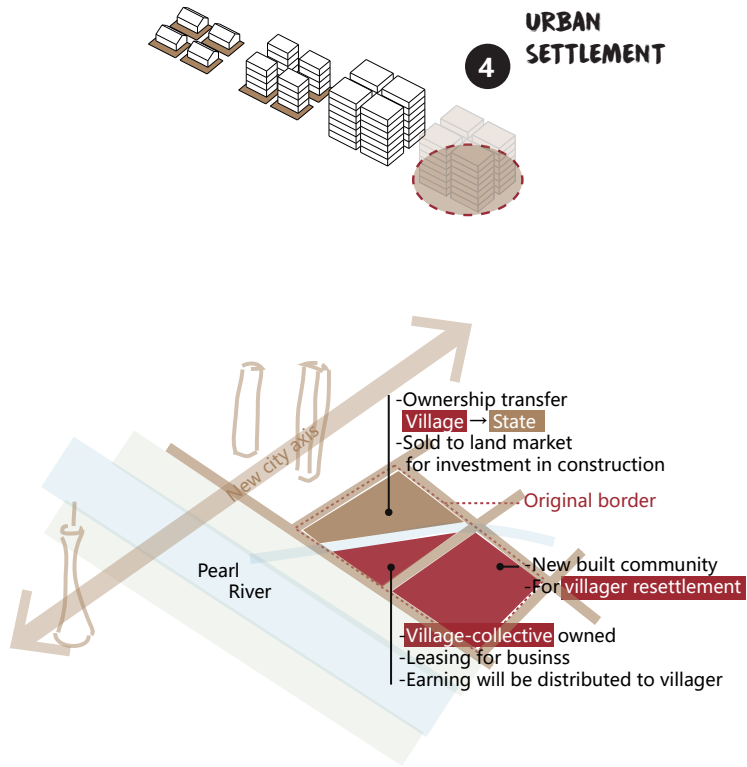


Figure 3.2.1-7. Lie-de village redevelopment project

In stage 4, urban-village has transformed as a urban settlement. Lie-de village redevelopment project is a typical case (started from 2007, completed in 2010). Due to its central location and the perfect timing - the city would host Asian Game in 2010 and needed new image, the whole village had been reconstructed with great amount of compensation. After the construction, villagers have resettled into this new-built community.



Figure 3.2.1-8 (Left). Lie-de village, Guangzhou (Google earth, 2000)

Figure 3.2.1-9 (Up). Lie-de village before redevelopment, Guangzhou (Sina news, 2007)



Figure 3.2.1-10 (Left). Lie-de village, Guangzhou (Google earth, 2010)

Figure 3.2.1-11 (Up). Lie-de village resettlement, Guangzhou (Guangzhou Urban Renewal Bureau, 2011)

### 3 Site analysis:

#### 3.2 'Urban-village' in Guangzhou city

##### 3.2.2 'Urban-village' redevelopment



Figure 3.2.2-1. A holdout case in Lie-de redevelopment project (Sohu news, 2007)

The previous way of urban-village redevelopment (mainly demolishing the whole urban village spatial structure then develop an urban settlement) is costly not only in economic term but in social one because it has to generate issues like property transaction, compensation, relocation, etc. Along with the public awareness and increasing interest, new strategies 'Micro-transformation' is

launched by Guangzhou municipality to encourage alternative methods for urban renewal. It is similar to integrative transformation mode according to its description. And 'Self-renewal' has been stated in this new mode that village collective and villagers are encouraged to renew their own village and properties (Guangzhou Municipality. 2015)<sup>5</sup>.

#### 3.3 'Micro-transformation' in Yong-tai village

##### 3.3.1 New business for village collective

Cooperated with developer, village collective rent out the old factories site with 40-year contract to the developer who will build a new commercial complex there. At the same time, the developer need to help the whole village to upgrade the infrastructure and public spaces. All the expenses that paid by developer will be deducted from the rent of land. After 40 years, village collective will operate the commercial complex. And in this way, the ownership of land stay as before.



Figure 3.3.1-1. Self-renewal process by Yong-tai village collective

### 3 Site analysis:

#### 3.3 'Micro-transformation' in Yong-tai village

##### 3.3.2 Main question: Same old story for urban villagers

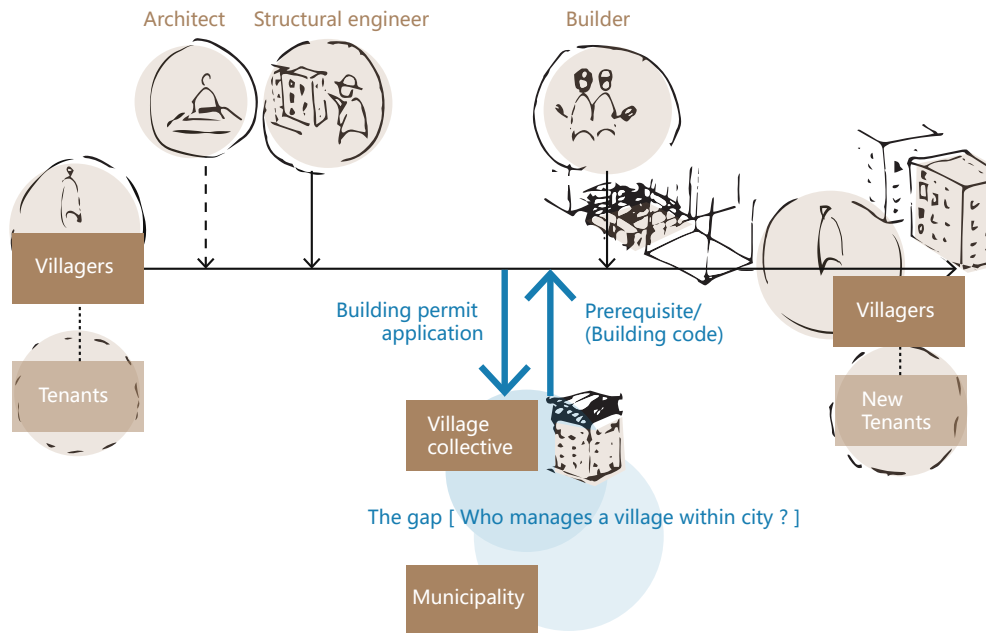


Figure 3.3.2-2. The process of villagers rebuilding their housing

The process of villagers rebuilding their housing is summarized as the graph above. In this process, villagers are the main actors who have abilities to rebuild and manage their housing property. Before rebuilding their housing, villages need to apply for building permit and there are some prerequisites they need to fulfill. But as a village within city, there is

a gap exists in the management system who should take responsibility to manage and promote villagers 'self-renewal' ? And as a housing located in urban-village, the building context is so different from normal rural one. Is there any suitable design guidance provided for this urban-village housing?

### 4 Summary:

#### 4.1 The aim & objectives

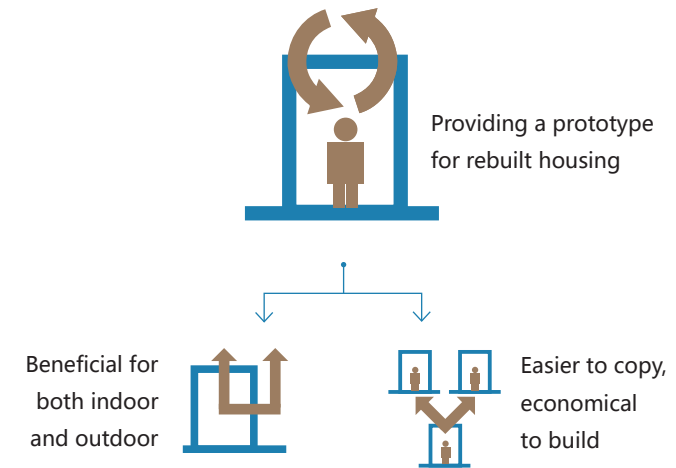
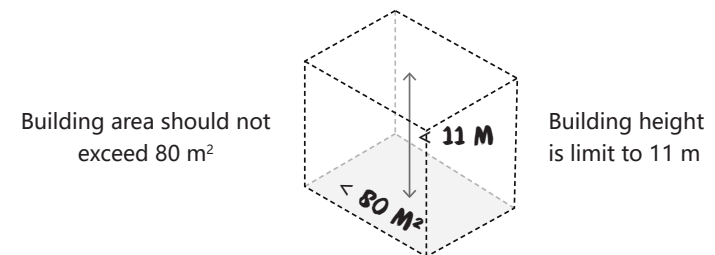


Figure 4.1-1. The aim and objectives



Each family can own one property

Figure 4.1-2. Prerequisites of building permit

In order to promote self-renewal by urban-villager, the aim of this thesis is to provide villagers a design guidance followed the regulations, to explore a prototype for Yong-tai urban-village rebuilt housing. The prototype should be easier to copy,

economic to build. At the same time, this thesis will estimate the result in data showing the potential benefits if this prototype could be implemented in larger scale.



## 4 Summary:

### 4.2 Delimitation

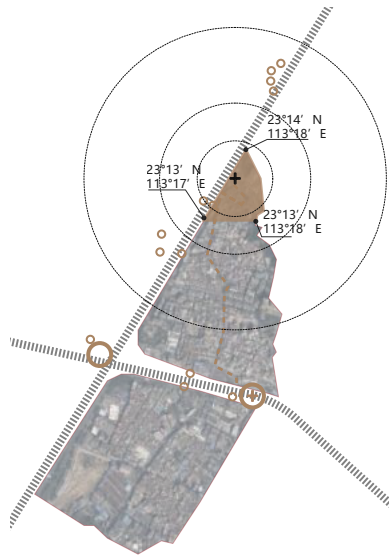
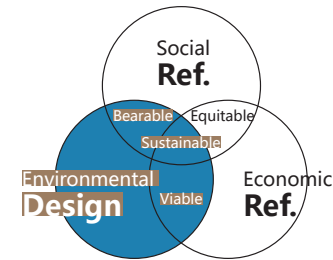


Figure 4.2-1. Location of the focus area

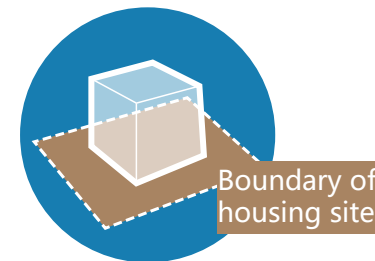


Figure 4.2-2. Map of the focus area

This thesis will focus on the northeast part of Yong-tai. As an a place that far from metro stations, many buildings in this area are not as easier as the southern ones to rent out. Thus villagers here care market demand and willing to upgrade the living conditions by rebuilding their property. In this selected area, there are 252 housings occupying more than 60 percent of land. The FAR (floor area ratio) here is higher as 3.91. Within these housings, more than a half of them was first built in 1990s with various dimensions and orientations, which might be affected by the previous natural context likes small canal (which has been covered). Whereas buildings that built in 2000s are more likely to share a similar dimension with regular planning.



Issues in environmental aspects is what this thesis will zoom in to design and adjust for sustainable transformation, whereas relevant investigation in social and economic ones will be references and give design a limitation to make sure it could be bearable for society and viable in economy.



The context of this these is limited in Guangzhou, China, while the strategies/ prototypes are generated from the investigation of Yong-tai urban-village. Urban-villagers who own their housings are the main considered actors in this topic, hence the scope of this prototype design will be also delimited by their ownership which is the boundary of their building site.

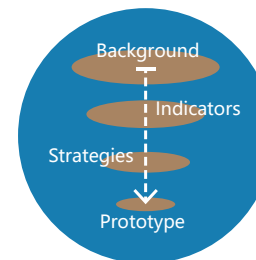
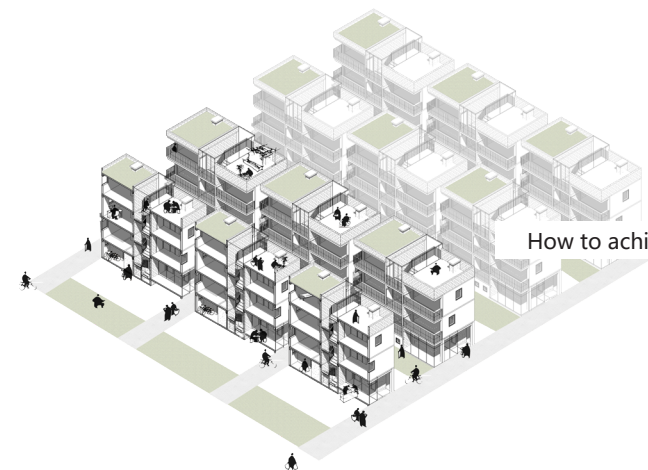
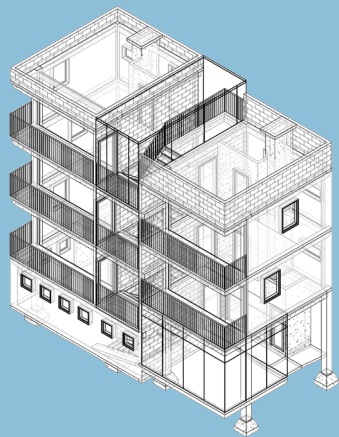


Figure 4.2-3. Delimitation

Design process is started from background investigation, through indicators selection, strategies design, then generate a design result as a building prototype.

### III PROTOTYPE





## 5 Prototype design

### 5.1 Indicators selection

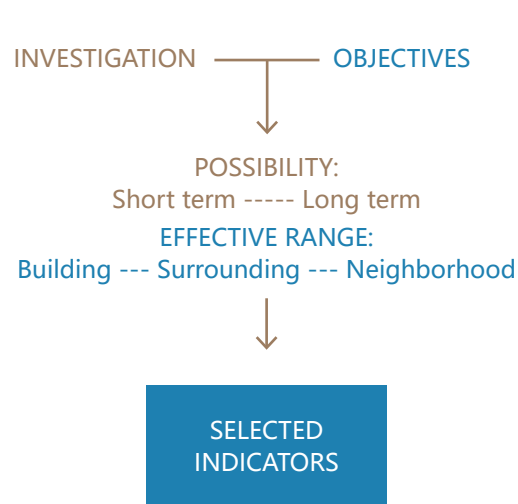


Figure 5.1-1. Approach of indication selection

Indicators are selected by the approach above to provide the prototype a design guidance. Focusing on the objectives, several key issues have been summed up from the investigation. By evaluation of their possibilities of improvement and the effective range, seven indicators are selected for further consideration. Among these indicators, Adaptable layout and Economical design can be easily adjusted within a sole building by its owner. But indicators like Daylight, Privacy/sight-line and Ventilation can not gain obvious improvements without 'cooperation'

in-between building and the buildings around, thus how to optimize this 'relation' are crucial in this prototype design. Although Rainwater and Waste management are difficult to change effectively without a regional planning, but rainwater and waste management within building scale have also been considered into the prototype design in order to provide potentials for further development in larger scale.

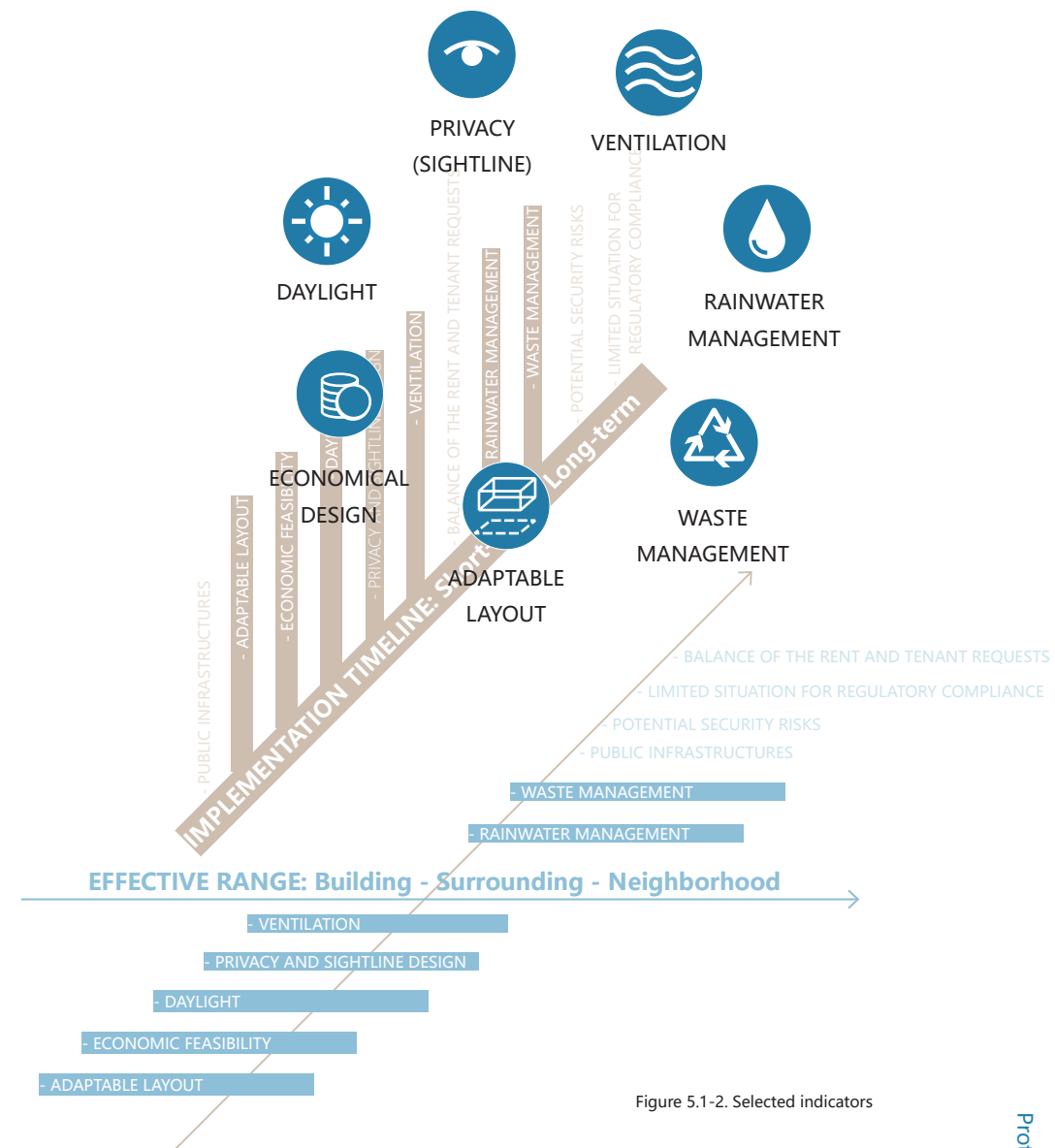


Figure 5.1-2. Selected indicators

## 5 Prototype design

### 5.2 Prototype design based on selected indicators

#### 5.2.1 Daylight



According to the regulation, building height of a rebuilt housing should not exceed 11 meters (Guangzhou Urban Renewal Bureau. 2012)<sup>1</sup>. If most of the rebuilt housing can follow this requirement, apparently it is possible to get more daylight compared with the current volume consists of seven floors or more. However, from the detailed calculation, data show that with a common narrow lane (width: 2.5 - 3m), the lowest apartment can not fulfill the daylight requirement to gain at least one hour daylight on the worst date - December 21st. The distance in-between two buildings, especially in south-north direction, should be widened from 2.5 or 3 meters to 5.5 or 6 meters, which need the building volume set back about 3 meters to reach the required distance. Although there is a little gap exists (6.12m is still exceed the distance 6m) when the buildings are directly facing south. But in the selected area, most of housings are built with turning angle, through the calculation with four representative angles, the results show it is possible to optimize the daylight situation by having such setback.

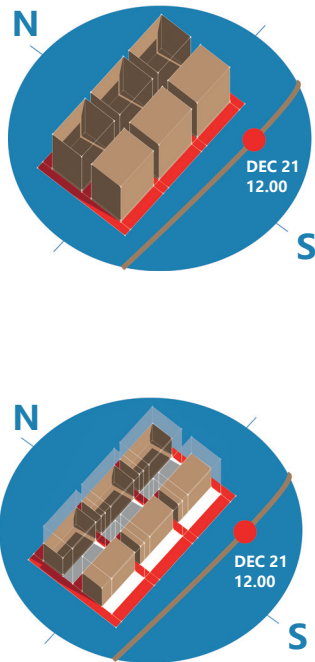


Figure 5.2.1-1. Stimulation of daylight

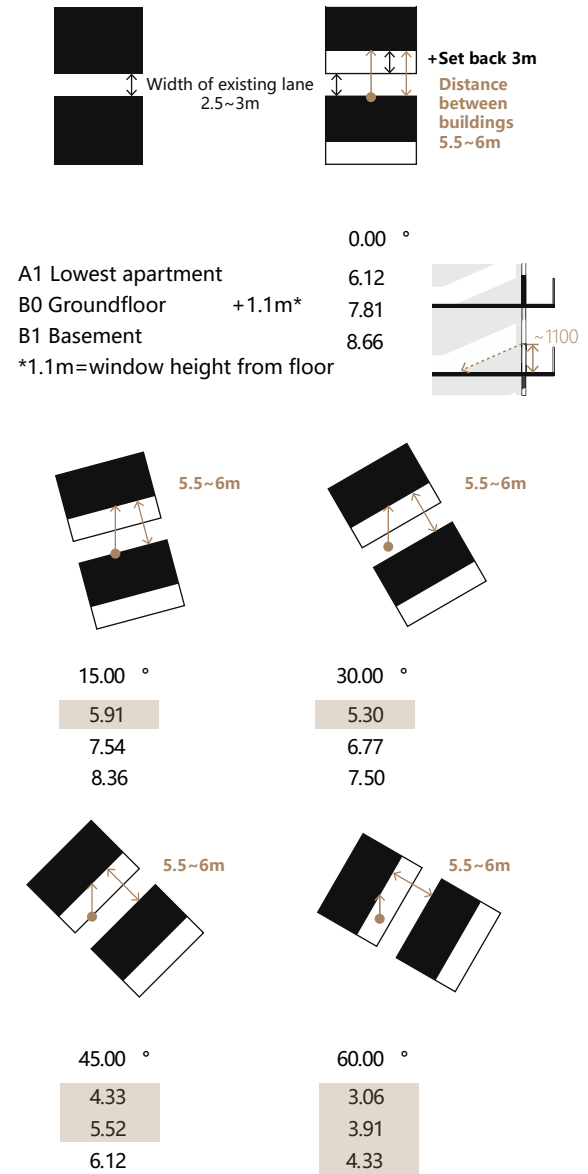


Figure 5.2.1-2. Optimization of setback for enough daylight



## 5 Prototype design

### 5.2 Prototype design based on selected indicators

#### 5.2.2 Privacy



Figure 5.2.2-1. Window covered by newspaper for privacy

It is a common scene in urban-village housing that many windows have been covered with newspapers. Due to the extremely high density, it is hard to keep distance in-between buildings. And without consideration of building context, many windows are facing directly to windows in the opposite building. Thus, covering windows with newspapers is the last way for users to protect their

privacy in this situation. Therefore this issue should also be considered in the prototype design. It is true that there is no enough space horizontally to keep for privacy. But vertically, it is still possible to redirect sight-line with a height difference (about 1.5m). Followed this method, building volume has been modified, so does windows setting.

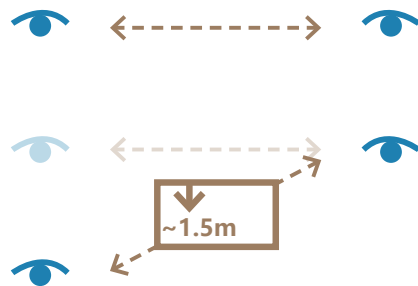
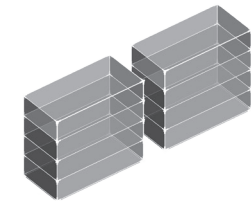


Figure 5.2.2-2. Concept of sight-line redirection

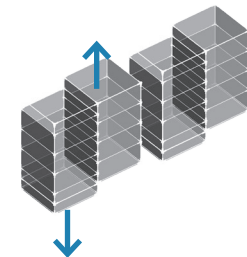
> The regular building volume (two for showing the changing relation)



> Split the building volume in half



> Move a half to have a height difference for sight-line redirection



> Modify windows setting to redirect sight-line horizontally

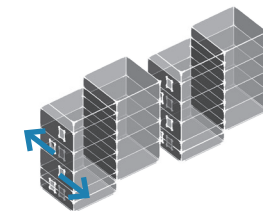
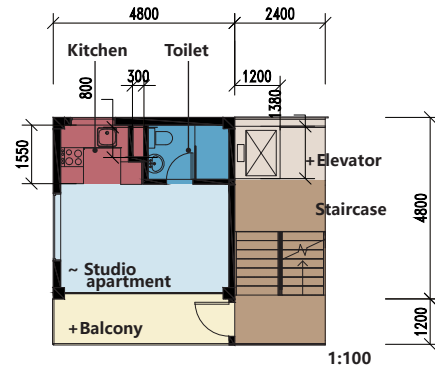


Figure 5.2.2-3. Modification process of building volume

## 5 Prototype design

### 5.2 Prototype design based on selected indicators

#### 5.2.3 Adaptable layout



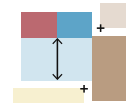
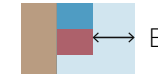
TYPICAL FLOOR PLAN

Figure 5.2.3-1. Typical floor plan of prototype

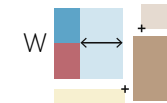
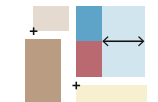
Since many urban-villagers have changed their economic source, earning a living by apartment rental business, they preferred to design a housing with more apartments that available for renting out. With the building volume modification (see chapter 5.2.2 Privacy), a typical floor plan has been designed to fit in the limited dimensions, which has contained kitchen (3.7 m<sup>2</sup>), toilet (3.7 m<sup>2</sup>), studio apartment (15.6 m<sup>2</sup>), balcony (5.8 m<sup>2</sup>), elevator (3.3 m<sup>2</sup>) and staircase (11.0 m<sup>2</sup>). With all these basic functions, floor area is about 43.0 m<sup>2</sup>. Urban villagers who own limited space for their housing site

can follow the minimum floor plan (34.0 m<sup>2</sup>) to rebuild their housing, sharing staircase and elevator with neighbors. To urban villagers who own larger building plot, they can combine two typical floor plans as one larger floor plan. But ensure building area should not exceed the permitted building area 80 m<sup>2</sup> and floor area 280 m<sup>2</sup> (Guangzhou Urban Renewal Bureau. 2012)<sup>1</sup>. Additionally, aimed to keep a better ventilation, urban villagers can also choose to rearrange those functions if their housing plot has different building orientation.

MINIMIZE  
DIMENSION  
~34m<sup>2</sup>



+ ELEVATOR  
/BALCONY  
~43m<sup>2</sup>



COMBINATION  
(\*Building area  
<80m<sup>2</sup>)

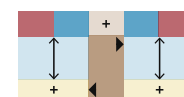
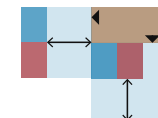


Figure 5.2.3-2. Changing configuration for adaptability



## 5 Prototype design

### 5.2 Prototype design based on selected indicators

#### 5.2.4 Rainwater & waste management

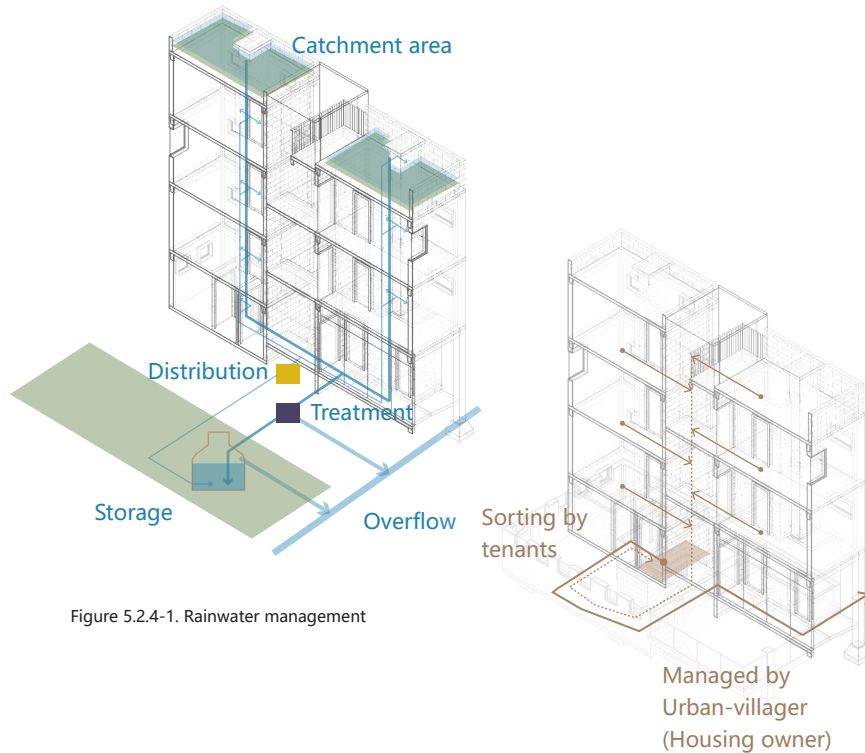


Figure 5.2.4-1. Rainwater management

Figure 5.2.4-2. Waste management

As an 'urbanized' village, farmland, fishpond that allow natural rainwater infiltration have disappeared. Except land occupied by building blocks, most of the rest has become impermeable surface, and the village now is running the urban-like water management system, giving more load to the city's one that they connected. In order to ease the load, a building-scale rainwater harvesting system has involved in this prototype design, utilizing rooftop as green roof and rooftop garden (Housing and Urban-rural Development Bureau. 2013)<sup>6</sup>, combining with indoor pipe shafts, water filter, pump and storage tank that in the basement or underground.

#### 5.2.5 Ventilation & economic feasibility

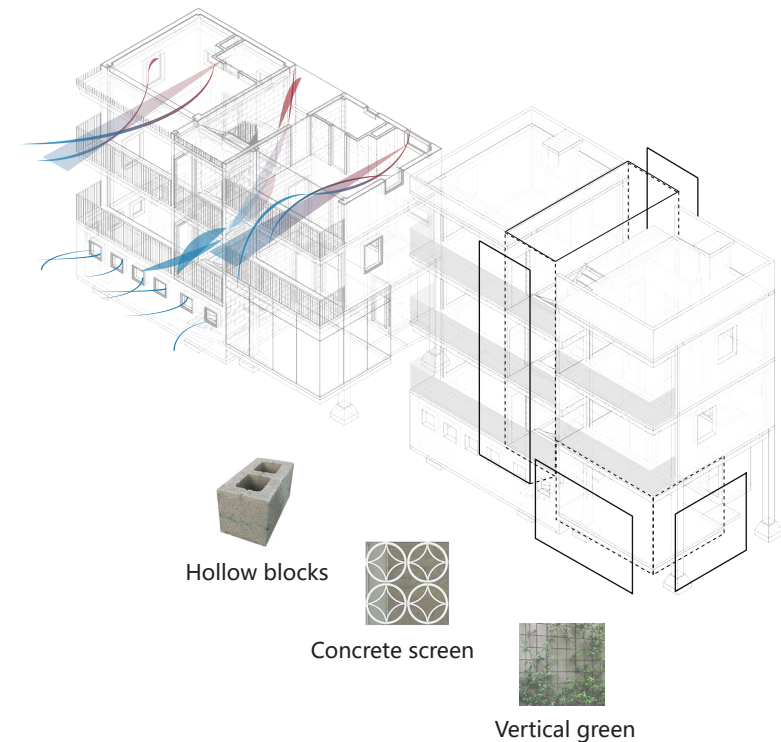


Figure 5.2.5-1. Ventilation consideration and suggestion of facade materials

In addition to design the layout which allow airflow passing through, the facade design has also given consideration to the optimization of ventilation: Balcony, floor-to-ceiling windows are set on the windward side, while on the leeward side there are kitchen and toilet which need smaller windows to meet their functional requirements (Koch-nielsen, H. 2002)<sup>2</sup>. There is no special required materials selection, villagers can choose materials that fit their economic conditions. Materials like hollow blocks, concrete screen, or vertical green, which are low technology and conducive to better ventilation could be some suggestions.

## 6 Design results

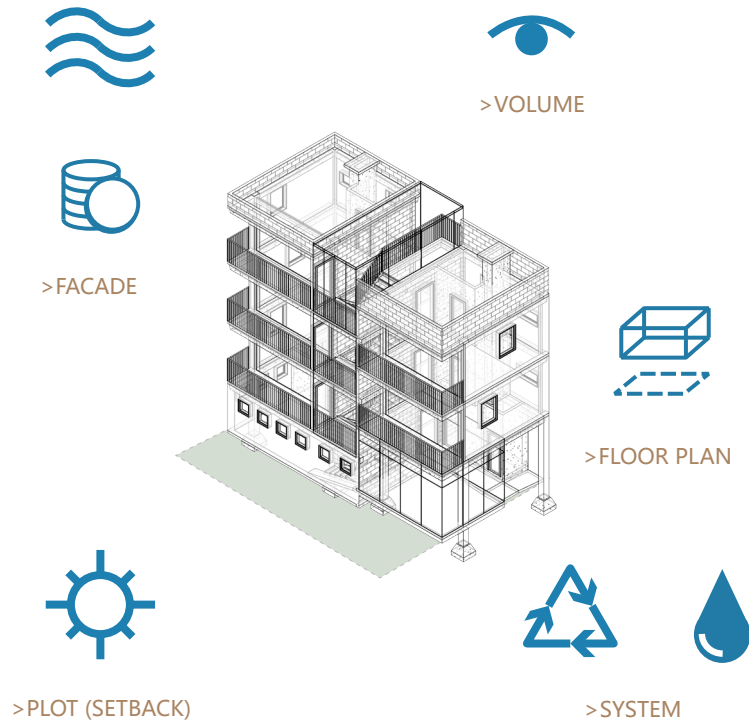


Figure 6-1. Design results of the housing prototype

Set back the building on plot for enough daylight, modify its volume to redirect sight-line, design a adjustable floor plan for different configuration of plots, involve rainwater and waste management into building system, choose facade materials that are conducive to better ventilation and economic feasible. Merging all these strategies for the selected indicators, a prototype design result has been generated.

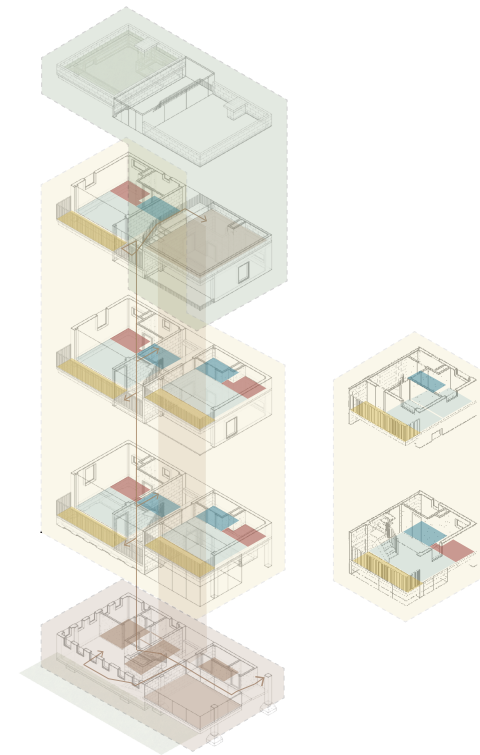


Figure 6-2. Functions zoning of the housing prototype

Refer to the function zoning, as a housing type of building, functions have been divided and arranged into three parts of the building. On the rooftop, green roof and rooftop terrace/garden are not only functioning as a catchment area for rainwater harvesting system, but provide a place for recreations. In the middle are studio apartments that can be rent out continuing urban-villager' s rental business. If there is need for family apartment, it is possible to combine two rooms as a loft. Basement have contained most of the services like garbage room, laundry room, indoor bicycle parking, etc. Space on the ground floor can be rent out for small-scale commercial activities keeping the street lively.

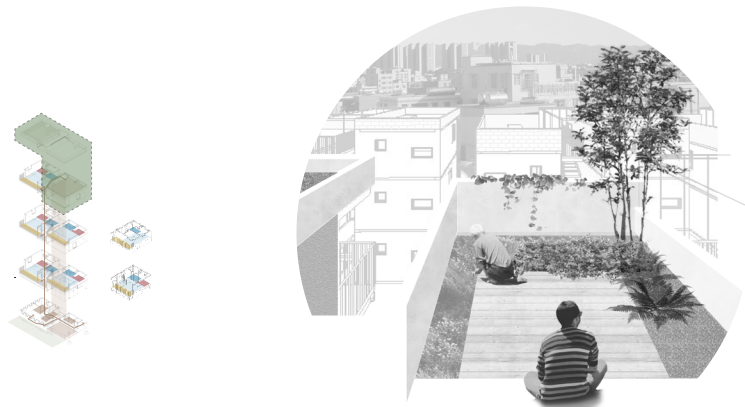


Figure 6-3. View from rooftop terrace

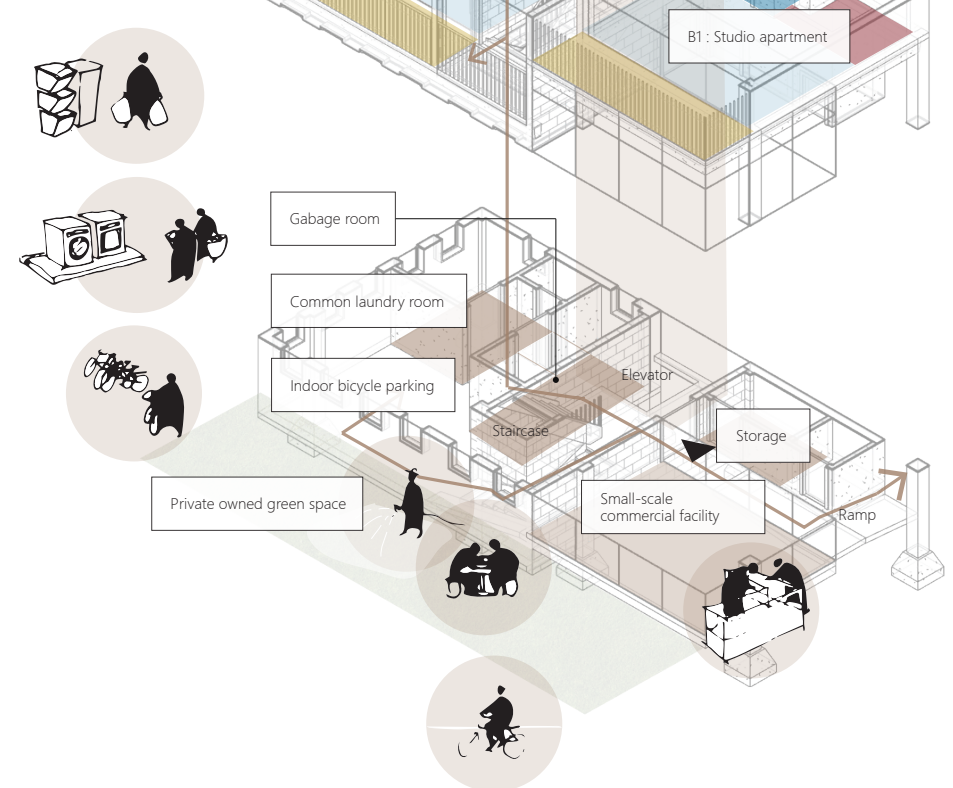
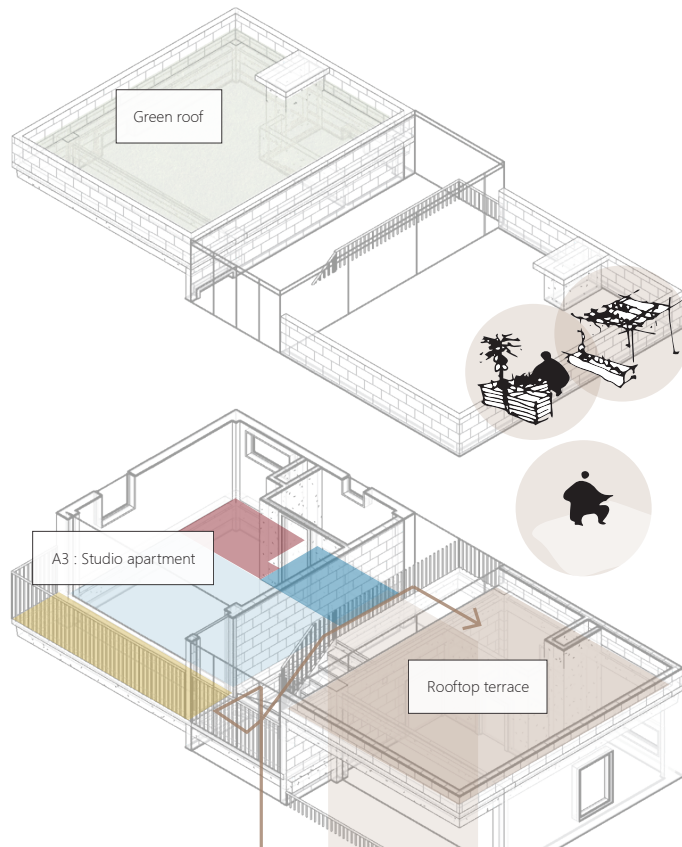


Figure 6-4. View from street



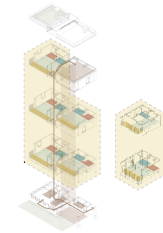
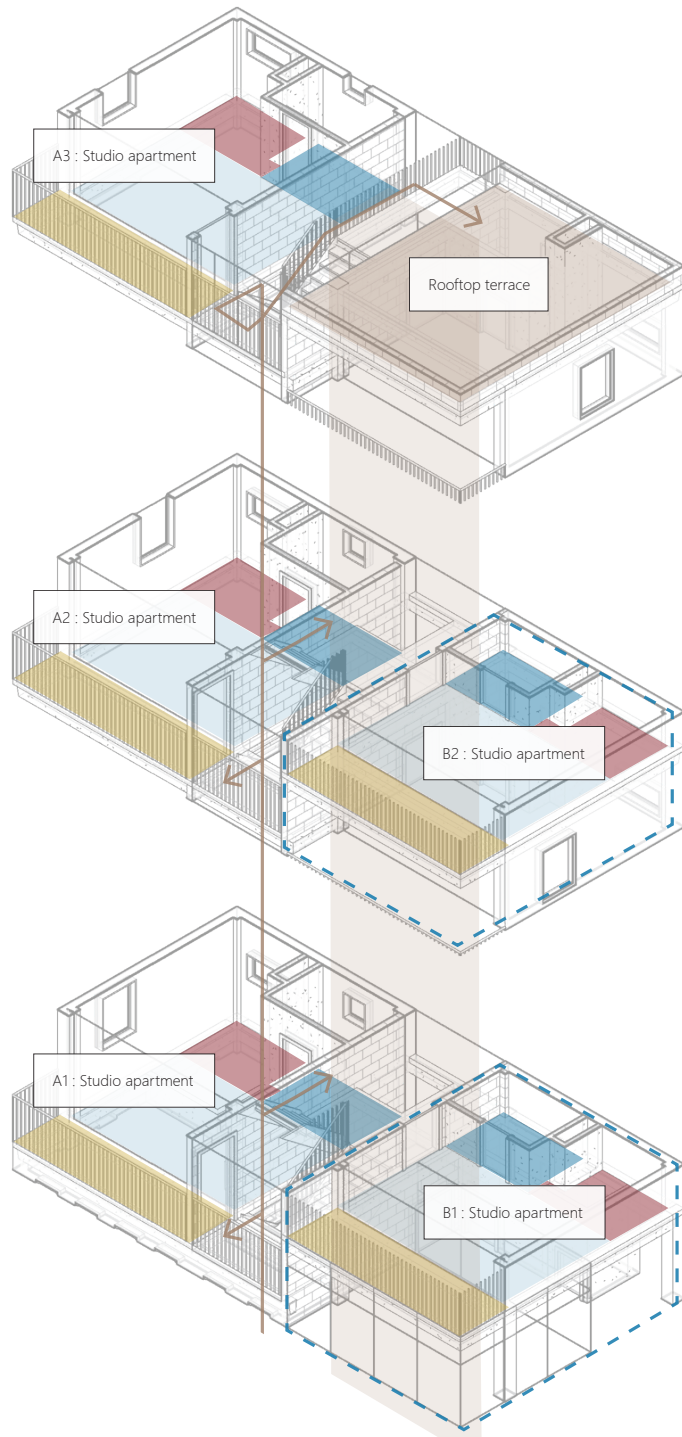
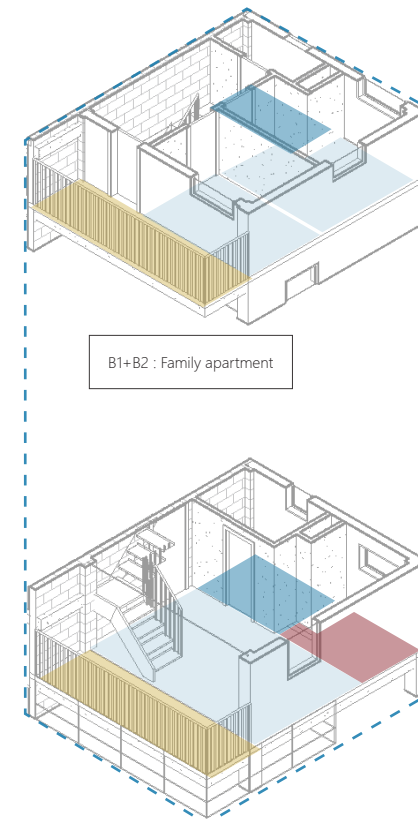
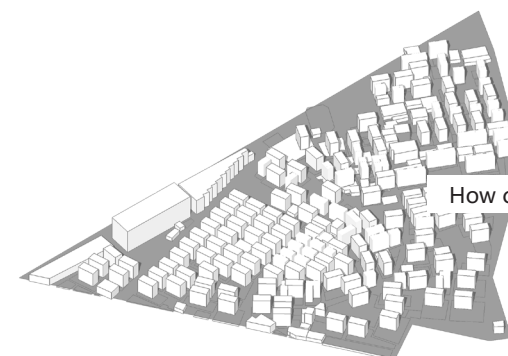
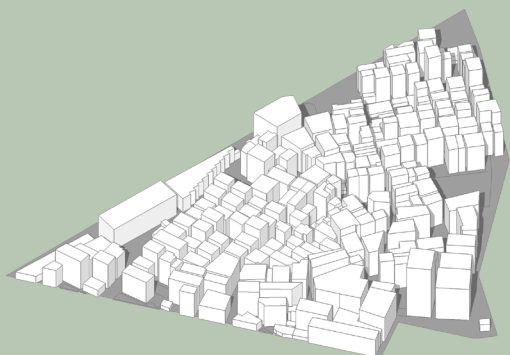


Figure 6-5. View from studio apartment



#### IV DISCUSSION



How could it be developed further?

## 7 Elevated view: From sole building to neighborhood

From the calculation, data show that there are 252 buildings in this selected area, 146 of them have exceed the permitted building area which is 80 square meters (Guangzhou Urban Renewal Bureau, 2012)<sup>1</sup>. Ideally, if all of them would comply with the prerequisites when they rebuild on the same plot, at least about 22 percentage of land (which is 10,627

square meters) can be transformed back as green space that allow natural rainwater infiltration, which could be an big potential for green infrastructure construction in this urban-village context. (To mitigate the potential dispute over equity, these part of land could be kept as villager owned, functioning as their private owned garden.)

# 146/252

housing can provide more space for green.

( 146 / 252 housings > 80m2 permitted building area )

# ~22.19%

of land can be transformed as private green space, and it will be an advantage for green infrastructure in this context. (10,627m<sup>2</sup> / 47,891m<sup>2</sup>)

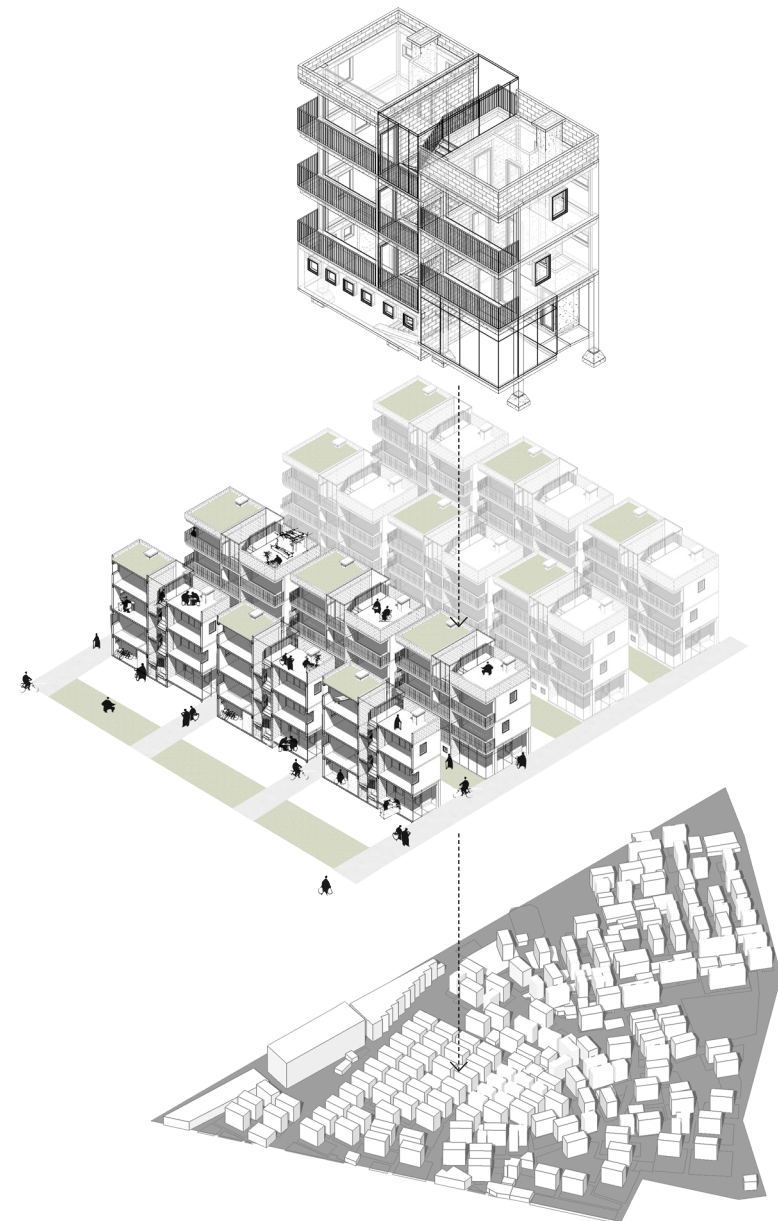
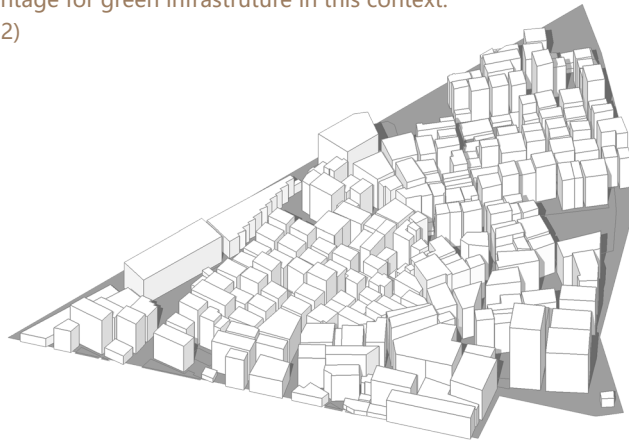


Figure 7-1. Current aerial view and the possible change after prototype implementation



## 8 Conclusion & reflection

Things that related to land equity is less likely to be easy pieces, honestly, urban-village issue is more complex than the description in this thesis. And It is hard to define who is the vulnerable one, but stakeholders having different requests. Finding out a common ground is the key to keep a balanced development. Hence, now it is a good timing that the changing market demand motivates villagers to upgrade their building, municipality is now encouraging long-term, win-win

transformation mode. With these changes in economic and social aspects, urban-village sustainable transition, which is hard to imagine in the past, is now showing more possibilities than before.

But as a complex issue, there are a lot of topics to focus, e.g. public facilities, social problems, security, etc. In the very beginning, environmental topics are what I am interested, limited by my study background, public space was what

I wanted to concentrate. However, as a settlement with extremely high building density, villager housings are the main elements that occupied most of the land and waiting for attentions. It is more likely to be the first step of changes. Thus, in this thesis, I choose to put emphasis on building scale to design a basic prototype for rebuilt urban-village housing, and estimate in data showing how its application can bring effort to larger scale providing potential for further

development.

In village scale, different from the previous redevelopment project, this proposal respects the initiatives and capabilities that villagers have, let villagers, motivated by rental market, take part in the transformation. Although its changing process may go slower than the reconstructive one, but slow progress might be healthier.

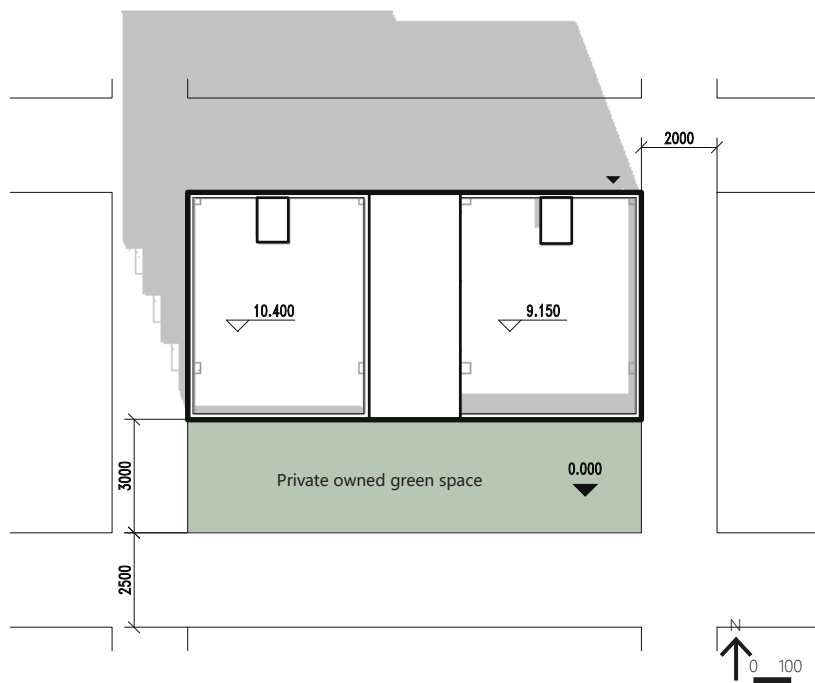
Figure 8-1. Long-gui village, Guangzhou, 2016

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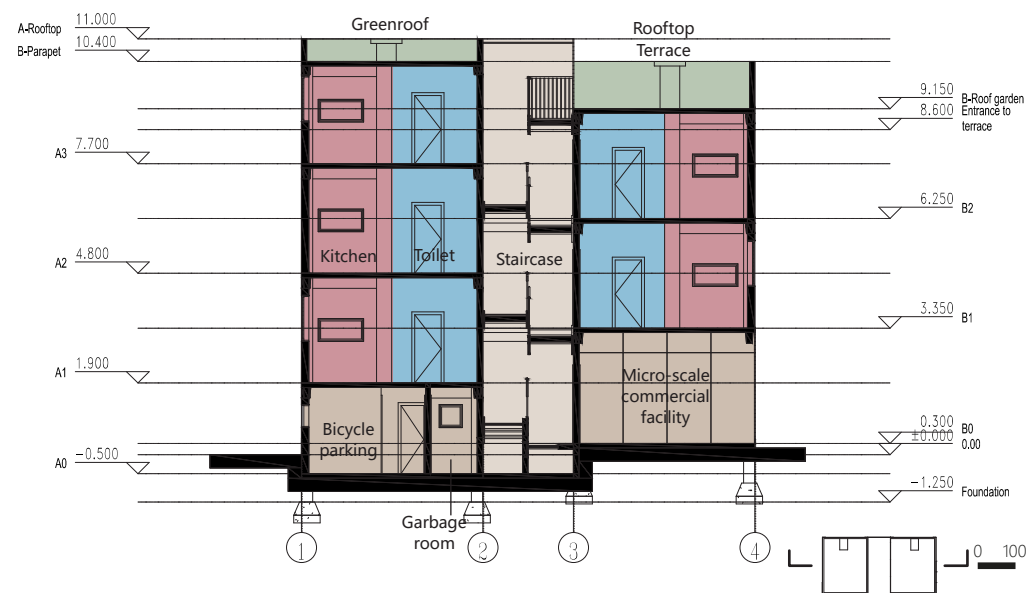
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## DETAILED DRAWINGS OF PROTOTYPE

- I. Site plan, 1:200
- II. Section, 1:200
- III. Plan of ground floor, 1:200
- IV. Plan of typical floors: A2 & B1, 1:200

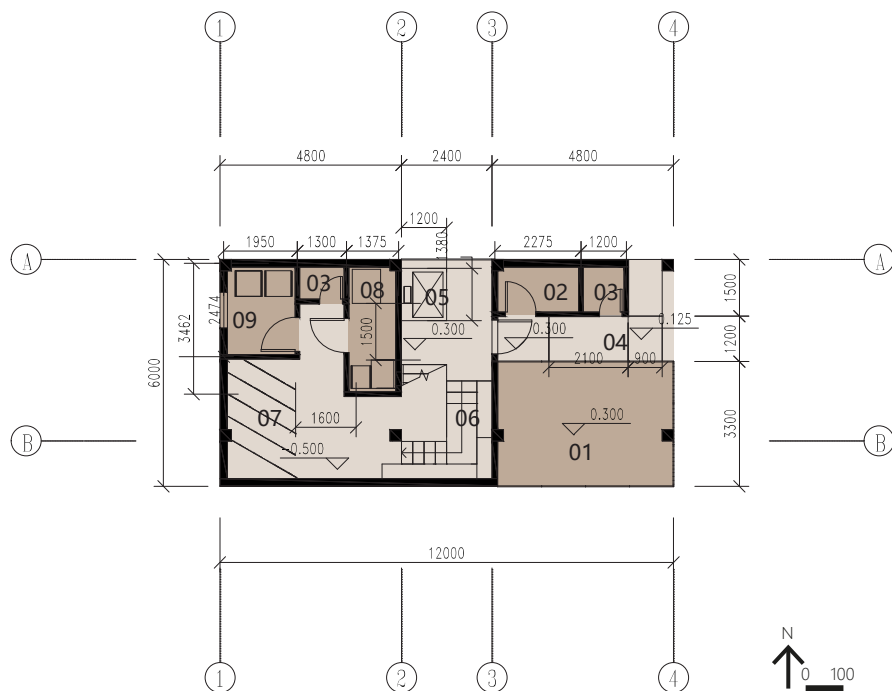


I. SITE PLAN



II. SECTION

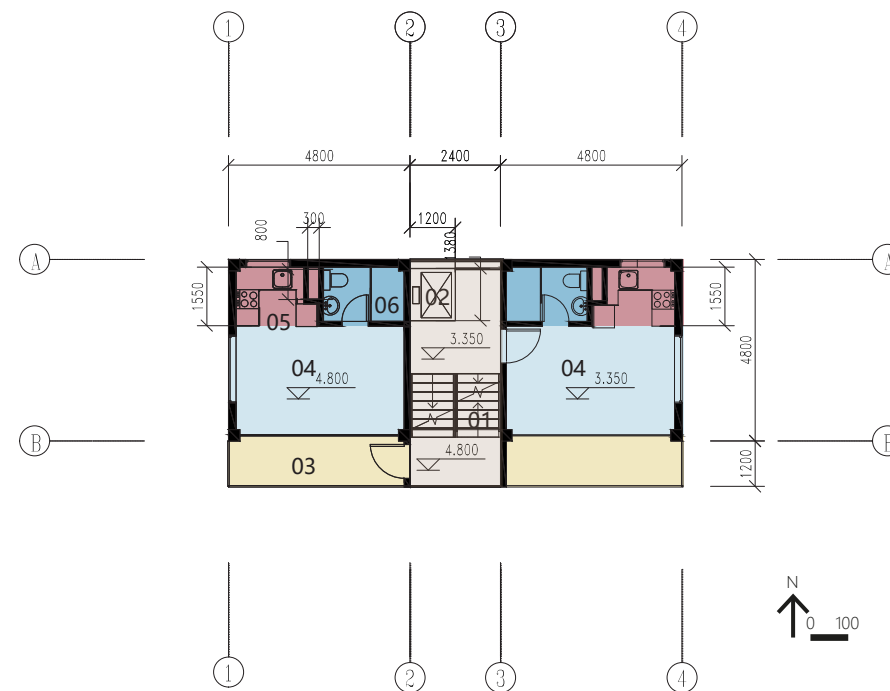




III. PLAN OF GROUND FLOOR

- 01. Micro-scale commercial facility
- 02. Storage
- 03. Mechanical room
- 04. Ramp
- 05. Elevator

- 06. Staircase
- 07. Bicycle parking
- 08. Garbage room
- 09. Laundry room



IV. PLAN OF TYPICAL FLOORS: A2 & B1

- 01. Staircase
- 02. Elevator
- 03. Balcony
- 04. Studio apartment
- 05. Kitchen
- 06. Toilet