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TOWARDS THE MAKING OF USER FRIENDLY PUBLIC SPACE IN CHINA

AN INVESTIGATION OF THE USE AND SPATIAL PATTERNS OF NEWLY DEVELOPED SMALL AND MEDIUM-SIZED URBAN PUBLIC SQUARES IN GUANGZHOU AND SHENZHEN

BY

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"We choose to go to the moon. We choose to go to the moon in this decade and do other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win and the others, too."

John F. Kennedy

Address at Rice University on the Nation's Space Effort

12 September 1962

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Wellington, 30 June 2016

Ngoc Minh Nguyen

STATEMENT OF ORIGINAL AUTHORSHIP

I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of materials which have been accepted for the award of any other degree or diploma at Victoria University of Wellington or any other educational institutions, except where due acknowledgement is made in this dissertation. Any contribution made to the research by others, with whom I have worked at Victoria University of Wellington or elsewhere, is explicitly acknowledged in this dissertation.

I also declare that the intellectual content of this dissertation is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.

Ngoc Minh Nguyen

ABSTRACT

This thesis investigates how new small and medium-sized public squares are designed and used on a daily basis in Guangzhou and Shenzhen, two major cities in the Pearl River Delta, China. Given an extreme lack of open public space in these cities, these newly developed public space are expected to improve the life of millions of Chinese urban citizens; however, many of them are frequently criticised as inconvenient for users. How to improve the performance of these small and medium-sized public squares is therefore a critical issue faced by the city planners and designers. However, to dates, academic studies of public space in China are primarily focused on the architectural expression of the space or the development of the 'public sphere' in China. Hence, information about the actual use of small and medium-sized public squares in China is virtually absent.

In order to fill this gap in knowledge on how these new public space are designed and used, this thesis examines 13 small and medium-sized public squares that have been (re)developed over the last 15 years in Guangzhou and Shenzhen using primarily the space syntax methodology, including direct (non-participant) observations and space syntax analysis techniques. The thesis focuses on the examination of three aspects: static occupancy and its relation to actual physical settings, transient use of the space and its relation to urban configuration, and the location preferences by Chinese users and the underlying visual logic.

The findings from this thesis document a significantly different way of using public squares in China, as compared to their Western counterparts. Specifically, these spaces are used primarily by the elderly and organised activity groups. This collective way of using public space in China in combination with a wide range of cultural specific activities such as "exercising", "babysitting", "playing chess/cards" and "group-singing" has resulted in different spatial use patterns. In particular, this thesis has documented a strong preference for visually exposed

locations, with much activity occurring at the centre rather than at the edges of public space, which are the most popular locations in public space in the West.

Apart from providing valuable insights about the use and design patterns of small and medium-sized public squares, this research also proposes a number of spatial principles that could provide some guidance for designers and policy makers in the making of more user friendly public space in China in the future. Last but not least, findings of this thesis also hope to stimulate further studies of public space in China, especially those using Space Syntax methods.

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DEFINITION OF FREQUENTLY USED TERMS

Public Square: There are different definitions of public space in general and public squares in particular. In this thesis, the term **"public"** simply means that everyone has the right to access and use the space. The term **"square"** is indicative**.** This can be a public plaza, a market place, a pocket park or a square-like setting in a park. Often the ratio of paved area to the total area of the space can be used to differentiate squares and plazas from urban parks. However, this ratio varies greatly among different climate regions. In Guangzhou and Shenzhen, the Southern part of China, the investigation of 13 case studies suggests a ratio of paved area to total area of public squares to be about 65 % on average (see page 164).

Small and Medium-sized public squares**:** This term is relative and only relevant within the Chinese context where the average size of monumental civic squares is about ten hectares. Each of the 13 case studies presented in this thesis has a size ranging from 1,500 square meters to above 3.5 hectares, with the average size being 1.2 hectare.

Off-peak period: This is the time period where the number of static users is less than other periods of the days. In this research, in order to identify the location preference by users, observations of three off-peak periods of each square were used.

Wall and Fence: The walls of public space are often brick in China. Solid walls are often both visual and physical obstacles. In contrast, fences of public space are often mainly obstacles for physical accessibility, but not necessarily for visual accessibility. Hence, the two terms are used interchangeably when examining the physical accessibility of the space; whereas these two terms are used carefully when examining visibility of the space.

Explicit Seats: These are designated seats such as chairs or benches.

Integral Seats: In contrast to explicit seats, integral seats are sitting places that are integrated into other elements. For example, they are steps or low walls.

Linear Seats: These are arranged in a linear manner so that users can easily avoid eye contact with strangers. In this thesis, the width of one linear seat is suggested to be 60 cm.

Group-seats: In contrast to linear seats, group-seats are arranged in a way to enhance face-to-face conversation. Chairs around a table are good examples of this type.

Informal Sitting: This term is often used in a situation where people sit on the ground or anything possible as there are not enough designated seats available.

Primary Activities: Primary activities are those which can be easily identified through the human body postures. They are defined in this thesis as "sitting", "standing" and "exercising".

Secondary Activities: In contrast to primary activities, secondary activities cannot be identified only through the human body postures. Typical secondary activities which occur in public space in Guangzhou and Shenzhen are "playing chess/cards", "babysitting" and "singing/sewing".

Centric Space: The terms "centric" and "enclosed" space are borrowed from J. S. French's seminal work entitled *"Urban space: A brief history of the city square"*. A centric space is a space that invites "through-movement" by providing simple and direct routes crossing the centre of the space. In contrast, the term 'open space' in this thesis simply indicates a space without fences or walls to control accessibility.

Enclosed Space: In contrast to a centric space, an enclosed space often directs movement towards the edges of the space; therefore, it often has no pathway leading to the centre of the space.

Working-aged User Group: Given the nature of non-participant observations, the ages of public space users are judged from direct observation without asking questions. Working-aged users are believed to be within the age range from 15 to 55.

Elderly User Group: These users appear to be older than 55 years (the official retirement age in China for women). In other words, they are retirees or old people who do not have a daily routine of working from 9.00 am to 5.00 pm. The elderly group forms the largest proportion of the total number of public space users in China. Given the nature of non-participate observation, age is simply judged from appearance.

Static Use: Static use of a public space includes all kinds of activities that occur when people (nearly) stay in one location. Static use of the space excludes the use of the space as a moving-through space.

Mean Use Density: This measure is an indicator of how effective a public space is used by static activities. It is calculated by dividing the mean level of static use by the paved area of the space.

Transient Use: In contrast to static use, transient use normally concerns the use of the space as a moving space. All activities such as moving through the space or moving inside the space should be counted as part of transient use. In this thesis, given the fact that the number of people moving into a public space is much greater than the number of static users,[1] transient use is simply defined as the number of people entering a public space.

Visibility Graph Analysis (VGA): VGA is a modelling method developed by Space Syntax Laboratory. This method is used to calculate the visual integration or the degree of visibility of

[1] On average, there are about 1,200 people entering a public space from the sample of 13 public space whereas the mean number of static users at any given time is only just over 100.

each cell within a space. VGA has been used for more than a decade by many researchers to quantify the impact of visibility on human behaviour in public space. VGA maps are generated using Depthmap – the most used and free Space Syntax software.

Overlapping Isovists of the Gates (OIG): This method was firstly developed by Maria Campos – a researcher at Space Syntax Laboratory using the concept of the isovist – a visual field introduced by Benedikt (1979). The overlapping isovists method offers a way to quantify the exposure degree of any point within a space from the gates or entrances of public squares. OIG maps are generated using Depthmap and Photoshop.

Axial Map: This method was introduced by Hillier and his colleagues in which urban spaces are simplified as a set of axial lines. With the help of graph theory, an axial map offers a way to quantify accessibility, integration or segregation of any urban space.

Strategic Value of a Public Square**:** This is a syntactic measurement of the degree of accessibility of the space which is calculated as the sum of the integration value of all axial lines that interface the body of the square. The strategic value has been proved to be useful to predict the level of public space visitors by a number of studies in the European context.

Visual Core (Centre) or High Visibility Area of a Public Square**:** This is the most visible location from all other locations within a given public square. When staying within the visual core, people are more likely to be seen by other public space users than in other areas. The visual core can be identified with the help of the Depthmap software.

Low Visibility Area of a Public Square**:** Compared to the visual core, low visibility areas are the most visually segregated locations within a given public square. When staying within this area, people are least likely to be seen by other public space users.

Medium Visibility Area: This is the location with medium degree of exposure.

Legible Space: This term was introduced by Kevin Lynch and is defined as the ease with which people understand the layout of a space. In Space Syntax, the legibility of a space is related to another property- the intelligibility, which can be calculated mathematically.

Convex Space: This is defined as a space in which no straight line drawn between any two points goes outside the space**.**

CHAPTER ONE

INTRODUCTION

1.1 Background

Over the last three decades, Chinese cities have undergone tremendous changes under the influence of rapid modernisation and globalisation processes (Friedmann, 2005; P. Rowe, 2005; W. Wu & Gaubatz, 2013). Both of these processes have left their mark on the development of public space in China. On the one hand, like elsewhere, the urban structures of Chinese modern cities, often called superblock urbanism (Abramson, 2006, 2008), have been developed to privilege fast movement and accommodate the rapid rise of car numbers. However, this has led to a trend away from the use of streets as primary public space in many Chinese cities (Pu, 2011; Qing Wang, 2010). On the other hand, the globalisation process favours the development of commercial public space and the consumption of existing ideas and models from the West and this has led to the homogenisation of public space locally and globally (Bracken, 2009; Gaubatz, 2008; Pu, 2011; Ren, 2011; Zukin, 2009).

And yet, under the influence of these political and economic processes, public squares have been introduced into Chinese cities with a considerable speed. Prior to the 2000s, many cities simply wanted to have their own version of Tiananmen Square in Beijing (Gaubatz, 2008), and thus hundreds of monumental civic squares, with an average size of ten hectares, were constructed throughout the country (Y. Wang, 2002). These spaces, however, like their original are argued to be designed and used to display political power. Socially, they are places of

exclusion rather than gathering or meeting spaces for ordinary people (Douglass, Ho, & Ling, 2002; Hassenpflug, 2004b). The dawn of the 21st century has seen many major cities begin their redevelopment process, in which small and medium-sized public squares have been inserted into both historic areas and urban villages (Hang, 2006; Yang & Volkman, 2010). The cities of Guangzhou and Shenzhen have acted as experimental fields for these new models, including the recent development of small and medium-sized public squares.

While there has been a significant increase in the number of small and medium-sized public squares, the quality of the space and especially the user experience has received minimal attention. Previous studies conducted by both Chinese and Western researchers often focus merely on the making of civic and monumental public squares, while providing virtually no information about the newly developed small and medium-sized public squares. Given this knowledge gap, this thesis sets out to provide insights into the form and use patterns of these public squares, which are necessary for the development of user friendly public space in Chinese cities.

1.2 Problem Definition – The Lack of Quantitative Information about the Use of Small and Medium-sized Public Squares in Chinese Cities

Studies of public space in general and public squares in particular have emerged in China over the last two decades. Both Chinese and Western scholars have started to investigate different aspects of the making of public space and public squares in Chinese cities. For example, many studies dating back to the 1990s focus on the transformation of the development of the "public sphere" in China and its consequences on the use of public space as a disputed territory between the state and society (E. X. Gu, 1999; Huang, 1993; Orum et al., 2009; Rankin, 1993; W. T. Rowe, 1990; Wakeman, 1993). In a similar vein, it is argued that newly developed public squares in China have been designed as a scene for the state to display its political power and achievements (Gaubatz, 2008; Hassenpflug, 2004a; Mary Padua, 2006; Pu, 2011), with much

less attention being given to the people's daily needs. In addition, many studies report on the commercialisation and privatisation of public space in China that occurs due to an absence of institutional regulation which further compromises the rights of public space users (Broudehoux, 2004; Chen, 2010; Juan, 2010; Pu, 2001, 2003). However, while raising the fact that public squares and public space in China are not user friendly; the majority of studies do not provide insights into the actual use of the space. Important information including the type and amount of static users, their daily activities, their spatial behaviours or their preferred locations in public squares, is virtually absent in the literature. The following sections further define the lack of information about the use and design of small and medium-sized public squares in Chinese cities.

User unfriendly features of public squares in Chinese cities

A review of many studies of public squares and urban plazas in China suggests frequent features that make Chinese public squares appear user unfriendly are: (1) the size of the space, (2) the existence of walls and fences; and (3) the poor provision of sitting opportunities. According to a study conducted by Wang, the average size of civic squares in major cities in China is nearly 13 hectares, whereas the largest civic square – Xinghai Square in Dalian has a size of about 176 hectare (Wang, 2002). Even small cities have also developed extremely large squares. For example, Gaomi, a small town in Shandong Province, has developed a new square the size of 60 football fields in 2006. When visiting some public squares in China, Hassenpflug (2010) states that people tend to lose their sense of orientation when navigating inside the space. Another scholar, Pu (2011) has found these civic squares unwelcoming, especially as they remain empty during the day. This thesis does not examine civic and monumental squares because civic and monumental squares often carry additional purposes rather than serving the daily needs of public space users. The focus of this thesis is placed on the small and medium-sized public squares and urban plazas whose design is supposed to address the needs of users. However, a pilot study of the small and medium-sized public squares in Shenzhen also suggests

that the scale issue is present (Nguyen, Brand, Schnabel, & Moloney, 2015). Nguyen et al. (2015) report that the size of a medium-sized public square in an urban village – Xiasha village is more than three hectares which is three times larger than that of the Trafalgar Square, one of the largest civic squares in England.

In addition, many researchers have reported that public squares in China are often walled. In this regard, Gaubatz believes that the existence of walls and fences throughout history has prevented the development of "real" public space in China (Gaubatz, 2008). Observation in the West shows that walls and fences have a negative impact on the performance of the space (Whyte, 1980; Gehl, 1987, 2003). Nevertheless, the impact of walls and fences on the use of the space in China might not be necessarily negative, as these elements are essential parts of the Chinese culture, and therefore they might not be perceived as negative as in the West. It is suspected that the existence of walls and fences might not affect the levels of usage, but they might affect the type of activity inside the space. In a walled public space, people might not be afraid of being seen and judged by strangers passing by, and thus they might try out different types of activity such as singing or dancing. In short, the impact of walls and fences needs to be carefully examined in the Chinese context.

The last unfriendly feature of public space in China is said to be the poor provision of sitting opportunities (Pu, 2003, 2008; Hassenpflug, 2010; Yang and Volkmann, 2010). In a study of public space in Beijing, Guangzi Su (2012) reports that the lack of sitting opportunities is significant, *"so that people have to lean on trees for resting, some even sit on the floor"* (Su, 2012, p.166). Another observation of a medium-sized public square in Shenzhen has confirmed the lack of seats. Nguyen et al. (2015), report that Chinese public space users often carry their own chairs with them as a means to overcome the poor provision of seats, especially of group-seats.

The three unfriendly features of public squares in China have been raised by many scholars. However, the majority of studies do not relate them directly to the use patterns of the space as the use patterns are often not part of their studies. Hence, these studies are not able to provide any useful recommendation to architects and designers if they want to develop more user friendly public space. The three following sections present a gap in the literature which is the starting point for this thesis.

Lack of information about static use patterns of small and medium-sized public squares

Since the 1960s in the West, generations of researchers have studied static use patterns of public space. Hence, when designing a public square or urban plaza in the West, architects often know the most likely type of users they design for, their temporal use patterns as well as their preferred locations in open public space. This set of information is crucial for the development of a user friendly public space. However, in China this set of information is virtually absent. Some academic studies unveil a few facts about the daily performance of public squares. For example, Li investigates the use of two public squares in Dalian, showing that playing cards or chess and exercising in a group often occur in public squares (Li, 2004). An observation of a prominent urban park in Shanghai by Orum (2009) has acknowledged the popularity of group activities including dancing – *Guangchang Wu*, exercising, singing and playing chess/cards in public space in China. A more recent study suggests that public square dancing – *Guangchang Wu*, has attracted 100 million participants in China. Most of the participants are middle-aged and elderly women who are organised into big groups (Qianni Wang, 2015). There is evidence that group activities including exercising and playing chess/cards are also dominant in small and medium-sized public squares (Nguyen et al., 2015).

It would appear that the use of public squares and urban plazas in China is vastly different from their Western counterpart given the dominance of large activity groups. Previous studies of public squares in China do offer some insights about the type of users and activities. However,

the number of users and activities is still missing. Without this information, it is impossible to quantify the impact of the scale, walls and fences, as well as the provision of seats on the performance of the space. More importantly, none of the previous studies offer any insights about the spatial behaviour of public space users in China.

Lack of information about the "preferred location" in small and medium-sized public squares

The West (including West European and Northern American cities) has also experienced a vast decline in the use of public squares and urban plazas after the Second World War, and since then how to improve the performance of public squares and urban plazas has become a popular topic for many western architects and researchers. Jan Gehl (1987) and William Whyte (1980, 1988) state many seats in public space are left empty because they are placed where people do not want to sit. Hence, the improvement strategy is not simply about the provision of public amenities, but more importantly the distribution of these amenities. Many studies have been conducted to discover the "preferred location" and the psychological process behind how public space users select a space to stay. De Jonge (1968), Alexander at al. (1977), William Whyte (1980) and Jan Gehl (1987) document a clear preference for the edges of public squares. According to Whyte, people are attracted by other people, thus sit at the edge in order for them to have a great view of pedestrians passing by (Whyte 1980, 1988). Alexander suggests that the life of public squares forms naturally around their edges (Alexander et al. 1977), and the centres of the squaress are often left empty because people do not want to be greatly exposed to others. From the field of environmental behaviour, Appleton explains how the ability "to see" and "to be seen" has configured human behaviour in open public space. According to his "theory of prospects and refuges", in an open space, a person naturally prefers locations where he is well protected (refuge), but at the same time has a wide view (prospect) of the surroundings. No one wants to be in an "exposed" location and seeks to avoid unexpected potential dangers (Appleton, 1975). More recently, a method to quantify visibility of public

open spaces, Visibility Graph Analysis (VGA), was developed in the Space Syntax Laboratory (Turner, 2004) which has been used widely by many researchers to proven to study human behaviour in open spaces. Early studies using this method confirm the validity of the "edge effect" (Campos, 2005, Bada and Farhi, 2009). More importantly, this method allows researchers to identify locations inside a square that have the quality of the edges and vice versa. Thus this method views an open space in a much more sophisticated way than simplifying it into merely the edges and the centre.

However, virtually no studies have been conducted in China to investigate the "preferred location" of public space users. Do Chinese public space users prefer the edges over the centre of the space? Is the "theory of prospects and refuges" also valid in China where the collective use of public space is dominant? The answers to these questions will immediately help designers to detail the design of public space. Knowing the "preferred locations" of users, designers can avoid a common mistake of placing seats in undesired locations. Unfortunately, the majority of studies of public space in China have paid little attention to the users' spatial behaviour. Hence, the "preferred locations" by Chinese public space users still remains a big gap in the literature.

Lack of information about transient use of public squares in China

In the West, a shift in the perception of what makes a successful public square or urban plaza occurred in the second half of the 1980s. Before this shift, the key principles of a successful square were believed to be inside the square. These are, for example, the proportion of the square, and the picturesque characteristics or the enclosure property of the space (Sitte, 1989; Unwind, 1909; Zucker, 1959; Alexander et al., 1977). However, over the last three decades, researchers believe that the success of a public square or urban plaza depends on the levels of pedestrian movement inside and outside of the space (Whyte, 1988; Hillier, 1984, 1996; Campos, 1999; Carmona, 2014). Consequently, enhancing the degree of visual permeability

and accessibility of public space has become more important than any other factor in improving its performance. Professor Hillier and his colleagues at University College London have used the space syntax methodology to quantify the correlation between the degree of accessibility of a public space and the level of pedestrian movement inside and outside it (Hillier, 1984; Campos, 1997, 1999, 2005). In a study of public squares in London, Hillier introduces the "strategic value" of public space, which is the syntactic accessibility of public squares and is calculated with the help of an axial map (Hillier, 1984). According to his study, the higher the 'strategic value', the better the performance of the space. More recent research conducted by Campos (1999) confirms a positive correlation between the "strategic value" and the level of usage including both transient and static use of public squares in the Western context. In other words, the space syntax method suggests that the more centralised or accessible a place is, the higher its performance. In contrast to the West, transient use of public squares in China has not attracted enough attention by researchers. Although walls and fences have been gradually removed to enhance the physical and visual accessibility of public space in China (Gaubautz, 2008), insights about transient use are largely unavailable.

Basically, studies of public space and public squares in China have mainly focused on the formal expression. There is a gap in knowledge about the actual use of (small and medium-sized) public squares in Chinese cities including static and transient use. Towards the development of user friendly public space in China, this thesis sets out to fill the gap. Importantly, it also contributes to the understanding of the collective use of public space as well as further examining the validity of the space syntax methodology in a non-Western context.

1.3 Research Aim and Objectives

1.3.1 Research aim

This thesis aims to provide valuable insights into the use and design of small and medium-sized public squares in Chinese cities. It is the very first study of small and medium-sized public squares in China that uses space syntax methodology to quantify the linkage between spatial properties of the spaces and their use patterns. The findings of this thesis aim to provide architects and urban planners more concrete and useful guidance to make more user-friendly public space in China. In addition, the findings from this thesis about the collective way of using public space will set the foundation for the study of collective behaviours in public space.

1.3.2 Research objectives

- To examine the use patterns of small and medium-sized public squares on a daily basis including gaining quantitative information about the users, their activities and their choice of locations in open spaces.

- To assess quantitatively the impact of spatial properties on the use of small and medium-sized public squares including size, the impact of fences and gates and the provision and distribution of sitting places.

- To assess the impact of the urban configuration (locational factors) on the levels of transient and static use of public space.

- To evaluate the design and performance of 13 newly (re)developed small and medium-sized public squares in Guangzhou and Shenzhen and to identify factors that constrain the design and performance of these spaces.

1.4 Research Question

Given the lack of information about the use and design of small and medium-sized public squares and the relevance of this type of public space in contemporary China, the main research question is stated as follows:

> *What insights can be gained about the spatial and use patterns of small and medium-sized public squares in Guangzhou and Shenzhen through spatial analysis techniques?*

In order to answer this main research question, the space syntax method is used as the main research tool of this investigation. The space syntax method was developed at University College, London by Professor Hillier and his colleagues and has been widely used since 1984 to investigate key principles behind successful urban public squares (Hillier, 1984; Campos, 1997, 1999, 2005; Bada and Farhi, 2009; Ling, 2008) and public space in general (Hillier, 1993, 1996, 1997, 1999, 2004, 2005; Hanson, 1999; Karimi, 2002; Papargyropoulou, 2009; Haofeng, 2008).

The space syntax method is composed of two sets of methods: direct observation methods and syntactic spatial analysis methods. Direct observation methods are used to study the use patterns of public space including the type and number of users, their activities and choices of locations, whereas syntactic spatial analysis methods including the Axial Map and Visibility Graph Analysis (VGA) offer the opportunity to investigate the correlations between formal and use patterns of public space. In particular, the Axial Map method can potentially explain why some squares attract much higher numbers of visitors than others based on their ability to quantify accessibility of the space objectively (Hillier, 1994; Campos, 1999; Ling, 2008). In contrast, the VGA method can quantitatively examine the visual logic behind the location preferences of public space users (Turner, 2004; Bada and Farhi, 2009; Papargyropoulou, 2009).

In order to answer the main research question, three detailed investigations are conducted. Each of these three investigations is led by one of the three following research sub-questions:

> *Research sub-question 1: What are the static use patterns and how do spatial properties impact on these patterns?*
>
> *Research sub-question 2: What locations are preferred by different groups of users and what is the visual logic behind these preferences?*
>
> *Research sub-question 3: What are the patterns of transient use and how are these patterns affected by the design of the circulation and the urban configuration of public space?*

The first investigation, which is led by the first research sub-question, examines the static use patterns of small and medium-sized public squares using direct observation methods including activity mapping. Public space users are classified according to their age, gender and type of activity. This investigation is expected to provide not only insights into the type and number of static users and activities, but also their temporal patterns. In addition, the impact of three particular spatial properties: the size of the square, the existence of walls and the provision of sitting opportunities on the static use patterns are also examined.

The second investigation, which is led by the second research sub-question, examines the visual logic behind the distribution of the static use of public space using the space syntax method. In particular, this investigation relies on two methods: behaviour mapping and visual graph analysis (VGA). The second investigation will unveil the "preferred locations" of different types of public space users in China. The findings from this investigation will directly help architects to place seats where they are most likely to be used.

The final investigation, which is led by the third research sub-question, studies the patterns of transient use of small and medium-sized public squares also using the space syntax method.

This investigation will examine the impact of the urban configuration on the level of transient as well as static use. In addition, it also tests the validity of the space syntax method in the Chinese context.

1.5 Research Scope

According to Neal (2010), there are three distinct research approaches to the topic of public space: (1) the legal-economic perspective which seeks to answer the most concrete questions about public space, such as what it is, or who pays for it, thereby laying the definitional and institutional groundwork for other enquiries; (2) the political perspective that questions the role of public space in democracy, both abstractly as a site for discursive activities and concretely as a site for exclusion or empowerment; and (3) the social-spatial perspective that is more concerned with questions of design and application, such as what it looks like and how it is used.

The scope of this thesis is within the social-spatial perspective as located above by Neal (2010). To be more precise, this thesis focuses ***primarily on the use of the space, the spatial properties and the linkage between these two***. This means that this thesis will not address the philosophical discourse of how the development of a "public sphere" or the perception of the "publicness" and the lack of regulations might affect the use and design of public space.

This thesis is not a comparative study between the West and China per se, although it touches on the problem of using Western models in China. Additionally, in the absence of previous research studies on use patterns of public squares in China, this thesis uses findings that emerge from the West to reflect on, and to clarify, the contribution of the research. Thus, any comparison should be seen as a side result rather than the focus of this thesis.

Furthermore, there are many factors that might affect the use of public space including tangible and intangible factors. This thesis, however, does not investigate the impact of any intangible

properties of the space such as the historical and cultural background of the space. It does not focus on the architectural expression of physical elements; hence, it does not discuss the identity, meaning and ideology behind the architectural elements. The wall is not a neutral element in Chinese architecture and urban planning, as its placing and the placing of gates might be linked with the practice of feng-shui theory in China. However, in this research, the wall is only considered to be a physical and visual obstacle for public space users.

The assessment of the level and the distribution of static use are based on the objective and direct observations of public squares under relatively similar conditions. A spatial analysis of public squares will be undertaken using space syntax methods, which quantify objective spatial properties such as the degree of accessibility and visibility. No attempt has been made to investigate users' emotions or perceptions and their impact on behaviours in open spaces. In short, the nature of the evidence used in this thesis referring to both spatial properties and human behaviours is objective and numerical.

The terminology of public space includes many different types, including open spaces, indoor spaces, parks, public squares as well as streets; therefore, there might be a need to further clarify the subject of the thesis. This thesis studies only one type of public space, namely the urban public square. The term "public" here is simply defined as being freely accessible for a wide range of users. Furthermore, considering the scale, there are roughly three types of squares in China: (1) the large urban plazas or grand civic squares; (2) the intermediate or small and medium-sized public squares; and (3) neighbourhood courtyards often found in gated communities. This thesis focuses only on the form and function of the small and medium-sized public squares that have been developed over the last three decades.

It is worth noting that the term "small and medium-sized" public square is a relative term which is relevant for the Chinese context, but not necessarily in other contexts. A survey of monumental civic squares in China conducted by Wang (2010) points out that the average size

of newly developed civic squares in Chinese cities is about ten hectares, so a square of three hectares might be considered to be medium-sized by the Chinese. However, this three hectare square might be considered extremely large in other contexts. Given the fact that the 13 case studies in this thesis have a size range from 1,500 m^2 to 3.5 hectares, they are by definition small-and medium-sized public squares in the Chinese context.

Regarding data collection, the public squares investigated will be observed from 7 am to 7 pm on a weekday. This time selection has an advantage regarding the study of location preferences. At weekends, public spaces in China often attract more users than on weekdays. This research thus concerns the majority use of these squares in the five weekdays.

Recently, the use of public space is gradually being affected by the popularity of mobile phones as well electronic surveillance. Studies of the impacts of these factors have been growing, especially in Western countries. However, these aspects are not the focus of this thesis as there is very limited information about the basic use and design of public space in China, and this is the necessary background for any further study of advanced topics.

1.6 Research Outline

This research sets out to answer one main research question: *What insight can be gained about the design and use of small and medium-sized public squares in China through spatial analysis techniques?* The thesis is composed of eight chapters. In addition to the introduction and conclusion, chapters two and three review existing studies of public space and public squares in China and in the West. These two chapters provide the theoretical framework for the empirical part of the research (chapters five to seven). Each of these three chapters sets out to answer one of the research sub-questions.

1.6.1 Chapter one

The first chapter provides background information for the research. In this chapter, the research problem, research scope and study area are defined in addition to the introduction of the research questions, aims and objectives.

1.6.2 Chapter two

The second chapter reviews the development of public squares in China to examine the influence of historical precedents and the relevance of small and medium-sized public squares for contemporary Chinese cities. More importantly, this chapter extends the problem statement set out in chapter one: the poor provision of basic amenities to support daily usage of public space and the lack of empirical studies that focus on the human dimension in the Chinese context. This chapter also highlights the collective use of public space in China and discusses the problem of direct imitation of Western models.

1.6.3 Chapter three

Building on chapter two, the third chapter reviews key studies of public space and public squares in the West within the social-spatial research perspective, ranging from Camillo Sitte to Hillier. This chapter locates the relevance of major research trends over the last century from which the position of this thesis is identified. This chapter critically examines the key principles of successful public squares in the West such as the scale, enclosure, edge effect, accessibility and visibility, and questions the validity of these principles in China. Given the difference between the two civilisations, many principles are unlikely to be concurrently present in both contexts; however, it is proposed that quantitative spatial analysis techniques developed in the West might be helpful for studying public squares in China. Chapter three concludes with a selection of two sets of spatial analysis methods for the empirical part of this research, which are presented in detail in chapter four, the methodology chapter.

1.6.4 Chapter four

This methodology chapter introduces two set of methods: direct observation and space syntax. A detailed description of the design of each method is presented. In addition, this chapter introduces the 13 case studies of small and medium-sized public squares in Guangzhou and Shenzhen cities in Southern China. This chapter concludes with a discussion of the strengths and limitations of the selected methods with regard to the aims and scope of the thesis.

1.6.5 Chapter five

Chapter five sets out to answer the first research sub-question: *What are the static use patterns and how do spatial properties impact on these patterns?* Using direct observation including behaviour mapping, this chapter investigates the types of users and activities and their relationship to spatial properties of the space such as size, the presence of fences and gates and the provision of sitting opportunities. In addition, design aspirations are assessed to identify the influence of historical precedents. An evaluation of the performance of 13 cases of small and medium-sized public squares is conducted according to three main sets of criteria: vitality, diversity and the provision of seats.

1.6.6 Chapter six

Chapter six can be seen as an extension of chapter five as it focuses on one major aspect regarding the static use of the space: the distribution of static activities, or the location preferences in open public space. This chapter addresses the second research sub-question: *What locations are preferred by different groups of users and what is the visual logic behind these preferences?* To answer this question, this chapter relies on the overlapping of two sets of methods: the behaviour mapping method and the visual analysis method – Visibility Graph Analysis (VGA) and Overlapping Isovists of the Gates (OIG). The outcomes of this chapter

confirm whether the edge effect is significant in the Chinese context and whether Chinese public space users prefer to locate themselves differently in open public space.

1.6.7 Chapter seven

While the first two empirical chapters are concerned with the static use of small and medium-sized public squares, the final empirical chapter focuses on transient use of the space. This chapter aims to answer the third research sub-question: *What are the patterns of transient use and how are these patterns affected by the design of the circulation and the urban configuration of public space?* This chapter identifies the factors that constrain the design in supporting the use of the space for movement. Using the gate method and movement tracing in combination with the space syntax method, the axial map, this chapter investigates how the degrees of accessibility generated by the urban grid configuration might affect transient use and thus the static use of public space.

1.6.8 Chapter eight

Chapter eight summarises all findings from previous chapters, discusses these findings in relation to the theoretical context of the research and proposes two sets of recommendations. The first set of recommendations concerns the potential integration of spatial analysis methods into different stages of the design process. The second set of recommendations comprises twelve spatial principles for the design of small and medium-sized public squares in China. This chapter concludes by noting the limitations of this research and suggests some possible directions for future research.

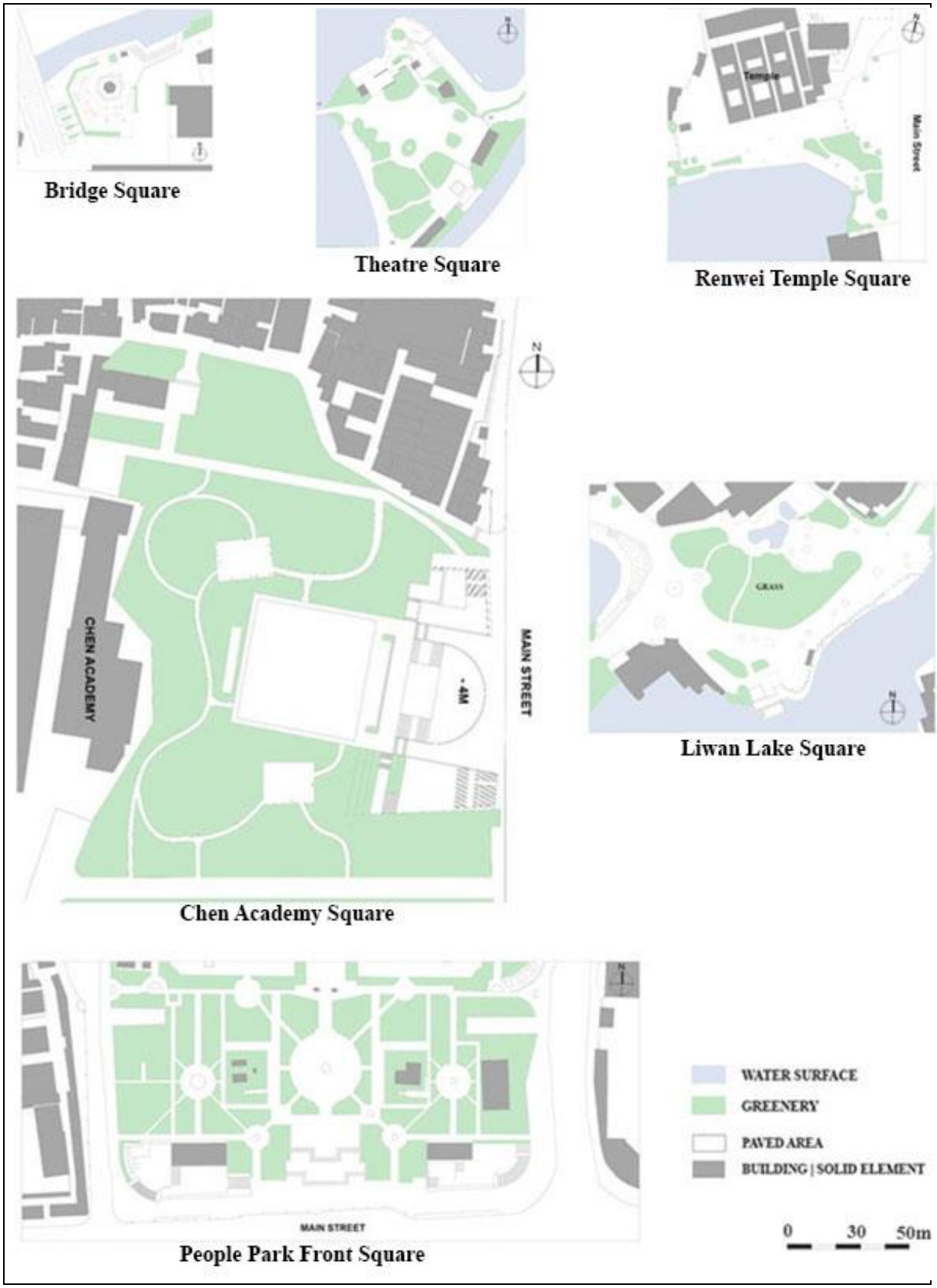


Fig. 1.1: The layout of the six squares in Guangzhou

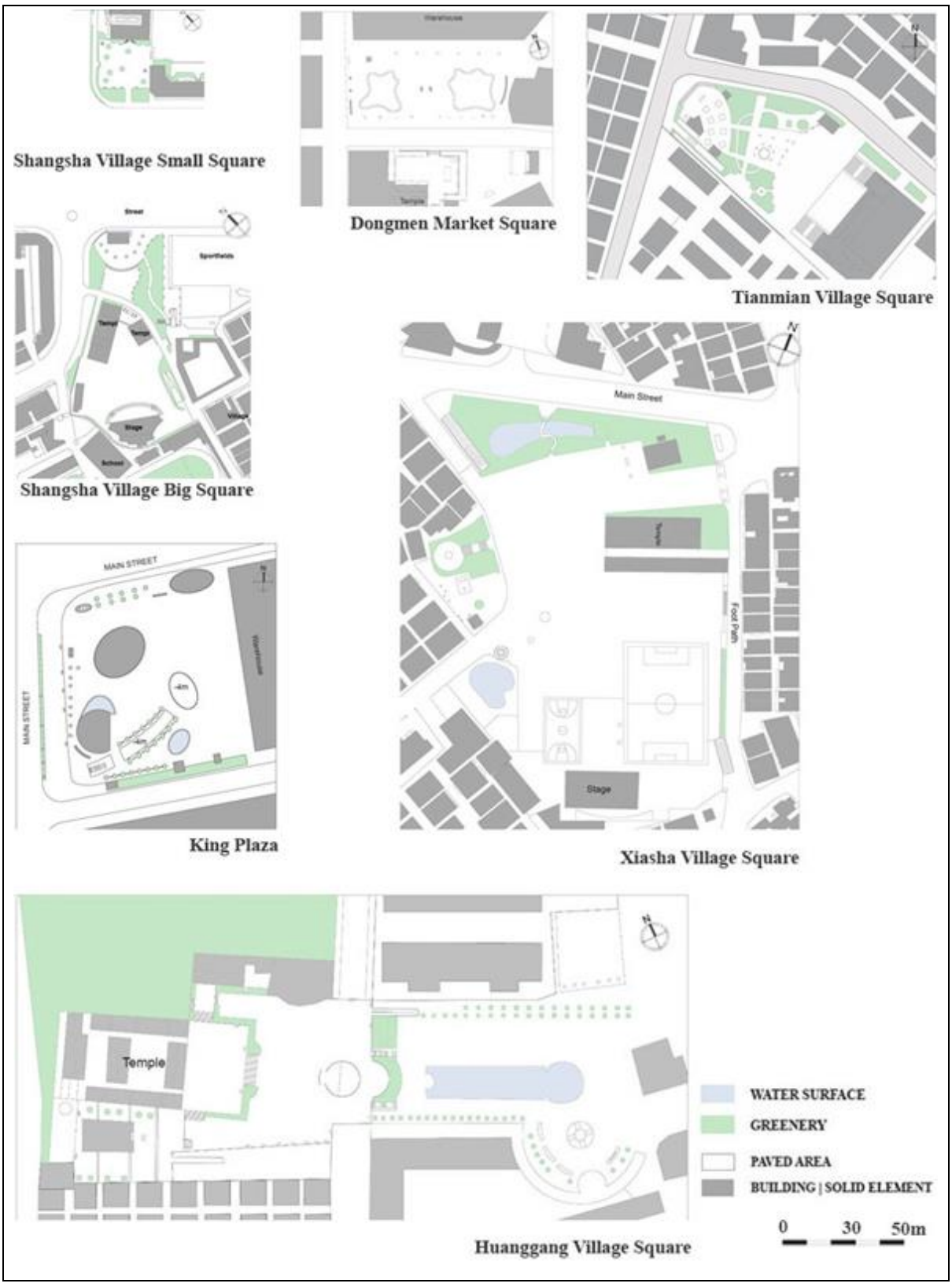


Fig. 1.2: The layout of the seven squares in Shenzhen

CHAPTER TWO

BACKGROUND TO THE DEVELOPMENT OF PUBLIC SQUARES IN CHINA

2.1 Introduction

This chapter reviews key studies of public space in China. It first introduces the state of knowledge about the topic and then further describes the problem statement addressed in chapter one.

2.1.1 Aim and scope

> *What insight can be gained about the design and the use of small and medium-sized public squares in China through spatial analysis techniques?*

This central research question provides the scope for this chapter. Through an examination and discussion of key sources, the aims are to: (1) provide an outline of the historical background to the development of small and medium-sized public squares in China; (2) identify major spatial problems in the design of small and medium-sized public squares; and (3) highlight the collective use of public space in China, which might lead to conflicts of interest among different stakeholders.

This chapter looks at major studies of public space in China, including works of key authors such as Pu, Padua, Gaubatz, Hassenpflug and Yang and Volkmann. Given the recent emergence of small and medium-sized public squares in China, the discourse on the design and

the use of this type of public space is minimal. While there are studies that focus on the political and legal-economic aspects of public space more generally, these are not within the scope of the research. Very few authors have explicitly studied the design and the use of public squares or urban plazas in China.

Despite the lack of in-depth studies of public space and public squares in China, this chapter provides the background and theoretical context for the spatial analysis methodology and with which to frame the later discussion of the findings. The literature review identifies the gaps in knowledge: the lack of quantitative information about the design and the use of small and medium-sized public square in general and the linkage between spatial design and patterns of use in particular. The generic issue of user friendly public squares is examined in detail in chapter three.

2.1.2 Overview

This chapter is organised into four sections. The first section reviews the historical development of public space in China over the last century to provide the historical context in which small and medium-sized public squares are introduced. In addition, this section also highlights the relevance of this type of public space for the current and future development of Chinese cities. In the absence of previous studies about this type of public space, this section includes informed observations by the author.

The second section identifies major problems and issues in the design of public space and public squares in China: the obsession with image-building or formal identity, the scale problem, the poor provision of basic amenities, and the existence of fences and gates.

The third section provides an overview of the collective use of public space in China, and the conflicts of interest between different stakeholders. It also locates significant differences in use patterns compared with Western counterparts.

In the final section, the issues identified in the literature review are discussed. This leads to the identification of a significant gap in knowledge: the lack of quantitative information regarding patterns of use in relation to the spatial design of small and medium-sized public squares in China. In addition, this final section highlights key theoretical aspects from the literature review that provide the context for the contribution to knowledge of this thesis.

2.2 Historical Development of Open Public space in China

The historical development of open public space in China can be divided into six distinct periods: (1) the Imperial/Pre-modern period (before 1840); (2) the Semi-colonial/Semi-imperial period (1840 - 1911); (3) the Republic period (1912-1947); (4) the Maoist period and (5) the 1980s-2000s; and (6) the 2000s onwards. Although the focus of this thesis is on small and medium-sized public squares, this section includes studies on urban parks, scholar gardens, and temple grounds, as these spaces are the origin of the notion of "public" space in China. More importantly, the design of scholar gardens and urban parks seems to influence the design of contemporary urban plazas and public squares.

2.2.1 The imperial/pre-modern age: Before 1840

Did public space exist in pre-modern Chinese cities? The answer seems to differ between scholars. According to Gaubatz, the use of high walls as a central element to organise urban spaces precluded the existence of true public space (Gaubatz, 2008). A similar argument can be found in work of Kiang (1999) who studies the making of ancient Chinese cities. He described the use of streets in Kaifeng – the capital of the Tang dynasty as follows:

> *"Politically, the severe ward walls, the strict control of access to the wide avenues, and the frequent disposition of police posts at intersections also made the Tang thoroughfares instruments of population control." (Kiang, 1999, p. 151)*

Pu, an important researcher in the field of public space in China, argued in one of his early publications that one of the seven most significant characteristics of Chinese traditional cities is the absence of public squares.

> *"Such a type of space was not in favour in traditional Chinese cities, especially in Southeast China. In these cities, the public realm took a linear form, that of a commercial street which frequently ran along a canal." (Pu, 1990)*

Pu went on to explain that China lacks the socio-economic background that would support the development of open public space. In his words:

> *"The square in the European city was used by merchants, the church, the municipal administration, and the general public for political and other gathering. In China, however, a centralised political system and a segregated society prevented the majority of residents from sharing local power or even a piece of officially designated open space." (Pu, 1990)*

However, other scholars have different views on the existence of public space in pre-modern China. Kiang himself has suggested in "Cities of Autocrats and Bureaucrats" that public space could have emerged after the Tang dynasty (6-9th century):

> *"Most spatial and temporal constraints were lifted. Public space such as streets and squares were opened to business and entertainment round the clock. Commercialization was so important that even temple courtyards were opened to the public for trade. (Kiang, 1999, p. 170)*

In addition to the temporal variation, there might also be geographical variation regarding the development of public space in China. In the South of China where political control was much looser (Gates, 1999), precedents for public space can be found in many market towns, where street markets and bridges have become popular open public space. In his study of water towns

in the South of China, Tong Gan identified several types of public space, including three types of squares: market squares, entrance squares and squares on water (Gan, 1999). However, these squares seem to have emerged spontaneously rather than being planned. Pu states that large and well-defined public squares in front of public buildings were not regularly used by the public (Pu, 1990).

Besides these spontaneous public squares, according to historians, there are other types of "public" space: (1) Imperial gardens, (2) Scenic parks, (3) Temple and Monastic gardens, and (4) Scholar gardens. The European and North American equivalents would be: royal parks, national parks or hunting grounds, sacred gardens, and domestic courtyard spaces or private residential gardens (Padua, 2007).

Among these types of open space, the design principles of the scholar or private garden are considered to have influenced the design of new public space in general and public squares in particular in China (Padua, 2007; Yang and Bo, 2010).

Scholar gardens differentiate themselves from imperial gardens not only in terms of their small sizes but also their ownership. Scholar gardens typically belonged to government officials, rich merchants or scholars who might use their garden to hold court, entertain guests, read, play chess, drink tea, recite poetry and paint. The a scholar garden often contains living quarters, reception halls, and studies with a fascinating array of pavilions, corridors, terraced houses, hills, creeks and vegetation, which are not large in size but are sited with the intention of capturing the feeling of natural scenery *(*Qingxi, 2003). In his book entitled "Chinese Gardens", Qingxi presents the difference between gardens in Northern and Southern China given the climate variations. However, there are several similar principles[2] across the regions. The scholar gardens reached their peak during the mid-Ming (circa 1500s) to early Qing Dynasty

[2] The very first book that contains techniques and design principles for scholar gardens is "Craftsmanship of Gardening" by Ji Cheng in the Ming Dynasty (1369-1644) (Qingxi, 2003). The most famous existing scholar gardens were built in the Ming dynasty in Suzhou, a prosperous city in the South of China.

(circa 1650s) with hundreds of private gardens, many of which are still well-kept in Suzhou and Yangshou (Keswick, 1986).

Fig. 2.1: Chinese royal and scholar gardens: Painted map of the Master of the Nets Garden (left); Jichang Garden (right)

According to Padua, the design of the "scholar garden" is derived from the "shan-shui" or "mountain-water" motifs in classical Chinese art, and is heavily influenced by feng-shui theory. Key principles include the making of small spaces seem large, the creation of an abstraction of nature and the intensive use of architectural elements. The design approach is narrative, focusing on the creation of a series of viewpoints shifting along the path to reveal different scenes; and each image is a visual representation of a verse of poetry (Han, 2012; Keswick, 2003; M. Padua, 2007a). This spatial concept is interpreted as a view of a horizontal scroll painting at the human scale (Barnhart et al., 1997). Many elements of scholar gardens such as stones, curved pathways and pavilion architecture can be seen in the design of modern public squares (Yang and Volkmann, 2010).

2.2.2 The semi-colonial/semi-imperial period: 1840-1911

In the period from 1840 to 1911, other notions of public space were introduced to China by the European and Japanese (Shi, 1998). In some coastal cities where trading with the Europeans occurred, a new nodal form of public space, the market place was introduced. In addition, urban public parks in the Western style were built, which were only open for a limited group of the

elite as the entrance fee was “too” high for the working class (M. Padua, 2008; Shi, 1998; Yang & Volkman, 2010).

In this period, the City Beautiful Movement in America (1890s-1920s) which was characterised by the making of numerous urban parks, reached China through European and Japanese architects and planners. In China, urban parks at that time had become a place not only for recreational purposes but also for political discussions (Shi, 1998; Padua, 2007). According to Meng Shi (1998), urban parks were public places where women and men could be together for the first time in history. Soon after their introduction, urban parks replaced the temple grounds to become the most popular meeting places in the early-modern age of China (Shi, 1998). In major cities such as Beijing, Shanghai and Guangzhou, a number of urban parks which were developed in this period remain well preserved and are still popular meeting places.

2.2.3 The republic period: 1912-1949

People Park in Guangzhou is the first urban park in the city, established in 1921. The city government commissioned Yang Xigong, a graduate of Cornell University, to design the park using a Western model.

Fig. 2.2: People Park in Guangzhou, the first park in the city designed in a Western mode

In this period, a number of influential Chinese governors advocated for imitation of Western and American city planning models. They commissioned American and European architects

and planners for a wide range of projects, but also sent Chinese students abroad to study Western architecture and city design. However, because of the civil war, the outcomes of this time are limited to the transformation of a vast number of imperial and scholar gardens into urban parks where Western-inspired styles are strongly present (Padua, 2007; Yang et al, 2010).

2.2.4 The Maoist period 1949-1978: Tiananmen Square – the first public square in China

Fig. 2.3: Tiananmen Square Beijing
(Akhtar, 2004)

Under Mao's regime, Chinese architects and planners learned intensively from Soviet urban planning. Soviet advisors worked together with Chinese planners to produce grand public monuments, large public squares and new city centres dominated by monumental landscape that were not unlike their Soviet counterparts (Bate 1980; Gaubatz, 2008). Significant outcomes from this period were the development of enclosed work-units and the introduction of the very first public square in China – Tiananmen Square. Tiananmen Square, which was originally part of the Forbidden City, was enlarged twice and converted into an open civic square of a scale and status that could resemble the Russian original – Red Square in Moscow (Hung, 1991; Lee, 2009). Tiananmen Square is a political space without any kind of facilities that serve other informal activities such as sitting opportunities or weather protection. It is simply a place to display political power. Hence, Tiananmen Square is claimed to be a "political" rather than a true "public" space (Gaubatz, 2008; Hassenpflug, 2010).

The problem of Tiananmen Square in particular and of many squares following it in China was not very different from their Soviet models, something already pointed out by many scholars.

For example, in "The Soviet Model: Ideal and Reality", Bater stated that the primary purpose of the square in socialist city planning is to cater for massive public demonstrations and to reflect the glory of the state (Bater, 1980). Soviet urban planning ideology often leads to the preference for large scale architecture and the use of symbolic elements, but not without problems. A further design problem was also raised by Bater: *"The design problem was one of striking a reasonable balance between occasional public functions and the ordinary day-to-day purposes these same thoroughfares, squares and buildings had to serve."* (Bater, 1980, p 29)

However, from the user experience perspective, public space in Socialist China was even more restrictive than during the imperial era. Commercial and entertainment sectors within cities were sharply curtailed, further limiting the public life of urban residents (Gaubatz, 2008). Nevertheless, this design ideology continues to dominate urban design thinking in China (Deng, 2009).

2.2.5 The post-Maoist period: From 1978 onwards

Since the 1980s, Chinese cities have undergone a tremendous expansion horizontally and vertically. This rapid urbanisation process can be roughly divided into two distinct periods. The first period from 1980 to 2000 is the time when Chinese cities were expanded beyond their physical boundaries, extensive new urban areas were constructed and infrastructure was upgraded, whereas from 2000 onwards, many Chinese cities have undergone the redevelopment of historical urban areas and urban villages.

The first wave of development from 1980 to 2000

Over the three decades of Mao's period, many cities decayed physically (Brand & Nguyen, 2014; Deng, 2009). This was followed by a period of rapid redevelopment and expansion, especially after the 1990s when the land-market and private ownership were first established

(Deng, 2009; F. Wu, 2009b). Urbanisation in this period is characterised by the development of enclosed superblocks and a car-friendly road system (Pu, 2003; Abramson, 2009). According to Wang (2010) and Pu (2001, 2003, 2011), the development of gated communities has had a severe negative impact on the function of streets as public space. While each gated community offers recreational spaces within its boundaries, the brutal containment has worsened the overall connectivity of the surroundings, making many streets only places for vehicles (Pu, 2001,2003, 2011; Wang, 2010).

Fig. 2.4: Century Plaza Shanghai
(Yang & Volkman, 2010)

During this period, most cities throughout China designed their own versions of "Tiananmen Square", creating massive paved squares either within the existing urban fabric or at its outskirts. According to Gaubatz (2008), these squares have ephemeral lives as viable public space: during official events, they are filled with people, but at other times, these vast paved expanses in many cases simply act as a void at the centre of the city. In a similar vein, Pu criticises the design of these spaces as being for show (a "window dressing" syndrome) rather than to support people's activities, since the model serves to intimidate the citizenry (Pu, 2001, 2003).

The second wave of development from 2000 onwards

From the 2000s onwards, many Chinese cities have undergone a redevelopment phase in which small and medium-sized public squares have been used as an important instrument to beautify old parts of historical cities (Law et al., 2009) and to restructure decaying urban villages (Hang, 2006). This redevelopment process is also called the "Cosmetic city movement" (Yang and Volkmann, 2010).

Many first ranked cities began to redevelop their old urban areas, with the intention of turning them into tourist destinations (Law et al., 2009). A good example of this movement is the case of a large square in front of the Chen Academy in Guangzhou, which allows tourists to see the Chen Academy from one of the busiest roads in the city. Plenty of decorative elements were added to the square including a grand gate, flower beds and expensive paved materials to make the square look as antique as the Chen Academy itself (see Fig. 2.5).

Fig. 2.5: Newly inserted square in front of Chen Academy in Guangzhou
(photos taken in 2013)

Furthermore, as Chinese cities have rapidly expanded after the 1980s, many rural villages have suddenly become surrounded by arterial roads and high rise office towers. Having no agricultural land left, former villagers turned their homes into rental apartments (Brand & Nguyen, 2014; Hao, Sliuzas, & Geertman, 2011; Logan, 2011; F. Wu, 2009a). By the 2000s, many of these villages have become overcrowded without any improvement of the existing infrastructure (Brand & Nguyen, 2014; Hang, 2006). In this circumstance, Shenzhen, one of the very first cities in the Pearl River Delta and the whole of China has promoted a rational

redevelopment of these villages. The narrow, irregular existing street patterns were replaced by a wider, grid-like street system. Old and decaying houses were replaced by mid-rise rental apartments which were built on relatively equally divided plots (Hang, 2006; Hao, 2010).

Fig. 2.6: Xiasha Village after redevelopment, Shenzhen
(photos taken in 2014)

Many urban villages in Shenzhen are spatially arranged around a small or medium-sized public square. Typical features of these spaces are one or two ancestral halls,[3] a Chinese grand gate, large cultural statues, one or two sports fields and often an open stage for periodic events (see Fig. 2.6). In Shenzhen and Guangzhou alone, according to statistics (Lin, De Meulder, & Wang, 2011; Ma & Wu, 2004), hundreds of decaying urban villages are waiting to be redeveloped in the near future, whereas this number China wide is nearly 2,000.

2.3 Spatial Problems and Issues in the Design of Public Squares in China

According to Pu (2003, 2011), the lack of open public space in Chinese cities has become more problematic over the last three decades because of the priority given to cars in recent urban development, which has affected the use of streets as public space. Hence, many streets have become deserted, whereas others have become over-crowded most of the time (Chen, 2010; Pu, 2003, 2011).

Under such conditions, the introduction of public squares could better serve the needs of the population. However, according to Chinese authors, local authorities and commercial investors

[3] The original ancestral halls were destroyed and then rebuilt in the public square.

also intend to use these “scarce” public spaces to showcase their achievements or to increase property prices in newly developed areas (Chen, 2010; Pu, 2003, 2011). Consequently, the design of public squares is biased in favour of political and commercial interests and is said to eschew the most basic daily needs of users (Hassenpflug, 2004b; Pu, 2011; Yu & Padua, 2007). In the following section, some typical problems regarding the design of public squares in China are reviewed.

2.3.1 Obsession with image-building and symbolic value

Unlike many modern public spaces in the West that are argued to exhibit a lack of identity (Canter, 1977; E.C. Relph, 1976), the making of public space in China seems to pay great attention to the construction of the image of the space. This is perhaps partly because of the characteristics of the Chinese culture and partly because of the influence of post-modernist design trends. There are two particular types of images that are favoured in China: an image of the West and an image of Chinese Grand History, both of which function as a leitmotif for the fabrication of public space.

Western models as a sign of modernisation and progression

At the beginning of the political and economic Reform initiated by Deng Xiaoping in the 1980s, numerous Chinese political leaders were sent to European and American countries to learn from the Western experience of city building. Having a modern city which looks similar to New York or Paris has become the ultimate aim of many Chinese politicians and planners (Marshall, 2003; Yu & Padua, 2007). It is argued that modernisation is often mistaken for westernisation in China (Hassenpflug, 2010; P. Rowe, 2005). Padua (2007) has called this the “west-wild” movement and the creation of “cosmetic” cities where content and form are not identical.

A study of urban plazas and squares in China conducted by Yang and Volkmann (2010) reports that their design is heavily influenced by Renaissance and Baroque garden design and the urban parks of the American City Beautification movement, that are characterised by rectilinear arrangements, expansive lawns and geometric patterned planting. In addition, throughout the country, there are many new towns whose design purposely mimics European towns, including the design of their public spaces. The case of Anting Town near Shanghai is good example of this movement.

Fig. 2.7: Public Space in Anting German Town
(Hassenpflug, 2010)

The design of one public square in Anting Town is inspired by the Theatre Square in Weimar, Germany. It has a statue of Goethe and Schiller and is surrounded by open street blocks, which are a fundamental element of German cities. However, according to Hassenpflug, the copying of Western models in China is limited to the construction of an image. In reality, these spaces use “light” fences and gates to separate public and private spaces, making the square a semi-private courtyard. Hence, according to Hassenpflug, a truly open city structure and the functionality of a Western city is not transplanted into China (Hassenpflug, 2004a, 2010). Western images not only help local authorities show their achievement, but also allow developers to increase the prices of their properties. Over the last few decades in the

development of Chinese cities, Western images have been used as a popular marketing strategy throughout China (Broudehoux, 2002, 2010; Ren, 2011).

The image of Chinese grand history

Parallel to the "west-wild" movement, recent urban redevelopment projects are often aimed at creating an image of a particular historical period in China for the sake of attracting tourists (Bracken, 2009; Ren, 2011). Xintiandi project in Shanghai is a prime case in point.

Fig. 2.8: Xintiandi project advertising the metropolitan culture of past Shanghai

It is said that the Shanghai political authority wanted to promote the image of 19th century metropolitan Shanghai, a period in which Shanghai was an important international city (Bracken, 2009; Law et al., 2009; Ren, 2011). In order to reconstruct this image, the authentic historic urban fabric of Xintiandi was destroyed and replaced by buildings designed with an architectural style that was popular in 19th century Shanghai (see Fig. 2.8). The economic success of the Xintiandi project has triggered similar developments in other cities (Ren, 2011). Criticism is focused on the fact that the making of this "fake history", a commercially-biased public space, occurs at the cost of the authentic one.

Fig. 2.9: Images of public squares in China
(photos taken in 2014)

Besides the image of the colonial past, an image of the Grand History of China has also become popular in the last few decades. Broudehoux (2002) explains how selectively Beijing authorities and developers chose the architectural style for Wangfujing, a commercial district in Beijing. The style chosen is derived from the Qing dynasty when China was rich and globally influential, regardless of the real history of the site (Broudehoux, 2002).

2.3.2 Extreme scale of open public space

Regarding scale, urban planners in China are said to combine the objectives of Le Corbusier and Haussmann (Abramson, 2008). The scale of public squares in Chinese cities is obviously so large that it does not reflect the relative scale of the human body (Hassenpflug, 2004a; Pu, 2011). The dimensions of public squares in Western cities are defined as inhuman if they are over around 140 metres in length or width (K. Lynch & Hack, 1984; Sitte, 1889); however, civic squares in China are much larger. Pu (2011) reports that Chengdu – the capital of the Sichuan province, has had a new 5.4 hectare Tianfu Square constructed in the city centre. Even in a small town such as Gaomi (Shandong Province), a new square with the size of 60 football fields was developed in 2006 (Y. Wu & Yuan, 2006). A survey of 12 squares in the largest cities in China reports that the average area of civic squares is nearly 13 hectares. Even in smaller cities, the number remains close to 10 hectares (Y. Wang, 2002).

Fig. 2.10: Large scale public squares in China

The concentration of public space into a few large nodes, which might symbolise political centralisation, does not attract a high number of visitors given the limited catchment of such public space. Many public squares are said to be too far away from the majority of urban inhabitants (Pu, 2011; Yiqian, 2014). In addition, these spaces are often surrounded by high speed traffic boulevards that seem to turn them into isolated islands rather than popular meeting places (Pu, 2003, 2011).

In this regard, Pu argues that large open public squares are not an appropriate type of public space for the fine grained urban fabric of Chinese cities. From his point of view, instead of creating one or two large public squares, it is better to create a series of small courtyards (Pu, 2001) because small courtyards, whose precedents are the temple grounds, not only create a better microclimate but are also more aesthetically appropriate for Chinese cities.

2.3.3 Poor Provision of basic amenities

In addition to the inhuman scale, the provision of amenities in public space in Chinese cities is often limited. User friendly public space is rare in China. Hassenpflug, a German urbanist observed:

> *"Public urban spaces with a welcoming character, purposely designed for encounter, meeting, communication, scheduled and spontaneous gathering, for playing, or simply for seeing and being seen, are still scarce in China – especially*

in less favoured, old urban areas… Due to the lack of suitable places, we see people exercising, playing, or dancing beneath highway bridges, on abandoned parking lots or noisy traffic islands." (Hassenpflug, 2010, p25)

Fig. 2.11: Meeting point beneath a highway – Changsha
(Hassenpflug, 2010)

Even many showcase projects that present the public "face" of the city often lack the necessary amenities such as sitting places or weather protection (Hassenpflug, 2010; Pu, 2003, 2011). A study of public space within the most prominent shopping malls in Wangfujing, The Place and Salitun Village, in Beijing conducted by Guangzi Su (2012) reports that the lack of sitting opportunities is significant *"so that people have to lean on trees... for resting, some even sit on the floor"* (Su, 2012, p.166).

The observation of small and medium-sized public squares in Guangzhou and Shenzhen confirms the poor quality of some public space.

Due to the poor quality of open public space in Chinese cities, a large percentage of urban dwellers could decide to stay indoors. Liu (2007) reports that 80 percent of the elderly in a Tianjin neighbourhood prefer to stay at home. A more comprehensive study of the six largest cities in China conducted by Zhou in 2007 documents that 82% of children spent their after-school time in their own or their friends' homes (R. Zhou, 2007).

2.3.4 Existence of walls and fences

The Position of the wall element in Chinese traditional architecture

The wall is a special element in Chinese architecture and city planning (Gaubatz, 1996; Kiang, 1999; V. Sit, 1995; Wheatley, 1971; Wright, 1965). David Strand, for example, has described how:

> *"…early 20th century Beijing, as a physical entity, remained a city stubbornly defined by walls, walled enclosure, and gates. The 15th century Ming plan of the capital decreed boxes within boxes and cities within cities. The habits of vernacular architecture extended this principle into neighbourhoods and residences"(Strand, 1989).*

According to Miao Xu and Zhen Yang (2009), "walled enclosure' is one of five major morphological characteristics of the traditional Chinese city. In 'Cities of aristocrats and bureaucrats', Kiang Heng (1994) has described how the walls formed the city and city life of Chang'an in the Tang Dynasty. As Figure 2.12 shows, the city of Chang'an as a whole was walled with 16 city gates. Within this fortified perimeter, the walled palace was located to the north. Eleven north-south and 14 east-west major streets divided the walled city into 108 fang or wards (residential quarters) and two designated markets. These residential wards, fang, ranging from 30 to 80 hectares, were enclosed by earthen walls on the sides of a rectangular precinct and connected with the outside through one or two major gates guarded by warders. Apart from the aristocrats and government dignitaries, the commoners were forbidden to pierce private gates in the ward walls to have direct access to the external streets. The residents were not allowed to leave the wards after the gates were closed from the second night watch (9 - 11 pm), unless a special permit was issued in case of an emergency, such as illness or marriage (Kiang, 1994).

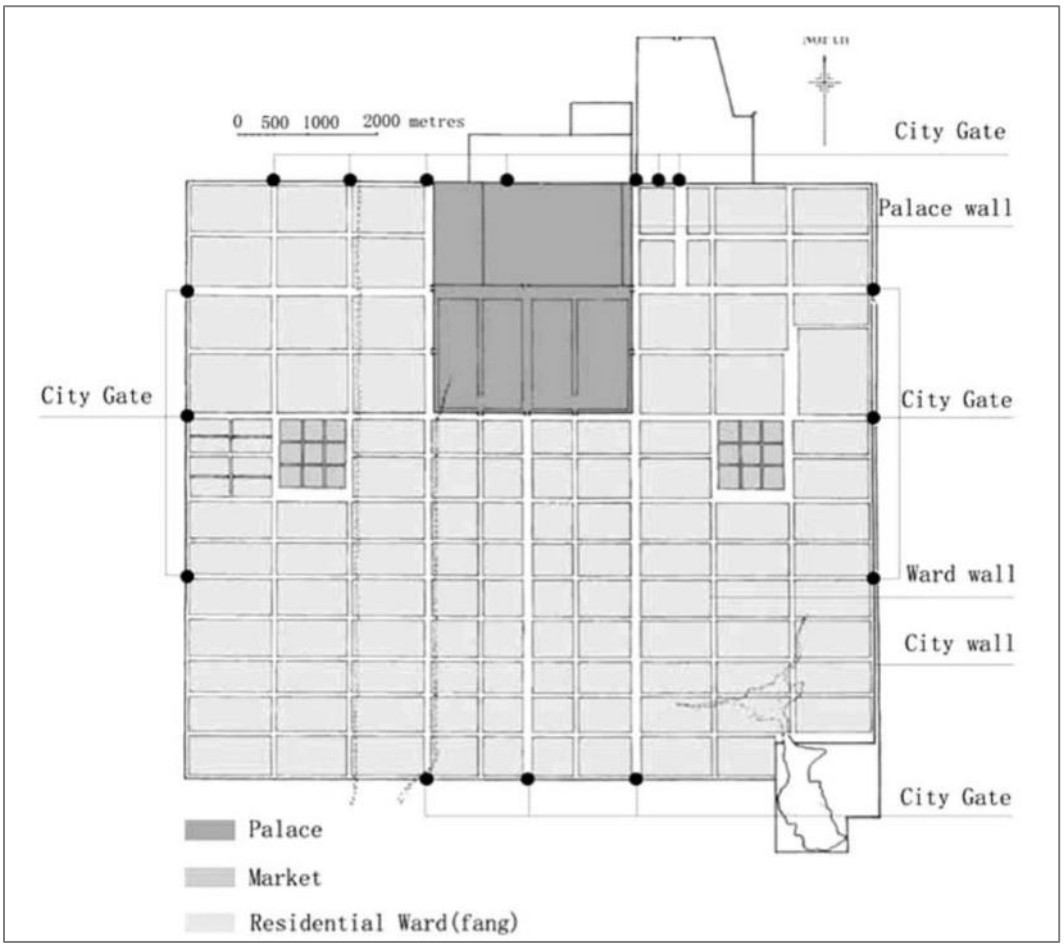


Fig. 2.12: City map of Tang Chang'an (618-907)

It is argued that these spatial arrangements with large avenues and wards were the means of separation, administration and control, being a representation of the hierarchical social structure with their public appearance but non-public functions (Kiang 1994). However, after the Tang Dynasty, Chinese traditional cities became more commercialised and open. The walled-ward system inevitably broke down and the once-strict regulation became severely eroded by the rise of commerce. Nevertheless, the walled enclosure still remained as the most enduring characteristic of Chinese cities.

The use of walls and fences

In the past, any open spaces such as temple grounds, scholar gardens and urban parks were often visually and physically cut off from the surroundings by high walls (Gaubatz, 2008;

Padua, 2006). This tradition has been carried over from the Maoist period[4] into contemporary Chinese cities (K. Gu, 2001; Lu, 2006). A study of recent urban development by Wang (2010) reported that about 80% of urban dwellers in major cities in China live in such gated communities whose (semi-)public spaces are only accessible for the inhabitants of each neighbourhood.

Furthermore, many newly developed small and medium-sized public squares, especially those in urban villages, are also gated although their purpose is to serve a wider range of users.

Fig. 2.13: Gated Public Squares in urban villages
(photos taken in 2014)

It is worth mentioning that the use of fences and gates is part of the traditional Chinese approach to spatial design where open spaces represent a miniaturised cosmos and a place of absolute harmony which is clearly cut off from the hustle and bustle of urban life. A long tradition of architecture that associates the inside with the good and the outside with the bad (Ashihara, 1989; Shelton, 1999; Tuan, 1974; Wright, 1977) might consequently lead to the priority of the centre and the unconscious devaluation of the edges of public space by Chinese designers. In this way, unlike historic public squares in European cities that were organically shaped by movements (French, 1978; Kostoff, 1991; Siksna, 1990), public squares in Chinese cities are often cut off from the movement network.

[4] This is an era where traditional building theory such as feng-shui theory was forbidden. However, elements like walls and gates that might be derived from feng-shui theory continued to be used frequently.

Over the last 15 years, the existing walls of public space in many Chinese cities have been torn down and replaced by light fences and electronic security. *"In this manner the physical landscapes of Chinese cities have become more open – more public, yet the distinctions between what is public and what is private remain relatively unchanged*" (Gaubatz, 2008, p. 75).

2.4 The Collective Use of Public space in China and Conflicts of Interest among Different Stakeholders

Small and medium-sized public squares in China offer a unique opportunity to study the collective use of urban public space. Group users and individuals might have significantly different location preferences and spatial behaviours. According to previous studies, the domination of one group might also lead to the absence of the others (Marcus & Francis, 1997). In China, conflicts between different users and stakeholders are far more intense and complicated. These conflicts are reviewed below.

2.4.1 Collective use patterns

Collective rather than individual behaviours are still predominant in China (unlike in America and Western Europe), and this seems to determine contemporary public space usage.

Studying the use of public space in Beijing, Hagenbjork (2011) reports that "people often engage with one another in public activities. They do so primarily in groups, whose numbers may range from a few people to a large group of 50 people" (Hagenbjork, 2011, p. 60).

Fig. 2.14: Large groups of the elderly in a Shanghai Park
(Orum et al., 2009)

In another study of an urban park in Shanghai, Orum et al. (2009) observed large groups of men and women, who were retired workers singing various songs. In addition, there were many groups of ballroom dancers, with up to 40 couples or more, occupying a wide swathe of space. Besides these big groups, there were smaller groups of women, outfitted in beautiful silk suits, who danced with fans, or were doing tai chi (Orum et al., 2009).

The presence of large groups can also be seen in many urban public plazas and squares. In fact, they have become a popular location for many large organised-activity groups. These groups are often called "public plaza dancing aunties" which reveals the dominance of old women and the major activity[5] of these groups in public squares (Yiqian, 2014b).

[5] The Chinese word for dancing activity in public squares is *guangchangwu*, which automatically associates with old women groups and their style of dancing.

Fig. 2.15: Dancing group in a public square in Shanghai
(Hongyi, 2014)

Given the limit access to indoor recreation facilities, public squares become the places for the elderly to meet, to socialise and to improve their health (Yiqian, 2014b). Many dancing groups begin in the early morning, whereas other groups occupy the space in the evenings. The one child policy in China has reduced the number of family members in many Chinese urban households to two elderly people when their child has left home. Many elderly people feel lonely and seek places for socialising purposes (Yiqian, 2014b).

The intensive use of public space by dancing groups and the noise might create many conflicts between different user groups. This will be the focus of the next section.

2.4.2 Conflicts of interest between different stakeholders

Given the lack of public space in Chinese cities, conflicts of interest between different stakeholders and users are intense. The first type is that between the users and those who manage the spaces. Chen Zhu (2010) reports that in a Shenzhen civic square, a number of guards were used to ensure that no commercial activities, no vendors, or sports such as skateboarding could occur there. According to Chen, there is a “Rule of Plaza” that clearly details the kind of prohibited activities, which seems to include many leisure activities including riding bicycles, roller skating, lying down on chairs, shouting, walking dogs,

retailing, distributing flyers or any written materials, and gathering without permission (Chen, 2010, p. 149). Similar to Tiananmen Square, many civic squares are used to display political power and to discourage everyday activities (Chen, 2010; Pu, 2011).

Another example of the conflict between users and the manager of public space is the case of a neighbourhood courtyard in a newly developed area in Shenzhen. The space is well connected with the surroundings and a nearby school and is used intensively, attracting a high number of visitors during the day. However, this intensive use may have increased the cost of maintaining the space as the manager of the neighbourhood decided to it (Chen, 2010). According to Chen, the issue is that many property developers tend to use public space to market and increase the price of their properties; however, due to the absence of institutional regulation, property developers can close these public space without having any consequences for their business operations.

The second type of conflict is that between groups of "plaza dancing aunties". The Guangdong-based Qingyuan Daily reported in 2013 that two "dancing aunties" groups in the city fought for a square to dance in. Over 200 people danced in an area that was only 50 square metres (Yiqian, 2014b). And this is not the only fight between two groups of dancers. According to Yiqian, in this district, there are only 13 squares, but there are over 40 teams, each with at least 100 people, thus fights often occur.

Fig. 2.16: Conflicts between different public space users
(Yiqian, 2014)

Furthermore, the domination of “dancing aunties” often disturbs other user groups. People often complain about the noise from the loudspeakers of “dancing aunties” that make them unable to do many things such as talking on a phone, concentrating on reading or simply relaxing. In a survey of the use of public squares in Shanghai, 46.3 % of interviewees said that the dancing group had monopolised public space, thereby affecting other people’s activities (Hongyi, 2014). The domination of the elderly might also lead to the low percentage of young people using public space (Yiqian, 2014a). In addition, people living nearby often complain about the noise that might go from 6 am until late in the evening, affecting their lives and leading to the drop in property prices of nearby apartments (Fuana, 2014).

2.5 Discussion and Identification of the Knowledge Gap

Chinese traditional architecture and urban design seem to focus on the creation of the image or the symbolic meaning of the space. Over the last few decades, this tendency has been amplified by the search for a modern Chinese identity and the assimilation of principles of post-modern urban design. As a result, urban spaces in Chinese cities are either over-decorated with Chinese historical elements, or have adopted culturally distant icons following post-modern urban design. The tendency towards “theme park” urban design has had a great impact on the making of public space in general and (small and medium-sized) public squares in particular. As reviewed above, critiques of this design trend can be found in many publications that have questioned the authenticity of the space and the reduction of place-making theory to place-marketing strategy.

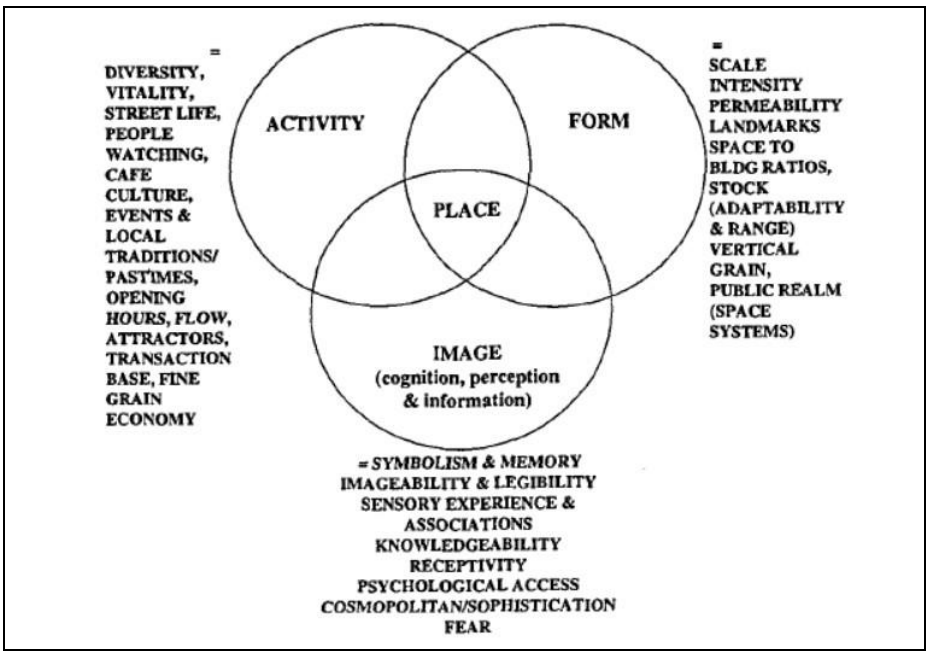


Fig. 2.17: The Framework of place-making theory
(Montgomery, 1998)

According to the framework of the theory of place-making illustrated in Fig 2.17 (initiated by Canter (1977) and further developed by Punter (1991) and Montgomery(1998)), spatial interventions should create a relevant image or identity for the space, as well as support activities appropriate for its users. As identified in the literature review section, the design of Chinese public space and public squares seems to overemphasise the importance of imagery with minimal awareness of how spatial design can support daily informal activities. Hence, many new public squares appear to be conceived as "show-pieces", rather than providing quality public space that supports the needs of users, in particular the typically large numbers that congregate for group activities.

The quest for a more sophisticated approach to historical precedents, rather than the copying of Western models and/or the superficial use of Chinese decorative elements, has been raised by various Chinese scholars. For example, Pu argues that large open public squares are not suitable for the fine grained urban fabric of Chinese cities and suggests that a series of small walled-in courtyards would be more appropriate. In a similar vein, Yang and Volkmann suggest the adoption of the concept of the Chinese scholar garden, characterised by circuitous pathways and the provision of many small sub-spaces. However, these historical precedents are

conceived as private spaces that are designed for the use of individuals. Arguably, the "private sphere" of these spaces might hinder their redeployment as public space in highly populated cities. Furthermore, as identified in section 2.4, small and medium-sized public squares are intensively used by large groups and are also places that host public events and local festivals. These activities require more spacious and open settings than those afforded by the precedent of scholar gardens and small courtyards. It would appear that there is a tendency by some Chinese scholars to romanticise the adoption of traditional precedents for contemporary use. However, the observation of the development of public space in China suggests that each time period is aligned with different types of public space. For example, 'urban parks' replaced the popularity of temple grounds, a type of walled-in courtyard, to become the most popular public space within a few decades after their first introduction into China in the late 19th century. Similarly, in 21st century China, small and medium-sized public squares and urban plazas are argued to be the most popular type of public space, as Chinese society has gradually transformed into a more open one.

Apart from the obsession with image, another major issue identified in the literature review is the large scale of public squares in China. Studies of new civic squares in Chinese cities report that the average size of these spaces is more than ten hectares, nearly ten times larger than Trafalgar Square in London. In this regard, through a comparison based on an anecdotal observation of these new civic squares and small open spaces, including pocket parks and neighbourhood courtyards, Pu argues that small public spaces are most appropriate for the dense urban fabric of China, and is thus against the construction of large public squares. This comparison seems to be overstated as the two types of public space are designed for different purposes and hence cannot be expected to deliver a similar use. Furthermore, Chinese cities have much higher population densities and much less open spaces than Western cities; therefore, Chinese cities can theoretically sustain the use of much large public squares than their Western counterparts. As identified in the literature review section, previous studies show

that many small urban plazas suffer from being overcrowded while other large squares are largely underused. This thesis takes the view that in relation to scale, the objective should be to identify the size appropriate to particular usage patterns found in China to avoid any generalisation such as “the small public space always performs better”.

In addition to the scale problem, another significant issue with public squares in China is related to the existence of fences and gates. As noted in the literature review section, some authors interpret these features as a continuity of Chinese traditional architecture, whereas others who consider public space as the physical manifestation of the public sphere, see it as something that reflects the “changing” relationship between the people and the state. In other words, previous studies focus on an intangible value, the “publicness” of the space and its physical appearance given the existence of fences and gates. However, they do not provide insights into how these elements might affect the use levels and the diversity of public space. Furthermore, as identified in section 2.3.3, a more serious problem of public squares and urban plazas in China is the poor provision of basic amenities such as places to sit. Apart from providing adequate sitting places, these sitting opportunities should be placed where Chinese users are most likely to use them. Without such improvement, new urban plazas and public squares are likely to become venues low standard for those who have no alternative options.

Reflecting on the literature review, four strands have informed the development of this thesis: (1) the adoption of postmodern urban design in China; (2) collective use patterns prevalent in Chinese public space; (3) issues around appropriate scale; and (4) the continuing presence of fences and gates. It would appear that models from the West or a return to fine grained traditional Chinese precedents are at odds with how public spaces have been used and the sheer population of Chinese cities.

The pragmatic view of this thesis is that public squares will continue to be developed in China, especially small and medium-sized public squares. As discussed in section 2.1, since the 2000s

small and medium-sized public squares have been used as an important element in the redevelopment phase of many cities and urban villages in China. This trend is likely to continue in the near future as hundreds of cities and urban villages are awaiting re-development. However, studies to date have provided little information about the design and the use of new small and medium-sized public squares in China. Hence, taking these as the research subject, this thesis aims not only to provide information that can inform the development of urban design theory relevant to China but also to be of practical relevance to the development of user friendly small and medium-sized public squares in the future.

The objectives of this thesis are to identify the problems of small and medium-sized public squares and to provide new knowledge that can inform designs that are more appropriate for Chinese cities through the analysis of a comprehensive set of empirical data. The challenge that Chinese designers and architects are facing include the need (1) to address particular activities and users of Chinese public space; (2) to maximise the effectiveness of the use of basic amenities such as sitting places within the constrained resource and investment strategies applied to these amenities; (3) to optimise the distribution of open public space within a local district and city wide; and (4) to address the problem that some large public squares are underused, whereas many smaller spaces are overcrowded.

In short, this literature review chapter identifies a significant gap in knowledge, namely, the lack of quantitative information about the design and use of small and medium-sized public squares. In addition, it clarifies the scope of this thesis and the emphasis on the objective spatial properties of the space such as size, the existence of fences and gates, accessibility and visibility, and most importantly the impact of spatial properties in relation to patterns of use particular to China.

The following chapter will extend the theoretical framework for this thesis through reviewing relevant studies of public squares in the Western context. In addition, it will examine different

spatial analysis methods to provide insight into the linkage between the use and spatial patterns of public space.

CHAPTER THREE

PRINCIPLES OF PEOPLE SPACES – PUBLIC SPACE

3.1 Introduction

Chapter one of this thesis mentioned effective methods which have been used to study the use and design of public squares including activity mapping, visibility graph analysis and the axial map. This chapter sets out to review key studies of public squares in the West to date. This review will demonstrate what insights one can expect when using these spatial analysis techniques. In addition, this chapter partly reflects on the theoretical background of this thesis.

3.1.1 Aim and scope

The previous chapter provided the general context for the thesis and identified a significant gap in knowledge: the lack of quantitative information about the use of public squares, especially the linkage between the urban form and patterns of use. This chapter examines in more detail the theoretical background within urban design relevant to this issue. This is undertaken through a review of relevant design principles for user friendly public space that have emerged in the Western context. The aim of the review and discussion is twofold: (1) to consider the validity of these principles for small and medium-sized public squares in China; and (2) to inform the choice of spatial analysis methods that can provide the most relevant information.

Given this aim, this chapter examines key studies of public squares and public space in the West that have emerged within the social-spatial perspective. These include studies of spatial principles of successful historical public squares (Sitte, 1889; Zucker, 1959; French, 1978;

Moughtin, 2003), studies of the use and spatial patterns of contemporary urban plazas (Whyte, 1980, 1988; Gehl, 1987, 2006; Marcus & Francis, 1997, Carr, 1992, Alexander et al., 1977), studies of the environmental psychology that explains human behaviour in open public space (Appleton, 1975; De Jonge, 1968), and studies of public space using the space syntax methodology (Hillier, 1984, 1990; Campos, 1999, 2005; Bada, 2009).

3.1.2 Overview

This chapter is organised in five sections. The first reviews major studies of historical public squares in Western cities in order to examine spatial properties that are believed to contribute to their success, such as enclosure properties, irregular shapes, size and proportion, and the placement of freestanding elements (e.g. monuments).

The second and third sections examine the static use of public space. These include types of users and their informal activities, studies of location preferences in public open spaces including the edge and island effect, and the visual logic behind the choice of location. In addition, section 3.4 also examines how visibility affects the use of urban spaces and introduces two specific space syntax spatial analysis methods – overlapping visual fields and visibility graph analysis.

In contrast, the focus of the fourth section is on transient use of urban space and its relation to the circulation and urban grid configurations. This section begins with a review of general principles that enhance transient use of the space, as proposed by key authors in the field such as Whyte, Marcus and Francis, and Carmona. It then examines key studies of public squares conducted by space syntax researchers using axial mapping – a method to quantify the accessibility generated by the urban grid configuration. This section defines the "strategic value" or the degree of accessibility of public squares that will be used later in the empirical part of this thesis.

The final section discusses key theoretical aspects that are relevant to the research. It discusses strengths and weaknesses of different research approaches. Importantly, this section discusses in more detail the gap in knowledge addressed, and identifies relevant spatial analysis methods that are used in the empirical part of this thesis.

3.2 Spatial Principles of Successful Public Squares in Historical Cities

Many Western cities have experienced a decline in the use of public space over the last century. The reason for this is claimed to be integral with Modernist planning tenets including both their physical and social aspects (Batty, 2012; Jacobs, 1961; Edward C. Relph, 1987; Salingaros, 2005; Sitte, 1889; Trancik, 1986), and it is suggested that architects can learn from the success of earlier historical public space. The important aesthetic principles extracted from the latter are the human scale of the space, the degree of enclosure and the irregularity of the plan (Sitte 1889; Unwind, 1909; Zucker, 1959).

The first and most frequently discussed spatial property is the ideal "size and proportion" of the square. It is assumed that this has a major effect on the users' feeling. By examining numerous famous squares, Sitte (1889) suggests the ideal dimension of a public square is 139 by 58 metres. From his perspective, this is a human scale by which people do not feel overwhelmed. Similar results are found by more contemporary researchers. Lynch (1984) recommends a dimension of 100 by 25 metres, while Gehl (1987) states that 100 by 70 metres is the maximum distance for comfortably seeing events. In contrast, Alexander, Ishikawa, and Silverstein (1977) suggest that there is no single ideal size for public squares. Instead they propose an ideal relationship between the metric size and the number of users. Claiming that the failure of modern urban plazas is due to their extreme scale and through examining good and bad squares in San Francisco, they concluded that *"at 150 square feet (~14m^2) per person, an area is lively. If there are more than 500 square feet (~46m^2) per person, the area begins to be dead"* (Alexander et al., 1977, p. 597).

According to Alexander et al. (1977), the ideal size for public squares should be between 14P and 28P m^2 where P is the mean number of people in the place at any given moment.

In addition to "size and proportion", the second spatial property that is widely accepted as a key principle of good public squares is the degree of "enclosure", as this can give people a sense of completeness and security (Childs, 2006; Sitte, 1889; Unwin, 1909). The "enclosure" property can be achieved through different methods. For example, architects in the past often *"broke the infinite perspective of a street by a monumental portal or by several arcades to close their squares"* (Unwind, 1909, p60). In principle, the intersection of side streets and the square should be designed in a way so that it is impossible to see out of the square along more than one street at a time (Sitte, 1889, Unwin, 1909).

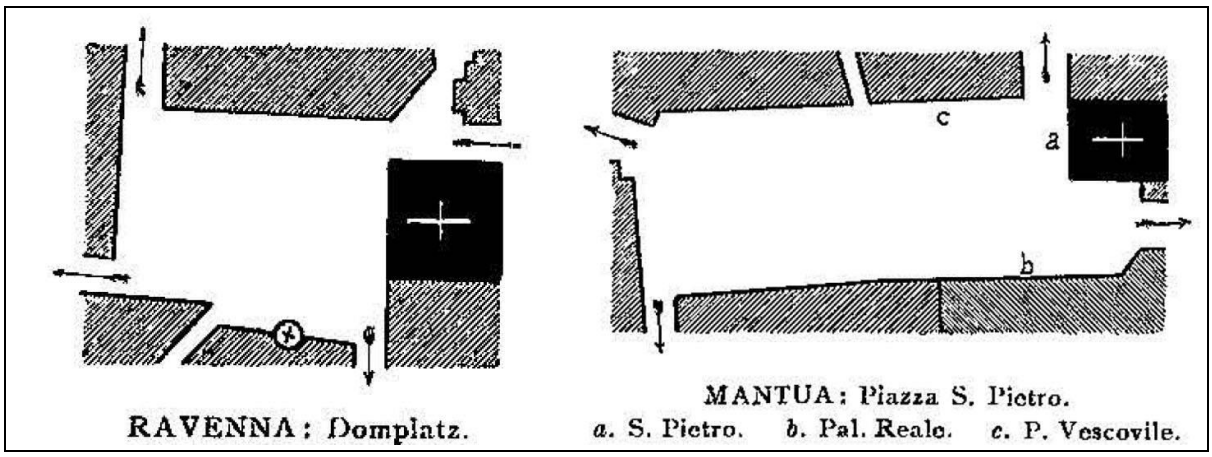


Fig. 3.1: The enclosure effect of historical urban squares
(Sitte, 1889)

Similarly, Jere Stuart French, who studied urban squares in Western society, argued that enclosure is important because it creates a sense of intimacy, protection, well-being and comfort (French, 1978). French defines primary and secondary elements that contribute to the creation of the enclosure effect. The primary elements are free standing inside public space such as fountains, statues or free-standing buildings while secondary ones are the external enclosure elements such as the surrounding buildings. In "Urban space: A brief history of the city square", French claims that the performance of an urban square depends not only on the aesthetic qualities of these elements but also on the placement of primary enclosing agents

(French, 1978, p. 8). In short, from French's perspective, the aesthetic quality and the composition of these two groups of elements are the key for a successful urban square. Likewise, Paul Zucker claims that the degree of enclosure will have a certain impact on the way people feel and behave inside a public square. From his perspective, "specific visual and kinaesthetic relations" of a good space will create a sense of wholeness that is important to the wellbeing of users (Zucker, 1959).

Fig. 3.2: Piazza San Marco Venice: The enclosure property
(Canaletto, 1730)

The enclosure property can also create the "surprise effect", an experience one receives by going through dark, concealed entrances, or beneath arcades and suddenly encountering an open, bright and grandiose plaza (Lennard & Lennard, 1984). Lennard and Lennard illustrated this effect with the example of Salamanca Plaza Mayor (Fig. 3.3):

> *"The entrance into Plaza Mayor is designed to heighten the experience of entering. The entrance is narrow, dark, arched, offering a glimpse and suddenly, in stepping across the threshold one is in … an outdoor room filled with people … The visual enclosure gives the sensation of having arrived at a destination, of needing to go no further, of belonging" (S.Lennard & Lennard, 1984, p. 42).*

Fig. 3.3: The enclosure and "surprise" effect: Salamanca Plaza Mayor
(Luis Cortés, 1960)

In addition to "enclosure" and "size and proportion", Sitte suggests that "keeping the centre of the square free" and an irregular shape can also be key principles in creating the picturesque characteristics of public squares (Sitte, 1889). Other principles such as the architecture of the surroundings and the paving (Childs, 2006; Cullen, 1961; Moughtin, 1992) are repeatedly found in some publications.

Over the last few decades, these formal aesthetic principles have been integrated into different design theories including those emanating from place-making theory, such as New Urbanism or Neo-Traditionalism. Many squares have been developed from and inspired by the design of historical squares but are nonetheless not successful. A prime example is Boston City Hall Plaza. The spatial concepts of the plaza tend to imitate those of the Piazza del Campo in Siena with sloping ground that provides various seating opportunities (Carr, 1992). However, it was observed to be mostly empty, even during lunch time because many people working there chose to go elsewhere instead of using the plaza (Carr, 1992).

Fig. 3.4: Boston City Hall Plaza (right) and Piazza del Campo (right)

The failure of this plaza among many others has led to the conclusion that the success of public space lies far beyond its picturesque characteristics (Alcock, 1993; Carmona, Heath, Oc, & Tiesdell, 2003; Whyte, 1988). In this regard, Jane Jacobs argues that it is misleading to substitute art for life, and that a city cannot be a work of art because art alone cannot sustain the most complex and intense forms of life (Jacobs, 1961). Nevertheless, artistic formal principles do have a certain value, and only become problematic if designers misuse them and overlook the daily needs of people. Social-minded architects and researchers would argue that the users and their needs should be the first priority of any design before any formal intervention. Hence, the use of the space is reviewed in the next section.

3.3 Daily Patterns of Static Use of Public space

In the last four decades, many Western cities have been evolving from places of production to places of consumption, and so have their public spaces, including streets and squares (Gehl, Gemzøe, & Steenhard, 2003; Gospodini, 2002; Madanipour, 1999). In our modern age, the use of public space is no longer necessary, but optional (Gehl, 1987, 2001, 2006); therefore, it is unwise to predict the current use of public space based on past observations (Carmona, 2014). Changes in societies' use of the public realm have led to a conceptual shift in urban design where the focus is placed on users' needs and their behaviours in the public space rather than on aesthetics, as in the past. The success of any public space now depends more on understanding the users and their activities (Carr, 1992; Carmona, 2014).

3.3.1 Public space users: Demographic and gender issues

From direct observation, it is said that the majority of users of urban plazas in Western cities are office workers, many of whom are from just three building blocks away from the space in question (C. C. Marcus & Francis, 1997; Whyte, 1980). The majority of users visit urban plazas during lunch time, and at other times of the day, many spaces are relatively empty (Whyte, 1980; Marcus & Francis, 1997; Campos, 2005). More importantly, it is reported that modern urban plazas and squares seem to fail at attracting other user groups such as teenagers, the elderly and children (Travlou, 2003, 2007).

The results of an investigation of 16 urban plazas and other open public space in downtown Manhattan, conducted by William Whyte demonstrate that the most used plazas are the most sociable. That is, they consist of groups with a higher number of people (2 or 3 people) and more women:

> *"Women are more discriminating than men as to where they will sit, more sensitive to annoyances, and women spend more time casting the various possibilities … Men show a tendency to take the front row seats and if there is a gate they will be the guardians of it. Women tend to favour places slightly secluded etc." (Whyte, 1980, p. 18).*

In the West, a high percentage of female and/or group users is widely accepted as a sign of a good place (Marcus & Francis, 1997; Gehl, 2006, 2010). Even in modern Western society, the perceived male gender norm might still limit the access and use of public space by women (Valentine, 1989, 1992; Wilson, 1992). This gender issue could be worsened given the fact that the design of many public spaces does not address the needs of female users for a higher degree of privacy and a 'backyard experience' (a feeling of comfort, relief, security, control and relaxation) (Franck & Paxson, 1989; Loukaitou-Sideris & Banerjee, 1998; Mozingo, 1989).

Many recent studies attempt to identify differences between male and female users. For example, an observation of downtown plazas in American cities reveals that female users are more likely to be found in groups than men (Banerjee & Loukaitou-Sideris, 1992; Dornbusch & Gelb, 1977). Cooper-Marcus believes that this behaviour pattern by women might be a direct result of the long existing attitude against women being seen alone in a public space (C. C. Marcus & Francis, 1997). Using behavioural mapping and a questionnaire to survey the users of downtown open spaces in San Francisco including Crocker Plaza (a busy and noisy street plaza) and Trans America Redwood Park (a quiet and green urban oasis), Mozingo (1989) reports that men and women have totally different concepts of good or bad open public space. She found that unlike men, women dislike being "too exposed" in a public space, thus avoided places like Croker Plaza (see Fig. 3.6). Furthermore, Mozingo found that in an urban plaza, a woman's personal space was intruded twice often as that of a man. This in turn might affect the number of women who decide to sit alone in urban plazas. According to Mozingo, good open public spaces for women are those which provide them with a sanctuary from the stress of urban life or the office environment. They prefer to spend time in natural environments or spaces that filter out urban stimuli and are secure. Men, on the other hand, perceive urban plazas as places for interaction; they expect to be intruded upon and are more tolerant with such interruptions. In short, women seek "back yard" experiences whereas men seek "front yard" experiences (publicness, social interaction and involvement) (Mozingo, 1989).

Fig. 3.5: Crocker Plaza (left); Trans America Redwood Park (right)

However, Marcus and Francis note that the number of female users alone does not always reflect the quality of the space. In a study of an under-used bank plaza in Seattle with 90 % of users being female, they comment on a problem:

> *"That of a particular age, sex, or ethnic group taking over a portion of public open space and the tradition becoming so entrenched that others are reluctant to intrude" (Marcus et al., 1997, p. 27).*

In this regard, it is widely suggested that in addition to levels of usage, the diversity of users is a good indicator of good public space (Carmona et al., 2003; C. C. Marcus & Francis, 1997; Montgomery, 1998). However, this is more easily said than done. In reality, some urban plazas and squares in Western cities are still dominated by one user group or another at the expense of others, including teenagers, the elderly and children (Mozingo, 1989; Carmona, 2014).

3.3.2 Static activities: Types and popularity

Understanding the nature of activities occurring in public space is argued to be crucial for its design. The type, amount and diversity of activities greatly reflects on the quality of the space (Gehl, 1987; Marcus & Francis, 1997).

Types of activity

There are different ways to classify types of activity. According to Stephen Carr (1992), the two major categories of activity are passive and active; passive activities relate to a sense of relaxation, and sitting and people-watching are primary forms of these. This type of activity often takes place in locations that provide good views of the surroundings. In contrast, active engagement encourages social interaction among users. Gehl (1987) calls this the resultant or social activity. Successful public spaces are those that invite social encounters and interactions among strangers and have more active than passive engagement (Whyte, 1980; Gehl, 1987).

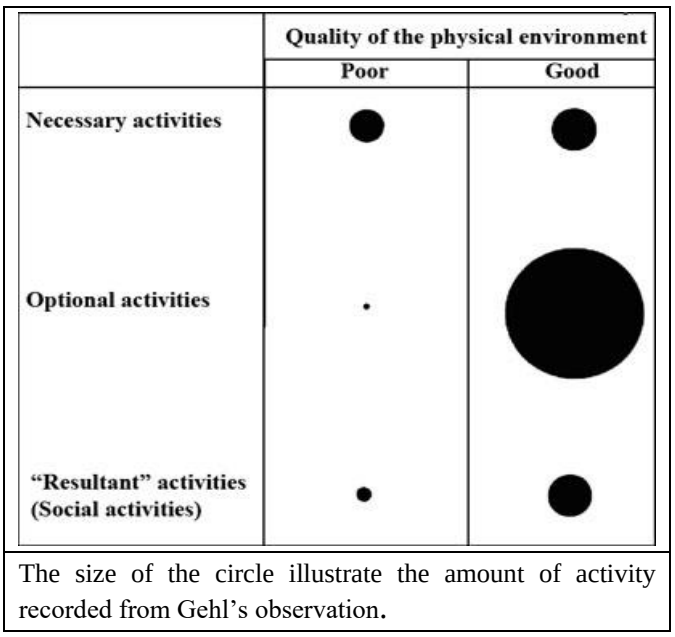
Fig. 3.6: Active engagement in a public space
(Gehl, Gemzoe, Kirknaes, & Sondergaard, 2006)

The most well-known classification of activities was developed by Jan Gehl, in which activities are divided into three types: the necessary, the optional and the social as follows:

- Necessary activities are those which occur in nearly all conditions, because participants simply have no choice. They include most everyday tasks, such as going to school or work, going shopping, or distributing mail. These activities are independent of exterior conditions such as the weather or the quality of the physical design of outdoor spaces.

- Optional activities are those which involve choice. This type of activity occurs when the exterior conditions are good and invite people, for example, to take a walk to get some fresh air, sit outdoors and enjoy life or sunbathing.

- Social activities are also labelled as resultant activities. They include all activities that are dependent on the presence of others in the same place. Social activities occur among strangers who are open to interaction with each other in a good and comfortable environment.



The size of the circle illustrate the amount of activity recorded from Gehl's observation.

Fig. 3.7: Types and amount of activities
(Gehl, 1987)

According to Gehl (1987), the quality of public space can be revealed through the percentage score of each type of activity that occurs within it. In bad public space, only necessary activities occur. However, good public space often has the right mix of all three types of activities, without consisting of just "optional" or "social" activities. Instead, "necessary" activities including simply walking through are also important because they provide a pervasive co-presence of others, thus enhancing the feeling of safety, which is a crucial factor determining the use of public space.

Popular activities

Among the many activities occurring in open public space, "people-watching" is widely observed as the most popular and frequent activity in a Western context (Gehl, 1987; Marcus & Francis, 1997; Whyte, 1980).

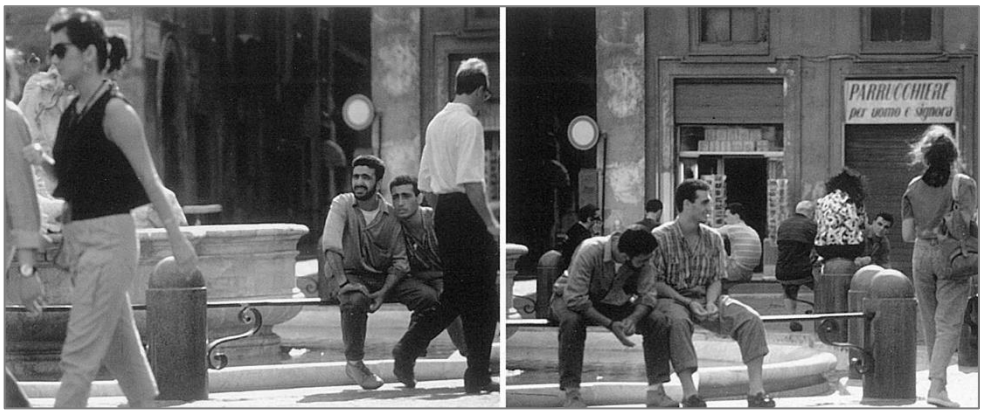


Fig. 3.8: “People-watching” – a popular activity in open public space
(Gehl, 2010)

In a study of the First National Bank Plaza, Chicago, a highly used downtown plaza, Marcus & Francis (1997) report that people-watching contributes to at least 34 % of all activities occurring in public space. Similar results were found by William Whyte (1980, 1988). Using over-lapsed photography for a study of 16 urban plazas in New York, Whyte argues that aesthetics, the shape and size of a space are not the main factors that determine the success of urban plazas. In contrast, people are attracted by other people. He concluded that people tend to go to “where other people and activities are” (Whyte, 1980, 1988).

In addition to “people-watching”, urban plazas attracted a large percentage of users during lunch time. A study of public squares in London suggests that lunch time activities contribute 40 % of total users (Campos, 2006). Similarly, Marcus et al. (1997), in a study of urban plazas in San Francisco and Los Angeles, found that the most common purpose that drew people into plazas is to eat lunch. It is worth noting that the two most popular activities, “people-watching” and “eating lunch”, depend on the provision and placement of sitting places. This issue will be discussed in depth in the following section.

The sitting activity and sitting places

Sitting is an activity that makes more demand on the quality of the physical environment than other activities. When designing sitting places, architects face a variety of questions concerning location and the orientation of seats. But foremost is the question of how many seats will be

enough. In this regard, The Project for Public space recommends one linear foot of seating for each thirty square feet of plaza space (Miles, Cook, & Roberts, 1978). Furthermore, it is suggested more seats should be provided in more populated areas, An observation of five well-used plazas in New York conducted by Whyte (1980) found that at peak periods about 70 % of seats were occupied. Given the importance of personal space, many users will not sit next to strangers although they might have to stand instead (Whyte, 1980).

Commenting on the provision of seats, Marcus and Francis warn that row upon row of benches can seem intimidating and unwelcoming when only a few people are present. Therefore, they have suggested the use of different kinds of integral seats including steps and ledges to reduce the number of benches. However, if people stay for the duration, benches are needed as they provide a higher degree of comfort (Marcus et al., 1997; Whyte, 1980).

Fig. 3.9: Explicit seats – Rockefeller Centre (left); Integral Seats – Jamison Square, Portland (right)

In addition to the provision of sitting opportunities, the location and orientation of seats and benches should support the "people-watching" activity. Hence, seats should be placed to face pedestrian flows or towards focal points, or an interesting view (Childs, 2006; Francis, 2003; C. C. Marcus & Francis, 1997). It seems urban plazas that provide seats with a variety of views hold a greater diversity of people and a wider mix of ages, gender and activities than a typical linear configuration (Joardar & Neill, 1978). With this in mind, one innovative idea initiated by Whyte (1980) is the provision of moveable chairs in open public space. For Whyte, this not only helps to optimise the view, but also offers users the right to act.

Fig. 3.10: Linear seats, good for individual users (left); Moveable seats for people in groups (right)

Besides the physical dimension of seats, there is also a social dimension embedded in them. Sitting alone or in groups requires a different approach. Those who come alone to a plaza often want to sit near but not within the eye contact of other users, thus they are more likely to choose locations that permit a natural spacing between people and do not force eye contact. For example, a circular bench around a planter enables several unattached users to sit fairly close but maintain their privacy (Alexander et al., 1977; Marcus & Francis, 1997). In contrast, people in a big group prefer locations that support face-to-face conversations, therefore, they are more likely to sit in a corner of the space rather than on linear benches (Whyte, 1980; Gehl, 1987). Marcus et al. (1997) suggest that wide, backless benches, benches at right angles, and benches curving inwards are good for users in groups, as well as moveable chairs.

In a nutshell, while other facilities such as provision of trees, the micro climate or the facades of surrounding buildings, are also important, “a place to sit” – this simplest of amenity is the most important element in plaza use (Whyte, 1974).

3.4 Visibility and Location Preference of Static Users

The previous section revealed people prefer to sit where they can have good views of the surroundings. This is evidence of the fact that human behaviour in open spaces is largely determined by visibility. How people select a place in open public space does not only depend on what views they have but also on the degree they can be seen by others (Appleton, 1975). Visual connection associates with the feeling of safety, but it can also be a kind of intrusion

(De Jonge, 1968). This section explores the visual logic behind human behaviour in open public space and its impact on the choice of location for static use.

3.4.1 The visual logic behind the choice of location in open spaces

From the discipline of environmental psychology, Appleton (1975, 1984) in his "theory of prospects and refuges" suggests that human behaviour in open spaces is heavily influenced by our primitive instincts as hunters. Accordingly, in open spaces, a person naturally prefers locations where he is well protected (refuge), but at the same time has a wide view (prospect) of the surroundings (Appleton, 1975). No one wants to be in an "exposed" location and people seek to avoid unexpected potential dangers. Similarly, later studies conducted by De Jonge (1968), Whyte (1980), Gehl (1987, 2010), Alexander et al. (1977), Stevens (2007) and Thwaites et al. (2005) have confirmed Appleton's theory. It is widely suggested that in an urban public space, the edges are mostly preferred as they provide exactly the quality that Appleton has described, whereas the exposed centre of the space is likely to be underused. De Jonge and Gehl consider this the "edge effect" and the "island effect", two opposing spatial use patterns of open public space.

In addition to the "theory of prospects and refuges" which explains why people prefer certain locations in open spaces, the two properties that make people enjoy and remember an environment are suggested to be "legibility" and "imagibility" (Kevin Lynch, 1960; Kelvin Lynch, 1981). Lynch believes that "imagibility" is more important. A "vivid image" will make people "delighted by surprise and mystery", whereas the "legibility" of the urban environment can be aided by the use of a simple map (Kevin Lynch, 1984). In a similar vein, Kaplan and Kaplan (1982) have suggested "coherence", "legibility", "complexity" and "mystery" as four visual properties of an environment that shape people' preferences (Fig. 3.11). Furthermore, Kaplan &Kaplan and Lynch have suggested that over time, people prefer an environment with a high degree of "complexity" and "surprise" (Kaplan & Kaplan 1982; Lynch, 1960).

	Present or Immediate	Future or Promised
Making Sense	**Coherence** Environments easy to organize or structure	**Legibility** Environments suggesting they could be explored extensively without getting lost
Involvement	**Complexity** Environments with enough in the present scene to maintain interest	**Mystery** Environments suggesting that, if explored further, new information could be acquired

Fig. 3.11: The framework of environment preference
(Kaplan and Kaplan, 1982)

3.4.2 The "edge effect"

The term "edge effect" was first used by De Jonge (1968) when studying location preferences in an indoor environment. Seats with their backs or sides to the walls with a good view of the general situation are preferred to other places. Window seats in particular, from which the outdoor as well as the indoor space are visible, are most frequently used (De Jonge, 1968).

Similar patterns were also found in outdoor spaces. Alexander et al. (1977), Whyte (1980, 1988) and Gehl (1987) through observing the use of many public squares report that the edges are preferred by both sitting and standing people. Only when the edge is fully occupied, will people then move inward to the middle of the space. Hence, Alexander argued that "*the life of a public square forms naturally around its edge. If the edge fails, then the space never becomes lively"* (Alexander et al., 1977, p. 600).

Fig. 3.12: Edges of Seagram Building Plaza, preferred locations in public space
(Moga, 2011)

Quentin Stevens (2007) in a more recent publication, *The Lucid City*, argues that generally the edges of public space are the best places for inviting people to a full level of involvement, to play and to experiment with new things. According to him, *"the edge of a public space is a popular place for people to situate themselves during leisure time, because it offers protection, while allowing controlled exposure to outside stimuli*" (Stevens, 2007, p. 115).

Therefore, Alexander et al. have suggested that designers should not treat the edge merely as a *"line or interface without any thickness",* instead it should be designed *"as a place, a zone with volume to it"* (Alexander et al., 1977, p. 600). They recommend that multiple seating opportunities and activity pockets (shops and food vendors) should be placed at the edges (see Fig. 3.13). It is widely believed that the success of historical squares is partly because of the existence of several small shops at the edges and partly because of the treatment of the edges. For instance, archways or colonnades around the squares make the edges a good place to stay and observe the surroundings (Lennard and Lennard, 1984).

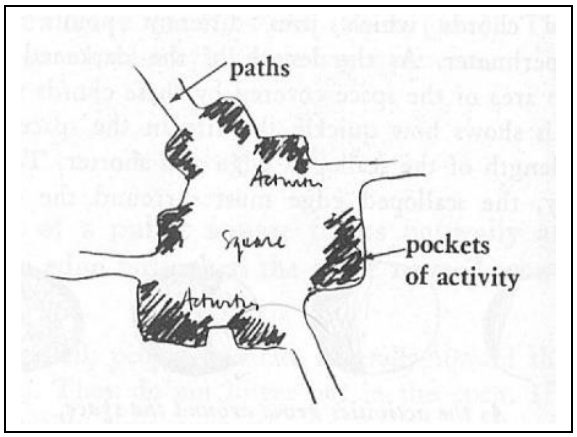


Fig. 3.13: Treat the edge as a zone with volume
(Alexander et al., 1977, p.600)

In short, the edges of public space are likely to be the most heavily occupied locations in open public space in the West.

3.4.3 The “island effect”

De Jonge (1968) found that the centre or middle of indoor and outdoor space is the most avoided location. He called this spatial pattern the “island effect”. Similarly, Alexander (1977) observed that the centre of an open space would only be used when the edges were fully occupied (see Fig. 3.14). The life of public squares thus begins at the edges then slowly spills over towards the centre. From a psychological point of view, a person while wanting to see others, does not want to be exposed (Appleton, 1975). The fear of the public gaze, to be seen and to be judged by others (Valentine, 1998) makes people move away from the centre, out of view of other people.

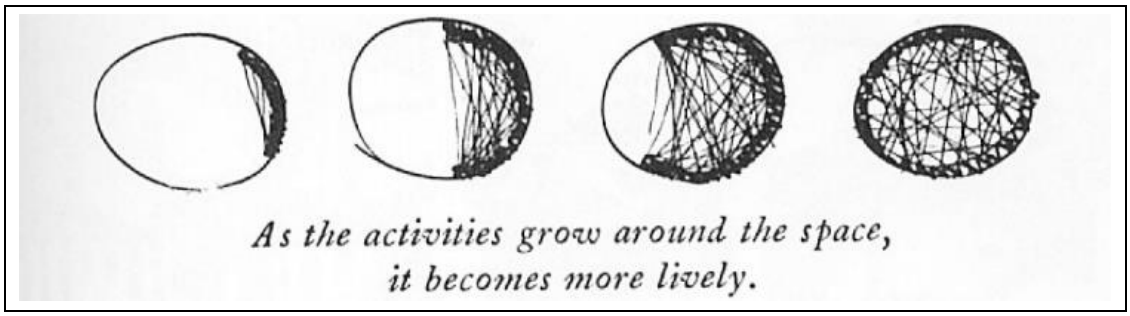


Fig. 3.14: Preference for the edges over the centre of open spaces
(Alexander et al., 1977, p. 601)

The impact of the “island effect” on the vitality of public space is significant. In this regard, Gehl & Svarre (2013) did an experiment, asking their students to assess the vitality of a square with the same number of users in two different settings. In the first setting, people were gathered in the middle of the square, and in the second setting, people were distributed evenly at the edges (see Fig. 3.15). Even with the same amount of users, most students found the picture of the second setting with an empty centre evoked an unwelcome feeling in contrast to the first one (Gehl & Svarre, 2013).

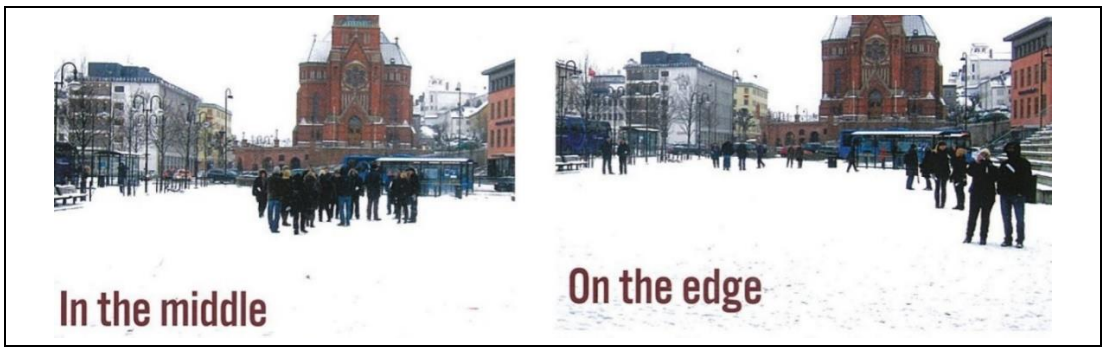


Fig. 3.15: The distribution of people
(Gehl & Svarre, 2013)

To enhance the vitality of open spaces and eliminate the "island effect", it is suggested that designers create a focal point at the centre of the space (Marcus & Francis, 1997; Carr et al., 1992; Sitte, 1889), such as a fountain, statue or bell tower (Marcus & Francis, 1997; Carr et al., 1992; Francis, 2003), which can also contribute to the image and identity of the space.

In spite of the recognition of the importance of visibility, the development of a method to quantify visibility and its impact effectively has recently emerged with the use of digital technology. Studies using such methods will be reviewed in the following section.

3.4.4 Studies of the impact of visibility on the use of public space using the Space Syntax methods

Over the last fifteen years, two models have been developed by space syntax researchers to quantify visibility and its impact on the use of public space. In the development of these, the concept of an isovist (visual field) initiated by Benedikt (1979) plays an important role (Batty, 2001; Turner, Doxa, O'sullivan, & Penn, 2001). Benedikt describes an isovist as "the set of all points visible from a given vantage point in space" (Benedikt, 1979, p. 47). Based on the concept of an isovist, both overlapping isovists (Campos, 2000) and visibility graph analysis (Turner, 2003) have been developed.

Overlapping isovists

Fig. 3.16: The overlapping isovists method
(Campos, 2000)

The overlapping isovists method was developed by Campos (2000) to investigate how the distribution of static use inside public squares is determined by the degree of exposure to the surroundings. According to Campos (2000), the intersection points of axial lines in the surroundings (see the map on the left in Fig. 3.16) are vantage points from which people tend to start to browse for sitting places inside the space. Subsequently, an overlapping isovists map is created by overlapping isovists (visual fields) constructed from these vantage points (see the maps in Fig. 3.16).

The degree of exposure of any point inside the space is manually calculated as the number of visual fields that cover this point (B. Campos, 1999, 2000). Then, by plotting the degree of exposure against the observed distribution of static users, Campos found that static users preferred locations with low visibility (blue or purple areas), followed by medium visibility, and avoided the most visible areas (red or yellow areas). In addition, a second trend is that within low visibility areas, people concentrate at spots that are close to high visibility zones (Campos, 1999, 2000, 2005). These findings suggest that in open public squares, the distribution of people is affected by the visual relationship with the surroundings rather than the internal layout of the space itself.

Nevertheless, the overlapping isovists method contains technical flaws. In Fig. 3.16 the map on the left shows the selection of vantage points from which the isovists were constructed is relatively subjective. In addition, this method overlooks the impact of elements inside the space that are visual obstructions. If these technical flaws can be fixed, overlapping isovists could provide researchers with a simple but effective method to study the impact of visibility on the use of public space.

Visibility graph analysis (VGA)

Visibility graph analysis was developed by Turner (2003) and is a new and more frequently used method to quantify the degree of exposure and visibility. In a VGA map, urban space is divided into many small cells (the recommended unit is 60 cm by 60 cm, which is approximately the size of a human foot print) (Turner, 2004). Then, the degree of visibility of each cell is calculated as the (visual) integration value based on its topological depth to all other cells[6] (Batty, 2001; Turner, 2003). Cells that are typically coloured red are those which are most visible from all other cells, whereas the most secluded cells are blue or purple (see Fig. 3.17). The construction of VGA maps can be achieved with the use of specialised space syntax software – Depthmap (Turner, 2004). Over the last decade, the VGA method has been used by many researchers to study the use of both nodal and linear spaces.

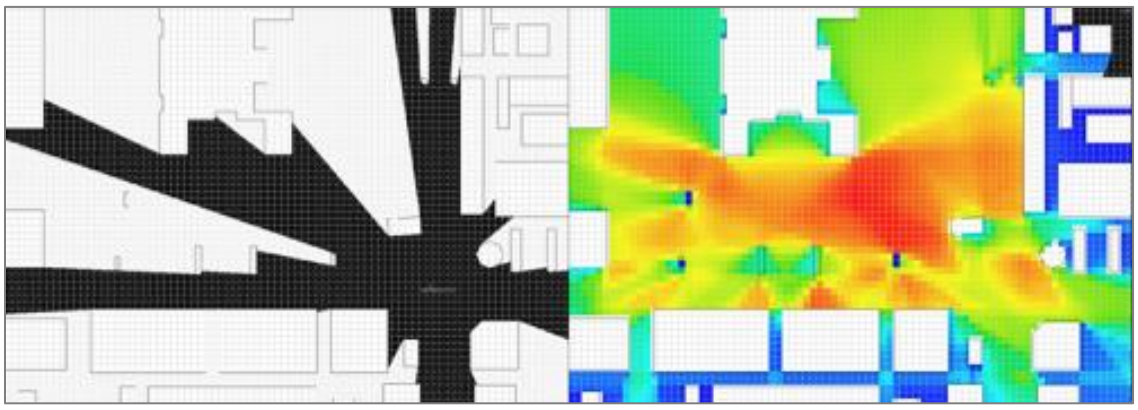


Fig. 3.17: From isovist field (left) to VGA (right)
(Wawrzyniak, 2010)

[6] A more detailed explanation is presented in chapter four.

As a visibility analysis expert, Campos (2005) used VGA to examine the choice of location in six public squares in London. Her findings reveal that 45 % of static users selected low visibility areas, followed by 31 % for medium visibility areas. Only 25% of total users were found in high visibility areas. In another study of urban plazas, Bada and Farhi (2009) reveal different preferences for people standing and sitting. Standing people tend to occupy locations with high visibility that are also the busiest locations in the square. In contrast, sitting people preferred locations with low visibility. Bada and Farhi conclude that *"the use of a plaza does not depend on the amount of sitting spaces provided. People might accept some discomfort (standing or sitting in informal spaces) for the sake of visibility matters"* (Bada and Farhi, 2009, p. 111).

In another study of an urban park, Papargyropoulo (2006) points out that locations with the highest visibility are preferred by large, organised groups. In contrast, individuals or couples who are engaged in other activities such as eating, reading and relaxing select more visually secluded areas (Papargyropoulou, 2006).

In summary, VGA offers a new way to quantify or re-examine existing accepted assumptions about the relationship between visibility and human behaviour in public space. Bada and Farhi show that the choice of location largely depends on the nature of activities, whereas Papargyropoulo's study (although not focusing on public squares) suggests that the size of groups also plays a fundamental role in the selection of location. These findings seem to challenge the universality of the prospects and refuges theory of Appleton.

3.5 Transient Use: Accessibility and Circulation in Public space

Given the decline in the use of public space over the second half of the last century, the importance of transient use has been recognised (Carmona et al., 2003; Ewing & Clemente, 2013; Pushkarev & Zupan, 1975; Whyte, 1980; Yeang & Baxter, 2007). According to William Whyte, the key to the success or failure of a public space lies in its relationship with the streets

and adjacent pedestrian flows. In his seminal work, he states that *"the key space for a plaza … The area where the street and plaza or open space meets is a key to success or failure. Ideally the transition should be such that it is hard to tell where one ends and the other begins"* (Whyte, 1980, p. 57).

Whyte argues that while other elements such as trees, water and amenities can always be added later, the relationship with the street is "integral and it is far and away the critical design factor" (Whyte, 1980, p. 54). A more recent study of public squares in London has also confirmed that public spaces that are less integrated into the movement network or that are too enclosed are likely to be underused (Carmona, 2003, 2014). This implies the need for a conceptual shift in the design of public space to encourage not only static but also transient use. The following section examines factors that draw people into public space with a focus on circulation and the relationship of the space with the urban configuration.

3.5.1 Circulation and other factors that draw people into public squares

The importance of transient use has been recognised, and over the last few decades, accessibility, connection and walkability have become important criteria for the development of public space. However, in many theoretical frameworks including place-making theory or Sense of Place, initiated by Canter (1977) and further concretised by Punter (1991) and Montgomery (1998), these criteria might not be sufficiently explicit and concrete for architects and designers. Among many design checklists and recommendations, the work of Marcus & Francis (1997) and Carmona (2014) provides more useful recommendations and insights for such people.

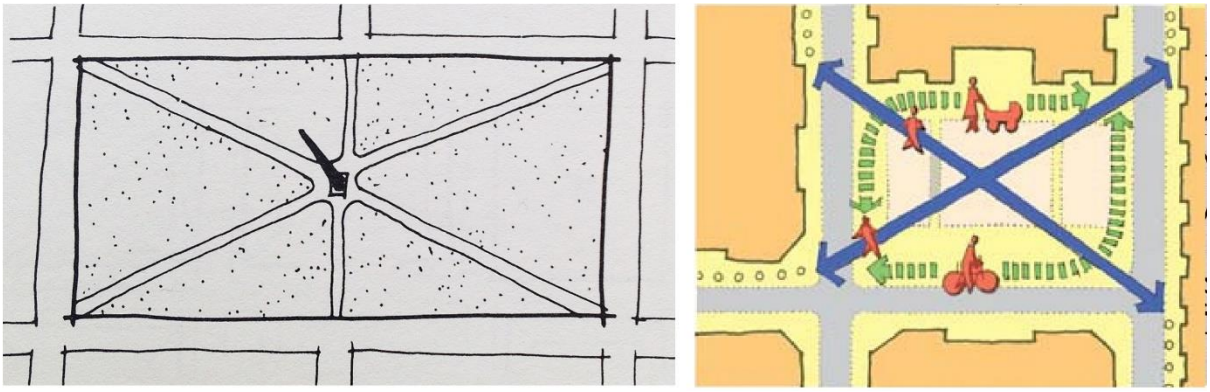


Fig. 3.18: Simple and effective circulation systems
(French, 1958; Baxter, 2007)

According to Marcus & Francis (1997), most plazas should accommodate three forms of circulation:

(1) Passing through: people using the plaza as a shortcut or a pleasant walking-through space;

(2) Access to a cafe, bank or other retail use peripheral to the plaza;

(3) Access to seating or viewing areas: people enter the plaza in order to sit in the sun, eat lunch, view an exhibit, or listen to a concert.

Marcus & Francis (1997) report that people in the first two categories seem to prefer an open walkway area, and the most direct route. Other authors agree that people prefer to walk in a diagonal line through the space unless they are with a baby buggy or on a bicycle (Baxter, 2007; Gehl et al., 2006). In a study of public squares in London, Carmona (2014) found the most successful public space are often movement corridors, whereas spaces that are cut off from the main movement network are probably doomed to failure. The principles for good circulation design proposed by Marcus & Francis and Carmona can be summarised as follows:

- Integration of existing movement networks;
- Visual accessibility: possibility to see through the space from outside;
- Simple and legible circulation system;

- Provision of movement corridors and desire lines (diagonal routes);
- Allowing and encouraging movement through the centre of the space;
- Accommodating the needs of the disabled, the elderly, and parents with strollers and vendors with carts.

A legible, simple circulation system will improve transient use of the space. The challenge for architects is not simply to create the clearest and most legible circulation, but to find a design that supports both static and transient usage.

3.5.2 The Space Syntax methodology: quantifying the degree of accessibility generated by the urban configuration

Over the last three decades, the space syntax theory initiated by Hillier and Hanson (1984) has provided a method for quantifying the accessibility of an urban space, including nodal spaces such as public squares and parks.

The accessibility of an urban space is understood by the space syntax method as the degree of integration of this element within the urban configuration. This method consists of creating diagrams of urban spaces or urban configurations as a set of the longest and fewest sets of lines of sight passing through all the convex spaces in the system (see Fig. 3.19). Each urban space is represented by an axial line on an axial map, thus the accessibility of an axial line (urban space) can be calculated based on its topological depth[7] in the system using graph theory (Hillier & Hanson, 1984; Hillier, Penn, Hanson, Grajewski, & Xu, 1993; Penn, 2003; Turner, Penn, & Hillier, 2005).

[7] The definition and calculation of topological depth is explained in detail in section 4.4.

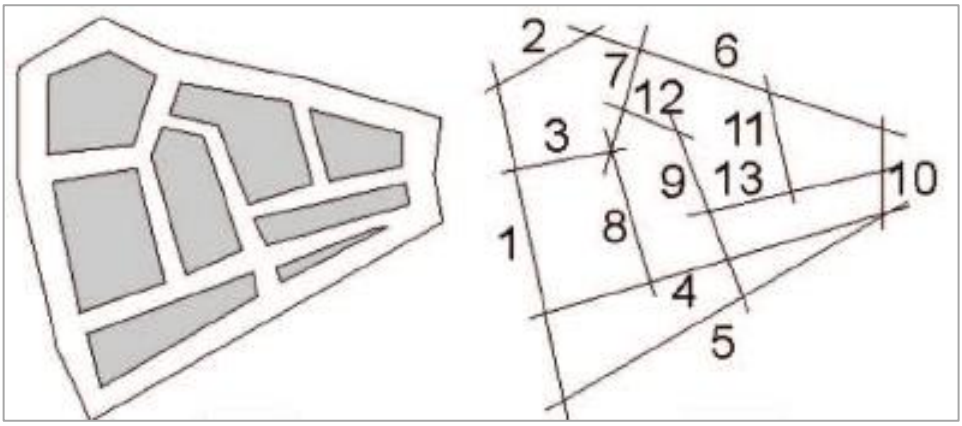


Fig. 3.19: The figure-ground map (left); The syntactic axial map (right)

In contrast to the accessibility of linear spaces (streets), the accessibility (also referred as integration value) of a public square is calculated as the sum of the integration values of all axial lines that interface the body of a public square, termed the "strategic value" (Hillier, 1984) (see the detailed description in chapter four).

The first study of public space using the space syntax method was conducted in 1984 by Hiller and his colleagues. This was an investigation of seven urban squares in the heart of London in order to figure out why some were well-used whereas others remained empty most of the time. According to Hillier (1984), there was a strong correlation between the "strategic value" (accessibility of the squares) and the level of pedestrians found in adjacent streets. In other words, the numbers of adjacent pedestrians, or the potential users of public space, are generated by the larger urban morphology independent of the quality of design of the spaces themselves. In short, by using the space syntax method, Hillier was able to quantify and identify the key factor for the success of a public space, accessibility generated by the urban grid configuration. In this way, Hillier has extended Whyte's argument that the success of a public space is determined more by the relationship with the surrounding streets than by its internal design.

Continuing this line of research, Campos, after studying twelve public squares in the city of London, argued that there is not only a strong linear correlation between the syntactic accessibility of public space and the pedestrian density in the surrounding streets, but also a strong correlation between accessibility and the number of static users inside the public space

(B Campos, 1997; B. Campos, 2000). Another study on urban plazas in Algerian cities also reported similar results (Bada & Farhi, 2009).

In China, the use of the space syntax method to study public space has only lately emerged. A strong correlation between the syntactic accessibility and the density of pedestrians and the adjacent land use in many urban areas of Shenzhen city was found (H. Wang, Shi, & Rao, 2013). However, regarding the use of public squares, a recent study in the city of Hong Kong conducted by Ling (2008) reports no significant correlation between levels of all static users and the syntactic accessibility. Ling (2008) suggests that this low correlation occurs because the urban fabric of Hong Kong is highly fragmented, and less legible than other contexts (Ling, 2008). However, there might be different factors in the Chinese context that could affect such correlation, including the existence of fences and gates as well as the circulation inside the squares.

3.6 Discussion

This section discusses the key aspects and findings from the literature review that are relevant to and within the scope of this thesis, ranging from studies of historical public squares to the performance of modern urban plazas. In addition this section reinforces the insights from chapter two that the linkage between the urban form and patterns of use is an especially significant consideration for the development of user friendly small and medium-sized squares in China. The discussion also introduces the most appropriate spatial analysis methods for the body of the research – case studies of 13 squares in Southern China as reported in chapters five to seven.

It is widely suggested that the main issue of squares and plazas in Western cities is that underuse. The failure of modern urban public space is believed to be rooted in the simplicity of Modernist planning principles, which does not reflect the richness and complexity of cities and human life. To bring life and people back to urban spaces in general and to modern plazas

in particular, different schools of thought have provided a range of ideas and theories. Key authors are presented in Fig. 3.20 using three reference points: form, activity and cognition (image/meaning).

The use of different font sizes is an attempt to illustrate the influence of these authors.

Fig. 3.20: Urban public space research trends in the last century in Western literature

Top left is a cluster of authors who have emphasised the formal, architectural aspects, where design is focused on the urban form with minimal concern for activities or cognition. From the analysis of successful public squares in the past, theorists ranging from Sitte to Moughtin have identified “picturesque” formal characteristics which they consider significant for the success of public squares. These include irregular shape, human scale, proper proportion, degree of enclosure, materials, and the placement of free standing elements such as monuments. In China, the works of Pu, Yang and Volkmann (see chapter two) are aligned with this trend. However, while these studies might be theoretically interesting, the empirical data do not prove the relationship between such picturesque characteristics and the success of public squares and urban plazas. William Whyte found no evidence suggesting that “beautiful” plazas are used

better than "ugly" ones or vice versa. Instead, he found that people are attracted more by the presence of other people than the architecture. In this regard, Jane Jacobs argues that an emphasis on the aesthetic aspect makes the mistake of substituting art for life, observing that for the city, an artistic emphasis cannot sustain the complexity and intensity of urban life. In China, Jacobs's views again become relevant, as many highly "decorated" public squares have failed to attract users.

Within the scope of urban design (from a social-spatial research perspective), the failure of form-oriented research has given rise to research with a focus on the linkage between form-cognition/perception and form-activity.[8] From the 1970s, form-cognition studies became a major research trend with key figures including Lynch, Kaplan and Kaplan and John Appleton. This research approach differs from the form-oriented research in that the researcher's perception and value system do not play the central role, which is left to the users. Form-cognition studies analyse the mental image of (urban) spaces, and from this, identify what environmental settings users like or dislike. Studies also examine how intangible properties of urban spaces such as imagibility, legibility, coherence, complexity and mystery might affect users' feelings and wellbeing. One limitation of form-cognition studies is that they are based on the analysis of images of urban spaces, while in reality, users' feeling and behaviour are largely affected by the co-presence of other people. Form-cognition studies have mainly failed to address this issue. This is a complex issue as on the one hand, people are attracted by the presence of others, and on the other hand, a number of people wish to avoid the public gaze of the crowd. Hence, the feelings and behaviour of users are the result of a dynamic interplay

[8] Although place-making theory integrates three attributes: form, activity and perception/meaning into a single theoretical framework, a study of how the perception of public space affects user behaviours in a broader sense is beyond its scope. According to Neal (2010), the linkage between perception and activity or design falls within political and legal-economic research perspectives. Studies within these perspectives include works by Richard Sennett, Manuel Castells and Elin Tan which have led to a discussion on the loss of public space as unavoidable and integral to modern Western society. This thesis, however, adopts a positive view that public space is simply a public good and can be improved by spatial interventions.

among three variables: the environment, the individual and the co-presence of others, rather than a static relationship between users and the physical setting.

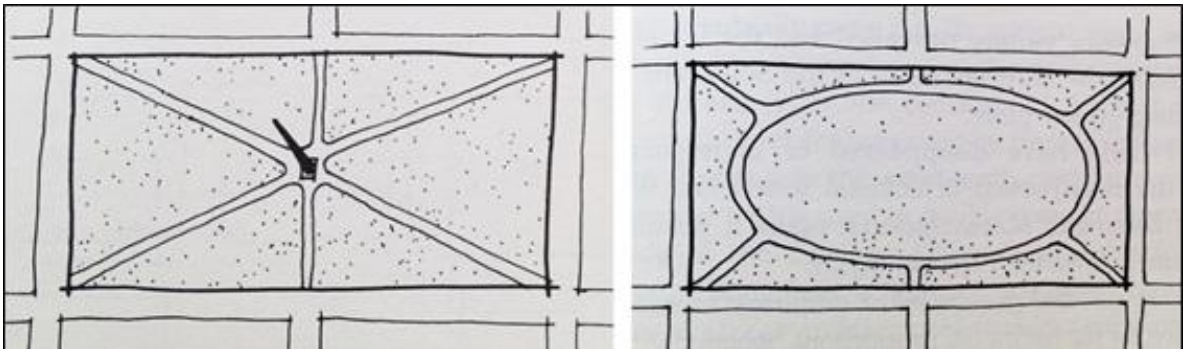
William Whyte when studying the use of urban plazas in New York found that what people said in interview about their potential behaviour in public space is largely not reflective of their actual behaviour. Hence, he believes that observing how people behave in public space provides a more rigorous result. Towards this end, William Whyte along with Jan Gehl initiated a new research direction to improve the design of urban spaces through the direct observation and analysis of the relationship between form and activity. Within this research approach, well-used space is defined as good space. Hence, the focus of many studies is to find out what objective spatial properties would increase the use of public space. These properties include sitting places, microclimate, landscape, water, and artwork.

One of the most significant findings of this research shift is the edge effect. From the observation of many urban plazas and public squares in Western cities, the edges of public space are the most preferred location, as people can comfortably watch the pedestrians and have a sense of visual control of the whole space. Many authors believe that if the edge fails, the function of the whole square fails. These findings resonate with the theory of prospects and refuges of Appleton. Appleton, however, explains the preference for the edges as the result of primitive human instincts. In order to survive, the hunter seeks places where he can hide himself, but at the same time have a good view of the surroundings. In other words, visibility, an important spatial property that relates to the feeling of safety and belonging, is suggested as the underlying motive behind the choice of location in open public space. From the understanding of users' location preferences, design elements can be tailored to provide adequate numbers of sitting places where they are most likely to be used.

Alongside the visual logic of location preference, accessibility of urban plazas is recognised as another significant factor. William Whyte considers that the relation with the street is far more

important than other factors because he argues that other factors can be added later, whereas that to the street is fundamental and integral. Although Whyte and other similar researchers have recognised the importance of accessibility and visibility, the impact of these properties on the use of public space is not explicitly investigated given the lack of a method to quantify these two properties.

In relation to the issue of predicting behaviour in unrealized designs, the space syntax method offers ways that quantify the two most important spatial properties related to successful urban spaces: accessibility and visibility. Potentially, a combination of direct observations with space syntax techniques could provide more insights that could inform future design. According to Hillier, movement is the key to the success of public space, and the problem with previous studies is that they have considered public space as static rather than as a key component of a large movement network. Previous studies in the city of London using the space syntax methodology report a positive correlation between the levels of transient and static use of public squares and their degrees of accessibility, or their strategic values. These findings are useful in the Western context as they indicate that it is possible to predict the levels of usage of a public square based on the analysis of its relationship with the urban configuration. Hence, investment can be successfully allocated to places that are used the most. It would appear that in the West, adjacent movement is the lifeblood of the performance of a public space as it provides not only attractive views for passive users, but also a sense of safety from the co-presence of others. However, in the context of China where the feeling of safety is not such an issue in public space (due to the lower levels of public crimes and violence) and people-watching is not the most popular activity, the question of the relationship between transient and static use and hence the degree of accessibility needs to be re-evaluated.



Type A: Encouraging Transient Use	Type B: Prioritizing Static Use

Fig. 3.21: Two archetypes of public squares
(French, 1958)

In his seminal work, Jere French identified two archetypes of public squares that have appeared throughout the history of European cities: centric spaces (type A) and enclosed spaces (type B). These two archetypes are distinct in their design and use. Enclosed spaces provide a higher degree of enclosure and direct movement towards the edges of the space, attracting higher levels of static use. In contrast, centric spaces are more open and legible and provide short movement corridors across the space, thus experiencing higher levels of transient use. In reality, any square is likely to be a combination of the two types. Previous studies, while mentioning the importance of both static and transient use, tend to overlook the contradiction or tension between the two. An alternate approach would be to divide research into the use of a public space into static and transient use in order to provide a deeper insight into the tension between the two.

Compared to research conducted in the West, research into public space within the urban design discipline in China is still at an early stage, with an emphasis on formal approaches typically related to historical precedents. In relation to the focus of this thesis on small and medium-sized public squares, there are no historical precedents for reference in China. Moreover, as has been established by Whyte and Jacobs among others, the approach of using aesthetic principles from historical spaces will not necessarily lead to well used, successful public space. This experience from the West provides useful lessons for Chinese researchers, who need to

direct their attention from artistic and formal aspects to the users' needs and activities on a daily basis.

Furthermore, the validity of many findings in the West needs to be examined critically in the Chinese context. There are significant cultural differences between the two civilizations that hinder any direct imitation. As reported in chapter two, the most popular activity in public squares and urban plazas in China is not "people-watching". In addition, public spaces in China are dominantly occupied by large and organised groups of the elderly, whose spatial behaviour might be vastly different from that of office workers, the main user type of public squares in the West. People in groups might be significantly differently affected by the public gaze than individuals; hence, these two user types might have different strategies for selecting a location in open public space.

The major issue of many underused public spaces in the West can in part be explained by the availability of public space in Western cities often being higher than the actual need. In a condition where the provision of basic amenities is not sufficient to bring people back to public space, Western authors recommend the use of images or other intangible values to attract people. Chinese designers, however, should be aware of a hierarchy of needs. According to Maslow (1943), the primary need of human beings is physiological, and only when this need is fulfilled, will people feel the secondary aesthetic and self-esteem needs. Accordingly, it would be appropriate that the design of public space should address the physiological need first before attempting to fulfil aesthetic and self-esteem aspirations. Hence because this and the other issues discussed above, this thesis aims to fulfil the physiological needs of users through studying the relationship between their behaviour and formal patterns of public space. Therefore, the scope of this thesis does not include users' perceptions and feelings which are conditioned by the meaning, feeling of belonging and other intangible values of the space.

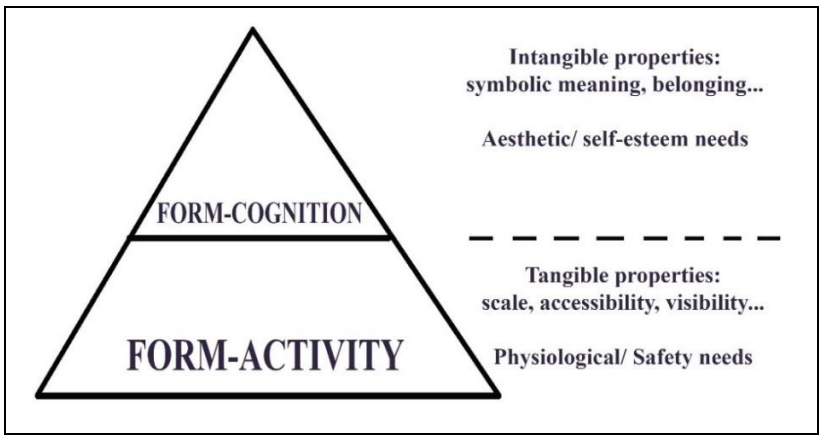


Fig. 3.22: Hierarchy within the three attributes (form-activity-cognition) of place-making framework

Although some Chinese architects and researchers might find ready-made principles from the West less useful in China, they can however adopt other research methods that provide insights into how spatial interventions can address users' needs and support their activities. The literature review has identified two relevant sets of methods that have the potential to generate information and insights that can enhance the design of Chinese small and medium-sized public squares: direct observation (behaviour mapping) and space syntax.

In summary, this literature review further extends the problem statement within the scope of this thesis, situates the gap in knowledge, and identifies relevant spatial analysis methods. A summary of the research framework that explains each stage of the research from the literature review through the data collection and analysis and final findings is presented in Fig. 3.23. In the next chapter, a detailed description and review of each of the three methods identified will be presented. In addition, the 13 case studies will be introduced.

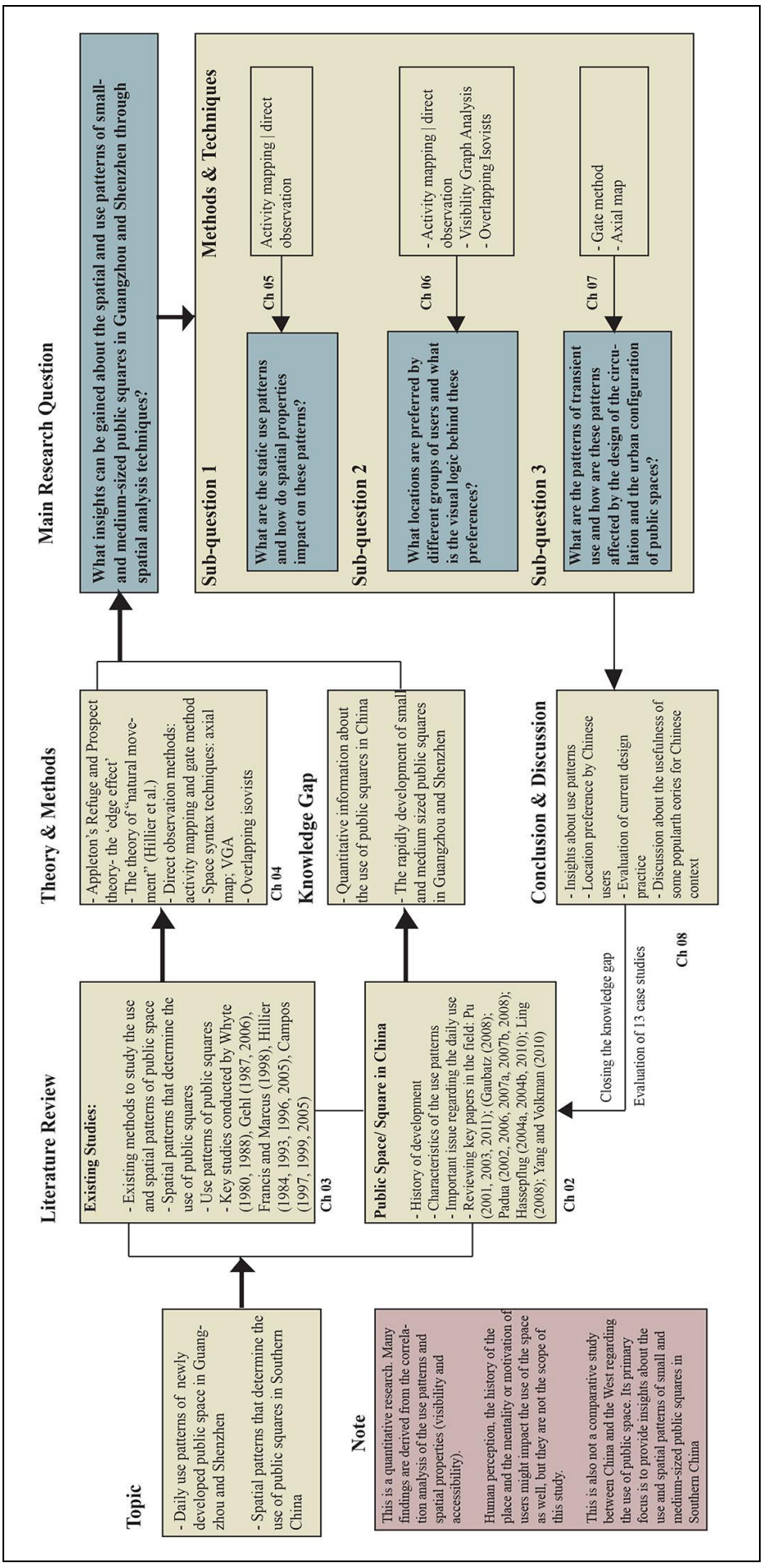


Fig. 3.23: The research framework

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

4.1.1 Aim of the chapter

Space syntax forms the main research method, further divided into two parts: (1) direct observation methods[9] and (2) space syntax analysis techniques. This chapter sets out to explain in detail each method used, how the data was collected, and the selection of 13 case studies of small and medium-sized public squares in Guangzhou and Shenzhen.

4.1.2 Overview of the chapter

This chapter is composed of four sections. Section 4.2 describes the overall research approach and introduces the case studies. Section 4.3 describes the direct observation methods, including behaviour mapping, the gate method and movement tracing and how they were executed on site. Section 4.4 provides a brief introduction to space syntax methods, including their historical development and key concepts. Subsequently, the used in the case study analysis are described in technical detail: axial mapping, Visibility Graph Analysis (VGA), and the Overlapping

[9] Direct observation methods used in this thesis are borrowed from the Space Syntax Observation Manual published by the Space Syntax Laboratory at University College, London.

Isovists Gate (OIG) method. The final section of this chapter discusses the strengths and limitations of these methodologies.

4.2 Research Design

4.2.1 Space Syntax methodology: An integrated research approach

This thesis uses the space syntax method, which is an integrated research approach that relies on the combination of space syntax techniques and direct observation methods. The empirical results of this thesis are presented in chapters five to seven, addressing the three following research sub-questions respecting the use of small and medium-sized public squares in China.

> *Research sub-question 1: What are the static use patterns and how do spatial properties impact on static use patterns?*
>
> *Research sub-question 2: What locations are preferred by different groups of users and what is the visual logic behind these preferences?*
>
> *Research sub-question 3: What are the patterns of transient use and how are these patterns affected by the design of the circulation and the urban configuration of public space?*

In order to address the first research sub-question, chapter five describes the direct observation method (behaviour mapping). Data collected from systematic behaviour mapping are analysed to identify static space use patterns, including the levels of usage, types of users and their activities. Subsequently, these space use patterns are examined in relation to spatial properties such as the size of the space, the existence of fences and gates and the provision of sitting opportunities.

Chapter six addresses the second research sub-question through the overlapping of two methods: behaviour mapping method and the (space syntax) visual analysis method. To

examine location preference patterns, the behaviour maps of three off-peak periods are used. The spatial patterns extracted from the behaviour mapping method are plotted against visual maps, visibility Graph Analysis (VGA) and the Overlapping Isovists of the Gate (OIG). The objective is to examine the correlation between the location preferences and degrees of visibility revealed by the space syntax analysis.

To investigate how degrees of accessibility and circulation design affect transient use of small and medium-sized public squares, chapter seven combines the space syntax (axial map) and direct observation methods (gate method and movement tracing). Axial map techniques measure the degree of accessibility generated by the urban grid configuration, called the "strategic value", whereas the gate method is used to count the levels of movement inside the space (transient use) and the pedestrian density in adjacent streets. By plotting the "strategic value" against the recorded levels of (static and transient) use, the relationship between the two sets of measures can be revealed.

4.2.2 The selection of case studies

This thesis specifically focuses on small-and medium-sized public squares in Guangzhou and Shenzhen, the two major cities of the Pearl River Delta. This section first introduces the background of the two cities, followed by a brief investigation of 27 samples of public squares in these two cities which led to the final selection of 13 case studies in this thesis. Lastly, an introduction to each case study is conducted.

Guangzhou and Shenzhen – The Experiment Fields of China

Over the last three decades, the Pearl River Delta region as a whole has been the fastest developing region in China and worldwide. Composed of about 42 million inhabitants, the region has recently overtaken Tokyo as the world's largest metropolitan region. Within this region, Guangzhou and Shenzhen are the largest and most developed cities, each of which has

more than ten million permanent inhabitants and a considerable additional number of working migrants (Hao, 2010; Y. P. Wang, Wang, & Wu, 2010).

Fig. 4.1: The geographic location of Guangzhou and Shenzhen in the Pearl River Delta

As a whole, the population density of Guangzhou is 6,626 people per km^2, whereas that of Shenzhen is 7,500 people per km^2 which makes Shenzhen fifth in terms of population density globally and the second just after Hong Kong China wide (Telesetsky & He, 2016).

According to an academic study, old urban districts in Guangzhou have population densities much higher than 33,300 people per km^2. In particular, the Yuexiu district has more than 52,000 people per km^2. According to the same study, the population density of some neighbourhoods can be even three times that of Yuexiu. For example, Danan neighbourhood in the Yuexiu district has a density of 143,000 people per km^2 (C. Zhou, Xu, & Sylvia, 1998).

These two cities have been experimental fields in economic development, as well as spatial planning, particularly as models for other cities in China (Friedmann, 2005; P. Rowe, 2005). These cities were selected as each provides a different model of recently developed small and medium-sized public squares for analysis. In Guangzhou, public squares have been inserted into the old part of the city and used as a central instrument in the City Cosmetic Movement (Kongjian, 2007; Yang & Volkman, 2010), which aims to turn many parts of the old city into

tourist destinations. Chapter two has outlined some prime examples of this movement throughout China, including the Xintiandi project in Shanghai and the making of the Chen Academy Front Square. These new developments have not been comprehensively studied and provide a directly relevant set of small and medium-sized urban squares for field studies.

In contrast, Shenzhen, a young city that has been rapidly transformed from a small town three decades ago to be one of the busiest cities in Asia, has experienced different issues in its redevelopment phase. In the course of its rapid development, many rural villages became urbanised, overcrowded and decayed. Therefore, since the 2000s many urban villages have undergone a radical redevelopment plan that has superseded the old urban fabric and inserted a new grid street network. Interestingly, many of these new urban villages are spatially arranged around a central public square (Hang, 2006).

A Brief Investigation of 27 Samples of Small and Medium-sized Public Squares

Fig. 4.2: Small-and medium-sized public squares in the Old Part of Guangzhou

Before selecting 13 case studies for this thesis, a brief examination of 27 samples of public space in two cities was conducted – 14 samples in Guangzhou and 13 samples in Shenzhen. This was to ensure that the final 13 case studies had relatively similar conditions, such as the

degree of cleanness, freedom of access and to act and basic amenities on site, including sitting opportunities and sun protection. The locations of the 14 samples of public squares in Guangzhou are shown in Fig. 4.2.

All of the 14 samples are located in the old districts of Guangzhou. Many of these spaces are part of the redevelopment programme with the aim to turn the historic parts of the city into tourist destinations. Three days were spent observing the use of these 14 public spaces, and six samples were selected for further investigation. Fig. 4.3 summarises the result of this brief investigation in Guangzhou and explains why the six samples were selected.

NUMBER	NAME OF SQUARE IN GUANGZHOU	SELECTION	COMMENTS
1	ZHONGSHAN BA SQUARE	No	This square is located next to a big bus station in Guangzhou. Its design is however no more than a paved area with limited sitting opportunity and sun protection. The space is used only as moving-through space.
2	RENWEI TEMPLE SQUARE	Yes	This square is located close to Pantang Village. It has a good atmosphere and a good mixture of transient and static use.
3	LIWAN LAKE SQUARE	Yes	This square-like setting attracts many types of informal activities and good levels of through movement at the same time.
4	BRIDGE SQUARE	Yes	The square is small but has a good atmosphere and a good mixture of transient and static use. There might be tourists stopping from time to time, but local users are dominant.
5	THEATRE SQUARE	Yes	The square is relatively cut-off from the main pedestrian street, but it attracts many types of activities and high levels of static use throughout the day.
6	METROPOLITAN PLAZA	No	This square is located in front of a big shopping mall with access to a metro station. However, no seats are provided. The space is also highly controlled by mall guards. Thus, the square is used mainly as a going through space.
7	FRIENDSHIP SQUARE	No	This square is located in the Shamian Island, the old Westerner quarter. It is well-designed and maintained. However, the main type of users appears to be tourists. The typical activity there is photography. Other types of activities are virtually absent.
8	CHEN ACADEMY FRONT SQUARE	No	This square is simply a large empty paved area with virtually no seats and no subdivision.

			Thus, it is used mainly as a moving through space.
9	CHEN ACADEMY SQUARE	Yes	In contrast to the square nearby, this square provides a good number of sub-spaces with sitting opportunities. The space is occupied by a wide range of activities during the day and it is also well used as a through movement space.
10	SHANGXIA JIU SQUARE	No	This square is located within the most popular pedestrian street in Guangzhou, thus it is overcrowded most of the time largely by tourists. It is highly controlled with the presence of a group of guards. Types of activity here are also poor given the lack of seats and room.
11	GUANGXIAO TEMPLE SQUARE	No	This temple square attracts many beggars at the entrance and is highly controlled by on site guards, limiting freedom of activity.
12	STONE CHURCH SQUARE	No	The square is located in front of the most famous catholic church in Guangzhou, thus attracting many tourists. However, the space is fenced and highly controlled by on site guards. Few types of activities are observed.
13	PEOPLE PARK FRONT SQUARE	Yes	This square was inserted in the front of the first urban park in Guangzhou. The square attracts high levels of usage given its central location.
14	HAIZHU SQUARE	No	This is one of the very first squares in Guangzhou, but was redesigned to become a traffic island with highly limited access for pedestrians. Hence, low levels of use during the day are observed.

Fig. 4.3: Summary of a brief investigation in Guangzhou

Some of the squares were not selected as they are primarily used by tourists such as the Stone Church Square or the Friendship Square in Shamian Island. Shangxia Jiu Square was also not selected although it attracts both tourists and locals. This is because of its poor provision of

sitting places and other public amenities. Furthermore, the space is controlled by a group of guards[10] that might limit the number of activities occurring there. The six selected spaces in Guangzhou are Theatre Square, Bridge Square, Renwei Temple Square, Liwan Lake Square, Chen Academy Square and People Park Front Square.

A similar process was conducted in Shenzhen. From the pool of 13 samples of small and medium-sized public squares, seven samples were chosen as case studies for this thesis. The location of the 13 samples in Shenzhen is shown in Fig. 4.4.

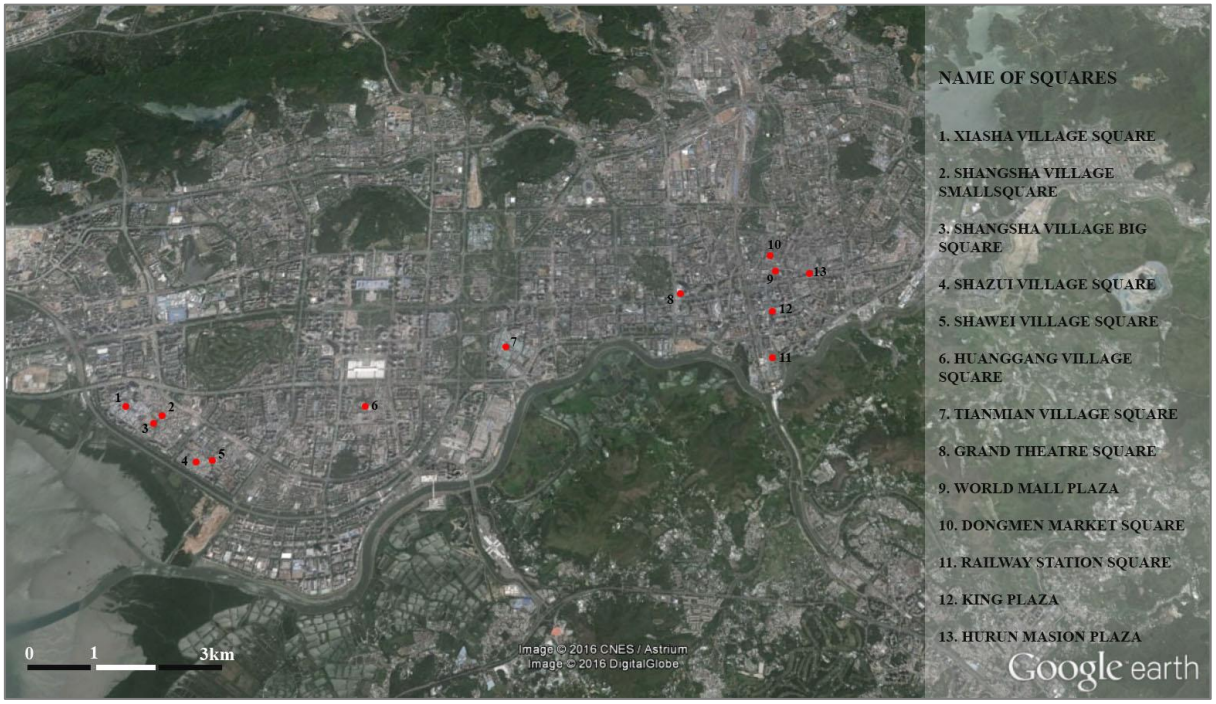


Fig. 4.4: The location of 13 samples of public squares in Shenzhen

All of these 13 squares are located in the most central districts in Shenzhen. Given the rapid development of the city, there are many urban villages inside the central districts whose public squares might offer interesting insights into the use of public space in China.

The results of a brief examination of these 13 public space in Shenzhen are summarised in Fig. 4.5. Only seven were selected for further investigation. The selected ones are Xiasha Village

[10] In fact, at least one or two guards were found in all visited squares. In the 13 selected samples, the impact of the presence of these guards has limited effect on the use of the space. In contrast, some squares were ruled out because of the obvious intrusion of the guards and the effect of this on observed actvities.

Square, Shangsha Village Small and Big Squares, Tianmian Village Square, Huanggang Village Square, Dongmen Market Square and King Plaza. The main reason for the disqualification of the other six spaces is the lack of freedom of access and activities, issues that directly relate to the level and diversity of use of the space.

NUMBER	NAME OF SQUARE IN SHENZEN	SELECTION	COMMENTS
1	XIASHA VILLAGE SQUARE	Yes	The square is located at the heart of a large and dense urban village in Shenzhen. The design of the space includes many decorative and cultural elements. A wide range of activities occurrs inside the square during the day.
2	SHANGSHA VILLAGE SMALL SQUARE	Yes	This square-like setting is separated from the central square of Shangsha Village by a local road. The simple design of the square with circular flowerbeds seems to offer a good number of seats as well as sun protection. Hence, the square attracts high levels of use during the day.
3	SHANGSHA VILLAGE BIG SQUARE	Yes	The design of Shangsha Village Big Square uses many elements that are similar to those seen in Xiasha Village Square. However, this square appears to attract more users and a wider range of activities.
4	SHAZUI VILLAGE SQUARE	No	This square is a single open public square in the village, but the size of the square is very small and cannot accommodate medium and large groups of users. Hence, only limited types of activity can occur there.
5	SHAWEI VILLAGE SQUARE	No	The square is located at the heart of a relatively big urban village in the centre of Shenzhen. However, the use of the site is controlled and scheduled by the local authority.

6	HUANGGANG VILLAGE SQUARE	Yes	The design of the square borrows many elements from Western architecture, although it is located in front of a popular temple in Shenzhen. The site is well connected to the pedestrian network. A good level of static use with a wide range of activities is observed during the day.
7	TIANMIAN VILLAGE SQUARE	Yes	This square is well connected to the surrounding footpaths. It provides a good number of seats as well as basic amenities for users such as sun protection and toilets. Hence, the square attracts a large number of users.
8	GRAND THEATRE SQUARE	No	The square is located in front of the largest theatre in Shenzhen. This square is simply a large and paved area with no means of sun protection and no subdivision. There are only a few sitting opportunities. The use of the square is also controlled by permanent guards during the day.
9	WORLD MALL PLAZA	No	This square is located close to the most popular pedestrian street of Shenzhen. Its design is similar to that of the Dongmen Market Square with raised sitting steps. However, part of this square is used to collect trash. In addition, the square is hidden by large advertising panels. Thus, it is used as the backyard of the nearby mall and attracts very few users.
10	DONGMEN MARKET SQUARE	Yes	The design of the square includes an innovative element – two simply raised sitting steps that can accommodate the needs of a wide range of users. Being located within the pedestrian street, this square attracts a large number of users, especially after 10 am.
11	RAILWAY STATION SQUARE	No	This square has a good design and is used well by travellers. However, given the limited accessibility to the surrounding pedestrian network and the presence of guards, the space is used mainly as a moving through or waiting space.

12	KING PLAZA	Yes	This square is located in front of a luxurious shopping mall and there is a metro station entrance as well as a bus stop at its edges. This square is well used not only as a moving through space but also as a place to stay. A good level of use is recorded during the day.
13	HURUN MASION PLAZA	No	This square is located close to a dense village and in front of a big mall with access to a metro station. However, this square is cut-off from the main pedestrian network by two busy roads. Hence, the space is mostly empty during the day.

Fig. 4.5: Summary of a brief investigation in Shenzhen

The following section introduces the six selected case studies in Guangzhou and seven case studies in Shenzhen in more detail.

Introduction to Six Case Studies in the Old Part of Guangzhou City

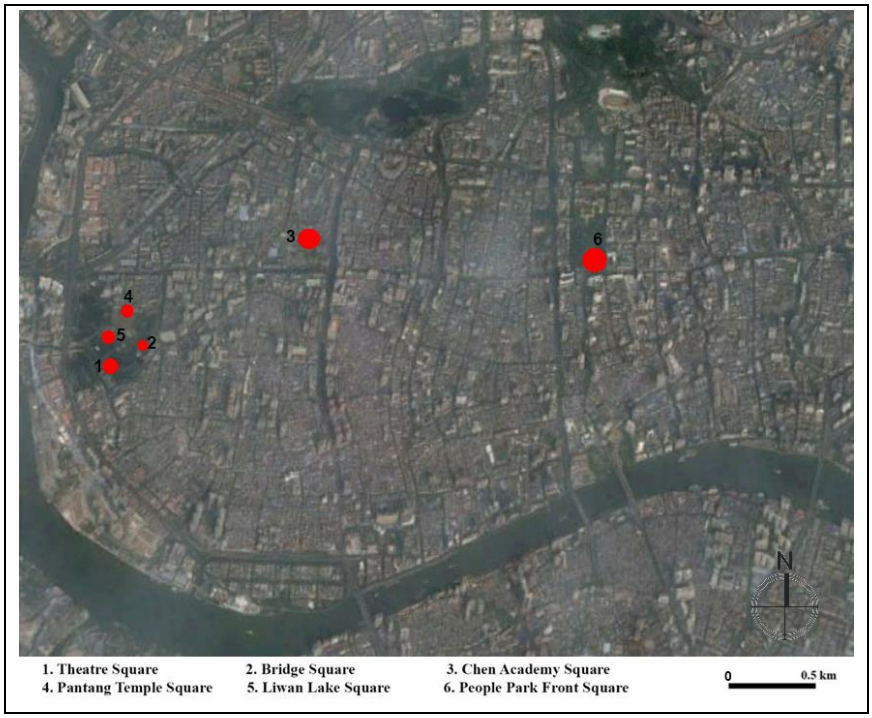


Fig. 4.6: The location of the 6 case studies in Guangzhou city

The location of the six selected squares, all within the central districts of Guangzhou can be seen in Fig. 4.6. These central districts of Yuexiu and Liwan have a population density of

36,000 people per km^2 (refer to www.demographia.com), whereas the population of the whole urban area in Guangzhou is about 14,000 people per km^2.

Among the six samples of public squares in Guangzhou, Theatre Square is located in an urban park. Hence, according to a strict classification of public squares, it might not be identified as an 'urban' public square, and therefore excluded from the research sample. However, from a Space Syntax point of view, any public square can be fully represented through its interfacing axial lines without regard to its setting. The characteristics of Theatre Square (being remote from major movement routes) are represented by its syntactic accessibility, as explained in section 4.4. In other words, the inclusion of Theatre Square is anticipated to be helpful in clarifying one crucial point, namely, whether the degree of accessibility affects the levels of usage of public space in China.

Theatre Square

Fig. 4.7: Theatre Square's layout and its urban context

Theatre Square is relatively small in size and has a comparatively high degree of greenery (about 30 %). The square is part of the Liwan Park, which was redeveloped as an important

node along a tourist walk in the Liwan District of Guangzhou and was opened in the public in the last decade. The name of the square comes from the existence of a traditional opera house on site (that opens weekly). The square is remote from vehicular streets and is largely surrounded by water that lends the place the look of an urban oasis, rather than a typical urban square. In addition to the opera house, there is a pavilion or shelter, a sculpture, big trees and large stones which create a sense of the local culture. Theatre Square is used primarily by elderly groups playing different sports during the day.

Bridge Square

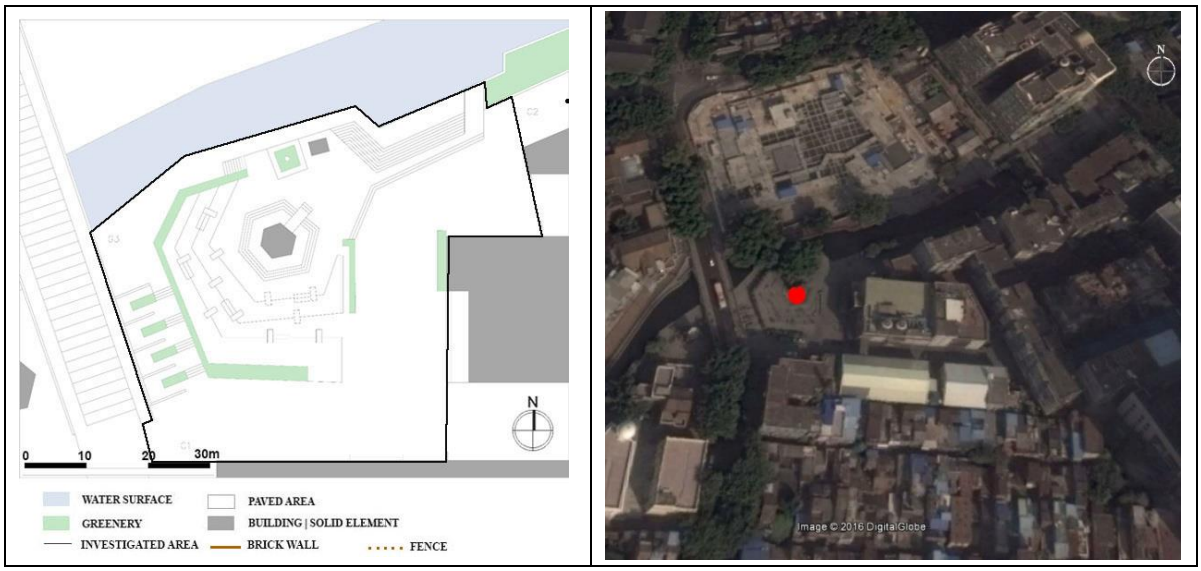
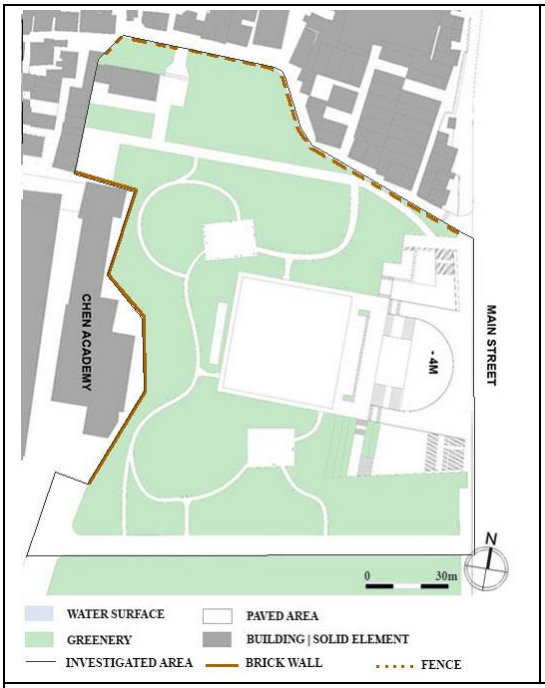


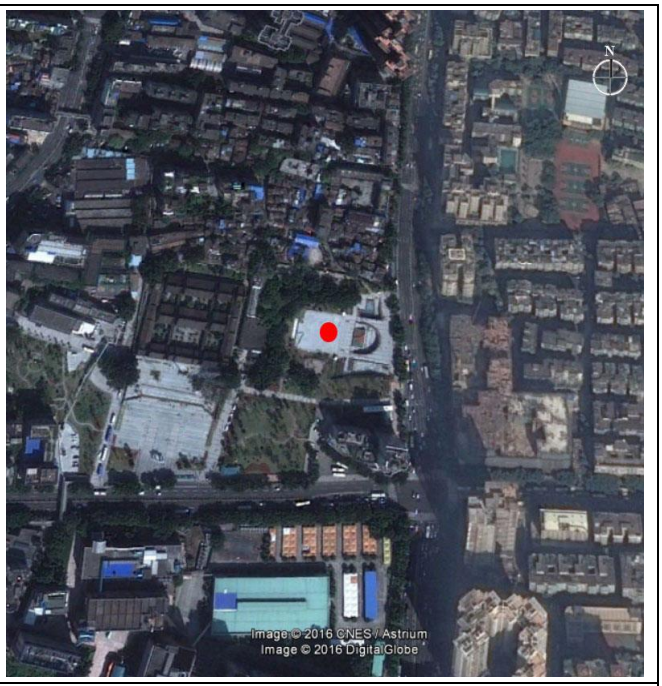
Fig. 4.8: Bridge Square's layout and its urban context

Bridge Square is a small place, relatively close to Theatre Square. Both are part of a walkable tourist route which has recently been developed in Guangzhou. This square is embedded in the densest and most historically rich urban context of the whole city. The name of the square comes from its proximity to a bridge and a small creek. In order to make space for this square, a dozen residential houses were removed. The design of the square is characterised by the symmetrical arrangement of steps and seats around a small religious temple at the centre. The square also serves as a stop-off for small tourist boats. The square, in fact, is part of a broader scenic setting along the creek whose design is supposed to reveal the past prosperity of China. Unlike other spaces, Bridge Square attracts a higher percentage of individuals and people in

small groups who come to relax for a short duration. There is no sign of people engaged in playing sport or exercising.

Chen Academy Square





Chen Academy is a famous tourist destination. It is surrounded by a number of open public spaces. The square investigated in this thesis is one of these, and is adjacent to the street on the right of the map.

Fig. 4.9: Chen Academy Square's layout and its urban context

Chen Academy Square is the largest square of the 13 samples, being nearly 3.5 hectares. The square is bordered by the Chen Academy, one of the most ancient building complexes in Guangzhou, which was built as the ancestral hall of the Chen family hundreds of years ago. This square has recently been renovated to accommodate retailers and provide a connection to the underground metro line. The design of this square is highly symmetrical with a vast square shape at the centre, paved with expensive marble. The centre of the square is empty but the ground is carved with Chinese ornaments. Chen Academy Square is heavily used in the morning by different exercising groups, whereas at other times of the day, it is a meeting place for groups of carers with small children.

Renwei Temple Square

Note: There is ongoing development of the water surface of the lake which creates differences between the drawing and the Google map.

Fig. 4.10: Renwei Temple Square's layout and its urban context

Renwei Temple Square is a small square situated in the Liwan District relatively close to Bridge Square. Renwei Temple is a hundred year old Taoist temple that was built outside the walled city of Guangzhou. One side of the square is connected to a local main street while the other sides are connected to an informal local market for the adjacent Pantang Village. At the back of the temple, there is a high school that is also part of the village. The temple and the square are open to Liwan Lake. With the existence of a rich decorative temple and a monumental gate in a small area, the square presents a strong image of Chinese local culture. The primary function of the temple and thus the square is as a religious place. In the past, such temple grounds were the only public space for the ordinary people. Therefore, it is interesting to see how this temple ground functions today, in comparison with other modern public squares. Similar to Bridge Square, this square attracts high levels of transient use, whereas the diversity of static activity is relatively low compared to other public space.

Liwan Lake Square

Fig. 4.11: Liwan Lake Square's layout and its urban context

Liwan Lake Square is part of the Liwan Park which was built in 1958. The park has recently been renovated and become open to the public without charging a fee. Liwan Lake Square is situated to the South of Pantang village, a decaying village. The access from the village to the park is limited to a small number of gates. Liwan Lake Square has the characteristics of an urban oasis rather than a real urban public square, but has a relatively high percentage of paving (about 64 %). The design of this space is more similar to that of Chinese gardens than examples observed in the West. There is also a pavilion, huge stones and a pond that function as attraction points inside the square. The space is intensively used in the morning by both large and small groups, while in the afternoon the majority of activities is people playing chess and cards.

People Park Front Square

People Park Front Square is a new square that has recently been added in front of the main gate of People Park, the oldest urban park in Guangzhou. The Front Square connects People Park with a main road of the city. The underground level of the Square is a busy shopping centre and is well connected to two metro lines.

This square was recently developed in front of the oldest urban park in Guangzhou-People Park. These two areas are separated by the main gate of the park and a footpath with a width of about one metre. This footpath is included in the investigated area.

Fig. 4.12: People Park Front Square's layout and its urban context

The spatial design of the Front Square is highly symmetrical, centred on the axis going from the main street to the main gate of People Park. At the centre of the square, a circle carved on the ground has created a focal point. The two wings of the space are divided into many small sub-spaces. In addition, there are also plenty of free standing columns with Chinese decorations, which grants the square a strong image of Chinese culture while its plan reveals that of Western influence. The area of the Front Square alone is about 1.9 hectares making this space one of the larger squares in the 13 samples. It is also the square where the percentage of paved area is relatively low (about 54 %). The square is a meeting place for a wide range of

people and hosts many activities. The percentage of the working-aged users here is also higher than elsewhere.

Small and Medium-sized Public Squares in Shenzhen

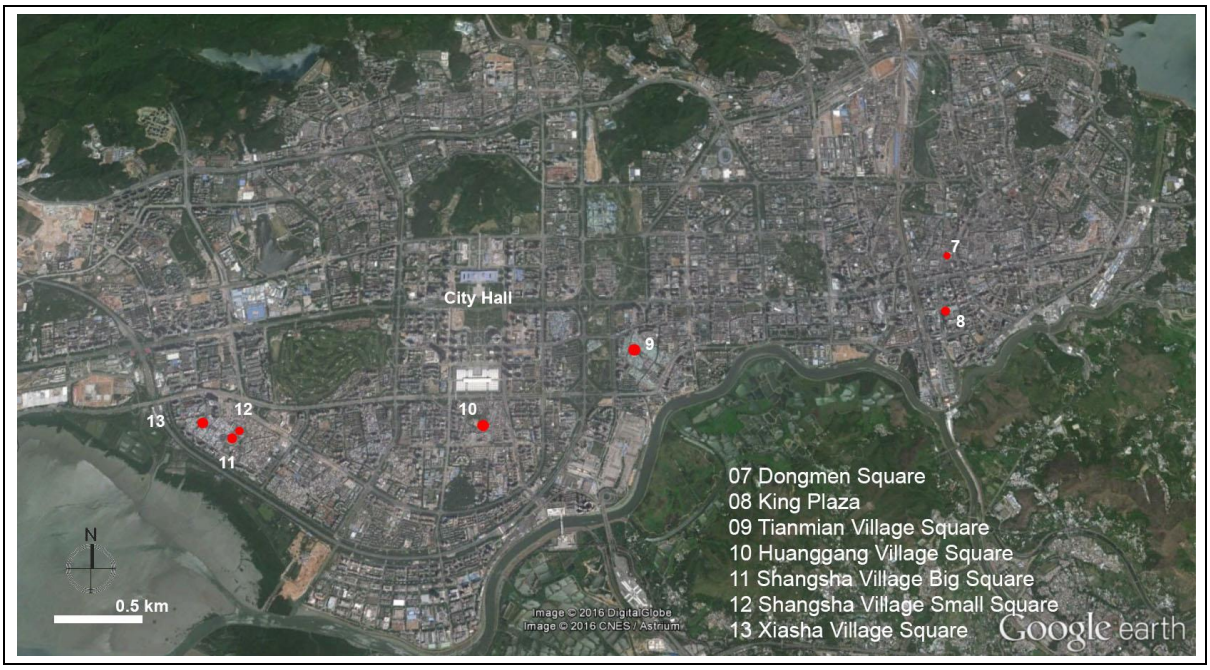


Fig. 4.13: Locations of seven case studies in Shenzhen

Seven examples of small and medium-sized public squares in Shenzhen were investigated. These spaces are in the two most central districts of Shenzhen. Five of them are situated within four urban villages, with two located in the old commercial district of the city. Shenzhen is a young and dynamic city that has expanded over the last three decades from a small town of about 100,000 inhabitants to a mega city in the region. The old part of the city is the area around the Dongmen Market Square that is characterised by an organic and irregular street pattern. The new urban areas were developed with a more grid-like street pattern and a preference for superblocks. The geographic and political centre of the city is now where the new city hall is located above Huanggang village.

Dongmen Market Square

Dongmen Market Square is situated in an old commercial district of Shenzhen. The whole Dongmen shopping area has recently been redeveloped to become the pedestrian walking area

of the city. Without vehicular traffic, the number of people strolling everyday through the square is extremely high.

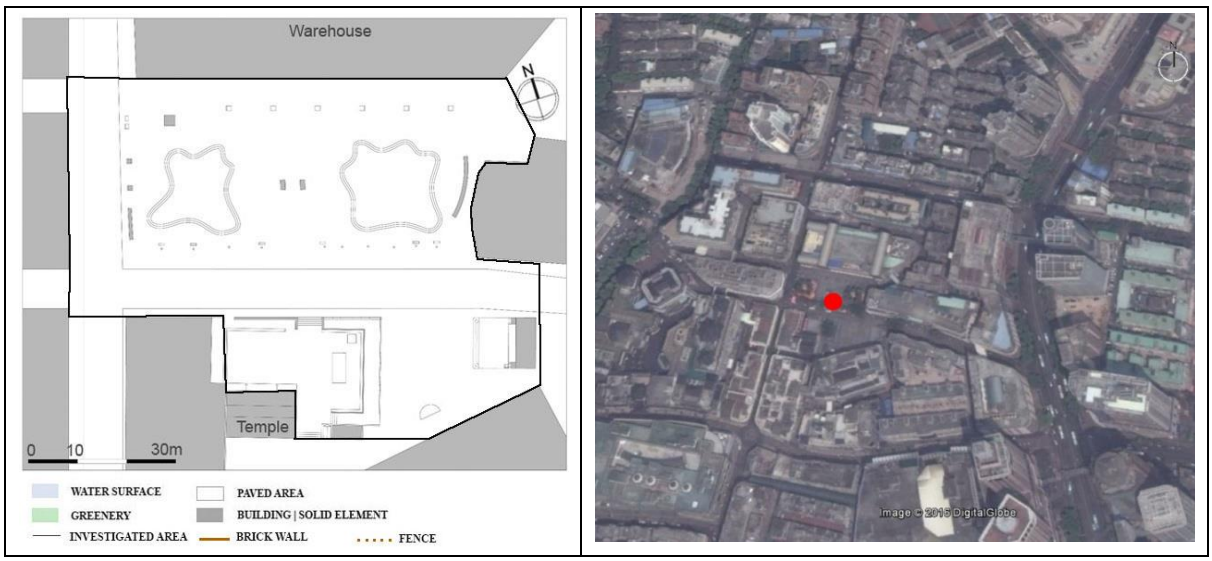


Fig. 4.14: Dongmen Market Square's layout and its urban context

Dongmen Market Square is defined not by walls or fences but rather by adjacent warehouses. At the centre of the square, there is a decorative bell tower granting a sense of Chinese culture. Two organically shaped raised platforms symmetrically sited on either side of the bell-tower provide plenty of sitting places as well as protected areas for small children. On the other side of the bell-tower, there is a small open stage for occasional artistic performances and a relatively enclosed temple. Dongmen Market Square attracts a high number of working-aged users who go to the district for shopping and use the square as a resting place. Hence, common activities here include sitting and watching other people passing by. There is no sign of "exercising" or "playing chess/cards" that are common activities in more secluded squares.

King Plaza

King Plaza is a newly developed urban square and is located in front of a prominent retail store near the old city centre of Shenzhen. This square includes three free standing houses and big light-wells in oval shapes that connect to the underground levels where there are a number of cafes and restaurants as well as an entrance to a metro line.

Fig. 4.15: King Plaza's layout and its urban context

The designs of retail stores and the square itself are very similar to Western contemporary counterparts. There is also a cafe and bar opening to the square at ground level which makes the facade of the retail store more welcoming. Although King Plaza is an open plaza, rows of large tree pots are placed along the edges that function like fences. King Plaza is used in the morning by different "exercising" groups, while at other times of the day, there are a considerable number of "babysitting" activities. In addition, given the existence of a metro line entrance and a bus station at one corner (Fig 4.15 left), there is a moderate but pervasive pedestrian route going diagonally across the square from the station to the south-east corner (Fig. 4.15).

Tianmian Village Square

Tianmian Village Square is one of five samples that are located in recently redeveloped "urban villages" in Shenzhen. The Square is situated at the heart of Tianmian village, an extremely highly populated and busy area. On the site, there is an open stage and an enclosed sports field behind the stage, while the underground level is used as a public car park. Many of the

inhabitants from urban villages are people who have known each other for generations and they still own the land of the village collectively (Yuting Liu, He, Wu, & Webster, 2010).

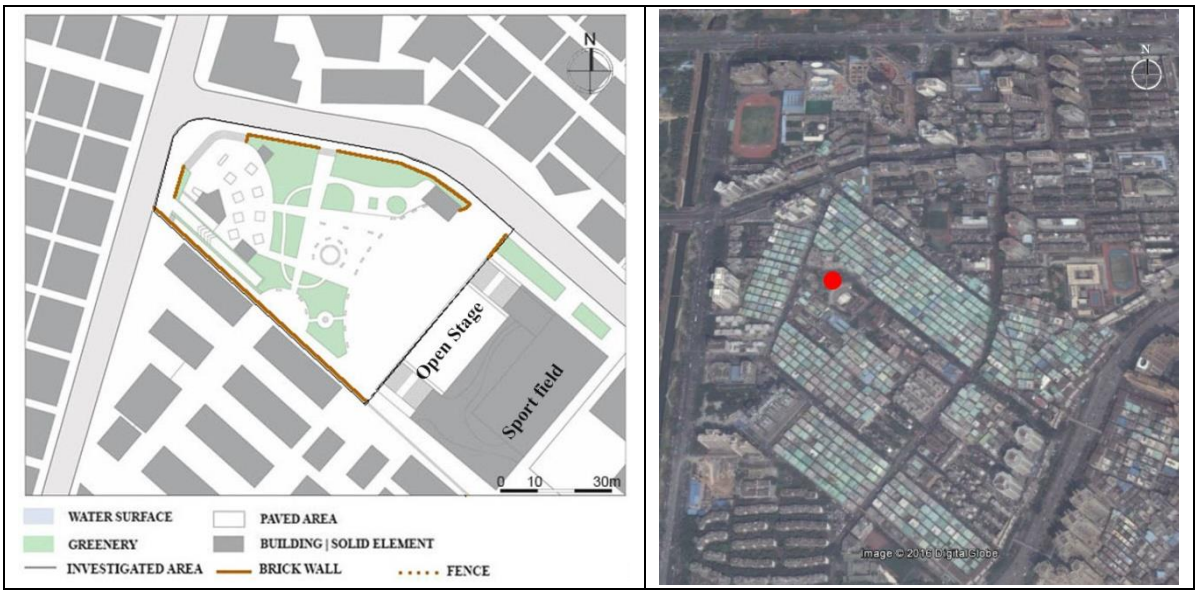


Fig. 4.16: Tianmian Village Square's layout and its urban context

Despite a large area in front of the stage, the square is divided into many small sub-spaces by geometric patterned plantings. In addition, the square is enclosed by soft and hard fences that visually disconnect it from its surroundings.

Tianmian Village Square has a moderate amount of "exercising" in the morning. At other times of the day the square is occupied primarily by "babysitting" activities.

Huanggang Village Square

Huanggang Village Square is located at the heart of the new centre of Shenzhen city, near the new city hall. Given its centrality, many parts of Huanggang village have been replaced by high-rise office towers. The square of this village is situated between a historic temple on the left and a busy street on the right which leads to the gate of the village.

Fig. 4.17: Huanggang Village Square's layout and its urban context

The spatial layout of the square is highly axial and symmetric with a long fountain at the centre. There is an open sports field at the NW corner. There is also a row of stone tables and chairs. Most sitting places are found near the palm trees that were planted in two rows to the north of the fountain. This square attracts a moderate amount of users during the day. Activities occurring here are a mixture of "babysitting", "exercising" and "sitting".

Shangsha Village Big Square

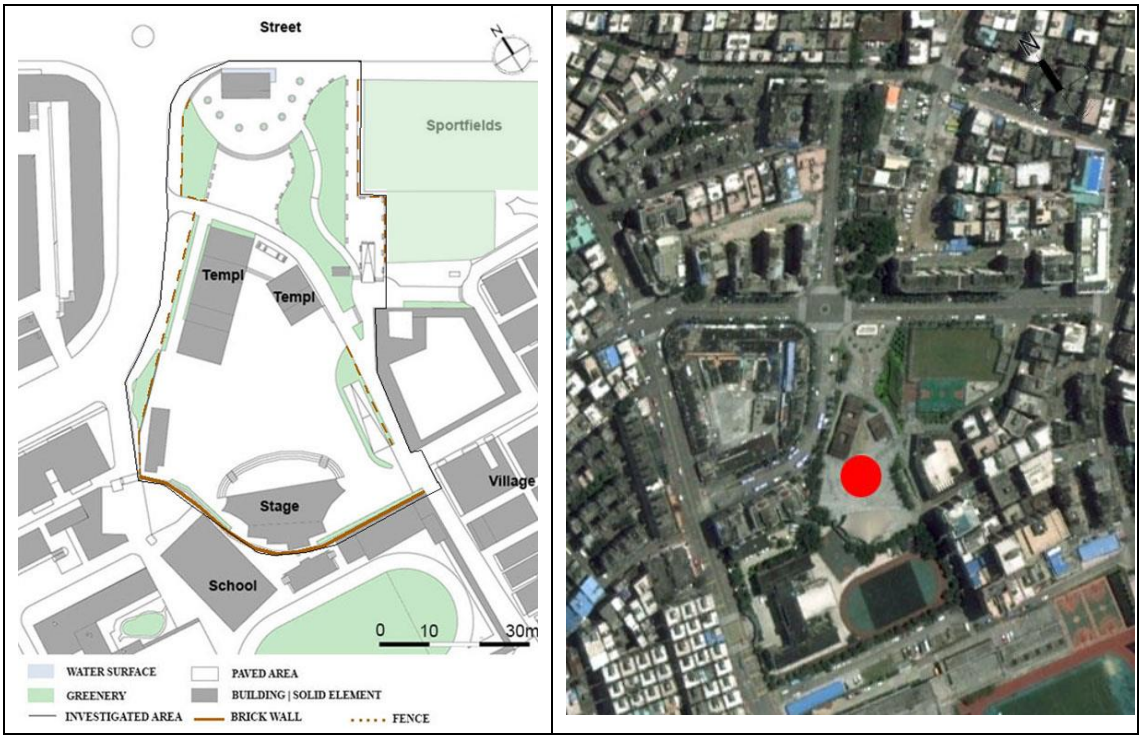


Fig. 4.18: Shangsha Village Big Square's layout and its urban context

Shangsha Village Big Square is located at the heart of the village, at an intersection of two busy streets. On the site, there are an open stage, two ancestral halls and two sport fields adjacent to the square. The underground level of the square is also used as a car park. Spatially, the square is divided into two parts. The southern part is spacious and enclosed by two temples and an open stage. The northern part of the space is divided into many small sub-spaces by the use of geometric patterned planting and tree pots.

Shangsha Village Big Square is heavily occupied by "babysitting" activities. People are likely to occupy the northern part first, where they have more choices of seats. At peak times of the day, people spill over to the southern part of the space, although there are virtually no sitting opportunities there.

Shangsha Village Small Square

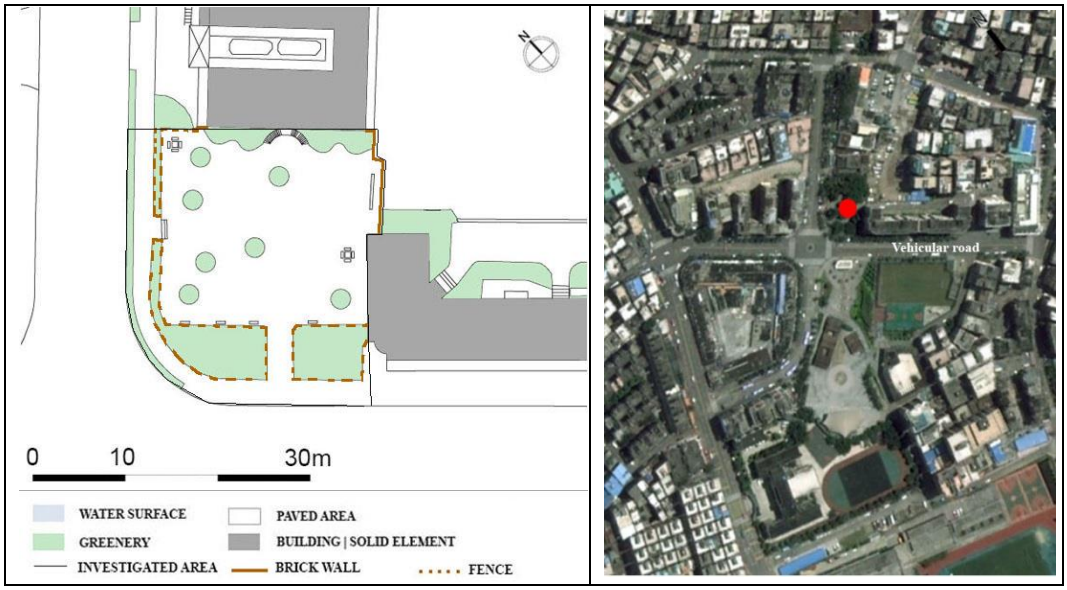


Fig. 4.19: Shangsha Village Small Square's layout and its urban context

Shangsha Village Small Square is separated from the Big Square only by a vehicular road, but these two spaces have very different spatial and use patterns. This square is the smallest space among the 13 case studies, being only 1,500 m^2. The design of the square is simple and characterised by random positioning of big trees inside the space. A hard but low fence separates the square from adjacent movement; however, a visual connection is still possible. This square is a popular meeting place for people who play chess and cards. At its peak time, this space is primarily occupied by "playing chess/cards", leaving no space for other activities.

Xiasha Village Square

Xiasha Village Square is the second largest square in the 13 samples with a total area of about 3 hectares. Xiasha Village Square contains many Chinese garden design elements such as a stone mountain, a pool and several cultural statues. In addition, there are two ancestral halls and a richly decorated gate. The ground of the square is carved with Chinese motifs, which give the space a strong sense of the local culture. In addition, on the ground level, there are two sports fields and an open stage while the underground level is used as a car park. The square is

separated from its surroundings by fences and walls, reducing access to the space to a limited number of gates.

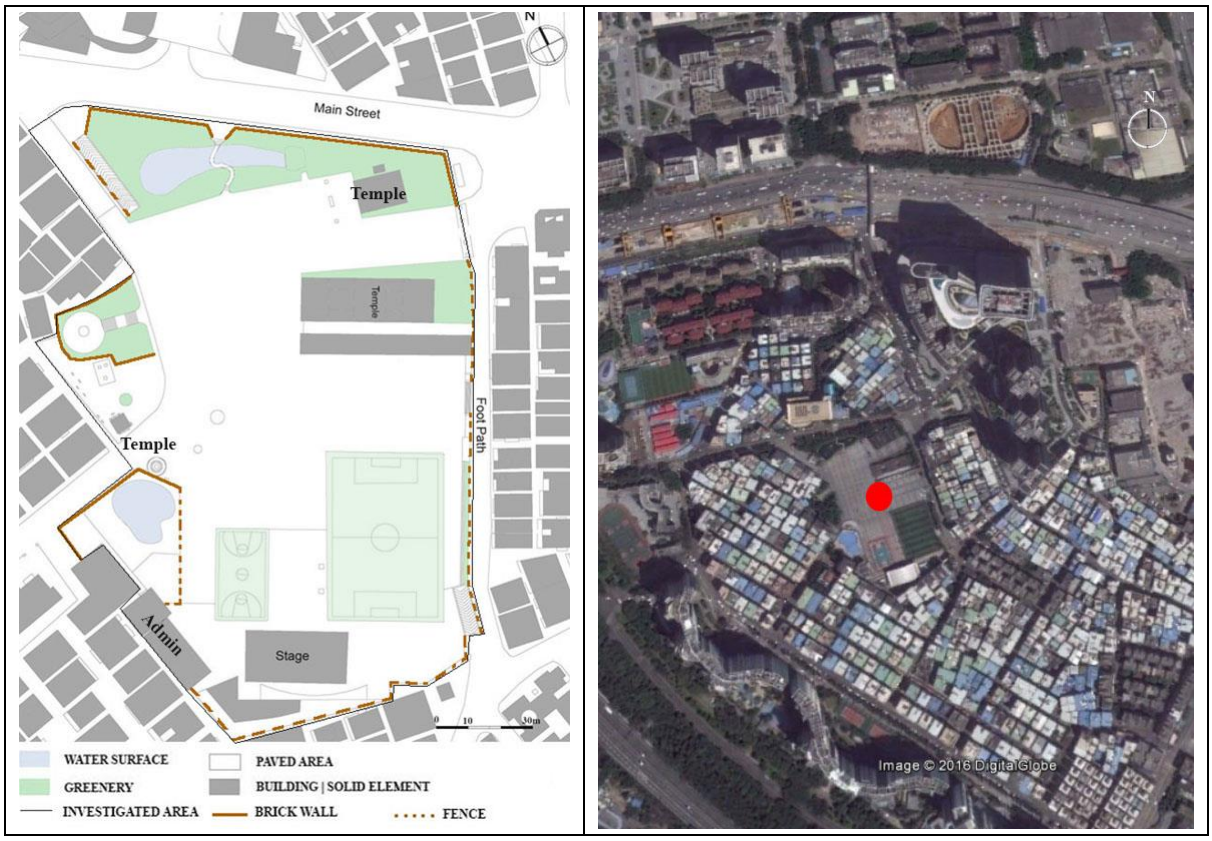


Fig. 4.20: Xiasha Village Square's layout and its urban context.

On a daily basis, the space is occupied primarily by "babysitting" activities in addition to a small portion of "exercising" activities in the morning. The two sports fields are only used occasionally and remain closed most of the time. Given the lack of sitting places, the elderly are likely to cluster around the small temple.

In summary, this section has introduced the two major sets of methods, direct observation and space syntax, employed in this thesis. In addition, the general features of 13 small and medium-sized public squares in Guangzhou and Shenzhen are described. Given the nature of these methods, this thesis does not focus on the users' perceptions or their mental images of the space. Instead, public space users and their activities are objectively observed. Space syntax analysis, axial map and visibility graph analysis methods study the impact of two objective

properties of the space (accessibility and visibility) and their impact on use patterns. The next section examines these methods in further detail.

4.3 The Description of Data Collection

This thesis relies on two sets of methods: (a) direct observation including activity mapping, gate method and movement tracing; and (b) spatial analysis including axial map, visibility graph analysis and overlapping visual fields. How these two sets of methods should be combined and executed in a study of the use of public space is documented in the Space Syntax Observation Manual (Vaughan, 2001) which is widely used by space syntax researchers. Many existing studies of public space that have adopted similar methods to this thesis were reviewed in chapter three. For example, Campos used axial map, visibility graph analysis and overlapping isovists to study the use of public squares in London along with activity mapping, gate method and movement tracing (Campos 1997, 1999, 2000, 2005). Similarly, Bada and Farhi (2009) used these two sets of methods to study the use of urban plazas in a non-Western context, whereas Papargyropoulou (2006) used them in his study of urban parks in London and Athens. Within the Chinese context, the axial map and gate method have been used to study the impact of urban configuration on levels of pedestrian flow (Wang 2009, 2013). In particular, a study conducted by Ling (2009) investigated the relationship between the levels of use and the urban configuration of public squares in Hong Kong using the axial map and gate method. This section introduces only direct observation methods, which are the primary data collection method in this thesis.

Direct observation is a well-established set of methods developed within environmental psychology (Proshansky, Ittelson, & Rivlin, 1970), landscape architecture and urban design (Gehl et al., 2013; Marcus & Francis, 1997). Within the urban design discipline, the development of this method has seen many contributions. For example, William Whyte has introduced and used time-lapse photography and direct observation to study 16 urban plazas in

Manhattan (Whyte, 1980, 1988), whereas in the last few decades Jan Gehl has used activity mapping, gate method and direct observation (non-participant) for numerous studies of different places (Gehl, 1987, Gehl et al., 2006, 2010, 2013). Cooper Marcus has used and described in detail different types of behaviour mapping including (non-)participant observation, activity mapping and movement tracing (Marcus & Francis, 1997).

In order to fully understand public space users including their perception, needs, feelings and behaviours, interviewing and observing participants are both suggested (Creswell & Miller, 1997; Yin, 2013). However, according to Whyte (1980, 1988), data from interviewing can be misleading as people might not reveal their true opinions, or they might not be aware of their behaviour in open public space. Hence, it is said that objective (non-participant) observations including activity mapping alone can generate rigour and substantial knowledge to enhance the design of public space (Francis, 2003; Whyte, 1988).

4.3.1 Activity mapping or "snapshot" technique: Data collection of static use

Activity mapping can provide information to answer questions such as who the users are, what activities they do and where these activities are likely to occur (Yin, 2013; Marcus & Francis, 1997). In addition, if the space is systematically surveyed with many rounds in a day, the temporal patterns will be revealed. In this thesis, the focus of activity mapping will be explained in terms of the demographic structure of public space users, types of activities and temporal patterns.

(1) The Demographic Structure of Public Space Users

Public space users will be divided into different groups regarding their age, gender and the size of the group they are in. Here three age groups are: children, working aged people and the elderly (retired). In this thesis, working-aged people are often referred to as young people. Similarly, children might be called 'small children' given the fact that most children observed

were less than five years old. This age division is based on the informal observation of public squares on weekdays in Southern China where virtually no teenagers are found (presumably as they are in school), and as the working aged group forms less than one-third of total public space users, no further division of it is suggested. In addition to age groups, the total population of users is divided into groups of men, women and children[11]. This set of data is important because a high number of women is often suggested to be an effective indicator of better quality space (Whyte, 1980; Gehl, 1987; Marcus & Francis, 1997). Additionally, people are also classified into different group sizes: individual users, people in pairs, and people in big groups (3+). In fact, the size of big groups varies from three up to 50 in China. Those who are engaged in "exercising" are often found in very large groups.

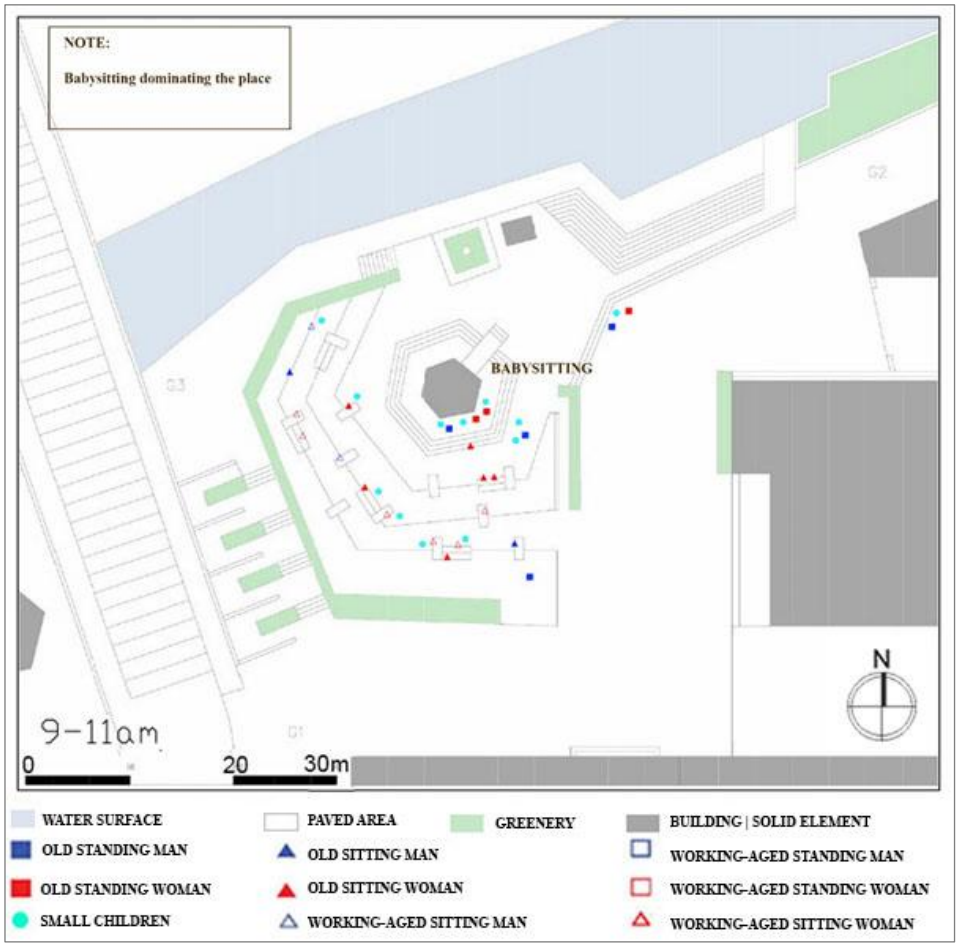


Fig. 4.21: A sample of activity mapping

[11] Given the observation time, the majority of children observed in China are small children aged under five. Most are accompanied by adults when visiting public squares. However, all children under 13 were recorded.

Fig. 4.21 shows an example of an activity map in which different colours and signs are used to symbolise different types of users. Men, women and children are represented in blue, red and cyan, respectively. Additional information, such as the specific type of activity, is noted on the map or recorded in photos.

(2) Types of Activities

The five typical activities that occur in public squares in China are sitting, standing, "exercising", "playing chess/cards" and "babysitting". While some activities, such as sitting and standing, can be directly recognised on activity maps, others might require additional information from notes or photos taken on site. Those sitting are represented by triangles, whereas those standing are represented by squares. Small children are represented by circles, regardless of their body posture.

(3) Temporal Patterns

All 13 public squares in this thesis were surveyed between 20 December 2013 and 20 February 2014 on weekdays. The weather conditions were good and consistent with a temperature variation from 8°C to 15°C. While other research studies might investigate the use of public space during the evening/night, this thesis limits its study time to 7 am to 7 pm as many public squares in China are closed or heavily controlled by guards at night.

The time spans from 7 am to 7 pm are again divided into six periods each lasting two hours. In each period, a "snapshot" is conducted. The time each marking up takes depends on the size of the space. For example, it takes about 5 minutes to produce an activity map for a small square such as Bridge Square, but it can take about 30 minutes for a large square such as Xiasha Village Square; therefore, in the case of big squares, two observers are needed to keep the observation time under 20 minutes in each round. The marking time also depends on the

number of people on site. During peak periods, it often takes longer to complete. The observation was conducted by the author of this thesis with one local research assistant.

In order to conduct the marking up, the observers went round the space and mapped any static person and his/her activity on a scaled map of the space. In addition, the observers noted on the map or took a photo when needed to ensure any activity could be recognised later. The number of photos varied between squares as well as the different periods given the changes in the use of the space.

4.3.2 Gate method: Data collection of transient use

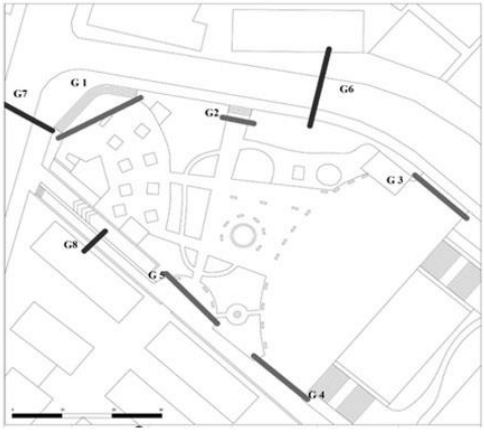
The gate method is widely used to collect information on pedestrians. In space syntax, the "gate method" is said to be the "workhorse" of data collection techniques (Space Syntax Observation Manual, 2001). According to the Observation Manual (L Vaughan, 2001) produced by the urban planning department of University College, London, in order to conduct the "gate method", the observer must:

> *"... stand at each gate position and draw an imaginary line crossing the street space (that is right angles to the direction of the street). Count people (or vehicles) crossing this line for a set period of time, usually from 2.5 to 5 minutes" (Space Syntax Observation Manual 2001).*

In this thesis, the counting time was 3 minutes for each gate and the number of people counted is then totalled to derive the rate per hour. Fig. 4.22 (bottom right) shows how the information of moving people is recorded. Pedestrians are classified regarding their gender and age, and are divided into five groups: old man, old woman, working-aged man, working-aged women and child. In each of the six periods, from 7 am to 7 pm, each gate was counted once.

Before carrying out the observation, a number of "gates" were placed on adjacent streets and at the entrances of the square (Fig. 4.22). The number of gates varied from place to place

depending on the site conditions. Two types of movement were counted, that inside the public space (going through the entrances) and movement in all adjacent streets



GATE NUMBER	TIME	OLD MAN	OLD WOMAN	WORKING -AGED MAN	WORKING -AGED WOMAN	CHILDREN
G1 3 Minutes	7-9:00 AM	3	2	1		
	9-11:00 AM	5	4		2	2
	11-13:00 PM	1	2			
	13-15:00 PM	3	4	3	2	2
	15-17:00 PM	1	2			
	17-19:00 PM	3	4	3	2	2

Fig. 4.22: An example of gate positions and documentation sheets

For example, in Fig. 4.18, people moving inside the square are those who go into the square through gates G1, G2, G3, G4 and G5 (counting one direction of movement), whereas the three other gates G6, G7 and G8 provide information about adjacent pedestrian flows (counting two directions of movement). No vehicles are counted.

The data collected by the gate method is important, as it is widely suggested that the success of public space heavily depends on the number of people found in adjacent streets (Whyte, 1980; Marcus & Francis, 1997; Hillier, 1984, 1993). In the space syntax method, Hillier found a strong correlation between the integration value of the space and number of adjacent pedestrians. This implies that if a square is situated in a location with a high integration value, the level of adjacent movement will be higher regardless of the quality of the space. Therefore, the quality of the space can be revealed in the ratio between the number of adjacent pedestrians and the number of people moving into the space (Hillier, 1990).

4.3.3 Movement tracing

The “movement tracing” technique is used to identify major routes of through movement[12] in public squares to clarify how the circulation space supports or constrains such movement.

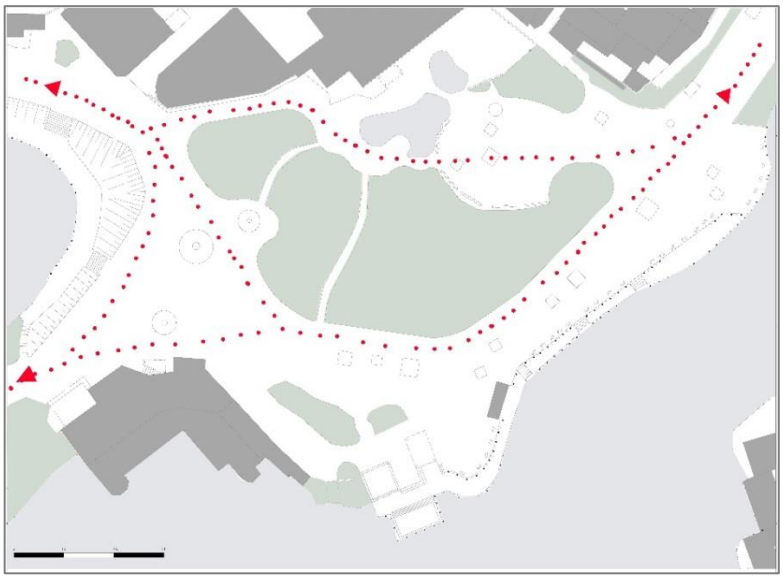


Fig. 4.23: A sample of movement tracing

In order to trace the movement, the observer stood for a length of time to record all major movement routes observed inside the space (Space Syntax Observation Manual, 2001). The choice of standing location had to provide the observer with a good view of the whole site.

4.4 The Space Syntax Methods

The second and third research sub-questions in this thesis concern the impact of accessibility and visibility on the levels and distribution of different groups of people and activities. The questions are answered by using space syntax methods to measure degrees of accessibility and visibility; these values are then plotted against the data collected from direct observations. This section introduces the space syntax methodology in general and explains the method used to measure accessibility, followed by description of visibility models.

[12] The movement from within the space, for example from one seat to another, was not recorded.

4.4.1 Introduction to the space syntax methods

The space syntax method is understood as a set of theories and set of techniques. As a set of theories, it includes several specific theories, such as the theory of order and structure (Hanson, 1989), the theory of natural movement (Hillier et al., 1993), centrality as a process (Hillier, 1999), the city as movement economy (Hillier, 1997), and movement generated land-use agglomeration (Penn & Turner, 2004). In addition, the space syntax method can be also seen as a set of analytical models or techniques including axial analysis (Hillier & Hanson, 1984), visual graph analysis (Turner, 2001, 2003), and more recently segment-angular analysis (Hillier & Iida, 2005).

Although having different foci, all of these theories and techniques are derived from the same root. This section introduces the basis of the space syntax method to provide sufficient technical and conceptual background for readers to comprehend the two space syntax analytical models used in this thesis: axial map and visibility graph analysis.

The Space Syntax Method and the Concept of Topological Accessibility

Geometry = Topology + Metric
Accessibility = Topology + Metric

Fig. 4.24: Two components of "absolute" accessibility
(Czerkauer, 2007)

Hillier (1996) states that space syntax theory is an analytical theory or in other words, it is a by-product of the analysis of the relationship between urban morphology or configuration and movement patterns through that morphology. In other words, the space syntax method analyses accessibility generated by the urban configuration and its consequences on other functions of the city (L. Marcus, 2007). Before the introduction of space syntax theory, different theories from urban economics and traffic engineering have also attempted to quantify the accessibility

of an urban location (Hansen, 1959). The departure of space syntax theory from other theories is derived from a proposition that can be explained as follows:

If urban geometry or the urban form is understood as both topology and metric (Czerkauer-Yamu & Voigt, 2011; Czerkauer, 2007), accessibility of any location would concern both topological and metric properties. However, accessibility is calculated in other theories by only using metric properties without any regard to the topology (Hillier et al., 1993). According to Hillier, other theories do not take the characteristics of street patterns or morphological properties of the urban form into the calculation of accessibility.

In contrast, it is argued in the space syntax method that the topology or configuration of the urban grid itself inherently embeds a degree of encounter or avoidance. This degree of encounter or avoidance is in fact the topological accessibility that will in turn generate a "pervasive" portion of movement in urban spaces (Hillier, 1993, 1996). Hillier considers this "pervasive" portion of movement generated by the urban grid itself as "natural movement":

> *"Natural movement in a grid is the proportion of urban pedestrian movement determined by the grid configuration itself. Natural movement, although not always quantitatively the largest component of movement in urban spaces, is so much the most pervasive type of movement in urban areas" (Hillier et al., 1993).*

The portion of natural movement is not always the largest. In many cases, the movement generated by the attraction of shops, retailers or employer locations far exceeds the portion of natural movement. However, it is observed that shops, retailers or companies are often located where higher levels of natural movement already exist (Hillier, 1993, 1996; Karmini, 2012). The clustering of retailers and shops at accessible vantage locations creates a multiplier effect on the level of movement.

The Space Syntax Method and Representation of Spaces

At the beginning of its development, the space syntax method was confronted with the question of how to represent urban spaces in ways that reveal their topological properties and how to quantify the topological accessibility. Regarding the first question, Hillier and Hanson (1984) developed a technique called the axial map in which urban spaces would be represented as a set of "longest and fewest lines of sight" (see Fig. 4.25).

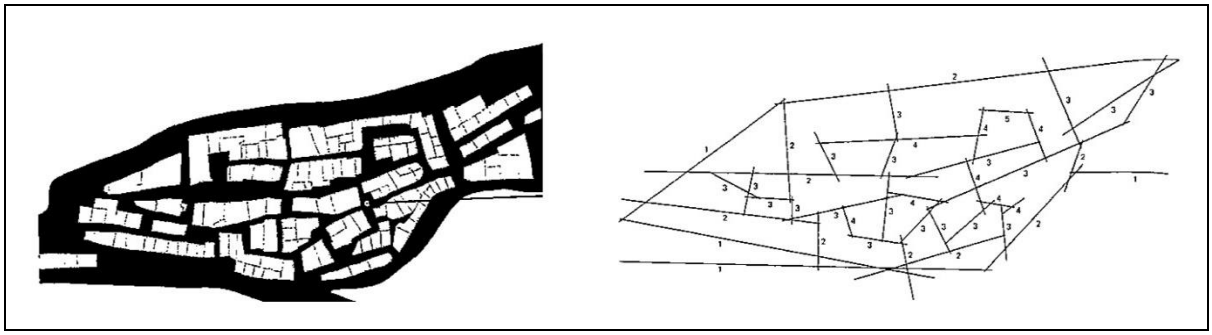
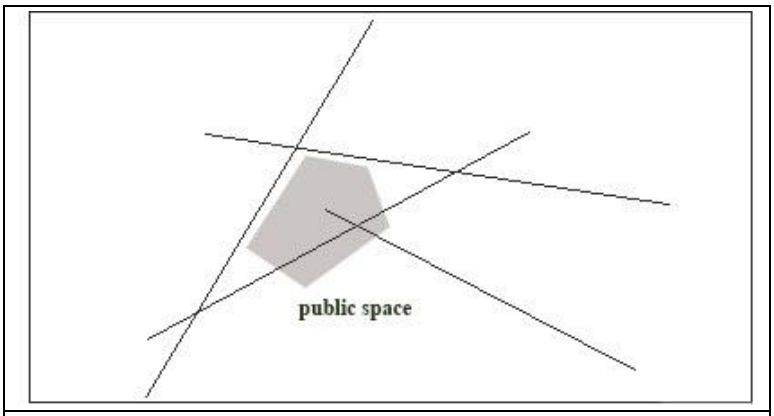


Fig. 4.25: Figure ground map (left) and axial map (right) of a French town
(Hillier and Hanson, 1984)

In an axial map, nodal spaces including public squares and parks are not directly presented, but represented through the axial lines that interface the body of those nodal spaces (see Fig. 4.26).



Note: Axial lines are not identical to the central line of streets. Please see description of axial line in earlier section

Fig. 4.26: This public space is represented by four axial lines

The axial map is the first and most basic technique of the space syntax method, and provides the foundation for another ongoing developing technique, segment graph analysis. In a segment graph, an axial line is divided into segments. Segment-angular graph analysis attempts to combine both topological and metric properties into a single framework, potentially offering a

new understanding of how people navigate in an urban environment. However, by comparing these two techniques, the axial map is found to be as effective as segment-angular graph analysis for the study of basic movement patterns (Hillier & Iida, 2005).

The representation of nodal spaces such as parks or squares has experienced a huge development with the invention of a new technique called visibility graph analysis (Turner, 2001, 2003). In order to quantify the degree of visibility, the nodal space is divided into small cells. Specifically in this research, a cell is defined as 60 cm by 60 cm which is about the foot print of a person standing or sitting (this is also used by other researchers when studying public space). Each cell is defined as a grid visual field, the smallest visual field that is comparable to an axial line, the smallest element in the axial map. The topological relationship among all cells is computed using Depthmap space syntax software initiated by Turner (2004). Those cells which are most visually exposed are coloured red, whereas the most segregated cells are blue (see Fig. 4.27).

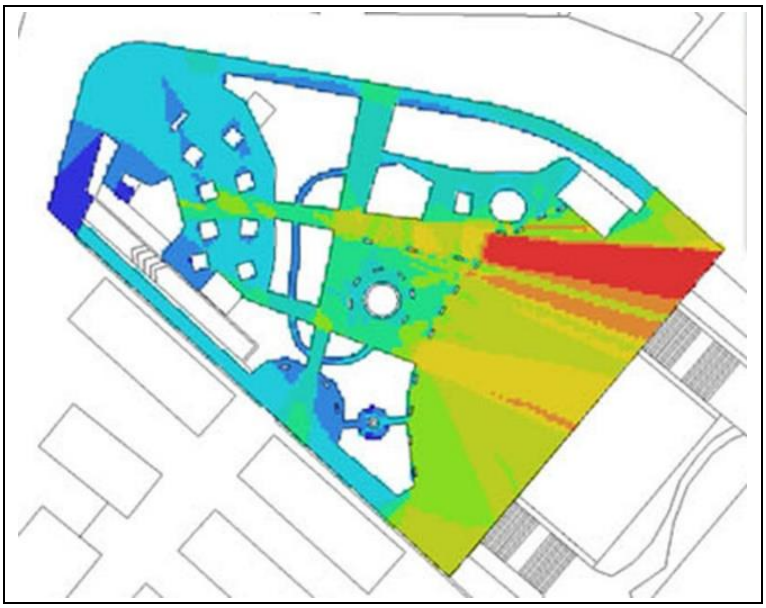


Fig. 4.27: A sample VGA map (the colour version)

While having different basic units, the axial graph, visibility graph or segment-angular graph are calculated in a similar way based on the topological depth and the mathematical background of graph theory. The calculation procedure is introduced in the following section.

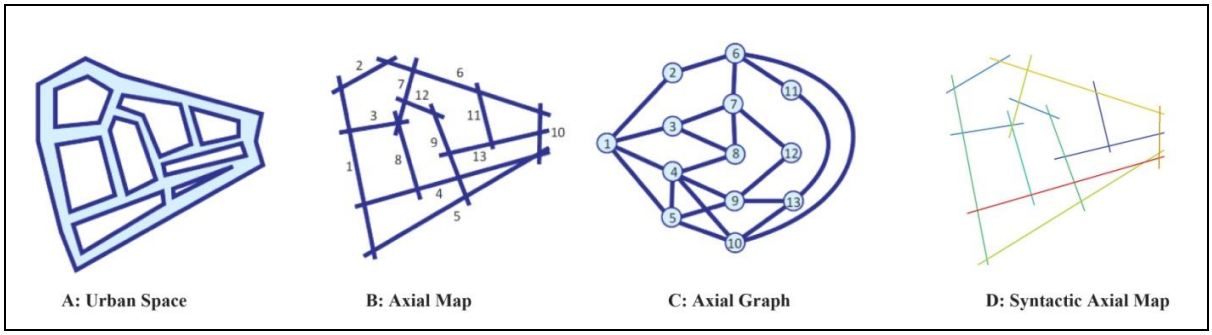


Fig. 4.28: Different representations of urban spaces reflecting the calculation procedure

Fig. 4.28 illustrates how urban spaces (A) are represented by a set of axial lines (B). Subsequently, the axial map is sent to a computer program that reads it as a graph (C) where axial lines become nodes. After calculating the topological relation between these axial lines, different lines are displayed with different colours that reveal their accessibility (D).

In order to understand how accessibility is calculated, the following concepts need to be explained: Total Depth, Mean Depth, Relative and Real Asymmetry.

Total Depth and Mean Depth

The depth is the most important concept in the space syntax method. Instead of using a conventional concept of metric depth, the space syntax method adopts the concept of topological depth. The topological depth between two points can simply be understood as the number of turns one should make to get from one point to the other.

The difference between metric and topological depths is illustrated in Fig. 4.29. In the left figure, all five points have different metric depths (or distance) to the central point of the circle. However, considering topological depth (right figure), points (1), (2) and (5) have the same depth to the central point (in this case the topological depth is one), whereas point (3) and (4) have the longest distance or depth to the central point. It is observed that while point (3) has the shortest metric distance, it has the longest topological distance to the central point.

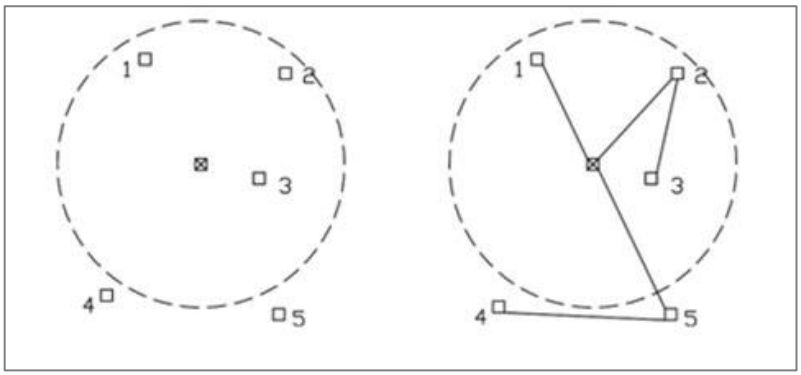


Fig. 4.29: The difference between metric and topological distance or depth (Jiang, 1998)

Total Depth of one element is defined as the number of turns to get from this element to all other elements in the system.

Mean Depth of one element is equivalent to the Total Depth relativized to the number of elements (axial lines or cells) of the system and represents the average steps needed to reach any of other elements of the system.

Fig. 4.30 demonstrates how total depth and mean depth of one element are calculated in a system of 8 elements.

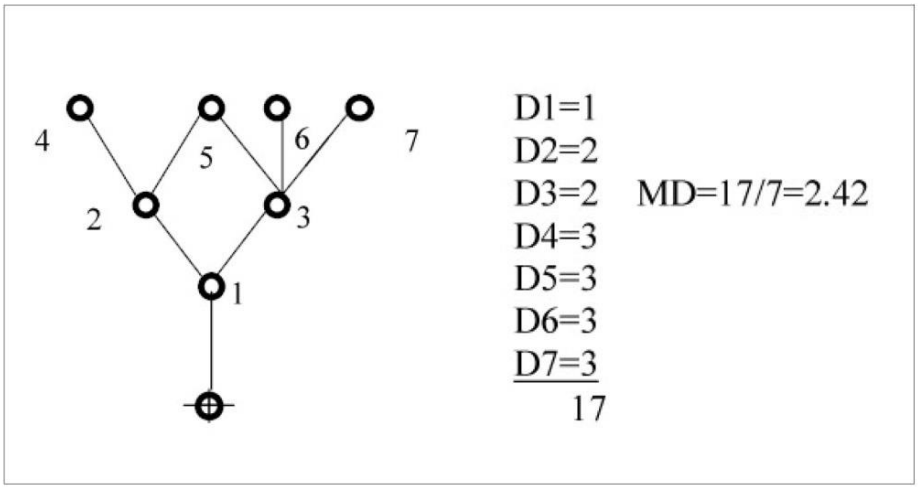


Fig. 4.30: An example of the calculation of Total Depth and Mean Depth

The total depth of the root to all other seven nodes is 17. Subsequently, its mean depth is 2.42 by dividing 17 to 7. Therefore, the average steps needed from the root to all other nodes is 2.42. Total depth and mean depth of each node are different based on the topological relationship of the node to all other nodes.

Relative Asymmetry (RA)

The Mean Depth provides the basis for the calculation of RA. If a system has k elements (axial lines or cells), then its RA will be defined by the formula:

$$\mathbf{RA = 2(MD-1)/(k-2)}$$

Real Relative Asymmetry (RRA)

According to Hillier, RA is affected by the size of the system that is represented by the value of k. In turn, it makes comparison between different systems inaccurate. In order to overcome the size effect, RRA is introduced and calculated by the formula:

$$\mathbf{RRA = RA/Dk = 2(MD-1)/(Dk*(k-2))}$$

In this formula, Dk is the relative asymmetry of a diamond shape pattern of k spaces (for detailed explanation of the method of calculation, see Hillier and Hanson (1984, p. 108-113).

Integration Value

The introduction of RRA reaches the most important measure in the space syntax method in general, and the primary syntactic measure used in this thesis, which is the Integration Value (Ri). The Integration Value in the space syntax method is defined as the reciprocal of RRA:

$$\mathbf{Integration\ Value = 1/RRA = Dk*(k-2)/2(MD-1)}$$

Hillier and Hanson describe "Integration" as a global measure of depth, normalised in such a way that differently sized systems can be compared to one another (Hillier and Hanson, 1984). In the space syntax method, the integration value is used to quantify the degree of physical and visual accessibility. The terms integration and accessibility are interchangeable within the space syntax method.

Empirical studies have found a strong correlation between the integration value of axial lines and the levels of movement (Hillier et al., 1993; Read, 1999; H. Wang et al., 2013). Lines or streets with the highest integration values are argued to be the most accessible spaces in a system. Similarly, in a visibility graph, the most integrated spots (coloured red) are locations that are most visible from all other spots. In contrast, spots with a low integration value (dark blue) are the most secluded zones.

In an axial map method, the integration value is further defined as being a global or a local integration. For the global integration value Rn, the mean depth is calculated using all the elements of the system, whereas for the local integration value, e.g. R3, the mean depth calculation is only based on up to three steps from the root (Hillier and Hanson, 1984).

The Implication of the Space Syntax Method

Over the last 30 years, the space syntax method has primarily been used to study movement patterns generated by the urban grid and its impact on the use of urban space (Penn, Hillier, Banister, & Xu, 1998; Penn & Turner, 2004). Through the understanding of movement, the space syntax method has found the association between the urban configuration and cognition and way-finding (Dalton, 2003, 2005; Y. O. Kim & Penn, 2004), the location of prominent buildings (Hanson, 1989; Haofeng, 2008b; Karimi, 2002), land use patterns (H.-K. Kim & Sohn, 2002; H. Wang et al., 2013), social segregation (Laura Vaughan, 1997, 2007; Laura Vaughan & Arbaci, 2011), and crime (Hillier, 2004; Hillier & Shu, 2000). The space syntax method has also been used to study the use of public squares (B Campos, 1997; B. Campos & Golka, 2005; Hillier, 1984; Hillier, Grajewski, Jones, Jianming, & Greece, 1990). Several successful squares have been re-configured using the space syntax method, including the redesign of Trafalgar Square in London and the Market Hall in Nottingham (Karimi, 2012).

4.4.2 VGA-Models for quantifying visibility

In order to quantify the impact of visibility on the choice of location for static usage, visibility graph analysis (VGA) is used as the primary model. In addition, a non-syntactic model, the overlapping isovists is used for gated public squares, called here overlapping isovists of the gates (OIG). The construction of these two models with their relevant measures is introduced in the following sections.

Visibility Graph Analysis (VGA)

The construction of a VGA map is illustrated in Fig. 4.31 and consists of the following steps:

- Step 1 – Site Survey: Based on a scaled map of a square including any physical elements, those which are visual obstacles for an person of average height, have to be identified. Elements such as low benches and chairs or low plants are not visual obstructions, thus they should be omitted in the visibility map.

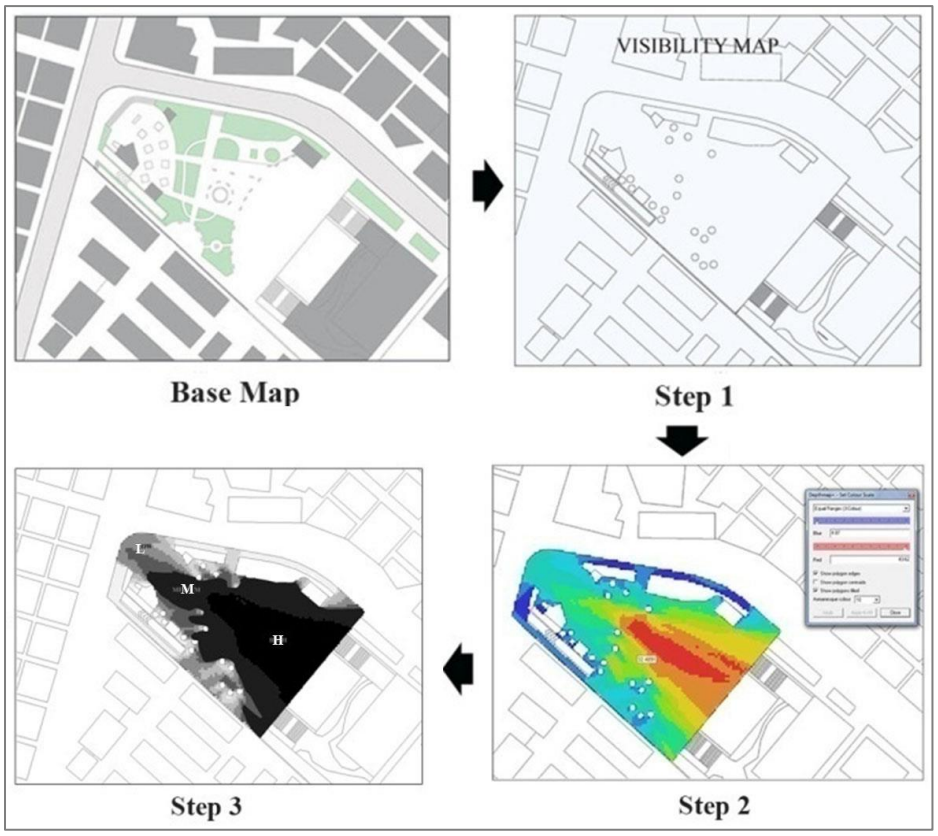
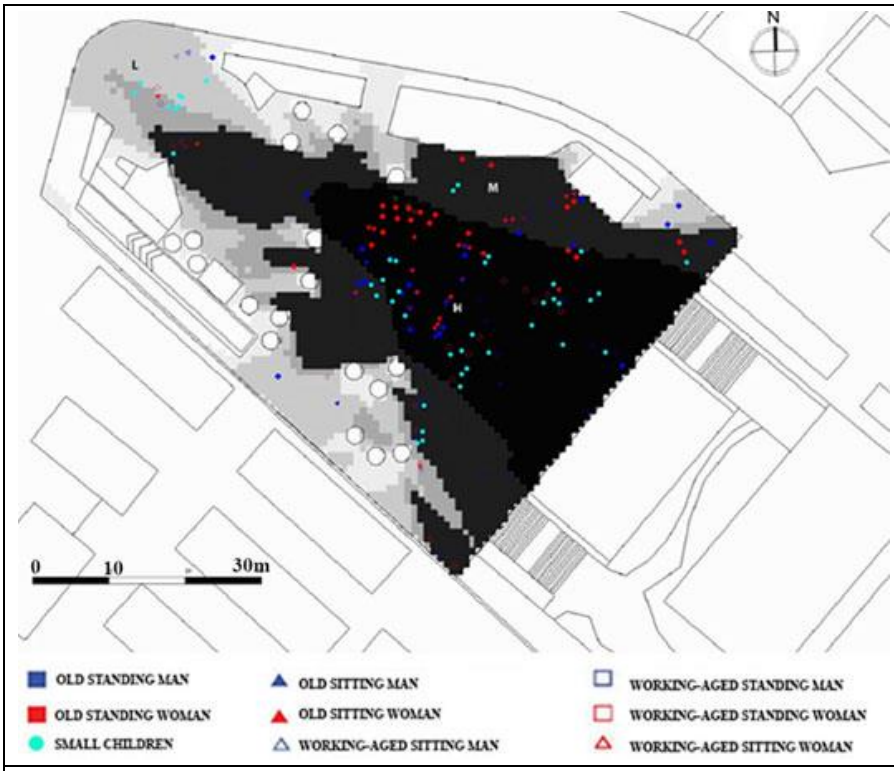


Fig. 4.31: The construction procedure of a VGA map

- Step 2 – Compute Processing: subsequently the "raw" visibility map generated by the first step will be digitised as a cad file and imported to Depthmap, the most used Space Syntax program for further processing. First, the whole area of a public square will be divided into cells of 60 cm by 60 cm, reflecting a human footprint. Then, the computer quantifies the visibility of each cell based on its topological relation to all other cells. Cells with the shortest topological distance to all other cells are the most visually integrated, whereas cells with the longest topological distance are the most visually segregated. As a result of this step, each cell receives a numerical value of visual integration. In a VGA map, in addition to the numerical value, a visual integration value can be also represented by the use of colour. In a colour map, the gradient from high to low visibility is represented by a gradient from red to blue. Similarly, a visibility value can be represented by a gradient from black to white to represent high to low visibility. In this thesis, black and white are chosen.



Note: In this thesis, counting people was conducted using a cad file to enhance the correctness and consistency. In the cad files, people and VGA maps are located in two different layers.

Fig. 4.32: A VGA map overlaid with an activity map

- Step 3 – Degree of Visibility: Based on the map generated in step 2, the square is divided into three distinct zones regarding their degree of visual integration: high visibility, medium visibility and low visibility using the “colour range”, a component in Depthmap. The high visibility zone is the darkest area, whereas the low visibility zone is the lightest area. The colour of medium visibility lies between these two.

After that, the VGA map is overlaid with the data collected from the direct observation. This, in turn, allows quantification of how visibility correlates with distribution patterns of static people and activities.

Overlapping Isovists of Gates (OIG)

In the Western context, public space might be less used if fenced and gated even if in a very busy location. In China, while the existence of gates and fences might not affect the levels of usage, it might affect the distribution of people and activities in the place. In order to quantify this, a model called the overlapping isovists (or visual fields) of gates (OIG) is used. The construction of this model follows the three steps below:

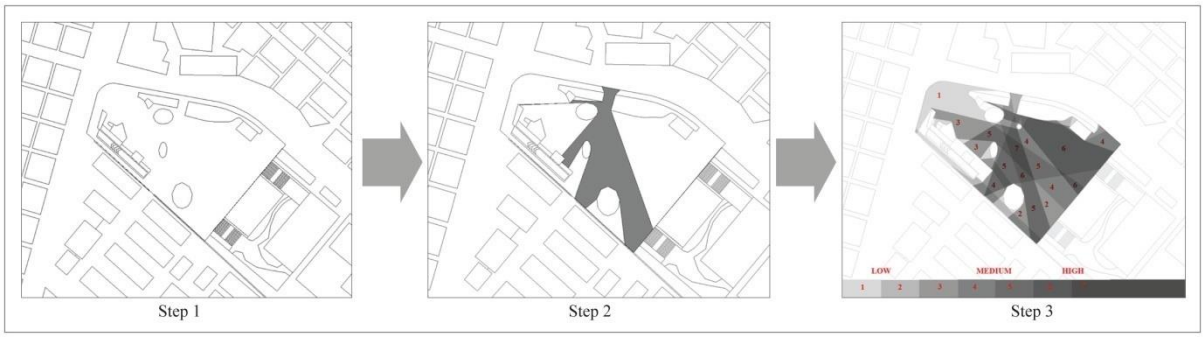


Fig. 4.33: The construction procedure of an OIG map

- Step 1 – Site Survey: This step is similar to step 1 of the VGA model where visual obstacle and non-obstacle elements are identified. The latter are omitted from the OIG map.

- Step 2 – The Construction of the Visual Field Generated from Each Gate: The raw map generated through the first step is digitised as a cad file and sent to Depthmap. In

Depthmap, the construction of the visual field from one point, the gate in this case, is conducted using the "isovist" component. The visual field of each gate is first individually generated by Depthmap, and later these are overlaid on top of each other in Photoshop.

- Step 3 – Quantifying the Degree of Visibility: This step is conducted in Photoshop using the "transparency" component. Normally, if a location is overlapped by five different visual fields, its visual degree can be simply defined as five if all gates are considered to be equally important in terms of the number of people using them. However, in reality, some gates are heavily used, whereas some are rarely used. This factor is also taken into account in this thesis by giving different gates different weightings reflecting their levels of usage. For example, if gate A is used by 40 people, its visual field will have a degree of visibility twice that of gate B which is used by only 20 people.

4.4.3 Axial map: models for quantifying accessibility

Fig. 4.34: A sample of an axial map (London)

The axial map is the central method of the space syntax method for studying the impact of street pattern on movements and movement-related functions. According to Czerkauer (2007),

an experienced space syntax researcher, the construction of a syntactic axial map consists of the following three steps:

- Step 1: Draw axial lines on a separate layer as an overlay from a chosen base map. This map consists of the longest and fewest lines. For the manual drawing procedure, there are a few rules to consider:
  - Start with the longest line and finish with the shortest;
  - Avoid "over-modelling" that can influence the results;
  - The fewest lines should be drawn;
  - Keep the same rules for representing convex elements such as parks or squares.
- Step 2: Analysing and processing the map (using softwares: Axwomen, Confeego, Depthmap, and currently many other plugins in Grasshopper). This step transfers the "raw" set of axial lines into a syntactic axial map and calculates the degree of accessibility of axial lines[13] and subsequently of public squares.
- Step 3: Display and interpretation of the results.

In this research, the axial maps of City Guangzhou and Shenzhen were provided by Professor Wang Haofeng from the University of Shenzhen. However, through site survey, the areas of the 13 case studies have been updated.

The research framework and data collection and analysis methods in this thesis are summarised in Fig. 4.35.

[13] In an axial map, nodal spaces such as urban parks and squares are not present, but they are represented by axial lines that interface the body of convex spaces.

4.4.4 Limitations of Space Syntax

General criticism such as that of Cuthbert (2007) states that the space syntax methodology is an exercise of abstraction where people are reduced to characterless atoms moving about in a space. The usefulness of the space syntax method, which developed out of the organic morphology of London, has been challenged when applied to other planned cities such as New York, where the scale and the hierarchy of streets perhaps play a more important role than the degree of accessibility in shaping their use patterns (Ratti, 2004; Ratti & Richens, 2004; Read, 2005, 2007). Furthermore, Porta and Latora (2008) argue that the space syntax methodology studies only one type of centrality, whereas there are other kinds that also affect the use of urban spaces such as population density and land use. Porta and Latora's argument is relevant especially in the Chinese context where open public space is extremely scarce. Therefore, the land-use attraction of public space might overweigh that of accessibility generated by the urban grid configuration.

In summary, this chapter explains in detail the proposed spatial analysis methods of direct observation and space syntax, and introduces the case studies (13 small and medium-sized public squares in Guangzhou and Shenzhen). The main research question has been reconfigured as three research sub-questions that are addressed in the next three chapters, each of which adopts different combinations of the two sets of methods. Chapter five investigates static use and its relation to tangible spatial properties such as size, fences and gates and the provision of seats using behaviour mapping as the sole method. Chapter six is as an extension of chapter five and combines behaviour mapping and two visual analysis methods – visibility graph analysis (VGA) and the overlapping isovists of the gate (OIG) to examine how visibility determines location preferences in the public squares. Chapter seven utilises the overlapping of gates method, movement tracing technique and axial mapping to investigate the impact of accessibility on transient use of small and medium-sized public squares

Fig. 4.35: Data Collection and Analysis Methods

CHAPTER FIVE

DAILY PATTERNS OF STATIC USAGE AND PHYSICAL PROPERTES OF SMALL AND MEDIUM-SIZED PUBLIC SQUARES IN CHINA

5.1 Introduction

This chapter with chapters six and seven together make up the empirical part of this thesis. The focus of this chapter is on the static usage, whereas chapter six investigates the impact of visibility on location preference and chapter seven examines the transient use of small and medium-sized public squares.

5.1.1 Aim and scope

The first research sub-question provides the aim and scope of this chapter.

> *What are the static use patterns and how do spatial properties impact on these patterns?*

Considering the design of public squares should be user-oriented and that the information about users and their activities is of crucial important one in order to begin a design, this chapter aims to provide a comprehensive set of information about small and medium-sized public square users, including their age, gender, group size and activities. In addition, this chapter examines how design concepts and elements (design aspirations, the existence of fences and gates, the

size and provision of seats) in the 13 case studies of this type of public space in Guangzhou and Shenzhen are aligned with users' needs.

Direct observation and behaviour mapping methods are combined and the results described in this chapter. Behaviour mapping was introduced in detail in section 4.3. Users will be classified according to their age, gender and group size, whereas the classification of activities includes specific activities such as exercising, babysitting, playing chess/cards or sewing and more general activities such as standing and sitting. Each space is scanned in six time blocks between 7 am and 7 pm in similar weather conditions.

5.1.2 Overview

Chapter five is organised into five main sections. Section 5.2 examines the static use patterns of 13 small and medium-sized public squares in Guangzhou and Shenzhen. It provides insights into the age, gender and group size of public space users and their activities. This section identifies the most popular activities occurring in small and medium-sized public squares in China.

The focus of section 5.3 is on the physical characteristics and spatial properties of small and medium-sized public squares including their design aspirations. Furthermore, this section examines how size, the existence of fences and gates and the provision of seats affect the static use of public space.

Section 5.4 evaluates and describes the static use of the 13 case studies using vitality, diversity, and provision of seats as three assessment criteria. This section also highlights the differences in the use and design of public space in old and new urban areas.

The final section in this chapter summarises major findings and discusses their theoretical relevance.

5.2 Static Use Patterns of Small and Medium-sized Public Squares

In the framework of place-making theory (Canter, 1977; Montgomery, 1998; Punter, 1991), activities or the use of public space form one of the three components of place (activity, form and meaning). In a more recent publication, Carmona (2014) further clarifies the importance of the daily use patterns of public space. From his perspective, the use of the space is the strongest force that shapes the place. Hence, the lack of information about the daily use of public space might create misleading assumptions and subsequent design failures (Carmona, 2014).

This section sets out to fill a knowledge gap in the literature about the daily use patterns of small and medium-sized public squares in Chinese cities. It includes information about the demographics of users, the types and level of frequent activities as well as their temporal dimension. The total number and percentage values of static users and the number of different activities observed on a weekday from 7 am to 7 pm are summarised in Fig. 5.1 and 5.2. Most of the charts in the following sections are derived from the numbers in these two tables. The detailed data set used in this section is presented in Appendix 1.

5.2.1 Demographic structure of public space users

Regarding the demographics of public space users, three aspects were examined: age, group size and gender.

SQUARE NAME	TOTAL NO. USERS	ELDERLY	WORKING-AGED	CHILDREN
THEATRE SQUARE	535	520	12	3
BRIDGE SQUARE	112	55	31	26
CHEN TEMPLE	663	454	99	110
PANDANG TEMPLE	196	142	49	5
LAKE SQUARE	749	664	45	40
PEOPLE PARK	940	524	358	58
DONGMEN	469	83	341	45
KING PLAZA	460	195	223	42
TIANMIAN	532	215	173	144
HUANGGANG	1041	577	259	205
SHANGSHA BIG SQUARE	1195	536	283	376
SHANGSHA MINI SQUARE	520	476	13	31
XIASHA	838	481	115	242
TOTALS	**8250**	**4922**	**2001**	**1327**

Fig.5.1: Number of users by age group observed on a weekday from 7 am to 7 pm

SQUARE NAME	TOTAL NO. USERS	MEN	WOMEN	CHILDREN
THEATRE SQUARE	535	253	279	3
BRIDGE SQUARE	112	33	53	26
CHEN TEMPLE	663	203	350	110
PANDANG TEMPLE	196	83	108	5
LAKE SQUARE	749	392	317	40
PEOPLE PARK	940	536	346	58
DONGMEN	469	206	218	45
KING PLAZA	460	222	196	42
TIANMIAN	532	143	245	144
HUANGGANG	1041	316	520	205
SHANGSHA BIG SQUARE	1197	191	628	376
SHANGSHA MINI SQUARE	520	335	154	31
XIASHA	838	274	312	242
TOTALS	**8250**	**3187**	**3726**	**1327**

Fig.5.2: Number of men, woman and children observed on a weekday from 7 am to 7 pm

SQUARE NAME	TOTAL NO. USERS	INDIVIDUALS	PAIRS	GROUPS (3+)
THEATRE SQUARE	535	30	66	439
BRIDGE SQUARE	112	33	36	43
CHEN TEMPLE	663	139	142	382
PANDANG TEMPLE	196	58	44	94
LAKE SQUARE	749	68	128	553
PEOPLE PARK	940	115	166	659
DONGMEN	469	87	130	252
KING PLAZA	460	120	100	240
TIANMIAN	532	130	74	328
HUANGGANG	1041	101	146	794
SHANGSHA BIG SQUARE	1197	90	300	805
SHANGSHA MINI SQUARE	520	33	66	421
XIASHA	838	111	184	543
TOTALS	**8250**	**1115**	**1582**	**5553**

Fig.5.3: People observed by group size on a weekday from 7 am to 7 pm

Age groups

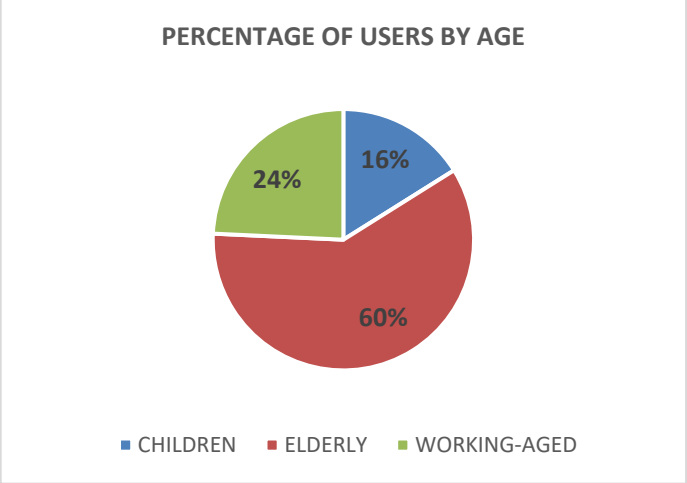


Fig. 5.4: Percentage of users by age for all 13 squares

One of the most striking facts found in Guangzhou and Shenzhen is that 60 % of public space users are the elderly. This number is extremely high as according to the population census 2014 (Index-Mundi, 2014), the percentage of people older than 55 in China is about 20 % of the whole population. Among the 13 case studies, three have more than 90 % elderly users. Only Dongmen Market Square has a percentage of older users proportionate to the demographic

structure of China. Even in Shenzhen, a young city where only 1.22 % of the population are over 65 (Index-Mundi, 2014), about 50 % of public space users are the elderly.

Although people of working age make up nearly 60 % of the population in China, our data suggests that only 24 % of this age group are public space users. The last age group refers mostly to small children or toddlers aged less than five as school children and teenagers are virtually absent in our samples of public space.[14] Children make up about 16 % of total users. As a small child is often accompanied by an adult, the "baby-sitting" group makes up nearly one-third of total public space users.

Due to the absence of school children, and the small proportion of people of working age, medium sized public squares function as a substitute space for clubs for the elderly and kindergartens in China. It is worth mentioning that both of these user groups put a high demand on the quality of the space, including the provision of adequate seating and a good degree of safety.

Group sizes

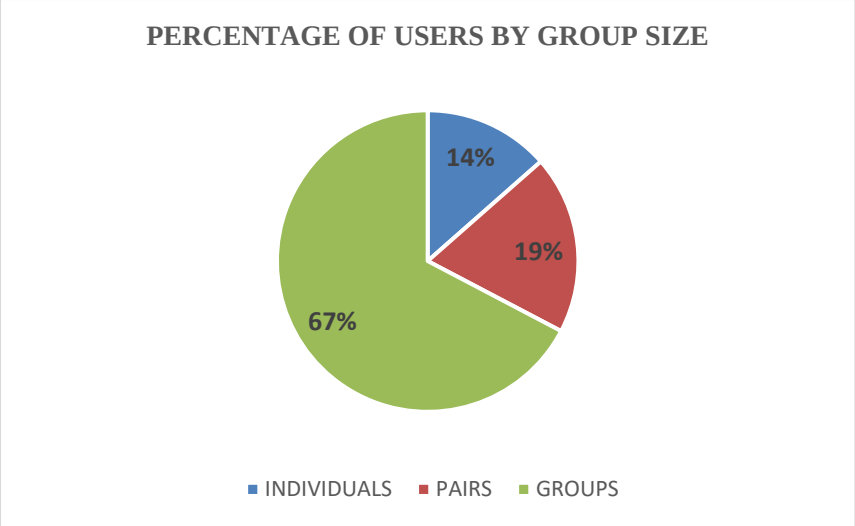


Fig. 5.5: Percentage breakdown of three group types in 13 squares

[14] The fact that the observation time is from 7 am to 7 pm on a weekday might explain the absence of adult children as many will be in school for much of this time.

Another significant finding is that the majority of public space users were found in groups of more than three people. On average, about two-thirds (67 %) of total users belong to such groups. The number of people in big groups also varies considerably. While the typical size of big groups is about five to seven people, larger groups can be up to forty or more.

Fig. 5.6: Big groups users versus individuals

In contrast, the percentage of individual users is relatively low with a mean value of 14 %. This suggests that public squares in Guangzhou and Shenzhen are places for collective use rather than places for individuals to rest or escape from the crowded metropolis.

Gender issues

Fig. 5.7: Only men were once found in public space
(T. Wu, 1997)

The ratio between male and female users of public space often reflects the local culture and society. A famous historical painting of a Chinese city (see Fig. 5.7) shows that mainly men were present in traditional paintings of urban public space. Indeed, prior to the Communist Revolution in 1949, the presence of women in public was highly restricted due to the patriarchal nature of the Confucian ideology which had institutionalised a strict separation of the spheres, associating women with the inner and men with the outer sphere (Bray, 1997; Cheng, 2000; Leung, 2003). The Communist ideology however equalised the role of women in modern Chinese society, which might account for certain positive impacts on the presence of women in public space (Jin, 2011). In the post-Maoist era, although the influence of Confucian ideology was still present, a different image of public space was found in China. In fact, our data suggests that the number of women found in small and medium-sized public squares is slightly higher than that of men. From the observation of 13 public squares, the mean percentage of women is 45 %, whereas that of men is 39 % (see Fig. 5.8).

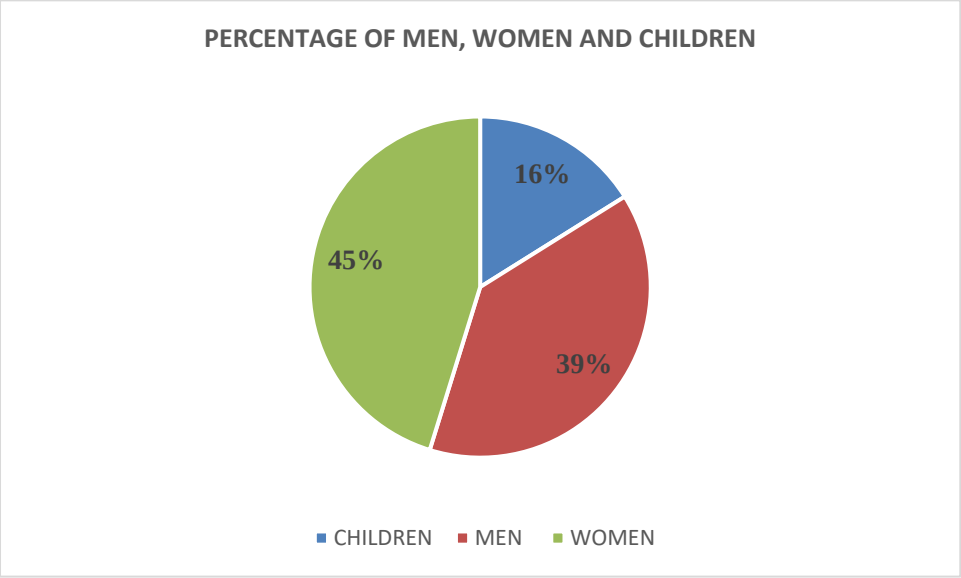


Fig. 5.8: Percentage of male and female users and children in 13 squares

The majority of women were engaged in group activities such as exercising, babysitting, and sewing that reflects their domestic role of wife and (grand) mother, while men were engaged in other activities such as playing chess/cards or lingering in public space. Given that the type

of activity women were engaged in is necessary rather than optional, the quantum of these activities might not depend on the physical quality of the spaces (Gehl, 1987).

Fig. 5.9: Female versus male activities in public space

5.2.2 Types of daily activity in public squares

Public squares are nodal and focused spaces in which a wider range of informal activities can take place than in the linear space of the street. These activities can be anything from passively sitting to playing games, celebrating a birthday or even organising a business meeting.

From the observation of 13 public squares, many of the informal activities found in the West such as sitting, standing, people-watching, playing games and meeting friends can also be found in China. However, eating lunch outside is virtually absent in China. Furthermore, some activities were observed that are distinct to the Chinese, for example dancing or singing in large groups, playing chess or cards, sewing (by women) and playing with small children or toddlers in a big group.

In this thesis, activities are divided into two main groups: primary and secondary activities. Primary activities are sitting, standing and exercising that can be recognised by body postures. In contrast, secondary activities are playing chess/cards, babysitting, singing and sewing.

Three primary activities

For all 13 case studies, the three primary activities are “sitting”, “standing” for a duration and “exercising”, which also includes any kind of dancing or tai-chi. Among these three, “sitting”

contributes to over half of all primary activities (54 %), followed by “standing” with 30 %. Although “exercising” occurs mostly in the early morning, it contributes to only 16 % of activities of the whole day (see Fig. 5.10).

SQUARE NAME	TOTAL No. USERS WITHOUT CHILDREN	ABSOLUTE NUMBER			PERCENTAGE		
		SITTING	STAND-ING	EXER-CISING	SITTING	STANDING	EXER-CISING
Theatre Square	532	178	64	290	33	12	54
Bridge Square	86	58	28	-	67	33	0
Chen Academy	553	259	167	127	47	30	19
Renwei Temple	191	76	109	6	40	57	3
Liwan Lake Square	709	245	221	243	35	31	32
People Park Square	882	446	358	78	51	41	8
Dongmen Square	424	257	167	-	61	39	0
King Plaza	418	178	142	98	43	34	21
Tianmian Square	388	216	159	13	56	41	2
Huangang Square	836	555	189	92	66	23	9
Shangsha Big Square	819	568	170	83	69	21	7
Shangsha Small Square	489	352	118	19	72	24	4
Xiasha Square	596	341	214	41	57	36	5
Totals for all squares	6923	3729	2106	1090	**54**	**30**	**16**

Fig. 5.10: Primary activities observed on a weekday from 7 am to 7 pm

The high percentage of people “sitting” is possibly related to the numbers of the elderly who visited the squares for the duration and had a higher demand for sitting than other groups. It was observed that many public space users brought foldable chairs with them (see Fig. 5.12), so they could sit where they wanted, forming groups “sitting” with face-to-face contact. The single fact that some people bring their own chairs to a public space might suggest that the provision of seats is not sufficient.

People probably take less time to find a place to stand than to sit. People might stand to wait for a friend or watch something interesting happening for a short duration.

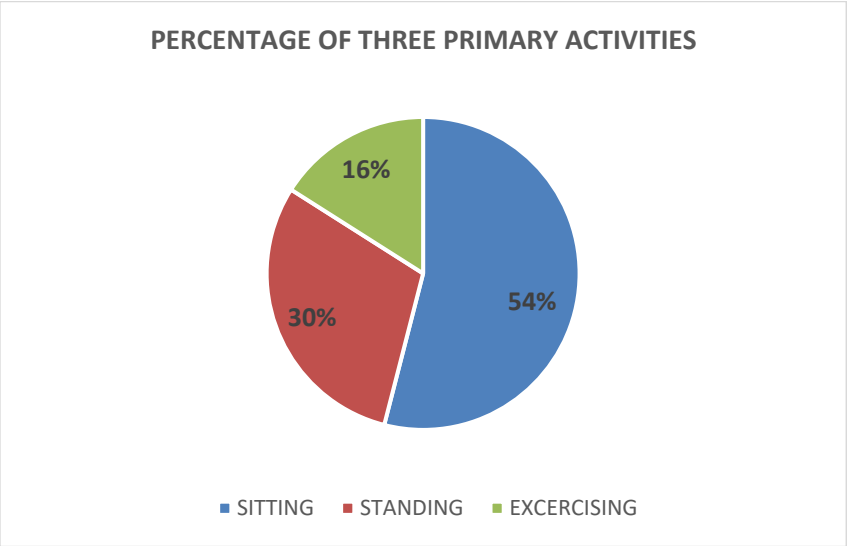


Fig. 5.11: Percentage breakdown of primary activities in public squares

In Guangzhou and Shenzhen, a large portion of standing activity is dedicated to "babysitting" duty. Many (grand) parents stand in the open space to watch their small charges playing or learning to walk. The "baby-sitting" activity is often clustered into big and dominant groups in many public squares (see Fig. 5.12).

Fig. 5.12: Public squares as kindergartens with a high number of toddlers

The last main activity that makes public squares in China distinct is "exercising". Although this activity comprises only 16 % of all primary activities, it often serves as an attraction in public squares in China. Here, "exercising" includes any physical activity, ranging from individuals practicing yoga to big groups learning Western dancing. Orum (2009) mentions enjoying watching groups of people wearing traditional colourful suits performing fan or sword dances. This impression might be true for many other Westerners. The Chinese are also attracted to this kind of activity. Thus for each interesting "performance", there is often an accompanying audience.

Three secondary activities

SQUARE NAME	TOTAL No. USERS WITH CHILDREN	TOTAL No. USERS SIMPLY STANDING AND SITTING	TOTAL No. USERS ENGAGED IN SECONDARY ACTIVITIES	PERCENTAGE OF SECONDARY ACTIVITIES BY TOTAL USERS
Theatre Square	535	429	106	20
Bridge Square	112	60	52	46
Chen Academy	663	403	260	39
Renwei Temple	196	187	9	4
Liwan Lake Square	749	443	306	40
People Park Square	940	681	259	27
Dongmen Square	469	379	90	19
King Plaza	460	365	95	20
Tianmian Square	532	209	323	61
Huangang Square	1041	451	590	57
Shangsha Big Square	1195	316	879	73
Shangsha Small Square	520	106	414	79
Xiasha Square	838	285	553	65
Totals for all squares	8250	4314	3936	48

Fig. 5.13: Secondary activities by total number of users on a weekday from 7 am to 7 pm

SQUARE NAME	TOTAL COUNT OF SECONDARY ACTIVITY	ABSOLUTE NUMBER			PERCENTAGE		
		CHESS CARDS	SINGING SEWING	BABY-SITTING	CHESS CARDS	SINGING SEWING	BABY-SITTING
Theatre Square	106	18	79	9	17	75	8
Bridge Square	52	0	0	52	0	0	100
Chen Academy	260	21	0	239	8	0	92
Renwei Temple	9	0	0	9	0	0	100
Liwan Lake Square	306	174	47	85	57	15	28
People Park Square	259	123	0	136	47	0	53
Dongmen Square	90	0	0	90	0	0	100
King Plaza	95	0	9	86	0	9	91
Tianmian Square	323	0	27	296	0	8	92
Huangang Square	590	165	12	413	28	2	70
Shangsha Big Square	879	38	38	803	4	4	91
Shangsha Small Square	414	353	0	61	85	0	15
Xiasha Square	553	70	0	483	13	0	87
Totals for all squares	3936	962	212	2762	**24**	**5**	**70**

Fig. 5.14: Secondary activities on a weekday from 7 am to 7 pm

Babysitting activity

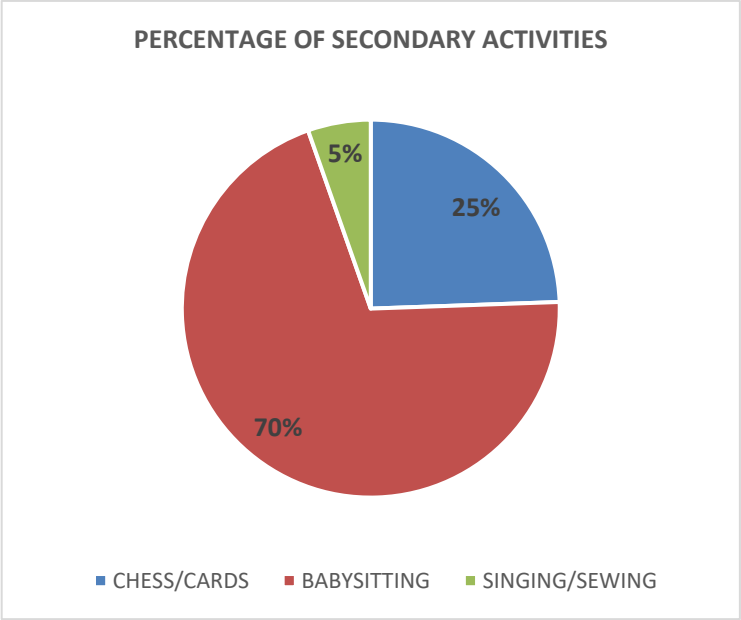


Fig. 5.15: Secondary activities breakdown

Babysitting as mentioned previously is a popular activity in public squares in the Shenzhen and Guangzhou. As shown in Fig. 5.15, babysitting contributes to 70 % of secondary activities (about 33 % of all activities). There might be two reasons for the high percentage of this activity. It is a cultural fact that instead of sending their small children to kindergarten, Chinese people seem to prefer to have the grandparents taking care of them. In addition, there is limited access to kindergartens for the children of migrant workers (Lin et al., 2011); therefore, for these people public space serves as a substitute for a childcare amenity.

Playing chess/cards and singing/sewing

The number of people engaged in playing chess/cards and singing/sewing activity is documented in Fig. 5.14 and 5.15.

Playing chess/cards is one of the most popular activities for the Chinese. In any local club for the elderly, we observe that this is the most likely activity to happen. In People Park in Guangzhou, old people gather from early morning to early evening to play such games. In

many narrow alleys in Guangzhou and Shenzhen, groups of four to seven people sitting in front of a house door, sometimes encroaching on the traffic way and enjoying games were observed.

Fig. 5.16: Playing chess or cards in public space

Playing chess/cards activity was recorded in eight out of thirteen sample public squares in Guangzhou and Shenzhen. On average, this activity contributes to 24 % of secondary activities. However, the actual number varies from case to case. For example, in Shangsha Village Small Square, this activity is 85 % of secondary activities (more than two thirds of the total activities), whereas in five other squares, this activity did not occur. It is likely that this number could be constrained by the poor provision of group sitting opportunities in the latter spaces. In all 13 samples of squares, if there is any table with seats around, there is a big group of people playing cards.

Fig. 5.17: Group singing in public space in Guangzhou

The last group activity is singing/sewing in public space. This activity occurred less frequently than the others and was found only in six out of thirteen squares in Guangzhou and Shenzhen. On average, singing/sewing forms 5 % of secondary activities, although where it happens, it often creates big crowds. A singing group can be up to 50 people. They sing different kinds of songs from Chinese traditional opera, to modern pop and Russian folk songs. This activity represents a strong sense of collectivism in China.

There are also many other types of activities happening in public squares in China. However, the types discussed are the most frequently occurring within the case studies. It should be noted that many of them occur collectively. The nature of these activities and the large sizes of activity groups imply a distinct Chinese way of using of public space.

5.2.3 Levels of static usage

SQUARE NAME	7-9 am	9-11 am	11 am-1 pm	1-3 pm	3-5 pm	5-7 pm	Total No Users	Mean No Users
Theatre Square	133	158	69	106	55	14	535	89.17
Bridge Square	9	35	11	23	12	22	112	18.67
Chen Academy	115	166	140	104	89	49	663	110.50
Renwei Temple	15	46	28	38	52	17	196	32.67
Liwan Lake Square	179	244	62	114	96	54	749	124.83
People Park Square	46	174	123	156	260	181	940	156.67
Dongmen Square	9	14	84	153	137	72	469	78.17
King Plaza	93	76	50	54	88	99	460	76.67
Tianmian Square	31	75	106	93	157	70	532	88.67
Huangang Square	70	103	195	188	280	205	1041	173.50
Shangsha Big Square	77	230	238	169	344	137	1195	199.17
Shangsha Small Square	25	98	51	103	197	46	520	86.67
Xiasha Square	36	187	171	99	185	160	838	139.67
MEAN	64.5	123.5	102.2	107.7	150.2	86.6	**634.7**	**105.8**

Fig. 5.18: Levels of Static Use

Fig. 5.18 shows the number of static users recorded in six periods from 7 am to 7 pm in 13 public squares in Guangzhou and Shenzhen. As can be seen, a public square in Guangzhou and Shenzhen on average has about 105.8 stationary users at any given time between 7 am and 7 pm.

However, the absolute number of stationary users in each square varies widely over the course of the day. In the three squares that attracted the highest number of people – People Park Front Square, Huanggang Village Square and Shangsha Big Square, the absolute number of stationary users varies from 46 to 280 people between 7 am and 7 pm. Whether this variation is related to the size of the space will be discussed later in this chapter.

5.2.4 Temporal use patterns

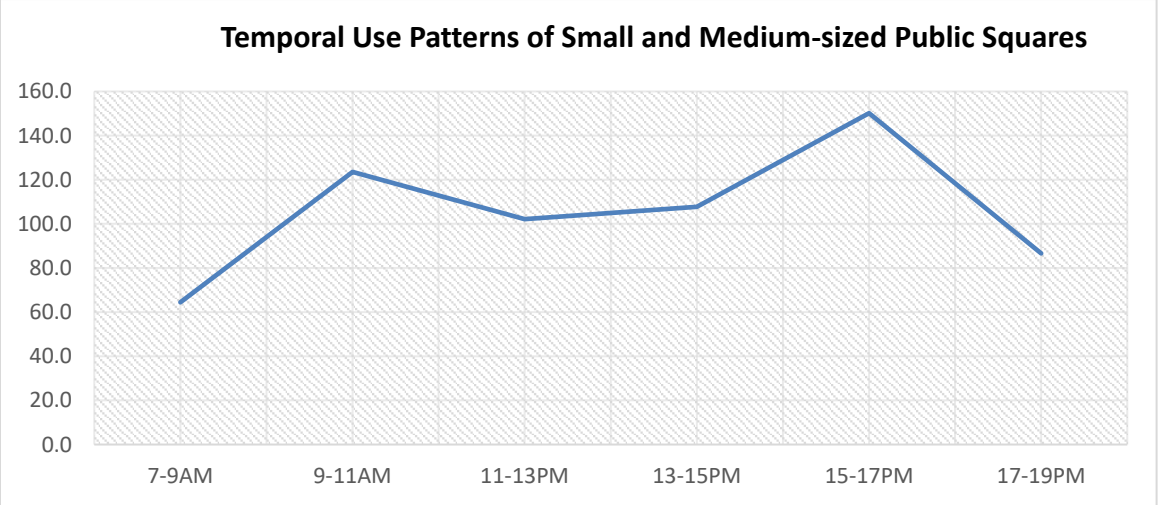


Fig. 5.19: Time patterns of 13 public squares

Figure 5.19 illustrates the temporal static use patterns of the 13 sample small and medium-sized public spaces. Two peaks are shown between 7 am and 7 pm, one in the morning at 10 am and another in the late afternoon at 4 pm. Lunch time is when relatively fewer people were recorded. Eating lunch in a public space seems not to be popular in Chinese cities.

In the absence of office workers eating lunch in public squares, the temporal use patterns of public squares are largely determined by the elderly. The morning peak occurs at 10 am and is the time when groups of people exercising overlap with those arriving for socialising purposes. They might remain in the open spaces until lunch time. Many will go to restaurants or home for lunch, and then take a midday nap, before going back to the public space for late afternoon exercises or simply meeting with friends. The late afternoon peak that occurs between 3 pm and 5 pm has far more users than the one in the morning, despite a smaller number of old

people. The reason for this is the fact the number of children and working-aged people using the squares peaks during this period (after work and after school).

SQUARE NAME	7-9 am	9-11 am	11 am-1 pm	1-3 pm	3-5 pm	5-7 pm	Total No. Working-aged Users
Theatre Square	1	0	0	7	3	1	12
Bridge Square	3	8	2	10	1	7	31
Chen Academy	13	15	34	16	13	8	99
Renwei Temple	3	6	9	2	27	2	49
Liwan Lake Square	4	23	0	1	9	8	45
People Park Square	10	27	42	63	110	106	358
Dongmen Square	9	11	65	115	85	56	341
King Plaza	16	32	36	34	44	61	223
Tianmian Square	8	16	33	40	40	36	173
Huangang Square	17	21	50	46	80	45	259
Shangsha Big Square	4	40	62	49	84	44	283
Shangsha Small Square	0	2	4	3	3	1	13
Xiasha Square	2	9	31	11	31	31	115
MEAN NUMBER	**6.9**	**16.2**	**28.3**	**30.5**	**40.8**	**31.2**	**153.9**

Fig. 5.20: Temporal use patterns of working-aged people

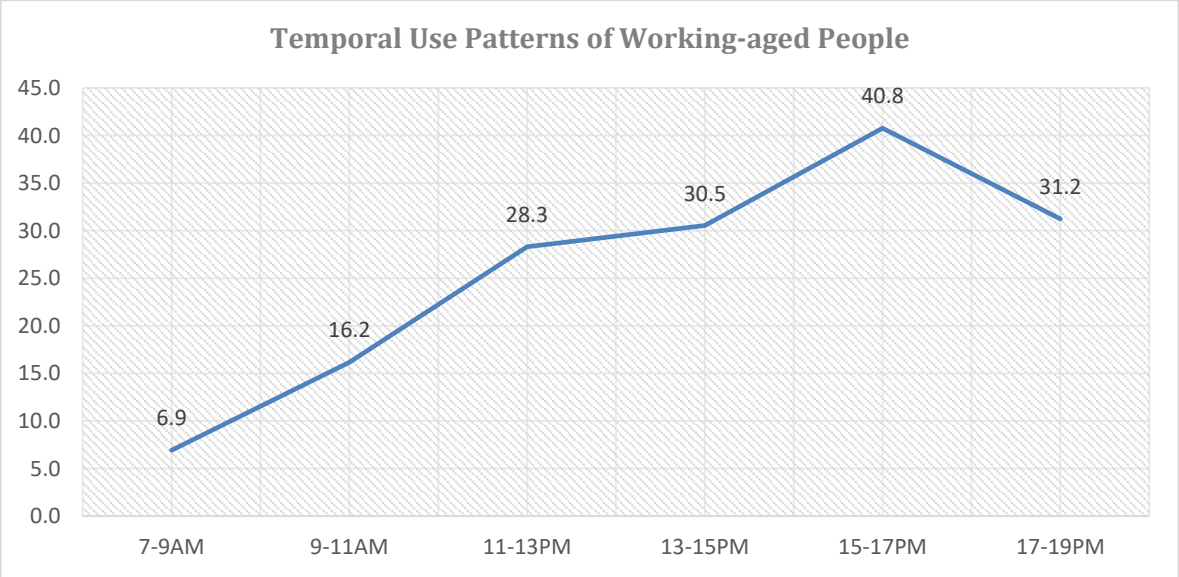


Fig. 5.21: Temporal Use Patterns of Working-aged Users (mean values for 13 squares)

The data in Fig. 5.20 shows the mean number of working-aged users gradually increases from early morning, peaking by 3 pm to 5 pm and decreasing towards the evening. The peak before 5 pm happens because many of these working-aged people might use public space after picking up their children from school and kindergarten.

In summary, the small and medium-sized public squares in Guangzhou and Shenzhen are dominantly used by big groups of the elderly with typical activities being sitting, standing, exercising, playing chess/cards, singing and sewing. These activities are distributed relatively evenly during the day with two peaks in the morning and the afternoon, and a trough at lunchtime.

Small and medium-sized public squares in Guangzhou and Shenzhen seem to attract a high number of people at first sight. However, many are less well used, and whether these spaces are used effectively or not needs to be further examined.

5.3 Physical Characteristics of Small and Medium-sized Public Squares

The first part of this chapter analyses the daily use patterns of small and medium-sized public squares. The second part analyses their physical dimensions and characteristics. Fig. 5.22 provides basic information on the general physical features of the 13 samples.

These spaces have a relatively similar degree of cleanness and a good provision of public restrooms. In addition, there are minimal safety issues given the presence of guards in many enclosed spaces. Four specific aspects of the design of public squares are considered: design aspirations, scale, existence of fences and gates and the provision of seats and their impact on the use of the space.

Name	New or Redeveloped	Fences/ Gate	Edges	Spatial Arrangement	Major Decoration Elements	Shape	Big Trees	Low Plants	Paved Area %
Theatre Square	Redeveloped	Yes Plants	Water	Centred	Pavilion/ Status/ Temple	Organic/ Irregular	Plenty	Medium	60
Bridge Square	New	No	Buildings Water	Centred/ Highly Symmetrical	Temple	Modified Circle	Medium	Poor	91
Chen Academy	Redeveloped	Yes High Wall & Plants	Roads Villages Temple	Highly Symmetrical	Chinese stone garden/ paved materials	Square	Plenty	Plenty	36
Renwei Temple	Old	Yes High Walls	Temple Water Market Roads	Axial	Taoist Temple/ Chinese Gate	Long Rectangle	Plenty	Medium	84
Liwan Lake Square	Redeveloped	Yes High Walls Plants	Village Water	Natural	Stone Garden/ Chinese pavilion	Organic/ Irregular	Plenty	Plenty	64
People Park Square	Redeveloped	No Plants	Roads Park	Highly symmetrical/ Axial	Baroque park influence	Rectangle	Plenty	No	54
Dongmen Square	Redeveloped	No	Retailers	Highly symmetrical	Bell Tower	Rectangle	Plenty	No	94
King Plaza	New	No	Retailers Roads	Random	Western style	Square	No	Medium	73
Tianmian Square	New	Yes High walls, Plants	Village Roads	Highly symmetrical	Baroque park influence	Rectangle	Plenty	Plenty	71
Huangang Square	New	Yes High walls	Buildings Temples	Axial/ Highly Symmetrical	European elements	Long Rectangle	Poor	Poor	83
Shangsha Big Square	New	Yes Fence & Plants	Villages Roads School	Axial	Baroque park influence	Long Rectangle	No	Medium	64
Shangsha Small Square	New	Yes Plants & Walls	Buildings Roads	Random	Chinese Stone Mountain	Square	Plenty	No	76
Xiasha Square	New	Yes High Walls	Village Roads	Axial	Chinese temple/ gates/ statues	Irregular	Poor	Poor	49

Fig. 5.22: General Physical Features of Public Squares in the Southern China

5.3.1 Design aspirations: Chinese grand history and Western models

The literature review chapter has identified two particular trends or aspirations in the design of public space over the last three decades in China. They are the desire to replicate the Grand History of China and the mimicry of Western models (M. Padua, 2007b; Ren, 2011; Yang & Volkman, 2010; Yu & Padua, 2007). The observation of 13 samples of newly (re)developed small and medium-sized public squares confirms the existence of these two trends.

Chinese grand history

Fig. 5.23: The use of Chinese decorative elements

First, the design of 8 out of 13 case studies includes many Chinese decorative elements (see Fig. 5.23). Frequently used Chinese decorative elements are free standing temples or pavilions, a grand gate, settings of large stones, carved ornaments on the ground and cultural statues. In addition, the spatial arrangement of these spaces is highly symmetrical, with a preference for an orthogonal axis, derived from Chinese traditional spatial design principles (Wheatley, 1971; Yang & Volkman, 2010; Zhu, 2004, 2013). The existence of fences and gates might also be interpreted as a continuity of Chinese traditions. Although the use of such elements might support the making of the space as a "cosmos" in its own right and direct the attention to the centre of the space, it might indirectly lead to the devaluation of the edges.

The use of Chinese decorative elements and spatial principles could create a strong sense of local culture. However, there exists a concern about the authenticity of the place when this new development invents a "fake" history for commercial or political purposes. Local authorities and designers have strategically chosen decorative elements from the periods when China was prosperous and a world power (Broudehoux, 2002; Ren, 2011). In fact, in four urban villages from the sample, the original ancestral halls of different families were destroyed, and then rebuilt into new public squares. The centralisation of ancestral halls, in fact, has broken the

distinct lineage-based spatial distribution of villages in China, where the ancestral hall is the spatial centre of a group of families (Haofeng, 2008a; Zacharias, Hu, & Huang, 2013).[15]

The phenomenon of Disneyland architecture and the nostalgia for the past of New Urbanism can be also observed in the making of public space in Guangzhou and Shenzhen. However, it would appear that this trend has occurred in China at the cost of the existing local history.

Western influence and the hybrid style

Fig. 5.24: Tianmian Village Square (left); Huangang Village Square (right)

Besides the aspiration of emulating Chinese Grand History, to various degrees the designs of nearly half the case studies have used Western elements (Smith, 2014). Huanggang Village Square contains elements such as a grand fountain at the centre of the square and an archway on one side (see the layout in Fig. 4.17) which has been interpreted as "a quotation of a European town hall" (Smith, 2014). In addition, the designs of many squares are characterised by rectilinear arrangements and geometric patterned planting that is said to be copied from Western models (Bo and Yang 2010) (see Fig. 5.25). Hassenpflug (2010) suggests that many Chinese designers create an image of the West because this is likely to be interpreted as a sign of progress and prosperity.

The Huanggang Village Square is a good example of copying a Western "image". A prime example of the Western influence in the layout of the space is observed is People Park Front

[15] Chinese villages were socially and physically arranged around ancestral halls of different lineages. Each lineage normally occupies a part of the village which reflects its power and status (Haofeng, 2008; Zacharias et al., 2013).

Square (see Fig. 5.25). While its layout is highly symmetrical, reflecting European Baroque garden design, the use of free standing columns carved with Chinese ornaments and large native trees (in their natural shape) grant this space a sense of the local culture.

Fig. 5.25: People Park Front Square fusing Western (plan) with Chinese elements (trees, stones)
(

This section confirms that two major design aspirations - Western models and Chinese Grand History are, to varying degrees, experienced in the design of the 13 small and medium-sized public squares. The following section discusses important physical properties, including the size and scale of the spaces, the existence of fences and gates and the provision of seats and their impact on the performance of these public squares.

5.3.2 The metric size of public squares

The first physical property that stands out is the scale of public space in China. Even small and medium-sized public squares in China are much larger than their Western counterparts.

The total area of the 13 squares studied has a mean value of 12,000 m^2, which is roughly the size of Trafalgar Square. According to many authors (Sitte, 1889; Lynch, 1971; Gehl, 1987; Alexander et al., 1977), this far exceeds the optimum size for a civic square. Four of the case studies (Chen Academy Square, Huangang Square, Shangsha Big Square and Xiasha Square) have an area that far exceeds the size of the Trafalgar Square, peaking at 3.2 hectares for Xiasha Village Square.

Despite this large scale, according to statistics, each urban resident of major cities in China has about one-tenth the amount of public space of a person in Western cities (Pu, 2001). For example, Shanghai has only 0.77 m^2 green space per capita, whereas this is 19.20 m^2 per capita in New York and 22.80 m^2 per capita in Paris. Therefore, the extreme scale of public squares in China implies that public open spaces in China are centralised into large nodal spaces, while there is an overall chronic lack of open space.

SQUARE NAME	Total Area	Paved Area	Mean Number of Users	MPA
Theatre Square	5,112	3,058	89.2	34.3
Bridge Square	3,017	2,756	18.7	147.6
Chen Academy	35,931	12,769	110.5	115.6
Renwei Temple	4,261	3,571	32.7	109.3
Liwan Lake Square	9,702	6,180	124.8	49.5
People Park Square	19,897	10,680	156.7	68.2
Dongmen Square	5,791	5,471	78.2	70.0
King Plaza	10,557	7,670	76.7	100.0
Tianmian Square	5,270	3,768	88.7	42.5
Huangang Square	14,923	12,442	173.5	71.7
Shangsha Big Square	8,352	5,371	199.2	27.0
Shangsha Small Square	1,529	1,169	86.7	13.5
Xiasha Square	32,040	15,592	139.7	111.6
Note: total and paved area were calculated using cad file.				

Fig. 5.26: Mean Personal Area excluding vegetation, water and building footprints

One indicator, which can be used to examine the performance of a square, is the "mean use density" or the "mean personal area" (MPA). MPA is calculated by dividing the paved (usable) area by the mean number of users. This indicator shows how much room a person on average has in public space. In this regard, Alexander et al. (1977) in their study of public squares in the North America found that good squares offer a MPA between 14 and 28 m^2. This implies that if the MPA is lower than 14 m^2 people might feel too crowded, and if it exceeds 28 m^2 people might feel unwelcome (Alexander el al., 1977).

Using MPA as an indicator for the efficiency of open space, even when considering only the paved area, Shangsha Big Square has a Mean Personal Area between 14 and 28 m^2. In contrast, Shangsha Mini Square with a MPA of 13.5 m^2 appears crowded most of the time. Nevertheless, all 11 remaining public squares offer plenty of room for each individual and four squares offer more than 100 m^2 for each user. In other words, most of the squares attract a relative small number of users in relation to their sizes. They are in fact not used effectively on a daily basis.5.3.3 The Existence of Fences and Gates

Fig. 5.27: Edge conditions of many public squares in Shenzhen and Guangzhou

The next striking physical property is the existence of gates and fences in many of the case studies. All 13 public squares studied have gates or gate-like settings except for King Plaza, Dongmen Square, Huanggang Village Square and Bridge Square. Fences and gates can be interpreted as the continuity of a Chinese architectural tradition that links with the feng-shui ideology (Kiang, 1999; Needham, 1962; V. F. Sit, 2010; Xu, 2000). Open "public" spaces in pre-modern China such as temple grounds, literati gardens or urban parks that developed in the 19th century under Western influence were always fenced and gated. Before the 2000s, to enter urban parks in China, people had to buy a ticket, and in the early of the 19th century this cost about half the day's wage of a working class person (Shi, 1998).

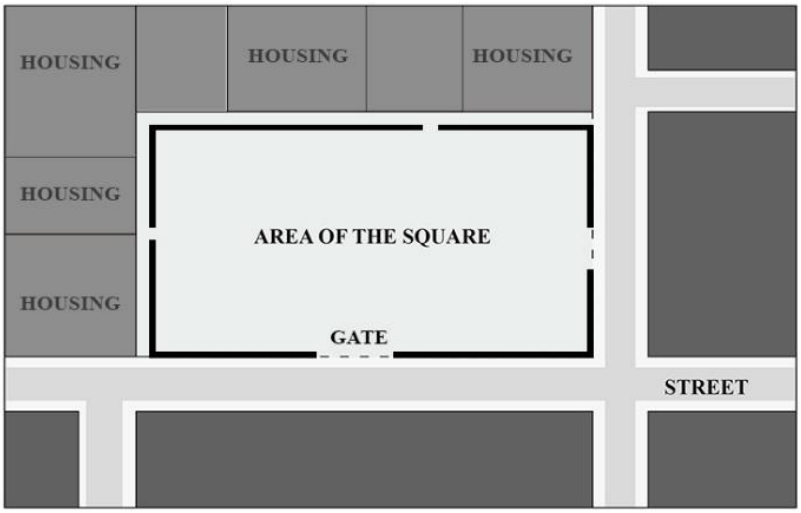


Fig. 5.28: Diagram of edge conditions of public squares in China

As Fig. 5.28 shows, with fences, buildings adjacent to public squares might not be seen as a continuous part of public space. With limited connection between the public space and surrounding buildings, these buildings are often residential and private. Thus, the function of Chinese public squares to a large extent seems to be independent of the function and architecture of the surrounding buildings.

The existence of fences and their impact on the use of public space (including the levels and distribution of static usage) in China are examined next.

The Impact of fences and gates on levels of usage

Do gated and fenced public space attract fewer users than open ones in the Chinese context? The data from the case studies shows no negative impact of gates and fences on the number of users when compared with open squares. With an average mean use density of 0.015 people/m^2, all four “open” public squares have a mean use density below the average.

The fact that gated and fenced public squares fail to attract fewer users than open ones, is possibly due to the extreme scarcity of open space and limited access to indoor recreational

spaces in Guangzhou and Shenzhen.[16] In addition, gated and fenced squares in China could make people feel safe given the presence of guards and the collective use of public space.

Name	Total Area m^2	Total Users	Mean Users	Mean Use Density people/m^2
Theatre Square (open)	5,112	535	89.2	0.017
Bridge Square (open)	3,017	112	18.7	0.006
Chen Academy	35,931	663	110.5	0.003
Renwei Temple	4,261	196	32.7	0.008
Liwan Lake Square	9,702	749	124.8	0.013
People Park Square	19,897	940	156.7	0.008
Dongmen Square (open)	5,791	469	78.2	0.013
King Plaza (open)	10,557	460	76.7	0.007
Tianmian Square	5,270	532	88.7	0.017
Huangang Square	14,923	1,041	173.5	0.012
Shangsha Big Square	8,352	1,195	199.2	0.024
Shangsha Small Square	1,529	520	86.7	0.057
Xiasha Square	32,040	838	139.7	0.004

Fig. 5.29: Mean Use Density of fenced and unfenced squares

While the existence of fences might not affect the levels of usage, it appears to affect the spatial behaviour of the users. In the four "open" spaces, certain activities such as "playing chess/cards", "singing" and "sewing" are virtually absent, whereas they frequently occur in fenced spaces. Fenced spaces that are visually cut off from the surroundings might liberate people from the "public gaze", thus encouraging them to engage in activities that they would not do in highly exposed spaces (Stevens, 2007).[17]

[16] According to statistics, only three percent of the elderly have access to indoor recreational facilities (Ministry of Civil Affairs, 2013)

[17] Stevens (2007) observed that the edges or secluded places invite people to play and experiment with new things as they liberate them from the fear of being judged by other people.

The impact of fences on the distribution of static use

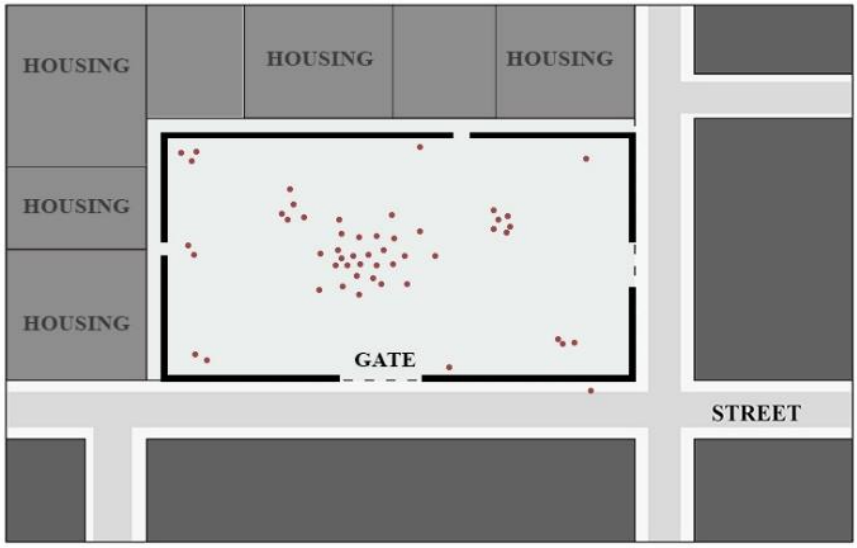


Fig. 5.30: The distribution of static users inside public squares in China

Given the existence of fences and gates, adjacent buildings are largely separated from public space, offering no more than shade to the space. Consequently, people are not attracted to the edges In contrast, as there are many eye-catching activities occurring inside the squares such as playing with small children, exercising, dancing, and singing, people tend to locate themselves towards the centre of the space. The case of King Plaza, an open square, shows this trend. Although seats are provided along the edges of the square (see Fig. 5.30), these seats are far less used than those in the centre of the space.

Fig. 5.31: Underused seats at the edges of King Plaza

Chapter six further investigates the Chinese location preferences in open spaces by examining the visual logic of the distribution of different people and activities. However, it seems to be clear that the edges are not the most preferred location in open public space in Guangzhou and Shenzhen. The next section examines the provision and use of seats.

5.3.4 The provision of seats

In order to keep people in public space, the provision and location of seats is crucially important. A good square provides not only a sufficient numbers of seats, but also has a good distribution of sitting places. Chapter seven examines in depth whether the observed distribution of seats is aligned with the location preferences of the Chinese. This chapter limits the investigation to the provision of seats. Three indicators are used to assess the provision of seats: the number of seats in relation to the size of the square; opportunity for sitting-the number of seats in relation to the number of the actual users; and the proportion of linear to grouped-seats.

It is important to note that only integral and explicit seats were counted. Integral seats can be low steps or low walls but they should be not higher than an explicit seat (50 cm), so that users can sit comfortably.

The number of seats in relation to the size of small and medium-sized public squares

The number of designated seats counted in each public space is documented in Fig. 5.32. The number of integral seats, for example a low retaining wall around a tree, is counted by the number of widths of 60 cm, as this counts as a single seat.

According to the data, the number of designated seats varies greatly from 37 in Bridge Square to 942 in People Park Front Square. On average the number of integral seats is about five times more than that of explicit seats.

SQUARE NAME	TOTAL AREA M^2	INTERGRAL SEATS	EXPLICIT SEATS	ALL SEATS	M^2 OF SQUARE PER SEAT
Theatre Square	5,112	183	216	399	12.8
Bridge Square	3,017	0	37	37	81.5
Chen Academy	35,931	178	18	196	183.3
Renwei Temple	4,261	156	0	156	27.3
Liwan Lake Square	9,702	104	120	224	43.3
People Park Square	19,897	942	0	942	21.1
Dongmen Square	5,791	278	16	294	19.7
King Plaza	10,557	126	66	192	55.0
Tianmian Square	5,270	106	48	154	34.2
Huangang Square	14,923	306	30	336	44.4
Shangsha Big Square	8,352	242	153	395	21.1
Shangsha Small Square	1,529	169	40	209	7.3
Xiasha Square	32,040	199	44	243	131.9
Mean Number	12,039	230	61	291	52.5

Fig. 5.32: The provision of seats

Big squares tend to have more seats than smaller ones, thus the absolute number of seats might not reveal the quality of the space. Hence, the ratio of seats to the area of the square is more frequently used for assessment.

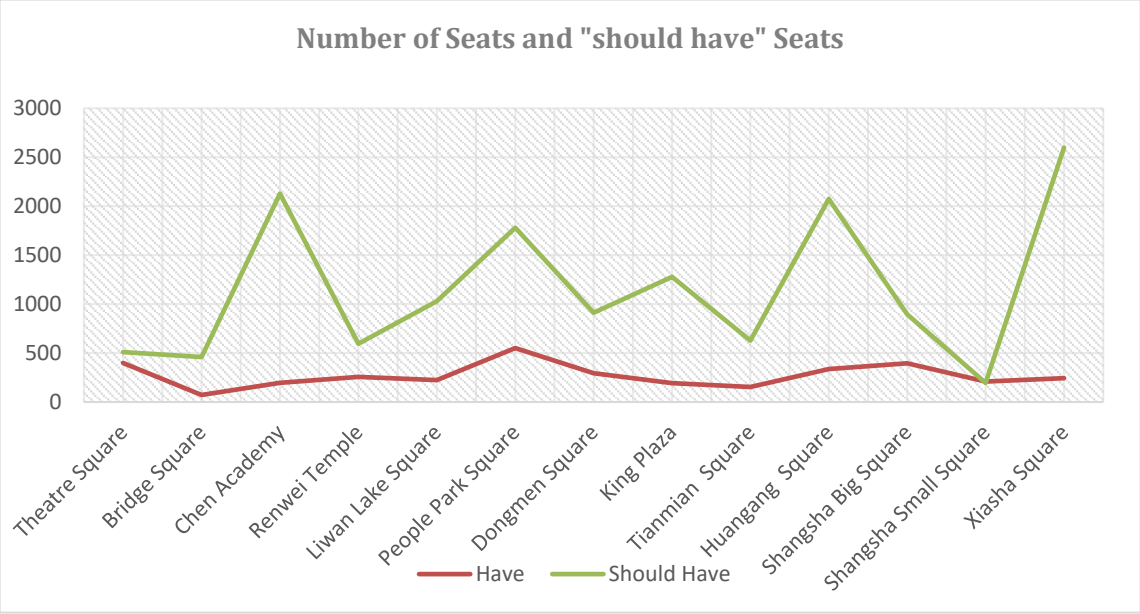


Fig. 5.33: Number of seats (red line) versus number of "should have" seats (green line)

Project of Public Space (PPS) suggests a seat for every 6 m^2 of the open space. However, only Shangsha Small Square nearly meets this standard. It is followed by Theatre Square, Renwei

Temple Square and Shangsha Big Square with one seat per 13 m^2, 17 m^2 and 21 m^2 respectively, whereas the overall ratio of the 13 squares is about one seat per 50 m^2. This means that the mean provision of seats in public squares and urban plazas in Guangzhou and Shenzhen is about eight times lower than it should be.

Opportunity for sitting offered by 13 public squares

The second indicator is the number of seats in relation to the number of static users at peak time and at any given moment (mean value). From the data on the 13 squares, the mean number of sitting opportunities at any given time is about 3.[18] Nevertheless, five squares (Liwan Lake, Xiasha, Tianmian, Huanggang and Chen Academy) out of the 13 examined offer a choice of less than 2 places to sit (see Fig. 5.34).

The lack of seats becomes more obvious at peak time (see Fig. 5.34), since seven out of the 13 squares offer a choice of between 0.9 and 1.3. This means the total number of seats is less than or just about equal to the total number of static users. As a result, in many squares (Xiasha Village Square, Shangsha Small Square, Liwan Lake Square, Renwei Temple and Chen Academy), the percentage of people who have to sit informally on anything possible is high, ranging from 43 % on average to above 82 % at peak time.

The issue of informal seating is partly a direct result of poor provision, but might also be a consequence of a bad distribution of sitting places. If seats are places where people do not want to sit, they are likely to be underused. Chapter six will explore in depth the issue of optimising the distribution of seats.

[18] Each seat is defined as 60 cm in width.

Name of Square	Sitting Opportunities	Sitting Opportunities during Peak-period	Ratio Informal Seats to the total No of Sitting Users during Peak-period
Theatre Square	Good 4.5	Good 2.5	Good 5%
Bridge Square	Good 3.9	Medium 2.1	Medium 19%
Chen Academy	Bad 1.8	Medium 1.2	Bad 54%
Renwei Temple	Good 7.8	Good 4.9	Bad 82%
Liwan Lake Square	Bad 1.8	Bad 0.9	Bad 46%
People Park Square	Medium 3.5	Medium 2.1	Medium 25%
Dongmen Square	Good 3.8	Medium 1.9	Good 5%
King Plaza	Medium 2.5	Medium 1.9	Good 14%
Tianmian Square	Bad 1.7	Bad 1.0	Medium 20%
Huangang Square	Bad 1.9	Bad 1.2	Medium 30%
Shangsha Big Square	Medium 2.0	Bad 1.1	Good 18%
Shangsha Small Square	Medium 2.4	Bad 1.1	Bad 63%
Xiasha Square	Bad 1.7	Bad 1.3	Bad 43%

Fig. 5.34: The impact of available seats on percentage of informal sitting

The Proportion of group-seats versus linear seats

The third indicator for evaluating the provision of seats is the proportion of group-seats to linear seats. Group-seats are defined as those which support face-to-face conversation for a group of more than three people. This indicator might not be relevant in other contexts where individuals or couples are the main users, but would seem important in China where public spaces are often used collectively.

Despite the high percentage of group-users, the data from the 13 squares demonstrates the importance of group-seats might not be recognised. Fig. 5.25 shows that seven out of the 13 squares offer no grouped seating opportunities. Only Shangsha Big Square has more group-seats than linear ones.[19] Nevertheless, the overall proportion of group-seats is less than 10 % of the total number of seats provided.

[19] The majority of grouped seats in this case are provided along a narrow corridor. They are not explicit grouped seats.

Because of the lack of group-seats, three or four people might have to squeeze themselves to fit into a double bench. Some of them bring light, foldable chairs. These movable chairs are effective in forming group-seats with the existing linear ones.

Name	Linear Seats	Group-seats	Total Seats
Theatre Square	379	20	399
Bridge Square	72	0	72
Chen Academy	196	0	196
Renwei Temple	256	0	256
Liwan Lake Square	197	27	224
People Park Square	551	0	551
Dongmen Square	294	0	294
King Plaza	176	16	192
Tianmian Square	154	0	154
Huangang Square	306	30	336
Shangsha Big Square	209	186	395
Shangsha Small Square	209	0	209
Xiasha Square	217	26	243

Fig. 5.35: The proportion of group-seats to total available seats

In summary, regarding design aspirations, both Western and Chinese design principles seem to influence the design of small and medium-sized public squares. However, when considering the physical properties of these spaces, the data suggests that small and medium-sized public squares in Southern China are much larger and seem to provide fewer sitting opportunities than their Western counterparts.

In particular, by relating the size of the space to the number of users, small and medium-sized public squares in China were not observed to be used effectively on a daily basis. Given the limitation of the catchment of each public space, the 13 public squares offer each user a mean personal area of 50 m^2 which far exceeds the standard suggested by Alexander el al. (1977) (14 to 28 m^2 per head). In spite of this, the number of seats is much lower than it should be. In addition, this section shows that the existence of fences and gates does not affect the levels of usage, but might affect the diversity of activities and the distribution of static users.

The next section evaluates the performance of the 13 case studies and conducts a comparison between those in new and old urban areas.

5.4 Evaluation and Comparison of the Performance of 13 Small and Medium-sized Public Squares

5.4.1 Criteria for evaluation of functional dimension of public squares

Any evaluation involves a degree of subjectivity in terms of the selection of evaluation criteria. The literature review chapter discussed the different post-evaluation criteria proposed by Gehl, Marcus & Francis and others that are all qualitative in nature (chapter 3, section 3.3 and 3.4). These evaluations often require an assessment of human feeling and perception. In contrast, within this thesis, the evaluation criteria are quantitative in that they are measurable.

The three main evaluation criteria of diversity, vitality and provision of seats are used reveal the relationship between the level of usage and the physical and spatial properties of the square. Each main criterion has 12 sub-criteria as shown in Fig. 5.16. Each sub-criterion receives from zero to two points according to the level of performance (two points for good, one for medium and zero for bad). Consequently, the maximum performance score is 2 x 12 sub-categories = 24 points. These criteria are further explained in detail.

Diversity				**Vitality**				**Provision of Seats**			
Types of Activity	**Balance of Activity Types**	**Balance Working -Aged| Elderly**	**Balance Group Sizes**	**Level of Usage**	**Mean Personal Area- Peak use**	**Mean Personal Area**	**Use of Centre**	**Area per seat**	**% Group-seats**	**Choice of seat**	**Choice of seat at peak use**
2	2	2	2	2	2	2	2	2	2	2	2
Note: 12 criteria were examined. Regarding each criterion, two points were given to high quality, zero for low quality and one point for quality in between. The evaluation was based on the results of previous investigations and direct observation of how the sites worked.											

Fig. 5.36: Evaluation criteria for functional dimensions of public squares

Diversity

In contrast to vitality, diversity concerns the balance of different activities and user groups. A good space should invite a wider range of activities and user types rather than being used dominantly by one group at the expense of others, although this is related to time of day. The degree of diversity might be interlinked with the degree of publicness of the space.

Vitality

Montgomery, who was inspired by Jane Jacobs's writing, suggests that vitality and diversity are two fundamental qualities of public places (Montgomery, 1998). Vitality in a narrow sense means the level of usage or how many people are using a space at a given time. It can be expressed through the degree of crowdedness that is revealed by the mean personal area (MPA). The MPA at peak period and the mean MPA of the whole day are used as two sub-criteria for vitality. The remaining sub-criterion for vitality is borrowed from Gehl et al. (2006), namely the degree of occupation of the centre of the space. According to their experiment, with a similar number of users, a square seems more vital if people gather at the centre of the space rather than staying at the edges (Gehl et al., 2006).

The provision of seats

William Whyte asserted that sitting places should be considered one of the most important factors for the success of public space (Whyte, 1980, 1988). The evaluation here however is limited to the provision of seats, as their distribution will be examined in chapter seven.

In this regard, the Project of Public Space (Miles, Cook, & Robert, 1978) provides the benchmark of a linear seat per square metre of paved space (based on their study of the New York City). However, the 13 case studies are only rated in relation to each other rather than being measured against the PPS standard. The second sub-criterion is relevant to the Chinese context, as it concerns the level of group-seats. Ideally a public square in China should address the issue of big groups of the elderly, who are the majority of public square users. The two remaining sub-criteria concern the choice of seats at any given time during the day and at peak time.

With these criteria, the evaluation results are described below.

5.4.2 Interpretation of the evaluation result

Using the criteria to assess the performance of the 13 case studies, the two squares that score the best are Theatre Square and Shangsha Big Square, each with 15 points out of the maximum 24 points. In contrast, the three squares that score the least are Huanggang, Chen Academy and Xiasha Square with 8, 7 and 5 points, respectively. The remaining eight squares are positioned in between. Four are ranked equally with 12 points (see Fig. 5.37).

Name of Squares	Diversity				Vitality				Provision of Seats				Total Scores
	Types of Activity	Balance Activity Types	Balance Young Old	Balance Group Sizes	Level of Usage	Mean Personal Area- Peak	Mean Personal Area	Occupation of Centre	One Seat for How many m2	Grouped Seats %	Choice of seat	Choice of seat at Peak	
Theatre Square					89.2	19.4	34.3		13	5	4.5	2.5	15
Shangsha Big Square					199	15.9	27		21	47	2.0	1.1	15
Bridge Square					18.7	78.7	147.6		42	0	3.9	2.1	12
People Park Square					156.7	41.1	68.2		36	4	3.5	2.1	12
Dongmen Square					78.2	35.8	70		20	0	3.8	1.9	12
Tianmian Square					88.7	24	42.5		34	0	1.7	1.0	12
Renwei Temple					32.7	68.7	109.3		17	0	7.8	4.9	11
King Plaza					76.7	77.5	100		55	8	2.5	1.9	10
Liwan Lake Square					124.8	25.3	49.5		43	12	1.8	0.9	10
Shangsha Small Square					86.7	5.9	13.5		7	0	2.4	1.1	9
Huangang Square					173.5	44.4	71.7		44	9	1.9	1.2	8
Chen Academy					110.5	76.9	115.6		183	0	1.8	1.2	7
Xiasha Square					139.7	83.4	111.6		132	11	1.7	1.3	5

HIGH MEDIUM LOW

Fig. 5.37: Evaluation of the functional dimension of 13 public squares

It should be noted that the three squares at the bottom of the evaluation (Chen Academy, Huanggang and Xiasha Village Squares) are the largest squares studied. The scattergram in Fig. 5.38 shows the relationship between paved area and the evaluation score of 13 squares.

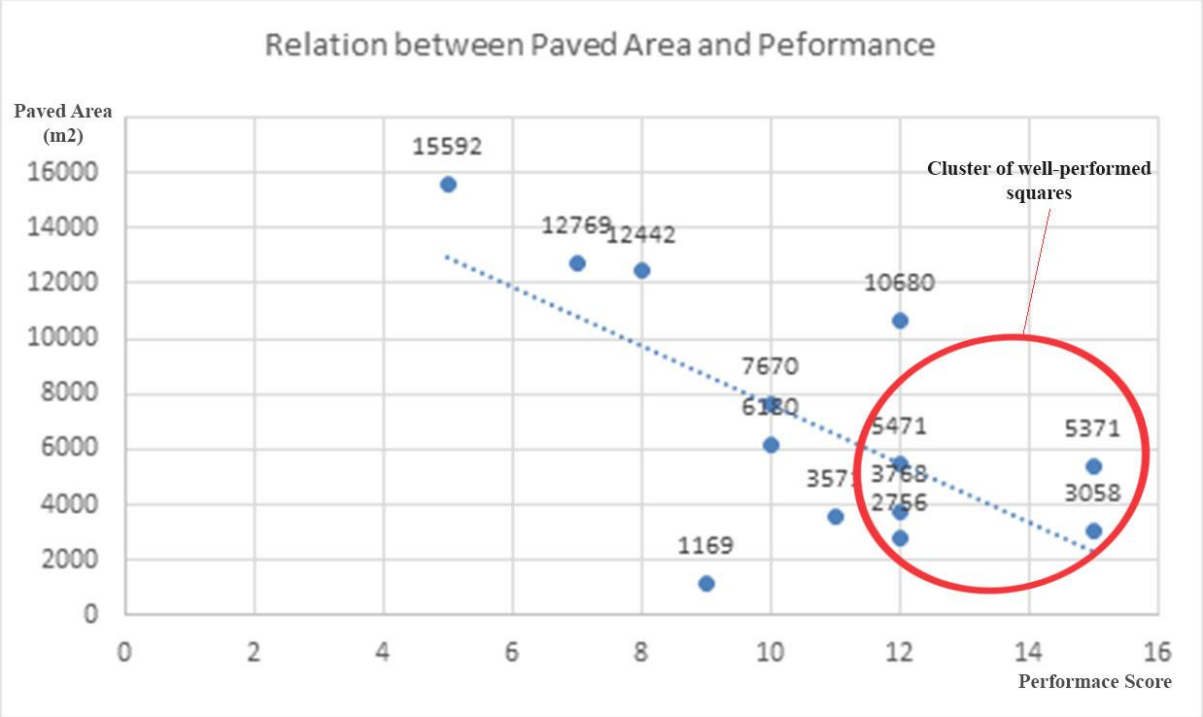


Fig. 5.38: Scattergram of performance scores (horizontal axis) against paved areas (vertical axis)

Although there is a great fluctuation among squares of less than one hectare, a linear correlation exists for those larger than one hectare. The scattergram illustrates that for squares larger than one hectare, the larger the space the poorer the performance. In addition, the five squares that score the highest have a paved area somewhere between 5,500 m^2 and nearly 3,000 m^2 with an average paved size of about 4,000 m^2.

5.4.3 Comparison between public squares in old city areas and in urban villages

Over the last three decades, Chinese cities have expanded rapidly, turning many rural villages into densely populated areas overnight (Brand & Nguyen, 2014; Hao et al., 2011). However, the lifestyles of villagers and urban dwellers might be significantly different. In addition, collective land ownership in urban villages and the presence of large numbers of migrant workers who seek cheap rental apartments might also be factors that make the use of public

space in urban villages different than those in older urban areas. This section aims to clarify these differences.

Comparison of use patterns

Regarding the use patterns, major differences between two areas are the percentage of children and the percentage of exercising, sitting and babysitting.

The Demographics of Public Space Users

LOCATION	SQUARE NAME	ELDERLY		WORKING AGE		CHILDREN	
		AB. NUMBER	%	AB. NUMBER	%	AB. NUMBER	%
OLD CITY AREA	**Theatre Square**	520	97	12	2	3	1
	Bridge Square	55	49	31	28	26	23
	Chen Academy	454	68	99	15	110	17
	Renwei Temple	142	72	49	25	5	3
	Liwan Lake Square	664	89	45	6	40	5
	People Park Square	524	56	358	38	58	6
	Dongmen Square	83	18	341	73	45	10
	King Plaza	195	42	223	48	42	9
	AVERAGE VALUE	**329.6**	**61**	**144.8**	**29**	**41.1**	**9**
URBAN VILLAGE	**Tianmian Square**	215	40	173	33	144	27
	Huangang Square	577	55	259	25	205	20
	Shangsha Big Square	536	45	283	24	376	31
	Shangsha Small Square	476	92	13	3	31	6
	Xiasha Square	481	57	115	14	242	29
	AVERAGE VALUE	**457**	**58**	**168.6**	**20**	**199.6**	**23**

Fig.5.39: Public space users in old city areas and urban villages

Regarding the demographics of public space users, a vast difference between old city areas and urban villages concerns the percentage of children users. While the number of children is 9 % of public space users in old urban areas, it is 23 % in urban villages.

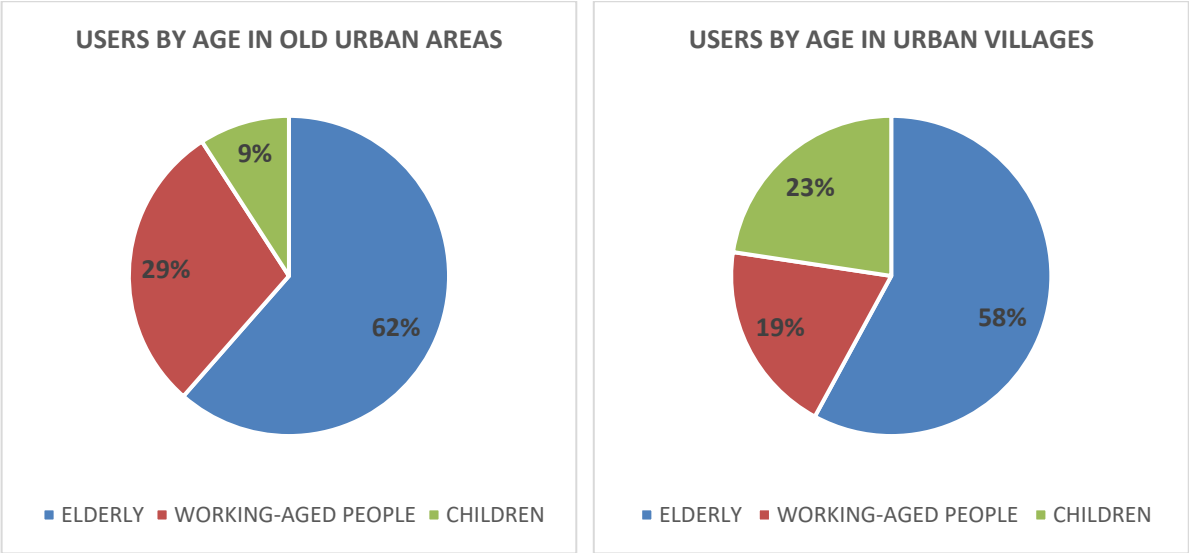


Fig. 5.40: Demographic structure of public space users in two urban areas

Cities like Shenzhen or Guangzhou are in fact focused destinations for working migrants, who account for about half the city's total population (Hao, 2010). The majority of migrant workers choose to stay in urban villages because of the low rents and the proximity to the city centre where their jobs are (Hao et al., 2011; Yuting Liu et al., 2010). Nevertheless, according to Chinese policy, their children might have restricted access to local public kindergartens and schools (Lin et al., 2011). Therefore, the new public squares would appear to function as a substitute for these public institutions.

Primary Activities

	SQUARE NAME	TOTAL NUMBER OF ADULTS	SITTING		STANDING		EXERCISING	
			AB. NUMBER	%	AB. NUMBER	%	AB. NUMBER	%
OLD CITY AREA	**Theatre Square**	532	178	33	64	12	290	55
	Bridge Square	86	58	67	28	33	-	0
	Chen Academy	553	259	47	167	30	127	23
	Renwei Temple	191	76	40	109	57	6	3
	Liwan Lake Square	709	245	35	221	31	243	34
	People Park Square	882	446	51	358	41	78	9
	Dongmen Square	424	257	61	167	39	-	0
	King Plaza	418	178	43	142	34	98	23
	AVERAGE VALUE	**474.38**	**212.13**	**47**	**157.00**	**35**	**140.33**	**18**
URBAN VILLAGE	**Tianmian Square**	388	216	56	159	41	13	3
	Huangang Square	836	555	66	189	23	92	11
	Shangsha Big Square	819	568	69	170	21	83	10
	Shangsha Small Square	489	352	72	118	24	19	4
	Xiasha Square	596	341	57	214	36	41	7
	AVERAGE VALUE	625.60	406.4	**64**	170	**29**	49.6	**7**

Fig.5.41: The difference in level of primary activities between two areas

Regarding primary activities, the percentage of those exercising in old urban areas (18 %) is nearly three times higher than that in urban villages (7 %). Generally, it appears that nearly two thirds of all activity in urban villages is sitting, whereas this is less than half in old urban areas (see Fig. 5.42).

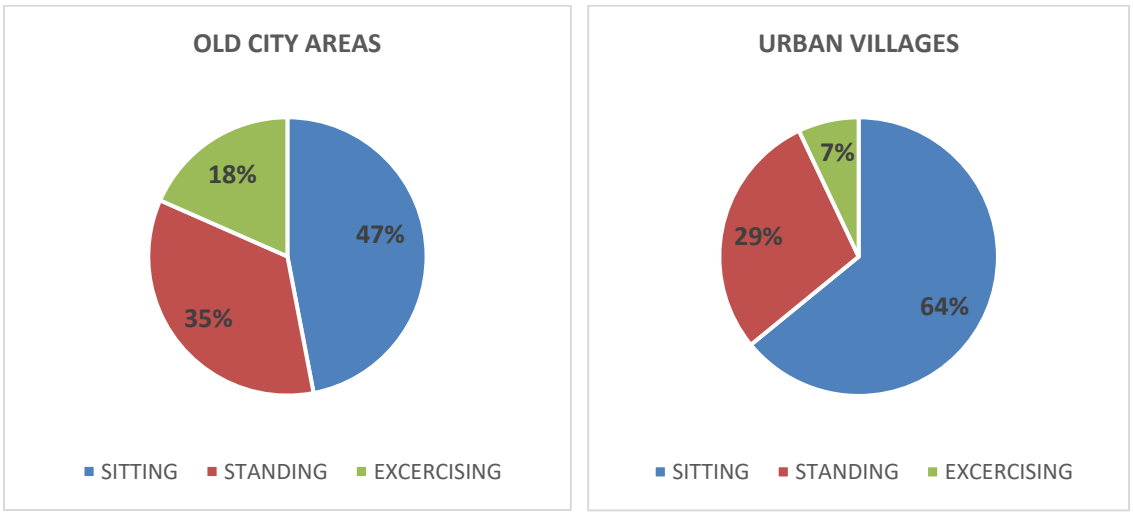


Fig. 5.42: Percentage breakdown of primary activities

Babysitting Activity

LOCATION	SQUARE NAME	TOTAL NUMBER OF USERS	BABYSITTING	
			AB. NUMBER	%
OLD CITY AREA	**Theatre Square**	535	9	2
	Bridge Square	112	52	46
	Chen Academy	663	239	36
	Renwei Temple	196	9	5
	Liwan Lake Square	749	85	11
	People Park Square	940	136	14
	Dongmen Square	469	90	19
	King Plaza	460	86	19
	AVERAGE VALUE			**19**
URBAN VILLAGE	**Tianmian Square**	532	296	56
	Huangang Square	1,041	413	40
	Shangsha Big Square	1,195	803	67
	Shangsha Small Square	520	61	12
	Xiasha Square	838	483	58
	AVERAGE VALUE			**46**

Fig. 5.43: Percentages of babysitting activity

When examining the babysitting activity separately, a significant difference appears. Nearly half of all activity in public space in urban villages is babysitting, whereas it is less than 20 % of all static activity recorded in old city areas. This significant difference might remain unless there is new regulation that allows migrants' children to access public kindergartens in urban villages.

Comparison of physical patterns

Regarding the physical features, public squares in urban villages at first sight differ from the other examples because they include traditional elements such as ancestral halls, open stages and a Chinese Grand Gate. In addition, many public squares in urban villages are adjacent to several sports fields. Furthermore, the underground levels of public squares in urban villages

are often used as car parks. Hence, all village communal functions seem to be centralised inside and around these public squares.

In some old parts of Guangzhou and Shenzhen, the fences and gates of public space have been gradually removed over the last decade; however, newly developed squares in urban villages still have these elements as well as a number of guards watching the spaces most of the time.

Last, public squares in old city areas tend to have larger areas for vegetation and more big trees, which is rarely the case in urban villages, possibly because of the underground parking levels. Many squares in urban villages seem to be much larger than the average size of those in old city areas; hence many of them might appear deserted and unwelcome to potential users.

In short, this section addresses the physical and social differences regarding the design and the use of public squares in urban villages and old city areas. The homogenisation process could gradually reduce the gap between two areas. However, at this stage, designers still need to be aware of these differences in order to create more user friendly public space.

5.4.4 Description of static use patterns of 13 small and medium-sized public squares

While the previous sections analyse and describe overall patterns across all 13 case studies, this section examines how each case study has been used on a daily basis. Activity maps and quantitative information for each case study are presented in Appendix 1.

Theatre Square

From the evaluation, Theatre Square is one of two spaces that perform the best. This space has a total area of 5,000 m^2 of which 60 % is paved. Theatre Square attracts an 90 people at any given time. It is a place dominantly occupied by the elderly playing different Chinese games or sports in groups of four to six people. It is also a meeting and performing place for a large

singing group. Unlike other places where exercising takes place mostly in the morning, in Theatre Square it happens all day until evening.

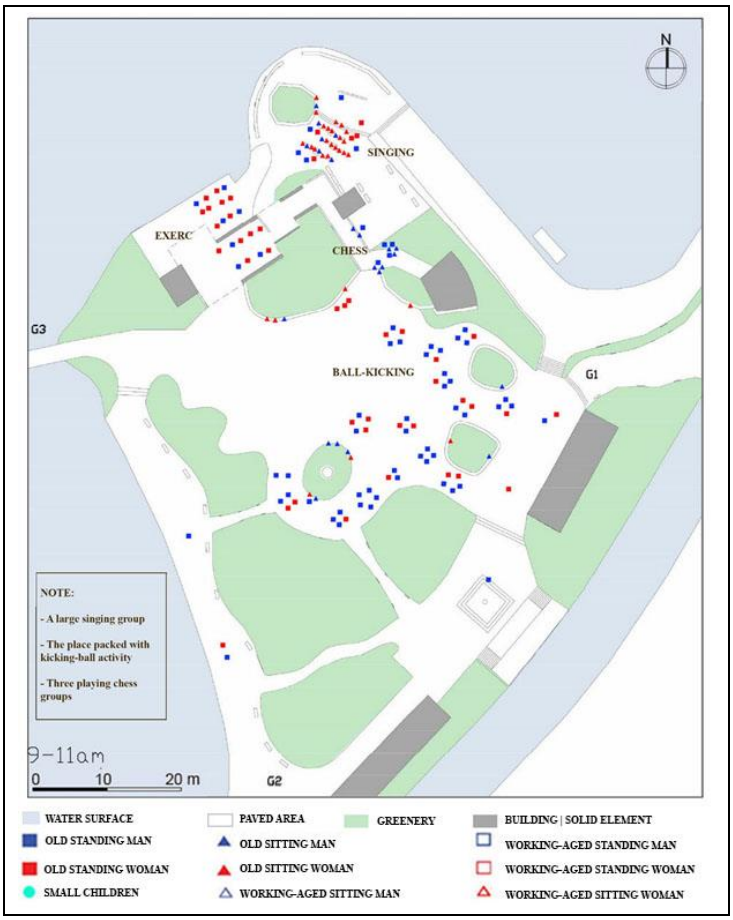


Fig. 5.44: Theatre Square-Activity map from 9am-11am

This square is virtually cut off from the vehicular movement network (see Fig. 4.3), and 97 % of its users are elderly. There are virtually no working-aged users or other activity groups here. For example, “babysitting”, the second most popular activity group in the samples studied, was not recorded here at all. Concerning the provision of seats, Theatre Square provides plenty of sitting opportunities for individuals as well as for groups. As a result, the percentage of people sitting informally is relatively low at only 5 % of all sitting people at peak time.

Overall, Theatre Square functions as a popular sports club for the elderly on a daily basis. Its human scale, natural setting and good provision of seats are the positive points of the space.

Bridge Square

Bridge Square is the second smallest square among the 13 samples with a paved area of only 2,700 m^2. Nevertheless, this square is ranked third in the evaluation. It is one of a small number of spaces that have a good balance of different age groups including the working-aged, elderly and children. Unlike other gated spaces, the most frequently occurring activities here are sitting, reading and simply relaxing. There is no sign of exercising or playing chess/cards. The openness of the space or its small scale might be the reason for the absence of these activities.

Fig. 5.45: Bridge Square typical scene

At first sight, the square provides a good number of seating places. However, when looking closer, many of those designated seats are far too high to sit on. Hence, at peak time, 19 % of users simply sit on the steps, leaving many of the designated benches empty.

Chen Academy Square

Despite the advantage of this space as a tourist destination in the centre of the old city of Guangzhou and the use of expensive materials, Chen Academy Square is one of the worst performing squares. Although this square attracts more users than others with a mean number of 110, its total size of about 3.5 hectares, three times larger than the average area of the 13 samples, makes the space seem empty during much of the day. As discussed above, the population density of Guangzhou and Shenzhen seems to be able to sustain the use of squares with a size of less than one hectare. However, if the size exceeds this benchmark, the larger the space, the worst its performance. In addition, the design of the edges of the square with

expansive lawn and other decorative elements make it less accessible and visible from the surrounding streets. Here, we observed a group of people in wheelchairs staying at the entrance to the space because there was no access for them to get into it.

Furthermore, users of the space appear to suffer from the lack of sitting places. The provision is about one seat per 180 m^2, far less than one seat every 6 m^2, the standard proposed by the Project of Public Space (Miles, Cook, & Robert, 1978). As a result, the availability of seats to users is low, varying around a mean value of 1.8.

Fig. 5.46: Chen Academy Square: Carved ground with a lack of seats

As a result, many people sit where they can on the ground or stones (see Fig. 5.46). The percentage of those who sit informally on non-designated seats at peak time is more than half all sitting people (54 %). In addition to the lack of seats, the space has a low degree of user diversity as the number of elderly users is more than four times that of the working-age.

Renwei Temple Square

Fig. 5.47: Renwei Temple Square: Strong identity but a lack of seats

The presence of a temple, an important religious institution, might influence the type of activity occurring here. There is virtually no sign of people playing chess/cards, exercising, babysitting or singing. The majority of activities are sitting, standing, praying and observing others.

The square provides a good number of seats in relation to its size, but the majority of sitting opportunities occur in secluded sub-spaces rather than in the main area. As a result, at peak times 82 % of sitting people were sitting uncomfortably on non-designated seats in order to have a better view of the whole area (see Fig. 5.47). Here, a designer could improve the situation by integrating more seats into the existing flower beds in the main area.

Liwan Lake Square

Liwan Lake Square is not an officially designated public square, but is part of the Liwan Lake Park and has a square-like setting characterised by a high percentage of paving. Being part of a park, this space is used heavily in the morning by large exercising groups. The number of users peaked at 9am to 11 am with nearly 250 people on site. However, in the afternoon, this place becomes much quieter and was dominantly used by a few large groups of elderly people playing chess/cards.

Similar to other secluded spaces, this space has a poor balance between the working-aged and the elderly as the working-aged users are only 6 % of the total. In addition, with only 12 % group seating, there is poor provision for playing chess/cards. As a result, many of those engaging in this activity (46 %) suffer from the lack of group-seats although plenty of linear seats were available. Fig. 5.48 illustrates how the space works from 7am to 7pm.

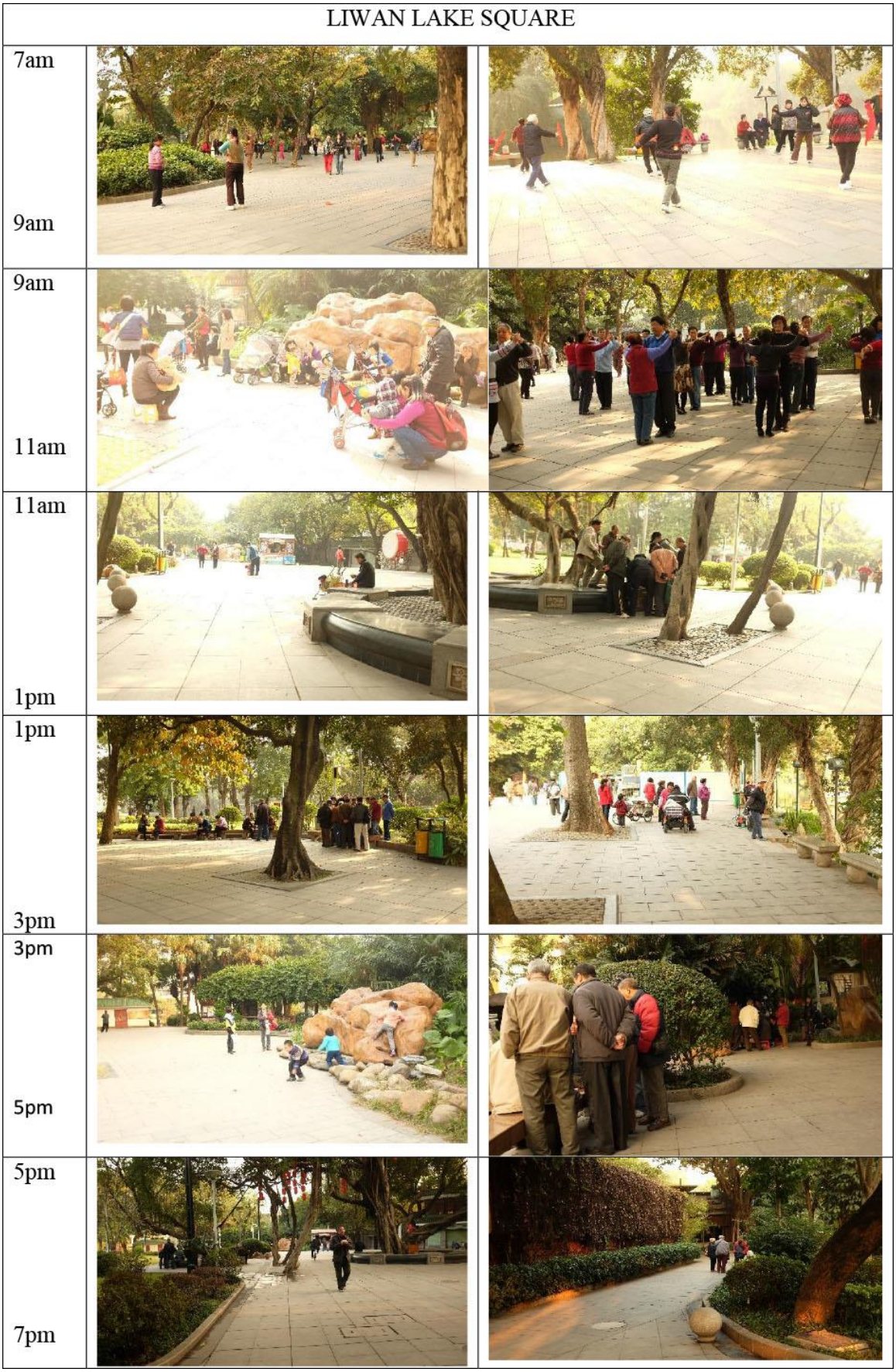


Fig. 5.48: Liwan Lake Square: Activity from 7am – 7pm

People Park Front Square

People Park Front Square is one of the largest squares in the sample of 13 with a paved area over one hectare. The square has recently been developed, being located in front of the first and very popular park in Guangzhou, the People Park. Sited at the heart of the old city, this space attracts a high number of users at all times with a mean number of 156.7. The centrality of the location and the proximity to metro lines and shopping areas might be the reason for a relatively high percentage of working-aged users (18 %) compared with other case studies.

Fig. 5.49: People Park Front Square – Centre of the square (right); Sub-space at rear (left)

Despite the dominance of people in big groups (70 %), only 4 % of seats support group-sitting being provided by the cafes at the entrance to the underground level. The majority of seats are integrated into flower beds in a linear manner that does not support face-to-face conversation. Hence, playing chess/cards, which is one of the most popular activities here, might be disadvantaged. Otherwise, people seem to enjoy to sitting close to the centre of the square to observe other people playing sports or simply passing through into the park. However, many small and secluded sub-spaces at the rear of the square are much less used. Increasing the visibility of these sub-spaces and allowing people from side streets to see through, might improve their use. People Park Front Square is the only big square ranked high in the evaluation with 12 points in total. This relatively good performance might be largely due to the centrality of the location, the proximity to public transport and the popularity of the adjacent park.

Dongmen Market Square

Dongmen Market Square differs from the other case studies as 73 % of its users are working-aged people. The reason for this significant difference might be linked to the commercial activity of the whole area. The noise of the space and the high density of pedestrian movement across the space could make it a less popular for the elderly and for relaxation purposes.

Fig. 5.50: Dongmen Square - quiet morning (left) and busy afternoon (right)

The temporal use pattern here is also different and is largely dictated by the adjacent commercial activities. The space seems quiet in the morning, whereas from 10 am until late evening it turns into an overcrowded place (see Fig. 5.50). Therefore, despite the high number of users in the afternoon, the mean number of users (about 80) is relatively low in comparison with other squares. In addition, like other open public squares, Dongmen Market Square is not a popular place for exercising, playing chess/cards or other group performances that might happen in a more enclosed environment. Over 60 % of static usage here is related to sitting.

The design of two raised platforms to be both integral seating and secure places for children to play is an innovative highlight of the space. Unlike many squares, here, seats are concentrated at the centre of the space and they are well-used. Given the absence of large group activities, the demand for group-seats was not obvious here. Therefore, the percentage of “informal” sitting is very low at only 5 %.

King Plaza

King Plaza has a relative low level of usage among the 13 case studies with a mean number of nearly 77 users at any given time.

Like other squares that are located in more centralised and commercialised areas, King Plaza attracts a higher number of working-aged users, 48 % compared to 42 % of elderly people. The percentage of working-aged users here is nearly twice the average figure for all case studies of 26 %. In addition, like other open and well-connected spaces, the percentages of individuals and people in pairs are also higher than those in more secluded spaces.

In the morning, King Plaza is a good place to watch people engaging in different types of exercising. One large group (of about 30 people) practiced Western dancing under the instruction of a working-aged woman. Furthermore, there were a good number of small groups doing tai-chi in traditional clothes. The square was then transformed into a place for small children playing in the afternoon as well as a place for people to rest comfortably at lunch time. There is no sign of playing cards or chess on the site. In the early evening, the action in the space was made by a group of ten handicapped musicians singing and dancing near a street intersection.

A negative aspect of the plaza is the poor provision of group-seats. At its peak use time about 14 % of sitting people, mostly people with small children, had to bring their own movable chairs or sit informally where possible. The placement of large tree pots at the edges of the Plaza also blocks the connection between the adjacent pedestrian movement and the inside of the space visually and physically. The benches along the edges of the space may be underused for this reason.

The centre of gravity of action in Chinese public squares and plazas seems to be at the centre of the space rather than at the edges as in their Western counterparts. Hence, sitting places that do not provide a good view of the action might be well less used.

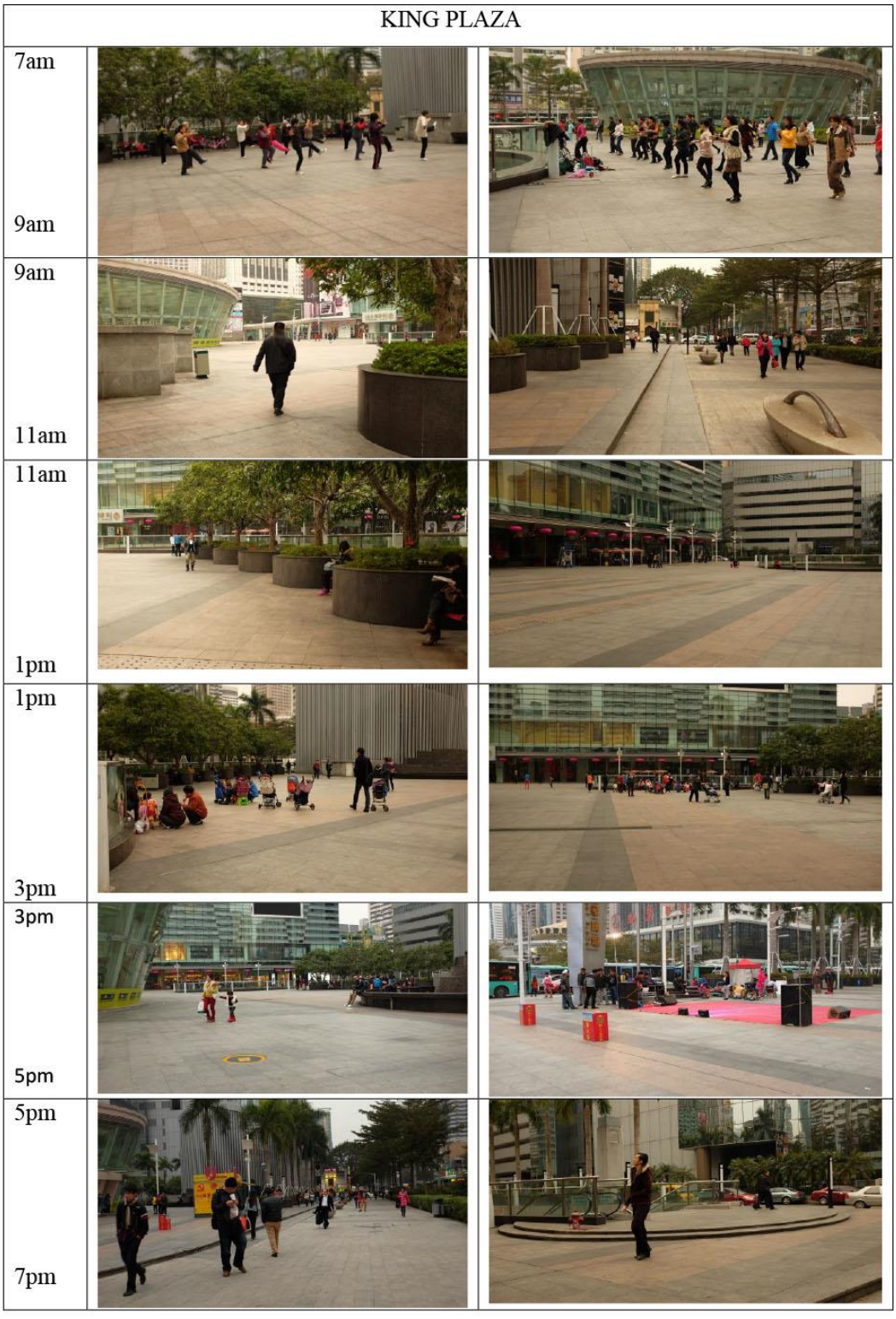


Fig. 5.51: King Plaza – Activities from 7am- 7pm

Tianmian Village Square

Situated at the heart of Tianmian Village, a vibrant district of Shenzhen city, Tianmian Village Square performs relatively well with a high degree of vitality and diversity. There is a good balance between different group users.

Fig. 5.52: Tianmian Village Square – An uneven distribution of static occupancy

Negative points of the space are the poor provision of seats, at one seat per 34 m^2. Consequently, at peak times the choice of seat is only about 1.0. It was observed that four and five people groups had to squeeze themselves to fit on a double bench. In addition, the distribution of seats might be also problematic. Figure 5.52 shows that plenty of seats are less used because they are placed at the other end of the square which is visually segregated from its centre where the majority of activities take place.

The case of Tianmian Village Square, along with King Plaza, strongly demonstrates the argument that the right distribution of seats could improve the use of the space without necessarily increasing the provision of seats.

Huanggang Village Square[20]

Huanggang Village Square is one of the three largest squares with a paved area of 1.2 hectares. It is also one of the three spaces that perform the worst.

[20] In this chapter, the area of Huanggang Village Square includes both the lower part and the higher part in front of the temple.

Huanggang Village Square attracts a high number of users during the day, with a mean of 170 users at any given time. However, despite its large size, the space is not effectively used. People clustered at the lower end of the square which is close to the sports field and the main entrance of the space, whereas the rest of the square was often left empty (see Fig. 5.53). There are more female users (50 %) than male users (30 %). This ratio might relate to the high percentage of babysitting activities that count for 40 % of the total.

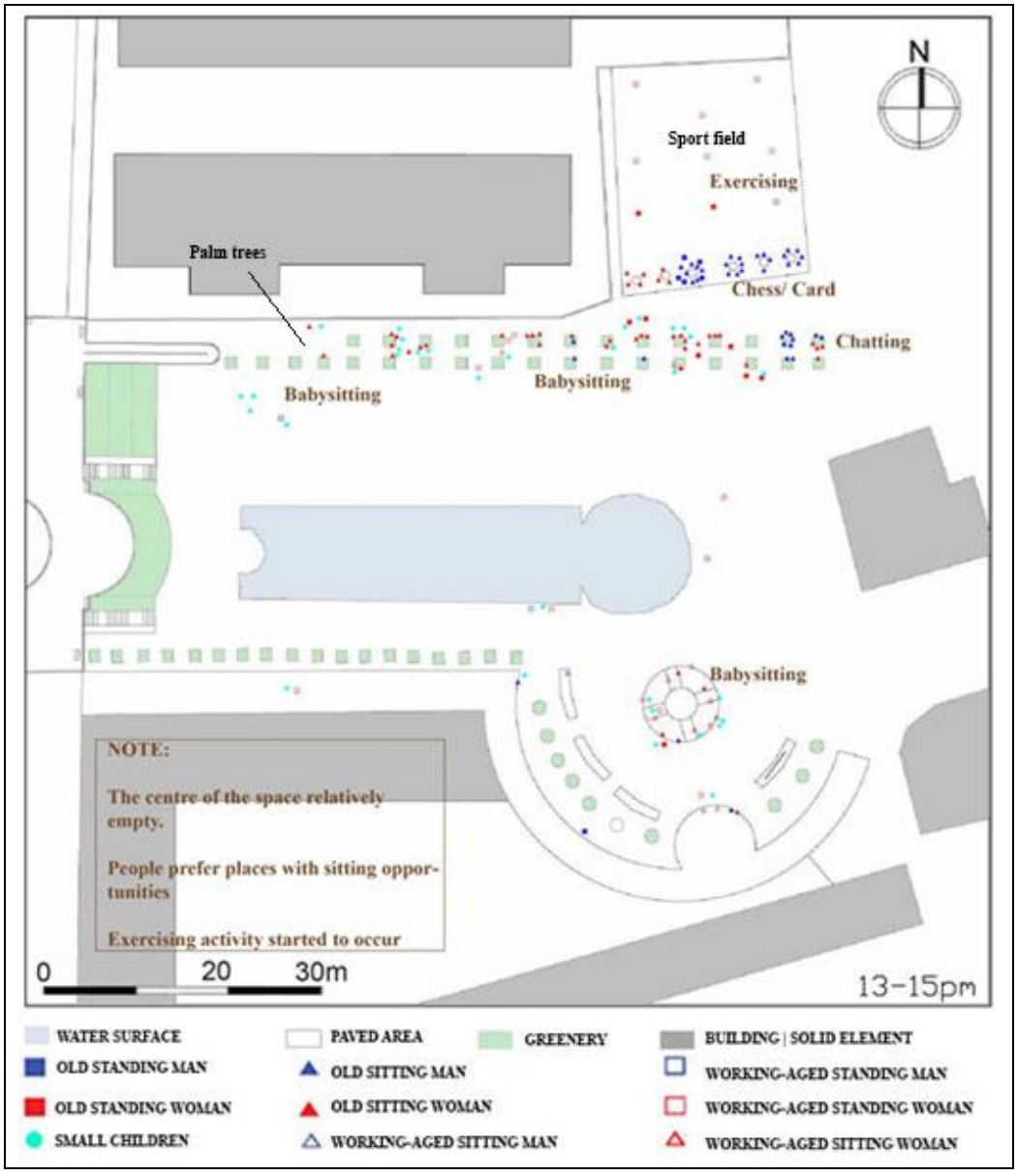


Fig. 5.53: Huanggang Village Square – Activity map from 13-15pm

Most of the seats are integrated into the pots of two rows of palm trees from which only those close to the sports field were heavily used. The large fountain only works as a show object that in fact makes the space seem unwelcome. The upper part of the square, the Temple Ground, is

visually disconnected with the main area located far away from the main pedestrian route, and is consequently less used for significant periods.

Shangsha Village Big Square

Among the five squares located in urban villages, Shangsha Big Square performs the best and is ranked at the top in the evaluation along with Theatre Square.

Shangsha Village Square attracts the highest number of users among all 13 case studies with a mean of 199 people at any given moment. Similar to other spaces in the urban villages, the percentage of children here is extremely high, at 31 % of all users. Consequently, “babysitting” makes up about two-thirds of total activities. However, the dominance of “babysitting” leaves less space for other activities. This square appears to be an open kindergarten most of the time.

A narrow, long open corridor (see Fig. 5.54) is the place where other activity groups such as the elderly play music, sew or simply relax. The narrowness of the corridor allows people to sit on two opposite sides and still have a good conversation.

Fig. 5.54: Shangsha Big Square – Kindergarten at the centre (left); Elderly club at the rear (right)

This square is composed of two parts. The northern part is divided into many spaces by the use of tree pots and expansive lawns, whereas the southern part is composed of two ancestral halls and an open stage. The majority of sitting places are integrated into the northern part, with only a few in the large southern part. The primary function of the southern part seems to be a place for occasional local events and festivals that require a spacious setting, which might not be suitable for everyday activities. The issue, here, is the concentration of many big structures

(open stage, sports fields, and ancestral halls) whose functions are occasional. Thus, for most of the time when these large facilities are not occupied, the space seems deserted and unwelcoming.

Shangsha Village Small Square

Shangsha Village Small Square is the smallest square in the 13 case studies with a paved area of 1,000 m^2 (nearly 15 times smaller than the biggest one, Xiasha Village Square). Nevertheless, this small square seems to perform far better than the other big squares. Shangsha Small Square attracts a mean 87 people at any given time, and has the highest mean use density among the 13 squares. At peak time, the space seemed to be overcrowded.

Being close to Shangsha Village Big Square, the uses of these two squares complement each other. The Big Square was dominantly occupied by "babysitting" activities, leaving little room for other activities groups. In contrast, 92 % of users of the Small Square are the elderly and most of them were engaged in playing chess/cards.

Although the provision of sitting opportunities here was the best among the 13 squares with one seat per 7 m^2 of paved area, this provision seems inadequate for the level of playing chess/cards activity. At peak times, the majority of users rely on movable chairs which they brought with them.

Apart from the lack of group-seats, the design of the square could provide valuable lessons. Its spatial design is simple and composed of a number of big trees that protect users from the sun. Most of the area is paved without expansive lawn to maximise the usable capacity of the space. The existence of low fences creates a sense of enclosure, but still maintains a good degree of visual connectivity with the surroundings.

SHANGSHA VILLAGE SMALL SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

Fig. 5.55: Shangsha Small Square: Activities from 7am-7pm

Xiasha Village Square

Xiasha Village Square is mentioned as one of the most successful examples of public space design in the redevelopment of urban villages in China (Hang, 2006). Indeed, the square has plenty of decorative elements including several statues such as a "mountain-pond" setting and a Chinese Grand Gate. There are also two sports fields, an open stage and three temples on site, and the underground level is used as car park. However, the performance of the space on a daily basis is problematic and the space is ranked at the bottom of the 13 cases with only five points in total.

Given the large size of the space and the high population density of Xiasha Village, this square attracts a relatively high number of users with a mean of 140 people. Nevertheless, this high number cannot make an area of 3.5 hectare look animated. Instead, the space looks deserted and unwelcoming.

The "unwelcome" feeling and a low degree of vitality is the result of poor provision of sitting places, with one seat per 132 m^2, nearly 20 times less than that of Shangsha Small Square. Suffering from the lack of seats, users including people with small children lean or sit where possible.

In addition, the space has a low degree of diversity regarding types of users and activities. Babysitting activities account for 60 % of the total, and playing chess/cards makes up most of the remaining. There was no sign of more cultural activities such as singing, playing music or exercising in beautiful clothes.

Among other squares in urban villages, Xiasha Village Square might suffer the most from the decision to design the space by prioritising occasional uses (which require large supportive structures including ancestral halls, sports fields and an open stage) at the expense of daily use patterns.

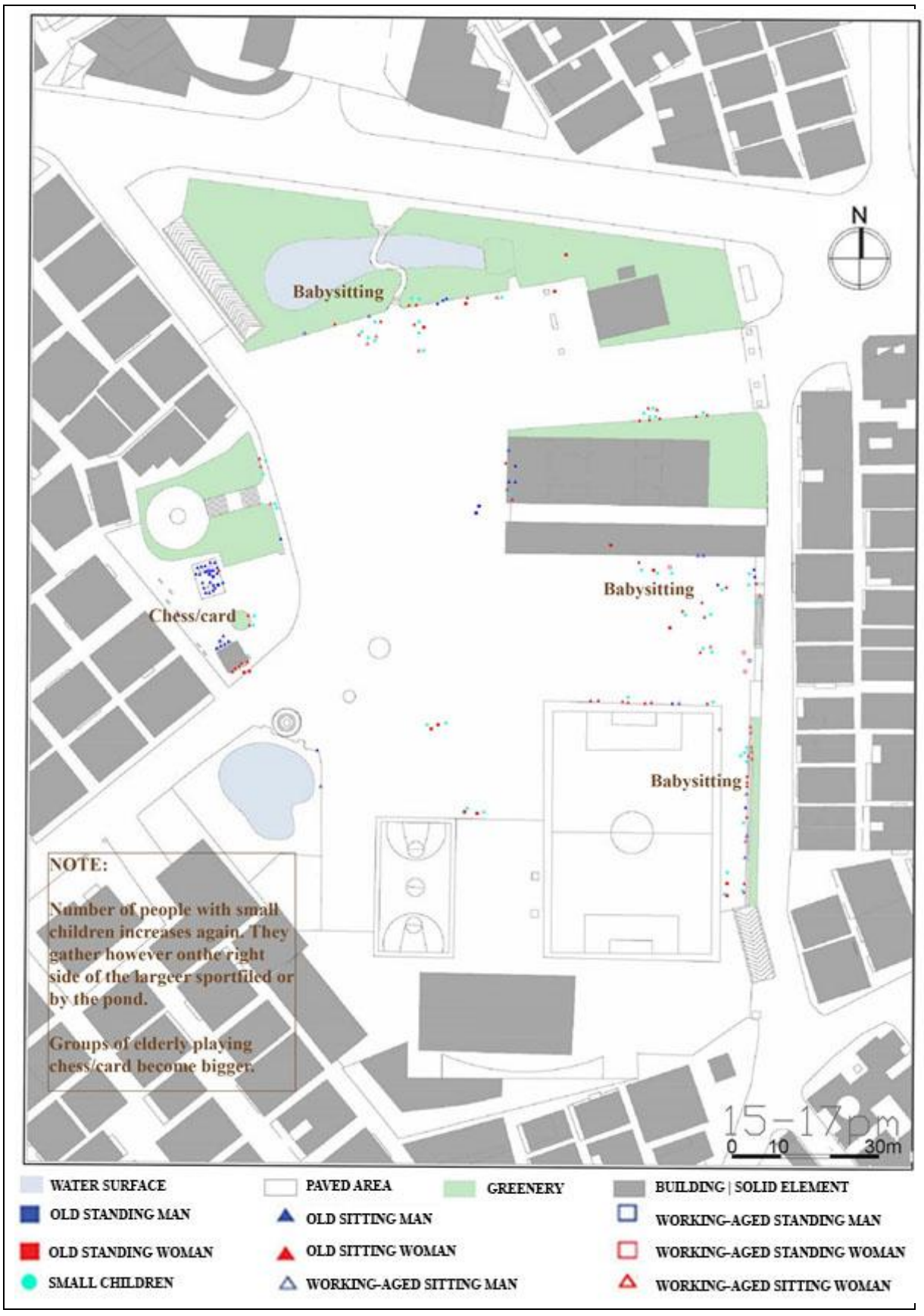


Fig. 5.56: Xiasha Village Square: Activity map from 15- 17pm

5.5 Discussion and Conclusion

5.5.1 Discussion

The findings about the static use patterns and their relationship with formal patterns of small and medium-sized public squares question the validity of some well-accepted assumptions in the existing literature about the use of contemporary public squares and urban plazas. These concern gender, types of activities, the impact of gates and fences and the size of the space.

Previous authors including Whyte and Gehl often suggest that the number of women and people in groups is an indicator for high quality space as women seem to be more sensitive to the environment than men. Similarly, when a group collectively selects a public space to go to in their spare time, this space can satisfy different users' needs at the same time. Whyte's and Gehl's observation might be correct for the West European and North American contexts, however, the investigation of 13 small and medium-sized public squares in China does not necessarily confirm this conclusion. Public squares in China are dominantly used by group users and by women regardless of their quality. This research suggests Chinese small and medium-sized public squares do not suffer the problem of being underused, but have a problem of a lower level of diversity during weekdays. There are virtually no teenagers and office workers and only a limited number of working-aged and individual users. It is uncertain whether the social structure of users remains the same at the weekends, but certainly the numbers of women and group users are not indicators of the quality of public space as in the West.

Existing literature in the West suggests that gated and fenced public spaces are likely to be underused, because users might feel unsafe inside them. Fences and gates separate users from the most intensive land-use attractions at the edges of a space, and from the adjacent pedestrians which otherwise provide an attractive view for public users. Therefore, in the Western context, having fences and gates can significantly decrease the levels of usage of public space.

However, in China, a similar phenomenon does not occur. Given the presence of guards and large user groups in most small and medium-sized public squares, users inside gated and fenced public space in China might not feel unsafe as in the West. Furthermore, the findings demonstrate that Chinese public space users are not necessarily attracted to adjacent pedestrians or uses. Instead, they are attracted by happens inside the space, and to activities such as exercising, babysitting or playing chess/cards. Comparing the mean use density of four open public squares with nine gated and fenced ones, no evidence suggesting that gates and fences negatively affect the levels of static usage was found. In contrast, fences and gates seem bring certain positive aspects to the use of the space. For example, in fenced and gated spaces, more types of activities tend to occur, whereas in open and legible environments, the majority of activities are only sitting, standing and a small amount of babysitting. As Quentin Stevens points out in his book "The Ludic City", environments which are visually cut off from the general public might create an atmosphere that invites people to "play", experiment and try new things without the fear of being judged by strangers. From this research, gated and fenced public space could produce a similar atmosphere. Nevertheless, the negative impact of gates and fences on the static use of public space is related to user-diversity. In open and more legible public squares, there are significantly higher percentages of working-aged users and individuals than in gated places. Some gated public squares are virtually only occupied by the elderly at 95 % of the total users.

Another widely discussed factor is the size of public squares. While theorists such as Alexander, Lynch and Pu believe smaller spaces are likely to perform better than large ones, empiricists such as William Whyte and Beatriz Campos have observed no relationship between the size of a space and its performance. In this regard, the findings in this chapter provide Chinese architects and policy makers a more concrete recommendation, by providing a range of "good" sizes. When relating the paved areas of the squares to their performance, the relationship of size to performance is not necessarily linear. For squares with a paved area of

less than one hectare, the performance fluctuates significantly. However, the data suggests that squares with paved areas of between 3,000 and 6,000 m^2 seem to perform the best. Importantly, when the paved area exceeds one hectare, the larger the space is, the worst the performance is even if this space is in a very busy location. Chen Academy, Huanggang and Xiasha Village Squares are cases in point. This indicates that Chinese cities that are characterised by high population density and an extreme lack of open space seem able to sustain the use of public squares with a maximum paved area of one hectare. These findings could be relevant as Chinese planners and policy makers often tend to make public squares as big as possible to display local prosperity and progress.

Beyond the impact of the spatial dimension, Chinese culture seems to have an impact on the low diversity of users and activities in public space. For example, it is widely reported that eating lunch forms nearly half of all activities in public squares and urban plazas in the West. Many of those eating lunch in public space are office workers from nearby (classified as working-aged group in this research). In contrast, the habit of eating lunch in public seems something new in China. As the Chinese are likely to prefer a hot meal for lunch, an indoor environment is likely to be prioritised over open public space. Consequently, this activity is virtually absent in small and medium-sized public squares, including the most centralised squares such as People Park Front Square and Dongmen Market Square.

In summary, many phenomena observed in the West were not found in China. Given the scarcity of open space and the limited access to indoor recreational and educational institutions for the elderly and migrant workers' children, small and medium-sized public squares in China are dominantly occupied by many necessary activities such as exercising and babysitting, whereas in the West, the use of public space has gradually become optional. Therefore, using principles generated for the design of the Western public space in China needs to be approached cautiously.

5.5.2 Conclusion

The major findings from using the direct observation method (behaviour mapping) to investigate the static use and design patterns of 13 small and medium-sized public squares in Guangzhou and Shenzhen, are summarised as follows:

Static use patterns on a daily basis

- Medium scale public squares are dominantly used by the elderly, especially in urban villages. However, there are virtually no teenagers and a very small number of office workers in public spaces on weekdays (7am-7pm).

- Most of the users were found in groups, two thirds of which were large, organised groups. In contrast, there was a very small percentage of individual users (16 %).

- Most typical activities recorded in public squares in China are sitting, standing, “exercising” including any kind of dancing or tai-chi, “babysitting”, “playing chess or cards” and “group-singing”. Many activities that are popular in the West such as “pedestrian-watching”, “eating lunch” or reading are not typical in China.

- “Exercising” and “babysitting” activities were often organised in big groups that tend to occupy spacious locations. They are in fact eye-catching spots for sitting people, and hence might affect the distribution of other user groups.

- The temporal use patterns are relatively evenly distributed over the day with two peaks in the morning at 10 am and in the afternoon at 4 pm, and are thus very different from the West. These time patterns might reflect the lifestyle of the elderly.

- The use of public squares in old and new urban areas in China is very different. Given the high percentage of migrants living in urban villages whose children have no legal right to enrol in public education institutions, public squares there seem to be used as a

substitute for kindergartens. In addition, public squares in urban villages are designed to serve particular locals thus they might be used more as communal rather than public space.

Typical physical patterns and their relationship to static use

- This chapter confirms the existence of the design trends for using Chinese Grand History and Western models. However, what might be considered as copying Western models is limited to the creation of an image or style without copying the functionality.

- The average size of the 13 cases is above one hectare which is equal to the size of Trafalgar Square, whereas the maximum size exceeds 3 hectares. By relating the levels of usage to the size of the space, it seems that small and medium-sized public squares are not being used effectively in China (in comparison with the existing data from Western literature). If the size exceeds one hectare, the larger the space is, the worst its performance. In contrast, squares with a paved area of between three and five thousand square metres perform the best (scoring best in the evaluation).

- No negative impact of fences and gates on the levels of usage of public squares was found. However, these might affect the diversity of activities and users. In open spaces without fences, activities such as playing chess/cards, exercising and singing are less frequently observed. The enclosed nature of fenced and gated squares might provide an environment that encourages certain types of activities. In contrast, in open spaces, there are more working-aged users and individuals present, whereas some enclosed spaces were dominantly occupied by only the elderly or one single type of activity.

- The provision of seats, especially group-seats is generally not sufficient in relation to the number of users of small and medium-sized public squares in Southern China. As

a result, the percentage of users engaged in “informal” sitting is very high in many cases.

This chapter has provided many insights into the design and static use of small and medium-sized public squares in China. Chapter six is an extension of this chapter as it investigates the visual logic behind the choice of locations in public space.

CHAPTER SIX

THE VISUAL LOGIC BEHIND LOCATION PREFERENCES IN SMALL AND MEDIUM-SIZED PUBLIC SQUARES

6.1 Introduction

6.1.1 Aim and scope

This chapter can be seen as an extension of chapter five as it focuses explicitly on one aspect of static occupancy, namely the location preferences or the distribution of different users and activities when the space is not crowded. The aim and scope of this chapter is linked to the second research sub-question:

> *What locations are preferred by different groups of Chinese public space users and what is the visual logic behind these preferences?*

In order to answer this question, this chapter relies on the overlapping of two sets of methods: direct observation (behaviour mapping) and space syntax visual analysis technique (visibility graph analysis). In addition, to investigate the visual impact of gates on the choice of location, the overlapping isovists of the gates is adopted. The detailed description of these three methods is presented in sections 4.3 and 4.4.

To date, there are no studies of location preferences in open public space in China. Hence, important information such as where babysitting, a popular activity in urban plazas in China, is likely to occur is unknown. In the West a preference for the edges of public space has been

documented (Gehl, 1987; Whyte, 1988). The provision of amenities in buildings bordering public space as edge attractors supplements Appleton's theory of prospects and refuges, which argues that edge preferences primarily exist for psychological comfort. People prefer to be in locations where their backs are well protected (refuges), while still having a good view of the surroundings (prospects) (Appleton, 1975, 1984). According to Appleton, the desire "to see without being seen" in public determines the use pattern of a preference for the edges over the centre of the space. Recent empirical studies have added another reason for the popularity of the edge as it provides a good location to watch pedestrians passing by, which is one of the most popular activities in public space in Western cities (Carmona, 2014; C. C. Marcus & Francis, 1997; Stevens, 2007; Whyte, 1980).

In China, the presence of large activity groups inside a public space and the existence of fences and gates might cause a different distribution of patterns of static occupancy. The different nature of group activities in China such as "exercising", "babysitting" or "playing chess/cards" might also lead to different location preferences. All of these are investigated in this chapter.

6.1.2 Overview

The main body of this chapter is organised in five sections. Section 6.2 investigates the location preferences of different demographic and activity groups. In particular, it looks at the difference in the choice of locations of male and female, the elderly and working-aged users, as well as people in big groups and individuals. Similarly, this section looks at how passive (sitting and standing) and active activities (exercising, babysitting and playing chess/cards) are distributed, as well as the interaction between the two types of activities.

Subsequently, section 6.3 examines the distribution and provision of sitting places, which is argued to be the most important amenity in urban plazas for evaluating whether the actual distribution of seats is aligned with users' preferences. This section uses the occupancy ratio of sitting places as an indicator to identify the visual characteristics of liked and disliked areas

by Chinese people for sitting. Sections 6.2 and 6.3 use Visibility Graph Analysis (VGA) and behaviour maps of off-peak periods for the analysis.

Section 6.4 uses a none-syntactic visual analysis method, overlapping isovists (visual field) of the gates (OIG), with which to examine the visual impact of the gates on the distribution of static occupancy and hence the choice of location of different user groups. The point of departure for this investigation is that the gates are vantage locations where people on entering might pause and start looking for friends or available seats. Furthermore, some static users might want to have 'control' over the space by locating themselves where they have a good view of people passing through its major gates.

Section 6.5 describes the distribution of static occupancy in the 13 case studies. Existing literature suggests that the centre of a public space is likely to be empty (the island effect), because people are afraid of the public gaze, leading to increased occupancy of its edges. By analysing all case studies, this section identifies factors that might neutralise the "public gaze" effect and thus refocus the (visual) centre of the space towards being a preferred location.

Section 6.6 summarises the major findings.

6.2 Visibility and Location Preference for Static Occupancy

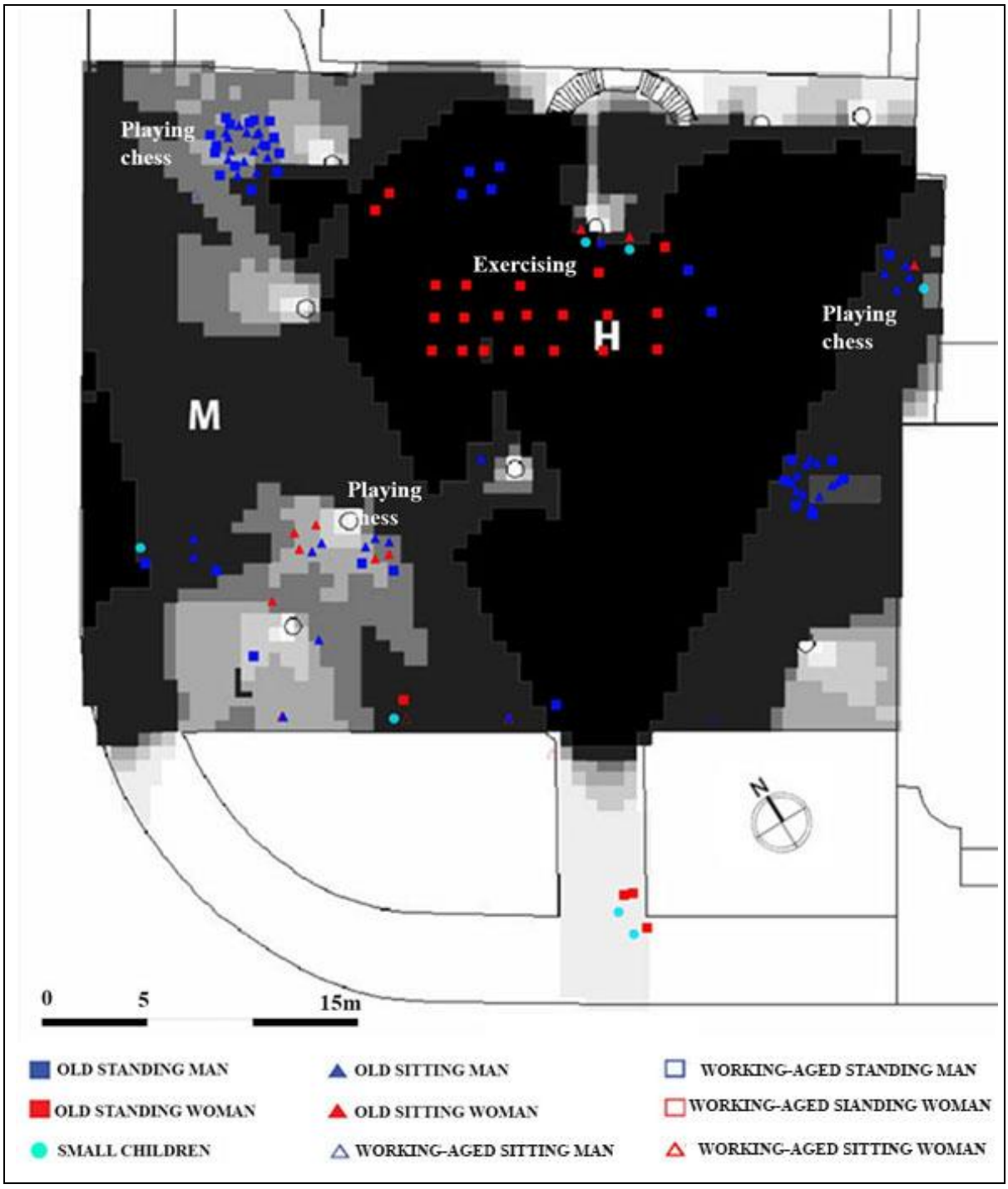


Fig. 6.1: Example Visibility Graph Analysis (VGA) map overlaid with Activity Maps of off-peak periods

The investigation of the impact of visibility on the choice of location of static occupancy involves two kinds of maps: activity-maps and visibility maps.[21]. From the total six observation periods, the maps of the three off-peak periods (periods with the lowest number of static users)

[21] The methodology adopted in this chapter is presented in detail in chapter four where more information about the construction of visibility and activity maps is presented.

of each square were selected fur further analysis[22]. In contrast, visibility maps were constructed using Space Syntax software in order to quantify the different degrees of visual integration at any location within the boundary of the public space. To make sense of the visibility map, three distinct zones with different degrees of visual integration were identified: low, medium and high, marked L, M and H respectively.

It should be noted that the spatial structure of a visibility graph is not identical to that of the geometrical layout, as the visibility graph is based on the topological relationship between all points within the boundary of the space. The visual core of a visibility graph, the high visibility zone, is the most visually exposed (or integrated) area within the space. Hence, part of the (geometric) centre of the space could overlap with the visual core of visibility map but they are not identical. The same principle applies to the edges of the space.

The syntactic visibility graph analysis (VGA) of the 13 case studies is then overlaid with the activity-maps of off-peak periods when the positions of people are more likely to match their preference than when the space is crowded. These overlapping maps are presented in the following figures (see Appendix 2 for high resolution figures). The analysis of these maps provides quantitative information regarding the location preferences of different group users in public space. The following sections describe the results of this investigation.

[22] On page 460, the table of total static users in the six periods from 7am to 7pm is used to identify the three off-peak periods.

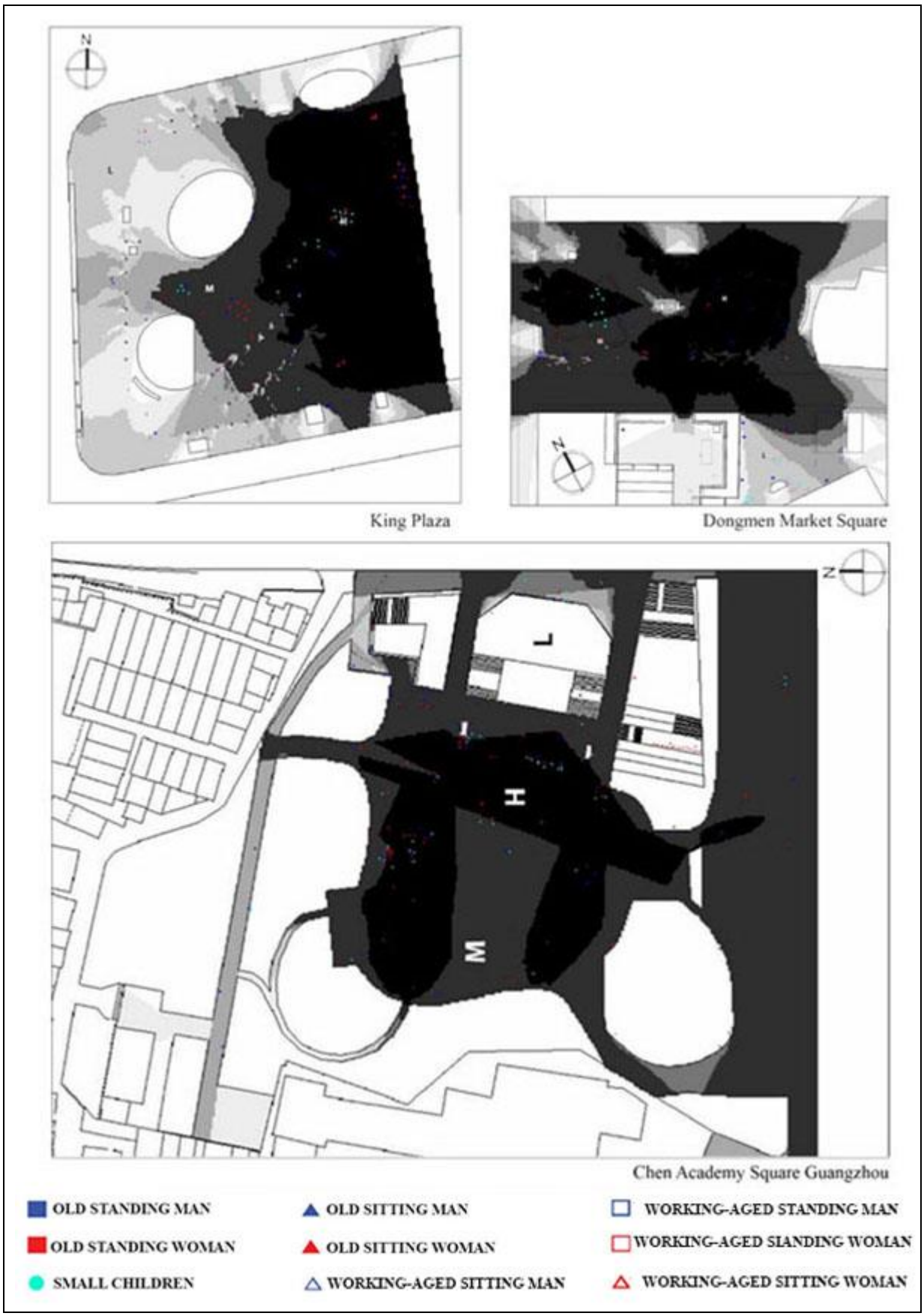


Fig. 6.2: VGA-Activity Maps of off-peak periods (a)

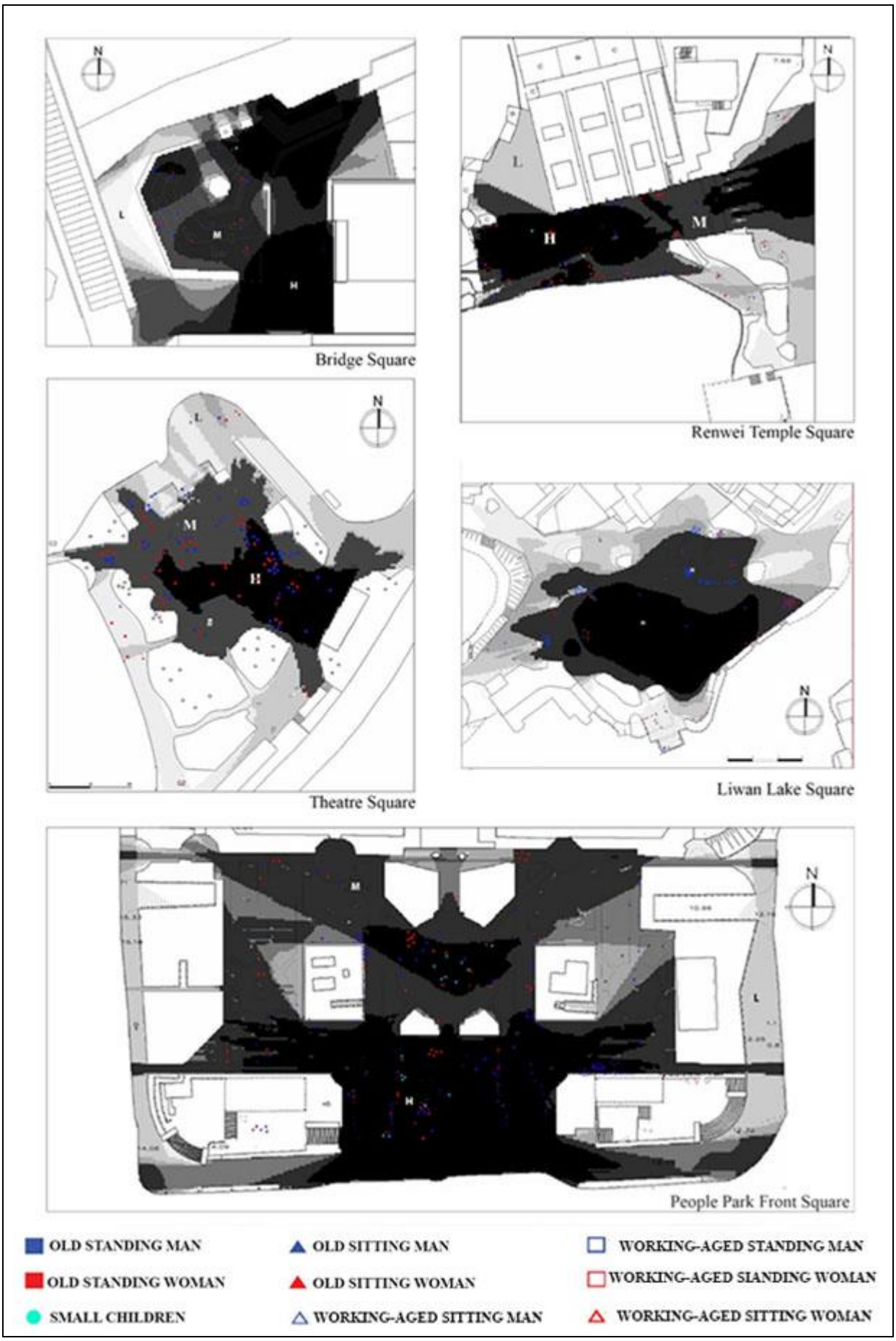


Fig. 6.3: VGA-Activity Maps of off-peak periods (b)

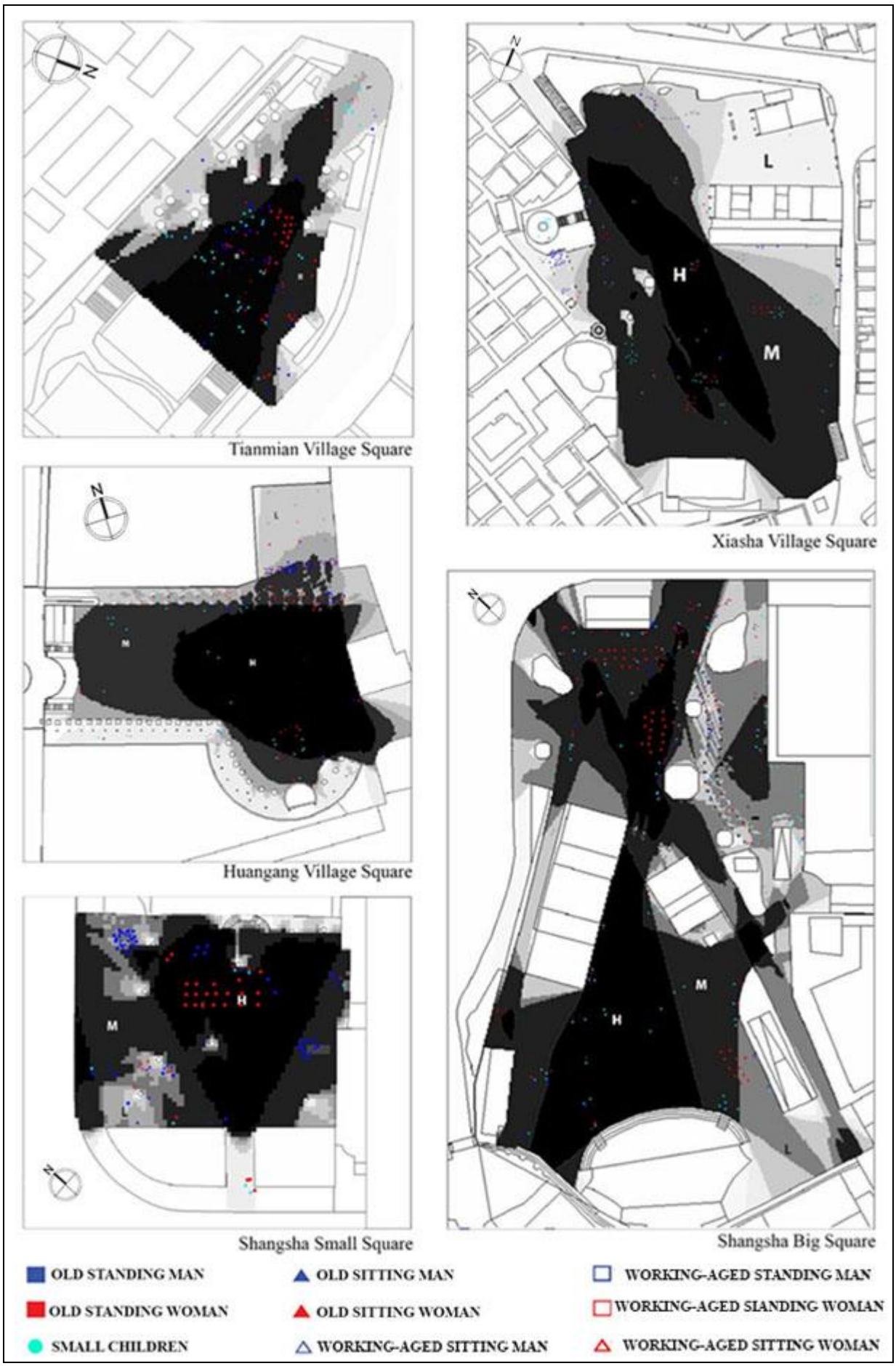


Fig. 6.4: VGA-Activity Maps of off-peak periods (c)

6.2.1 Distribution of different demographic groups

Figure 6.5 gives the total number of different group users recorded in off-peak periods.

SQUARE NAME	Off-Peak Periods	Total users	Age		Gender		Group Size		
			Elderly	Working-Aged Users	Men	Women	Individuals	Pairs	Groups
Theatre Square	3-5-6	138	134	4	77	61	11	26	101
Bridge Square	1-3-5	32	23	6	13	16	14	12	6
Chen Academy	4-5-6	242	162	37	82	117	66	72	104
Renwei Temple	1-3-5	60	45	14	21	38	24	10	26
Liwan Lake Square	3-5-6	212	173	17	152	38	24	42	146
People Park Square	1 3-4	325	194	115	193	116	57	80	188
Dongmen Square	2-3-6	179	23	141	84	80	55	60	64
King Plaza	2-3-4	180	57	102	82	77	51	42	87
Tianmian Square	1-2-6	176	73	60	64	69	43	44	89
Huangang Square	1-2-4	254	166	46	100	112	27	32	195
Shangsha Big Square	1-4-6	383	180	97	73	204	43	128	212
Shangsha Small Square	1-3-6	122	110	5	77	38	15	14	93
Xiasha Square	1-4-6	295	157	44	108	93	45	72	178
Mean Value at any given time		66.6							

Observation periods from 7 am to 7 pm on a weekday:
Period 1: 7-9 am; Period 2: 9-11 am; Period 3: 11 am-1 pm; Period 4: 1-3 pm; Period 5:3-5 pm and Period 6: 5-7 pm
Each square has different temporal use patterns which reflect in on their off-peak periods.

Fig. 6.5: Static users in off-peak periods

In chapter five, the average number of users at any given time in the 13 samples of public squares is 105.8 people. Only looking at the off-peak periods drops the average number of users at any given time to 67 people, less than two thirds of the whole day average. However, if this number is compared with the average of three peak-periods (144.9 people),[23] the average number of users in off-peak periods is less than half that in peak-periods. This is important as a means of ensuring that people in off-peak periods generally have more choice regarding where to stand or sit in a public space.

[23] This figure was generated using the data from Figures 5.1 and 6.5.

SQUARE NAME	STATIC USE					
	Absolute Number			Percentage		
	Low	Medium	High	Low	Medium	High
Theatre Square	15	72	51	11	52	37
Bridge Square	7	17	8	.22	53	25
Chen Academy	54	94	94	22	39	39
Renwei Temple	11	17	32	18	28	53
Liwan Lake Square	64	129	19	30	61	9
People Park Square	62	75	188	19	23	58
Dongmen Square	39	83	57	22	46	32
King Plaza	37	72	71	21	40	39
Tianmian Square	24	58	94	14	33	53
Huangang Square	86	130	38	34	51	15
Shangsha Big Square	133	170	80	35	44	21
Shangsha Small Square	43	50	29	35	41	24
Xiasha Square	147	113	35	50	38	12
Mean Value	55.5	83.1	61.2	**26**	**42**	**32**

Fig. 6.6: Distribution of static use in VGA maps

When observing the data as a whole, a general trend is that the medium visibility areas are preferred by 42 % of static users, followed by high visibility areas, the visual centre of the space, at 32 %. About one quarter of static occupancy occurs in secluded areas in public space. This general trend highlights the importance of the medium visibility areas. They are locations that offer a good degree of privacy together with a good degree of connection with other parts of the space. Nevertheless, each user group might have different location preferences which are examined as follows.

Distribution of male and demale users

In the West male and female users are said to have different location preferences in open public space. Do Chinese women tend to be found in secluded areas and therefore leave men to dominate the highly exposed parts of public space?

SQUARE NAME	DISTRIBUTION OF MALE USERS						DISTRIBUTION OF FEMALE USERS					
	Absolute Number			Percentage			Absolute Number			Percentage		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Theatre Square	7	45	25	9	58	32	8	27	26	13	44	43
Bridge Square	5	3	5	38	23	38	2	12	2	13	75	13
Chen Academy	19	41	22	23	50	27	26	41	50	22	35	43
Renwei Temple	5	8	8	24	38	38	6	9	23	16	24	61
Liwan Lake Square	48	99	5	32	65	3	13	18	7	34	47	18
People Park Square	35	49	109	18	25	56	27	26	63	23	22	54
Dongmen Square	25	37	22	30	44	26	9	42	29	11	53	36
King Plaza	27	34	21	33	41	26	9	32	36	12	42	47
Tianmian Square	10	27	27	16	42	42	6	20	43	9	29	62
Huangang Square	37	59	4	37	59	4	37	51	24	33	46	21
Shangsha Big Square	34	30	9	47	41	12	65	94	45	32	46	22
Shangsha Small Square	30	40	7	39	52	9	11	7	20	29	18	53
Xiasha Square	61	43	4	56	40	4	45	34	14	48	37	15
Mean Value	26.4	39.6	20.6	**31**	**45**	**25**	20.3	31.8	29.4	**23**	**40**	**38**

Fig. 6.7: The distribution of men and women in VGA maps

As can be seen from Fig. 6.7, a relatively consistent trend throughout the 13 samples is the clear preference for the medium visibility areas. On average 45 % male and 40 % female users were found in the medium visibility locations. In contrast, the percentage of users found in low and high visibility areas varies greatly.

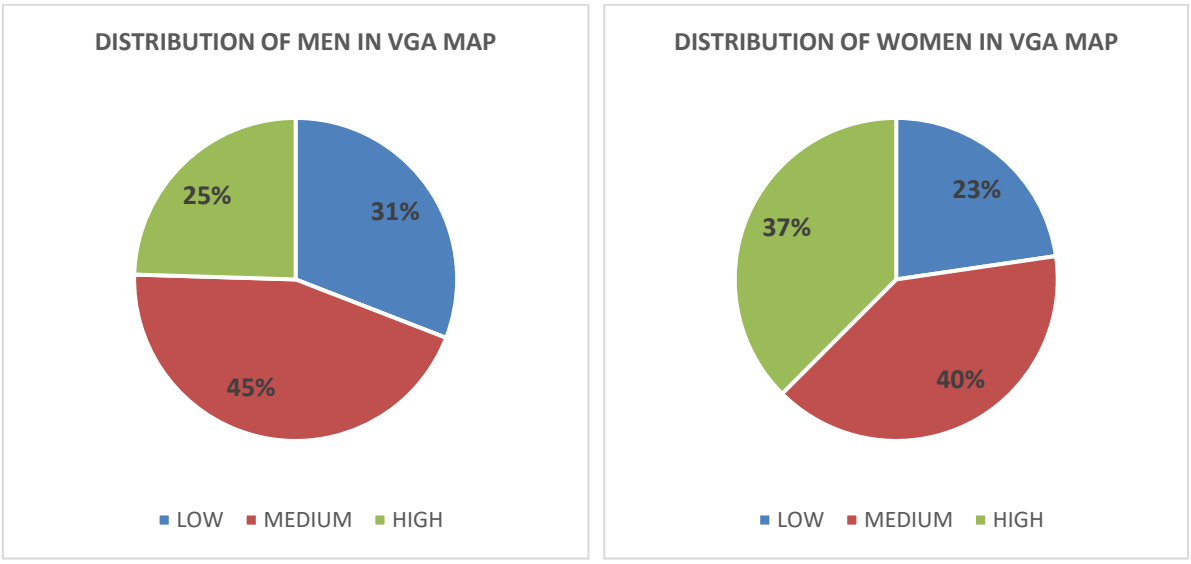


Fig. 6.8: Distribution patterns of male and female users

Overall, the main difference lies in the fact that male users tend to prioritise locations with low visibility (secluded areas) over those with a high degree of visual exposure (31 % compared to

25 %). In contrast, the opposite trend is recorded for women namely, 38 % of female users were found in high visibility areas, nearly equal to the most preferred medium visibility areas, whereas less than 25 % opted for secluded areas.

Distribution of working-aged users and the elderly

	DISTRIBUTION OF ELDERLY						DISTRIBUTION OF WORKING-AGE USERS					
	Absolute Number			Percentage			Absolute Number			Percentage		
SQUARE NAME	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**
Theatre Square	14	70	50	10	52	37	1	2	1	25	50	25
Bridge Square	6	13	4	26	57	17	1	2	3	17	33	50
Chen Academy	36	68	58	22	42	36	9	14	14	24	38	38
Renwei Temple	9	16	20	20	36	44	2	1	11	14	7	79
Liwan Lake Square	56	106	11	32	61	6	5	11	1	29	65	6
People Park Square	25	62	107	13	32	55	37	13	65	32	11	57
Dongmen Square	8	7	8	35	30	35	26	72	43	18	51	30
King Plaza	8	28	21	14	49	37	28	38	36	27	37	35
Tianmian Square	9	18	46	12	25	63	7	29	24	12	48	40
Huangang Square	70	82	14	42	49	8	4	28	14	9	61	30
Shangsha Big Square	62	78	40	34	43	22	37	46	14	38	47	14
Shangsha Small Square	39	44	27	35	40	25	2	3	0	40	60	0
Xiasha Square	90	52	15	57	33	10	16	25	3	36	57	7
Mean Value	33.2	49.5	32.4	**27**	**42**	**30**	13.5	21.8	17.6	**25**	**44**	**32**

Fig. 6.9: Distribution of the elderly and working-aged people in VGA maps

It was suspected age might play a role in how people select a place for static use in open spaces. However, the data from the case studies indicates no significant difference between the two groups. Both elderly and working-aged users are similarly affected by the degree of visual exposure as just over 40 % of these two groups were recorded in locations with medium levels of visibility, followed by more than 30 % staying in high visibility areas and around 25% in secluded areas.

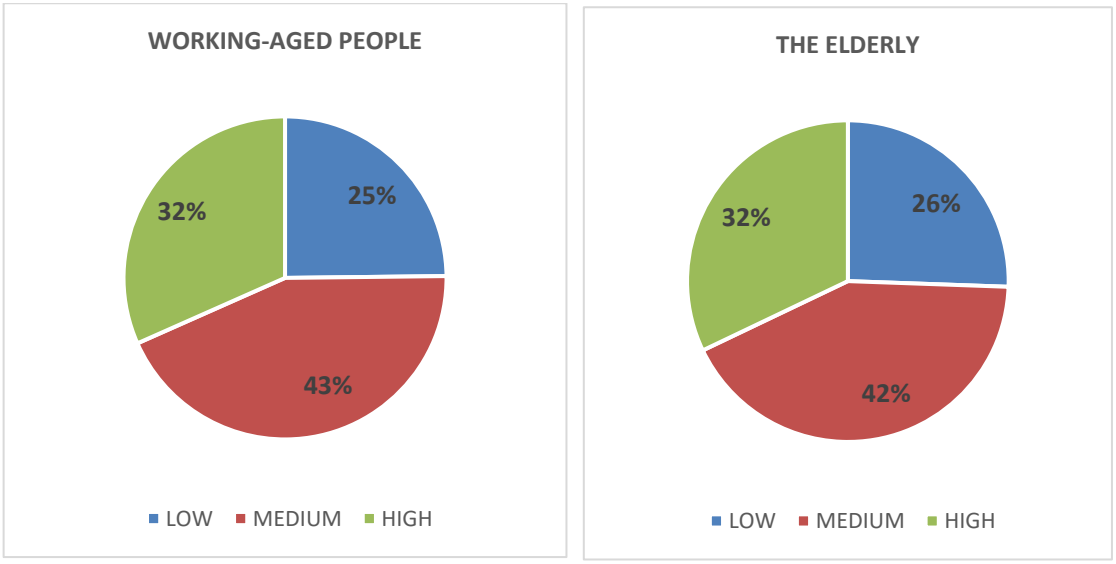


Fig. 6.10: Distribution patterns of working-aged and elderly users

In addition, the ratio between elderly and working-aged users seems to remain unchanged in off-peak periods compared with the ratio for the whole day as discussed in chapter five. Throughout the day, about 20% of total users are working-aged people, whereas about 60 % are the elderly.

Distribution of individuals and big groups

	DISTRIBUTION OF INDIVIDUAL USERS						DISTRIBUTION OF GROUP USERS					
	Absolute Number			Percentage			Absolute Number			Percentage		
SQUARE NAME	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**
Theatre Square	3	4	4	27	36	36	8	60	33	8	59	33
Bridge Square	5	7	2	36	50	14	0	6	0	0	100	0
Chen Academy	16	26	24	24	39	36	24	28	52	23	27	50
Renwei Temple	7	8	9	29	33	38	2	7	17	8	27	65
Liwan Lake Square	8	13	3	33	54	13	38	100	8	26	68	5
People Park Square	16	21	20	28	37	35	26	32	130	14	17	69
Dongmen Square	15	22	18	27	40	33	14	31	19	22	48	30
King Plaza	13	31	7	25	61	14	14	21	52	16	24	60
Tianmian Square	8	22	13	19	51	30	12	14	63	13	16	71
Huangang Square	11	10	6	41	37	22	63	112	20	32	57	10
Shangsha Big Square	17	24	2	40	56	5	66	92	54	31	43	25
Shangsha Small Square	8	6	1	53	40	7	31	40	22	33	43	24
Xiasha Square	15	29	1	33	64	2	98	54	26	55	30	15
Mean Value	10.9	17.2	8.5	**32**	**46**	**22**	30.5	45.9	38.2	**22**	**43**	**35**

Fig. 6.11: Individuals and group users in low, medium and high visibility areas

Public squares in Guangzhou and Shenzhen are dominantly used by people in big groups that make up to more than 60 % of total users (result from chapter five), with the percentage of individual users being only around 10 %. Thus, insights into the location preferences of these two groups might provide useful information for addressing the needs of these users.

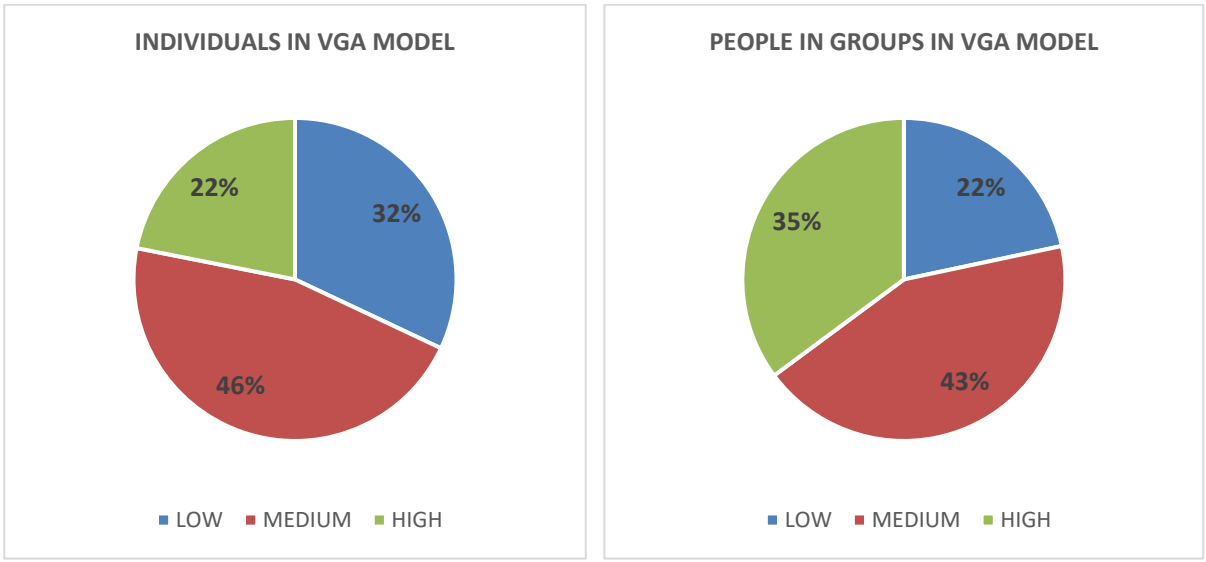


Fig. 6.12: Distribution patterns of individuals and group users

From the data both individuals and groups have a clear preference for locations with a medium degree of exposure, as 46 % of individuals and 43 % of group users were recorded in this zone. In contrast, a significant difference occurs regarding the choice of secluded and exposed areas. In fact, individual users in China show a clear preference for secluded areas (32 %) over that of visually exposed areas (22 %). By contrast, people in big groups prefer to occupy high visibility zones as 35 % of users in big groups were recorded in highly exposed locations, while only 20% were found in secluded areas.

In summary, regarding the choice of location, a difference between men and women as well as individuals and people in groups was observed. However, no significant difference was found between different age groups. As people in groups dominate the use of public space, their distribution patterns greatly affect the overall distribution pattern with a clear preference for medium visibility areas. In addition, more people are likely to be in visible areas than in secluded ones.

While this section focuses on the location preference of different demographic groups, the two following sections examine the distribution patterns of different types of activity.

6.2.2 Distribution of Secondary Activities: Babysitting and Playing Chess/Cards

Informal static activities are classified as primary and secondary activities in this thesis. Primary activities consist of "sitting", "standing" and "exercising", whereas the secondary activities investigated in chapter five are "babysitting", "playing chess/cards" and "singing/sewing". Among these, the two more frequently found activities of babysitting and playing chess/cards are selected for further examination as singing/sewing occurs only occasionally in less than half the 13 case studies. The distribution of these two activities in each case study is documented in Fig. 6.13.

	DISTRIBUTION OF BABYSITTING						DISTRIBUTION OF PLAYING CHESS/CARDS					
	Absolute Number			Percentage			Absolute Number			Percentage		
SQUARE NAME	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Theatre Square	0	0	0	0	0	0	0	5	0	0	100	0
Bridge Square	0	5	2	0	71	29	0	0	0	0	0	0
Chen Academy	15	30	45	17	33	50	12	0	0	100	0	0
Renwei Temple	0	0	2	0	0	100	0	0	0	0	0	0
Liwan Lake Square	6	25	14	13	56	31	24	68	2	26	72	2
People Park Square	0	0	32	0	0	100	0	14	16	0	47	53
Dongmen Square	10	5	8	43	22	35	0	0	0	0	0	0
King Plaza	2	9	31	5	21	74	0	0	0	0	0	0
Tianmian Square	11	23	43	14	30	56	0	0	0	0	0	0
Huangang Square	26	40	22	30	45	25	23	44	0	34	66	0
Shangsha Big Square	71	93	52	33	43	24	0	0	0	0	0	0
Shangsha Small Square	4	8	2	29	57	14	30	31	0	49	51	0
Xiasha Square	73	66	29	43	39	17	29	0	0	100	0	0
Mean Value				**19**	**35**	**46**				**44**	**48**	**8**

Fig. 6.13: Distribution of babysitting and playing chess/cards in VGA maps

Generally, these two activities seem to attract significantly different location preferences as reflected in Fig. 6.14.

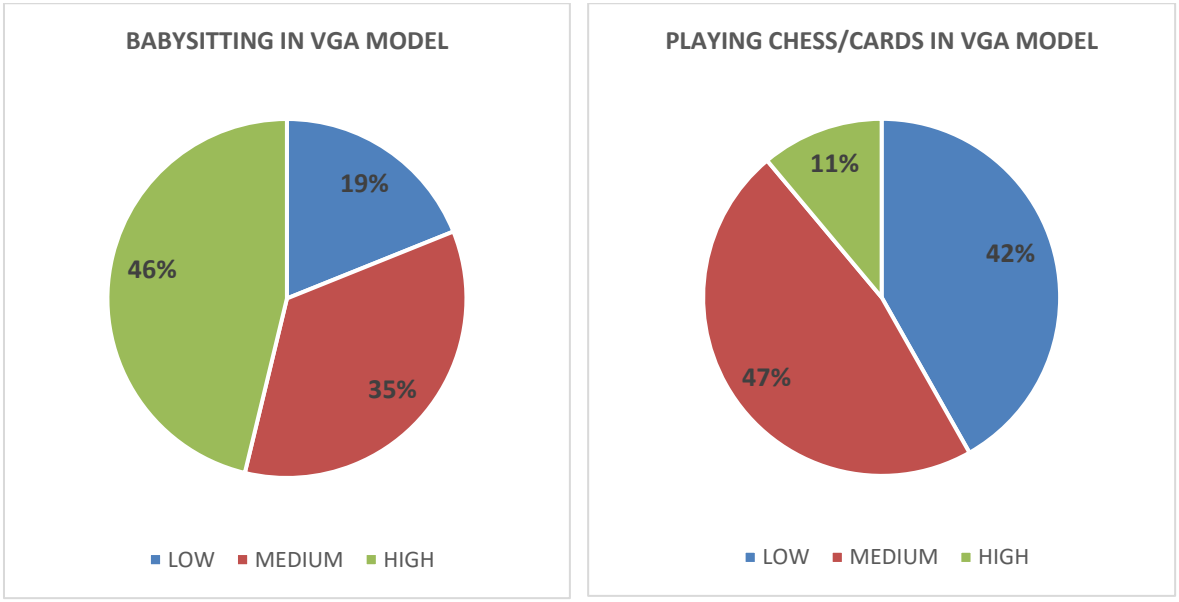


Fig. 6.14: Distribution pattern of babysitting and playing chess/cards activities

First, "babysitting" or playing with toddlers displays a totally different pattern from other activities (except that of "exercising"). The left pie chart in Fig. 6.14 shows a clear preference for higher visibility zones as nearly half of this activity occurred in such areas (46%). In contrast, only 19% of this activity took place in secluded areas. It is perhaps easy to understand this group's choice of locations. People seek spacious areas so that small children can walk or run. These selected locations should also be highly legible, so that adults can supervise their toddlers easily even when chatting with other adults in the group.

This group's preference for the visual core often makes it an active spot for watching others in public space, thus it might affect the choice of locations by other simultaneous users.

In contrast to "babysitting", "playing chess/cards" demonstrated the least degree of preference for highly exposed areas or the visual centre of the space, as only around 10 % of this activity was recorded in the visual centre of the space, whereas about 40 % took place in the secluded parts of the public space.

Given that this activity requires seats arranged in groups, "playing chess/cards" is more likely to occur where these facilities are available. This dependency on sitting is believed to affect the choice of locations by this group, beside that of the visual exposure.

6.2.3 Distribution of primary activities: sitting, standing and exercising

	SITTING USERS' PREFERENCE						STANDING USERS' PREFERENCE					
	Absolute Number			Percentage			Absolute Number			Percentage		
SQUARE NAME	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Theatre Square	6	26	14	13	57	30	4	8	4	25	50	25
Bridge Square	5	16	2	22	70	9	2	2	3	33	33	50
Chen Academy	35	70	58	21	43	36	10	12	14	28	33	39
Renwei Temple	9	2	9	45	10	45	1	12	20	3	36	61
Liwan Lake Square	36	61	5	35	60	5	23	52	7	28	63	9
People Park Square	38	45	90	22	26	52	22	24	60	21	23	57
Dongmen Square	8	52	37	8	54	38	26	27	14	39	40	21
King Plaza	21	44	6	30	62	8	15	14	35	23	22	55
Tianmian Square	9	26	33	13	38	49	6	19	27	12	37	52
Huangang Square	53	86	15	34	56	10	24	18	13	44	33	24
Shangsha Big Square	81	81	25	43	43	13	11	25	11	23	53	23
Shangsha Small Square	25	31	0	45	55	0	16	15	9	40	38	23
Xiasha Square	68	41	2	61	37	2	38	18	12	56	26	18
Mean Value	30.3	44.7	22.8	**30**	**47**	**23**	15.2	18.9	17.6	**29**	**38**	**35**

Fig. 6.15: Distribution of sitting and standing activities in low, medium and high visibility zones

The three primary activities discussed in chapter five are "sitting", "standing" and "exercising". Although a number of sitting or standing people might be involved in other secondary activities such as "babysitting", "playing chess/cards", there are many people who simply sit and observe others or are involved in a conversation in a big group. The distribution of sitting and standing activities recorded in the 13 samples of public space in Guangzhou and Shenzhen is presented in Fig. 6.15.

Distribution of "sitting" activity

Unlike almost all other activities, sitting makes more demand on the quality of the physical design of a public space, including the provision, distribution and orientation of seats. Thus, the distribution of sitting is believed to be affected not only by visibility but also by the provision of sitting.

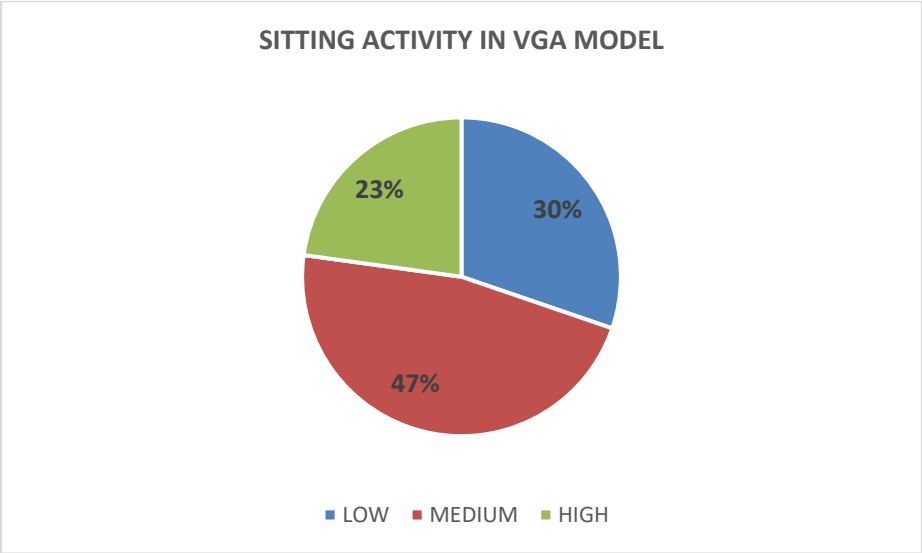


Fig. 6.16: Distribution pattern of sitting in low, medium and high visibility zones

The data shows that in off-peak periods 30 % of the sitting activity was found in secluded zones, slightly more than the portion found in high visibility areas (23 %). However, it appears that nearly half of the sitting activity occurred in the medium visibility zones. This might suggest that sitting people prefer a certain degree of privacy, but also want to be visually connected with what is happening inside the space.

Fig 6.17 also indicates another trend of sitting people in that they tend to be closer to the visual centre of the space (black area marked with H), thus sitting places in the medium visibility zones (M) and close to the visual centre (circled in yellow) are more likely to be used than those in other locations.

As mentioned above, the distribution pattern of sitting people is to a degree affected by the provision of seats, although in off-peak periods a lack of sitting places is less severe than in other periods. Hence, in order to investigate the logic behind the distribution of sitting, a close examination of the provision and distribution of sitting places is needed. This is the focus of section 6.3.

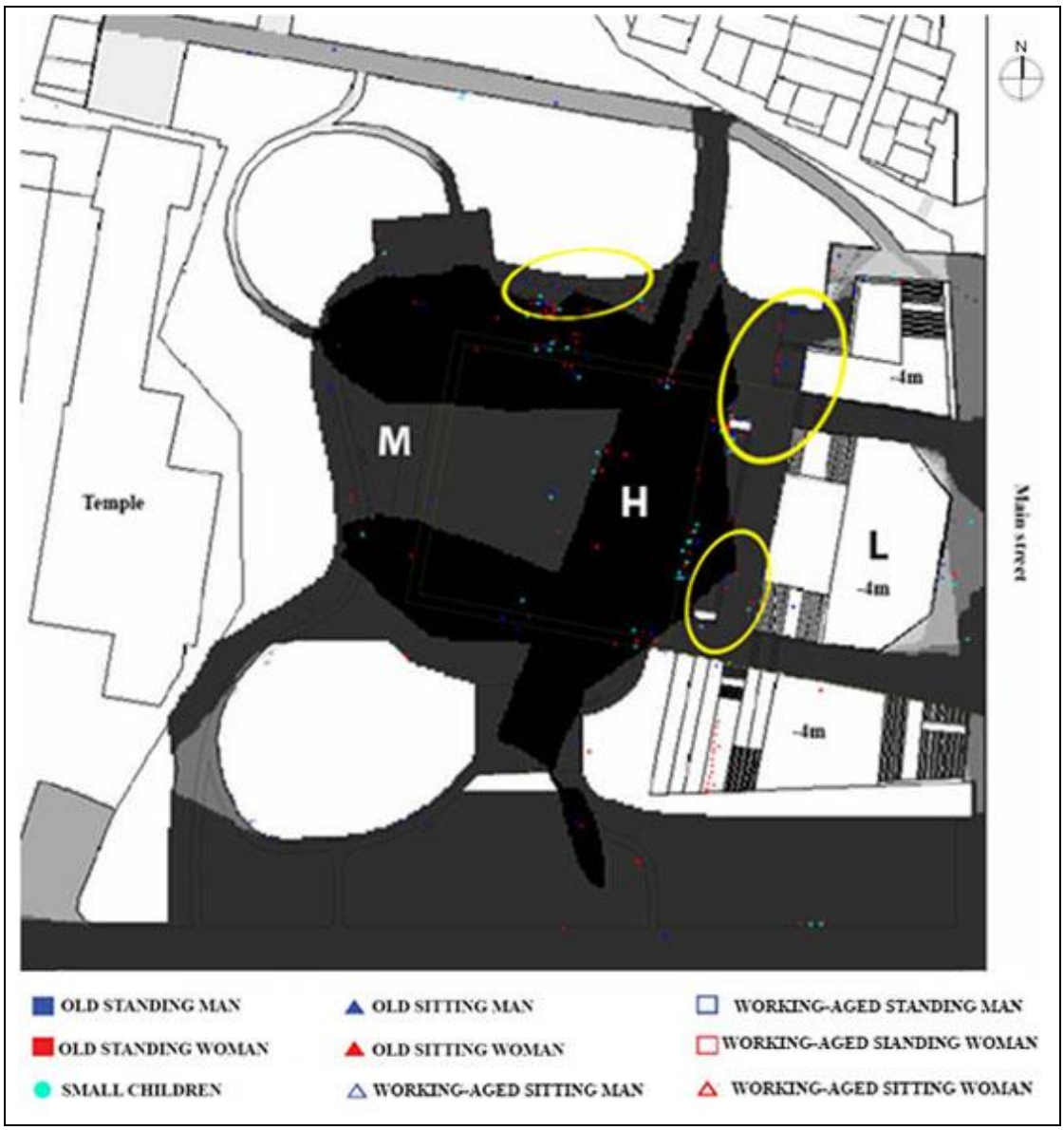


Fig. 6.17: Sitting clustered near the visual core

Distribution of the "standing" activity

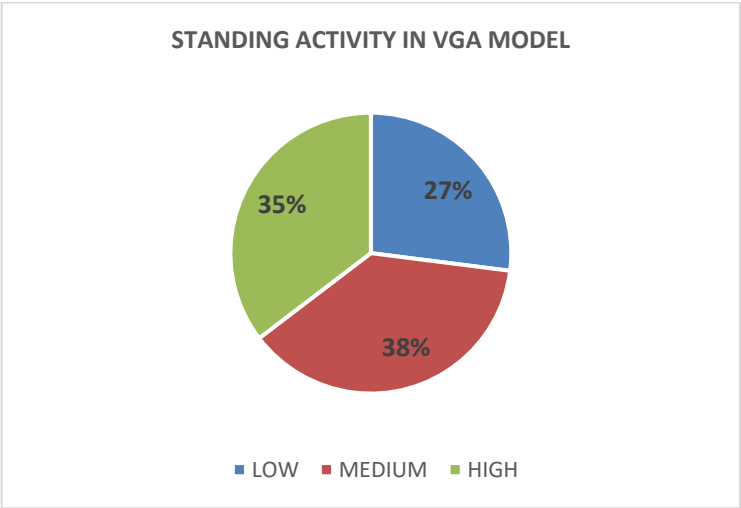


Fig. 6.18: Distribution pattern of the standing activity

The data indicates a relatively even distribution of "standing" people in public space, as 38 % of this activity occurred in medium visibility areas, followed by 35 % and 27 % in high visibility and secluded areas, respectively. The reason behind this relatively even distribution could be related to the fact "standing" people are less visually sensitive. Their position can be easily adjusted to avoid undesired eye contact. In addition, "standing" people prefer high visibility areas more than "sitting" people perhaps because they want to observe "eye-catching" activities such as "exercising"; or because many of them participate in "babysitting", an activity that is most likely to occur in the visual centre of a public space.

Distribution of the "exercising" activity

	EXCERCISING PREFERENCES					
	Absolute Number			Percentage		
SQUARE NAME	Low	Medium	High	Low	Medium	High
Theatre Square	5	35	36	7	46	47
Bridge Square	0	0	0	0	0	0
Chen Academy	0	12	0	0	0	0
Renwei Temple	1	3	2	17	50	33
Liwan Lake Square	2	4	0	33	67	0
People Park Square	2	6	22	7	20	73
Dongmen Square	0	0	0	0	0	0
King Plaza	0	8	16	0	33	67
Tianmian Square	1	2	10	8	15	77
Huangang Square	9	0	0	100	0	0
Shangsha Big Square	4	23	18	9	51	40
Shangsha Small Square	0	1	18	0	5	95
Xiasha Square	0	18	4	0	82	18
Mean Value				**18**	**37**	**45**

Fig. 6.19: Distribution patterns of the "exercising" activity

The "exercising" groups are often called "aunties dancing" groups in China as the majority of participants are older women. These "aunties dancing" groups practice many kinds of exercises, ranging from gymnastics to Chinese tai-chi and Western classical dance. As discussed above, "exercising" is most likely to occur in the visual centre of the space.

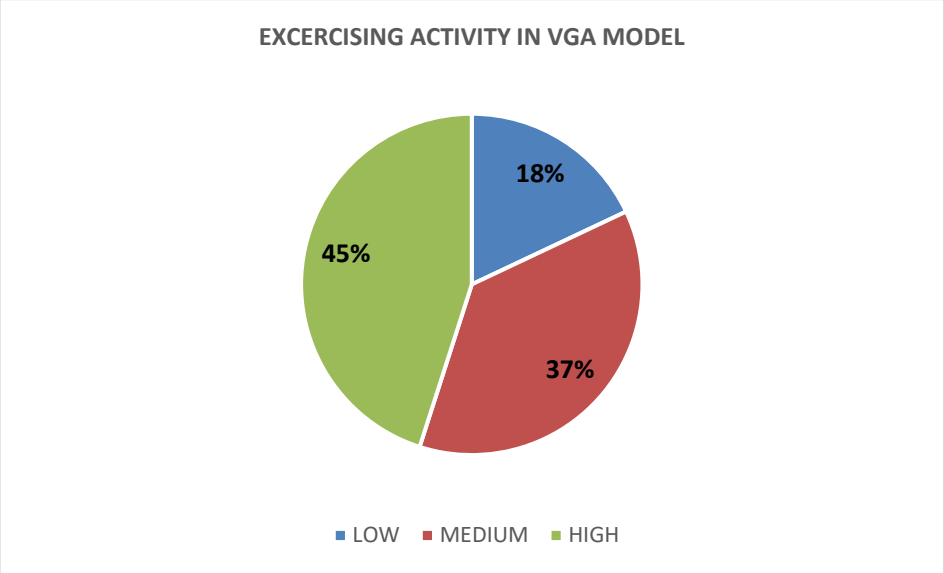


Fig. 6.20: Distribution patterns of the “exercising” activity

Data collected from the 13 samples of public space in Guangzhou and Shenzhen suggests that nearly half of this activity (45 %) happened in high visibility areas, while 37 % was recorded in medium visibility areas, and only 18 % was found in secluded zones in public space.

The reason for the clear preference for the visual centre by this activity group is partly because “exercising” is more likely to be a group activity in China , with groups of often up to 50 people. These large groups require spacious locations. They also prefer locations that offer a strong visual connection between group members, and both of these qualities are found in the visual centre of public space. Occurring in the most visible location, “exercising” activities are often the hot spots of the space, hence the presence of these activity groups could greatly affect the distribution of other activities.

In summary, location preferences in public space are a relatively complex matter. Generally, a preference for the medium visibility areas is found for many user groups, with the two exceptions of “exercising” and “babysitting” groups. These two groups prioritise the visual centre of the space with nearly half of these group activities occurring there. Being perceived as “eye-catching” activities, this might affect the distribution of other users which consequently makes high visibility areas, the visual centre of the space, slightly more popular than secluded ones.

However, the "sitting" activity demonstrates the least degree of preference for visible locations in public space. Is this result partly affected by the provision of sitting places? This issue is examined in section 6.3.

6.3 Examination of the Distribution of Designated Sitting Places

The distribution of the "sitting" activity is believed to be affected by (1) the provision of seats and (2) visibility offered by the location of sitting places. Although the data suggests sitting people prefer to be in secluded rather than high visibility areas, this may be because there are more seats available in the former. In order to clarify the impact of visibility versus the provision of sitting places, the two following sub-sections examine how the provision of sitting places determines the distribution of sitting activity in China[24] and the occupancy ratio of sitting places in the three different visibility areas.

6.3.1 Distribution of sitting places

In order to examine the distribution of sitting places in the case studies, the number of both explicit and integral seats in low, medium and high visibility areas are counted, based on a width of 60 cm for each seat (Fig. 6.12).

PUBLIC SQUARE NAME	DISTRIBUTION OF SEATS IN ABSOLUTE NUMBER			DISTRIBUITON OF SEATS %			No. TOTAL SEATS	MEAN No. SITTING PEOPLE
	Low Visibility	Medium Visibility	High Visibility	Low Visibility	Medium Visibility	High Visibility		
Theatre Square	234	132	33	59	33	8	399	15.3
Bridge Square	4	30	3	11	81	80	37	7.3
Chen Academy	56	136	4	29	69	2	196	54.3
Renwei Temple	113	31	12	72	20	8	156	6.7
Liwan Lake Square	109	103	12	49	46	5	224	34.0
People Park Square	285	357	300	30	38	32	942	57.7
Dongmen Square	58	96	142	20	33	48	294	24.3
King Plaza	58	102	16	33	58	9	176	23.7

[24] The provision of seats is believed to determine the distribution of sitting activity in cases where the provision of seats is much less than the actual demand. This might be the case even in off-peak periods in China.

Tianmian Square	58	62	34	38	40	22	154	22.7
Huangang Square	123	177	36	37	53	11	336	51.3
Shangsha Big Square	261	107	27	66	27	7	395	62.3
Shangsha Small Square	70	88	51	33	42	24	209	18.7
Xiasha Square	91	152	0	37	63	0	243	37.0
Mean Value				**38**	**45**	**18**	**260**	**31.9**

Fig. 6.21: Distribution of sitting places in low, medium and high visibility zones

According to Fig. 6.21, the majority of seats (45 %) are allocated to medium visibility zones. Low visibility areas contain 38 % of total sitting places which is more than twice the number of seats in high visibility areas.

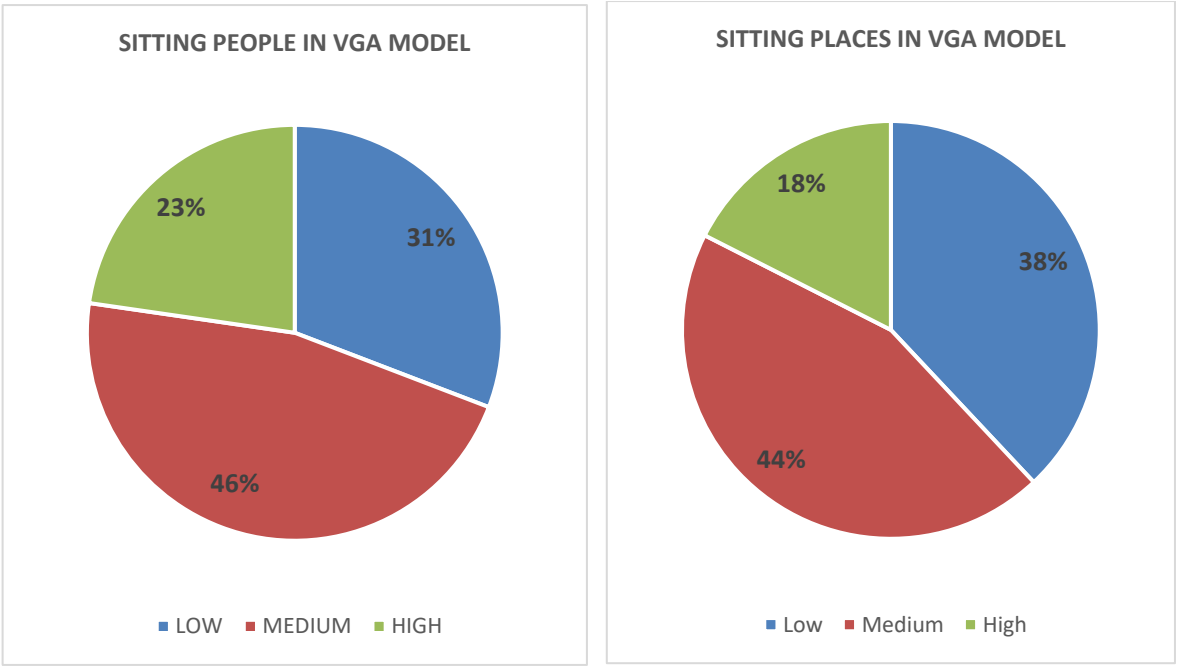


Fig. 6.22: Distribution of seats and sitting people

When comparing the distribution of sitting places with the distribution of sitting people in off-peak periods, it becomes clear how the distribution of sitting is determined by the distribution of seats in the Chinese context. The two pie charts in Fig. 6.22 display relatively similar patterns. However, despite this, the percentage of people sitting in high visibility areas is higher than the provision of seats there, and the opposite is true for the low visibility areas.

At this stage, this is not sufficient to confirm a clear preference for high visibility areas for the sitting activity in China. The second indicator, the occupancy ratio of sitting places, is needed to further clarify this preference.

6.3.2 Occupancy ratio of sitting places in different visibility areas

The occupancy ratio of sitting places indicates the possibility a seat will be used in an off-peak period and is calculated by dividing the mean number of sitting people in each visibility area by the number of designated seats there. All data required for this calculation is presented in Fig. 6.23.

Public Space Name	DISTRIBUTION OF DESIGNATED SEATS			DISTRIBUTION OF SITTING PEOPLE			OCCUPANCY RATIO		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Theatre Square	234	132	33	2	8.67	4.67	0.01	0.07	0.14
Bridge Square	4	30	3	1.67	4.33	1.33	0.42	0.17	0.22
Chen Academy	56	136	4	19	21.33	18.67	0.34	0.16	4.67
Renwei Temple	113	31	12	3	0.67	3	0.03	0.02	0.25
Liwan Lake Square	109	103	12	12	20.33	1.67	0.11	0.2	0.14
People Park Square	285	357	300	12.67	15	30	0.04	0.04	0.10
Dongmen Square	58	96	142	2	13	9.25	0.03	0.14	0.07
King Plaza	58	102	16	7	14.67	2	0.12	0.14	0.13
Tianmian Square	58	62	34	3	8.67	11	0.05	0.14	0.32
Huanggang Square	123	177	36	18.67	26	6.67	0.15	0.15	0.19
Shangsha Big Square	261	107	27	27	27	8.33	0.1	0.25	0.31
Shangsha Small Square	70	88	51	8.33	9.67	0.67	0.12	0.11	0.01
Xiasha Square	91	152	1	22.67	13.67	0.67	0.25	0.09	0.67
Mean							**0.14**	**0.13**	**0.54**

Fig. 6.23: Occupancy ratio of seats in different visibility zones

The occupancy ratio of sitting places in high visibility zones is 54 % in off-peak periods, being nearly four times more than that of other locations. Chen Academy Square is a good example of the preference for high visibility areas. While there are only four designated seats in the visual centre of the space, an average 18.7 sitting people were recorded there which makes an occupancy ratio of 4.67 for each seat in the visual centre. In contrast, low visibility areas with 56 seats only attract a similar number of sitting people which results in an occupancy ratio of

only 0.34. There are a few exceptions in the 13 samples of public space; however, this analysis might be sufficient to confirm that high visibility areas are prioritised over secluded areas by the majority of sitting users in China.

In summary, this section suggests that the distribution of the sitting activity is greatly determined by the provision of designated sitting places with the number of seats in secluded areas more than twice that of the visual centre. This distribution of sitting places does not appear to address the needs of Chinese users. As the data shows, the occupancy of seats in high visibility areas is about four times higher than that in other locations, including the medium visibility areas, recorded as the most preferred zone. Therefore, Chinese designers have to find a way to increase the number of seats in the visual centre of public space without taking too much space from other activities such as “exercising” or “babysitting”. This can be done by integrating sitting places into flower beds, low walls or steps.

While this section examines the distribution of seats and its impact, the next section investigates the visual impact of gates on the location preferences inside a public space by different user groups.

6.4 Examination of the Visual Impact of Gates

The findings in chapter five suggest that the existence of fences and gates does not necessarily affect the static use of small and medium-sized public squares in Guangzhou and Shenzhen. This section utilises the overlapping visual fields method, also called the overlapping isovists of gates, to examine whether the position of the gate affects the distribution of static users inside a public space. Of the 13 case studies 10 that are gated or have gate-like settings are selected for this investigation.

The detailed description of this method is documented in chapter four. Basically, from each gate, one visual field is constructed in Depthmap (a space syntax software). Subsequently, all

visual fields are manually overlapped in Photoshop using different degrees of opacity.[25] Then, locations covered by a higher number of visual fields are given a darker colour, whereas locations with fewer overlaps are given a brighter colour. The colour range from dark to bright is further simplified into three zones of low, medium and high visibility. These OIG maps are overlaid with the off-peak activity-maps. The OIG maps of the 10 public squares are presented in the following figures, and maps with higher resolution are in Appendix 2.

[25] The degree of opacity is also determined by the degree of popularity of gates. Visual fields of gates that are used more frequently are darker than those used less.

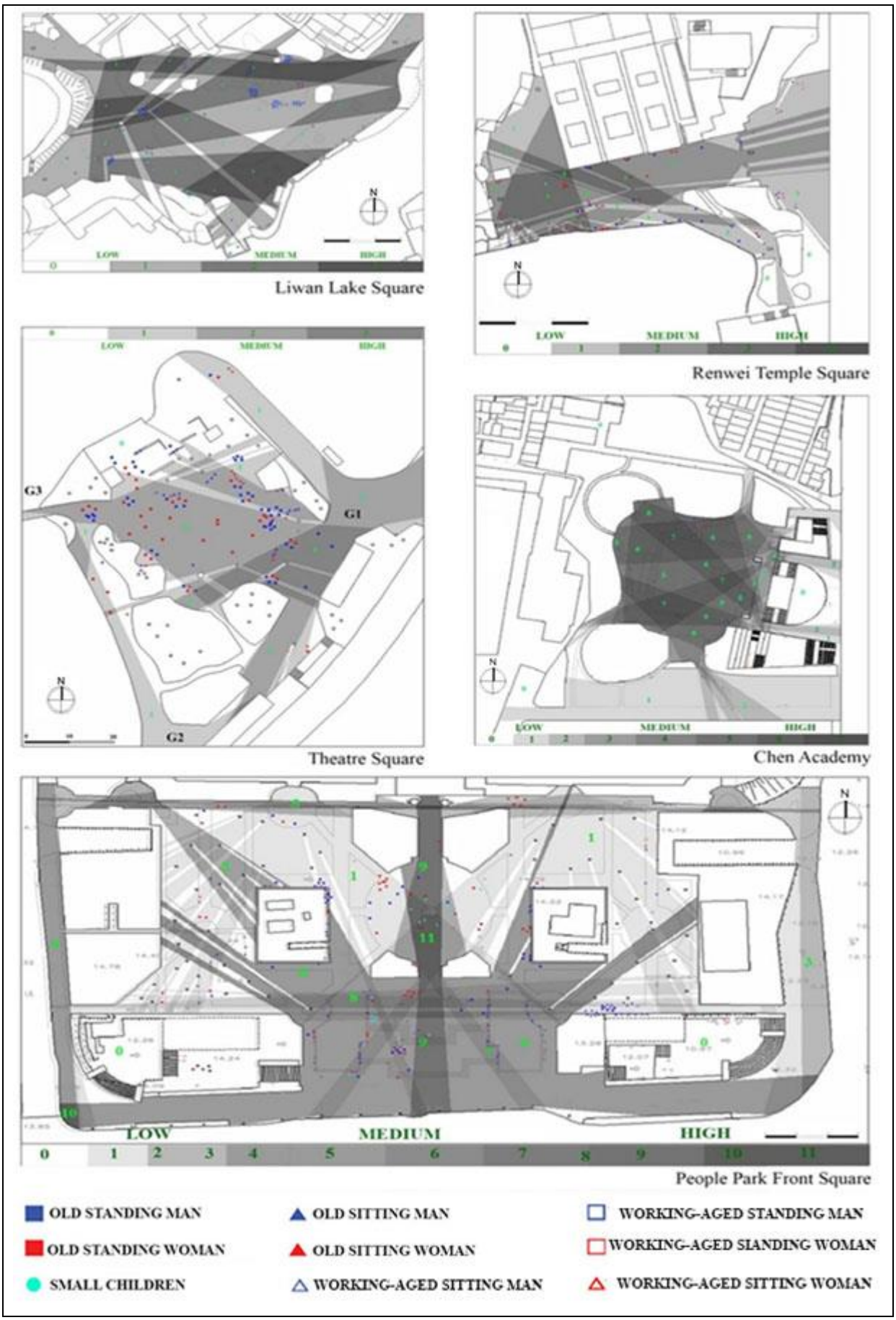


Fig. 6.24: OIG and activity maps for gated public squares in Guangzhou

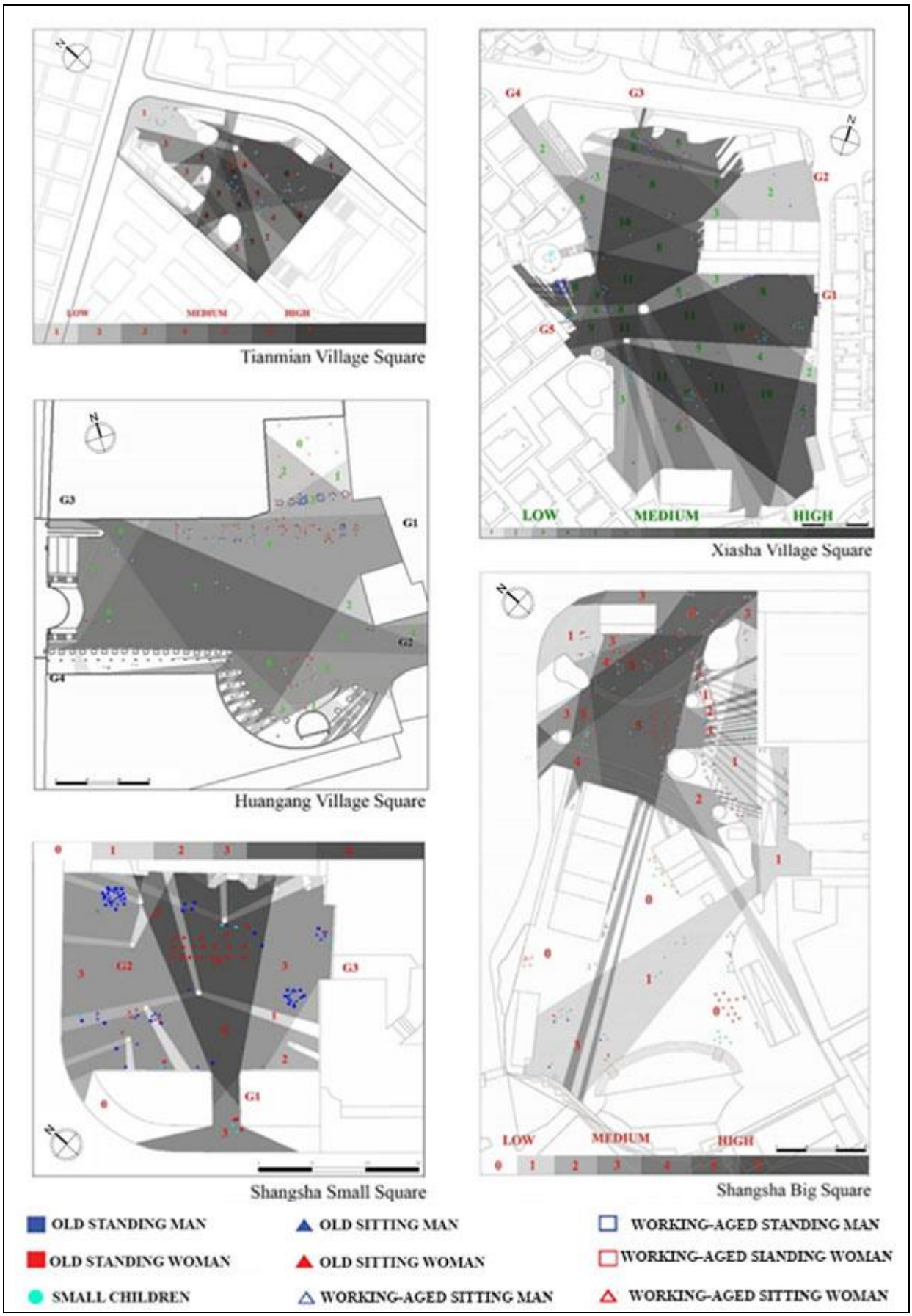


Fig. 6.25: OIG and activity maps for gated public squares in Shenzhen

6.4.2 Visual impact of gates on the distribution of static use – general trend

SQUARE NAME	STATIC USE- OIG					
	Absolute Number			Percentage		
	Low	Medium	High	Low	Medium	High
Theatre Square	44	75	19	32	54	14
Chen Academy	70	79	93	29	33	38
Renwei Temple	14	30	16	23	50	27
Liwan Lake Square	86	94	32	41	44	15
People Park Square	132	34	159	41	10	49
Tianmian Square	16	84	76	9	48	43
Shangsha Big Square	160	102	121	42	27	32
Shangsha Small Square	21	72	29	17	59	24
Xiasha Square	86	174	37	29	59	13
Mean Value	69.9	82.7	64.7	**29**	**43**	**28**

Fig. 6.26: Overall distribution patterns in OIG maps

The overall distribution patterns discovered by using OIG maps are similar to those revealed by the VGA maps with a clear preference for medium visibility areas. This suggests the majority of users want a certain degree of control of gates. In contrast, static users seem to be indifferent towards locations with low and high visual control of gates as 29 % of users in off-peak periods were found in locations with low visual control of gates, and 28 % in areas with a good view of the entrances.

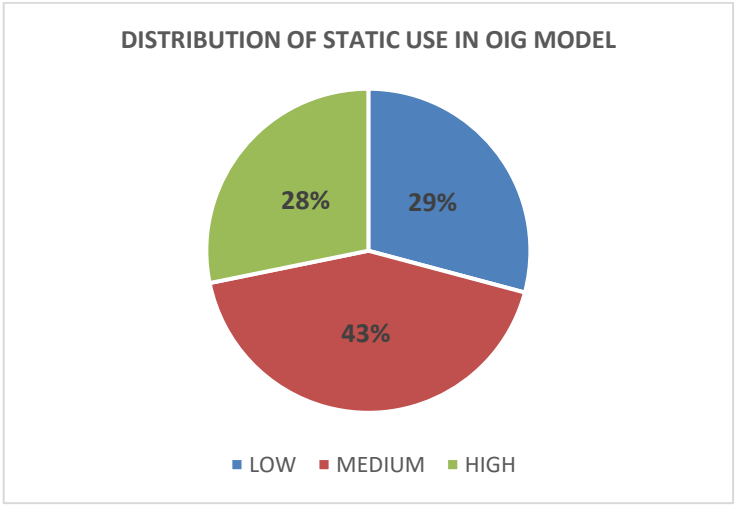


Fig. 6.27: Overall distribution patterns in OIG maps

In order to identify the visual impact of gates on each user group, each demographic and activity group are examined separately. However, to avoid unnecessary repetition in sections 6.2 and 6.3, only major findings from the analysis of the OIG maps are discussed.

6.4.3 Visual Impact of gates on the distribution of different demographic groups

DISTRIBUTION OF MEN						DISTRIBUTION OF WOMEN						DISTRIBUTION OF THE ELDERLY					
	Absolute Number			Percentage			Absolute Number			Percentage			Absolute Number			Percentage		
SQUARE NAME	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High
Theatre Square	25	40	12	32	52	16	19	35	7	31	57	11	43	72	19	32	54	14
Chen Academy	29	34	19	35	41	23	35	32	50	30	27	43	55	52	55	34	32	34
Renwei Temple	8	9	4	38	43	19	6	21	11	16	55	29	11	23	11	24	51	24
Liwan Lake Square	60	65	27	39	43	18	18	16	4	47	42	11	74	72	27	43	42	16
People Park Square	83	22	88	43	11	46	48	10	58	41	9	50	87	24	83	45	12	43
Tianmian Square	6	40	18	9	63	28	2	30	37	03	43	54	2	32	39	3	44	53
Shangsha Big Square	27	26	20	37	36	27	79	47	78	39	23	38	53	50	77	29	28	43
Shangsha Small Square	17	53	7	22	69	09	3	15	20	08	39	53	20	63	27	18	57	25
Xiasha Square	27	75	6	25	69	06	26	50	17	28	54	18	38	98	21	24	52	13
Mean Value	31.3	40.4	22.3	31	47	21	26.2	28.4	31.3	27	39	34	42.6	54.0	39.9	28	42	29

DISTRIBUTION OF WORKING-AGED USERS						DISTRIBUTION OF INDIVIDUALS						DISTRIBUTION OF GROUP USERS					
	Absolute Number			Percentage			Absolute Number			Percentage			Absolute Number			Percentage		
SQUARE NAME	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High
Theatre Square	1	3	0	25	75	00	5	3	3	45	27	27	27	64	10	27	63	10
Chen Academy	9	14	14	24	38	38	22	27	17	33	41	26	26	24	54	25	23	52
Renwei Temple	3	7	4	21	50	29	9	11	4	38	46	17	3	15	8	12	58	31
Liwan Lake Square	4	9	4	24	53	24	8	13	3	33	54	13	38	100	8	26	68	05
People Park Square	44	8	63	38	07	55	30	1	26	53	02	46	74	25	89	39	13	47
Tianmian Square	6	38	16	10	63	27	2	22	19	05	51	44	8	50	31	09	56	35
Shangsha Big Square	53	23	21	55	24	22	18	13	12	42	30	28	85	74	53	40	35	25
Shangsha Small Square	0	5	0	0	00	00	0	13	2	00	87	13	19	55	19	20	59	20
Xiasha Square	15	27	2	34	61	05	17	24	4	38	53	09	47	108	25	26	61	14
Mean Value	15.0	14.9	13.8	26	52	22	12.3	14.1	10.0	32	43	25	36.3	57.2	33.0	25	49	27

Fig. 6.28: Distribution of different demographic groups in OIG maps

Figure 6.28 presents the results for the visual impact of gates on each demographic group. The data shows a slightly different impact for each group.

First, the elderly distribute themselves more evenly than working-aged users. The distribution of the elderly is also nearly identical to the overall distribution, which again reflects the domination of this age group in public space in China. In contrast to the elderly, working-aged users show a clear preference for locations with medium visual control of the gates (52 %). In addition, more old persons want to have the highest visual control of gates than working-aged users. In other words, the elderly appear to have a greater desire to know who enters or leaves public space than working-aged users.

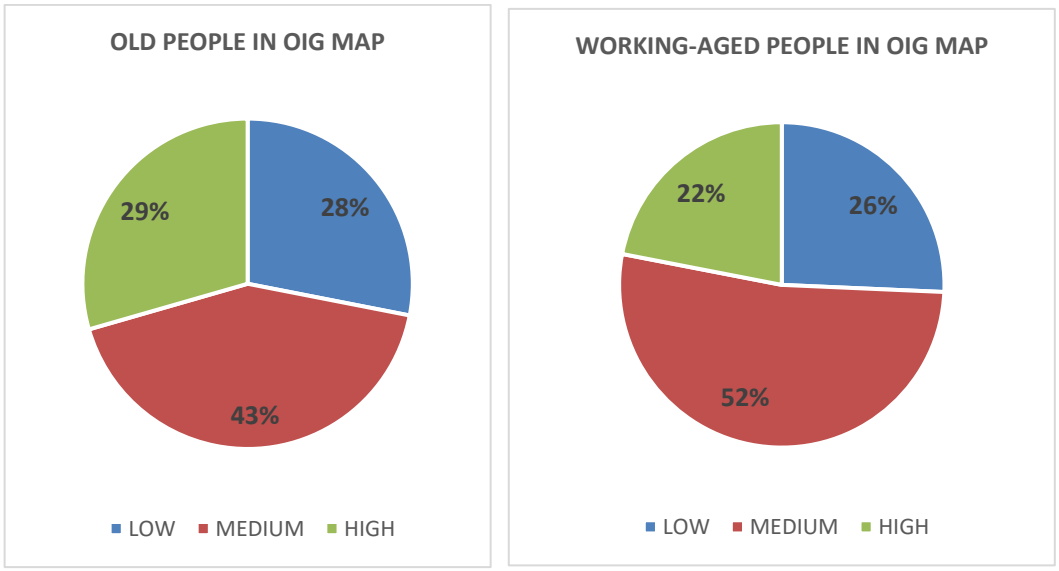


Fig. 6.29: Distribution of the elderly and working-aged users in OIG maps

Second, no significant difference compared to the general trend was observed for different group sizes,. Group users tend to prefer locations with a high rather than low degree of visual control of gates, whereas the opposite is true for individuals.

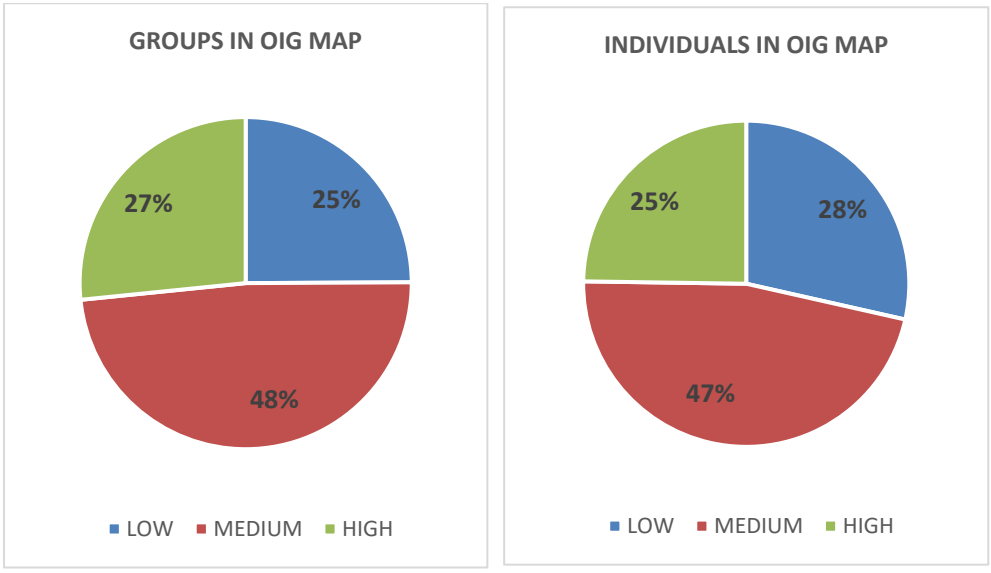


Fig. 6.30: Distribution of individuals and group users in OIG maps

While the two demographic pie charts in Figure 6.30 are similar, a significant difference is observed between male and female users.

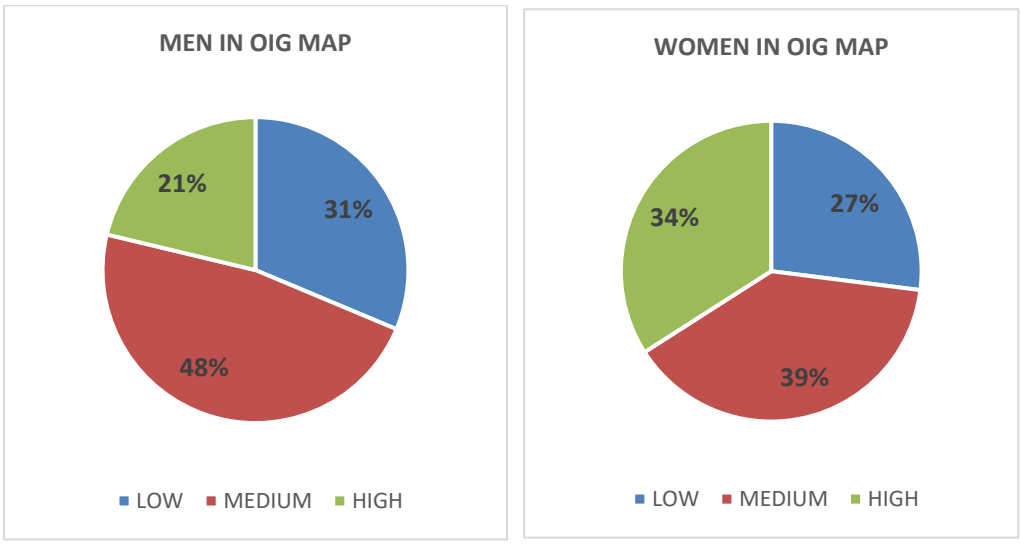


Fig. 6.31: Distribution of men and women in OIG maps

The two pie-charts in Figure 6.31 show that 34 % of female users were recorded in locations with a high degree of control of gates, compared to only 21 % of male users. Overall, women prioritise locations that are visible from the gates, and 27 % were found in locations with a low degree of control of gates.

6.4.2 Visual impact of gates on the distribution of different activities

SQUARE NAME	DISTRIBUTION OF SITING						DISTRIBUTION OF STANDING						DISTRIBUTION OF EXCERCISING					
	Absolute Number			Percentage			Absolute Number			Percentage			Absolute Number			Percentage		
	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High
Theatre Square	16	23	7	35	50	15	9	4	3	56	25	19	19	48	9	25	63	12
Chen Academy	56	51	56	34	31	34	8	17	13	22	47	36	0	0	0	0	0	0
Renwei Temple	6	12	2	30	60	10	6	17	10	18	52	30	2	1	3	33	17	50
Liwan Lake Square	52	32	18	51	31	18	23	53	7	28	65	09	2	4	0	33	67	0
People Park Square	67	21	85	39	12	49	49	9	48	46	08	45	15	2	13	50	07	43
Tiannnian Square	3	35	30	04	51	44	4	30	18	08	58	35	1	5	7	08	38	54
Shangsha Big Square	73	48	57	39	26	30	27	8	9	57	17	19	12	5	28	27	11	62
Shangsha Small Square	13	39	4	23	70	07	7	27	6	18	68	15	0	2	17	00	11	89
Xiasha Square	32	74	5	29	67	05	21	40	7	31	59	10	0	11	11	00	50	50
Mean Value	35.3	37.2	29.3	**32**	**44**	**24**	17.1	22.8	13.4	**32**	**44**	**24**	6.4	9.8	11.0	**22**	**33**	**45**

SQUARE NAME	DISTRIBUTION OF BABYSITTING						DISTRIBUTION OF PLAYING CHESS/CARD						DISTRIBUTION OF STATIC USE					
	Absolute Number			Percentage			Absolute Number			Percentage			Absolute Number			Percentage		
	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High	Low	Medi.	High
Theatre Square	0	0	0	0	0	0	5	0	0	1.00	0	0	44	75	19	32	54	14
Chen Academy	12	81	29	10	66	24	0	0	12	0	0	1.00	70	79	93	29	33	38
Renwei Temple	0	0	2	0	0	0	0	0	0	0	0	00	14	30	16	23	50	27
Liwan Lake Square	17	26	2	38	58	04	24	68	2	0.26	72	02	86	94	32	41	44	15
People Park Square	2	2	28	06	06	88	30	0	0	1.00	0	0	132	34	159	41	10	49
Tiannnian Square	11	29	37	14	38	48	0	0	0	0	0	0	16	84	76	09	48	43
Shangsha Big Square	117	51	48	54	24	22	0	0	0	0	0	0	160	102	121	42	27	32
Shangsha Small Square	2	7	5	14	50	36	17	44	0	0.28	72	0	21	72	29	17	59	24
Xiasha Square	57	89	22	34	53	13	0	29	0	0.00	0	0	86	174	37	29	59	13
Mean Value	27.3	35.6	21.6	**21**	**37**	**42**	12.7	23.5	2.3	**0.42**	**41**	**17**	69.9	82.7	64.7	**29**	**43**	**28**

Fig. 6.32: Distribution of different activity groups in OIG maps

Figure 6.32 presents data for the visual impact of gates on different activity groups, revealing insights about the use of public open space.

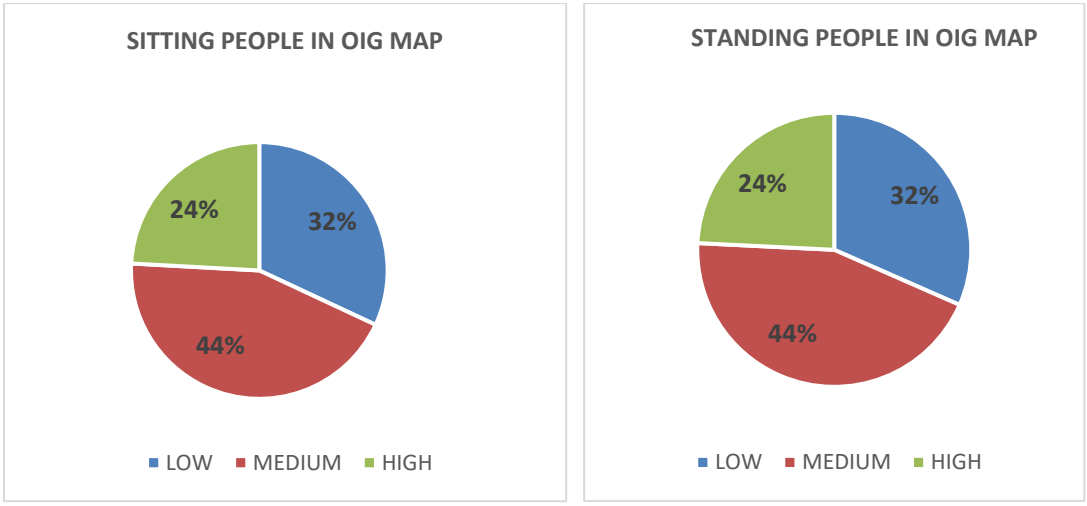


Fig. 6.33: Distribution of sitting and standing activities in OIG maps

First, the two primary activities of "standing" and "sitting" have identical distribution patterns (see Fig. 6.33), with 44 % of both standing and sitting activities in locations with a medium degree of visual control of gates, 32 % in areas with a limited view of gates, and 24 % in the most exposed areas relative to the gates.

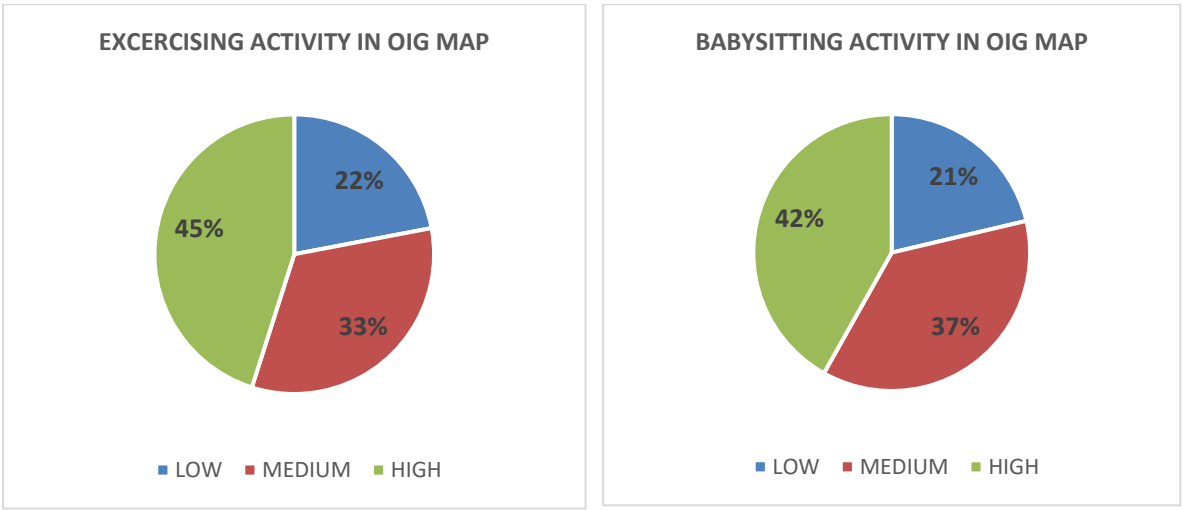


Fig. 6.34: Distribution of exercising and babysitting activities in OIG maps

Second, the two other frequent activities of "exercising" and "babysitting" also demonstrate nearly similar distribution patterns. The most preferred locations that attracted more than 40 %

of each group are those which are most visible from the gates. The medium visibility areas attracted 33 – 37 % of these two activities, and 21 -22 % took place in areas that are most hidden from the gates.

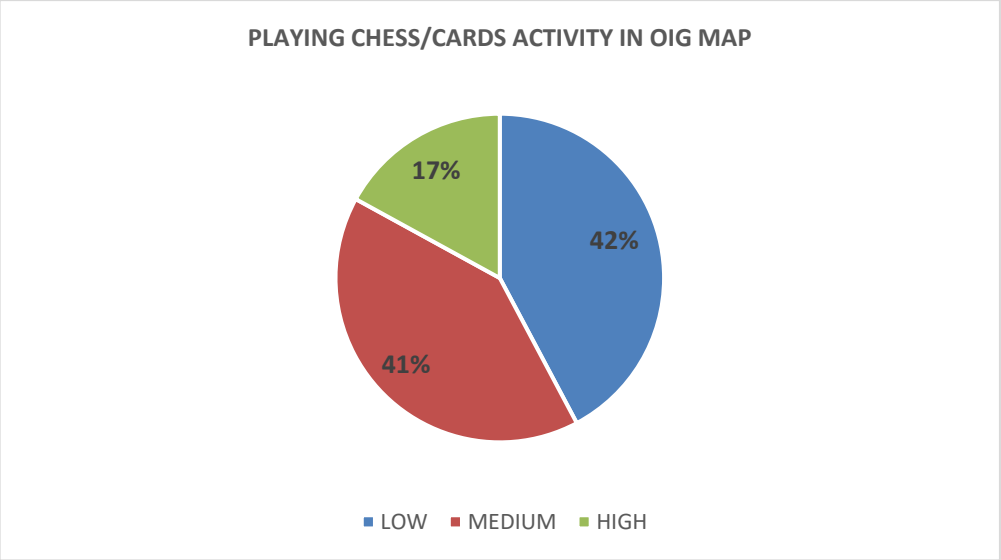


Fig. 6.35: Distribution of playing chess/cards activity in OIG maps

Last, playing chess/cards again displays a highly contrasting pattern to that of exercising, with 42 % of this activity in locations that are most hidden from the gates, whereas only 17 % occurred in areas with a high visual control over the gates. The rest of playing chess/cards activity (41 %) happened in locations with a medium degree of exposure to the gates.

In summary, different types of activities seem to have significantly different distribution patterns in OIG maps which suggests those engaged in these prefer different degrees of exposure to the gates of the space. A more interesting finding is that the difference among demographic groups is much less significant than that among activity groups. This finding echoes the result found by using VGA maps. Taking account of the results of both methods, this suggests the type of activity determines the patterns of distribution more significantly than other demographic factors such as age and gender.

It is worth discussing the fundamental difference between Visibility Graph Analysis (VGA) and Overlapping Isovists of the Gates (OIG).

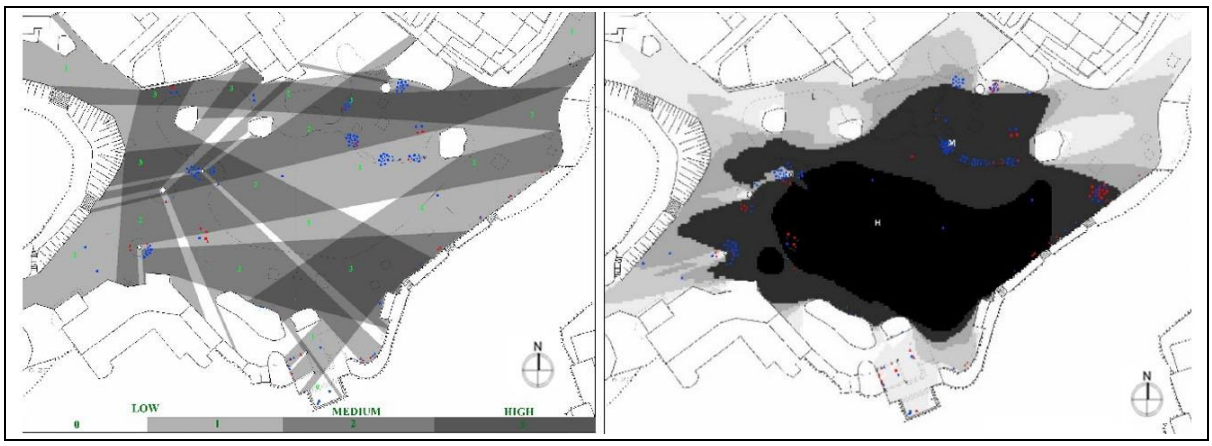


Fig. 6.36: OIG and VGA maps of Liwan Lake Square

The logic of the OIG model is that people look around the space before entering it, whereas in a VGA model, people navigate themselves from within the space. The VGA method is more comprehensive and sophisticated as it takes into account every single cell of the space in the calculation of the degree of visibility. In contrast, in the OIG method, the degree of visibility is fundamentally based on a few vantage points, which are the gates or entrances of the space, with less attention to the size of gates. Both methods have been used to quantify the impact of visibility on the selection of locations in public open space (Campos, 1999, 2005; Bada, 2012) with a clear preference for the VGA method. However, from the experience of using these two methods, it appears the OIG maps can be used in addition to VGA maps to examine different visual characteristics of one location. As the two maps in Fig. 6.36 demonstrate, an OIG map can detect small spots in secluded areas that offer a sudden wide view of the surroundings. This quality is suggested by Appleton to be that most preferred by users (Appleton, 1975). This thesis demonstrates that OIG maps are a simple way to study the impact of visibility can detect the difference between activity groups.

6.5 The Description of 13 Case Studies

This section describes how visibility affects the choice of locations in each case study and how the degree of visual impact might be conditioned by the presence of and interaction between different group users. The case studies are divided into two groups: (1) well-used visual cores and (2) underused visual cores, in order to identify what additional factors might contribute to the preference or lack of it for the visual core for static occupancy.

6.5.1 Small and medium-sized squares with well-used visual Cores

People Park Front Square

Fig. 6.37: Sitting around the visual core of People Park Front Square

People Park Front Square is one of the case studies that best shows a preference for the visual core. While the square is divided into many small sub-spaces of which a large part are occupied by flowerbeds, the visual core includes a paved area approximately 30 m by 60 m. The visual core stretches between the heaviest pedestrian flow and the main gate of the People Park to the North, and predominantly serves a pedestrian route crossing the visual core. In addition, the visual core is wide enough so that babysitting and playing sports can occur without intruding on the space of people passing by.

As a result, nearly 100 % of people playing with children were found within the visual core, and 70 % of people exercising or playing sports also occupied this space. Consequently, the visual core alone attracted 52 % of sitting people, despite the fact seats are evenly distributed in the three visual zones. In Figure 6.38, circled areas identify places in low visibility zones

with plenty of seats that remain mostly empty. Interestingly, seats adjacent to the main pedestrian flow (marked at the bottom of the map) are the least used seats

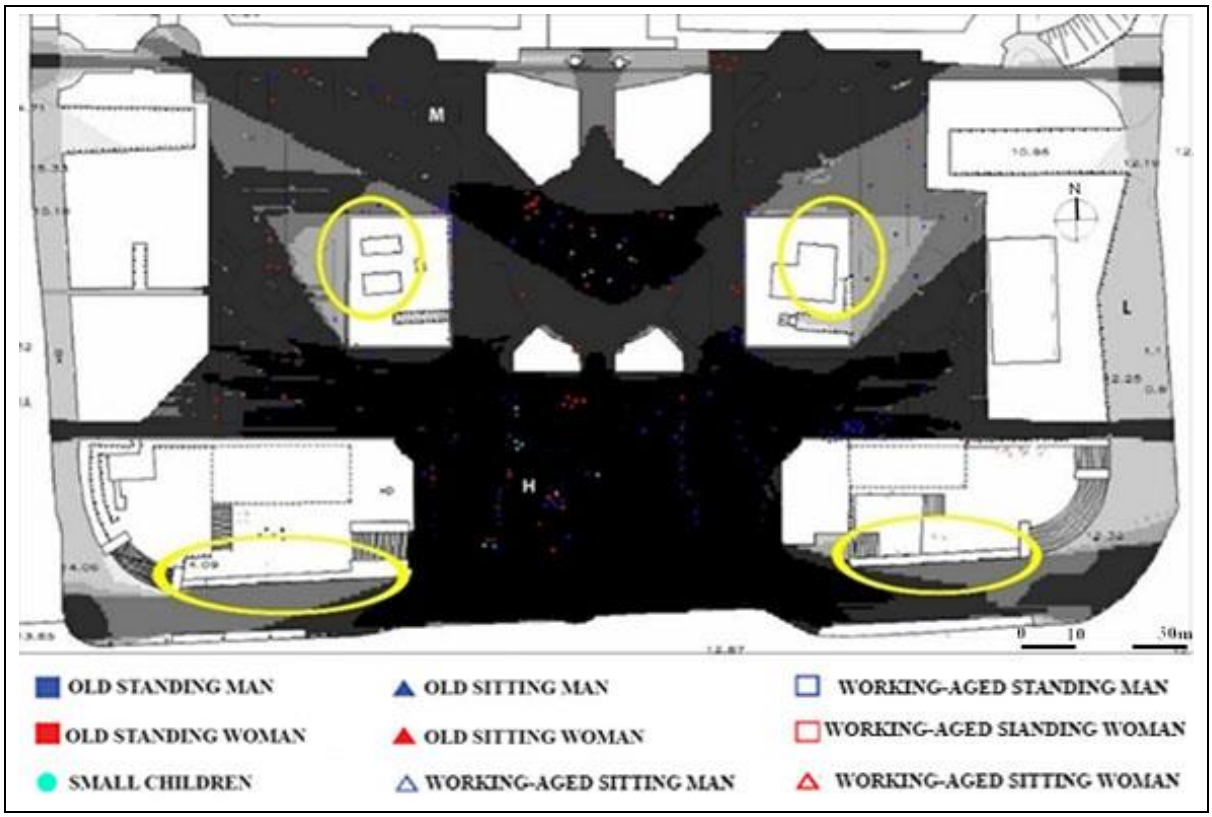


Fig. 6.38: The VGA map shows underused seats in People Park Front Square

Renwei Temple Square

Fig. 6.39: Renwei Temple Square; location close to the centre (left), low visibility area (right)

Renwei Temple Square has a simple layout of two main areas: the front yard of the temple (17 m by 80 m) and a quieter, secluded sub-space adjacent to the main street (see Fig. 6.40). The front yard of the temple lies between the main local street and an informal market at one end of a nearby urban village called Pantang. Therefore, there is always a good number of people crossing the front yard, which is also the visual core according to the VGA map. In addition, a

significant number of religious activities occur in the front yard such as praying and burning incense. A combination of people walking by and religious activities make the place vital and interesting and although there are almost no seats in the visual core, people accept discomfort to sit there. In, the more secluded sub-space that provides more seats remained underused.

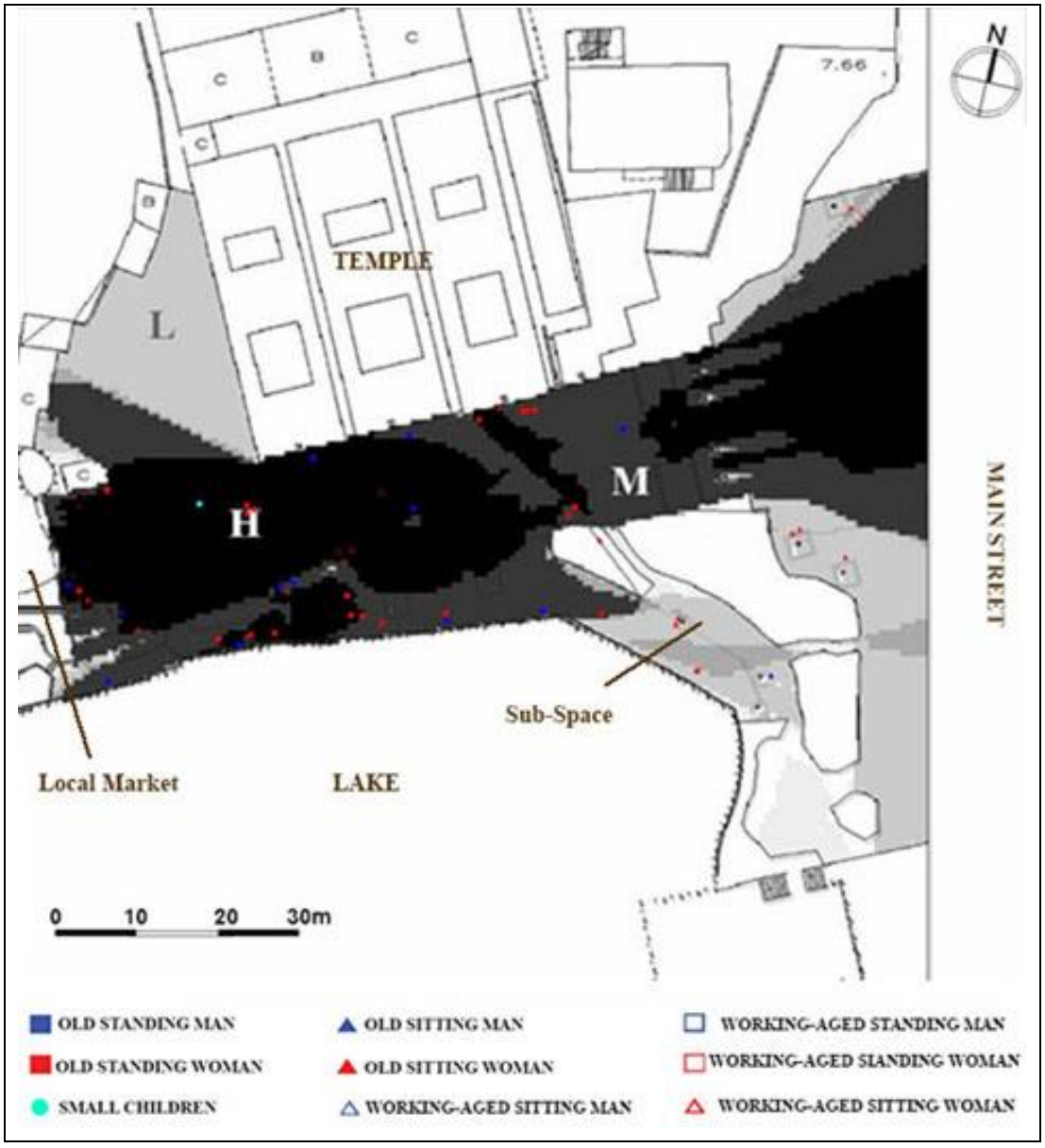


Fig. 6.40: VGA map of Renwei Temple Square

Tianmian Village Square

Fig. 6.40: Tianmian Village Square; Visual core (left); low visibility area (right)

Tianmian Village Square is one of the three samples whose visual core attracts the highest percentage of activities. Although this square does not have the visual core used as a movement route, it has seats arranged in a half circle which turn the visual core into a natural open stage of 30 metres in radius.

In off-peak periods, 56 % of babysitting activities took place within the visual core in contrast to only 14 % in low visibility areas. In addition, 77 % of exercising activities is also found in the visual core. Consequently, 49 % of sitting people were attracted to the centre of the square although the provision seats here are only 20 % of the total available (see Fig. 6.40 left). In contrast, low visibility areas attracted only 13 % of sitting people while providing 38 % of seats.

Tianmian Village Square shows an interesting point related to the position of gates. Fig. 6.41 shows the main gate of the square has an ideal location at the intersection of two local main streets. However, as it is located in a low visibility zone remote from the visual core, the square is less legible for people at the main gate, and thus is less used. In addition plenty of seats are provided close to the main gate but are highly underused. Compared with other samples, the main gate needs to be adjacent to main streets, but must also open directly to the visual core. The visual core functions not only as a place to host activities but also needs to be a place for navigation and looking for seats.

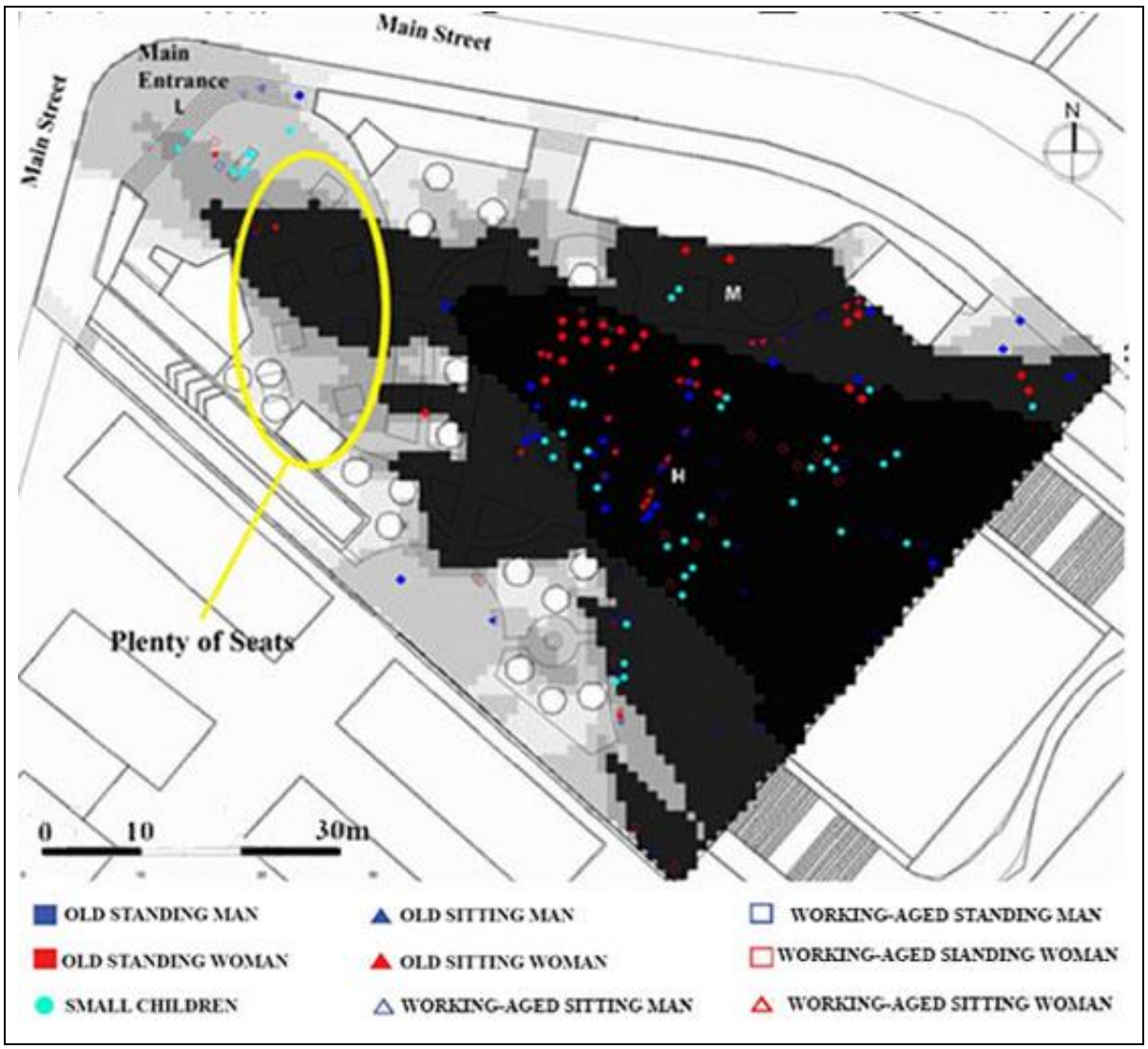


Fig. 6.41: Underused Seats in Tianmian Village Square

Theatre Square

Theatre Square is ranked among the 13 case studies as one of the two most successful public space in chapter five. Even in off-peak periods, the major activity was Chinese sports in groups of four or five, which contributed to about half of all activities. This group activity took place mainly within the high and medium visibility areas, leaving the low visibility zones empty during the day, with the only exception being a number of hours in the morning

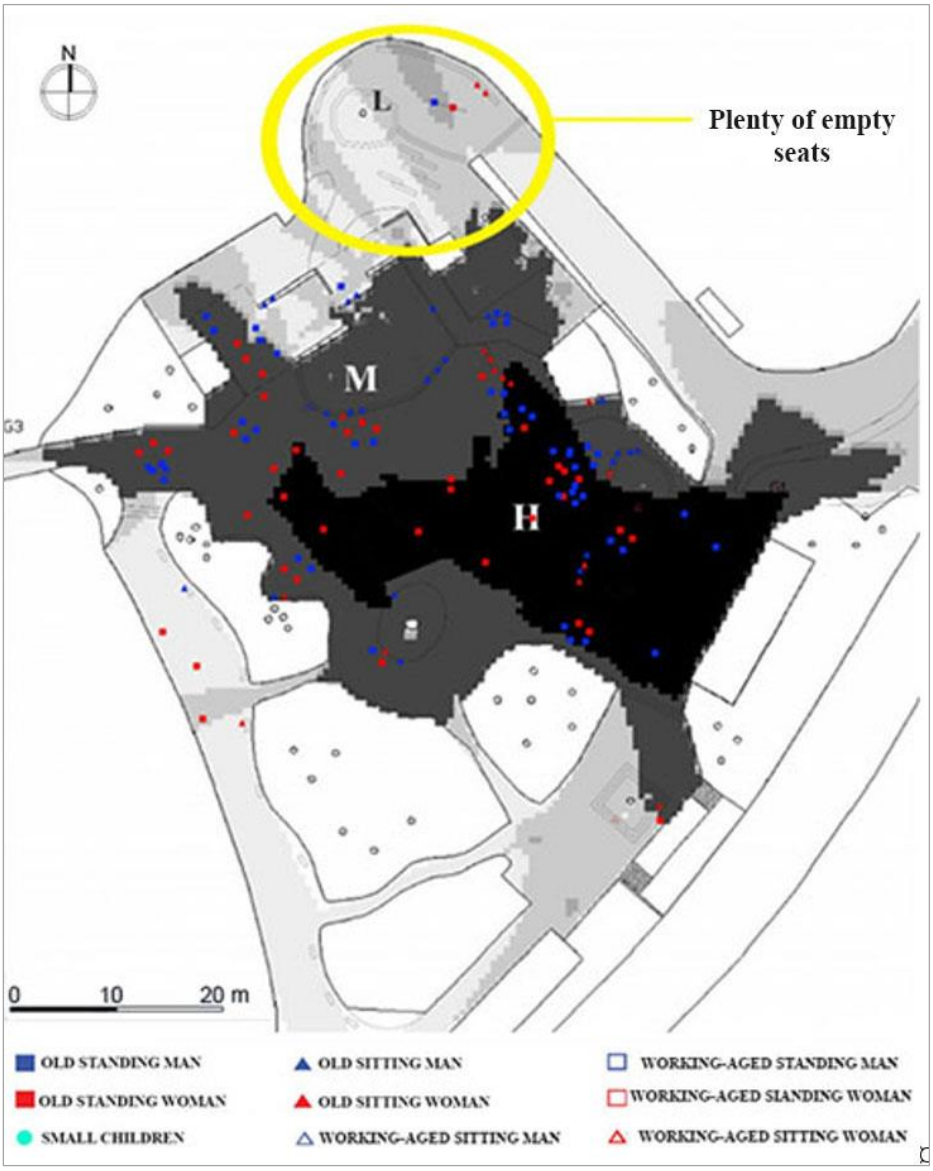


Fig. 6.42: Underused designated seats in Theatre Square

The centre of the space has a roughly circular shape (with radius of 15 metres) where seats are arranged looking towards the visual core, making a stage-like setting ideal for watching what is happening. Consequently, the majority of sitting people are found in medium visibility areas (57 %), but close to the visual core. In addition, while the number of seats provided in low visibility areas is twice that in high visibility areas, 30 % of sitting people were found inside the visual core compared to only 13 % in secluded areas (see Fig. 6.42).

Chen Academy Square

Fig. 6.43: Chen Academy Square

The case of Chen Academy Square was previously mentioned when examining the provision of seats. The visual centre of the space includes a large part of the physical centre, which is primarily composed of a huge square (60 m by 60 m) paved with rich decorative stones. Interestingly, the VGA map in Fig. 6.15 shows that most activities took place within the visual core or very close to it, making the visual core as much preferred as the medium visibility zones (each attracting 39 % of total users). Although there are virtually no seats in the visual core (only 2 % of total seats), it still attracted 36 % of sitting people. In fact, many users brought their own movable chairs or simply sat where possible despite a high degree of discomfort in order to have a good view. The high level of informal sitting inside the visual core can be seen as an indicator of the strong preference for this location.

Dongmen Market Square

Dongmen Market Square demonstrates an innovative design solution for public squares in China, by providing two slightly raised platforms that can serve a multitude of uses. The edges of these platforms can be used as seats with flexible orientation towards the inside and the outside. The raised and protected area within each platform is an ideal playground for children. The use of colourful mosaics as paving materials makes these platforms eye-catching objects in the space. In addition, the use of high canopied trees which provide shade but do not impair visibility is highly effective (see Fig. 6.45).

Fig. 6.44: Dongmen Market Square

Regarding visibility, Dongmen Market Square demonstrates that seats in high visibility zones or the centre of the space are prioritised by users. The visual core in fact attracted nearly 40% of sitting people, slightly lower than the percentage of people found in the medium visibility zones. However, the map in Fig. 6.45 shows that the majority of sitting people in medium visibility areas are close to the visual core around these two platforms. Consequently, only 8% of people sit in low visibility zones, in spite of there being plenty of seats available in these.

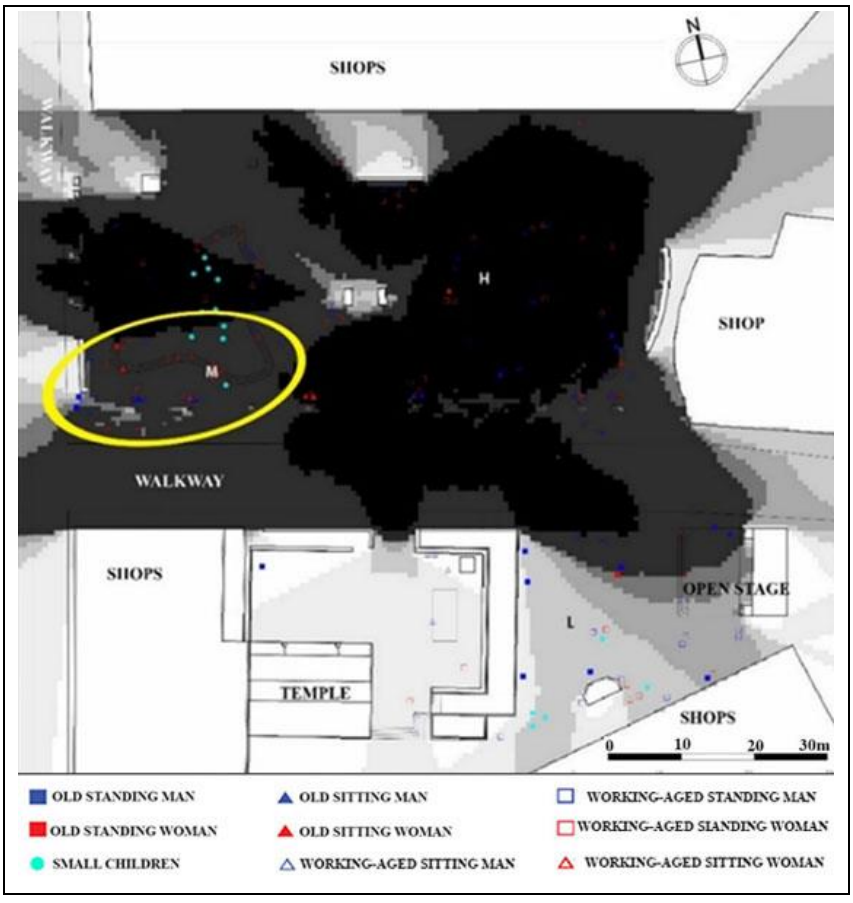


Fig. 6.45: Preferred sitting locations closed to the visual core

6.5.2 Small and medium-sized squares with underused visual cores

King Plaza

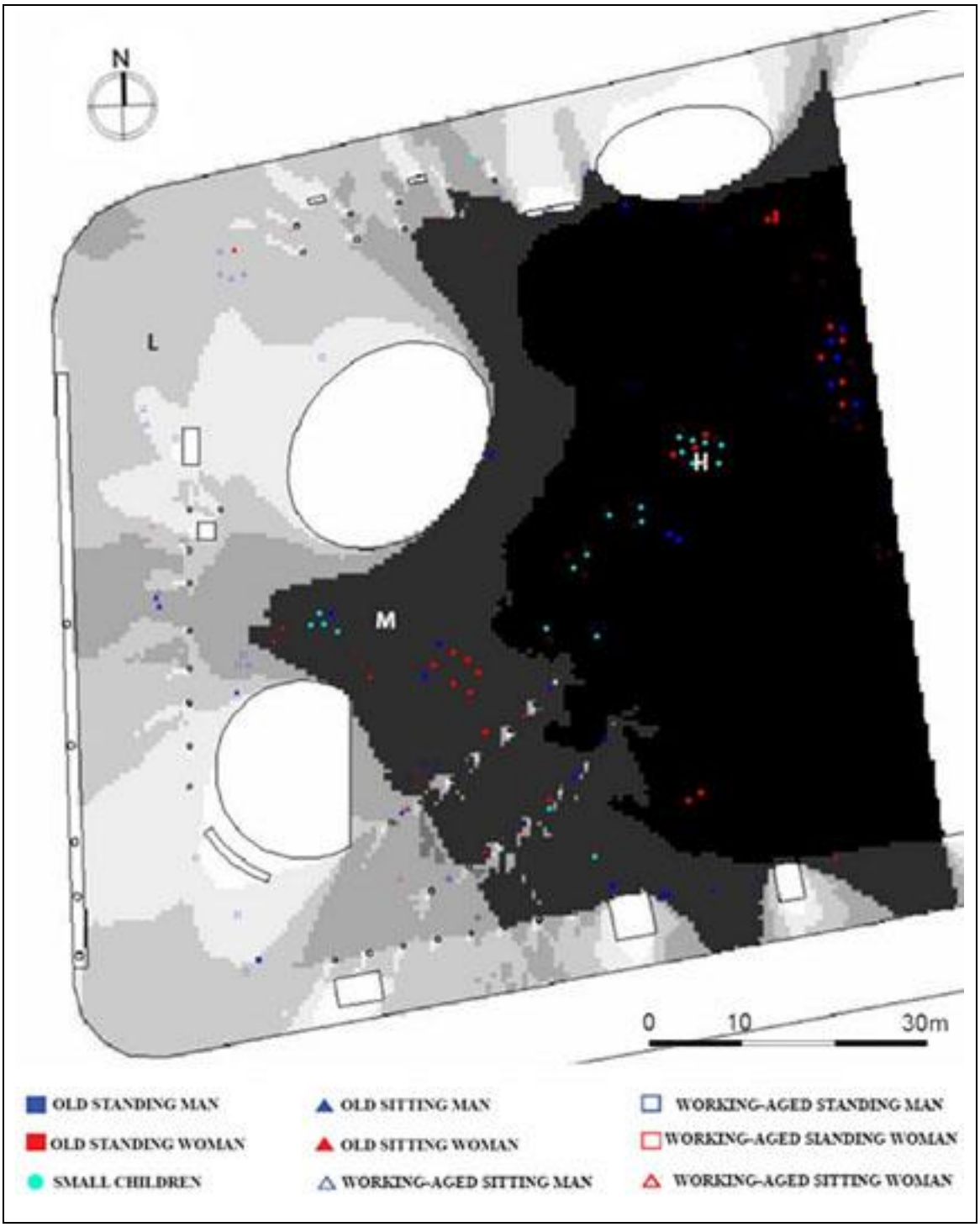


Fig. 6.46: King Plaza VGA-Activity maps

King Plaza is primarily composed of five large oval shapes (enclosed buildings) and an organically shaped light well. These large elements are unable to generate positive spaces, thereby contributing to the lack of a strong central focus for the space as a whole. Many seats

are positioned in the low visibility areas, whereas inside the visual core, there are few sitting options, except for the seats provided by an adjacent cafe for its customers.

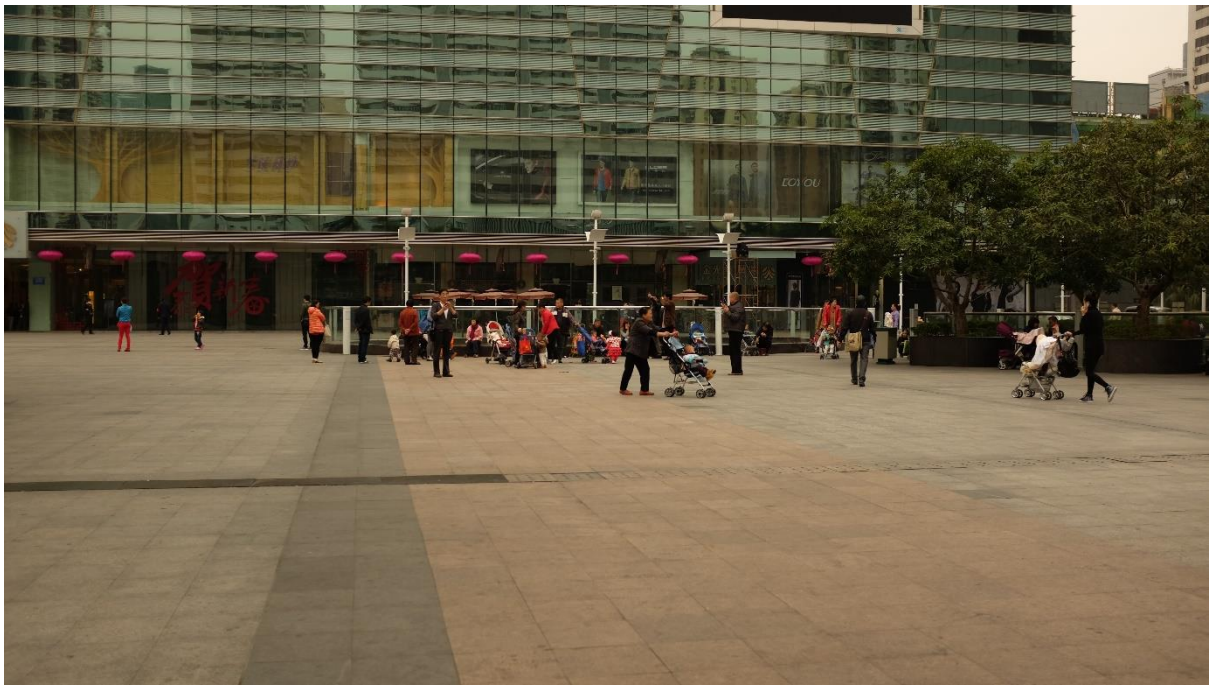


Fig. 6.47: Lack of seats at the visual centre of the space

Despite the lack of seats at the centre, people with small children still concentrated inside the visual core, fomring 74 % of this activity. Some of them brought their own moveable chairs, but most people accepted the discomfort from lack of seats (see Fig. 6.47) to be in the centre of the space, rather than at the edges. In short, with the lack of seats, while only 8 % of sitting occurs in the visual core, it is still the place where two thirds of other active activities including exercising and babysitting occur.

Liwan Lake Square

Liwan Lake Square is situated at a traffic intersection within Liwan Park, with a predominant pedestrian flow through the space during the day. In fact, the pedestrian flow crossing the visual core has the potential to turn it into an interesting place for sitting people. Nevertheless, more than half of tthis area (70 m by 30 m) is grass and is not allowed to be crossed. (This rule might not apply to all squares. In Chen Academy Square, users were recorded sitting and walking on grass during the day without this being a problem). In addition, there are virtually no seats at

the edge of this grass “island”. Consequently, static activities taking place in the visual core contribute to less than 10 % of total activities. However, 30 % of the babysitting activity still occurred in the visual core (the black area marked with H in Fig. 6.39), with a large percentage occurring adjacent to the grass.

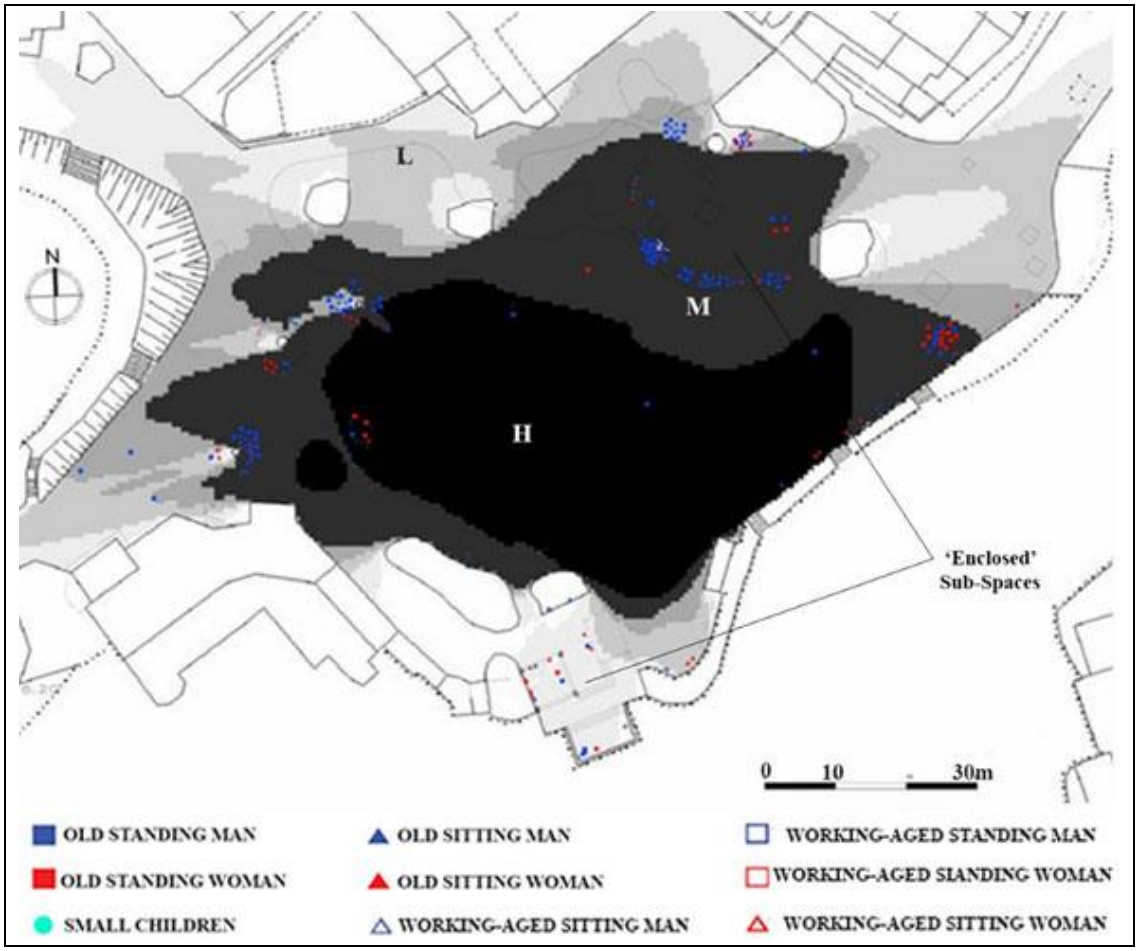


Fig. 6.48: Liwan Lake Square VGA-Activity maps

Fig. 6.49: Liwan Lake Square: Large part of visual core (left); Babysitting inside the visual core

Having failed to capitalise the potential of a pervasive pedestrian flow and the existence of babysitting activities occurring at the centre of the square, the visual core remained nearly

empty most of the time. Hence, people are distributed to sub-spaces where there are more seats available.

Bridge Square

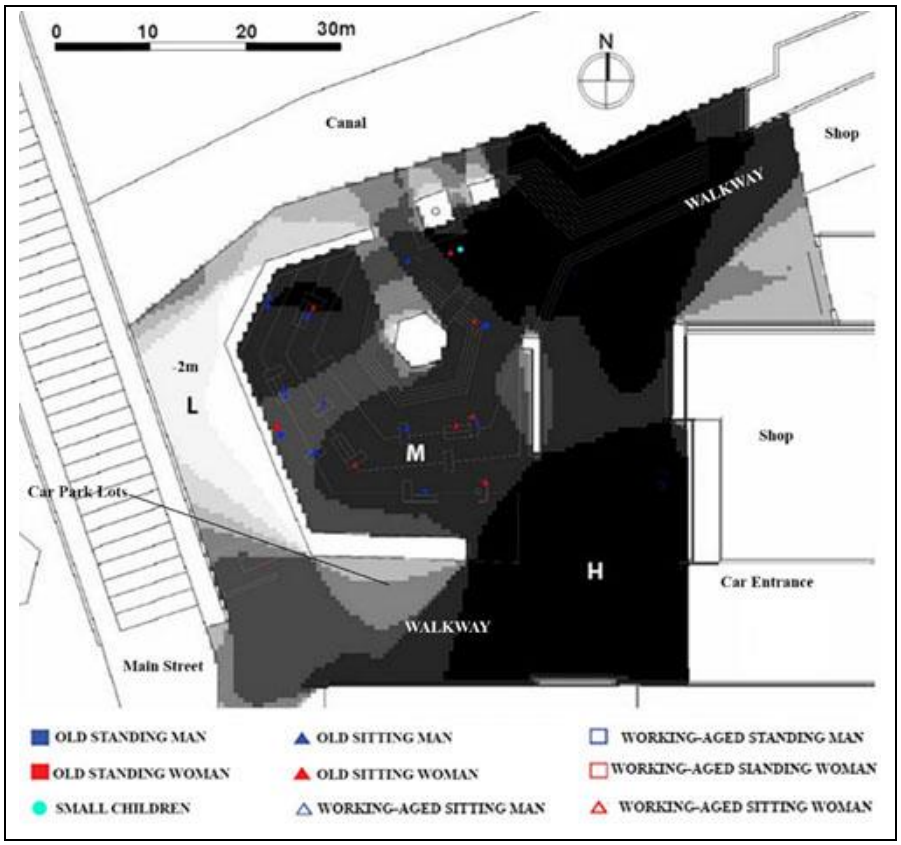


Fig. 6.50: Bridge Square VGA-Activity map

Bridge Square is the second smallest square of the 13 case studies. It includes a walkway that separates the main area of the square from adjacent buildings. The VGA map in Figure 6.50 shows the visual core of the space is largely composed of two parts of the walkway from which a big part is shared with a car entrance to a nearby restaurant. In this circumstance, the visual core is primarily used for traffic purposes rather than as a place for social interaction. Consequently, the majority of users are concentrated in medium visibility areas, which contain more than half of all activities.

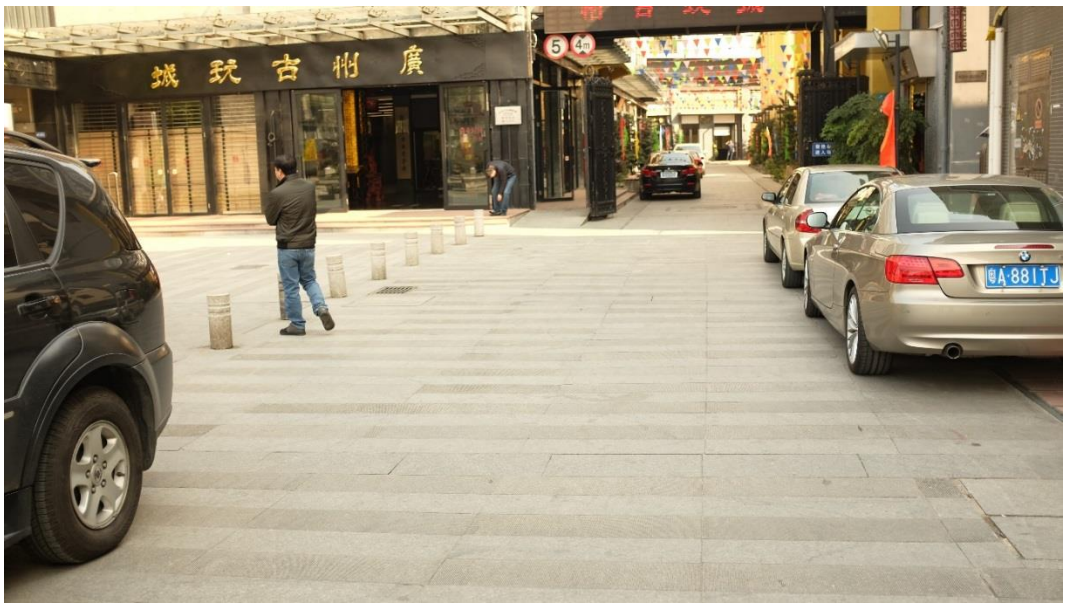


Fig. 6.51: Car parking occupied the visual centre of Bridge Square

Xiasha Village Square

Fig. 6.52: The lack of seats in Xiasha Village Square

Among the five public squares in urban villages, Xiasha Village Square is the largest. Its visual core (the H black zone) alone is about 130 metres long and 25 metres wide. Similar to Liwan Lake Square, a large part of the visual core is unusable as in this case it is part of a fenced football field. The problem of Xiasha Village Square is not a small number of users. Instead it attracts a great number of static users during the day. However, because there are virtually no seats in the visual core, sitting people distribute themselves towards the edges (see Fig. 6.52).

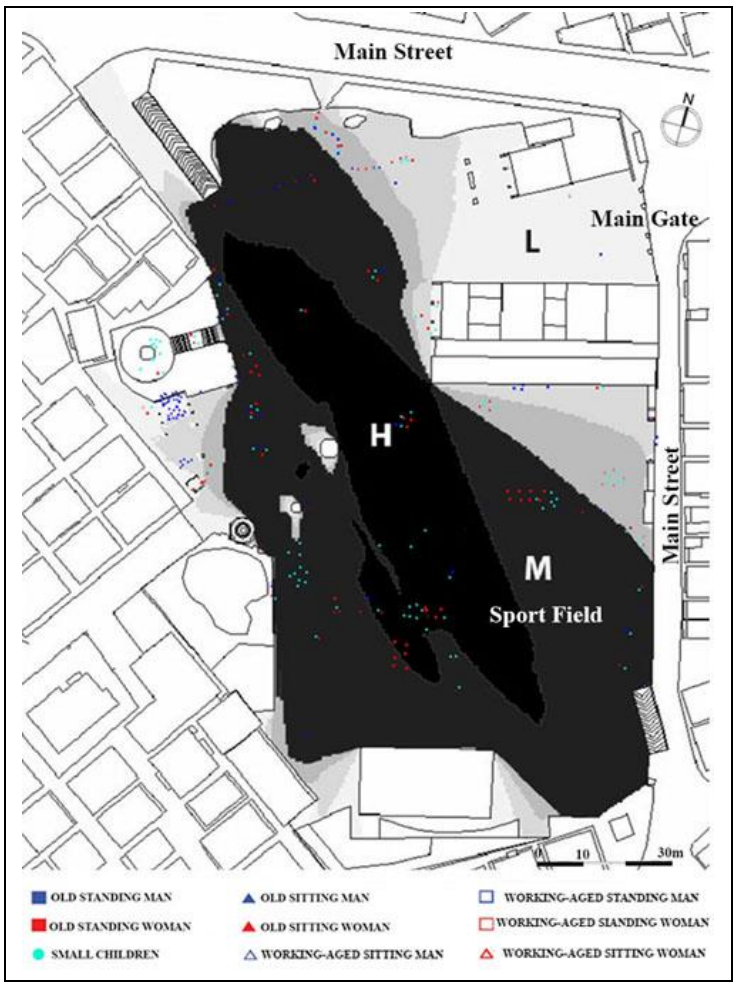


Fig. 6.53: Xiasha Village Square VGA-Activity maps

In addition, the design of the square seems problematic as both gates adjacent to the busiest street are found in the low visibility area, remote from the visual core. This means that while having a very large visual core, this is not easily seen from the main streets by people passing by.

Huanggang Village Square

Huanggang Village Square has similar problems to Xiasha Village Square, with a very large and empty centre. The visual core of the square alone is an approximate circle with a radius of 30 metres. Right at the middle of the visual core, there is a huge fountain that is fenced to keep people away from the water (see the left photo in Fig. 6.54).

Fig. 6.54: Inadequate distribution of sitting places in Huanggang Village Square

According to the data, most static activities occurred in the medium visibility zone (53 %) compared to only 15 % in the visual core. However, Fig. 6.55 shows that the majority of static activities including sitting still occur close to the visual core.

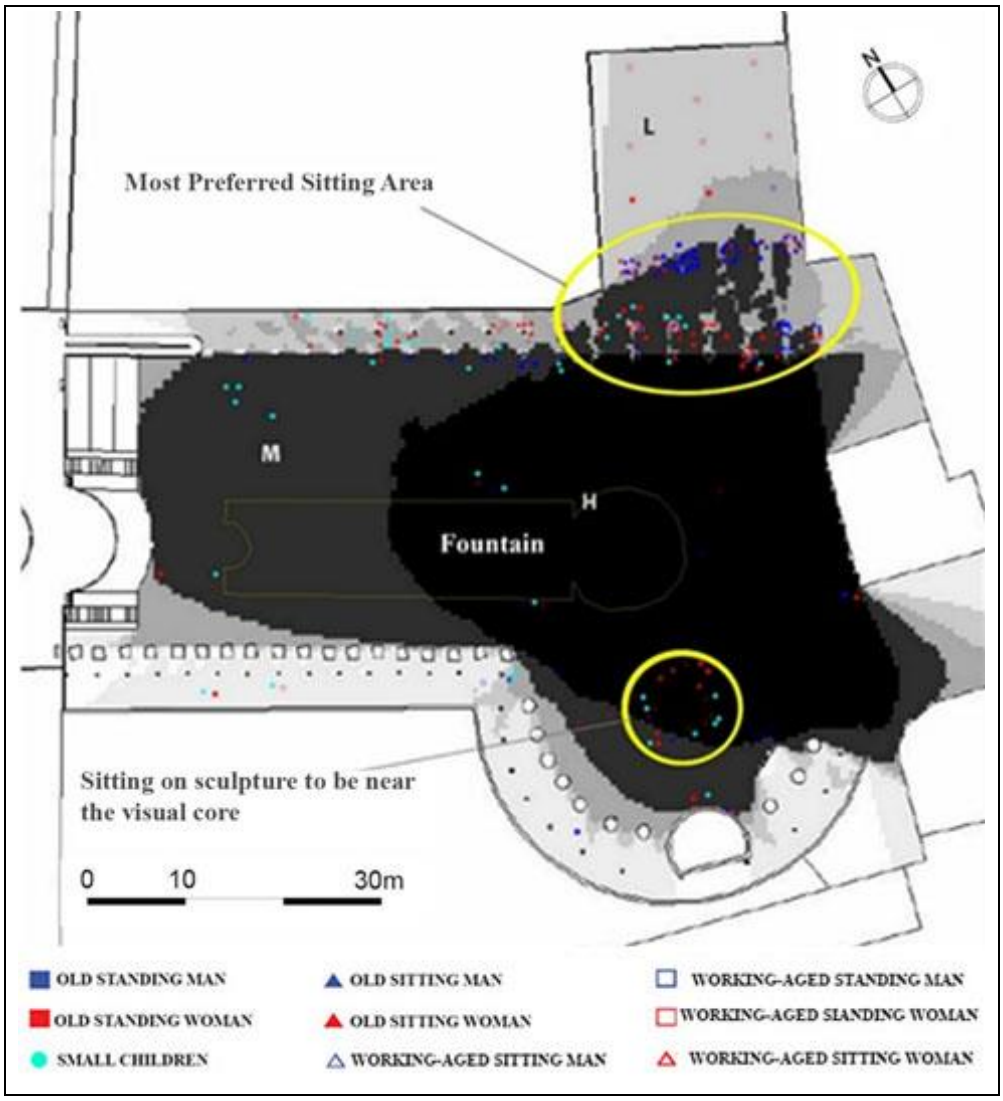


Fig. 6.55: Preference for location close to the visual core in Huanggang Village Square

Shangsha Village Big Square

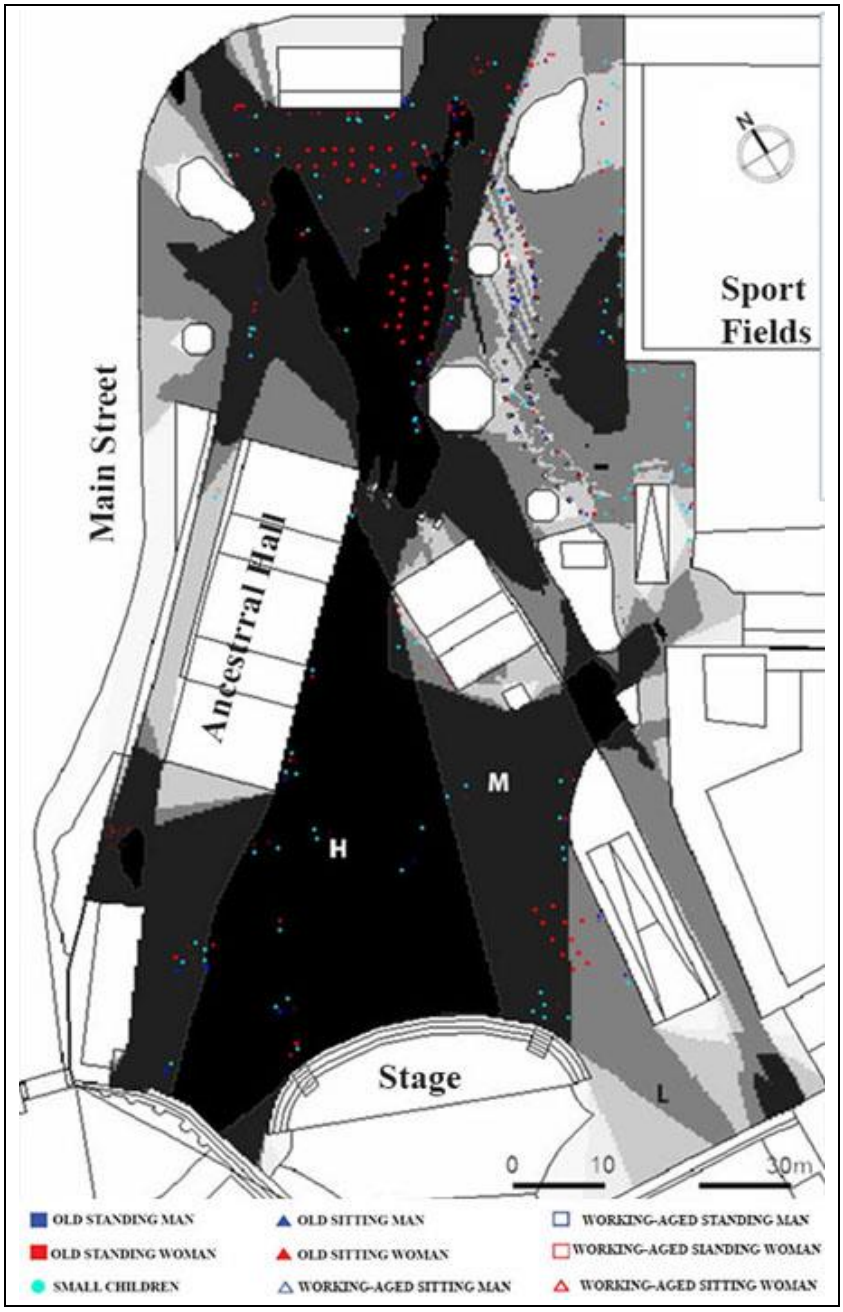


Fig. 6.56: VGA map of Shangsha Village Big Square

Shangsha Village Big Square is ranked the second most successful square in the sample. There are sufficient seats for group users and it attracts a great variety of informal activities. The layout of the square can be divided into the northern and southern parts. While the northern seems a vibrant place (see Fig. 6.57), the southern part appears problematic.

Although the southern part of the square attracts a good number of babysitting activity users, there are few seats provided in this area. Consequently, people clustered along the edges of ancestral halls to find a place to sit (see Fig. 6.57).

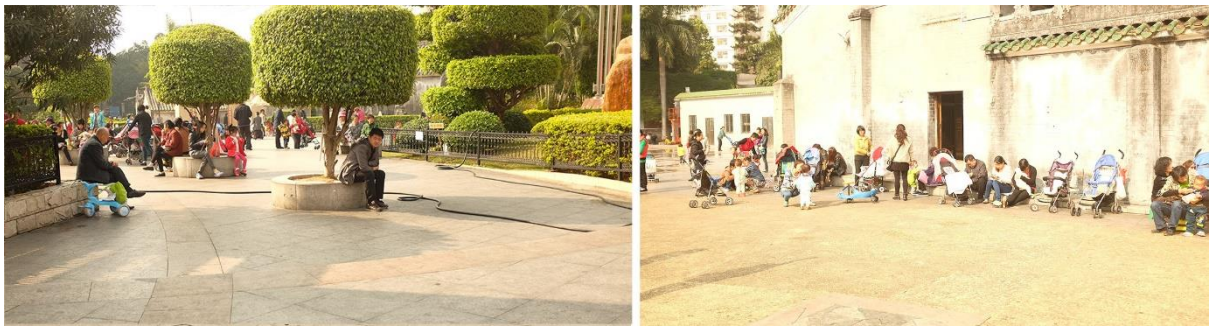


Fig. 6.57: Shangsha Village Big Square: Northern part (left); Southern part (right)

The existence of the open stage in the southern part of the space with its need for a spacious setting could be the reason for the limited number of seats provided. However, simply placing sitting opportunities along the ancestral hall would improve the situation without interfering with the setting of the stage.

Shangsha Village Small Square

Shangsha Village Small Square is the smallest space in the sample, and the square is crowded during the day. The visual core of the space attracts the majority of people exercising, and also a moderate number of babysitting activities. However, what could make the visual core disliked by sitting users might be related to the major activity of the space (50 % of all activities are playing cards), especially in off-peak periods,. This activity requires group sitting and preferably occurs in the most secluded places. Although the edges of this space have insufficient group seating, with additional chairs, people can easily change this setting to facilitate card-playing activities.

Examining the 13 case studies, it seems that small and medium-sized public squares are likely to be animated because of the presence of eye-catching active group activities at the visual centre of the space throughout the day, without having any additional amenities such as shops

or cafes. Furthermore, public squares with well-used visual cores often achieve one of two additional characteristics: “sufficient” provision of sitting places within the visual core and/ or a pervasive pedestrian route crossing the visual centre of the space. The flow of pedestrians could neutralise the public gaze possibly felt by sitting people at the centre of public space. In contrast, public squares with underused visual cores might have active activity groups, but often lack both of these additional conditions.

6.6 Discussion and Conclusion

6.6.1 Discussion

This chapter is set out as an extension of chapter five in which the focus is placed on the spatial patterns or location preferences of different demographic and activity groups in small and medium-sized public squares in China. The findings also highlight how different groups behave differently, and hence have different location preferences in public space. The findings in this chapter challenge many well-accepted assumptions in existing Western literature about the use of public space such as the edges, the island effect and the theory of prospects and refuges. They are also of practical relevance as they can be used to fine tune the spatial layouts of small and medium-sized Chinese public squares by optimising the size of the (visual) centre and the placement of sitting opportunities.

First of all, from De Jonge to Whyte, the edges are argued to be the most preferred locations in open public space, as from there people have good views of the whole space and feel both visually and physically protected. In addition, according to Whyte, the view of adjacent pedestrian movement from the edges makes these the best locations for “people-watching”. This finding might be true in the Western context, but this research does not confirm its relevance in China. Instead, as documented in chapter six, sitting places in highly visually exposed areas (the visual centre) are used four times more frequently than in other locations including much of the edges. The preference for the centre over the edges is evidenced even in

open squares without any fences or gates. It seems the location preferences in Chinese public squares are shaped by the nature of activities and the interaction between passive and active activities. Group (active) activities such as babysitting and exercising require spacious but safe locations; hence they tend to occupy the (visual) centre of the space. In turn, the customary presence of these eye-catching activities tends to turn the centre into the "hotspot" of the space and this attraction far outweighs that of adjacent pedestrian movement or edge activities. Consequently, passive public space users including people sitting are likely to situate themselves close to the centre. The significant difference between public squares in the West and China lies in the different location of action hotspots. In the West, the action occurs adjacent pedestrians and particularly at active edges whereas in China the centre of the space is where the most eye-catching activity occurs.

The finding that Chinese public space users prefer the exposed over secluded areas, or the centre over the edges also challenges the relevance of the "prospects and refuges theory" of Appleton (discussed in chapter three). The finding from this thesis suggests Appleton's theory might be correct in the Western context where many users are individuals and strangers to each other. However, the majority of public space users in China are people in big groups. Hence, their fear of the "public gaze" might not be the dominant factor driving the choice of location.

Furthermore, previously choice of location has been thought to be significantly affected by gender. In other words, according to Whyte and Mozingo, women tend to situate themselves in more secluded areas for a "backyard" experience, in contrast to men who prefer busy areas for social interaction. However, this thesis has shown the opposite trends in China as a significant number of female users have selected visually exposed areas and many male users have tended to be in secluded locations. These findings do not totally contradict previous findings, but rather suggests the type of activity rather than gender determines users' choices of location. For example, when playing chess/cards both male and female users tend to select

the most hidden locations, whereas when playing with small children or exercising, both genders tend to occupy the visible areas.

Apart from being theoretically relevant, the findings in this chapter are also useful for the design of small and medium-sized public squares, including the placement of sitting opportunities and the optimisation of the size of the visual centre. First, the findings in this chapter suggest that the distribution of designated seats is not well aligned with the location preferences of the users. In particular, 45 % of seats are in medium visibility areas, followed by 38 % in low visibility areas and only18 % in the visual centres. However, when examining the occupancy ratio of sitting places in these three visibility zones, the analysis shows that sitting places in high visibility locations are four times more likely to be used than those in the other two locations. In addition, in nearly half of the 13 small and medium-sized public squares, the percentage of sitting people in high visibility areas (42 %) is twice that of secluded locations (20 %). Therefore, to meet the users' needs and maximise the use of sitting places, an adequate number of seats should be placed in high visibility instead of secluded areas.

Second, while chapter five defines the range of good size for small and medium-sized public squares as 3,000 to 6,000 m^2 of paved area, the findings in this chapter further concretises the "optimal" size of their visual centre, as this has to accommodate different groups at the same time, but should not be too large to appear deserted at other times. Through an analysis of both well-used and underused visual centres in the 13 small and medium-sized public squares, those ranging from 1,200 m^2 (30 m by 40 m) to 1,800 m^2 (30 m by 60 m) are likely to be animated most of the time. In addition, squares with a centre of less than 800 m^2 are likely to be overcrowded, whereas they tend to be underused and empty when their centres exceed 2,800 m^2.

The findings in this chapter are relevant to both theory and practice. They highlight the importance of the centres and the collective use patterns of small and medium-sized public squares in the Chinese context. The conclusion below, briefly summarises the major findings.

6.6.2 Conclusion

The Location preference of different demographic and activity groups

- The location preference in small and medium-sized public squares in China cannot be explained simply in terms of the edge and island effects as in the case of Western examples. Each user and activity group seem to have different location preferences. Some prefer highly exposed areas, whereas others like to be in secluded areas. However, Chinese public space users overall seem to prefer medium visibility areas which are close to the visual centre of the space.

- In contrast to the existing literature, the case study data suggests that Chinese female users prefer high over low visibility areas, whereas the opposite is true for men. In addition, there is no difference between working-aged and elderly users regarding their location preferences as both these groups slightly prefer high over low visibility areas. Furthermore, a sharp contrast can be drawn between individuals and group users. In other words, individuals are likely to avoid highly exposed areas, whereas group users tend to locate themselves away from secluded areas.

- Highly exposed areas are preferred by active activities including “exercising” and “babysitting”. In contrast, secluded areas are the first priority for “playing chess/cards” activities.

- Finally, it appears that the nature of different static activities is a stronger driver for their distribution rather than other demographic factors such as gender or age.

Evaluating the distribution of designated sitting places and the visual impact of gates

- The preference for high visibility areas is revealed by the high occupancy ratio of sitting places. Overall, sitting places in highly exposed areas are likely to be used four times more than those in other locations.

- The current distribution of sitting places in the samples does not reflect Chinese location preferences as more seats are provided in low visibility areas than in the (visual) centre of the small and medium-sized public squares.

- The gates influence the choice of location inside public squares in China. Overall active activity groups prefer high visibility locations and also those that can bee seen from the gates, whereas the opposite is true for "playing chess/cards". In addition, the working-aged and elderly users tend to situate themselves slightly differently in regard to the gates. More than half of working-aged users prefer locations with medium visibility that are not too exposed, but at the same time are not too hidden from the gates. In contrast, elderly users were distributed more evenly across the space.

Factors mitigating the island-effect of the centre of small and medium-sized public squares

- While small and medium-sized public squares are likely to be animated simply because of the presence of active activities at the visual centre, public squares with well-used visual cores often have two additional aspects: sufficient sitting places within the centre and/or a moderately used pedestrian route crossing it.

- The comparison of squares with well-used and underused visual centres suggests an ideal size of 1,800 m^2 to 1,400 m^2. Visual centres exceeding 2,400 m^2 will lead to less animated spaces.

This chapter along with chapter five provides many insights into the static use and design of small and medium-sized public squares for China. Chapter five studies the users, their activities and the impact of spatial properties on the use of the space, such as size, the existence of fences and gates and the provision of sitting places, whereas chapter six focuses on the impact of visibility on the choice of locations of different groups. As the use of public space is conceptualised as having static and transient uses, the next chapter investigates transient use patterns and their relationship to the design of circulation within a public space, as well as connections to the surrounding urban grid configuration.

CHAPTER SEVEN

TRANSIENT USE PATTERNS AND THEIR RELATIONSHIP TO STATIC USE, DESIGN OF CIRCULATION AND URBAN GRID CONFIGURATION

7. 1 Introduction

7.1.1 Aim and scope

This chapter sets out to answer the third research sub-question:

> *What are the patterns of transient use and what is the relationship between transient use and the design of circulation as well as the urban configuration?*

It is suggested that transient use is necessary and to a great extent determines the static use of public space. Given its importance, this chapter aims to provide information about the patterns of transient use and its relationship with static use. This chapter also investigates the impact of the circulation design and urban grid configuration on the levels of transient use and static use of public space. To do this the following methods are adopted: the "gate method" to quantify the density of movement or the levels of transient use, and the "movement-tracing" method to identify major movement routes inside a public space. In addition, axial mapping, a space syntax technique, is adopted to measure the degrees of accessibility or the strategic value of each public square as generated by the urban grid configuration of Guangzhou and Shenzhen, respectively. Correlations between strategic values and levels of movement and use are

calculated using bootstrapping, a statistical technique to overcome the small sample size. By analysing the correlation between the strategic value and levels of transient and static use, insights into how the levels of usage of small and medium-sized public squares are determined by the surrounding urban configuration are provided.

7.1.2 Overview

This chapter is organised into four main sections. Section 7.2 analyses the circulation design of small and medium-sized public squares in China. It identifies cultural and historical factors that constrain the design of legible pathway systems in these spaces. An evaluation of the circulation of all the case studies is conducted. Based on the results of this evaluation, the13 small and medium-sized public squares are divided into two groups: (1) centric spaces; and (2) enclosed spaces, a notion borrowed from French (see chapter 3, section 3.5.1). A centric space is a space that contains a simple, legible circulation, making it easy to move through. In contrast, an enclosed space tends to have a highly circuitous and complicated circulation so that pedestrians might prefer to go around the space instead of crossing it.

Section 7.3 uses the gate-method and movement tracing techniques to examine transient use patterns, including the density of movement, the demographics of moving people and major movement routes. This section investigates the relationship between transient use and adjacent pedestrian movement and static use of the two public space types (centric and enclosed).

Section 7.4 examines the impact of the urban grid configuration on the levels of transient and static use of public space using the axial map technique. In this section, the degree of accessibility of a public space is defined as the sum of integration values of all axial lines that interface the body of this space. The degree of accessibility generated by the urban grid configuration is also called the “strategic value”.

Section 7.5 describes the transient use patterns of each of the 13 case studies and their relationship with static use and the circulation design. Through case study analysis, this section highlights the preference for the enclosed type of public square in China and the implications of this for the degree of publicness and the diversity of users.

The final section discusses major findings and concludes by summarising the results of the previous sections.

7.2 Circulation Design of Small and Medium-sized Chinese Public Squares

According to the many design guidelines for public space discussed in chapter three, the circulation should be simple, legible and have a direct movement route crossing the centre of the space. In addition, the internal circulation of public space should be well integrated into the surrounding movement network. However, in China, the tradition of building fences and gates around spaces, and the preference for circuitous circulation patterns might create a negative impact on transient use of the space. The focus of this section is to investigate the movement within public squares and to identify factors that constrain the circulation design.

7.2.1 Typical factors affecting the design of circulation system and their impacts

From the analysis of 13 samples of small and medium-sized public squares, the following factors appear to affect the design of their circulation: the irregular shape of the site, the concentration of multiple large structures into a public square, the preference for circuitous pathways, and the use of fences and gates as part of a tradition that tends to create public space as an isolated cosmos.

The irregular shape of the site

Public squares often have a clear geometric shape, and often an approximate square or rectangle. However not, this is not the case in Guangzhou and Shenzhen where only 4 of the

13 samples have a clear, simple shape. These are People Park Front Square in Guangzhou, and King Plaza, Tianmian Village Square and Shangsha Village Small Square in Shenzhen. The remaining nine public squares have zig-zag boundary lines. With such irregular shapes, it is difficult to see these public squares as a whole. Furthermore, in many cases, no walkway is provided along the physical boundaries of these public squares, thus making them difficult to access, not to mention to impact of building fences around them.

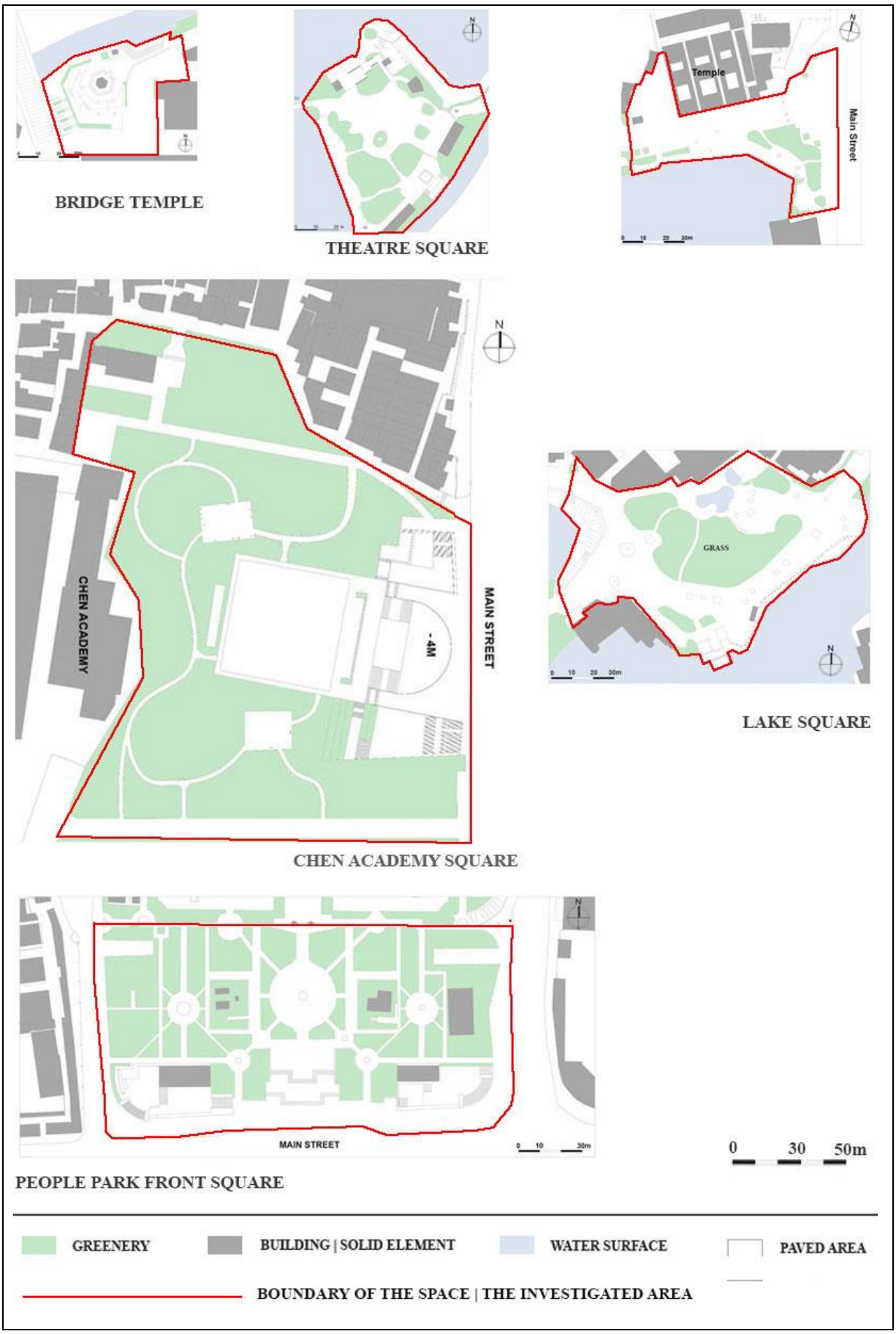


Fig. 7.1: Boundaries of public squares in Guangzhou

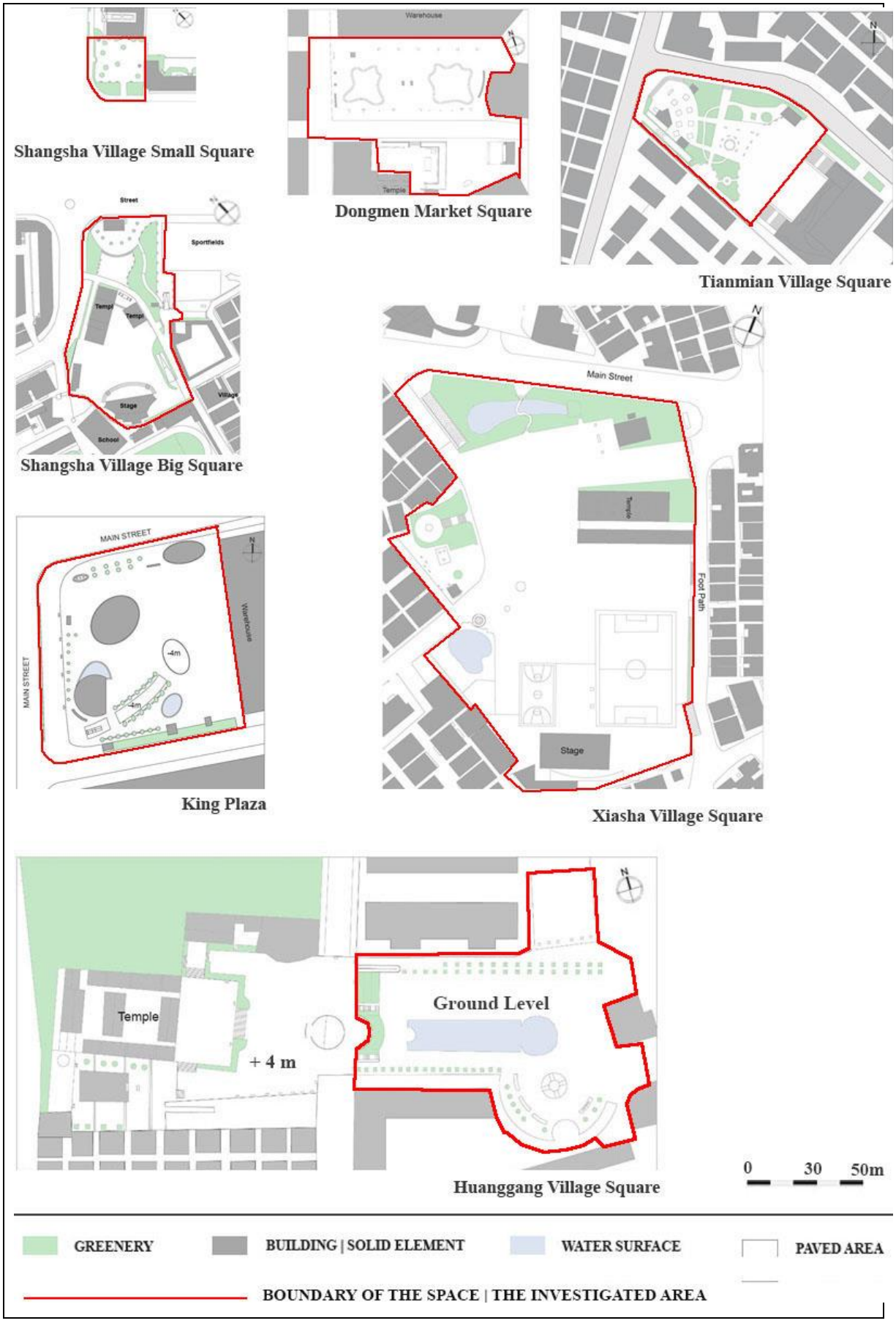


Fig. 7.2: Boundaries of public squares in Shenzhen

A possible reason that might explain the irregular shapes of these spaces is that public squares were not initially planned in many parts of Chinese cities. They have only been added over the last decades when the cities were already crowed. The shape of the public space that developed in this way is the result of a negotiation between the local authorities and private home owners, which often results in the unexpected and irregular shapes. The development of Chen Academy Square and Bridge Square are good examples of this kind.

The irregular shape can also result from a planning process that does not recognise the importance of the accessibility and visibility of public space. For example, in many newly redeveloped urban villages, although the old urban fabric was totally wiped out, the shapes of their public squares are often irregular. It appears that the area of the square is what is left after all other residential dwellings are built.

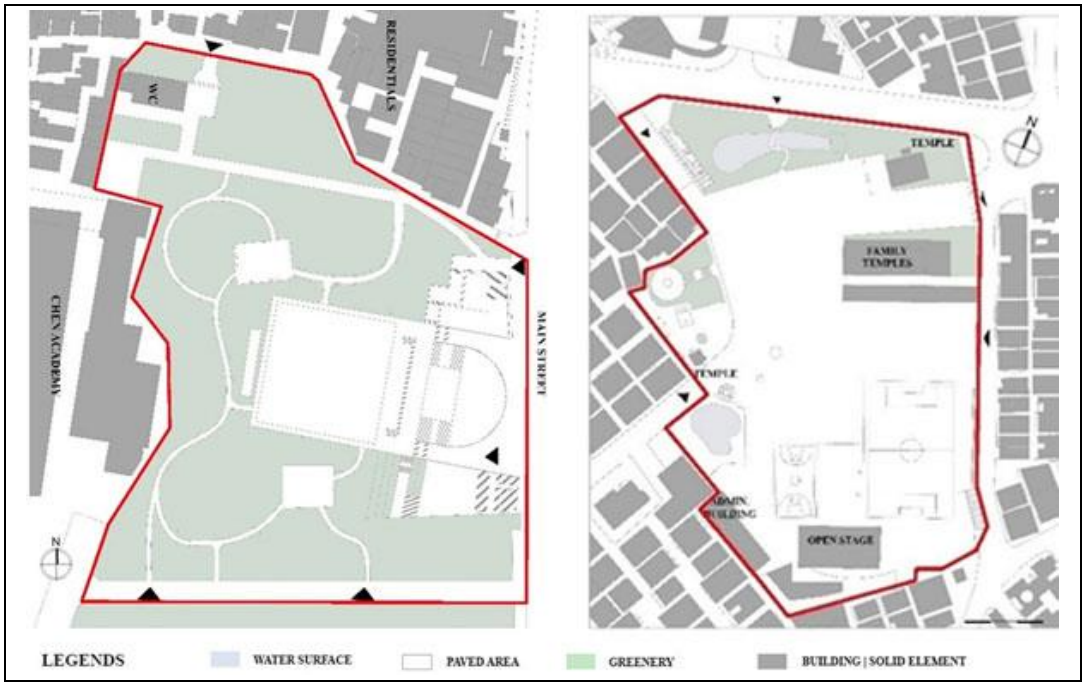


Fig. 7.3: Chen Academy Square (left); Xiasha Village Square (right)

The concentration of many occasionally used public facilities

Unlike monumental civic squares, small and medium-sized public squares, especially those in urban villages, often include large structures such as ancestral halls, open stages, underground car parks, administration or technical buildings and sports fields (see Fig. 7.4).

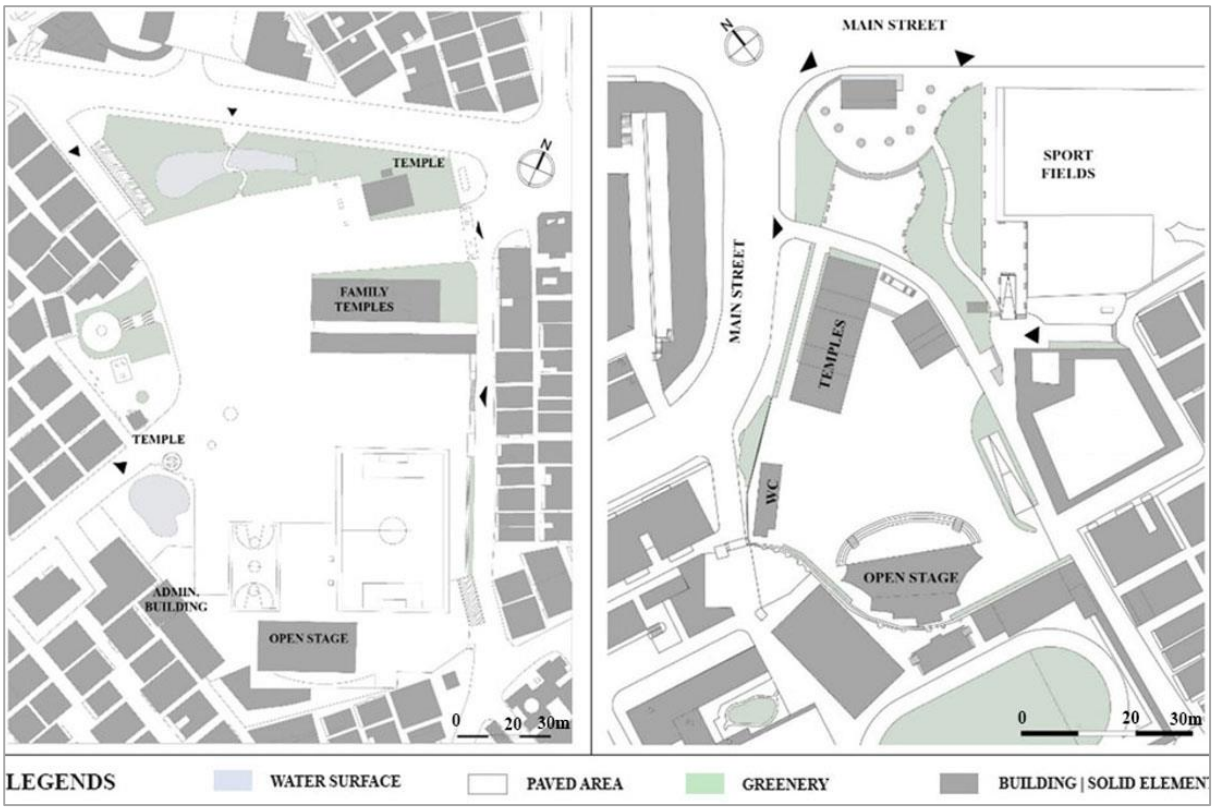


Fig. 7.4: Multiple public facilities inside public squares in urban villages

More importantly, the location and orientation of some of these structures could result from feng-shui theory, especially that of ancestral halls[26] and gates. These two factors together appear to constrain the design of the circulation in public space, making it difficult to create a simple and legible circulation pattern. The position and long narrow form of the ancestral halls make the main gate invisible from many other locations inside the space (see Fig. 7.4). However, when placing these elements along the edges, these facilities become obstacles to visual connection between inside and outside the space.

The problem is that many facilities such as open stages and sports fields are only used occasionally, but seem to have great impact on the daily use patterns. In the case of China, especially in urban villages, it would appear that providing multiple smaller squares in order to decrease the number of public facilities in each square might be a good alternative to the current situation.

[26] The spatial arrangement of ancestral halls is along an axis whose orientation is determined by feng-shui theory. The long and narrow layout with access available only on one side might add further difficulty for designers.

Circuitous pathways inside the space

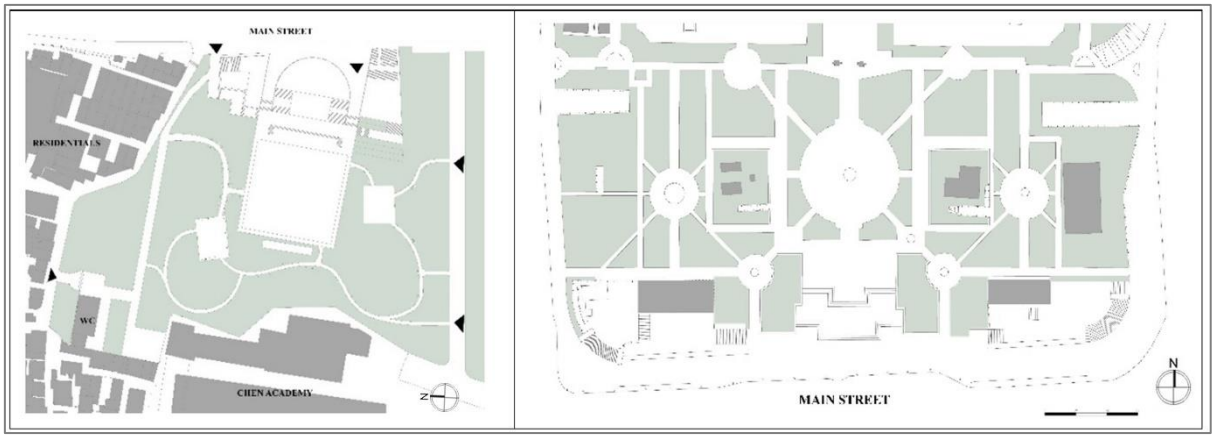


Fig. 7.5: Examples of circuitous circulation patterns

The circulation of many public space in Guangzhou and Shenzhen is circuitous, which is believed to be related to two particular styles of open space design: the Chinese scholar and European Baroque gardens (Padua, 2007; Yang et al., 2010). The Chinese traditional garden design has natural curved pathways that tend to eliminate all direct movement routes (see Fig. 7.5). In contrast, Baroque garden design tends to create a dense and intensive system of orthogonal pathways (Yang et al., 2010). While this seems to create a high degree of visual complexity, it might not necessarily enhance transient use of the space with its inherent complicated circulation. In fact, by dividing public squares into many small sub-spaces, people might have problems with orientation or wayfinding within the space. Thus, many might decide to go around the square to avoid the complicated internal pathway system.

Level changes and accessibility for all users

Fig. 7.6: Chen Academy Square (left); Xiasha Village Square (right)

Two major user groups in China are the elderly and people with small children. Some of the elderly are in wheelchairs, and many babysitters come with pushchairs. These users are disadvantaged by a design that overlooks the impact of sudden level changes. Observations in China indicate that in some places regular public space visitors in wheelchairs have to stay at the entrance to the space as there is no ramped access for them (see Fig. 7.6). In a country where the elderly and toddlers are the two major user groups, a more accessible and user friendly design is urgently needed.

Devaluing the edges

Fig. 7.7: Devaluating the edges: Xiasha Village Square (left); Tianmian Village Square (right)

The final factor that affects the design of the circulation system is the devaluing of edges, which could be derived from traditional Chinese spatial design ideas (Zhu, 2013). The left photo in Figure 7.7 shows a cultural and scenic setting that orients itself inwards to the centre of the space, while turning its back to the outside, thus creating an unpleasant view for people passing by. Traditionally, open spaces in China are designed as a cosmos within themselves, a peaceful world existing within the chaos of the real world (Keswick, 2003; Nitschker, 1991; Mary Padua, 2006; Wright, 1977). The use of walls and fences is also a part of this tradition which strives to protect the human-made cosmos. This long tradition of perceiving the inside as the good, clean and meaningful against the dirty and noisy outside (Ashihara, 1989; Lip, 1995; Lung, 1978; Tuan, 1974; Wright, 1977) is still to an extent apparent in the modern age. As a

consequence, connections to the immediate surroundings are visually and physically kept to a minimum, resulting in a limited number of access points.

In summary, the design of the circulation inside public squares in China is constrained by multiple factors many of which are integral to the Chinese culture. Design principles suggested by many authors to enhance the level of transient use, such as the provision of direct movement routes, legibility, and visual and physical accessibility, might be acknowledged by Chinese designers, but these ideas might not always be easy to implement given the cultural and contextual constraints identified above. The next section evaluates the design of the 13 case studies in terms of their function as movement spaces.

7.2.2 Evaluation of accessibility based on analysis of the layout of public space

The circulation design directly affects the accessibility of a space. In this chapter, two methods are used to evaluate accessibility. The primary method is that of space syntax, which forms the focus of the second half of this chapter. This section provides a brief overview of accessibility of the samples of public space in Guangzhou and Shenzhen using an evaluation based on eight criteria extracted from the literature. Each criterion is individually evaluated. The layout of each space is analysed and checked with a site a visit in order to justify the criteria used.

Eight evaluation criteria of accessibility

Over the last three decades the importance of transient use has been recognised. Recommendations regarding the accessibility of public space can be found in many publications (e.g. the Project of Public Space and the Urban Design Compendium). Studies conducted by Marcus & Francis (1997) and Carmona (2014) explicitly concern the design of circulation in public squares. The eight principles extracted from the literature and used in this thesis are set out below:

- Legibility of the space: This is the degree to how easily a spatial structure can be read or how easy it is to move around a space without the fear of getting lost;
- Connection to the local movement network from easy through-movement routes;
- Movement possible through the centre of the space;
- A diagonal pathway crossing the space;
- Visual accessibility from outside allowing passing pedestrians to see the interior and activities occurring inside the space;
- Easy access to seats and other amenities;
- Changes of level tested so as to provide accessibility for all users
- In the Chinese context, one more principle is added, which is having continuous walking routes around the space. This route should enhance both visibility of the space and its accessibility from inside to outside and vice versa.

From the analysis of the spatial layout of the 13 public squares in combination with information collected from direct observation, each square is evaluated against these eight criteria. For each criterion, the space is given two points for good quality, one for medium and zero for poor quality. Hence, the maximum possible number of points is 16.

Interpreting the results

Name of Square	Degree of Legibility when inside	Integration to local circulation	Movement through the centre	Diagonal Shortcut Movement	Visual Accessibility from outside	Access to Seats and Amenity	Walkability for all	Walking Routes around the space	Total Score
Renwei Temple	2	2	2	2	2	1	2	2	15
Dongmen Market	2	2	2	1	2	2	2	2	15
Bridge Square	2	2	1	1	2	2	1	2	13
King Plaza	1	2	1	1	1	2	2	2	12
Liwan Lake Square	2	2	1	2	1	2	2	0	12
Shangsha Big	1	2	1	1	1	2	2	1	11
Tianmian Village	1	2	1	1	1	1	1	2	10
Huanggang Village	2	1	1	0	2	1	1	1	9
People Park	0	1	1	0	1	2	2	2	9
Shangsha Small	1	1	1	0	1	2	2	0	8
Theatre Square	1	1	2	1	0	1	0	1	7
Chen Academy	1	1	1	1	1	1	0	1	7
Xiasha Village	1	0	1	0	0	2	1	0	5

Fig. 7.8: Evaluation of circulation

According to the evaluation, seven squares (Renwei Temple Square, Dongmen Market Square, Bridge Square, King Plaza, Liwan Lake Square, Shangsha Big Square and Tianmian Village Square) have better circulation systems of which Renwei Temple Square, Dongmen Market Square and Bridge Square are ranked best with 15, 15 and 13 points out of the total 16 points, respectively. At the other end, Theatre Square, Chen Academy Square and Xiasha Village Square are evaluated as the worst squares with only 7, 7 and 5 points respectively.

According to the evaluation in this chapter and in chapter five, some squares are badly designed for both static and transient use, such as Xiasha Village Square and Chen Academy Square, with the lowest scores in both evaluations. However, the case of Theatre Square shows that a space can serve static users well (being ranked one of the two best spaces in chapter five), but does not necessarily support transient use.

In chapter 3, French, a historian who has studied the history of public squares, uses the terms “enclosed” and “centric” to classify two fundamental types of public square regarding their accessibility. “Enclosed” space discourages movement inside the square including any direct routes crossing its centre, whereas “centric” space does exactly the opposite. These two terms are useful for this thesis. Thus, the samples with higher scores (greater than 9) are considered

as the “centric” space group, whilst the remainder are classified as the “enclosed” group. A notion of the difference between these two groups is demonstrated in Figure 7.9.

Fig. 7.9: Centric space higher degree of publicness versus “enclosed space”

In reality, there is no such absolute division between the two groups as each square seems to be a different mixture of the two types. For example, in the samples, People Park Front Square has characteristics of both types, as it has direct movement routes crossing the centre of the space together with a complicated pathway network that could prevent people moving through the space.

In summary, this section has identified factors that constrain the design of the circulation in small and medium-sized public squares in China and then evaluated the circulation designs of the 13 case studies. Based on the results of the evaluation, the squares can be roughly divided into the two groups of “centric” and “enclosed” spaces. These terms are consistently used in the second half of this chapter. In the following sections, the empirical data describes the patterns of transient use and examines its relationship with static use and pedestrian density with respect to the difference between these space types.

7.3 Transient Use Patterns

Transient use has a holistic relationship with both static use and the density of adjacent pedestrian flows. In this section, the patterns of transient use in public squares and their relationship to other types of uses are described using the data collected from direct

observations, in particular, that of the "gate method". The emphasis is placed on the difference between "centric" and "enclosed" open spaces.

7.3.1 Description of fieldwork

The "gate method" is used to measure the pedestrian flow both inside and in the surroundings of each public space. A detailed description of the gate method can be found in chapter four. The number of pedestrians is counted for six time periods, similar to the activity mapping, with each round 3 minutes long. Pedestrians are classified according to their age and gender. It is worth repeating that the detection of age is based only on observation therefore, this classification should be seen as indicative rather than absolute. "Gates" (where people are counted) are placed at all "entrances" to the public squares. Only the people entering a public space through these "entrance" gates are counted and this measure defines the level of transient use. This effectively avoids the double counting of one moving person who goes in one gate and out through another. In addition, gates are positioned in the streets surrounding each public space ("street" gates). The number of pedestrians moving through these reveals how busy an area is. The position of the observer when counting is ideally at one end of the "entrance" or nearby, without being an obstacle to the movement. Unlike 'entrance gates', the observer counts pedestrian movement in both directions at 'street gates'. In order to count all pedestrians going into a square, the observer needs to count at all the 'gates' one after the other within a time period of two hours.

In total, 62 "gates" of 12 public squares[27] were observed. Their locations and the mean density of pedestrian flows at each gate are illustrated in Figures 7.10 to 7.12. Detailed information collected from the "gate method" is presented in Appendix 3.

[27] Dongmen Market Square is excluded from the investigation because of its extremely high pedestrian density and unclear movement patterns that makes the measurement of movement impossible.

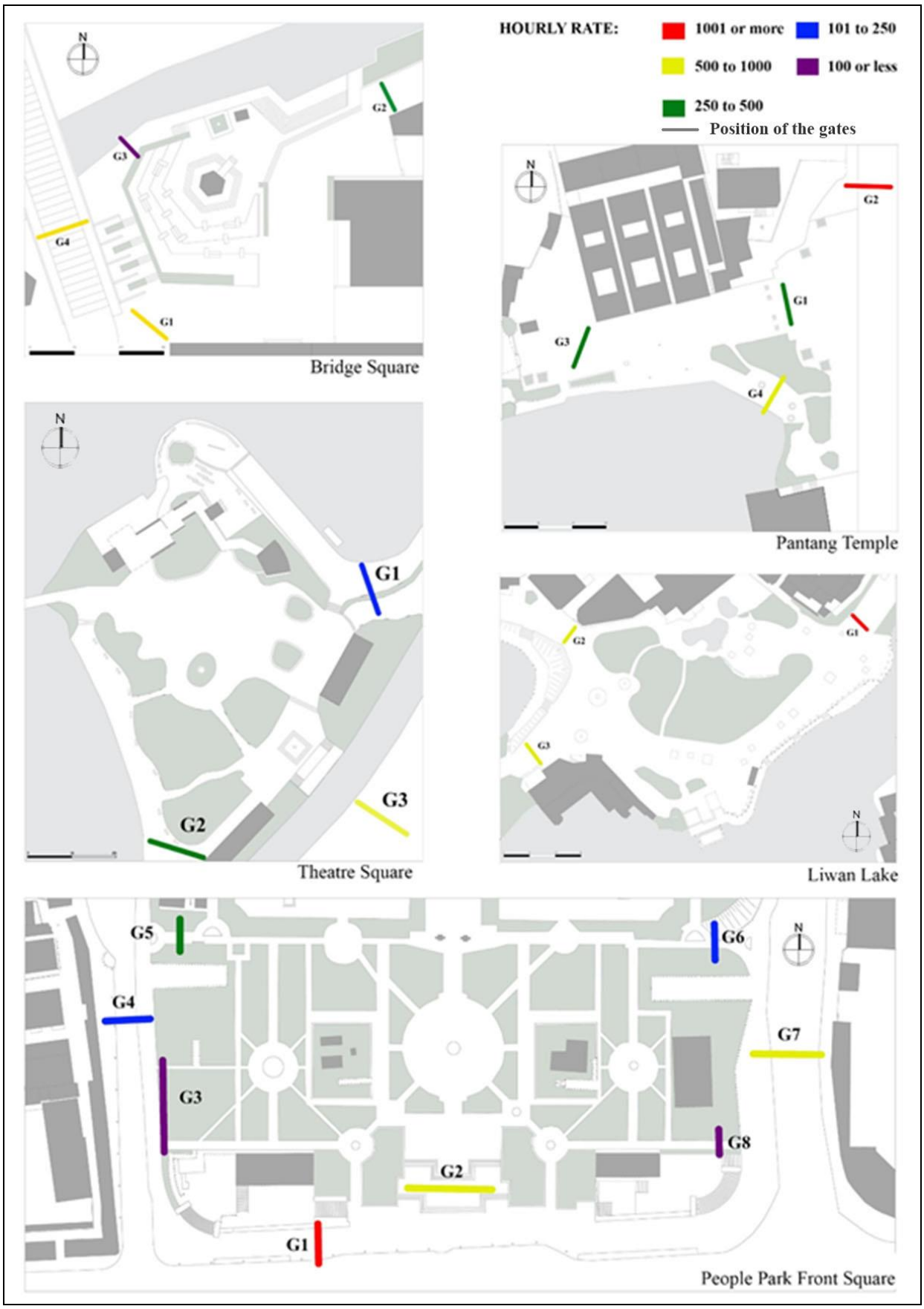


Fig. 7.10: The location of gates and hourly rates of pedestrian movement

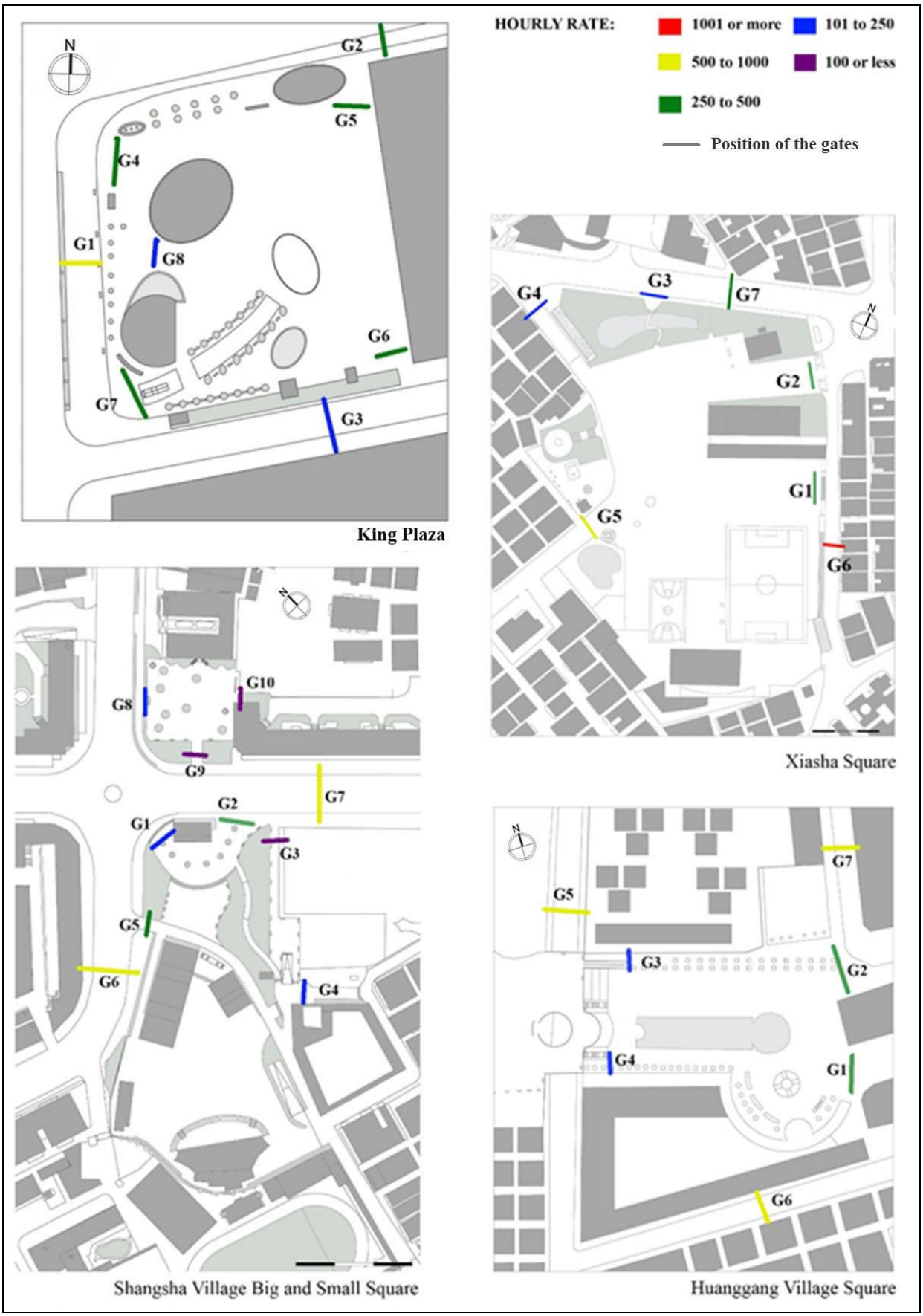


Fig. 7.11: The location of gates and hourly rates of pedestrian movement

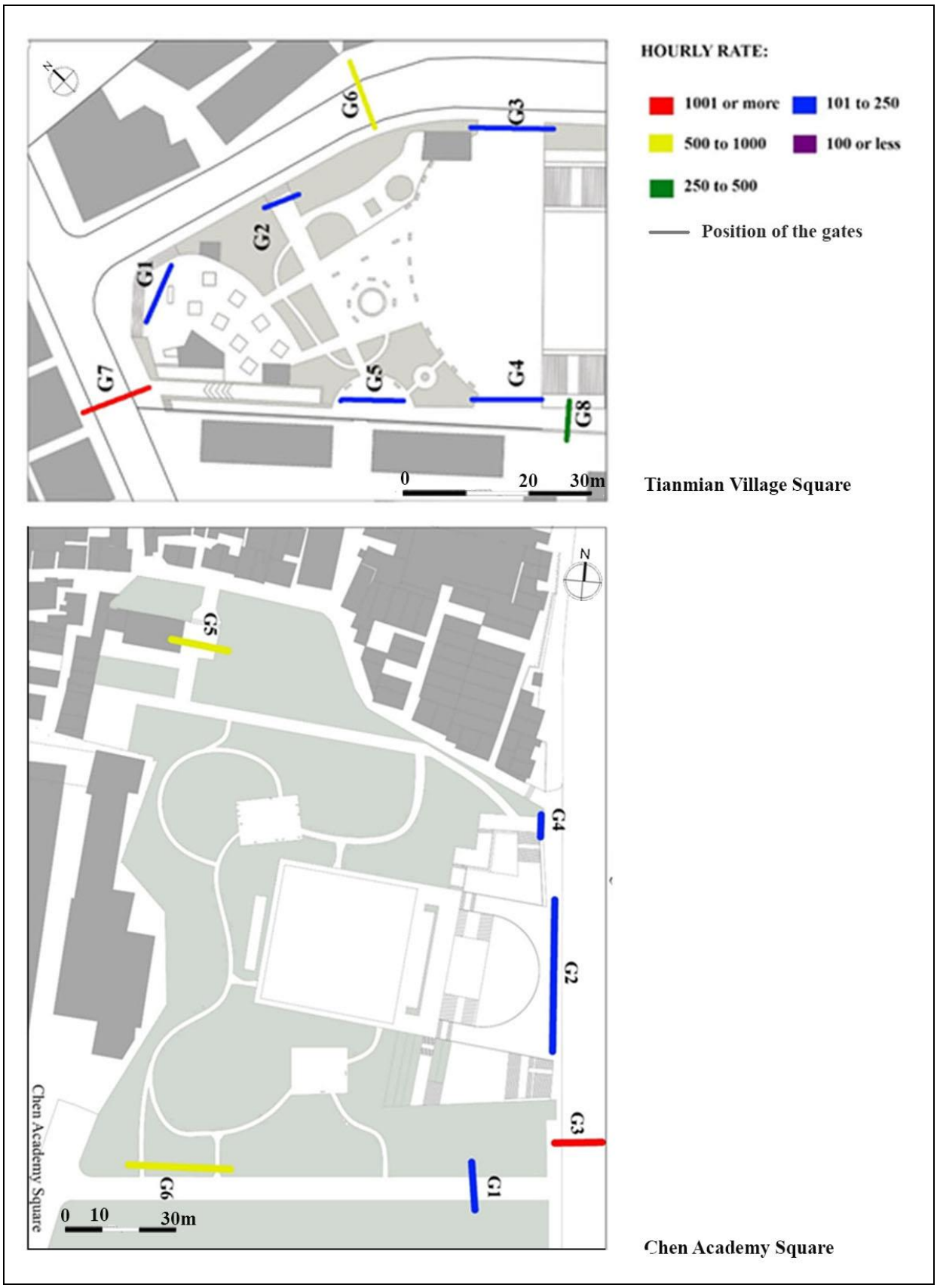


Fig. 7.12: The location of gates and hourly rates of pedestrian movement

7.3.2 Description of transient use

From analysis of the data collected from the "gate method" (and "movement tracing"[28]), three aspects of transient use are described: demographics, temporal patterns, and levels of transient use.

Demographics of transient use

The mean number of people moving inside and in adjacent streets of a public space is shown in Fig. 7.13 and 7.14:

	MOVING INSIDE | TRANSIENT USERS (PEOPLE PER HOUR)						
	AVERAGE NUMBER				PERCENTAGE		
SQUARE NAME	**Total**	**Elderly**	**Working-aged**	**Children**	**Elderly**	**Working-aged**	**Children**
Theatre Square	436.7	296.7	113.3	26.7	68	26	6
Bridge Square	983.3	510.0	383.3	90.0	52	39	9
Chen Academy	1,730.0	470.0	880	380.0	27	51	22
Renwei Temple	1,236.7	786.7	373.3	76.7	64	30	6
Liwan Lake Square*	2,656.7	2110.0	426.7	120.0	79	16	5
People Park Square	1,183.3	753.3	383.3	46.7	64	32	4
King Plaza	1,620.0	313.3	1,226.7	80.0	19	76	5
Tianmian Square	736.7	273.3	366.7	96.6	37	50	13
Huangang Square	1,050.0	280.0	620.0	150.0	27	59	14
Shangsha Big Square	1,193.3	286.7	476.7	430.0	24	40	36
Shangsha Small Square	220.0	100.0	83.3	36.7	45	38	17
Xiasha Square	1,513.3	460.0	773.3	280.0	30	51	19
Mean Value	1,213.3	553.3	508.9	151.1	**45**	**42**	**13**

Fig. 7.13: Demographics of transient users

On average, just over 1,200 people per hour were moving into a sample public square whereas the number of pedestrians in adjacent streets is just under 2,000 per hour. However, this number varies greatly between samples. In Theatre Square, 437 people per hour enter the space, whereas Liwan Lake Square attracts more than 2,600 people per hour. Similarly, the number of pedestrians in adjacent streets of Theatre Square is the least at 920 people per hour, whereas

[28] The procedure of 'movement tracing' was described in chater four

in the surroundings of People Park Square or Xiasha Village Square, nearly 3,000 pedestrians per hour were recorded.

SQUARE NAME	PEDESTRIANS IN ADJACENT STREETS (PEOPLE PER HOUR)						
	AVERAGE NUMBER				PERCENTAGE		
	Total	Elderly	Working-aged	Children	Elderly	Working-aged	Children
Theatre Square	920.0	346.7	503.3	70.0	38	55	8
Bridge Square	1,090.0	413.3	570	106.7	38	52	10
Chen Academy	1,306.7	226.7	976.7	103.3	17	75	8
Renwei Temple	1,376.7	563.3	656.7	156.7	41	48	11
Liwan Lake Square*	2,656.7	2110	426.7	120.0	79	16	5
People Park Square	2,933.3	1,276.7	1480	176.6	44	50	6
King Plaza	1,376.7	290	1070	16.7	21	78	1
Tianmian Square	2,393.3	506.7	1490	396.6	21	62	17
Huangang Square	2,510.0	603.3	1596.7	310.0	24	64	12
Shangsha Big Square	2,210.0	460	1260	490.0	21	57	22
Shangsha Small Square	2,210.0	460	1260	490.0	21	57	22
Xiasha Square	2,823.3	450	2110	263.3	16	75	9
Mean Value	1,983.9	642.23	1116.7	225.0	**32**	**57**	**11**

Fig. 7.14: Demographics of pedestrians adjacent public squares

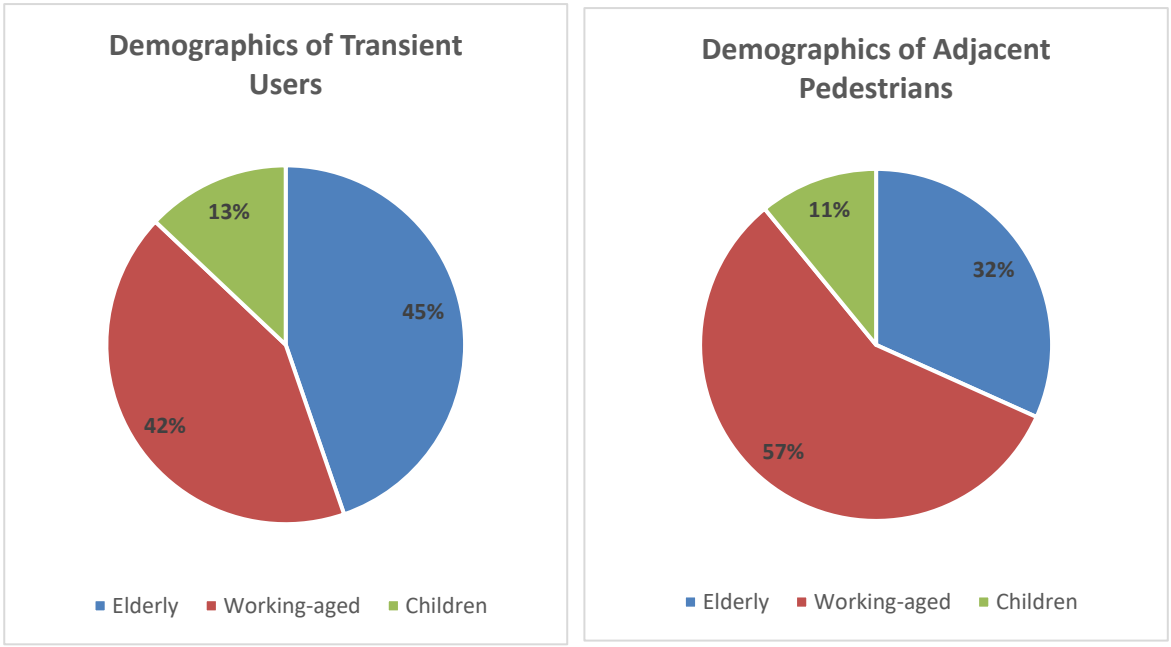


Fig. 7.15: Demographics of transient users and adjacent pedestrian movement

In chapter five, more than 60 % of static users are the elderly, as working-aged users and children 26 % and 14 %, respectively. The data collected using the gate method suggests that moving people inside public squares are composed of 45 % the elderly, 42 % working-aged

and 13 % children, whereas in the adjacent streets, the percentage of working-aged users is nearly double that of the elderly (57 % compared to 32 %).

Type Name	Elderly	Working-aged	Children
Adj. Pedestrians	32%	57%	11%
Transient Users	45%	42%	13%
Static Users	60%	26%	14%

Fig. 7.16: Demographic breakdown of adjacent pedestrians, transient users and static users

Figure 7.16 reveals on average there are significantly more working-aged people in the streets than the elderly, although the percentage of working-age people entering the sample public spaces is less than the elderly. In addition, only a small percentage of working-aged people entering public squares are likely to become static users, while the opposite is true for the elderly. In this sense, public squares seem to be the final destination for many of the elderly, but are more likely to be a transit space for the working-aged group.

Temporal patterns of transient use

NUMBER OF TRANSIENT USERS IN SIX PERIODS (PEOPLE PER HOUR)													
	Theatre Square	Bridge Square	Chen Temple	Renwei Temple	Liwan Lake	People Park	King Plaza	Tian-mian	Huang-gang	Shangsha Big	Shangsha Small	Xiasha	Mean Value
7-9AM	380	460	1660	1540	4400	400	1440	440	680	1560	140	1940	1253.3
9-11AM	460	760	2060	1620	4860	840	1680	600	1180	880	200	1080	1351.7
11-1PM	360	440	1260	1020	1900	1280	920	980	760	1580	180	1220	991.7
1-3PM	240	1640	1440	1080	1380	1840	1400	1240	640	1040	240	1260	1120.0
3-5PM	760	1340	1620	1240	1500	1540	1820	400	1020	1140	360	1620	1196.7
5-7PM	420	1260	2340	920	1900	1200	2460	760	2020	960	200	1960	1366.7
NUMBER OF PEDESTRIANS IN ADJACENT STREETS IN SIX PERIODS (PEOPLE PER HOUR)													
	Theatre Square	Bridge Square	Chen Temple	Renwei Temple	Liwan Lake	People Park	King Plaza	Tian-mian	Huang-gang	Shangsha Big	Shangsha Small	Xiasha	Mean Value
7-9AM	520	1000	1440	2080	4400	400	920	1620	2100	2160	2160	7640	2203.3
9-11AM	660	1380	1700	1180	4860	840	880	2480	2680	1560	1560	1660	1786.7
11-1PM	1000	640	1400	1520	1900	1280	1340	2060	2080	2400	2400	1380	1616.7
1-3PM	740	780	1160	880	1380	1840	1680	3240	1800	1800	1800	1440	1545.0
3-5PM	1100	1120	1300	1220	1500	1540	1840	2600	3000	2420	2420	1920	1831.7
5-7PM	1500	1620	840	1380	1900	1200	1600	2360	3400	2920	2920	2900	2045.0

Fig. 7.17: Number of moving people inside and outside sample public spaces

The data required to investigate the temporal patterns of transient use is presented in Figure 7.17. The average number of people moving into public space from 7 am to 7 pm varies from around 1,000 to nearly 1,400 people per hour. There is a slight increase from 7 am to a peak

by 10 am, then the average volume decreases to the lowest point of the day at lunch time, followed by a gradual increase until the early evening that is the second peak of the day. The average pattern[29] of transient use is slightly different from that of the adjacent pedestrian flow in the early morning periods, but they are temporally almost identical during the day (see Fig. 7.18).

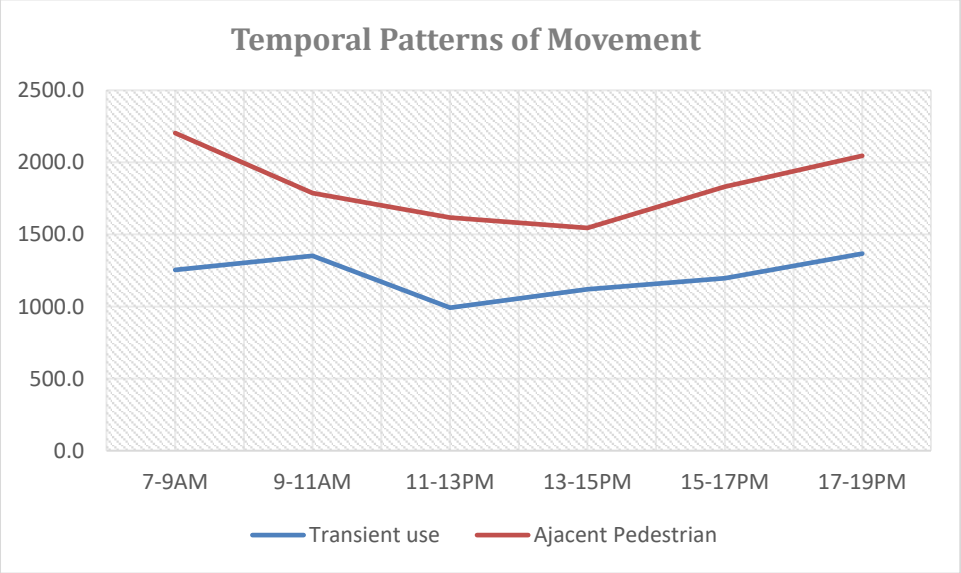


Fig. 7.18: Temporal patterns of transient use and adjacent pedestrians (people per hour)

However, within each case study, the level of transient use fluctuates greatly during the day. For example, Figure 7.17 shows that Liwan Lake Square attracted 4,400 people per hour from 7 am to 9 am, dropping to only 1,380 during the lunch time period from 1 pm to 3 pm. In contrast, People Park Front Square displays the opposite. It has only 400 people per hour entering the space in the first period from 7 am to 9 am, and well over four times this number by 2 pm which is the peak of the day.

Levels of transient use and transient mean use density

The data collected from the "gate-method" to measure the levels of transient use is presented in Fig. 7.19.

[29] Fig. 7.17 shows the temporal pattern of each square varies slightly.

PUBLIC SPACE NAME	LEVELS OF TRANSIENT USE (PPH)	PAVED AREA (M^2)	TRANSIENT USE DENSITY (PPH/M^2)	Type of Space
Liwan Lake Square	2,656.7	6,180	0.43	Centric Space Mean Ratio=0.30
Bridge Square	983.3	2,756	0.36	
Renwei Temple Square	1,236.7	3,571	0.35	
King Plaza	1,620	7,670	0.21	
Shangsha Big Square	1,193.3	5,371	0.22	
Tianmian Village Square	736.7	3,768	0.20	
Huangang Village Square	1,050	6,884	0.15	Enclosed Space Mean Ratio=0.14
People Park Square	1,183.3	10,680	0.11	
Shangsha Small Square	220	1,169	0.19	
Theatre Square	436.7	3,058	0.14	
Chen Academy Square	1,730	12,769	0.14	
Xiasha Village Square	1,513.3	11,984	0.13	

Fig. 7.19: Levels of transient use and transient use density

The absolute number of people moving inside the sample public spaces varies considerably from 220 per hour (Shangsha Small Square, the smallest space) to above 2,500 people per hour (Liwan Lake Square). Given the relative impact of the size of a space size, this absolute number does not represent how busy a space is. A more effective way to reveal the how busy a square is requires measuring the mean transient use density which is calculated by relating the levels of transient use to the paved area of the square.

The data in Figure 7.19 suggests that centric spaces have on average a mean transient use density of 0.30 which is more than twice that of enclosed spaces (0.14). Liwan Lake Square which is basically a junction of radial footpaths has the highest transient use density of 0.43 people per hour per square metre (pph/m^2), followed by Bridge Square and Renwei Temple with transient use densities of 0.36 and 0.35, respectively. Similar to Liwan Lake Square, these two spaces are used primarily as movement corridors connecting a main street and a nearby residential neighbourhood (see Fig. 7.20). Hence, there is a pervasive movement of pedestrians going through the space during the day.

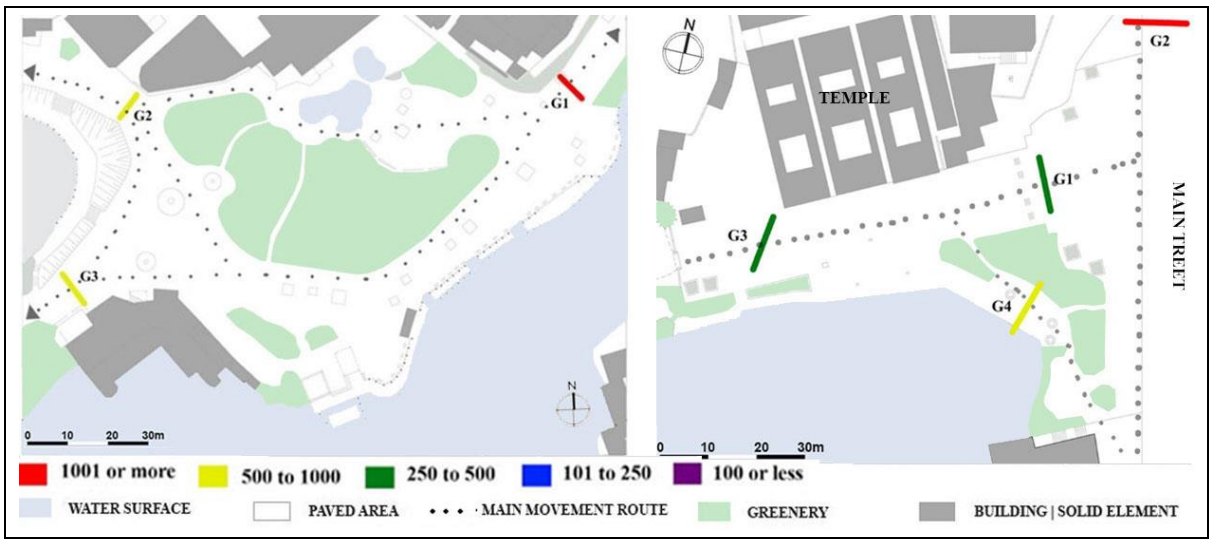


Fig. 7.20: Clear movement routes: Liwan Lake Square (left); Renwei Temple Square (right)

In addition to exhibiting a quantitative difference, centric spaces tend to have observable movement patterns that are made up of clearly defined routes. In contrast, many enclosed spaces tend to have unclear movement patterns. Among the latter, People Park Front Square has the lowest transient use density of 0.11 (pph/m^2) although this space is located right at the heart of the old city of Guangzhou and has a high level of adjacent pedestrian flow.

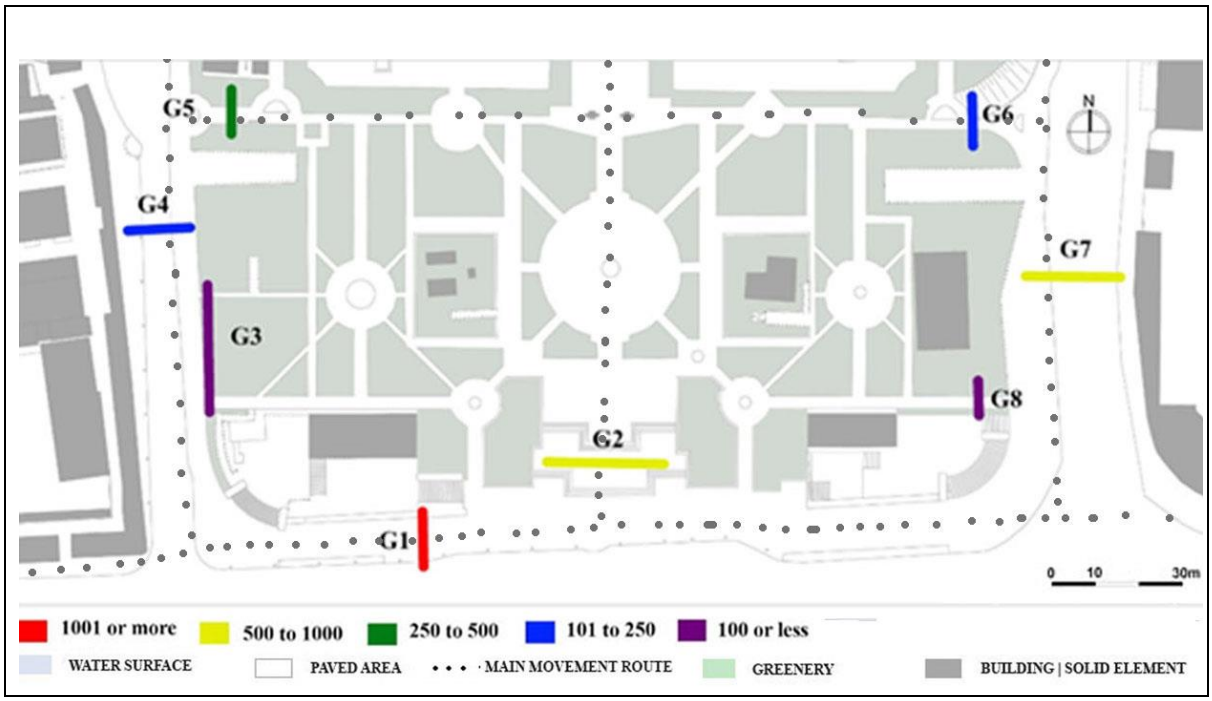


Fig 7.21: The main movement corridors in People Park Front Square

However, as shown in Figure 7.21, the circulation of this square is highly complex. Many side entrances are very narrow and hinder any visual connection to the inside of the space. As a

consequence, those who enter the space mostly follow the central axis (through G2) and are mainly those who want to use the space or visit the park behind. The data collected suggests that a simple, open, wide movement route seems to correlate with high levels of transient use.

7.3.3 Relationship between transient use and adjacent pedestrian movement

Adjacent Pedestrian Density is independent of the internal design of public space. Nevertheless, the relationship between the number of people passing by and those entering the public space will depend on its quality (Hillier, 1984; Hillier et al., 1990). Figure 7.22 shows the ratio of transient use to the adjacent pedestrian flow in the surroundings of 12 public squares in Guangzhou and Shenzhen.

Public Space Name	Mean Transient Use (people per hour)	Mean Adjacent Pedestrians (people per hour)	Ratio of Transient Use to Adjacent Pedestrian Flows	Type of Space[30]
King Plaza	1,620	1,376.8	**1.18**	Centric Space Mean Ratio = 0.80
Liwan Lake Square	2,656.7	2,656.7	**1.00**	
Bridge Square	983.3	1,090	**0.90**	
Renwei Temple	1,236.7	1,376.7	**0.90**	
Shangsha Big Square	1,193.3	2,210	**0.54**	
Tianmian Square	726.7	2,393.3	**0.30**	
People Park Square	1,183.3	2,933.3	**0.40**	Enclosed Space Mean Ratio = 0.54
Huangang Square	1,050	2,510	**0.42**	
Theatre Square	436.7	920	**0.47**	
Shangsha Small Square	220	2,210	**0.10**	
Chen Academy	1,730	1,306.7	**1.32**	
Xiasha Square	1,513.3	2,823.3	**0.54**	

Fig. 7.22: Relationship between transient use density and adjacent pedestrian density

First, the mean number of adjacent pedestrians varies greatly. People Park Front Square has the highest surrounding pedestrian density with nearly 3,000 people per hour. In contrast, Theatre Square has a mean movement density of 920 people per hour. It seems the mean

[30] Explanation of the grouping of 'centric' and 'enclosed' spaces can be seen on pages 278 and 279

adjacent pedestrian density closely reflects the degree of centrality of the space. Google maps of these two samples illustrate this fact.

Fig. 7.23: The centrality of People Park Front Square (left) versus the segregation of Theatre Square (right)

It is worth mentioning that the levels adjacent pedestrian movement for public spaces in urban villages are on average higher than in old urban areas. The mean number of pedestrians in the adjacent streets of Xiasha Village Square is very close to the highest figure for People Park Front Square, while for Shangsha Village Small and Big Squares, Tianmian Village Square and Huanggang Village Square this number varies from about 2,200 to over 2,500 people per hour.

Concerning the ratio of transient use to adjacent pedestrian movement, the six "centric" squares have a mean ratio of 0.80, whereas that of the enclosed squares is 0.54 (see Fig. 7.22), thus centric public space appears to attract more people moving through it than an enclosed space. However, Chen Academy Square, an enclosed square with one of the lowest accessibility scores, is an exception as the number of people moving into the space is about 30 % more than people moving in adjacent streets. A further examination of the surroundings reveals an explanation for this unusual case.

The plan of Chen Academy Square shows a circuitous movement network inside the space (see Figure 7.24). However, Chen Academy Square lies between a metro station to the South and a bus stop to the North. As a consequence, a pervasive movement flow crosses the space as

shown in Figure 7.24 as instead of going around the square, people take a shortcut through it from metro station and bus stop and vice versa.

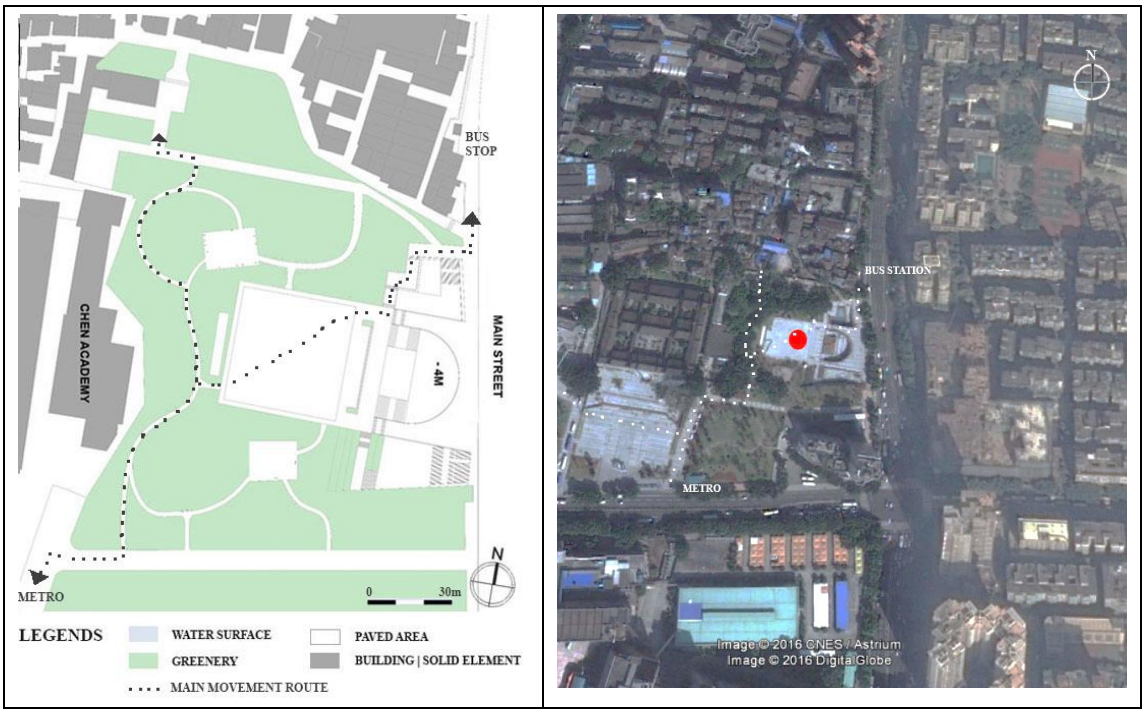


Fig. 7.24: Main movement routes in Chen Academy Square

Although a centric space normally attracts proportionately more people moving into it than an enclosed one, there are exceptions in certain circumstances.

7.3.4 Quantitative relationship between transient and static occupancy

This section examines whether a higher transient use density leads to a higher level of static occupancy.

As can be seen from Figure 7.25, the ratio of static users to transient users varies greatly from 0.02 (Bridge Square) to 0.39 (Shangsha Small Square). The average for all centric spaces is 0.07, suggesting that out of every 100 people going through the space, about seven will stay. This figure is around one-third of the mean ratio of enclosed spaces (0.18). Although enclosed spaces might attract fewer people going through, a much larger percentage of them will stay.

The two squares with the highest ratios are Shangsha Small Square (0.39) and Theatre Square (0.20). Both spaces are dominantly used by groups of the elderly who contribute more than 90

% of total users (92 % in Shangsha Small Square and 97 % in Theatre Square). Hence, other groups might feel out of place when entering these spaces. The dynamic flow of people moving in and out of centric spaces might be good for an encounter between strangers and local users, thus enhancing the publicness of the space (a quality that is argued to be weak in many Chinese public squares).

Public Space Name	Mean No Transient Users (pph)	Mean No of Static Users	Ratio of Static to Transient Users	Type of Space
King Plaza	1,620	76.7	**0.05**	Centric Space Mean Ratio=0.07
Liwan Lake Square	2,656.7	124.8	**0.05**	
Bridge Square	983.3	18.7	**0.02**	
Renwei Temple	1,236.7	32.7	**0.03**	
Shangsha Big Square	1,193.3	199.2	**0.17**	
Tianmian Square	726.7	88.7	**0.12**	
People Park Square	1,183.3	156.7	**0.13**	Enclosed Space Mean Ratio= 0.18
Huangang Square	1,050	173.5	**0.17**	
Theatre Square	436.7	89.2	**0.20**	
Shangsha Small Square	220	86.7	**0.39**	
Chen Academy	1,730	110.5	**0.06**	
Xiasha Square	1,513.3	139.7	**0.09**	

Fig. 7.25: Mean number of moving and static users of 12 public spaces

To examine the relationship between the level of transient use and diversity of users, the mean number of working-aged static users is plotted against the mean number of static users of the two types of space. The data presented in Figure 7.26 shows that centric spaces have a ratio of working-aged to total static users of 0.27, nearly twice the ratio for enclosed spaces (0.16).

Public Space Name	Mean No of Total Static Users total	Mean No of Static Working-aged Users	Ratio of Working-aged to Total Static Users	Type of Space
King Plaza	**76.7**	37.17	0.48	Centric Space Mean Ratio=0.27
Liwan Lake Square	**124.8**	7.50	0.06	
Bridge Square	**18.7**	5.17	0.28	
Renwei Temple	**32.7**	8.17	0.25	
Shangsha Big Square	**199.2**	47.17	0.24	
Tianmian Square	**88.7**	28.83	0.33	

People Park Square	**156.7**	59.67	0.38	Enclosed Space Mean Ratio=0.16
Huangang Square	**173.5**	43.17	0.25	
Theatre Square	**89.2**	2.00	0.02	
Shangsha Small Square	**86.7**	2.17	0.02	
Chen Academy	**110.5**	16.50	0.15	
Xiasha Square	**139.7**	19.17	0.14	

Fig. 7.26: Mean number of total and working-aged static users of 12 public spaces

The results indicate a strong correlation between the level of transient use and working-aged static users, and hence user diversity. Small and medium-sized public squares with an open, legible layout that contain a direct movement corridor seem to attract more working-aged users than those with a higher degree of enclosure.

This section reveals the quantitative relationship between the levels of adjacent pedestrian movement and transient and static users. However, the primary objective of this section is to examine the relationship between the level of usage of a public space and the urban configuration around it, and this is examined in the following section.

7.4 Degree of Accessibility Generated by Urban Configuration and its Impact on the Use of Public Squares

This section begins with an introduction to modern urbanism in China with the superblock or enclave urbanism of Shenzhen being a prime example. It then moves to an examination of the degree of accessibility of public squares, their strategic value and their relationship to the adjacent pedestrian movement density, and transient and static use.

7.4.1 Enclave-superblock urbanism and its impact on the use of public space

The Chinese city centre is composed of large superblocks whose dimensions are often larger than one kilometre by one kilometre (see the centre of Shenzhen City in Fig. 7.27). Within

these superblocks, the street network is often circuitous and irregular, with many culs-de-sac.[31] Hence, the street network within one block does not mesh with those in neighbouring urban blocks. Many authors have argued that gated-communities, which polarise the relationship between streets within urban blocks and surrounding boulevards, have negatively impacted the use of the street as public space in Chinese cities (Pu, 2003; Qing Wang, 2010). This has led to many boulevards being overcrowded leaving no space for people to res, whereas many of the internal streets in superblocks are underused because of their low degree of connectivity (Pan, 2002; Qing Wang, 2010).

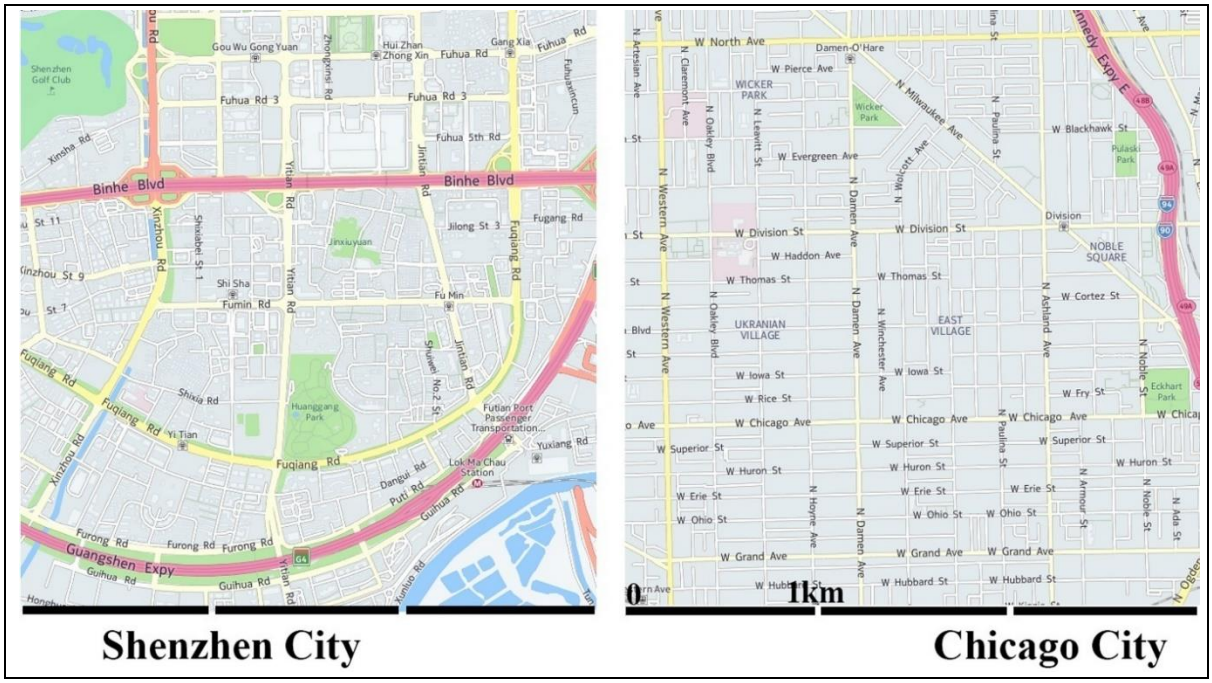


Fig. 7.27: The difference between Chinese and Western street networks

Some of the 13 case study public squares have been inserted into such superblocks.[32] They are, therefore, less integrated with the main movement network of the city compared to those that are directly located on the main boulevards. It is important to note that the degree of accessibility of a location is integral to its relationship with the urban configuration, and this is to a great extent independent of the design of the space itself. In the following sections, the

[31] Lynch suggests that superblock development with cul-de-sac street patterns can save a large level of investment due to the lower density of roads (Lynch et al., 1984).

[32] Urban villages were developed as superblocks whose internal street layout patterns are completely different and cut-off by large urban arterials

degree of accessibility of public squares and its impact on the use of the space are examined using space syntax techniques.

7.4.2 Syntactic integration of 13 public squares in Guangzhou and Shenzhen cities

The space syntax method has been proven effective for studying the degree of accessibility generated by the urban configuration and its impact on movement patterns in cities in general (Hillier, 1990; Penn, 1998) and on public space in particular. Among different techniques within the space syntax method, the axial map is most frequently for measuring the degree of accessibility of any location. In an axial map a public square, as a nodal space, is represented by all axial lines going through it. Hence, its accessibility, defined by Hiller as its "strategic value", is calculated as the sum of the integration value[33] of all interfacing axial lines.

In a syntactic axial graph, the degree of accessibility is ranked from red to blue to purple. The most accessible space is red, and the most segregated is purple. Numerical values can be extracted from Depthmap, a Space Syntax software. The axial graphs[34] of Guangzhou and Shenzhen with the sample public squares are presented in Figures 7.28 and 7.29.

The axial graph of the old part of Guangzhou city covers an area of about 50 km^2 and contains most of the urban area prior to the 1980s, including the historic "walled" city. Six of the investigated squares are located in the old part of Guangzhou. Among these, People Park Front Square has the most central location and is, in fact, the heart of the original walled city. This centrality is reflected in the two red axial lines that interface the body of this public space. Chen Academy Square is also highly accessible given its proximity to the intersection between two

[33] Space syntax calculates the integration value or degree of accessibility using the concept of topological depth and mathematical formula that are derived from graph theory. A detailed description is presented in chapter four.

[34] The original axial graphs of parts of Guangzhou and Shenzhen in this thesis were produced by Professor Wang Haofeng from Shenzhen University. These maps are used and modified with his permission.

red axial lines. In contrast, the four remaining squares in Guangzhou are located in relatively segregated areas in the Western part of the walled city, known as the Xiguan District.

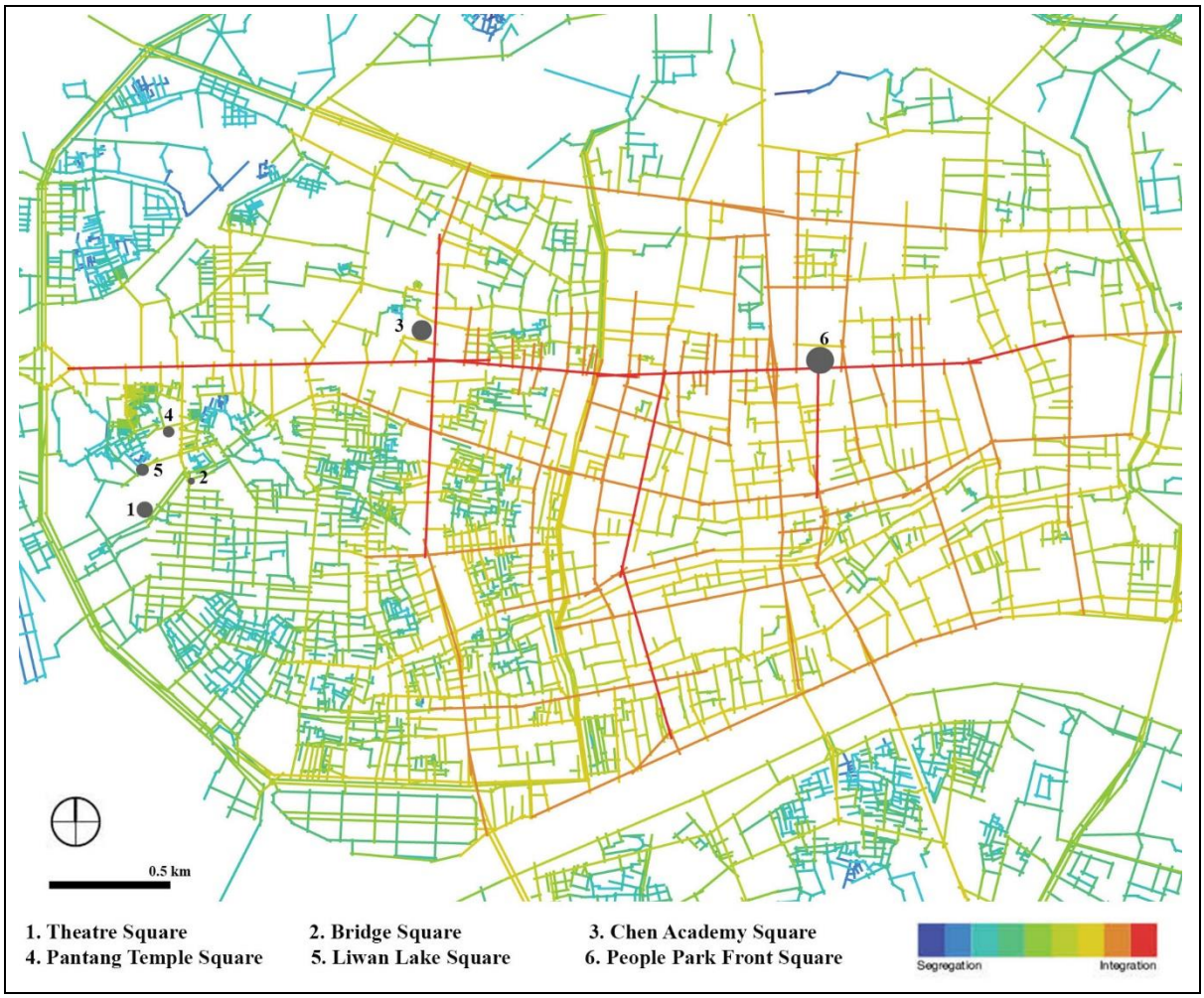


Fig. 7.28: Axial Map of the old part of Guangzhou city

The Xiguan District is the busiest commercial district and has evolved informally over hundreds of years (Wei, Yan, & Liu, 2008). Its major urban structure still survives while the areas within the walled city were mostly destroyed. The old urban structure of this district is characterised by the concentration of short and narrow streets and alleys in contrast to the broad, long roads in other parts of the city. Among the four segregated spaces in the Xiguan District, Theatre Square is the most segregated as it is accessible only through a pedestrian path along a rebuilt canal.

In contrast to Guangzhou, Shenzhen is a newly developed city. Over the last three decades, a network of orthogonal roads has created the major urban structure of the city. The axial map is

of the centralised districts of Shenzhen (see Figure 7.29). Seven of the sample public squares are located in Shenzhen. Among these, Dongmen Market Square and King Plaza are in the old part of the city that is characterised by shorter and irregular patterns of streets. These two squares have a relatively low degree of integration as the centrality of the city has been moved to the new city hall above Huanggang Village.

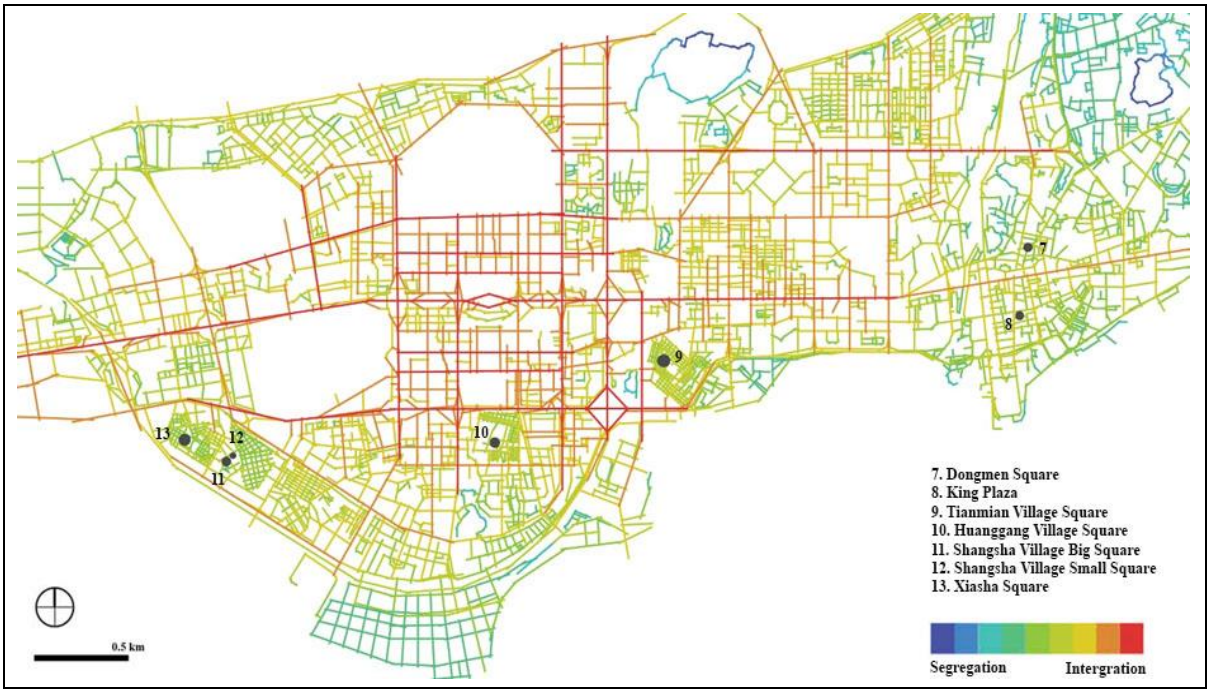


Fig. 7.29: Axial Map and location of public squares of Shenzhen City

The other five urban village squares are located within superblocks. While the latter are interfaced by highly integrated axial lines (marked in red), the street patterns inside these blocks are vastly different. These village streets are much shorter but also denser and only a few can be accessed by cars. The following paragraph examines the numerical degree of accessibility of each space.

Degree of accessibility or "strategic value" of the 13 public squares

The degree of accessibility is defined as the sum of the integration values of all axial lines interfacing a public space. The following maps show all the interfacing axial lines used for the calculation.

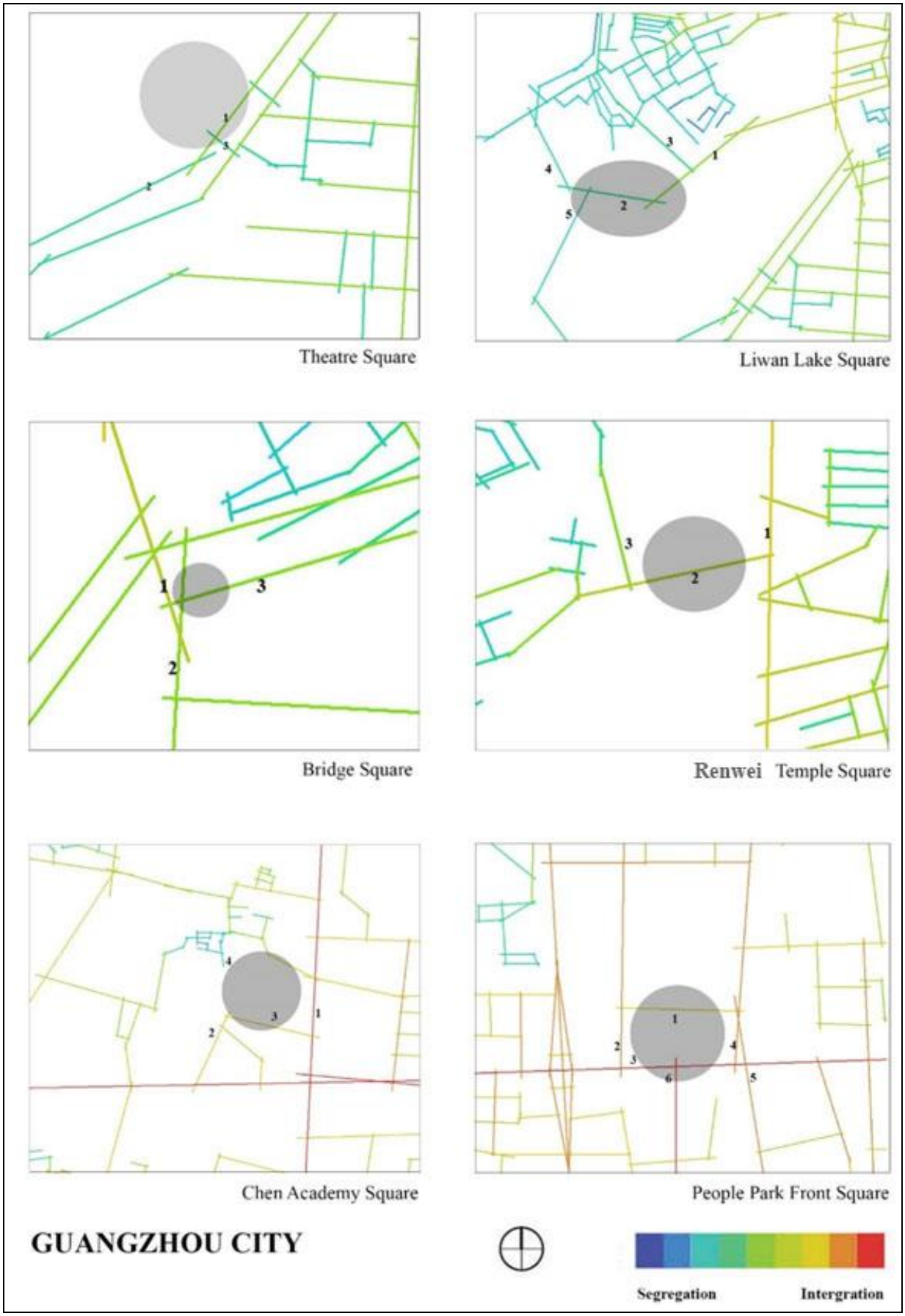


Fig. 7.30: Interfacing axial lines of sample public squares in Guangzhou

Fig. 7.31: Interfacing axial lines of sample public squares in Shenzhen

In addition to the "strategic value" (both Rn and R3[35]), the number of interfacing axial lines and their sum length for the 13 public squares in Guangzhou and Shenzhen are shown in Figures 7.30 and 7.31. The value of each individual line is provided in Appendix 3.

City	Public Space Name	Strategic value (Rn)	Strategic value (R3)	Number of interfacing axial lines	Sum length of all interfacing axial lines (m)
Guangzhou City (Old part only)	**Theatre Square**	2.691	4.821	3	567.3
	Bridge Square	2.986	8.621	3	916.7
	Chen Academy	4.251	10.039	4	1,785.1
	Renwei Temple	3.106	6.767	3	652
	Liwan Lake Square	4.292	7.992	5	822.9
	People Park Square	7.264	19.16	6	5,125.6
	Average	4.098	9.566	4	1,644
Shenzhen City	**Dongmen Market Square**	6.514	14.869	7	1,836.2
	King Plaza	3.052	9.279	3	1,835.2
	Tianmian Village Square	5.735	13.438	5	2,296.1
	Huangang Square	5.687	14.184	6	1,622.4
	Shangsha Big Square	5.405	12.484	6	1,942.3
	Shangsha Small Square	1.811	5.207	2	1,330.8
	Xiasha Village Square	5.471	13.987	6	849.6
	Average	4.677	12.826	5	1,662

Fig. 7.32: Syntactic Properties of sample Public Squares

Smal and medium public squares in the old part of Guangzhou city have a mean strategic value of 4.098 (Rn) which is lower than that of public squares in Shenzhen (4.677) although none of the latter adjacent to the most integrated streets, such as People Park Front Square in Guangzhou.

In the last three decades the city of Shenzhen has been made more generally accessible than the old city of Guangzhou because of the rapid development of a city road system. While the two cities are mostly composed of superblocks with many culs-de-sac, Shenzhen has more

[35] Rn is the global integration value whereas R3 is the local integration value for axial lines 3 steps away from the root.

direct, long boulevards that run across the city, and these might be the main reason for the higher degree of accessibility of its public squares.

At a local scale, on average each sample public square in Shenzhen is directly connected with more streets than those in the old city of Guangzhou, with average numbers of 5.1 and 4.0, respectively. This means that squares in Shenzhen are more embedded into the local street networks than those in Guangzhou, which is clearly reflected in the mean value of local strategic value (R3) of the two cities with 12.216 for Shenzhen and 9.566 for Guangzhou.

When considering each city separately, in Guangzhou old city, Theatre Square is the most segregated space, having the lowest strategic value of 2.691 (Rn), which is far below that of the most integrated or accessible space, People Park Front Square (7.264). In Shenzhen, Shangsha Small Square has the lowest strategic value of 1.811 (Rn), which is only one-third of the highest figure of Dongmen Market Square (6.514).

The next section examines whether there is any correlation between the strategic value and the level of movement and static occupancy.

7.4.3 Correlation between "strategic value' and level of pedestrian movement

This section analyses the correlation between syntactic strategic values and the number of pedestrians found inside (transient use) and outside (adjacent pedestrian flow) public squares. The data needed is presented in Figure 7.33.[36] Appendix 2 provides detailed data of transient use and movement outside public space in each period.

[36] As the strategic value with radius R3 and the strategic value with radius Rn are strongly correlated, only strategic value with radius Rn is used.

City Name	Public Space Name	Mean No moving inside	Mean No moving in adjacent streets	Total mean No moving people per hour	Global strategic value (Rn)
Guangzhou City (Old part only)	**Theatre Square**	436.7	920.0	**1,356.7**	**2.691**
	Bridge Square	983.3	1,090.0	**2,073.3**	**2.986**
	Chen Academy	1,730.0	1,306.7	**3,036.7**	**4.251**
	Renwei Temple	1,236.7	1,376.7	**2,613.3**	**3.106**
	Liwan Lake Square*	2,656.7	2,656.7	**2,656.7**	**4.292**
	People Park Square	1,183.3	2,933.3	**4,116.7**	**7.264**
Shenzhen City	**King Plaza**	1,620.0	1,376.7	**2,996.7**	**3.052**
	Tianmian Village Square	736.7	2,393.3	**3,130.0**	**5.735**
	Huangang Square	1,050.0	2,510.0	**4,020.0**	**5.687**
	Shangsha Big Square	1,193.3	2,210.0	**3,403.3**	**5.405**
	Shangsha Small Square	220.0	2,210.0	**2,430.0**	**1.811**
	Xiasha Village Square	1,513.3	2,823.3	**4,336.7**	**6.327**

Fig. 7.33: Local and global strategic values and mean numbers of moving people

The two scattergrams in Figure 7.34 reveal the correlation between the "strategic value" and the mean number of moving people per hour in the two cities. There is a strong positive linear correlation in the old part of Guangzhou with an adjusted R^2 of 0.8037[37], whereas this correlation in Shenzhen only has a slightly lower adjusted R^2 of 0.6446.

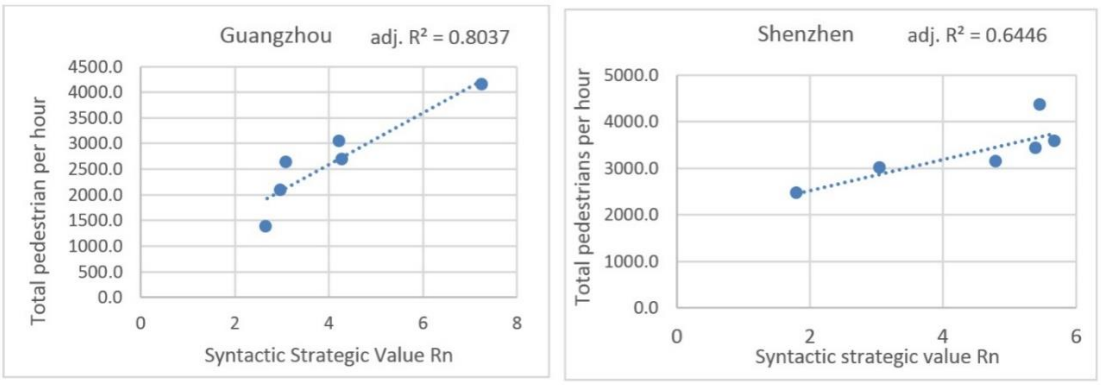


Fig. 7.34: Correlations between the mean number of pedestrian and the global strategic value

Given the fact that the data collection is limited to the pedestrians found inside and in surrounding public space, it is not accurate to suggest that the movement patterns in Guangzhou and Shenzhen can be predicted by the degree of accessibility. However, there is a strong correlation between the degree of accessibility generated by the urban configuration and the

[37] The adjusted R^2 value is calculated in Stata, using the bootstrapping technique to eliminate the effect of small sample size (in this case the sample comprises only six public squares).

number of pedestrians found both inside and adjacent to public space in the Guangzhou and Shenzhen samples.

The next section examines whether the level of static occupancy of the space is also a function of the syntactic strategic value.

7.4.4 Correlation between "strategic value' and level of static occupancy

The data needed to examine the relationship between the degree of accessibility and the level of static occupancy is presented in Figure 7.35. The mean number of static users is calculated by dividing the total number by six (the number of observation periods). The total number of static users is documented in chapter five.

City Name	Public Space Name	Total No. of Static Users	Mean No. of Static Users	Syntactic Strategic Value
Guangzhou City (Old part only)	Theatre Square	535	89.2	2.691
	Bridge Square	112	18.7	2.986
	Chen Academy	663	110.5	4.251
	Renwei Temple	196	32.7	3.106
	Liwan Lake Square*	749	124.8	4.292
	People Park Square	940	156.7	7.264
Shenzhen City	King Plaza	469	76.7	3.052
	Tianmian Square	460	88.7	4.802
	Huangang Square	532	173.5	5.687
	Shangsha Big Square	1,041	199.2	5.405
	Shangsha Small Square	1,195	86.7	1.811
	Xiasha Square	520	139.7	6.327

Fig. 7.35: Mean number of static users at any given time and strategic value

By plotting the level of static occupancy against the strategic value, two scattergrams are derived (Fig 7.36).

The two scattergrams in Fig. 7.36 suggest a general positive correlation between the strategic value and level of static occupancy in Guangzhou with an adjusted R^2 of 0.5281, whereas there is no clear linear correlation in Shenzhen as reflected in a low value of adjusted R^2 of 0.1994. This means that in Guangzhou city, locations with a higher degree of integration or accessibility

will have higher levels of static occupancy, whereas this is not the case in Shenzhen. The low value of the adjusted R^2 for Shenzhen suggests there is no relationship between the two factors. A well-integrated public space can have a lower number of static users and vice versa, although in the previous section, it is observed that the higher degree of accessibility does lead to higher levels of pedestrians both entering the square and in streets adjacent to the space.

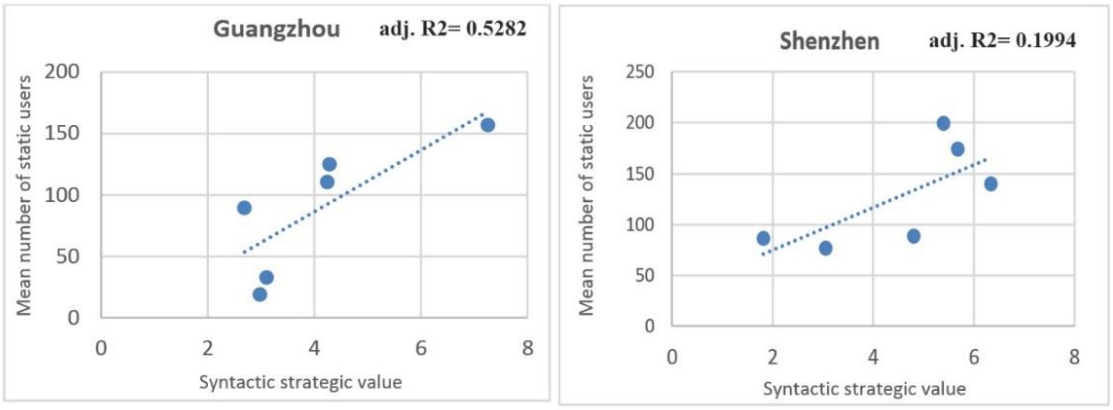


Fig. 7.36: Correlations between the strategic value and the mean number of static users.

7.4.5 Correlation between "strategic value' and level of working-aged static users

The previous section shows that only in Guangzhou is there a strong correlation between static use and the "strategic value". This section further examines whether the degree of correlation is similar for the major user groups of the working-aged and the elderly. Working-aged users are likely to have less spare time than the elderly, hence they might prefer a public space that is easier to access or is close to the main movement network. To investigate this, data for the six small and medium-sized public squares in Guangzhou is used, as shown in Figure 7.37.

Public Space Name	Total No of working-aged static users	Mean No of working-aged static users	Total No of elderly static users	Mean No of elderly static users	Syntactic Strategic Value (Rn)
Theatre Square	12	2.00	520	86.67	2.691
Bridge Square	31	5.17	55	9.17	2.986
Chen Academy	99	16.50	454	75.67	4.251
Renwei Temple	49	8.17	142	23.67	3.106
Liwan Lake Square	45	7.50	664	110.67	4.292

People Park Square	358	59.67	524	87.33	7.264

Fig. 7.37: Mean number of static users and strategic value in Guangzhou

Plotting the mean number of working-aged and elderly static users against the global strategic values of the six public squares gives the two scattergrams in Fig. 7.18. These indicate a significant difference between how the working-aged and elderly are affected by the urban grid configuration.

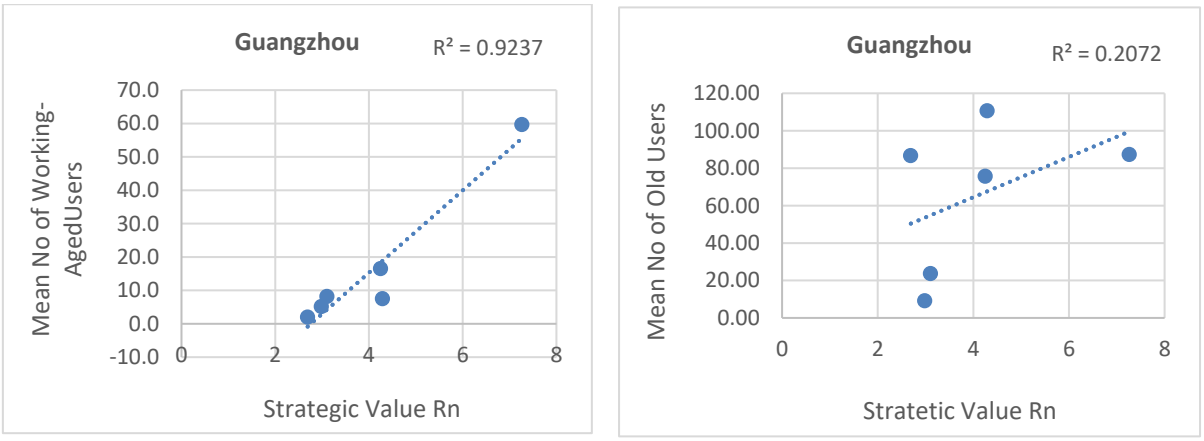


Fig. 7.38: Correlations between strategic value and working-aged (left) and elderly (right) static users

There is a strong and positive correlation between the strategic value and number of working-aged static users with a R^2 value of 0.9237, whereas there is no correlation between elderly static users and the strategic value. This implies that the more integrated or centralised a space is, the higher the number of working-aged static users. In contrast, a segregated public space, such as Theatre Square, is likely to attract a lower number of working-aged users than other spaces although it could have a higher number of elderly static users.

7.5 The 13 Case Studies in Use

The 13 examples of public squares are divided into the two groups of centric and enclosed spaces. The intention is to reveal the difference in the design and use of these two groups. In particular, the issue of publicness, and diversity of activities and user behaviour in relation to the circulation system are examined.

7.5.1 Centric spaces

Bridge Square

Fig. 7.39: Transient use of Bridge Square

Bridge Square opens out from a pedestrian movement corridor along the canal. In addition to a highly legible layout, this pervasive pedestrian flow increases the sense of "publicness" of the space. The square exhibits a ring-shaped circulation system centred on the temple, but it does not discourage through movement because of the clarity of the plan and the small size of the space. The space is ranked third for its legibility, circulation design and high level of transient use that makes a major contribution its vitality.

Renwei Temple Square

Renwei Temple Square is largely used as a straight movement corridor connecting Pantang Village to a local main street (see the map on the left in Fig. 7.40). In addition, bicycle access is integrated into a small garden that is often used as a shortcut for pedestrians going to the village from the south. The space is legible and has good levels of transient use. However, the level of sitting people is relatively low given the lack of sitting places, especially in front of the temple.

Fig. 7.40: Transient use of Renwei Temple Square

Dongmen Market Square

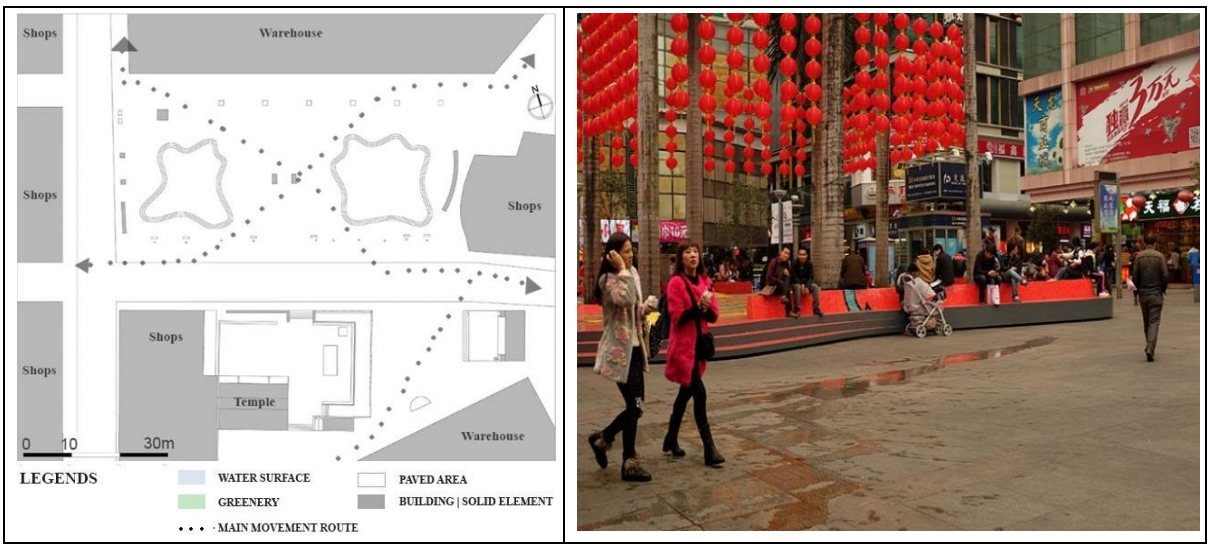


Fig. 7.41: Transient use of Dongmen Market Square

Dongmen Market Square is in a pedestrian district surrounded by warehouses and shops, hence transient use of the space is extremely high from midday onwards. However, this space is relatively empty in the morning when the warehouses and shops are closed. The structure of the space is simple and legible using high trees, including palm trees, that do not block views through the space. The irregular shape of two slightly raised platforms creates plenty of seating and they enhance the visual complexity of the space, but still allow diagonal routes to cross the square. Although there are some negative points such as the clutter of signs and tree pots that

split the space into many less usable sub-spaces, the overall design offers valuable lessons in the Chinese context.

King Plaza

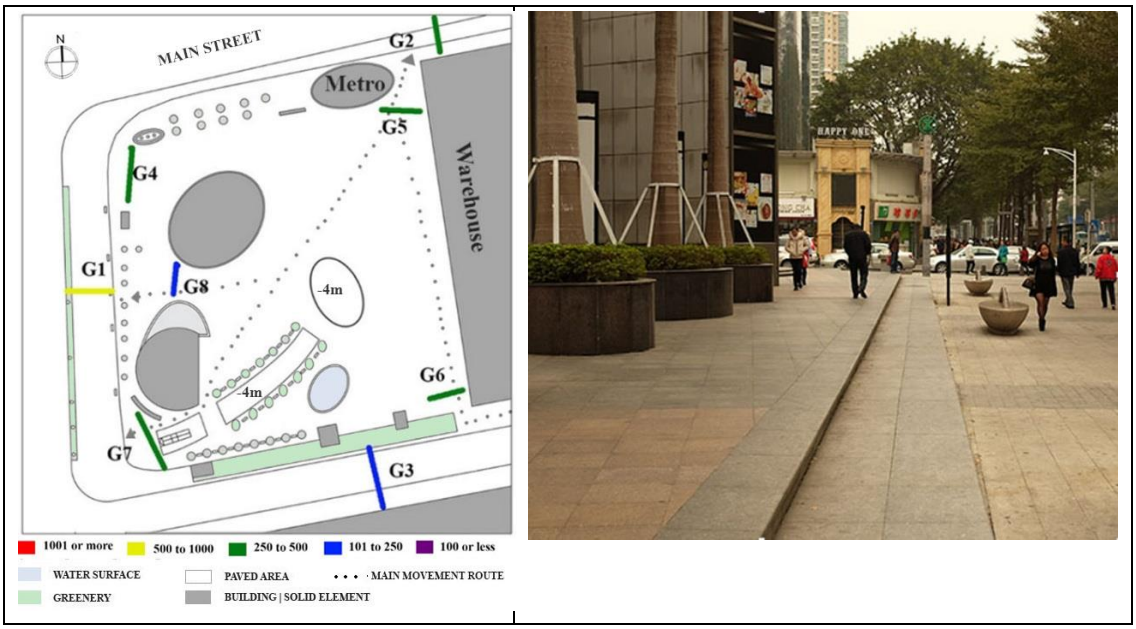


Fig. 7.42: Transient use of King Plaza

As an urban plaza in front of an expensive warehouse, and near a metro and bus station, King Plaza is used heavily as a moving through space, which is reflected in the high level of transient use. Although diagonal routes from the metro station across the space are possible, there are many obstructions at the corners and edges that make through movement difficult. In addition, the space might be legible from inside, but it is less legible for pedestrians looking in from outside. Despite the high level of movement inside the space, its design seems to prioritise the function of a commercial institution over the use of ordinary people.

Liwan Lake Square

Liwan Lake Square has a legible circulation system in which a large grass area works like the roundabout in a traffic junction for pedestrian routes. There are two large “pocket” sub-spaces adjacent to the main movement flows that are the main areas for people sitting. In addition, many users prefer to sit around the tree-beds in the middle of traffic routes (see the photo on

the right in Fig. 7.43). The negative points of this space are the lack of sitting places in highly visible areas around the grass. The zig-zag boundary to the north of the space adjacent Pantang Village and the large size of the non-usable grass area also make the space seem empty.

Fig. 7.43: Transient use of Liwan Lake Square

Shangsha Village Big Square

Fig. 7.44: Transient use of Shangsha Village Big Square

The circulation design of Shangsha Village Big Square provides a movement corridor connecting the village and a local main street with a desire line going from the corner of the sports field to the school. Hence, the space has relatively high levels of transient use. However, its circulation is complicated. The zig-zag boundary adjacent to the village and the sports fields

and numerous tree pots make the space less legible. The absence of a continuous walking route around the space and the placement of the technical building at the main entrance between G1 and G2 decrease the visual and physical accessibility of the space.

Furthermore, Shangsha Village Square includes many large structures that are only occasionally used, such as two ancestral halls, one open stage and two sports. These create additional difficulty for the design of the space.

Tianmian Village Square

Fig. 7.45: Transient use of Tianmian Village Square

Similar to Shangsha Village Big Square, the layout of Tianmian Village Square is complicated being divided into many small less used spaces. In addition, the circuitous circulation layout makes the space less legible, especially from its main entrance G1. However, the space does offer walking routes around it and also has a clearly defined, simple boundary. Furthermore, with two direct movement corridors, Tianmian Village Square still has relatively good levels of transient use. However, the space is mainly animated because of its high levels of static use.

7.5.2 Enclosed spaces

Huanggang Village Square

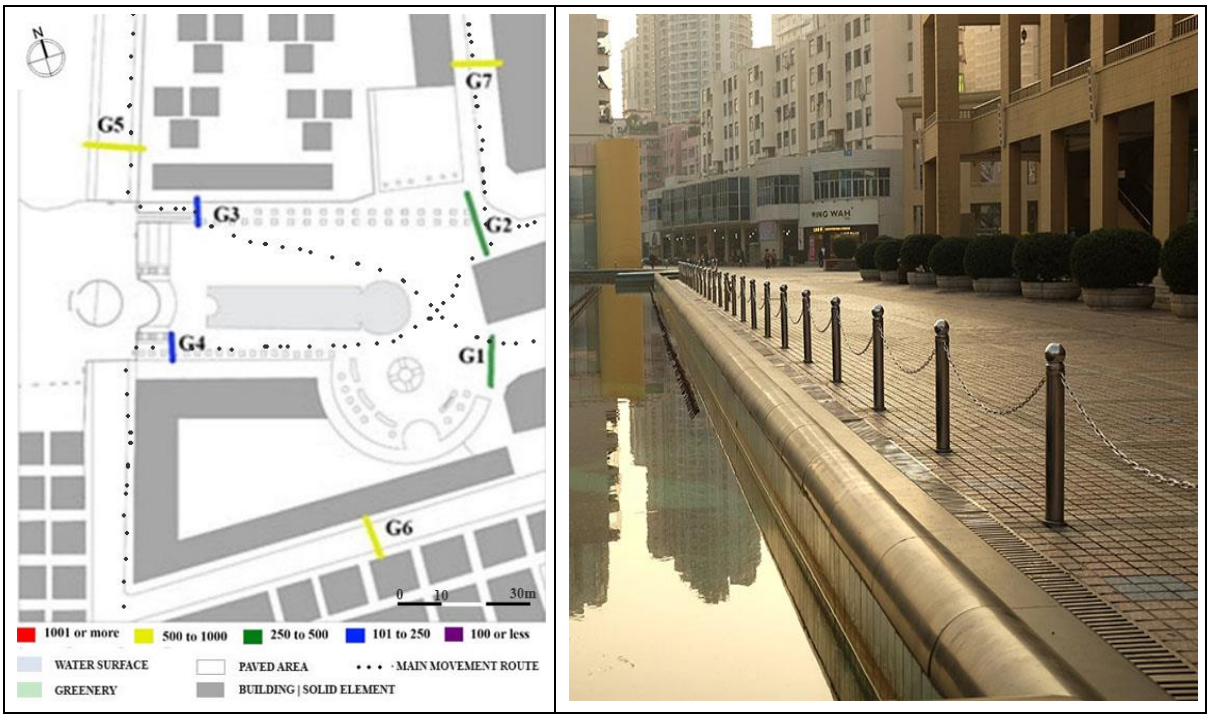


Fig. 7.46: Transient use of Huanggang Village Square

The design and function of Huanggang Village Square is affected by a large, long fountain. Although there are people going through G3 and G4, these gates are both not very legible and narrow, so only local people might know where they lead. Hence, the space functions more like a pocket square, being cut off from the main movement flows in the surroundings. Furthermore, activities seem to concentrate at one end of the space near gates G1 and G2 where sports facilities are provided. In contrast, the rest of the space looks deserted, especially around the fountain.

Chen Academy Square

Chen Academy Square is an exception in the 13 case studies because it attracts a high level of through movement, despite its circuitous circulation system. People follow a zig-zag movement line to go from the nearby metro station to the residential areas on the other side of the square. However, this movement flow does not contribute to the vitality of the space given

the fact that it occurs at the edges of the space and mostly in low visibility areas. There is a large empty square at the middle of the square (see the right photo in Fig. 7.47), which is difficult to access from all sides of the space, including from the adjacent main street (via gates 2 and 3). In addition, the irregular shape of the space and the lack of continuous walking routes around it further exacerbate the visual and physical accessibility of the square.

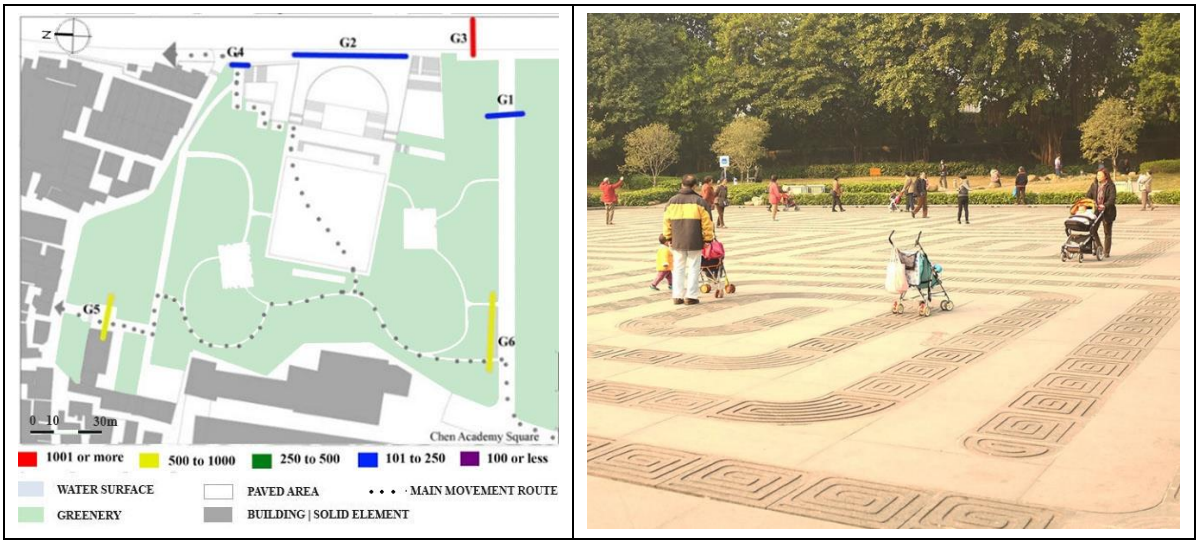


Fig. 7.47: Transient use of Chen Academy

Xiasha Village Square

Fig. 7.48: Transient use of Xiasha Village Square

Xiasha Village Square is ranked relatively low in regard to its design and use as a movement space. The concentration of too many large spatial structures makes it complex, as these are at the edges of the space so they block the view in from adjacent pedestrian movement routes. In addition, these large structures create many underused spaces between them.

Furthermore, the square is irregular in shape, and does not have a continuous good walking route around the boundary. Hence, while the square is internally spacious, the lack of a buffer zone makes it less legible and accessible from the outside. Consequently, although the adjacent streets have a high level of pedestrian traffic, only a small percentage of people move into the square. In summary, without good permeability and visual connections to the surroundings, Xiasha Village Square works as a large but isolated island in the middle of a densely populated urban village.

Theatre Square

Fig. 7.49: Transient use of Theatre Square

Theatre Square is virtually cut off from adjacent movement systems both visually and physically. The space has a beautiful natural setting being surrounded by water in a historic

district of Guangzhou. This space is also remote from any public transport station. Hence, it attracts a very low level of transient use.

However, the space attracts a high level of static occupancy during the day. This space seems to work as a final destination for many of its users. The only possible problem associated with the low level of movement is the lack of user diversity. The space has become open air club for the elderly to the exclusion of most other groups. This problem can also be seen in Shangha Village Small Square.

Shangsha Village Small Square

Fig. 7.50: Transient use of Shangsha Village Small Square

Shangsha Village Small Square is a typical pocket square that offers almost no through movement. Hence, people who enter the space are likely to become static users. Being adjacent to two areas of dense pedestrian movements, this space has the highest density of use during the day. One striking problem of this type of "urban oasis" is the dominance of particular user groups at the expense of others. Shangsha Village Small Square is dominantly occupied by the elderly "playing cards". This kind of "enclosed space" might not provide a comfortable environment for encounters between the locals and strangers. Hence, building spaces that are

too “enclosed” might be a problem in the development of true “public space” in Chinese urban villages.

In summary, it is observed that enclosed public spaces in China that are cut off from movement networks can be animated without the provision of bars/cafes or kiosks if they are small. However, the problem of these small enclosed spaces is that they are usually dominated by one activity group, such as the elderly playing sports in Theatre Square or playing chess/cards in Shangsha Small Square. In contrast, centric spaces seem to encourage a higher degree of user diversity.

7.6 Discussion and Conclusion

7.6.1 Discussion

This section discusses the relevance of transient use for the diversity of users of small and medium-sized public squares. In addition, it discusses possible strategies for increasing user diversity through improving transient use, and debates the difficulty of implementing these in the Chinese context.

From Whyte to Hillier, and more recently Campos and Carmona, transient use is argued to determine static use of modern public squares and urban plazas in the West. Therefore, factors that increase the levels of transient use such as active edges with cafes/ bars, kiosks, and good connectivity and accessibility are considered crucially important. In her studies of public squares in London, Campos argues that the levels of static and transient use are a function of the degrees of accessibility or the strategic values of public spaces. Campos reports no relationship between levels of static use and the degree of enclosure, which has been widely suggested as important for users’ wellbeing. In the West where the use of public space has become optional, it is widely observed that public squares are doomed to failure if they are cut off from the movement network and/or fail to attract people going to and through them. In other

words, the to- and through- movements have become the lifeblood of modern public squares in Western cities.

However, the findings in this chapter do not show a similar phenomenon in the Chinese context. In particular, the findings show no correlation between the levels of static and transient use. Public squares remote from the main movement networks and that have low levels of transient use, such as Theatre Square, still attract high levels of static use during the day. In contrast, public squares with high levels of transient use, such as Bridge Square and Renwei Temple Square, seem not to be attractive for static users. Therefore, given the extreme lack of open space and limited access to indoor recreational/educational institutions, public space forms a purposeful destination in their daily routine for many people. Therefore, this land-use attraction might outweigh that of accessibility.

Although transient use seems not to determine the level of static use in China, the findings in this chapter show a strong link between transient use density and diversity of users of small and medium-sized public squares in China. In particular, squares with legible and simple circulation have a mean transient use density more than twice that of those with a high degree of enclosure and circuitous pathways. Consequently, open and legible squares have nearly twice the percentage of working-aged static users (27%) than enclosed squares (16%). These findings indicate a linear correlation between the mean transient use density and the percentage of working-aged static users. As discussed in chapter 6, the issue of public space in China is that it is dominantly used by the elderly at the exclusion of working-aged group. The findings in this chapter suggest a way to improve the diversity of users would be to increase the level of transient use in small and medium-sized public squares. According to existing theories and this research this could be achieved through the design of more open and legible circulation that includes direct movement corridors across the space.

However, this thesis suggests several factors that constrain such development, for example the irregular shapes of public space, the concentration in them of many large structures such as sports fields, open stages and ancestral halls whose orientation and location might be limited by feng-shui theory, historical precedents such as scholar gardens and European Baroque gardens with their preference for circuitous and complicated pathways, and traditions in spatial design that devalue the outside or the edges and deliberatey create open public space as an isolated cosmos. Many of these factors are integral to Chinese culture and might be difficult to change in the near future. Although over the last decade in Guangzhou, the fences of many public spaces have been removed, this does not seem enough to turn an enclosed space into an open one. The devaluation of the edges and the preference for circuitous pathways still negatively affect the level of transient use.

Besides the circulation design, the space syntax analysis of the old city of Guangzhou suggests that the more centralised or integrated a square is, the higher its percentage of working-aged users. This indicates that in the redevelopment process of Guangzhou or other historical cities with a similar urban structure, if small and medium-sized public squares are strategically inserted in locations with higher strategic value or degree of accessibility, the space should have more user diversity. However, a similar correlation is not found in Shenzhen, a young city whose urban fabric is generated in the mode of "superblock-urbanism". The difference between the two cities is that the old city of Guangzhou has a much denser network of local movement routes, whereas Shenzhen has a modern grid-like highway system running through the city and no continuous local movement network. Therefore, public squares in Shenzhen are likely to be used much more locally than those in Guangzhou, especially, those in highly segregated urban villages.

In summary, although Chinese designers might be aware of important principles for increasing transient use, thereby increasing the user diversity of public squares, their decisions might be constrained by a multitude of cultural factors and the planning paradigm of superblock

urbanism, which is considered to be appropriate for the high density of Chinese cities. This in conjunction with the poor provision of basic amenities makes small and medium-sized public squares likely to become places for less privileged groups such as the elderly and migrants with their small children. In this way, public squares are under the threat of being a sign of social exclusion rather than places where people from different classes meet and share ideas.

7.6.2 Conclusion

The findings from using direct observation methods such as the gate and movement-tracing methods in combination with a space syntax analysis including axial maps to investigate the impact of accessibility on transient and static use of small and medium-sized public squares, are summarised below.

Factors that constrain accessibility of public squares

- The circulation of small and medium-sized public squares in China tends to be *circuitous* under the influence of historical precedents such as the Chinese scholar and European Baroque gardens.

- Many small and medium-sized public squares in China have *irregular shapes with zig-zag boundaries* that hinder visual and physical connection between outside and inside them.

- Accessibility of public squares in urban villages is further constrained by the *concentration of large but only occasionally used structures* such as ancestral halls, open stages, and sports fields, as well as underground car parks. The orientation and location of some of these structures might interfere with the design of circulation as they might be dictated by feng-shui theory.

- Chinese traditional architecture and urban planning tend to create open space as an isolated independent cosmos, hence *devaluing the edges* and the importance of the immediate surroundings of the public space. This leads to the use of fences and gates and the separation of adjacent buildings from public space.

Patterns of transient use

- In contrast to static occupancy,[38] pedestrian movement adjacent to the sample of small and medium-sized public squares is composed of approximately 60 % working-aged, 30 % elderly people and 10 % children. Transient use is made up of relatively equal proportions of working-aged and elderly people (about 43 % each) and 13 % children.

- The average temporal patterns of transient use are nearly identical to those of adjacent pedestrians, with two peaks in the early morning and late afternoon (rush hours in China) and a low point at lunch time. At lunch time, the average levels of both static and transient use reach their lowest points.

- The absolute levels of transient use vary from 220 (Shangsha Village Small Square) to 2,657 people per hour (Liwan Lake Square), whereas the mean transient use density varies from 0.11 to 0.43 pph/m^2. Overall, a public space with open and legible pathways (centric space) has a transient use density twice as that of a public space with complicated, circuitous circulation (enclosed space).

Relationship between transient use and pedestrian movement

- The design of circulation affects the ratio of transient use to adjacent pedestrian density. In particular, open and legible squares seem to demonstrate a ratio nearly 50 % higher than that of enclosed squares.

[38] In China, static users comprise 60 % elderly, 26 % working-aged and 14 % small children (see chapter five)

- However, the proximity to public transportation might outweigh the impact of circulation. For example, Chen Academy Square has the highest ratio of transient use to adjacent pedestrians (1.32) because this space is situated between a metro station and a neighbourhood. Therefore, the square is used as a shortcut despite its circuitous pathways.

Relationship between transient use and static use

- The ratio of static to transient use varies greatly from 0.02 (Bridge Square) to 0.39 (Shangsha Village Small Square). Overall, open and legible squares have a mean ratio of 0.07 whereas enclosed squares have a mean ratio of 0.18, nearly three times higher. This indicates that the level of transient use does not necessarily determine the level of static use, and more importantly, spatial qualities that support transient use of a space such as legibility, openness and direct movement routes might not be those that make people stay.

- However, open and legible squares (centric space) have nearly twice the percentage of working-aged static users (0.27) compared with squares with a higher degree of enclosure (enclosed space). Therefore, in China, transient use might not necessarily determine the levels of static use, but perhaps has a strong impact on user diversity (which is believed to be a major concern for public space in China).

Relationship between urban grid configuration (accessibility) and transient and static use

- The degree of accessibility of small and medium-sized public squares (strategic value) generated by the urban grid configuration of Guangzhou correlates positively with the level of people moving inside and in the surroundings of small and medium-sized public squares with an R^2 of 0.8037, whereas this correlation in Shenzhen is slightly weaker

with an R^2 of 0.6446. This indicates that the urban grid configuration might seriously impact the movement patterns in the areas of Guangzhou and Shenzhen investigated.[39]

- There is a medium positive correlation between the strategic values and levels of static use in the Guangzhou samples with an R^2 of 0.5282. However, there is no correlation between these variables in Shenzhen.

- A further analysis of the Guangzhou sample shows that there is a strong correlation between the number of working-aged static users and the strategic value (with an R^2 of 0.9237), but no correlation was found between the number of older static users and the strategic value (with an R^2 of 0.2072). This indicates that the urban grid configuration determines the level of only a small proportion of public space users (the working-age group) in Guangzhou.

This chapter concludes the empirical part of this thesis. The two previous chapters have focused on the static use of small and medium-sized public squares including the study of users, their activities and importantly their spatial behaviour. This chapter has added insight into the transient use of each sample space and its relationship with static use, circulation design and the urban grid configuration. The outcomes of the three chapters could be useful not only for designers but also for urban planners and policy makers, given the early development stages of public squares in China. The conclusion chapter summarises and discusses the major findings from the three empirical chapters.

[39] Previous studies conducted by Professor Haofeng Wang in the city of Shenzhen also indicate correlation between accessibility of streets and their levels of movement. However, given the limited number of gates (points of counting), the result in this thesis is only indicative.

CHAPTER EIGHT

CONCLUSION

This thesis set out to examine how small and medium-sized public squares have been designed and are used on a daily basis using data from 13 case studies in Guangzhou and Shenzhen. The thesis is primarily a quantitative (empirical) research study in which findings are derived from numbers rather than theoretical speculation. As stated in the first chapter, the focus of this thesis is placed on use patterns and their linkage to spatial patterns, with the aim of providing insights into the use and design of newly developed squares, something currently virtually absent from the literature. This thesis does not intend to join any philosophical discourse around the development of the "public sphere" or how the perception of "publicness" might affect the use of the spaces. It is also not a comparative study between China and the West, and the purpose of any such comparison in the thesis is mainly to relate the research findings with existing ones. Within this scope, the main research question is stated below.

> *What insight can be gained from the design and use of small and medium-sized public squares in China through spatial analysis techniques?*

To answer this research question, two literature reviews and three empirical studies were conducted. The first literature review (chapter two) describes the development of public squares in China to examine the influence of historical precedents and the relevance of small and medium-sized public squares for contemporary Chinese cities. The second literature review (chapter three) discusses key studies of public space and public squares in the West within the social-spatial research perspective and relevant spatial analysis methods. Space

syntax emerged as the main research methodology in the empirical part of this thesis that comprises three smaller studies. The first empirical study (chapter five) focuses on the physical properties and patterns of static usage of small and medium-sized public squares using direct observation, including activity mapping, methods. The second (chapter six) explores the relationship between location preference and visibility, using different space syntax visual analysis techniques in combination with behaviour mapping methods. The third (chapter seven) examines transient use and its relationship to the design of circulation and the degree of accessibility, using direct observation in combination with space syntax analysis techniques.

This chapter aims are to bring major findings from the three empirical studies together, explaining what insights have been gained through the spatial analysis techniques. In addition, it highlights the contribution to knowledge of this thesis.

This chapter is organised into six parts. The first summarises the findings of the three empirical studies, emphasising the valuable insights gained through the use of different spatial analysis methods. It demonstrates that many existing phenomena observed in the West are not present in China and, therefore, advocates a more localised approach to urban design in the Chinese context.

The second part of this chapter suggests concrete recommendation for the design of small and medium-sized public squares in China, providing 12 spatial principles that could make public space in China more user friendly.

The third part of this chapter discusses the relevance of the major findings from chapters five, six and seven. Here, the intention is to relate these two previous studies in both China and other contexts.

The fourth part of this chapter discusses the other contributions of this thesis. Apart from the contribution to design practice, the findings also contribute to the development of a theory on the collective behaviour of users in open public space.

Part five of this chapter addresses the thesis limitations and suggests directions for future research regarding the development of user friendly public space in China, whereas part six provide some important notes on the use of the Space Syntax methodology in the Chinese context.

8.1 Insights gained into the Design and Use of Small and Medium-sized Public Squares in Guangzhou and Shenzhen

Given the lack of quantitative information on the daily use patterns of public space in China, when designing a new public space, architects and urban planners, especially Westerners, have insufficient information to answer fundamental questions such as: What are the typical public space users in China, their activities and spatial behaviour?; and What are the problems with the use of public space in China?

Using space syntax methodology and combining direct observation and space syntax techniques, this thesis has provided valuable insights into: (1) static use patterns and their relationship to spatial patterns; (2) the location preferences or spatial behaviour of different group users and the associated underpinning visual logic; and (3) transient use patterns and their relationship to circulation design and the urban grid configuration.

8.1.1 Daily static occupancy and the impact of physical properties

Chapter five provides insights into the static use patterns including the demographic structure of the users, temporal patterns, and the levels of different types of activity occurring in the 13 public squares in Guangzhou and Shenzhen. The second half of chapter five, is an examination of the impact of three physical properties on the static use of public squares – size, the provision

of seats, and the existence of fences and gates. Major findings from these investigations are summarised below.

Dominance of the elderly and people with small children

Small and medium-sized public squares in China are predominantly used by the elderly (being an average of over 60 % of total static users). Given the limited access to indoor recreational activities, small and medium-sized public squares are used as a substitute for recreational centres for the elderly. The dominance of one group might lead to the absence of other groups. The observations made during a weekday from 7 am to 7 pm shows that the percentage of working-age users is less than half that of the elderly, although most of this time the working-aged will be at work and teenagers at school[40].

In addition to the dominance of the elderly, the number of people with small children is also significant. Although small children contribute only 14 % of total static users, each child is often accompanied by one or two adults. Therefore, the total usage of this group is quite large, especially in urban villages.

Types of Activity and the Dominance of Group Activities

In Guangzhou and Shenzhen, most frequently occurring activities occurring in public squares are sitting, standing and exercising. Many of these happen at the same time as “babysitting”, “exercising”, “playing chess/cards” or simply “chatting”. Sometimes, “singing” and “sewing” also occur. The pervasive existence of eye-catching activity groups such as “babysitting” and “exercising” contributes greatly to the positive atmosphere of many public squares in Guangzhou and Shenzhen.

[40] According to examiners, the absence of some user groups might correlate with the observation time. Hence, the results of this research might not be taken without mentioning the time of the observation.

In addition, the use of public space is characterised by the dominance of large and organised activity groups. A group can vary from 3 to more than 50 people. The dynamics of these groups and their types of activity appear to be behind many of the behavioural patterns discovered in this thesis.

Poor provision and distribution of seats

Public squares in Guangzhou and Shenzhen generally contain considerable levels of decorative elements, but the provision and distribution of seats is usually poor. By counting the number of available seats and relating this to the number of static users, even in off-peak periods, people might have difficulty finding a good sitting place in many squares. On average the provision of seats in Guangzhou and Shenzhen is about one seat per 50 m^2 of paved area, which is about eight times lower than the recommended number of linear seats by The Project of Public Space (one seat per 6 m^2).

More importantly, there is an extreme lack of seats arranged to support the face-to-face conversation of large groups. It is worthwhile mentioning that about two thirds of users are members of large groups, but overall the percentage of grouped seats is less than 10 % of total. In addition, 7 out of the 13 sample public squares provided no grouped seats.

The problem created by the lack of seats is further exacerbated by placing those that exist in undesirable locations such as along the edges of adjacent streets or in secluded areas, separated from the action spots of the space, something Chinese public space users appear to dislike.

Large scale and ineffective use of public space

Scale is a frequent problem in public space design, and this is extremely evident in China. Although small and medium-sized public squares are much smaller than monumental civic squares in China, the average size of the 13 squares in the sample is still above one hectare (the size of the Trafalgar Square in London). Despite the high population of Guangzhou and

Shenzhen, large public squares are used much less efficiently and, therefore, many public space appear deserted and unwelcoming. In particular, if the size of the paved area exceeds one hectare, the larger the space is, the worst its performance. In addition, public squares with paved areas between 3,000 and 6,000 m^2 are likely to be animated and used effectively.

Fences, gates and devaluing of the edges

Fences and gates are elements of Chinese traditional architecture and are present in many public squares in China. Hence, adjacent buildings are not conceptualised as being contiguous with public squares. Shops, cafes and bars are virtually absent. However, a comparison of fenced squares with their open equivalents in this thesis reveals no significant difference regarding levels of static use.

However, fences and gates seem to affect the diversity of activity. Enclosed spaces which are gated and fenced appear to attract more informal activities than open spaces. The high degree of enclosure of fenced squares seems to create an atmosphere that invites users to play and experiment as they are not afraid of being seen and judged by strangers. As a result, activities such as singing in groups and playing chess/cards seldom take place in open spaces, being more common in highly enclosed ones. In contrast, enclosed public squares in Guangzhou and Shenzhen appear to have less user diversity by attracting fewer working-aged users than equivalent open spaces. Nevertheless, this is not sufficient to state that the existence of fences and gates alone is the primary cause of such differences as the type circulation might be a greater contributor.

8.1.2 Visibility and location preferences for static occupancy

There is virtually no information about location preferences in open public space in China. Hence, the findings in this thesis provide many new insights. The investigation of location preference is based on the proposition that people select a location based on its degree of

visibility or exposure. Some people might prefer to be seen, whereas others might prefer a higher degree of privacy in open public space. Using visibility graph analysis in combination with direct observation during off-peak periods, major findings emerged that are summarised as follows.

Preference for high visibility areas by large activity groups

Public squares in China are predominantly used by large activity groups such as those "exercising", "dancing", "babysitting" and "playing chess/cards". The analysis revealed the two group activities of "exercising" and "babysitting" are likely to occur in high visibility areas[41] such as the centre of the space (46 % of all occurrences), which is nearly three times the percentage found in secluded areas. This in turn potentially affects the distribution of other activities such as sitting or standing.

Furthermore, preference for the visual centre or high visibility areas is also observed for sitting people. Although the distribution of people sitting is affected by the placement of seats, those provided in high visibility areas are used four times more frequently than those in medium and low visibility areas.

What determines choice of location

This thesis set out to examine whether choice of location is affected by demographic factors such as age and gender or it is more dependent on the nature of the activities of users. Data collected from the 13 samples of public squares in Guangzhou and Shenzhen suggests there is little difference when it comes to age and gender regarding choice of location, whereas difference based on activities is more significant. In particular, "exercising" and "babysitting"

[41] High visibility areas are the most visually integrated zone in a public space. This visual centre or visual core is not necessarily the geometric centre of the space because its calculation is not based on geometry but topology. Only if the space is totally empty, will the visual centre and the geometric centre be identical. Nevertheless, spacious locations are likely to have a higher degree of visibility than restricted and less legible ones.

are most likely to occur in high visibility areas. In contrast, people "playing chess/cards" are most likely to be found in secluded areas inside public space.

Individuals' preference for medium visibility areas

Individuals form a small percentage of public space users in China, and have different location patterns compared to groups. While individuals are more sensitive to visibility, they are also attracted by "other people". The behaviour that Appleton has described as the desire "to see without being seen" might be correct for Chinese individuals. The findings from this thesis show the majority of individuals selected a medium visibility zone, and only a few preferred to be in highly exposed areas (22 % of all individuals). This pattern is more obvious for "sitting" individuals.

Mismatch between Location Preference and Distribution of Sitting Places

The centres of public squares in China are likely to be animated given the pervasive existence of activities such as playing with small children or group dancing, and hence sitting places in high visibility zones are used four times more frequently than those in medium and low visibility areas. However, the distribution of sitting places does not reflect this preference, with on average twice as many sitting places in secluded rather than high visibility zones. Consequently, while people need to squeeze themselves together into seats in the visual centre, many seats in other areas are much less used.

Visual impact of gates on location preferences

Using a non-syntactic visual analysis (overlapping visual fields) reveals the position of the gates to certain extent affects the choice of location inside a public space. While the findings show many people prefer high visibility areas, they also choose to be in areas that are seen from all the gates. In contrast, passive users such as sitting people, including individuals, mostly prefer areas with medium exposure to the gates as well as to all others locations.

8.1.3 Relationship between transient use, circulation design and urban configuration

In addition to static use, the patterns of transient use and their relationship to the design of circulation in a space as well as the degree of accessibility ("strategic value") generated by the urban configuration around the public squares were all investigated. From the analysis of transient use and the design of the circulation, the terms centric and enclosed space (borrowed from Rene French) are used to describe the two types that emerged. The centric space group includes public squares whose design encourages through movement crossing the space, whereas the design of the enclosed group does not invite people to move through the space.

Using both direct observation (the gate method and the movement tracing method) and the axial map, the latter being the most frequently used space syntax technique to examine transient use patterns and their relation to circulation design and urban configuration, major findings are summarised as follows.

Circulation design and transient use of public squares

Chinese public squares are likely to discourage people from moving through them due to contextually and culturally related design constraints. The former are the typically irregular shape of the site, the absence of pathways around the public space, and the low degree of integration with the local movement network. These features lead to a low degree of visual and physical accessibility. The cultural constraints lead to squares that are typically fenced with a small number of entrances, a design preference for a circuitous circulation system, the limited choice of orientation, and the presence of gates and major buildings (such as ancestral halls) inside public squares. Under such conditions, public squares in China are often not very legible, making through-movement more difficult.

Small public squares can be animated without through-movement

The findings from this research suggest some small public squares do not need high levels of through-movement to be animated. For example, Theatre Square is located far away from a main movement network and has low levels of through-movement but still attracts high levels of static use throughout the day. Because of the lack of public space in China, the performance of small and medium-sized public squares might be much less dependent on their levels of transient use than is the case in the West. However, this finding does not apply to large-sized squares such as Xiasha Village Square and Huanggang Village Square.

Relationship between Urban Configuration, Levels of Movement and Static Usage

Using space syntax techniques to measure the degree of accessibility generated by the urban configuration revealed a strong correlation between the degree of accessibility of public squares and the numbers of people moving inside them and their surroundings. However, the correlation in the old part of Guangzhou (with the R^2 of 0.8037) is significantly stronger than that of Shenzhen (with an R^2 of 0.6446), a modern city developed using superblock urbanism. Furthermore, in the old city of Guangzhou where the network of local streets is denser, a medium correlation between the strategic value of and the static users in public squares is found with an R^2 of 0.5282. In contrast, there is no such correlation in Shenzhen. In other words, the level of static occupancy of public squares in Shenzhen appears not to be determined by the urban configuration as in the case of Guangzhou.

To verify whether different types of user are differently affected by the degree of accessibility created by the urban configuration, the two user groups of the working-aged and elderly in six public squares in Guangzhou were examined. The relevant number of static users in each group was plotted against the global strategic value for each square. While there is a strong correlation between strategic values and the number of working-aged static users with an R^2 of 0.9237, no correlation is found between strategic value and the number of elderly users. This suggests that

easily accessible public space in Guangzhou attracts more working-aged static users than the elderly. This insight might help Chinese planners find the best locations for new public squares to encourage a higher degree of user diversity than currently.

8.1.4 Summary

The findings above answer the main research question and its three research sub-questions and fulfill all research objectives stated in the first chapter as repeated below:

- To examine the use patterns of small and medium-sized public squares on weekdays to gain quantitative information about the users, their activities, and their choice of location.

- To assess quantitatively the impact of spatial properties on the use of small and medium-sized public squares, including size, fences and gates and the provision and distribution of sitting places.

- To assess the impact of the surrounding urban configuration on levels of transient and static use of public space.

- To evaluate the design and performance of 13 newly (re)developed small and medium-sized public squares in Guangzhou and Shenzhen and to identify factors that affect the design of these spaces.

Using spatial analysis techniques such as direct observation methods and space syntax, this thesis provides many valuable insights that could directly help Chinese planners to create more user friendly public squares. In particular, architects and planners now know who the users of small and medium-sized public squares are, what types of activity they tend to do there and, more importantly, their location preferences inside an open public space. Hence, mistakes such

as placing seats in undesired locations or sub-dividing the square into many small areas can be avoided.

This thesis has identified the major issue for public squares in Guangzhou and Shenzhen is not one of underuse, but rather the lack of user diversity on a weekday. The findings show that small and medium-sized public squares in Guangzhou and Shenzhen are dominantly occupied by the elderly and people with small children. They use public space as a substitute for educational or recreational centres given the limited access to these institutions in China. These people have to use public space even though there is an extreme lack of basic amenities such as places to sit. This research raises a significant "hidden" issue of public squares in Guangzhou and Shenzhen that they might become venues for less privileged citizens, such as the elderly and migrants with small children.

In addition, the findings in this thesis also highlight the collective use of public squares in China. People in big groups behave differently from individuals. They tend to occupy high visibility areas which are often the centre of the space. They appear to be less sensitive to being exposed to strangers. In turn, this collective use of big groups affects the distribution patterns of individuals and couples. Hence, public space users in China have highly distinct use patterns that are different from elsewhere.

Finally, the findings from this thesis can also be used to improve not only the design of the 13 case studies, but also the design of public space in China in general. A detailed guideline is presented in Appendix 4.

8.2 Recommendations for the Design of Public Squares in China

Based on the results from this research, two sets of recommendations are proposed. The first concerns the design process for public squares, and suggests the incorporation of an analytical approach to urban design through integrating different spatial analysis techniques into different

design stages. The second set of recommendations concerns spatial principles to be considered when designing public squares in China.

In the Western context, the top-down approach to urban design and planning has gradually shifted to a more bottom-up approach, with the increasing involvement of users and the local community in the design process. This transition is still to happen in China. Meanwhile, different spatial analysis methods can be used at four different stages of the design of public space to make it more user friendly.

8.2.1 Recommendations for the design process of public squares

Development of the design brief

In the development of public squares or plazas, it is necessary to integrate concerns about potential users, their activities, and user diversity into the design brief. In this context, quantitative information about the potential use of public space can be collected through surveying several public spaces near the selected site using different direct observation methods. The observed types of user and types of activity will provide a basis for any future spatial interventions. The findings in this research suggest that not only the design of public squares, but also the characteristics of the urban grid configuration contribute significantly to the diversity of users

Development of the overall urban structure

In the early stages of the design of a public space, its overall structure should be explored to examine its fitness for the context. At this stage, different space syntax analysis techniques such as axial maps or visibility graph analysis can be used in combination with surveying the pedestrian movements in the surroundings. The findings from such investigations have suggested that the more a public square is integrated into the existing movement network, the

more likely will its transient and static use be predictable. Space syntax analysis methods can help designers to estimate the potential use and adjust the design accordingly.

Furniture, plants and other elements

At the detailing stage, seating and planting will be added, and here visibility graph analysis (VGA) can be used to identify what zones might be preferred or ignored by users. In the Chinese context, this research found a preference for medium and high visibility over low visibility zones by people "sitting". Hence, an adequate number of sitting places should be provided in the high and medium zones, whereas other facilities such as buildings can be allocated to low visibility zones.

Subsequently, another space syntax method, the axial map, can be used to ensure that the provision of secondary elements such as sitting places, trees, and fountains will not disturb the movement flows across the space.

Post-occupancy evaluation

After the space has been in use for a good period of time, it is necessary to survey its use using the aforementioned spatial analysis methods. The aim of this post-occupancy evaluation is twofold. First, it will identify what spatial features are not aligned with users' needs, and where seating or other amenities might need adjusting. Second, successful design features should be documented for the development of future spaces.

In summary, this section has shown how different spatial analysis methods can be integrated into different design stages to inform the design of public space. In addition, based on the evaluation of the small and medium-sized public squares in Shenzhen and Guangzhou, the following section provides a set of spatial principles for architects and urban designers of open public space.

8.2.2 Spatial principles for the design of small and medium-sized public squares in China

Twelve spatial principles are proposed, of which seven are related to the urban structure and five to the detailing and fine-tuning of the design of public squares. These twelve principles address the needs of users as well as providing practical guidance for creating more user friendly public squares in the Chinese context.

1. Plan for multiple smaller public spaces

Public squares with paved areas between 3000 and 5000 m^2 are likely to be animated because of the high population densities in Guangzhou and Shenzhen. In fact, many public squares are less effective in terms of daily use when their areas are larger than one hectare. Consequently, the concentration of open space into a few large squares may only improve the quality of life for a small proportion of citizens living nearby.

2. Minimize the number of large structures in public squares

In many small and medium-sized squares, especially those in urban villages, there are many large structures such as ancestral halls, sports fields and open stages that are only used occasionally. The concentration of these facilities and their spatial settings create additional difficulties for the designing of the space, including its circulation and placement of sitting places. The inclusion of such structures should be reconsidered or minimised.

3. Divide squares into a few large sub-spaces instead of many small ones

Many small and medium-sized public squares are divided into small sub-spaces. The findings, however, suggest that Chinese users with collective use patterns prefer large open zones. These work like stages and are likely to be occupied by "actors" such as "exercising" and "baby-sitting" groups, attracting an "audience" who to sit around such zones.

4. Simplify the circulation design and create more direct movement corridors

The circuitous circulation systems of Baroque and Chinese garden designs might have aesthetic quality, but often discourage efficient through-movements, which is critical for the "publicness" of open spaces. Human beings are an energy saving species, and prefer short-cuts where possible. Therefore, if the public space has such short-cuts, it is likely to draw more people into it.

5. Adding gates to the corner of the squares to allow diagonal movement[42]

The corners of the squares are special locations, but are often been treated as having minimal importance. Adding gates at the corners would facilitate people crossing the squares by providing desire lines (diagonals).

6. Simplify the shape of the space

Many small and medium-sized public squares in China have irregular shapes with "zig-zag" boundary edges that contribute to their low degrees of visual accessibility. Where a zig-zag site boundary is unavoidable, a buffer zone of greenery or a walking route between adjacent buildings and the fence around the square should be considered.

7. Provide a continuous walking route around the square

Many small and medium-sized public squares do not have a continuous walking route along their boundaries, and thus function like isolated "islands". Providing wide, continuous walking routes along the boundary will enhance the visual accessibility, as well as the integration of the space into the urban context.

8. Provide more sitting places, especially grouped-seats

[42] This principle might generate potential conflicts with traditional Chinese spatial principles including feng-shui theory. In this context, the aim is to reconcile the symbolic value with the actual use of the space.

Given that the majority of users are groups of the elderly, substantially more seats should be provided. Designers can increase the number of linear sitting places without impacting other priorities by integrating these with raised flower beds (low walls). In addition, seats in groups that support face-to-face conversation are also preferred, and substantially more such arrangements should be included.

9. Place more seats in high visibility areas near the (visual) centre of the space

The findings have suggested that seating places near the centres of squares are four times more frequently used than those in other places, including at the edges. The squares are animated by the presence of activities, whereas adjacent streets are too crowded. Therefore, seats should be located in and oriented towards the centre of the space.

10. Create a location for people with small children in high visibility areas with play equipment

Small children and their carers form a major user group of small and medium-sized public squares in China, especially in urban villages given the limited access to kindergartens and lack of playgrounds. The current designs do not adequately address the needs of this group who need a spacious and legible location with sufficient seats to encourage small children to play while being watched by their carers. Given that many come with a baby buggy, they prefer locations that are easy to access, and not far from public transportation.

11. If fences are required, integrate small shops and shelters into them

Fences and walls are part of Chinese architectural culture, and designers can make use of this tradition. Many gated communities in China have recently transformed their hard fences into space that contains shops or shelters, a strategy that could be considered for public squares.

12. Add large trees and minimise the areas for low plants and grass

The climate in Southern China is very hot and humid in summer, thus there is need for sun protection. Adding high canopied trees will provide such protection, without decreasing the ability to see through the space. In addition, the preference for Baroque garden design leads to many areas of grass and hedges that are unusable in China and require intensive maintenance. This suggests minimising these decorative and unusable areas and their conversion into paved areas with large, high-canopied trees.

8.3 Discussion

Two points for further discussion emerge from the findings in this thesis: (1) The performance of small and medium-sized public squares in China and (2) The underpinning principles behind location preferences in open public squares.

Firstly, despite the lack of sitting places and their poor distribution, many small and medium-sized public squares in Guangzhou and Shenzhen appear to function well. This is evidenced by the number of visitors on weekdays, as well as the ability of the space to accommodate a wide range of activities. In a wider context, small and medium-sized public squares seem crucially important for the elderly and children of working migrants. Given the lack of indoor recreational institutions for the elderly, older people in China use these spaces for socialising and health-maintenance purposes. Similarly, children of working-migrants, who legally have no access to kindergartens in urban areas, use small and medium-sized public squares as a substitute. In this sense, unlike the civic and monumental public squares, which are the stages for political power, small and medium-sized squares serve the needs of the most neglected groups of people in Chinese cities.

The ‘success’ of these spaces is partly formed from the ability of Chinese people to deal with the lack of public amenities in them. Many people bring movable chairs when visiting the squares. They also have no problem with sharing their seat with other people. Their ‘movable’ chairs are good for forming group-seats, thus enabling conversations between group users.

Chinese public space users appear happy when spending time in the small and medium-sized public squares. During the day, groups of people singing or knitting in peaceful sub-spaces inside these squares are apparent. The provision and design of these squares might be less of a problem for their users simply because around 20 years ago such public spaces did not even exist. The extreme lack of open public space in conjunction with a high population density has possibly made success easy for public spaces in Chinese cities, regardless of the quality of their design.

The most important lesson learned from the sample of Chinese small and medium-sized public squares is that their 'success' goes beyond their spatial design. Open public spaces are more likely to be well-used in a dense city. The density of population, urban form, and a collective way of life all contribute to the success of these small and medium-sized public squares in China. It may be that the West, too much attention has been paid to 'design' whilst overlooking these other factors. However, one thing designers should note is that the function of an open public space is largely conditioned by the dynamics of the city where it is located. The way design is taught often in isolation from the city context has formed a tendency to think good places will make a good city but this thesis suggests the opposite, namely that a good city will make good places.

The second point of discussion relates to the 'edge effect'. In the West, authors have reported that the edges of public squares are the most preferred locations. However, the 'edge effect' was not found in China. Chinese public space users are likely to cluster around the centre of the square. Seats inside the centre are four times more likely to be used than in other areas. This is partly because of the dominance of big activity groups which eases the fear of any group member being seen and judged by strangers in a public space. Without this fear of the 'public gaze', the visual centre of the space becomes an attractive spot.

Despite the differences, there is a fundamental similarity across cultures, which is people are attracted to other people. In the West, the majority of human activity occurs at the edges of public squares, making these a popular place. In China, the centre of public squares is often the eye-catching spot given the presence of interesting group activities such as ‘dancing’ or playing sport. Watching these activity groups appears to be more interesting than watching passing pedestrians. Thus, the centre of the space is better used than the edges. However, a key principle, which is ‘people are attracted to other people’, appears to hold the same value in both the West and China.

8.4 Towards a theory of collective behaviour in urban public space

The two previous sections have shown the major contributions to knowledge of this thesis are: (1) filling the knowledge gap about the use and design of small and medium-sized public squares in China and describing the spatial use patterns of Chinese public space users; and (2) providing practical recommendations for maximising the use of public space and encouraging greater user diversity on weekdays. Additionally, the findings also contribute to the development of a theory on collective behaviour in urban public space.

Through the investigation of the use of public space in China, it seems the existing literature on the use of public space in the West might only describe and theorise on its dominant use individuals and small groups, whereas collective behaviour in public space has not yet been theorised. The findings in this research suggest that collective behaviour is very different from that of individuals and small group users. For example, in existing literature about location preferences in open public space, from Appleton to Whyte and more recently Campos, the desire “to see without being seen” is argued to determine how people select their location. In other words, when staying in public open spaces including public squares and urban plazas, people search for locations where they can have good views of the surroundings, while at the same time being visually protected from the gaze of strangers. The edges of public space are

the most popular locations for static users as they exactly fulfil these physiological needs. In contrast, the centres of public squares, with their high degree of exposure, are argued to be the most avoided spot as Western users do not want to be seen and judged by strangers in public.

However, the analysis of the 13 Chinese case studies does not confirm the edge and island effects mentioned above. Although the analysis only includes off-peak periods to mitigate the effect of a crowd on the choice of location, in China the (visual) centre of public squares seems to be preferred by the majority of users, followed by the medium visibility zones, whereas the low visibility areas including large parts of the edges are the least preferred. This indicates that in China the desire "to see without being seen" seems not to dictate how people select their location. Therefore, the prospects and refuges theory by Appleton might only be relevant for the West, where the majority of users are individuals and couples. In other words, this theory can describe the spatial behaviour of individuals, but not necessarily the collective use patterns that are dominant in Chinese public squares.

	User Motivation	**Suitable Visual Quality for User Motivation**	**Fear of Public Gaze**	**Choice of location**	**Theory**
Western Individual Use Patterns (individuals/ couples)	Passive interaction with others (observing others)	Good visual connection to adjacent pedestrian movement	Significant	Clear preference for the edges Avoidance of the centre	Prospects and refuges theory
Chinese Collective Use Patterns (big organised groups)	Active interaction among group members	High visual connection among group members	Less significant	Clear preference for high visibility areas or (visual) centre	?

Fig. 8.1: Difference in choices of location between individual and collective use patterns

If the choice of location is based on the interaction between the three factors of user motivation, suitable visual quality related to user motivation, and the fear of being seen and judged by strangers (public gaze), the difference for each factor for the majority of Chinese and Western users is summarised in Fig. 8.1.

Figure 8.1 demonstrates that the prospects and refuges theory seems to effectively describe the behaviour of the majority of public space users in the West. The key factor is the visual connection between public space users and the adjacent pedestrians and other strangers.

In contrast, for the majority of public square users in China, people in big, organised groups, the visual connection between group members plays a more important role than the fear of the public gaze or the view of strangers. For example, members in big exercising groups want to observe the leader and other members in order to follow their movements. Similarly, in babysitting groups, carers while sitting still want to keep control of their small children who are learning to walk and play. Locations such as the (visual) centres of public squares that provide a higher degree of visual connection or integration for a large number of group members are likely to be most frequently used. Once, the public gaze of the centre is neutralised by the pervasive presence of large group activities, the centre itself and places near the centre are argued to become more popular even for individuals and passive users.

In summary, the findings in this thesis provide valuable insights into how differently large groups behave and select their locations. It is uncertain whether these patterns of behaviour occur only within the cultural and social context of China. It is believed that many of these patterns are integral to Chinese culture. However, the case of China has provided concrete evidence for a new research avenue that could investigate the general characteristics of collective behaviour in open public space.

8.5 Limitations and directions for future research

8.5.1 Limitations

There are two limitations that affect the result of this research: (1) Accuracy of the activity mapping method; and (2) Access to base maps from planning archives in China.

First a ‘snap-shot’ or an activity map is supposed to reveal a moment in the use of a public space. Ideally the duration of this ‘moment’ should be less than 5 minutes. This appears to work well in Western context. However, in China, it might take much longer to finish an observation round given the size of the squares, and the number of people in them. In addition, it is difficult and time-consuming to quantify the number of users in big groups. With two observers, one ‘activity map’ can take 30 minutes to finish. This single fact might lead to issues related to the accuracy of the data given the possible movement of public space users.

Furthermore, the small and medium-sized public squares in China were observed in six rounds of two hours each from 7am to 7pm on a weekday to provide overall temporal use patterns. However, this time division might not reveal the dynamics of the use of public space in China. Ideally from 5 to 10 research assistants need to work on direct observation. This will allow observation periods of 30 minutes instead of two hours. In short, given the availability of research funds, the large size of public squares in China and their high number of users, the data collection from activity mapping could have some accuracy issues. Related to this is the need to judge the ages of people, which again could lead to accuracy issues with the data.

The second difficulty this research faced is the limited access to base maps and planning documentation, as well as to designers and other stakeholders. The top-down planning process and the sensitiveness of a topic that is likely to be associated with the development of democracy and civil society constrain exchanges between Chinese local authorities and researchers (especially those from a foreign country). In addition, the presence of numerous guards who police public space could constrain interviewing users.

This thesis has mainly examined the use of public space and its relationship to design, whereas other factors such as management can also have a significant impact on the performance of the space.

Furthermore, given the limits of time and budget, only 13 case studies were undertaken, in the two major cities of Guangzhou and Shenzhen. Therefore, the word "China" is used indicatively. The data and findings in this thesis are limited to Southern China or more precisely to two major cities in the Pearl River Delta.

Given the difficulty in accessing base materials, and the time required for preparing base maps, including measurement of each space and the position of features on site, and for processing space syntax maps, it is still believed that the data collected and the findings are significant, such that an academic dialogue can be stimulated, providing a platform with many interesting directions for future research.

Many factors might affect the use of public space including cultural and historical contexts as well as user motivations. Using space syntax as the main methodology, this thesis might have overlooked these factors, which might impact on the topological or syntactic properties of the space and its usage. However, the findings suggest that in the context of China where the lack of open space is visible, public squares might function as attractors and therefore their usage might be less dependent on accessibility as generated by the street configuration compared to their Western counterparts.

8.5.2 Directions for future research

As discussed in section 8.1, the findings from this thesis suggest that collective behaviour is significantly different from individual behaviour observed in the West and described by the theory of prospects and refuges developed by Appleton. Hence, both edge and island effects are not found in the Chinese context. Therefore, the findings could contribute to the development of a theory that describes and explains how people in groups behave and select locations in open public space. This theory could guide the design of public space in China. In order to develop such a theory, future research must cover a large number of case studies in

different regions of China, and in other countries with similar social and economic backgrounds.

Future research could involve instruments such as interviews or questionnaires to provide a more comprehensive understanding of users' feelings and degrees of satisfaction with the design of a space. In particular, the users views on the provision of amenities, design and management would be informative. Consequently, it would be interesting to compare the findings of this research with the views of users. In addition, collaboration with local researchers in China should be encouraged as the language and cultural differences of China create substantial barriers for researchers from foreign countries.

According to Carmona (2014), the performance of a public space is shaped by the interaction of four sub-processes: design, development, space in use and management. One of the directions for future research would be to examine how the management process could improve the use of public space.

Within the design and space in use processes, future research studies might also focus on the question of how to utilise the potential of high population density. The high degree of mixed uses recommended in the Western context may not be appropriate for China. Functional separation, a high degree of legibility (simplicity) and other Modernist planning principles might be revisited in the context of the extremely high population densities of China.

In addition, many public squares have recently been under electronic surveillance. This might affect how people behave in public space. Similarly, the use of mobile phones can also change the way people communicate and use public space. These two new trends are not included in the scope of this thesis but could be an interesting topic for future studies.

It is also worth mentioning again that the observation times of this research are weekdays, from 7am-7pm, between December and February. Future research should investigate the use the

spaces at other times: during the nights, at weekends, and in the summer. Hopefully, this will help to detect other behaviour patterns that have not been discussed in this thesis as well as refining other findings, in particular those related to working-aged users.

Last, this thesis has investigated the relationship between the urban grid configuration or the street network and the use of public space. Research studies in the West have shown that the street network determines the use of public space. However, this research has shown that in Southern China, public space, being a special kind of land-use attraction, largely affect the use of the surrounding street network. If Western urbanism can be roughly defined as "network" urbanism, Chinese urbanism might appear to be a kind of "patchwork" urbanism as its emphasis is not on the development of well-connected movement networks, but on each individual patch. The notion of "patchwork" urbanism has been theoretically discussed (Douglass, Wissink, & van Kempen, 2012; Shelton, 1997, 1999) however, future research might extend its theoretical framework as well as conducting empirical studies to investigate the difference between the use and function of these two urbanism types.

8.6 Use of Space Syntax Methodology in the Chinese Context

The majority of previous studies of public space in China have focused on design. Many have discussed the making of a modern Chinese identity by revising existing traditional models, whereas others have criticised the reckless copying of Western models over the last two or three decades. In contrast to this, space syntax could provide more objective insights given the quantitative nature of its methods.

Two major Space Syntax techniques used in this research are the axial map and visibility graph analysis (VGA). Over the last two decades these mapping techniques have been used by many researchers in different contexts. However, there are still few such studies in the Chinese context, and especially of public squares and public space. As the space syntax community has

grown significantly over the last few years, leading to the establishment of the Space Syntax Annual Conference in China, some notes on the use of this method will hopefully be useful.

The use of axial maps to predict levels of usage

Although the axial map technique is said to be able to predict the use of public space (at least in a Western context), given the strong positive correlation between levels of usage and the strategic value of the space, this still needs to be further examined in the Chinese context.

This research did not find any significant correlation between the 'strategic value' and levels of usage of public squares, especially when considering all types of users together. This means that the most accessible spaces might not achieve the highest use density as it is often the case in the Western context. For example, a relatively remote square, Theatre Square, has almost the highest use density among the 13 samples of public space, whereas more accessible squares including Bridge Square and Renwei Temple Square have a considerably lower use density.

The main reason behind this is believed to be integral to the nature of the major user of public space in China, this being the elderly in large groups. In contrast to the working-aged user group, the elderly have plenty of time during the day and might, therefore, tend to go to squares which fulfil the spatial requirements of their group activities rather than using the most accessible spaces. Two particular spatial features are attractive to older users in groups, spacious areas for exercising and places with plenty of group-seats for playing chess/cards. The absence of these two spatial features often leads to lower levels of use density as with Bridge and Renwei Temple Squares.

From another perspective, this research found a relatively strong correlation between the number of weekday working-aged users and the 'strategic value' of public squares in the city of Guangzhou. This finding not only resonates with similar studies in the West, but also provides a concrete suggestion for improving the number of working-aged public space users.

However, further studies in Guangzhou as well as in other regions in China are needed to justify this finding.

Regarding the use of the axial map, the last concern is the definition of the 'strategic value' of a public square as the sum of the integration values of its interfacing axial lines. This means that a public square is represented through the minimum set of axial lines which do not reflect the circulation inside the space. This might work well in another context (Hillier, 1990, 1996; Campos, 1999, 2005) but the findings in chapter seven suggest that the correlation between 'strategic value' and the levels of usage of public squares is strongly conditioned by the circulation inside them. Hence, 'strategic value' might need to be redefined for the Chinese context and might also include the axial lines that represent the circulation inside public squares.

The use of visibility graph analysis (VGA) to examine location preferences

In this research, VGA was used primarily to examine the location preferences of public space users. It was able to detect significant differences between different types of users. However, when using the VGA method in conjunction with activity mapping in the Chinese context, the time span of each observation period needs further comment. The normal recommended observation time for each period is about two hours. With two observers, this seems good enough to detect the dynamics of the use of public squares in China. However, given the great number of users and the size of Chinese squares, more observers might be needed. This will allow researchers to reduce the time spent on each snapshot which will potentially lead to more realistic temporal use patterns.

Another concern when using VGA is the inclusion of large areas such as sports fields or open stages, which are often part of public squares in China. These facilities are often closed and empty most of the time, thus the majority of public space users cannot use them. However, their large sizes might affect the configuration of the VGA map, moving the visual centre closer

to the location of those facilities. Therefore, including or excluding those facilities should be carefully considered.

Is Space Syntax methods culturally neutral?

The final note on the use of space syntax in China refers to the cultural aspect of the method. Some authors might argue that this method is rooted in Western culture and might impose certain limitations when used in China, however, this argument seems debateable. For a large community of Space Syntax researchers, the foundation of this method is purely mathematical by using graph theory as a new way to view the built environment. This method involves the topological properties of space rather than its metric ones as in previous approaches. Hence, space syntax is often considered to be culturally neutral, and has been used widely to detect cultural differences because of its neutrality (Karmini 2012; Wang 2006).

Nevertheless, from the experience of this thesis, the findings in China are likely to be different from those in other contexts. As it stated in the methodology chapter, while space syntax focuses on the topological centrality, it might leave out other kinds of centrality including population or land-use. Being aware of this limitation, when using space syntax, researchers might consider the use of other methods at the same time to cover the impact of such factors.

8.7 Final Comments

Given the lack of open spaces and the perception of the development of public squares as a sign of progress, public spaces have become a battle site for different ideas and intentions. As a result, the spatial layout of public squares in China tends to be overly complicated to address multiple agendas. In addition, given the limited access to indoor educational and recreational facilities, public squares have become a contested place between different user groups. If the spatial design prioritises use by certain groups, it might lead to the absence of the others. Consequently, Chinese designers face highly complex situations and tend to “overcook” the

design. The overall recommendation from this thesis is to keep the design as simple, open and legible as possible.

Throughout this thesis, the size of the space is often mentioned as a major issue for public space in China. Despite the population density of Chinese cities, large public squares often remain empty. Being aware that building such large squares has become a competition among Chinese cities and local officials with the purpose of showcasing them to flaunt their achievements, the Chinese central government has released a series of documents in an attempt to regulate the size of city squares. In these, it is suggested that the size of squares cannot exceed one, two or three hectares in small cities and towns, middle-sized cities, and big cities, respectively. Cities with more than 2 million people can build squares of no more than five hectares (Yingzi, 2009).

While this regulation focuses on city and monumental squares, small and medium-sized squares have remained unregulated. Regarding this, another problem that goes hand in hand with that of scale is the distribution of open spaces. Instead of centralising the total area of public space into one or two large nodes, the model of multiple small and medium-sized squares might offer a better solution regarding the use of those spaces. This recommendation might be highly relevant when redeveloping urban villages. Chinese local authorities should encourage the design of new villages with multiple small and medium-sized squares in contrast to the one-core model used over the last two decades.

From another perspective, the “newness” of public squares in China might lead to a conservative stance taken by designers. They are likely to use Western principles or principles from the past, which are often not appropriate, as revealed in this thesis. China and the West are in the two different stages of development with vastly different socio-economic backgrounds and conditions. Chinese public spaces do not face the problem of being underused as is the case for many in the West. However, in spite of their intensive use, public spaces in China are facing the problem of becoming venues of low standard for those who have no better

options. In addition, they tend to be used as “communal” spaces, especially by those in urban villages. This is not necessarily a negative quality as the function of public space design is about bringing people together. However, over localising a public space might discourage encounters between locals and strangers. In this way, it does not contribute to the development of a more inclusive, tolerant, and civil society.

The on-site observations of this thesis were conducted from late 2013 to early 2014. From that time some of 13 samples of small and medium-sized public squares in Shenzhen and Guangzhou have been under redevelopment. In particular, Huanggang Village Square and Chen Academy Square, which are quantified as being user unfriendly, have been totally deconstructed. Huanggang Village Square seems to be part of a larger development within the village, whereas Chen Academy Square’s underground level will accommodate several new functions. The dynamics of Chinese cities have produced huge challenges for Chinese planners and designers. However, at the same time, they offer an opportunity to create public space that could be more user friendly. In this regard, this thesis might be useful for those who think about and design for the daily use of such space.

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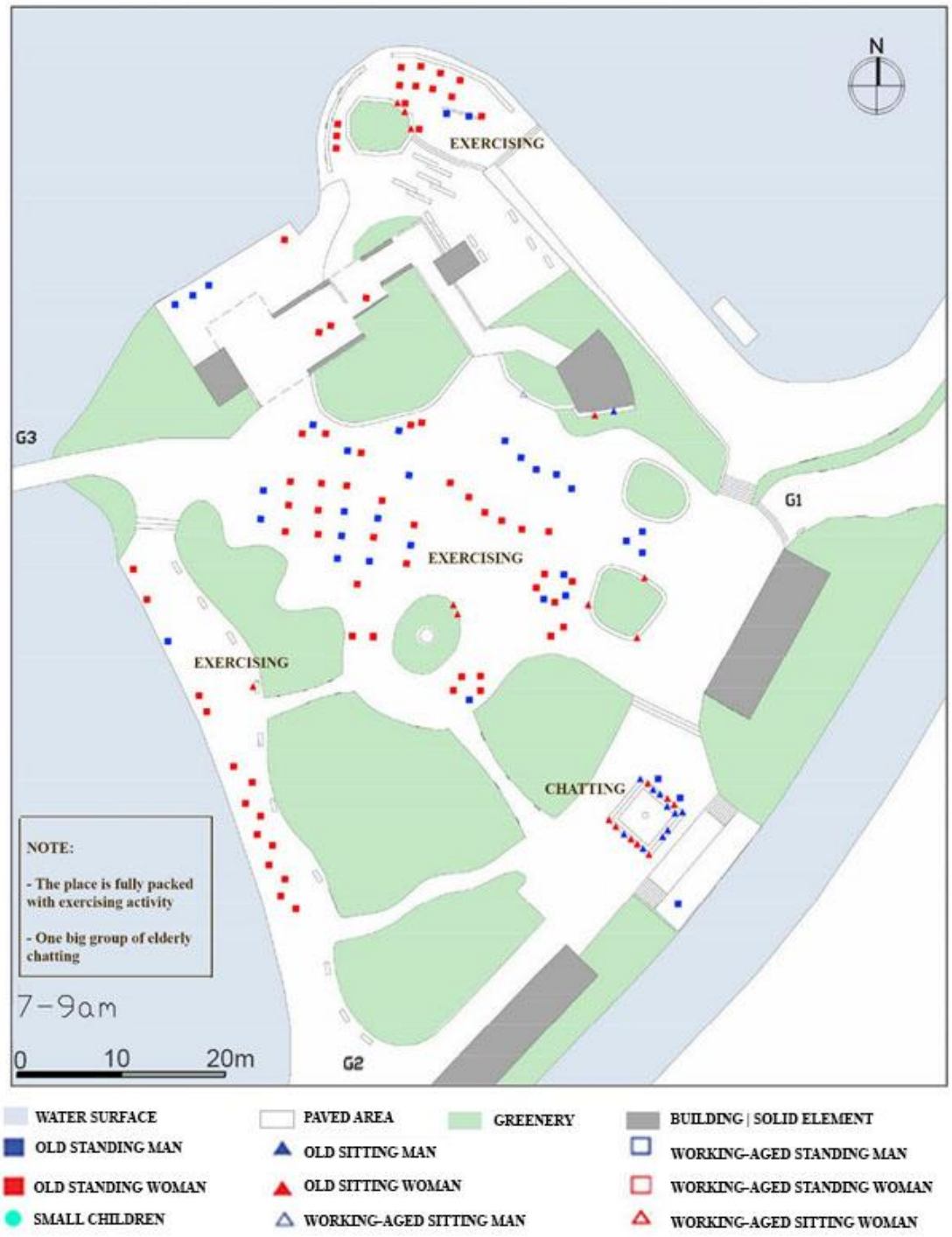
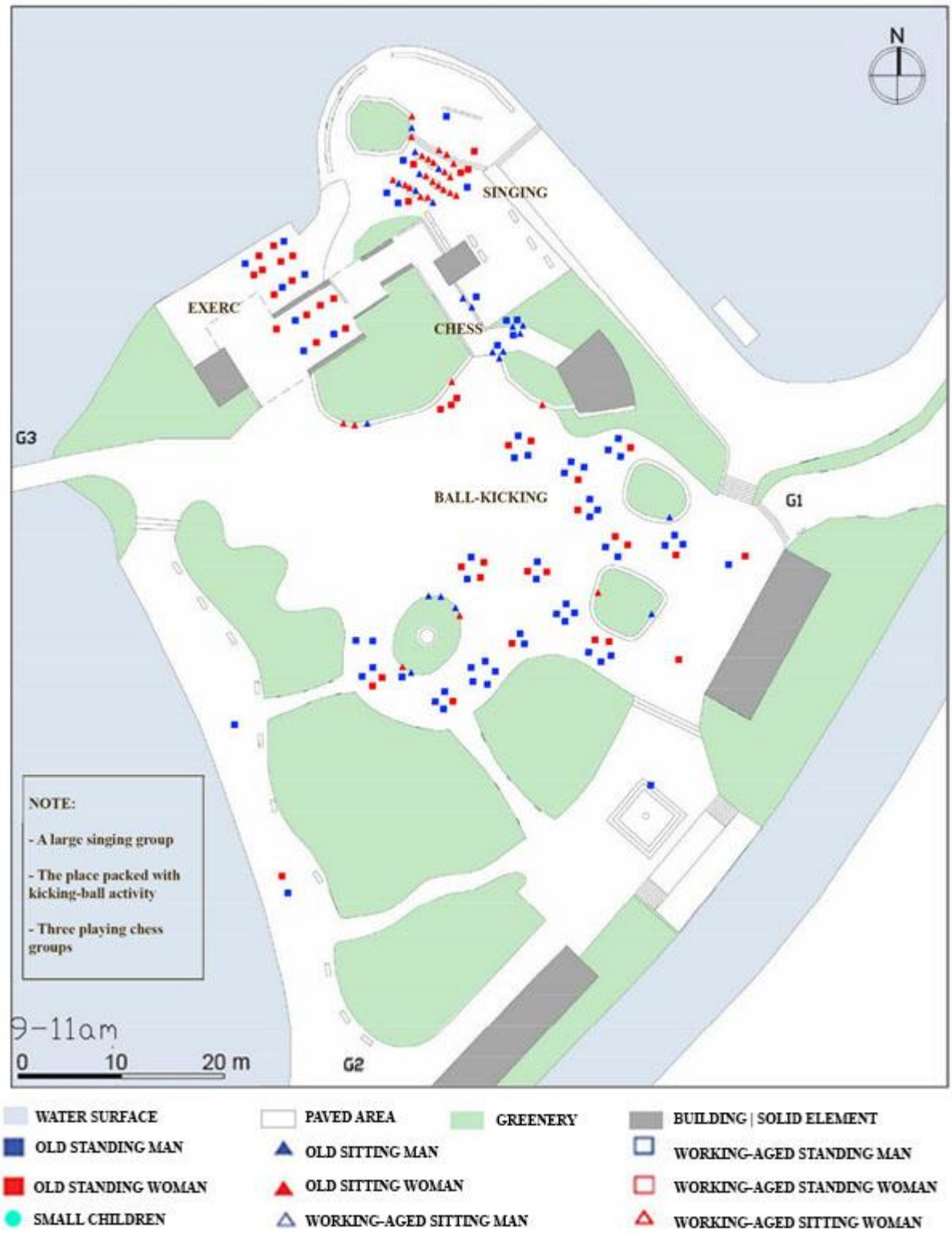
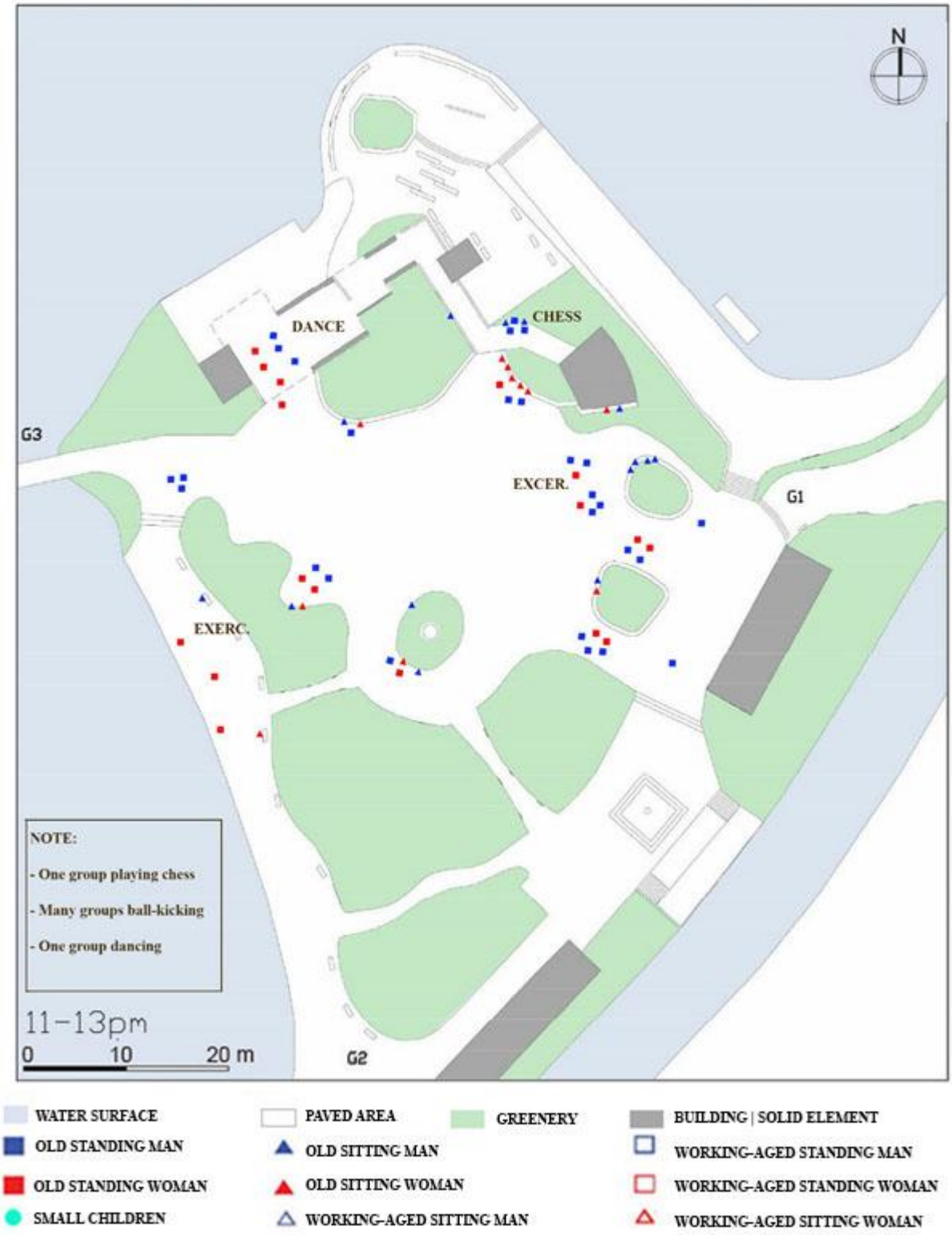
Appendix 1

Activity Maps

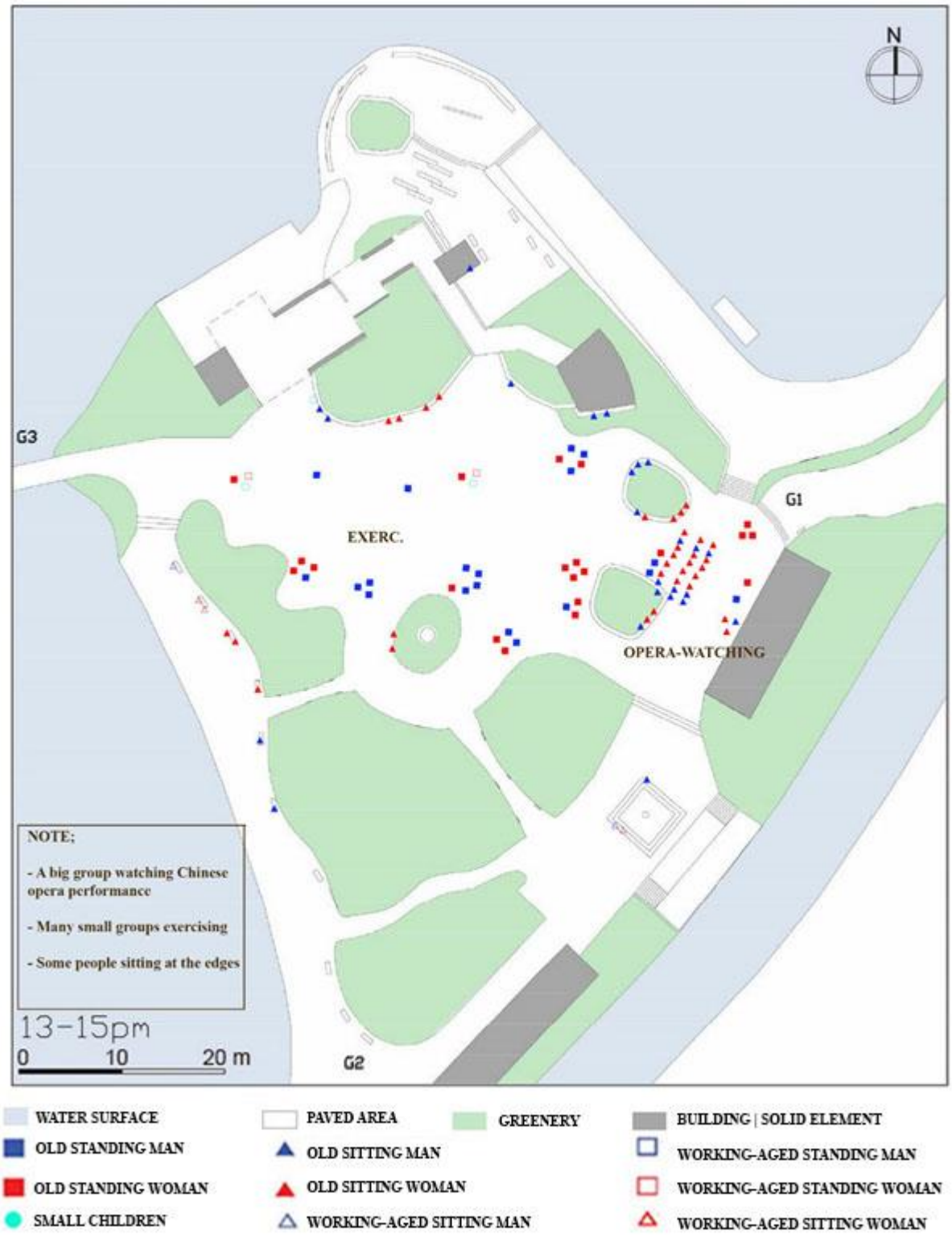
Theatre Square | Observation Date Monday 23/12/2013



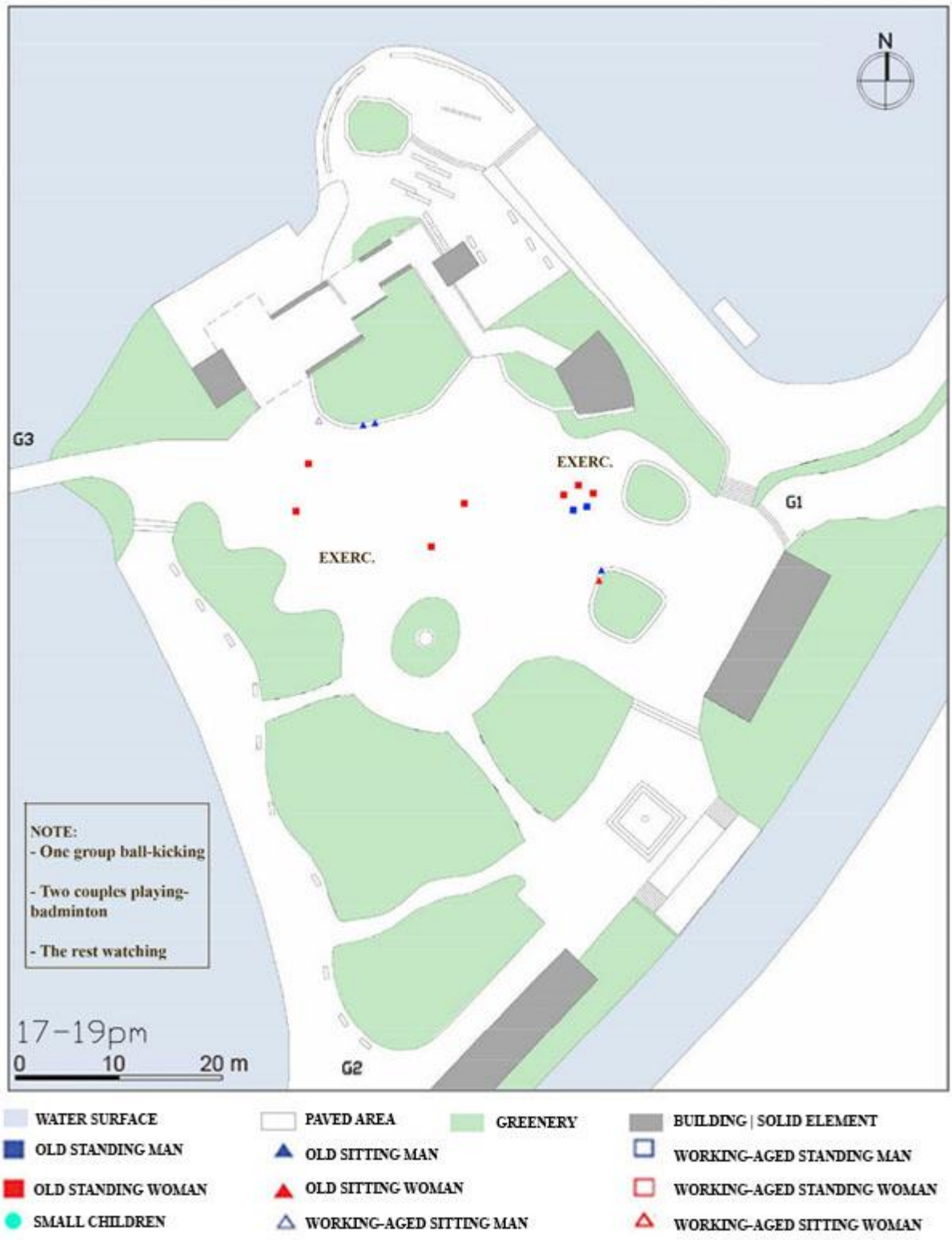

N
SINGING
EXERC
CHESS
G3
BALL-KICKING
G1
G2
NOTE:
- A large singing group
- The place packed with kicking-ball activity
- Three playing chess groups
9-11am
0
10
20 m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN



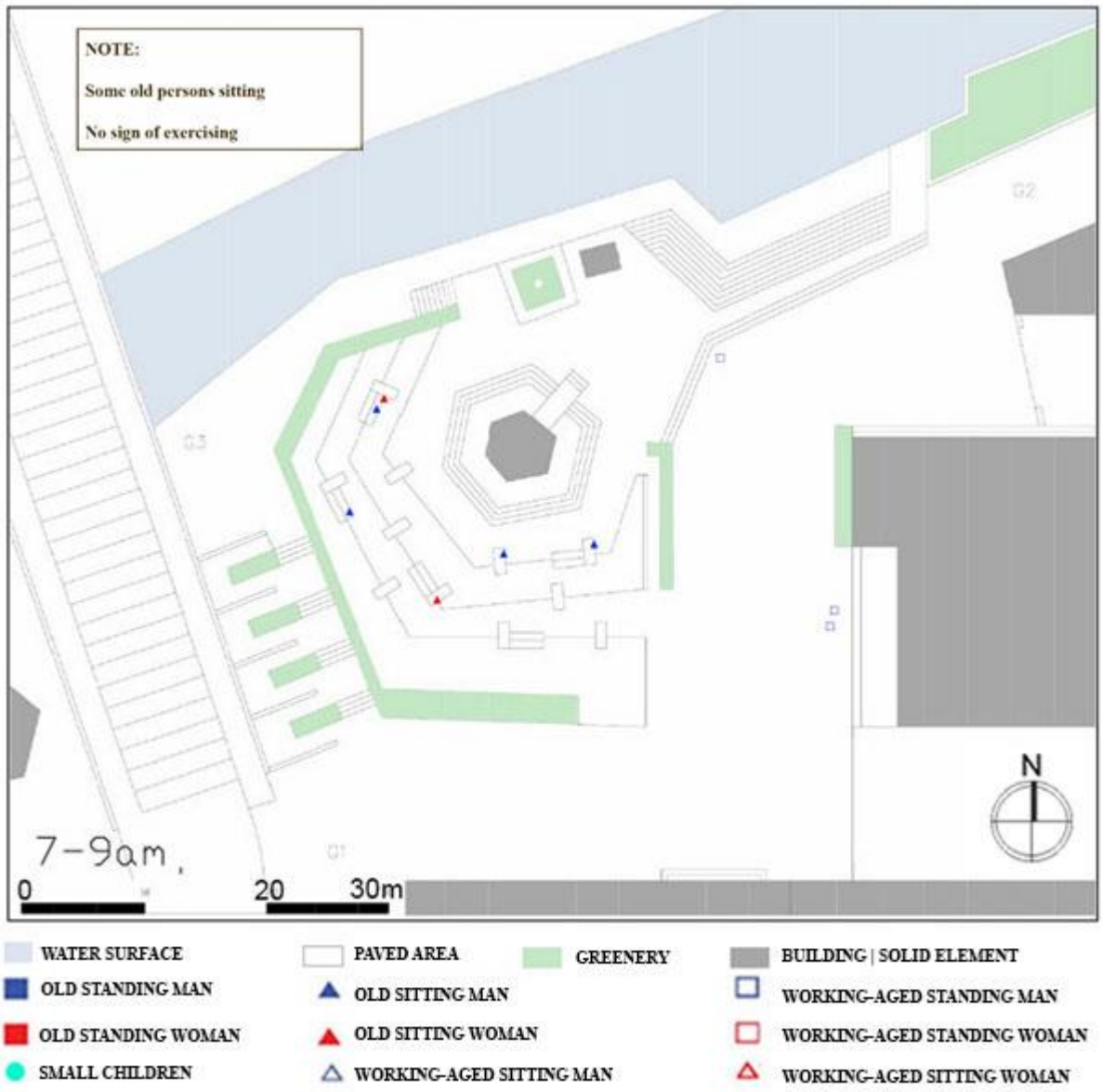
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

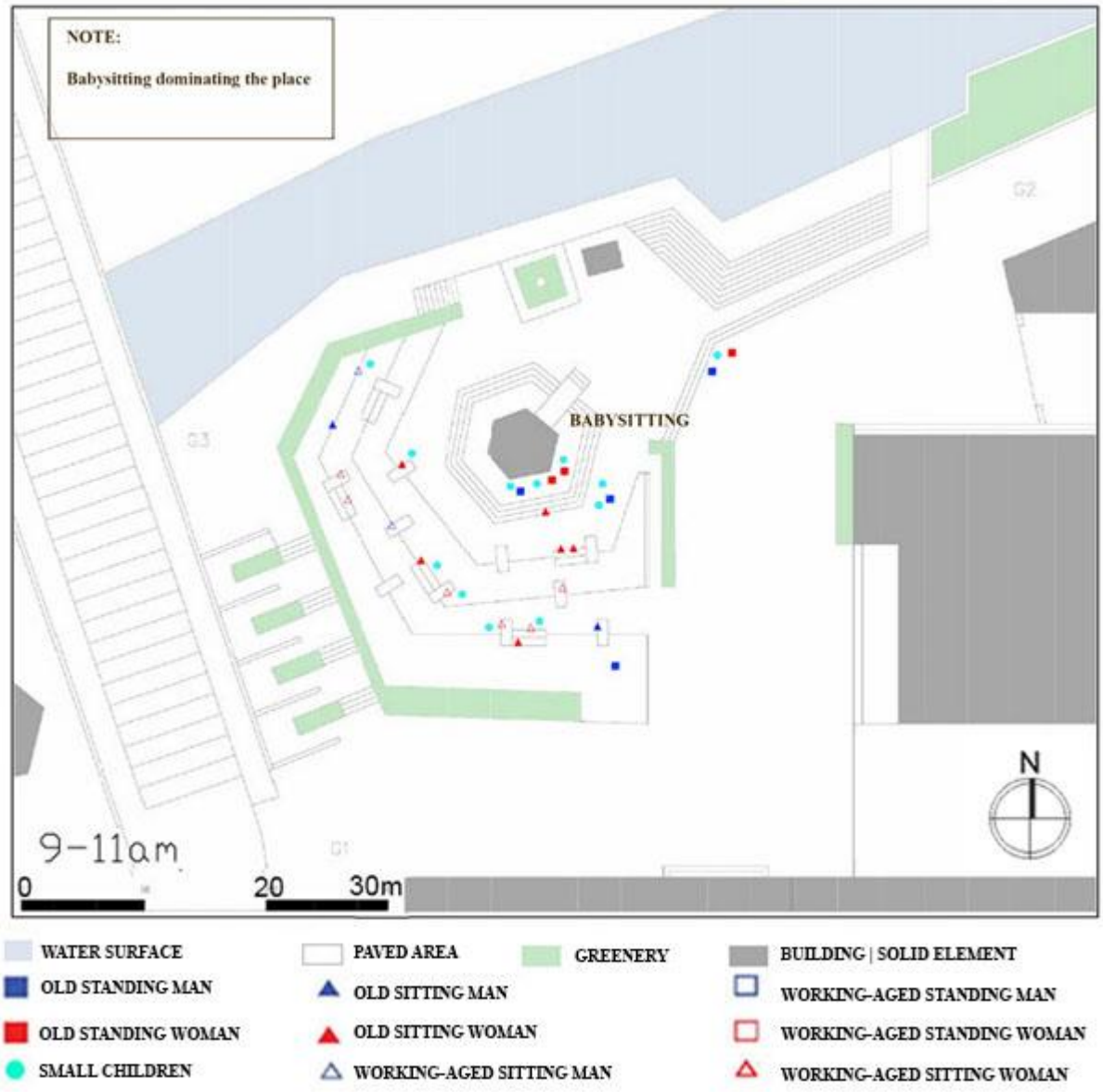

N
G3
G1
G2
EXERC.
OPERA-WATCHING
NOTE;
- A big group watching Chinese opera performance
- Many small groups exercising
- Some people sitting at the edges
13-15pm
0 10 20 m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

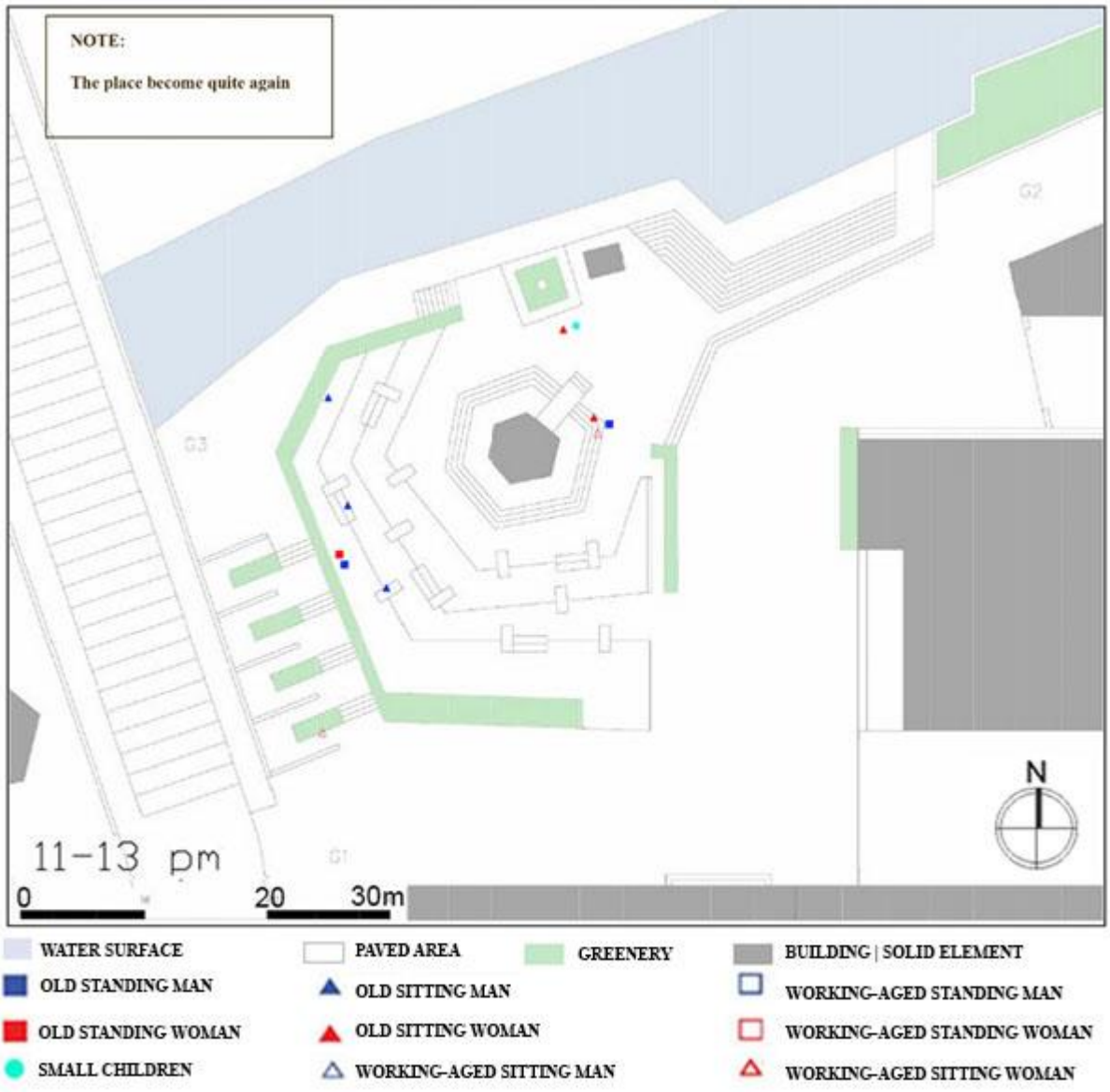
N
G3
EXERC.
G1
G2
NOTE:
- Many groups exercising at the centre of the space
- Some people sitting and watching
- Theatre closed
15-17pm
0
10
20 m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

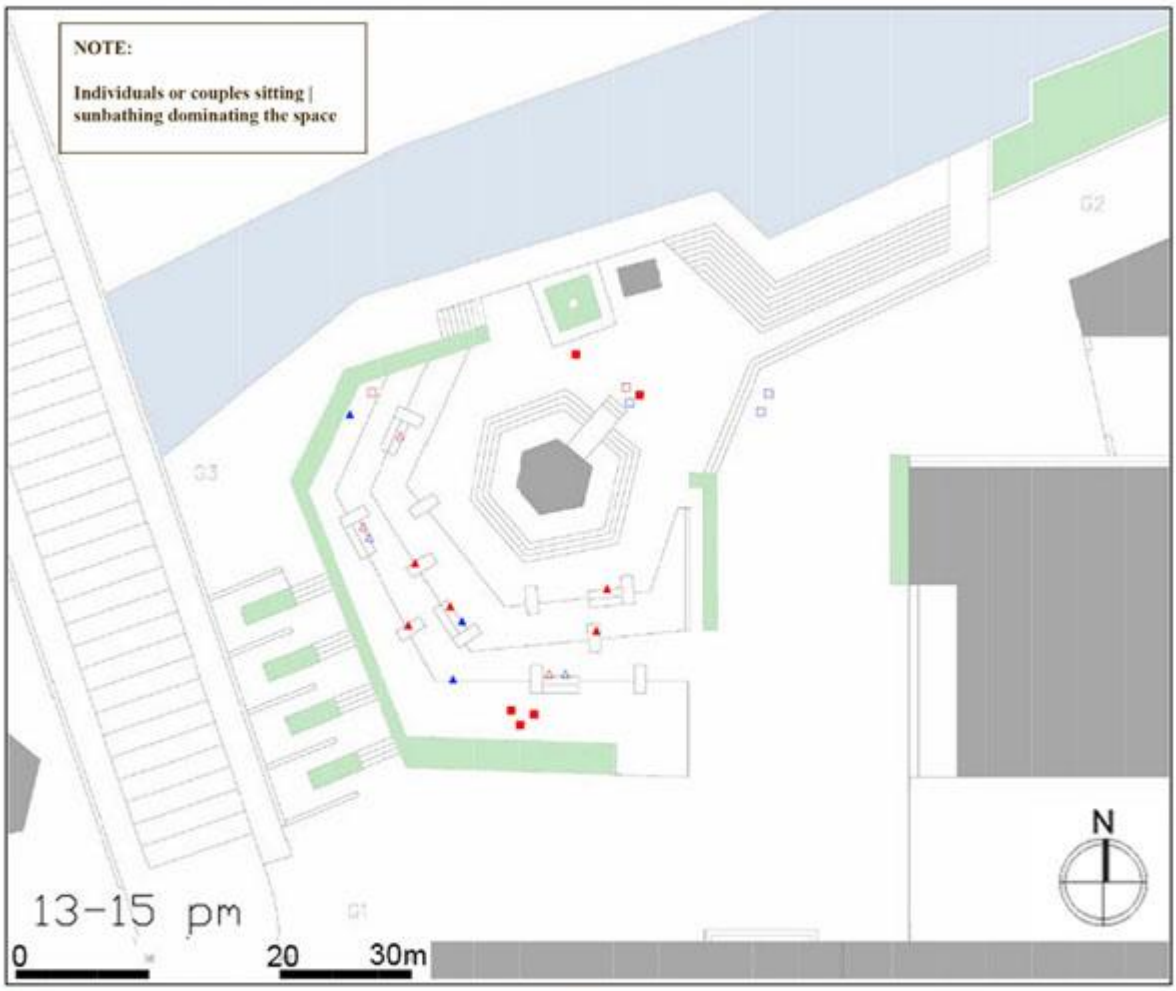

N
G3
G1
G2
EXERC.
EXERC.
NOTE:
- One group ball-kicking
- Two couples playing-badminton
- The rest watching
17-19pm
0
10
20 m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

Bridge Square | Observation Date Monday 23/12/2013

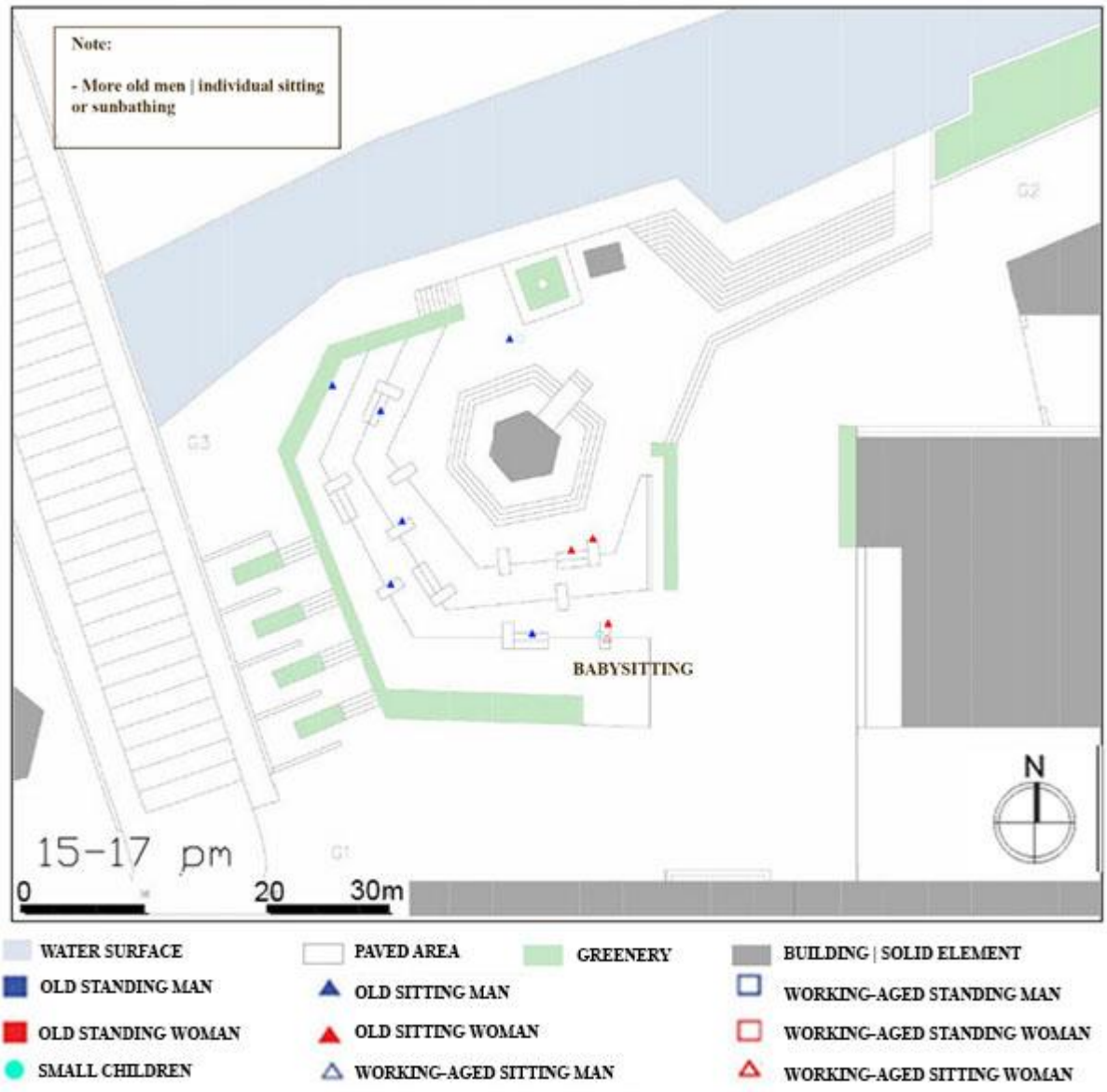


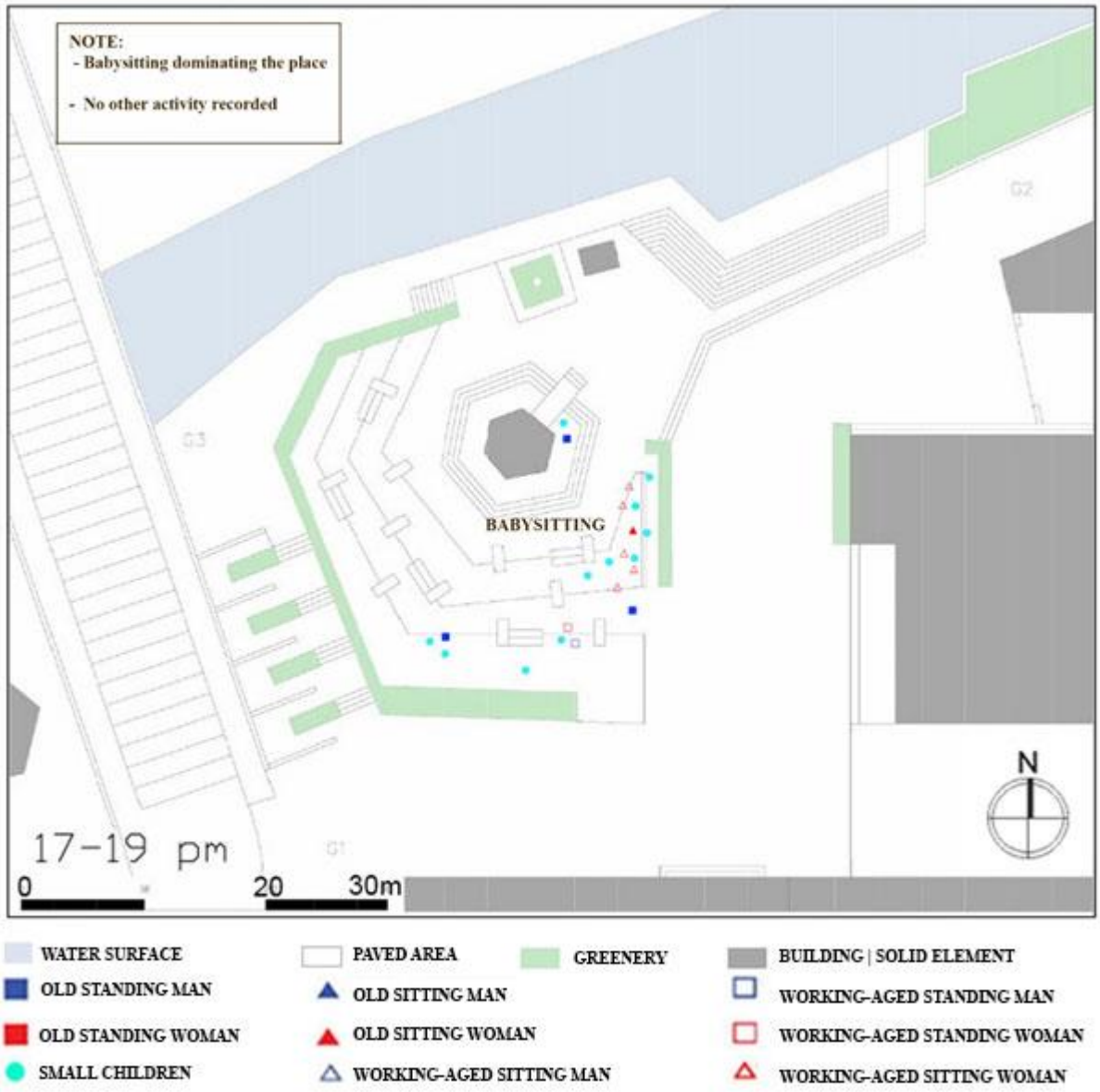

NOTE:
Babysitting dominating the place
BABYSITTING
N
9-11am
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


NOTE:
The place become quite again
G2
G3
G1
N
11-13 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

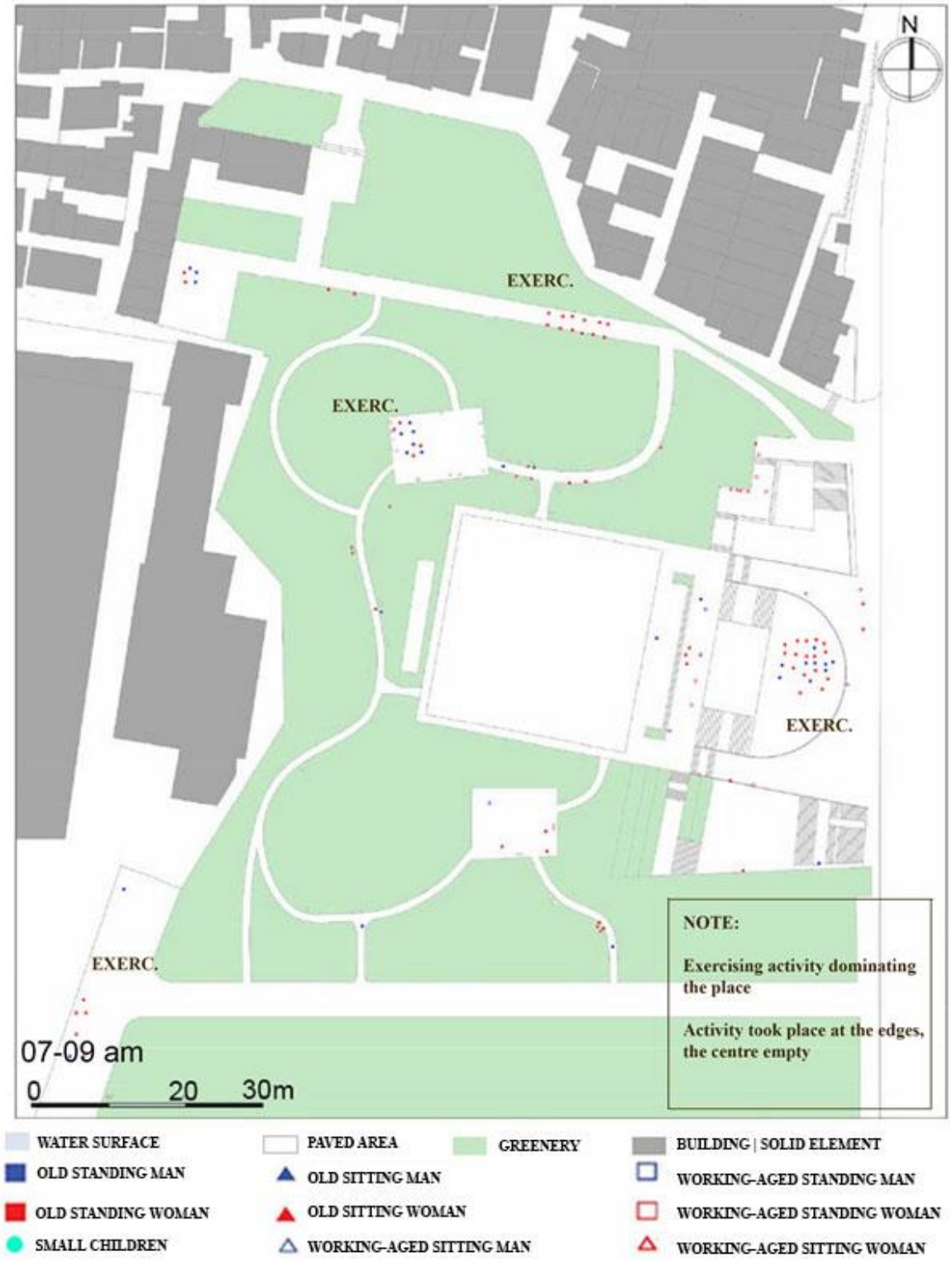


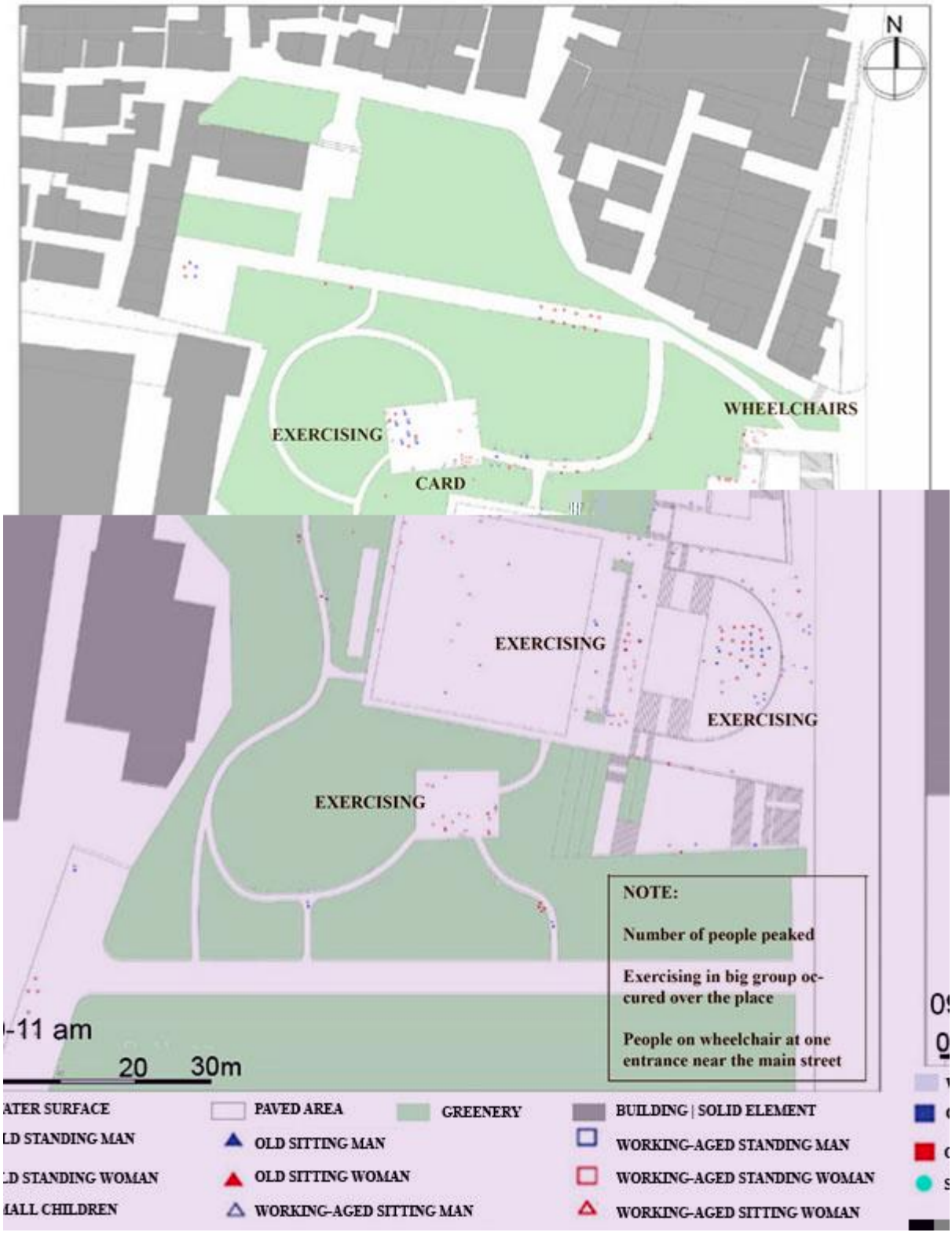
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

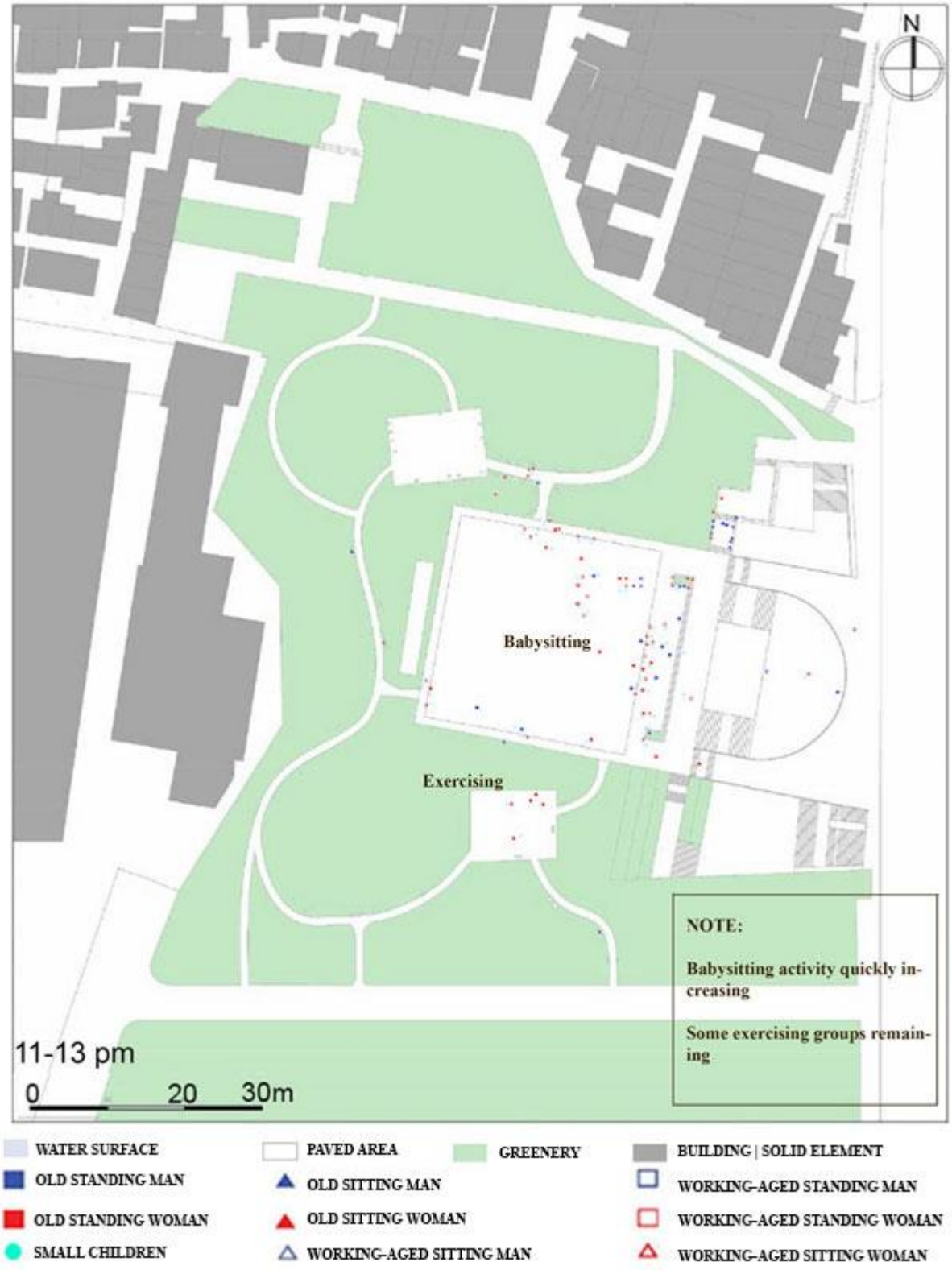

Note:
- More old men | individual sitting or sunbathing
G2
G3
BABYSITTING
N
15-17 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

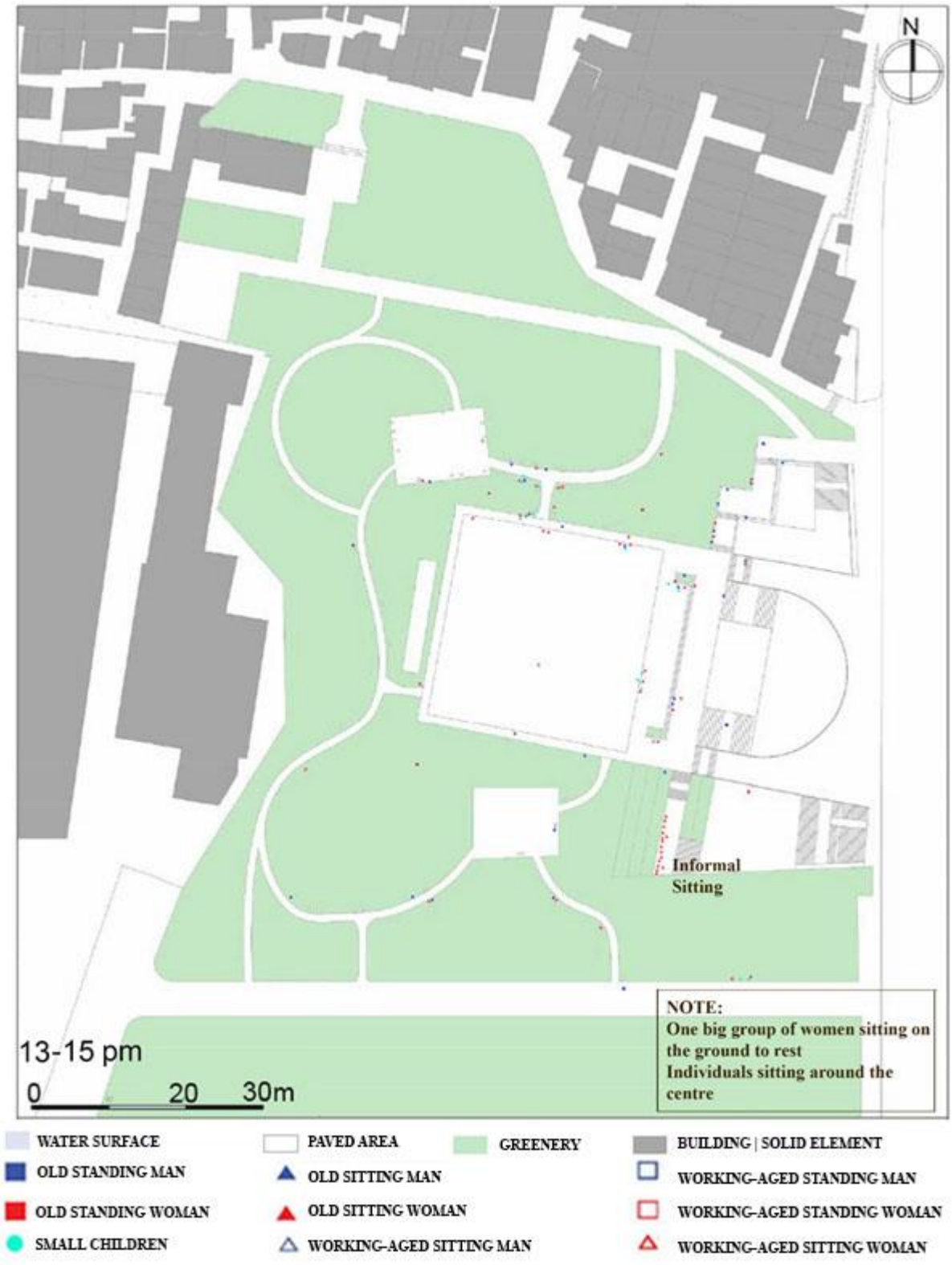

NOTE:
- Babysitting dominating the place
- No other activity recorded
BABYSITTING
N
17-19 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

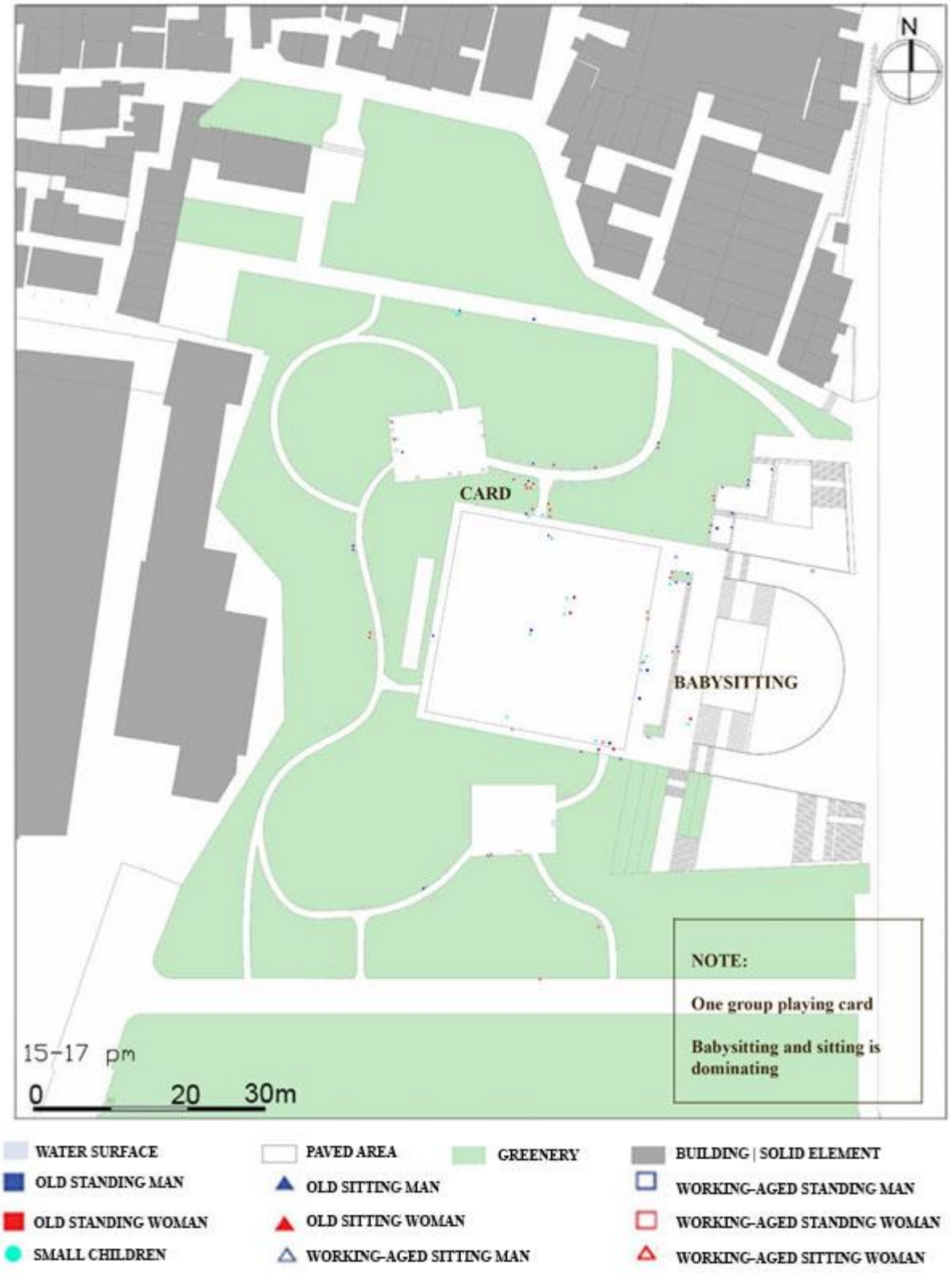
Chen Academy Square | Observation Date Tuesday 24/12/2013

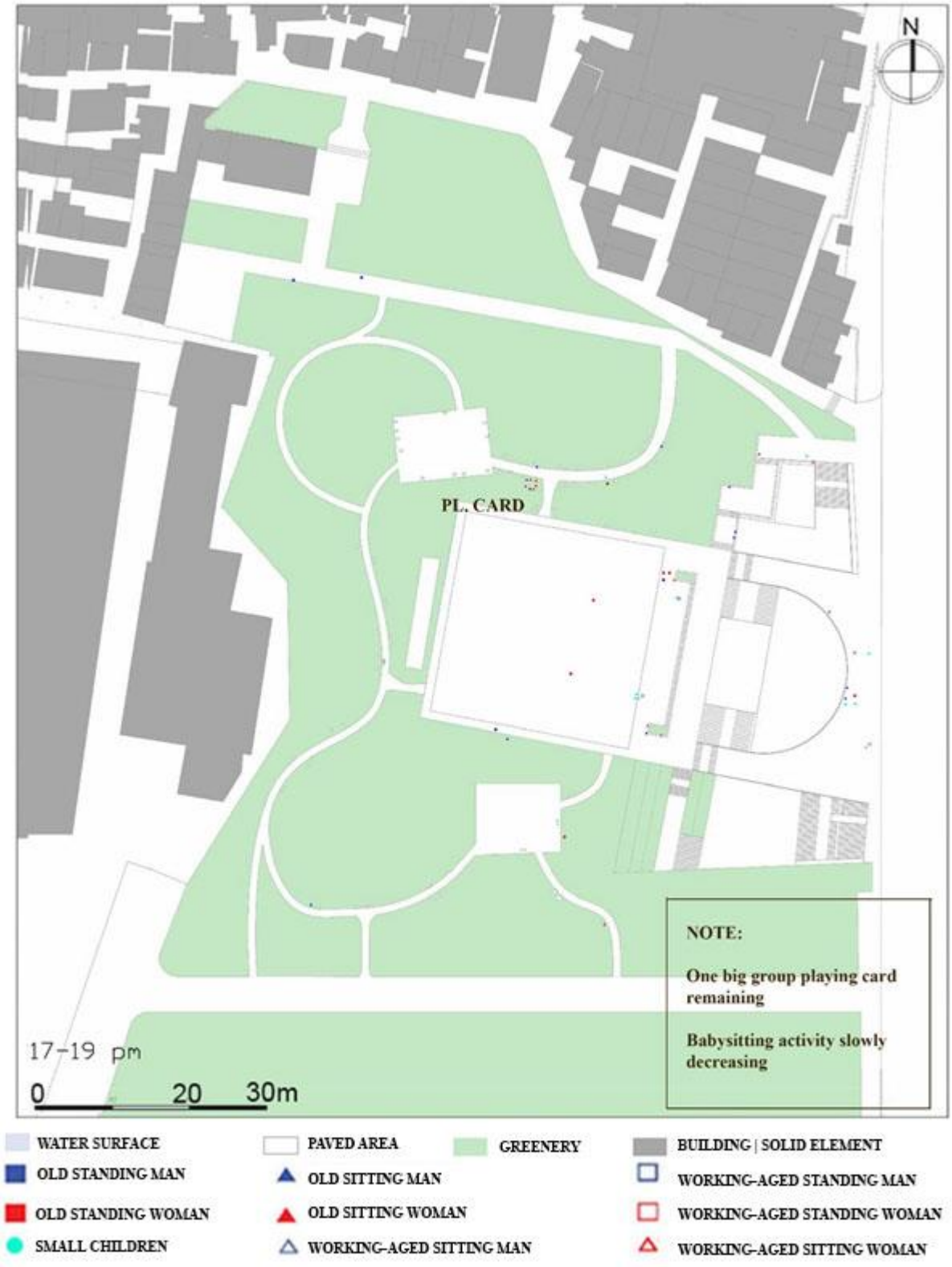



N
WHEELCHAIRS
EXERCISING
CARD
EXERCISING
EXERCISING
EXERCISING
NOTE:
Number of people peaked
Exercising in big group occured over the place
People on wheelchair at one entrance near the main street
-11 am
20
30m
ATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
LD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
LD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
MALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

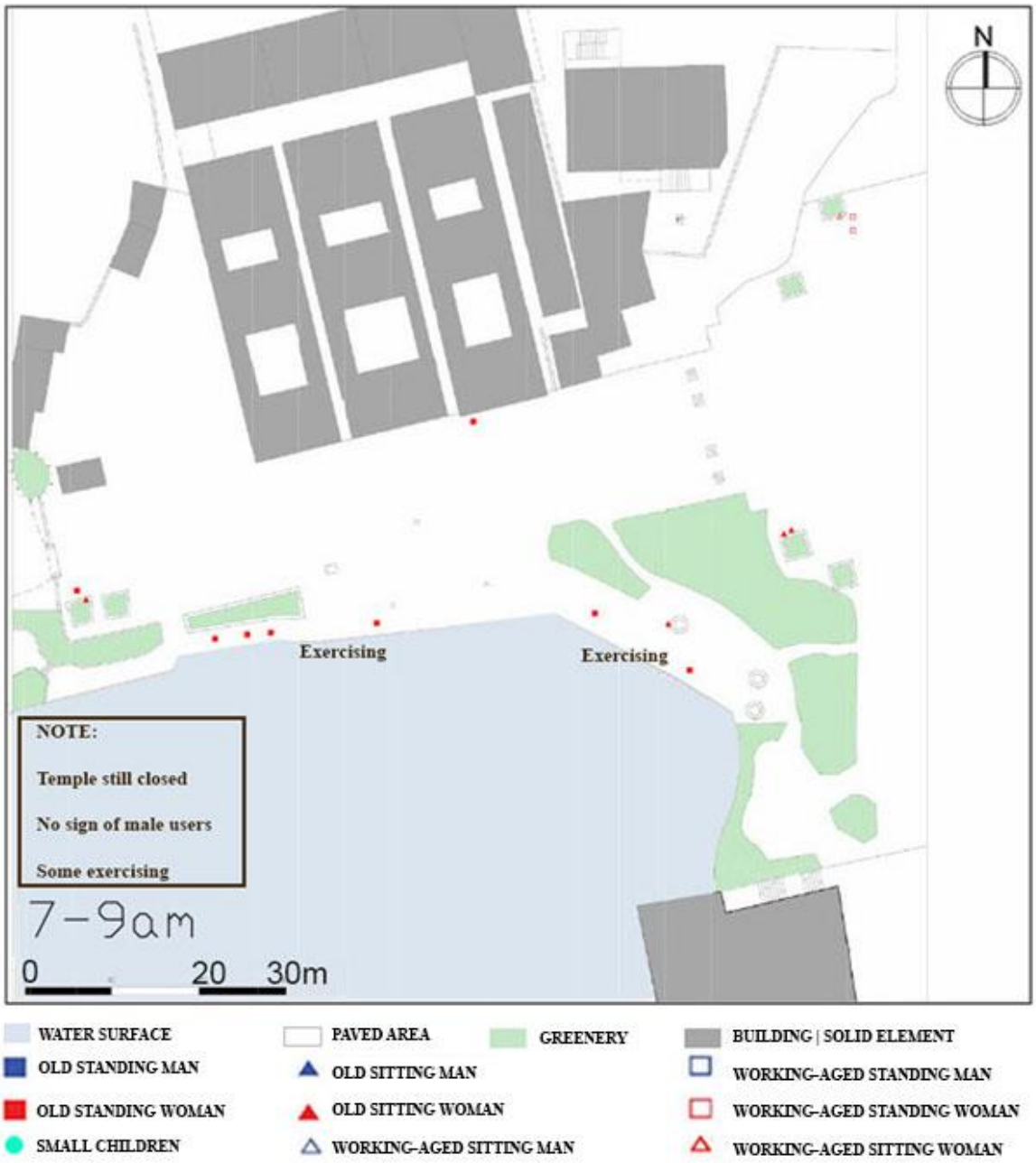

N
Babysitting
Exercising
NOTE:
Babysitting activity quickly increasing
Some exercising groups remaining
11-13 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

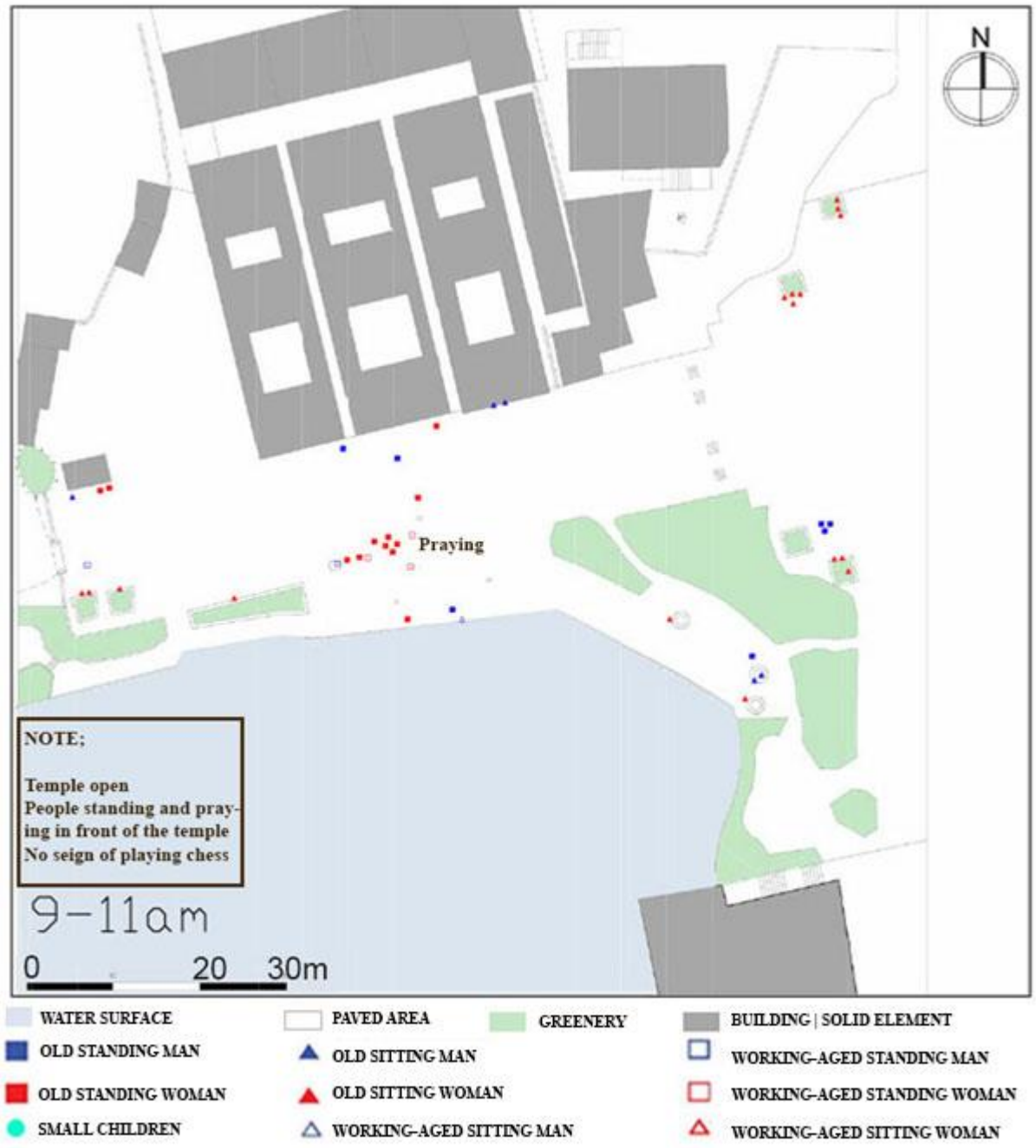

N
Informal
Sitting
NOTE:
One big group of women sitting on the ground to rest
Individuals sitting around the centre
13-15 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

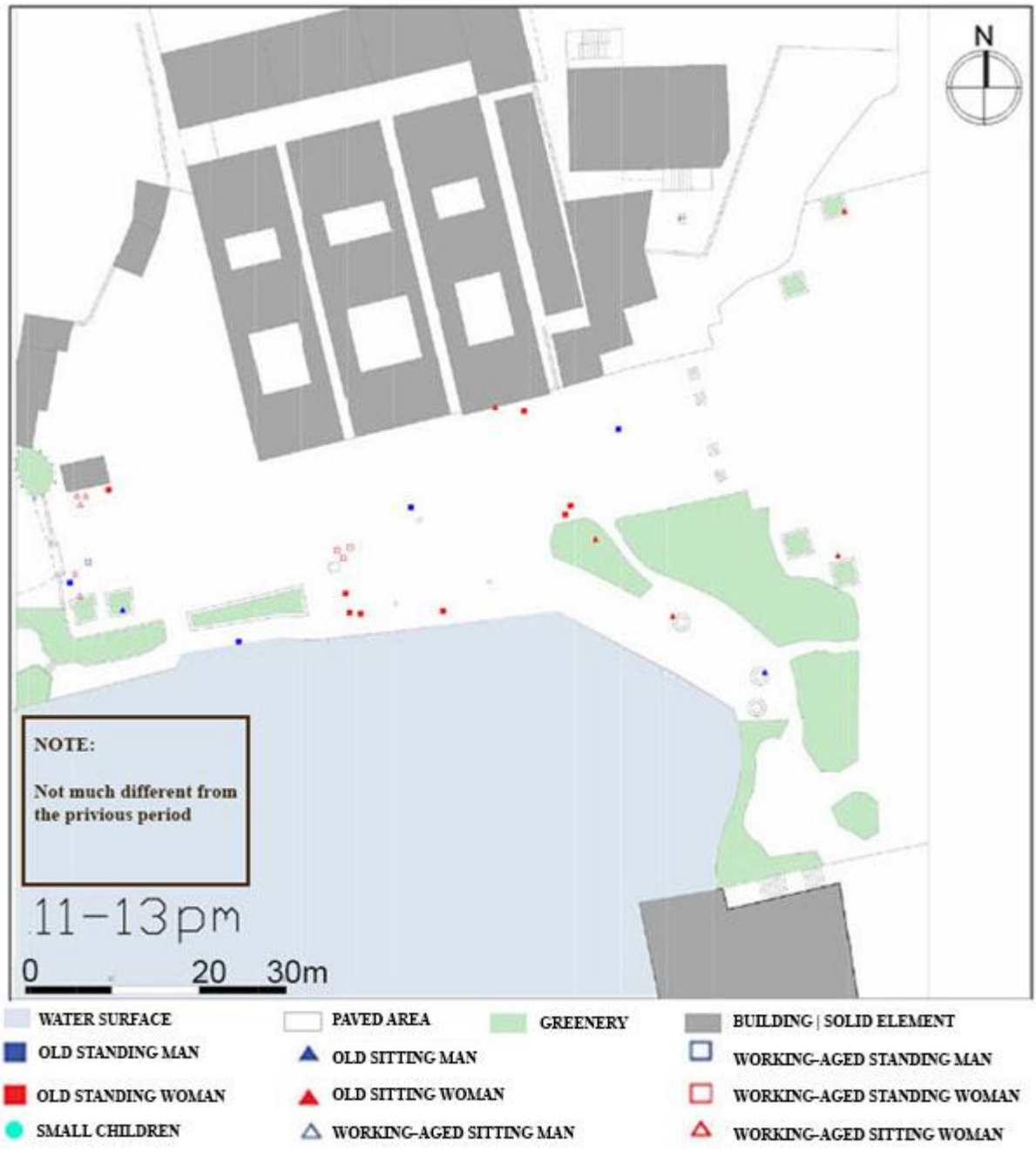

N
CARD
BABYSITTING
NOTE:
One group playing card
Babysitting and sitting is dominating
15-17 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

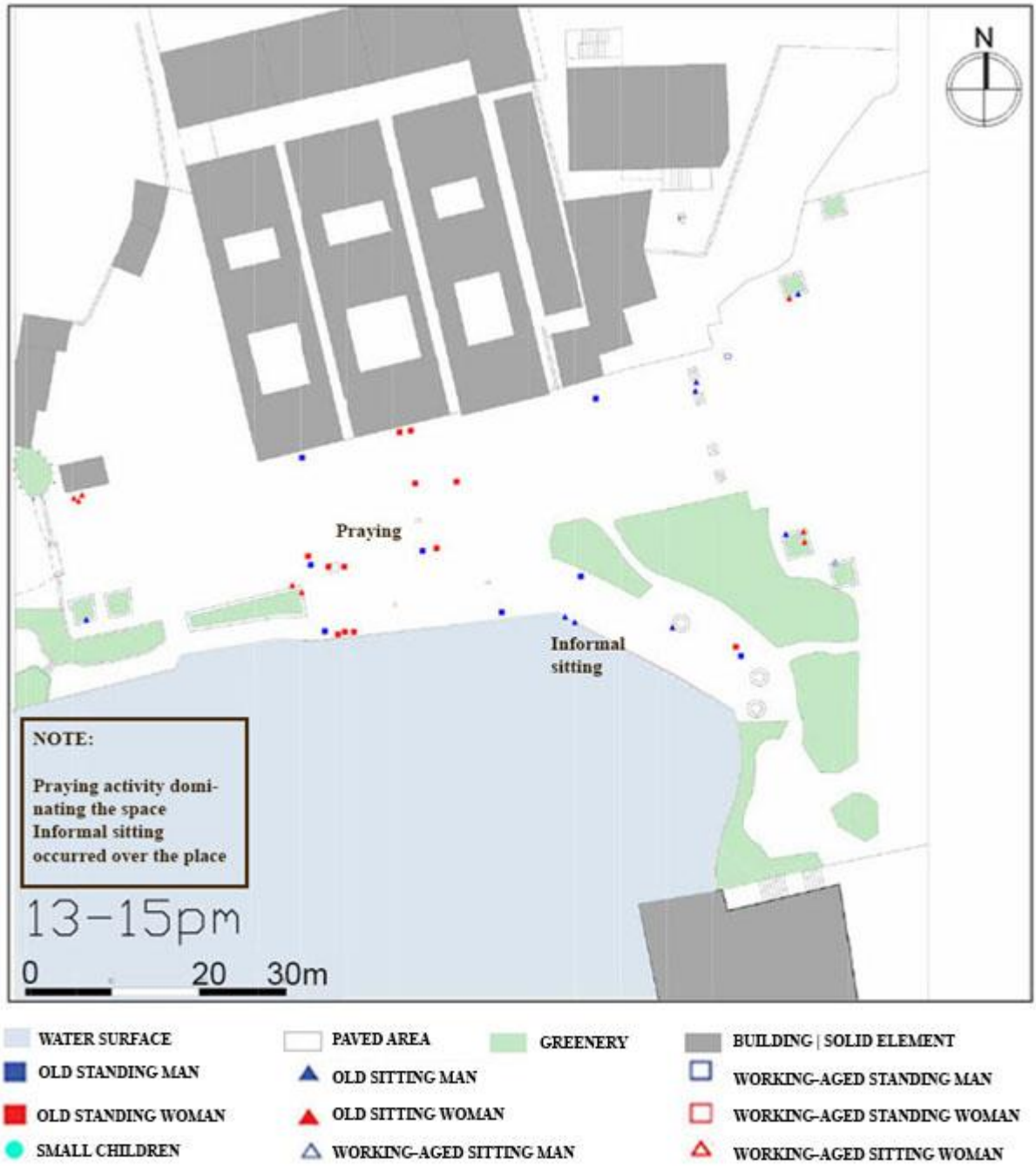

N
PL. CARD
NOTE:
One big group playing card remaining
Babysitting activity slowly decreasing
17-19 pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

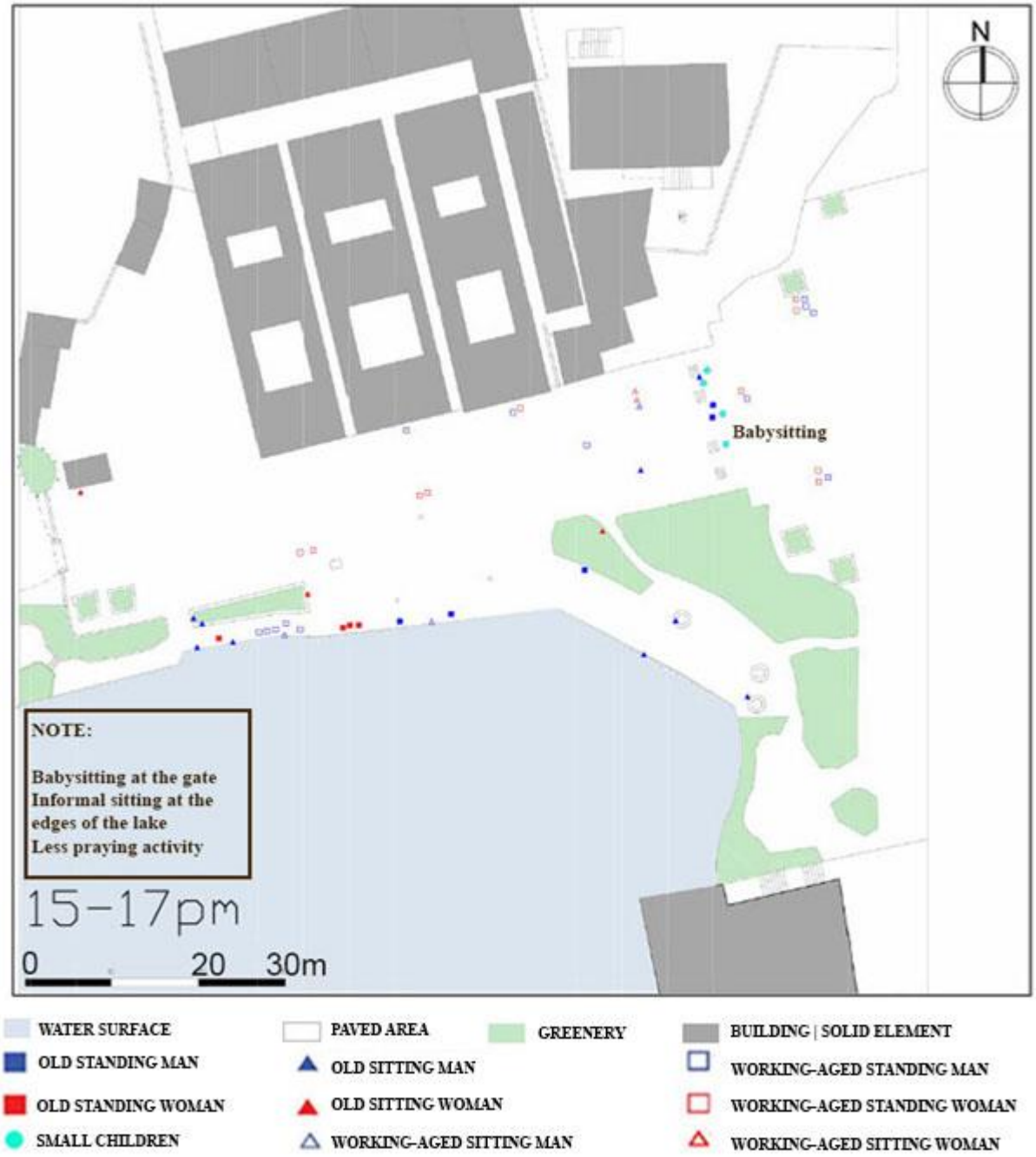
Renwei Temple Square | Observation Date Wednesday 25/12/2013

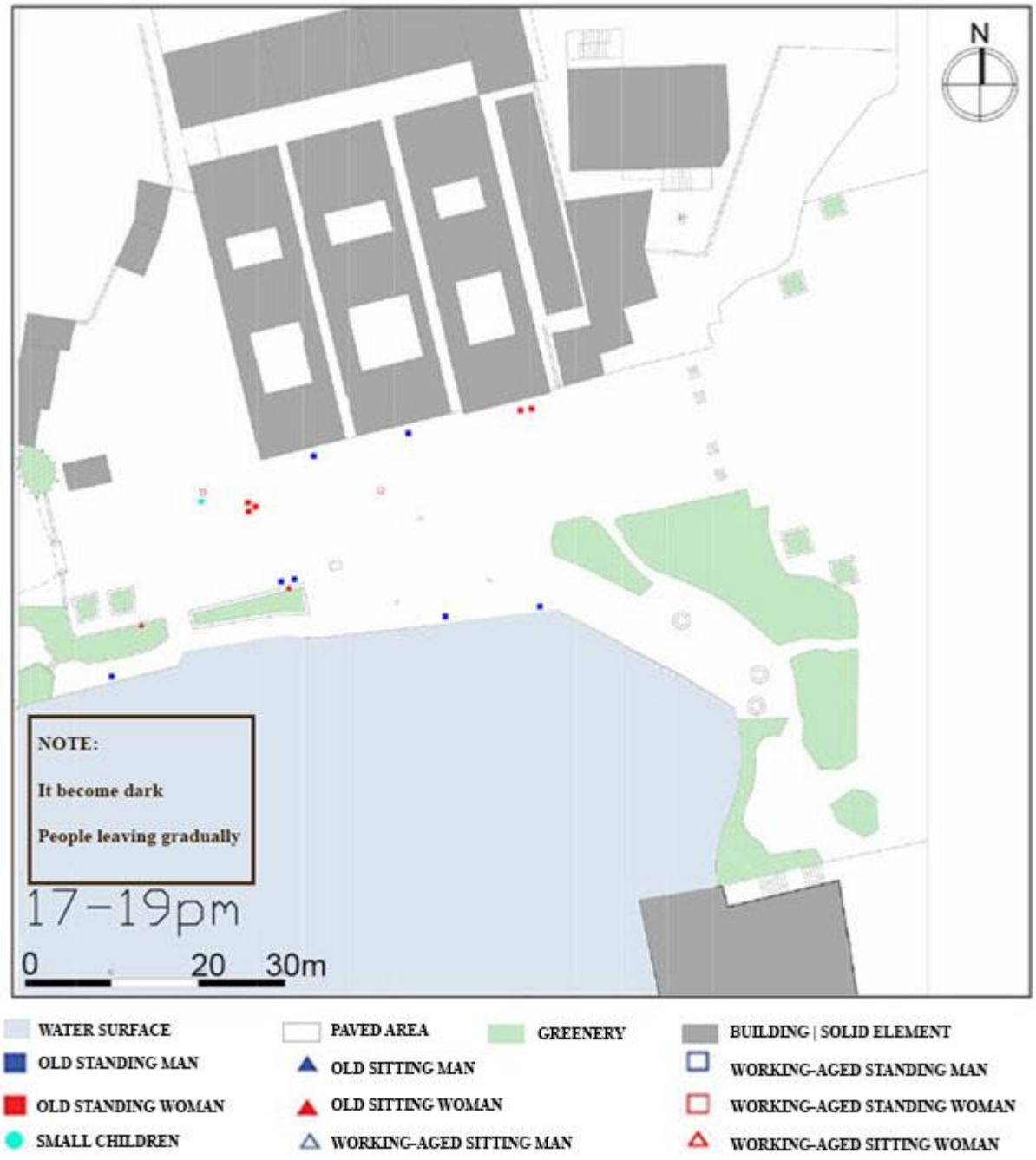



N
Praying
NOTE;
Temple open
People standing and praying in front of the temple
No seign of playing chess
9-11am
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

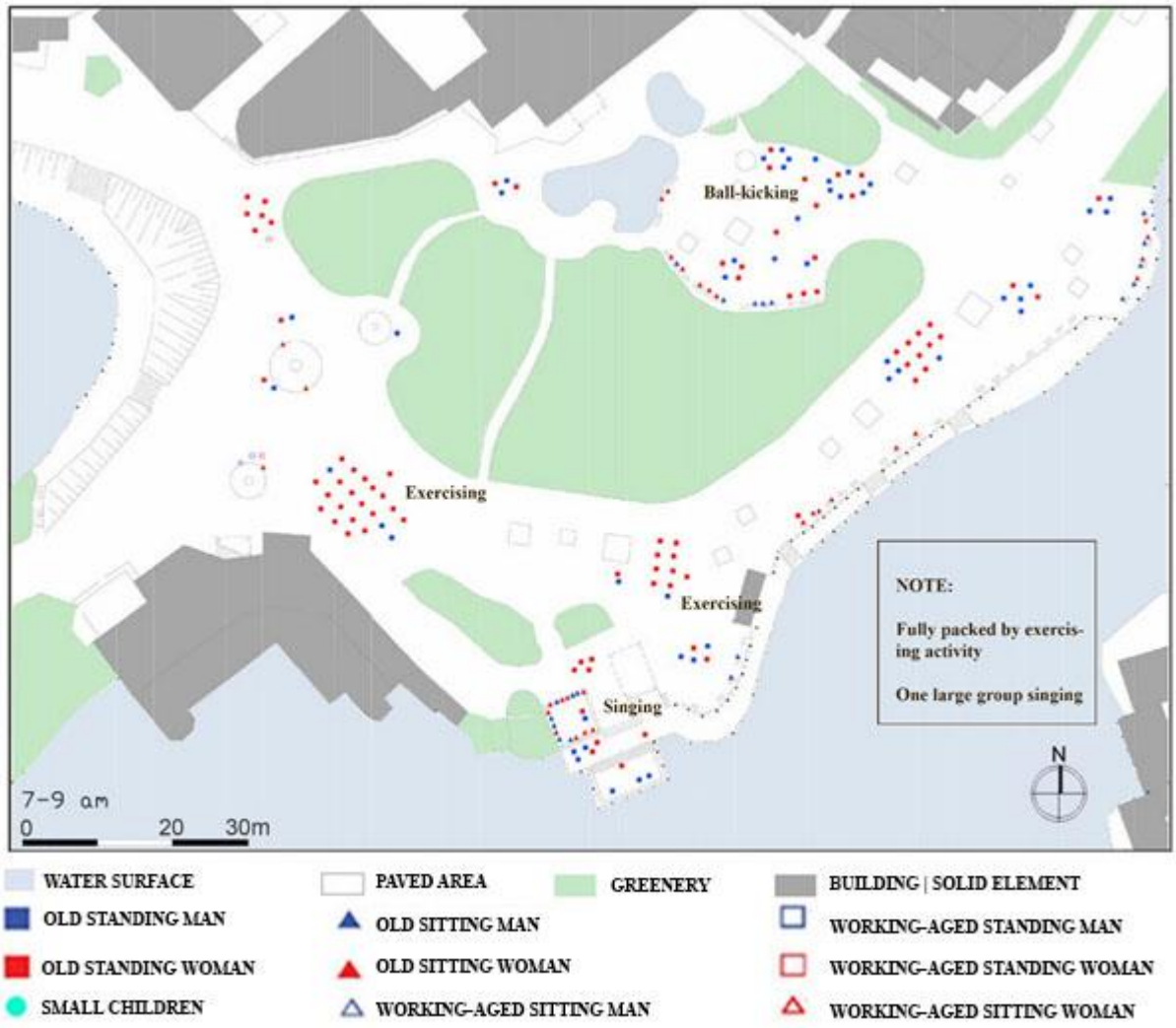

N
NOTE:
Not much different from the privious period
11-13pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

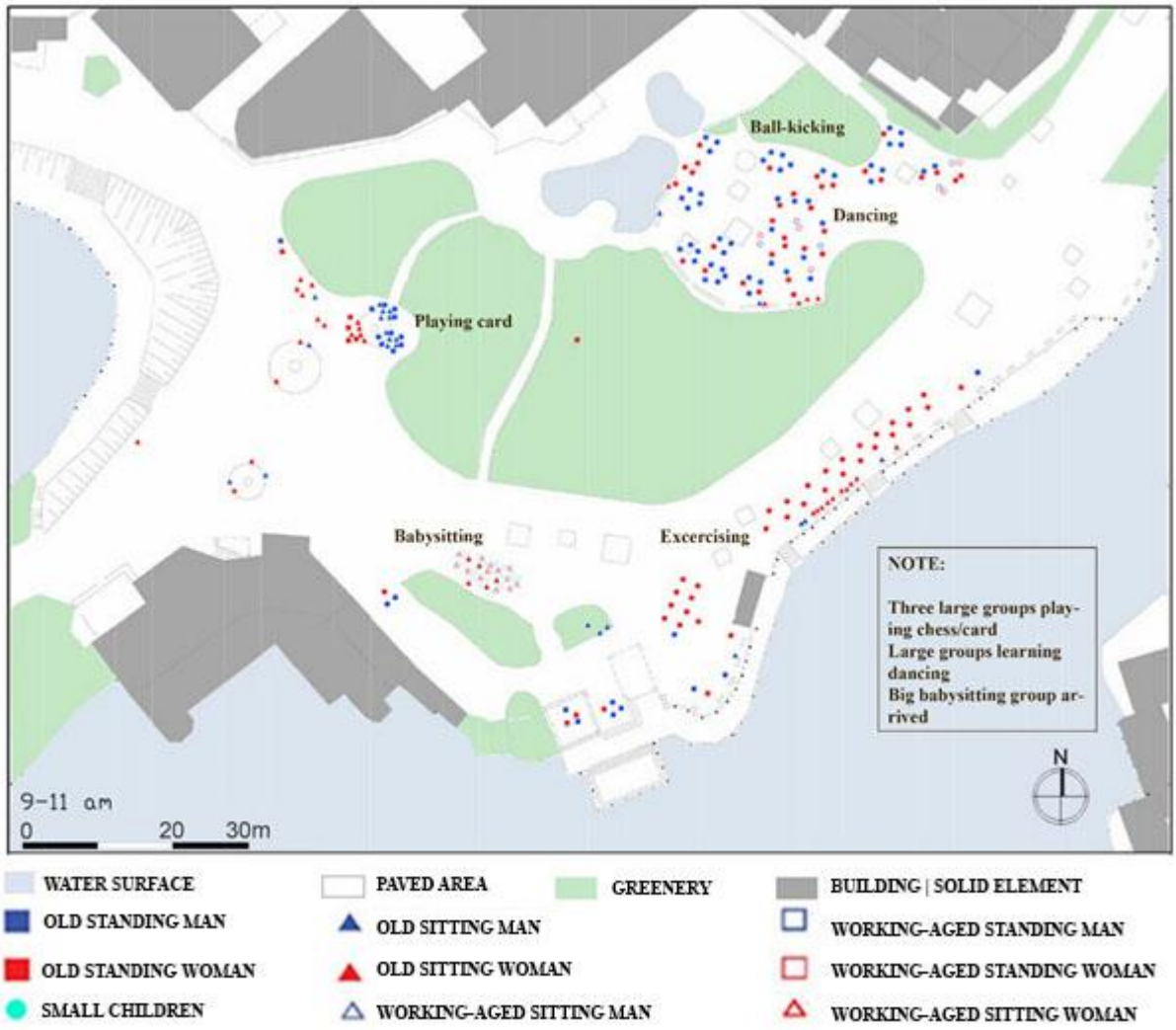

N
Praying
Informal sitting
NOTE:
Praying activity dominating the space
Informal sitting occurred over the place
13-15pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

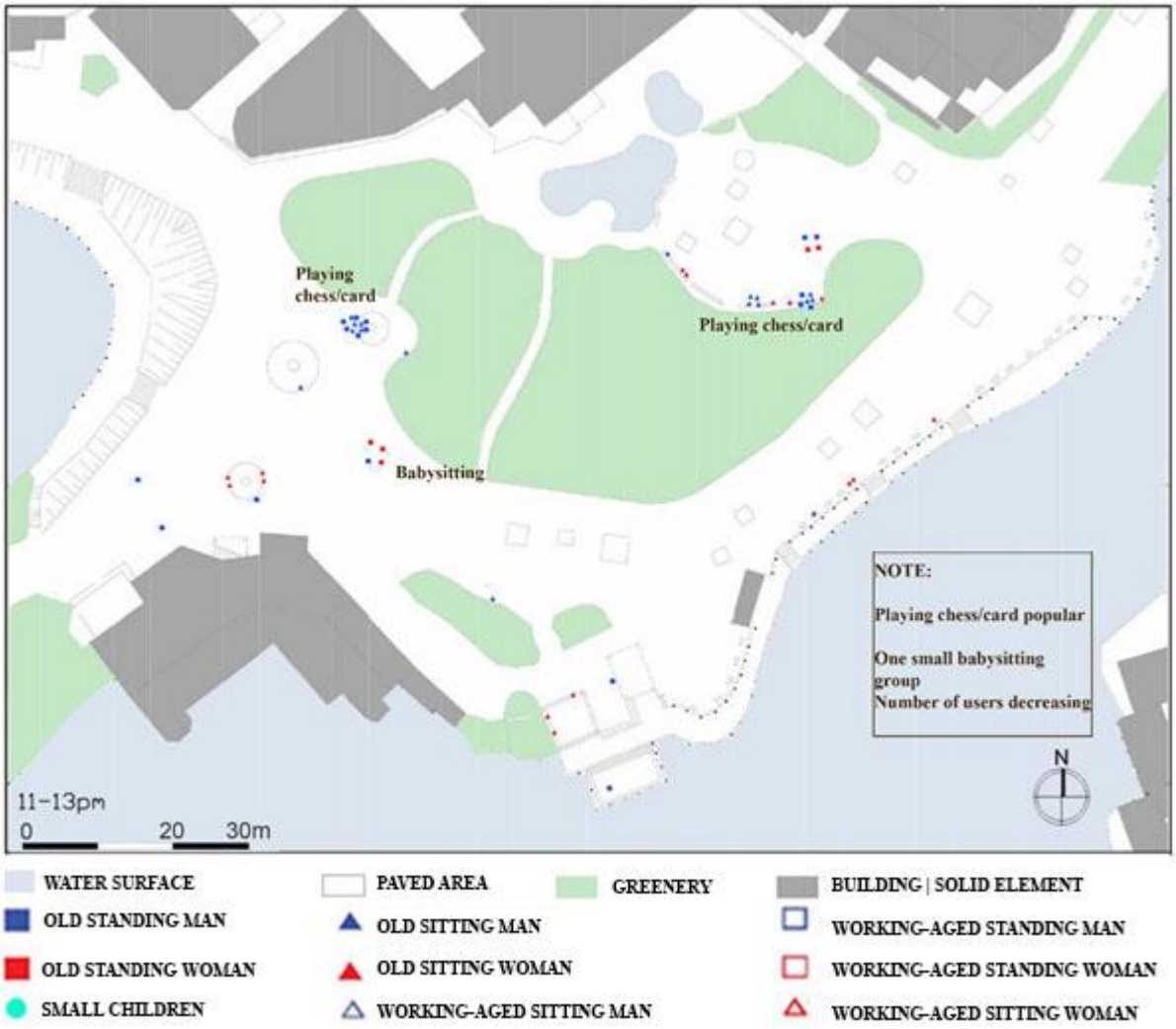

N
Babysitting
NOTE:
Babysitting at the gate
Informal sitting at the edges of the lake
Less praying activity
15-17pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

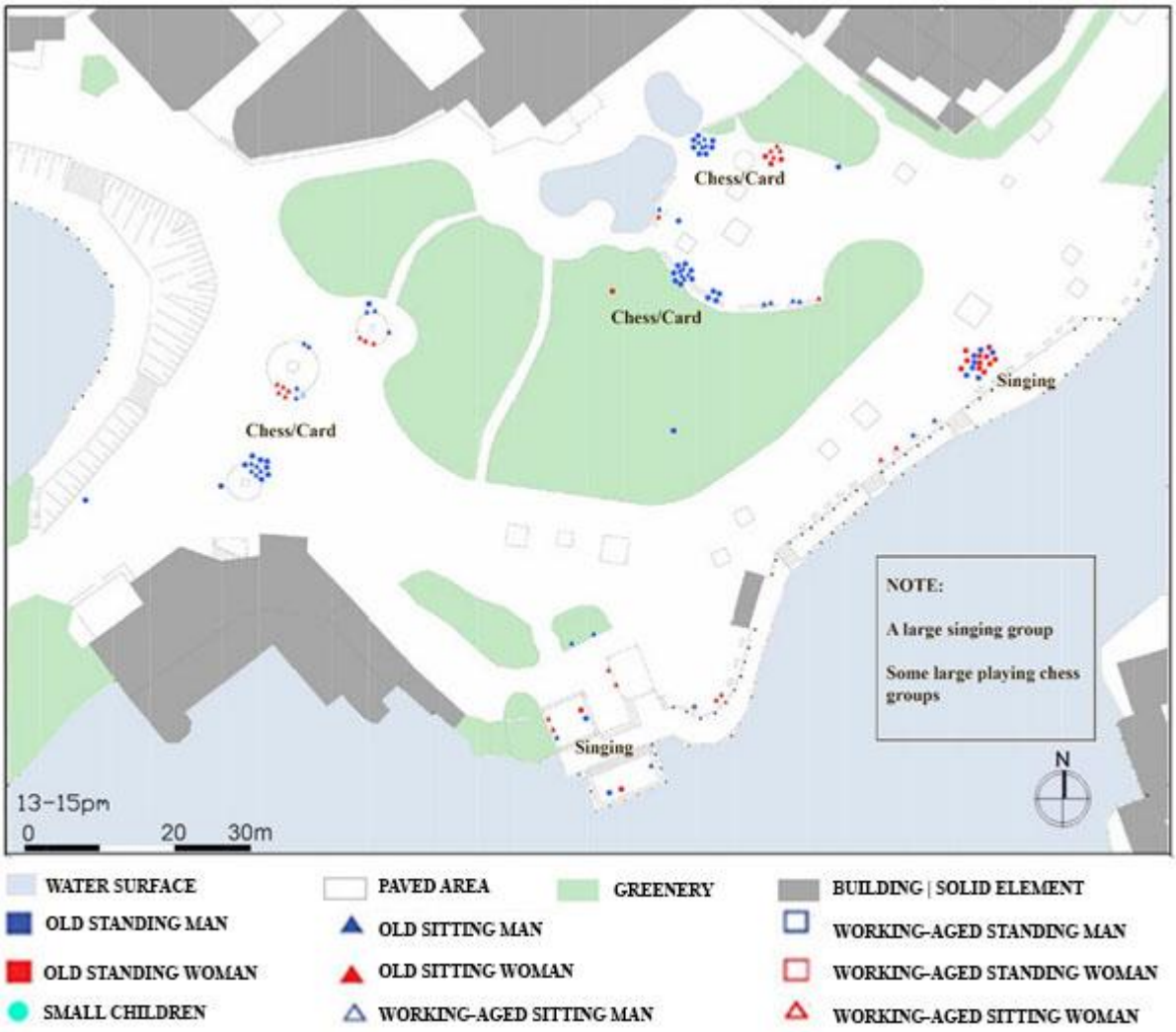

N
NOTE:
It become dark
People leaving gradually
17-19pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

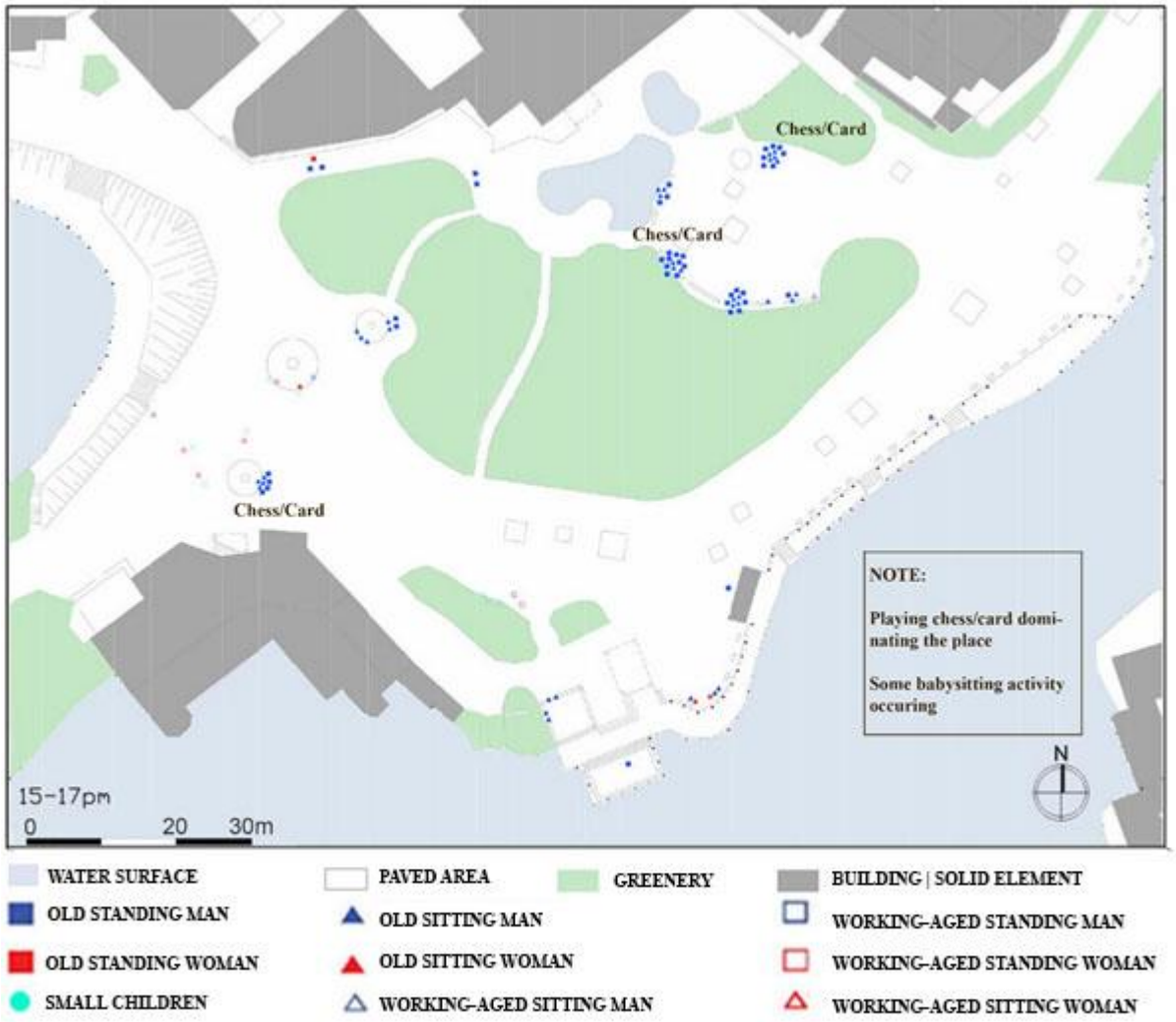
Liwan Lake Square | Observation Date Friday 27/12/2013

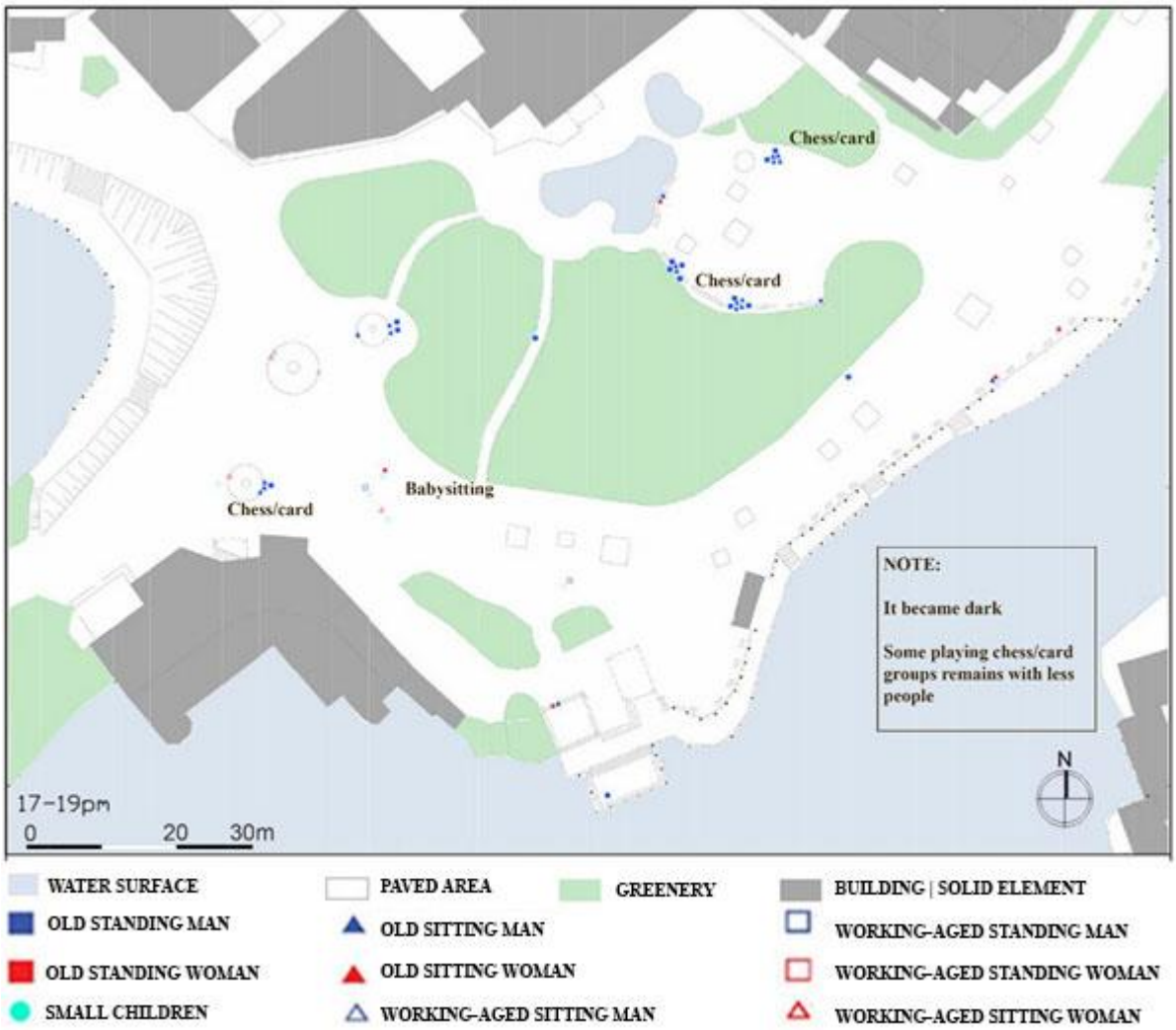



Ball-kicking
Dancing
Playing card
Babysitting
Excercising
NOTE:
Three large groups playing chess/card
Large groups learning dancing
Big babysitting group arrived
N
9-11 am
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

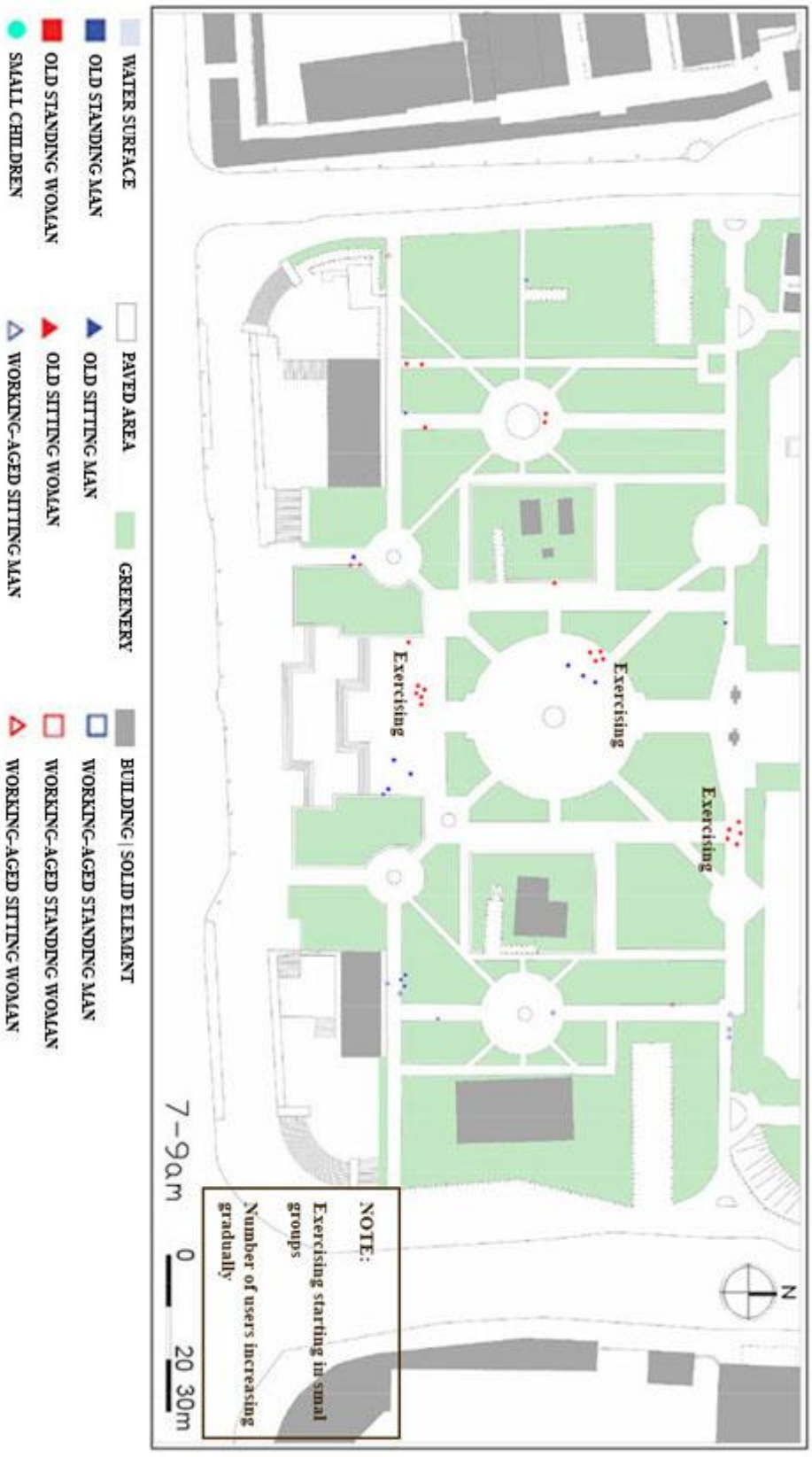

Playing chess/card
Playing chess/card
Babysitting
NOTE:
Playing chess/card popular
One small babysitting group
Number of users decreasing
N
11-13pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

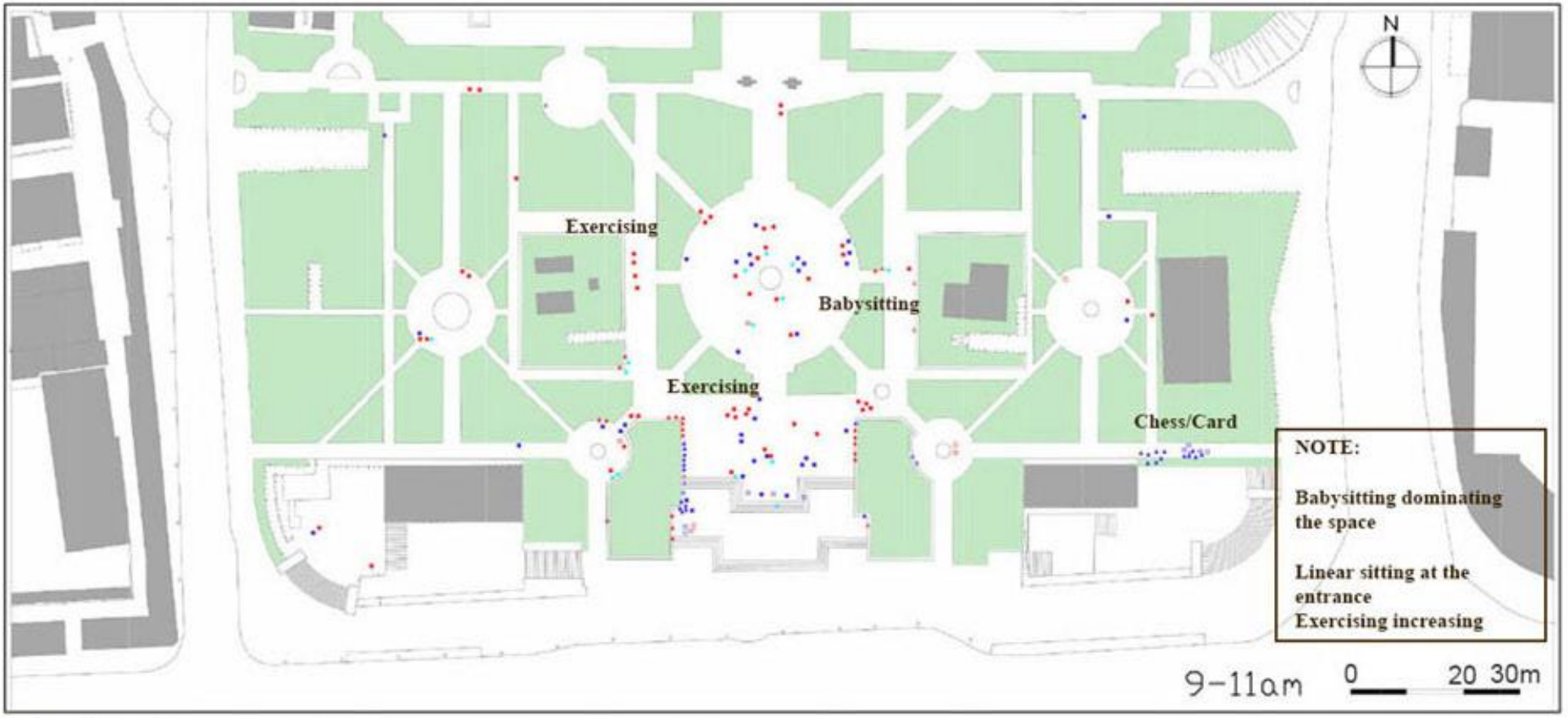

Chess/Card
Chess/Card
Chess/Card
Singing
Singing
NOTE:
A large singing group
Some large playing chess groups
N
13-15pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

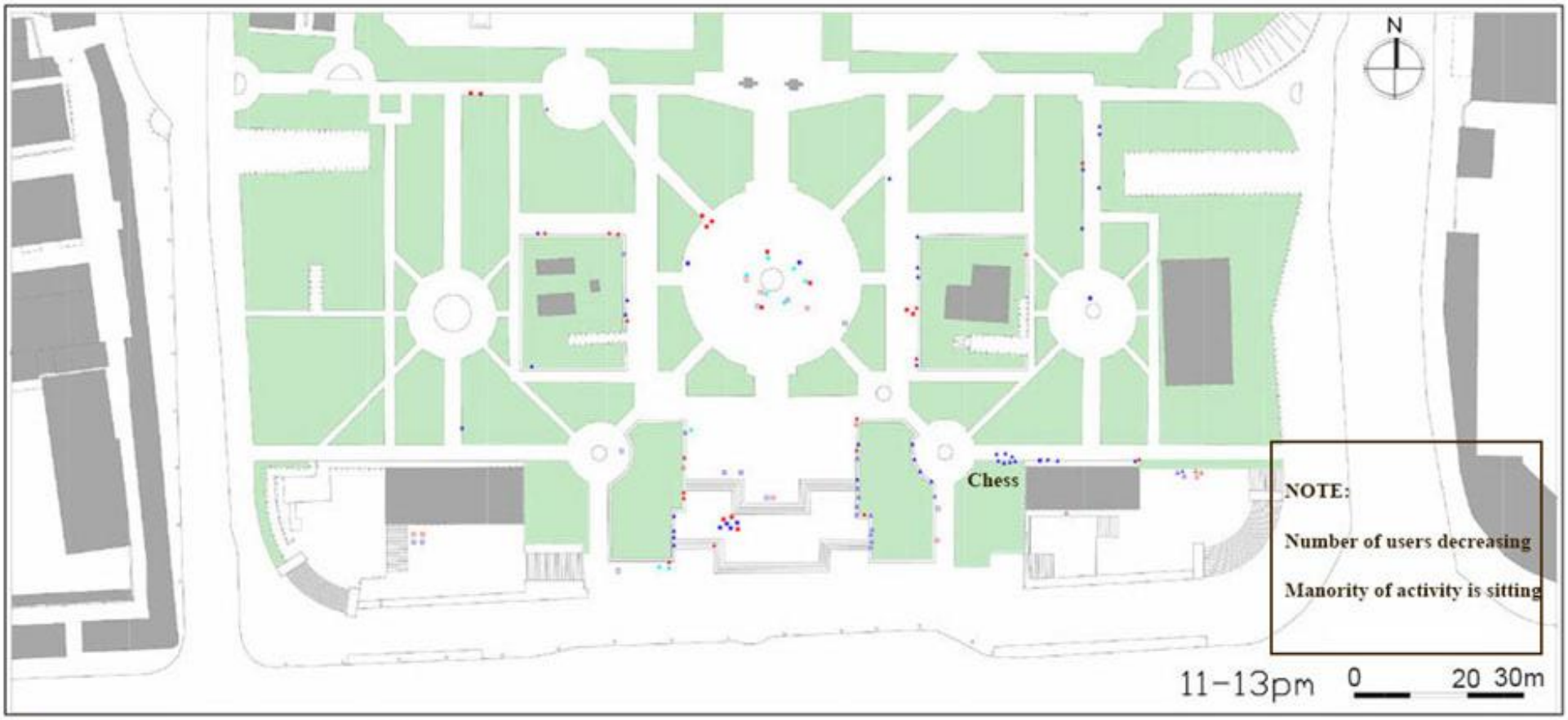

Chess/Card
Chess/Card
Chess/Card
NOTE:
Playing chess/card dominating the place
Some babysitting activity occuring
N
15-17pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


Chess/card
Chess/card
Babysitting
Chess/card
NOTE:
It became dark
Some playing chess/card groups remains with less people
N
17-19pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

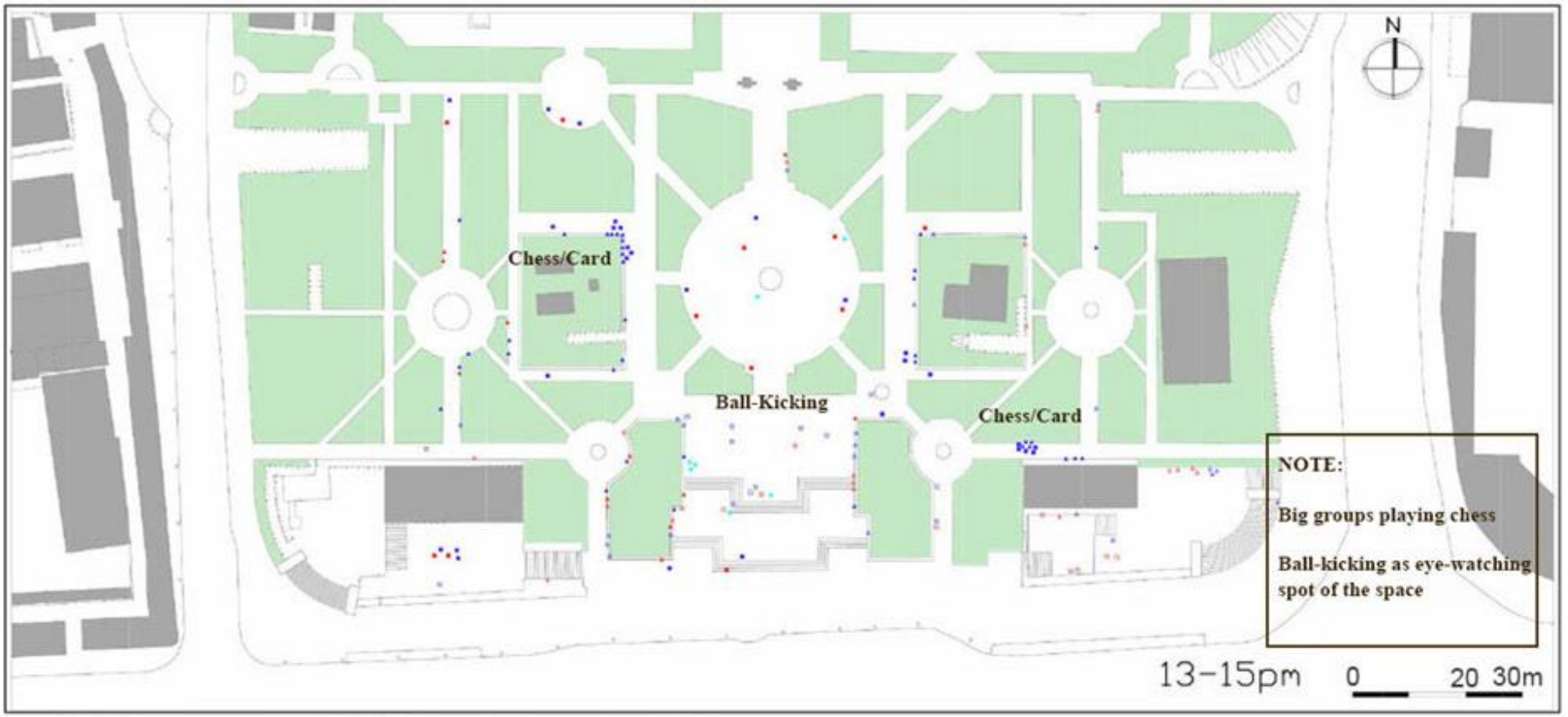
People Park Front Square | Observation Date Monday 30/12/2013

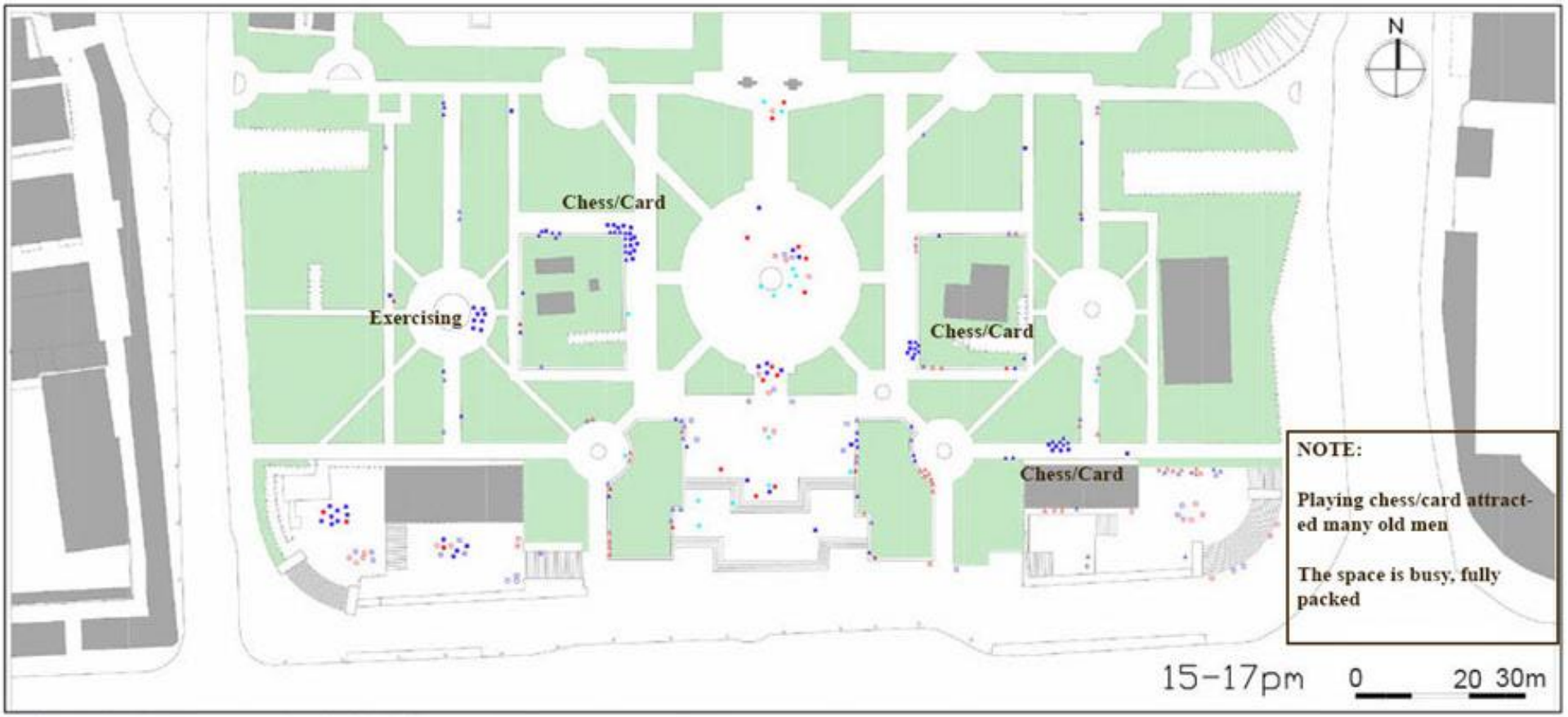


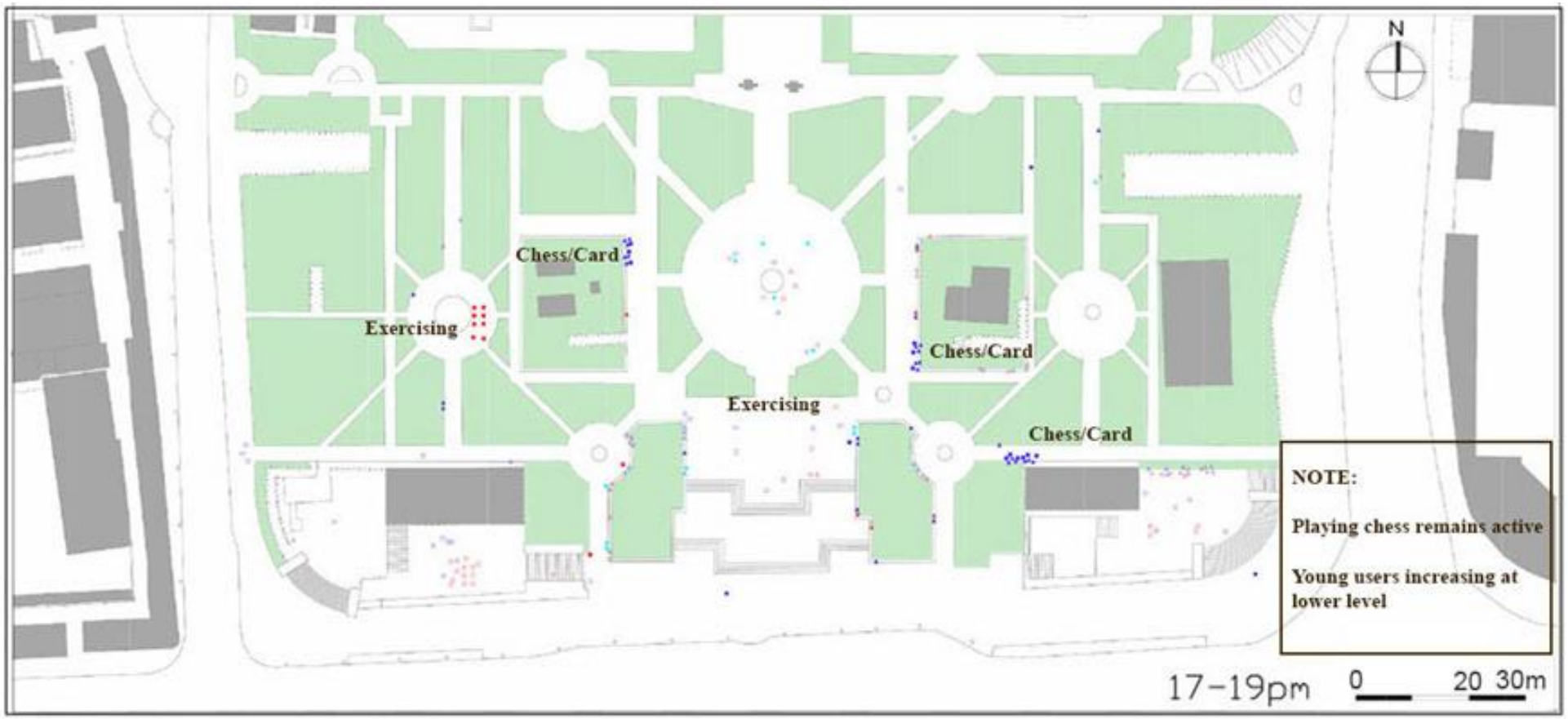

N
Exercising
Babysitting
Exercising
Chess/Card
NOTE:
Babysitting dominating the space
Linear sitting at the entrance
Exercising increasing
9-11am
0
20 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN



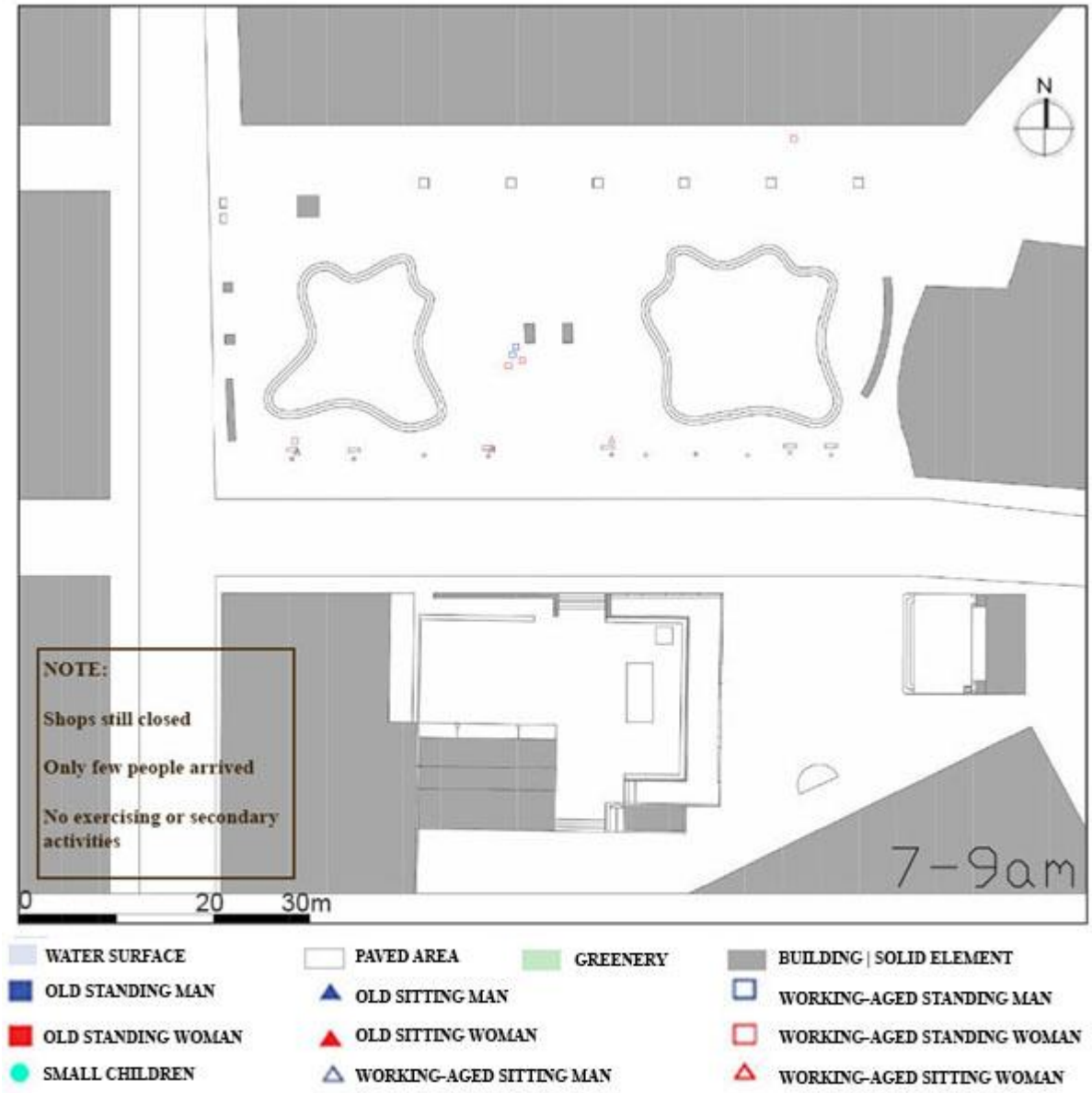
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

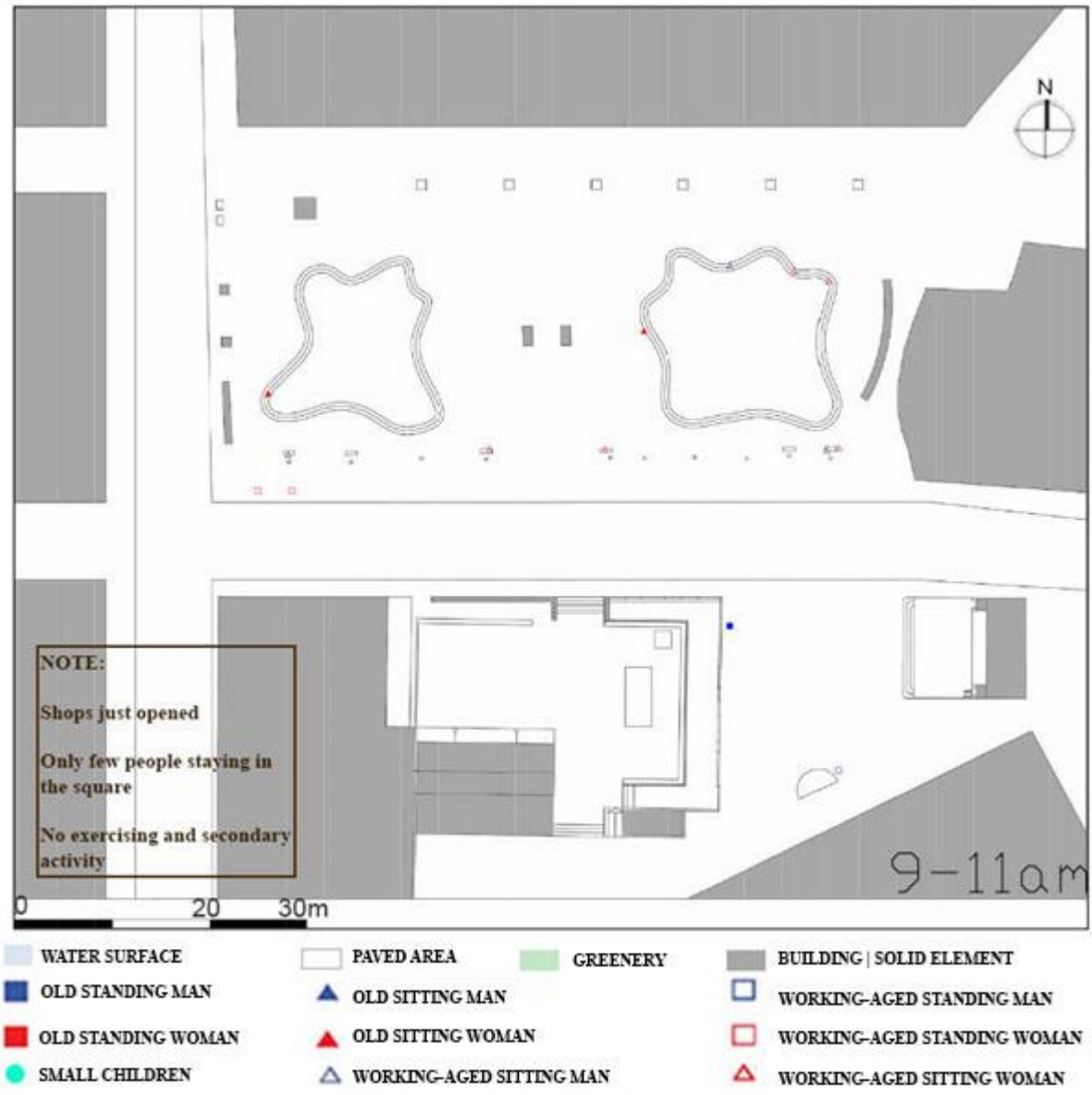

N
Chess/Card
Ball-Kicking
Chess/Card
NOTE:
Big groups playing chess
Ball-kicking as eye-watching spot of the space
13-15pm
0
20 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

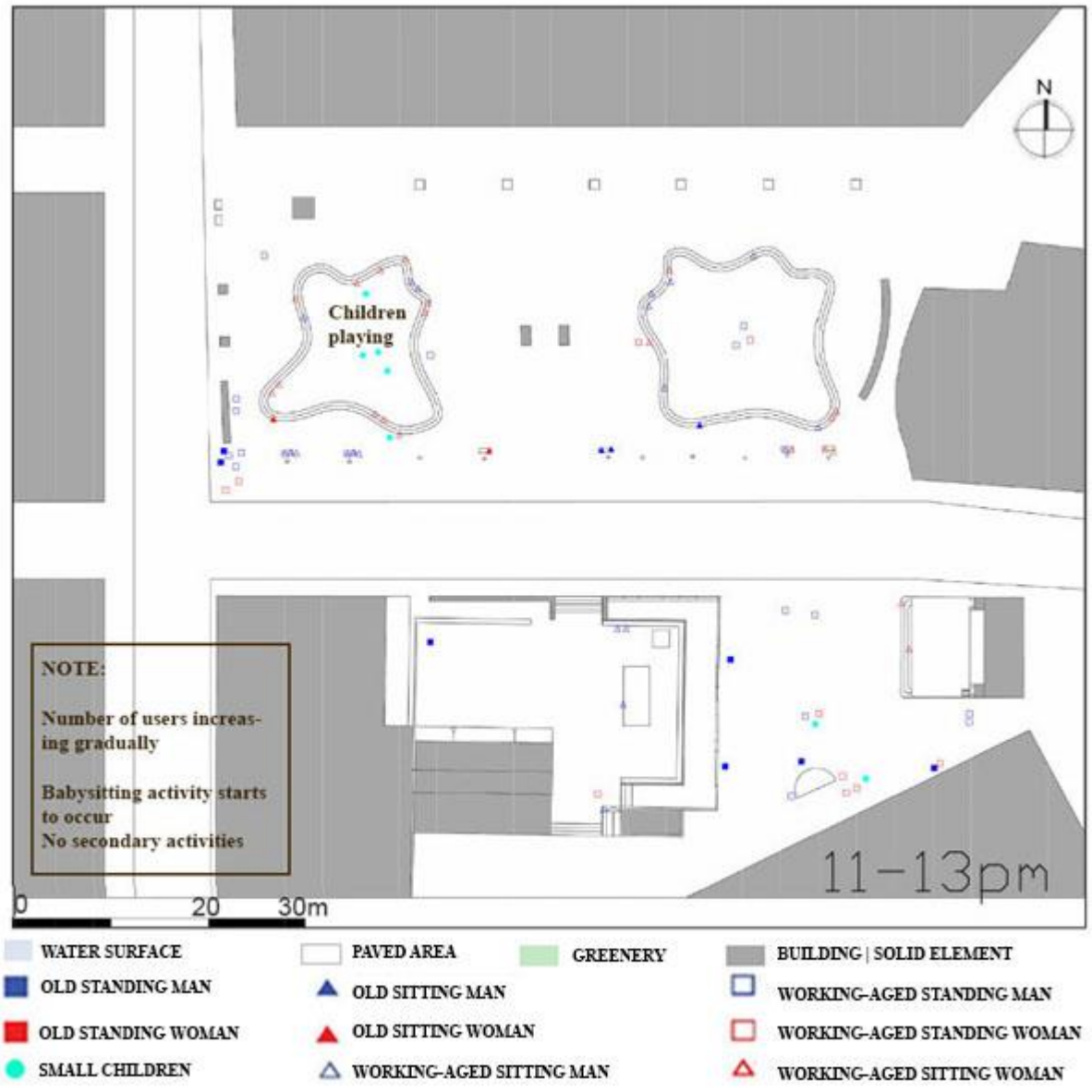

N
Chess/Card
Exercising
Chess/Card
Chess/Card
NOTE:
Playing chess/card attracted many old men
The space is busy, fully packed
15-17pm
0
20 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

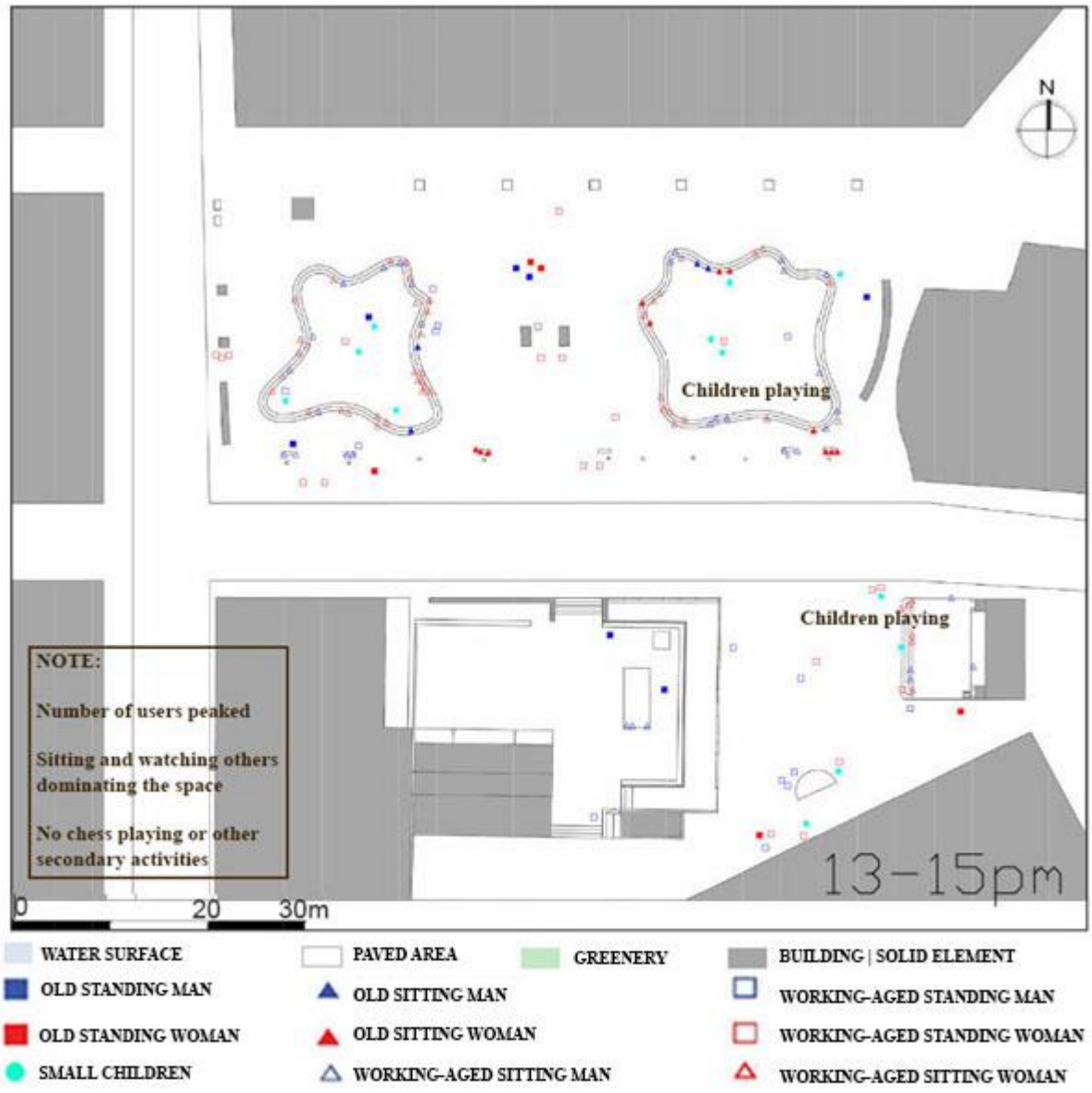

N
Chess/Card
Exercising
Chess/Card
Exercising
Chess/Card
NOTE:
Playing chess remains active
Young users increasing at lower level
17-19pm
0
20 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

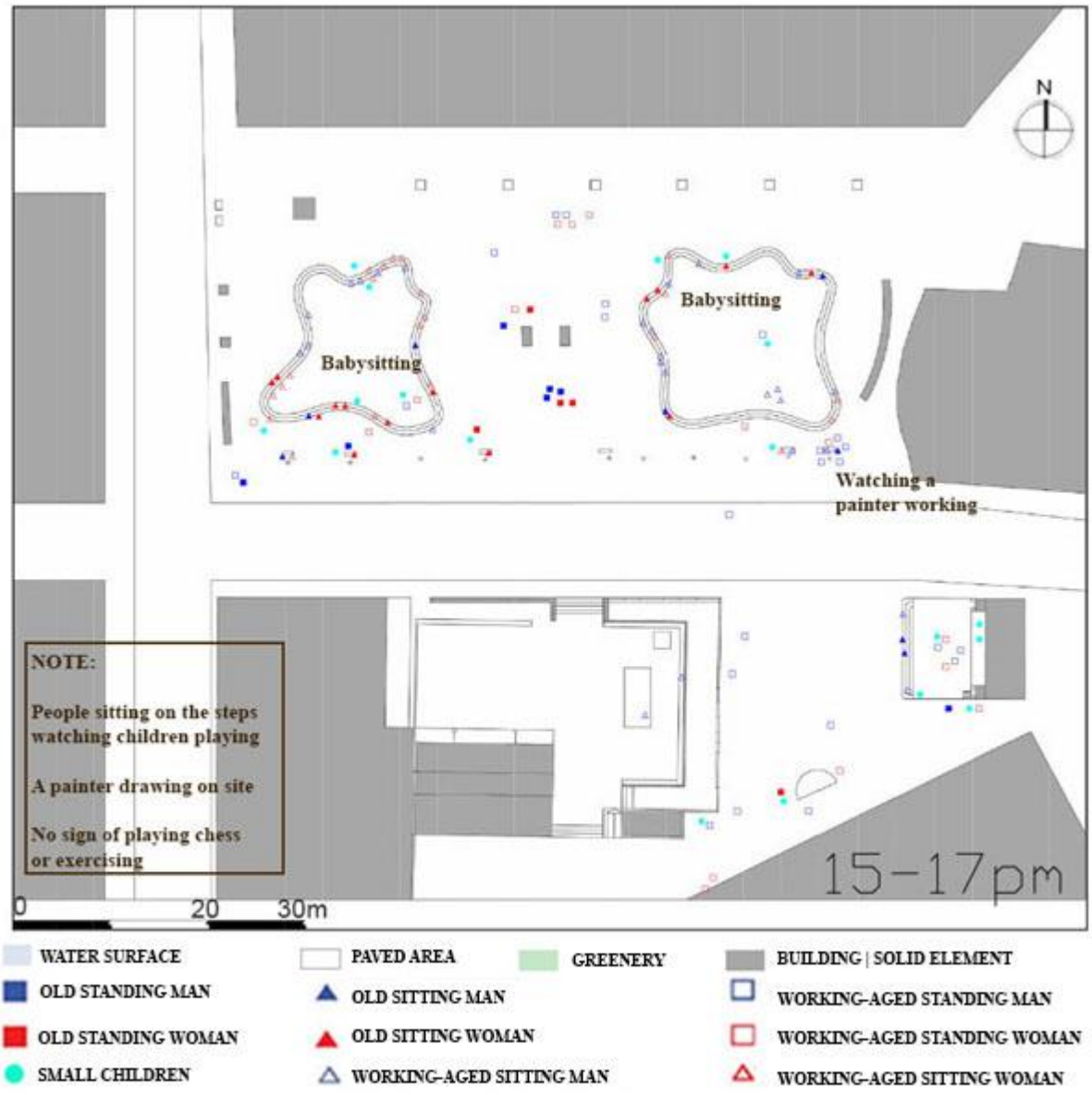
Dongmen Market Square | Observation Date Friday 10/01/2014

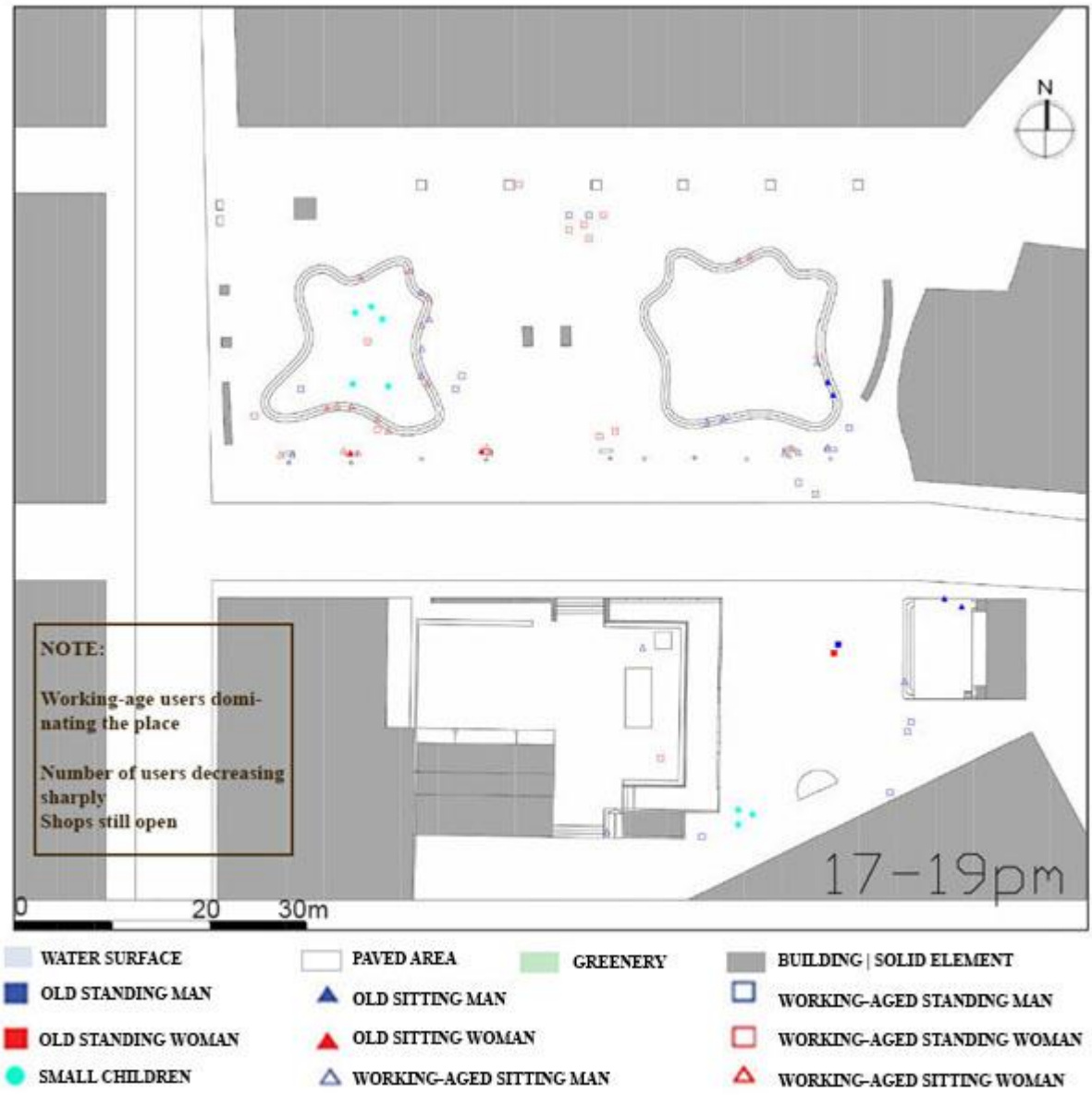



N
NOTE:
Shops just opened
Only few people staying in the square
No exercising and secondary activity
9-11am
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

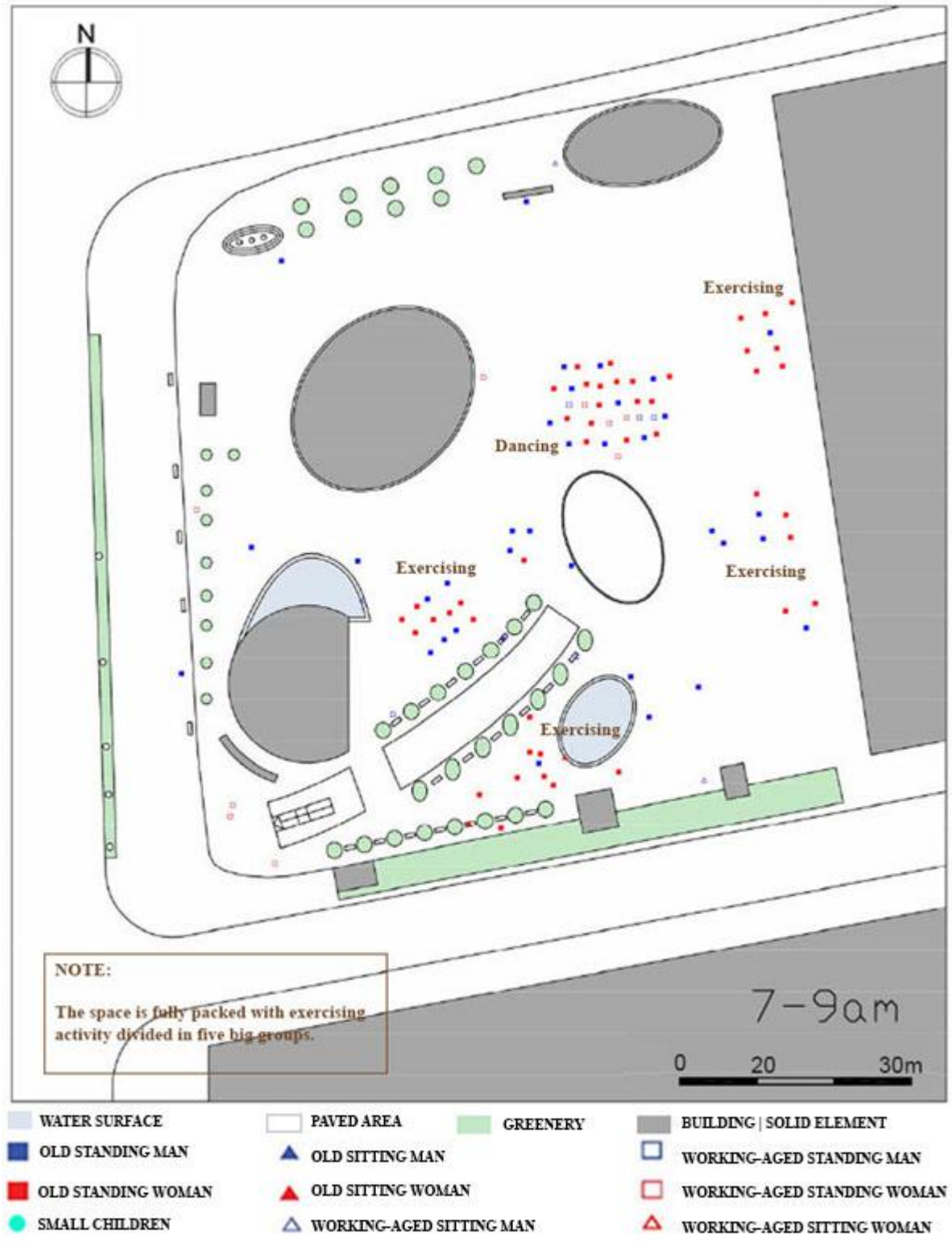

N
Children playing
NOTE:
Number of users increasing gradually
Babysitting activity starts to occur
No secondary activities
11-13pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

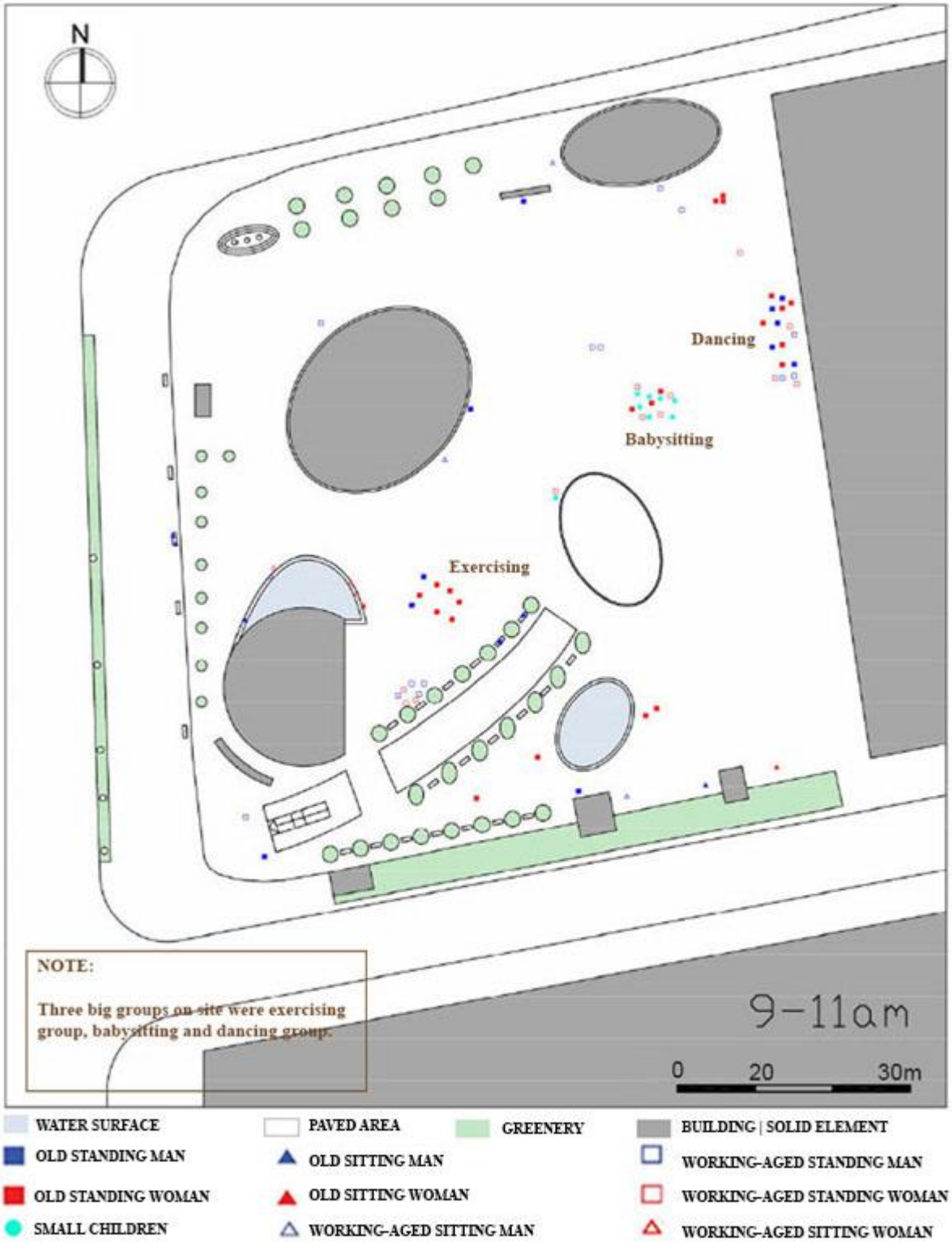

N
Children playing
Children playing
NOTE:
Number of users peaked
Sitting and watching others dominating the space
No chess playing or other secondary activities
13-15pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

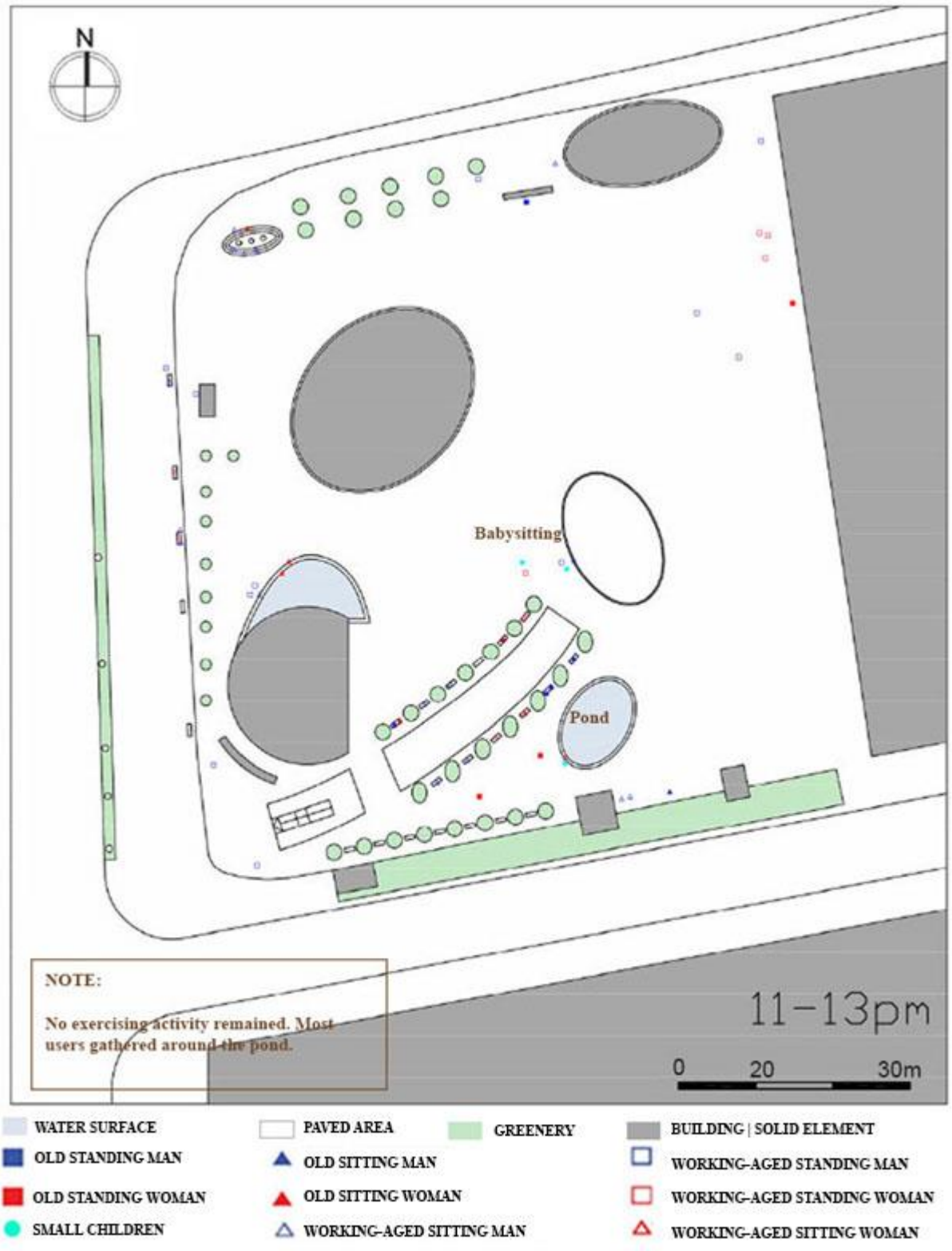

N
Babysitting
Babysitting
Watching a painter working
NOTE:
People sitting on the steps watching children playing
A painter drawing on site
No sign of playing chess or exercising
15-17pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

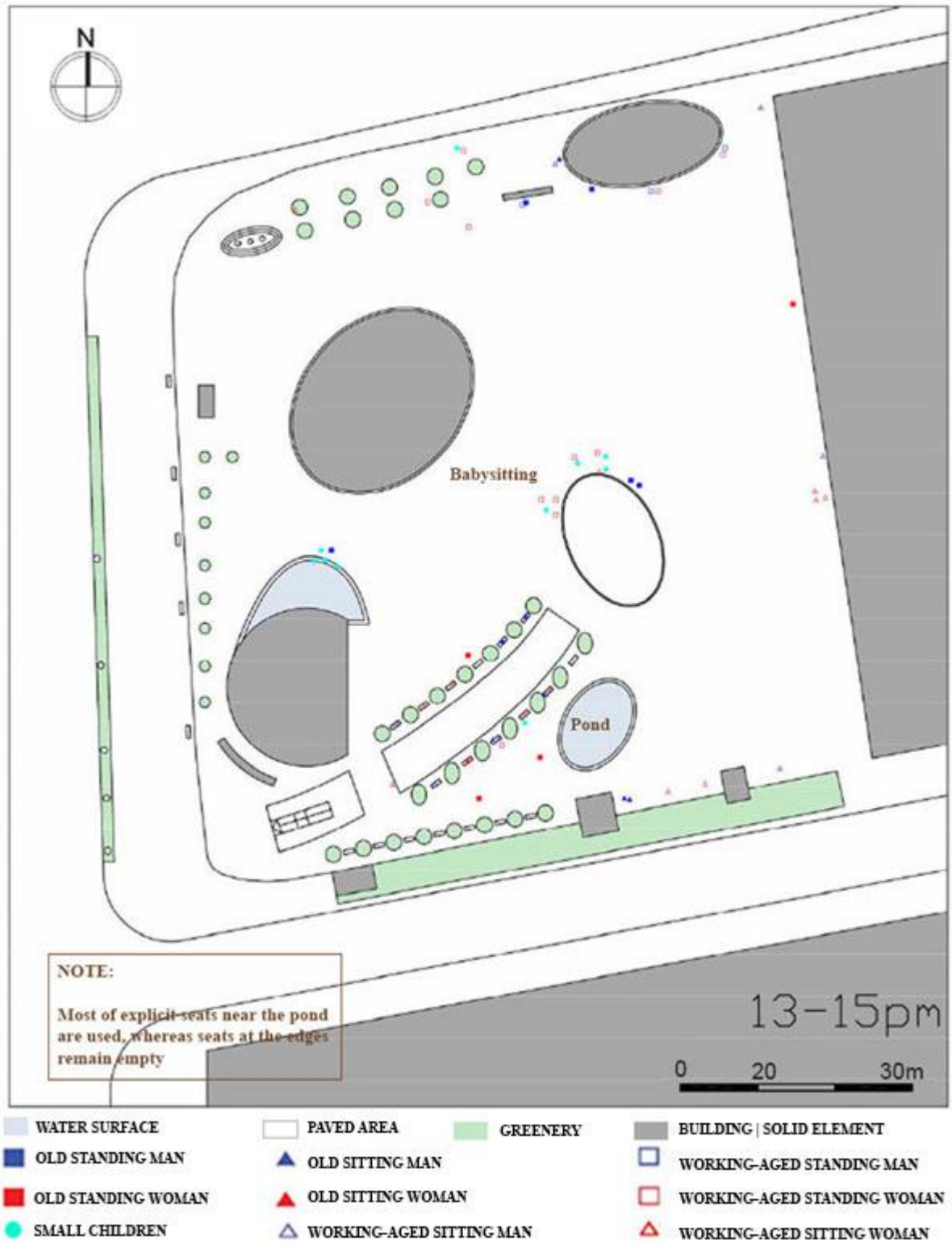

N
NOTE:
Working-age users dominating the place
Number of users decreasing sharply
Shops still open
17-19pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

King Plaza | Observation Date Friday 10/01/2014




N
Dancing
Babysitting
Exercising
NOTE:
Three big groups on site were exercising group, babysitting and dancing group.
9-11am
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


N
Babysitting
Pond
NOTE:
No exercising activity remained. Most users gathered around the pond.
11-13pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

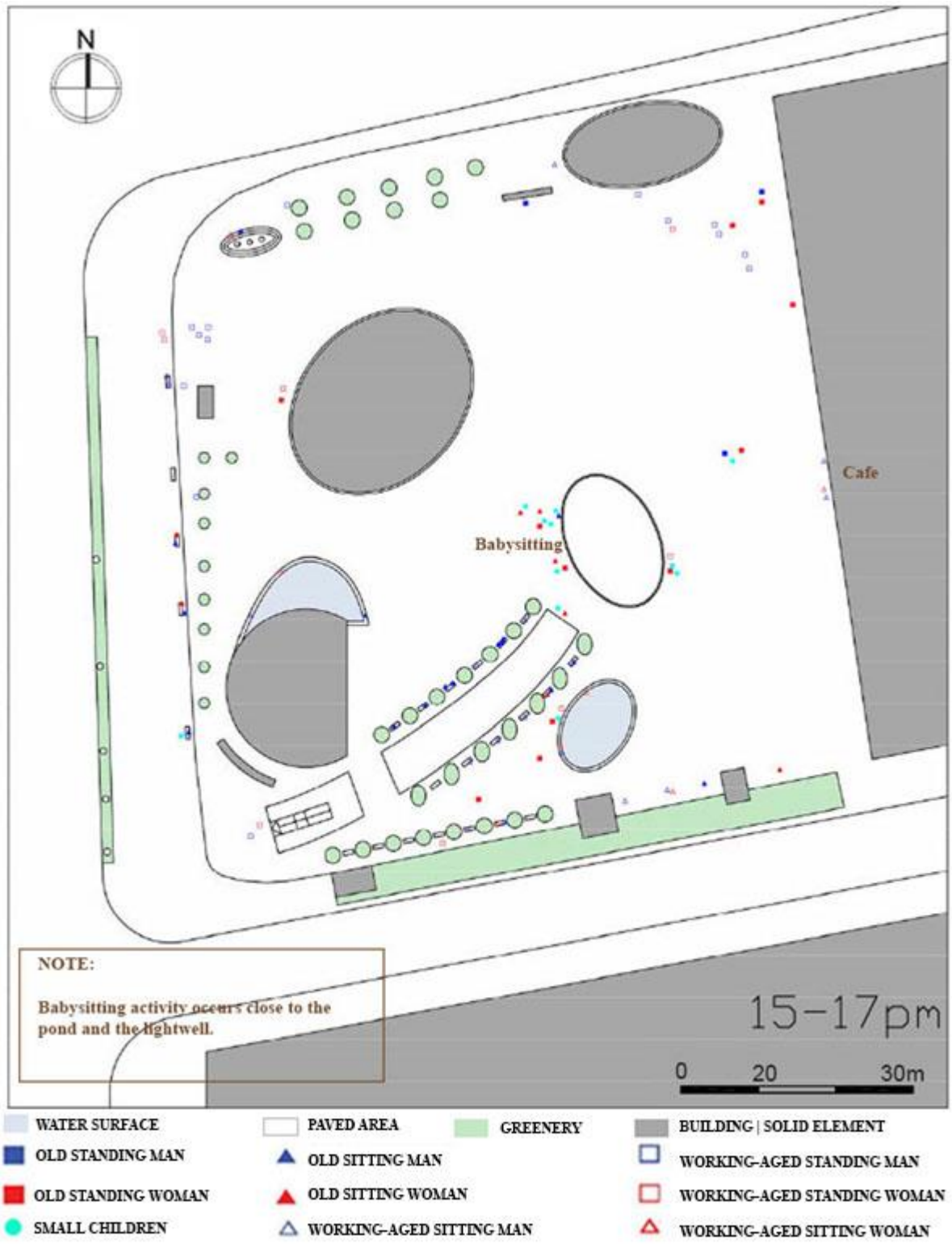


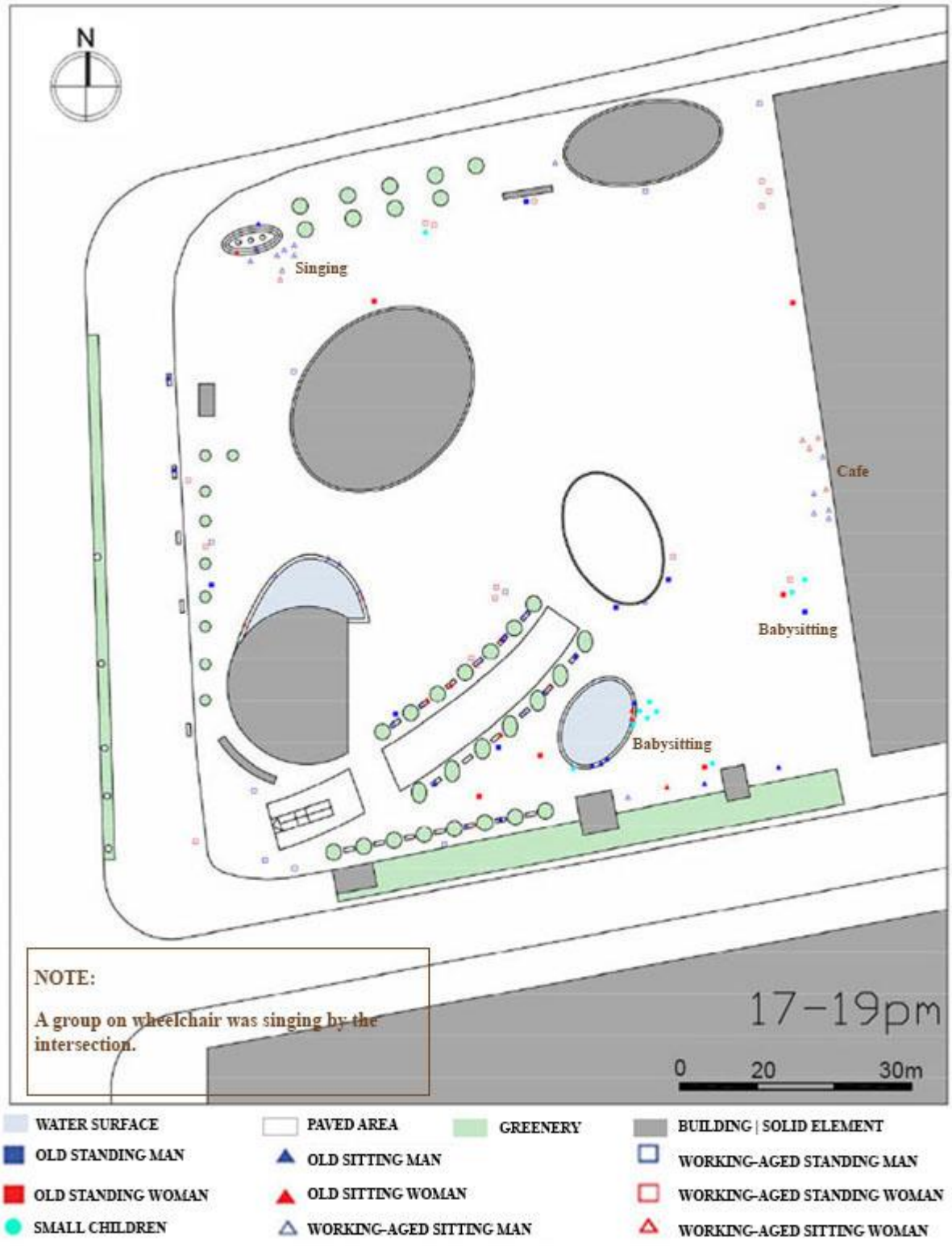
WATER SURFACE | PAVED AREA | GREENERY | BUILDING | SOLID ELEMENT

OLD STANDING MAN | OLD SITTING MAN | WORKING-AGED STANDING MAN

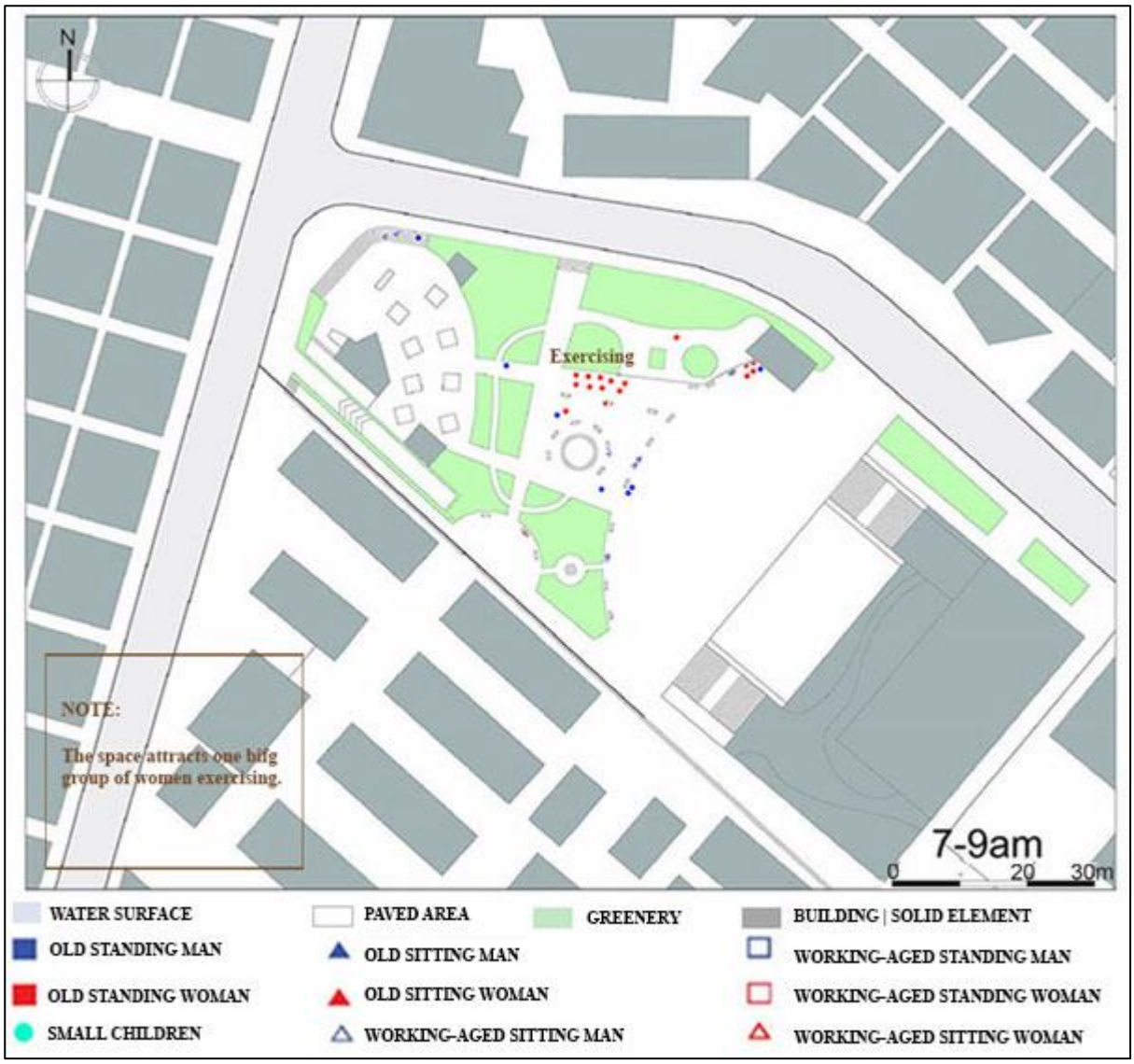
OLD STANDING WOMAN | OLD SITTING WOMAN | WORKING-AGED STANDING WOMAN

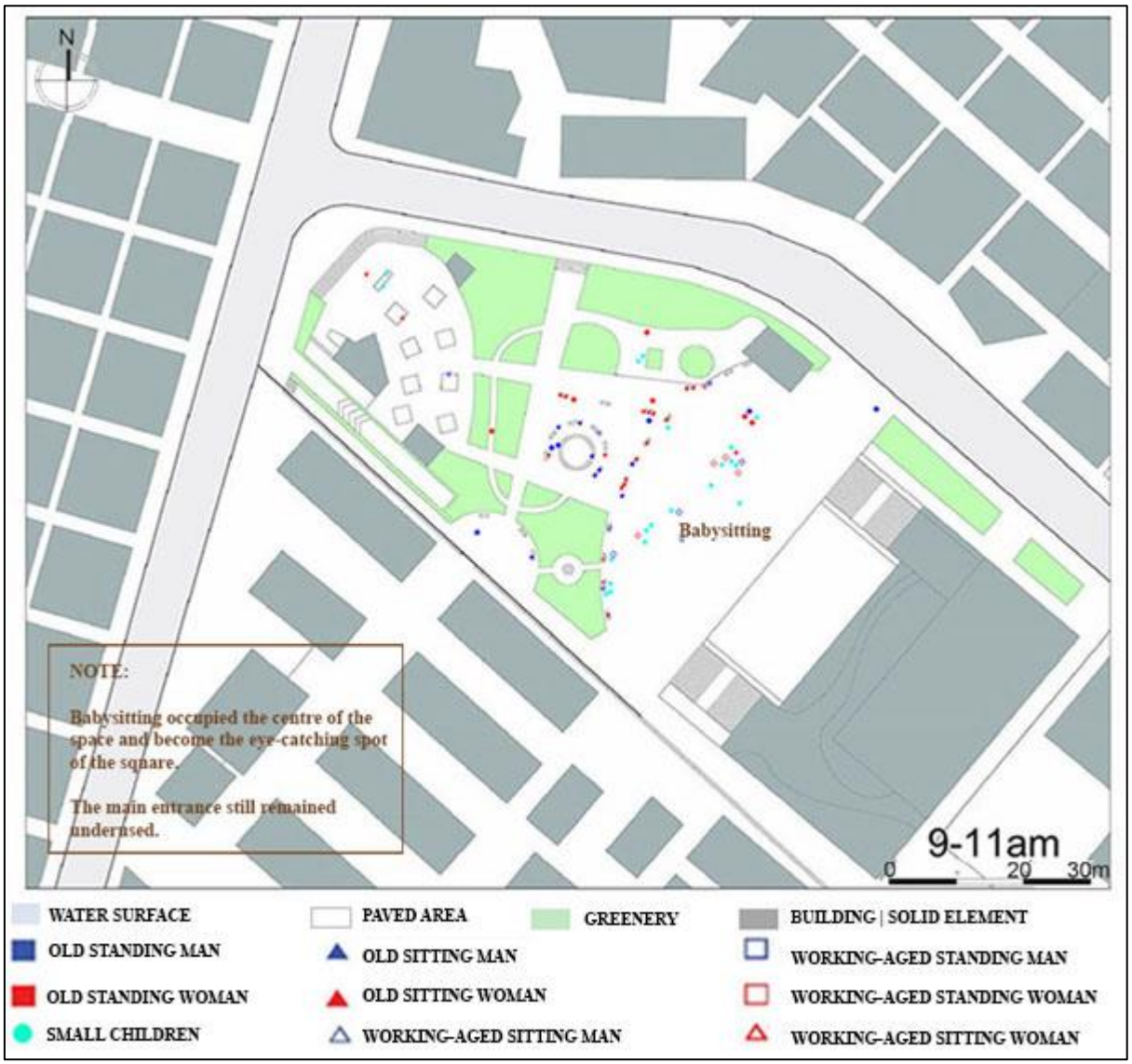
SMALL CHILDREN | WORKING-AGED SITTING MAN | WORKING-AGED SITTING WOMAN

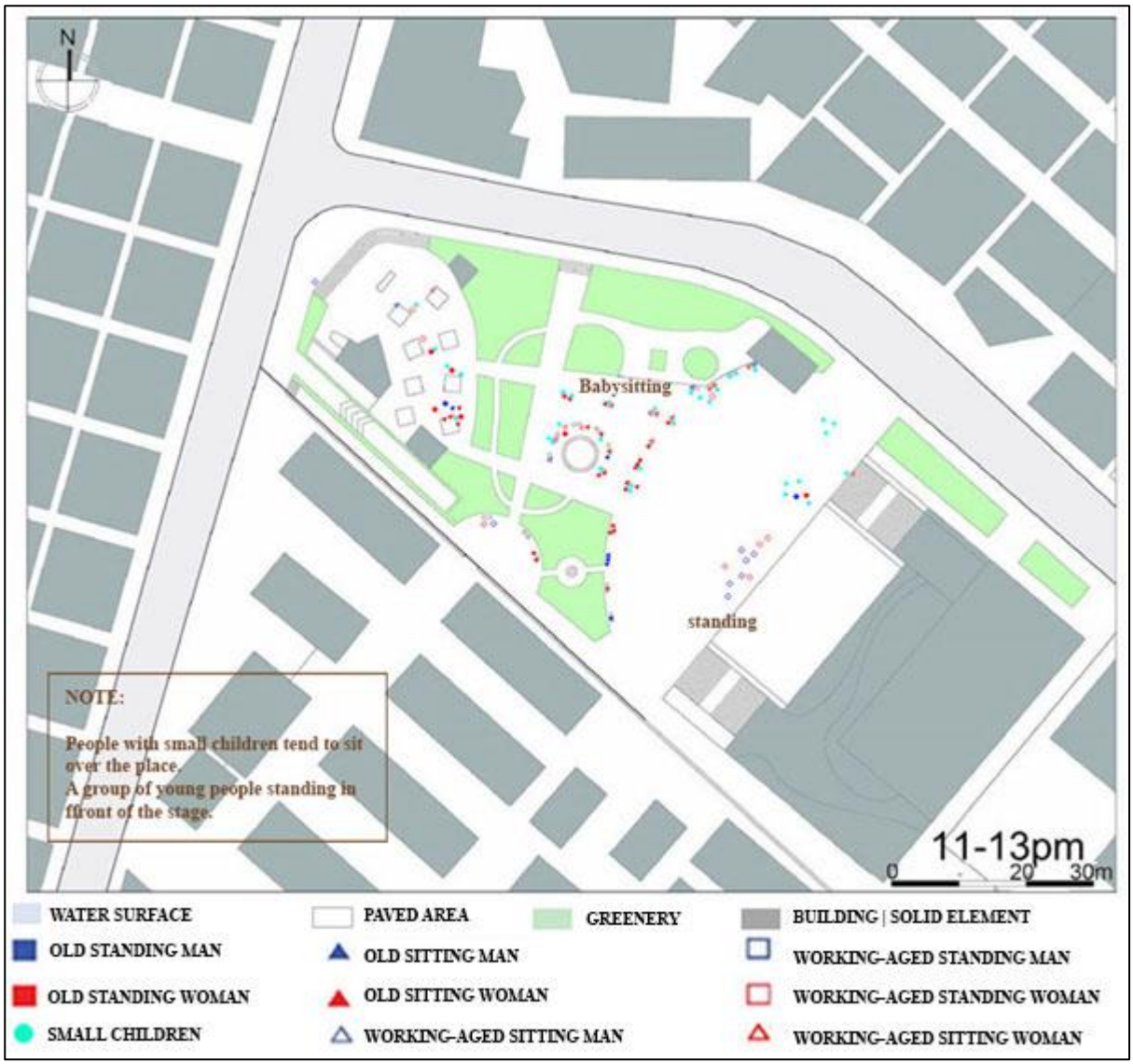

N
Cafe
Babysitting
NOTE:
Babysitting activity occurs close to the pond and the lightwell.
15-17pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

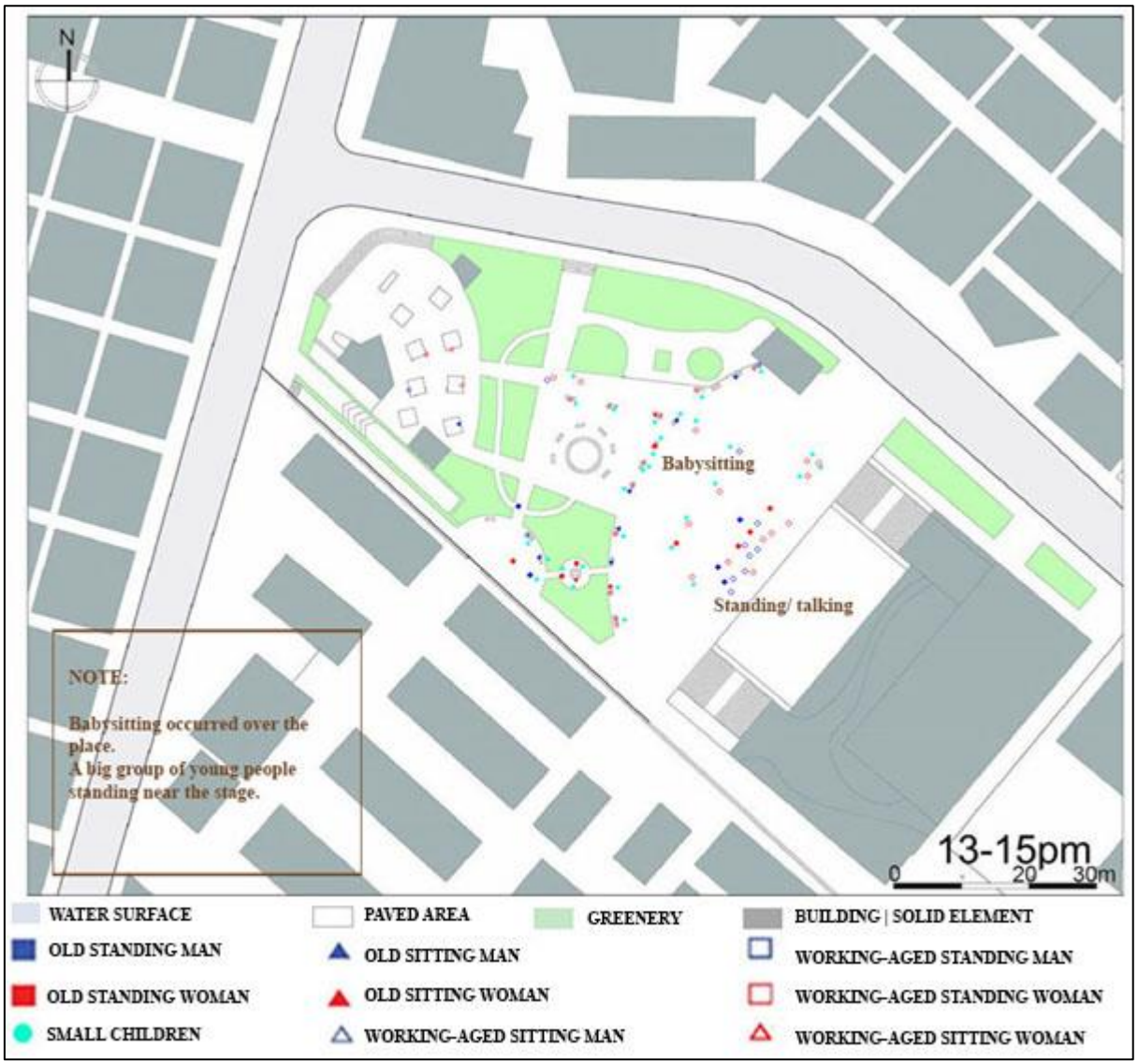

N
Singing
Cafe
Babysitting
Babysitting
NOTE:
A group on wheelchair was singing by the intersection.
17-19pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

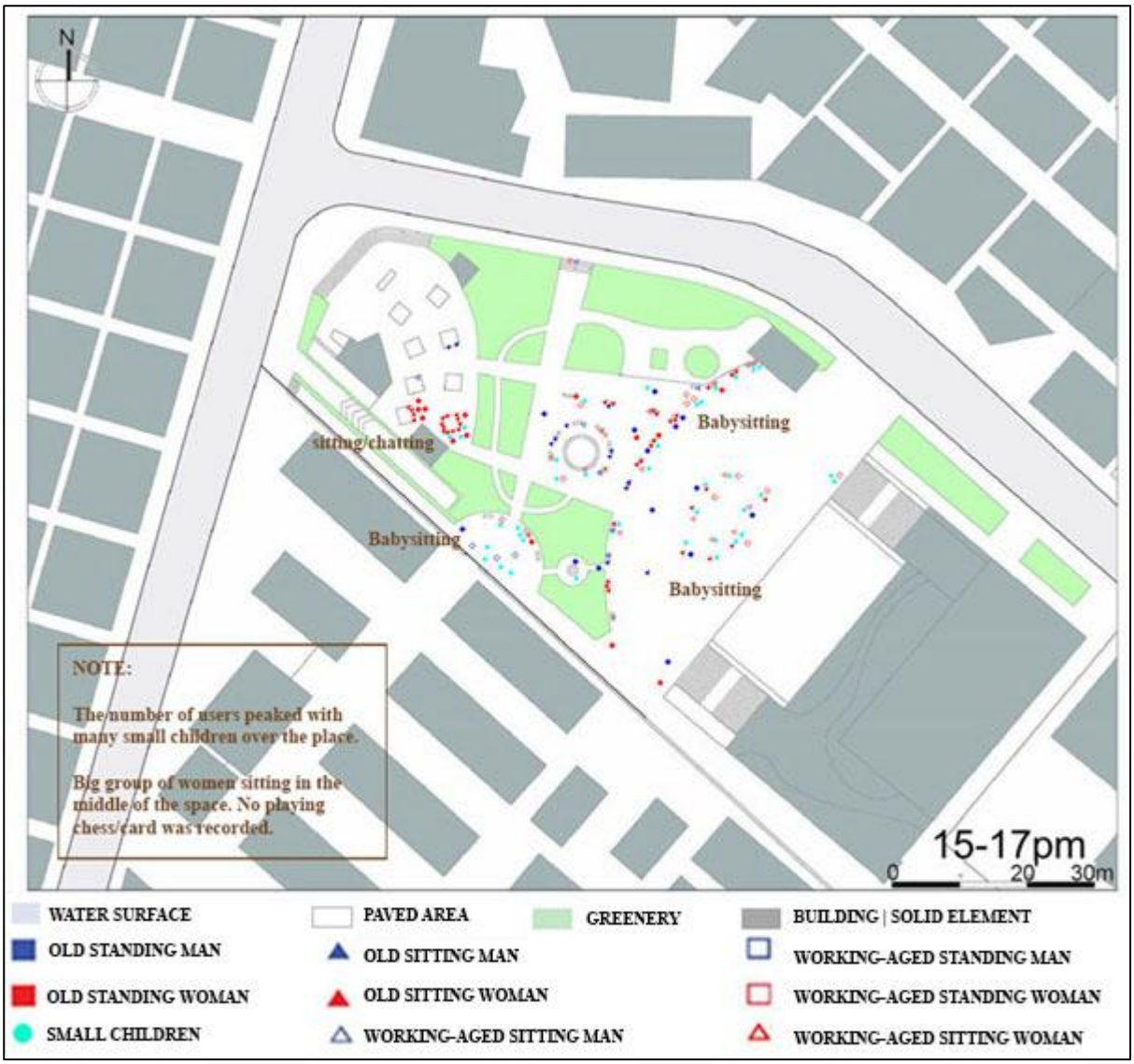
Tianmian Village Square | Observation Date Monday 06/01/2014

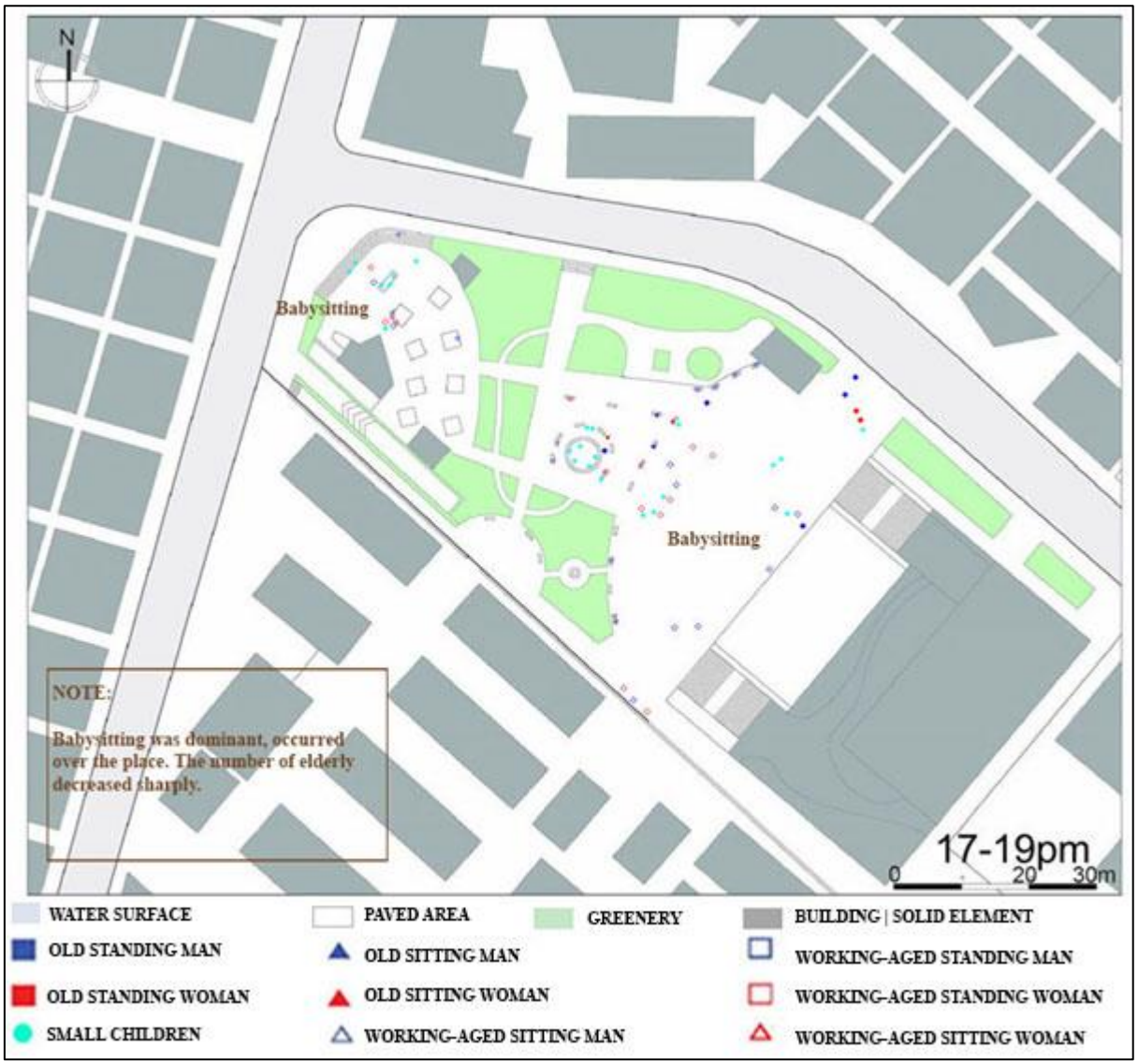



N
Babysitting
NOTE:
Babysitting occupied the centre of the space and become the eye-catching spot of the sqnare.
The main entrance still remained undernsed.
9-11am
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

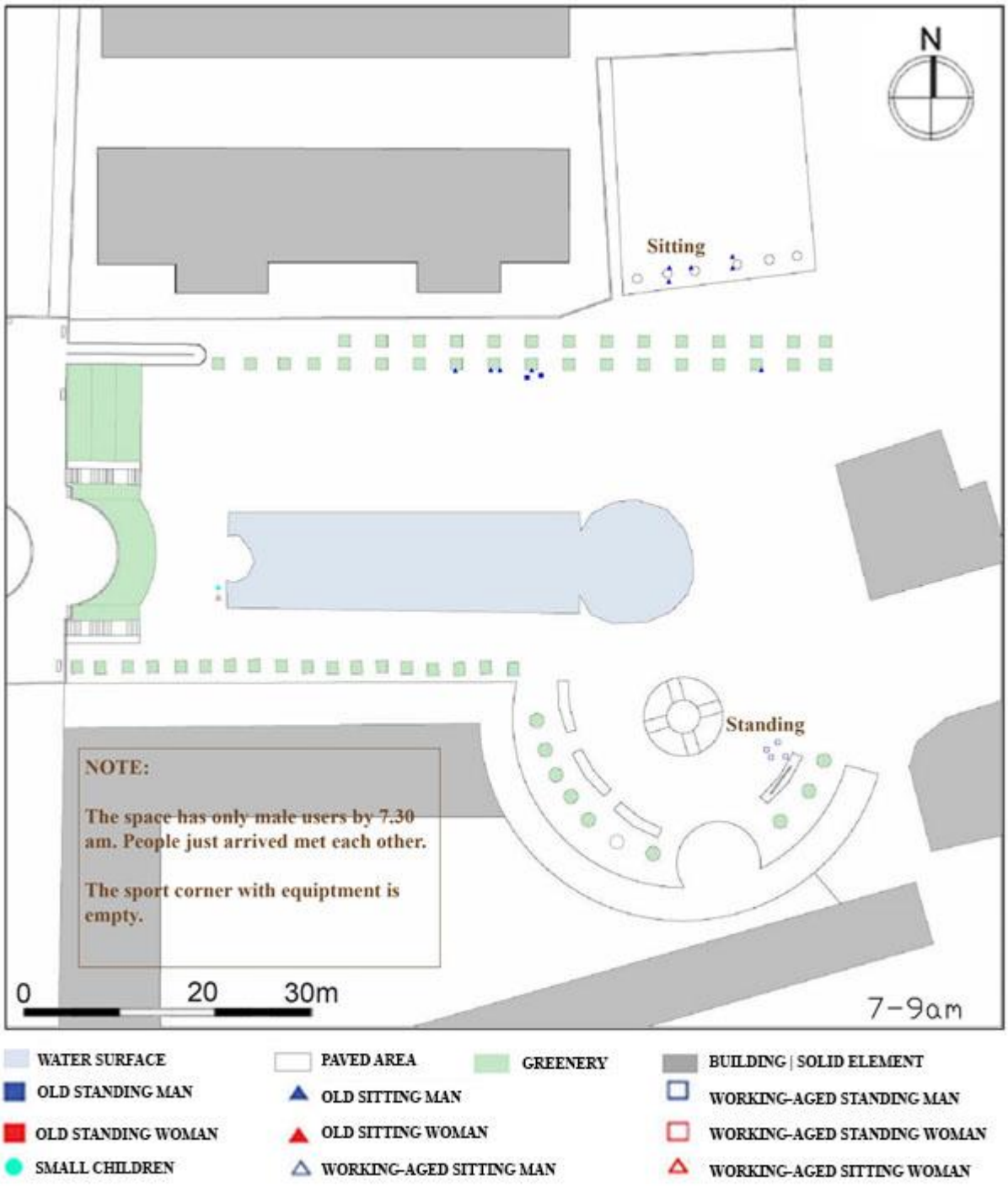

N
Babysitting
standing
NOTE:
People with small children tend to sit over the place.
A group of young people standing in ffront of the stage.
11-13pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

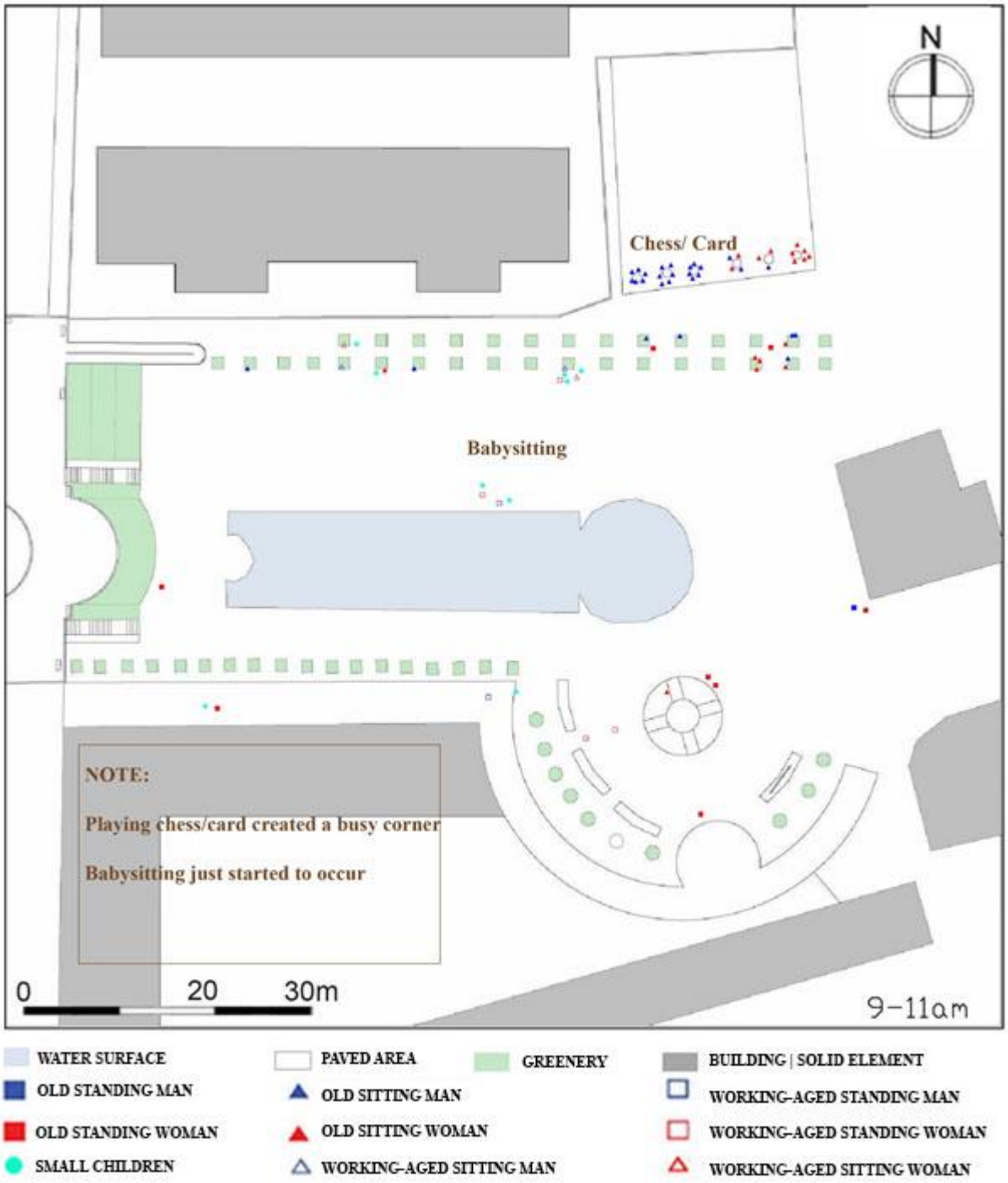

N
Babysitting
Standing/ talking
NOTE:
Babysitting occurred over the place.
A big group of young people standing near the stage.
13-15pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

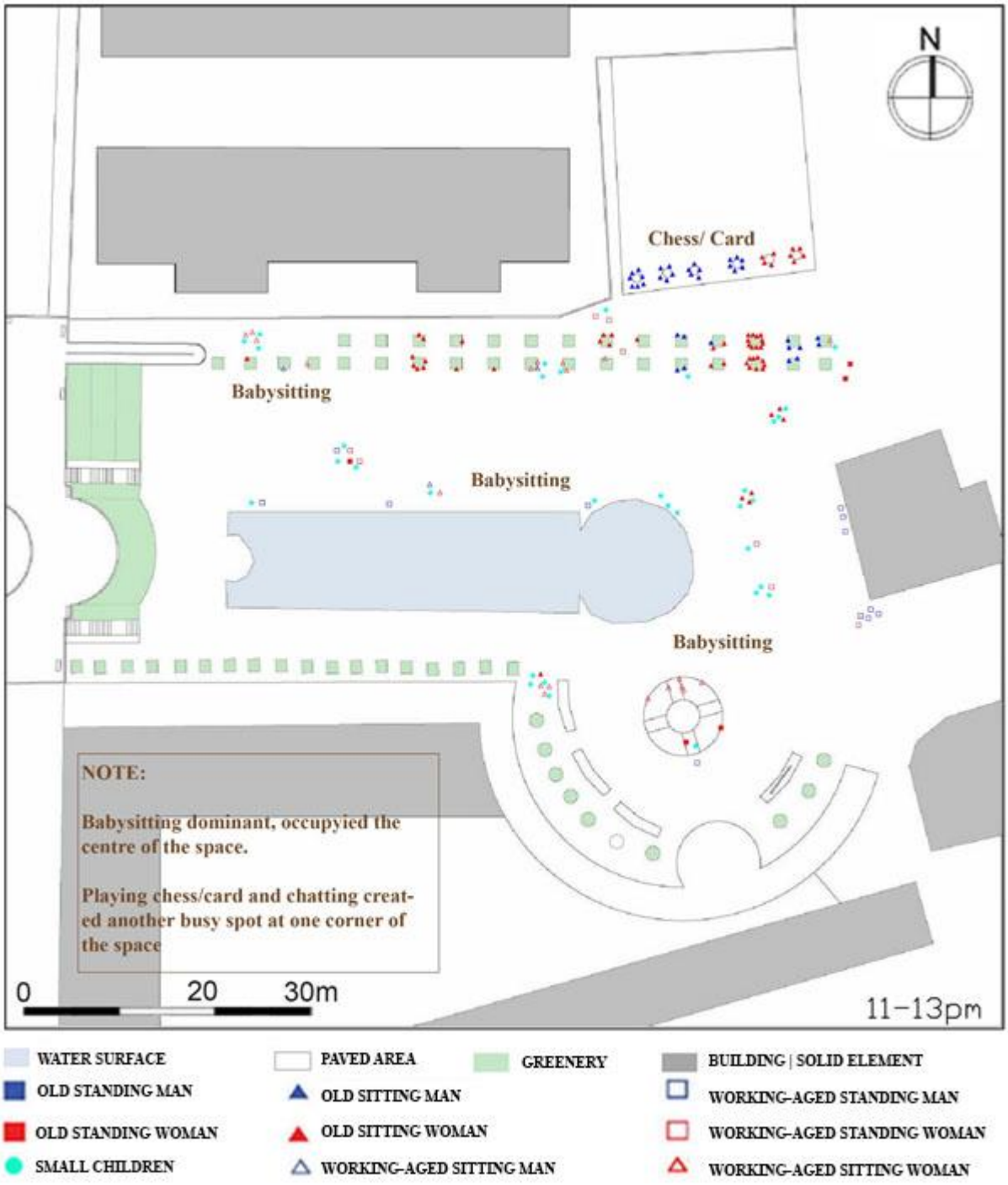

N
sitting/chatting
Babysitting
Babysitting
Babysitting
NOTE:
The number of users peaked with many small children over the place.
Big group of women sitting in the middle of the space. No playing chess/card was recorded.
15-17pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

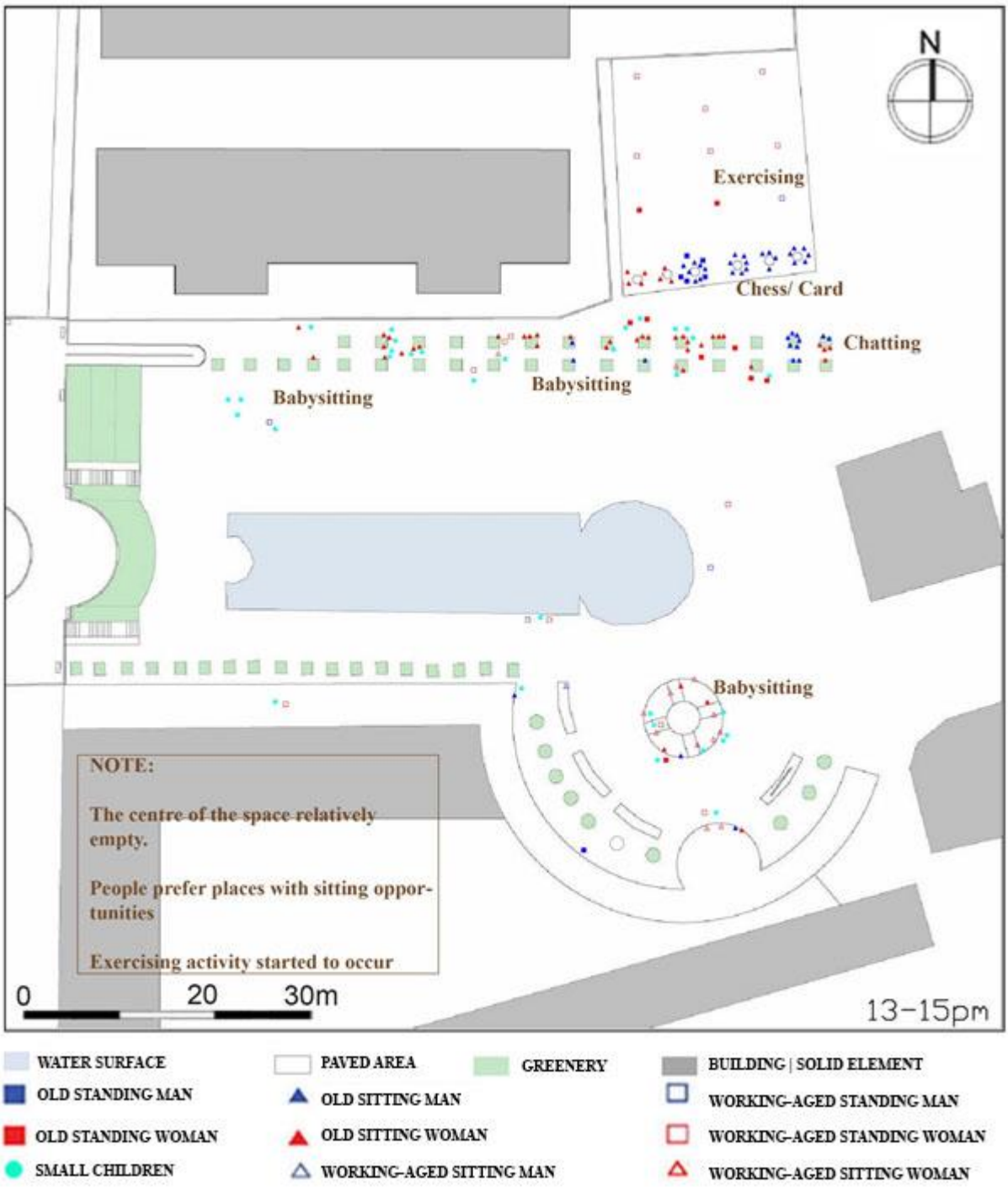

N
Babysitting
Babysitting
NOTE:
Babysitting was dominant, occurred over the place. The number of elderly decreased sharply.
17-19pm
0
20
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

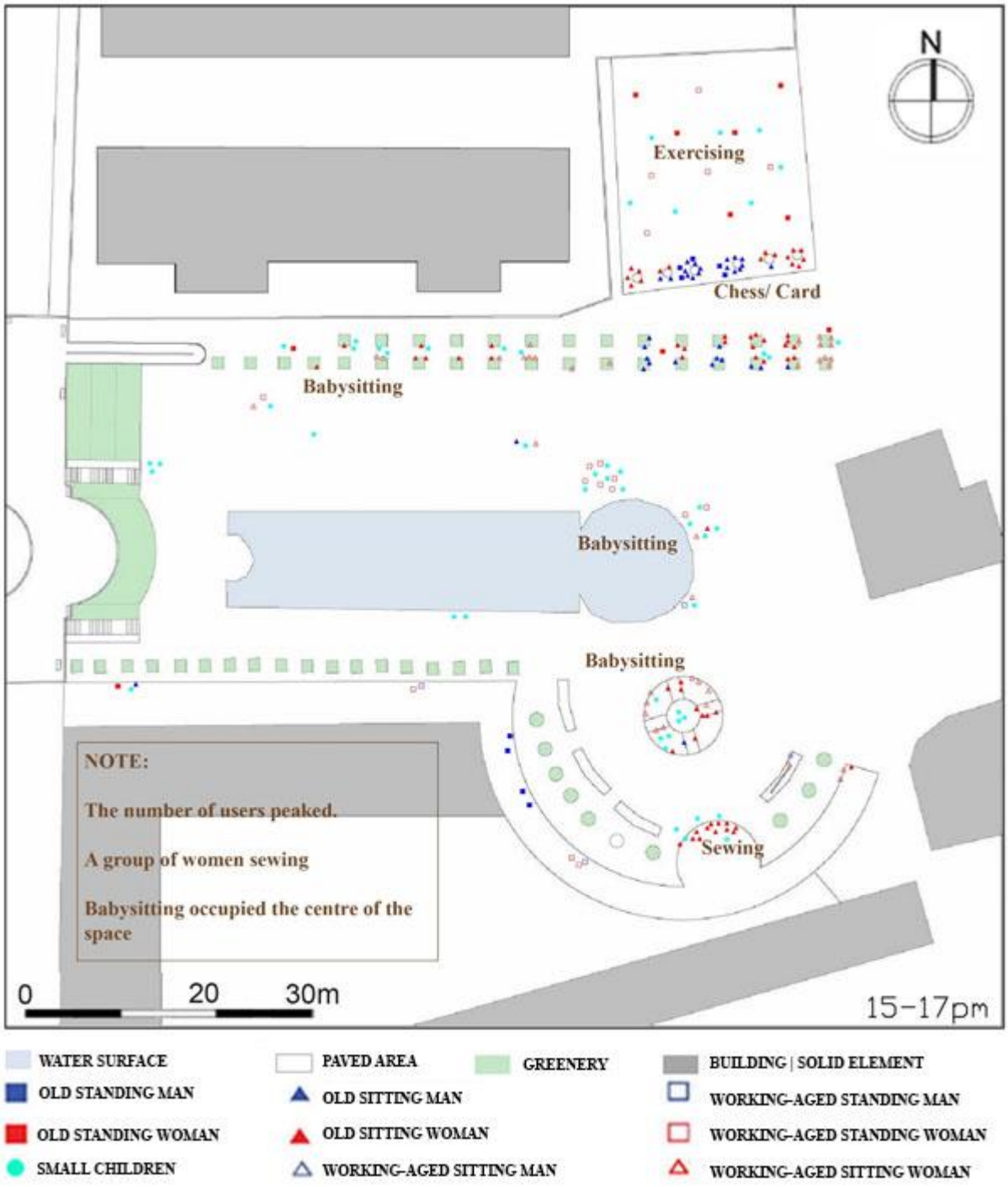
Huanggang Village Square | Observation Date Thursday 09/01/2014

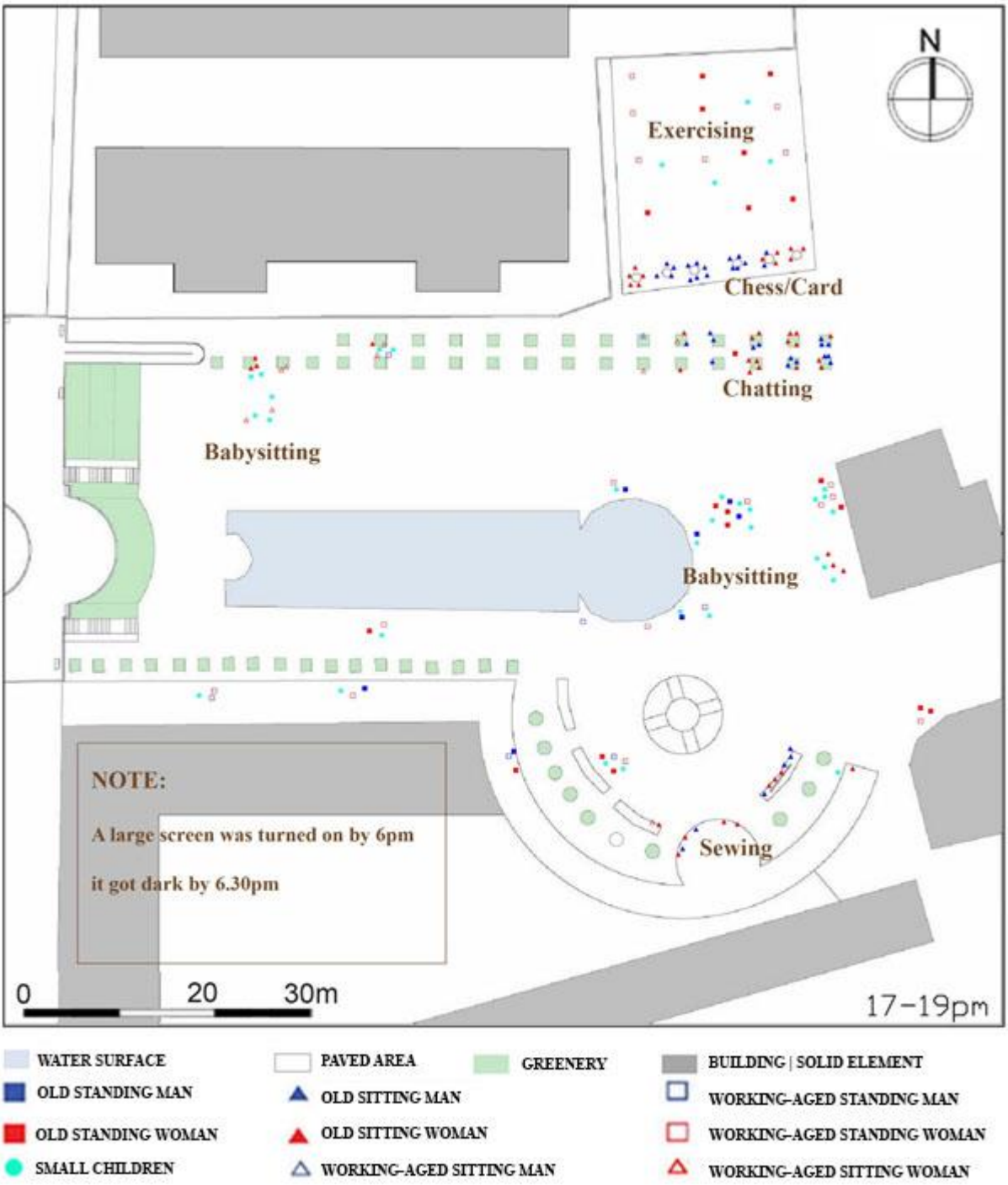



N
Chess/ Card
Babysitting
NOTE:
Playing chess/card created a busy corner
Babysitting just started to occur
0
20
30m
9-11am
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

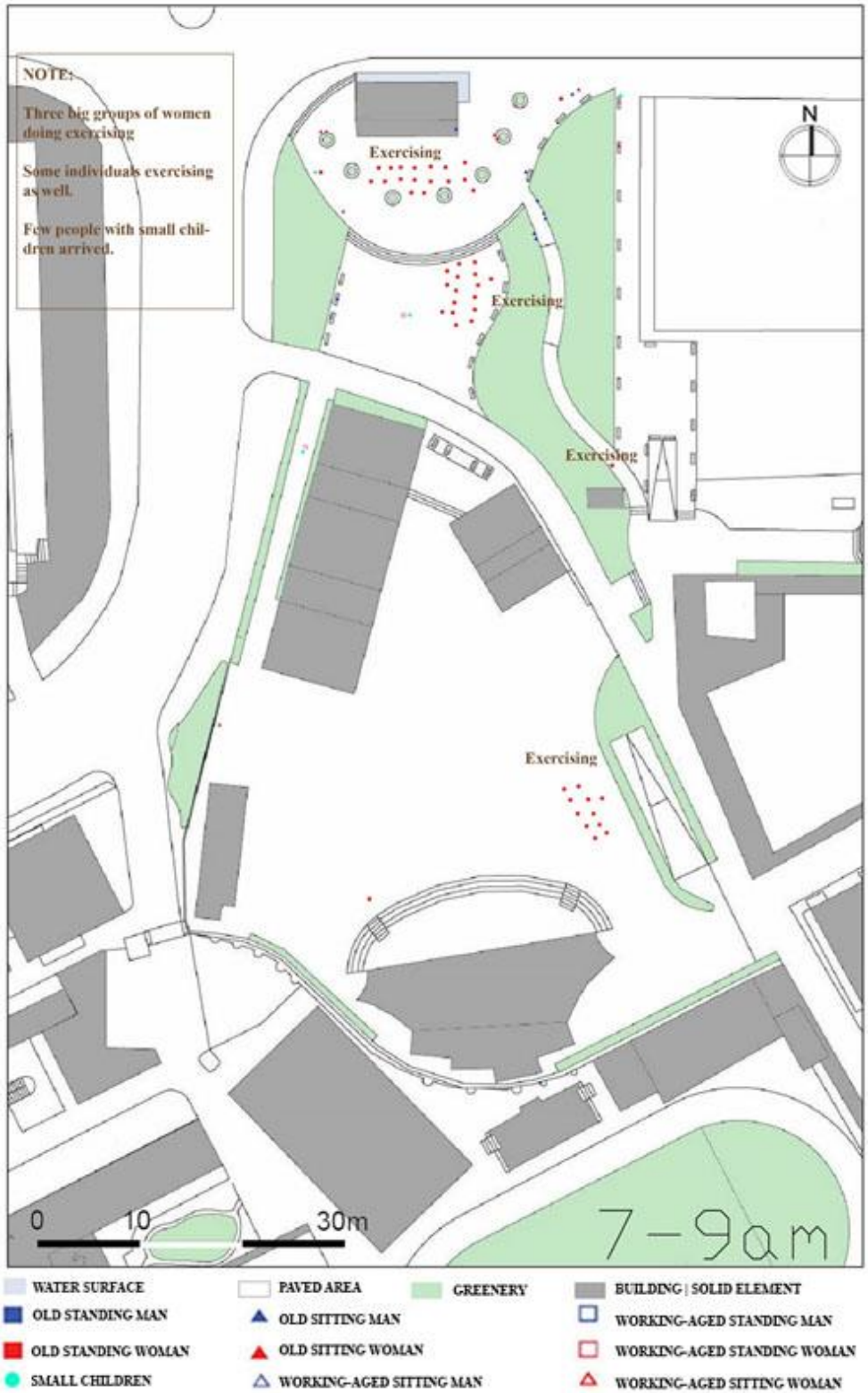

N
Chess/ Card
Babysitting
Babysitting
Babysitting
NOTE:
Babysitting dominant, occupyied the centre of the space.
Playing chess/card and chatting created another busy spot at one corner of the space
0
20
30m
11-13pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

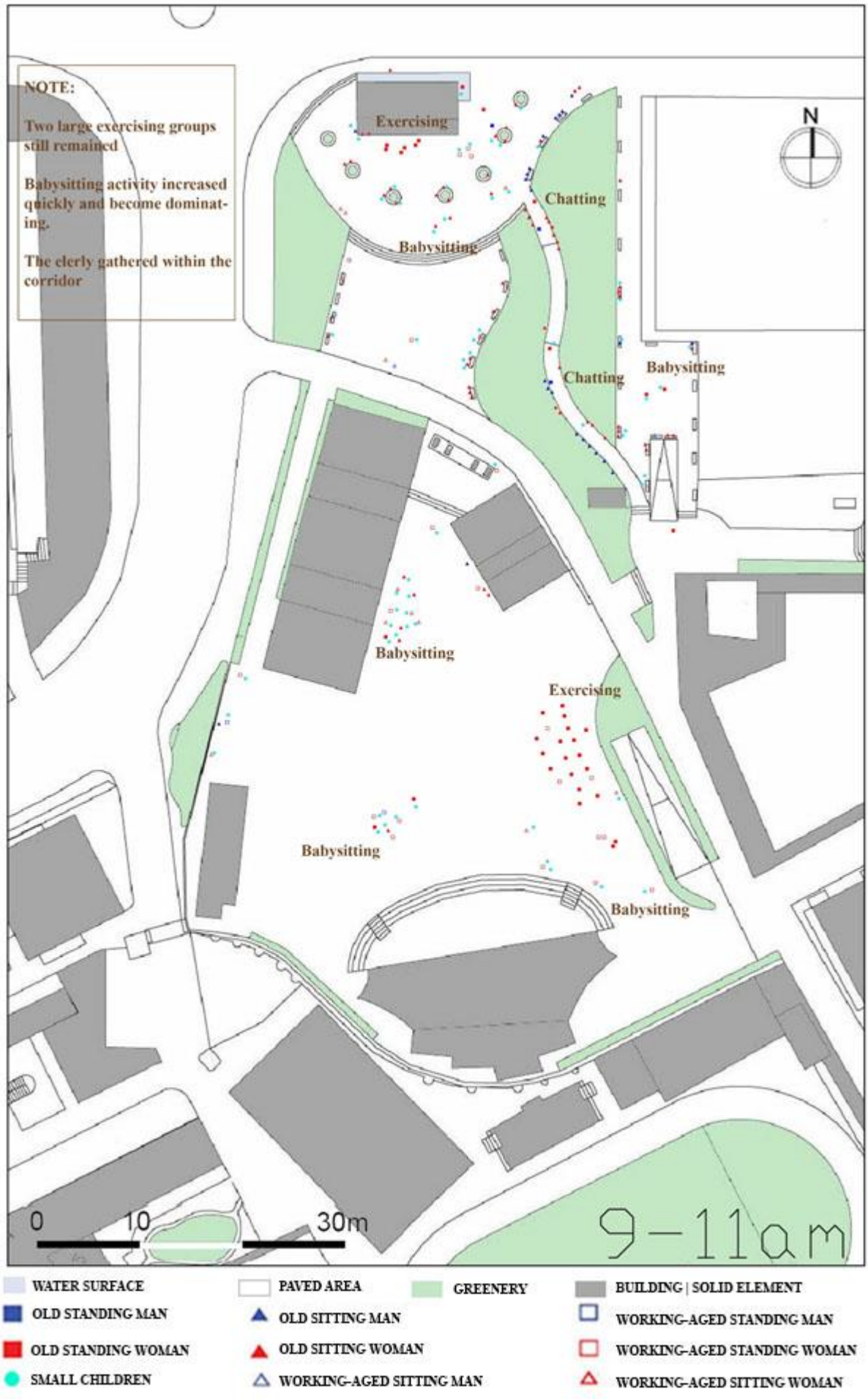

N
Exercising
Chess/ Card
Chatting
Babysitting
Babysitting
Babysitting
NOTE:
The centre of the space relatively empty.
People prefer places with sitting opportunities
Exercising activity started to occur
0
20
30m
13-15pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

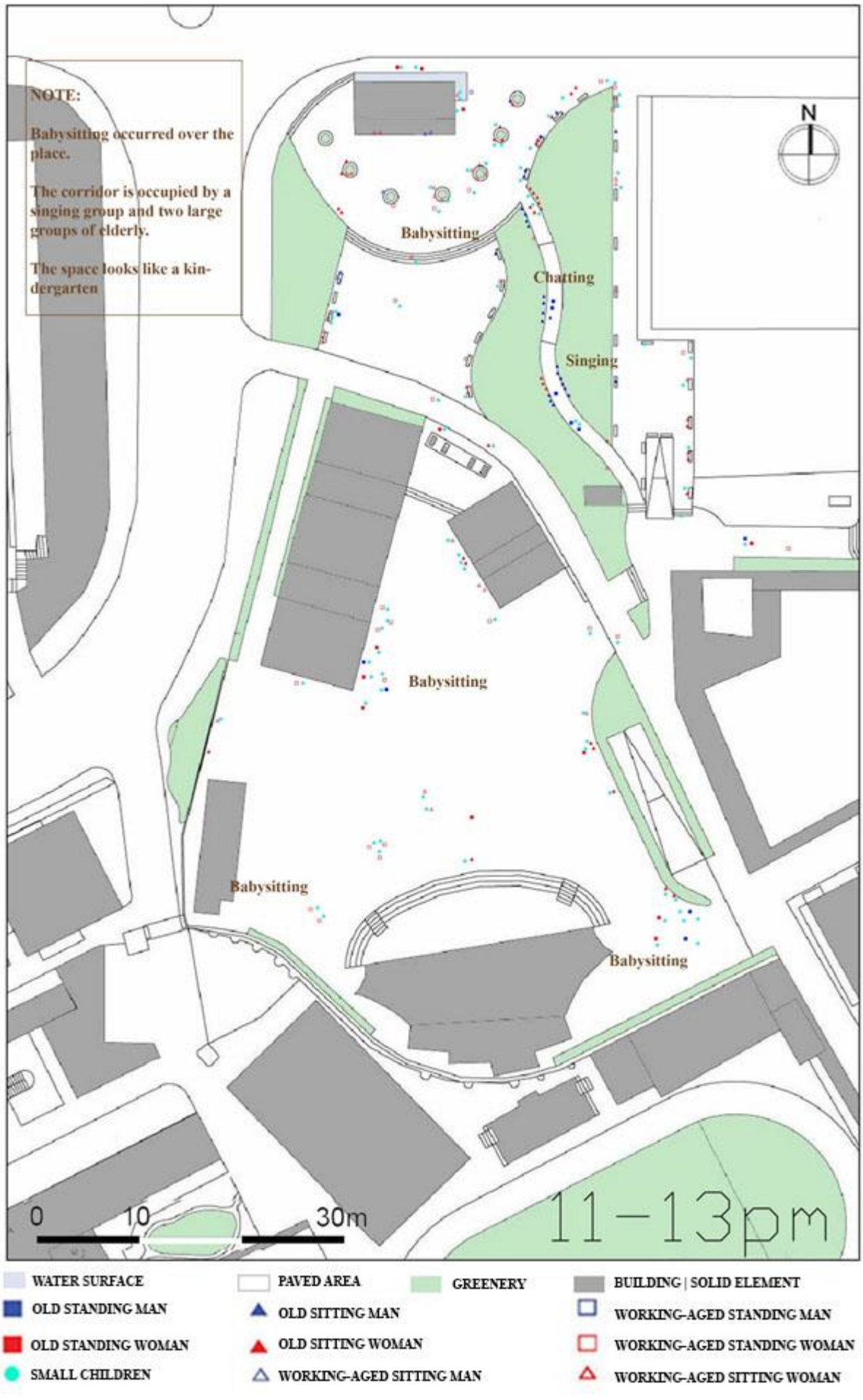

N
Exercising
Chess/ Card
Babysitting
Babysitting
Babysitting
Sewing
NOTE:
The number of users peaked.
A group of women sewing
Babysitting occupied the centre of the space
0
20
30m
15-17pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

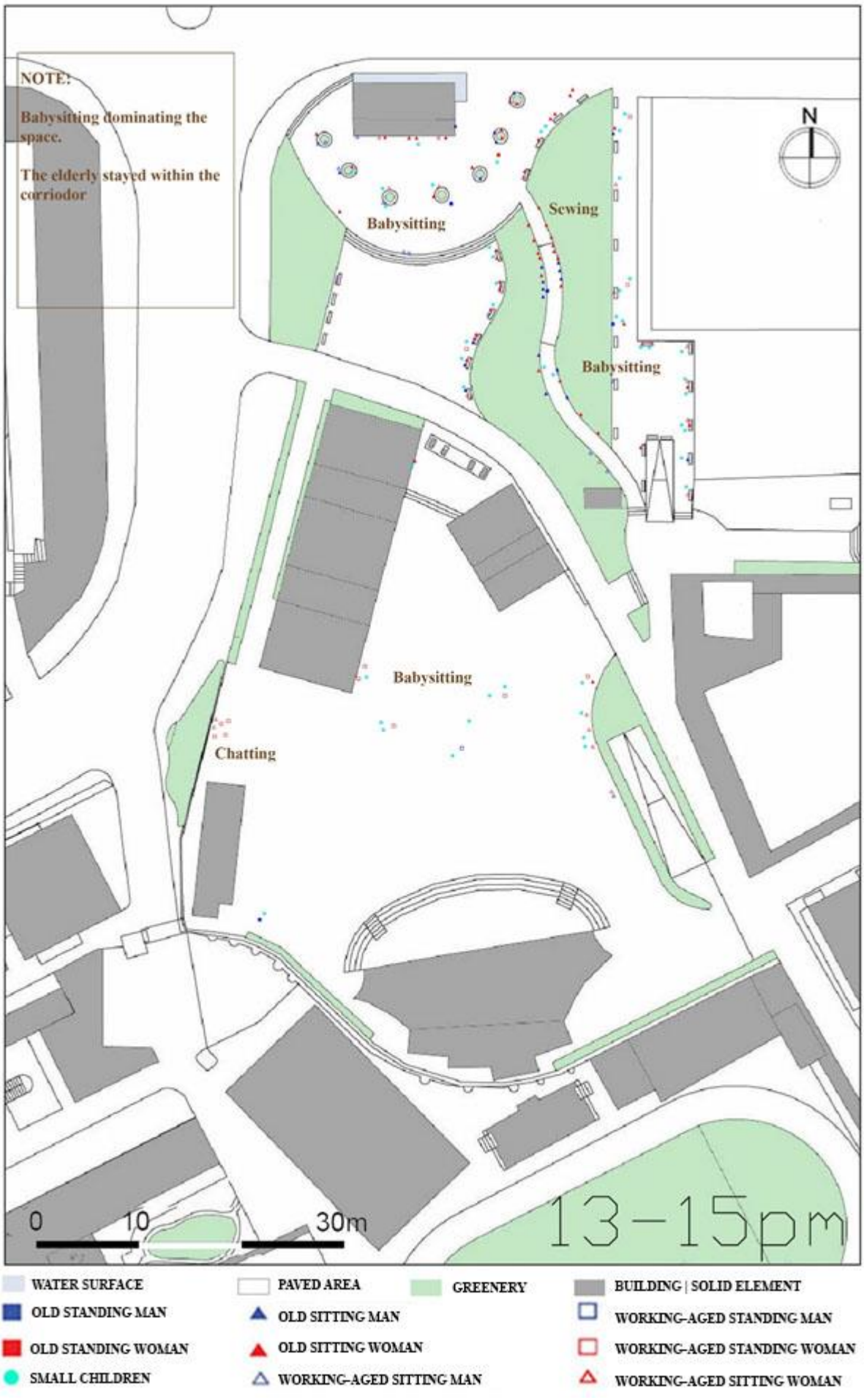

N
Exercising
Chess/Card
Chatting
Babysitting
Babysitting
NOTE:
A large screen was turned on by 6pm
it got dark by 6.30pm
Sewing
0
20
30m
17-19pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

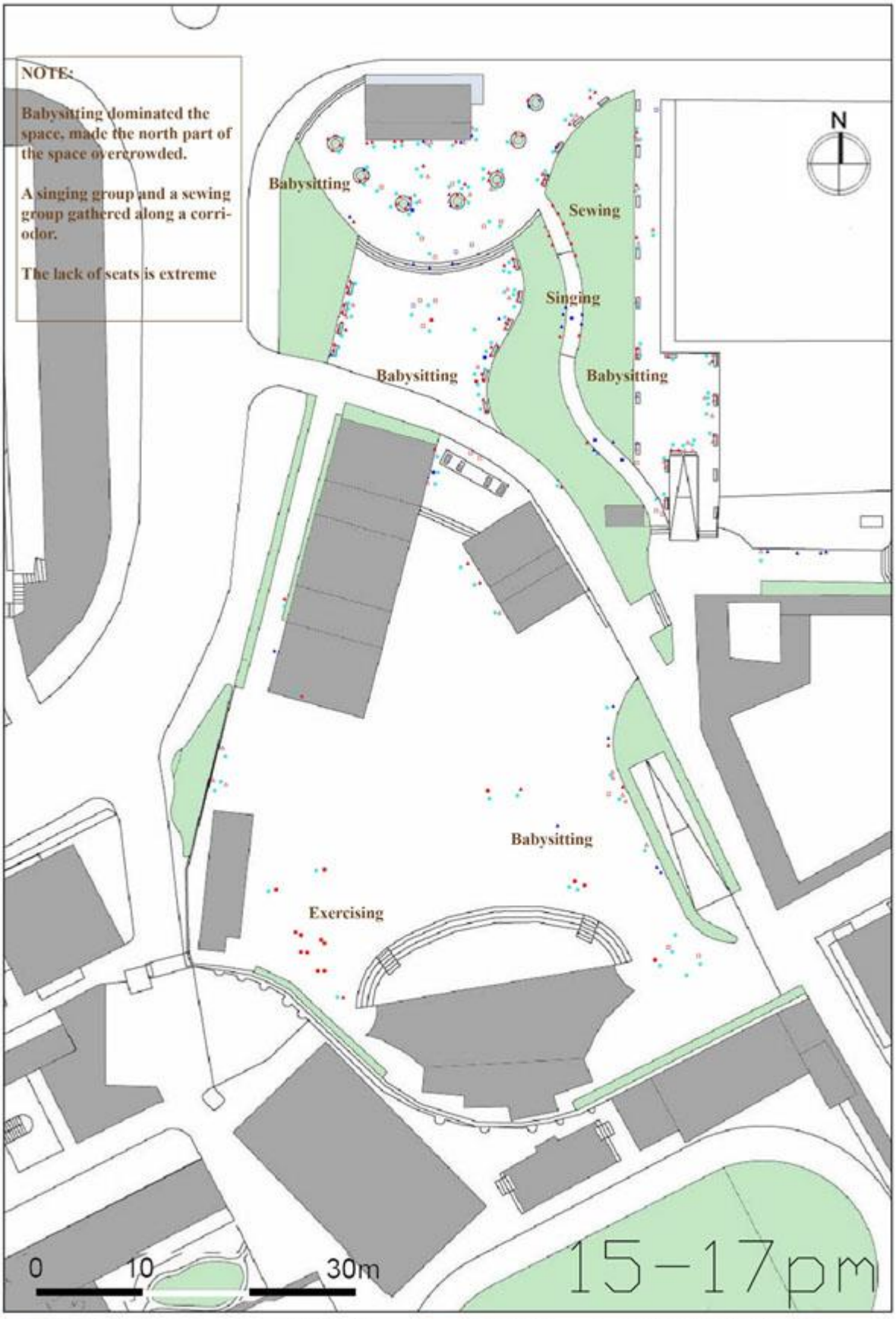
Shangsha Village Big Square | Observation Date Monday 07/01/2014

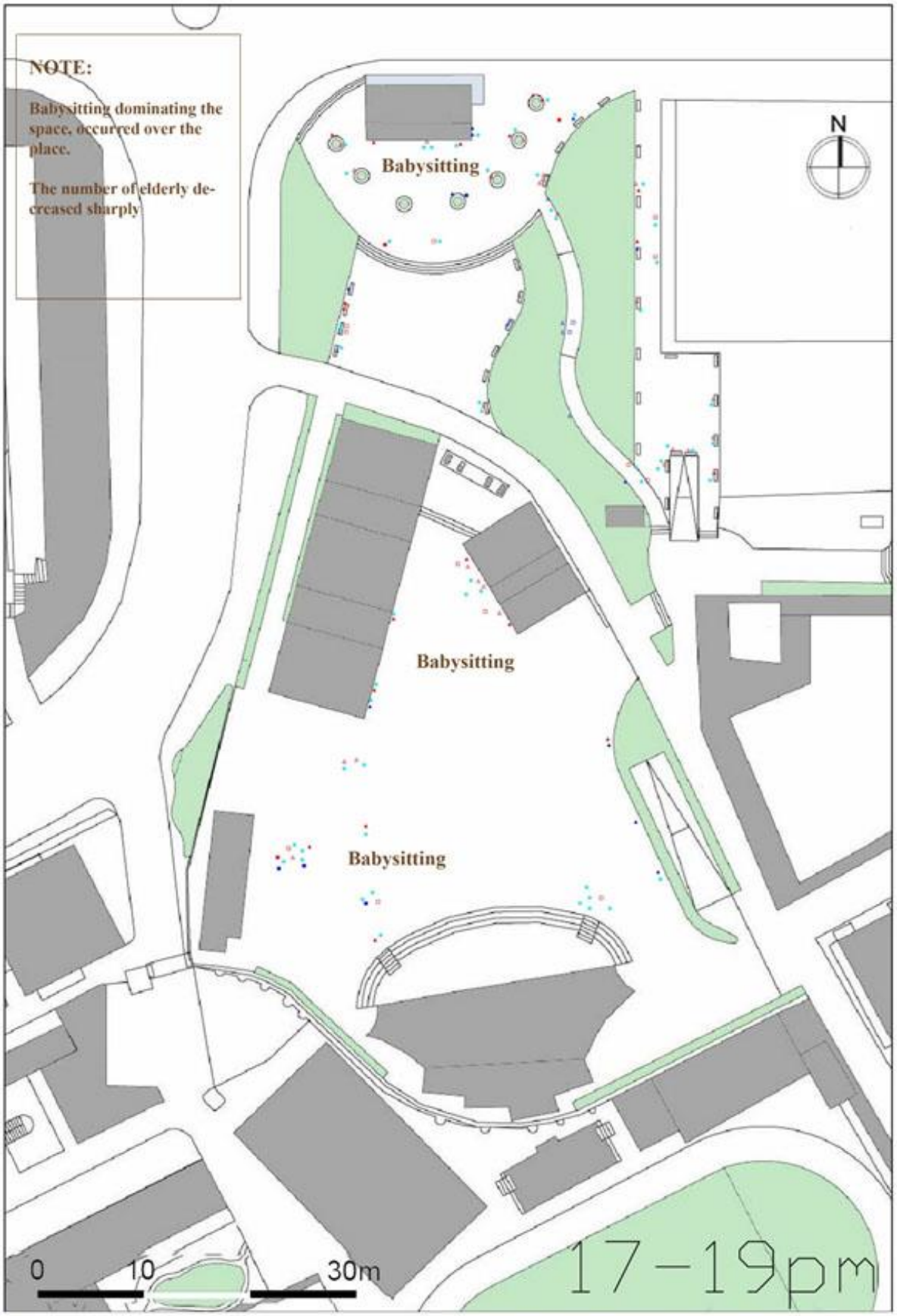



NOTE:
Two large exercising groups still remained
Babysitting activity increased quickly and become dominating.
The elerly gathered within the corridor
Exercising
Chatting
Babysitting
Chatting
Babysitting
Babysitting
Exercising
Babysitting
Babysitting
N
0
10
30m
9-11am
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

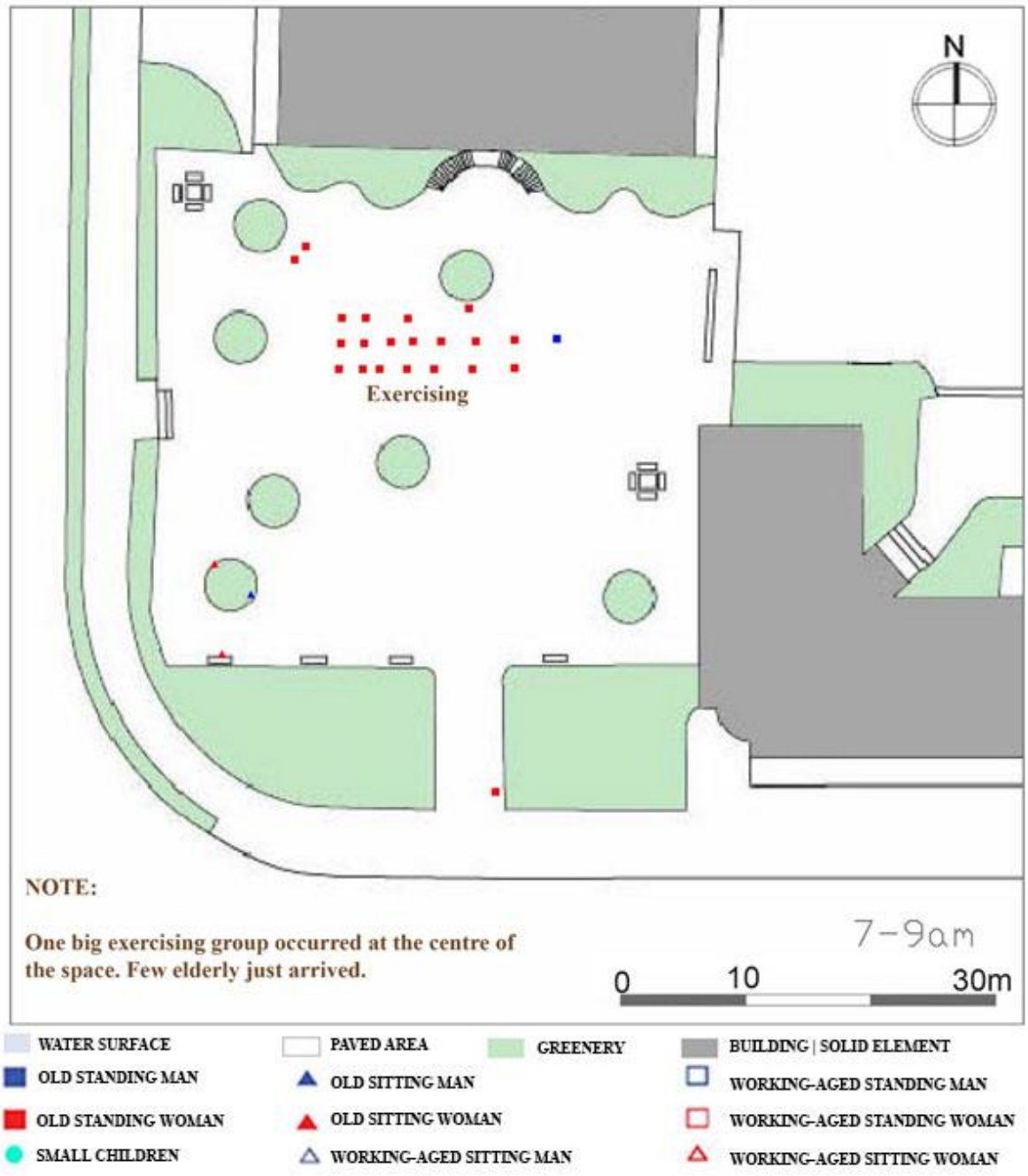

NOTE:
Babysitting occurred over the place.
The corridor is occupied by a singing group and two large groups of elderly.
The space looks like a kindergarten
N
Babysitting
Chatting
Singing
Babysitting
Babysitting
Babysitting
0
10
30m
11–13pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


NOTE:
Babysitting dominating the space.
The elderly stayed within the corriodor
N
Babysitting
Sewing
Babysitting
Babysitting
Chatting
0
10
30m
13-15pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


NOTE:
Babysitting dominated the space, made the north part of the space overcrowded.
A singing group and a sewing group gathered along a corridor.
The lack of seats is extreme
N
Babysitting
Sewing
Singing
Babysitting
Babysitting
Babysitting
Exercising
0
10
30m
15-17pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


NOTE:
Babysitting dominating the space, occurred over the place.
The number of elderly decreased sharply
Babysitting
Babysitting
Babysitting
N
0
10
30m
17-19pm
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

Shangsha Village Small Square | Observation Date Tuesday 7/01/2014

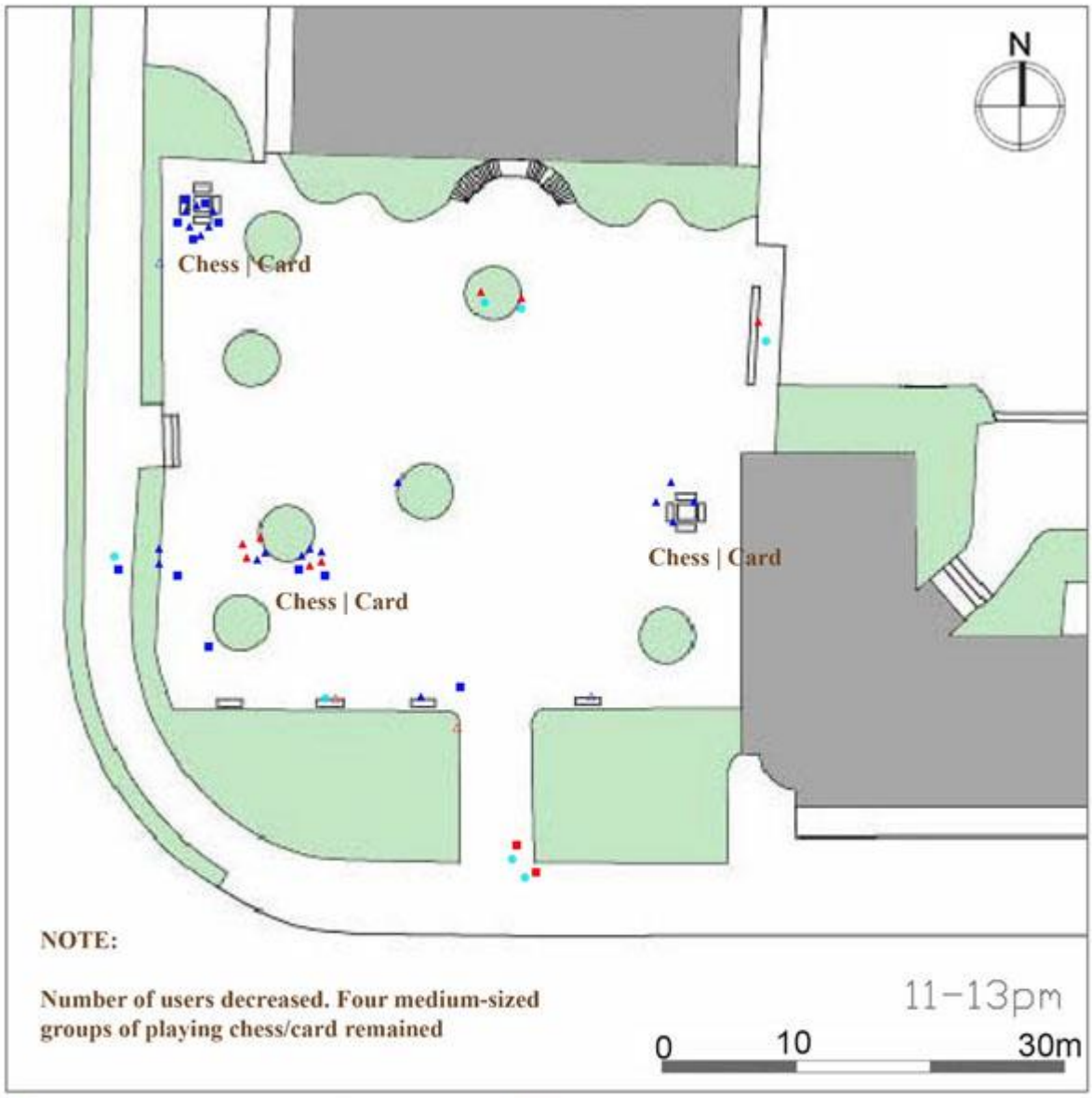


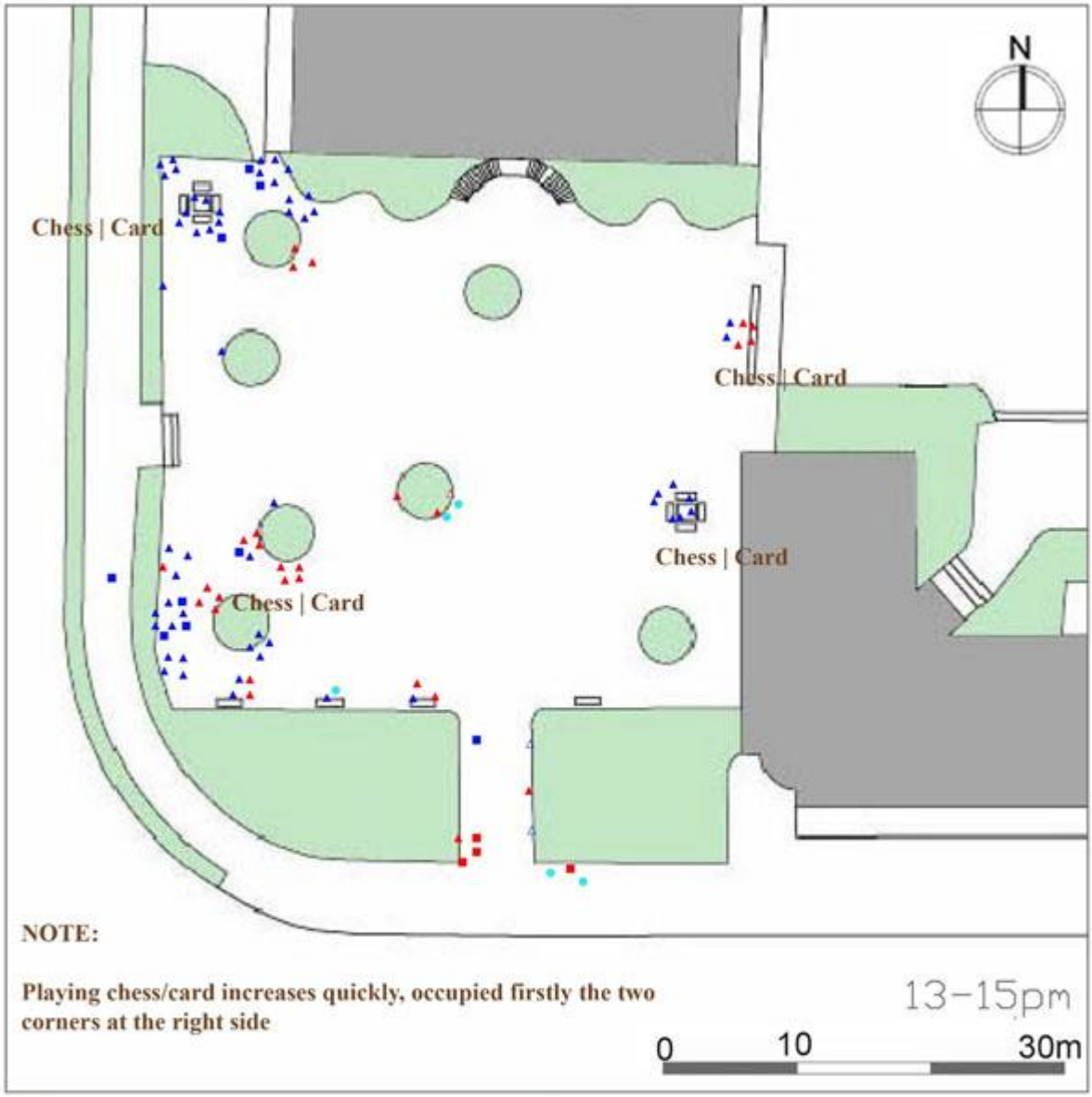
WATER SURFACE | PAVED AREA | GREENERY | BUILDING | SOLID ELEMENT

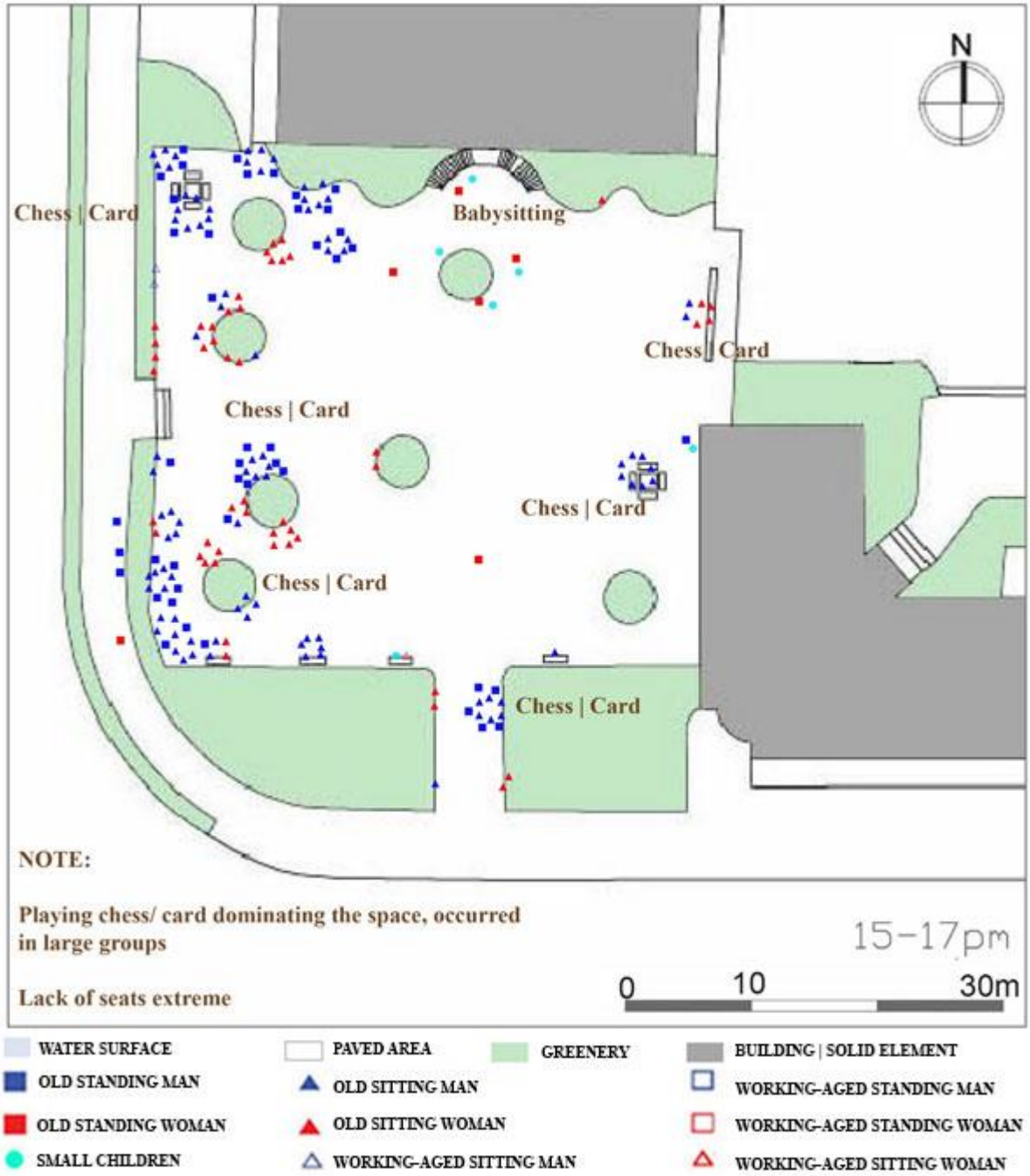
OLD STANDING MAN | OLD SITTING MAN | WORKING-AGED STANDING MAN

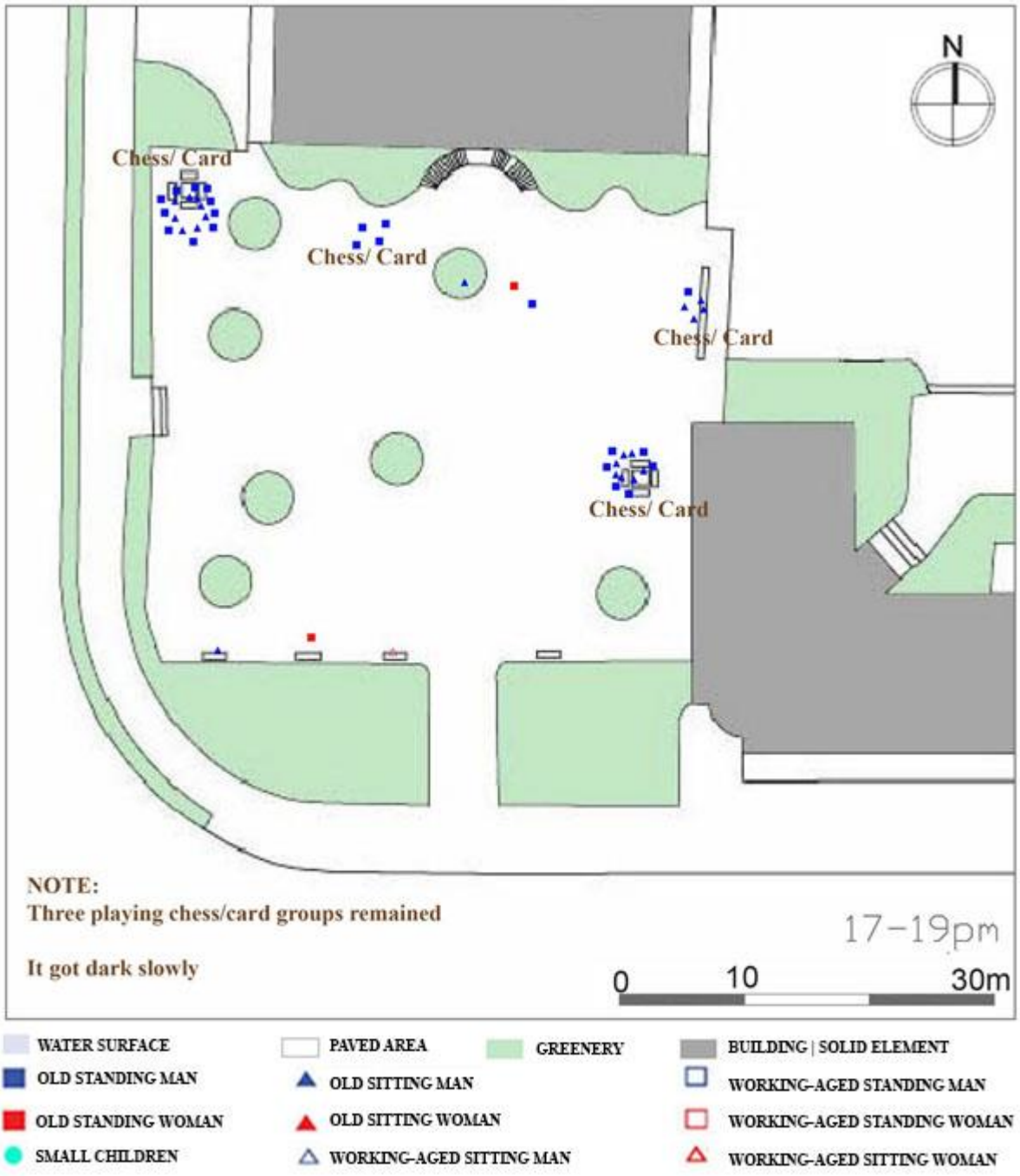
OLD STANDING WOMAN | OLD SITTING WOMAN | WORKING-AGED STANDING WOMAN

SMALL CHILDREN | WORKING-AGED SITTING MAN | WORKING-AGED SITTING WOMAN

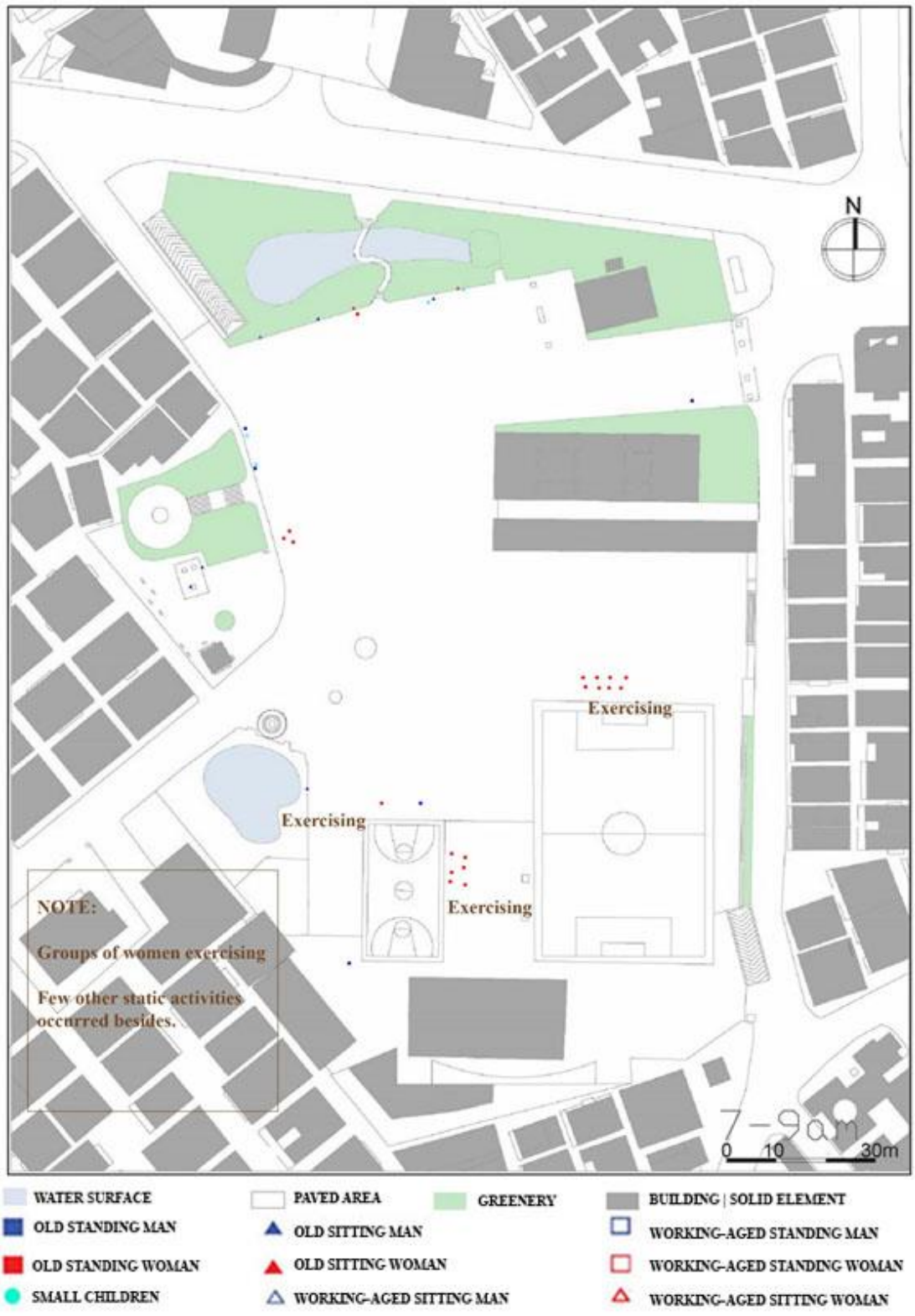

N
Chess | Card
Chess | Card
Chess | Card
NOTE:
Number of users decreased. Four medium-sized groups of playing chess/card remained
11-13pm
0
10
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

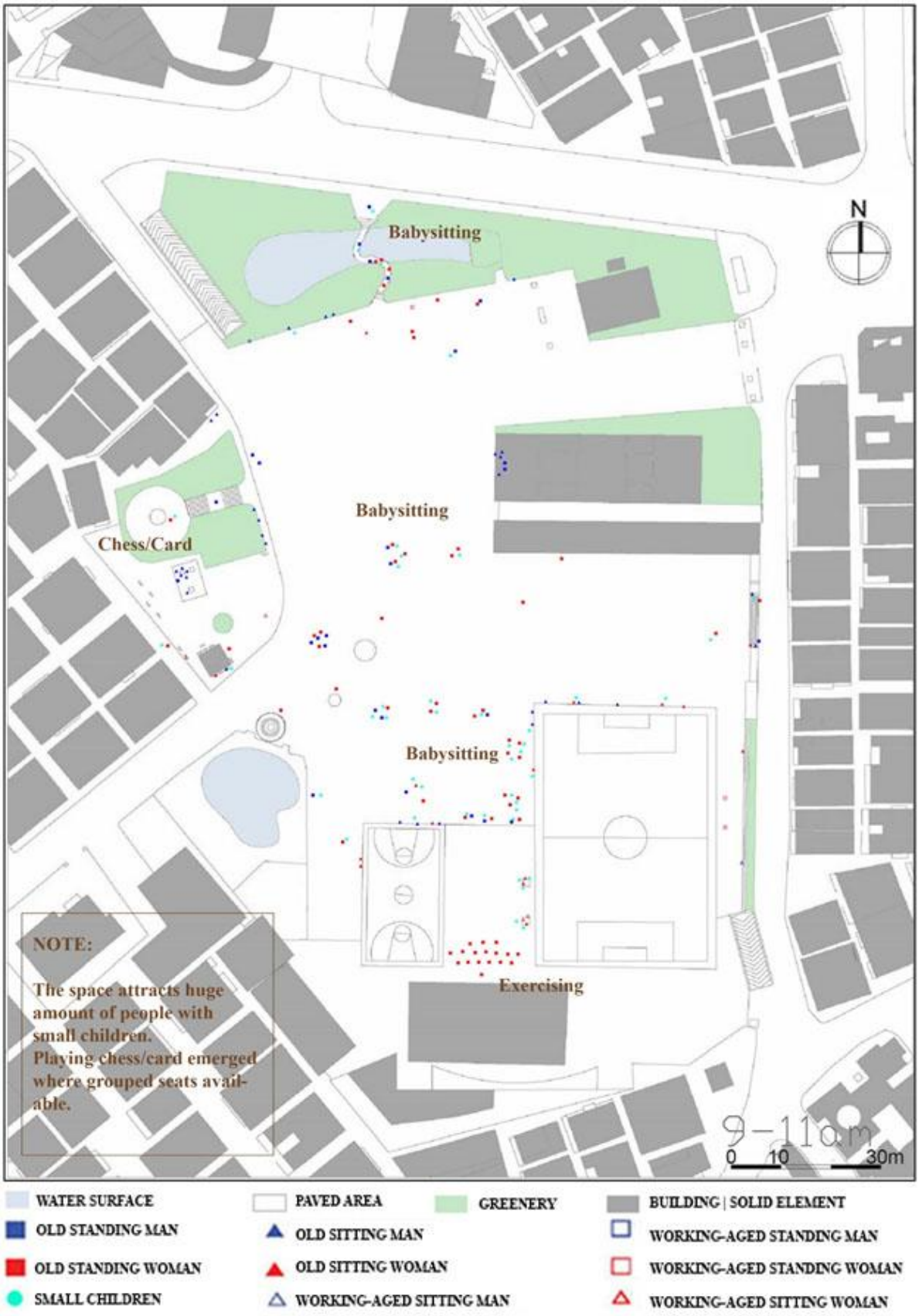

N
Chess | Card
Chess | Card
Chess | Card
Chess | Card
NOTE:
Playing chess/card increases quickly, occupied firstly the two corners at the right side
13-15pm
0
10
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

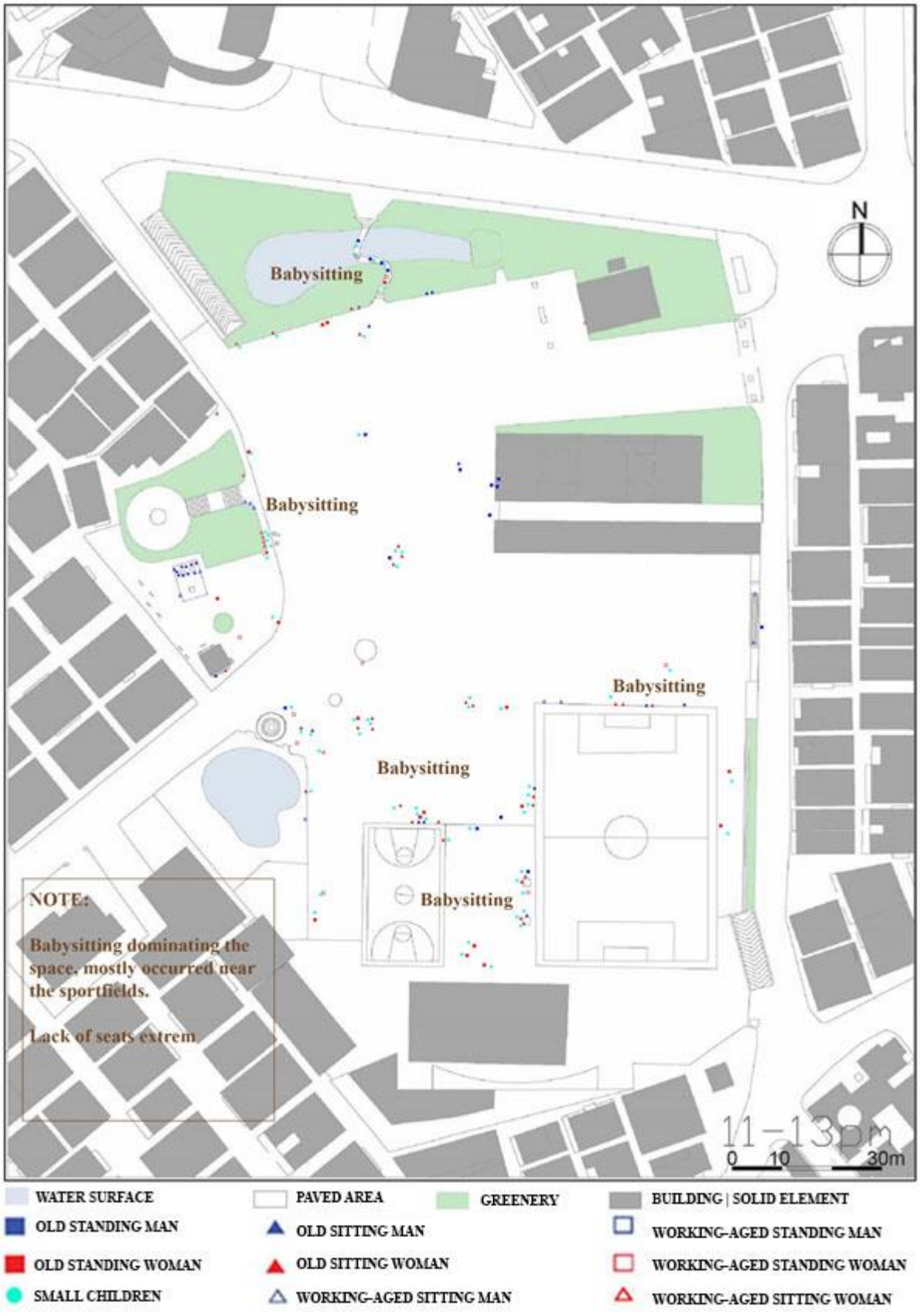

N
Chess | Card
Babysitting
Chess | Card
Chess | Card
Chess | Card
Chess | Card
Chess | Card
NOTE:
Playing chess/ card dominating the space, occurred in large groups
Lack of seats extreme
15-17pm
0
10
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

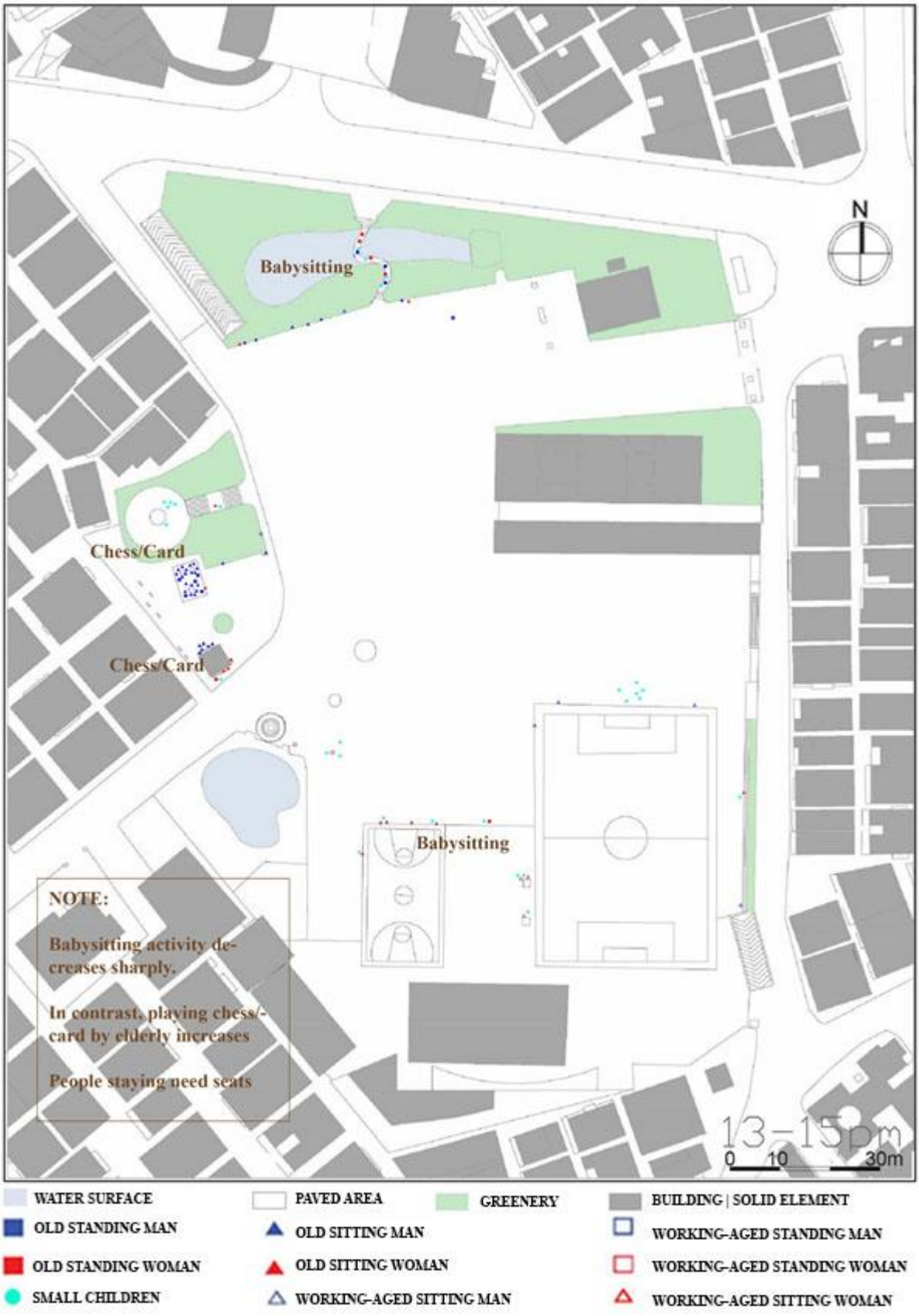

N
Chess/ Card
Chess/ Card
Chess/ Card
Chess/ Card
NOTE:
Three playing chess/card groups remained
It got dark slowly
17-19pm
0
10
30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

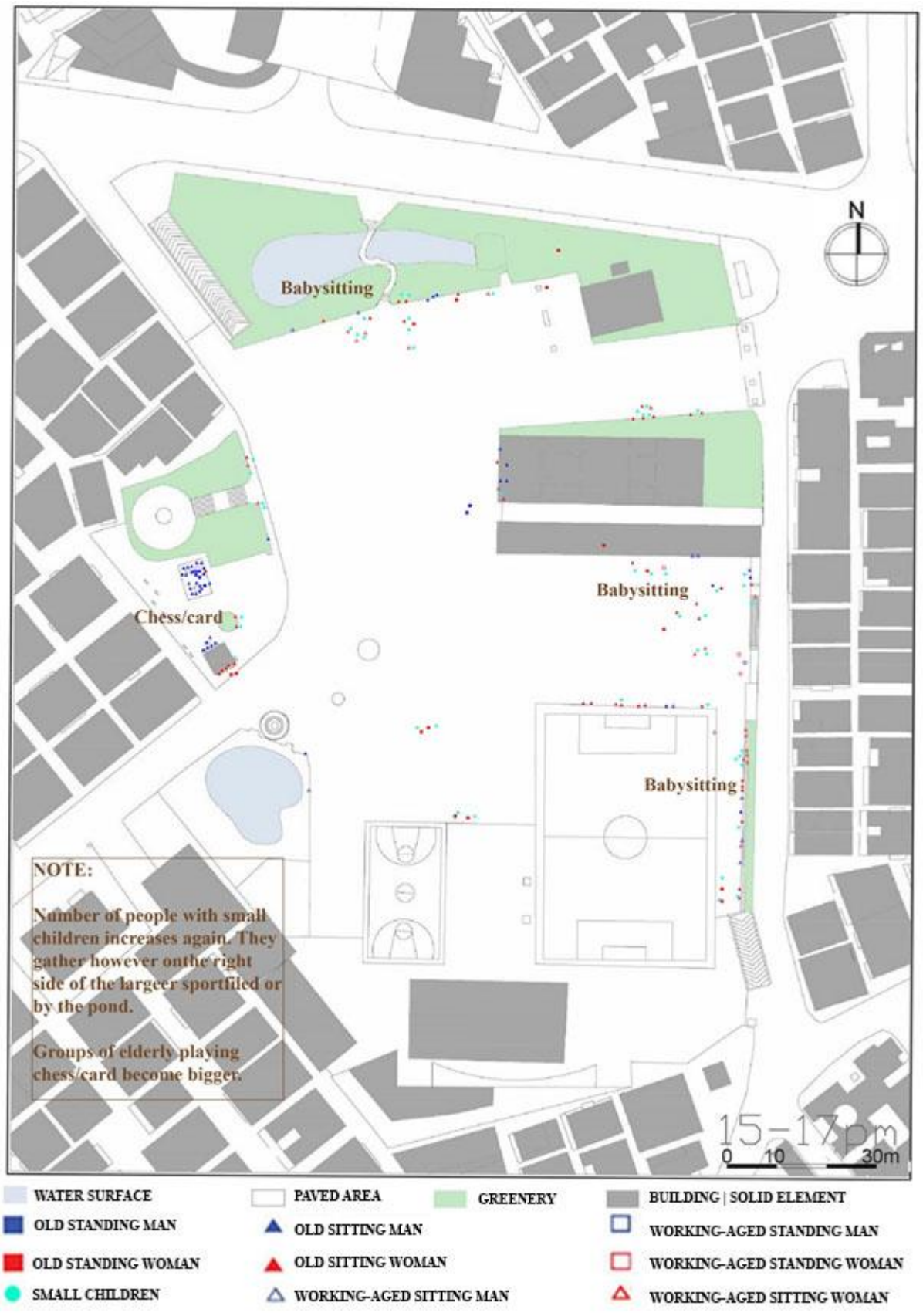
Xiasha Village Square | Observation Date Wednesday 08/01/2014

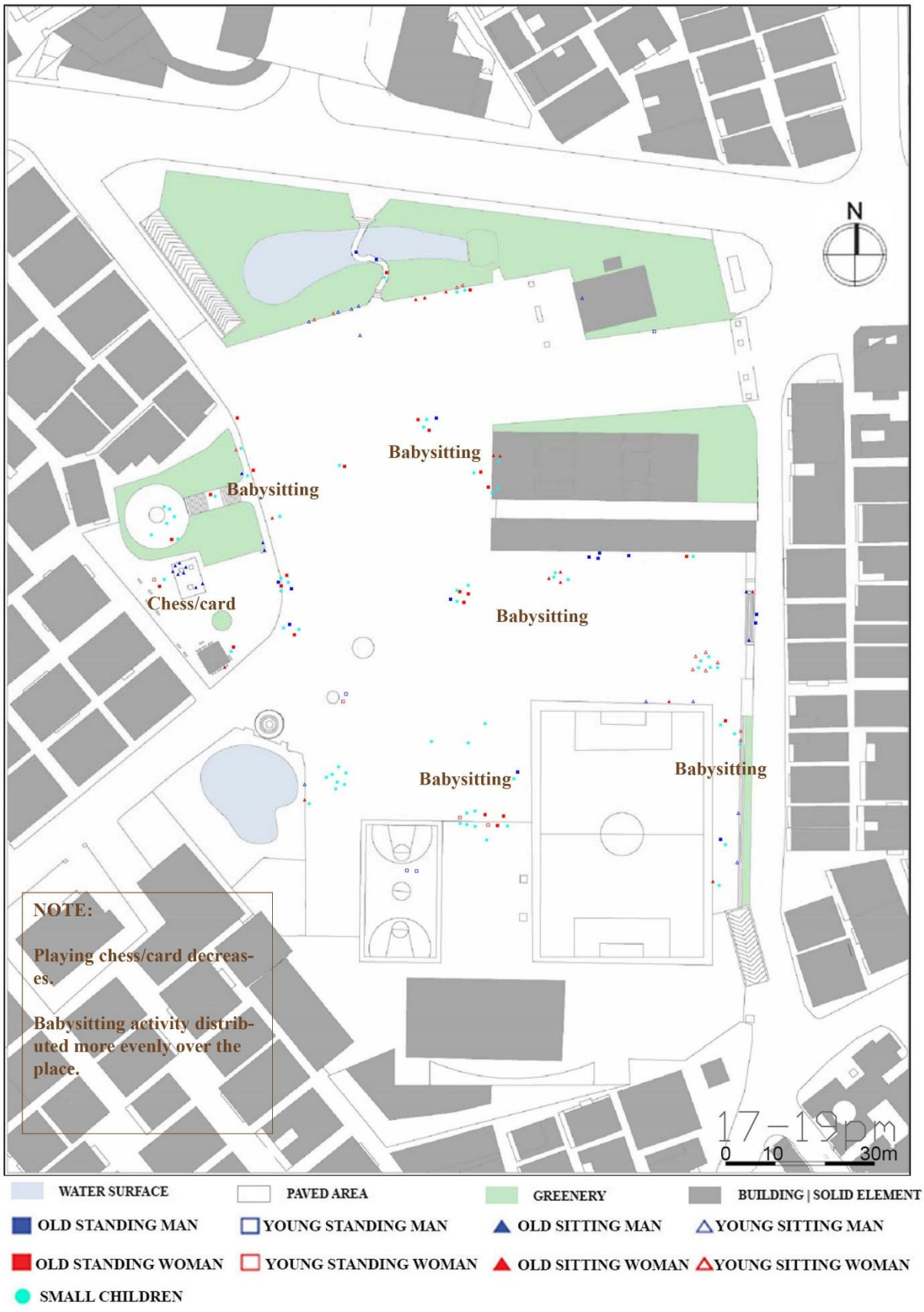



Babysitting
Babysitting
Chess/Card
Babysitting
Exercising
N
NOTE:
The space attracts huge amount of people with small children.
Playing chess/card emerged where grouped seats available.
9–11a.m
0 10 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


N
Babysitting
Babysitting
Babysitting
Babysitting
Babysitting
NOTE:
Babysitting dominating the space, mostly occurred near the sportfields.
Lack of seats extrem
11-13pm
0 10 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


N
Babysitting
Chess/Card
Chess/Card
Babysitting
NOTE:
Babysitting activity decreases sharply.
In contrast, playing chess/-card by elderly increases
People staying need seats
13-15pm
0 10 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


N
Babysitting
Babysitting
Chess/card
Babysitting
NOTE:
Number of people with small children increases again. They gather however onthe right side of the largeer sportfiled or by the pond.
Groups of elderly playing chess/card become bigger.
15-17pm
0 10 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED STANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN


N
Babysitting
Babysitting
Chess/card
Babysitting
Babysitting
Babysitting
NOTE:
Playing chess/card decreases.
Babysitting activity distributed more evenly over the place.
17-19pm
0 10 30m
WATER SURFACE
PAVED AREA
GREENERY
BUILDING | SOLID ELEMENT
OLD STANDING MAN
YOUNG STANDING MAN
OLD SITTING MAN
YOUNG SITTING MAN
OLD STANDING WOMAN
YOUNG STANDING WOMAN
OLD SITTING WOMAN
YOUNG SITTING WOMAN
SMALL CHILDREN

Activity Mapping Data

Number of Total Users

Number of Total Users	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	133	158	69	106	55	14	535
Bridge Square	9	35	11	23	12	22	112
Chen Academy	115	166	140	104	89	49	663
Renwei Temple	15	46	28	38	52	17	196
Liwan Lake Square*	179	244	62	114	96	54	749
People Park Square	46	174	123	156	260	181	940
Dongmen Square	9	14	84	153	137	72	469
King Plaza	93	76	50	54	88	99	460
Tianmian Square	31	75	106	93	157	70	532
Huangang Square	70	103	195	188	280	205	1041
Shangsha Big Square	77	230	238	169	344	137	1195
Shangsha Small Square	25	98	51	103	197	46	520
Xiasha Square	36	187	171	99	185	160	838
Mean Value	64.5	123.5	102.2	107.7	150.2	86.6	634.6

Number of Older Users

Number of Older Users	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	132	158	69	96	52	13	520
Bridge Square	6	15	8	13	9	4	55
Chen Academy	101	132	59	74	58	30	454
Renwei Temple	12	40	19	36	21	14	142
Liwan Lake Square*	175	204	54	112	79	40	664
People Park Square	36	133	72	86	134	63	524
Dongmen Square	0	3	12	26	34	8	83
King Plaza	77	36	11	10	33	28	195
Tianmian Square	23	39	40	23	79	11	215
Huangang Square	50	71	102	104	140	110	577
Shangsha Big Square	68	126	92	74	138	38	536
Shangsha Small Square	25	83	40	95	188	45	476
Xiasha Square	30	134	83	61	107	66	481
Mean Value	56.5	90.3	50.8	62.3	82.5	36.2	378.6

Number of Working-Aged Users

Number of Working-Aged Users	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	1	0	0	7	3	1	12
Bridge Square	3	8	2	10	1	7	31
Chen Academy	13	15	34	16	13	8	99
Renwei Temple	3	6	9	2	27	2	49
Liwan Lake Square*	4	23	0	1	9	8	45
People Park Square	10	27	42	63	110	106	358
Dongmen Square	9	11	65	115	85	56	341
King Plaza	16	32	36	34	44	61	223
Tianmian Square	8	16	33	40	40	36	173
Huangang Square	17	21	50	46	80	45	259
Shangsha Big Square	4	40	62	49	84	44	283
Shangsha Small Square	0	2	4	3	3	1	13
Xiasha Square	2	9	31	11	31	31	115
Mean Value	6.9	16.2	28.3	30.5	40.8	31.2	153.9

Number of (Adult) Male Users

Number of Male Users	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	45	86	41	45	30	6	253
Bridge Square	2	8	5	8	6	4	33
Chen Academy	32	58	31	33	32	17	203
Renwei Temple	7	15	7	18	29	7	83
Liwan Lake Square*	68	98	34	74	79	39	392
People Park Square	21	78	71	101	160	105	536
Dongmen Square	3	5	45	58	64	31	206
King Plaza	40	32	31	19	46	54	222
Tianmian Square	14	23	20	24	35	27	143
Huangang Square	39	49	54	60	59	55	316
Shangsha Big Square	9	30	43	40	45	24	191
Shangsha Small Square	2	56	32	66	136	43	335
Xiasha Square	19	60	48	47	58	42	274
Mean Value	23.2	46.0	35.5	45.6	59.9	34.9	245.2

Number of (Adult) Female Users

Number of Female Users	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	88	72	28	58	25	8	279
Bridge Square	7	15	5	15	4	7	53
Chen Academy	82	89	62	57	39	21	350
Renwei Temple	8	31	21	20	19	9	108
Liwan Lake Square*	111	129	20	39	9	9	317
People Park Square	25	82	43	48	84	64	346
Dongmen Square	6	9	32	83	55	33	218
King Plaza	53	36	16	25	31	35	196
Tianmian Square	17	32	53	39	84	20	245
Huangang Square	28	43	98	90	161	100	520
Shangsha Big Square	63	136	111	83	177	58	628
Shangsha Small Square	23	29	12	32	55	3	154
Xiasha Square	13	83	66	25	80	55	322
Mean Value	40.3	60.5	43.6	47.2	63.3	32.5	287.4

Number of Children

Number of Children	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	0	0	0	3	0	0	3
Bridge Square	0	12	1	0	2	11	26
Chen Academy	1	19	47	14	18	11	110
Renwei Temple	0	0	0	0	4	1	5
Liwan Lake Square*	0	17	8	1	8	6	40
People Park Square	0	14	9	7	16	12	58
Dongmen Square	0	0	7	12	18	8	45
King Plaza	0	8	3	10	11	10	42
Tianmian Square	0	20	33	30	38	23	144
Huangang Square	3	11	43	38	60	50	205
Shangsha Big Square	5	64	84	46	122	55	376
Shangsha Small Square	0	13	7	5	6	0	31
Xiasha Square	4	44	57	27	47	63	242
Mean Value	1.00	17.08	23.00	14.85	26.92	19.23	102.08

Number of Individuals

Number of Individuals	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	8	6	6	5	4	1	30
Bridge Square	5	9	4	9	5	1	33
Chen Academy	31	24	18	31	19	16	139
Renwei Temple	5	11	12	11	12	7	58
Liwan Lake Square*	13	13	11	18	6	7	68
People Park Square	10	13	18	29	27	18	115
Dongmen Square	3	12	20	17	15	20	87
King Plaza	19	15	17	19	21	29	120
Tianmian Square	11	21	17	40	30	11	130
Huangang Square	11	18	12	24	23	13	101
Shangsha Big Square	11	16	16	19	15	13	90
Shangsha Small Square	4	3	7	9	6	4	33
Xiasha Square	7	28	21	17	17	21	111
Mean Value	10.6	14.5	13.8	19.1	15.4	12.4	85.8

Number of People in Pair

Number of People in Pair	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	14	10	6	16	12	8	66
Bridge Square	4	14	4	8	4	2	36
Chen Academy	10	38	22	18	38	16	142
Renwei Temple	4	10	2	16	8	4	44
Liwan Lake Square*	28	48	14	10	14	14	128
People Park Square	8	28	34	38	34	24	166
Dongmen Square	2	2	36	36	34	20	130
King Plaza	2	10	18	14	34	22	100
Tianmian Square	6	12	8	10	12	26	74
Huangang Square	20	26	24	18	38	20	146
Shangsha Big Square	20	54	76	54	42	54	300
Shangsha Small Square	2	24	10	6	22	2	66
Xiasha Square	12	48	42	20	22	40	184
Mean Value	10.2	24.9	22.8	20.3	24.2	19.4	121.7

Number of People in Big Group (3+)

Number of People in Group (3+)	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	111	142	57	85	39	5	439
Bridge Square	0	12	3	6	3	19	43
Chen Academy	74	104	100	55	32	17	382
Renwei Temple	6	25	14	11	32	6	94
Liwan Lake Square*	138	183	37	86	76	33	553
People Park Square	28	133	71	89	199	139	659
Dongmen Square	4	0	28	100	88	32	252
King Plaza	72	51	15	21	33	48	240
Tianmian Square	14	42	81	43	115	33	328
Huangang Square	39	59	159	146	219	172	794
Shangsha Big Square	46	160	146	96	287	70	805
Shangsha Small Square	19	71	34	88	169	40	421
Xiasha Square	17	111	108	62	146	99	543
Mean Value	43.7	84.1	65.6	68.3	110.6	54.8	427.2

Number of "Exercising" People

Number of 'Doing Exercising' People	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	99	85	33	30	34	9	290
Bridge Square	-	-	-	-	-	-	-
Chen Academy	81	46	0	0	0	0	127
Renwei Temple	6	0	0	0	0	0	6
Liwan Lake Square*	106	131	5	0	1	0	243
People Park Square	19	22	3	8	10	16	78
Dongmen Square	-	-	-	-	-	-	-
King Plaza	74	24	0	0	0	0	98
Tianmian Square	13	0	0	0	0	0	13
Huangang Square	29	12	0	9	27	15	92
Shangsha Big Square	45	30	0	0	8	0	83
Shangsha Small Square	19	0	0	0	0	0	19
Xiasha Square	20	19	0	0	0	2	41
Mean Value	46.5	33.5	3.7	4.3	7.3	3.8	99.1

Number of "Babysitting" People

Number of 'Babysitting' People	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	0	0	0	9	0	0	9
Bridge Square	0	24	2	0	5	21	52
Chen Academy	2	49	98	31	40	19	239
Renwei Temple	0	0	0	0	7	2	9
Liwan Lake Square*	0	36	17	4	16	12	85
People Park Square	0	34	19	13	39	31	136
Dongmen Square	0	0	13	26	41	10	90
King Plaza	0	16	7	19	25	19	86
Tianmian Square	0	37	66	64	89	40	296
Huangang Square	5	22	85	79	115	107	413
Shangsha Big Square	10	134	178	99	273	109	803
Shangsha Small Square	0	26	14	9	12	0	61
Xiasha Square	8	95	120	45	100	115	483
Mean Value	1.9	36.4	47.6	30.6	58.6	37.3	212.5

Number of "Playing Chess/cards" People

Number of 'Playing Chess/cards' People	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	0	13	5	0	0	0	18
Bridge Square	-	-	-	-	-	-	-
Chen Academy	0	9	0	0	5	7	21
Renwei Temple	-	-	-	-	-	-	-
Liwan Lake Square*	0	34	21	46	50	23	174
People Park Square	0	17	7	23	46	30	123
Dongmen Square	-	-	-	-	-	-	-
King Plaza	-	-	-	-	-	-	-
Tianmian Square	-	-	-	-	-	-	-
Huangang Square	0	31	32	36	38	28	165
Shangsha Big Square	0	6	13	10	9	0	38
Shangsha Small Square	0	49	25	81	162	36	353
Xiasha Square	0	6	10	23	25	6	70
Mean Value	0.0	27.5	18.8	36.5	55.8	21.7	160.3

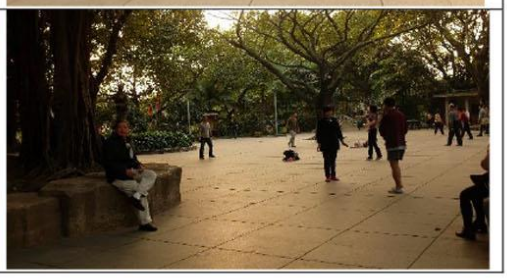
Number of “Sitting” People

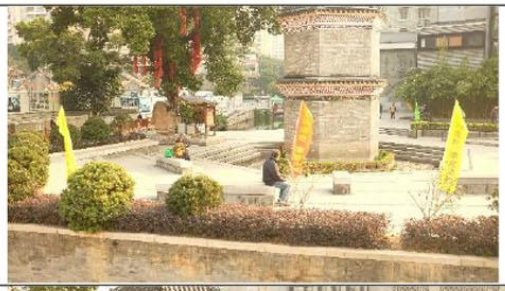
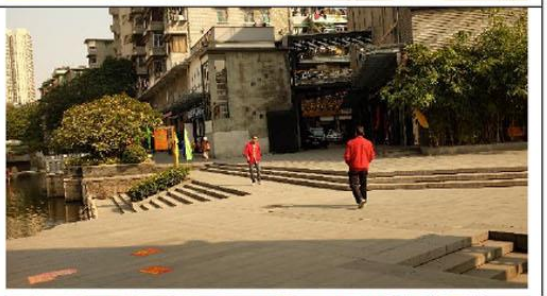
Number of ‘Sitting’ People	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	30	42	25	60	16	5	178
Bridge Square	6	16	7	13	10	6	58
Chen Academy	15	39	42	81	57	25	259
Renwei Temple	6	22	12	17	17	2	76
Liwan Lake Square*	15	72	32	56	45	25	245
People Park Square	11	57	74	88	128	88	446
Dongmen Square	3	10	45	92	68	39	257
King Plaza	5	14	32	25	45	57	178
Tianmian Square	11	36	48	25	75	21	216
Huangang Square	15	60	114	110	157	99	555
Shangsha Big Square	19	95	106	107	180	61	568
Shangsha Small Square	3	69	31	85	142	22	352
Xiasha Square	8	52	64	53	114	50	341
Mean Value	11.3	44.9	48.6	62.5	81.1	38.5	286.8

Number of “Standing” People

Number of ‘Standing’ People	7-9AM	9-11AM	11-13PM	13-15PM	15-17PM	17-19PM	Total
Theatre Square	4	31	11	13	5	0	64
Bridge Square	3	7	3	10	0	5	28
Chen Academy	18	62	51	9	14	13	167
Renwei Temple	3	24	16	21	31	14	109
Liwan Lake Square*	58	24	17	57	42	23	221
People Park Square	16	81	37	53	106	65	358
Dongmen Square	6	4	32	49	51	25	167
King Plaza	14	30	15	19	32	32	142
Tianmian Square	7	19	25	38	44	26	159
Huangang Square	23	20	38	31	36	41	189
Shangsha Big Square	8	41	48	18	34	21	170
Shangsha Small Square	3	16	13	13	49	24	118
Xiasha Square	4	72	50	19	24	45	214
Mean Value	12.8	33.2	27.4	26.9	36.0	25.7	162.0

Selected Photos of 13 Squares

THEATRE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

BRIDGE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

CHEN ACADEMY SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

RENWEI TEMPLE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

LIWAN LAKE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

PEOPLE PARK FRONT SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

DONGMEN MARKET SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

KING PLAZA		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

TIANMIAN VILLAGE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

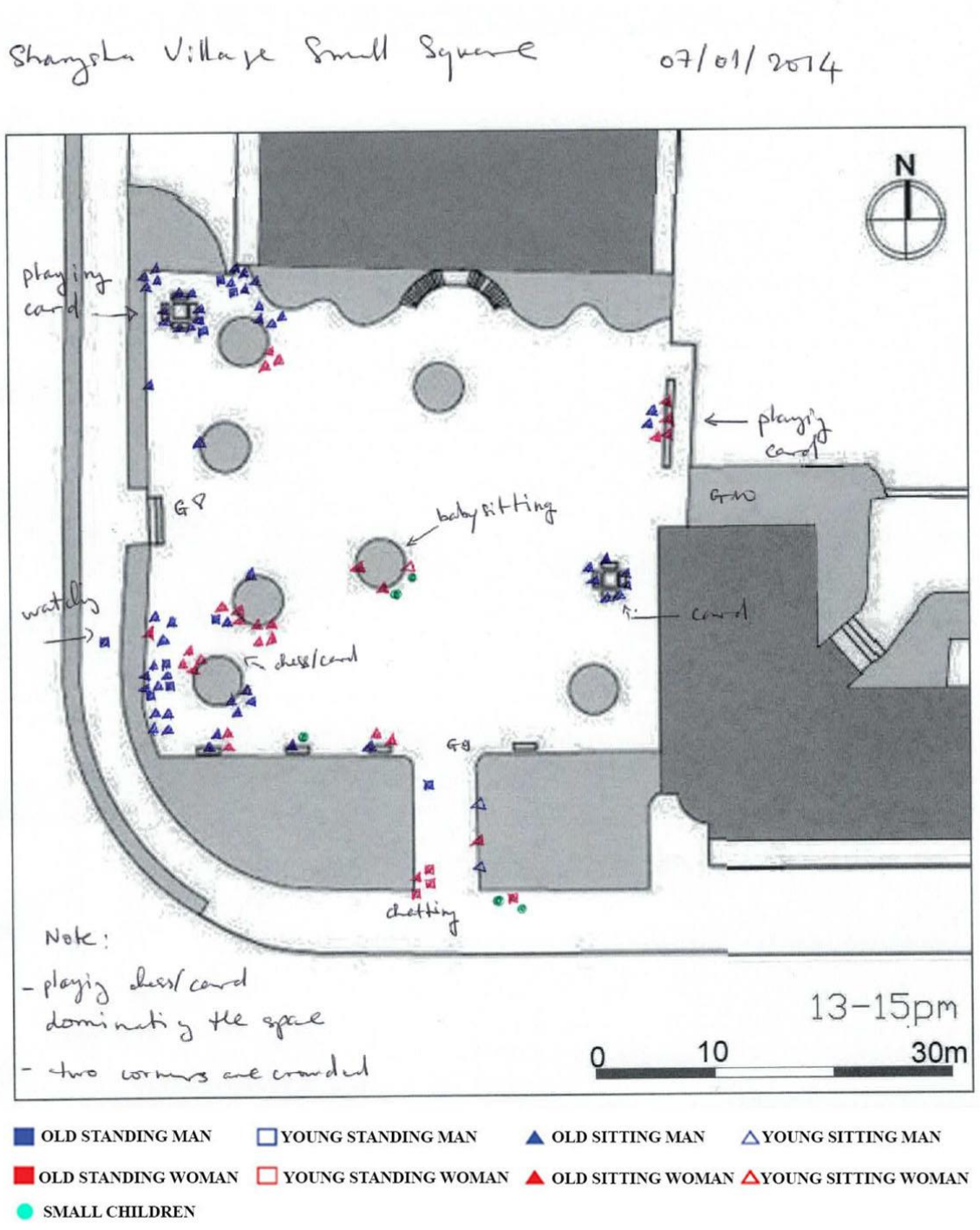
HUANGGANG VILLAGE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

SHANGSHA VILLAGE BIG SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

SHANGSHA VILLAGE SMALL SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

XIASHA VILLAGE SQUARE		
7am 9am		
9am 11am		
11am 1pm		
1pm 3pm		
3pm 5pm		
5pm 7pm		

Sample of activity record sheets



Square Name: Shagoha Village Small Square Gate Number: 8 Date: 07/07/2014

Time Period: 11 am - 1 pm

Type	Old Men (60+)	Old Women (60+)	Men (15-60)	Women (15-60)	Children
	1	1			111
Total	1	1	0	0	3

ToH = 5

Time Period: 1pm - 3pm

Type	Old Men (60+)	Old Women (60+)	Men (15-60)	Women (15-60)	Children
	11	1			11
Total	2	1	0	0	2

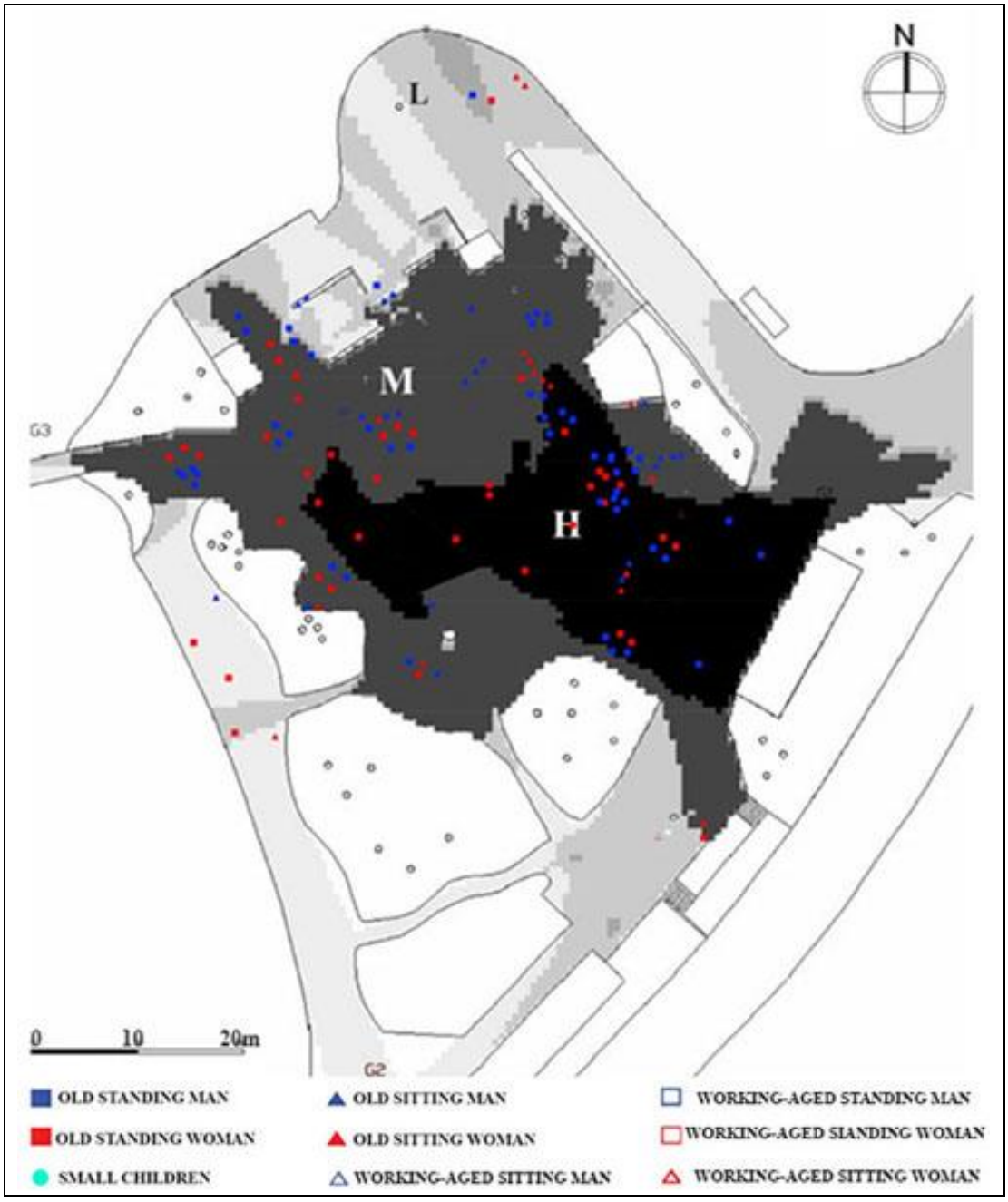
ToH 5

Appendix 2

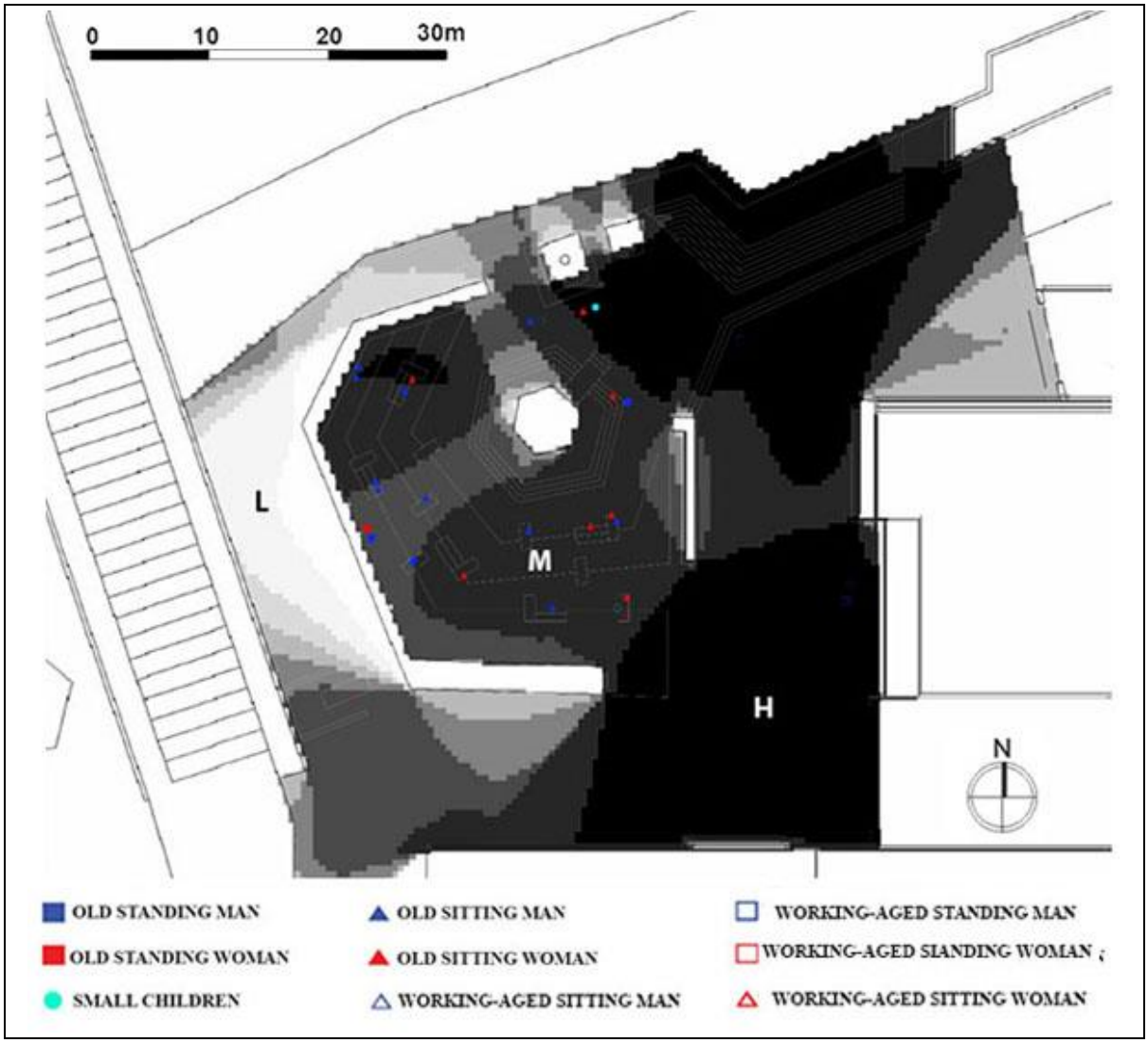
Overlapping of VGA Maps and Activity Maps

VGA maps were generated using Depthmap, a space syntax software which is provided by the Space Syntax Laboratory at University College London (UCL).

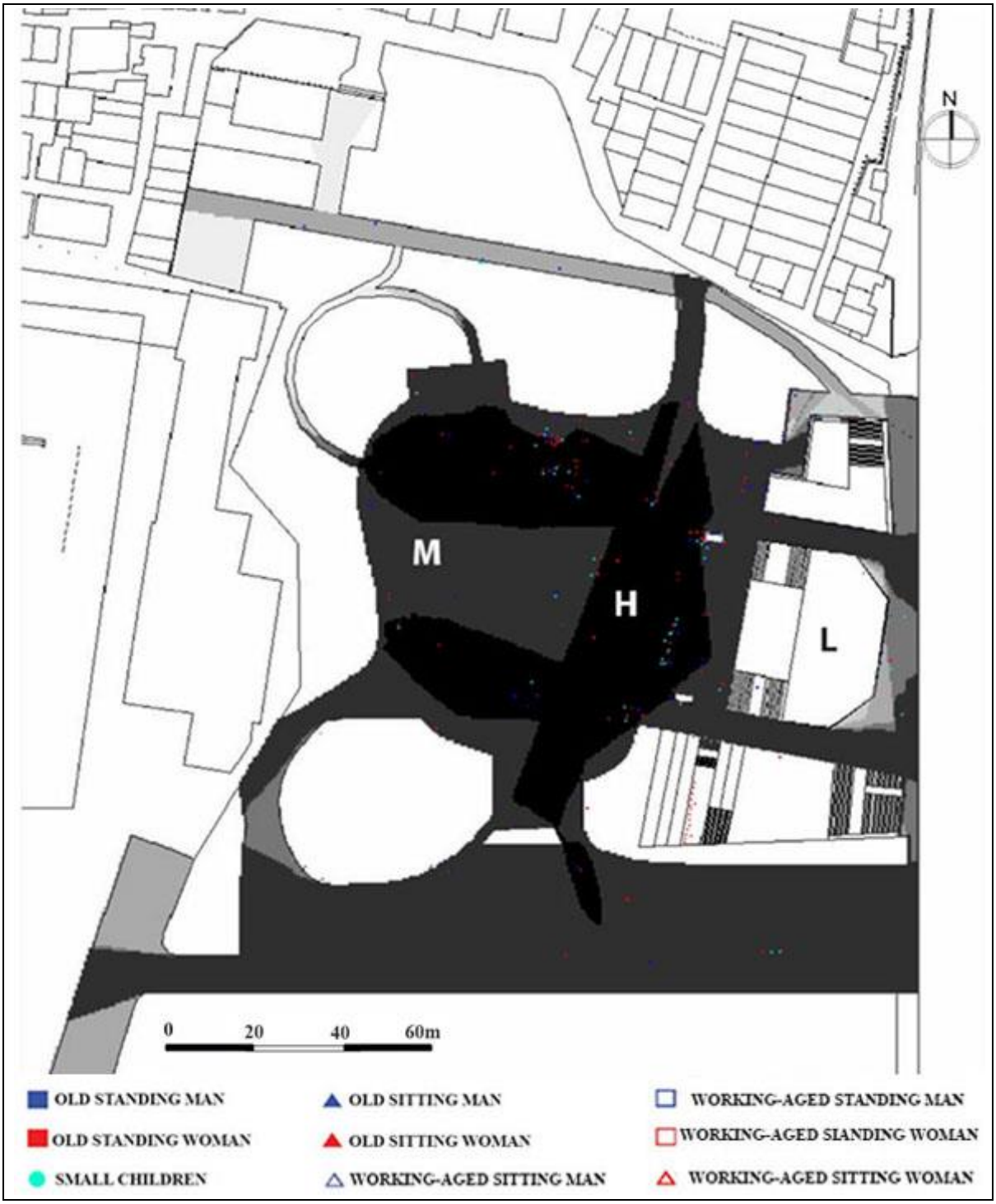
Theatre Square



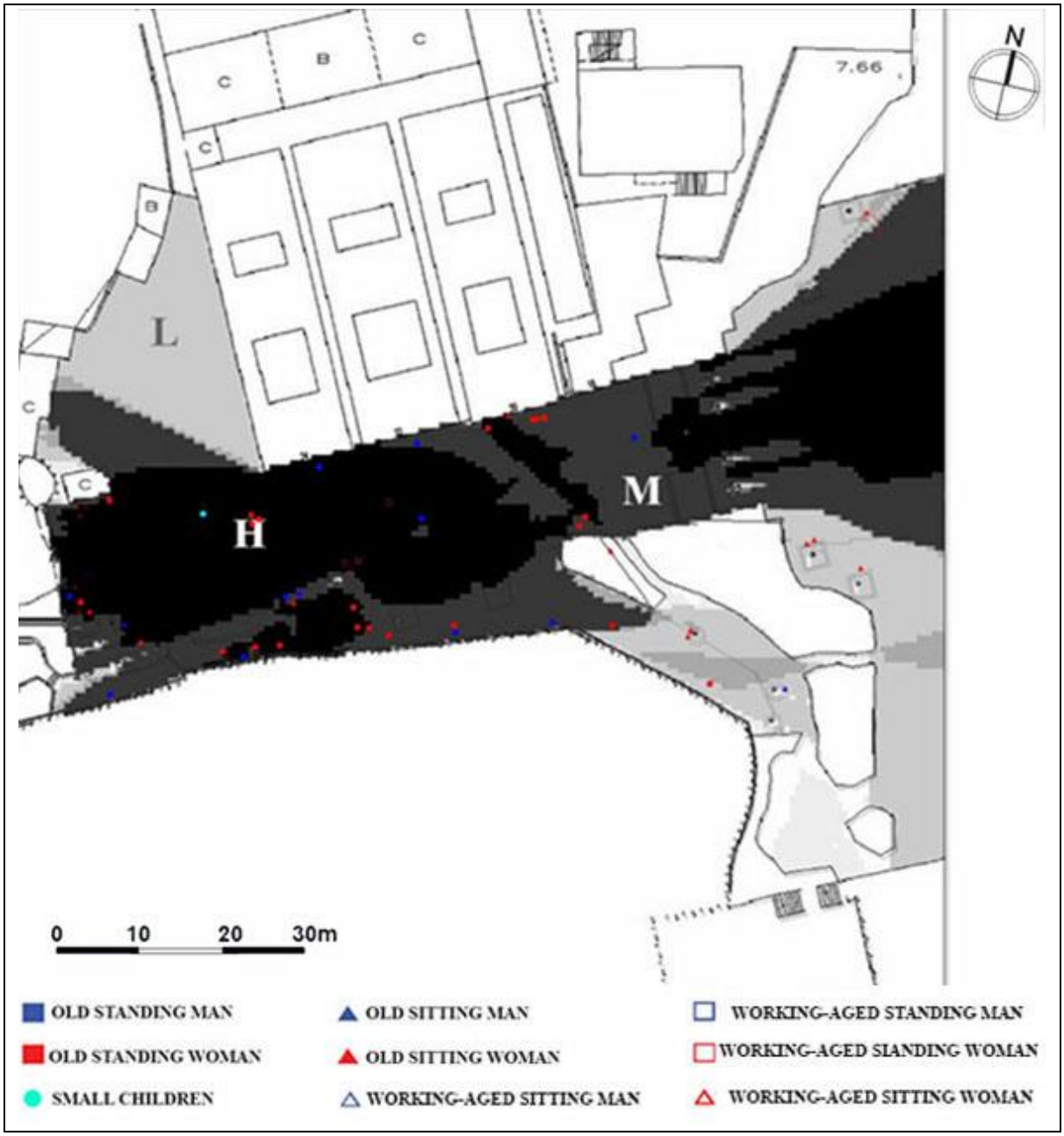
Bridge Square



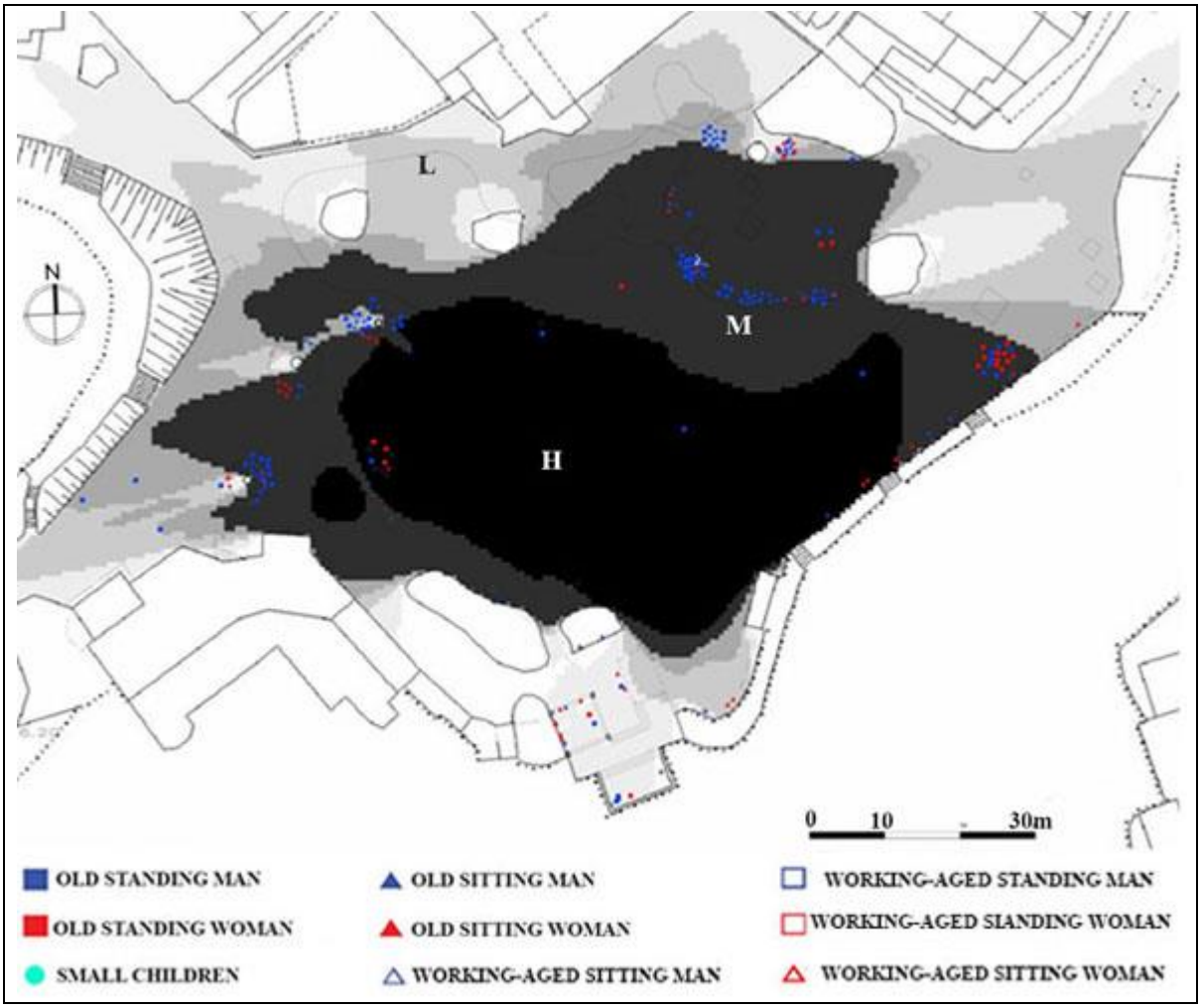
Chen Academy Square



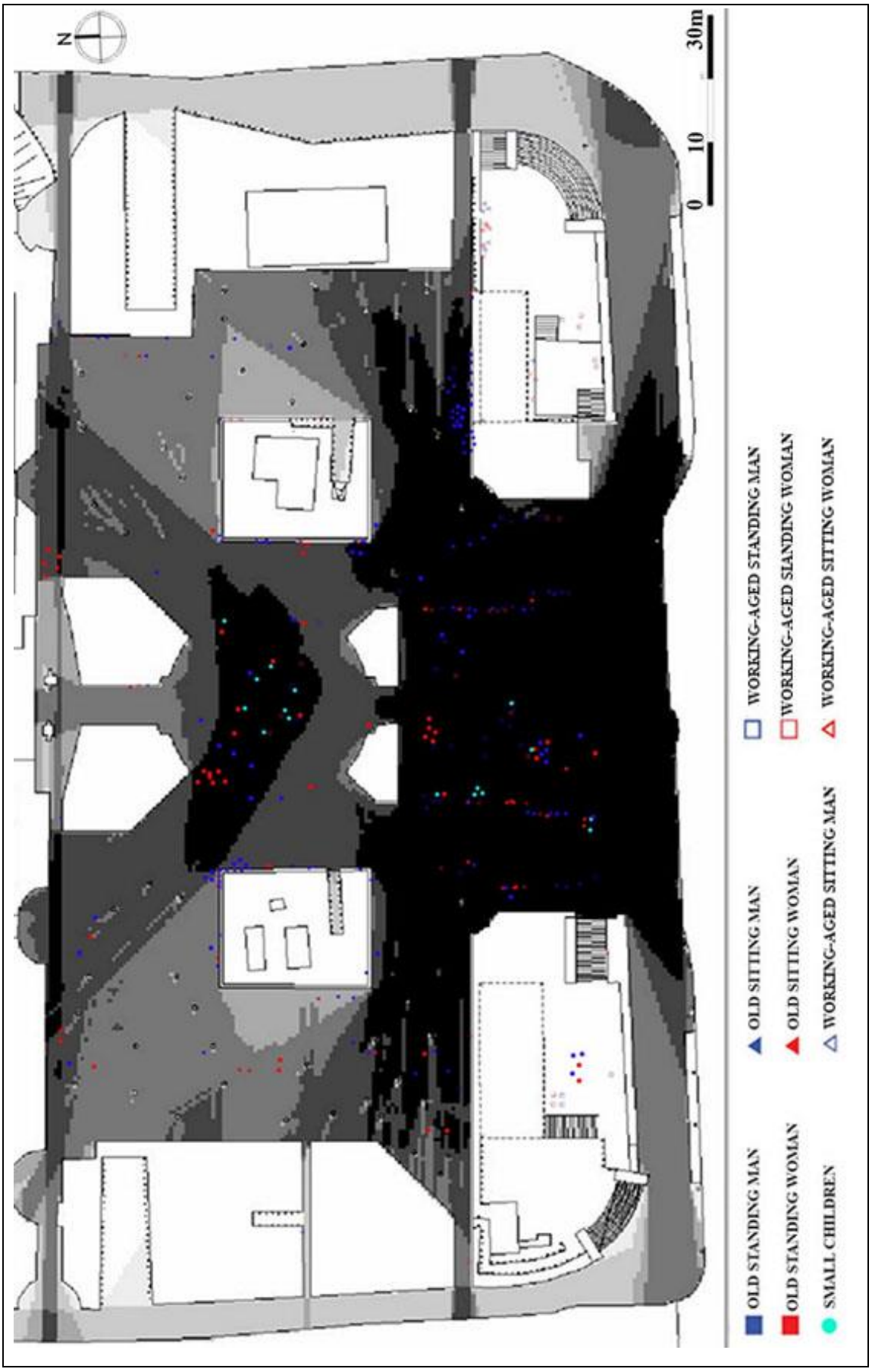
Renwei Temple Square



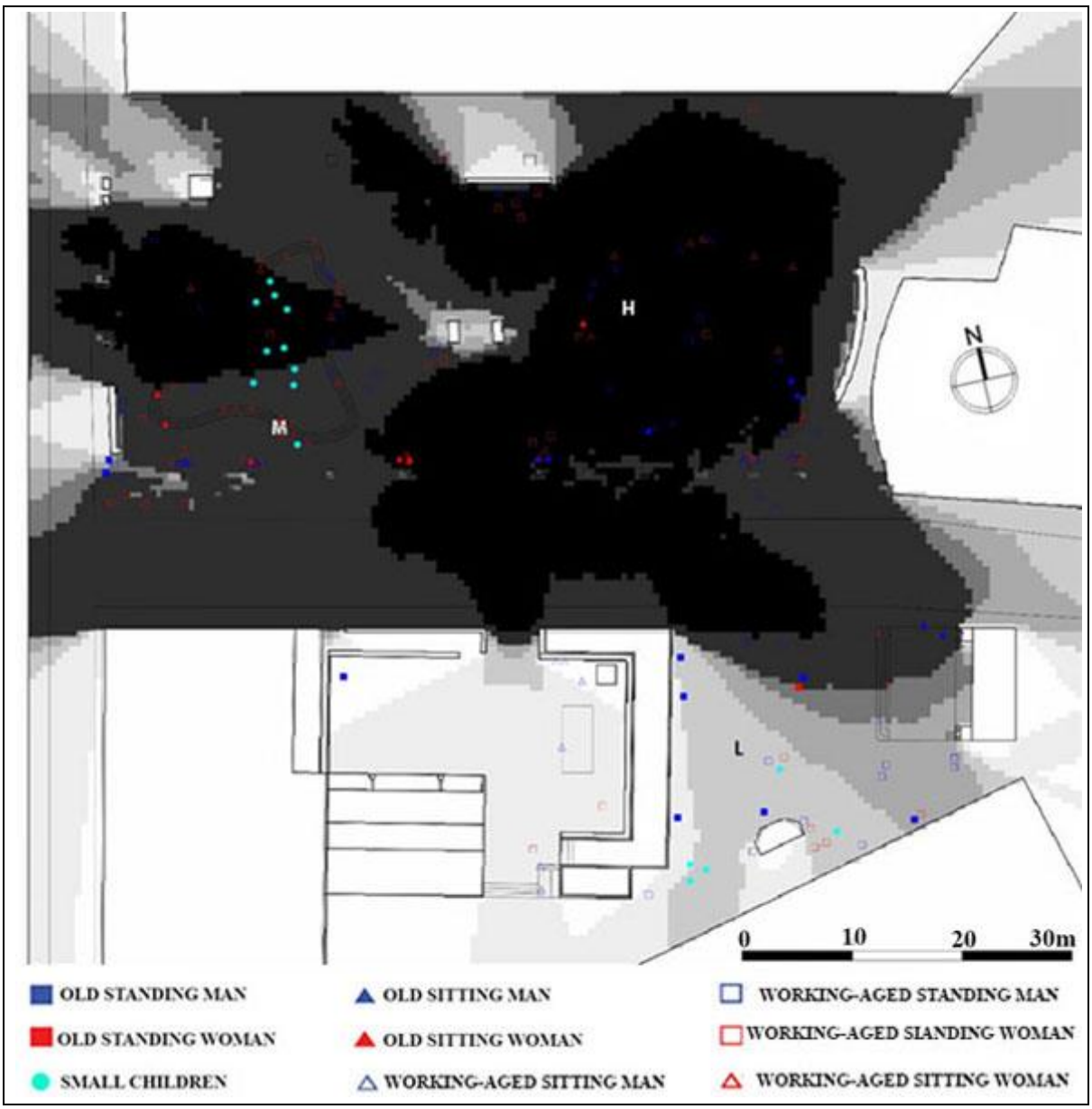
Liwan Lake Square



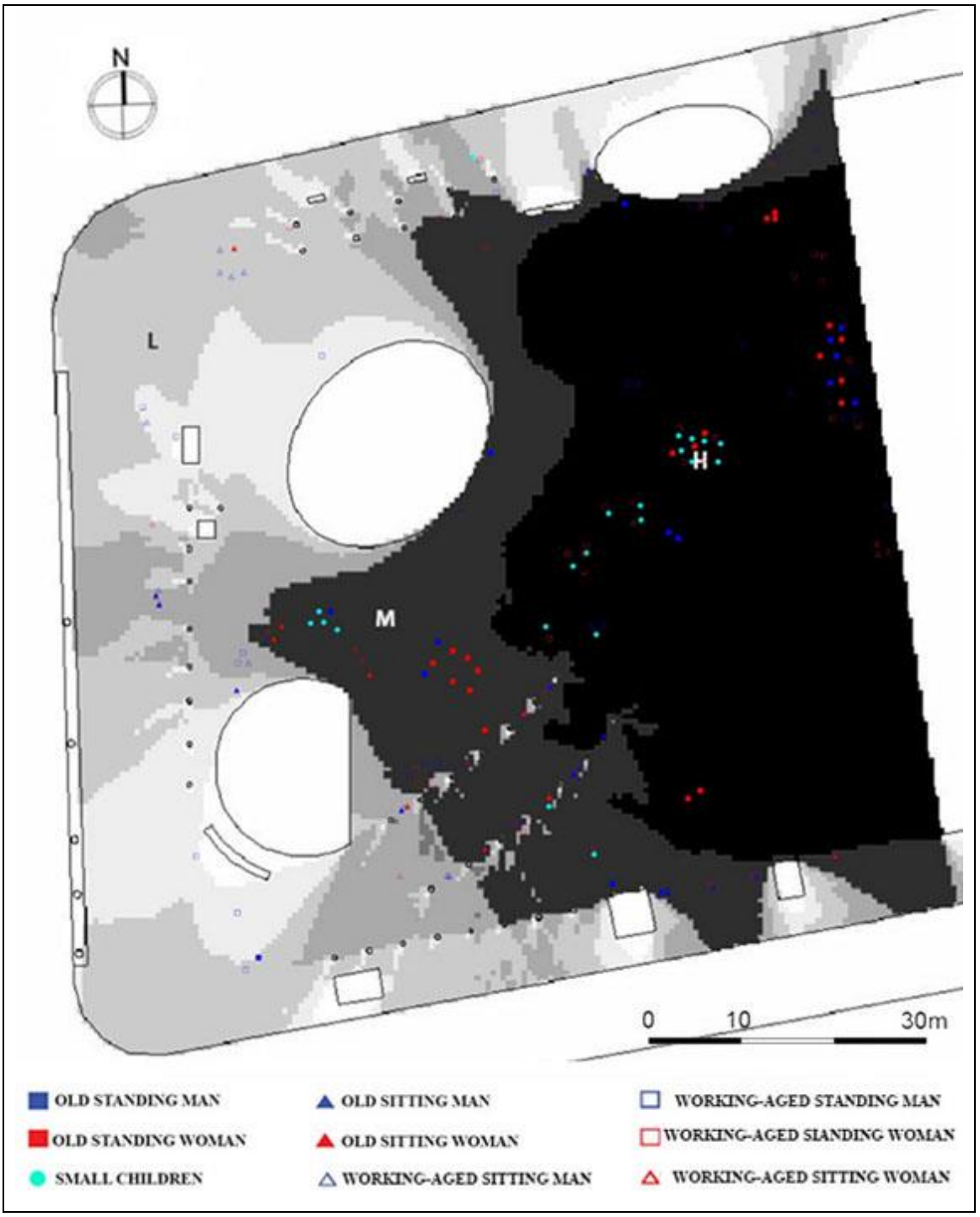
People Park Front Square



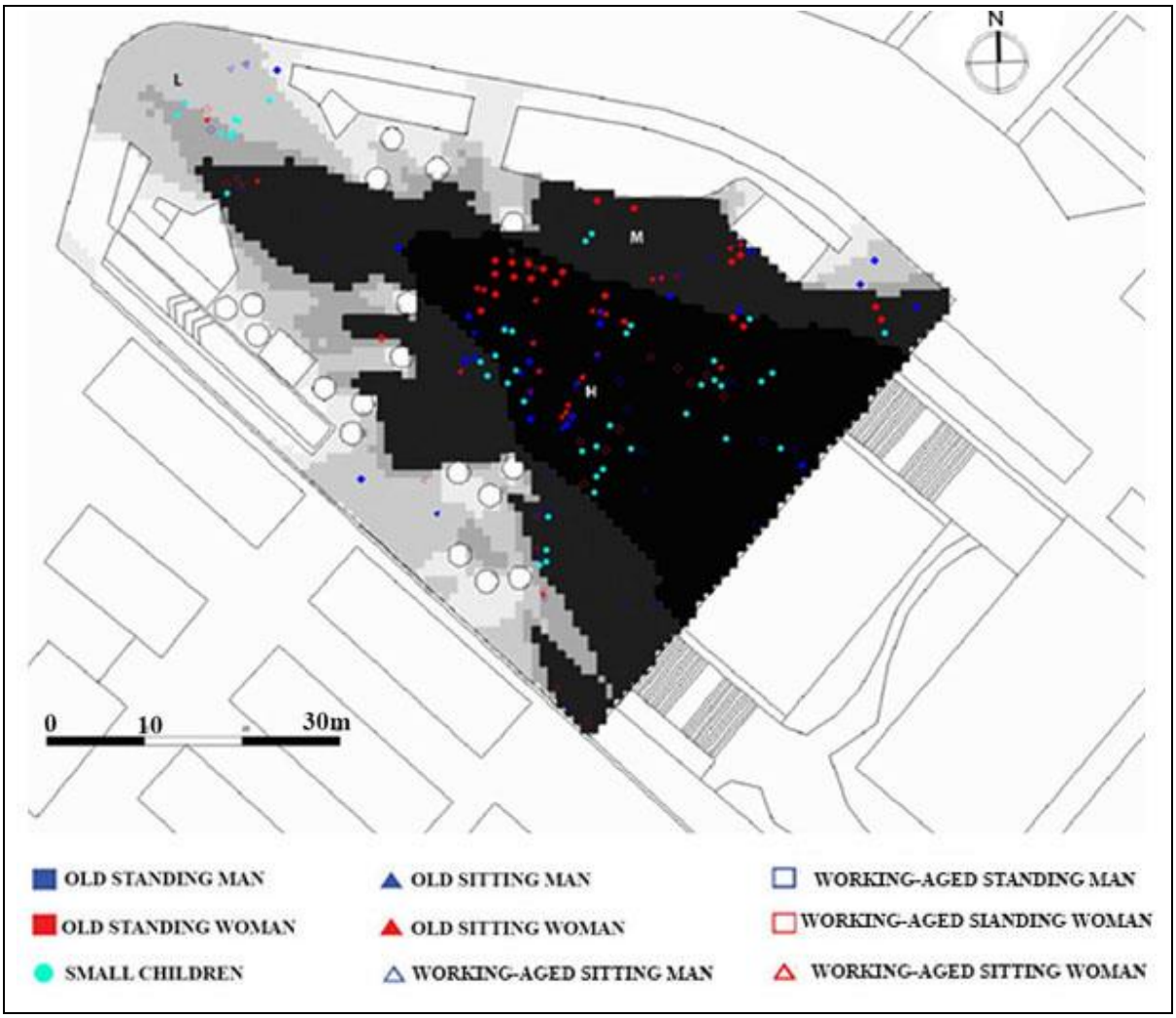
Dongmen Market Square



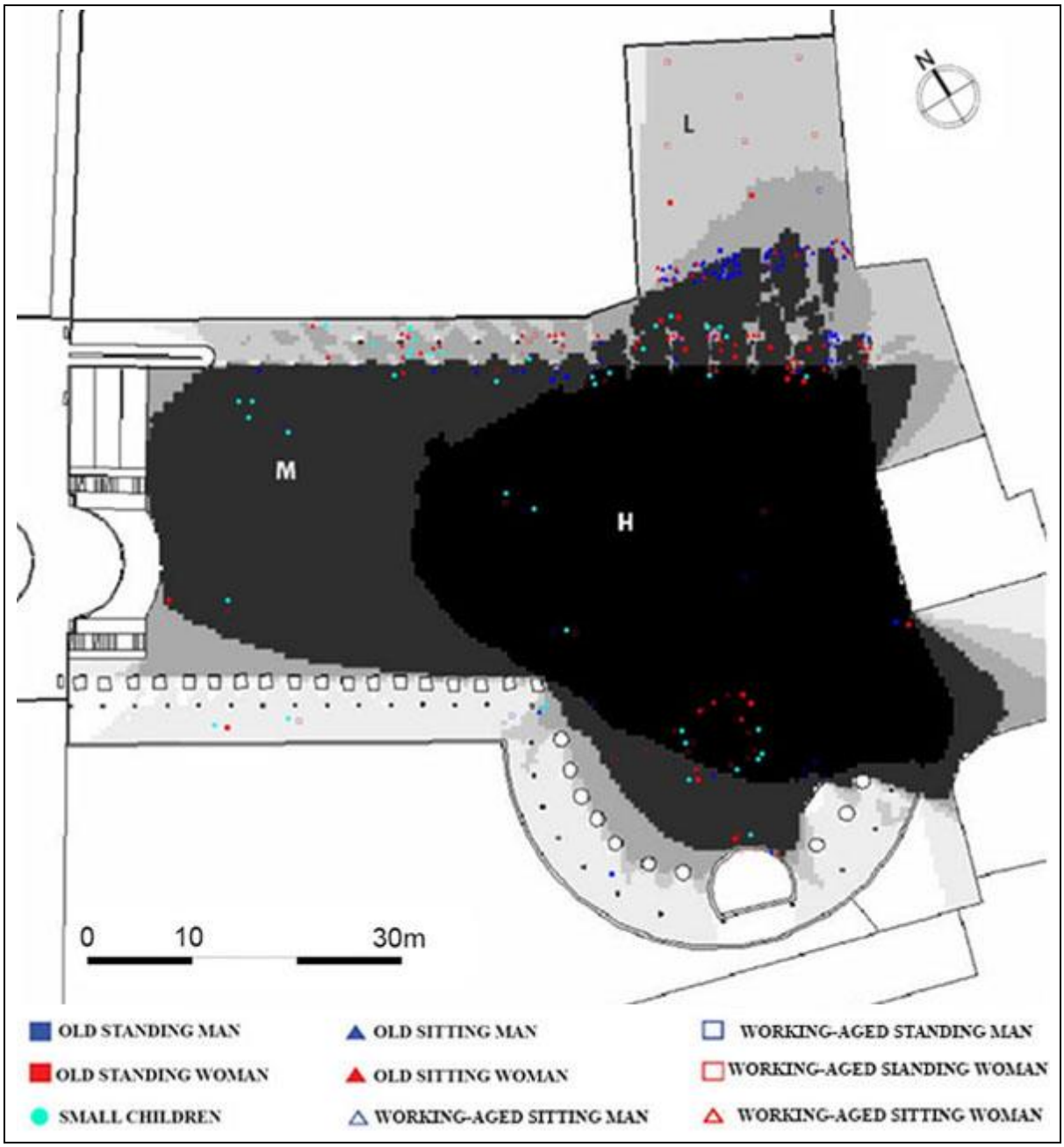
King Plaza


N
L
M
H
0
10
30m
OLD STANDING MAN
OLD SITTING MAN
WORKING-AGED STANDING MAN
OLD STANDING WOMAN
OLD SITTING WOMAN
WORKING-AGED SIANDING WOMAN
SMALL CHILDREN
WORKING-AGED SITTING MAN
WORKING-AGED SITTING WOMAN

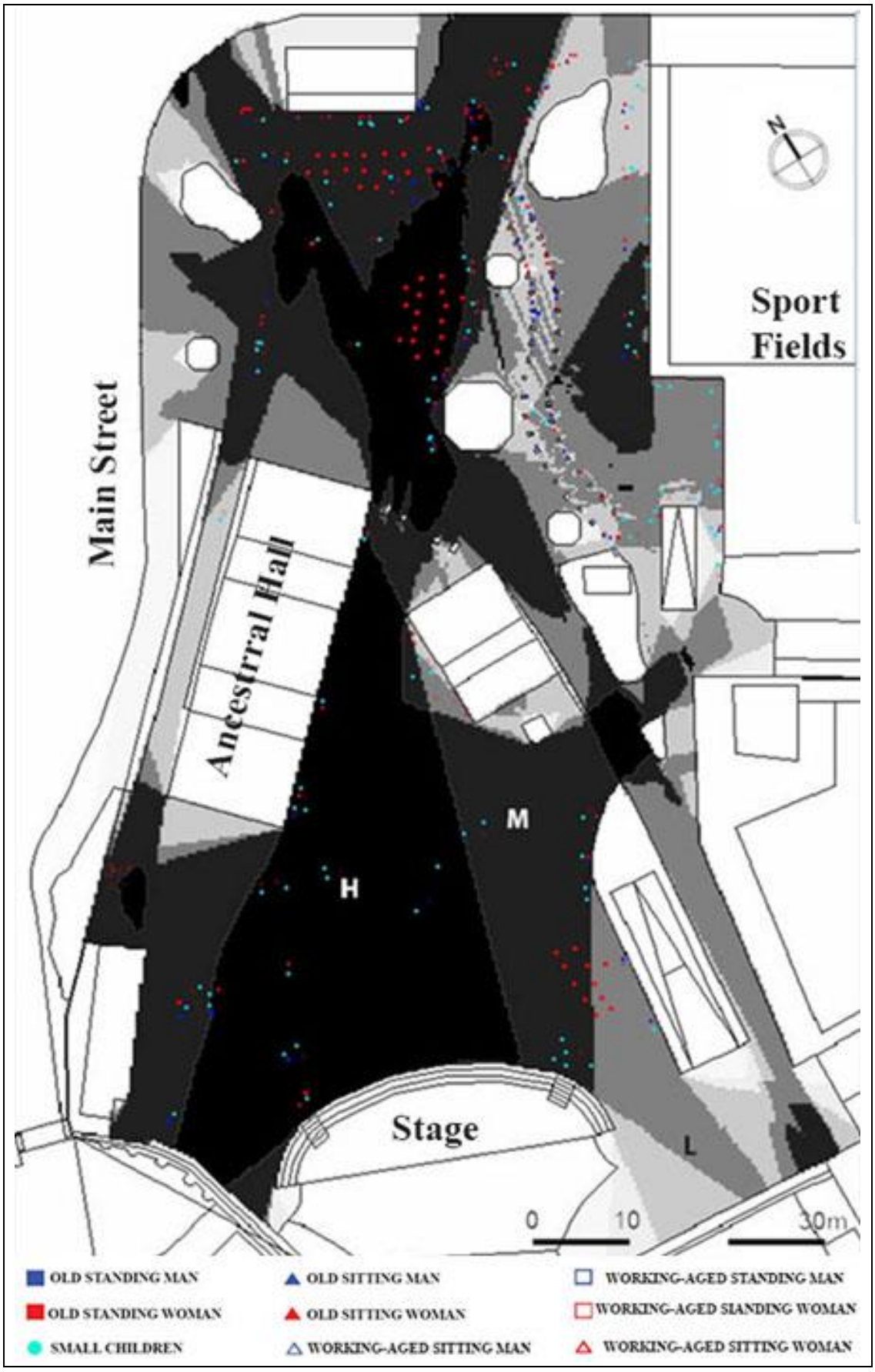
Tianmian Village Square



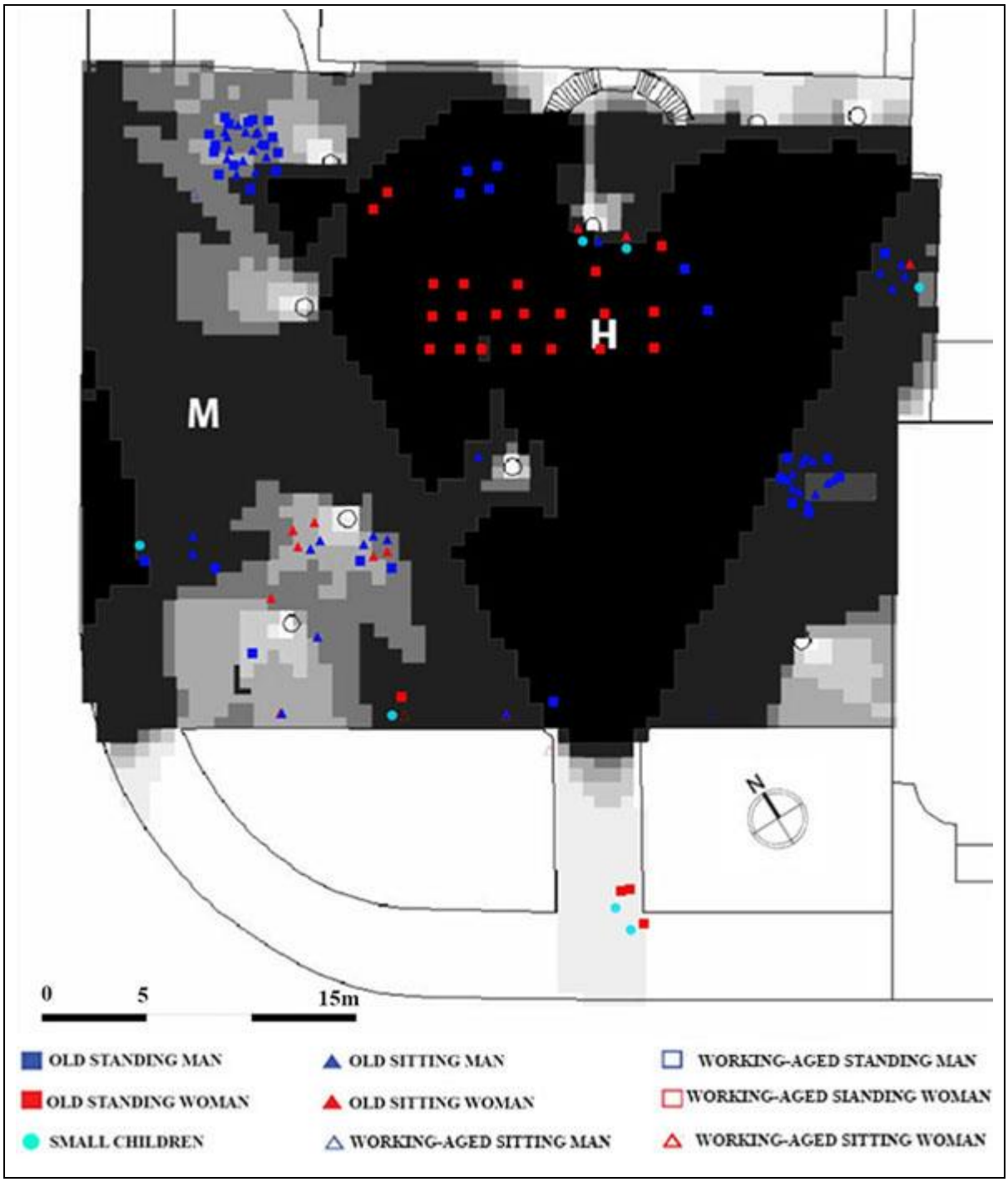
Huanggang Village Square



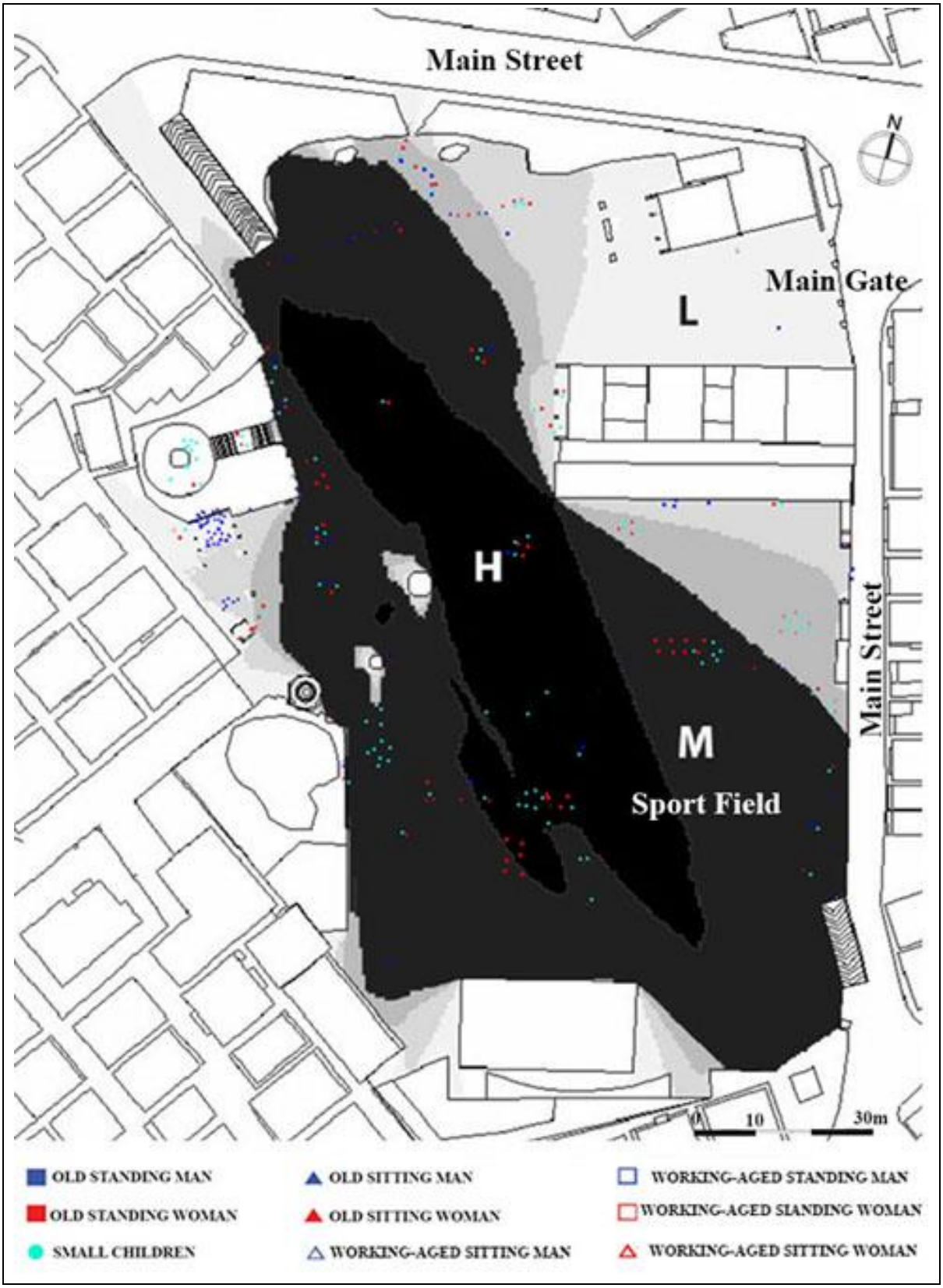
Shangsha Village Big Square



Shangsha Village Small Square



Xiasha Village Square



Visibility Analysis/Location Preference Data

Theatre Square

PERIOD 1, 3 AND 6	ABSOLUTE NUMBER			
THEATRE SQUARE	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	14	70	50	134
WORKING-AGED PEOPLE	1	2	1	4
SMALL CHILDREN	0	0	0	0
WOMEN	8	27	26	61
MEN	7	45	25	77
INDIVIDUALS	3	4	4	11
GROUP 3+	8	60	33	101
PAIRS	4	8	14	26
EXCERSICING	5	35	36	76
SITTING	6	26	14	46
STANDING	4	8	4	16
CHESS/CARDS	0	5	0	5
BABY SITTING	0	0	0	0

Bridge Square

PERIOD 1, 3 and 5	ABSOLUTE NUMBER			
BRIDGE SQUARE	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	6	13	4	23
WORKING-AGED PEOPLE	1	2	3	6
SMALL CHILDREN	0	2	1	3
WOMEN	2	12	2	16
MEN	5	3	5	13
INDIVIDUALS	5	7	2	14
GROUP 3+	0	6	0	6
PAIRS	2	4	6	12
EXCERSICING	0	0	0	0
SITTING	5	13	4	22
STANDING	2	2	3	7
CHESS/CARDS	0	0	0	0
BABY SITTING	0	5	2	7

Chen Academy Square

Periods 4, 5 and 6	ABSOLUTE NUMBER			
CHEN ACADEMY	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	36	68	58	162
WORKING-AGED PEOPLE	9	14	14	37
SMALL CHILDREN	9	12	22	43
WOMEN	26	41	50	117
MEN	19	41	22	82
INDIVIDUALS	16	26	24	66
GROUP 3+	24	28	52	104
PAIRS	14	40	18	72
EXCERSICING	0	0	0	0
SITTING	35	70	58	163
STANDING	10	12	14	36
CHESS/CARDS	0	12	0	12
BABY SITTING	15	30	45	90

Renwei Temple Square

Periods 1, 3 and 6	ABSOLUTE NUMBER			
RENWEI TEMPLE	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	9	16	20	45
WORKING-AGED PEOPLE	2	1	11	14
SMALL CHILDREN	0	0	1	1
WOMEN	6	9	23	38
MEN	5	8	8	21
INDIVIDUALS	9	11	4	24
GROUP 3+	6	10	10	26
PAIRS	2	6	2	10
EXCERSICING	3	3	0	6
SITTING	9	10	1	20
STANDING	5	14	14	33
CHESS/CARDS	0	0	0	0
BABY SITTING	0	0	2	2

Liwan Lake Square

Periods 3, 5 and 6	ABSOLUTE NUMBER			
LIWAN LAKE	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	56	106	11	173
WORKING-AGED PEOPLE	5	11	1	17
SMALL CHILDREN	3	12	7	22
WOMEN	13	18	7	38
MEN	48	99	5	152
EXCERSICING	2	4	0	6
SITTING	36	61	5	102
STANDING	23	53	7	83
CHESS/CARDS	24	68	2	94
BABY SITTING	6	25	14	45
INDIVIDUALS	8	10	6	24
GROUP 3+	94	47	5	146
PAIRS	18	14	10	42

People Park Front Square

Periods 1, 3 and 4	ABSOLUTE NUMBER			
PEOPLE PARK	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	25	62	107	194
WORKING-AGED PEOPLE	37	13	65	115
SMALL CHILDREN	0	0	16	16
WOMEN	27	26	63	116
MEN	35	49	109	193
INDIVIDUALS	16	21	20	57
GROUP 3+	26	32	130	188
PAIRS	20	22	38	80
EXCERSICING	2	6	22	30
SITTING	38	45	90	173
STANDING	22	24	60	106
CHESS/CARDS	0	14	16	30
BABY SITTING	0	0	32	32

Dongmen Market Square

Periods 1, 2, 3 and 6	ABSOLUTE NUMBER			
DONGMEN	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	1	17	5	23
WORKING-AGED PEOPLE	14	92	35	141
SMALL CHILDREN	0	7	8	15
WOMEN	9	42	29	80
MEN	25	37	22	84
INDIVIDUALS	15	22	18	55
GROUP 3+	14	31	19	64
PAIRS	10	30	20	60
EXCERSICING	0	0	0	0
SITTING	8	52	37	97
STANDING	26	27	14	67
CHESS/CARDS	0	0	0	0
BABY SITTING	10	5	8	23

King Plaza

Period 2, 3 and 4	ABSOLUTE NUMBER			
KING PLAZA	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	8	28	21	57
WORKING-AGED PEOPLE	28	38	36	102
SMALL CHILDREN	1	6	14	21
WOMEN	9	32	36	77
MEN	27	34	21	82
INDIVIDUALS	13	31	7	51
GROUP 3+	14	21	52	87
PAIRS	10	20	12	42
EXCERSICING	0	8	16	24
SITTING	21	44	6	71
STANDING	15	14	35	64
CHESS/CARDS	0	0	0	0
BABY SITTING	2	9	31	42

Tianmian Village Square

Period 1, 2 and 6	ABSOLUTE NUMBER			
TIANMIAN	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	2	32	39	73
WORKING-AGED PEOPLE	6	38	16	60
SMALL CHILDREN	8	14	21	43
WOMEN	2	30	37	69
MEN	6	40	18	64
INDIVIDUALS	2	22	19	43
GROUP 3+	8	50	31	89
PAIRS	6	12	26	44
EXCERSICING	1	2	10	13
SITTING	9	26	33	68
STANDING	6	19	27	52
CHESS/CARDS	0	0	0	0
BABY SITTING	11	23	43	77

Huanggang Village Square

Period 1, 2 and 4	ABSOLUTE NUMBER			
HUANGGANG	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	70	82	14	166
WORKING-AGED PEOPLE	4	19	23	46
SMALL CHILDREN	12	16	14	42
WOMEN	37	51	24	112
MEN	37	50	13	100
INDIVIDUALS	11	10	6	27
GROUP 3+	63	99	33	195
PAIRS	12	8	12	32
EXCERSICING	9	0	0	9
SITTING	56	78	20	154
STANDING	7	31	17	55
CHESS/CARDS	23	44	0	67
BABY SITTING	26	40	22	88

Shangsha Village Big Square

Period 1, 4 and 6	ABSOLUTE NUMBER			
SHANGSHA BIG	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	62	78	40	180
WORKING-AGED PEOPLE	37	46	14	97
SMALL CHILDREN	34	46	26	106
WOMEN	65	94	45	204
MEN	34	30	9	73
INDIVIDUALS	17	24	2	43
GROUP 3+	66	92	54	212
PAIRS	50	54	24	128
EXCERSICING	4	23	18	45
SITTING	81	81	25	187
STANDING	11	25	11	47
CHESS/CARDS	0	10	0	10
BABY SITTING	71	93	52	216

Shangsha Village Small Square

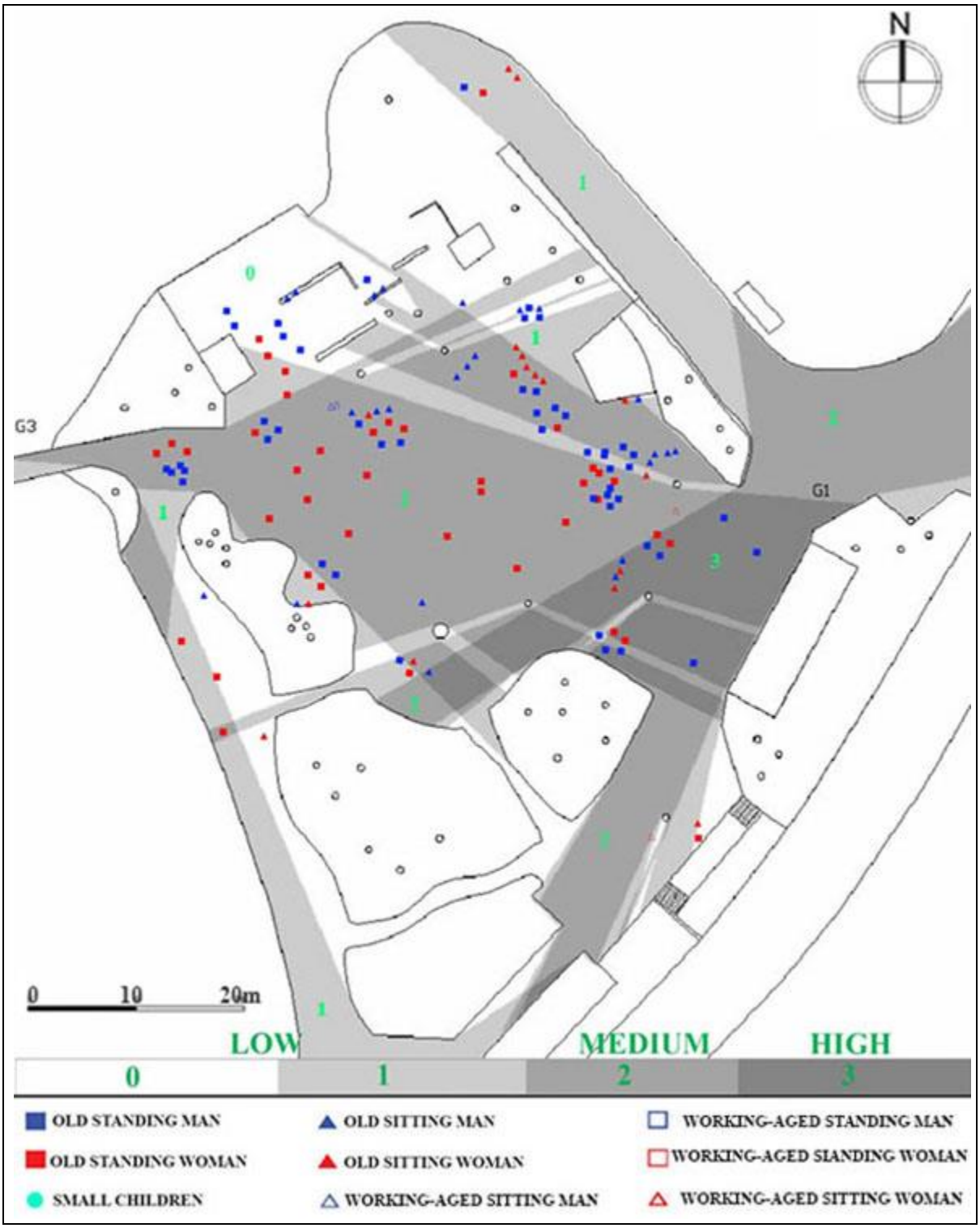
Period 1, 3 and 6	ABSOLUTE NUMBER			
SHANGSHA SMALL	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	39	44	27	110
WORKING-AGED PEOPLE	2	3	0	5
SMALL CHILDREN	2	3	2	7
WOMEN	11	7	20	38
MEN	30	40	7	77
INDIVIDUALS	8	6	1	15
GROUP 3+	31	40	22	93
PAIRS	4	4	6	14
EXCERSICING	0	1	18	19
SITTING	25	29	2	56
STANDING	16	17	7	40
CHESS/CARDS	30	31	0	61
BABY SITTING	4	8	2	14

Xiasha Village Square

Period 1, 4 and 6	ABSOLUTE NUMBER			
XIASHA	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	90	52	15	157
WORKING-AGED PEOPLE	16	25	3	44
SMALL CHILDREN	41	36	17	94
WOMEN	45	34	14	93
MEN	61	43	4	108
INDIVIDUALS	15	29	1	45
GROUP 3+	98	54	26	178
PAIRS	34	30	8	72
EXCERSICING	0	18	4	22
SITTING	68	41	2	111
STANDING	38	18	12	68
CHESS/CARDS	29	0	0	29
BABY SITTING	73	66	29	168

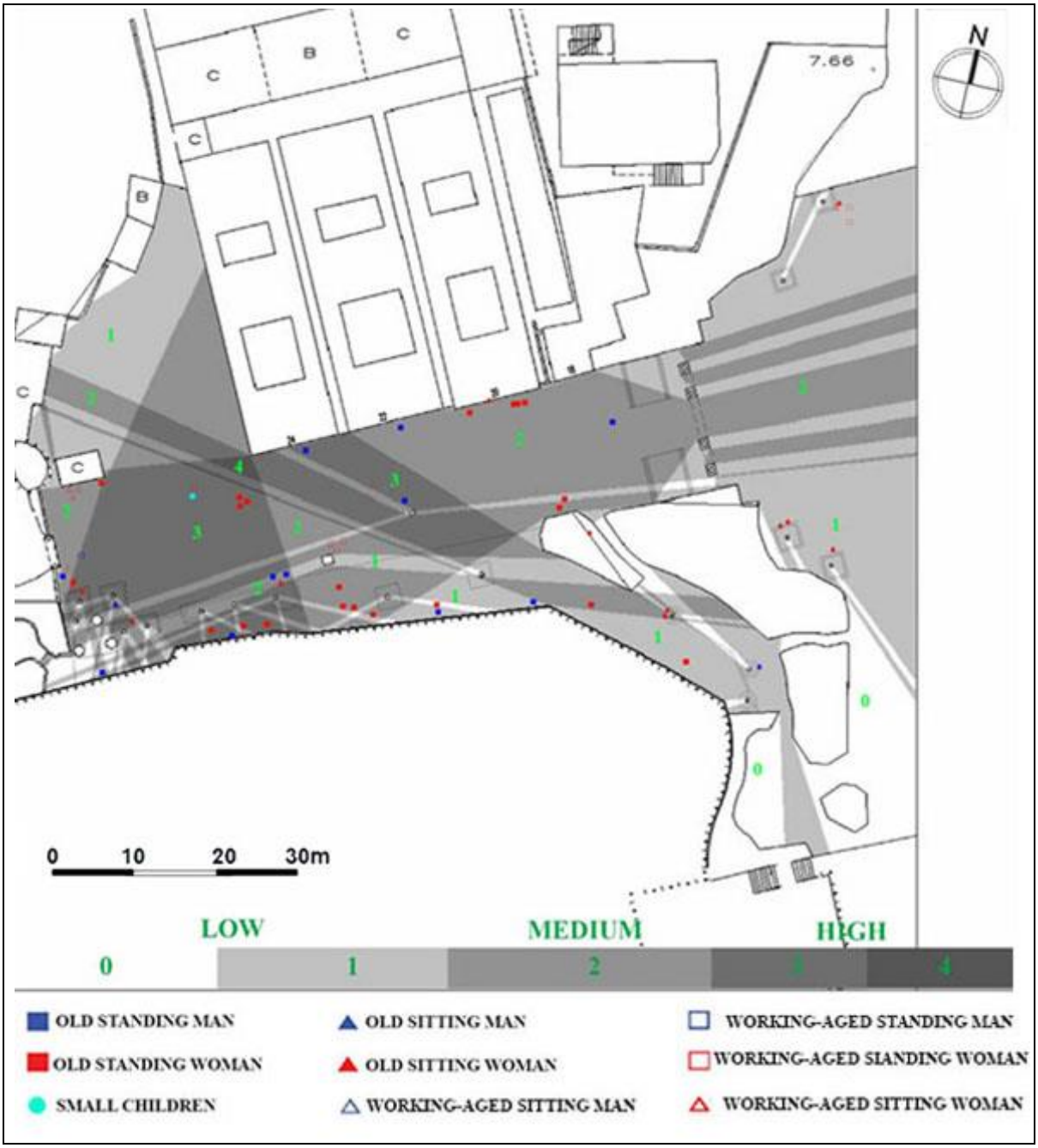
Overlapping of OIG Maps -Activity Maps

Theatre Square

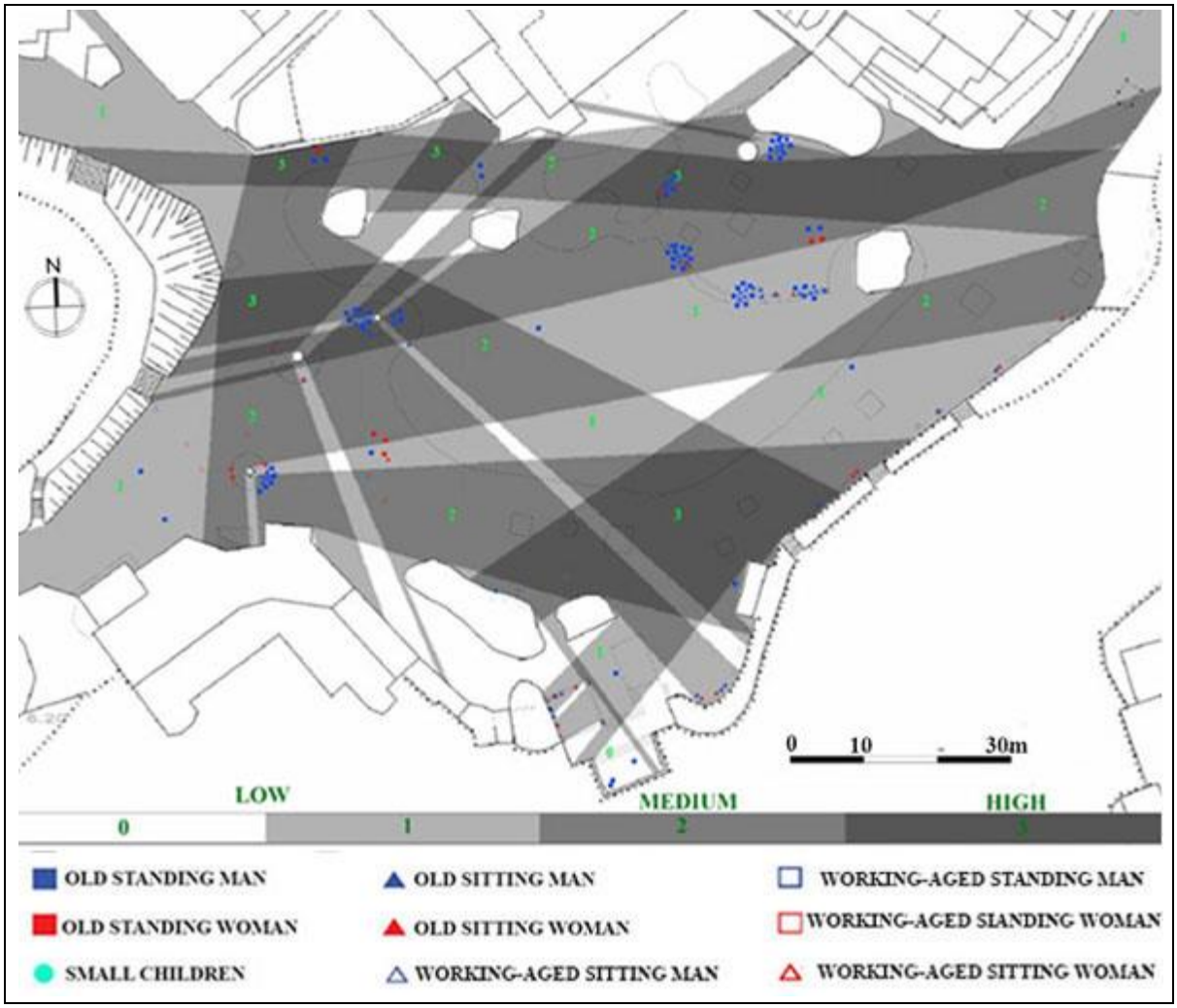


Chen Academy

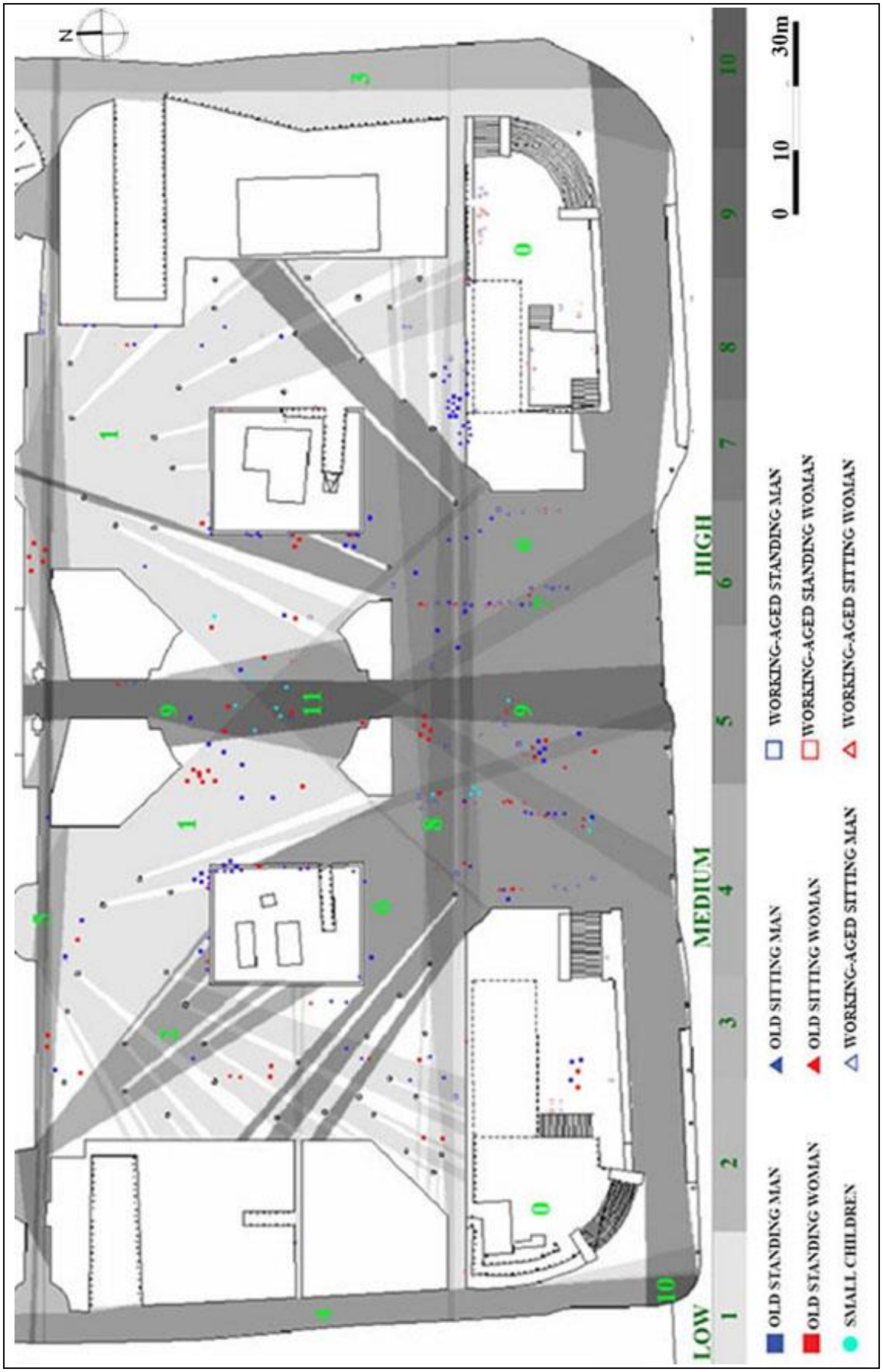
Renwei Temple Square



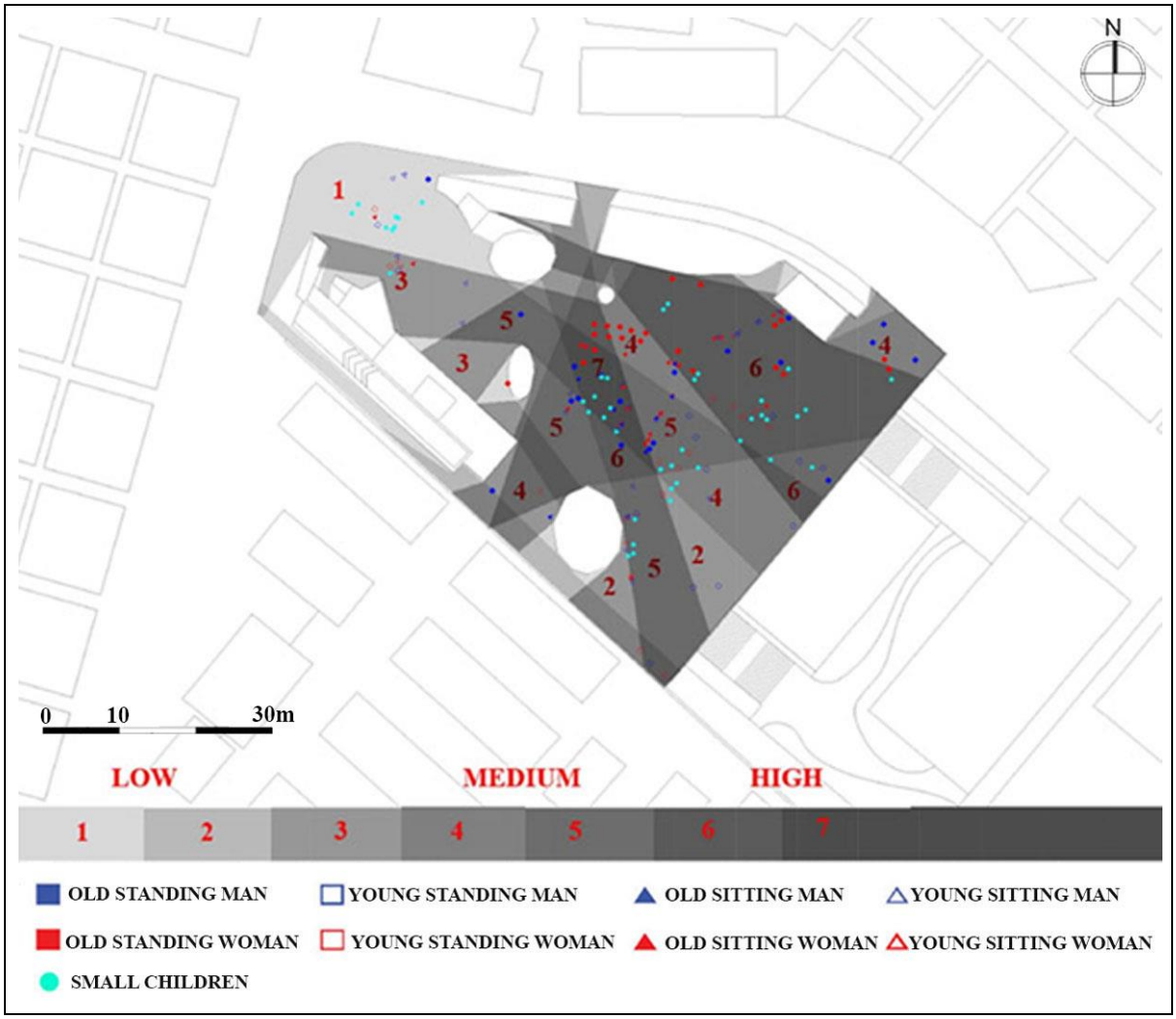
Liwan Lake Square



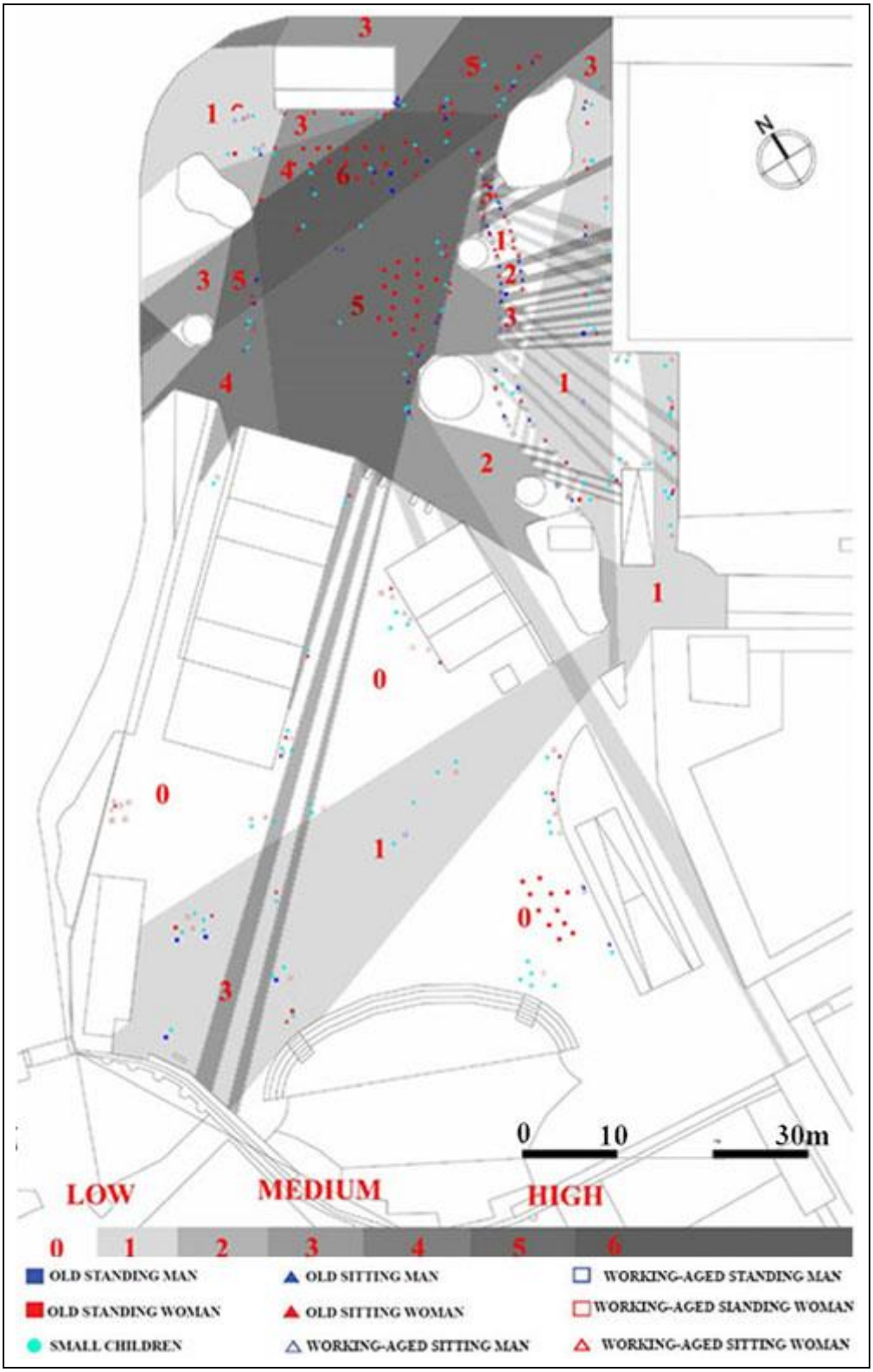
People Park Front Square



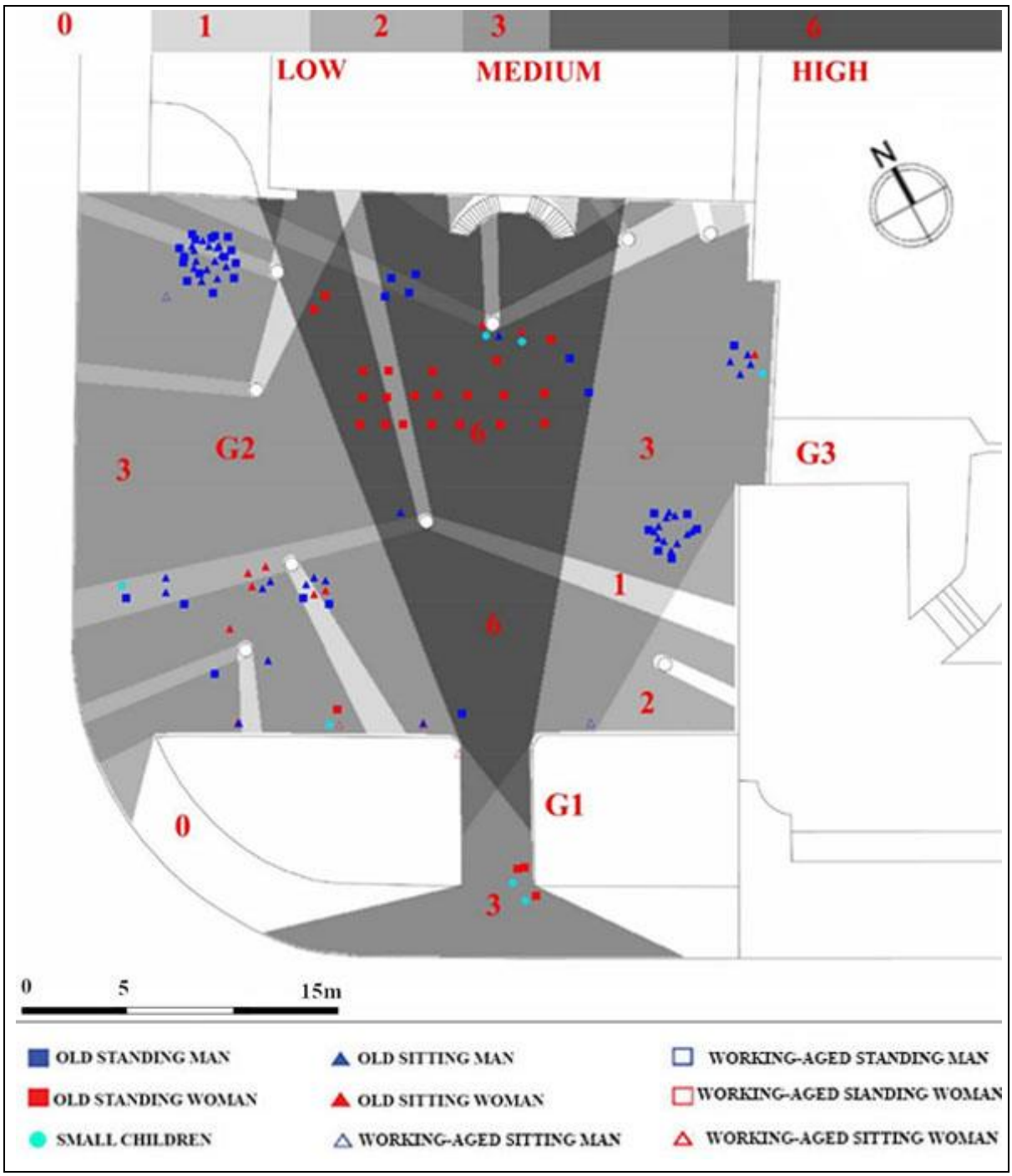
Tianmian Village Square



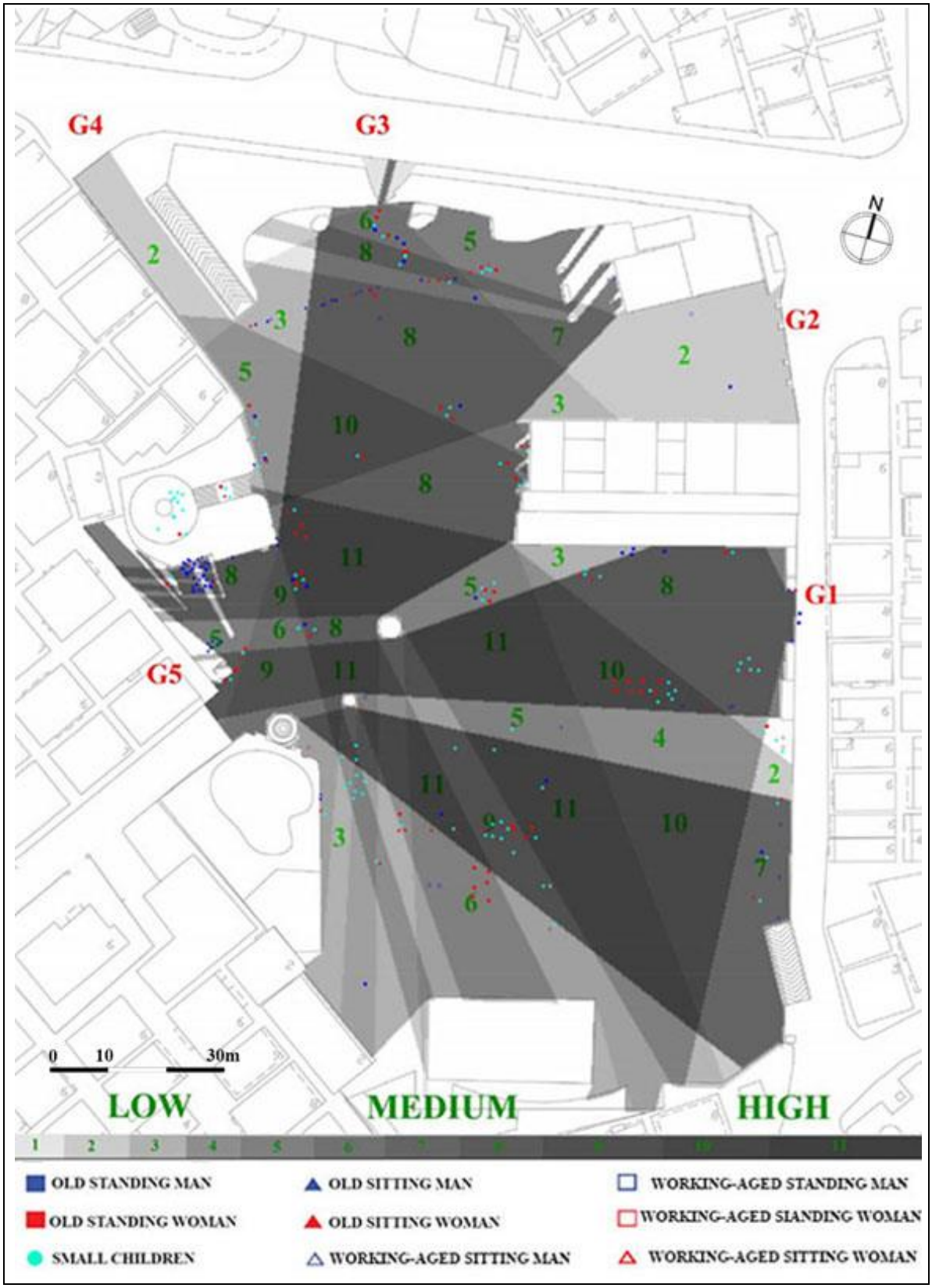
Shangsha Village Big Square



Shangsha Village Small Square



Xiasha Village Square



Data from Overlapping Maps of OIG and Activity maps

Theatre Square

PERIOD 1, 3 AND 6	ABSOLUTE NUMBER			
01 GZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	43	72	19	134
WORKING-AGED PEOPLE	1	3	0	4
SMALL CHILDREN	0	0	0	0
WOMEN	19	35	7	61
MEN	25	40	12	77
INDIVIDUALS	5	3	3	11
GROUP 3+	27	64	10	101
PAIRS	12	8	6	26
EXCERSICING	19	48	9	76
SITTING	16	23	7	46
STANDING	9	4	3	16
CHESS/CARDS	5	0	0	5
BABY SITTING	0	0	0	0

Chen Academy

PERIOD 4, 5 AND 6	ABSOLUTE NUMBER			
03 GZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	55	52	55	162
WORKING-AGED PEOPLE	9	14	14	37
SMALL CHILDREN	6	13	24	43
WOMEN	35	32	50	117
MEN	29	34	19	82
INDIVIDUALS	22	27	17	66
GROUP 3+	26	24	54	104
PAIRS	22	28	22	72
EXCERSICING	0	0	0	0
SITTING	57	64	42	163
STANDING	7	16	13	36
CHESS/CARDS	12	0	0	12
BABY SITTING	11	33	46	90

Renwei Temple Square

PERIOD 1, 3 AND 6	ABSOLUTE NUMBER			
04 GZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	11	23	11	45
WORKING-AGED PEOPLE	3	7	4	14
SMALL CHILDREN	0	0	1	1
WOMEN	6	21	11	38
MEN	8	9	4	21
INDIVIDUALS	9	11	4	24
GROUP 3+	3	15	8	26
PAIRS	2	4	4	10
EXCERSICING	1	3	2	6
SITTING	9	2	9	20
STANDING	1	12	20	33
CHESS/CARDS	0	0	0	0
BABY SITTING	0	0	2	2

Liwan Lake Square

PERIOD 3, 5 AND 6	ABSOLUTE NUMBER			
05 GZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	74	72	27	173
WORKING-AGED PEOPLE	4	9	4	17
SMALL CHILDREN	8	13	1	22
WOMEN	18	16	4	38
MEN	60	65	27	152
INDIVIDUALS	17	10	2	24
GROUP 3+	49	78	24	146
PAIRS	20	6	6	42
EXCERSICING	2	4	0	6
SITTING	36	61	5	102
STANDING	23	53	7	83
CHESS/CARDS	24	68	2	94
BABY SITTING	6	25	14	45

People Park Front Square

PERIOD 1, 3 AND 4	ABSOLUTE NUMBER			
06 GZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	87	24	83	194
WORKING-AGED PEOPLE	44	8	63	115
SMALL CHILDREN	1	2	13	16
WOMEN	48	10	58	116
MEN	83	22	88	193
INDIVIDUALS	30	1	26	57
GROUP 3+	74	25	89	188
PAIRS	28	8	44	80
EXCERSICING	2	6	22	30
SITTING	38	45	90	173
STANDING	22	24	60	106
CHESS/CARDS	0	14	16	30
BABY SITTING	0	0	32	32

Tianmian Village Square

PERIOD 1, 2 AND 6	ABSOLUTE NUMBER			
09 SZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	2	32	39	73
WORKING-AGED PEOPLE	6	38	16	60
SMALL CHILDREN	8	14	21	43
WOMEN	2	30	37	69
MEN	6	40	18	64
INDIVIDUALS	2	22	19	43
GROUP 3+	8	50	31	89
PAIRS	6	12	26	44
EXCERSICING	1	5	7	13
SITTING	3	35	30	68
STANDING	12	38	2	52
CHESS/CARDS	0	0	0	0
BABY SITTING	11	29	37	77

Shangsha Village Big Square

PERIOD 1, 3 AND 6	ABSOLUTE NUMBER			
11 SZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	62	78	40	180
WORKING-AGED PEOPLE	37	46	14	97
SMALL CHILDREN	34	46	26	106
WOMEN	65	94	45	204
MEN	34	30	9	73
INDIVIDUALS	17	24	2	43
GROUP 3+	66	92	54	212
PAIRS	50	54	24	128
EXCERSICING	4	23	18	45
SITTING	81	81	25	187
STANDING	11	25	11	47
CHESS/CARDS	0	10	0	10
BABY SITTING	71	93	52	216

Shangsha Village Small Square

PERIOD 1, 3 AND 6	ABSOLUTE NUMBER			
12 SZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	20	63	27	110
WORKING-AGED PEOPLE	0	5	0	5
SMALL CHILDREN	1	4	2	7
WOMEN	3	15	20	38
MEN	17	53	7	77
INDIVIDUALS	0	13	2	15
GROUP 3+	19	55	19	93
PAIRS	2	4	8	14
EXCERSICING	0	2	17	19
SITTING	13	39	4	56
STANDING	7	27	6	40
CHESS/CARDS	17	44	0	61
BABY SITTING	2	7	5	14

Xiasha Village Square

PERIOD 1, 4 AND 6	ABSOLUTE NUMBER			
13 SZ	LOW	MEDIUM	HIGH	TOTAL
THE ELDERLY	38	98	21	157
WORKING-AGED PEOPLE	15	27	2	44
SMALL CHILDREN	33	47	14	94
WOMEN	26	50	17	93
MEN	27	75	6	108
INDIVIDUALS	17	24	4	45
GROUP 3+	47	106	25	178
PAIRS	22	42	8	72
EXCERSICING	0	11	11	22
SITTING	32	74	5	111
STANDING	21	40	7	68
CHESS/CARDS	0	29	0	29
BABY SITTING	57	89	22	168

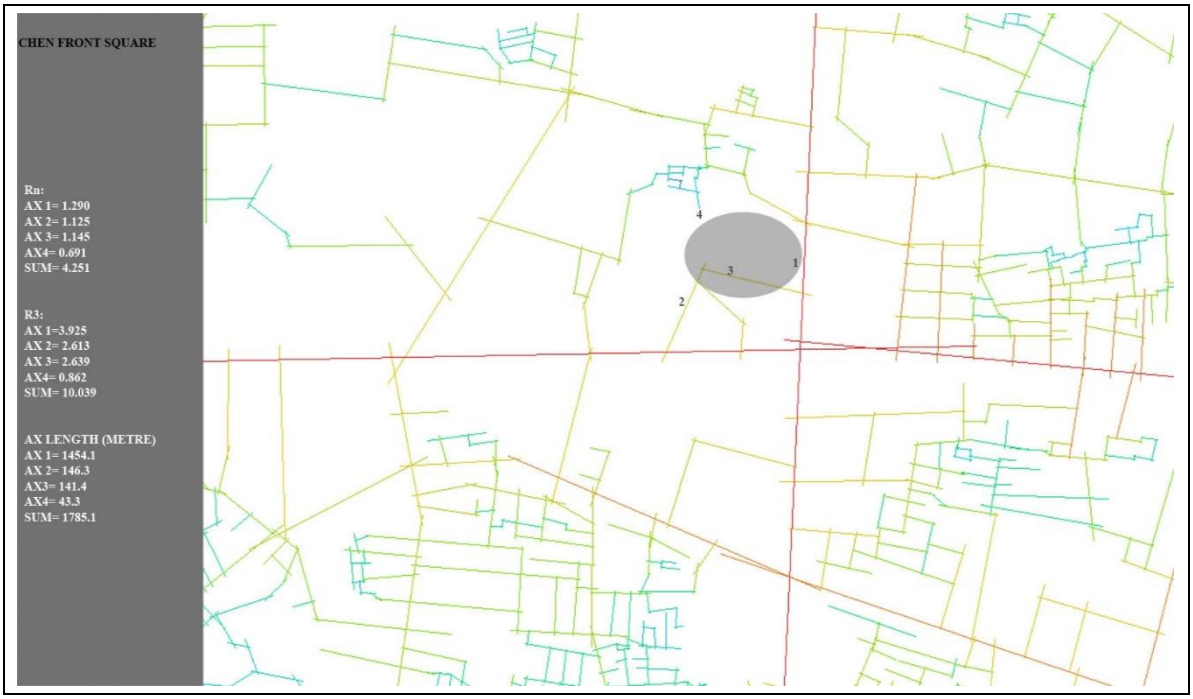
Appendix 3

Axial Maps

Theatre Square Guangzhou

Bridge Square Guangzhou

Chen Academy Square



Renwei Temple Square

Liwan Lake Square

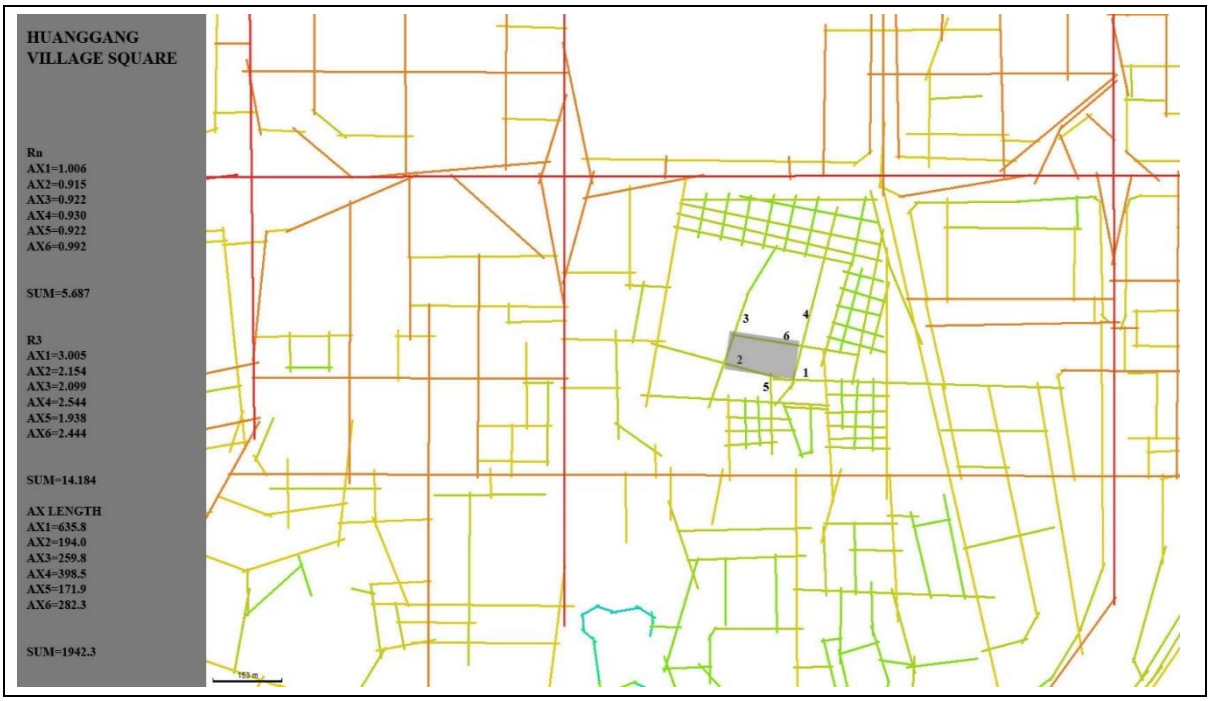
People Park Front Square

Dongmen Market Square Shenzhen

King Plaza Shenzhen

Tianmian Village Square Shenzhen

Huanggang Village Square Shenzhen



Shangsha Village Big Square Shenzhen

Shangsha Village Small Square Shenzhen

Xiasha Village Square Shenzhen

Gate Method Data

Theatre Square

OBSERVING DATE MONDAY 23.12.2013; TWO OBSERVERS ON SITE

THEATRE SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING INSIDE	GATE 1	7-9 AM	2	3	0	0	0	5
		9-11 AM	1	5	0	0	0	6
		11-13PM	1	4	0	0	0	5
		13-15PM	3	1	0	0	0	4
		15-17PM	3	11	5	6	1	26
		17-19PM	3	3	0	0	1	7
		TOTAL	13	27	5	6	2	53
	GATE 2	7-9 AM	6	5	1	2	0	14
		9-11 AM	5	12	0	0	0	17
		11-13PM	6	2	0	4	1	13
		13-15PM	0	6	0	2	0	8
		15-17PM	2	2	3	2	3	12
		17-19PM	1	2	4	5	2	14
		TOTAL	20	29	8	15	6	78
PEOPLE MOVING OUTSIDE	GATE 3							
		7-9 AM	2	3	8	13	0	26
		9-11 AM	4	7	9	11	2	33
		11-13PM	9	8	13	16	4	50
		13-15PM	8	12	5	10	2	37
		15-17PM	13	9	12	14	7	55
		17-19PM	12	17	19	21	6	75
		TOTAL	48	56	66	85	21	276

Bridge Square

OBSERVING DATE MONDAY 23.12.2013; TWO OBSERVERS ON SITE

BRIDGE SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE	GATE 1	7-9 AM	5	10	2	1	3	21
		9-11 AM	9	9	4	9	3	34
		11-13PM	6	4	4	7	1	22
		13-15PM	18	9	11	7	1	46
		15-17PM	7	11	6	4	2	30
		17-19PM	8	4	6	5	5	28
		TOTAL	53	47	33	33	15	181
	GATE 2							
		7-9 AM	1	0	0	0	0	1
		9-11 AM	0	0	1	1	0	2
		11-13PM	0	0	0	0	0	0
		13-15PM	8	8	5	10	2	33
		15-17PM	10	7	2	11	2	32
		17-19PM	8	4	6	8	8	34
		TOTAL	27	19	14	30	12	102
	GATE 3							
		7-9 AM	1	0	0	0	0	1
		9-11 AM	0	0	1	1	0	2
		11-13PM	0	0	0	0	0	0
		13-15PM	0	2	1	0	0	3
		15-17PM	1	2	2	0	0	5
		17-19PM	0	1	0	0	0	1
		TOTAL	2	5	4	1	0	12
PEOPLE MOVINGOUTSIDE	GATE 4							
		7-9 AM	6	8	16	8	12	50
		9-11 AM	12	9	21	19	8	69
		11-13PM	9	12	5	6	0	32
		13-15PM	7	10	12	9	1	39
		15-17PM	12	15	13	16	0	56
		17-19PM	15	9	21	25	11	81
		TOTAL	61	63	88	83	32	327

Chen Academy Square

OBSERVING DATE TUESDAY 24.12.2013; THREE OBSERVERS ON SITE

CHEN ACADEMY SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE	GATE 4	7-9 AM	1	3	0	0	0	4
		9-11 AM	1	6	2	1	0	10
		11-13PM	2	1	1	2	2	8
		13-15PM	3	3	2	1	0	9
		15-17PM	4	3		3	2	12
		17-19PM	1	0	8	7	0	16
		TOTAL	12	16	13	14	4	59
	GATE5							
		7-9 AM	3	2	15	19	0	39
		9-11 AM	8	5	11	13	0	37
		11-13PM	7	6	5	7	1	26
		13-15PM	4	0	11	8	0	23
		15-17PM	8	2	9	8	4	31
		17-19PM	2	0	22	18	0	42
		TOTAL	32	15	73	73	5	198
	GATE2							
		7-9 AM	1	2	0	1	0	4
		9-11 AM	3	3	1	3	0	10
		11-13PM	2	1	1	2	1	7
		13-15PM	1	0	4	5	0	10
		15-17PM	3	0	0	0	0	3
		17-19PM	1	0	4	1	2	8
		TOTAL	11	6	10	12	3	42
	GATE6							
		7-9 AM	2	1	21	12	0	36
		9-11 AM	4	6	12	23	1	46
		11-13PM	5	7	4	5	1	22
		13-15PM	5	2	12	9	2	30
		15-17PM	5	3	11	13	3	35
		17-19PM	8	1	17	25	0	51
		TOTAL	29	20	77	87	7	220
PEOPLE MOVING-OUTSIDE	GATE 3							
		7-9 AM	4	5	23	34	6	72
		9-11 AM	7	8	27	36	5	83
		11-13PM	5	4	25	21	7	62
		13-15PM	6	3	18	18	1	46
		15-17PM	6	2	23	20	3	54
		17-19PM	8	1	16	9	4	38
		TOTAL	36	23	132	138	26	355

		PERIODS	OLD MAN	OLD WO	MAN	WM	KID	TOTAL
	GATE 1	7-9 AM	0	0	0	0	0	0
		9-11 AM	1	0	1	0	0	2
		11-13PM	0	3	2	2	1	8
		13-15PM	1	2	4	4	1	12
		15-17PM	1	0	5	2	3	11
		17-19PM	0	1	3	0	0	4
		TOTAL	3	6	15	8	5	37

Renwei Temple Square

OBSERVING DATE WEDNESDAY 25.12.2013; TWO OBSERVERS ON SITE

RENWEI TEMPLE SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE	GATE 1	7-9 AM	3	12	1	2	0	18
		9-11 AM	3	9	1	5	3	21
		11-13PM	3	7	2	1	1	14
		13-15PM	3	7	2	1	1	14
		15-17PM	3	5	6	1	1	16
		17-19PM	4	1	5	9	0	19
		TOTAL	19	41	17	19	6	102
	GATE 3							
		7-9 AM	6	14	1	0	1	22
		9-11 AM	5	5	2	1	1	14
		11-13PM	5	5	2	1	1	14
		13-15PM	5	14	2	1	0	22
		15-17PM	4	6	3	4	3	20
		17-19PM	0	1	0	0	0	1
		TOTAL	25	45	10	7	6	93
	GATE 4							
		7-9 AM	7	15	6	8	1	37
		9-11 AM	8	33	2	3	0	46
		11-13PM	8	8	2	4	1	23
		13-15PM	3	8	1	3	3	18
		15-17PM	4	4	9	6	3	26
		17-19PM	4	4	9	6	3	26
		TOTAL	34	72	29	30	11	176
PEOPLE MOVING-OUTSIDE	GATE 2							
		7-9 AM	8	5	36	32	23	104
		9-11 AM	9	12	16	19	3	59
		11-13PM	22	31	7	10	6	76
		13-15PM	11	17	3	8	5	44
		15-17PM	21	15	12	7	6	61
		17-19PM	11	7	31	16	4	69
		TOTAL	82	87	105	92	47	413

Liwan Lake Square

OBSERVING DATE FRIDAY 27.12.2013; TWO OBSERVERS ON SITE

LIWAN LAKE SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE IS EQUAL TO PEOPLE MOVING OUTSIDE	GATE 1	7-9 AM	23	73	3	3	0	102
		9-11 AM	31	46	2	6	5	90
		11-13PM	9	18	2	7	2	38
		13-15PM	17	8	5	3	2	35
		15-17PM	11	12	2	2	0	27
		17-19PM	13	7	3	3	0	26
		TOTAL	104	164	17	24	9	318
	GATE 2							
		7-9 AM	20	37	4	5	1	67
		9-11 AM	23	39	1	6	7	76
		11-13PM	11	8	4	2	0	25
		13-15PM	9	7	3	2	1	22
		15-17PM	8	6	3	7	2	26
		17-19PM	14	4	7	7	3	35
		TOTAL	85	101	22	29	14	251
	GATE 3							
		7-9 AM	22	26	1	2	0	51
		9-11 AM	18	48	3	3	5	77
		11-13PM	2	26	1	3	0	32
		13-15PM	3	6	0	2	1	12
		15-17PM	4	7	4	4	3	22
		17-19PM	10	7	7	6	4	34
		TOTAL	59	120	16	20	13	228

People Park Front Square

OBSERVING DATE MONDAY 30.12.2013; THREE OBSERVERS ON SITE

PEOPLE PARK SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING INSIDE	GATE 2	7-9 AM	4	2	2	1	0	9
		9-11 AM	9	6	3	2	1	21
		11-13PM	7	9	5	4	3	28
		13-15PM	15	10	8	4	2	39
		15-17PM	13	6	8	6	2	35
		17-19PM	26	5	7	2	0	40
		TOTAL	74	38	33	19	8	172
	GATE 3							
		7-9 AM	1	0	0	0	0	1
		9-11 AM	0	0	0	0	0	0
		11-13PM	2	2	1	1	0	6
		13-15PM	6	0	3	1	0	10
		15-17PM	4	0	3	2	1	10
		17-19PM	1	0	0	0	0	1
		TOTAL	14	2	7	4	1	28
	GATE 4							
		7-9 AM	3	2	2	1	0	8
		9-11 AM	5	2	2	1	0	10
		11-13PM	9	2	5	0	0	16
		13-15PM	9	0	7	1	0	17
		15-17PM	11	1	5	1	0	18
		17-19PM	6	1	2	0	0	9
		TOTAL	43	8	23	4	0	78
	GATE 11							
		7-9 AM	1	1	0	0	0	2
		9-11 AM	2	0	0	1	0	3
		11-13PM	3	2	2	1	0	8
		13-15PM	9	3	6	3	1	22
		15-17PM	3	2	1	1	1	8
		17-19PM	4	1	2	0	1	8
		TOTAL	22	9	11	6	3	51
	GATE 12							
		7-9 AM	0	0	0	0	0	0
		9-11 AM	3	2	1	1	1	8
		11-13PM	1	2	1	1	1	6
		13-15PM	3	0	1	0	0	4
		15-17PM	4	1	1	0	0	6

		17-19PM	0	0	2	0	0	2
		TOTAL	11	5	6	2	2	26
	GATE 1							
		7-9 AM	1	2	18	21	0	42
		9-11 AM	18	24	42	17	6	107
		11-13PM	17	6	29	16	10	78
		13-15PM	28	33	35	35	5	136
		15-17PM	15	13	29	31	12	100
		17-19PM	16	12	42	25	7	102
		17-19PM	95	90	195	145	40	565
	GATE 6							
		7-9 AM	0	0	0	0	0	0
		9-11 AM	1	1	2	1	0	5
		11-13PM	3	2	2	0	0	7
		13-15PM	6	0	1	3	0	10
		15-17PM	6	3	4	1	0	14
		17-19PM	3	4	0	0	1	8
		TOTAL	19	10	9	5	1	44
	GATE 9							
PEOPLE MOVING OUTSIDE		PERIODS	OLD MAN	OLD WO	MAN	WM	KID	TOTAL
		7-9 AM	11	13	7	6	1	38
		9-11 AM	13	4	8	4	1	30
		11-13PM	3	5	1	2	0	11
		13-15PM	9	7	4	2	0	22
		15-17PM	18	15	10	7	6	56
		17-19PM	14	6	8	4	4	36
		TOTAL	68	50	38	25	12	193

King Plaza

OBSERVING DATE MONDAY 10.01.2014; TWO OBSERVERS ON SITE

KING PLAZA GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING INSIDE	GATE 4	7-9 AM	1	2	4	6	0	13
		9-11 AM	0	1	2	7	1	11
		11-13PM	1	0	3	4	2	10
		13-15PM	2	4	4	7	2	19
		15-17PM	2	1	7	6	1	17
		17-19PM	2	3	16	9	2	32
		TOTAL	8	11	36	39	8	102
	GATE 5							
		7-9 AM	1	2	11	13	0	27
		9-11 AM	2	3	15	11	0	31
		11-13PM	2	1	3	5	2	13
		13-15PM	2	2	2	3	2	11
		15-17PM	3	6	7	9	1	26
		17-19PM	1	0	12	13	1	27
		TOTAL	11	14	50	54	6	135
	GATE 6							
		7-9 AM	0	0	4	5	0	9
		9-11 AM	2	2	3	7	2	16
		11-13PM	1	0	3	3	0	7
		13-15PM	2	1	5	7	0	15
		15-17PM	0	1	5	5	1	12
		17-19PM	1	2	9	11	2	25
		TOTAL	6	6	29	38	5	84
	GATE 7							
		7-9 AM	0	1	7	9	0	17
		9-11 AM	2	2	5	8	0	17
		11-13PM	0	3	3	3	1	10
		13-15PM	3	4	1	2	2	12
		15-17PM	2	3	8	11	0	24
		17-19PM	1	3	11	9	0	24
		TOTAL	8	16	35	42	3	104
	GATE 8							
		7-9 AM	0	1	2	3	0	6
		9-11 AM	2	1	2	4	0	9
		11-13PM	2	0	3	1	0	6
		13-15PM	1	2	5	3	2	13
		15-17PM	1	0	7	4	0	12
		17-19PM	1	3	4	7	0	15
		TOTAL	7	7	23	22	2	61
		7-9 AM	2	3	6	9	1	21
		9-11 AM	2	1	12	7	0	22

PEOPLE MOVING-OUTSIDE	GATE 1	11-13PM	2	1	27	21	0	51
		13-15PM	7	6	18	20	2	53
		15-17PM	9	3	21	17	1	51
		17-19PM	6	5	23	16	0	50
		TOTAL	28	19	107	90	4	248
	GATE 2							
		7-9 AM	0	2	5	5	0	12
		9-11 AM	2	1	12	7	0	22
		11-13PM	3	3	6	4	0	16
		13-15PM	5	6	9	6	0	26
		15-17PM	4	7	12	6	0	29
		17-19PM	2	0	8	10	0	20
		TOTAL	16	19	52	38	0	125
	GATE 3							
		7-9 AM	1	0	5	6	1	13
		9-11 AM	0	0	0	0	0	0
		11-13PM	0	0	0	0	0	0
		13-15PM	0	0	2	3	0	5
		15-17PM	3	0	6	3	0	12
		17-19PM	1	0	6	3	0	10
		TOTAL	5	0	19	15	1	40

Tianmian Village Square

OBSERVING DATE MONDAY 06.01.2014; TWO OBSERVERS ON SITE

TIANMIAN VILLAGE SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING INSIDE	GATE 1	7-9 AM	1	0	0	0	0	1
		9-11 AM	0	0	0	1	0	1
		11-13PM	0	1	1	1	0	3
		13-15PM	3	1	11	2	3	20
		15-17PM	0	0	1	2	1	4
		17-19PM	1	0	2	2	0	5
		TOTAL	5	2	15	8	4	34
	GATE 2							
		7-9 AM	0	5	0	0	0	5
		9-11 AM	3	3	1	0	0	7
		11-13PM	2	7	3	3	0	15
		13-15PM	3	1	2	2	3	11
		15-17PM	0	1	1	0	0	2
		17-19PM	0	0	7	10	4	21
		TOTAL	8	17	14	15	7	61
	GATE 3							
		7-9 AM	0	3	0	0	0	3
		9-11 AM	1	3	1	2	3	10
		11-13PM	2	2	5	2	0	11
		13-15PM	3	0	6	4	5	18
		15-17PM	0	1	4	6	2	13
		17-19PM	2	0	0	2	1	5
		TOTAL	8	9	16	16	11	60
	GATE 4							
		7-9 AM	2	0	2	2	1	7
		9-11 AM	2	4	0	0	2	8
		11-13PM	1	3	0	8	0	12
		13-15PM	0	0	0	1	1	2
		15-17PM	0	0	0	0	0	0
		17-19PM	1	2	0	1	2	6
		TOTAL	6	9	2	12	6	35
	GATE 5							
		7-9 AM	3	2	1	0	0	6
		9-11 AM	2	1	0	1	0	4
		11-13PM	0	1	2	5	0	8
		13-15PM	2	5	1	2	1	11
		15-17PM	0	1	0	0	0	1
		17-19PM	0	1	0	0	0	1

		TOTAL	7	11	4	8	1	31
PEOPLE MOVING-OUTSIDE	GATE 6	**PERIODS**	**OLD MAN**	**OLD WOMAN**	**MAN**	**WOMAN**	**KID**	**TOTAL**
		7-9 AM	6	2	6	3	2	19
		9-11 AM	5	4	11	5	6	31
		11-13PM	1	3	17	9	3	33
		13-15PM	6	1	25	5	2	39
		15-17PM	8	1	24	8	7	48
		17-19PM	7	0	18	10	1	36
		17-19PM	33	11	101	40	21	206
	GATE 7							
		7-9 AM	7	3	16	16	3	45
		9-11 AM	2	6	26	19	7	60
		11-13PM	2	3	10	13	13	41
		13-15PM	5	3	32	25	7	72
		15-17PM	4	3	21	11	4	43
		17-19PM	5	8	25	11	8	57
		17-19PM	25	26	130	95	42	318
	GATE 8							
		7-9 AM	2	2	1	2	1	8
		9-11 AM	3	1	2	3	10	19
		11-13PM	0	0	3	3	4	10
		13-15PM	2	1	4	7	8	22
		15-17PM	1	6	2	1	15	25
		17-19PM	2	2	5	4	6	19
		17-19PM	10	12	17	20	44	103

Huanggang Village Square

OBSERVING DATE THURSDAY 09.01.2014; TWO OBSERVERS ON SITE

HUGANGANG VILLAGE SQUARE - GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE	GATE 1	7-9 AM	1	2	2	4	1	10
		9-11 AM	2	6	5	4	5	22
		11-13PM	2	4	2	4	2	14
		13-15PM	1	0	5	7	1	14
		15-17PM	4	6	5	4	2	21
		17-19PM	5	7	8	11	12	43
		TOTAL	15	25	27	34	23	124
	GATE 2							
		7-9 AM	1	1	9	5	0	16
		9-11 AM	0	3	5	12	3	23
		11-13PM	3	2	5	4	2	16
		13-15PM	1	2	3	3	1	10
		15-17PM	3	1	3	3	5	15
		17-19PM	3	1	9	11	5	29
		TOTAL	11	10	34	38	16	109
	GATE 3							
		7-9 AM	1	0	3	2	0	6
		9-11 AM	1	0	3	3	0	7
		11-13PM	1	0	1	2	1	5
		13-15PM	0	2	1	0	0	3
		15-17PM	1	3	0	1	2	7
		17-19PM	2	2	5	6	1	16
		TOTAL	6	7	13	14	4	44
	GATE 4							
		7-9 AM	1	0	1	0	0	2
		9-11 AM	1	0	2	3	1	7
		11-13PM	0	0	1	2	0	3
		13-15PM	1	2	2	0	0	5
		15-17PM	2	0	3	2	1	8
		17-19PM	1	2	3	7	0	13

		TOTAL	6	4	12	14	2	38
PEOPLE MOVING-OUTSIDE	GATE 5	PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
		7-9 AM	3	4	11	6	2	26
		9-11 AM	4	2	8	3	8	25
		11-13PM	3	6	4	7	3	23
		13-15PM	3	6	9	8	2	28
		15-17PM	8	9	8	12	8	45
		17-19PM	3	4	12	11	4	34
		TOTAL	24	31	52	47	27	181
	GATE 6							
		7-9 AM	5	3	21	16	2	47
		9-11 AM	6	7	16	19	9	57
		11-13PM	5	8	11	14	3	41
		13-15PM	4	3	7	8	2	24
		15-17PM	2	3	24	19	7	55
		17-19PM	6	9	17	26	8	66
		TOTAL	28	33	96	102	31	290
	GATE 7							
		7-9 AM	5	2	10	12	3	32
		9-11 AM	10	8	10	13	11	52
		11-13PM	7	4	11	15	3	40
		13-15PM	6	2	12	16	2	38
		15-17PM	9	3	16	14	8	50
		17-19PM	2	7	17	36	8	70
		17-19PM	39	26	76	106	35	282

Shangsha Village Big Square

OBSERVING DATE TUESDAY 07.01.2014; TWO OBSERVERS ON SITE

SHANGSHA BIG SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE	GATE 1	7-9 AM	0	2	0	0	0	2
		9-11 AM	2	4	1	1	4	12
		11-13PM	0	4	1	2	4	11
		13-15PM	1	0	0	3	1	5
		15-17PM	3	1	2	4	3	13
		17-19PM	2	0	1	2	1	6
		TOTAL	8	11	5	12	13	49
	GATE 2							
		7-9 AM	0	4	2	11	47	64
		9-11 AM	5	2	1	1	3	12
		11-13PM	0	0	1	6	1	8
		13-15PM	0	1	3	2	3	9
		15-17PM	4	2	3	6	3	18
		17-19PM	0	0	2	1	0	3
		TOTAL	9	9	12	27	57	114
	GATE 3							
		7-9 AM	0	1	0	0	0	1
		9-11 AM	3	2	1	1	1	8
		11-13PM	0	1	0	0	0	1
		13-15PM	0	2	1	2	3	8
		15-17PM	0	0	0	1	1	2
		17-19PM	1	0	1	1	0	3
		TOTAL	4	6	3	5	5	23
	GATE 4							
		7-9 AM	0	0	5	3	0	8
		9-11 AM	1	1	1	2	3	8
		11-13PM	3	2	3	3	1	12
		13-15PM	0	1	6	2	1	10
		15-17PM	2	4	3	1	2	12
		17-19PM	0	4	5	5	4	18
		TOTAL	6	12	23	16	11	68
	GATE 5							
		7-9 AM	0	3	0	0	0	3
		9-11 AM	1	0	1	2	0	4
		11-13PM	1	3	6	11	26	47

		13-15PM	0	3	4	5	8	20
		15-17PM	2	3	2	2	3	12
		17-19PM	3	2	3	4	6	18
		TOTAL	7	14	16	24	43	104
PEOPLE MOVING-OUTSIDE	GATE 6	**PERIODS**	**OLD MAN**	**OLD WOMAN**	**MAN**	**WOMAN**	**KID**	**TOTAL**
		7-9 AM	10	2	34	28	1	75
		9-11 AM	2	11	2	20	14	49
		11-13PM	6	5	2	10	7	30
		13-15PM	5	6	5	7	4	27
		15-17PM	5	7	14	12	3	41
		17-19PM	9	4	25	14	3	55
		17-19PM	37	35	82	91	32	277
	GATE 7							
		7-9 AM	1	2	11	13	3	30
		9-11 AM	1	2	10	6	6	25
		11-13PM	4	3	10	13	13	43
		13-15PM	3	2	12	15	11	43
		15-17PM	2	3	15	24	24	68
		17-19PM	9	13	17	19	15	73
		17-19PM	20	25	75	90	72	282

Shangsha Village Small Square

OBSERVING DATE TUESDAY 07.01.2014; TWO OBSERVERS ON SITE

SHANGHA VILLAGE SMALL SQUARE- GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING INSIDE	GATE 8	7-9 AM	2	0	0	0	1	3
		9-11 AM	3	1	0	2	1	7
		11-13PM	1	1	0	0	3	5
		13-15PM	2	1	0	0	2	5
		15-17PM	2	3	2	1	1	9
		17-19PM	2	0	1	0	0	3
		TOTAL	12	6	3	3	8	32
	GATE 9							
		7-9 AM	0	1	0	1	0	2
		9-11 AM	1	1	0	0	0	2
		11-13PM	0	0	3	0	0	3
		13-15PM	2	1	1	0	0	4
		15-17PM	1	0	0	3	1	5
		17-19PM	1	0	4	1	1	7
		TOTAL	5	3	8	5	2	23
	GATE 10							
		7-9 AM	0	1	0	1	0	2
		9-11 AM	0	0	0	1	0	1
		11-13PM	0	0	0	0	1	1
		13-15PM	2	1	0	0	0	3
		15-17PM	0	0	2	2	0	4
		17-19PM	0	0	0	0	0	0
		TOTAL	2	2	2	4	1	11
PEOPLE MOVING OUTSIDE	GATE 6	**PERIODS**	**OLD MAN**	**OLD WOMAN**	**MAN**	**WOMAN**	**KID**	**TOTAL**
		7-9 AM	10	2	34	28	1	75
		9-11 AM	2	11	2	20	14	49
		11-13PM	6	5	2	10	7	30
		13-15PM	5	6	5	7	4	27
		15-17PM	5	7	14	12	3	41
		17-19PM	9	4	25	14	3	55
		17-19PM	37	35	82	91	32	277
	GATE 7							
		7-9 AM	1	2	11	13	3	30
		9-11 AM	1	2	10	6	6	25
		11-13PM	4	3	10	13	13	43
		13-15PM	3	2	12	15	11	43
		15-17PM	2	3	15	24	24	68
		17-19PM	9	13	17	19	15	73
		17-19PM	20	25	75	90	72	282

Xiasha Village Square

OBSERVING DATE WEDNESDAY 08.01.2014; TWO OBSERVERS ON SITE

XIASHA VILLAGE SQUARE GATE COUNT		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
PEOPLE MOVING-INSIDE	GATE 1	7-9 AM	1	0	10	4	1	16
		9-11 AM	1	2	2	2	1	8
		11-13PM	6	3	3	2	2	16
		13-15PM	0	3	3	3	12	21
		15-17PM	2	4	2	6	7	21
		17-19PM	6	3	4	4	11	28
		TOTAL	16	15	24	21	34	110
	GATE 2							
		7-9 AM	3	1	2	2	0	8
		9-11 AM	5	1	0	3	3	12
		11-13PM	2	1	9	1	1	14
		13-15PM	3	1	3	4	6	17
		15-17PM	2	1	6	3	1	13
		17-19PM	0	0	7	5	1	13
		TOTAL	15	5	27	18	12	77
	GATE 3							
		7-9 AM	2	2	0	1	0	5
		9-11 AM	1	2	0	0	0	3
		11-13PM	3	0	2	1	2	8
		13-15PM	1	0	2	1	1	5
		15-17PM	0	4	0	0	1	5
		17-19PM	2	1	3	0	2	8
		TOTAL	9	9	7	3	6	34
	GATE 4							
		7-9 AM	2	3	0	1	0	6
		9-11 AM	2	1	3	1	1	8
		11-13PM	3	2	1	4	1	11
		13-15PM	3	0	1	1	2	7
		15-17PM	3	3	2	4	3	15
		17-19PM	2	1	9	4	3	19
		TOTAL	15	10	16	15	10	66
	GATE 5							
		7-9 AM	3	5	26	24	4	62
		9-11 AM	3	8	4	5	3	23
		11-13PM	1	5	0	2	4	12
		13-15PM	4	0	4	2	3	13
		15-17PM	4	5	11	5	2	27
		17-19PM	2	4	9	9	6	30
		TOTAL	17	27	54	47	22	167
		PERIODS	OLD MAN	OLD WOMAN	MAN	WOMAN	KID	TOTAL
		7-9 AM	3	0	132	159	0	294
		9-11 AM	7	4	17	16	3	47

PEOPLE MOVING-OUTSIDE	GATE 6	11-13PM	4	4	13	7	3	31
		13-15PM	5	6	15	12	3	41
		15-17PM	8	2	19	19	7	55
		17-19PM	2	6	23	26	5	62
		17-19PM	29	22	219	239	21	530
	GATE 7							
		7-9 AM	2	1	16	7	0	26
		9-11 AM	2	1	6	3	1	13
		11-13PM	3	0	6	5	12	26
		13-15PM	4	3	6	5	0	18
		15-17PM	2	7	2	2	1	14
		17-19PM	5	10	10	6	22	53
		17-19PM	18	22	46	28	36	150