



## **Urban Characteristics of High-density Low-rise Residential Areas in Tokyo**

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### **Abstract**

This article aims to identify the urban characteristics of low-rise residential areas with high population density in Tokyo through the use of extensive fieldwork and mapping in a single case study area. Although the original planning for these high-density low-rise residential areas in Tokyo was inspired by the garden city philosophy, over time these areas have developed into different and original urban patterns. This article focuses on development patterns in the case study area that contribute to livability, such as gap spaces, distributed greenery, remnants of activity, and gradation of privacy. Knowledge of the characteristics of high-density low-rise residential areas can act as a starting point to address problems affecting these areas. Also, this knowledge is useful for developing future urban models for suburban low-rise residential areas that seek ways to achieve higher sustainability by increasing population density.

**Key words:** High density / low rise / urban morphology / residential area / sustainability





## 1. INTRODUCTION

The stereotypical image of Tokyo—extremely high population density, ultra-modern buildings, neon-clad streets, and crowded trains—does not correspond to the actual urban landscape that shapes most residential areas in the city. Narrow streets and small single family houses, many of which are made of wood, are common in Tokyo neighborhoods and can be reminiscent of a quiet village. The relatively high population density in Tokyo is achieved through a tightly knit, low-rise urban fabric of buildings with high lot coverage.

This paper investigates these areas, known in Japanese as *kōmitsu teisō* (meaning “*high-density, low-rise*”). In particular, this study examines public spaces to identify the physical elements that contribute to the livability of high-density, low-rise areas. Unlike previous studies that primarily looked at specific aspects of the urban environment, such as gaps and alleyways (Kim and Takahashi, 1995) or the composition of exterior gardens (Ochiai, 2007), this article aims to understand the relationship between the various elements that shape open public spaces.

The analysis is based on a case study on Himonya Sanchōme (Himonya Third District), a typical high-density, low-rise area, using in-depth mapping of open spaces. The patterns discovered through these mappings are used to identify key design principles that can be applied in the design of other low-rise urban morphologies in different locations or cultures. The design principles learned from Tokyo are also expected to be especially relevant for the transformation of suburban sprawl areas in light of efforts to increase population densities to address sustainability.

## 2. BACKGROUND

### 2.1 Object of study

Himonya Sanchōme was selected for the case study from the 23 wards in Tokyo because it meets the criteria of a residential area with high population density and low building height. Each criterion has been mapped separately using the following definitions. “*High density*” is defined as population density above 200 persons per hectare (mapped in Fig. 1-A). “*Low rise*” is defined as areas with building height up to 3 stories (10 to 12 m) (Fig. 1-B). Residential areas are identified by mapping both collective housing blocks and detached houses (Fig. 1-C). By overlaying these three maps, the geographic location of high-density, low-rise residential areas is identified



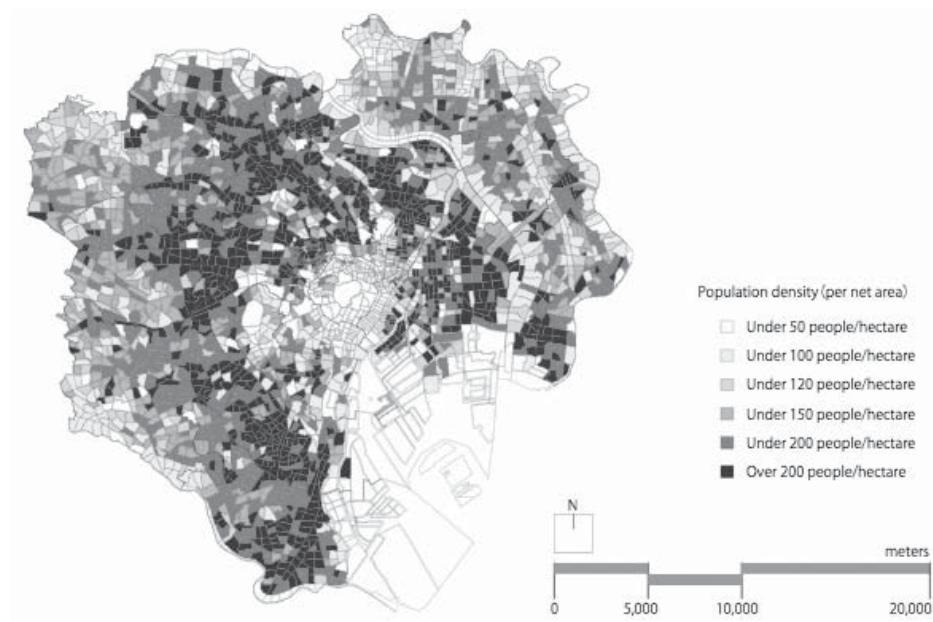


Fig. 1-A: Population density in Tokyo



Fig. 1-B: Low-rise buildings in Tokyo





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Fig. 1-C: Residential areas in Tokyo



Fig. 1-D: Defining high-density, low-rise residential areas in Tokyo



in each ward in Tokyo (Fig. 1-D). Many of these areas are found in the western part of Tokyo, where most residential suburbs were developed after the Second World War (Ohno 2006: 99). Himonya Sanchōme in Meguro Ward was selected and investigated for the case study, as it is a typical example of these high-density, low-rise residential areas.

## 2.2 Historical development

Living in high-density areas with traditional low-rise houses was common in the merchant districts of Edo (old Tokyo). However, most of the current low-rise, high-density areas did not directly evolve from the types of buildings in Edo, nor did they result from the vision of planners and architects. Rather, these areas are the unexpected result of social and economic factors since the beginning of the 20th century, such as high land values and the development of large quantities of land lots, especially after the period of rapid economic growth in the 1970s (Kim and Takahashi 1995: 87).

As seen in Fig. 1-D, high-density, low-rise residential areas are located in a ring around Tokyo's center, with a clear concentration in the western part of the city, most of which was originally farmland. Himonya Sanchōme is located in this western area and was farmland at the beginning of the 20th century, as shown in the 1909 map in Fig. 2-A. By the time of the Second World War, the area was already surrounded by consolidated urban areas that had developed rapidly along the railways built since the 1920s (see the 1937 map in Fig. 2-B). These new developments in the western part of Tokyo were originally planned and managed by private railways companies following the garden city model of spacious suburban living proposed by Ebenezer Howard (Sorensen 2004: 137). However, throughout the 20th century these areas have deviated greatly from the original vision of the Garden City. The most famous exception is the area of Den-En Chōfu, developed in 1923, which has kept its spacious lots and greenery to the present day because of its status as one of the most exclusive areas for the upper class in Tokyo.

The Japanese government has repeatedly revised regulations and put forth development plans to protect residential areas. Despite these efforts, however, changes in the economy and lifestyles have shifted many residential areas away from their original plans as garden suburbs in terms of land use, living environments, and landscape. The factors listed below have all combined to facilitate the development of the current low-rise, high-density areas in Tokyo.





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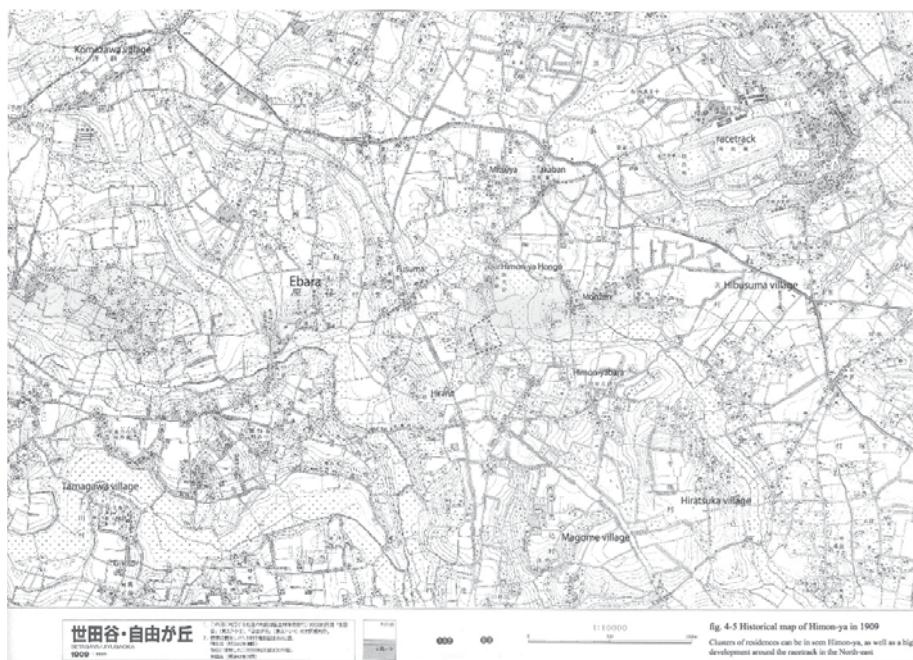


fig. 4-5 Historical map of Himon-ya in 1909  
Clusters of residences can be seen Himon-ya, as well as a high development around the racetrack in the North-east  
■ The marked area is the current location of Himon-ya 3-chome

Fig. 2-A: Historical map of the Setagaya/Jiyugaoka area in 1909 (Case study site outlined)

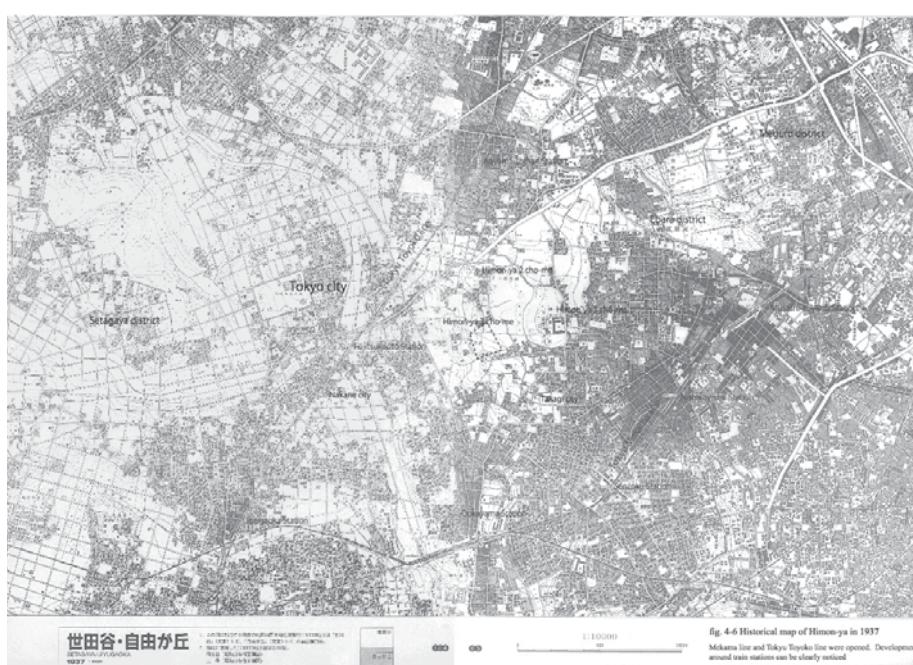


fig. 4-6 Historical map of Himon-ya in 1937  
Mekama line and Tokyo Tokei line were opened. Development around train stations can be clearly noticed  
■ The marked area is the current location of Himon-ya 3-chome

Fig. 2-B: Historical map of the Setagaya/Jiyugaoka area in 1937  
(Development of Tokyu railway lines)





1) *Subdivision of land.* One of the main physical factors that lead to changes in residential environments is the subdivision of land lots. As a consequence of the post-war period of rapid economic growth from 1954 to 1973, lower-income populations increasingly inhabited residential areas once owned by middle- to upper-class populations. Smaller lands lots were created and in them, smaller houses were built. Also, the Inheritance Tax Act in Japan has led to the subdivision of land, since inherited land is subjected to a high tax rate between 10% and 50% of the price of the land. Because of this taxation, many landowners subdivide their land to distribute it among relatives, or to sell part of the subdivided land to be able to pay the taxes on the remaining part.

Up until the present day, the Japanese Building Standards Law did not have limitations or guidelines concerning the subdivision of lots.<sup>1</sup> Currently, the only regulation when subdividing lots is that each lot must have an access space of at least 2 m in width to provide entry from the front road.

2) *Deregulation leading to intensification of land use.* Changes to the Building Standards Law have decreased regulation of land use. Consequently, the expected spatial density and landscape have changed from the initial conception. By using garages, basements, or other utility spaces it became possible to build residences that are more than 1.5 times the floor area ratio allowed by law. As a consequence, although the Japanese City Planning Act<sup>2</sup> of 1919 established a recommended minimum lot size of around 300 m<sup>2</sup>, most residential developments did not conform to this lot size. Presently, the typical lot size is estimated to be 100 m<sup>2</sup>, one-third of the originally recommended size (Koide and Fujii, 2000: 32).

3) *Change in lifestyle.* Changes in lifestyles have also contributed to the evolution of residential areas in Tokyo. For example, in recent developments, parking spaces, rather than gardens, are placed in the front of houses to accommodate the increased automobile traffic (Fig. 3). As a result, the amount of greenery in residential areas has decreased dramatically in recent years (Tabata and Kim 1989: 225-226).





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Fig. 3: Parking spaces in front of houses (from fieldwork in *Himonya Sanchōme*)

### 2.3 Problematic issues

The lack of open space and loss of greenery in residential areas have become problematic issues for high-density, low-rise residential areas in Tokyo. While building coverage limitations in exclusively residential areas are set in law at 60%,<sup>3</sup> in most cases only gap spaces of about half a meter are left around buildings. Also, the random formation of land lots has resulted in multiple dead-end streets in areas that have become even more densely populated. In the event of earthquake disasters, these conditions are considered dangerous.

These areas can also be criticized according to established urban theories and images of residential areas. The lack of greenery and the small lots differ greatly from the modernist ideal of the garden city model proposed by Ebenezer Howard (Howard, 1902). From the postmodern perspective, these almost exclusively residential areas can be critiqued as lacking the necessary mixture of uses to create lively streets.

Criticism should be carefully examined and necessary measures to improve these residential areas should be considered. However, the good qualities of these areas and the existing communities and lifestyles within these spaces, which would be destroyed in the event of radical urban redevelopment, must also be recognized. This paper aims to discover the characteristics of high-density, low-rise areas in Tokyo to explain, from a point of view of design theory, the reasons why these areas are often considered to be comfortable living environments by their inhabitants.





### 3. RESEARCH METHOD

This paper focuses on the human scale and spatial reflections of everyday life in a case study of a typical residential area in Tokyo. This in-depth investigation uses extensive field observation, mappings, and photograph analysis with the aim of clarifying the spatial qualities that contribute to the creation of livable and comfortable residential environments. Livability is a highly subjective quality that can differ according to cultural and social backgrounds. To understand the particular cultural context of Tokyo, this study uses the work of Soma and Hatakeyama (2001), who surveyed Tokyo residents to understand their ideas on livability. The results of the survey show that the most important factors for Tokyo residents when assessing a residential environment are, in order of importance, 1) sunlight and ventilation, 2) privacy, 3) amount of greenery, 4) house layout, 5) manners of the neighbors, 6) physical state of the environment, 7) transportation, and 8) safety.

The scope of this paper only includes outdoor spaces, accordingly, only factors directly related with public exterior spaces are considered. Sufficient sunlight and ventilation is a factor related with the internal architectural configuration of the house since there are no urban constraints, such as tall buildings, to prevent proper sunlight and ventilation in areas zoned as exclusively residential areas with height limitations between 10 and 12 m. The same can be said about house layout, manners of the neighbors, and transportation, which all are factors that fall outside the scope of this study. However, Japanese civility and manners and the excellence of the train transportation network in the 23 wards of Tokyo should be noted as important factors that contribute to livability, even though they are not considered here. In the rest of this study, privacy, greenery, the physical state of the environment, and safety are factors that will be addressed in regard to exterior space.

### 4. RESULTS OF MAPPING

The factors affecting livability mentioned above have been investigated by mapping the physical spatial configuration and the objects found in the open spaces of Himonya Sanchōme. The real intricacy and spatial richness of the area can be better understood as a complex interaction of overlapping layers. However, for analytical purposes, the results of the investigation has been summarized in four maps that cover the most relevant physical factors affecting livability, as will be argued in detail in the following sections.





#### 4.1 *Gap space: Visual permeability compensating for high lot coverage*

In low-rise, high-density areas the lot coverage is very high. Gross lot coverage in Himonya Sanchōme is 45.4%, which is a high ratio compared with similar areas like the previously mentioned Den-en Chōfu (29.4%, according to Ohno 2006: 101). In comparison with Den-en Chōfu, the spaces between buildings in Himonya Sanchōme have become *gaps* rather than proper gardens. These gap spaces could be considered as leftover or wasted space, but in visual terms they compensate for the high coverage ratio on the land by creating continuous visual permeability throughout the area. Although large open spaces are scarce, the addition of gap spaces creates a general sensation of openness. There is an increasing awareness among Japanese architects about the importance of considering *gap spaces* as an element of design. Tsukamoto and Kaijima (2006: 213) aim to establish gap space as a conscious design principle (see Moca House). Ryue Nishizawa's Moriyama House, where the house is divided into several small, stand-alone sections, is also a clear example of architectural awareness of the potential of gap spaces.

Gap spaces visible from the main roads in Himonya Sanchōme have been mapped by fieldwork observation and are shown in Fig. 4. Not all interstices are open; some of them are blocked with greenery or fences. The shaded areas show the actual visual range from the main streets. Sightlines from the street penetrate far into the residential block and it is possible to see past buildings into others' backyards and the verandas of homes, or even to the other side of the block. Open sightlines throughout the area turn the gaps into a window through which one can glimpse what is occurring inside the residences of others, as the photographs in Fig. 4-A to 4-C photographs show.





Fig. 4-A: View of gap①



Fig. 4-B: View of gap②



Fig. 4-C: View of gap③



Fig. 4-D: Afuredashi in gap④



Fig. 4: Spatial density and visible objectives





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The narrowness of gap spaces between adjacent houses or between the house and the street encourages inhabitants to provide added filters inside or outside the openings, such as vegetation, curtains, or devices such as *sudare* (traditional screens or blinds made of wood or bamboo). These soft filters and the presence of gaps create transparency and visual permeability in the streets. As a way of illustration to understand the character of this visual permeability, it is worth to compare Himonya Sanchōme with similar residential areas that have approximately the same architectural building coverage. For example, the Fitzroy area in Melbourne has gross building coverage of 44.8%. In Fitzroy, the typical configuration consists of Victorian row houses with a see-through fence along the street; visual openness is concentrated along the road, as shown in Fig. 5-A and 5-B).



Fig. 5-A: Visual permeability along the roadway in Fitzroy Fig. 5-B: No sightline through residences in Fitzroy  
(Both pictures taken from fieldwork in Fitzroy)

Gaps not only play a visual role, they also compensate for the limited interior residential space. As shown in Fig. 4-D, many personal belongings such as motorbikes, bicycles, and potted plants can be found in the gaps. Some items are placed outside the lot boundaries, but no one is prosecuted for this action. This phenomenon is very common in low-rise, high-density residential areas in Tokyo and is referred to as *afuredashi* (“overflow”) in Japanese by several researchers (Kim and Takahashi 1995, Aoki and Yuasa 1993). Due to this overflow of personal belongings onto the gaps between residences, the area lacks a clear delineation of the possession boundaries and functions.





Fig. 6: Greenery in *Himonya Sanchome*



Fig. 7: Plants in a blind alley



Fig. 8: Extension of lot border - afuredashi of potted plants



#### 4.2 Dispersed greenery: Private contributions to create an overall green atmosphere

The amount and layout of greenery has been mapped in Fig. 6. Greenery appears in various forms: trees and bushes, plantation hedges, and potted plants placed outside by the inhabitants. Although there are no large concentrations of greenery such as individual gardens, parks, or tree-lined streets, a fine-grained greenery is present in the whole area. As a natural reaction in order to compensate for narrowness, the density of greenery placed by inhabitants appears thicker along narrower streets. Greenery is especially thick near the entrances of blind alleys, where there are many potted plants that contribute to the general feeling of greenery (Fig. 7). This self-managed greenery is cultivated because of the strong awareness that other neighbors are paying attention and the sense of responsibility felt toward common space. Very often, private greenery grows beyond the private boundaries of each site (Fig. 8). This private border greenery can also be seen as an appropriation of public space, or *afuredashi* of greenery, which plays an important role in contributing to liveliness in the residential area, as discussed in the next section.



Fig. 9: Investigated roads

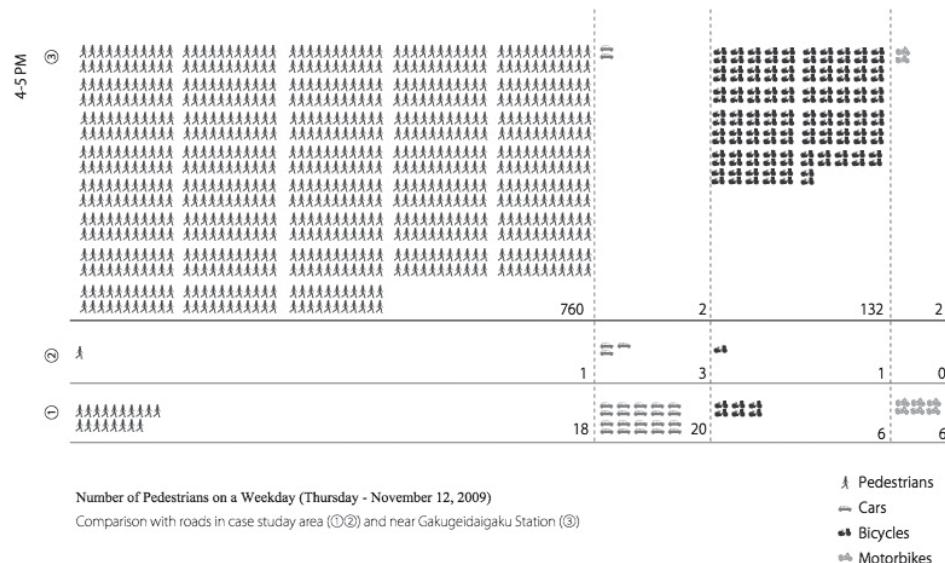


Fig. 10: Comparison of the number of pedestrians and vehicles on a weekday in residential areas and near a train station



Fig. 11: Remnants of activity: Personal belongings left on the street





#### 4.3 *Remnants of activity: Secondary contacts supporting liveliness*

Liveliness, the animation of streets, is an often-mentioned quality of public space. Although there is no consensus on what constitutes “*liveliness*”, the number of people on the streets is a commonly accepted measure of liveliness. In Tokyo’s low-rise, high-density areas there is a strong contrast between the bustling areas around train stations and much quieter residential areas. To offer a quantitative illustration, the flow of people in three streets was observed on a weekday. Two streets in Himonya Sanchōme, marked as no. 1 and no. 2 in Fig. 9, were compared with another street, marked as No. 3, leading to one of the nearby stations (Gakugei Daigaku Station). Typically, streets around stations concentrate the pedestrian flow, which decreases concentrically moving out toward the surrounding residential areas.

Observation in Himonya Sanchōme shows that few people are on the streets, especially around noon on weekdays (Fig. 10).<sup>4</sup> Social rhythms and gender roles are evident in these mainly residential areas. Because of the overwhelmingly residential nature of the area and the lack of functional mixture, the presence of people on the streets is connected with commuting and working hours. However, in spite of the lack of people on the street during periods of the day, dense inhabitation leaves personal belongings or *remnants of recent activities* of people to be seen. Cars, bicycles, plants, and laundry were frequently present in public spaces (as expected from the *ofuredashi* phenomenon mentioned above).

Figure 11 shows a map of elements visible from the streets. These objects are not abandoned, but rather left temporarily and provide evidence of activity. It is fair to say that these remnants offer liveliness to the area in the same sense that people do: the presence of human activity. The remnants are a secondary level of interaction that can be positioned as the lowest level of interaction intensity according to Jan Gehl’s table of possible interaction (Fig. 12). Gehl stresses the importance of passive contacts in public space, which he refers to as “see and hear” contacts. Seeing remnants of recent activity indicates human activity in the near past or imminent future and can be said to play a similar role to Gehl’s low intensity contacts. One can collect information about the surrounding social environment in the same way that can be achieved through by seeing and hearing people; one can predict the composition of a family or their lifestyles.





#### 4.4 Gradation of privacy: secondary “eyes on the street”

Jane Jacobs (1961) famously described how streets can contribute to safety by providing “eyes on the streets” People, windows, and shop entrances facing the street act as a deterrent of crime in public space. Jacobs also states that “*there must be a clear demarcation between what is public space and what is private space*” Himonya Sanchōme cannot be considered as a literal example of “eyes on the street” because the view from the windows is covered by blinds, screens, and vegetation; there are no shops; and few people are to be seen. Furthermore the boundaries between public and private are ambiguous, as explained before.

However, scale, articulation, and spatial practices act as secondary “eyes on the streets” The narrowness of streets and the small distance between houses is the first deterrent. Motorbikes, bicycles, and cars left on the streets, well-maintained potted plants, and gardening imply daily movement and activity. Public and private spaces are not clearly demarcated; rather, the border is blurred due to the *afuredashi* of personal belongings on the streets. The hierarchy instilled by the increasing width of streets creates the gradual boundaries of public and private areas of the city. This gradation from public to private is clearly visible when overlaying the map of personal belongings left on the street with the street hierarchy map (Fig. 13). It can be seen that there are more personal belongings left on the narrower streets, since they have a higher level of privacy. Small scale, the physical proximity of houses, and the width of streets create secondary “eyes on the streets.”

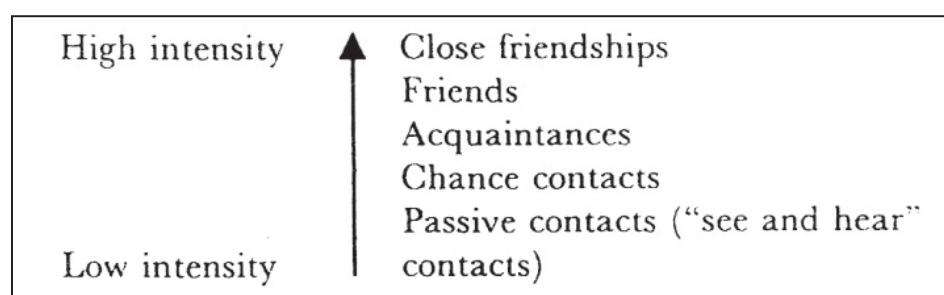


Fig. 12: Intensity of human interactions (from Gehl, 1987: 17)



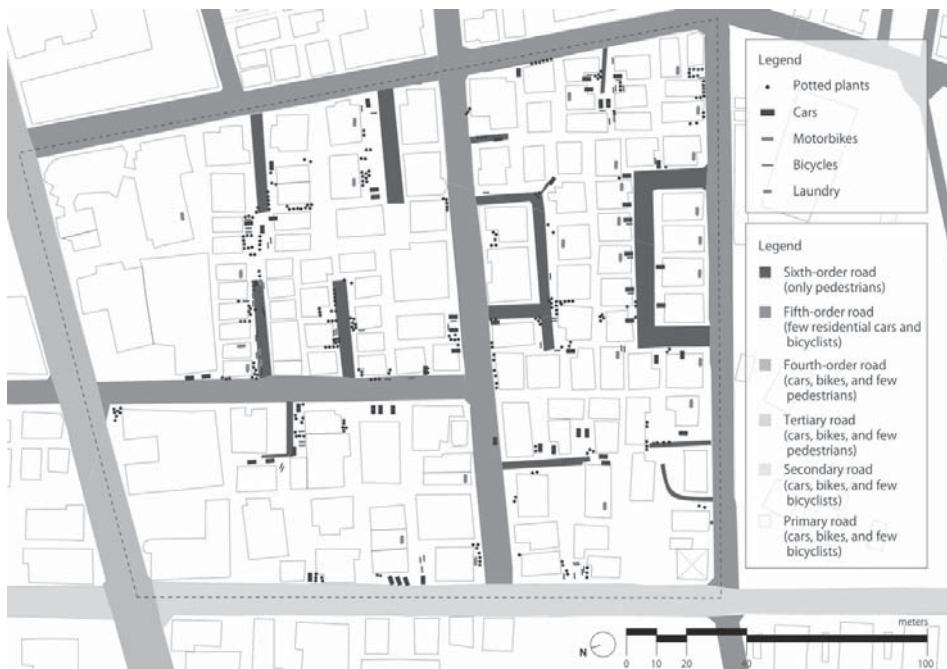


Fig. 13: Relationship between the hierarchy of streets and remnants of activity

## 5. CONCLUSION

This paper shows the characteristics of public spaces in Tokyo's high-density, low-rise residential areas from a positive perspective. In doing so, this study does not intend to neglect the problems that affect these areas, but rather aims to highlight properties that can be theorized and contribute to design theory. Secondly, this study seeks to overcome problems in these areas by emphasizing respect toward the existing urban fabric. This respectful attitude as a starting point represents an approach different from the modernist *tabula rasa* ideal of destroying the existing to create a new "rational" urban order.

High-density, low-rise residential areas in Tokyo can be considered as a failed urban form, since they did not reach the "garden city" ideal that inspired the first planning and land readjustment projects. Due to the lack of regulation, these areas became a fragile urban fabric easily transformed by subdivision of land, deregulation policies, and changes of lifestyle. However, in this loosely regulated and changing fabric a series of urban characteristics emerged. Through the case study of Himonya



Sanchōme, the following qualities have been identified. 1) There are no large open spaces, but the concentration of *gap spaces* achieves an overall visual permeability. 2) Parks and tree-lined streets are scarce, but private pieces of *dispersed greenery* contribute individually to create an overall atmosphere of greenery. 3) Due to its exclusively residential character, the liveliness of European mixed-use central precincts is not present; however, the small scale and local practices leaves remnants of recent activity in the open spaces, reinforcing an overall atmosphere of activity and human presence. 4) Streets do not concentrate all activities and views (as in the “*eyes on the street*” model); rather, to reinforce safety a subtle gradation of privacy exists that is achieved through the hierarchy of street width and the presence of remnants of activity and other obvious signs that the area is actively cared for by its inhabitants.

In conclusion, in these fragile urban fabrics a series of patterns that facilitate a satisfactory living environment have emerged and these areas have developed in local, original ways to achieve a livable high-density and low-rise morphology. The rich variety of semi-public spaces, filters, and interfaces between the houses and the exterior, and the spatial layout that encourages self-management of greenery are no doubt characteristics related to the specific Japanese urban context. However, these qualities, as abstract design principles and with the necessary adaptations, could also serve as inspiration in the design of neighborhoods in other cultural environments.





## NOTES

<sup>1</sup> In Japanese Kenchiku Kijun Hō [建築基準法]

<sup>2</sup> In Japanese Toshi Keikaku Hō [都市計画法]

<sup>3</sup> Lot coverage limitations for exclusively residential areas [住宅専用地域] in Japan are 30, 40, 50, or

60%. These numbers are determined by specific planning regulations in each district.

<sup>4</sup> Fieldwork was conducted on Thursday, November 12 through Sunday, November 15, 2009.

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