VIBRANT HIGH-DENSITY DEVELOPMENT WITHOUT HIGH-RISE BUILDINGS

An Urban Design Independent Study Project completed in partial fulfillment of the Master of Urban Planning degree

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Table of Contents

Abstract

In our rapidly changing world today, the context of housing development is changing faster than housing products. People's demand for better housing and a better life has increased dramatically in the past few decades. As a result, the two dominant models of housing in the city, high-rise multifamily housing and low-rise single-family housing, are not adequate to fulfill citizens' great demand for better housing anymore. High-rise housing easily achieves high residential density but fails to ensure a high quality of life. Low-rise housing causes urban sprawl and does not ensure the long-term sustainability of the city. All of these issues call for the creation of new model of housing that can achieve both high residential density and a high quality of life in the development.

The research on Vibrant High-Density Development without High-Rise Buildings aims to explore a new model of housing development and find optimal alternatives to conventional high-rise buildings, in order to provide better housing products that achieve both high residential density and a high quality of life in housing development. The research not only summarizes theories, criteria and design guidelines of designing vibrant high-density development without high-rise buildings, but also collects exemplary projects built in the past 20 years within a worldwide context, in order to present feasible alternatives to high-rise housing and creative ideas for designing vibrant high-density neighbourhoods. Furthermore, the research promotes housing forms related to the human scale and attempts to create intimate and attractive urban neighbourhoods in the city, in order to increase the quality and attractiveness of high-density development in the future.

Résumé

Dans un monde en constante évolution, le contexte du développement résidentiel change plus vite que ne le font les produits d'habitation. Les gens exigent de meilleurs habitations et qualité de vie en comparaison à il y a quelques décennies à peine. Par conséquent, les deux modèles dominants d'habitat dans la ville, l'habitat multi-famial dans une tour et l'habitation unifamiliale à basse densité, ne sont plus des modèles adéquats. La tour offre facilement une densité résidentielle élevée, mais elle ne garantit pas une bonne qualité de vie. L'habitation à hauteur limitée provoque l'étalement urbain et ne permet pas un développement urbain durable. Ces problèmes exigent la création de nouveaux produits d'habitation qui peuvent accomplir tant une haute densité résidentielle qu'une bonne qualité de vie dans les milieux résidentiels.

Dans ce rapport, le développement de haute densité et les nouveaux modèles d'ensembles résidentiels sont explorés. Pour fournir de meilleurs produits d'habitation qui offrent aussi bien une forte densité qu'une bonne qualité de vie, des alternatives optimales aux logements dans des tours conventionnelles sont recherchées. Cette recherche présente des concepts théoriques, des critères et des directives de design dans le but de concevoir un bon développement de haute densité. À cette fin, des projets exemplaires construits au cours des vingt dernières années dans le monde sont ici présentés comme étant des alternatives réalistes à la tour d'habitation et sont utilisées comme sources d'inspiration pour concevoir des quartiers de haute densité pleins de vie. En outre, la recherche promeut l'utilisation de formes d'habitation à échelle humaine et la création de quartiers urbains intimes et attrayants afin d'augmenter la qualité et l'attractivité du développement de haute densité dans l'avenir.

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Rationale of the Research

High-density residential development is a trend that is popular in most cities in the world, no matter they are fast-growing cities or slow-growing cities. Building communities with high densities is one of the major strategies adopted by both fast-growing cities and slow-growing cities to control urban sprawl and achieve the long-term sustainability of the city. It is “very difficult to separate ideas from the context”, because ideas are reactions and solutions to situations (Hall, 2002, p.265). The following are descriptions of situations in fast-growing cities and slow-growing cities.

Fast-growing cities

In eastern countries, such as China and Japan, high-density development is familiar to architects and planners in many fast-growing cities, where the population is high, so dealing with high population density remains one of the most significant subjects in community development. Additionally, rapid urbanization is still the context of many eastern cities, because the city is a different place, in terms of its job opportunities and vital environments, compared with suburban and rural areas. According to the United Nation Population Funding (UNFPA), over the past 60 years, the world has experienced a dramatic growth of its urban population (Figure 1.1.1): in 1950, 30% of the world’s population lived in urban areas; “in 2008, the world reaches an invisible but momentous milestone: For the first time in history, more than 50% its human population, 3.3 billion people, are living in urban areas”; and by 2030, the number is expected to swell to almost 5 billion, which is over 60% of the world’s population (UNFPA, 2007, p.1). In the next 20 years, the world’s urban growth is particularly notable in eastern cities, because the population of eastern countries keeps growing

very fast (ibid). Therefore, dealing with high population density continues to be significant issue for fast-growing cities in community development.

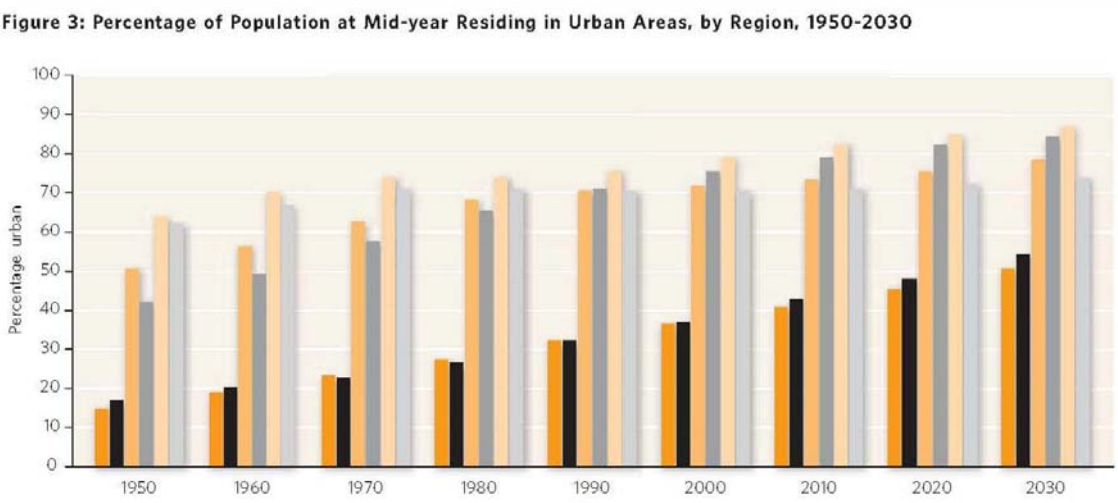


Figure 1.1.1: Urban population, by size class of settlement, world, 1975-2015
Source: UNFPA, 2007

There is a great deal of population migrating into the city, “there is a compelling need to control urban sprawl”, thereby there is certainly a growing interest in creating high-density development in fast-growing cities (Jenks and Dempsey, 2005, pp.416). Since there is a high demand for more urban housing and public facilities to accommodate the massive migration into cities, one of the direct solutions reached by the city and land use professionals is building more high-density communities to accommodate a growing urban population in the city. This phenomenon is very evident in many Chinese cities with aggressive urban growth, such as Beijing and Shanghai. High-rise, high-density development, primarily in the form of high-rise towers, has been a predominant model of community development during the late 20th century in China. Therefore, in fast-growing cities, the scheme of high-density development is posed by the large amount of urban population and rapid urbanization (Figure 1.1.2).

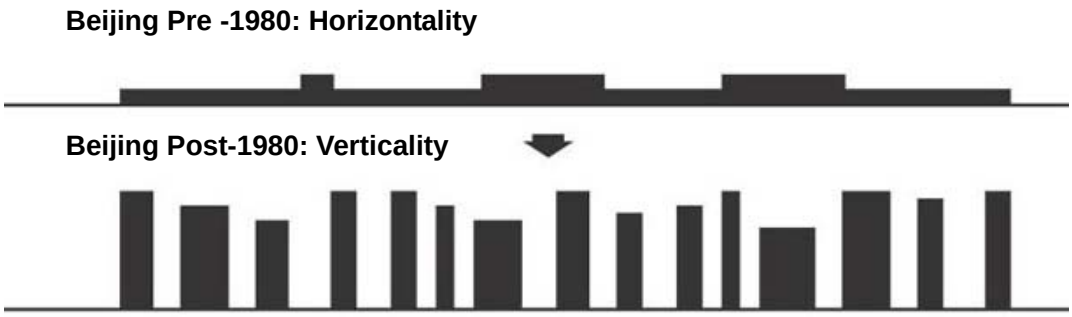


Figure 1.1.2: Urban silhouette of Beijing, pre-1980 (up) and post-1980 (below)
Source: http://www.stevenholl.com/project-detail

Slow-growing cities

Figure 1.1.3-1.1.4: Low-density development in Los Angeles outlying areas
Source: www.arch.mcgill.ca/prof/sijpkes/arch528/fall2001/lecture12/set-30.html

In western countries, such as the United States and Canada, high-density development is also more and more accepted by cities and land use professionals in recent decades, even though the majority of cities in these countries are slow-growing cities. Since the territory of the country is large and population density is low in these countries, low-density development, primarily in the form of single-family detached houses, has long been a dominant model of community development during the 20th century. The inefficient use of land results in widespread urban sprawl and the creation of a great deal of car-oriented neighbourhoods. Since low-density development is highly energy-consuming and does not increase the efficiency of using public infrastructure, it is unsustainable in the long run (Congress for the New Urbanism, 2000; ULI, 2008;

Edwards, 2005; Glicksman, L. et al. 2006; Friedman, A. 2007; Jenks & Dempsey, 2005). Cities in North American countries can "no longer afford to continue growing as they have in the past" (ULI, 2008, p.6) (Figure 1.1.3-1.1.4).

Ensuring a certain level of density in community development is one of the strategies to ensure the efficiency of using public infrastructure, reduce energy consumption and foster local economic growth (Congress for the New Urbanism, 2000; ULI, 2008; Friedman, A. 2007; Jenks & Dempsey, 2005) (see Section 2.3 for detail descriptions of values of high-density development). In recent few decades, building communities with higher densities is required by the city and encouraged by land use professionals in many slow-growing cities, in order to achieve the long-term sustainability of the city, because cities are paying closer attention to many new concerns in the 21st century, such as anticipated urban sprawl, the management of urban growth and the long-term outlook for energy etc. Therefore high-density development is also inevitable in slow-growing cities, even if some of the public is opposed to the idea of building communities with high densities.

Summary

In conclusion, high-density development, which is highly concerned with and coping with the sustainability of the city, is a significant issue in most cities in the world. Certainly, a high-density residential development that is acceptable to citizens who are used to living in high-density cities, such as cities in China and Japan, may not be appropriate for people who are coming from small towns and villages or for citizens who are used to living in cities with relatively lower densities, such as cities in the United States and Canada. In principle, there is no big difference in the general vision of community development in large cities throughout the world. All of the cities are

advocating residential developments with higher densities and vibrant living environments (Jenks and Dempsey, 2005, pp.415-417). As the first decade of the twenty-first century has just ended, it is time for architects and planners to think about what future high-density developments could be and how to design vibrant high-density development. Conducting research on the theories, criteria, built forms and the overall design of vibrant high-density development is worthwhile and imperative for land use professionals to be prepared for the future.

1.2 Definition of the Problem

Creating vibrant high-density development

Since the city and its citizens need high-density development, creating high-density development with vibrant living environment will be one of the primary tasks for developers and land use professionals in the new century. However, creating a vibrant housing community and at the same time achieving a relatively high residential density is a big challenge for developers and land use professionals. The following are major issues that community development will confront in the new century: Can we build high-density development without high-rise buildings? Where can we build high-density development without high-rise buildings? And how can we build vibrant high-density development without high- rise buildings?

Can we build high-density development without high-rise buildings?

The context of housing development is changing faster than housing products. Historically in western countries, the development of suburban single-family detached houses has long been associated with a wealthy population; and “the design of urban housing”, in particular apartment buildings, “has long been associated with public

housing for the poor" (French, 2006, p.8). However, in our rapidly changing world today, population is increasing, urbanization is spreading, population density is increasing, demographic structures are changing and new technologies are being invented all the time. As a result, the city and its social structure are constantly changing. In recent decades, architects and planners have primarily engaged their attention in the design of high-density housing for all of the high-income, middle-income and low-income populations, due to the new demographic structure and new density requirements of the city.

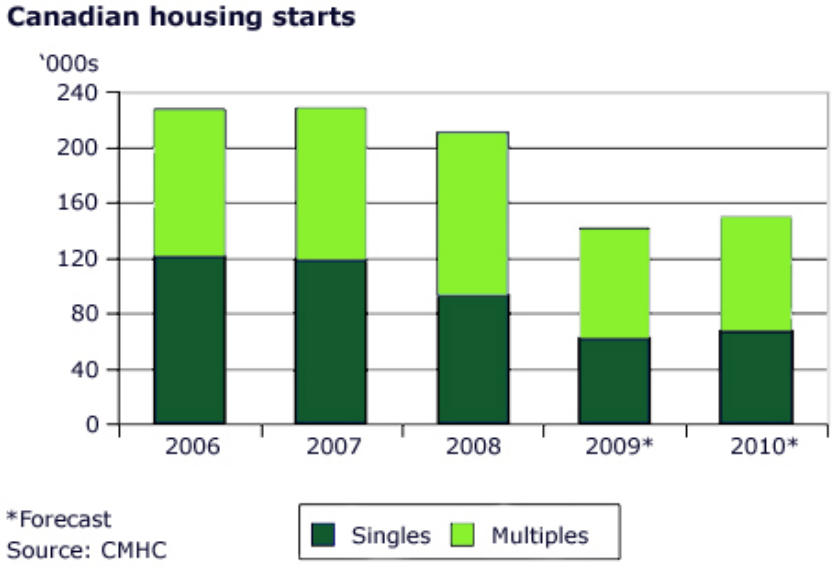


Figure 1.2.1: Canadian housing market outlook - total housing units of single-detached housing and multi-family housing in recent years
Source: CMHC, 2009

The middle-income population has been growing and now is the majority part of the urban population in many modern cities. People's demand for better housing and a better life has increased dramatically in the past few decades. There is a large demand in the housing market for vibrant high-density development that can ensure a high quality of life for citizens (Figure 1.2.1). However, the two dominant models of housing in many modern cities, high-rise multifamily housing and low-rise

single-family housing, are not adequate to fulfill citizens' great demand for better housing anymore (Figure 1.1.2-1.1.4). On one hand, conventional high-rise apartment buildings with poorly-structured site layout easily achieve high residential density, but do not ensure high quality of life for residents (Figure 1.2.2). On the other hand, conventional low-rise single-family houses seem to provide a better quality of life, but cause urban sprawl and do not ensure the long-term sustainability of the city (Figure 1.1.3-1.1.4). All of these issues call for the creation of new model of housing development that fulfills citizens' demand for better housing and at the same time ensures the long-term sustainability of the city.

Figure 1.2.2: A high-rise, high-density development in Montreal, at the intersection of Boulevard de Maisonneuve E and Rue St-Dominique
Source: www.bing.com, 2009

During the 20th century, high-rise apartment buildings are the predominant housing forms for high-density development in both eastern and western cities, especially in cities with fast growth. The typical layout of a high-rise, high-density community is simply situating a number of tall buildings on a large parcel of open land, which does

not seem to be an interesting neighbourhood to live and visit. Poorly-designed high-rise towers or slab buildings do not seem to satisfy residents. First, there is no direct enjoyment of natural features immediately outside housing units for residents living above the sixth floor (Schoenauer, 1994, pp. 95-105; Myers, 1979, pp. 104-113). Secondly, cramped elevators and narrow floor corridors are the only places where people meet and talk. Thirdly, residents are isolated in high-rise buildings for lack of easy access to streets and open spaces on the ground level. Additionally, poorly-designed huge open spaces on the ground level have never been used efficiently. Designers of these high-rise buildings had “little or no consideration for the delicate relationships that can exist between a human being and his or her environment” (Cuthbert, 1986, p.79). In one word, conventional high-rise housing has many shortcomings in social and environmental aspects (see Section 2.4.2 for detail descriptions) (Figure 1.2.2).

Building high-density development without high-rise buildings would be an ideal solution reached by the city and developers to fulfill citizens’ large demand for better housing that ensures a high quality of life. First, building high-density development without high-rise buildings can ensure that most of the residents have a direct enjoyment of natural features immediately outside their dwelling units. Secondly, it enables the creation of interesting and meaningful open spaces that effectively promote public activities in the community. Thirdly, it helps to create intimate urban neighbourhoods in the city for citizens to live and visit. In one word, this new model of housing development has many advantages that are lacking in conventional high-rise, high-density housing development (see Section 2.6 for detail descriptions).

In summary, the concept of building high-density development without high-rise

buildings, which is highly concerned with and coping with the rapidly changing context of housing development, is a major concern in future developments. The new concept aims to explore optimal alternatives to the two dominant models of housing, find ideal forms for high-density housing and promote optimal designs for vibrant high-density living environment, in order to meet the great demand of better housing in the city.

Where can we build high-density development without high-rise buildings?

People in the cities of western countries now live in an urban context that has been significantly transformed in the past few decades. Some of them live in low-rise, low-density housing in suburban areas and travel by car every day. Some of them live in high-rise, high-density housing in downtown areas and travel on foot or by public transit every day. A majority of them live in different types of housing on the periphery of the inner city with their employments in downtown and travel by car or public transit every day. It seems that even cities in North America that have lower population densities, in comparison with cities in Asia, “finally are more acceptable to an urban society that no longer expects the luxury of living in individual houses” (French, 2006, p.20). Therefore, there is a large demand for vibrant high-density housing on the periphery of the inner city (Figure 1.2.3).

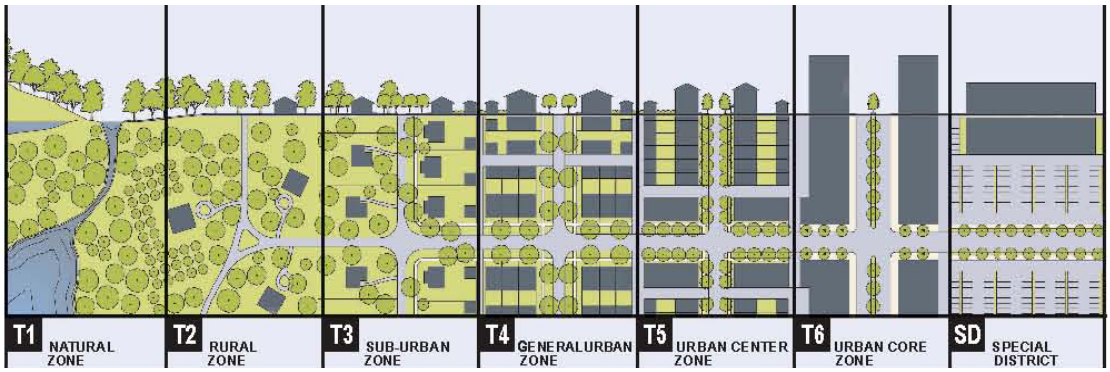


Figure 1.2.3: A typical rural-urban transect, with transect zones T1-T6
Source: www.smartcodecentral.org, 2009

Since there is a large demand in the city, there are certainly plenty of opportunities to build vibrant high-density development without high-rise building. The lands in between downtown areas (T6) and suburban areas (T3) of the city reflect these opportunities, for example, the lands within the urban center zone (T5), the lands within the general urban zone (T4), and even the lands close to a suburban town center within the suburban zone (T3) as shown in Figure 1.2.3. In these areas, both the density requirement of community development and the cost of land are relatively lower than that in downtown areas, and relatively higher than that in typical suburban areas. Therefore there is a wide choice when selecting built forms for community development. Architects and planners have a chance to decide whether to build high-density development with high-rise buildings or without high-rise buildings.

How can we build vibrant high-density development without high- rise buildings?

The recent trend in architecture and urban planning is to design medium-rise multifamily housing with a strong "intention to control the immediate surroundings" of the built form (A+U, 2009 Aug, p.9). According to the Congress for the New Urbanism, communities "should be compact, pedestrian-friendly"; "a range of green spaces…should be distributed within neighborhoods" to foster social interaction between residents; individual buildings "should be seamlessly linked to their surroundings"; public gathering places should be safe, comfortable, and interesting to the pedestrian and reinforce community identity (Calthorpe and Fulton, 2001, pp. 279-285; Congress for the New Urbanism, 2000, pp.71-175) (see Section 2.6 and Section 4.2 for detail descriptions). Architects and planners are still working hard to look for the best ways to design vibrant compact communities, to provide comfortable housing forms concerned with the actual users and families who live in high-density communities, and to create interesting and meaningful neighbourhoods for citizens to

live, visit, and experience. Therefore searching for optimal alternatives to conventional high-rise buildings and innovative designs for high-density neighbourhoods is imperative to architects, planners and urban designers before involving themselves in projects of community development.

1.3 Objectives of the Research

The future starts with the actions of today. The research on how to design vibrant high-density development without high-rise buildings attempts to find optimal alternatives to conventional high-rise built forms and innovative designs for high-density neighbourhoods. It also intends to encourage the creation of more satisfying designs and forms in future high-density developments. The research provides the reader a clear understanding of the complexities and new challenges of community development in the new era, prepares land use professionals comprehensive knowledge of high-density development, guides developers seeking to use the same vision to build communities, and assists architects and planners with their future practices on how to design a vibrant compact community achieving both high residential density and high quality of life. Meanwhile, it could provide potential community developers and participants some practical information, concepts, and scenarios of what a vibrant high-density development could be.

To answer the central research question, ***how to design vibrant high-density development without high-rise buildings,*** is the principal objective of the research. This broad research question leads to a few sub-questions closely relating to the design of vibrant high-density development, which have to be studied in order to answer the central research question. The following are specific objects of the research:

a. To understand the new challenges in future community development
b. To briefly study the concept, historical background and values of high-density development
c. To analyze negative attitudes towards and unsuccessful designs of past high-density development
d. To study theories, criteria and principles of vibrant high-density development which have already been proposed by scholars who have done similar studies before
e. To study recent exemplary projects of well-designed high-density development without high-rise buildings based on the theories and criteria found in front, examine these selected projects with respects to the theories and criteria found before, and summarize lessons learned from these projects with a great emphasis on urban design related issues
f. To review and analyze all of the theories, criteria and exemplary projects in front, and synthesize alternatives to high-rise built forms for high-density development
g. To summarize planning and design guidelines of how to build vibrant high-density development without huge high-rise buildings

Through intensively studying these specific objects closely relating to the central research question, the principal objective of the research will be achieved.

1.4 Methodology

The research is carried out in the following three recognizable stages: literature review, analysis of projects, and synthesis. A review of existing literature closely relating to the central research question and an intensive study of well-designed projects of vibrant high-density development are used as the overall methodology of the research.

Other appropriate analytical methods to fulfill various objectives of the research are used as the supplementary methodology. The following are detail explanations of the research methods.

Literature review

The first stage is a study of the general concept, historical background, and design flaws of past high-density developments as well as theories and criteria of vibrant high-density development in the recent research and studies, in order to have a good understanding and comprehensive knowledge on the broader context of high-density development. After a broad review of existing literature relating to high-density development and studying similar research conducted by other scholars, the general concept and historical background of high-density development, design flaws of past high-density developments as well as theories and criteria for recent high-density developments have been found out and studied in detail. Then new theories and criteria for vibrant high-density development are proposed based on the in-depth study conducted in front and real experience received from previous practices of high-density development. The main sources of information are published scholarly articles, journal articles and professional research reports. Reports from business organizations, student theses and information retrieved from the Internet are used as the supplementary sources of information.

Analysis of projects

The second stage is an intensive study of exemplary projects of high-density development, in order to obtain illustrated ideas and physical design approaches of how to create vibrant high-density development without high-rise buildings.

A total of 12 exemplary projects have been carefully selected from a group of well-designed high-density developments. Recently published design books and professional journals, as well as websites of design forms and professional research organizations are used as the major sources to select projects and collect relevant information and design documents. First, after a broad review of the major sources, almost 40 well-designed high-density projects built in the recent 20 years within a worldwide context were collected for general study, in order to have a comprehensive understanding of the recent trend of high-density development without high-rise buildings. Second, these 40 projects were classified into several groups based on different land use patterns of the development, such as the closed housing block, the U-shape housing block, the L-shape housing block, the two-bar housing block and free-style housing forms etc. Third, projects designed by world famous architects or famous design firms and award-winning projects were selected from each group for the final study, in order to ensure the quality of the design. In this way, 12 exemplary projects have different layouts and are the best ones of the group of total 40 projects.

Then, further information and design documents related to the selected project, such as site plan, architectural drawings, renderings, and site photos, as well as professional project reports and community development guidelines are collected again from the major sources as described before and used as the primary data to conduct the analysis during each case study. In order to have some on-site study, one project is selected from Montreal, where the whole research had been conducted. Net density of these projects could range from 75 dwellings per hectare (30/acre) to 400 dwellings per hectare (160/acre), focusing on developments with net density form 100 dwellings per hectare (40/acre) to 250 dwellings per hectare (100/acre) (Figure 1.4.1, Figure 2.1.1). If calculated in floor area ratio (FAR), net density could range from FAR 1 to FAR 4.

Dwelling Type or Neighborhood Type	Different Density Concepts (in dwellings per acre)		
	Net Density	Gross Density	Neighborhood Density
Single-family	up to 8	up to 6	up to 5
Zero lot line, detached single-family	8-10	6-8	6
Two-family, detached	10-12	8-10	7
Row houses	15-24	12-20	12
Townhouses	25-40	20-30	18
Walkup apartments	40-45	30-40	20
6-story apartments	65-75	50-60	30
High-rise apartments (13-story)	85-95	70-80	40
Mixed-use neighborhoods (e.g., Kentlands, Radburn)			4.5
Higher-density transit-oriented neigh'd. (TOD)			20.0

Figure 1.4.1: Typical residential densities
Source: Berke, 2006

Finally, theories, criteria, and principles of vibrant high-density development, which have been proposed in the first stage, are used to examine the design of these selected projects. After briefly analyzing the context and concept of the project, ideas and designs of the project are studied in detail, with an emphasis on examining design approaches related to planning and urban design, such as the overall layout of the site, the design of open spaces, and spatial relationships between built forms etc. Key findings learned from the project are summarized during each of the project study.

Synthesis

The third stage is a review and synthesis of all the theories and criteria found in the first stage as well as 12 exemplary projects studied in the second stage, in order to summarize key findings, introduce optimal alternatives to high-rise built forms for high-density development, summarize planning and design guidelines of how to build vibrant high-density development without high-rise buildings and make some recommendations for future high-density developments. Design guidelines are

synthesized with an emphasis on design approaches related to planning and urban design, such as how to deal with the overall site planning, the design of central open space and secondary open spaces, spatial relationships between built forms, as well as how to deal with the gateway, boundary and access route of the residential block. These design guidelines are organized according to different aspects of planning high-density development, such as finding “Alternatives to High-Rise Buidings”, and how to design “Safe Neighbourhoods”, “Healthy Neighbourhoods”, “Accessible Neighbourhoods”, “Active Neighbourhoods” and “Attractive Neighbourhoods”.

1.5 Structure of the Report

The final report of this research is structured in four chapters. Chapter 1 is an introduction of the research. It describes the rationale of studying high-density development in the city and the necessity of creating vibrant high-density development in the city. After that, new issues and challenges of future housing development, as well as objectives of the research are defined. At last, methodology and outline of the research are described in detail.

Chapter 2 is a review of the literature. It begins with the general concept of high-density development and different ways of measuring residential density. Then the historical background and evolution of high-density development are briefly studied and described. After that, values associated with high-density development are analyzed briefly. In the following sections, unsuccessful designs in past high-density developments and misconceptions about high-density development are studied. Finally, theories of building high-density development without high-rise buildings are studied and described, with a focus on finding out criteria for creating vibrant high-density

development in the city.

Chapter 3 is analysis of projects. In this chapter, a set of newly-built exemplary projects are studied and examined with respects to the theories, criteria and principles discovered in the literature review. Optimal alternatives to high-rise buildings for high-density development are introduced during each case study. In each of the cases, the study begins with analyzing the context of the project. Then concept, design and ideas are analyzed, with an emphasis on examining design approaches related to planning and urban design, such as how to deal with the overall site planning, the design of central open space and secondary open spaces, spatial relationships between built forms, relationships between buildings and their immediate surroundings as well as how to deal with the gateway, boundary and access route of the residential block. Lessons learned from the selected project are summarized at the end of each case study.

Chapter 4 is a synthesis and draws a conclusion of the research. Chapter 4 reviews and synthesizes all of the theories, criteria and projects studied in the previous chapters. First, it briefly reviews all the projects studied in Chapter 3, synthesizing design features of these projects and summarizing optimal alternatives to high-rise buildings. Then key findings, which are planning and design guidelines for how to design vibrant high-density development without high-rise buildings, are summarized with a focus on design elements in the scope of planning and urban design as described before. In the last section, there is a summary for the whole research and recommendations for future high-density developments.

Chapter 2

Literature Review

2.1 High-Density Development

High-density development is very common in cities throughout the world and provides homes for billions of people. In this research, high-density development refers to high-density residential development. Since there is a broad range of scenarios for this type of development, it is difficult to give a fixed definition to high-density development. However, it is still possible to define the general concept of high-density development.

Based strictly on design, high-density development refers to housing that contains a significant number of dwelling units, which normally are “stacked one on top of the other within the same building” (ULI, 2000, p.4). However, high-density development still can include a wide diversity of housing types, vary greatly in built forms and generate dramatically different layouts in the site plan. Based on form, it can be a huge individual apartment building, a group of smaller buildings, or a group of buildings different in scale and size. Based on quality, high-density development can range from luxury owner-occupied condominium buildings designed for higher-income families to affordable apartment buildings provided for lower-income families. Based on height, high-density development can range from medium-rise buildings of three to six stories in height to high-rise buildings of over 30 stories in height. Therefore, high-density development does not have to be high-rise buildings, because it includes much more than high-rise buildings.

Based strictly on density, high-density development can achieve net density from 50 dwellings per hectare (20 /acre) in the North American context up to 500 dwellings per hectare (200/acre) in the Eastern or European context. If calculated in floor area ratio

(FAR), high-density development can achieve net density ranging from FAR 1 up to FAR 10 or even more. Later in this research, project studies focus on residential developments with net density form 100 dwellings per hectare (40/acre) to 250 dwellings per hectare (100/acre); if calculated in FAR, net density could range from FAR 1 to FAR 4. Additionally, the concept of "high" density is fairly relative. A housing development with density of 80-100 dwellings per hectare (30-40/acre) considered as a high-density development in suburban areas is generally mediated by the density of most developments in the inner-city areas (Figure 2.1.1, Figure 1.4.1).

Figure 2.1.1: Developments with different densities – 40/acre (up left 1) and 100/acre (up left 2)
Source: www.hcd.ca.gov/hpd/mythsnfacts.pdf

Density measurement

There are different ways to calculate density: gross density, net density and net-net density. Gross density takes the whole developed area in the calculation, including all land uses within the same area (Berke, 2006, pp. 409-411). Net density, or "net site density", only takes the areas that relate to residential uses in the calculation (Jenks and Dempsey, 2005, p.293); but it should include the access roads, small gardens, car parking, nearby open spaces and playgrounds for children on site in the measure, and

exclude all the other uses and mixed uses from the measure (DETR, 2000b; Jenks and Dempsey, 2005, pp.287-307). Net-net density only takes the land occupied by residential buildings in the calculation. Since net density fails to take mixed uses and all land uses into account, it is necessary to measure gross density in large-scale projects in order to evaluate wider planning issues, such as the "walkability" of the neighbourhood, the "viability" of public transit, and the optimal location of public school, shopping centre and community centre (Rudlin and Falk, 1999; Jenks and Dempsey, 2005, pp. 287-307). In this research, net density is primarily used to measure the density of development.

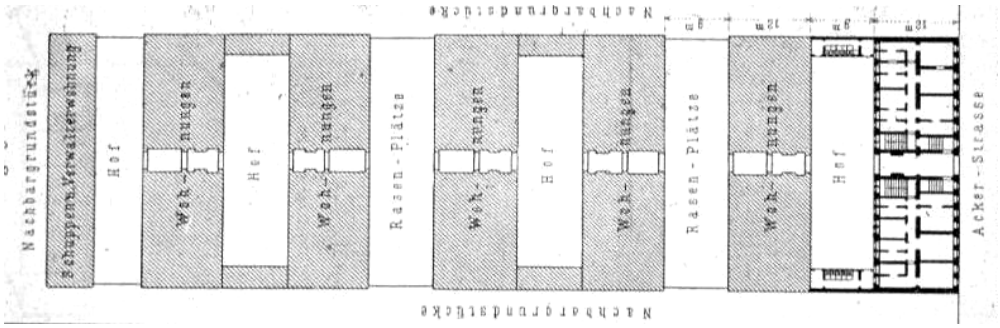
2.2 A Brief History of High-Density Development

High-density "living arrangements" can be dated back to the Middle Ages (11th – 15th century) in Western Europe: in early towns and cities of western countries, most residents, no matter if they were family members or not, lived "under the same roof" because they could not afford to have a house of their own (Schoenauer, 1992, pp.187-196; ULI, 2000, p.6). Those high-density housing scenarios are still far from high-density housing as we understand it today. If there are some prototypes of high-density development that look more like what we think of them today, they would be in the 19th century.

In the 19th century

Towns and cities in western countries, for example Germany, Britain and America, experienced rapid urbanization due to the rapid industrialization during the 19th century (Engels, 1845; Hall, 1988, pp. 13-46). People moved from the countryside into towns and cities for the work opportunities in many factories there. The migrant from rural

areas to cities created a large demand for housing in large industrial cities such as London, Berlin, Chicago and New York. Therefore a great deal of dwellings was built in cities and they were usually high-density apartment buildings, which were called “tenements” (ULI, 2000, p.6; Hall, 1988, p.34). Tenements in large industrial cities provided homes for workers, because these dwellings had a convenient location, normally allowing people to walk to their work (ULI, 2000, pp. 6-8). Landlords made them affordable to the poor by permitting too many people to live in one building (Engels, 1971, pp.30-37 & 50-57; Hall, 1988, pp.13-46).



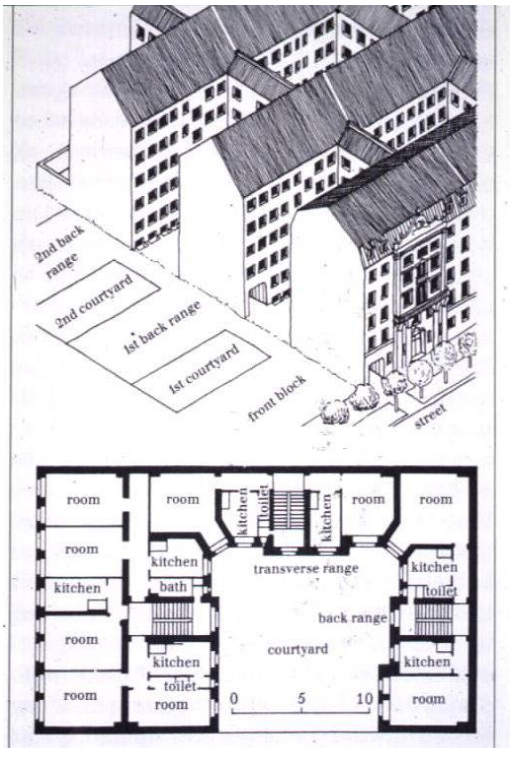


Figure 2.2.1-2.2.2: Tenements in Berlin, at the end of 19th century - floor plan and perspective
Source: www.arch.mcgill.ca/prof/sijpkes/arch528/fall2001/lecture9/lecture9p2

However, living conditions in tenements were very difficult: overcrowding, lack of open space, poor cross-ventilation, lack of light and necessary plumbing facilities (Schoenauer, 1981, pp. 202-238). All of these reasons resulted in very congested and unhealthy living environments, making diseases spread rapidly and creating slums in the city (Engels, 1971, pp.30-37 & 50-57; Hall, 1988, pp.13-46; Schoenauer, 1981, pp. 202-238). Since the late 19th century, a series of municipal by-laws had been established to ensure larger open spaces and better cross-ventilation in housing development, slowly improving living conditions in tenements (Schoenauer, 1981, pp. 202-238; Hall, 1988, pp. 47-85; Jenks and Dempsey, 2005, pp. 287-290) (Figure 2.2.1, 2.2.2).

Not all high-density dwellings in the 19th century were poorly constructed. Since the middle of the 19th century, some decent high-density housing equipped with electrical lighting and indoor plumbing facilities, different from the tenement, was also built for wealthier residents in large cities, such as New York, Boston and Paris, which were called “apartment hotels”, “French flats” or “Parisian apartments” with a concept of presenting European lifestyle (ULI, 2000, pp. 6-8; Schoenauer, 1981, pp. 250-254). However, these high-density housing blocks also had problems, such as lack of public open spaces and street-oriented neighbourhoods. Since the courtyards behind buildings were only accessed by residents on the ground floor, they were by no means defined as public open spaces (Panerai et al., 2004, pp. 18-29) (Figure 2.2.2a- 2.2.2b).

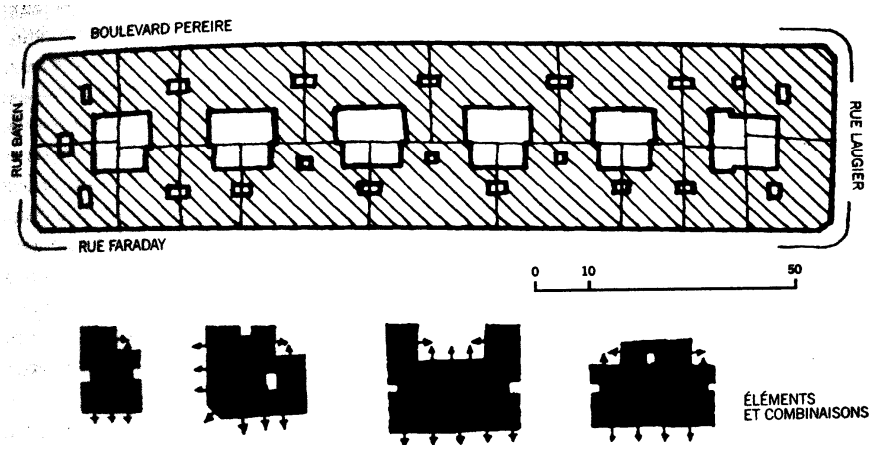


Figure 2.2.2a: Typical high-density housing block in Paris – site plan
Source: Panerai et al., 2004

Figure 2.2.2b: Typical high-density housing block in Paris – street facade
Source: Panerai et al., 2004

Summary

It is not difficult to see that during the 19th century, high-density housing initiated by the Industrial Revolution in many western cities was characterized by housing forms with high ground coverage. As a result, open spaces were reduced in the residential neighbourhood, leading to the creation of congested, unhealthy and unfriendly living environments, especially in the tenements or apartment buildings designed for the poor working class.

In the 1920s

With technology improvements, such as using elevators and standardized products in constructions, housing could be built higher and more compactly than before (Glendinning & Muthesius, 1994, pp.73-89). There was a surge of high-density development to fulfill the need of housing in large western cities during the 1920s; multifamily apartment buildings, both luxury and affordable, were built more than single-family houses during this decade (ULI, 2000, pp. 8-10). Famous architects, such as Le Corbusier in Europe, had many modern ideas and innovative designs for high-density housing development in the city, such as his Comtempary City in 1922 and Plan Voisin for Paris in 1925 (Hall, 1988). The intention was to create tall buildings and free the land on the ground for open spaces, in order to provide an alternative to the congested living conditions in many industrial cities during the 19th century (Panerai et al., 2004, pp. 114 -123) (see Figure 2.4.1-2.4.2 and Section 2.4.1 for detail descriptions).

From the 1930s to World War II (1940-1945)

Since the Great Depression started, the good era of high-density development was suddenly reversed with the collapsing of the stock market. In the United States, federal government was involved to establish financial groups and housing agencies in response to this circumstance, in order to revive the housing market and respond to the demand that the market could not meet. Consequently, many public housing projects with high densities were built during these years until World War II started. Throughout World War II, housing market declined and high-density housing development stopped except for constructions related to the war purpose (ULI, 2000, pp. 9-10).

In the postwar era

After World War II, the economies of North American countries were thriving (Schoenauer, 1994, pp. 1-17). Although "mass suburbanization" and owning a suburban single-family house as part of the "American dream" were major stories of this period (ULI, 2000, p.12), high-density housing projects were being built as well in North American cities, due to servicemen and women returning home from battle fields and immigrants from other counties flocking into North America (ULI, 2000, pp.9-12; Schoenauer, 1994, pp.17-110).

From the 1950s to the 1960s

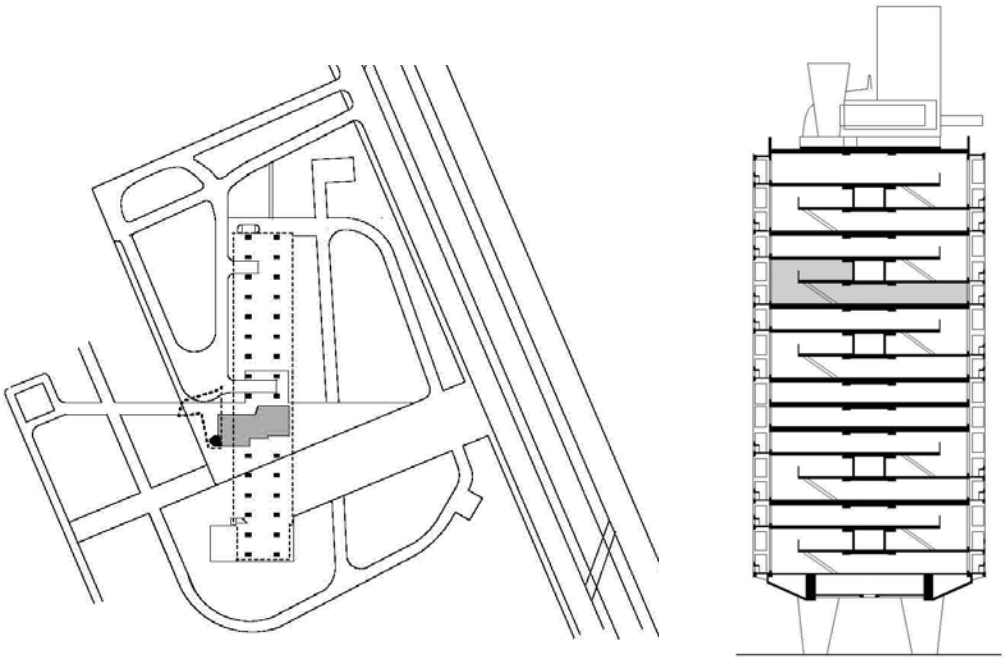
During the 1950s and the 1960s, large-scale urban renewal projects and public housing projects were built in cities throughout North American countries as well as European countries, attempting to clean up slums and replace them with new developments (Hall, 1988; Schoenauer, 1994; Glendinning & Muthesius, 1994). With even more technology improvements in construction and design, such as using the high-speed elevator and reinforced concrete, housing can be built much higher and even compactly than before (Glendinning & Muthesius, 1994, pp.73-89). For example, Robert Moses built many large-scale public housing projects in New York City at that time and gained extreme criticisms from Jane Jacobs for the erasure of original urban character (Hall, 1988, pp.204-240; Jacobs, 1961).

These developments were generally in the form of high-rise, high-density apartment buildings and mostly were designed along modernist architectural design principles, which primarily emphasized land use efficiency and the functional use of space, presenting the "tower-in-the-park" design concept (see Figure 2.4.1-2.4.11 and Section 2.4.1 for detail descriptions). For example, Mies van der Rohe's Lake Shore Drive

Apartments (1951) in Chicago and Le Corbusier's Unité d'Habitation (1952) in Marseilles, France (337 units, with a net density of approximate 110 dwellings per hectare, equal to 45 dwellings per acre) are two prototypes of postwar modern high-rise, high-density housing development (Schoenauer, 1994, pp.105-110) (Figure 2.2.3-2.2.6).

Figure 2.2.3: Mies van der Rohe and his Lake Shore Drive Apartments (1951) in Chicago
Source: http://edwardlifson.blogspot.com/2005_06_01_archive.html

Figure 2.2.4 - 2.2.6: Le Corbusier's Unité d'Habitation (1952) in Marseilles, France –perspective, site plan and section
Source: French, 2008



From the 1960s to the 1980s

During the 1960s and 1970s, the construction of high-density condominium and apartment buildings became popular in North American cities. In the late 1970s and 1980s, high-density housing development fluctuated due to conditions in the market; and in the late 1980s, high-density housing development constantly fell until into the 1990s (ULI, 2000, pp.12-14).

From the 1990s to the present

Large-scale high-rise, high-density public housing projects were gradually replaced with medium-rise housing developments with lower densities and scattered across the city to create mixed-income neighbourhoods and reinforce social integration (ULI, 2008; Jenks and Dempsey, 2005, pp. 294-307). Additionally, developers and designers have realized that oversized high-rise buildings and poorly-designed open spaces of past high-density developments did not meet the large demand for better housing in housing markets. Cities should be able to provide new products to satisfy the market. Therefore, in the recent 20 years, there has been a growing interest in building better high-density development in the city.

Summary

It is not difficult to see that during the 20th century, high-density housing designed by modernist architects was characterized by housing forms with excessive height and huge open spaces on the ground level. The idea of creating tall buildings and freeing the land on the ground for open spaces intended to provide an alternative to congested living conditions in many industrial cities during the 19th century (Panerai et al., 2004, pp. 114 -123). However, huge open spaces were never been used efficiently; high-rise buildings had many shortcomings in social and environmental aspects and were seen as unsafe buildings with a high occurrence of crime and vandalism (Schoenauer, 1994; Newman, 1972; ULI, 2000; ULI, 2008; Husock, 2003; Smith, 1991) (see Section 2.4.2 for detail descriptions). Therefore, there was a consensus in North American and European cities that the high-rise, high-density public housing developments built in the past were not successful (Jacobs, 1961; Schoenauer, 1994; ULI, 2000, 2008; Husock, 2003; Smith, 1991; Glendinning & Muthesius, 1994; Newman, 1972).

2.3 Values of High-Density Development

High-density development is a very sensitive topic in many western countries. Throughout the 20th century, there has been a constant debate on whether to build high-density development in western countries. In North American countries such as the United States and Canada, where the territory of the country is large and population density is low, it seems that dealing with high population density will never be a significant subject in community development, except in a few fast-growing cites such as New York City and San Francisco. The inefficient use of land results in widespread urban sprawl. Discussions of high-density development have been raised by cities and land use professionals throughout the past few decades (Duany and Plater-Zyberk 1994; Jenks and Dempsey, 2005, pp.287-307).

Recently in many North American towns and cities with fast growth, for example Silicon Valley in California, Vancouver, Montreal and Toronto in Canada, there is a growing interest in building communities with higher densities. Discussions are not on whether to build high-density development, but on how to increase density, where to build high-density development, how to encourage high-density development and how to plan and design vibrant high-density development (ULI, 2008; Calthorpe and Fulton, 2001). These ideas have been advocated and enhanced by recent movements of architecture and urban planning in North America, such as the New Urbanism and the Smart Growth movements (Duany and Plater-Zyberk 1994; Jenks and Dempsey, 2005, pp. 287-307). At present, many towns and cities in North America decide to grow smart and avoid “low-density sprawl”, which was a “land use mistake” in the past (ULI, 2008, pp.4-15). The values of high-density development have been more and more discovered by the city, and actually the city can benefit a lot from high-density

development.

The most apparent and significant value of high-density development is the "containment of urban sprawl" (Jenks et al., 1996; Urban Task Force, 1999; Jenks and Dempsey, 2005, p.298). Developing communities with high densities can largely reduce the pressure of building more constructions on more land. By building fewer structures and increasing land use efficiency, high-density development can significantly limit urban sprawl and reduce the rate of urban sprawl (Friedman, 2007).

Secondly, high-density development increases the efficiency of using public facilities and public infrastructure (ULI, 2008, pp. 4-12). When high-density development is appropriately located close to public transit, it can increase the ridership. Therefore, it is possible to serve residents economically by public transit. When high-density development is appropriately built around a commercial center, it can create more business opportunities. When high-density development is appropriately built close to an employment center, it can increase employment opportunities. Therefore, building high-density development around existing public facilities and public infrastructure can largely promote the efficiency of using these facilities.

Thirdly, high-density development reduces the dependence on cars. Building high-density communities within walking distance of a convenient public transit infrastructure or service facilities can largely reduce the distance between homes and these public facilities; thereby encouraging people to walk, bicycle and use public transit instead of using cars. In this way, traffic congestion and air pollution will be reduced in the city. To some degree, high-density development can prevent climate change and further support the long-term sustainability of the city (Jenks and Dempsey,

2005, pp. 415-417).

Fourthly, high-density development encourages the creation of great communities (ULI, 2008, pp. 4-12; Jenks and Dempsey, 2005, pp. 287-307). Creating more compact housing forms within an area can largely reduce the distance between families and encourage more social contacts between residents, thereby promoting social integration of this place. Moreover, building high-density developments along with convenient public services and commercial facilities can create vital mixed-use neighbourhoods and promotes diversity as well as "economic vitality" in the city (Jenks and Dempsey, 2005, p. 298).

Sometimes residents living in low-density communities complain about the lack of stores, services and public transit in the neighbourhood. However, all of these facilities require high population densities to make them work (ULI, 2008, pp.4-15). In summary, high-density development ensures the efficiency that low-density development fails to achieve. Many other advantages of high-density development are being discovered gradually by the city. In one word, high-density development is essential to create vibrant, efficient and exciting neighbourhoods in the city.

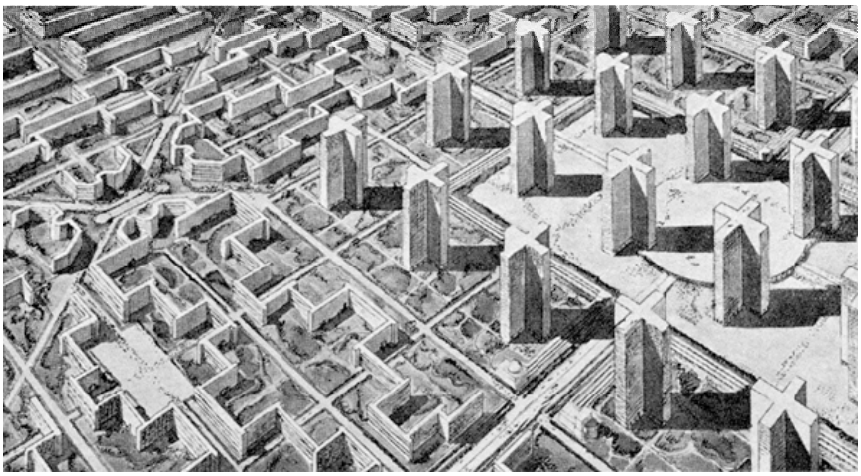
2.4 Negative Images of High-Density Development

Although the values of high-density development sound very convincing, in real life many people are opposed to any high-density development. When people hear about high-density development, they think of those disappointing public housing projects in the past. High density, if considered separately, is not a simple solution for vibrant high-density development. Sometimes high density "can be life-threatening when in the wrong hands" (Jenks and Dempsey, 2005, p.293). If architects and planners fail to use high density appropriately and achieve it with good design and forms, it is impossible to make vibrant high-density development a reality. Based on the same density requirement, some developments can be interesting, attractive housing neighbourhoods, some developments can be unpleasant, poor-quality places. This section analyzes unsuccessfully-designed high-density developments in the city.

2.4.1 The "tower-in-the-park" concept

Sine the 1920s, the idea of adopting huge high-rise towers and slab blocks as standard forms for high-density development has emerged from modernist architects in western countries (Schoenauer, 1994; Hall, 1988; Glendinning & Muthesius, 1994). These high-rise buildings were usually located on a large parcel of open space, which was called the "park-like setting" (ULI, 2000, p. 12). This design approach was often called the "tower-in-the-park" design concept (Schoenauer, 1994, p. 103). The first intention of this concept was to provide an alternative to congested housing neighbourhoods very common in many industrial cities during the 19th century (Panerai et al., 2004, pp. 18-24 & pp. 114 -123). At that time, high-density housing was achieved by creating buildings with high ground coverage and reducing open spaces on the ground level as analyzed before (see Figure 2.2.1-2.2.2, 2.2.2a-2.2.2b and Section 2.2 for detail

descriptions). Another intention of this concept was to increase land use efficiency by creating tall buildings within a restricted area as high as possible and freeing the land on the ground level as much as possible for open spaces (Schoenauer, 1994, pp. 95-110; Glendinning & Muthesius, 1994, pp. 61-72). This design concept along with many modernist architectural design principles were advocated by Le Corbusier, one of the pioneers of the Modern Architecture movement in the 20th century (Schoenauer, 1994; Hall, 1988). The "tower-in-the-park" design concept for high-density development during that period can be seen from Le Corbusier's Comtempary City in 1922, Plan Voisin for Paris in 1925, as well as his La Ville Radieuse in 1933, which presented his planning idea of the Radiant City (Figure 2.4.1-2.4.4).



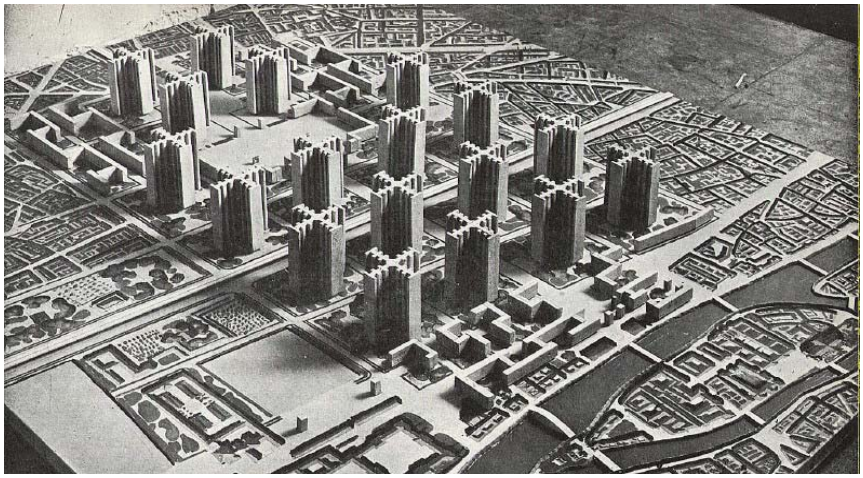
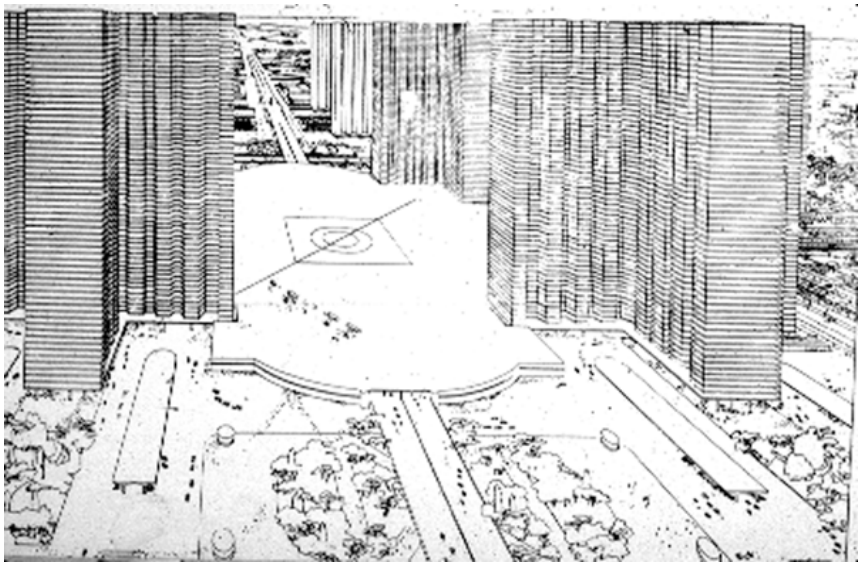


Figure 2.4.1 (up): Le Corbusier's Comtempary City in 1922
Figure 2.4.2 (below): Le Corbusier's Plan Voisin for Paris in 1925
Source: www.morrischia.com/david/portfolio/boozy/research/radiant_20city.html



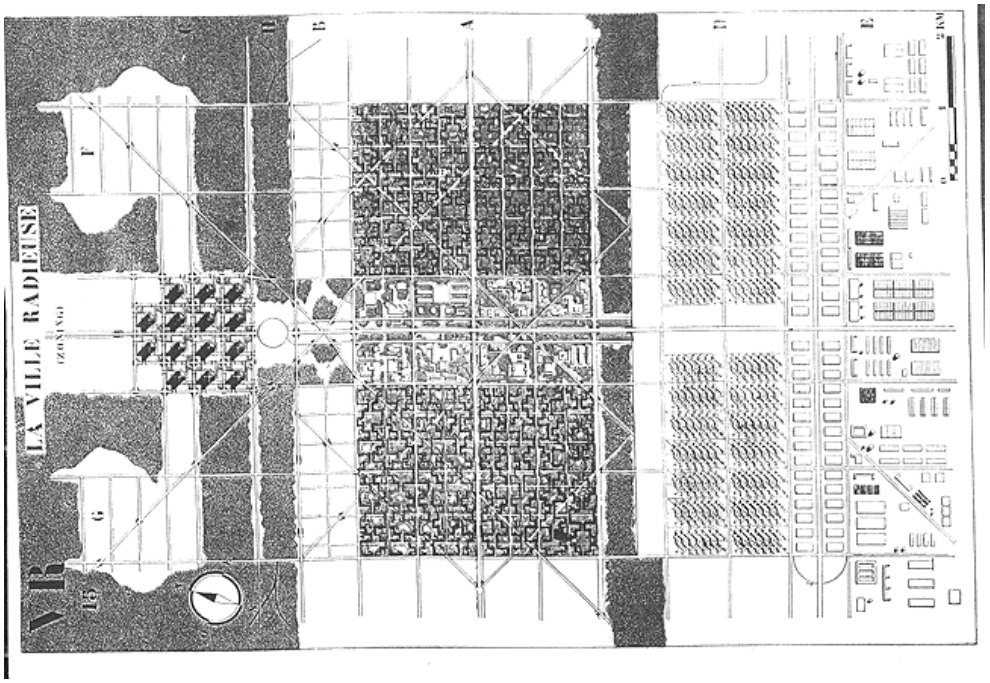


Figure 2.4.3-2.4.4: Le Corbusier's La Ville Radieuse in 1933 presenting his planning idea of the Radiant City - site plan and perspective
Source:www.morrischia.com/david/portfolio/boozy/research/radiant_20city.html

In the postwar years, many modernist architects put this “tower-in-the-park” concept as well as other modernist architectural design principles into practice to design high-density housing projects in large North American cities as well as European cities, especially in designing public housing projects for low-income people. Unfortunately, the final results of most “tower-in-the-park” high-density developments were disappointing. As Peter Hall described in his book *Cities of Tomorrow*, Le Corbusier considered house as “a machine to live in”, thereby hundreds of dwelling units were compactly structured into one high-rise tower just as “crowding thousands of minute components” into a clock (Hall, 1988, pp.204-240). Additionally, Le Corbusier’s innovative concept of the Radiant City is to geometrically design the city into “a planned harmony” as presented in his La Ville Radieuse in 1933; eventually “the evil that Le Corbusier did lives after him” (ibid). Indeed, human society does not simply run like a watch. Negative impacts in social, economic and environmental aspects of adopting the “tower-in-the-park” concept for high-density development were soon recognized by researchers and sociologists, especially in developing public housing projects for low-income populations. In the next section, there is a detailed analysis of design flaws associated with the “tower-in-the-park” concept (Figure 2.4.1-2.4.4).

2.4.2 Design flaws of the “tower-in-the-park” concept

Certainly, the failure of many high-density developments resulted from a series of complicated reasons, not merely design flaws of the “tower-in-the-park” concept. Most of the time architects and planners have no control over political and economic issues, such as making policies of housing development, assigning the density requirement of community development, selecting the project’s location, and ensuring financial support for the construction of the project (Bristol, 2004, pp 353-363). All of these factors may strongly affect the final planning and design of housing development.

However, architects and planners still play an active role in project development. Under the restricted context of development, it is architects and planners' crucial responsibility to provide optimal planning for the selected site, propose ideal built forms for each of the individual buildings, and integrate quality landscape design into the development. Studying design flaws of past high-density development is necessary for architects and planners in order to improve the design and avoid creating negative social and environmental impacts in future developments, thereby ensuring a good quality of life for residents and create interesting, meaningful urban neighbourhoods in the city.

The failure to adopt the "tower-in-the-park" concept for high-density development primarily comes from two major design flaws: one is the adoption of oversize high-rise buildings, such as huge high-rise towers and slab blocks, as common housing forms; and the other is the creation of huge, unmeaningful open spaces in the development. The following are analyses of negative impacts associated with these two major design flaws.

Isolation of high-rise buildings

High-density development does not work if a good quality of life can not be ensured in the development (Jenks and Dempsey, 2005, pp. 287-307). A feeling of isolation is very common for residents who live in huge high-rise buildings.

First, neighbors have little or no contact with each other due to lack of easy access to streets and open spaces on the ground level (Jephcott, 1971, pp. 106-118). Residents and families, especially those occupying the upper floors of the high-rise building, are isolated from social activities because their dwelling units are far from the ground level

and it is impossible for them to have a quick access to the nearby streets and open spaces (Schoenauer, 1994, pp. 95-110; Newman, 1972, pp.22-50). Lift lobbies, long and narrow floor corridors and cramped elevators become the only places where people meet and talk in high-rise buildings. However, these enclosed spaces without fresh air are the last place where people would like to stay. Since the environment inside the high-rise building is not very friendly and by no means can be defined as a pleasant social space for residents, neighbors have little or no contact with each other in the high-rise building, even if they live so close to each other (Figure 2.4.5).

In addition, a research of life in high-rise buildings conducted by Pearl Jephcott (1971) in Glasgow, Scotland reveals that high-rise living is not suitable for families with young children. Since it is difficult for parents to keep an eye on their young children and assure their safety when they play in the outdoor open space on their own, parents would like to keep their children playing in the apartment, thereby isolating their children from other children for long time may affect the development of the child's normal personality (Jephcott, 1971, pp. 80-115) (Figure 2.4.7).

Furthermore, there is no direct enjoyment of natural features immediately outside the dwelling units for residents living above the sixth floor (Schoenauer, 1994, pp. 95-105; Myers, 1979, pp. 104-113). It is even difficult for senior people to enjoy a healthy living environment. The life of senior people living in high-rise buildings is more isolated and less healthy than that of seniors living in other types of housing (Jephcott, 1971, pp. 70-79) (Figure 2.4.6).

All of these problems come from the unreasonable height of the high-rise building. To avoid all these problems, carefully selecting built forms for housing and designing the

building with a reasonable height would be important considerations in future high-density developments.

Figure 2.4.5 (up left): High-rise towers in Glasgow, Scotland
Figure 2.4.6 (up right): Life of senior people in high-rise building in Glasgow, Scotland
Source: Jephcott, 1971

Figure 2.4.7: Life of a family with young children in high-rise building in Glasgow, Scotland
Source: Jephcott, 1971

Crime hiding in high-rise buildings

A three-year research of crime prevention in public housing projects conducted by Oscar Newman (1972) throughout the United States proved that the crime rate is affected significantly by building height and project size: the taller the building, the higher the crime rate; the larger the project, the higher the crime rate (pp. 1-77).

Two public housing projects within the same area of Brooklyn in New York, different in design but same on density, were compared in Newman's study. One is the

Brownsville project, comprising medium-rise buildings from three to six stories in height; the other is the Van Dyke project, primarily comprising 14-story buildings. Both projects are almost equal in total built area and density: Brownsville covers 19.16 acres with a density of FAR 1.39; Van Dyke covers 22.35 acres with a density of FAR 1.49. The two projects are next to each other, both housing approximately 6,000 people with similar social backgrounds. However, the crime rate in Van Dyke project, comprised primarily of high-rise buildings, are almost twice as high as that in Brownsville project, comprised entirely of medium-rise buildings (Newman, 1972, pp. 22-50) (Figure 2.4.8, 2.4.9).

For one thing, high-rise towers and slab blocks are often designed with many interior floor spaces, for example lift lobbies, double-loaded long corridors in slab buildings, staircases behind elevators or at the end of the building. Normally crime and vandalism happen in these “interior public spaces” in high-rise buildings (Newman, 1972, p. 27). Since all the windows of apartment units are facing the outside, the “interior public spaces” can be reached by everyone but could not be well-supervised by people as outdoor public spaces, such as streets and neighbourhood open spaces (Newman, 1972, pp. 22-43). Therefore, these interior floor spaces in high-rise buildings are indefensible spaces (Figure 2.4.8a).

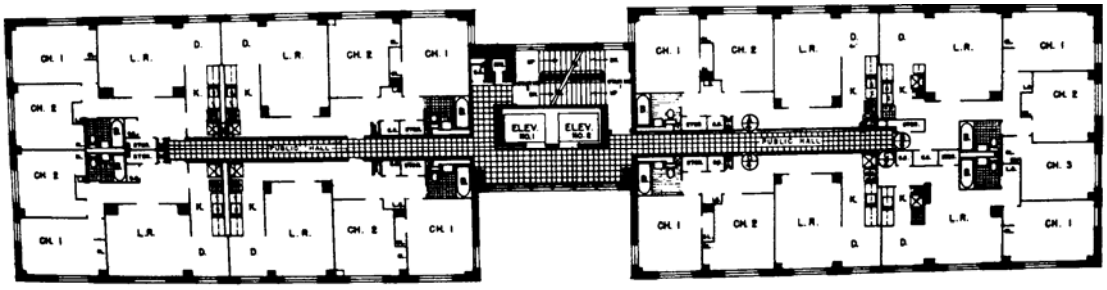
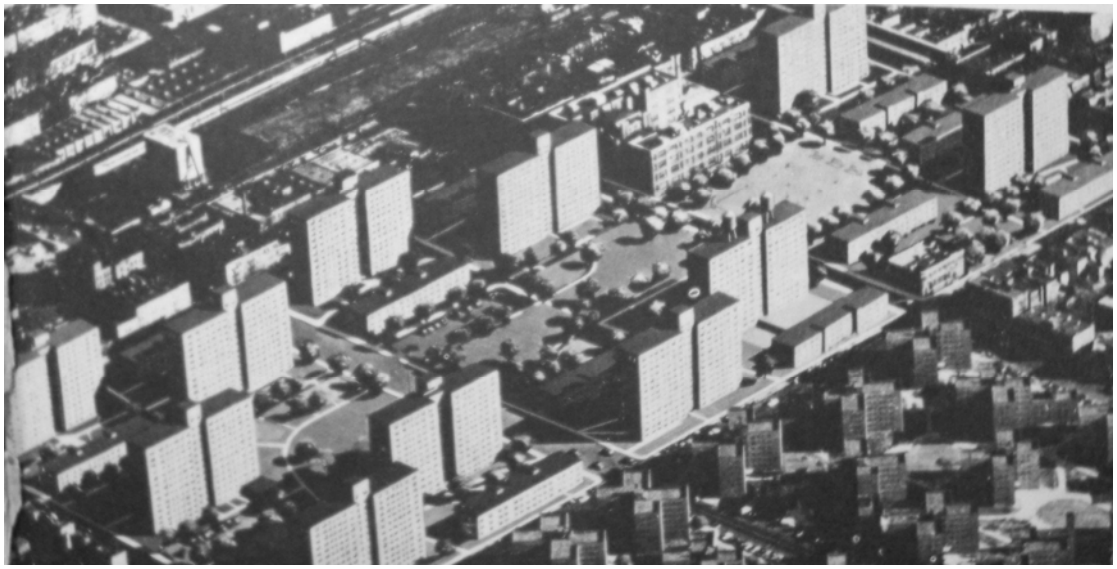


Figure 2.4.8a: Floor plan of high-rise slab blocks in Van Dyke project
Source: Newman, 1972

For the other, neighbourhood watch is a common way to ensure the neighbourhood safety in most of low-rise housing neighbourhoods in North American cities. However, in high-rise neighbourhoods, it is impossible to use neighbourhood watch to prevent crime and vandalism. The distance between two high-rise buildings is usually much longer than that between two low-rise or medium-rise buildings. Even though all the windows of apartment units are facing the outside, the huge open space between two high-rise buildings, which can be reached by everyone, are very difficult to be well-supervised by residents as the street and open space in a low-rise housing neighbourhood (Newman, 1972, pp. 40-43). Therefore, huge open spaces in high-rise neighbourhood are less secure than that in low-rise or medium-rise neighbourhood (Figure 2.4.8, 2.4.9).

In his book *Defensible Space*, Oscar Newman concluded that the physical design of built forms and open spaces in a residential neighbourhood plays a crucial role in crime defense, affecting the occurrence of crime much more significantly than the residential density (Newman, 1972, pp. 22-77). Ideal solutions to defense crime for future high-density developments would be proposing housing forms with reasonable building height, improving the site planning and improving the design of floor plan to avoid the creation of floor spaces that are out of surveillance by residents. Therefore, through improving the physical design, safety can be ensured in future high-density developments.



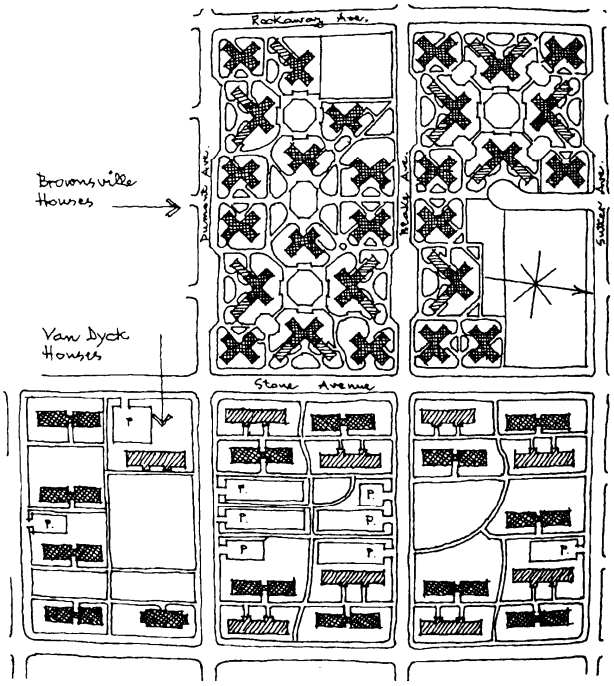


Figure 2.4.8: Perspective view of Van Dyke project and Brownsville project (bottom right) in Brooklyn, New York
Source: Newman, 1972

Figure 2.4.9: Site plan of Brownsville project (up) and Van Dyke project (below) in Brooklyn, New York
Source: Schoenauer, 1994

Huge open spaces

The physical design of built forms and open spaces in a residential neighbourhood not only affects the occurrence of crime, but also affects how residents feel about their homes and how they think about the neighbourhood (Newman, 1972, pp. 1-77; Marcus & Sarkissian, 1986, p. 33-62). The other major design flaw of the “tower-in-the-park”

design concept comes from the unsuccessful site planning.

At the ground level, the territory around residential buildings is normally considered by residents as a semiprivate area, “an extension of their own buildings”, gaining “natural surveillance” from residents living in the adjacent buildings (Newman, 1972, p. 45). The territory around buildings can be well organized by architects and planners into one larger area and designed as a more favorable semiprivate space. Within the semiprivate space, residents have a sense of security and a sense of ownership, feeling that they have control over this land (Newman, 1972, pp. 1-50). The semiprivate space is very useful and could be a busy place. It could be used for different purposes, such as children’s playground, leisure space, gathering place as well as temporary parking space. Therefore creating semiprivate space could successfully encourage social contacts between residents, promote public activities and ensure social integration in the neighbourhood (Figure 2.4.10).

Figure 2.4.10: L-shape building creating an interesting semiprivate space for residents
Source: Newman, 1972

However, architects and planners who adopted the “tower-in-the-park” concept for high-density development failed to take good advantage of the grounds around buildings, leading to the creation of huge, unmeaningful open spaces between buildings, even if they were called the “park-like” setting (ULI, 2000, p. 12). Designers

could focus too much on increasing the land use efficiency and fulfilling the high density requirement of housing development. Consequently, they had “little or no consideration for the delicate relationships that can exist between the human being and his or her environment” (Cuthbert, 1986, p.79); had little or no consideration for the possibility of organizing the territory around buildings into an interesting semiprivate space; and had little or no concerns on dealing with the relationship between buildings; thereby failed to create meaningful and useful open spaces between buildings (Schoenauer, 1994, pp. 95-122; Newman, 1972, pp. 51-60) (Figure 2.4.8, 2.4.11).

Another potential reason also comes from the unreasonable height of buildings. In order to avoid shadows, the distance between two high-rise buildings is usually much longer than that between two low-rise or medium-rise buildings. It is very difficult for architects and planners to organize the space between two high-rise buildings and create a more favorable open space in the development (Glendinning & Muthesius, 1994). Eventually, the unreasonable building height leads to the creation of huge, unmeaningful open spaces in the neighbourhood. These open spaces have never been used as efficiently as those semiprivate or semipublic spaces between medium-rise buildings (Figure 2.4.8, 2.4.11).

Figure 2.4.11: Pruitt-Igoe in St. Louis, Missouri; built in 1955 and demolished in 1976
Source: en.wikipedia.org/wiki/Pruitt-Igoe

Lack of semiprivate or semipublic space is an evident design flaw in most of the "tower-in-the-park" high-density developments. This problem can also be seen in the Pruitt-Igoe project in St. Louis, Missouri. Pruitt-Igoe, designed by Minoru Yamasaki, was a large-scale, high-density, public-housing project, with 33 identical 11-story slab blocks initially built in 1955 for slum clearance and low-rent housing, but eventually demolished in 1976 because of the widespread crime and vandalism in the entire neighbourhood (Bristol, 2004, pp 353-363). Huge open spaces between high-rise slab buildings in Pruitt-Igoe were seldom used by residents except for parking (Newman, 1972, pp. 51-60). Lack of clear definition of territory, such as semiprivate space, semipublic space and public space, give residents a sense of insecurity, which results in huge open spaces between high-rise buildings becoming underutilized (Schoenauer, 1994, pp. 95-122; Newman, 1972, pp. 51-60). This design flaw partly contributed to the failure of this project. Later Pruitt-Igoe became a tragic symbol of the most unsuccessful high-density development and has been frequently cited by researchers and designers to target high-density developments designed along modernist architectural design concept and principles (Figure 2.4.11).

Therefore, dealing with the territory around the building, dealing with the relationship between buildings and creating meaningful open spaces between buildings are crucial tasks of site planning. The physical design could largely increase people's satisfaction with their homes and the neighbourhood; otherwise it may reduce people's satisfaction with the whole development.

2.5 Misconceptions about High-Density Development

Since so many unsuccessfully-designed high-density projects were built in the past, some misunderstandings of high-density development are appeared in the public. Many people consider high-density housing as unsafe, uncomfortable, oversized, unattractive and overcrowded developments, out of character for housing development and incompatible with surrounding neighbourhoods with lower densities. It is important to clean up some major misconceptions about high-density development in order to reach a consensus on the general vision of community development and get enough support to build vibrant high-density development in the future. The following are major misconceptions about high-density development in the public.

High-density development means high-rise buildings; high-rise buildings mean high-density development.

When people hear about high-density development, they imagine high-rise buildings. High-density development does not have to be high-rise buildings. Based on the same site and the same density requirement, high-density development can adopt a broad range of housing types and built forms. It could be a tall building with 25% site coverage, a group of low-rise buildings with almost 75% site coverage or a group of medium-rise buildings with 50% site coverage. There are so many possibilities and the final results can vary significantly depending on specific planning and design. Therefore, it is possible to avoid using high-rise buildings in high-density development (Figure 2.5.1).

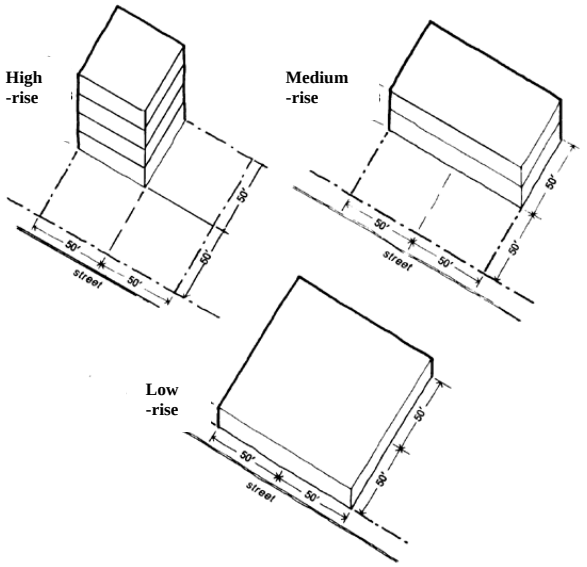


Figure 2.5.1: Achieving the same residential density by adopting three different types of housing
Source:www.tenant.net/Other_Laws/zoning/p131.gif

On the other hand, adopting high-rise built forms for housing development does not ensure higher residential densities than adopting low-rise or medium-rise built forms. For example, based on the same site and the same total floor areas (total built areas), one 30-story high-rise building with only 10% site coverage and five six-story medium-rise buildings with 50% site coverage are equal in density. This reality implies that medium-rise buildings could be ideal alternatives to high-rise buildings. Not only because they can achieve the same residential density as high-rise buildings, but also because they have lower construction cost and are more favorable built forms than high-rise buildings. Numerous features of medium-rise building will be analyzed in Section 2.6. In conclusion, high-density development does not mean high-rise construction; and high-rise construction does not mean high-density development.

High-density development increases crime.

There is no direct relationship between residential density and crime rate. High-density development does not increase crime. The high occurrence of crime in high-rise

buildings of public housing developments primarily results from the lack of security equipments, the lack of property management, limited property maintenance and the unsuccessful physical design of the living environment (Eggener, 2004; Schoenauer, 1994; Newman, 1972). As analyzed before in Section 2.4.2, after studying crime prevention in housing and neighbourhoods throughout the United States, Oscar Newman proved that the physical design of built forms and open spaces in a residential neighbourhood plays a crucial role in the crime defense, affecting the occurrence of crime much more significantly than the residential density (1972, pp. 1-77).

Crime not only happens in declining high-density neighbourhoods, but also happens in poorly-maintained low-density neighbourhoods. Crime may happen in any dreadful place in the city. The horrible place under the city highway, the dead zone along the railway, the secluded backyard in the low-density neighbourhood, as well as many inaccessible corners in public places are all places where crime may hide. Crime can be designed out in any residential neighbourhood through appropriate site planning and architectural design.

High-density development is only suitable to the inner city.

A lot of high-rise high-density housing is indeed concentrated in the inner-city area (T6 in Figure 2.5.2). But it does not mean high-density development could not be built outside the inner-city area. Whenever there is a large demand for housing in the city and there is an ideal location to accommodate higher density, high-density development is suitable to be built. Additionally, building infill housing developments with higher densities on existing urban lands such as abandoned brownfield sites or underutilized open spaces is normally encouraged by local governments.

High-density infill developments help to reduce urban sprawl, increase land use efficiency, revitalize declining neighbourhoods, promote social integration, increase social diversity of neighbourhoods and achieve long-term sustainability of the city etc (ULI, 2000, 2008; Friedman, 2007; Jenks and Dempsey, 1996, 2005; Urban Task Force, 1999; Jacob, 1961; Calthorpe and Fulton, 2001; Congress of New Urbanism, 1996). As described before in Section 2.3, high-density development has a lot of advantages; the city can benefit a lot from building high-density infill developments on existing urban lands (T4-T6).

Figure 2.5.2: An aerial view of typical rural-urban transect, with transect zones T1- T6
Source: www.smartcodecentral.org, 2009

Furthermore, high-density development can always be designed to fit into the existing neighbourhood. At present, there is a concentration of high-rise housing within the inner city (T6), because the high cost of urban land and the high density requirement in this area force developers and designers to choose high-rise housing forms, which is the only efficient way to achieve extremely high residential density on a small parcel of land. However, in the future, there should be other types of high-density development, without high-rise buildings, outside the inner-city area (T6). As mentioned before in Chapter 1 (see Section 1.2), in areas (T4 and T5) between the inner city (T6) and the suburb (T3)

of the city, both the density requirement and the cost of land are relatively lower than that in the inner city (Figure 2.5.2).

Therefore there is a wide choice for developers and designers to choose other favorable housing forms instead of adopting huge high-rise built forms, to propose optimal site plans and to ensure the overall integration of high-density development with the surrounding neighbourhood. Most towns and cities also adopt special planning regulations to regulate building appearance, urban design, and landscape design of new development (ULI, 2008). That may help high-density development integrate well with adjacent neighbourhoods. Experienced architects and planners can always ensure that new high-density developments fit into the existing neighbourhood perfectly.

High-density development is not attractive.

Generally, the unpleasant impression of high-density development comes from past experience with poorly-designed public housing projects. Most large-scale, high-density, public housing projects have left a negative image in people's minds. The adoption of huge high-rise towers and slab blocks as the common housing forms as well as the creation of huge underutilized open spaces in the development enhance unpleasant feelings of high-density development for citizens. Residents may fear that new high-density developments will keep the same volumes, same character and same unfavorable design as past development and will be out of character with the existing neighbourhood.

People think high-density development is not attractive also because there are so many poorly-designed high-density developments in the city and there are very few well-designed high-density developments to showcase the attractiveness of

high-density development. Actually, “there is no simple relationship between density and satisfaction; other significant variables combining with density affect perceived density and influence satisfaction” (Marcus & Sarkissian, 1986, p. 33). The physical design of residential neighbourhood significantly affects how residents feel about their homes and how they think about their neighbourhood (pp. 33-62). For example, people would like to see beautiful landscapes outside windows of their dwelling units rather than look at windows of other dwelling units (Friedman, 2007; Becker & Friedberg, 1974). Introducing landscaping between buildings can largely increase people’s satisfaction with their homes and their neighbourhood. Additionally, trees among buildings may also affect the perceived density by screening part of the view of other buildings in the neighbourhood (Marcus & Sarkissian, 1986, p. 33-62). Therefore, through providing better site plans, proposing alternatives to high-rise built forms, and integrating quality landscape features into the development, high-density development can be more attractive.

2.6 Theories and Criteria for Vibrant High-Density Development

Theoretically, high-density development can be more secure, comfortable, attractive and compatible with existing urban characters than in the past. When people complain about high-density developments, they often complain about the disappointing design of these developments. High density is only one component of community development; design is another crucial component, which addresses high density to the right forms and makes it possible to create vibrant high-density development (ULI, 2008). As analyzed before in Section 2.4, the physical design of a residential neighbourhood directly links to the safety and quality of this place, significantly affects the feeling of density and how people think of the place. Therefore, to actually increase the acceptance of high-density development, architects and planners should make an effort to create well-designed high-density developments. Calling for optimal alternatives to high-rise buildings and innovative designs for high-density neighbourhoods are extremely important to achieve both high residential density and high quality of life in future community development, making vibrant high-density development a reality.

This section concentrates on the theories and criteria for creating vibrant high-density development. Certainly, different people and different social groups may have different criteria in mind. It is also possible to identify common criteria that are shared by the majority of citizens. Vibrant high-density development can be achieved by proposing feasible alternatives to high-rise buildings and by planning quality and meaningful housing neighbourhoods in the city.

Alternatives to High-Rise Buildings

As analyzed before in Section 2.4.2, conventional huge high-rise towers and slab blocks have so many shortcomings in social and environmental aspects. A good quality of life is difficult to ensure in huge high-rise buildings, especially for senior people and families with young children. Apart from that, high-rise buildings are also disliked by most of citizens for their lack of aesthetic quality. They are oversized and out of the human scale. Their overwhelming presences provide unpleasant feelings for residents and visitors, especially when they are built in the proximity of low-rise or medium-rise neighbourhoods. Therefore, conventional high-rise towers and slab buildings which had been popular during the second half of 20th century are gradually abandoned by architects and planners in recent high-density developments, except in the areas where land values are very high.

Instead, medium-rise housing with higher densities become the best alternatives to conventional high-rise towers and slab buildings, not only because medium-rise buildings can achieve the same residential density as conventional high-rise buildings, but also because they have many advantages that conventional high-rise buildings do not have.

First, medium-rise buildings are close to the human scale; thereby they are more attractive than high-rise buildings and are easier to be constructed. They do not create any overwhelming presence for residents and visitors, especially when they are built close to low-density neighbourhoods. They also help the streetscape remain the human scale and are friendly to pedestrians compared to high-rise buildings (Myers, 1979, pp. 104-113). For this reason, medium-rise buildings would be the first choice when building infill projects in existing low-density neighbourhoods (Figure 2.6.1- 2.6.2).

Figure 2.6.1 (up):
Streetscape –
medium-rise building
vs. low-rise buildings
Source: Myers, 1979

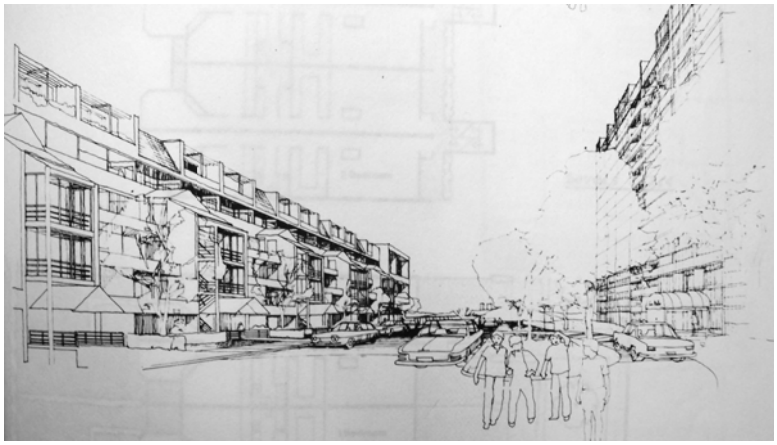


Figure 2.6.2 (below):
Streetscape – medium-rise
building vs. high-rise
buildings
Source: Myers, 1979

Secondly, medium-rise buildings are adjacent to the ground and trees. Therefore, residents in medium-rise buildings can enjoy a better living environment than those in high-rise buildings. Normally trees are about three to six stories in height and are only available at the ground level. It is difficult for residents living above the sixth or eighth floor to enjoy these natural features directly. If housing forms can be designed exactly at six or eight stories in height, most of residents in the building are able to immediately enjoy the natural features outside windows of their dwelling units and have a healthy living environment.

Thirdly, medium-rise buildings are easier to be designed with convenient access to the

nearby streets and open spaces than high-rise buildings. Residents can go outside and enjoy outdoor life easily. Neighbors have more chances to meet and talk with each other in outdoor open spaces. Children have more chances to play outside and meet with other children, which will help them to develop normal personalities. Also it is possible for the majority of families living below the sixth floor to keep an eye on their young children and assure their safety when they play in the outdoor open space. Since residents get involved in more public activities on site, social interaction has been effectively enhanced in medium-rise housing neighbourhoods. All these facts reveal that life in medium-rise buildings is much more pleasant than that in high-rise buildings.

Fourthly, medium-rise housing makes it possible to create more intimate open spaces between buildings and more intimate urban neighbourhoods in the city. As analyzed before in Section 2.4.2, in order to avoid shadows, the distance between high-rise buildings is much longer than that between medium-rise buildings, which is difficult for designers to organize the space between high-rise buildings and create a favorable open space (Glendinning & Muthesius, 1994). Huge open spaces between high-rise buildings have never been used efficiently. This design flaw can be completely avoided in medium-rise housing. Medium-rise buildings, with reasonable building height, have less shadow impact on adjacent buildings, thus the distance between buildings can be largely reduced. The open space between two medium-rise buildings can be easily organized and designed as an intimate semiprivate space or semipublic space, which can be used efficiently by residents and gives people a sense of enclosure, a sense of security and a strong sense of place in the neighbourhood (Figure 2.6.3).

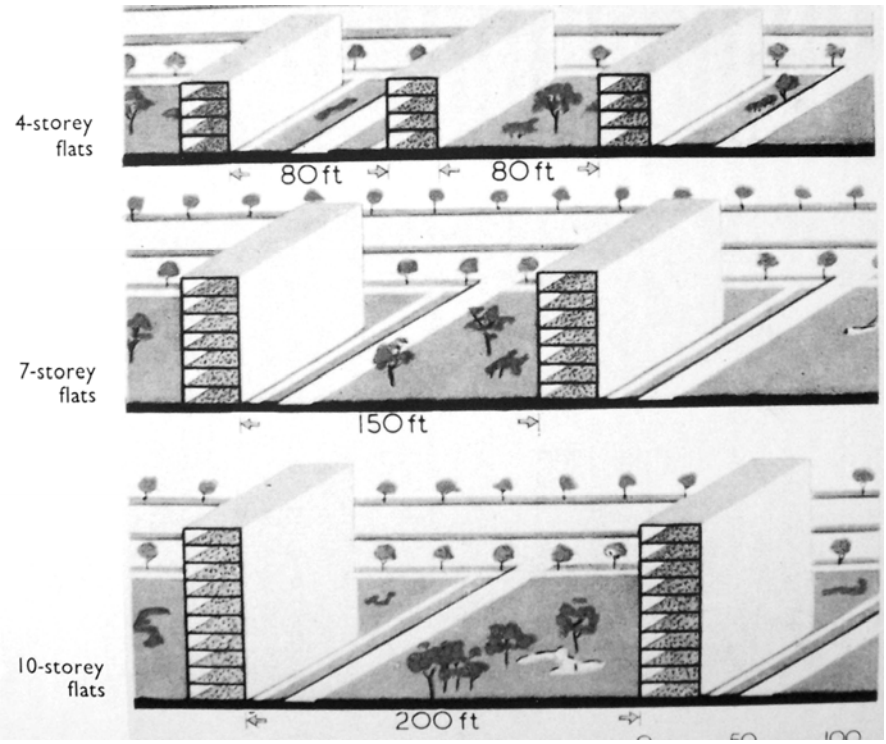


Figure 2.6.3: Relationship between the building height and the scale of open space
Source: Glendinning & Muthesius, 1994

Safe Neighbourhoods

In response to the widespread crime and vandalism in the high-rise, high-density public housing projects, more attentions have to be paid to the safety issue and crime prevention in future high-density development. Some neighbourhoods enforce security by putting electronic surveillance systems inside and outside the buildings or hiring 24-hour security guards. Other neighbourhoods install fences to prevent strangers entering into the territory. However, all of these methods are not absolutely reliable and they may make things even worse. Residents and visitors feel that these neighbourhoods are very isolated from the outside world and are very unfriendly, because the 24-hour camera and security guards are watching their activities when they travel around the neighbourhood. Eventually, residents may abandon to use the open space on site and visitors try to avoid getting in these neighbourhoods, which results in neighbourhoods lacking daily activities and becoming more vulnerable to crime and

vandalism (Figure 2.6.4).

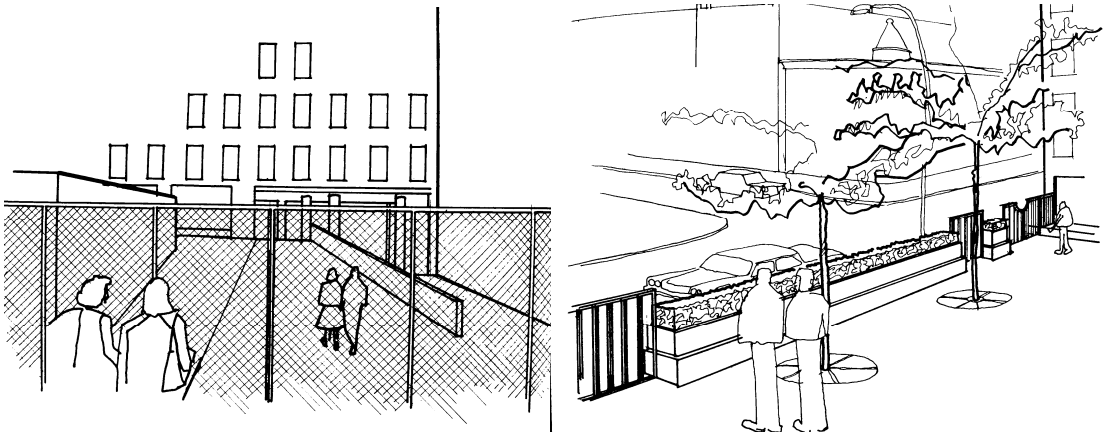


Figure 2.6.4 (left): Unfriendly “barrier-like” territorial boundaries creating a sense of isolation
Figure 2.6.5 (right): Friendly “soft” territorial boundaries creating a sense of enclosure
Source: Becher, 1974

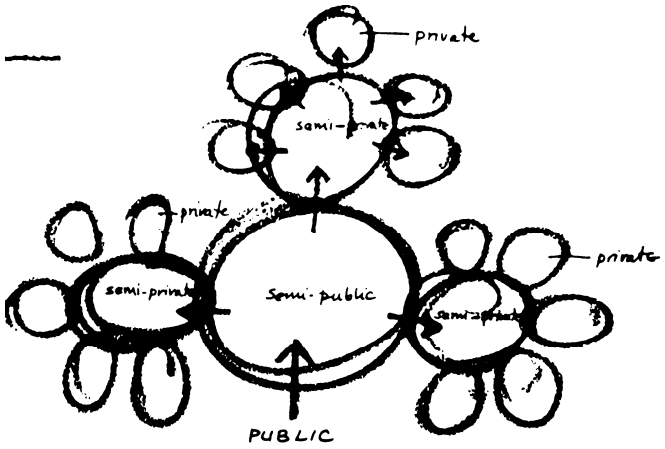


Figure 2.6.6: Hierarchy of “defensible space”, from private space, semiprivate space, and semipublic space to public space
Source: Newman, 1972

What Oscar Newman suggested in his book (1972) is that residents should control the neighbourhood on their own rather than rely on electronic equipments, the police, or metal fences around the property. Neighbourhood safety can be achieved through introducing “defensible space”, such as semiprivate space and semipublic space, into the housing design and site planning, because these areas can be well-supervised by residents and visitors passing by, therefore ensuring the safety of the neighbourhood (Newman, 1972, pp. 1-101). Another favorable way to ensure neighbourhood safety is creating “soft” territorial boundaries, such as “hedge-like fences”, lower planters and

trees, rather than building “barrier-like” boundaries around the property (Becker & Friedberg, 1974, pp.117 A-117B). This kind of components not only can prevent strangers entering into the territory but also can provide residents a sense of enclosure and security. Meanwhile, they do not block the view and do not reduce the aesthetic quality of the neighbourhood (Becker & Friedberg, 1974, pp.112-123). New Urbanism designers also recognize that neighbourhood safety should be reinforced by improving architectural design and site planning, rather than by reducing access and linkage with the street, because neighbourhood should be designed to bring people together and should be open to visitors rather than isolated from the surrounding neighbourhood (Gindroz, in Charter of the New Urbanism, 2000, pp.133-140) (Figure 2.6.5-2.6.6).

Healthy Neighbourhoods

It is hard to expect a good quality of life in high-density development without thinking of the healthy living environment of residents. Sunlight, fresh air and wind are natural recourses that are all necessary to and directly affect resident’s health. Since these natural resources can be accessed for free, building orientation and cross-ventilation become two major concerns of site planning for architects and planners, especially in high-density development. It is important to ensure that the majority of residents in the development have good access to sufficient sunlight, natural wind and fresh air throughout the year and enjoy a healthy living environment.

Some designers may place too much emphasis on the aesthetic quality of site planning and housing design, and fail to respect these natural elements of the site. Consequently, many dwelling units must completely rely on electrical appliances to control temperature, create ventilation and provide light. That would be very energy-consuming and potentially lead to the creation of an unhealthy neighbourhood,

significantly reducing the quality of life in high-density development. If architects and planners successfully take good advantage of sunlight and natural wind to design high-density housing, dwelling units will primarily rely on natural recourses for temperature control, ventilation and lighting. Meanwhile, the energy consumed in lighting, heating and air-conditioning will largely reduced. To some degree, planning healthy high-density neighbourhoods can prevent climate change and further support the long-term sustainability of the city (Jenks and Dempsey, 2005, pp.415-417).

Therefore, all housing forms and the site plan should be designed very carefully with respect to all the natural elements in the context, from where buildings should be located on the site, how they should be configured and oriented, to how buildings should be related to each other (Schimmenti, in Charter of the New Urbanism, 2000, pp.169-171). A healthy high-density development can be ensured by sophisticated site planning and housing design, placing great emphasis on the integration of sunlight, fresh air and natural wind into the development.

Accessible Neighbourhoods

A high-density neighbourhood is part of the district and part of the city; it should be connected with nearby neighbourhoods and the rest of the city. Otherwise it would give residents a feeling of isolation. Street plays an important role in bringing people together and connecting neighbourhoods with each other (Jacobs, 1961). Therefore linkages between the neighbourhood and nearby streets are necessary to ensure an accessible neighbourhood. These linkages not only refer to entrances of buildings, but also refer to paths, gateways and openings that link the internal space of a neighbourhood with the adjacent streets (Marcus & Sarkissian, 1986, pp. 107-134). Through these paths, gateways and openings, residents feel that their neighbourhood is

part of the city and they have convenient access to others who live in the nearby neighbourhoods. The linkages between the neighbourhood and nearby streets provide residents a strong sense of security.

Additionally, linkages between the internal space of the neighbourhood and the nearby streets allow people to see the streetscape directly from the inside of the neighbourhood. It gives residents a clear sense of location, a clear sense of orientation, and a strong sense of openness, especially for the first-time visitors to the neighbourhood. Therefore, paths, gateways and openings linking the neighbourhood and nearby streets are essential to ensure the accessibility of high-density development.

Furthermore, these linkages between the neighbourhood and nearby streets should be designed with care. A linkage, either an opening through the building or a path between two buildings, will be regarded as the access route for a neighbourhood. It enables people transfer from a street (a public space) to a neighbourhood (a semipublic space). The dimension and scale of the access route directly affects how people recognize the space (Marcus & Sarkissian, 1986, pp. 107-134). For instance, if an access is too wide, drivers may think that it is a road linking to another place and drive into the semiprivate or semipublic space by mistake. On the other hand, if an access is too narrow, it does not look very friendly and first-time visitors are more likely to miss this entry point of the neighbourhood. Designing the access to a neighbourhood is a big challenge for architects and planners. A well-designed access should provide people with a pleasant gateway experience and present a clear definition of territory (White, in Urban Design Reader, 1999, pp.185-198) (Figure 2.6.7, 2.6.8).

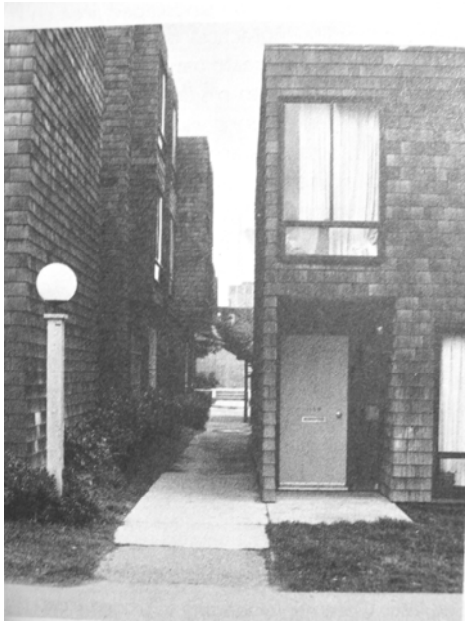
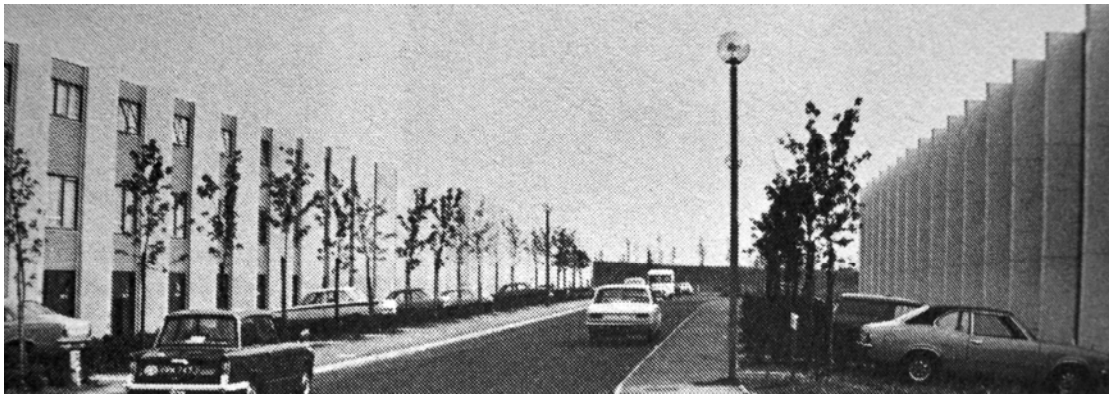


Figure 2.6.7 (up): Narrow access
Figure 2.6.8 (below): Wide access
Source: Marcus & Sarkissian, 1986



Active Neighbourhoods

Outdoor open space plays a crucial role in planning active neighbourhoods, especially in high-density development, where residents and families are concentrated. Urban life is full of stress. People should have a chance to relax and enjoy the life, especially for employed members of a family. Common open space must be ensured in residential neighbourhood for recreation purpose (Adams, 1960; Zhou, 2005; Becker & Friedberg, 1974; Glendinning & Muthesius, 1994; Marcus & Sarkissian, 1986). Outdoor open spaces offer residents a space to meet and talk, enjoy sunshine and fresh air, experience

the landscape and do exercises. These open spaces have to be designed to serve residents of all age groups (Adams, 1960, pp.42-53). Everyone should have a chance to use the on-site open space, especially senior people and families with young children. These two social groups rely more on the on-site open spaces for recreation than adults and teenagers (Jephcott, 1971, pp. 70-100). Also, open spaces designed to serve all age groups can foster social interaction between residents.

The dimension of the outdoor open space should be designed very carefully and should be in scale with building heights (Barnett, 1982; Marcus & Sarkissian, 1986, pp. 107-134). It should provide people a sense of security and enclosure. As analyzed before in Section 2.4.2, huge open spaces create a sense of insecurity for residents and visitors, thereby huge open spaces may be used inefficiently. On the other hand, a small open space enclosed by large buildings makes people feel uncomfortable and also could be underutilized. Therefore, a comfortable open space should encourage residents to use it and provide them a sense of relaxation (Gindroz, in Charter of the New Urbanism, 2000, pp.133-140). It can greatly increase people's satisfaction with their homes and the neighbourhood. Meanwhile, a comfortable open space ensures a vital living environment in the neighbourhood and enhances the creation of an active neighbourhood.

Attractive Neighbourhoods

Open space is essential to high-density development not only for its functional use as a recreation space, but also for a few aesthetic reasons. First, comfortable open space creates a reasonable distance between buildings, which enables residents to enjoy the complete building façade of their homes and experience the overall space of the neighbourhood. Well-designed open space can strengthen the sense of ownership for

residents and enhances the creation of an attractive neighbourhood (Becker & Friedberg, 1974; Marcus & Sarkissian, 1986; Newman, 1972).

Secondly, open space creates a place to accommodate more trees and landscape features within the neighbourhood. Beautiful landscape features, such as a water fountain, a tree-lined path and flowering plants, give a meaning to the open space, make the living environment attractive, and ensure a better quality of life in the neighbourhood.

Thirdly, green open space within the high-density neighbourhood provides residents a graceful and balanced living environment by presenting a big contrast between built and unbuilt environments, between heavy housing forms and light landscape features, and between hard man-made elements and soft natural elements (Comitta, in Charter of the New Urbanism, 2000, pp.113-119). Therefore, creating a great contrast in the living environment helps to make the neighbourhood attractive and increases the aesthetic quality of the neighbourhood.

Fourthly, some degree of aesthetic complexity and visual diversity in the living environment is preferred by residents and the neighbourhood will be regarded as attractive by residents (Marcus & Sarkissian, 1986, pp. 45-62). Landscaped open space provides pleasant views for residents when their dwelling units are directly oriented to the open space. It will greatly increase people's satisfaction with their homes and with the neighbourhood.

One of the design principles of the New Urbanism is that open spaces should be distributed within residential neighbourhoods (Comitta, in Charter of the New

Urbanism, 2000, pp.113-119). Recently, with the New Urbanism design concepts widely practiced in North America, citizens and land use professionals are well aware of the crucial role that landscaped open spaces plays in housing development and quality of life. Therefore, well-landscaped open space will highly contribute to the attractiveness of high-density development.

Chapter 3

Analysis of Projects

In the 21st century, the new vision of community development is to create vibrant, compact housing forms, achieving both high residential density and high quality of life. In this chapter, 12 exemplary projects reveal that building high-density development without high-rise buildings is a possible and creative way of building vibrant, compact residential development. Meanwhile, it reveals that there are plenty of different design solutions to achieve this new model of housing development. These projects not only illustrate how to make vibrant high-density development without high-rise buildings a reality, but also provide design concepts, ideas and strategies for future high-density developments seeking to use the same vision to build community.

These projects were carefully selected from a group of almost 40 well-designed high-density projects built in the recent 20 years within a worldwide context. After classifying 40 projects into several groups based on different land use patterns of the development, projects designed by world famous architects or by famous design firms and award-winning projects were selected for the final study. Therefore, 12 projects have different layouts and are the best ones of the group of projects. The first four projects were built in the 20th century. The rest eight projects were built in the 21st century and are presented in chronological order.

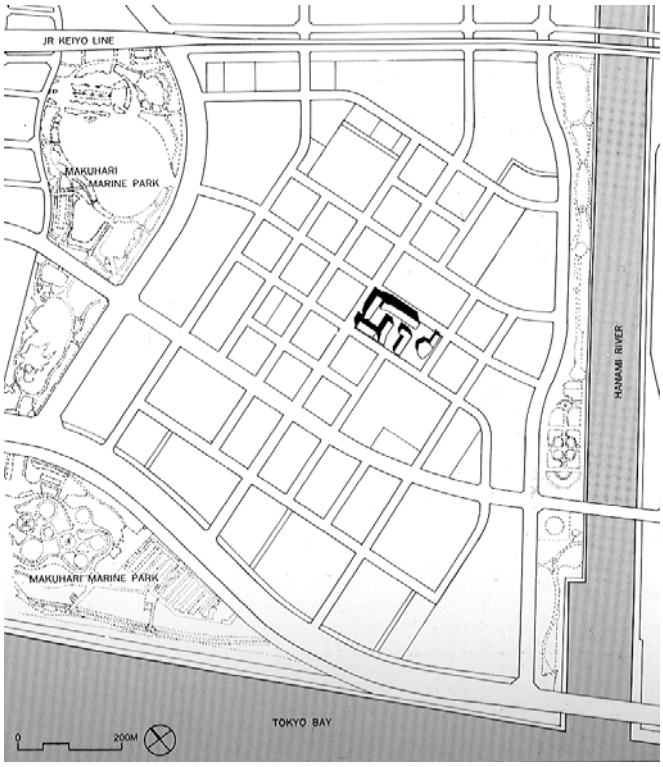
List of projects

1. Makuhari Bay Town Housing, 1996
2. Ju'er Hutong Renewal Project, 1992
3. Habitat 67, 1967
4. Rue de Meaux Housing, 1991
5. The Whale, 2000
6. Schots 1+2, 2002
7. Beaufort Housing, 2003
8. Kemerlife XXI, 2004
9. V M Housing, 2005
10. Social Housing in La Mina del Morro, 2007
11. Ninetree Village, 2008
12. Belle Vue Residences, 2010-

3.1 Makuhari Bay Town Housing

Chiba, Japan, 1996

Steven Holl



Site area: 0.84 ha (2.07 acres)
Total floor area: 26,869 sqm
Building height: 6-8 story
Number of dwellings: 190
Net density: 226 dwellings/ha (91.5/acre)
FAR 3.2
Program: market housing

Figure 3.1.1: Makuhari Bay Town housing block- key map
Source: GA Document Extra 06, 1996

Context

The new town of Makuhari is located on the northeast bank of Tokyo Bay. In 1991, the new town's infrastructure such as streets, parks and public buildings was complete, but the housing program was not finished. The project site, block M7-1, is located in the center of Makuhari close to the civic center, and was designated as an apartment block. Restricted planning rules had been established by urban planners at the planning stage of the Makuhari development to regulate building height, street patterns, streetscape, areas for landscaping, etc. According to the planning commission of Makuhari, each city block should be designed by three or four architects in order to achieve diversity in housing. Steven Holl was invited as an international design architect to create the

master plan of block M7-1 in 1992 and commissioned to design the whole project one year later (Steven Holl Architects, http://www.stevenholl.com; Domus, 1996 Jun, pp. 10-19; GA Document Extra 06, 1996, pp. 44-77; Zhou, 2005, pp. 231-235; Gausa, 1998, pp. 204-209) (Figure 3.1.1-3.1.2).

Figure 3.1.2: Makuhari Bay Town housing block- aerial view
Source: http://makuharihousing.blogspot.com

Concept

Fully understanding the intentions of town planners and planning regulations, Steven Holl supported the idea of ensuring diversity in housing, but argued that having different architects involved in the design of the same residential block would not be the best way to ensure the diversity, because it “doesn’t form a space” and the internal space of the urban block would become a chaos with building facades showing different architectural styles and presenting different intentions of individual architects (Holl, in GA Document Extra 06, 1996, p. 44). Instead, Steven Holl tried to achieve diversity in a different way, and he proved that diversity can be achieved by creating changes in built forms, proposing interesting relationships among buildings, and showing complexity in the open space of the residential block. Meanwhile, the overall

theme controlled by the same architect can give the whole urban block a sense of coherence.

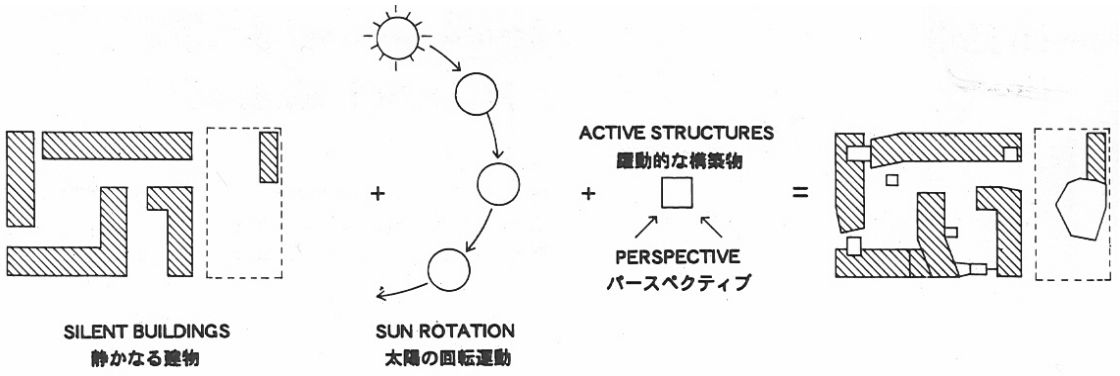


Figure 3.1.3: Two different types of built form collaborating with sunlight
Source: Domus, 1996 Jun

Idea and design

The architects' overall design concept is that two different types of built form, "silent buildings" and "active structures", shape the entire urban block; at the same time the two different forms interrelate with each other and collaborate with sunlight rules to form interesting internal open spaces, which creates a pleasant "inner journey" for residents and visitors within the residential block (Domus, 1996 Jun, pp. 10-13; GA Document Extra 06, 1996, pp. 44-50) (Figure 3.1.3-3.1. 19).

The silent heavy buildings are housing blocks, the major structures of the project, not only accommodating residential apartments but also shaping the forms of the urban block. The spatial arrangement of these heavy buildings was decided after carefully studying the rotation of the sun. To catch sunlight and reduce shadow impact as much as possible, the walls of these buildings inflect slightly. Meanwhile the inflected built forms strategically ensure the variety of housing forms and gently hold the open space inside just as "two hands forming a space" (Holl, in GA Document Extra 06, 1996, p. 54). When standing in the two open spaces, people have a strong sense of enclosure

and a strong sense of place (Figure 3.1.4-3.1. 19).

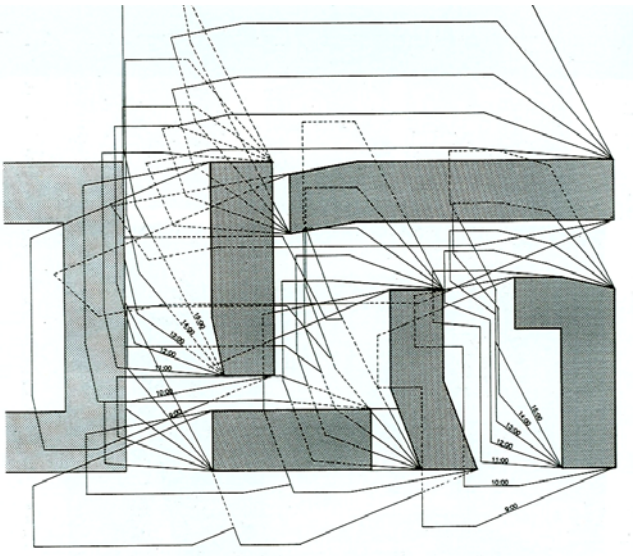
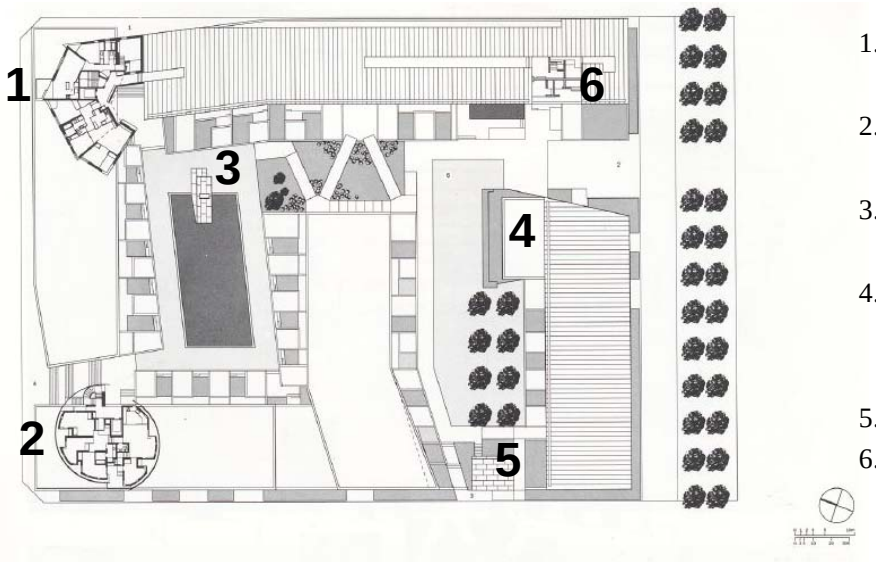


Figure 3.1.4: Study of shadow impact of the housing block
Source: Domus, 1996 Jun

The active light structures are designed as apartments, public meeting rooms, or ornamental structures, not only breaking the silence of the heavy housing blocks, but also giving a definition of the space (Domus, 1996 Jun, pp. 11-13; GA Document Extra 06, 1996, pp. 44-50). They include: East Gate House, reflecting sunlight; North Gate House, reflecting colors; North Court House, a public tea room; South Court House, a public meeting room; West Gate House, highlighting the space; and South Gate House, a public observation deck, which is the highest point of the place, permitting residents to enjoy a view of Tokyo Bay and Mount Fuji (ibid). They are carefully located at each of the gateways of the residential block, together with the internal open spaces, activating the place, defining the space, celebrating the special character of the place and forming an interesting internal journey on site (GA Document Extra 06, 1996, pp. 52-56; Zhou, 2005, pp. 231-235). The small-scale, active light structures make a great contrast with the large-scale, silent heavy housing blocks, having a high aesthetic quality and increasing the environmental quality of the space. They successfully highlight access routes and gateways of the residential neighbourhood also clearly define the boundaries of this urban block (Figure 3.1.5- 3.1. 19).



1. East Gate House, reflecting sunlight
2. North Gate House, reflecting colors
3. North Court House, a public tea room
4. South Court House, a public meeting room
5. West Gate House
6. South Gate House, a public observation deck

Figure 3.1.5: Site plan - locations of small scale active structures
Source: http://www.flickr.com/photos/7542656@N02/sets/72157601287600993/

Steven Holl placed a great emphasis on the design of open spaces in this housing project, even though the developer had little concern on the open space, because it doesn't have much commercial value. However, the architect believes that the open space is "a piece of the city", a crucial part of housing development, which provides many interesting experiences for the residents on site and visitors of the new town (Holl, in GA Document Extra 06, 1996, p. 52). Two landscape courtyards were designed by the architect with great enthusiasm. One is the south courtyard on the ground level, with trees, South Court House and West Gate House; the other is the north courtyard, on the second floor above the parking, with a pond and North Court House inside. They are open to all residents of the community, not only being internal, landscaped open spaces, but also being entrance courts from which residents enter into the housing blocks and get to their apartments. They are not designed as typical Japanese courtyards, but more as international, European models of public space, because the original intention of hiring international architects involved in local projects was to achieve diversity and provide something that does not exist on the

market (Domus, 1996 Jun, pp. 13-16; GA Document Extra 06, 1996, pp. 58-77). However, a few Japanese elements are reflected in the design of active structures, for example the shallow pond in the north courtyard and the configuration of North Gate House. These two semipublic open spaces with all the gateways of this urban block give residents the sense of quiet and the sense of connection to the city (Figure 3.1.5-3.1. 19).

Summary

Makuhari Bay Town housing development is an extremely successful high-density development. It is an interesting urban block that creates a pleasant internal journey for residents and generates many great perspective views in the street. In this project, Steven Holl paid close attention to the design of gateways, boundaries and open spaces of the residential block, completed a challenging design of high-density neighbourhood, which successfully solved the spatial relationships among buildings, controlled the overall scale of the entire urban block and created a great place for the new town of Makuhari.

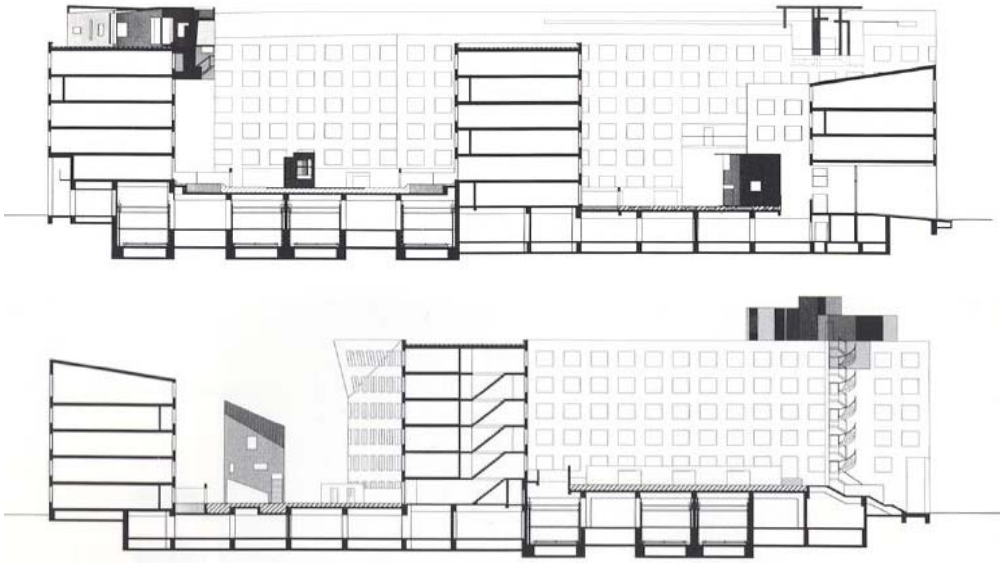
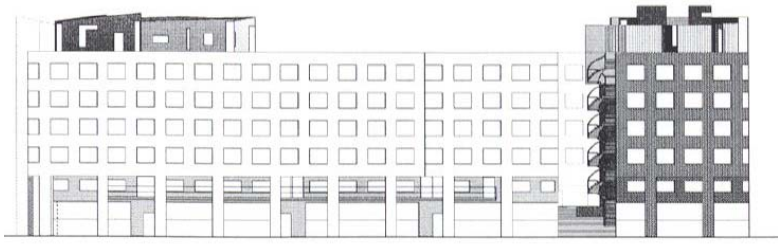
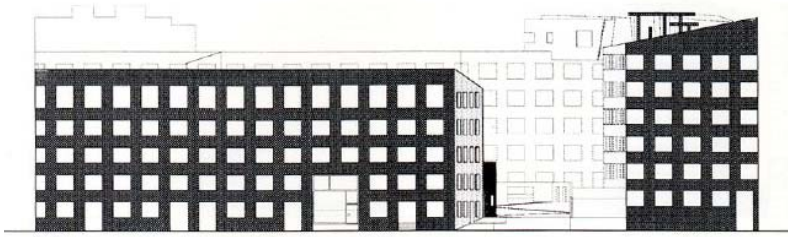


Figure 3.1.6-3.1.7: North-South block sections - (up) looking east, (below) looking west
Source: http://www.flickr.com/photos/7542656@N02/sets/72157601287600993/



North street elevation



South street elevation

Figure 3.1.8-3.1.11:
Street elevations
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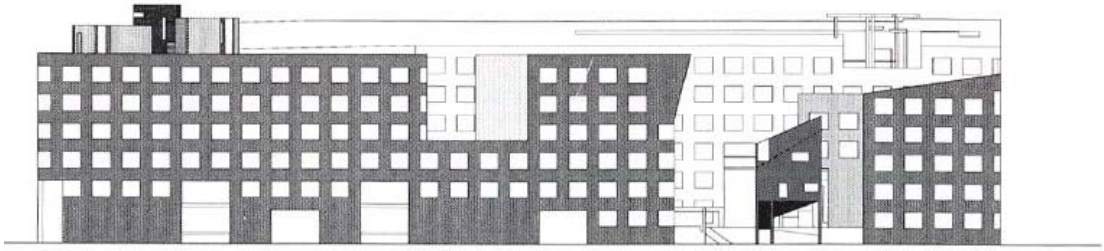


West street elevation (up); East street elevation (below)

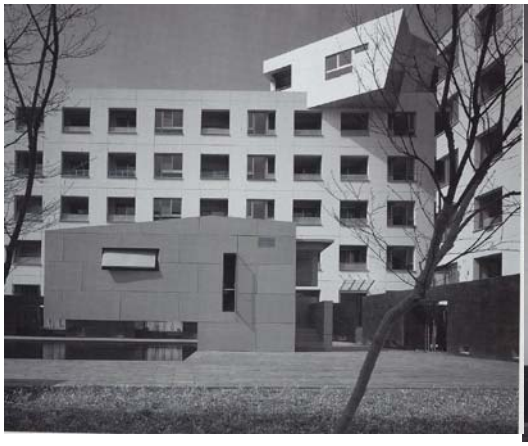


Figure 3.1.12: North courtyard (left)
Figure 3.1.13: East gateway (right)
Source:
http://www.flickr.com/photos/7542656@N02/sets/72157601287600993/

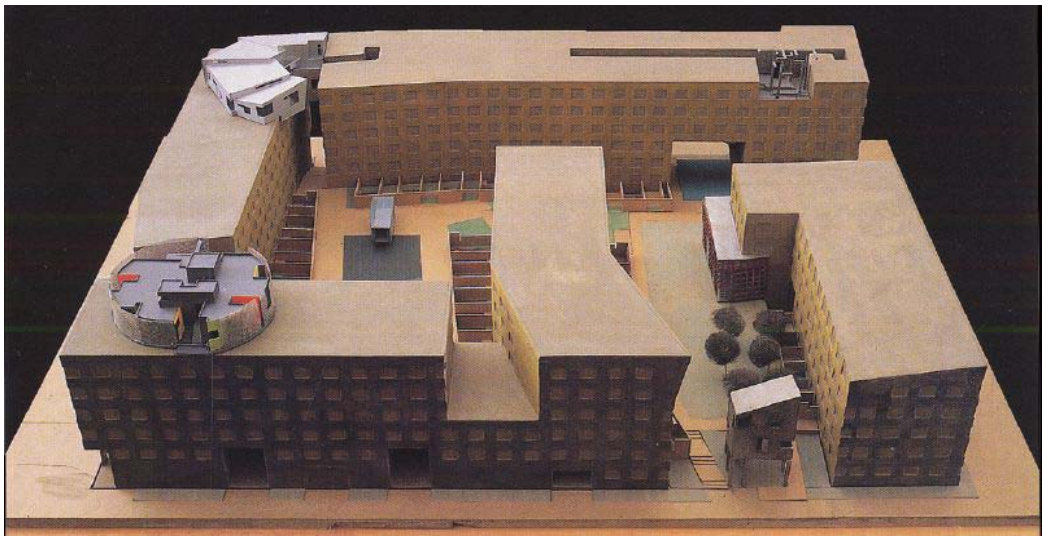


Figure 3.1.14 (up): Block model Figure 3.1.15-3.1.19 (below):Views from inside and outside
Source: http://www.flickr.com/photos/7542656@N02/sets/72157601287600993/

3.2 Ju’er Hutong Renewal Project

Beijing, China, 1992

Liangyong Wu

Site area: 8.2 ha (20.3 acres)
Total floor area: 112,000 sqm
Building height: 3-4 story
Number of dwellings: 770
Gross density: 94 dwellings/ha (38/acre)
Program: market and social housing

Figure 3.2.1-3.2.2: Ju’er Hutong Redevelopment – aerial view and perspective
Source: Zhou, 2005

Context

Beijing has successively been the capital city of China for many centuries. Since the Tang Dynasty (A.D. 618-907), the imperial rectangular street grid system has been set up in the city. In the Ming Dynasty (A.D. 1368-1644), the Forbidden City, a massive palace, has been located in the heart of the city. Additionally, Beijing has a long tradition of low-rise courtyard housing. Typical one-story courtyard housing units cluster together and the entrances can be reached by narrow and twisted paths (hutong) from the public street. They create a unique urban pattern and form the traditional urban texture of Beijing, which in turn are fit well into the imperial city grid (Wu, 1999,

pp. 1-15; Schoenauer, 1992, pp. 165-175; Architectural Review, 2000 Feb, pp. 73-74). Furthermore, there is a zone around the Forbidden City, called the Old City of Beijing, which is considered to be the area with significant historical value. In this area, building heights are strictly controlled, in order to ensure that there is no tall building interrupting the beautiful silhouette of the Forbidden City (Figure 3.2.3).

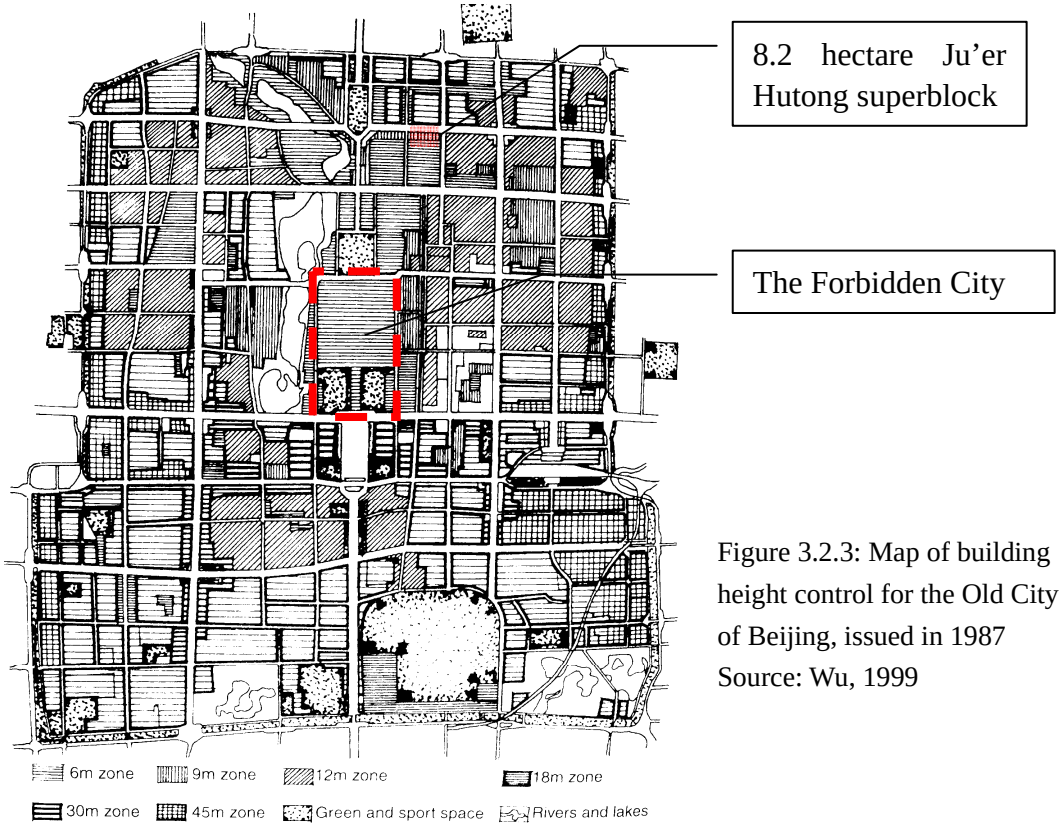


Figure 3.2.3: Map of building height control for the Old City of Beijing, issued in 1987
Source: Wu, 1999

Ju'er Hutong project is a large-scale urban renewal project, directed by Professor Wu Liangyong from Tsinghua University. The project site, the 8.2 hectare Ju'er Hutong superblock, is located to the northeast of the Forbidden City, within the Old City of Beijing. The old Ju'er Hutong neigbourhood was primarily comprised of traditional courtyard houses, but there were many severe problems with them. In 1987, a survey conducted by Wu and his team showed that the courtyards had been constantly occupied by poorly-constructed structures to accommodate additional population, thereby creating a major problem of overcrowding; consequently, sunlight and fresh air

had been reduced significantly; some courtyards below the street level were often flooded during the rain season; and sanitary facilities were not enough to serve the increasing populations (Wu, 1999, pp. 106-118). As a result, in 1989 Beijing Municipal Government decided to rebuild the entire Ju'er Hutong neigbourhood and develop new housing (Figure 3.2.3-3.2.4).

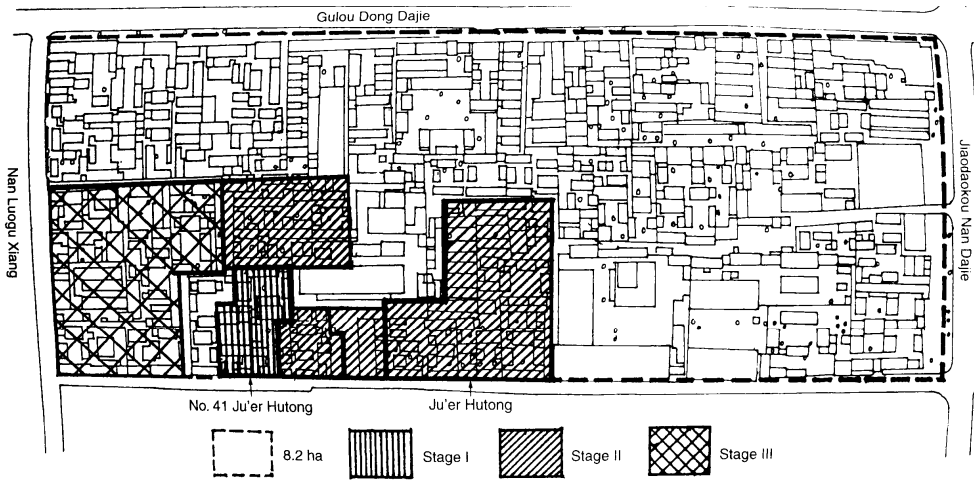


Figure 3.2.4: Survey of the old Ju'er Hutong neighbourhood with the phasing plan Source: Wu, 1999

Concept of the new courtyard housing

Since the city has an extraordinary historical background and traditional urban pattern, Beijing plays an important role in the field of urban planning. Professor Wu advocated that the traditional character of Beijing should be preserved, and any new urban development should respect the traditional planning principles of the city (Wu, 1999, pp. 1-43). Therefore, in the Ju'er Hutong renewal project Wu and his team decided to save the traditional fabric of the old neighbourhood as much as possible, enhance the traditional urban patterns and make this project a model for future urban renewal projects in the Old City of Beijing (Wu, 1999, pp. 56-65) (Figure 3.2.1-3.2.2).

In this restricted context, a new courtyard housing system, the "courtyard complexes", was born in the Ju'er Hutong project, which aims to combine all the features of

traditional Chinese courtyard housing and modern apartment buildings. It keeps the human scale of the traditional courtyard housing, comfortable courtyard space, intimacy and strong characteristics of traditional Chinese architecture; meanwhile, it allows higher densities, land use efficiency, privacy, convenience and amenities available in modern apartment buildings (Wu, 1999, pp. 104-140) (Figure 3.2.1-3.2.10).

Idea and design of the new courtyard housing system

The idea of the new courtyard housing is inspired by traditional Chinese courtyard housing and the design of the new courtyard complexes is based on the layout of the traditional courtyard house. The traditional one-story courtyard housing unit has been enlarged and transformed into a modern three-story "courtyard compound" which covers a larger parcel of land and consists of many dwelling units as conventional apartment buildings. Then a number of courtyard compounds can be clustered and developed into courtyard complexes, which can be organized and fit into the redevelopment site (Wu, 1999, pp. 66-162) (Figure 3.2.5-3.2.10).

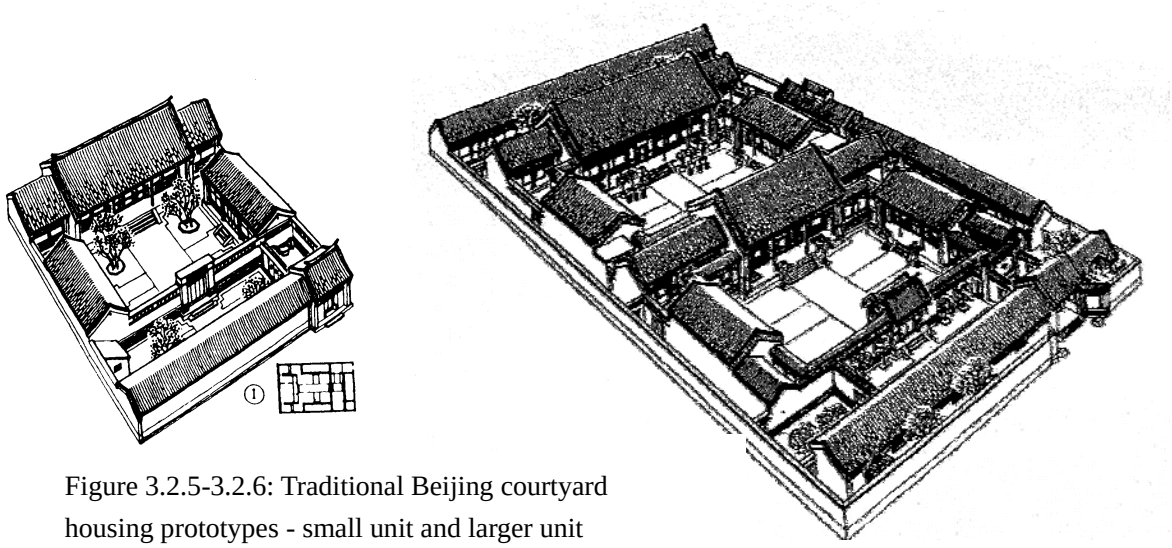


Figure 3.2.5-3.2.6: Traditional Beijing courtyard housing prototypes - small unit and larger unit
Source: Wu, 1999

Figure 3.2.7: New courtyard housing compound
Source: Wu, 1999

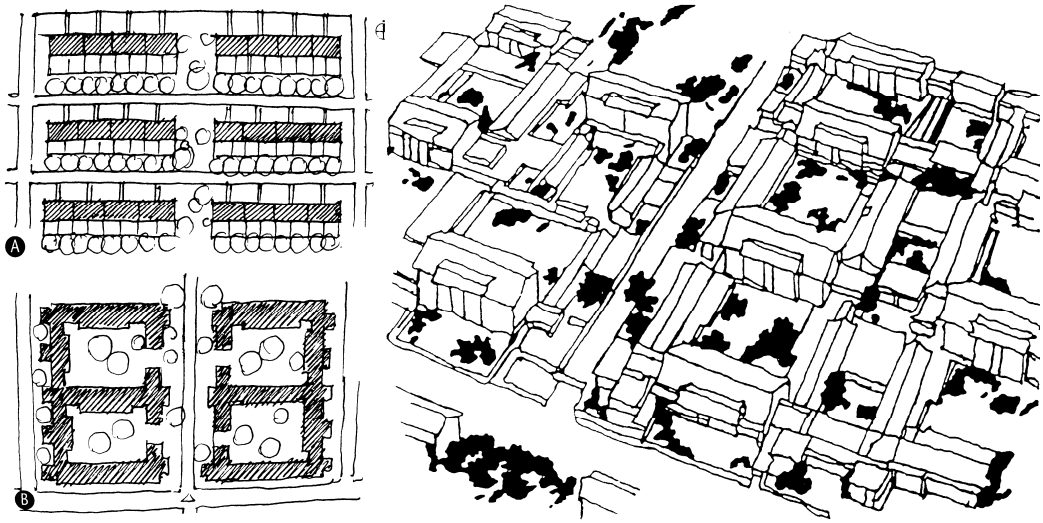


Figure 3.2.8 (left): Conventional apartment blocks (up) compared to new courtyard complexes (below)
Figure 3.2.9 (right): New courtyard complexes, consisting of many courtyard compounds
Source: Wu, 1999

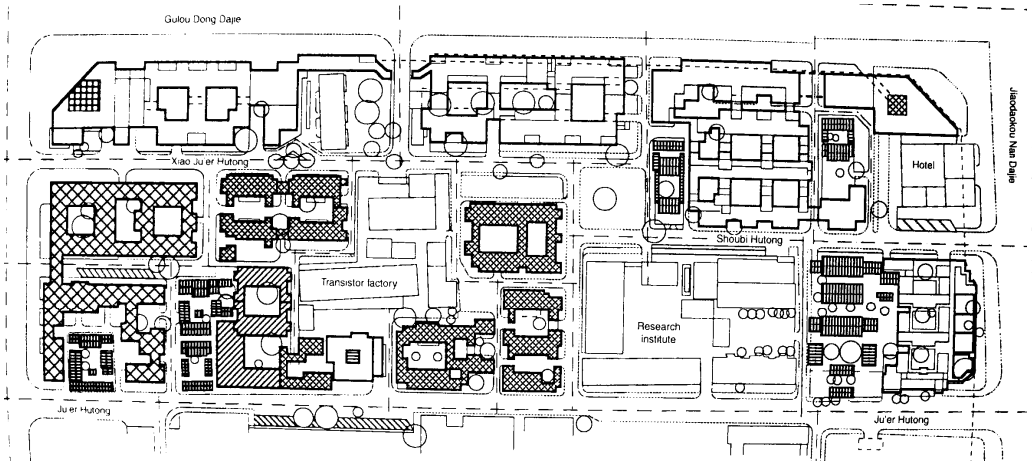


Figure 3.2.10: Master plan of the entire 8.2 ha Ju'er Hutong renewal project
Source: Wu, 1999

This new courtyard housing system has many advantages in its design and construction that are lacking in conventional apartment buildings.

First, it can achieve higher densities and land use efficiency with only two- or three-story buildings, especially in areas with building height limitations, such as in the Ju'er Hutong neighbourhood (nine meters is the maximum building height) (Wu, 1999, pp. 120-123) (Figure 3.2.3, 3.2.7-3.2.10).

Secondly, it enables the creation of more comfortable, intimate, peaceful open spaces as well as spacious roof terraces in the development than conventional apartment buildings do, offering residents a sense of quiet and more opportunities to enjoy planting, gardening and healthy outdoor life (Figure 3.2.11-3.2.12).

Thirdly, by adopting the traditional sloping roof in the housing form, it significantly reduces shadow impacts and ensures sufficient sunlight in both the courtyard and the dwelling units; meanwhile, it increases the aesthetic quality of housing forms. (Figure 3.2.12-3.2.13)

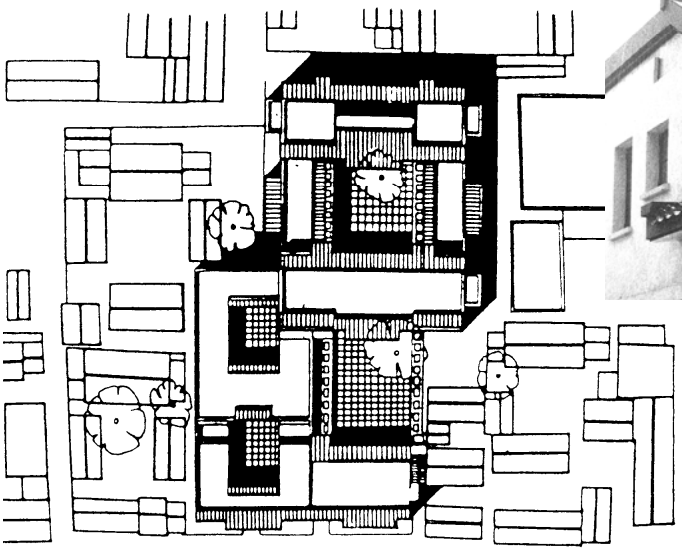


Figure 3.2.11 (left): Site plan of Phase One
Figure 3.2.12 (right): Planting and gardening on roof terrace
Source: Wu, 1999

Fourthly, the courtyard creates a “micro-climate” environment, which greatly reduces the energy consumed in heating, air-conditioning and ventilation (Wu, 1999, pp. 127-129) (Figure 3.2.13).

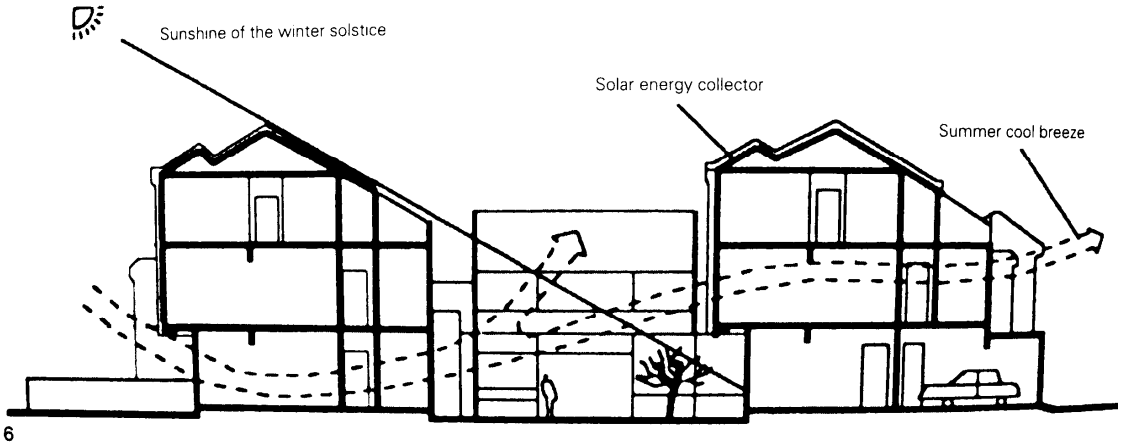


Figure 3.2.13: Study of sunlight and ventilation in the courtyard - section
Source: Wu, 1999

Fifthly, the layout of the new courtyard housing has a great flexibility. The size and location of the courtyard can be easily changed, which allows the possibility to preserve existing trees and historic buildings within the redevelopment site (Wu, 1999, pp. 129-130) (Figure 3.2.7-3.2.10).

Finally, the construction cost of this new courtyard housing is significantly reduced compared to that of conventional apartment buildings, and it doesn’t require much advanced technologies during the construction.

Idea and design of the new courtyard circulation system

The traditional narrow and twisted path (hutong), which connects the entrance of traditional courtyard housing unit with the public street, has also been redesigned into an internal pedestrian-friendly corridor, which is called the “alleyway”, connecting the

entrance of the dwelling unit directly to the nearby public street (Wu, 1999, pp. 129-166). These alleyways with staircases can also link the units on the upper floor to the street. Circulation routes for cars and other vehicles are arranged outside the courtyard complexes, separated from the alleyways in order to keep the internal living environment clean and quiet. Therefore, the alleyway is a car-free corridor and is much more efficient than the previous “hutong” system. Entrances for the internal alleyways normally are the gateways of the courtyard complexes. They can be highlighted by adopting traditional Chinese architectural design elements, such as the design of Chinese gateway, which in turn helps to enhance local character, increase neighbourhood legibility, and recall the history of the place (Figure 3.2.14-3.2.18).

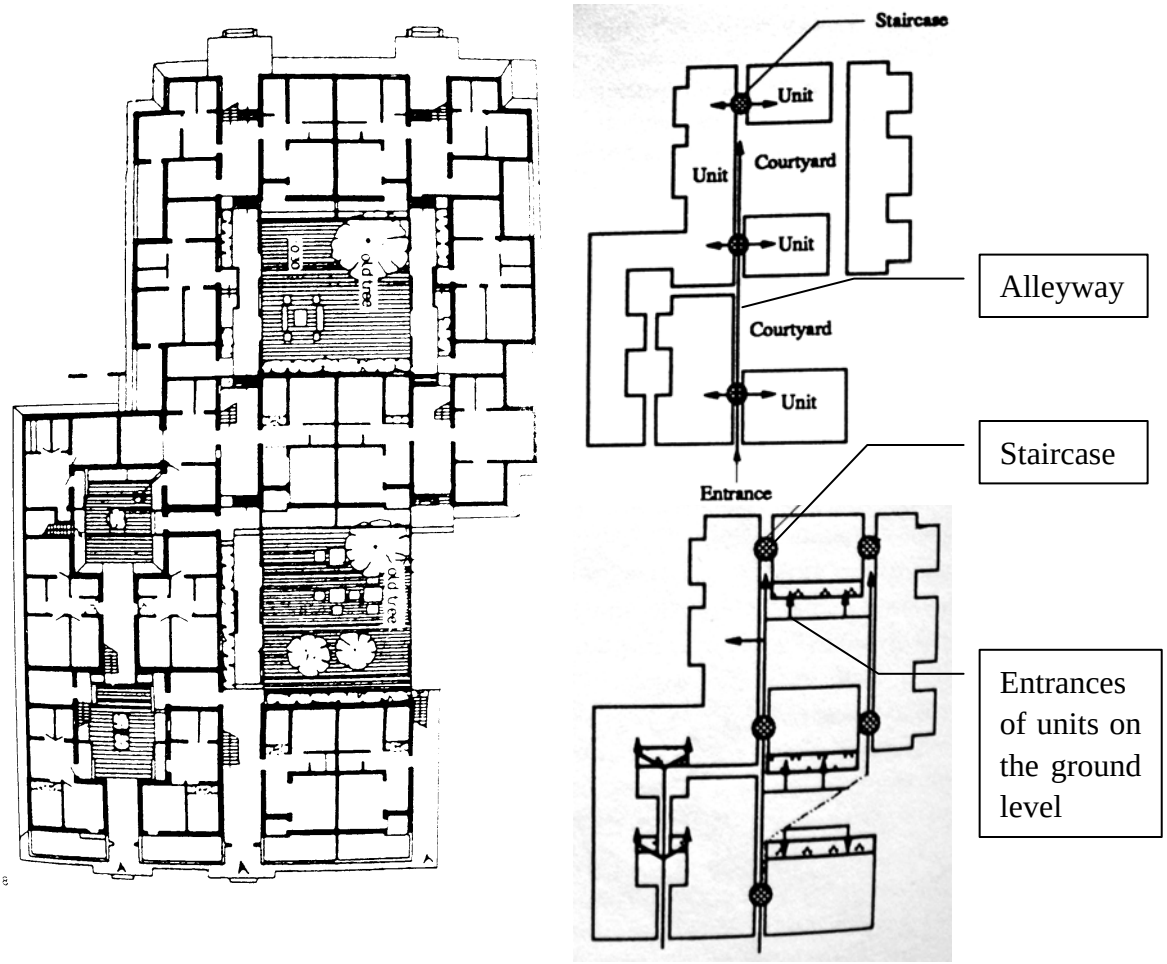


Figure 3.2.14(left): Ground floor plan of Phase One
Figure 3.2.15 (right up): Access route for units on the upper floor
Figure 3.2.16 (right below): Access route for units on the ground level
Source: Wu, 1999

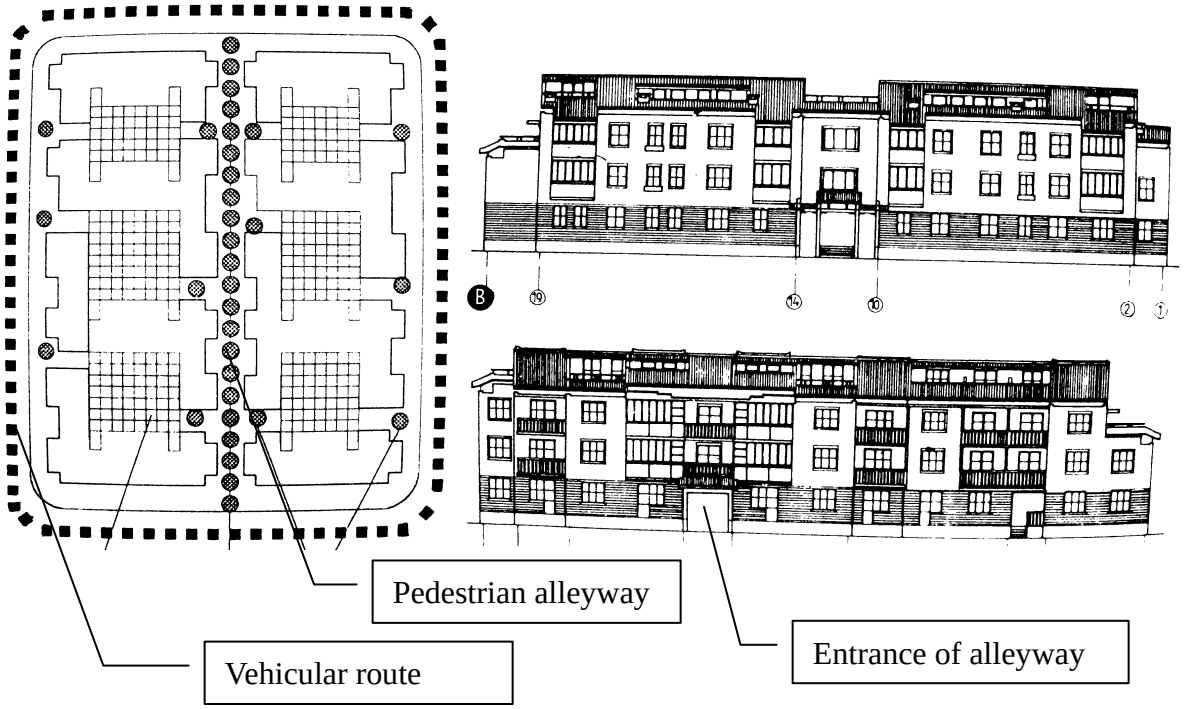


Figure 3.2.17(left): Separated circulation routes for pedestrians and vehicles
Figure 3.2.18 (right): Street elevations with gateways of the courtyard complexes
Source: Wu, 1999

Summary

This new courtyard housing prototype successfully combines all the advantages of traditional Chinese courtyard housing and modern apartment buildings. Meanwhile, it strategically avoids the negative impacts that modern apartment buildings ever created in the Old City of Beijing in many unsuccessful developments. The most obvious one of the negative impacts is that the heavy, clumsy conventional apartment buildings have nothing in common with the traditional urban fabric, severely conflict with the unique, intimate urban forms in the Old City of Beijing (Wu, 1999, pp. 92-103). The new courtyard housing adopted at the first time in the Ju'er Hutong renewal project is a

housing prototype and is not yet mature enough to have been built widely. However, it reveals that with more effort and consideration in the planning and architectural design, such as reintroducing a traditional concept of housing into the development and adopting traditional architectural design elements into the housing form, new residential developments can be more attractive and integrated well into the traditional urban context (Figure 3.2.19-3.2.21).

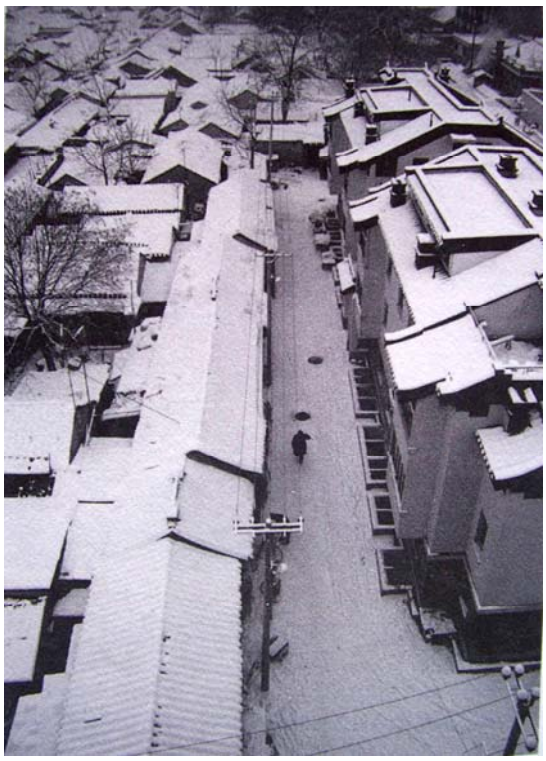


Figure 3.2.19(up left): A conflict between conventional apartment building and traditional courtyard house
Figure 3.2.20 (below left) - 3.2.21(right): Integrating new courtyard complexes with traditional courtyard houses Source: Wu, 1999

3.3 Habitat 67

Montreal, Canada, 1967

Moshe Safdie

Site area: 2.1 ha (5.2 acres)
Total floor area: 22,000 sqm
Building height: 12 story
Number of dwellings: 158
Density: 75 dwellings/ha (30/acre)
Program: market housing

Figure 3.3.1: Aerial view of Habitat 67 with downtown Montreal at the background
Source: http://www.msafdie.com/php/print_project.php?id=16

Context

Habitat 67, designed by Moshe Safdie, is an experimental housing development built on a man-made peninsula along the St. Lawrence River in Montreal, which was one of the major exhibitions of the 1967 Montreal World Exposition, Expo 67. In 1964, when plans for Expo 67 were announced in Montreal, Safdie persuaded the city to build a housing exhibition based on his 1961 thesis design project at McGill University (Kultermann & Hofmann, 1970, pp. 492-495; Roth, 1979, pp. 327-328; French, 2008,

pp. 218-219; Kohn, 1996, pp. 40-57).

Concept

Safdie's thesis design project, "A Three-Dimensional Modular Building System", and report, "A Case for City Living", invented a new housing system, "Habitat", which attempted to explore new ideas and design approaches for high-density multifamily housing in the city as well as alternatives to suburban single-family living (McGill Safdie Hypermedia Archive, an Industry Canada sponsored project: Habitat 67; Safdie, 1974, pp. 2-61). The main objective of designing this new housing system is to attract people from the suburbs back into the city by providing residents both the convenience of high-density urban living and the pleasures of owning a private garden which is only available in suburban houses (Kultermann & Hofmann, 1970, pp. 492-495; Safdie, 1974, pp. 2-87). Correspondingly, two basic design concepts, the "three-dimensional community" and "for everyone a garden", were born in the design of this new housing system in order to achieve Safdie's main objective (Safdie, 1974, pp. 2-87).

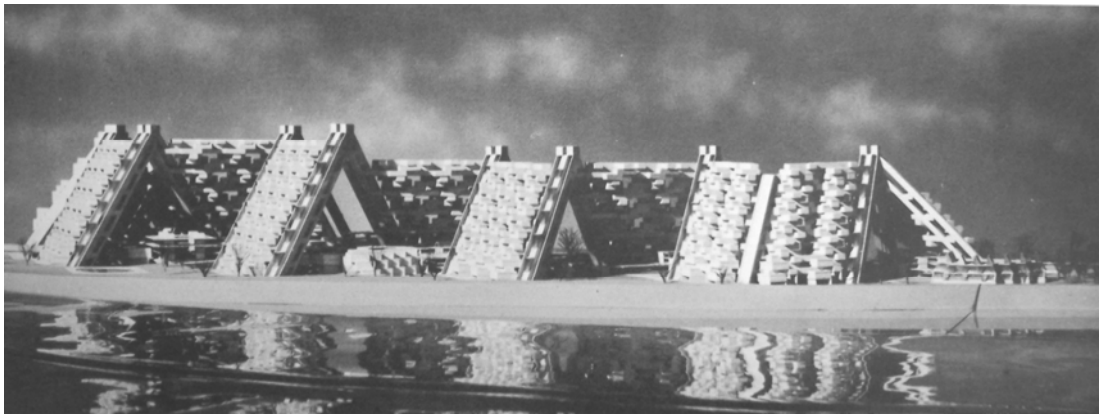


Figure 3.3.2: Original Habitat proposal, "A Three-Dimensional Modular Building System" -perspective
Source: Safdie, 1974

Idea and design

Safdie's original design for Habitat was a three-dimensional mixed-use community,

including approximately 950 dwelling units for 5000 people, which were inserted into a huge three-dimensional circulation structure about 20 stories in height, also including schools, shops, offices, parks, institutional facilities and elevated pedestrian corridors, which were called “pedestrian streets” by the architect, to provide direct access to dwelling units and serve as the internal horizontal connections throughout the entire community (Safdie, 1974, pp. 2-61; Roth, 1979, pp. 327-328; McGill Safdie Hypermedia Archive, an Industry Canada sponsored project: Habitat 67).

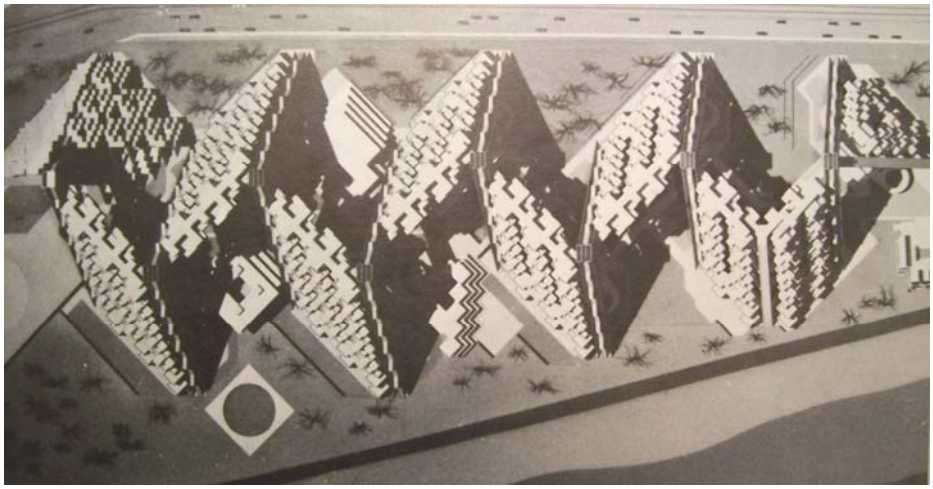


Figure 3.3.3: Original Habitat proposal, “A Three-Dimensional Modular Building System”- top view
Source: Safdie, 1974

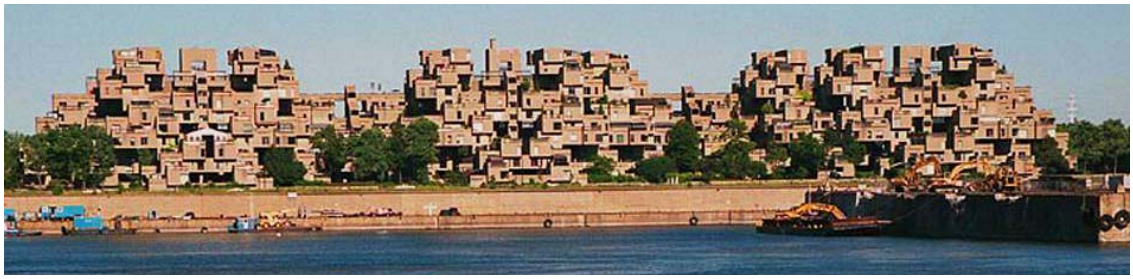


Figure 3.3.4: View of Habitat 67 from the city
Source: http://designistdream.com/2007/12/10/moshes-modernism/

In Expo 67, the project was built on a modest scale, thereby not fully representing the architect’s original idea of a housing community in a mixed-use environment (McGill

Safdie Hypermedia Archive, an Industry Canada sponsored project: Habitat 67). However, the concept of a “three-dimensional community” can be seen clearly in Habitat 67. It consists of three large residential clusters. Each of them contains a number of prefabricated concrete boxes, which are individual “houses”, strategically stacked one on top of the other in many different ways, including a total of 354 modular units attached together to form 158 houses for 700 people (Safdie, 1974, pp. 62-87).

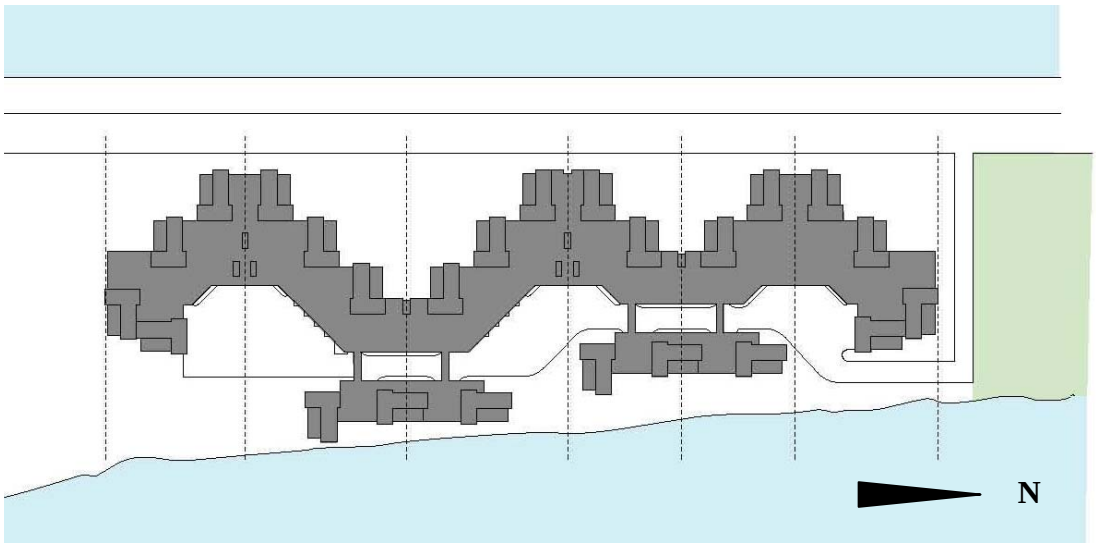


Figure 3.3.5: Site plan of Habitat 67
Source: French, 2008

Figure 3.3.6-3.3.8: Modular units forming a variety of house plans
Source: French, 2008

A vertical circulation system connects all the houses at different levels. There are three lift cores giving access to open lift lobbies and horizontal pedestrian corridors with plastic covers on the sixth floor and the tenth floor, which were called “pedestrian streets” by the architect; then from these “pedestrian streets”, staircases, walkways and bridges lead residents to their houses (Safdie, 1974, pp. 62-87). Additionally, pedestrian circulation and vehicular circulation are successfully separated in this project. At the ground level, there is a covered parking lot and a service road connecting all service areas and entrances of the parking lot. Above the parking lot, there is an open plaza giving access to the lift cores. Several convenience stores can also be reached from the open plaza, which are the only commercial facilities in this housing community. Therefore there is little or no chance for pedestrians to cross vehicular traffic in the neighbourhood.

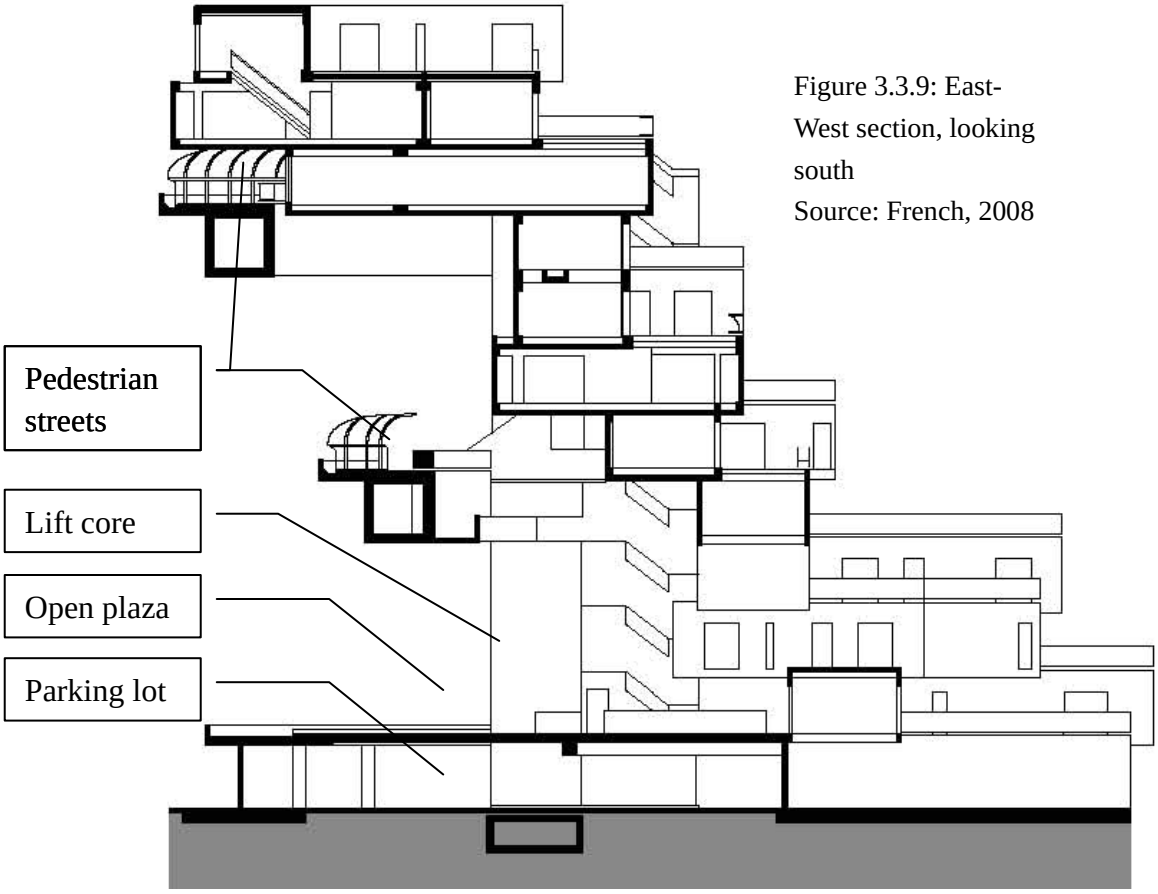


Figure 3.3.9: East-West section, looking south
Source: French, 2008

The pedestrian corridors serve not only as horizontal circulation corridors but also as communal open spaces with great views of the St. Lawrence River. At numerous places throughout the building, there are also small open playgrounds connecting with these pedestrian corridors for young children who are not able to go outside on their own. These elevated open spaces are optimal alternatives to the conventional open spaces at the ground level. They not only save land at the ground level for other uses but also enable residents to meet and talk frequently in the building, thereby largely enhancing social contacts among residents.

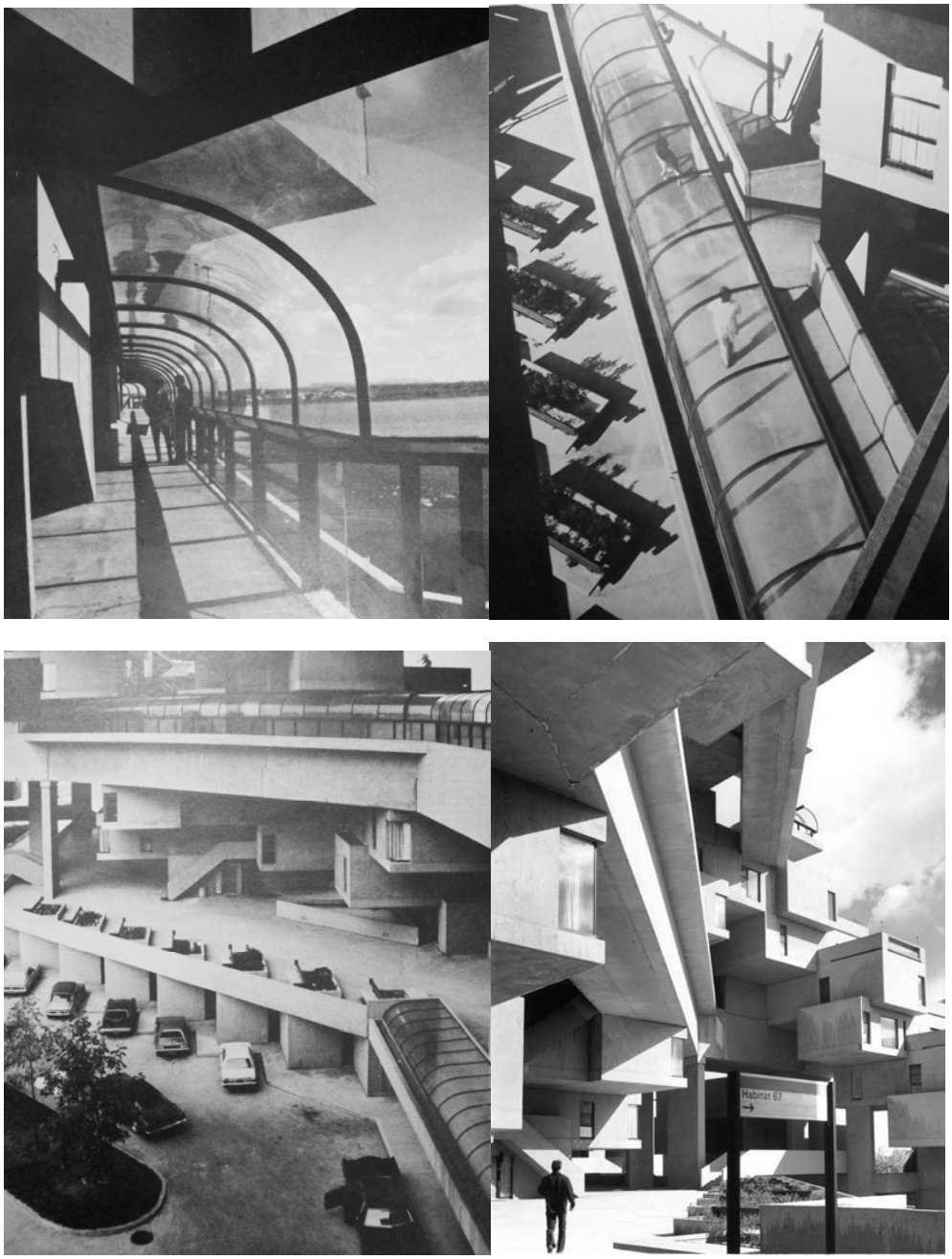


Figure 3.3.10-3.3.13: Pedestrian streets with plastic covers and open playgrounds in Habitat 67
Source: Safdie, 1974

For every house, there is at least one terrace with sufficient sunlight and open views in two or three directions, which is achieved by piling up housing units into three pyramidal structures. Then rooftop garden can be created on the roof of the unit below.

In this way, every roof garden can be fully exposed to sunlight, fresh air and great views of the surroundings. This design approach fulfills the concept of “for everyone a garden”, a dream of owning a private garden with the house, which is normally available in suburban houses. Here, Safdie conquered the great challenge for most architects, making high-density multifamily urban housing compatible with suburban single-family garden housing, which are two dramatically different housing prototypes (McGill Safdie Hypermedia Archive, an Industry Canada sponsored project: Habitat 67; Kultermann & Hofmann, 1970, pp. 492-495; Safdie, 1974, pp. 62-87).

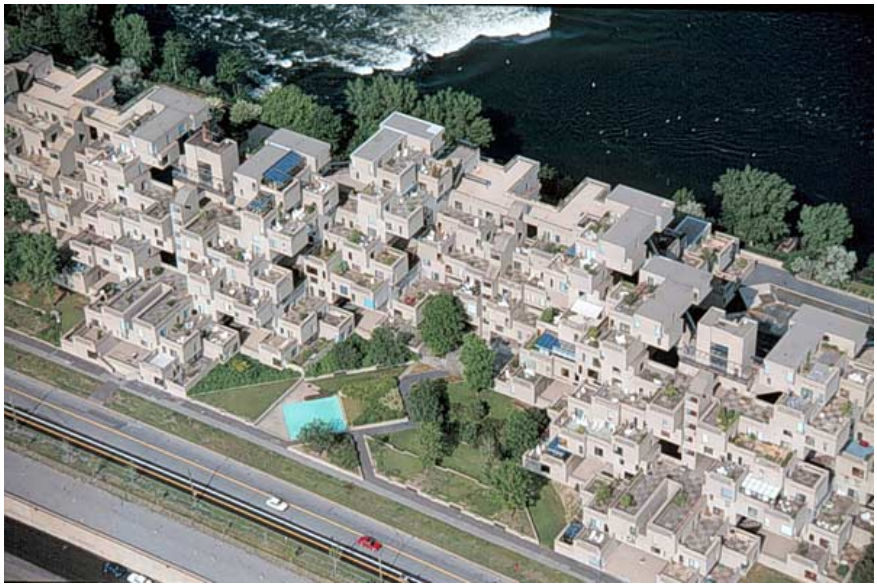


Figure 3.3.14: Roof gardens in Habitat 67 – aerial view
Source: http://www.msafdie.com/

Summary

There is little or no design in Habitat 67 relating to the conventional concept of high-density housing in the city. The project gained a lot of criticisms, since there are some problems associated with the construction of Habitat 67. The most obvious problem is the high construction cost. Including the extra cost of building a special crane to lift those heavy dwelling units from the ground to their locations, the final cost was more than twice as high as originally estimated (Kultermann & Hofmann, 1970, pp. 492-495). Additionally, advanced techniques were adopted during the on-site

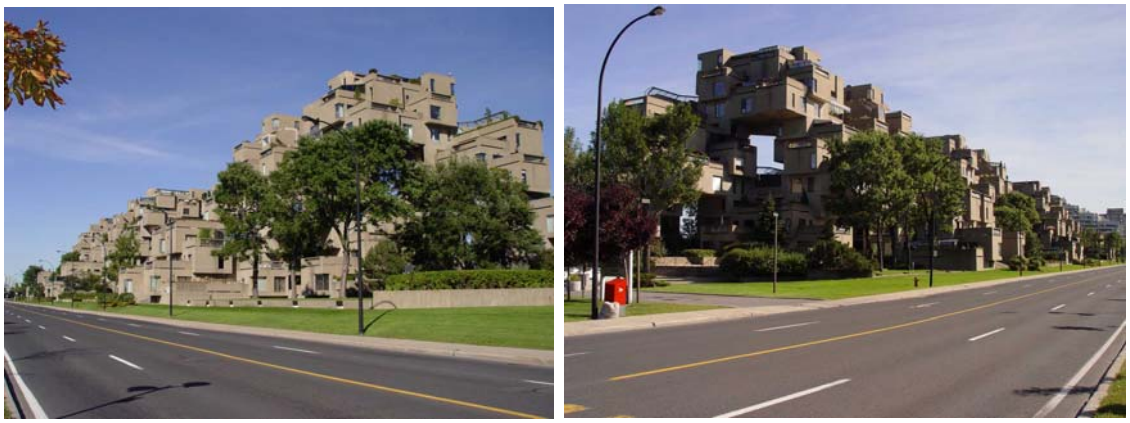
installation of those complicatedly-organized dwelling units, which further increased the construction cost (French, 2008, pp. 218-219; Safdie, 1974, pp. 62-87). Furthermore, instead of facing the south, the main façade is facing the west, which reduces the direct access to sunlight during the day time. Finally, the whole development is difficult to be maintained economically, due to the severe conditions of the long winter in Montreal. Therefore, Habitat 67 may not be a very successful high-density development in terms of its high construction cost and the integration with the context.

Figure 3.3.15: Perspective of Habitat 67
Source: http://www.space1999.net/~sorellarium13/habitat-67.htm

However, the design of Habitat 67 is still creative and remains on the frontier of high-density housing development, even if it was built 43 years ago. The two basic concepts of this project, the “three-dimensional community” and “for everyone a garden” have been achieved in Habitat 67 (Safdie, 1974, pp. 2-87). There are a few features associated with the design of Habitat 67, which can be applied in future high-density developments. First, the design reduces the high pressure of land use on the ground level by moving part of communal open spaces from the ground level to the upper levels. Secondly, the design promotes social interaction by building pedestrian linkages in the upper levels. Thirdly, the design makes high-density multifamily

housing as attractive as suburban single-family housing. Safdie may not be the first one to project these creative ideas, but he is the first architect to design this new housing system in detail and make it a reality.

Figure 3.3.16 -3.3.19 (up): Aerial view and perspectives of Habitat 67
Source: http://designistdream.com/2007/12/10/moshes-modernism/
Figure 3.3.20-3.3.21 (below): Perspectives of Habitat 67
Source: http://www.space1999.net/~sorellarium13/habitat-67.htm



3.4 Rue de Meaux Housing

Paris, France, 1991

Renzo Piano

Site area: 0.72 ha (1.78 acres)
Total floor area: 15,600 sqm
Building height: 7story
Number of dwellings: 220
Net density: 306 dwellings/ha (124/acre)
Program: social housing

Figure 3.4.1: Rue de Meaux housing block – key map
Source: http://www.housingprototypes.org/project?File_No=FRA006

Context

The Rue de Meaux housing development is a low-cost urban infill project for social housing, located in a dense and busy neighbourhood in the north of Paris, not far from La Villete, within the 19th arrondissement, which was undergoing a transformation at that time. The site is a roughly 70 by 100 meter rectangular block with a narrow street frontage facing Rue de Meaux, a small neighbourhood street. It was a large parking lot for street-cleaning vehicles, later had been underutilized and made room for new development. On the east of the site is a school built in the 1890s; on the west of the site are typical Parisian apartment buildings. Buttes Chaumont, one of the most famous parks in Paris, is within walking distance from the site. Therefore the project is situated

in a restricted area, which is immediately facing the diversity and complexity of the neighbourhood (Domus, 1991 July/Aug, pp. 29-39; Architectural Review, 1992 Mar, pp. 35-40; Zhou, 2005, pp. 239-243; French, 2008, pp. 188-189; Zabalbeascoa & Marcos, 1998, pp. 40-44; Irace, 2007, pp. 180-183; Piano, 2002, pp.27-30).

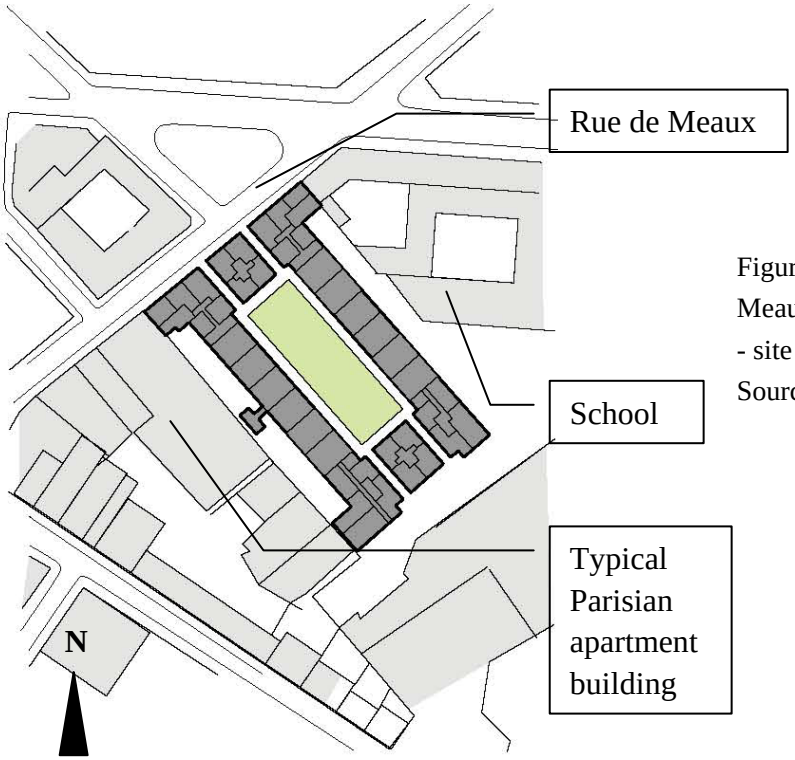


Figure 3.4.2: Rue de Meaux housing block - site plan
Source: French, 2008

Concept

Faced with such a diversified urban context, many complicated conditions coming from the existing buildings in the adjacent neighbourhood had to be taken into account, such as daylight requirements, shadow impact, emergency circulation, fire prevention, neighbourhood permeability, accessibility and other functional relationships with the surroundings. The major concern in the beginning of the project was to select an ideal urban form that can contain dwelling units as much as possible and at the same time has to work in harmony with the existing neighbourhood (Domus, 1991 July/Aug, pp. 29-39; Architectural Review, 1992 Mar, pp. 35-40). Instead of replicating the

traditional urban form in the surrounding neighbourhood, arranging buildings along the street with service yards at the back, Renzo Piano adopted a courtyard housing layout that is a unique urban form in the existing urban block. However, the scale and the proportion of the new urban form are closely related to the existing buildings in the neighbourhood. Because of its "inward-looking" layout, courtyard housing can contain many activities within the internal open space without generating much negative impact on the external environment (Schoenauer, 1981, p. 29; Schoenauer, 1992, pp. 73-100; Zhou, 2001 &2005). It is an ideal urban form for the Rue de Meaux housing development. Once the optimal urban form was found, all the complicated issues coming from the surroundings could be simplified and appropriately solved by the architect's skill and experience.

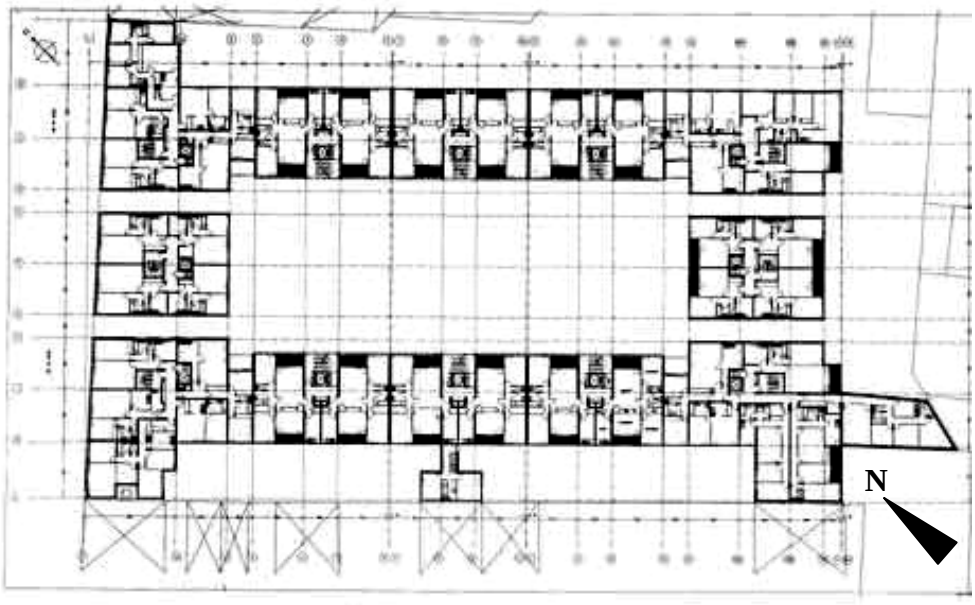


Figure 3.4.3: Rue de Meaux housing block – ground floor plan
Source: http://www.housingprototypes.org/project?File_No=FRA006

Idea and design

Buildings are located along all the four sides of the site, with a pleasant internal open space in the center of the site. On the Rue de Meaux, the only side facing the street,

three short blocks are located to fill the gap between existing buildings and are aligned with these buildings to preserve the existing street frontage. They are separated by two narrow pedestrian paths, which give access to the central courtyard, a green open space separated from the street. Linear buildings are located along each of the two long sides of the site, with appropriate set-backs from the existing buildings. On the other short side of the site, there are also three short blocks aligning with the existing buildings and separated by two narrow pedestrian paths. This symmetrical site layout creates a strong sense of balance in the space and is working in harmony with the surroundings. Furthermore, it contains 220 dwelling units in such a small area with such restricted conditions.

Figure 3.4.4 - 3.4.5: Landscape in the central courtyard
Source: http://www.dalnoky.com/projets/paris.html

The central courtyard is the central space of the entire project and is roughly 60 meter

long by 25 meter wide and surrounded by 7-story (roughly 25 meter) apartment buildings. The space inside is in scale with a medium-sized Paris street, but has a different character (Architectural Review, 1992 Mar, pp. 35-40). Tall and slim silver birch trees, which are planted throughout the central courtyard, are the major landscape elements on site. Since there is no parking or other facility beneath the courtyard, trees can be planted directly into earth and grow very well. These tall trees are also in scale with buildings, not only increasing the aesthetic quality of the central courtyard, but also reducing overlooking between apartments on both sides of the courtyard, creating a certain degree of visual complexity and providing some degree of privacy. The central courtyard is a quiet open space in great contrast to the busy environment in the neighbourhood, creating a sense of calm and offering residents a peaceful living environment in the development.

Figure 3.4.6 -3.4.7: A well supervised central courtyard
Source: http://www.dalnoky.com/projets/paris.html

The central courtyard serves not only as a garden, but also as a transition zone and a

social space. Entrances of buildings are located in the courtyard, thereby all residents have to pass through the courtyard to get to their apartments. Additionally, it is a semiprivate space that protects the neighbourhood from the noise and traffic outside the courtyard. At the same time it is also like a public plaza, where people meet, gather and talk. Furthermore, it is well supervised by residents in the apartments and by people coming in and getting out the housing blocks. Therefore, it is a defensible space, offering residents a sense of security.

Figure 3.4.8: The central courtyard giving access to entrances of housing blocks
Source: http://www.housingprototypes.org/project?File_No=FRA006

Built forms facing the inside and outside of the courtyard have different descriptions (Domus, 1991 July/Aug, pp. 29-39). First, differences can be seen from facades on both sides of the building. Since the Rue de Meaux frontage is the only street facade that can be seen from the city, and the other three frontages facing the neigbbourhood are not very visible, the Rue de Meaux street facade and facades facing the courtyard become more important. They are decorated with “terracotta” tiles, a special cladding system

that is one of the basic instruments in the architect's workshop, in order to create an clear identity for the new neigbbourhood (Irace, 2007, pp. 180-183; Piano, 2002, pp.27-30). Tiles are in red in order to form a vivid colour contrast to the green trees and vegetation in the courtyard. Secondly, differences can be seen from the roof line of the building. There are set-backs in the facades facing the neighbourhood. They form a series of roof terraces in order to reduce the shadow impact that the new development may create on the existing buildings.

Figure 3.4.9 (up): Facade along the Rue de Meaux
Source: Zhou, 2005

Figure 3.4.10 (below): Facades facing the central courtyard
Source: Zhou, 2005

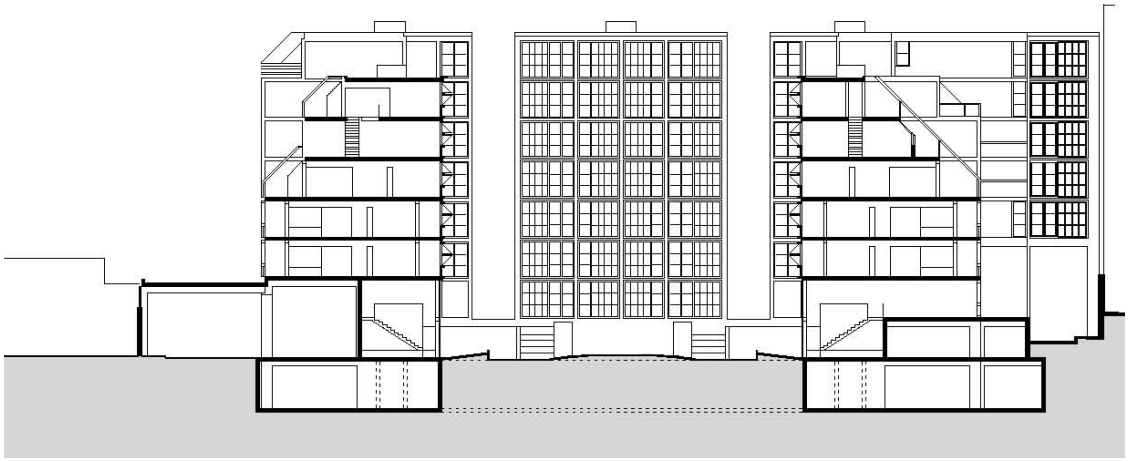


Figure 3.4.11: East-West block section, looking south
Source: French, 2008

Four narrow pedestrian paths between buildings are gateways of the new neighbourhood. They are designed very narrow to limit the noise and impacts from the street and the surroundings getting into the courtyard; thereby ensuring the privacy and peacefulness of the internal living environment. Meanwhile, they are completely separating built forms to keep necessary visual connections between the inside and outside of the courtyard. In this way, the courtyard can also be glimpsed from the street.

Figure 3.4.12: Rue de Meaux street elevation
Source: French, 2008

Summary

The overall design of the Rue de Meaux housing development looks simple, clear and modest, working in harmony with the surroundings, at the same time presenting its own character. At the first glimpse, it is hard to believe that the project was designed by Renzo Piano, who designed the Centre Pompidou, one of the famous landmarks of Paris. The two projects might look like works of two different architects. As Piano himself explained: in his long career, his "attitude to things has changed a great deal"; at the beginning of his career, his "enjoyment consisted in doing a piece"; today "attentions to context is much more important" (Domus, 1991 July/Aug, p. 32). Indeed, the greatest challenge of the Rue de Meaux housing development is to deal with the highly diversified and complicated context. Under such restricted conditions imposed by the existing buildings in the neighbourhood, the architect successfully found the ideal and precise urban form that could achieve both high density and high quality of life in the development, especially in a low-cost social housing development.

The Rue de Meaux housing development is an exemplary high-density development because of two facts. First, it reveals that urban form is closely related to the context; in other words, the context of development can help architects and planners to decide what kind of urban form should be adopted in the development. Second, it reveals that the quality of development does not primarily depend on the cost; in other words, even with limited financial support, it is still possible for architects and planners to improve the quality of development by adopting optimal urban forms and providing better designs.

3.5 The Whale

Amsterdam, the Netherlands, 2000

Frits Van Dongen / de Architekten Cie

Site area: 0.5 ha (1.3 acres)
Total floor area: 35,800 sqm
Building height: 7-11 story
Number of dwellings: 214
Net density: 428 dwellings/ha (173/acre)
Program: market and social housing with commercial space at the street level

Figure 3.5.1: Borneo-Sporenburg harbour area and the Whale - aerial view
Source: http://www1.cie.nl/projects/architecture/residential/the-whale

Context

The Whale, a residential complex, is part of the Borneo-Sporenburg redevelopment, which was completed in 2000. The project site is located in Borneo-Sporenburg area in the east of Amsterdam, along the shores of the river Ij near Amsterdam's inner city, in a former busy harbour area that fell into disuse in the 1970s. The entire redevelopment

includes a school, small parks, three new pedestrian bridges that connect the two islands of Borneo-Sporenburg together and 17,000 dwellings. Additionally, a minimum overall density of 100 dwellings per hectare (40/acre) was required by the city with the intention to resemble the Jordaan, Amsterdam's dense and lively inner-city district (Zhou, 2005.pp. 244-249; A+U, 2002 May, pp. 62-67; Domus, 2001 July/Aug, pp. 128-143; Lotus, 2007 Nov, pp.40-43; French, 2008, pp.218-219) (Figure 3.5.1-3.5.2).

Figure 3.5.2: Borneo-Sporenburg harbour area - aerial view
Source: http://www1.cie.nl/projects/architecture/residential/the-whale

Concept

The master plan of Borneo-Sporenburg, designed by West 8 Landscape Architects from Rotterdam, covers the two islands of the harbour area with long and straight rectangular blocks to house low-rise dwellings, at the same time creates three superblocks on the two islands to accommodate large "meteorite" buildings in order to form a great contrast to the surrounding "sea of low-rise buildings" (Domus, 2001 July/Aug, p. 136; A+U, 2002 May, p. 64). The three "meteorite" buildings were regulated by the master plan to be large-scale buildings, not only to achieve the assigned density of 100 dwellings per hectare, but also to serve as landmarks, the visual destinations of the

entire redeveloped harbour area (A+U, 2002 May, pp. 62-67; Zhou, 2005.pp. 244-249). The Whale is one of the three “meteorite” buildings on Borneo-Sporenburg (Figure 3.5.1-3.5.5).

Figure 3.5.3 (up): South elevation
Source: http://www1.cie.nl/projects/architecture/residential/the-whale

Figure 3.5.4 (below): South-east perspective view
Source: http://www.house42.net/htm/pla011.html

Idea and Design

Van Dongen, the design architect, working closely with West 8, decided to adopt the traditional European type of courtyard housing to develop the whole project and organize the whole development into one large, closed housing block, which can fulfill the density requirement and achieve the enormous superblock regulated by the master plan of Borneo-Sporenburg. Meanwhile, the closed housing block attempts to response to the surrounding traditional Dutch “canal side” houses, remaining some original characteristics of Dutch houses and creating variety in the urban form (Zhou, 2005, pp. 244-249; French, 2008, p.218). The entire residential complex has a 50 by 100 meter

footprint, containing 214 apartments, commercial spaces, a semi-public interior courtyard and an underground car park; therefore, the name of the development, the "Whale", comes from its enormous size (The whale, Amsterdam, de Architekten Cie) (Figure 3.5.5-3.5.6).

Figure 3.5.5: Aerial view of the Whale – closed housing block
Source: Zhou, 2005

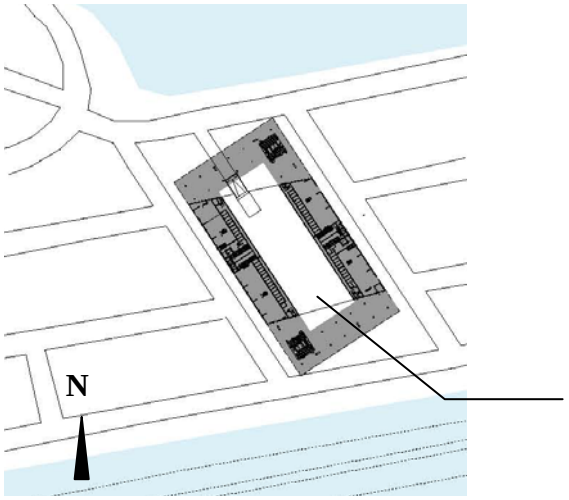


Figure 3.5.6: Site plan of the Whale
Source: French, 2008

The unique form of the Whale was decided by the position of the sun. Van Dongen explained that "one of the difficulties of a closed building block is getting light in" (Domus, 2001 July/Aug, p. 136). Therefore, the traditional courtyard housing block has

been carefully modified according to the position of the sun in order to introduce sufficient sunlight into the heart of the closed housing block (A+U, 2002 May, pp. 62-67; Domus, 2001 July/Aug, pp. 128-143). The roof is bent dramatically on the eastern and western sides and aligned with the path of the sunlight; more units are moved from the south side to the north side of the building. As a result, the internal open space and almost all dwelling units can have direct access to sunlight. Additionally, each corner of the building is elevated so that the units on the ground level could also receive direct sunlight which is coming in from the lower part of the building. Accordingly, a sharp, contemporary silhouette is created by the sloping roof lines and elevated corners of the building (Figure 3.5.7 -3.5.8).

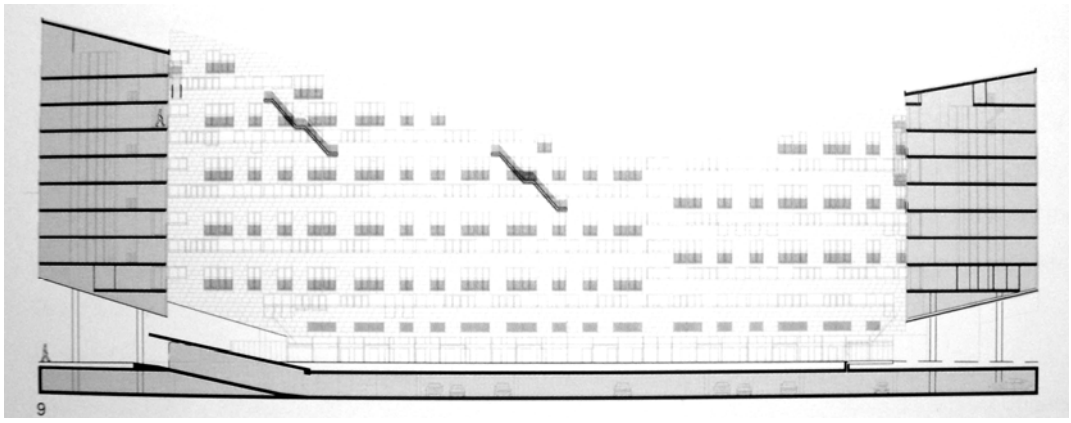


Figure 3.5.7 (up): North-South block section of the Whale, looking east
Source: Zhou, 2005
Figure 3.5.8 (below): East street elevation
Source: French 2008

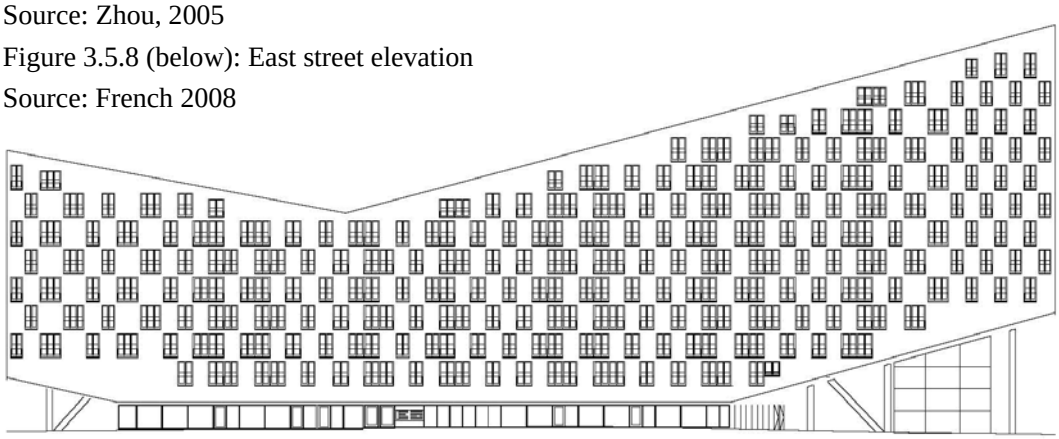



Figure 3.5.9 (left): The internal garden – looking from south
Source: Lotus International, 2007 Nov
Figure 3.5.10 (right): The internal green open space – looking from north
Source:http://www.e-architect.co.uk/amsterdam/jpgs/amsterdam_building_aw200407_770.jpg

Although the overall volume of the Whale is enormous, the internal open space provides people a sense of intimacy (Lotus, 2007 Nov, pp.40-43). The landscapes in the central courtyard, such as narrow pedestrian paths, ornamental vases, trees and bushes, all help to soften the Whale's sharp silhouette and heavy volume. Furthermore, according to the housing corporation of Amsterdam, public space should be accessible to everyone; the central courtyard of the closed building block is designed not as a traditional semiprivate open space but as a semipublic city garden that is primarily to be looked at (Domus, 2001 July/Aug, pp. 128-143). Gateways are created underneath the superblock to ensure visitors from the neighbourhood having access to the internal open space from the street directly (Figure 3.5.11-3.5.12).

Figure 3.5.11(up): North gateway
Source: http://www1.cie.nl/projects/architecture/residential/the-whale
Figure 3.5.12 (below): South gateway
Source: http://www.house42.net/htm/pla011.html

The superblock provides a wide variety of housing types, particularly in the upper and lower floors, in order to coordinate with the sloping roof lines and elevated corners (A+U, 2002 May, pp. 62-67; Domus, 2001 July/Aug, pp. 128-143) (Figure 3.5.7 -3.5.8). It also offers an extraordinary spatial enjoyment in the development, besides the central courtyard on the ground level. Entrances of apartments are located on the open floor corridors, which are facing to the internal green open space. They can be reached by residents on the same floor and from other floors through the open staircases overhang outside the open corridors. These open floor corridors enable residents to meet, enjoy fresh air and enjoy a view of the central courtyard immediately outside their dwelling units. In this way, they can be defined as optimal social spaces, compared to the

enclosed double-loaded floor corridors in conventional high-rise buildings (Figure 3.5.13 -3.5.18).

Figure 3.5.13(up): Open corridors with open staircases
Source: Zhou, 2005

Figure 3.5.14-3.5.15 (left): Typical floor plans of dwelling units - entrances of units on the open corridor
Source: French, 2008

Summary

The scale, the dramatic form and the contemporary silhouette of this super residential block reveal that it is one of the landmarks on Borneo-Sporenburg. The “Whale” creates a big contrast to the surrounding three-story low-rise dwellings, exactly like “a meteorite fallen from the sky” (The Whale, Amsterdam, de Architekten Cie). This architectural sculpture with its angled roof line and elevated corners not only ensures that all the dwellings and the courtyard garden enjoy sufficient sunlight, fresh air and natural wind, but also enables residents to enjoy dramatic views of both the internal open space and external cityscapes of Amsterdam as well as spectacular views of the

water of the river Ij. It is a successful high-density development in term of its creating an interesting residential block not with conventional high-rise built forms, but with an innovative urban form that can generate many great perspectives in the neighbourhood (Figure 3.5.1-3.5.18).

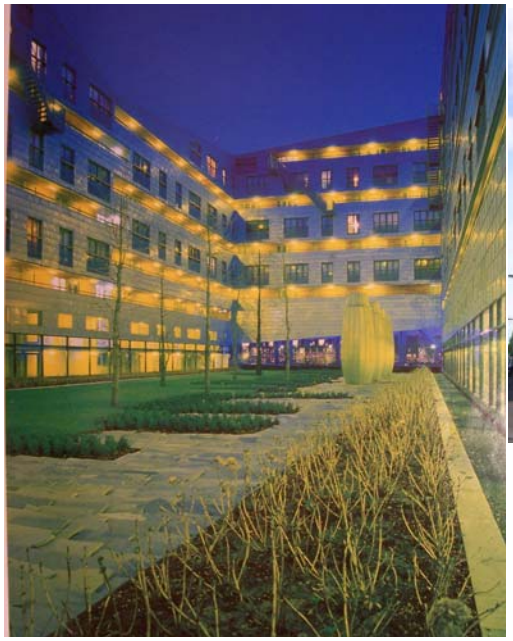


Figure 3.5.16 (up right): North-west perspective view
Source:http://archporn.wordpress.com/2009/05/01/trip-9-the-whale-by-de-architekten-cie/

Figure 3.5.17 (left up): Night view of the internal courtyard
Figure 3.5.18 (left below): Night view of the open corridor
Source: Zhou, 2005

3.6 Schots 1+2

Groningen, the Netherlands, 2002

S333 Architecture + Urbanism

Site area: 1.3 ha (3.2 acres)
Total floor area: 34,505 sqm
Building height: 4-8 story
Number of dwellings: 145
Net density: 112 dwellings/ha (45/acre)
Program: market and social housing with commercial space at the street level

Figure 3.6.1: Schots 1 and 2 – aerial view, looking from east to west
Source: www.s333.org

Context

Schcots 1 and 2 housing developments are part of a large-scale urban regeneration project in Groningen. After winning the first prize in the Europan competition on design of the "Circus terrains" in 1993, the design firm S333 was commissioned by the municipality of Groningen to develop the design principles for a development plan for the entire Circus, Bodem and Gasfabriek area, locally called as CiBoGa terrain. The

entire redevelopment covers 14 hectares of heavily polluted brownfield sites on the north-eastern edge of the inner-city area of Groningen, following the boundaries of the original medieval city walls. First, S333 indentified the role of the site as forming part of the large “urban ring structure” with its own independence and character, at the same time playing a key role in the city’s overall ecological structure. Additionally, the principles established by S333 in the environmental aspect fully supported the city’s intention to build a sustainable urban renewal project by establishing a policy of 0.5 car parking space per dwelling, with car-free zones throughout the redevelopment area. Later, Schots 1 and 2 were designed by S333 as the first phase of the whole regeneration project (Schots 1 & 2, CiBoGa Terrain, Groninge; A+U, 2006 Jun, pp. 59-65; Design Build Network, Schots 1 and 2, CiBoGa Terrain, Groningen; French, 2005, pp.140-145; French, 2008, pp.212-215; S333 Architecture + Urbanism, Schots 1 & 2, The CiBoGa Terrain) (Figure 3.6.1-3.6.3).

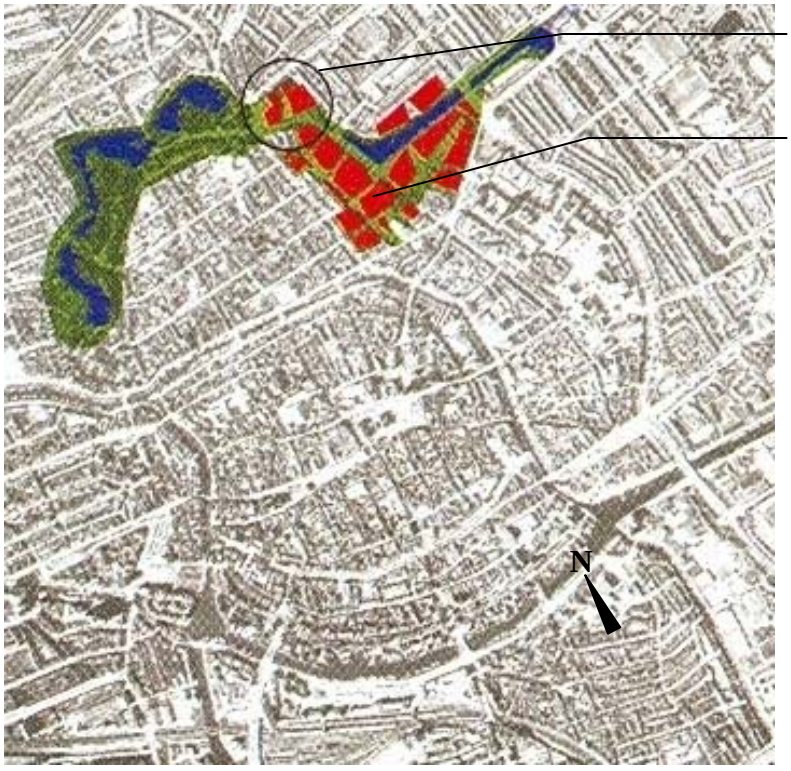


Figure 3.6.2: CiBoGa terrain– keymap
Source: A+U, 2006

Concept

Major concepts of the renewal project developed by S333 can easily be seen from the overall site layout of Schots 1 and 2, for example ensuring the high accessibility and permeability of the new neighbourhood by creating a series of easy access routes to the housing; ensuring a sense of "openness" and visual connections throughout the site by integrating housing forms closely with open spaces in the development; and achieving the programmed high residential density by appropriately distributing the density across the site (Schots 1 & 2, CiBoGa Terrain, Groningen). These concepts led to the creation of 13 "schotsen" in the whole development plan proposed by S333, which are high-density urban housing blocks intimately integrated with semipublic open spaces, appropriately located on the redevelopment site to form an ecological area and serve as a buffer zone between the inner- city area and the suburban low-density area (A+U, 2006 Jun, pp. 59-65) (Figure 3.6.1-3.6.3).

Figure 3.6.3: Schots 1 and 2 – site plan
Source: French, 2008

Idea and Design

Schots 1 and schots 2 are separated at the ground level by a central pedestrian street with retails on both sides, but are connected under the ground by a huge parking garage. In order to create a car-free neighbourhood promoting the sustainability of the renewal project, parking facilities are provided underground, occupying the entire heavily polluted brownfield site and serving both the residents of the site and visitors from the city (Schots 1 & 2, CiBoGa Terrain, Groningen; S333 Architecture + Urbanism, Schots 1 & 2, The CiBoGa Terrain, www.s333.org). This design approach not only makes cars disappear on the ground level but also greatly reduces the pressure and high cost of dealing with the decontamination of the brownfield site (Figure 3.6.4 - 3.6.7).

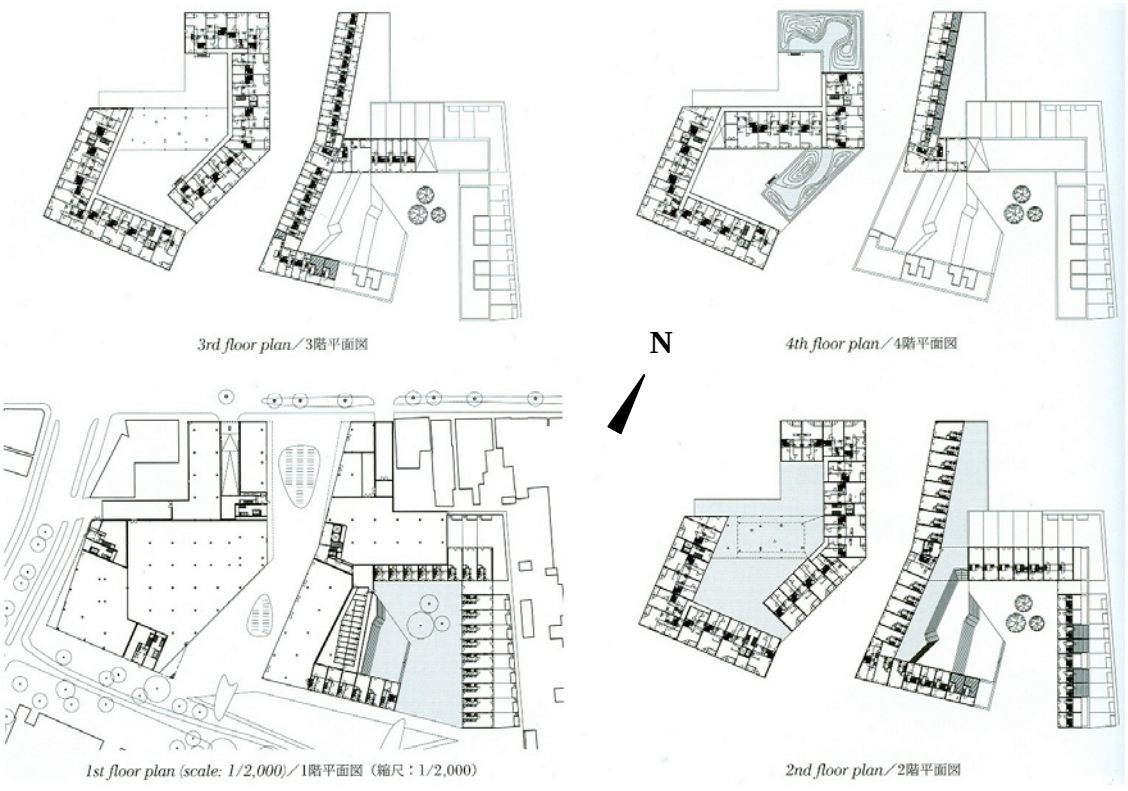


Figure 3.6.4 - 3.6.7: Schots 1 and 2 overall layouts – floor plans
Source: A+U, 2006

Above the ground, Schots 1 consists of apartment buildings with high densities, which

vary from three to eight stories in height forming a variety of semiprivate open spaces between buildings. Instead of concentrating the density at one large high-rise apartment block, designers evenly distribute density across the site and only concentrate higher density at three points by using smaller eight-story point-style apartment buildings, which are perceived as medium-rise buildings. It strategically avoids the creation of huge high-rise buildings, which significantly conflicts with the surrounding low-rise housing neighbourhood(Figure 3.6.1, 3.6.4-3.6.9).

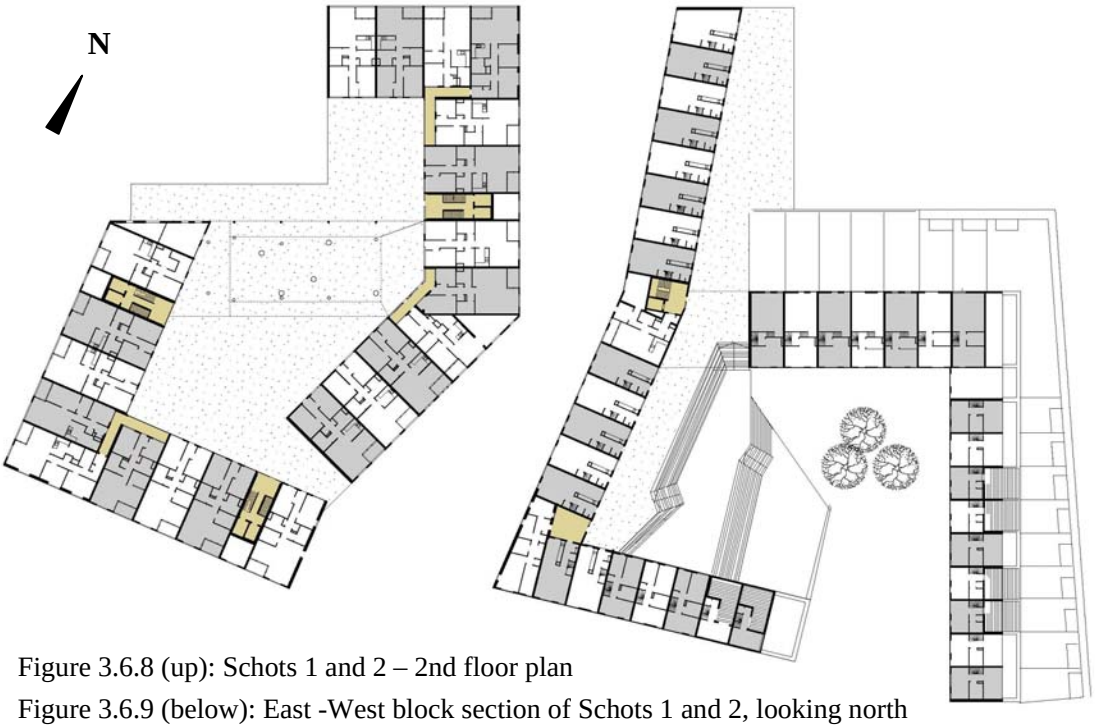
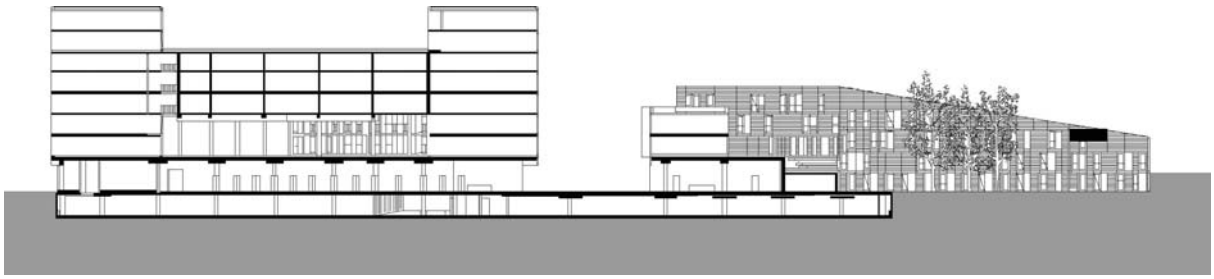


Figure 3.6.8 (up): Schots 1 and 2 – 2nd floor plan
Figure 3.6.9 (below): East -West block section of Schots 1 and 2, looking north
Source: French, 2008



Compared to Schots 1, Schots 2 consists of terrace houses with relatively lower densities, which vary from two to four stories in height and form one large semiprivate open space among buildings. This part of the new development is characterized by a sloping ground surface that creates an interesting landscaped courtyard gradually rising from the ground floor on the east side to the third floor on the west side. Houses at the upper level can be reached through a series of broad outdoor steps, which follow the sloping topography of the site. As a result, a majority of terrace houses have their own entrances connecting with this sloping open space and are separated from the busy commercial street at the ground level on the west side of Schots 2. This design approach answers citizens' large demand for housing with easy access to the ground and outdoor space, even though they are not actually at the ground level (Figure 3.6.1, 3.6.4-3.6.10).

Figure 3.6.10: East -West courtyard section of Schots 2, looking north
Source: French, 2008

Other creative ideas adopted in this development are also exemplary. Schots 1 and schots 2 have a very different appearance in both the built form and the housing type, which ensures that the new development provides diversity in housing for people with different income levels and the new neighbourhood becomes a socially mixed community (French, 2005, pp.140-145; French, 2008). Additionally, the landscape in

this project is not considered as something between buildings, but is seamlessly integrated with the built form, especially in Schots 2 (A+U, 2006 Jun, pp. 59-65). Part of the roofs, which are visible from apartments in Schots 1, are either planted with meadow grasses or covered with a graveled surface. Furthermore, private gardens located on the roof in Schots 2, associating with green roofs, patios, playgrounds and green building facades, create a three-dimensional landscape system for the city (S333 Architecture + Urbanism, Schots 1 & 2, The CiBoGa Terrain, www.s333.org) (Figure 3.6.8-3.6.14).

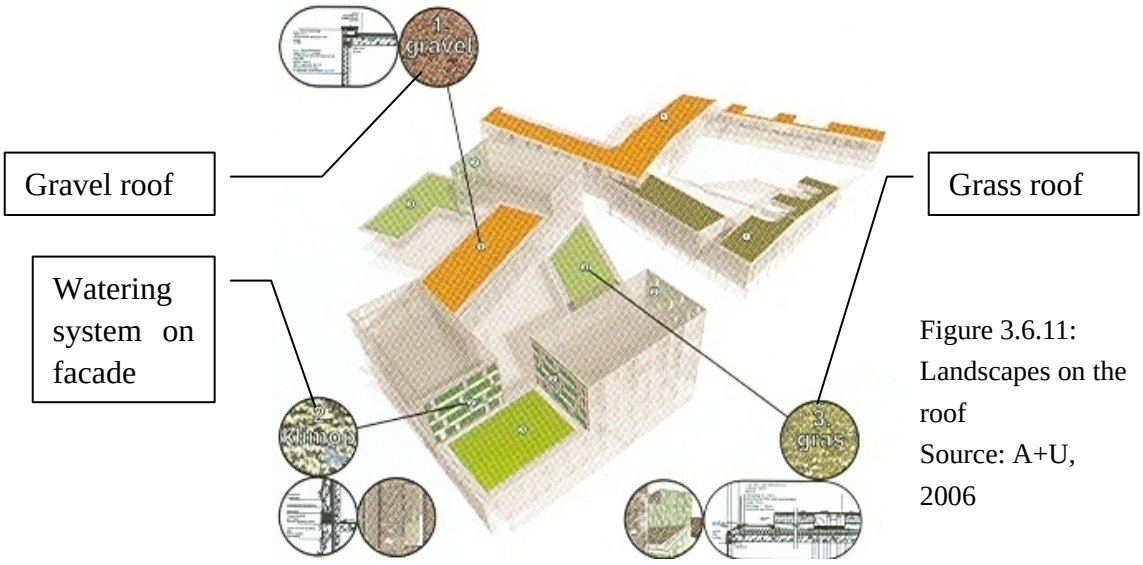


Figure 3.6.11: Landscapes on the roof
Source: A+U, 2006

Summary

In this high-density housing development, one great success is that designers try to avoid using huge high-rise built forms to meet the high density requirement. Instead, 3 smaller point-style high-rise buildings are adopted in Schots 1, which are close to the human scale and perceived as medium-rise buildings. Another great success is that designers try to achieve a sense of openness throughout the site by intimately integrating the landscape with the built form. It seems that built forms are also part of the landscape. Therefore, the outcomes of Schots 1 and 2 are new types of urban form that combine the traditional European type of courtyard housing with contemporary

design elements, offering optimal alternatives to the conventional high-rise housing. Furthermore, the “multi-layering” landscape system in Schots 1 and 2 creates a new type of spatial enjoyment in the high-density living environment (A+U, 2006 Jun, pp. 59-65) (Figure 3.6.1-3.6.19).

Figure 3.6.12 - 3.6.13 (up): Views in the courtyard of Schots 2
Figure 3.6.14 (below left): Stepped terrace in Schots 2
Figure 3.6.15 (below right): View in the courtyard of Schots 1
Source: www.s333.org

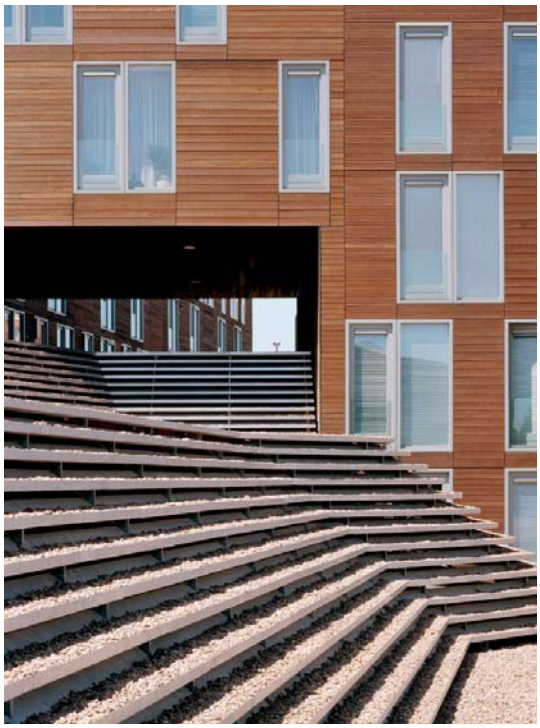
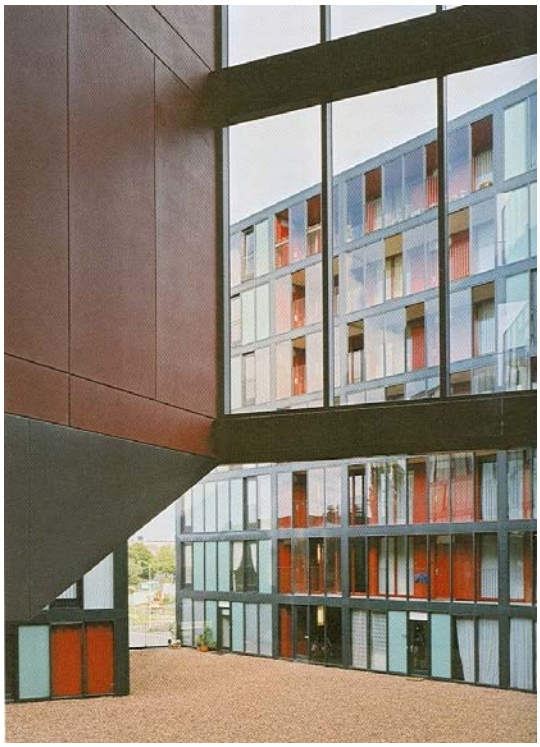


Figure 3.6.16 - 3.6.17 (up): Pedestrian street between Schots 1&2

Figure 3.6.18 -3.6.19 (below): View in the neighbourhood

Source: www.s333.org



3.7 Beaufort Housing

London, UK, 2003

Feilden Clegg Bradley Architects

Site area: 0.53 ha (1.31 acres)
Building height: 2-6 story
Number of dwellings: 65
Net density: 122 dwellings/ha (49/acre)
Program: shared ownership and social housing

Figure 3.7.1: Beaufort Court housing – view on Lillie Road
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

Context

The Beaufort Court housing development, also called the Lillie Road development, is a social housing project developed by the Peabody Trust with Feilden Clegg Bradley Architects. The project site is located in a restricted area with a complicated urban setting. The land was formerly occupied by a Victorian school that was demolished in 1998. The project stands next to an old Peabody housing development built in 1912 on Lillie Road, which is within a conservation area. The surrounding neighbourhood is a busy area, including residential buildings, offices, stores, retails and hotels with a variety of building types, ranging form Georgian town houses, modern high-rise hotel

buildings to low-rise school buildings. Later Peabody Trust bought the old school site from the local authority and intended to develop a social housing project (Broto, 2008, pp.146-153; CABE, Beaufort Court, London; Greenroofs.com Projects, Lillie Road, Beaufort Court). It was permitted to increase the number of dwelling units in the original permission; thereby, with the higher density, housing could be more affordable for citizens (CABE, Beaufort Court, London; Greenroofs.com Projects, Lillie Road, Beaufort Court). However, the local authority would not allow a high-density housing block to be built on the east side of the site, which is next to a high-rise hotel building; even if the hotel is much higher than the existing medium-rise housing in the neighbourhood, extra stories are still not accepted on the east side of the site (ibid) (Figure 3.7.1-3.7.2).

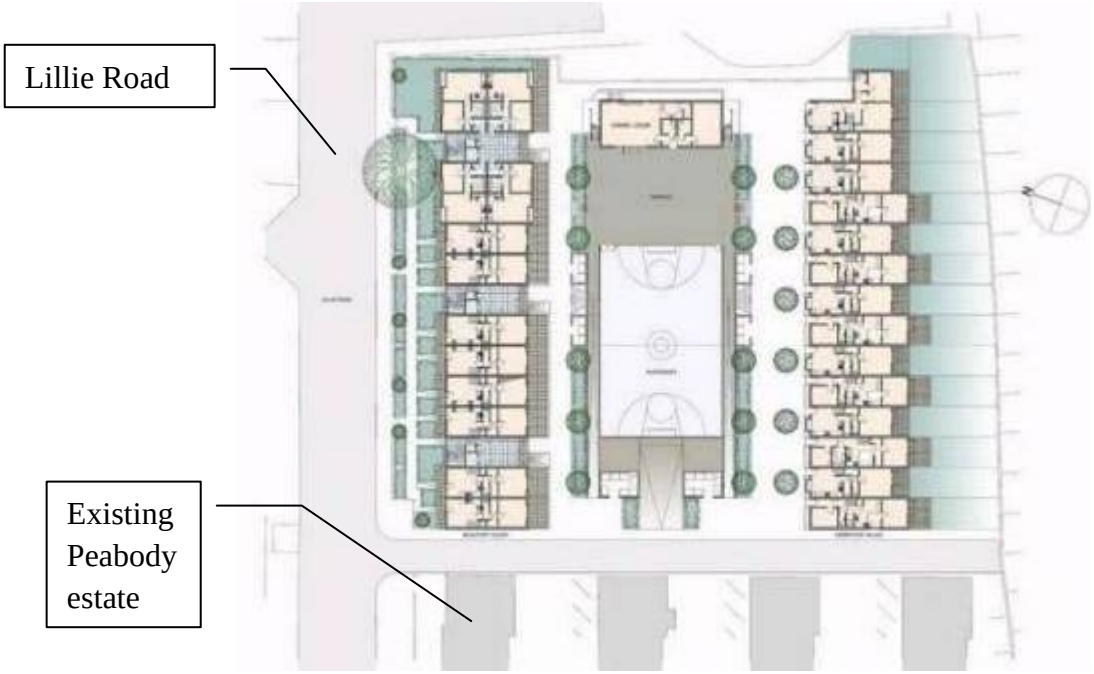


Figure 3.7.2: Beaufort Court housing – site plan
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

Concept

The design concept for the Beaufort Court housing development is to provide a high-

quality architectural design that is “sensitive” to its surroundings and is environmentally sustainable (Greenroofs.com Projects, Lillie Road, Beaufort Court). Furthermore, since the Peabody’s new development is situated in an existing urban area with a complicated context and adjacent to the existing Peabody properties that are within a conservation area, it has to work in harmony with its immediate surroundings, in terms of both the housing form and the architectural style.

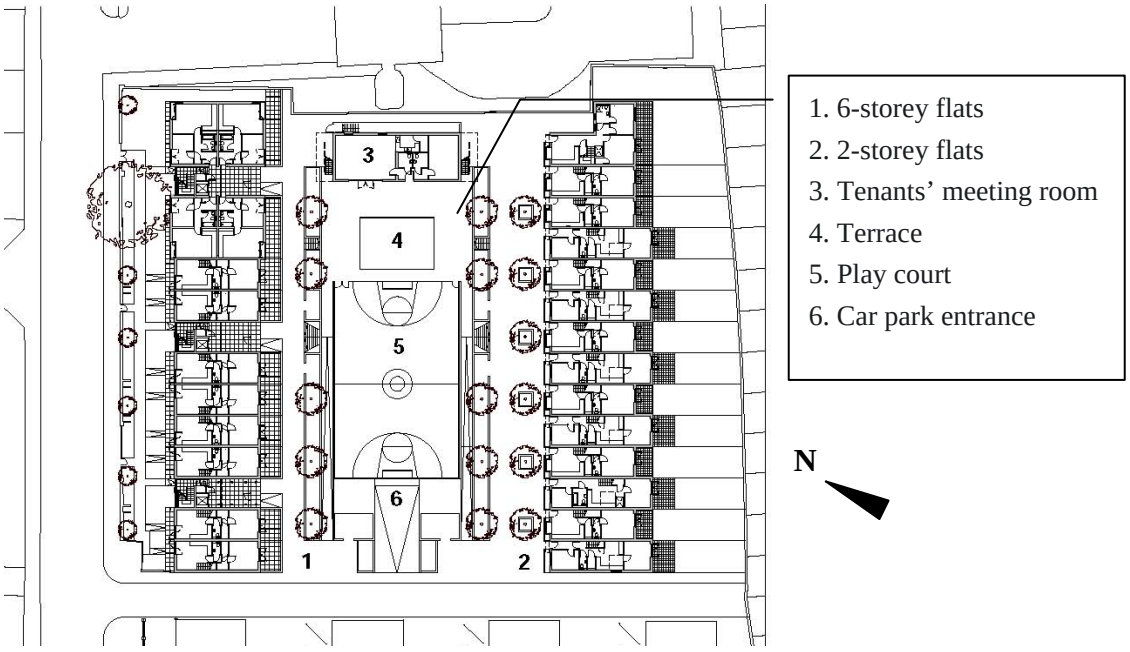


Figure 3.7.3: Overall layout of the new development
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

Idea and design

The entire Beaufort Court development consists of 65 dwelling units, primarily in the form of townhouses and apartments. It also includes a small community center, on-site amenities and car parking facilities, which serve both the new development and the adjacent Peabody properties (CABE, Beaufort Court, London). Townhouses and apartments are arranged in three housing blocks around a central communal open space. The central open space sitting on the top of a semi-underground parking lot is designed

into a landscaped courtyard containing an all-weather playground, a community meeting room and outdoor spaces for all residents (Figure 3.7.2-3.7.4).

Figure 3.7.4: North-South block section, looking east
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

The majority of dwelling units is arranged in a six-story apartment building on the north of the site. The rest of dwelling units are arranged in two-story townhouses on the south of the site and a three-story apartment building on the east of the site. In this way, the density is distributed on the north side and south side of the site; thereby avoiding concentrating the density in one large building, which leads to the creation of high-rise building. Meanwhile, arranging the higher building on the north side of the site reduces the shadow impact and ensures that all dwelling units as well as the central courtyard have sufficient sunlight. Furthermore, three housing blocks form the edges of the new neighbourhood and protect the central courtyard on three sides, creating a strong sense of enclosure for the new community. The central courtyard forms a focus point of the new neighbourhood (Broto, 2008, pp.148-151). Therefore, the new community is sensitively planned (Figure 3.7.2-3.7.4; 3.7.5, 3.7.8).

Figure 3.7.5: The central courtyard as a focus point for the new neighbourhood
Source: Broto, 2008

The three housing blocks are treated individually, according to different types of housing, their locations on the site, and their relationships to the surrounding buildings and nearby streets (Broto, 2008, pp.148-152). Townhouses on the south side of the site have small front yards facing the central courtyard and long backyards on the other side. The narrow frontage of two-story townhouses steps back from the neighbour's, in order to provide privacy and avoid overlooking between dwellings. The six-story apartment building on the north side of the site can be accessed from both the street and the central courtyard. All apartments have private balconies and units at the ground level have small private open spaces facing the central courtyard, which create a small buffer zone between the property and the semipublic open space, providing a clear sense of hierarchy in the space. Additionally, all three housing blocks are decorated with red terracotta tiles on building facades. This design approach provides a beautiful appearance for built forms, which look both contemporary and friendly. Meanwhile, building facades with red terracotta tiles fit well with the nearby old Peabody properties, which primarily use red bricks (Figure 3.7.2-3.7.4; 3.7.6, 3.7.7).

Figure 3.7.6 (up): Frontage of townhouses facing the central courtyard
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

Figure 3.7.7 (below): Frontage of the apartment block facing the central courtyard
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

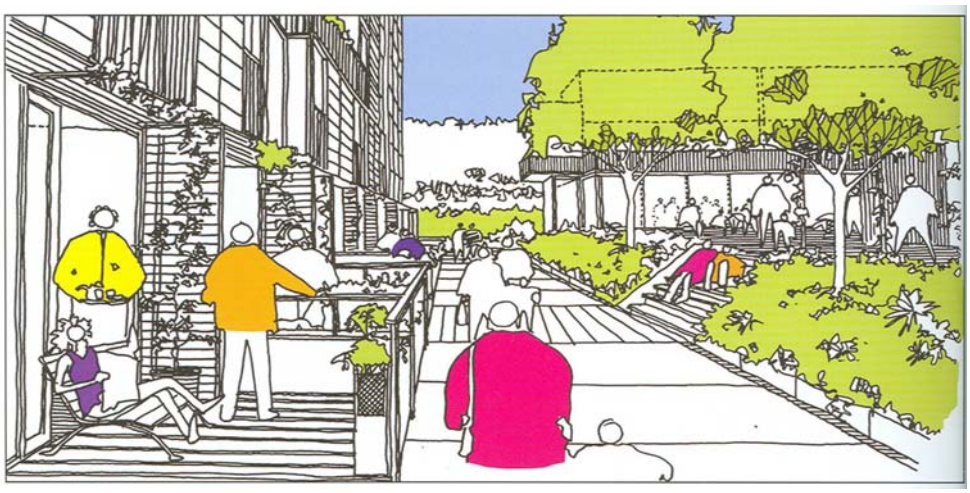


Figure 3.7.8: Clearly defined boundaries between private, semiprivate and public space
Source: Broto, 2008

Building a semi-underground parking garage with a large open space above is a very practical design and is highly efficient in land use, without generating any high construction cost. The majority of parking is restricted to the semi-underground parking garage. Only a few casual parking spaces are available on the ground level in areas between the trees on both sides of the central open space. Basically, the new community is a car-free neighbourhood and pedestrian-orientated place (Figure 3.7.2-3.7.4; 3.7.5, 3.7.8).

The central courtyard above the parking garage is a large recreation and leisure space frequently used by both children and adults in the new community and in the nearby old Peabody properties (CABE, Beaufort Court, London). It practically promotes outdoor activities, encourages social interaction and provides residents a strong sense of community. Additionally, as the central courtyard is elevated, there is a level change in the space, which clearly defines the boundary between semiprivate space (private gardens) and semipublic space (the central courtyard), thereby offering a clear sense of hierarchy in the space. Moreover, planting tall trees around the central courtyard increases the aesthetic quality of the neighbourhood, reduces overlooking between dwelling units and the courtyard, provides a certain degree of visual complexity and provides some degree of privacy for people using the central courtyard. Therefore, it is a successfully designed open space (Figure 3.7.5, 3.7.8-3.7.12).

Summary

The social housing development at Beaufort Court almost succeeds on all aspects. It is a high-density development and is highly efficient in the use of open space. It is a beautifully planned and designed community. Architecture is entirely contemporary and at the same time fits well with the existing Victorian red-brick Peabody buildings. Townhouse and apartment buildings with elegant facades are well located and sensitive

to the surroundings. Private, semiprivate and semipublic open spaces are well organized and clearly defined with a strong sense of hierarchy. Parking facilities and amenities are well organized and built on the same location of the site, promoting land use efficiency. Finally, within such a restricted urban context, with a limited construction cost and without adopting any high-rise built form, the new development still successfully achieves both high density and high quality living environments, especially in a social housing project. Therefore, Beaufort Court housing development is an exemplary project for building high density without high-rise structures (Figure 3.7.9- 3.7.13).

Figure 3.7.9 -3.7.12: Views in the neighbourhood
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

Figure 3.7.13: View on Lillie Road
Source: http://www.cabe.org.uk/case-studies/beaufort-court?photos=true

3.8 Kemerlife XXI

Istanbul, Turkey, 2004

EEA - Emre Arolat Architects

Site area: 2.18 ha (5.38 acres)
Building height: 2-5 story
Number of dwellings: 206
Net density: 94 dwellings/ha (38/acre)
Program: market housing

Figure 3.8.1: Kemerlife XXI housing – aerial view
Source: http://www.emrearolat.com/index_en.html

Context

In the late 1980s, a large urban renewal project called “Kemer Country” started in Istanbul, which included dozens of smaller projects constructed on empty fields and rapidly transformed the neighbourhood. The large renewal project initiated a widespread “eclecticism” in architectural design, whose impacts spread further later on and became a trend that would not stop in a short time (Emre Arolat Architects, Kemerlife XXI, http://www.emrearolat.com/index_en.html). In the beginning of the 1990s, land prices began to rise rapidly and more housing projects were initiated. Low-density single-family housing with large gardens was gradually replaced by high-density multifamily housing in the form of apartment buildings in the city. The

Kemerlife XXI project started under these circumstances and it took four years to make the final decision of the design. The project site is within one of the districts in the metropolitan area of Istanbul (Duran, 2009, pp. 164-169; Emre Arolat Architects, Kemerlife XXI, http://www.emrearolat.com/index_en.html; World Buildings Directory, Kemerlife XXI, http://www.worldbuildingsdirectory.com/project.cfm?id=927; Urbarama, Kemerlife XXI, http://en.urbarama.com/project/kemerlife-xxi) (Figure 3.8.1).

Concept

The Kemerlife XXI housing development seeks to follow a new design tendency that is contrary to the widespread "eclecticism" design attitude of previous developments in Istanbul (Duran, 2009, pp. 164-169). Therefore, a "calm" and clear design language was adopted in the planning and design of Kemerlife XXI, which aims to make use of contemporary construction techniques (Emre Arolat Architects, Kemerlife XXI, http://www.emrearolat.com/index_en.html) (Figure 3.8.1- 3.8.2).

Figure 3.8.2: Kemerlife XXI housing – site plan
Source: Duran, 2009

Idea and design

The entire Kemerlife XXI housing development consists of 206 housing units, primarily in the form of terrace houses and apartments with 13 different types of housing layout (Emre Arolat Architects, Kemerlife XXI, http://www.emrearolat.com/index_en.html). Contrary to typical housing developments, in which different types of housing are separated and are located on different part of the site, terrace houses and apartment units in Kemerlife XXI are combined together and are clustered into two large housing groups around a central communal open space. By aligning with the two longer sides of the site, two large housing groups close the site on two sides and permit the creation of semipublic and private open spaces in the middle portion of the site. They also form the borders of the new neighbourhood and protect the private gardens and the central open space from the traffic and noises in the city, creating a strong sense of enclosure for the new neighbourhood (Figure 3.8.1- 3.8.2, 3.8.5- 3.8.15).

Figure 3.8.3-3.8.4: Private gardens on the ground floor
Source: http://en.urbarama.com/project/kemerlife-xxi

The duplexes, designed as terrace houses, occupy the lower two floors of two housing groups and have their own private gardens on the ground level. Private gardens create a

series of semiprivate spaces, which are small buffer zones between the property and the central open space, giving people a clear sense of hierarchy in the space and enabling them to transfer smoothly between the interior space and the exterior space. Furthermore, these private gardens are separated from the central open space that is lower than the ground level, which further enhances the sense of hierarchy in the space (Figure 3.8.3- 3.8.9).

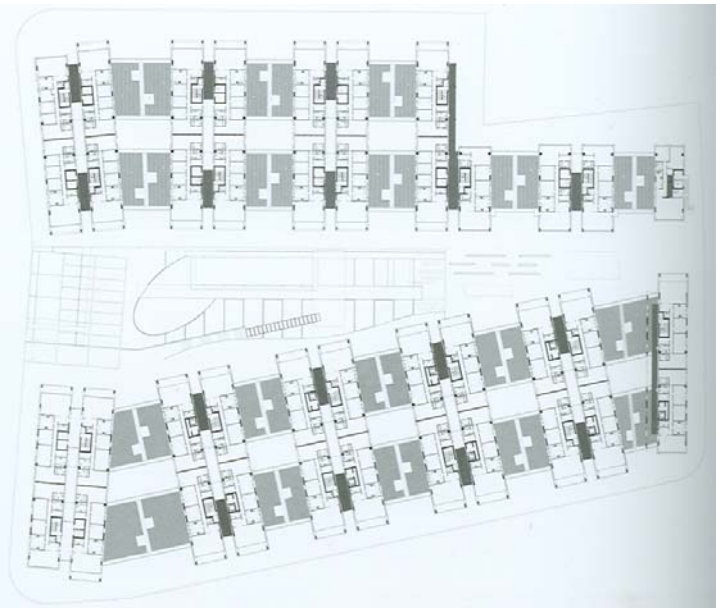


Figure 3.8.5 (left): Apartment buildings on the third floor
Source: Duran, 2009

Figure 3.8.6 (below): Apartment buildings positioned perpendicularly to the horizontal arrangement of the duplexes
Source: http://en.urbarama.com/project/kemerlife-xxi

Figure 3.8.7: Garden terraces for the apartments above the duplexes
Source: http://en.urbarama.com/project/kemerlife-xxi

Above the duplexes, three-story linear apartment buildings organized in pairs, with balconies facing the central communal open space, are positioned perpendicularly to the horizontal arrangement of duplexes that occupy the lower two floors of the development. This arrangement enables the creation of more windows for apartment units, thereby making the most of daylight in all of the rooms of apartment units. As a result of this change of angle, large roof spaces of the duplexes are available and can be transformed into garden terraces for the apartments on the third floor. Meanwhile, apartment buildings that occupy the upper three floors of the development overhang a few meters, giving some shade for the private gardens of the duplexes on the ground level. Therefore, the way in which built forms are organized creates a horizontal and vertical “fragmentation” in the overall housing layout (Emre Arolat Architects, Kemerlife XXI, http://www.emrearolat.com/index_en.html). This creative design approach provides a great flexibility for the design of housing units, in comparison with the design of units in conventional apartment buildings. It also promotes diversity in housing by enabling the possibility of containing 13 different types of housing units in the development (Figure 3.8.5- 3.8.15).

Figure 3.8.8: A sunken landscaped courtyard in the center of the site
Source: http://www.emrearolat.com/index_en.html

The communal open space in the center of the site is designed as a sunken landscaped courtyard. It is a recreation area for all residents, which contains small gardens, ponds, a swimming pool and other water features inside, forming a focus point of the new neighbourhood. A clear defined semipublic space is created by the change of level. The semi-underground floor is used to accommodate indoor recreational facilities and recreational spaces, which are located in the middle portion of this floor and are connected to the central courtyard on the same level (Emre Arolat Architects, Kemerlife XXI, http://www.emrearolat.com/index_en.html). As mentioned before, the central courtyard is separated from private gardens of the duplexes on the ground level. By taking advantage of the difference in level, the site plan provides a clear definition of the boundary between semiprivate space and semipublic space. Moreover, the change of level reduces overlooking between the duplexes and the central courtyard, thereby providing a certain degree of privacy for people using the central garden courtyard (Figure 3.8.8- 3.8.15).

Figure 3.8.9: Difference in level, providing a clear definition of the boundary between the semiprivate space and the public space
Source: http://www.emrearolat.com /index_en.html

Figure 3.8.10: Access to the parking garage at the lower ground floor
Source: http://www.emrearolat.com /index_en.html

Summary

A few successes make the Kemerlife XXI housing development an exemplary high-density development. First, there is a great innovation in the site planning and design of Kemerlife XXI residences. Different types of housing, terrace houses and apartment buildings, are not separated and located on different part of the site; instead, they are combined together and clustered into one housing group by locating apartment units on top of the terrace houses with a shift in axis. Secondly, the way in which built forms are organized makes the most of daylight and shading in all dwelling units and

maximizes the creation of private, semiprivate and semipublic open spaces. Thirdly, by taking advantage of the change in level, the site planning provides a clear definition of the boundary between semiprivate space and semipublic space, presenting a clear hierarchy in the space. Finally, within such a small area and without adopting any high-rise built form, the new development still successfully achieves both high density and high quality living environments. Therefore, Kemerlife XXI housing development is an exemplary project for building high density without high-rise structures (Figure 3.8.1- 3.8.15).

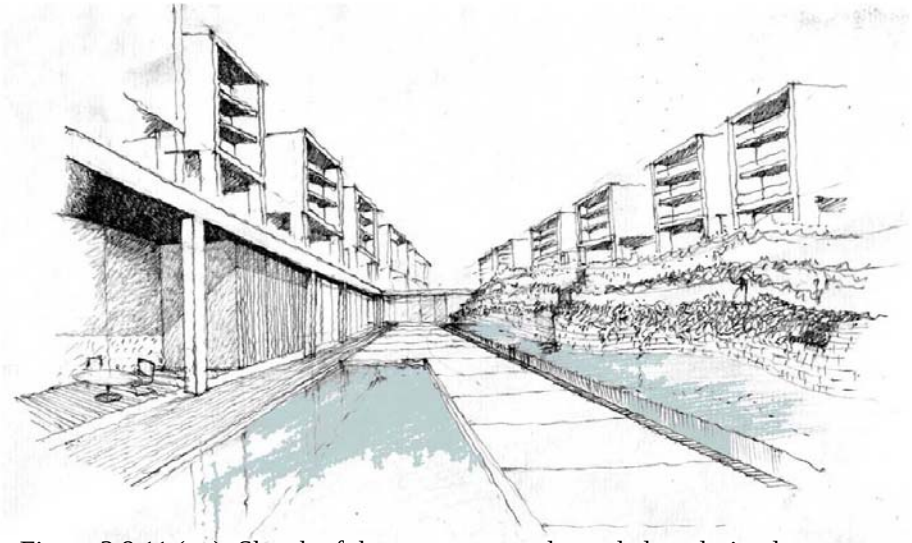


Figure 3.8.11 (up): Sketch of the concept - a calm and clear design language
Figure 3.8.12 (below): Streetscape of Kemerlife XXI
Source: http://www.emrearolat.com/index_en.html

Figure 3.8.13-3.8.15: Views of Kemerlife XXI in the neighbourhood
Source: http://www.emrearolat.com/index_en.html

3.9 V M Housing

Copenhagen, Denmark, 2005

PLOT Architects

Site area: 2.5ha (6.18acres)
Total floor area: 25,000 sqm
Building height: 6-12 floor
Number of dwellings: 230
Net density: 92dwellings/ha (37/acre)
Program: market housing

Figure 3.9.1: VM housing development (left) and Parking Houses (right) – aerial view
Source: http://www.arcspace.com/architects/plot/vm/vm.html

Context

The VM housing development designed by PLOT Architects, which split up later in 2006, is the first residential complex in a new district situated in the south of Copenhagen, which is characterized by built areas with higher populate density as well as areas of open fields preserved for future developments. The project is located on a

simple square lot bordered by two narrow canals, one on the east and the other on the west of the site. On the south of the site is a public park. On the north of the site is another new residential development, called “Parking House”. The new neighbourhood is connected to the downtown of Copenhagen by a new metro system immediately on the west side of the site (Duran, 2009, pp.176-185; Paredes, 2007, pp. 94-105; PLOT, in Global Housing Projects, pp. 174-179; A+U, 2006 Jun, pp.36-43; PLOT, JDS+BIG: VM Houses, http://www.arcspace.com/architects/plot/vm/vm.html) (Figure 3.9.1).

Concept

It was important to create an exemplary high-density neighbourhood with a welcoming environment as the first residential complex in the new district of Copenhagen, in which all the residents would enjoy views and sunlight (PLOT, in Global Housing Projects, pp. 174-179). In order to achieve a high density and ensure open views and sufficient sunlight on the simple square site bordered by two canals, two large housing blocks are created in this development, which are all oriented to the south and located at each end of the site, forming an open space in between (Figure 3.9.1-3.9.5).

Idea and design

Both of the two housing blocks took the diagonal shape instead of the conventional rectangular shape. The logic of the diagonal shape sounds very convincing. To ensure all the apartment units have a diagonal view of the open landscape in the neighbourhood and take good advantage of the evening and morning sunlight, designers angled the two buildings, creating two unique urban forms, which are shaped like a V and an M when looking from above (PLOT, JDS+BIG: VM Houses, http://www.arcspace.com/architects/plot/vm/vm.html). Therefore, the name of the project is derived from the physical shape of the two buildings (Figure 3.9.2-3.9.5).

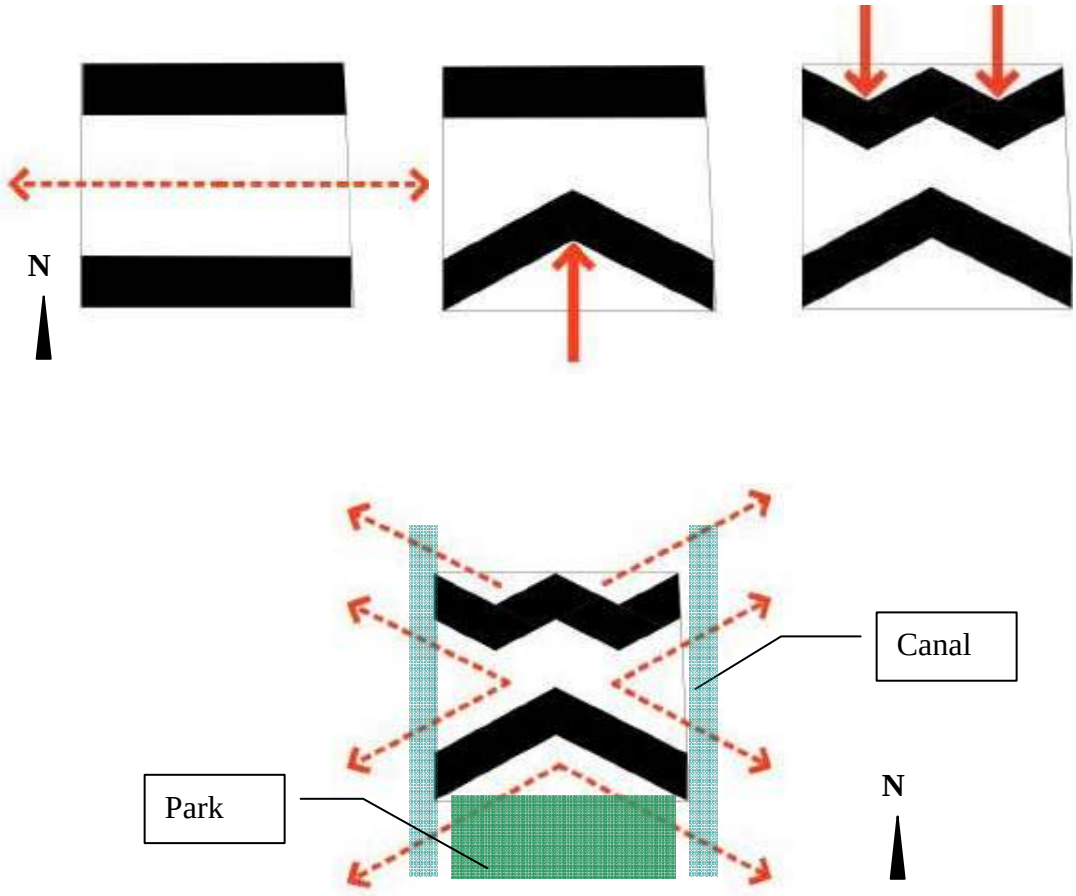


Figure 3.9.2-3.9.5: Concept plan of the overall site planning
Source: after the original image from http://www.arcspace.com/architects/plot/vm/vm.html

In Building V, the center of the volume is pushed towards the north, which gives a sense of enclosure and a sense of privacy to the space on the south side of the building. Building M responds to the angle of Building V and generates a zigzag form. At the western end of Building M, a two-story volume, which is attached to Building M and cooperating with the overall geometric layout of the site, forms a gateway and protects the central open space in between the two buildings from the impacts of the raised metro train tracks immediately on the west of the site (Figure 3.9.2-3.9.6).

Figure 3.9.6: VM housing –site plan
Source: after the original image from Duran, 2009

The space between the two buildings is designed into a landscaped courtyard, which also functions as a semipublic space, where people can meet frequently and children can play right on site. This landscaped courtyard was also connected with the larger public park on the south of the site by raising Building V entirely on five-meter-high columns (PLOT, in Global Housing Projects, pp. 174-179) (Figure 3.9.7, 3.9. 12-3.9.15). In this way, more open space is ensured around the two buildings on the ground level, creating a sense of openness on site (A+U, 2006 Jun, pp.36-43). The numerous entrances of the two buildings can be reached from the landscaped open space. Therefore, the communal open space in this project also serves as a transition zone. It is well supervised by residents in the apartments and people coming in and

getting out the two buildings. Therefore, it is a defensible space, offering residents a sense of security (Figure 3.9.6 -3.9.16).

Figure 3.9.7a (left): Building V on five-meter-high columns
Figure 3.9.7b (right): A two-story-high opening of Building M
Source: http://www.arcspace.com/architects/plot/vm/vm.html

On built forms, there is a dramatic building height change between the western and eastern parts of both buildings. It reflects their boundary positions on the site, and aims to work in harmony with the raised metro train tracks on the west of the site and the low-rise single-family residential area on the east of the site. In Building V, the height drops gradually from 12 floors at the western end of the building to 5 floors at the eastern end of the building. In Building M, building height also drops in the same direction, but it does so in a different way through smaller blocks stepping down from 11 floors on the western part of the building, seven and nine floors in the middle part of the building to five floors on the eastern part of the building (Figure 3.9.8, 3.9. 9).

Building V is characterized by its numerous triangular balconies sticking out from the south facade. They provide daylight, fresh air and further optimal views to all apartments in Building V (PLOT, in Global Housing Projects, pp. 174-179; PLOT, JDS+BIG: VM Houses, http://www.arcspace.com/architects/plot/vm/vm.html).

Furthermore, the advantage of these balconies is that the sharp triangular shape does not create much shadow impact on the building façade. This design feature ensures that all apartments on the south side of Building V can be exposed to sunlight and fresh air (Figure 3.9.10, 3.9. 11).

Figure 3.9.8 – 3.9.9: A dramatic height change on both the two buildings
Source: http://www.arcspace.com/architects/plot/vm/vm.html

Figure 3.9.10 (left): Numerous sharp triangle balconies on the south side of Building V
Source: http://www.arcspace.com/architects/plot/vm/vm.html
Figure 3.9.11 (right): Triangular shape balconies with less shadow impact on building façade
Source: http://www.arcspace.com/architects/plot/vm/vm.html

In the internal space of Building V and M, the housing typology of Le Corbusier's Unité d'Habitation, in which two standard apartment units occupying a double-floor height are created and organized in pairs around a central access corridor, is repeated

and recreated with some improvements (Duran, 2009, pp.176-185; PLOT, in Global Housing Projects, pp. 174-179) (Figure 3.9.12-3.9.14). However, the external space around Building V and M does not repeat the "tower-in-the-park" concept as Le Corbusier used in Unité d'Habitation. The architects try to adopt a contemporary design approach to interpret the relationship between the two buildings; thereby they look more pleasant than Unité d'Habitation (Figure 3.9.16).

Summary

New urban forms are created in the VM housing development which are based on the form of conventional high-rise slab blocks, but are updated with contemporary design approaches, offering ideal alternatives to the conventional high-rise slab block (Figure 3.9.12-3.9.16).

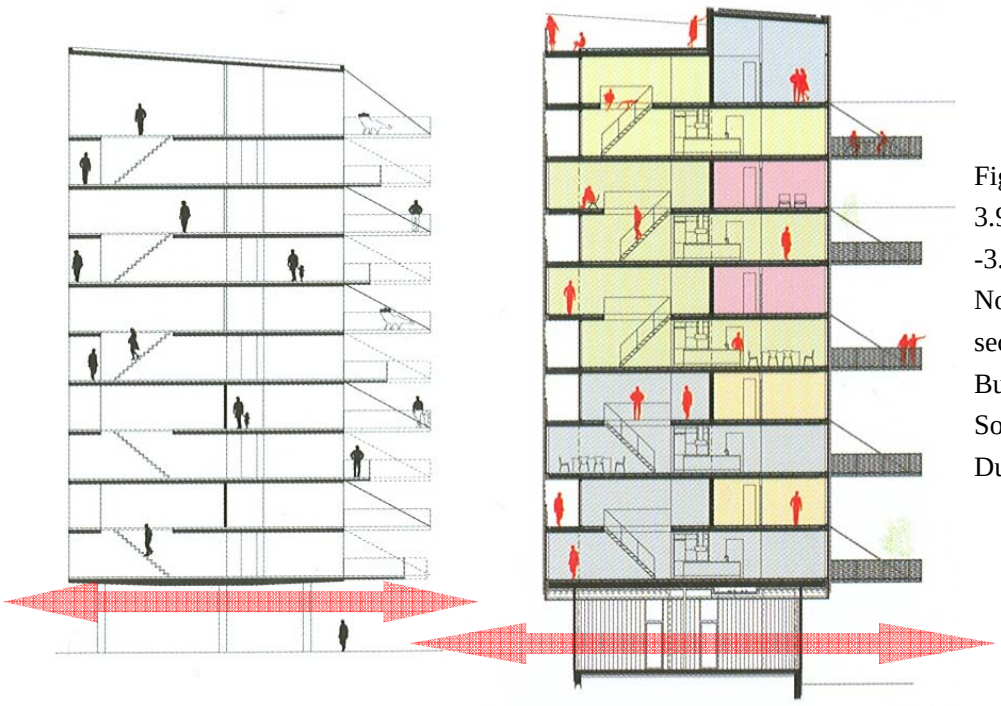


Figure 3.9.12 -3.9.13: North-South section of Building V Source: Duran, 2009

Figure 3.9.14: North-South section of Building M
Source: Duran, 2009

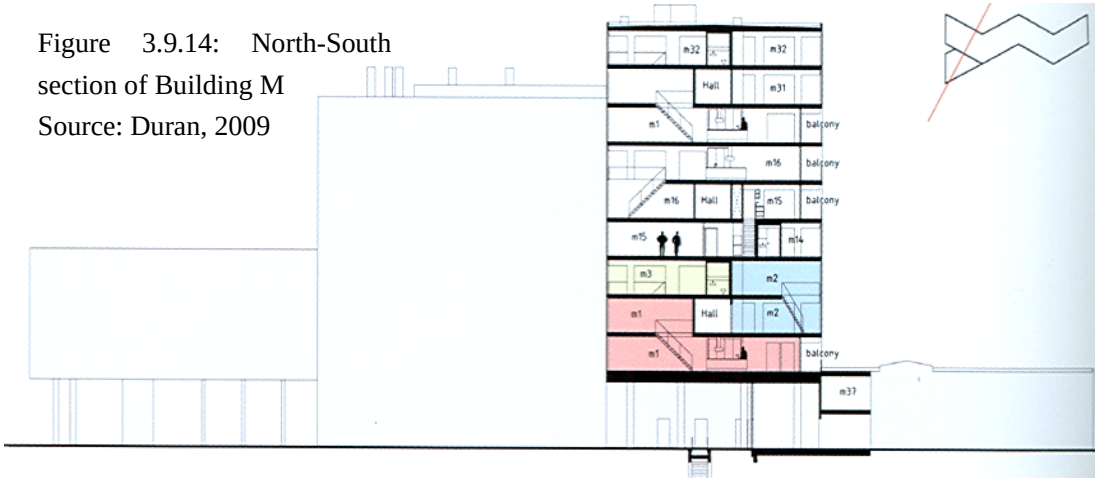


Figure 3.9.15: East-West section of Building V
Source: Duran, 2009

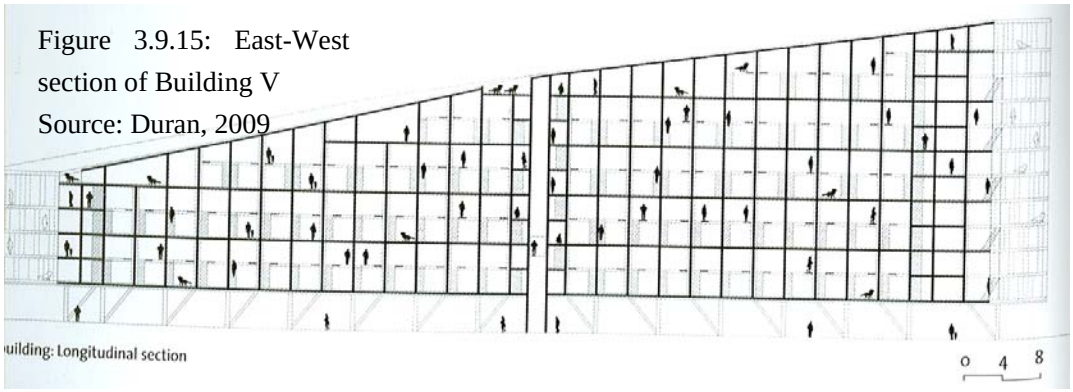
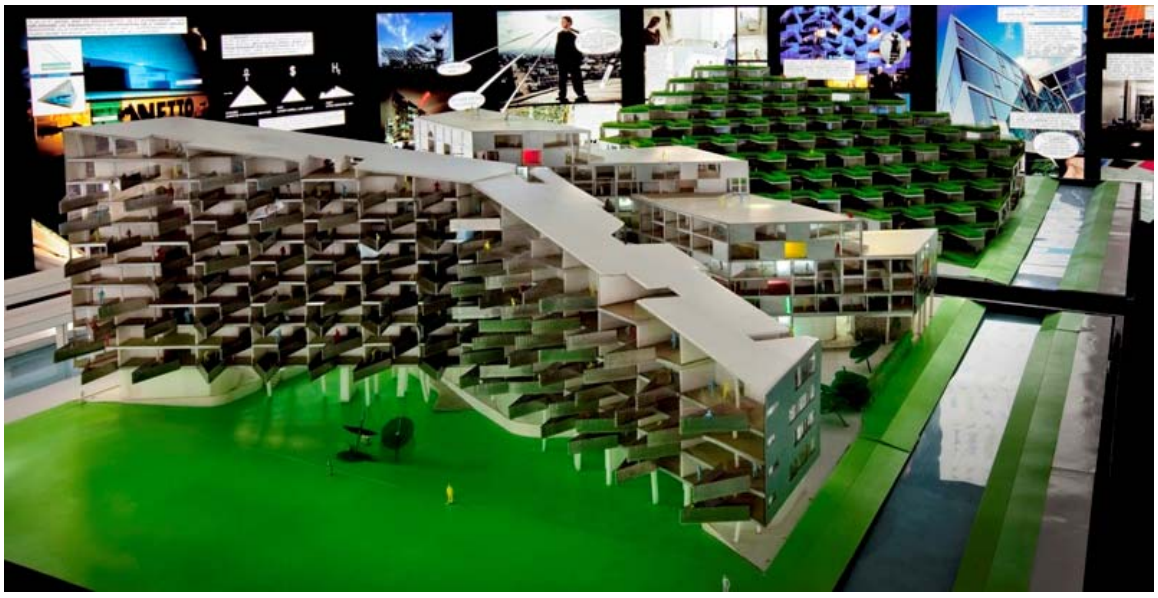


Figure 3.9.16 (below): Model of VM housing
Source: http://www.arcspace.com/architects/plot/vm/vm.html



3.10 Social Housing in La Mina del Morro

Bilbao, Spain, 2007

Luis Diaz-Maurino,

Eduardo Belzunce,

Juan Garcia Millan

Site area: 2.95ha (7.29acres)
Building height: 2-10 floor
Number of dwellings: 154
Gross density: 52 dwellings/ha (21/acre)
Net density: FAR 1.0 (low-rise cluster);
FAR 4.0 (small high-rise cluster)
Program: social housing

Figure 3.10.1: Housing in La Mina del Morro, Spain – aerial view
Source: A+U, 2009 Aug

Context

The social housing in La Mina del Morro is part of a large-scale urban housing development in Bilbao. The initial program, started from the Europan 4 Competition, called for design schemes for the entire development of hundreds of social housing units on a large parcel of land, complemented by green areas, public open spaces, commercial space, parking facilities, service facilities and social infrastructure, as well

as a solution for the street network. After winning the first prize in the Europan 4 Competition in 1996 with their scheme for the entire development, the winners, who are the three design architects of the current project, were commissioned by the city to develop the site plan for the entire development and the design for one of the two central areas of the whole development, which is the current social housing project (Domus, 2009 May, pp. 96-102; A+U, 2009 Aug, pp. 84-89; Studio Banana TV, Studio Banana TV interviews Belzunce-Maurino-Garcia Millan, authors of the hill-crawling social housing complex in Mina del Morro, Bilbao) (Figure 3.10.1-3.10.3).

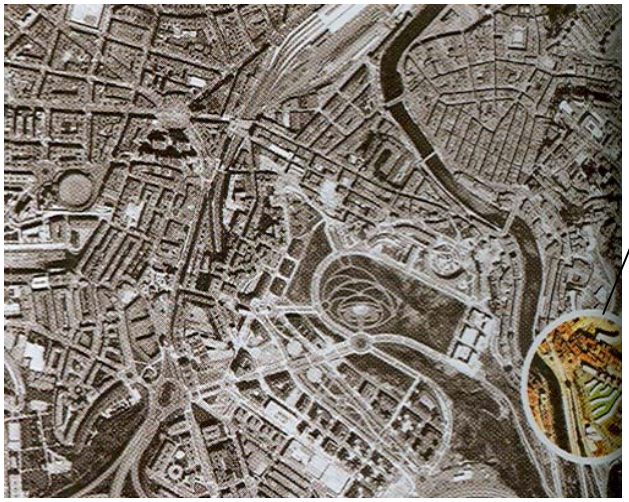
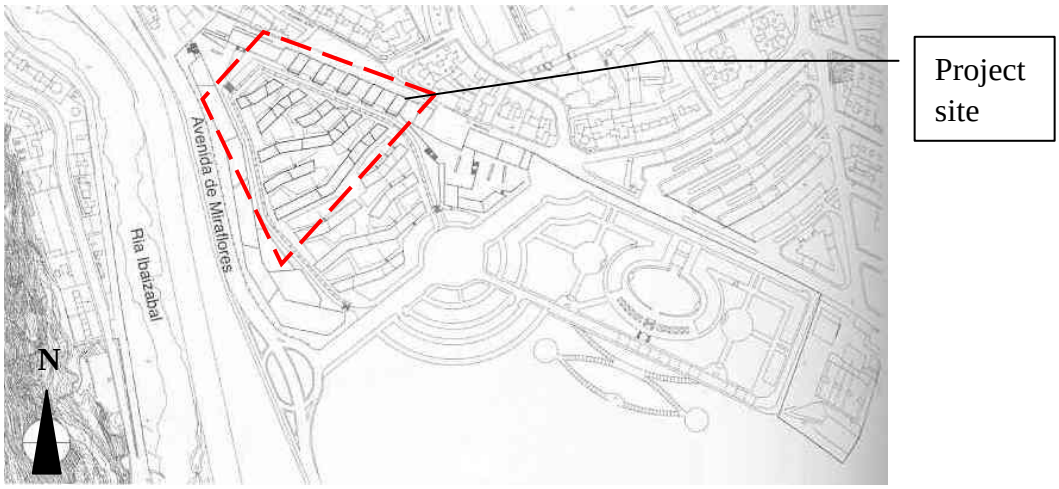


Figure 3.10.2 (up): Urban housing project in Bilbao - key map
Source: Domus, 2009 May
Figure 3.10.3 (below): Development plan for the entire urban housing project
Source: A+U, 2009 Aug



The physical context of the site is very complicated. First, the site is an abandoned brownfield site between the city and the suburbs, situated on the periphery of the inner-city area, separated from the neighbourhood on the west of the site by a river. Secondly, the surrounding neighbourhood is characterized by high-density apartment buildings with a poor quality for low-income populations, which were built during the 1950s and 1960s. Thirdly, the land slopes down significantly from the south to the north with wide steeps on it, which were carved by the mining company that previously occupied the land. Therefore, the site has an "ambiguous" status with an interesting natural setting and complicated conditions in the surrounding neighbourhood (A+U, 2009 Aug, p. 86; Domus, 2009 May, pp. 96-102; Studio Banana TV, Studio Banana TV interviews Belzunce-Maurino-Garcia Millan, authors of the hill-crawling social housing complex in Mina del Morro, Bilbao) (Figure 3.10.1-3.10.3).

Concept

Faced with such a complicated context, the architects intended to preserve the natural setting and essential character of the site by appropriately distributing the density across the site and proposing modest planning as well as housing forms (Domus, 2009 May, pp.96-102). Therefore, the site was divided into smaller sectors to form separate housing projects in order to blend the whole development well in to the surroundings and to make the financing of the project easier in the future. Additionally, since the site has a unique location on the periphery of the city, another major concept of the new scheme is to develop the new neighbourhood into an "urban facade" representing the entrance of the city (Studio Banana TV, Studio Banana TV interviews Belzunce-Maurino-Garcia Millan, authors of the hill-crawling social housing complex in Mina del Morro, Bilbao).

Idea and design

In order to achieve the two major objectives, the architects divided the whole development into two clusters. One is the high-rise housing cluster lining up along the northeast side of the triangular site and the other is the low-rise housing cluster occupying the majority of the site. The low-rise cluster forms the heart of the new neighbourhood. The high-rise cluster on the east, together with the river on the west, forms the border of the new neighbourhood and protects the low-rise housing on two sides (Figure 3.10.4-3.10.6).

Figure 3.10.4: Site plan
Source: A+U, 2009 Aug

The high-rise cluster consists of five eight-story point-style apartment buildings, small in scale and perceived as medium-rise buildings. Five apartment buildings are connected by a two-story podium on the ground level, in which offices, commercial space, service areas, car parking and other facilities are concentrated (A+U, 2009 Aug, pp. 88-89). They are close to the existing densely-built neighbourhood on the northeast; thereby the new facilities can serve both the old and new development. Five apartment buildings with equal space in between are conceived as an “open hand” acting as a “visual screen” filtering the urban landscape of the existing inner-city neighbourhood

behind them; at the same time facing to the suburbs, they forms an “urban facade” representing the entrance of the city (Studio Banana TV, Studio Banana TV interviews Belzunce-Maurino-Garcia Millan, authors of the hill-crawling social housing complex in Mina del Morro, Bilbao; A+U, 2009 Aug, pp. 84-86; Domus, 2009 May, pp.96-99) (Figure 3.10.4-3.10.6, 3.10.10- 3.10.11).

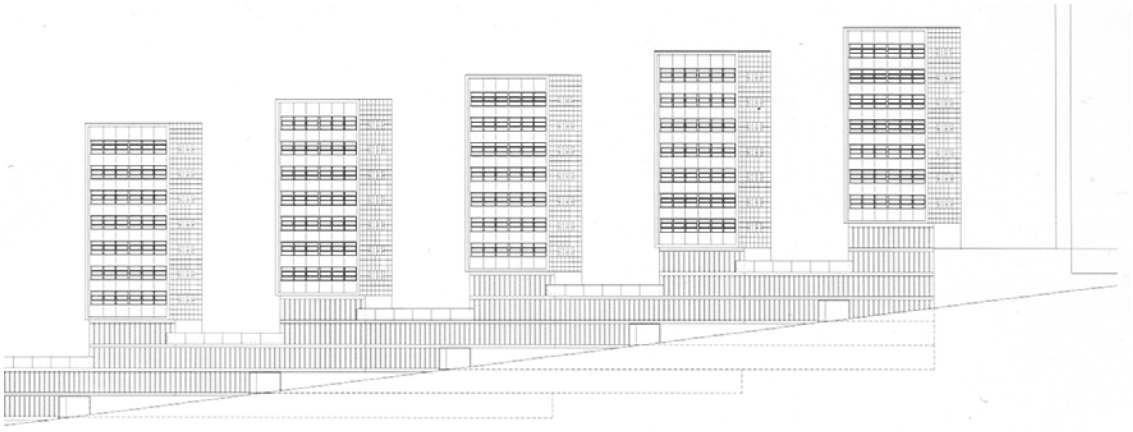


Figure 3.10.5: Five apartment blocks conceived as a “visual screen” for the new neighbourhood
Source: Domus, 2009 May

Figure 3.10.6: Facing the suburbs, five apartment blocks conceived as an “urban facade”
Source: A+U, 2009 Aug

The low-rise cluster, which is the heart of the new development, is surrounded by green open spaces. An internal loop road is created around the low-rise cluster, serving as the neighbourhood circulation route. Two larger open spaces are located at the southern

end of the site, which is the highest point of the neighbourhood and is open to great views. The low-rise cluster consists of six two- or three-story row houses. Based on the design idea of creating “elongated-terraced-uneven” urban patterns, the six low-rise blocks are situated on the sloping site presenting a layout with a sense of “randomness”, in order to protect the natural setting and original character of the site, at the same time generating interesting wide or narrow intimate open spaces between buildings to serve as meeting places for residents (Studio Banana TV, Studio Banana TV interviews Belzunce-Maurino-Garcia Millan, authors of the hill-crawling social housing complex in Mina del Morro, Bilbao; A+U, 2009 Aug, p. 86) (Figure 3.10.4, 3.10.7).

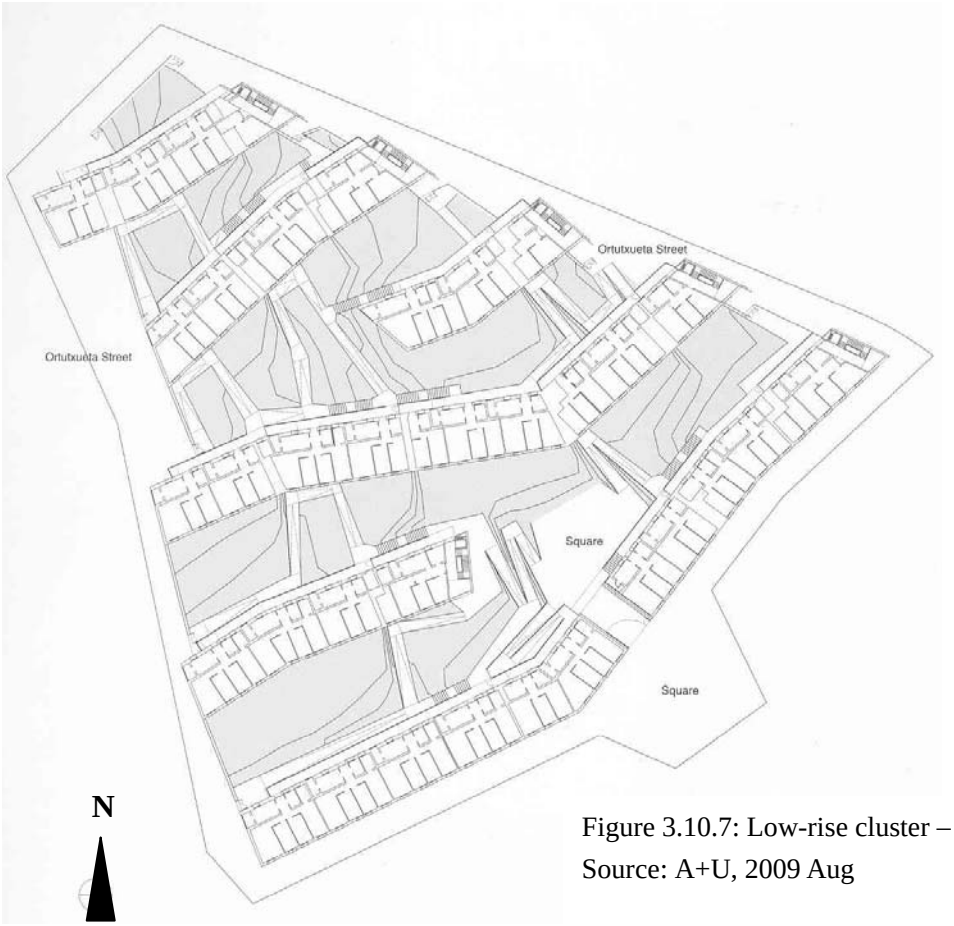


Figure 3.10.7: Low-rise cluster – site plan
Source: A+U, 2009 Aug

The building configurations of the low-rise cluster clearly imply that the planning and design of the housing have a great respect for the natural character of the site and try to

make the most of it. The linear housing forms are organized into a series of horizontal stripes that are parallel to each other, which creates a sense of continuity and a sense of “movement” in the site plan (A+U, 2009 Aug, p. 86). In this way, the building configurations offer residents a sense of place by responding to the river on the west of the site, which is one of the great natural landscapes of the site. Furthermore, building facades facing to the south are longer than those facing to the north. This design approach ensures that more rooms have windows open to the sunlight and at the same time access corridors on the north side are shorter and open to views, which makes it convenient for the pedestrians (Figure 3.10.4, 3.10.7).

Figure 3.10.8-3.10.9: Low-rise housing with separated entrances
Source: Domus, 2009 May

The six low-rise housing forms have a mixed housing typology which combines the features of single-family row houses and functions of apartment buildings (A+U, 2009 Aug, pp. 86-89). Each dwelling has a separate entrance, but they are piled one on top of the other and can be accessed through the shared exterior access corridors (Figure 3.10.8, 3.10.9).

Figure 3.10.10-3.10.11: Views in the neighbourhood
Source: Domus, 2009 May

Summary

Several factors make the social housing development in La Mina del Morro an exemplary high-density development. First, it is successfully planned and designed neighbourhood. The planning and design of this project have a great respect for the site and successfully preserves the natural setting and essential character of the site. Secondly, the architects try to avoid using huge high-rise built forms to fulfill the density requirement; instead, smaller, point-style apartment buildings are adopted, which are close to the human scale and perceived as medium-rise buildings. Thirdly,

facing the suburbs, the new neighbourhood successfully creates a pleasant gateway appearance resembling an entrance to the city. Fourthly, the planning and design positively responds to the natural landscape on site and successfully promotes a sense of place. Therefore, housing forms of this project offer ideal alternatives to the conventional high-rise built forms and generate a series of intimate open spaces to provide residents many spatial enjoyments in a high-density living environment (Figure 3.10.1- 3.10.11).

3.11 Ninetree Village

Hangzhou, China, 2008

David Chipperfield

Site area: 1.0 ha (2.47acres)
Total floor area: 23,500 sqm
Building height: 5 floor
Number of dwellings: 60
Net density: 60 dwellings/ha (24/acre)
FAR 2.35
Program: market housing

Figure 3.11.1: Ninetree Village, China – aerial view
Source: http://www.davidchipperfield.co.uk

Context

The project site is situated on a small hill within a quiet and beautiful bamboo forest, which is outside the inner-city area, but still in proximity to the center of Hangzhou. The site has an extraordinary natural setting. It is near the Qian Tang River, one of the famous rivers in China. Surrounded by small hills and dense bamboo forests, the site is designated for luxury housing development, because the great natural setting of the site

provides an ideal environment for luxury housing and only high-income populations can afford to live in such a gorgeous housing neighbourhood (E-architect, Ninetree Village, Building, Images, China; A+U, 2009 Aug, pp. 16-27; David Chipperfield Architects, Ninetree Village; CoolBoom, Ninetree Village by David Chipperfield) (Figure 3.11.1).

Concept

The concept of the development is closely related to the "particular charm and beauty" of the site (A+U, 2009 Aug, p. 19). Faced with such an excellent context, any new development should respect the natural beauty of the site and try to preserve this great feature. Therefore, the major concern behind the design is to find an ideal and precise housing form that is able to blend the high residential density (high total floor area) well into the natural surroundings and make the most of the beautiful setting of the site. The ideal housing form should be modest in scale and allow the architect to evenly distribute the density across the site, thereby preserving the natural features and essential character of the site (Figure 3.11.1-3.11.3).

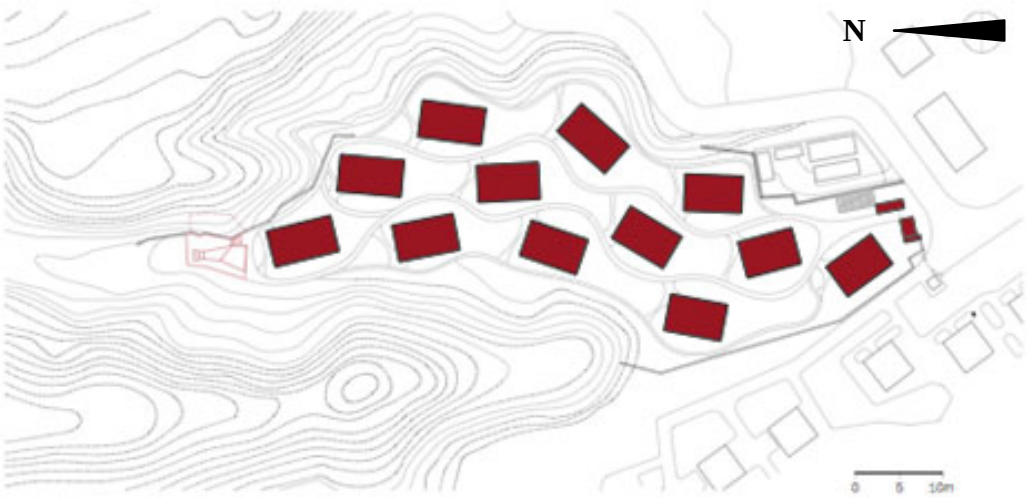


Figure 3.11.2: Ninetree Village, China – site plan
Source: http://www.architectureofchina.com/?p=921

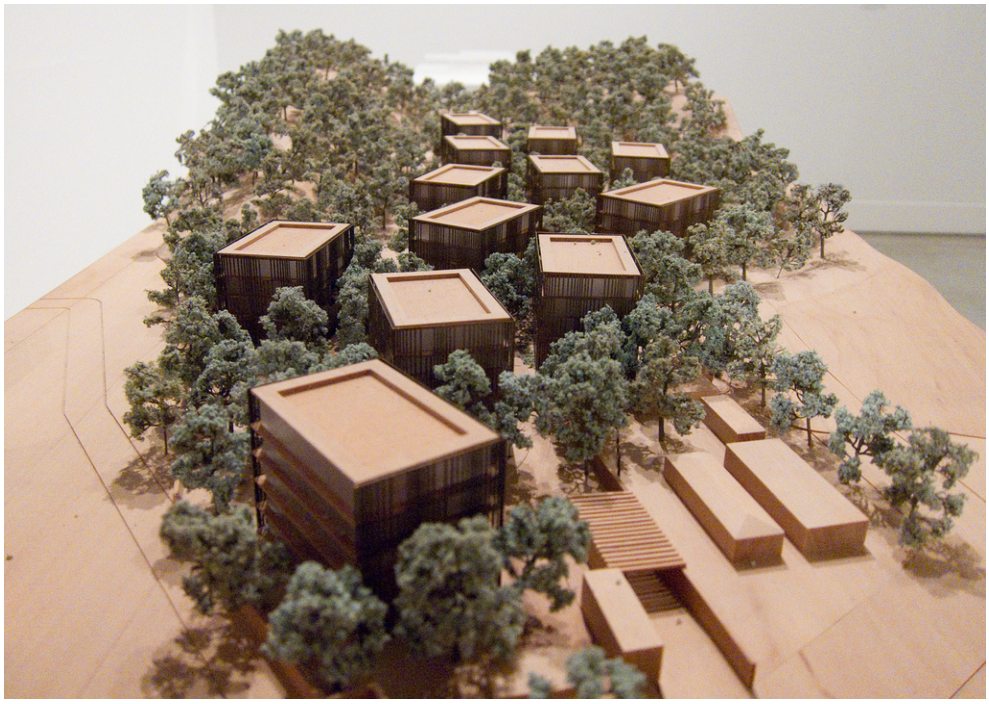


Figure 3.11.3: Ninetree Village, China – model
Source: http://www.flickr.com/photos/bluebus/4281638756/

Idea and design

Instead of adopting the courtyard plan as the overall layout, which is frequently used in other housing projects, twelve point-style, medium-rise buildings are used as the only built form in this project. These individual buildings are all modest in scale, same in shape and five stories in height, but slightly different in size. They are evenly distributed across the site with an overall pattern like chessmen on a “chessboard”, in order to maximize the open space around each of the buildings (David Chipperfield Architects, Ninetree Village; A+U, 2009 Aug, p. 19). Meanwhile, in comparison with other housing forms, smaller free-standing buildings are easier to be blended into the natural sitting of the site without significantly transforming the topography and original character of the site. Additionally, by slightly rotating each of the twelve

buildings, the overall layout of the site creates a strong sense of movement, in response to the Qian Tang River in the proximity of the site. This design approach offers residents a sense of place and seamlessly blends housing forms into the natural setting. Furthermore, all of the twelve buildings are located on an underground parking lot, enabling the site to become a car-free neighbourhood on the ground level. Buildings can be reached from an internal network of pedestrian paths, which gives access to the building entrances facing the south (Figure 3.11.1-3.11.4).

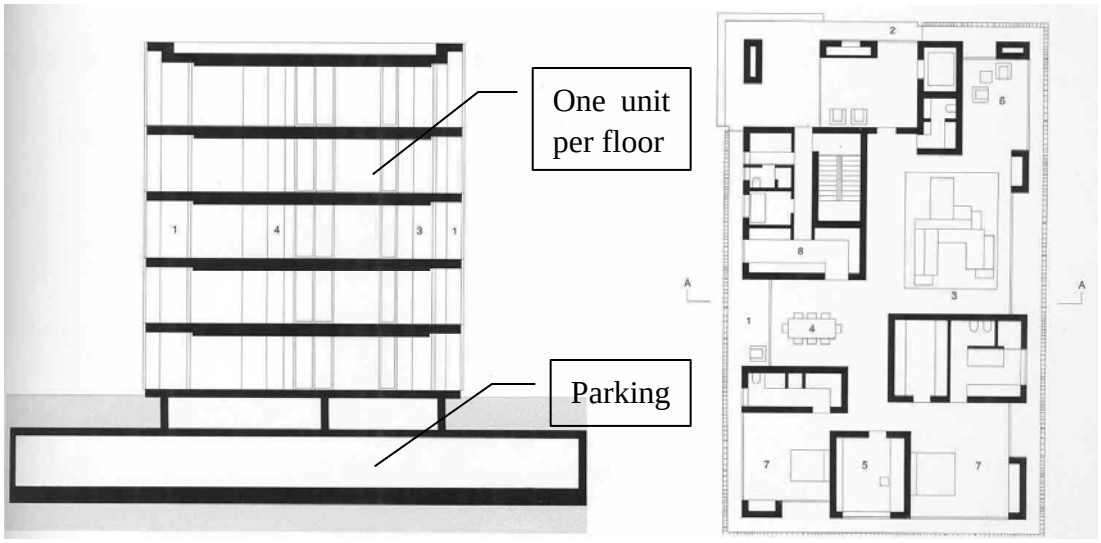


Figure 3.11.4-3.11.5: 5-story point-style housing blocks
Source: http://www.architectureofchina.com/?p=921

Within the development, each individual building contains only five well-designed luxury dwelling units, which occupy the entire floor of approximately 400 square meters (David Chipperfield Architects, Ninetree Village, http://www.davidchipperfield.co.uk). Dwelling units are difference in size and floor plan, according to their different location in the site and surrounding conditions. Every unit enables residents to enjoy wonderful views in four directions over the dense bamboo forest in the background and the beautiful landscape immediately in the new neighbourhood. Therefore, these dwelling units are more like single-family houses

stacked one on top of the other rather than typical apartment units within a conventional multifamily building (Figure 3.11.4-3.11.5).

Figure 3.11.6-3.11.7: Housing blocks decorated with wooden elements
Source: http://www.architectureofchina.com/?p=921

Additionally, in response to the bamboo forest in the surroundings and the long local tradition of using bamboo as one of the typical construction materials, all building facades are decorated with wooden elements, which look like bamboo and protect the privacy of residents by reducing direct overlooking between windows of dwelling units. Furthermore, by adopting the point-style building as the major built form, units have more windows open to the outside, which provide sufficient sunlight, fresh air, natural light and good ventilation. Meanwhile, compared to conventional apartment slab blocks, point-style buildings leave smaller shadows on the ground; thereby sufficient sunlight is also available for the open space and landscape in the neighbourhood (Figure 3.11.4-3.11.17).

Figure 3.11.8: Open spaces around individual housing blocks
Source: http://www.architectureofchina.com/?p=921

Instead of creating a large central open space in the middle of the site, open spaces in the Ninetree Village are scattered across the neighbourhood, associating with individual buildings. Areas around the building are designed as transition areas, semiprivate spaces, serving as small buffer zones between the property (private space) and the neighbourhood pedestrian path (semipublic space). These semiprivate spaces give residents a clear sense of hierarchy in the space and enable them to move smoothly between the private space and the semipublic space. Additionally, by planting new bamboos and other vegetation around buildings, each building has a smaller natural setting and situates in its own elegant and calm environment in the neighbourhood. These new landscape not only provide residents a further sense of privacy by reducing overlooking between dwelling units, but also present a clear definition of the space by enhancing the boundary between the area around the building (semiprivate space) and the neighbourhood pedestrian path (semipublic space).

Moreover, a small community center, which is located at the northern end of the site, is designed as a clubhouse with a small outdoor pool, providing a recreational destination at the far end of the neighbourhood. This small building also follows the irregular shape of the hill and the sloping topography of the site, forming the border of the neighbourhood (Figure 3.11.8-3.11.17).

Summary

The high-density housing development at Ninetree Village is modest in scale and volume but exemplary in quality. The planning and design is highly satisfying not only in China, but also in a worldwide context. Instead of starting with any specific housing layout and design idea, the design focused on the analysis of the surrounding natural setting (David Chipperfield Architects, Ninetree Village; A+U, 2009 Aug, pp. 18-25). Therefore, two successes have been achieved in the Ninetree Village project. The first is that throughout the new development the great concern is to provide the best solution for both the site planning and the design of each individual building which situates in its own specific condition. Consequently, the extreme beauty of the natural environment has been successfully preserved and the new development has been successfully integrated into the natural setting. The second is that the new development successfully avoids using huge high-rise built forms to achieve the high residential density (high total floor area), by adopting smaller medium-rise, point-style buildings.

Even though these housing forms are free-standing buildings in a park-like setting, there is no design in this project presenting the “tower-in-the-park” concept of high-density development of the 20th century. The overall scale of the project and the scale of each individual building are perfectly controlled by the designer. These point-style blocks are close to the human scale and perceived as low-rise buildings to

residents and visitors; thereby they are much friendlier than huge high-rise buildings. Therefore, Ninetree Village housing development is a highly exemplary project for building high density without high-rise buildings (Figure 3.11.1-3.11.17).

Figure 3.11.9-3.11.10: Each building situated in its own elegant environment
Source: http://www.architectureofchina.com/?p=921

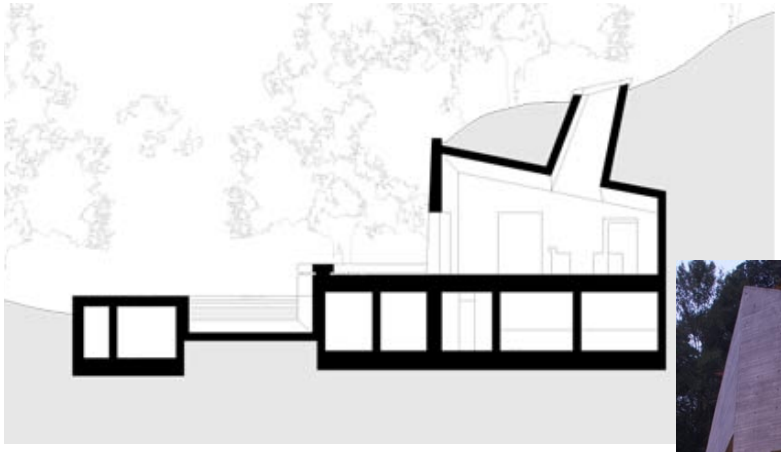


Figure 3.11.11-3.11.12: A clubhouse following the irregular topography of the site
Source: http://www.architectureofchina.com/?p=921

Figure 3.11.13-3.11.17: Views in the new neighbourhood
Source: http://www.architectureofchina.com/?p=921

3.12 Belle Vue Residences

Singapore City, Singapore, 2010 -

Toyo Ito

Site area: 2.3ha (5.68acres)
Total floor area: 32,204 sqm
Building height: 5 floor
Number of dwellings: 176
Net density: 77 dwellings/ha (31/acre)
FAR 1.4
Program: market housing

Figure 3.12.1: Belle Vue Residences, Singapore – aerial view
Source: http://www.h88.com.sg

Context

Belle Vue Residences is an ongoing development in Singapore City, a rapidly growing city that is characterized by its beautiful rain forest setting with lush tropical trees and vegetation. The project is located in the Oxley-Orchard area, along the city's most famous street, Orchard Road. The new development has a very convenient location. It

is next to a shopping and entertainment center, in proximity to the central business district (CBD) and within walking distance to a transportation hub and metro station. The surrounding neighbourhood is characterized by its peaceful and family-friendly environment, which is close to the centre of the city and still has its own beautiful natural setting. Additionally, because the site is within a special planning area that is in close proximity to the residence of the president, the building height is restricted to five stories and the project is designated for luxury housing development with a relatively high density (Benson Koh, Wing Tai's Belle Vue Residences Launches; A+U, 2009 Aug, pp. 112-115; Wing Tai Asia, Wing Tai Holdings Limited Singapore) (Figure 3.12.1-3.12.2).

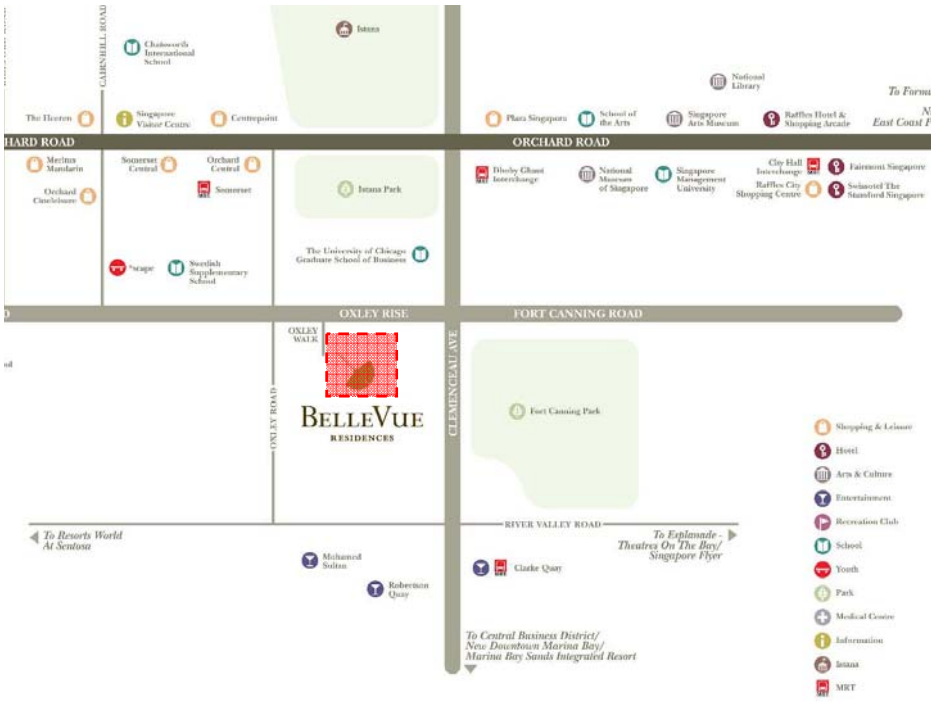


Figure 3.12.2: Belle Vue Residences, Singapore – key map
Source: http://www.luxurysingaporehomes.com/bellevueresidences-profile.htm

Concept

It is the convenient location and the great natural setting of the site that inspired the architect to create the concept of this project. It aims to build a new neighbourhood that

could seamlessly blend housing forms into the natural landscape, consequently preserving the natural character of the site. Therefore, the major concern of the design is to create an ideal site plan that has housing forms with intimate open spaces in between, thereby achieving a higher density and at the same time preserving the existing natural landscape and original character of the site as much as possible (A+U, 2009 Aug, pp. 112-115; Wing Tai Asia, Wing Tai Holdings Limited Singapore) (Figure 3.12.2).

Figure 3.12.3-3.12.5: Design concept
Source: http://www.wingtaiasia.com.sg/belle-vue-residences.php

Idea and design

Since the architect believes that a “human being is a part of nature”, the dwellings of human beings should respect nature (Wing Tai Asia, Wing Tai Holdings Limited Singapore, http://www.wingtaiasia.com.sg/belle-vue-residences.php). Therefore, the site planning and design are inspired by nature and try to use the natural structure of trees to reinterpret the relationship between buildings. The architect intends to create an overall site layout that looks like stems and branches of a tree and considers housing forms as stems and branches of a tree. In the beginning, nine major structures conceived as stems of a tree were distributed evenly across the site and dwelling units were conceived as branches of the nine stems. Then from the nine major structures, dwelling units were expected to “grow like trees”; thereby they were organized on each

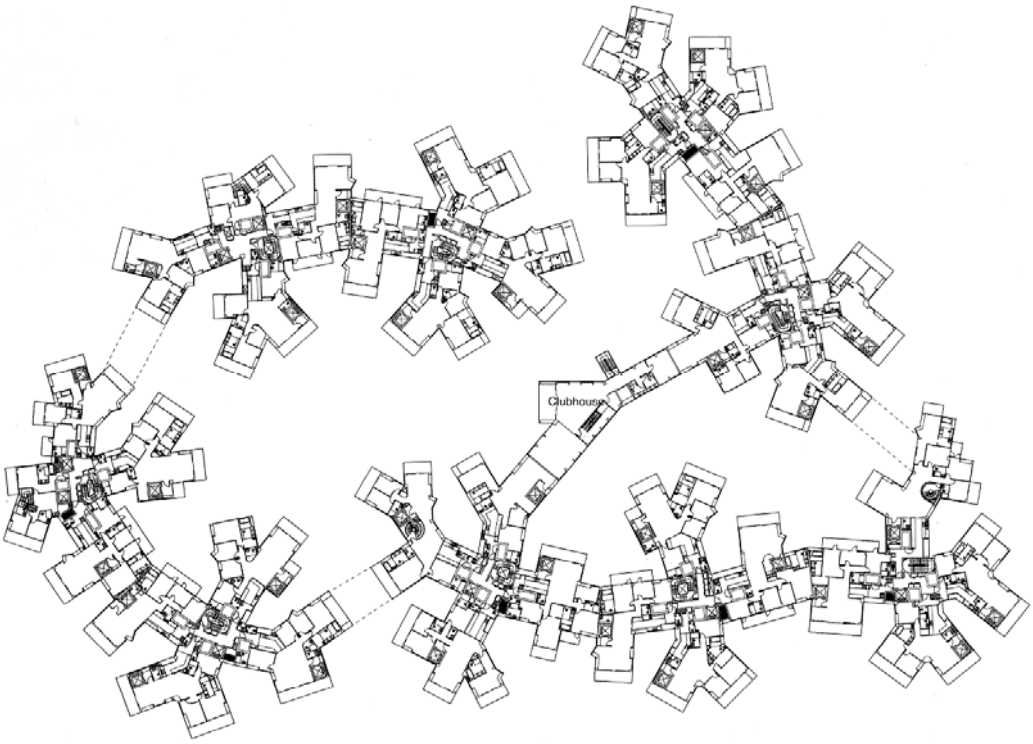
of the four sides of the nine major structures (A+U, 2009 Aug, p. 112). In this way, all dwelling units extend towards the outside of the major structure to find their space and sufficient sunlight, exactly growing like branches of a tree. Based on this logic, the site was planned and dwelling units were located. Like the tree grows, which spontaneously finds the space and sunlight, a free-style site plan and a great variety of built forms are created with a clear sense of harmony between built forms. As a result, the new development consists of a total of 176 units that are evenly distributed across the site and the majority of units are situated around a central open space in the middle of the site (Figure 3.12.3-3.12.6).

Figure 3.12.6: Site plan
Source: http://www.iproperty.com.sg/propertylisting/748133/Belle_Vue_Residences

Within the development, since the branches extend outwards the major structure, each dwelling unit has exterior walls in two or three directions. The great advantage of this

layout is that every unit enables residents to enjoy wonderful views in two or three different directions over the natural landscape in the background and the beautiful setting immediately in the new neighbourhood. Therefore, this creatively-designed site plan offers residents a new living environment that provides them many pleasant experiences. This free-style site layout allows the creation of more exterior walls, making it possible to open more windows in dwelling units. This design approach ensures that each dwelling unit enjoys sufficient sunlight, fresh air and natural wind, thereby allowing residents to have better ventilation and a healthy living environment. In spite of the space between buildings is relatively small, a sense of privacy can be ensured since the windows of different dwelling units never face each other (Figure 3.12.7-3.12.9).

Figure 3.12.7-3.12.8: Ground floor plan (up) and second floor plan (below)
Source: A+U, 2009 Aug



Within the neighbourhood, the landscape is an active element of the new development. The majority of dwelling units are oriented to a generously-landscaped open space in the middle of the site, which is a central courtyard with flourishing trees, small gardens, children's playgrounds, water features, pedestrian paths and recreation facilities, offering residents a high-quality living environment. In the middle of the central courtyard, there is a swimming pool surrounded by tropical vegetation, which provides a pleasant visual enjoyment of blue and green for residents (A+U, 2009 Aug, p. 115). Plants and trees in the central courtyard further strengthen the intimate relationship between built forms and the landscape (Figure 3.12.10-3.12.13).

Figure 3.12.9: Relationship between dwelling units - model
Source: A+U, 2009 Aug

Figure 3.12.10-3.12.12: Landscapes in the new neighbourhood
Source: http://www.iproperty.com.sg/propertylisting/748133/Belle_Vue_Residences

Figure 3.12.13: Landscapes in the new neighbourhood
Source: A+U, 2009 Aug

Summary

Belle Vue Residences is designed to preserve nature's beauty and “simplicity” (A+U, 2009 Aug, p. 112). The overall site planning and design are inspired by nature and successfully integrate high-density housing development into the beauty of nature. The greatest feature of the Belle Vue Residences is that high-density housing is planned in a new way that gives the best location to each individual building and blends the built form seamlessly into the surrounding natural landscape, thereby making the whole development work in harmony with the original character of the neighbourhood as well as the entire landscape of the city. The relationship between built forms and the landscape is strengthened in a creative way that cannot be achieved by adopting any of the conventional high-density housing form of the 20th century (A+U, 2009 Aug, pp.

112-115). Therefore, new urban forms were born in the Belle Vue Residences, which combine features of courtyard housing with contemporary design features, offering optimal alternatives to huge high-rise housing forms and providing residents a new living environment that gives them many pleasant experiences. Therefore, Belle Vue Residences is a highly exemplary project for building high density without high-rise buildings (Figure 3.12.1-3.12.13).

Chapter 4

Synthesis and Conclusion

In Section 2.6 of Chapter 2, theories and criteria of building high-density development without high-rise buildings, achieving both high density and high quality of life in housing development, were intensively studied and articulated. Then in Chapter 3, 12 exemplary projects collected within a worldwide context were analyzed with a focus on examining design approaches related to planning and urban design.

This chapter is a review and synthesis of all of the theories, criteria and projects studied in previous chapters. First, in Section 4.1, it briefly reviews all the exemplary projects studied in Chapter 3, presenting different design solutions for high-density development and synthesizing optimal alternatives to high-rise buildings. Then in Section 4.2, key findings that are design guidelines for building vibrant high-density development are summarized with a focus on describing design approaches related to planning and urban design, such as how to deal with the overall site planning, the design of central open spaces and secondary open spaces, spatial relationships between built forms, relationships between buildings and their immediate surroundings as well as how to deal with gateways, boundaries and access routes of residential neighbourhoods. Guidelines provide overall concepts, design ideas and strategies of building vibrant high-density development, achieving both high density and high quality of life, in order to help future housing developments seeking to use the same vision to build community. Finally, in the last section, there is a summary for the whole research project and recommendations for future high-density developments.

4.1 Synthesis: Table A- Brief Review of Projects

3.1 Makuhari Bay Town Housing, 1996
Site area: 0.84 ha (2.07 acres)
Total floor area: 26,869 sqm
Building height: 6-8 story
Number of dwellings: 190
Net density: 226 dwellings/ha (91.5/acre)
FAR 3.2
Program: market housing
Overall Pattern multiple courtyard block
Design Features
- Diversity in built forms
- Coherence in overall theme
- An "inner journey" on site
- Small shadow impact
- High efficiency of land use

- "Silent", heavy buildings shaping urban block
- "Active", light structures highlighting space
- Emphasize on design of gateways, boundaries and open spaces
- Open space above parking lot
- Separated pedestrian and vehicular circulation

3.2 Ju'er Hutong Renewal Project, 1992
Site area: 8.2 ha (20.3 acres)
Total floor area: 112,000 sqm
Building height: 3-4 story
Number of dwellings: 770
Gross density: 94 dwellings/ha (38/acre)
Program: market and social housing
Overall Pattern courtyard complexes
Design Features
- Respect for the traditional planning principles of the Chinese city
- A new courtyard housing system - "courtyard complexes"
- Separated pedestrian and vehicular circulation
- Small shadow impact

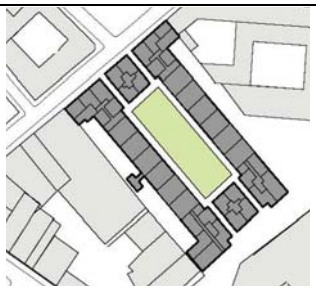
- A new internal circulation system - courtyard "alleyways"
- Combined advantages of traditional Chinese courtyard housing and modern apartment buildings
- Work in harmony with the existing Chinese courtyard housing in the neighbourhood
- Evenly distributed density across the site

3.3 Habitat 67, 1967
Site area: 2.1 ha (5.2 acres)
Total floor area: 22,000 sqm
Building height: 12 story
Number of dwellings: 158
Density: 75 dwellings/ha (30/acre)
Program: market housing
Overall Pattern clusters of stacked houses
Design Features
- A new housing system – "habitat"
- A "three-dimensional community"
- Small shadow impact
- Evenly distributed density across the site

- One roof garden for every house
- "Pedestrian streets" serving as both internal connections and communal open spaces
- Separated pedestrian and vehicular circulation

Table A- Brief Review of Projects (continued)

3.4 Rue de Meaux Housing, 1991
Site area: 0.72 ha (1.78 acres)
Total floor area: 15,600 sqm
Building height: 7story
Number of dwellings: 220
Net density: 306 dwellings/ha (124/acre)
Program: social housing
Overall Pattern closed courtyard block
Design Features
- An "inward-looking" courtyard housing working in harmony with the existing diversified context
- Separated pedestrian and vehicular circulation
- High efficiency of land use



- Tall trees as major landscape providing a sense of calm and privacy
- Central courtyard serving as a transition zone and a social space
- Built forms facing the courtyard and the neighborhood with different descriptions

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3.5 The Whale, 2000
Site area: 0.5 ha (1.3 acres)
Total floor area: 35,800 sqm
Building height: 7-11 story
Number of dwellings: 214
Net density: 428 dwellings/ha (173/acre)
Program: market and social housing
with commercial space at the street level
Overall Pattern closed courtyard block
Design Features
- A "meteorite" building serving as a strong "orientation point"
- Open space above parking lot
- Small shadow impact
- High efficiency of land use

- Sloping roof lines and elevated bottom corners introducing direct sunlight into the heart of the closed block
- Semipublic internal open space providing a sense of intimacy
- Open corridors on every other floor serving as communal open spaces
- Separated pedestrian and vehicular circulation

3.6 Schots 1+2, 2002
Site area: 1.3 ha (3.2 acres)
Total floor area: 34,505 sqm
Building height: 4-8 story
Number of dwellings: 145
Net density: 112 dwellings/ha (45/acre)
Program: market and social housing
with commercial space at the street level
Overall Pattern multiple courtyard block
Design Features
- A sense of "openness"
- High diversity in built forms
- High accessibility and high permeability in the neighbourhood
- Open space above parking lot
- Small shadow impact

- Underground car-parking as a strategy to deal with the decontamination of brownfield site
- Evenly distributed density across the site and partly concentrated density on three small point-style high-rise buildings
- Landscape seamlessly integrated with built forms
- Green roofs and sloping ground creating a three-dimensional landscape system
- Separated pedestrian and vehicular circulation

Table A- Brief Review of Projects (continued)

3.7 Beaufort Court Housing, 2003
Site area: 0.53 ha (1.31 acres)
Total floor area:
Building height: 2-6 story
Number of dwellings: 65
Net density: 122 dwellings/ha (49/acre)
Program: shared ownership, social housing
Overall Pattern U-shape courtyard block
Design Features
- Built forms "sensitive" to the surroundings
- Evenly distributed density across the site
- Small shadow impact
- Central courtyard as a focus point
- High efficiency of land use

- Semiprivate spaces and elevated central public space with clearly defined boundaries and a clear sense of hierarchy
- Open space and playground above semi-underground parking lot
- Separated pedestrian and vehicular circulation

3.8 Kemerlife XXI, 2004
Site area: 2.18 ha (5.38 acres)
Total floor area:
Building height: 2-5 story
Number of dwellings: 206
Net density: 94 dwellings/ha (38/acre)
Program: market housing
Overall Pattern double-bar courtyard block
Design Features
- A "calm" and clear design language
- Apartment units and duplexes combined in one built form
- Small shadow impact
- Evenly distributed density across the site

- Horizontal and vertical "fragmentation" of built forms giving direct access to sunlight and maximizing the creation of private open spaces
- Semiprivate spaces and sunken semipublic space with clearly defined boundaries and a clear sense of hierarchy
- Separated pedestrian and vehicular circulation

3.9 V M Housing, 2005
Site area: 2.5ha (6.18acres)
Total floor area: 25,000 sqm
Building height: 6-12 floor
Number of dwellings: 230
Net density: 92dwellings/ha (37/acre)
Program: market housing
Overall Pattern double-bar courtyard block
Design Features
- Built forms responding to each other and taking angular shapes
- Angels in built forms providing diagonal views to the surrounding landscape and a sense of privacy

- Building V entirely elevated by five-meter-high columns to ensure a sense of openness
- Central courtyard serving as a transition zone and a social space
- Height change in built forms to work in harmony with the existing context
- Separated pedestrian and vehicular circulation

Table A- Brief Review of Projects (continued)

3.10 Social Housing in La Mina del Morro, 2007
Site area: 2.95ha (7.29acres)
Building height: 2-10 floor
Number of dwellings: 154
Gross density: 52 dwellings/ha (21/acre)
Net density: FAR 1.0 (low-rise cluster);
FAR 4.0 (small high-rise cluster)
Program: social housing
Overall Pattern point-style buildings and parallel row houses
Design Features
- Preservation of the natural setting and essential character of the site
- Five point-style buildings filtering urban landscape and working as an "urban facade"
- Separated pedestrian and vehicular circulation

- Evenly distributed density across the site
- Configuration of low-rise housing respecting and following the natural character of the site
- Low-rise housing typology combining features of single-family row houses and functions of apartment buildings
- Small shadow impact

3.11 Ninetree Village, 2008
Site area: 1.0 ha (2.47acres)
Total floor area: 23,500 sqm
Building height: 5 floor
Number of dwellings: 60
Net density: 60 dwellings/ha (24/acre) FAR 2.35
Program: market housing
Overall Pattern free-standing point-style buildings
Design Features
- Preservation of the natural beauty and original character of the site
- Evenly distributed density across the site
- "Chessboard" layout maximizing open space and blending built forms well into nature
- Open space above parking lot
- Separated pedestrian and vehicular circulation

- Free-standing point-style blocks close to the human scale, providing low-rise sensitivity
- Semiprivate spaces around buildings with new vegetation clearly defining boundaries between spaces, providing a sense of privacy and ensuring a clear sense of hierarchy
- Small shadow impact

3.12 Belle Vue Residences, 2010
Site area: 2.3ha (5.68acres)
Total floor area: 32,204 sqm
Building height: 5 floor
Number of dwellings: 176
Net density: 77 dwellings/ha (31/acre) FAR 1.4
Program: market housing
Overall Pattern multiple courtyard block
Design Features
- Preservation of the natural beauty and original character of the site
- Built forms representing natural structure of trees
- Evenly distributed density across the site
- Open space above parking lot
- Small shadow impact

- Free-style site layout seamlessly blending housing into nature, ensuring views in two or three directions and preserving the natural setting of the site
- Well-designed landscape courtyard providing high-quality living environment
- Separated pedestrian and vehicular circulation

4.2 Conclusion: Design Guidelines for Vibrant High-Density Development

After reviewing all of the theories, criteria and projects studied in previous chapters, design guidelines for designing vibrant high-density developments without high-rise buildings are summarized in this section. Guidelines are categorized according to different design aspects in planning vibrant high-density development as structured in Section 2.6 of Chapter 2, namely “Alternatives to High-Rise Buidings”, “Safe Neighbourhoods”, “Healthy Neighbourhoods”, “Accessible Neighbourhoods”, “Active Neighbourhoods” and “Attractive Neighbourhoods”. These guidelines provide overall concepts, design ideas and strategies for proposing vibrant high-density development, achieving both high density and high quality of life.

4.2.1 Alternatives to High-Rise Buildings

1. On the urban scale, in order to control urban sprawl and foster the creation of multi-centered city, high-density developments should be evenly distributed across the city, rather than only concentrated in the inner city, which can avoid creating housing forms with excessive height (Myers, 1979, pp. 1-13) (Figure 4.2.1a-4.2.1b). In future developments, architects and planners should avoid either using high-rise housing forms that have many shortcomings in social and environmental aspects or using extremely low-rise, low-density housing forms that cause urban sprawl.

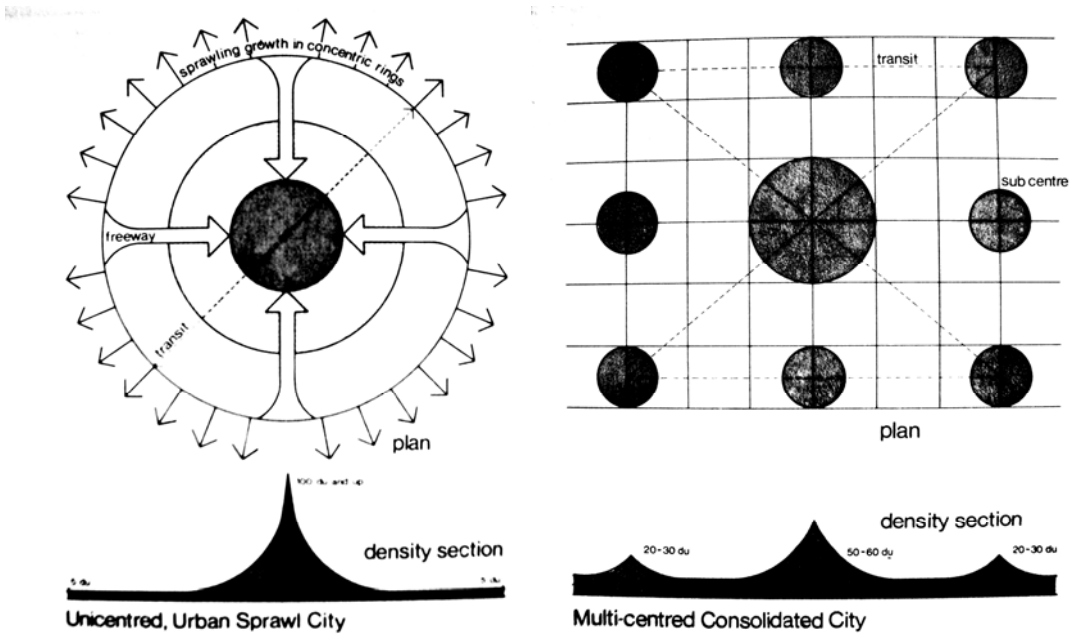


Figure 4.2.1a-4.2.1b: Urban Sprawl City (left) vs. Multi-centered City (right)-density section in the urban scale Source: Myers, 1979

2. On the urban block scale, instead of concentrating density in a few high-rise towers or large slab buildings, density should be evenly distributed across the site by adopting medium-rise built forms, making it possible to create intimate urban blocks and meaningful open spaces between buildings. First, medium-rise buildings can be fitted into the existing urban block more easily than high-rise buildings. Secondly, they can reinforce the streetscape in the human scale; thereby ensure a sense of intimacy in the place. Thirdly, they can preserve the natural setting and enhance the essential character of the site (Figure 4.2.1c-4.2.1d).

Figure 4.2.1c-4.2.1d: Medium-rise buildings close to the human scale and giving people a sense of intimacy
Source: Section 3.6

3. On the dwelling scale, medium-rise buildings from three to seven stories with the "inward-looking" courtyard housing layout are optimal alternatives to high-rise buildings (Schoenauer, 1981, p. 29). They are adjacent to the ground and trees, achieve the same density as high-rise buildings, enable convenient access to nearby streets and open spaces. Furthermore, they can easily contain and promote activities within the courtyard without having much impact on the surroundings, thereby working in harmony with the context (Figure 4.2.1e-4.2.1g).

Figure 4.2.1e - 4.2.1g: Medium-rise housing with "inward-looking" courtyard layout
Source: Section 3.5(left); Section 3.2 (middle); Section 3.8 (right)

4. On the dwelling scale, small point-style buildings from five to ten stories are also optimal alternatives to huge high-rise buildings. If necessary, higher density could be concentrated at several points of the site by using small, point-style buildings with appropriate distance in between to avoid congestions. They are also close to the human scale and perceived as medium-rise buildings, ensuring the aesthetic quality of built forms and increasing the overall satisfaction and attractiveness of

high-density development (Figure 4.2.1h-4.2.1i).

Figure 4.2.1h-4.2.1i: Small point-style high-rise blocks close to the human scale
Source: Section 3.6(left); Section 3.10 (right)

4.2.2 Safe Neighbourhoods

1. Neighbourhood safety should be ensured by improving physical design, rather than by building solid boundaries such as barriers and fences around the property, or by reducing access and linkages with the street, because neighbourhoods should be designed to bring people together and should be open to visitors rather than isolated from the surrounding neighbourhoods (Gindroz, in Charter of the New Urbanism, 2000, pp.133-140).
2. Soft boundaries not only can prevent strangers entering into the territory but also can provide residents a sense of openness (Becker & Friedberg, 1974, pp.112-123). For example, arranging lower planters or trees around the neighbourhood, or creating level change between the street level and the internal courtyard level, are favorable designs of soft boundaries, because they clearly define the territory of the neighbourhood, at the same do not block the view and reduce the sense of openness of the neighbourhood, thereby providing a balance between safety and accessibility of the neighbourhood (Figure 4.2.2a-4.2.2b).

Figure 4.2.2a-4.2.2b: Creating soft boundaries between street and courtyard by level change
Source: Section 3.1(left); Section 3.6 (right)

3. Neighbourhood safety can also be achieved by introducing “defensible space” between buildings, such as semiprivate space or semipublic space in the site plan (Newman, 1972, pp. 1-101). By gently bending building facades or orienting buildings to the internal open space, a series of pleasant semiprivate space or semipublic space can be created between buildings or around buildings (Figure 4.2.2c - 4.2.2e). These spaces can be well-supervised by residents and visitors, offering residents a sense of security, a sense of privacy and ensuring the safety of the neighbourhood.

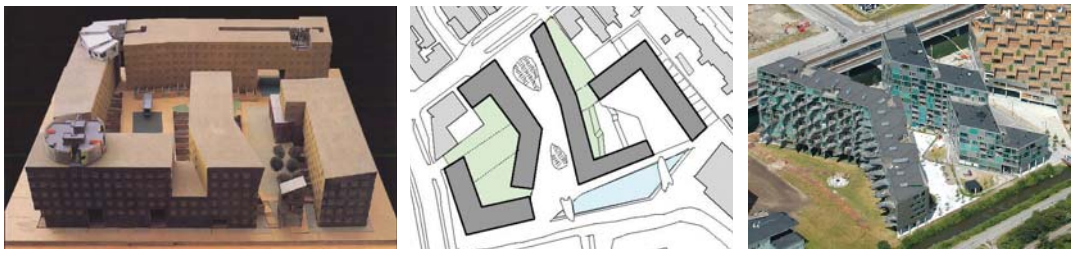


Figure 4.2.2c - 4.2.2e: Creating “defensible space” by orienting buildings to open spaces
Source: Section 3.1(left); Section 3.6 (middle); Section 3.9 (right)

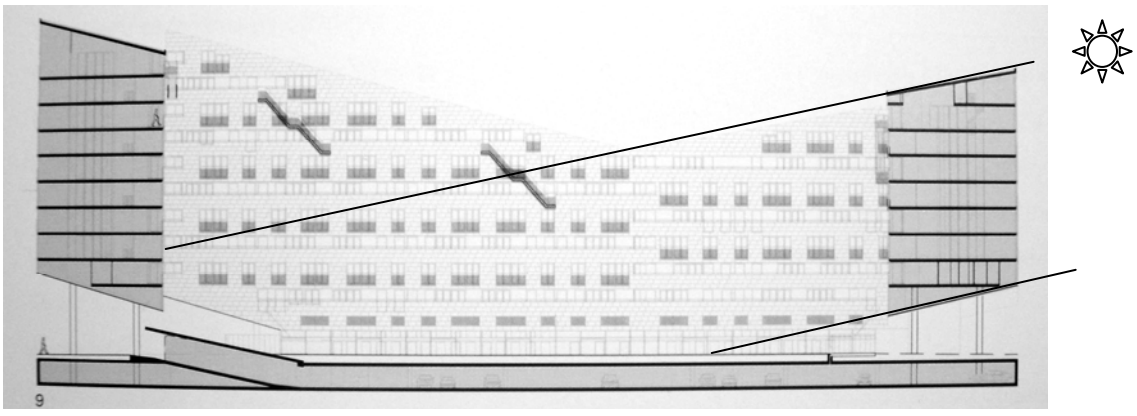
4. Neighbourhood privacy can be ensured by reducing overlooking between windows of dwelling units. First, arranging trees between buildings can reduce overlooking between windows, thereby ensuring a sense of privacy. Secondly, slightly rotating buildings or building facades can avoid windows of dwelling units directly meeting with each other, thereby providing residents a sense of privacy (Figure 4.2.2f -

4.2.2g).

Figure 4.2.2f - 4.2.2g: Slightly rotating buildings to avoid overlooking
Source: Section 3.11(left); Section 3.12 (right)

4.2.3 Healthy Neighbourhoods

1. Place great emphasis on integrating of sunlight, fresh air and natural wind into the development, in order to ensure dwelling units relying on natural recourses, rather than on electrical appliances, to control temperature, create ventilation and provide light, thereby ensuring residents to enjoy a healthy living environment. When designing closed courtyard block, adopting sloping roofs in architectural design or shaping rooflines according to the position of the sun can significantly reduce shadow impacts; thereby sufficient sunlight can be ensured in dwelling units (Figure 4.2.3a- 4.2.3b).



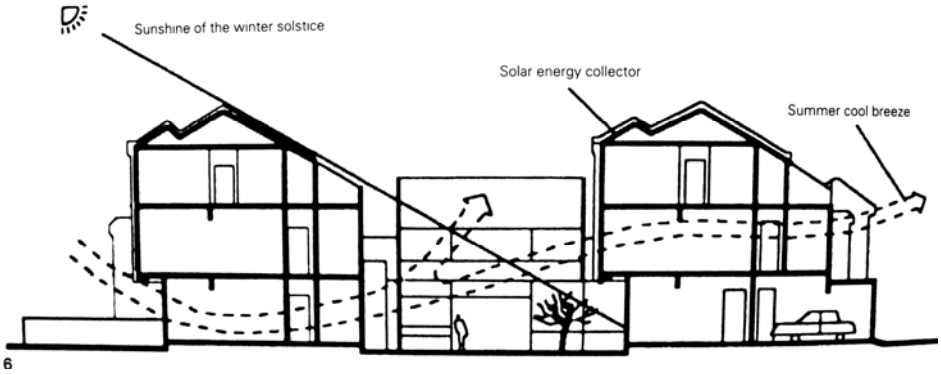


Figure 4.2.3a- 4.2.3b: Ensuring sufficient sunlight by adopting sloping roofs or inflecting rooflines according to the sun
Source: Section 3.5(up); Section 3.2 (below)

2. Respect to the natural character of the site and try to make the most of natural conditions to ensure access to sufficient sunlight and the creation a healthy neighbourhood. For example, when building on sloping land or site with an irregular shape, arrange major rooms facing to the south as much as possible and ensure that southern facades are longer than northern facades (Figure 4.2.3c-4.2.3d).


Figure 4.2.3c - 4.2.3d: Respecting to the site – major facades on the south (left) and corridors on the north (right) Source: Section 3.10

3. Sunlight, fresh air and natural wind should also be integrated into the design of open spaces in order to increase the quality of life in the neighbourhood. For example, locating higher buildings on the north side of the site can greatly reduce their shadow impacts on the open space. By planting trees in open spaces, strong

afternoon sunshine can be blocked and a comfortable micro-climate can be ensured in the neighbourhood (Figure 4.2.3e).

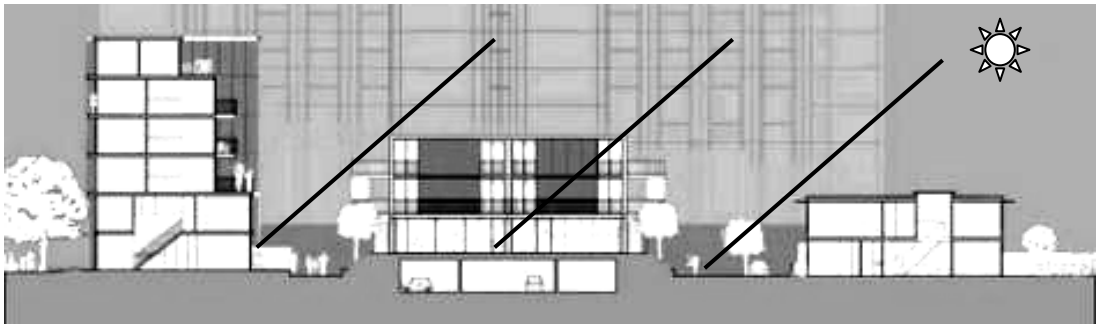


Figure 4.2.3e: Small shadow impact and a comfortable micro-climate in the neighbourhood
Source: Section 3.7

4.2.4 Accessible Neighbourhoods

1. Linkages between the neighbourhood and nearby streets, which not only refer to entrances of buildings but also refer to paths, gateways and openings that link the internal space of a neighbourhood with the adjacent streets, are necessary to create an accessible neighbourhood (Marcus & Sarkissian, 1986, pp. 107-134). For example, gateways and openings enable residents to see the streetscapes from the internal courtyard, thereby providing them a clear sense of location and a clear sense of orientation. Additionally, gateways and openings enable people from nearby neighbourhoods to come and visit, thereby promoting social interaction, ensuring a sense of openness and avoiding the creation of isolated neighbourhoods (Figure 4.2.4a- 4.2.4c).

Figure 4.2.4a – 4.2.4c: Gateways and openings linking the neighbourhood with nearby streets
Source: Section 3.5(left); Section 3.1 (middle); Section 3.9 (right)

2. The design of paths, gateways and openings directly affects how people recognize the neighbourhood (Marcus & Sarkissian, 1986, pp. 107-134). The dimension and scale of gateways and openings should be appropriate, neither too narrow nor too wide, in order to present a clear definition of territory and give people a pleasant gateway experience. For example, designing a gateway house or creating a two-story-high opening can highlight the gateway and give people a pleasant gateway experience when entering into the neighbourhood (Figure 4.2.4d- 4.2.4e).

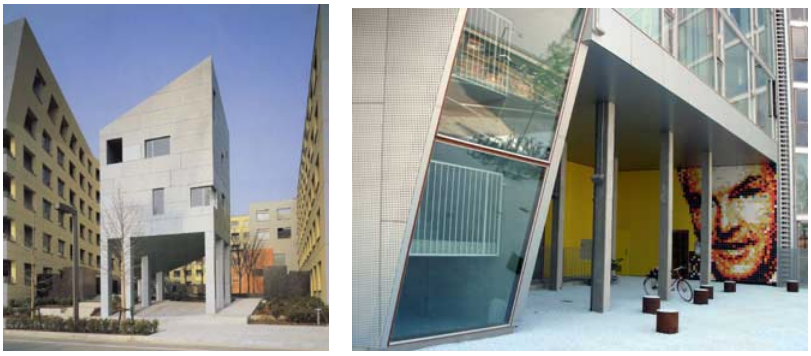


Figure 4.2.4d (left): A gateway house highlighting the pleasant gateway experience
Figure 4.2.4e (right): An obvious two-story-high opening at the bottom of the building
Source: Section 3.1(left); Section 3.9 (right)

3. Access routes of the neighbourhood should be pedestrian-oriented. If possible, pedestrian circulation and vehicular circulation should be separated in order to reduce the chance for pedestrians to cross vehicular traffic in the neighbourhood.

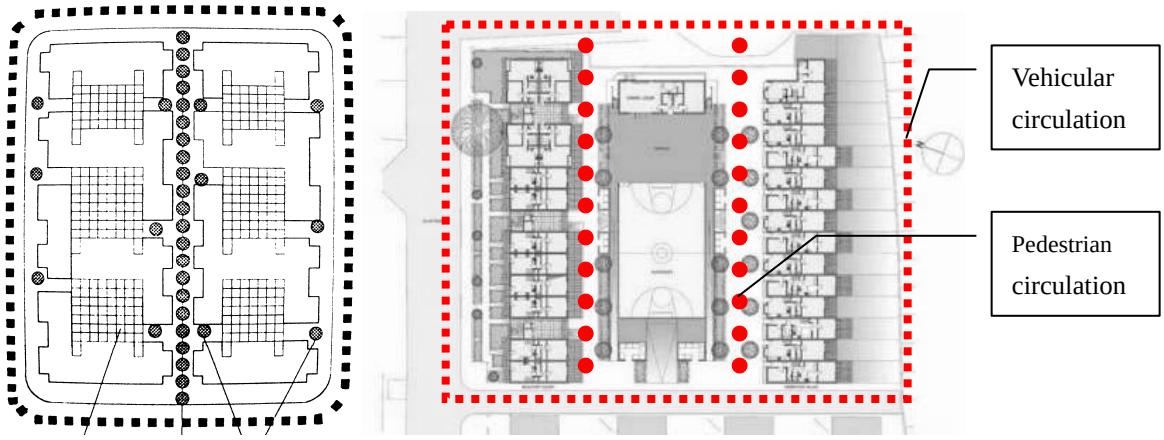


Figure 4.2.4f - 4.2.4g: Separated pedestrian circulation and vehicular circulation
Source: Section 3.2(left); Section 3.7 (right)

4.2.5 Active Neighbourhoods

1. Open space must be ensured in residential neighbourhoods for recreation purpose (Adams, 1960; Zhou, 2005; Becker & Friedberg, 1974; Glendinning & Muthesius, 1994; Marcus & Sarkissian, 1986), especially in high-density development, where residents and families are concentrated. For example, building a swimming pool or a play ground in the central courtyard can provide residents a space to enjoy sunshine and fresh air, play games and do exercises (Figure 4.2.5a- 4.2.5b). Additionally, open space should be designed to serve all residents, since senior people and families with young children are social groups relying more on nearby open spaces for recreation than adults and teenagers (Jephcott, 1971, pp. 70-100; Adams, 1960, pp.42-53).

Figure 4.2.5a – 4.2.5b: Building a swimming pool or a play ground in the neighbourhood
Source: Section 3.11(left); Section 3.7 (middle)

2. Open space can be used as social space to foster interaction between residents and plays a crucial role in creating active neighbourhoods. For example, when entrances of buildings are located in the central open space, residents have to pass through the courtyard to get to their apartments, thereby increasing opportunities for residents to meet. Additionally, in higher buildings, creating pedestrian corridors and small open spaces in upper floors can efficiently promote social interaction between residents (Figure 4.2.5c- 4.2.5d).

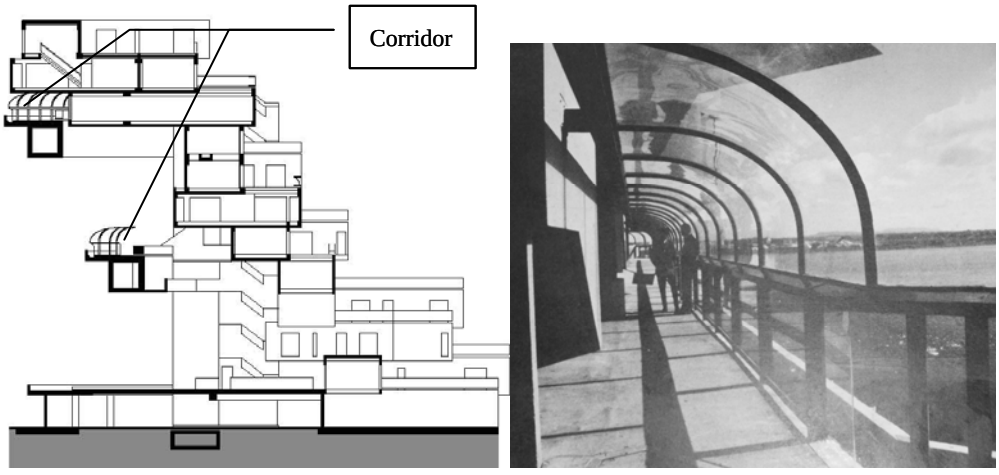


Figure 4.2.5c – 4.2.5d: Creating linkages and small open spaces in the upper floor to promote social interaction between residents Source: Section 3.3

3. A comfortable open space should encourage residents to use it (Gindroz, in

Charter of the New Urbanism, 2000, pp.133-140). For Example, the width of open spaces should be designed in scale with the height of surrounding buildings, providing people a sense of enclosure and a sense of relaxation; thereby they can be frequently used be residents (Figure 4.2.5e- 4.2.5f).

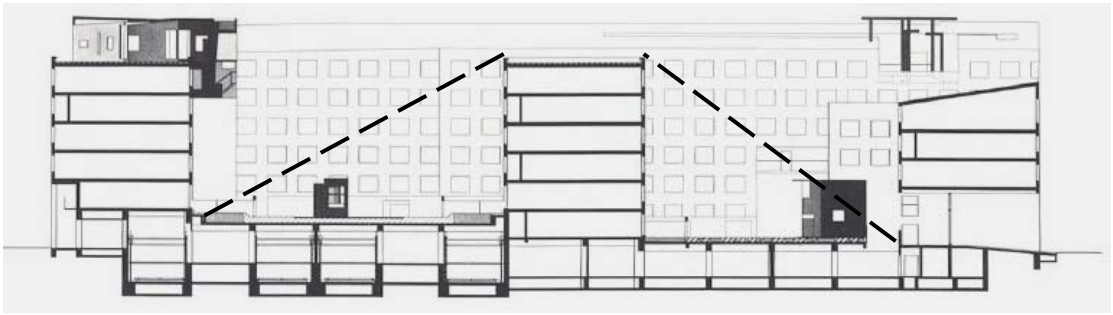
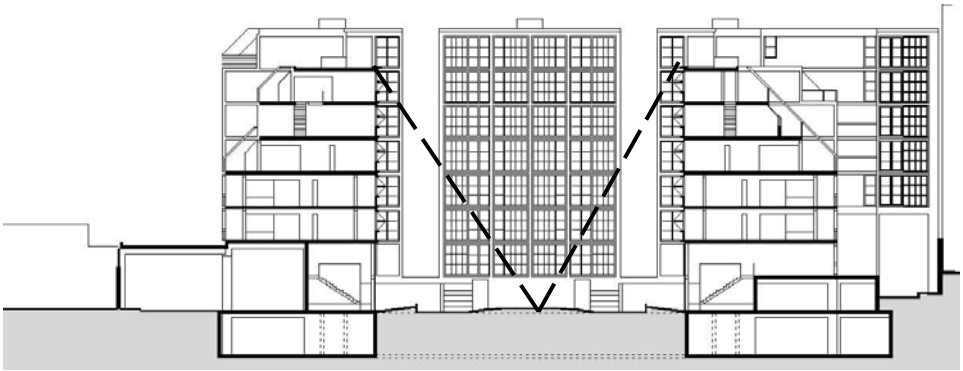


Figure 4.2.5e – 4.2.5f: Comfortable open spaces in scale with building heights
Source: Section 3.1(up); Section 3.4(below)



4.2.6 Attractive Neighbourhoods

1. Since a car-free neighbourhood is preferred by residents, excluding cars on the ground level is highly recommended in high-density development. Introducing underground or semi-underground car parking can create a pedestrian-friendly neighbourhood and increase both the environmental and aesthetic quality of the neighbourhood (Figure 4.2.2a - 4.2.2e).
2. Some degree of aesthetic complexity and visual diversity in the living

environment is preferred by residents and should be ensured in the neighbourhood (Marcus & Sarkissian, 1986, pp. 45-62). For instance, residents must have pleasant views of the open landscape directly from their dwelling units rather than look at windows of other dwelling units, which can largely increases people's satisfaction with their homes and the attractiveness of the neighbourhood (Figure 4.2.6a).

Figure 4.2.6a: Ensuring some degree of visual complexity in the environment
Source: Section 3.7

3. Arranging semiprivate space (area around buildings) between semipublic space (the courtyard) and private space (buildings) is recommended in order to present a clear sense of hierarchy in the space, which enables residents smoothly transfer from private activities to public activities. Boundaries between the private, semiprivate, semipublic and public space should be designed with care in order to present a clear definition of territory (Figure 4.2.6b; Figure 4.2.2a - 4.2.2b).

Figure 4.2.6b: Semiprivate space (small gardens) between private and semipublic space
Source: Section 3.7

4. Landscaped open spaces should be seamlessly integrated with built forms and scattered across the neighbourhood. In this way, built forms are also perceived as part of the landscape, which will greatly increase the quality of living environment and highly contribute to the attractiveness of the neighbourhood (Figure 4.2.6c- 4.2.6d).

Figure 4.2.6c - 4.2.6d: Seamlessly integrating open space with built form
Source: Section 3.6

5. A reasonable distance should be ensured between buildings. It enables residents to enjoy the complete building façade of their homes and experience the overall space of the neighbourhood, thereby strengthens the sense of ownership for residents and enhances the attractiveness of the neighbourhood (Figure 4.2.6e-

4.2.6f).


Figure 4.2.6e – 4.2.6f: A reasonable distance between buildings enabling residents to enjoy building façades Source: Section 3.1(left); Section 3.5 (right)

6. Landscape features, such as a water fountain, tree-lined paths and flowering plants, should be provided in the neighbourhood. They give a meaning to the open space, make the living environment attractive, and ensure a better quality of life in the neighbourhood (Figure 4.2.6g- 4.2.6h).


Figure 4.2.6g – 4.2.6h: Landscape features increasing the attractiveness and ensuring a better quality of life Source: Section 3.12

7. Creating a great contrast in the living environment can increase the aesthetic quality and the attractiveness of the neighbourhood (Comitta, in Charter of the New Urbanism, 2000, pp.113-119). For instance, a graceful and balanced living environment can be ensured by presenting a big contrast between built and unbuilt environments, between heavy housing forms and light landscape

structures, and between hard man-made elements and soft natural elements (Figure 4.2.6i – 4.2.6k).

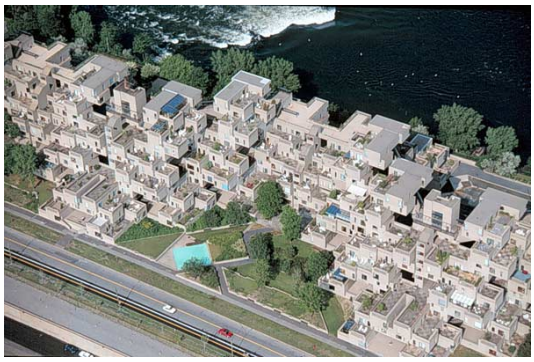


Figure 4.2.6i – 4.2.6k: Increasing the attractiveness of neighbourhood by creating a great contrast in the living environment
Section 3.12(up left); Section 3.1 (up right); Section 3.3 (below)

4.3 Summary

Design for improvement

Going through the history of architecture and urban planning, it is easy to see the evolution of high-density development. In the 19th century, high-density housing initiated by the Industrial Revolution was achieved by creating housing forms with high ground coverage. As a result, open spaces were reduced in the neighbourhood, leading to the creation of congested, unhealthy and unfriendly living environments. In the 20th century, high-density housing designed by modernist architects was achieved by increasing building height and freeing the land on the ground for open spaces, providing an alternative to the congested living conditions in many industrial cities during the 19th century. However, huge open spaces were never been used efficiently and high-rise buildings had many shortcomings in social and environmental aspects, as analyzed in Section 2.4 of Chapter 2. The research of vibrant high-density development without high-rise buildings recommends that in future high-density developments, land use professionals should avoid either using housing forms with high ground coverage that reduce open spaces on the ground level or adopting housing forms with excessive height that have many shortcomings. The research aims to find intermediary solutions in future developments and creates housing forms with appropriate ground coverage and reasonable height. This is a new model of housing development, which intends to provide better housing products that can achieve both high residential density and high quality of life in the development. To actually increase citizens' acceptance of high-density development, architects and planners should make an effort to find more satisfying designs and optimal forms for high-density development and create more vibrant high-density developments in the city.

Creating intimate urban neighbourhoods

High-density developments not only provide homes for billions of people, but also form urban neighbourhoods that are part of the city. In our modern world today, the city's silhouette has been dominated by high-rise buildings, among which there are not only high-rise hotels and office buildings, but also a great deal of high-rise residential towers. These residential towers are out of the human scale and lead to the creation of unattractive neighbourhoods in the city, as analyzed in Section 2.4 of Chapter 2. They largely reduce the quality and attractiveness of housing neighbourhoods in the city and significantly affect how citizens think of the place and the city. As a result, the intimate urban neighbourhood, which is close to the human scale and offers people a sense of enclosure, a sense of security and a strong sense of place, has been significantly lost in many modern cities. The research of vibrant high-density development without high-rise buildings attempts to bring the intimate urban neighbourhood back to the city and advocates that in future high-density developments, architects and planners should adopt housing forms related to the human scale and propose intimate urban neighbourhoods, in order to increase the quality and attractiveness of high-density development and create great places in the city.

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