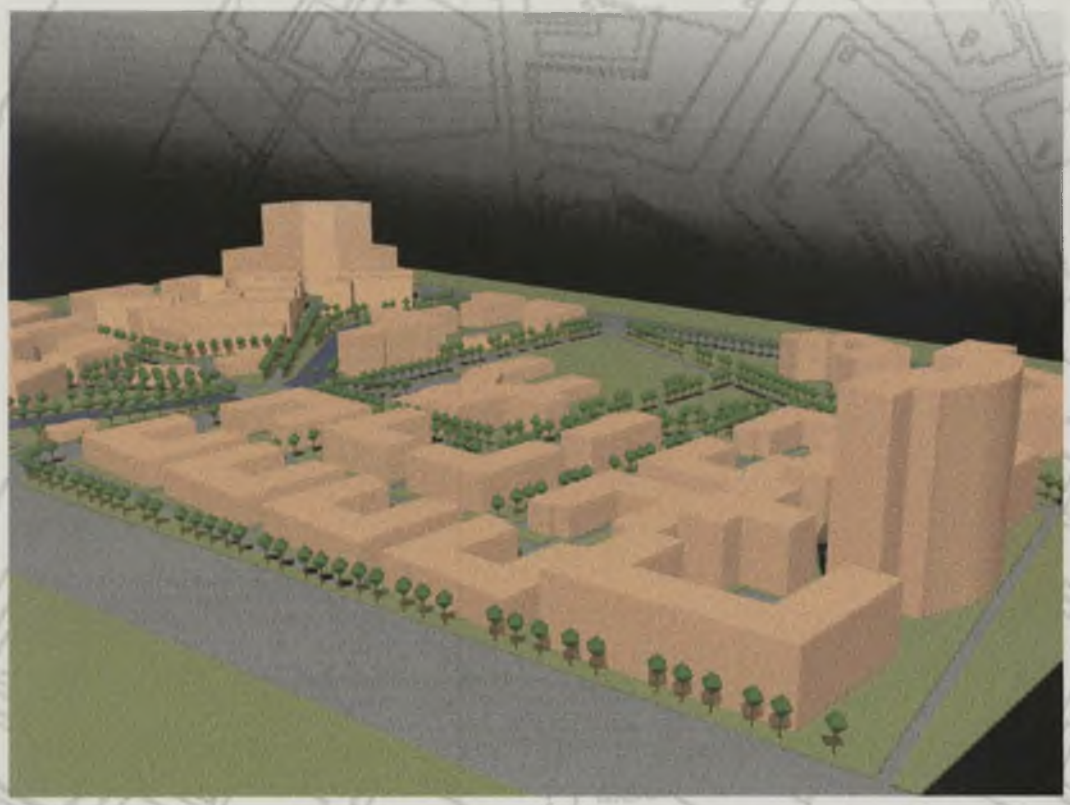

HIGH -DENSITY URBAN HOUSING IN CHINA

THE LIVING ENVIRONMENT

ZHENG CHEN

COLLEGE OF ARCHITECTURE, THE UNIVERSITY OF ARIZONA, 1997

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TABLE OF CONTENTS

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INTRODUCTION

"... In spite of many good intentions and indeed, a certain widespread enthusiasm for early designs, the building of modem housing seems to have floundered among plain unimaginative projects with no character, accommodations ill suited for their occupants, and building complexes with a significant lack of public amenity...."

Peter G. Rowe "Modernity and Housing"

In the past ten years, with the development of economic life, a goal of the Chinese government is to provide better housing for people. As the population booms and land shortage pressures for higher density residential development increase, so does the seriousness of the search for a more land-use efficient housing form in urban area, because of the undeveloped traffic situation limits the spread of urban housing to suburbia. As a result, building mid- and high-rise, high-density apartments in the downtown area is considered one of the best ways to provide more housing and larger living space within limited land. However, sense of traditional culture, social life-style and public amenities has being ignored and more and more communities have been filled with uniform, routine, and regularized concrete high-rise buildings. The conflict of creating bigger and better housing and the need to save more exterior spaces for social-life has become the focus of housing discussion and debate in recent China. Is it possible to create a satisfactory living environment without sacrificing amenities for private satisfaction? This challenge confronts not only architects, city planners and developers, but also the residents of the communities themselves.

HOUSING, DENSITY AND HIGH-RISE

Because of the population increase in China, a new goal for housing may be to maintain as many features and amenities of the low density house as possible while aggregating many more units on a single site for economy's sake. As economic and population pressures strongly influence community development, Chinese architects and planners have to face the seriousness of this dilemma - the conflict of "high-density versus low-density". Density has become one of the most important issues, deeply affecting the housing and community pattern.

Though high density is most often associated with a poor quality living environment, there is no simple relationship between density and satisfaction; other significant variables combine with density affect perceived density and influence satisfaction. In fact, in the United States some of the densest neighborhoods are the most elegant. (Park Avenue in New York and Rittenhouse Square in Philadelphia). The re-evaluation and review of the concept of high density may help people to create a better community under the high pressure of economic, population and land usage.

Another major confusion in the continuing argument over density is the association of high density with high-rise. Studies in recent years have shown that use of the high-rise has not resulted in substantial increases in density and land use efficiency (Mclaughlin, 1976; Davis, 1977). Therefore, high-rise is not the only and best way to achieve high density housing. There is the possibility to create a more livable, sustainable and healthy low-rise or middle-rise housing under the high density pressure.

HOUSING AND LIFE-STYLE

Today in Chinese urban housing, as new dwellings are continuously being produced to improve people's housing condition, many attempts have been focused on how to create more interior living space, while exterior environment, another element that measures housing quality, has been ignored (Fig.0-1).

Figure.0-1 Public Housing, Fuzhou, P.R. China

Increased levels of individual awareness and social consciousness regarding the physical environment demand public outdoor spaces be designed to echo the residents' outdoor activities and lifestyles. A piece of undeveloped land covered only by grass and trees and completely unresponsive to the residents' lifestyles is a land that belongs to no one, a land that could not bind an individual to a friendly neighborhood. Public spaces like streets, squares and parks should be a setting for the conduct of daily life. Hearing the people and designing for their lifestyle should be added to housing issues.

ORGANIZATION OF THE CHAPTERS

This master report is divided into two parts: The Study of High Density Housing Patterns and Environment, Case Study and Project Design. Part One started with a brief introduction of housing background in China. As

we review the housing situation, serious housing problems are presented. Finding some proper forms and patterns to solve the problems becomes the focus of this part. Because there is no one way to make better housing, different theories and influential examples are discussed in Part One, and each chapter of Part One is concluded with design principles that could enable us to shape urban housing in a more efficient, ecological and more humane ways. Part Two is a schematic design of a housing project in Fujian, China, in which those design principles that are addressed in Part One are used to test theories in real application.

CHAPTER ONE
HOUSING BACKGROUND IN CHINA

1. A BRIEF HOUSING REVIEW IN CHINA

In the whole process of urban improvement and neighborhood development, different theories have deeply influenced urban planning and housing style in different periods. Therefore, it is necessary to review the history of urban development before the study.

1.1 Housing and Nationalism

In the 1950's and 1960's, because of political isolation and chauvinism, the Chinese government advocated learning from the traditional culture. As an architectural expression of the Chauvinistic political movement, Nationalism became the major ideology that made an impact on housing design. During this period of Nationalism, traditional characters and city pattern were maintained to a certain degree during the modernization process. In neighborhood design, the traditional lifestyle and housing type were considered.

During this period, a distinct change of housing pattern was observed, in the emergence of new community towns under the influenced by Nationalism (Fig. 1-1). Delightful scale, stable transition, convenient accessibility and the friendly neighborhood relationship of traditional housing were applied to

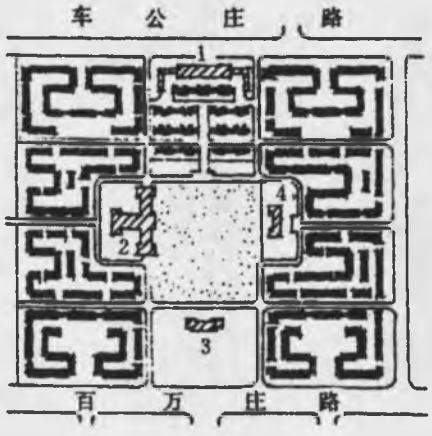


Figure 1-1. Bai-Wan-Zhuang Public Housing, Beijin. A 1950's community town built base on the traditional Hu-T'ong housing prototype

this new type of community. However, Nationalism did not last more than a decade. The major reason that finally brought about the fall of Nationalism was the sudden boom in population and economic pressures during the Culture Revolution, which had been ignored in Nationalism movement. The government had to abandon Nationalism and find a more efficient and economic way for creating more housing in a short time.

1.2 Internationalism and the High-rise Apartment

The Modernist International style with its simplicity in form and standard production, dominated the architecture field after Nationalism. Indeed, Modernism was a legitimate and proper response to the housing shortage, and with modern technology and materials, the modernist apartment complex, to a great extent, solved housing problems.

One of modernism's characteristics is that while high-rise apartment provide for physical function in the living environment, they greatly ignored the social life of their residents. The modern community towns were groups of monolithic flats with ambiguous boundaries, and weak neighborhood identities that gave little or no consideration to the function of public space. City pattern has been destroyed by the flooding of International style, high-rise apartment slabs. As the economy has grown more stable and prosperous, brought by an open government policy, people are not satisfied with simply satisfying physical needs. The desire for an enriched living environment is pounding away at "dull" high-rise building created by internationalism.

1.3 The Attempt of New Style in 1980 - 1990

With an open door policy in the 1980's, new Western architecture theories and practices strongly influenced Chinese architects and planners and brought about great changes in building styles and community design (Fig.

1-2). A tendency to reproduce humane housing that fulfills not only private requirements but also public amenities has been spreading from professional fields to residents, and promote the attempt to review traditional housing and community patterns. Consequently, post-modernism, new urbanism and critical regionalism were considered as the most flexible theories to fit the Chinese situation.


Figure 1-2, 1990's Housing in Shanghai.

1.3a Post-Modernism in late 1980's

In an attempt to provide continuity with the past and to recover a lost sense of tradition, practices have been influenced by post-modernism (Rowe, P1) Post-modernism has mostly been applied to the rehabilitation of traditional housing and the new street-oriented apartment. It gave a fresh vivid image to urban housing. Unfortunately, such attempt only manifested itself in excessive ornament of building detail and created inauthentic facades.

1.3b New Urbanism and Urban Rebuilding

As a result of learning from new urbanism, Designers of new housing projects implemented many changes. First, they preferred the vernacular over the unique. Regional character, present lifestyles and public amenities were added to housing issues as well as density and living space. Second, new codes were established to guide planners, developers and architects. To a great extent, these codes which includes lots sizes and shapes, building heights, street widths and the location and content of public center

shaped the urban pattern. Reinforcement of the city form became a more and more important social issue. Third, there was a growing practice to include diverse uses in community development, such as adding small-scale stores, daycare center, elementary schools to the neighborhood according to the size of site. These small retails shops and schools played an important role in sustaining neighborhood identity and enhancing exterior activities as well as providing personal service and convenience.

1.3c The Conflict of Public Versus Privacy

Besides all these attempts to bring back lifestyle and identity to neighborhood and urban pattern, under the pressure of density, budget and shortage of housing, most new community projects still emphasize the design for privacy over public life, not interested in balance the public and private requirements, most developers sacrifice community outdoor space to increase average personal indoor space and enhance private amenities.

As most contemporary theories are based on western culture and social background that is totally different from Chinese, the application of those theories can not be successful by simply copying the rules to China. The change of density, transportation means, social economic situation and cultural background calls for intense study of both present housing situation in China and the theories of housing design.

2. STRUCTURE OF CURRENT HOUSING PATTERN

The current housing pattern in China can be classified into four basic major categories: 1) 'Hu-t'ung housing (small lane house); 2) street-oriented housing; 3) community town; 4) commercial housing. Each pattern has a specific spatial structure. Such structure can be well explained by using the concept of "dot", "line", "net", and "branch".

2-1. "Hu-t'ung Housing - Net Structure

Traditional 'Hu-t'ung housing, which is also called courtyard house, is composed of individual or a group of courtyard houses, which are linked to the traffic routes by narrow access streets. The courtyard houses are open to the occupants of the house and completely closed against the outside world. In such housing districts, there is usually more than one 'Hu-t'ung connected by networks like small lanes to each other (Fig 1-3, 1-4).

Figure 1-3. Traditional Courtyard Housing in Shuzhou, P.R. China

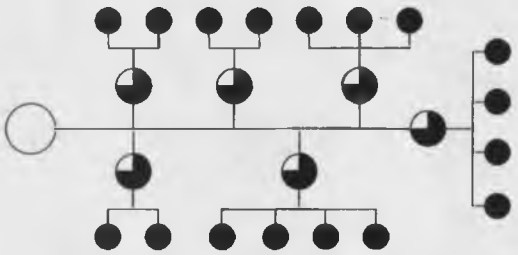


Figure 1-4. Net Structure

2-2. Street -oriented Housing - Line Structure

Line structure housing is an efficient residential pattern without an obvious end. Traditional low-rise high-density street orientated housing is of typical line structure type. It is always seen in traditional commercial street with its first floor open to the public as a small retail store (Fig. 1-5, 1-6).

Figure 1-5. Traditional Street-Oriented Housing, Fuzhou, P.R. China

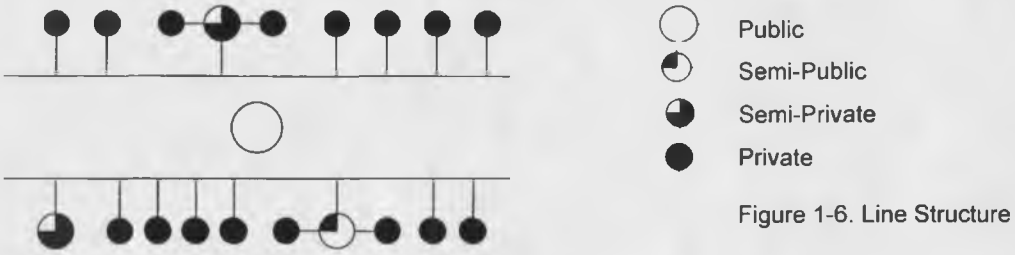


Figure 1-6. Line Structure

2-3. Community Town - Branch Structure (Fig. 1-7, 1-8)

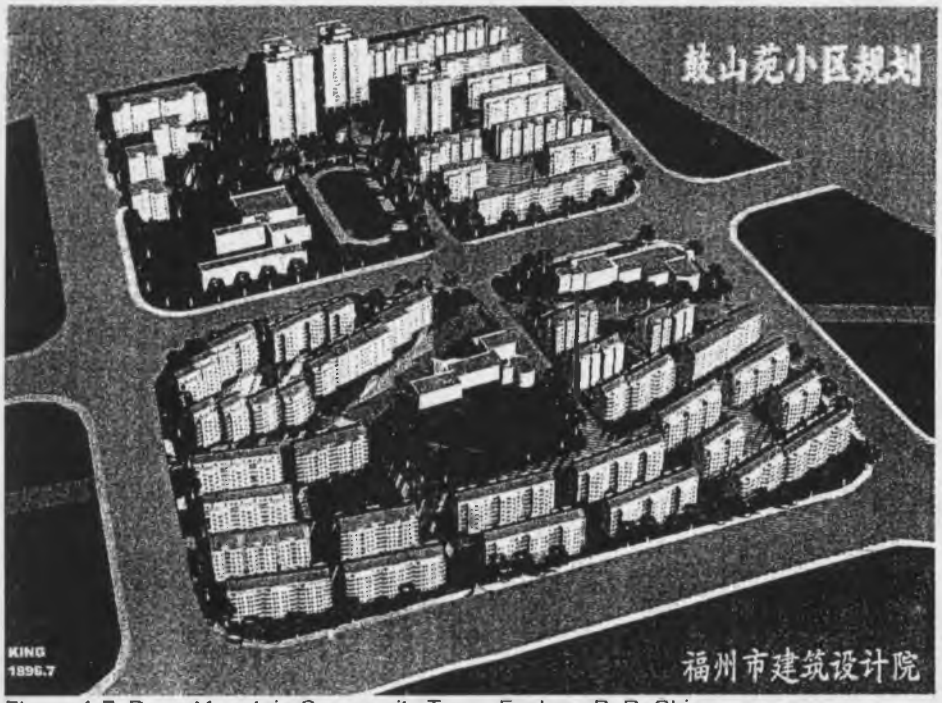
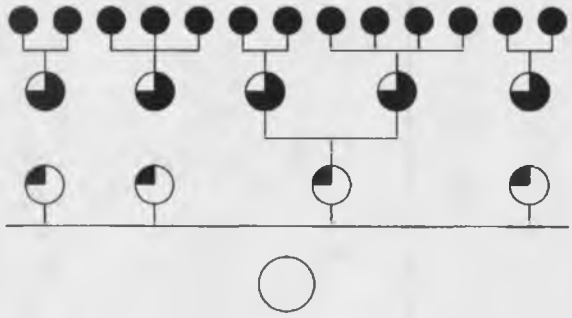


Figure 1-7, Drum Mountain Community Town, Fuzhou, P. R. China



Public
Semi-Public
Semi-Private
Private

Figure 1-8. Branch Structure

2-4. Commercial Housing - Dot Structure

New commercial housings are middle-rise or high-rise apartments on the street. A large commercial space connects these apartment buildings at street level with business, office, stores or entertainment places that service the public and resident. They are independent apartment complexes with no connection to the other buildings, and the entrance of apartments is separate from the commercial space (Fig.1-9, 1-10).

Figure 1-9. Commercial Housing with business office, stores and public entertainment center in street level.

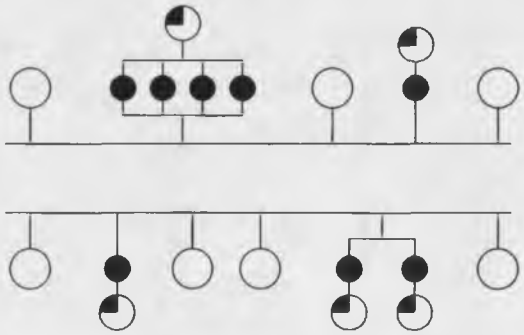


Figure1-10. Dot Structure

CHAPTER TWO
DENSITIES

"There is no simple relationship between density and satisfaction; other significant variables combining with density affect perceived density and influence satisfaction."

Cooper Marcus and Sarkissian "Housing as if People Mattered"

Discussion of density is difficult because there is no method or standard universally applied. Density may be expressed as people per acre, dwelling units per acre, FAR (floor area ratio of building to site), people per habitable room, and so on. The primary purpose of using density as a design guideline in most housing projects is to control the number of habitats or units within a site according to different requirements set by density planning and city code. Zoning, as a typical mechanism for establishing density limits, is used to ensure adequate daylight, sunlight, air, usable open space, room for community facilities, a feeling of openness and privacy, and adequate relationship of building cost to land and improvement cost. However, controls on density are frequently unwarranted, their real use being to prevent undesirable development (Davis, p3-p7).

The definition of low, middle or high density varies in different regions and countries. In the United States, the gross residential density of New York, the most dense metropolis, is 47 people per acre; that of San Francisco is 24 people per acre; that of Chicago, 23 per acre. But to take well-known European examples, the gross residential density of Paris is 84 people per acre, and that of London, 60 people per acre. The major cities' residential densities in the US are barely one-fourth to one-third of the European values (Lozano, P157-P162). Since density determines the accessibility of

people to people, of people to work, of people to services and recreation, the discussion of high density or low density has to be associated with region, culture background and sociol-economic factors. A good experience of high density housing in the US may not be simply applied to another country with a different social/culture perspective of high density.

1. DENSITY AND URBANITY

Density is the critical variable in determining urbanity because of its location effects. "The relationship between density and urbanity is based on the concept of viable thresholds: At certain densities (thresholds), the number of people within a given area is sufficient to generate the interactions needs to make certain urban functions or activities viable"(Lozano, p163). Clearly, up to a certain limit, the greater the number and variety of urban activities, the richer the life of a community; thus, urbanity is based on density.

Housing Type	Density (Units/acres)	Density Threshold	Effects of Density on Urbanity
Detached Single -Family House	1-5		Difficult to provide community facilities in close proximity to the dwellings
Tight Cluster Single-Family House	8		
Semidetached Two-Family House	5-12		
Townhouse (with party walls)	10-16	12	The net density of 12 units/acre is the first urbanity threshold. The density allowing the generation of an urban environment with community facilities nearby.
Tight Cluster Townhouse (with some mix of two-story flats)	20	20	Above the threshold, direct access to the ground cannot be provided from each units, leading to a

			radical change in the nature of the outdoor open space, a reduction of unit identity, a need for common parking areas.
Low-rise Apartment (3-5 stories)	35-50	45-50	Visual intimacy can begin to be lost, a concentrated urban scale emerges
Mid-rise Apartment (6-8 stories)	65-75	75-80	A wide variety of facilities and activities can easily access to each dwelling, the provision of parking and open space becomes an important design issue
High-rise Apartment	50-100	above 100	Has all the limitations and advantages the core of urbanity can provide - maximum accessibility, limited open space, congested streets, pressure of space

Recognizing density threshold is critical to understanding the effects of density on urbanity. The chart presented above, based on former studies and analysis by Eduardo E. Lozano, sketches a series of residential density ranges and suggests an initial set of thresholds. The relationship is expressed in dwelling units per acre (du/acre), and corresponds to ranges commonly found in United States (Lozano, p162-p166). The densities of Chinese low-rise, mid-rise and high-rise apartments are very similar to those listed in the chart.

Public transportation and density are closely intertwined. High density makes feasible various transportation modes, as well as pedestrian access to trains, subways, and buses, and thus is a crucial determinant of accessibility in an urban system. Capacity, technology, and the cost of

transportation systems are intimately related to density. For instance, if buses are uneconomical to operate below certain thresholds, people who live in low density areas will have no way of getting to work except by private automobile. This is especially true in China, since people can not afford to have private automobiles and there is limited use of a highway system. High density facilitates an effective public transportation system, and makes people's lives more convenient.

The relationship between density and urbanity extends beyond transportation, reaching to the viability of, and accessibility to, most urban services. In the retail sector, for example, there is an increase in the number of shops and stores as residential density increases. For residents, easy accessibility to commercial services that are provided by high density community planning, is not only a convenience but a social amenity.

2. DENSITY, CROWDEDNESS AND LIFE QUALITIES

Although indicators of density are intended to show the degree of crowdedness, density and crowding are measures of different phenomena. "Density is the ratio of people or dwelling units to land area. Differences in density have economic and physical implications but no clear social or psychological effects. Crowding is the ratio of people to dwelling units or rooms. Different degrees of crowding have clear social and psychological effects (Lozano, p168). At the neighborhood level, there is no correlation between density and crowding and different densities have no systematic relationship to people's perception of crowding (Schmidt, p41-p59). The difference between the two ratios can be shown by example: High density and low crowding can exist in a high-rise, upper-class apartment building, where there are many dwelling units per acre but few persons per dwelling. In contrast, low density and high crowding can be found in isolated rural

shacks in a depressed region, where there are few dwellings per acre but many people per room.

There is further confusion in associating density with negative image or life qualities. William Whyte pointed to the Brooklyn Heights area of New York as a neighborhood with high livability and many features of a low density settlement, yet, it has relatively high density with 65 dwelling units per acre and over 200 people per acre. Fischer et al. concluded in a recent review of crowding studies that high density does not seem to have definite or consistent negative effects, although people may perceive it as unpleasant. In fact, European countries support many more people per acre in both rural and urban areas than the United States. In some cities of the world, like Tokyo, where the perceived and actual density is higher than most areas, people live in close proximity quite successfully (Davis, p4).

3. DENSITY IN CHINA

Because of the pressure of population, the Chinese government always has to face the over density problem. Although great economic changes have happened in China, the shortage of transportation systems, such as buses, trains, subways, and highway systems, limits housing expansion from an urban to a suburban environment. Most people still live in downtown areas though many new communities are developed close to city boundaries. High density seems to be the inevitable solution to solving the housing problem and keeping the traditional social amenities in their context.

The concept of density has different meaning in different countries, also there are more ways to fulfill the density limits than through the stringent application of density indices. In China, the government establishes a floor area ratio system (FAR) to prevent undesirable density in new community. This ratio, equally valid in central, or peripheral areas, limits the building

gross floor area (i.e., the sum of all its floors) for given uses per lot area - which would ensure a balance between development and infrastructure capacity.

There are two basic categories defined by the Chinese government in community design: High-rise residential building and mid-rise or low-rise walk-up residential building. Twenty-five meters in height is the watershed between high-rise buildings and mid-rise or low-rise walk-up buildings. In a high-rise residential building, the maximum floor area ratio is limited to under 3.5, and that of low-rise and mid-rise is 1.2 to1.4. Because of the consideration of economy and land use efficiency, the floor area ratio of regular new communities with the combination of high-rise and low-rise walk-up residential building usually around 2.0 to 2.4 depends on the location of the new community. (Commonly, regular residential family units in China are around 100 sq. meter. Thus, 3 person per family will brings the density up from 120 people to 200 people per acre). Chinese architects have to struggle with such high density requests. Even in a low-rise walk-up community (6-stories), for example, the distance between buildings is regularly reduced to 1.1 times of building height to meet the 1.2 floor area ratio.

The density in China may look very high compared to that of the United States, but, high density has its advantages. For instance, English architect Theo Crosby's determined that public transportation is not economically feasible with less than 200-300 people per acre. At high densities, when good public transportation is affordable and convenient, cars become unnecessary. This alleviates the traditional planning dilemma of accommodating both pedestrians and private vehicles. Thus, high density is a rational solution to the housing problem in China. High density has land-use efficiencies, economical and commercial advantages, and rational

transportation that can help address population pressures in China. The point is how to create a such high density neighborhood with a relatively low perceived density.

4. DENSITY AND FORMS

The development of high density communities requires a more sensitive design approach than a general housing project. At high density, open exterior space is limited and distance between neighbors declines, thus, the need for a sense of identity, privacy, and the desire to live in a safe, attractive neighborhood is greatly increased. To create a positive perception of a particular community with a high density living environment, exterior design is an important piece of the design puzzle. This includes the arrangement of buildings, access to cluster, facade design, spacing between units, public open space and design details such as windows, roof lines, and so on.

4.1 Dividing Large Mass Housing Groups into Small Clusters

Where the community is one or several large masses, with hundreds of dwelling units or windows visible from one point, residents are likely to perceive it as massive and unattractive (Fig 2-1). Subdividing dwellings in medium to large developments into small, identifiable clusters (thirty to one hundred units) renders perceived density lower and therefore more acceptable than the actual density (Marcus & Sarkissian, p33-p35) (Fig. 2-2). Limiting the number of attached units per building can reduce building mass and break up a long, repetitious facade.

Figure 2-1, Numerous repetitive units make this scheme seem larger than it really is. It was nicknamed "The Concentration Camp" by people who lived nearby

Figure 2-2, This scheme housed three hundred families, but dwellings are clustered around three well-planted courtyards. There is a continual waiting list of people wanting to move in. (St. Francis Square, San Francisco)

4.2 Spacing of Units

Figure 2-3, Rue de Meaus Housing in Paris, designed by Renzo Piano, is a 220-unit housing complex with a central garden serving as a peaceful outdoor room for the entire project. Inside the garden (216 feet by 82 feet), two rows of silver birch trees provide visual privacy between apartments without ever becoming a solid canopy of leaves.

Most people's sense of density is fairly straightforward: It pertains to the distance between their lot or building and the one across from them, in front or behind, and building heights. But this distance affects perceived density, depending on the way it is treated. If the common space between rows of townhouses or apartments is marginal in width and primarily flat lawn, residents may look straight into the other person's window and feel they are living too close (Fig. 2-3). But if the common space is over 30 feet wide, and sensitively designed or landscaped to provide only a filtered view of opposite dwellings, people may be satisfied (Marcus & Sarkissian, p33-p35).

4.3 Protection of Privacy

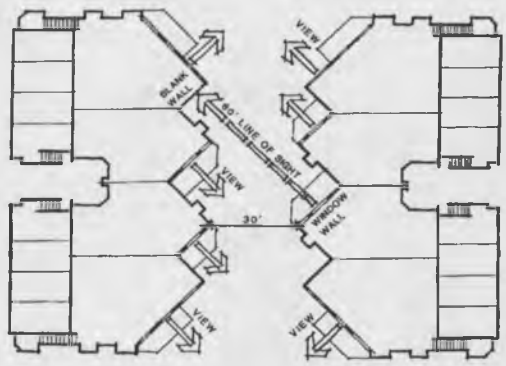


Figure 2-4

The higher the density, the more carefully must the design limit visual intrusions into dwellings, patios, yards, and balconies. Privacy can be achieved either by keeping people at a distance or by screening them off the sight. Because the distance between windows of two buildings can affect sight lines, the closer the windows are, the higher sense of density people might feel. Instead of using flat facades with windows directly facing to a parallel building, angled rear elevation minimizes direct window to window relationships and maximizes visual sight lines (Fig 2-4). Thus privacy is increased. Fences, hedges, or drapes can also be used as tools to create privacy to keep people at a distance (Goodkin, p70).

4.4 Variety In facade design

As densities increase, the interaction among buildings on the site becomes especially important. The sense of visual variety can help create a lower perceived density, such as providing variety in facade design through color, roofline variations, and positioning of entrances, as well as by staggering and detailing. Similar facades in row or terraced townhouses or apartment tend to create more monotony than those in look-alike detached or


Figure 2-5, Recognized for its design excellence, Phase I of the Tegel Harbor Housing Complex master-planned by Charles Moore, represents classic Post-Modernism at its best. The colors and forms of Tegel give people a lower visual density of the complex.

semi-detached buildings. To ensure a visually exciting community, buildings should be arranged to take advantage of site features and should offer a variety of views from the street and public space. Different building arrangements, heights, and roof style provide additional identity and variety to buildings (Fig. 2-5).

4.5 Access To Buildings

Almost everyone prefers private entrances at ground level, but where density or site design make this impossible, the smaller the number of households sharing an entry, the more satisfied they will be. Clear distinctions should be made between space and facilities serving a shared entry group and those serving a wider group. Effective and sensitive use of plant materials can highlight the entrance while simultaneously providing entry privacy. Similarly, the entry of clusters should be distinguished, separated and identified (Fig 2-6).

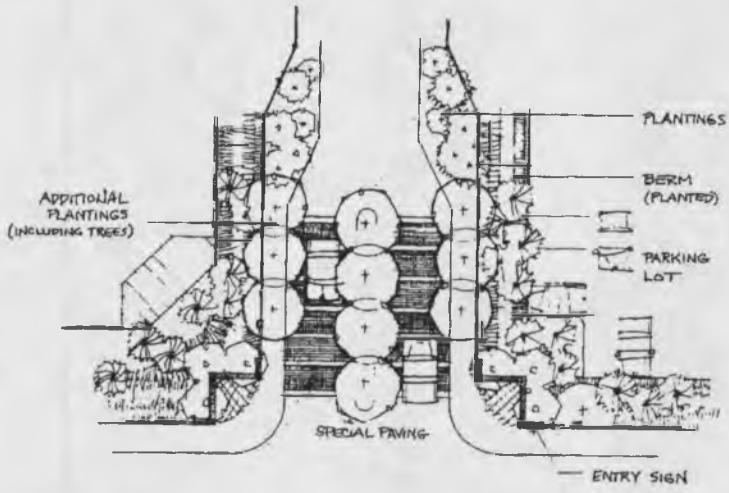


Figure 2-6

4.6 Minimum of Noise Intrusion

Noisy neighbors and noise from children playing outdoors can increase perceived density. Also, insensitive positioning of play facilities for children in the noisy team sports age group may be a daily reminder of density. Minimizing noise intrusion can be achieved either by using double glazing and insulation to increase acoustical effectiveness, or carefully layout of the out-door space, such as 1) carefully locating children's play facilities so that

they are within view but do not dominate communal spaces; 2) using landscape and fence to limit play area so that groups of older children can not play close to dwelling units (Marcus & Sarkissian, p33-35) (Fig. 2-7).

Figure 2-7, Fencing to limit play area

4.7 Adequate Private Open Space

Even the most sensitive spacing, size, or clustering may feel like overcrowding if residents have no access to private open space. Without adequately screened patios or yards people have nowhere to retreat from crowded communal areas or household pressures (Fig. 2-8).

Figure 2-8
Where space is very limited, at least provide ground floor units a small front porch or backyard to lower visual crowdedness. In this British row house, residents have created attractive flower gardens around their front doors.

CHAPTER THREE
NEIGHBORHOOD

> "The physical form of a community is one of the highest cultural expressions of the society, and as such it translates social structure, lifestyle, and values into buildings and spaces, into the physical vessel in which the community lives and evolves."
>
> Edward E. Lozano Community Design and the Culture of Cities"

Except for old traditional housing, most housing neighborhoods in China today are copies of American and European public urban housing of the 50's. Rows of rectangular blocks of mid-rise apartment houses are generously spaced in a green landscape, interspersed with neighborhood centers and schools. Within them, the traffic pattern is planned; the roads are lined with avenues of trees. While western planners now are fascinated by low-rise, mid-density developments, the Chinese, with 2,000 years of experience in this urban form, are ready for a change. Already, the impersonal apartment blocks are undergoing a peculiar Chinese personalization: balconies are used extensively, and storage buildings are appearing at the base of apartments. Learning from the past, young generation of planners and architects are balancing community with privacy, and integration with lifestyle and identities. Following the theories of New Urbanism and western experience, city planners and governors are establishing a whole new housing guideline to create a sense of community in housing projects for citizens and reinforcing the existing urban fabric.

The nomenclature may vary, but there is general agreement regarding the physical composition of the neighborhood. The principles of an ideal neighborhood design listed by New Urbanist Andres Duany in his report

"The Neighborhood, The District and The Corridor" (Katz, pXII) (Fig. 3-1) are very similar to current guidelines of neighborhood development in China. They include:

1) The neighborhood has a center and an edge;

2) The optimal size of a neighborhood is a quarter mile from center to edge;

3) The neighborhood has a balanced mix of activities – dwelling, shopping, working, schooling, worshipping and recreating;

4) The neighborhood structures, building sites and traffic are on a fine network of interconnecting streets;

5) The neighborhood gives priority to public space and to the appropriate location of civic buildings.

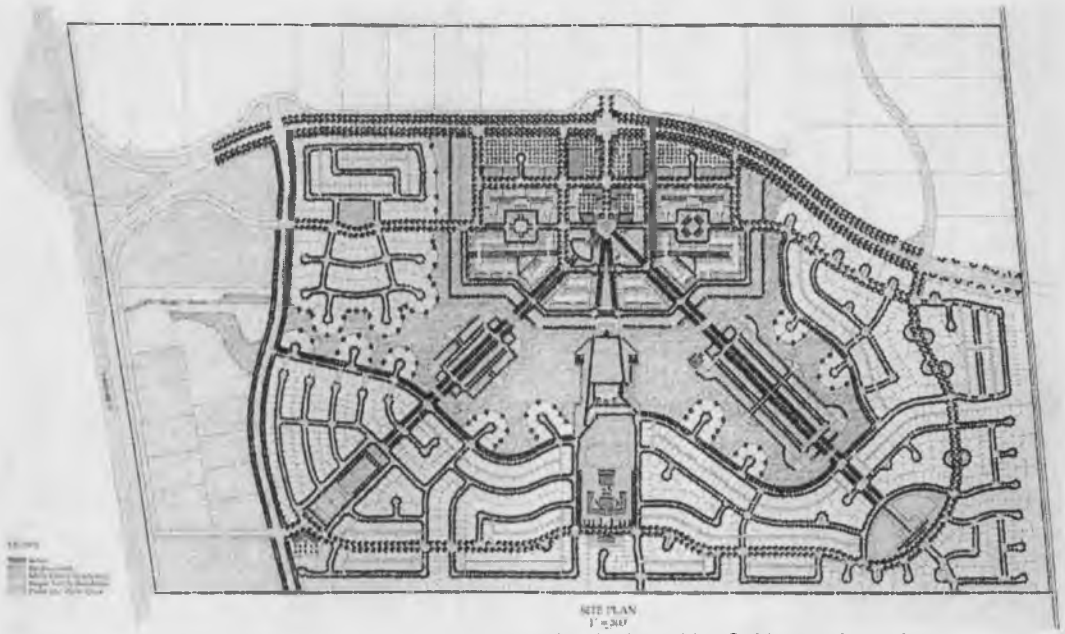


Figure 3-1, Laguna West, a New-Urbanism community designed by Calthorpe Associates, Sacramento County, California, 1990

However, most newer community blocks in China still lack a strong sense of community, neighborhood identity, and perceived acceptable density in part because of economic pressure, density requirement. For instance, the Drum Mountain Community in China, with a quarter mile radius size, mixed use facilities (schooling, shopping and recreation) and a central park, did

Figure 3-2, Drum Mountain Community Town, Fuzhou, P. R. China

not create a highly livable environment or neighborhood identity. There is not a clear boundary to its seven sub-blocks, the housing types are simply flat mid-rise concrete block and high-rise towers with dull facades. The paths, public spaces and play areas are rigidly defined around the building perimeter, and fail to provide incentive for the residents to use the gardens (Fig. 3-2). A sensitive design is needed especially in these types of high density neighborhood. To create better neighborhoods, there is a need to understand the form and components of a humanistic community at a deeper lever.

1. BOUNDARY

1.1 The Need For Boundary

In a low-density suburban area or village, the neighborhood edge can be natural, such as farms, orchards or nurseries that merge with mountain, forest, wetland or desert. The need for a boundary to define a clear edge is not so critical. However in high-density urban residential neighborhoods, a visual boundary is necessary for the purpose of security, excluding traffic from outside streets, creating neighborhood identity; together providing a sense of community. Transportation infrastructure, such as high volume

thoroughfares and buffered zones by planted with acoustic walls, are often used to define the neighborhood boundary (Katz, pXVII).

When the whole neighborhood is composed of several cluster blocks, a clear space definition - the boundary of each block - will encourage the formation of identity and diversity within blocks. Without boundaries, all the grounds are common to the whole neighborhood and disassociated from buildings and blocks and residents can not identify with them (Newman, p10). Therefore, exterior public spaces become anonymous spaces, they evoke no feelings of control by residents.

Mostly, residents are likely to protect space that they feel "belongs" to them. Like the fence of a private backyard, the boundary of a block helps to reassign areas and responsibilities to small groups of residents to use, maintain and control as their own. Besides, for these residents, the feeling of a clear boundary tends to stimulate the interaction of neighborhoods, and discourage strangers' and criminals' access and egress to their territory.

The more self-contained a housing development is, the more likely are its residents to recognize and look out for each other and to feel a sense of proprietorship and responsibility over the whole site. Strangers are less likely to intrude, and residents will feel more secure about their own and their children's safety (Marcus & Sarkissian, p10). Also, if residents feel comfortable in and responsible for a portion of communal open space inside their group territory, they develop a owner's attitude toward the common landscaping and facilities, thereby protecting and maintaining of their living environment.

1.2 The Form of Boundaries

1.2a Boundary of Neighborhood

The boundary of neighborhood is easy to define. Two types of separation, distance and physical dividers, can be used in any combination to create boundaries. Where there is heavy traffic and noise from the street, for example, a considerable distance is required - an open-space buffer, heavily wooded if possible - to protect the residential area. In many cases, a boundary may be a man-made feature that is institutionalized as a separation. It can take several forms, many of them based only on symbolism, such as a street separating residential zones from commercial zones, or a river cutting among neighborhoods, creating major territory separation (Lozano, p154).

1.2b Boundaries of Cluster Blocks

The definition of cluster boundary in neighborhood should be diverse and have discernible edges. In traditional Chinese neighborhood, the "Chinese Walls" were used to divide neighborhoods and encourage differences to emerge on either side (Fig. 3-3). These walls, established to create clear boundaries, artificially create seclusion and make those who dwell there the inhabitants of an imaginary kingdom (Blaser, p7). When a large site is divided into small clusters, territorial definition of cluster blocks also can be largely conceptual or symbolic, not necessarily preventing access with

Figure 3-3, Chinese Wall

physical barriers but psychologically discouraging it (Marcus & Sarkissian, p265). For example, the use of distinctive paving materials and patterns to "assign" site areas to particular groups of buildings or dwellings may contribute to a resident's sense of territory, belonging and security.

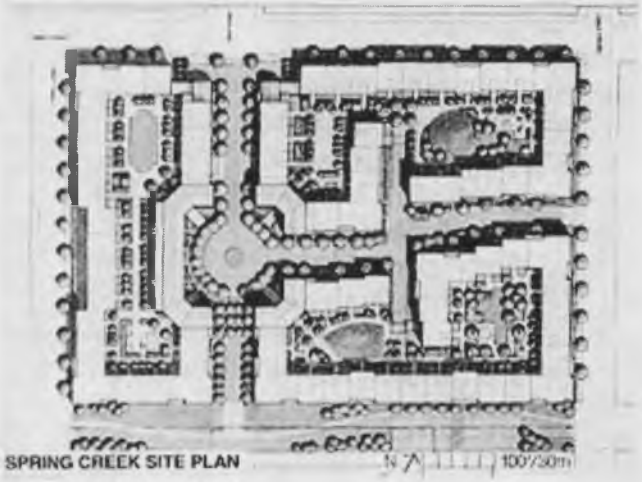


Figure 3-4 Spring Creek Site Plan

Methods of dealing with the boundaries of cluster blocks vary considerably. Fencing, planting and building placement can be used to reinforce the division and create visually identifiable cluster blocks. Other elements, such as grouped building types, and shared semi-public space, can also create a psychological boundary to discourage outsiders from coming through (Fig. 3-4).

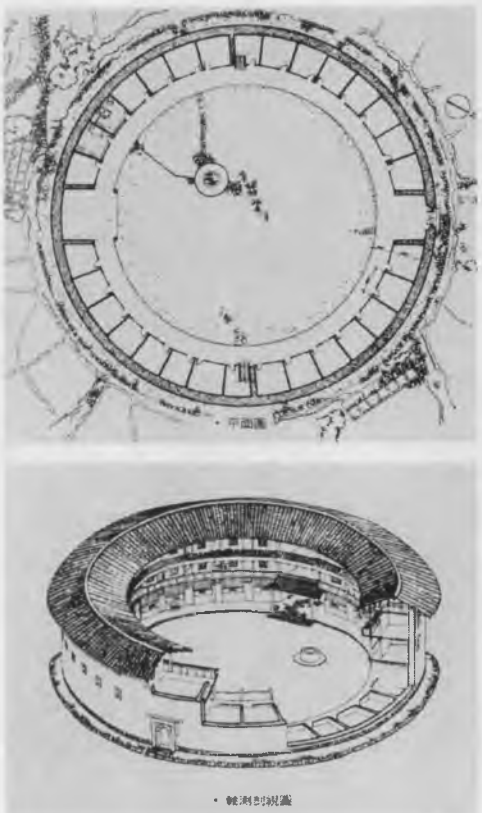


Figure 3-5, A traditional adobe housing for the whole village residents in a small mountain village in South China. The building itself is a fence that protects its dwellers and excludes wild animals and enemies.

• Building Placement: Place buildings at perimeter of a communal space to define the boundary for certain groups of people. In this case, the boundary,

buildings, is a strong physical mass that excludes outsiders (Fig 3-5).

• Fencing: Either low hedge or steel fence can be used as a transparent visual boundary to define the edge of clusters. Fencing reinforces the sense of territories without isolating one cluster from the others.

• Design a specific housing type or building style, a visual identity, for each cluster, provides residents with a recognizable identity their group territories and their neighborhood (Fig 3-6).

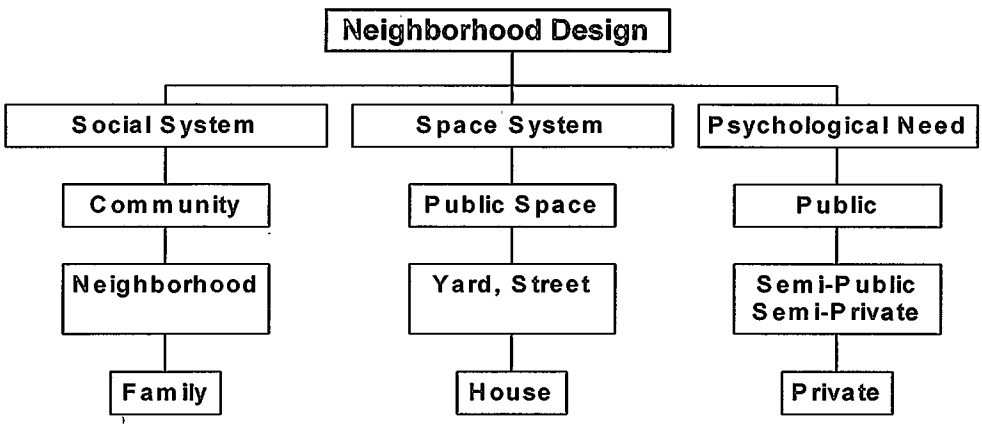
Figure 3-6, Wellington, Palm Beach County, Florida, 1989

• Use shared outdoor space as a transitional linkage to more secure personal entry gardening, the common space expresses a sense of a conceptual territory among a specific group of residents.

• Playgrounds or small public park can be effective transitional zones between blocks, providing critical separation and pedestrian level neighborhood connection. Therefore blocks are automatically separated. The edge of public space also serve as the edge of surrounding blocks and define the territories of the blocks.

2. THE SPACE

The form of a community should authentically express the cultural background, social economic situation and residents' lifestyles at the moment it is built. It also should be suitably responsive to the individual needs of users and to their collective public goods. Different factors in neighborhood design such as social system and residents' psychological needs influence and condition the neighborhood space system, thus, creating different forms of community. The relationship between these different factors in community design may be shown in the following chart. (see below)



For different social system levels, there should be suitable spaces to accommodate the specific psychological demand. To create better space system, neighborhood planning and design "must assert the importance of public over private values" (Katz, pXVII), that is, the individual property rights and private interests should be secondary to the public needs in order to promote public amenities, and bring residents to gather together in a harmonious living environment. To accommodate residents' psychological demands, a series of transition zones between public and private should be provided to help claim territory for residents and at the same time, shelter the non-residents' passage from public spaces to private spaces.

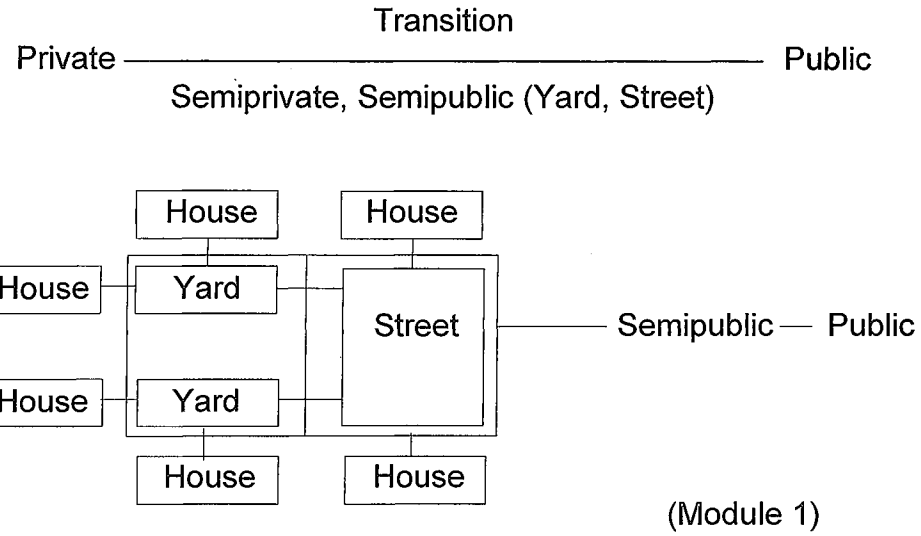
2.1 From Private To Public

"One of the potential aesthetic and social benefits of medium- or high-density housing is that clustering units onto part of a site allows other parts to be left in their natural state or to be landscaped into attractive communal area."

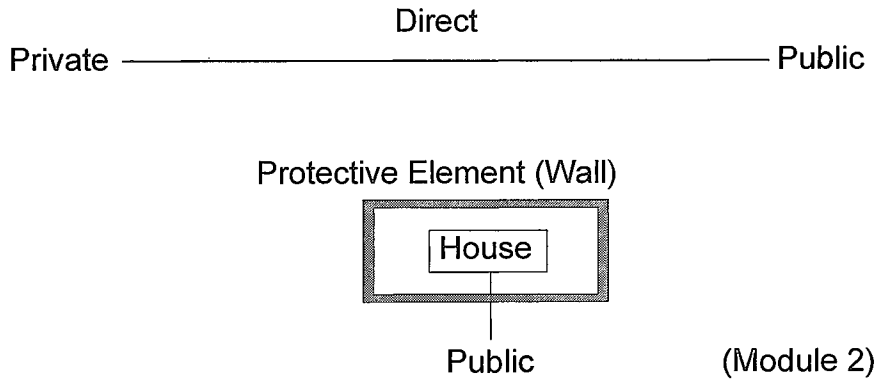
Marcus & Sarkissian, "Housing As It People Mattered"

In addition to a physical need for a minimum amount of space, free from physical discomfort, people have social and cultural needs. They need a place that is secure from outside threats. They need privacy and intimacy, and a place where they can socialize and express their identities. According to personal and social life demands, the neighborhood space is divided into basically two major categories - private and public space, and between them the semiprivate and semipublic spaces.

A community design, in fact, deals with the transition zone between public space and private space. There are two basic transition forms: one is indirect, which has a transition space between public and private space (Module 1, see below), the other is a direct connection (Module 2, see below). Inadequate site design only presents two categories of spaces: public space, which anyone can enter, and private dwelling space. In this case, a solid fence is often used to arbitrarily separate two spaces and protect privacy. The public spaces - the spaces other than private property, becomes "no man's land", where responsibility for the space is unclear and access can not be easily controlled.



(Module 1)



(Module 2)

A successful neighborhood design should clearly provides a hierarchy of neighborhood spaces: from public spaces open to everyone (streets, neighborhood center), to semipublic spaces intended for specific geographic or demographic groups (courtyards, play areas, seating for the elderly), to semiprivate spaces intended for several residents (stair, landing, corridor), to private spaces intended for individual households (dwellings and adjacent private open space)(Marcus & Sarkissian, p264). The semipublic and semiprivate spaces serve as transition zones between public spaces and private spaces. It is like the threshold or gray space that residents pass through from inside to outside or from outside to inside. In addition, the use of transition space is to help residents lay claim to the

spaces adjacent to their units and, as a group, assume control and responsibility for them (Marcus & Sarkissian, p264). With a hierarchy of spaces several "lines of defense" are created.

2.2 The Spaces and The Users

"In its most basic sense, housing can be defined as the provision of shelter. However, the word "housing" has broader connotations. It means a place where family life, comfort, and health are fostered, and not merely a place for protection from the elements" (Katz, p73). Therefore, a housing program, and the resulting built environment, should be well conceived to cope with the current daily needs of the people who live there. To create vital, attractive spaces and to accommodate the user's need, the outdoor spaces should be laid out and related to residents' intended use, and not left to chance. The houses people live in say much about them, about their life-style and dreams. If we are to design housing to fulfill people's needs, and dreams, we must find out what they want and do not want. On one hand, each person has unique needs and ways of expressing and satisfying his or her needs; on the other hand, everyone shares common needs with each other. The process of neighborhood design involves balancing common needs and individual ones. Knowing what shared needs to expect is important, but discovering the unique needs of a neighborhood is a key to socially suitable design because it is the "idiosyncratic needs that generate idiosyncratic values, which in turn generate idiosyncratic but appropriate neighborhood spaces (Hester, p57).

For designers seeking to design suitable outdoor spaces, two questions must be answered. First, who lives in the neighborhood, and second, what spaces do they prefer to use? As the type of households and user's need vary from place to place, it is hard to give a universal answers to these two

questions. By thinking of an outdoor space close to home and then listing all the reasons why one goes there and what would make one go there more often, an idea of the factors important to one's use of that space emerges. If these answers are combined with the answers of others, a pattern of personal preferences can be derived directly from the users. Such a pattern represents the requirements that residents expert neighborhood space to satisfy. A number of studies over the last decades attempted to uncover these pattern for diverse groups of people, and recurring user needs are identify.

The following part is based on Chinese culture and lifestyle background, and the reference sources are from an evaluate survey of four Chinese urban neighborhood and the 1990 Chinese census report.

2.2a Child User

It is a clearly proven empirical fact that children are the major users of the outdoor environment in residential areas of the city (Bjorklid, 1982; Cooper Marcus, 1974; Moore & Tung, 1978; U.K. Dep. Of the Environment, 1973). As chief users of outdoor common space, children are more deeply affected by the environment than any other age group, but children's needs have frequently been ignored. In China countless examples exist where the buildings are all oriented in the same direction and the spaces between them are merely designated as a "common green". There is a significant lack of sensitive and usable space for children in most public housing. A recent research shows in detail the character of the basic activities and spatial preference of different age groups ranging from age 1-18 (chart 1-4).

Most preschool children, age below 6, like to play in semi-private and semi-public space while supervised - within sight or calling distance - by their parents or other adults who know to them (chart 1-2). For primary school

children, they learn self-reliance by ranging farther and farther away from home. They mostly play in semi-public and public space with groups (chart 1-3).

Other research in Britain reports that children aged approximately five to twelve are generally the most frequent users of outdoor areas for play. This age group tends to use the whole site area for play activities. In the United States, a study of Pin Green, a neighborhood of thirty-six hundred dwellings, revealed that 85 percent of the children used communal open space for play; only 15 percent played on roads and parking areas (Marcus & Sarkissian, p152).

Teenagers prefer public space for ball games, and they use public space or neighborhood street as "hangout" places where they can socialize and which they can claim as their own (chart 4). They like to socialize, flirt, show off, and see and be seen by their peers. Therefore, places for teenagers to gather should be relatively close to home, but should not impinge unduly on adult residents.

2.2b Adult User

For adults, particularly young adults, considerable socializing occurs in the context of recreation. The enthusiasm for running, jogging, bicycling, and other active sports has drawn many adults into public spaces to exercise in the early morning and on weekends (Stokols & Altman, p41, p122). The open public spaces they use include neighborhood parks, streets, ball fields and so on (chart 5).

Semipublic or semiprivate space, on the other hand, becomes a place for relaxation with hedges, benches, tables, rather than a space for active

recreation. The major activities for adults here may be resting, reading, playing chess, or looking after their children after work.

2.2c Elderly User

Another major user of outdoor spaces might be the elderly. After retirement, with the end or curtailment of major work and family responsibilities, the elderly have available new constructive time. The possibility of pursuing full-time leisure and recreational activities becomes a new and practical reality. What is significant to this group is the promise of a recreation time (Golant, p71). Research found that old people prefer public spaces to semi-public spaces, and prefer semi-public spaces to semi-private spaces, possibly because it is easier to find friends who share a common interest or together as a group for entertainment in open spaces that serve the whole community (chart 6). As older people are more sensitive to the weather change than any other group, a covered club house for their use is an essential component in a neighborhood public center.

2.3 Structure of User Group in China

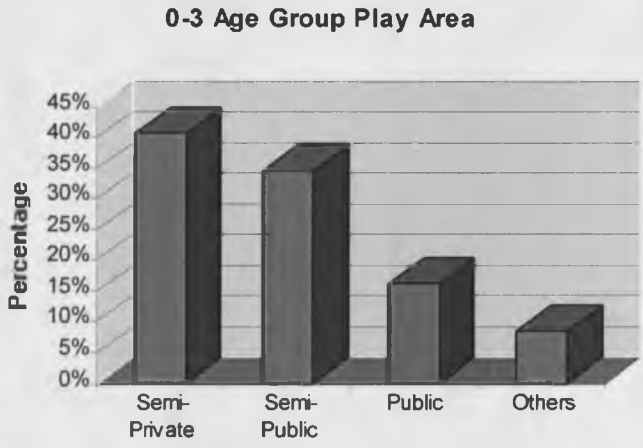
Compared to western family composition, there are two specific characteristics of the Chinese family. First, elderly people always live with one of their children and grandchildren. Second, since 1980, a new Population Control Policy limits each couple to only one child (nations besides Chinese, for example, Tibet are excepted). Typically, the structure of most Chinese households can be classified as three types:

1. a family composed by three generations: grandparent(s), parents and grandchildren (4-6 family members)
2. parents with teenage or adult children (3-4 family members)
3. young couples with or without child (2-3 family members)

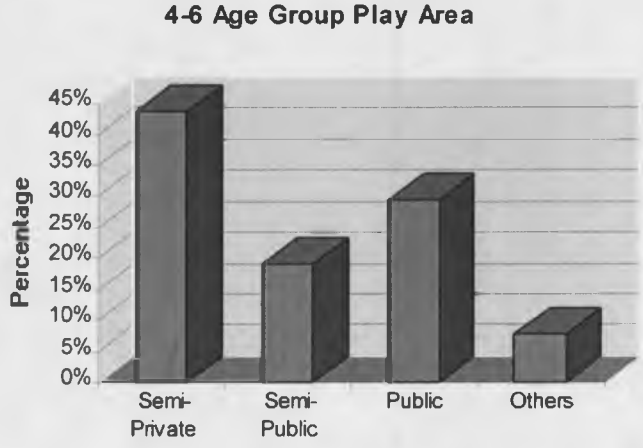
According to their activities and special requirement of outdoor space, the residents of a neighborhood can be classified into four age groups: child, teenage, adult and elder. The component of most Chinese urban neighborhoods is shown in the following chart:

Age Group	Children			Teen	Adult			Elder
Age	0-3	3-6	7-12	13-18	19-28	28-35	35-65	65-
Percentage (%)	2.32	2.64	7.01	7.40	24.49	11.99	35.32	8.83
Total	11.97			7.40	71.80			8.83

Note: reference source - Zhu, Jianda "Dangdai Guoneiwei Zhuzhaiqu Guihua Shili Xuanbian", 1996

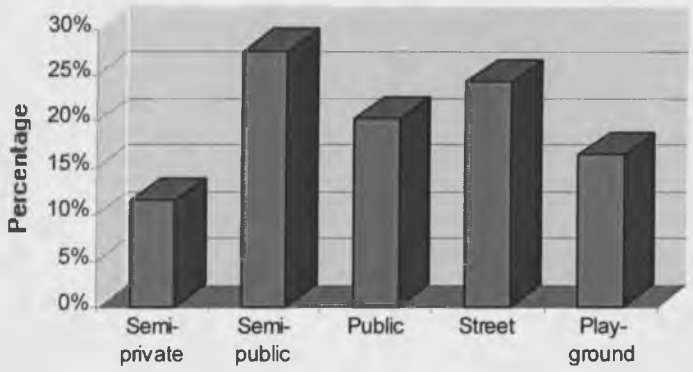


(chart 1)



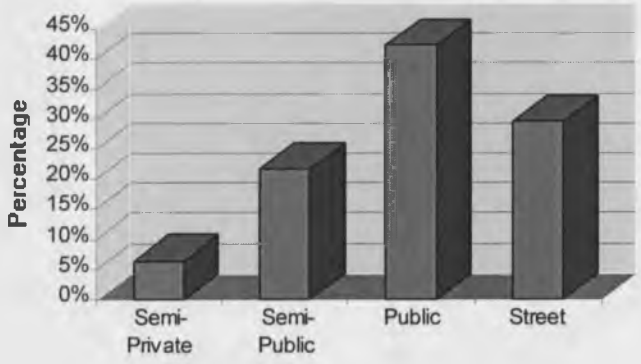
(chart 2)

7-12 Age Group Play Area



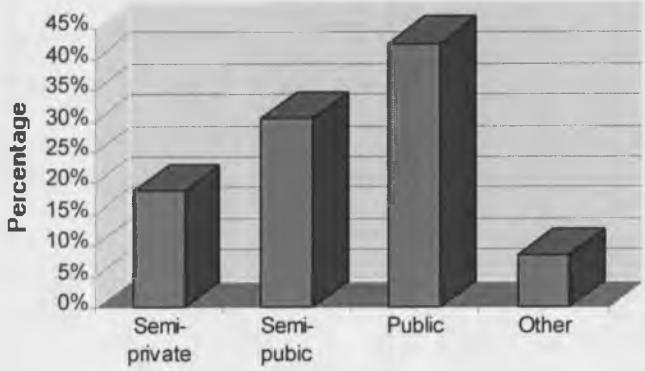
(chart 3)

13-17 Age Group Play Area

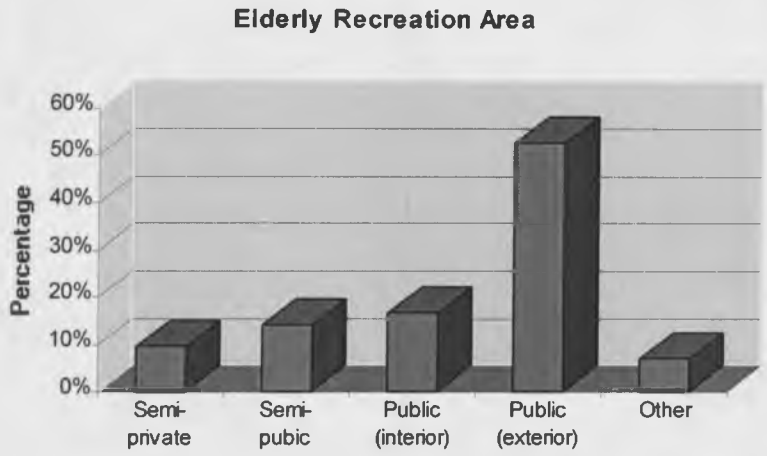


(chart 4)

Adults Recreation Area



(chart 5)



(chart 6)

2.4 The Form of Space

Neighborhood space is that territory close to home, including houses, churches, businesses, and parks that, because of the residents' collective responsibility, familiar association, and frequent shared use, is considered to be their "own". Depending on their specific function and location, neighborhood space can be classified into four hierarchies, ranging from private to public as following (Mackintosh, p58):

1. Private space: used only by the residents, such as a home, a patio or a bedroom.
2. Semiprivate space: used by a small group of residents living in the same building or close buildings, such as space directly adjacent to a home--hallway, lobby, and building entry.
3. Semipublic space: used mostly by residents living in a cluster or block and sometime nonresidents, such as the sidewalk outside a house or an apartment building, the plazas or sitting area within the cluster.
4. Public space: used by the entire public.

2.4a Private Space

Private space contributes to the symbolic image of the "home", and its exterior space supports outdoor activities requiring privacy. A private

outdoor space around a dwelling (a yard or patio) provides three necessities: visual privacy, a buffer zone for noise between the dwelling and children at play, and a needed outdoor space for such essential activities as toddlers' play, gardening, and drying clothes. Obviously, because different and potentially conflicting activities occur in private outdoor and in communal outdoor space, a clear separation between the two types of space is necessary (Marcus & Sarkissian, P127).

2.4b Semiprivate Spaces

There are two types of semiprivate spaces: interior and exterior. In a multifamily housing project, building interior circulation areas - lobbies, corridors, stairs, and landings - are for the common use of residents. If the number of users of these areas is small, they are perceived as semiprivate spaces to the residents whose units are directly adjacent to them. While the building entry porch and the outdoor space surrounding the entry are usually considered as the exterior semiprivate space for the residents who live inside the building. The semiprivate spaces provide the first filter, welcoming and sheltering the non-residents, and suggesting a private area beyond.

The Design of Semiprivate Space

1. Charts 1-6 show that age 0-3 children are the most frequent users of exterior semiprivate spaces. Children of this age group always play under supervised by adults, and their activities are very limited, such as learning to walk, or watching moving objects. Thus the semiprivate space should be visible from all the dwellings it serves, and it could be fenced or gated to keep small children from straying, and discouraging entry by older children.

2. For the convenience of supervising their children, adults need comfortable and attractive places to sit. Within the semiprivate space, a small table and benches are preferable to accommodate the needs of adults who want to read, study or communicate with the neighbors while their children are playing (Fig. 3-7).

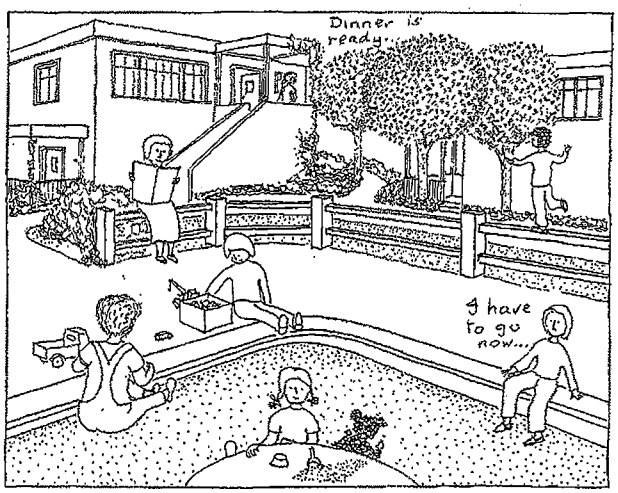


Figure 3-7, A play space for small children should always be sited within view of the dwelling to allow casual surveillance from home.

3. If spatial dimensions are limited, grade changes between semiprivate space and other open spaces can be used to create a sense of transition. However, where steps are used, ramps and adequate lighting should also be provided.

4. The interior semiprivate spaces should only serve a small number of residents. If shared by a large number of people, these spaces can only be designated as semipublic or even public space. Using several stairways in one building can prevent the occurrence of such problems.

2.4c Semipublic Spaces

Similar to semiprivate space, semipublic space provides a larger scale transition zone and communal place for the group of people who live in the cluster block. A semipublic space serves as an outdoor "family room" for the residents, a place to pause rather than just to pass through, a

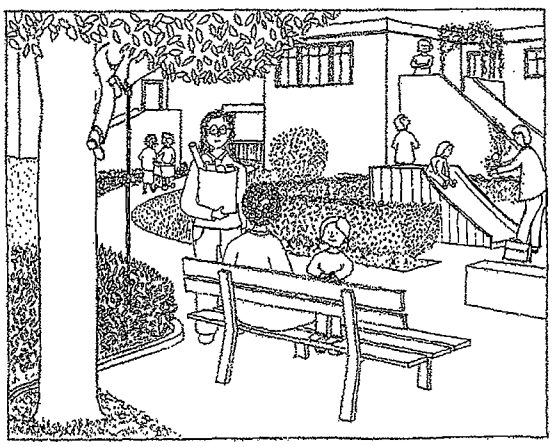


Figure 3-8, When neighbors frequently pass through a space where they see each other and can stop for a chat, the seeds of community are shown.

place to enjoy sun and fresh air with neighbors, and a place to fulfill a variety of defined and undefined needs (Fig. 3-8). The criteria for a well-designed outdoor room are: sense of enclosure, sense of scale, attractiveness and durability of landscape elements and accommodation of residents' outdoor activities (Katz, P94).

Sense of Enclosure

The sense of enclosure is first given by the outdoor room's embracing walls - the surrounding buildings. It is important that such walls have a sense of continuity with no large gaps or breaks in them, so that they can enclose the semipublic space, and make a definite shape out of the space. How the buildings are arranged around the semipublic space greatly determines the continuity of the "wall".

The sense of enclosure is also given by the entrance of such "outdoor rooms". The entry is a threshold that articulates the differences between the street - the public space, and the cluster (Obispo, P27). A small entry compresses the threshold, allows it to be interpreted as a clear threshold, thus making it easier to distinguish when one is in or out of the semipublic space, to give an uninterrupted sense of boundary about the space, to suggest a group territory of the cluster, and to provide a filter for pedestrians passing from public spaces to clusters (Fig. 3-9).

Figure 3-9, An archway of Langham Court connects the two building types, while forming a distinctive entry into the courtyard.

Sense of Scale

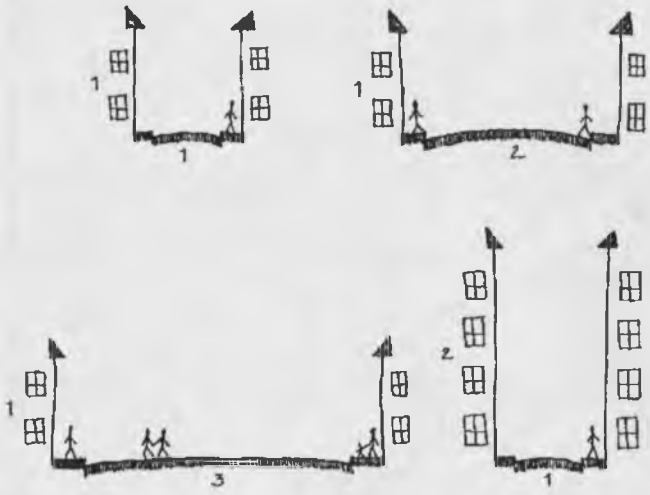


Figure 3-10,

There is a human-scale relationship between vertical and horizontal dimensions of the outdoor room. An outdoor space is most clearly perceived as being pleasantly enclosed when the height of the "walls" is at least one-quarter the width of the "floor" space, and no more than twice the width. If the width of a semipublic space exceeds the height of surrounding buildings more than four times, people begin to lose any sense of enclosure. If the height of a building is more than twice the width, people will get an unpleasant feeling of being at the bottom of a ditch. The most satisfactory ratio generally is a width that is two to three times the height of defining walls or edges (Greenbie, p41). In a high density housing situation, where more houses need to be built in a limited area, the ratio might drop, but it has to be kept at least one and a half to two to keep the sense of a semipublic space (Fig. 3-10).

2.4d Public Spaces

"Public spaces reflect ourselves, our larger culture, our private beliefs, and public values. Public space is the common ground where civility and our collective sense of what may be called "publicness" are developed and expressed. Our public environment serves as a reflection or mirror of individual behaviors, social processes, and our often conflicting public values." (Altman & Stokols, "Public Space", p149)

Generally, public outdoor space in a neighborhood is used for work and leisure activities, political gatherings, educational projects, and movement from place to place within or through the neighborhoods. How the space is used obviously depends on the activities occurring there: work (delivering mail, shopping for groceries); leisure activities (taking a walk, playing ball games, hanging out, playing checkers); political gatherings (protesting a city policy, planning a neighborhood event); educational projects (a lecture on the effects of air-pollution); and movement from place to place (bicycling to work, walking toa neighbor's home). Although it is easy to predict these theoretical uses of neighborhood public spaces, the actual specific use is much more difficult to predict (Hester, p15).

To design public spaces that fulfill the residents' needs, one of the most significant roles of the designer is to understand the residents, which includes identifying the public's needs and interests, analyzing and interpreting public opinion, and facilitating the process of clarifying issues that will affect residents' perception and use of the public spaces (Altman & Zube, 1989, p214).

Two common issues that should be addressed in a neighborhood public space design are: public service facilities (grocery stores, mini post office); and daycare center, because they are places providing daily conveniences and bringing people together consciously.

Neighborhood Grocery Stores

For the most part, a neighborhood provides not only shelter but also essential commodities for residents. Although shopping patterns have been changing in the direction of centralized malls and markets and although increasing numbers of people must travel to shop, in many areas the neighborhood stores are "perhaps the most romantic and most consistent

features" (Ryn & Calthorpe, pXV) of public life. These small retail shops play an important role in retaining local identity as well as providing residents with the most essential goods and conveniences. "Even the casual purchase of a carton of milk or daily newspapers, sets in motion a series of personal contacts that connect people to a place and its occupants" (Altman & Wandersman, 1987, p3). Friendships, trust, expression of oneself can happen naturally in these neighborhood scale stores as one does things with others (fig. 3-11).

Figure 3-11, Heilbron Place, a project designed jointly by Batey & Mack of San Francisco and VCM, addresses the street with a bank, stores and cafes at the ground level and residential balconies above.

Day Care Center

"In development of more than two hundred households, an on-site day-care center for the exclusive use of residents is preferable" (Marcus & Sarkissian, p193). There are distinct advantages to providing neighborhood day care for children aged one to five. First, the center brings significant convenience to residents. Second, the children and their parents have a better opportunity to get to know their neighbors. Third, the center may offer part-time employment for elderly who like to enjoy some social work after retirement. The day care center could be one ground-level flat or house with an adjacent space for a play yard.

CHAPTER FOUR
HOUSING TYPE

> "A community contains a diversity of people, a variety of household sizes and circumstances, a continuous flow in the cycle of life from youth to old age, a corresponding diversity is required in the stock of housing accommodation. Variety is the spice of life and housing design should express those variations within society which are essential to its vitality."
>
> Central Mortgage and HousingCorporation 1953

1. DEFINITIONS AND CLASSIFICATION OF HOUSING TYPES

Housing types may be classified according to :

1. number of dwelling units per building;
2. size of building (either by dimensions or by number of stories);
3. generic name - e.g., high rise, walkup apartment, town house;
4. physical relation of structures - e.g., detached, attached, row, block.

However, using only one type of classification to describe housing type will not give people a complete understanding of the housing. For example, three-story housing could means a three-story single home, a three-story town house or walk-up apartment. Using the generic classification to distinguish housing type also has certain limitations because of the inconsistent, confusing way terms are sometimes used. "Town house", for example, can refer to a dwelling, two or more stories in height, that is attached to other dwellings along one, two, or three common walls. In some communities, it is used to distinguish rental from owner-occupied accommodations with little reference to dwelling unit characteristics or site planning features. Another confusion that might occur in the definition of

high rise as the criteria of high-rise, mid-rise and low-rise varies in different countries. In the following discussion, high-rise is defined according to the Chinese housing code, which refers to buildings that are higher than 24 meter (about 72 feet) and have more than 7 stories. At this height, elevators are legally required. Buildings that are three stories or lower are considered as low-rise.

In this section, housing types are described by a combination of classifications, mainly using generic names. To avoid any confusion, housing is further addressed according to visual characteristics of building size, physical relation of buildings and housing type. Buildings will be classified as low-rise courtyard, mid-rise row apartment, high-rise block and mixed housing block. The discussion of housing types is based on Chinese public urban housing background, where single family housings are excluded.

2. LOW-RISE HIGH-DENSITY COURTYARD HOUSING

Out of the vast diversity of ancient Chinese housing, traditional courtyard housing is recognized for its land use efficiency, humane scale and delightful central court. Down the centuries (until the year 1949), each traditional courtyard house was a private building complex, where a great family lived in isolation from the world outside. "Enclosure and opening in one is the fundamental principle of this old form of house" (Blaser, 1979, p5). An encircling wall with buildings facing inwards creates the courtyard. The courtyard is open to the

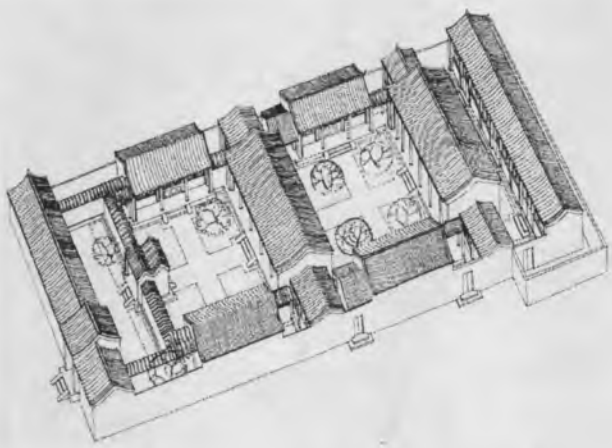


Figure 4-1, A traditional courtyard house in Beijin, China

occupants of the house and completely closed against the outside world (Fig. 4-1).

The basic architectural unit of courtyard housing is not the individual building but the group. The single building is integrated into the larger context of the courtyard complex. Thus, it is possible to have more than one family living in one courtyard harmoniously. Actually, after 1949, some of the traditional courtyard houses were successfully restored and converted to use as public housing with several families living inside one courtyard complex.

Today, in some new urban communities, the public courtyard housing has been included, not only for the reason of nostalgia, but for providing a natural form of living, high degree of community identity and enhancing the quality of outdoor space and public live. In the dense pattern of urban settlement, the courtyard house allows a relatively high density low rise building. The central court provides its occupants an open-air room of an intimate character and serves as the nucleus of the surrounding buildings. Those living there are protected from noise, observation and wind (Blaser, 1985, p146).

In public housing, as the courtyard no longer serves only one family, the form and the meaning of the traditional private courtyard should be changed to accommodate public amenities. First, the width of the courtyard should be wide enough to be a semi-public space. A recommended width of at least a 30 feet (9.41 meter) wide space between dwellings is necessary to filter views and contribute to the privacy. Second, a courtyard should be small enough to keep the sense of small enclosed courtyard housing. It is better to keep the building no more than 3 stories high, and the number of

households that share a courtyard around 30 units (Marcus & Sarkissian, p35).

3. MULTI-STORIED APARTMENTS

The logic of multi-storied flats had been fully formulated by the end of the 1940s. Height could be seen as the positive manipulation of daylight rules: "an increase in ... height ... will, for a given population density, always improve the lighting condition" (Glendining & Muthesius, p53). The calculation of light and height might be called "scientifically correct", but it would be a poor statement if it were intended as a characterization of the multi-storied flats as a whole. In multi-story housing, the design solutions successful in providing single family house amenities no longer works. Nearly all the dwelling units are off the ground. They are accessed by elevators and every unit is concealed within a greater building envelope. The potential for identifying the individual dwelling is reduced and replaced by the group identity (Fig. 4-2).

Figure 4-2, Postwar American public housing: Stateway Gardens, Chicagp, 1950's

Once the density is too high to avoid multi-story housing, especially the high-rise, private amenities should be carefully considered so that the building can "give more pleasure to more people, ... a new kind of space, surprise views" as Friederick Gibberd described in RIBA's High Flats Symposium of 1955. A user needs survey done by TODCO (Tenants and Owners Development Corporation) found that individual apartment balconies are overwhelmingly favored in multi-stories housing, where

providing private outdoor spaces on or near the ground is impossible. "View, sunlight, an easily accessible place to sit or grow plants, a way to get outdoors when one is sick were all reasons for this preference"(Hartman, p120). Other research found that balconies tend to be used more when they have glass doors and lead off a living room. Glass doors permit plants, flowers, and so forth on the balcony to be appreciate from inside the dwelling (Marcus, p106).

4. MIXED HOUSING TYPE

Once the density becomes so great (75 to 150 units pre acre) as to preclude the advantages of the low rise housing, high-rise towers are incorporated to achieve density. There are three ways to mix high-rise towers with low- or mid-rise walk-ups. One method uses a combination of free standing towers and walk-ups. There is no connection between these two building types. Second method connect two types directly that mix the towers and walk-ups in one building mass. In each case, the walk-ups generally face the street in order to meet the scale of existing buildings, while the towers are set back within the site to minimize their impact (Davis, p30-31). However, without transitional elements between the low and high parts, there is a sharp contrast between towers and walk-ups, and towers and existing environment. Thus, the third type of combination is that the lower structures and the high tower are connect in a single continuous building which steps from the lower

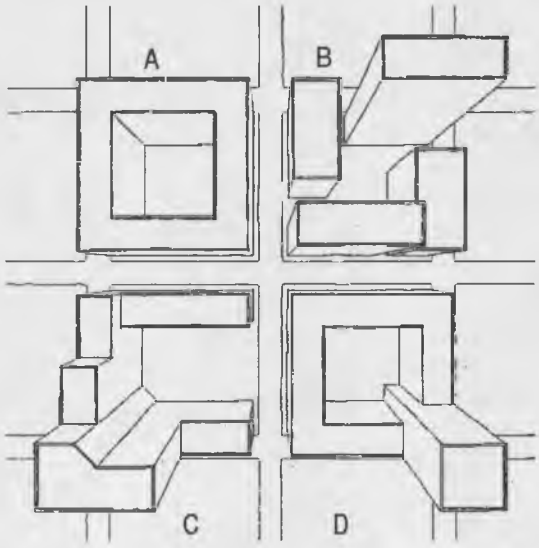


Figure 4-3,
A. Perimeter block
B. Mixed free standing high-rise and low rise
C. Stepped building
D. Perimeter block with point tower

scale into the tower. Such judicious linkage of two different building types is likely to produce the best results and will provide less visual contrast and establish a transition in scale from the more massive tower to human dimensions (Jensen, p36) (Fig. 4-3).

In this mixed housing form, the towers enhance the site density. The lower buildings relate the mass to the surrounding neighborhood and create controlled interior plazas (Fig. 4-4). The combination of these two forms in one block can provide family-oriented housing near the ground in low buildings, while in high portions, "there is a solution more appropriate for the elderly, singles, and other types of resident groups not dependent on a close proximity to ground level and outdoor play area"(Newman, p27).

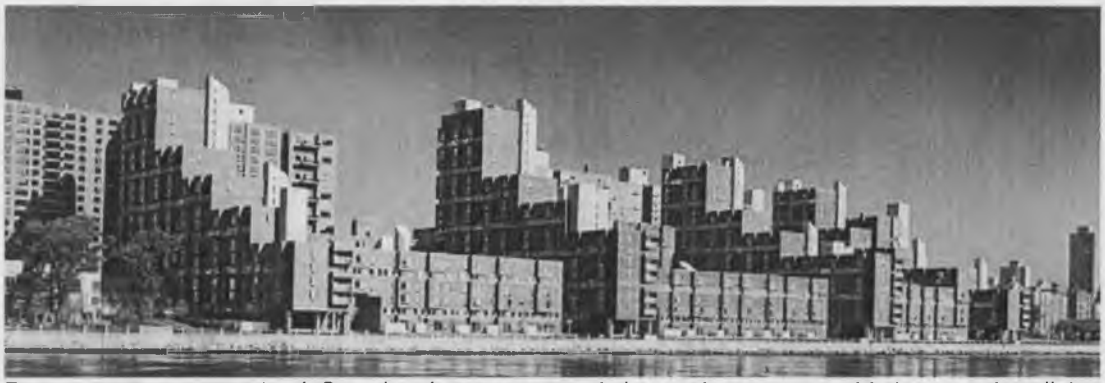


Figure 4-4, Roosevelt Island. Stepping down to meet existing environment, provide increased sunlight and views for units.

5. MIXED DEVELOPMENT

As individual lifestyles and households differ markedly, housing is produced to meet the various demand. "... whatever the age and size of the family, it has the right kind of dwelling" (Gilbberd, 1949). These differences require a wide range of dwellings, which has to be strongly distinguished in every way. The range of dwelling unit sizes and styles should allow for different households as well as a range and type of outdoor spaces for different age groups and activities. However, there is no precise answer as to which type

of housing best corresponds to which size of households. Mixed development seems to provide the answer of the question; it means building all types together, so to speak, and allocating them within one development (Glendining & Muthesius, p29). This gives residents choices of dwelling types.

The second reason for using mixed development is to provide long-term flexibility for residents. "A housing program and the resulting built environment, may be well conceived to cope with the current daily needs of, say, families with young children, but what happens when the children become teenagers or when half the original nuclear families become single-parent families or groupings of unrelated adults?" (Marcus & Sarkissian, p7). For planners and designers, assumptions of a simple statement of housing need, static in time, should be challenged, and consideration of user's need should be extended to household changes and population mobility(Glendining & Muthesius, p23). Thus, a sustainable neighborhood should contain sufficient variety of housing to enable not only the individual family to stay within the same neighborhood as their space needs change, but also the fluctuations in the composition of the population over time to be absorbed. By doing so, social networks can remain intact, children need not be uprooted from familiar schools, and elderly persons can remain near friends and families.

In principle, mixed development means that every household should move to another dwelling, as soon as there occurs any change in its size or circumstances. But in practice many old couples, for instance, simple do not want to move out of their three-bedroom apartments when their children have left home. In public housing, a proper and flexible housing policy is helpful in controlling what housing is offered to prospective tenants and to

encourage movement within the same neighborhood as family status changes.

A neighborhood needs identity and visual complexity to make it differ from other neighborhoods. In a nation-wide U.S. study of HUD-assisted projects, those developments that residents rank high on appearance have in common a degree of architectural complexity. Regardless of architectural style, most residents prefer aesthetic complexity and variety in their neighborhood, so that, they can distinguish their neighborhood from others and feel a sense of community identity. Furthermore, they look out for each others and feel a sense of proprietorship and responsibility over the whole site. Conversely, the least like developments, in the same study, range from traditional to contemporary styles but have in common monotonous facades (Jacobs, p55). For instances, rows of monolithic flat apartments have been conceived as plain unimaginative projects with no character, significant lack of public amenity and accommodations ill suited for their occupants (Rowe, p1) (Fig. 4-5). However too extensive a use of the high-rise point block in large groups, without contrasting buildings of other types, is also unsatisfactory and

Figure 4-5, Monolithic flats on the European urban periphery: the Polygonos of Barcelona.

Figure 4-6, Perkins Heights, Paddington, London. Architect R. Jensen.

can lead to a "candlestick" effect which may be just as monotonous as repetitive slab layouts (Jensen, p36) (fig. 4-6).

In mixed development, to ensure both harmony and variety, a good guide is to mix different styles and types in moderation. If row houses predominate, some walk-ups and a few elevator apartment buildings might provide a contrast which is pleasing, yet not too radical a departure from the existing pattern. If the dominant housing type is the garden apartment, a few tower or slab structures might well be introduced. More extreme mixtures of building types are difficult to handle well. When a mixture of housing forms is used to create a pleasingly varied, sculptural effect and similar families are housed in different architectural forms, if there is a major differing in degrees of popularity, it is likely to cause dissatisfaction and jealousy among neighbors. Thus, the design scheme must be work out with considerable care for an effective and harmonious blend, generally a whole site should establish a prevailing concept of building facade, colors, details and materials to minimize the difference, so that even the different type buildings have a degree of similarity. If two building types are too differ to balance the amenities, for example, a dwelling form that could be construed as being less prestigious than others on the site must be used, some compensatory qualities must be provided to the residents to diminished the dissatisfaction (Marcus & Sarkissian, p50) (Fig 4-7).

Figure 4-7, A much disliked and hard-to rent scheme in Runcorn New Town (U.K.). Residents could not understand why they had to live in these massive, displeasing structures when similar families nearby had small, "homey" dwellings of traditional materials.

SUMMARY

For the past decade or so, the Chinese government has been working to provide more and better housing for its growing population. Much effort has been placed community based lessons from the past. However, there is a serious lack of cohesive research that addresses community oriented high density urban improvements from the Chinese perspective.

This study examined Western thought in high density community development and couples it with the Chinese context and perspective. From the Nationalism period onward the evolution of housing in China has followed the trends in Western design. High-rise community models like those of the International period of the 1950's has pointed to the realization that better public and private spaces are needed to reinforce neighborhood and community.

Both design and policy tools have been reviewed to see how a good quality neighborhood could be achieved in a high density urban living environment. The research focused on the relationship between density, housing types, and what it takes to create neighborhood. To address the population and growth pressures in China we must recognizing that high density has land-use efficiencies, economical and commercial advantages, and is rational for transportation. The challenge is to create positive image for a high density living environment. This can be accomplished through careful site planning that considers both the density requirements and the creation of neighborhood.

Unit spacing, building massing, visual access, privacy and borders can all contribute to creating a better community. In addition and of equal importance, are family composition, community structure and other user needs, especially those related to their patterns of socialization and play. Consideration of these reinforces the idea of belonging. A more complete understanding of user's needs will allow for better prediction of design impact and will help minimize negative impacts and unintended consequences of a given design.

By systematically exploring the effects of density, neighborhood boundary, space relationships and housing types on urbanity and quality-of-life this part of the report is an attempt to achieve a better understanding of what it takes to create neighborhood in a high density development. For example, by dividing large, mass housing groups into smaller clusters, increasing the spacing of units and providing a variety of facade designs the perceived visual density will be lowered. Further developing visual boundary in urban residential neighborhoods is necessary for the purpose of security, excluding traffic from outside streets, and can help develop a sense of place while nurturing neighborhood identity.

Part II of this report applies these concepts and principles an existing high density housing project in Fuzhou, southeast China. The project will be analyzed and redesigned to illustrate how the ideas presented in this report can be incorporated into high density developments with positive results. Hopefully this kind of approach will be useful in designing more sensitive, community oriented housing projects under the pressures of high density.

PART II
CASE STUDY AND PROJECT DESIGN

PROJECT DESCRIPTION

In Part I, the design methods that could help architects and city planners to develop better housing environments in urban areas were explored. By studying density and some other elements that could influence the neighborhood living quality, I found that there is no specific correlation between density and living quality. The specifics of how to deal with exterior space design are a critical issues in creating a good neighborhood. A proper space design not only improves the relationship between neighbors, but also renders perceived density lower. To challenge the conclusions of my study, a case design was necessary and important.

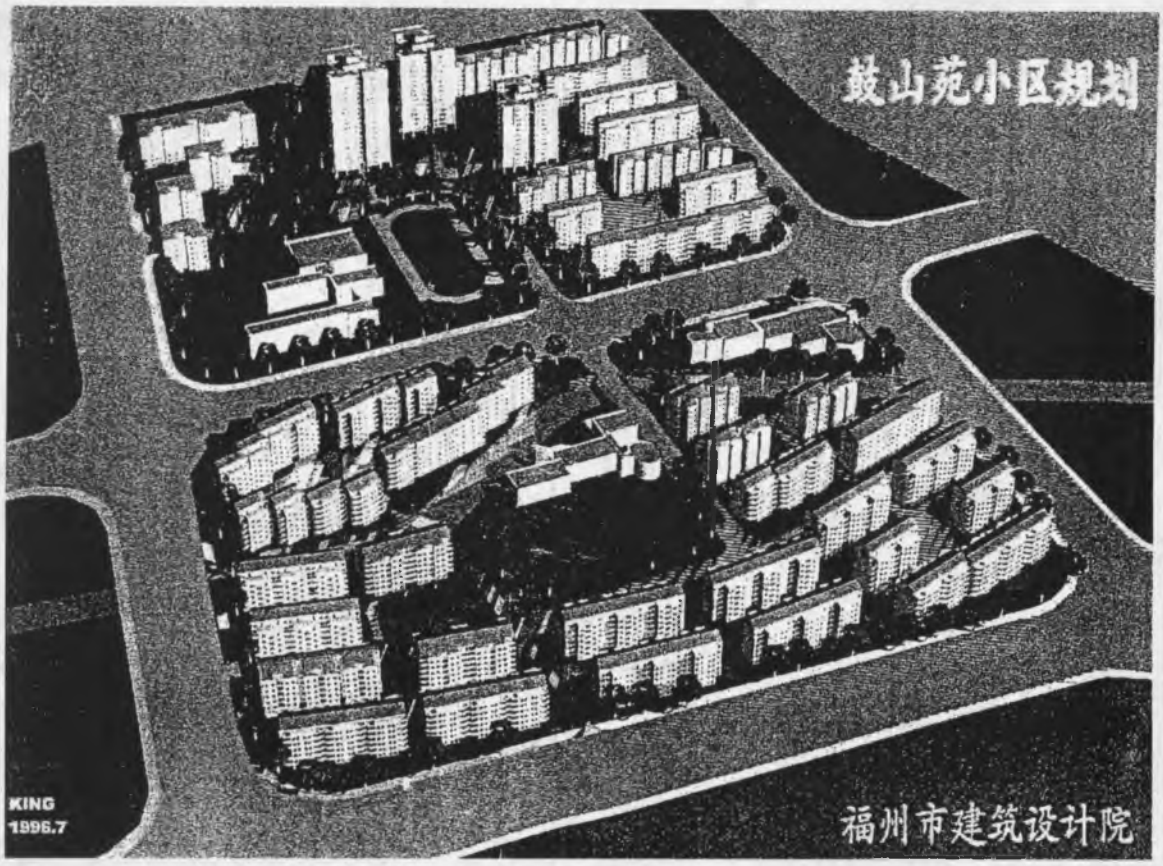
Drum Mountain Community Town is located in Fuzhou, south-east China. It is a public housing project funded by the Chinese government. It is a new community town for as many as 5,800 people, now under construction on 32.27 acres near the eastern edge of the downtown area, where once there were only farms. The original design was based on the new version of "Urban Community Design and Plan Guidelines", which were published by the government in 1993. The primary principle of the design is to provide a humane and convinence living environment for residents. But this design, with a quarter mile radius size, mixed use facilities and a central park, did not create a highly livable environment or neighborhood identity (see perspective view at p60). There is not a clear boundary to its seven sub-blocks, the housing types are simply flat mid-rise concrete blocks and high-rise towers with dull facades. The paths, public spaces and play areas are

rigidly defined around the building perimeter, and fail to provide incentives for the residents to use the gardens. Therefore, redesign of this project is done to illustrate the design principle of the study.

The design is base on the same density (50-55 units/acre) of the original planning. Clear boundary definition, proper exterior space design for the users and, a variety of housing types are carefully considered in this project. The following points out the short comings of the original planning, and presents solutions based upon the principles developed in the previously study. First section is a comparison of the original planning and the redesign, follows by a detail explanation of the redesign methodology. A set of computer 3-D model graphics are used to give a whole image of the redesign.

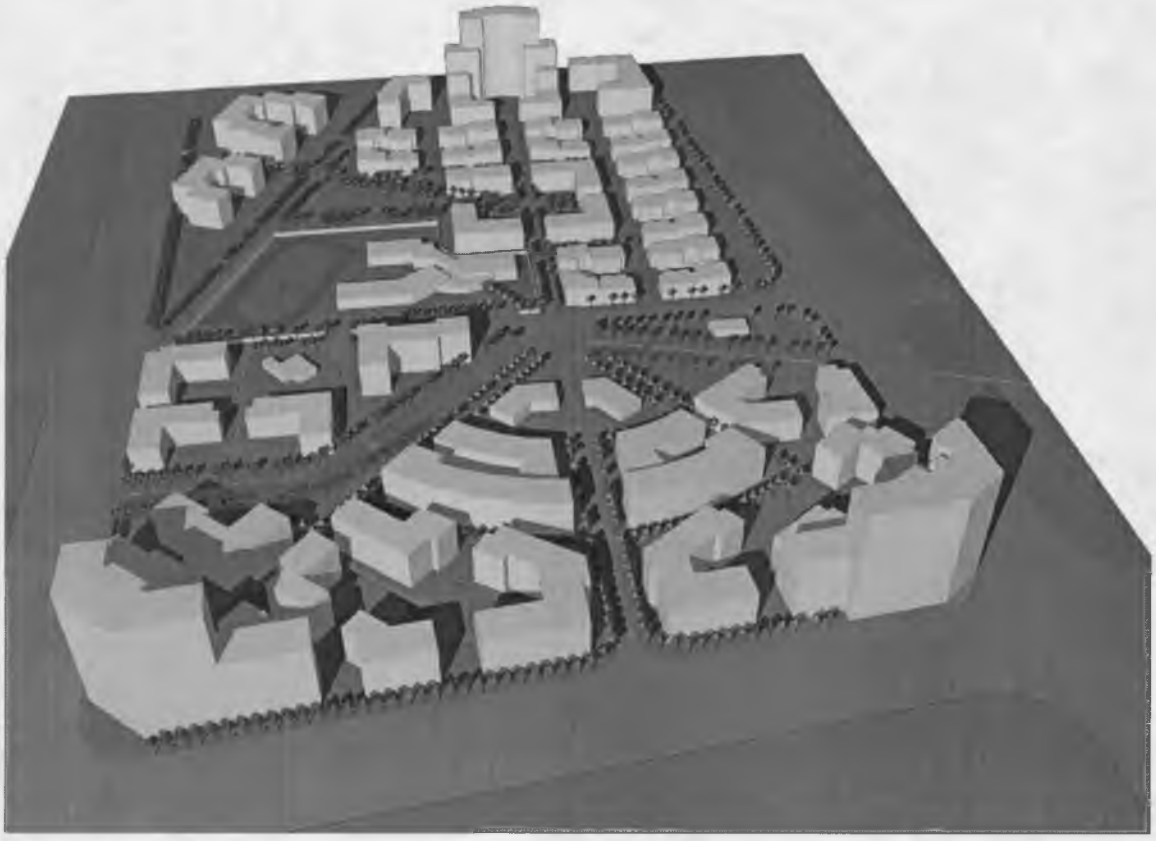
SECTION ONE:
COMPARITION AND ANALYSIS OF THE ORIGINAL PLANNING AND REDESIGN

1. SITE PLAN
2. CIRCULATION SYSTEM
3. GREEN SPACE DESIGN



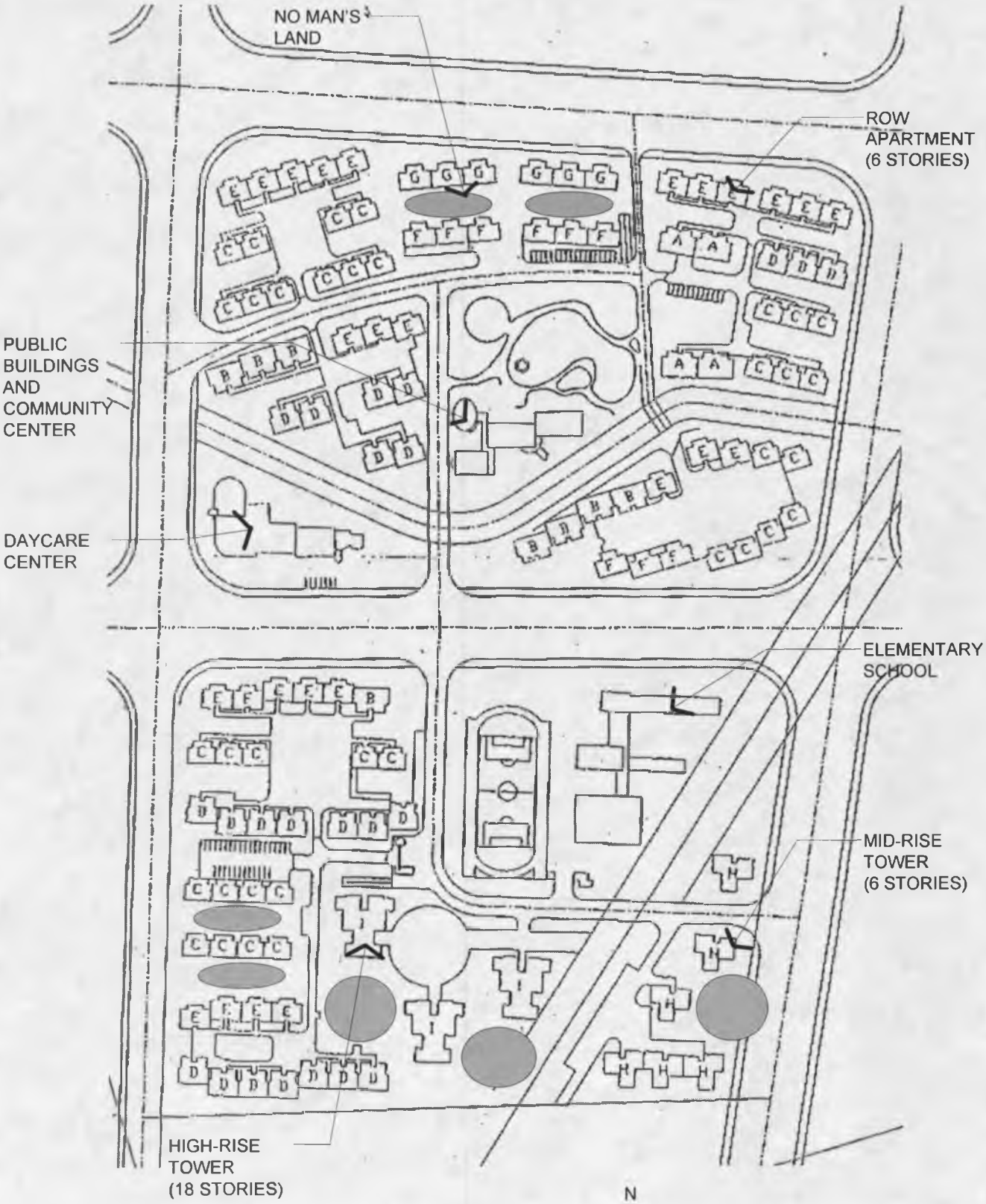
1.1 ANALYSIS OF THE EXISTING SITE PLAN:

1. The site is divided into seven blocks by its circulation system and housing types (see plan). As the circulation system is not clearly articulated and, there is not difference among unit A to unit G, the boundary of the blocks are hard to define. The whole site might be perceived as a large mass with hundreds of dwelling units, thus, the visual density might be perceived higher than it really is.
2. The planners do provide residents a choice of selecting different types of housing. In site plan drawing, letter A, B, ... G represent different units, ranging from two bedroom (800 sq. ft.) to four bedroom (1200 sq. ft.) units. In total, there are 9 types of units and 7 of them are placed in row apartments with the same building style, height and facade treatment. There is not much choice of micro-living environments for residents.
3. Exterior spaces, like those between or adjacent to buildings, are not clearly associated with a particular building or group of buildings. They are "no man's land", where responsibility for the space is unclear and access cannot be easily controlled.

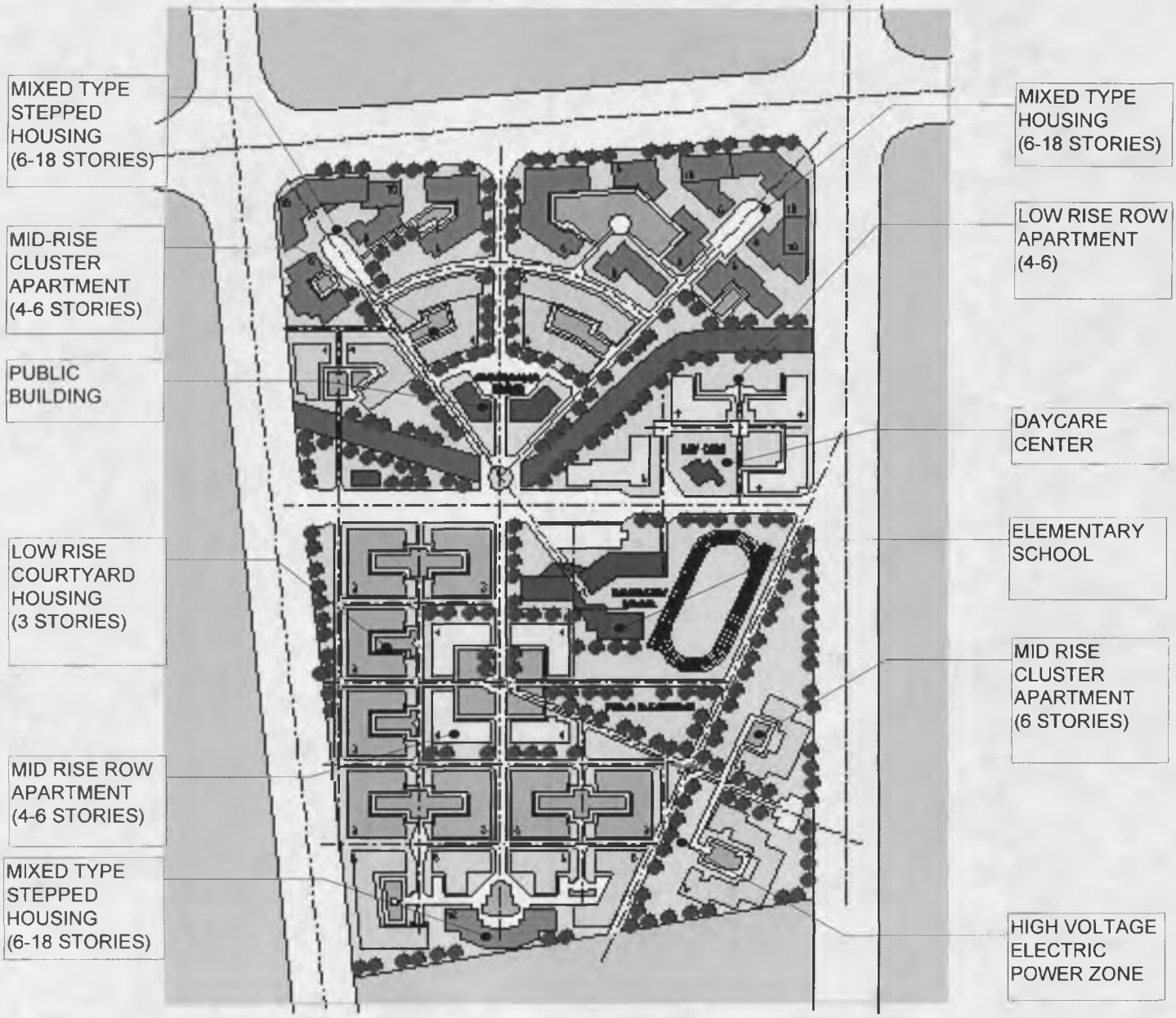


1.2 ANALYSIS OF THE NEW SITE PLAN:

The site is divided into six blocks, and each block is composed by several small clusters (see p71). There are variable housing types to fit different family sizes and compositions. Housing types range from mixed type high-rise modern block to mid-rise cluster, low-rise row apartment and low-rise traditional courtyard housing. Subdividing the whole neighborhood into small clusters with identifiable building styles renders the perceived density lower, and more acceptable than the actual density. The common exterior open spaces, in addition of private yard and public spaces, are carefully assigned to clusters and groups of people. Therefore, residents can lay claim to the spaces adjacent to their units and, as a group, assume control and responsibility for them.

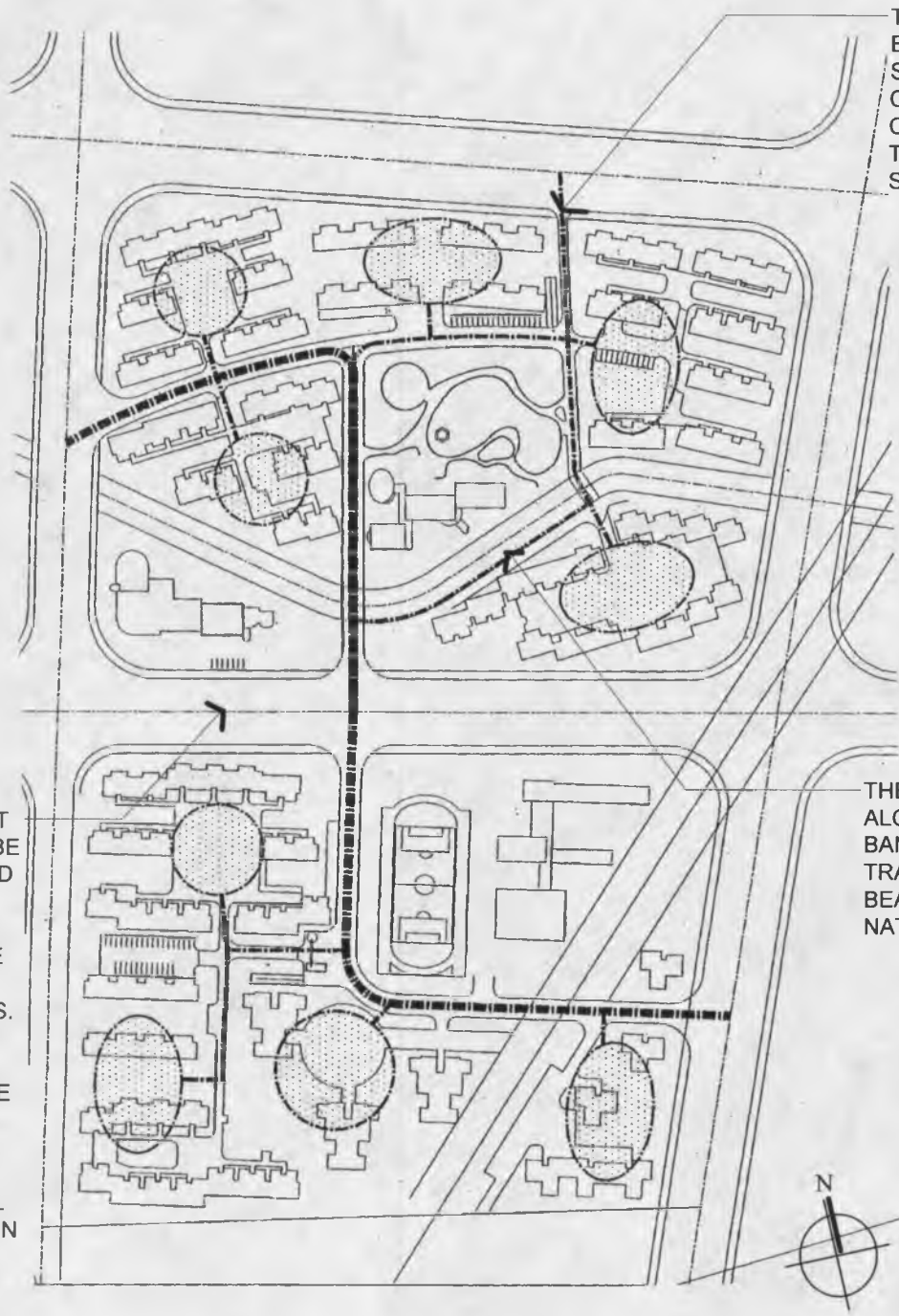


EXISTING SITE PLAN



REDESIGN SITE PLAN

SITE AREA:	**32.27 ACRE**
OVERALL DWELLINGS:	**1620 UNITS**
OVERALL RESIDENTS:	**5887 PERSONS**
DENSITY:	**52 UNITS/ACRE**



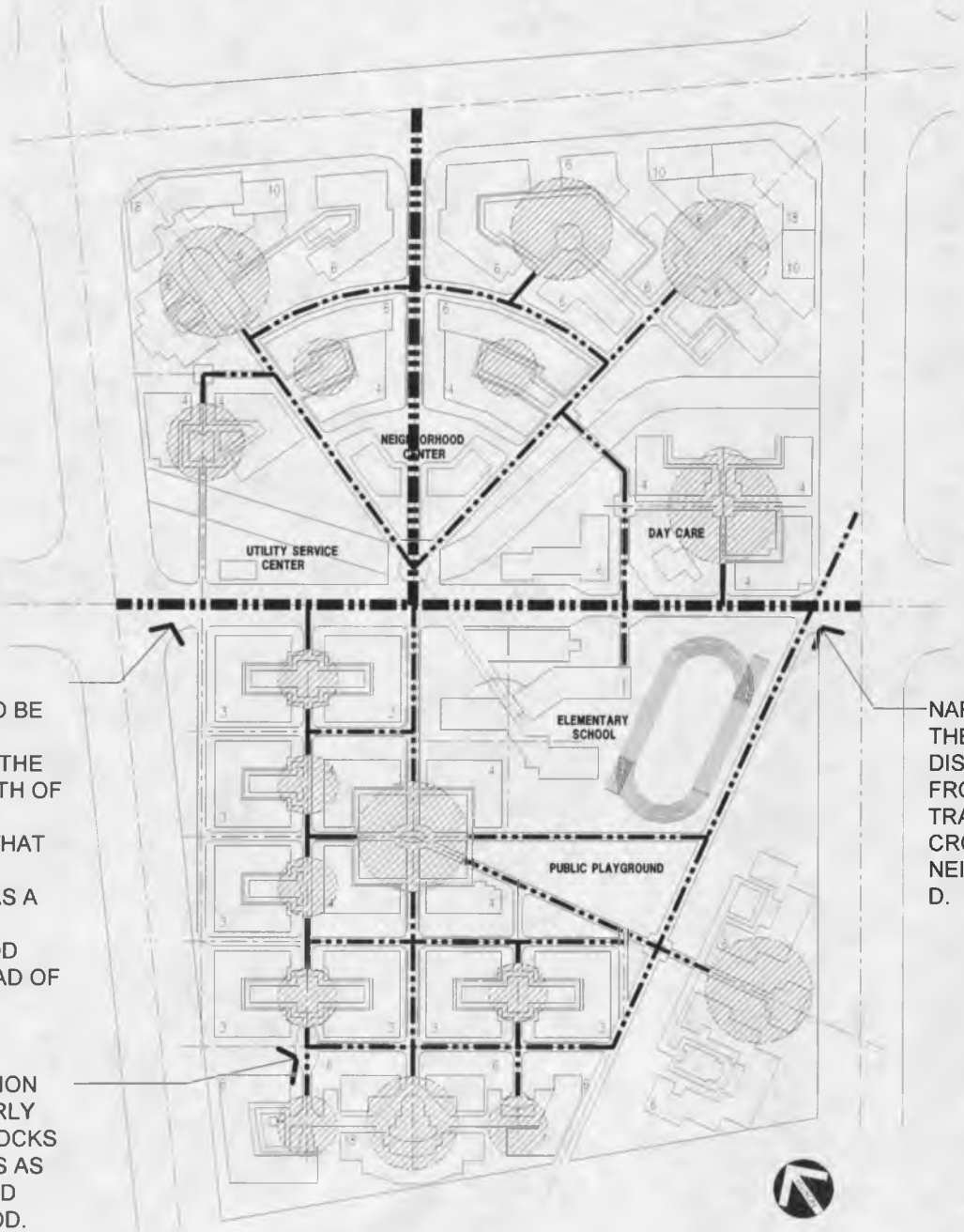
2.1 EXISTING NEIGHBORHOOD CIRCULATION ANALYSIS

Neighborhood circulation legend:

Main Street: Connects the site to the city streets with two traffic lanes and pedestrian path on each side of the road.

Secondary Street: Connects cluster blocks within the site.

Pedestrian: Connects secondary street to the entry of each building.



THE STREET IS MAINTAINED TO BE THE MAIN ENTRANCE OF THE SITE. THE WIDTH OF THE STREET IS REDUCED SO THAT IT WILL BE CONSIDERED AS A MAJOR NEIGHBORHOOD STREET INSTEAD OF MAJOR CITY TRAFFIC LANE

THE CIRCULATION SYSTEM CLEARLY CONNECTS BLOCKS AND CLUSTERS AS AN INTEGRATED NEIGHBORHOOD.

NARROWING THE ENTRY CAN DISCOURAGE FROM CITY TRAFFIC CROSSING THE NEIGHBORHOOD.

2.2 REDESIGN NEIGHBORHOOD CIRCULATION ANALYSIS

Neighborhood circulation legend:

Main Street: Connects the site to the city streets with two traffic lanes and pedestrian path on each side of the road.

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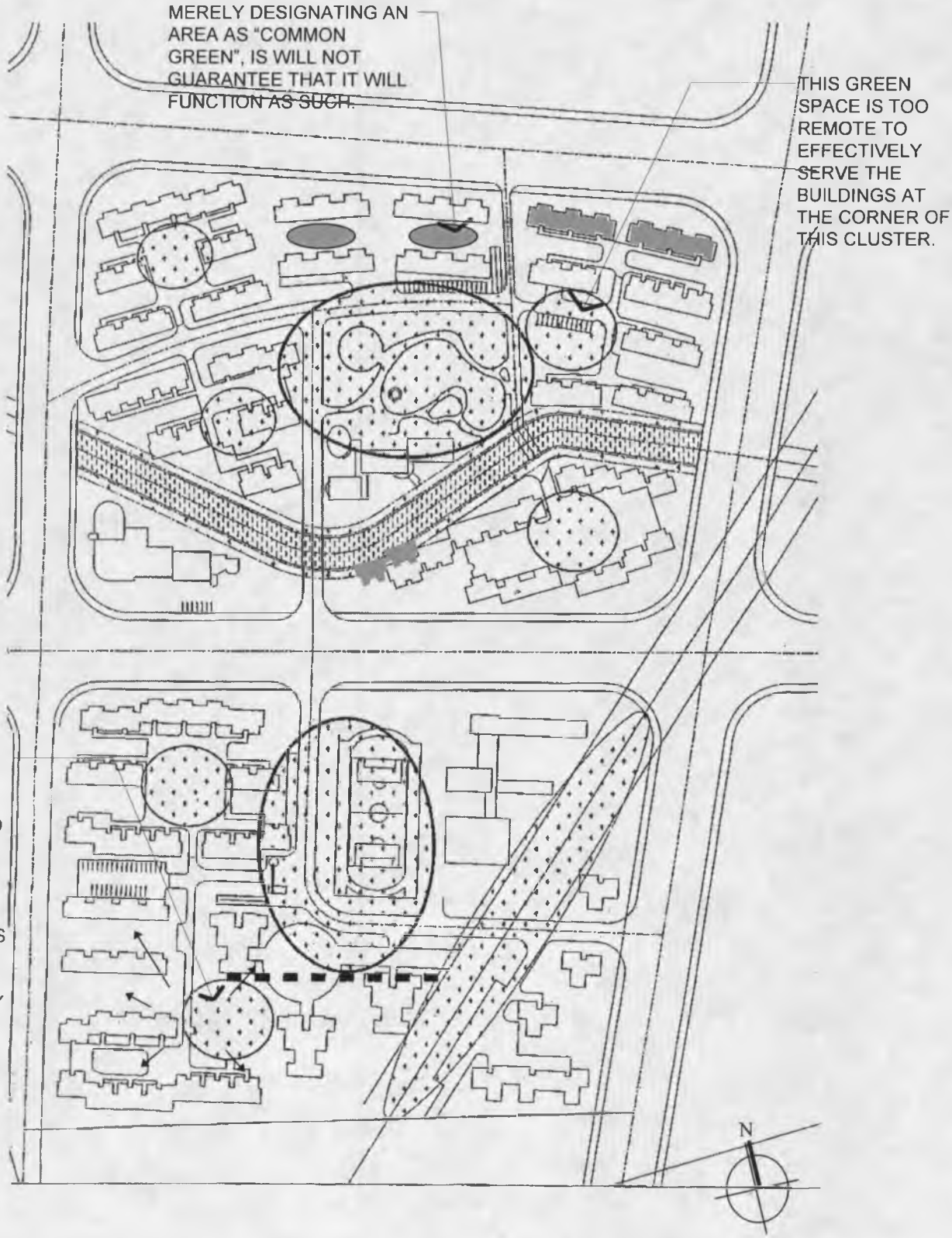
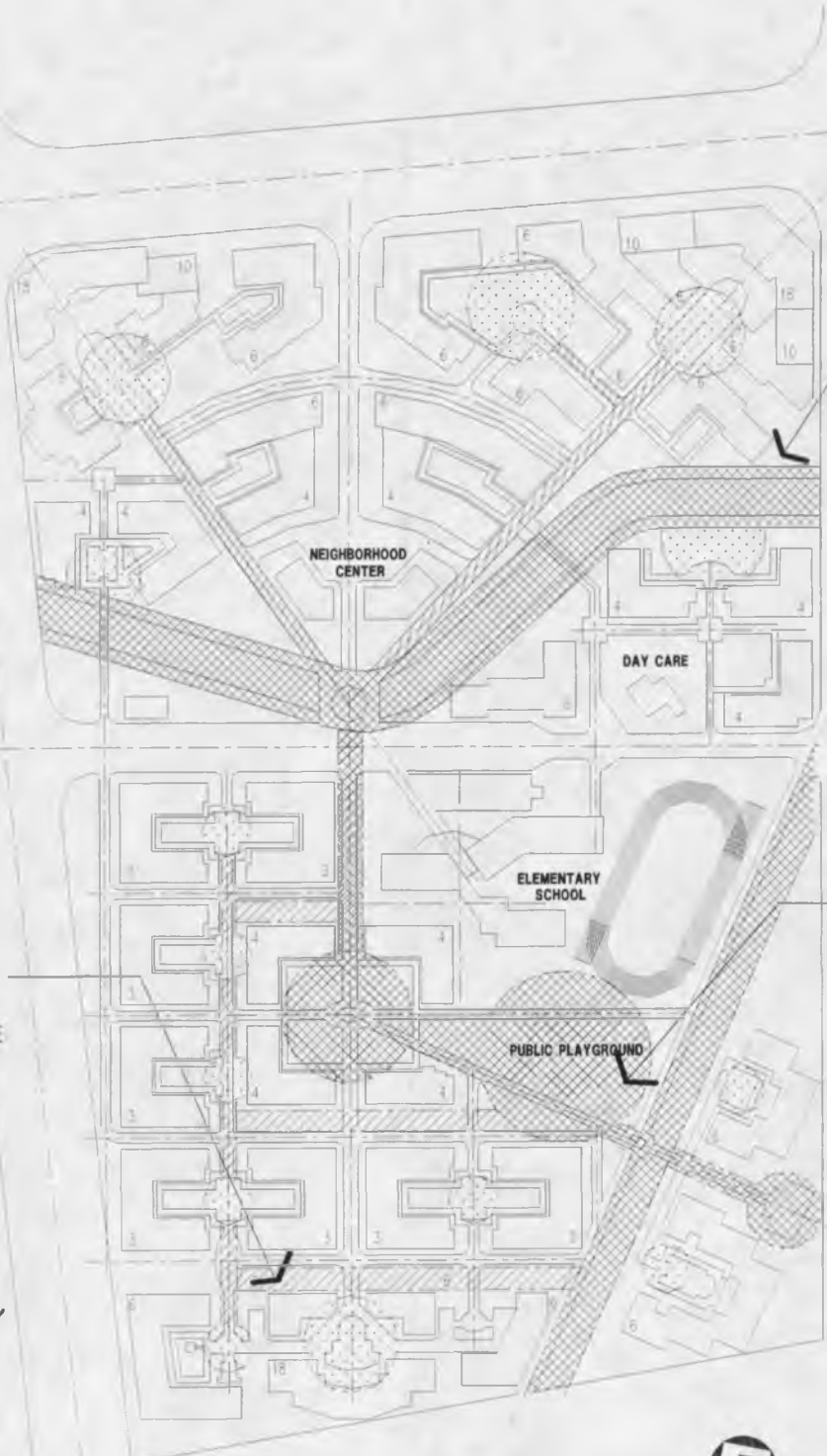


3.1 EXISTING NEIGHBORHOOD GREEN SPACE



THE RIVER BANK IS PROVIDED AS NATURALOPEN SPACE FOR RESIDENTS AND THE PUBLIC.

THIS PUBLIC PLAYGROUND ADJACENT TO THE SCHOOL PROVIDES A BIG OPEN GREEN AREA FOR NEIGHBORHOOD EVENTS ON THE WEEKEND OR HOLIDAY.

THESE LANDSCAPE AREA ALONG THE STREET ARE DESIGNED TO CONNECT NEIGHBORS OF DIFFERENT CLUSTERS AND, TO PERMIT THE STREET TO BE USED AS A CHILDREN'S PLAY AREA WHEN NOT IN USE FOR CIRCULATION.

3.2 REDESIGN NEIGHBORHOOD GREEN

Public green space

Landscape along the neighborhood street

landscape within the clusters

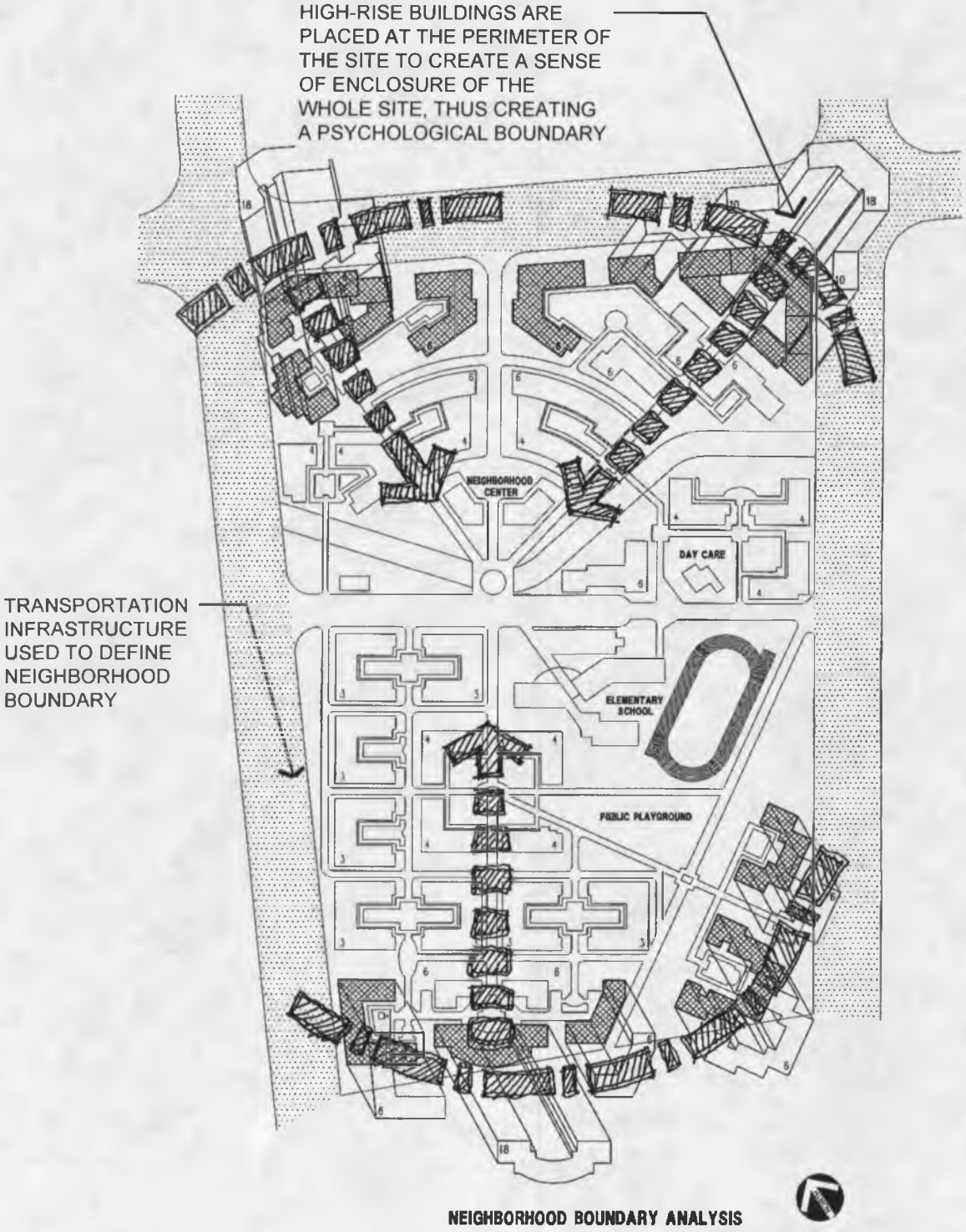
SECTION TWO:
DESIGN SOLUTIONS

1. THE DESIGN OF NEIGHBORHOOD BOUNDARY
2. THE DESIGN OF NEIGHBORHOOD SPACE
3. THE DESIGN OF DIFFERENCE HOUSING TYPES
4. COMPUTER AID DESIGN IMAGES

1. THE DESIGN OF NEIGHBORHOOD BOUNDARY

In High-density urban residential neighborhoods, a visual boundary is necessary for the purpose of security, excluding traffic from outside streets, creating neighborhood identity, and collectively providing a sense of community. The basic premise of a clear neighborhood boundary is that, to the extent that people can control, use, modify and personally mark a space, they will feel an attachment, commitment, and responsibility for it. They will, therefore, take good care of it, defend it from outsiders, and enjoy it.

Boundary definition can be achieved in many different ways, varying from symbolic demarcation, such as using different housing type in different clusters, to "soft" barriers, such as long hedges or short fences, to "hard" barriers such as buildings placed along the site perimeter (Mackintoch, P59,).



NEIGHBORHOOD BOUNDARY ANALYSIS

BOUNDARY OF THE NEIGHBORHOOD

The Boundary of the neighborhood is given, first, by the city street around the site, and secondly, by the high and mid-rise building placed in the corners of the site. Thus, a clear separation of site and the surrounding environment is created.

NEIGHBORHOOD BOUNDARY ANALYSIS

BOUNDARY OF CLUSTER BLOCKS

Within the neighborhood, the whole site is divided into six major cluster blocks. The definition of each block is formed by two types of separation: The symbolic dividers - different housing types, and the physical dividers, which are neighborhood streets, a heavily wooded landscape, the existing river bank and a high voltage power line zone.

2. THE DESIGN OF NEIGHBORHOOD SPACES:

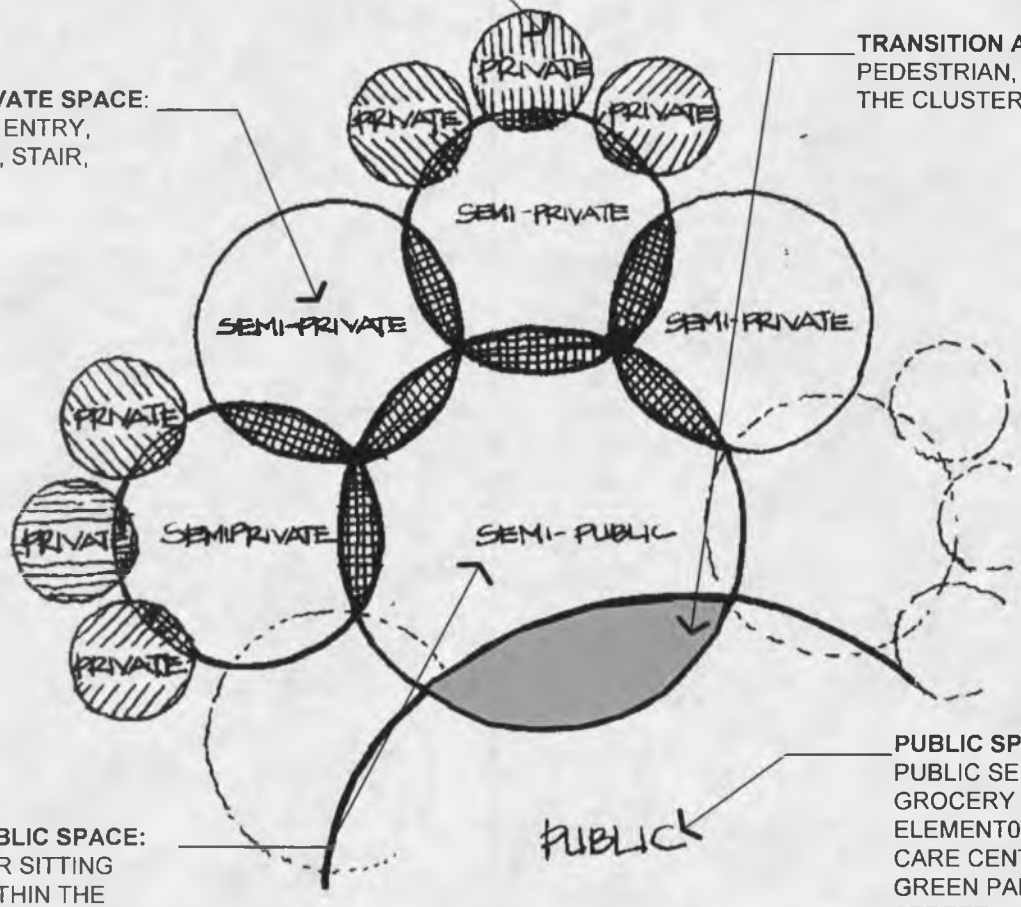
A successful neighborhood design should clearly provide a hierarchy of neighborhood spaces. In fact, it is dealing with the transition zone between the public space and the private space. The transitional spaces between the private and the public have two different but related aspects. One is the transition between the inside and the outside of the home envelope, the "here" and "there" polarity that governs all human experience. These establish the boundaries or extensions of "skin" between us and the material environment. The second aspect of transitional space involves the continuum between private and public. For those who find stimulation and creative satisfaction mainly in human interactions, the important transition between inside and outside, between our personal here and the larger there, may be in terms of the private built environment of our house or apartment and the built environment of the urban scene. Thus, we can look at transitional space as being between one level of physical enclosure and another, and simultaneously as being between one level of social enclosure and another. On the one hand it establishes a relationship between interior and exterior architecture, on the other between private and public life.(Greenbie, p7-8)

Like all built environments, in the design of neighborhood space, people and their behavior must be considered. How exterior spaces are combined, linked, separated or used varies greatly. To create vital, attractive spaces and to conserve land, the space should be designed with specific activities in mind and not left to chance. Usability is a consequence of planning and not a label. Merely designating an area a "common green," for example, is no automatic guarantee that it will function as such. To avoid waste, space has to fulfill its intended use in more than name only.

PRIVATE SPACE:
HOME, PRIVATE PATIO, BEDROOM

SEMI-PRIVATE SPACE:
BUILDING ENTRY, HALLWAY, STAIR, LOBBY, ...

TRANSITION AREA:
PEDESTRIAN, ENTRANCE TO THE CLUSTER



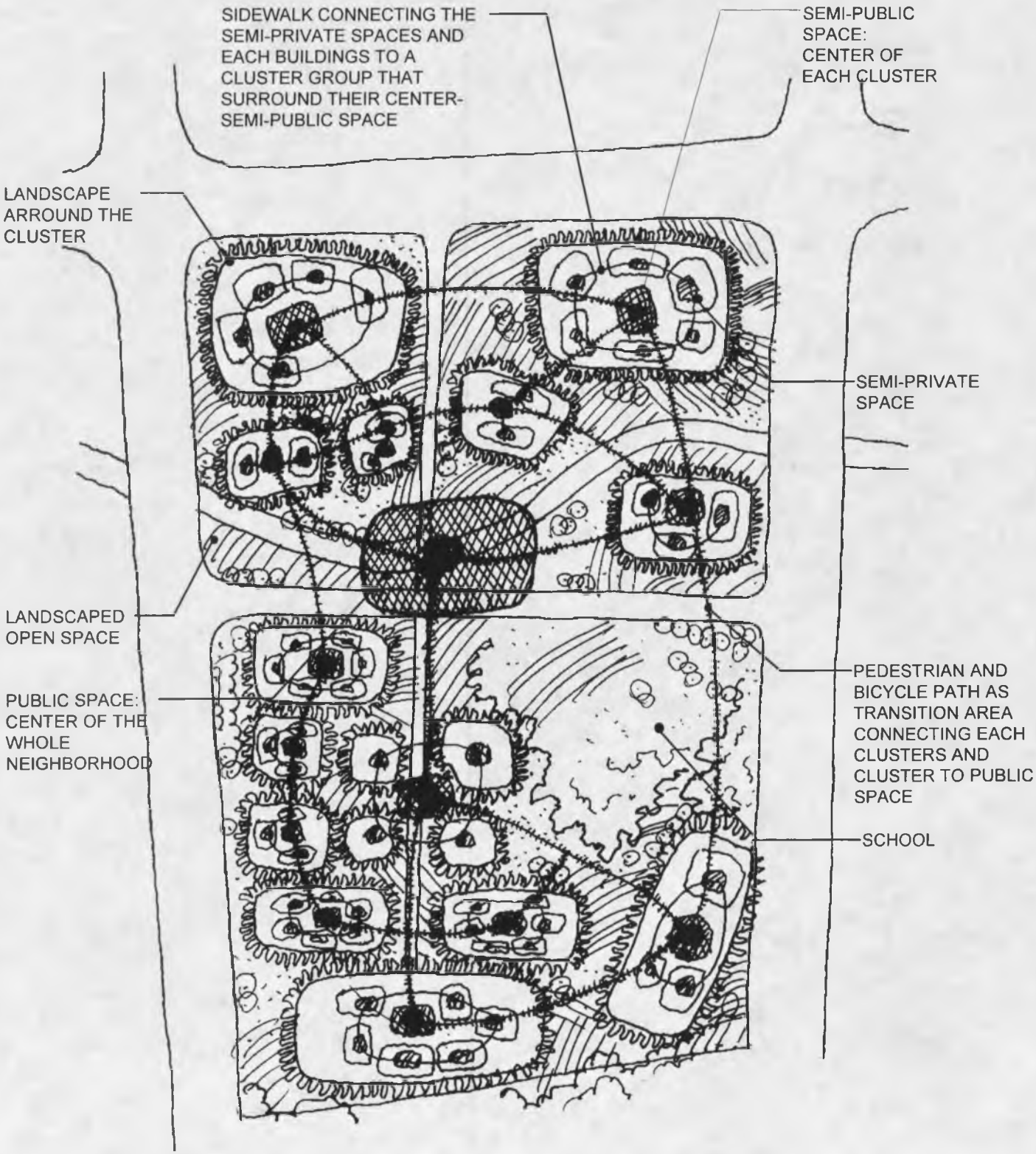
PUBLIC SPACE:
PUBLIC SERVICE CENTER, GROCERY STORIES, ELEMENTOTY SCHOOL, DAY CARE CENTER, PUBLIC GREEN PARK AND MAIN STREET.

SEMI-PUBLIC SPACE:
PLAZA OR SITTING AREA WITHIN THE CLUSTER, SIDEWALK, OUTSIDE BUILDINGS

THE NEIGHBORHOOD SPACE HIERARCHY

--TRANSITIONS FROM PRIVATE SPACE, TO SEMI-PRIVATE, TO SEMI-PUBLIC, TO PUBLIC SPACE

THESE GRADATIONS OF KINDS OF SPACES AND PLACES ARE ACCOMPLISHED THROUGH DESIGN. EACH SPACE IS INTENDED TO BE DISTINCT AND ORIGINAL, WITH ITS OWN CHARACTER, BOUNDARIES, AND SENSE OF PLACE, YET COMFORTABLY UNIFIED INTO THE LARGER COMPOSITION THROUGH DESIGN.



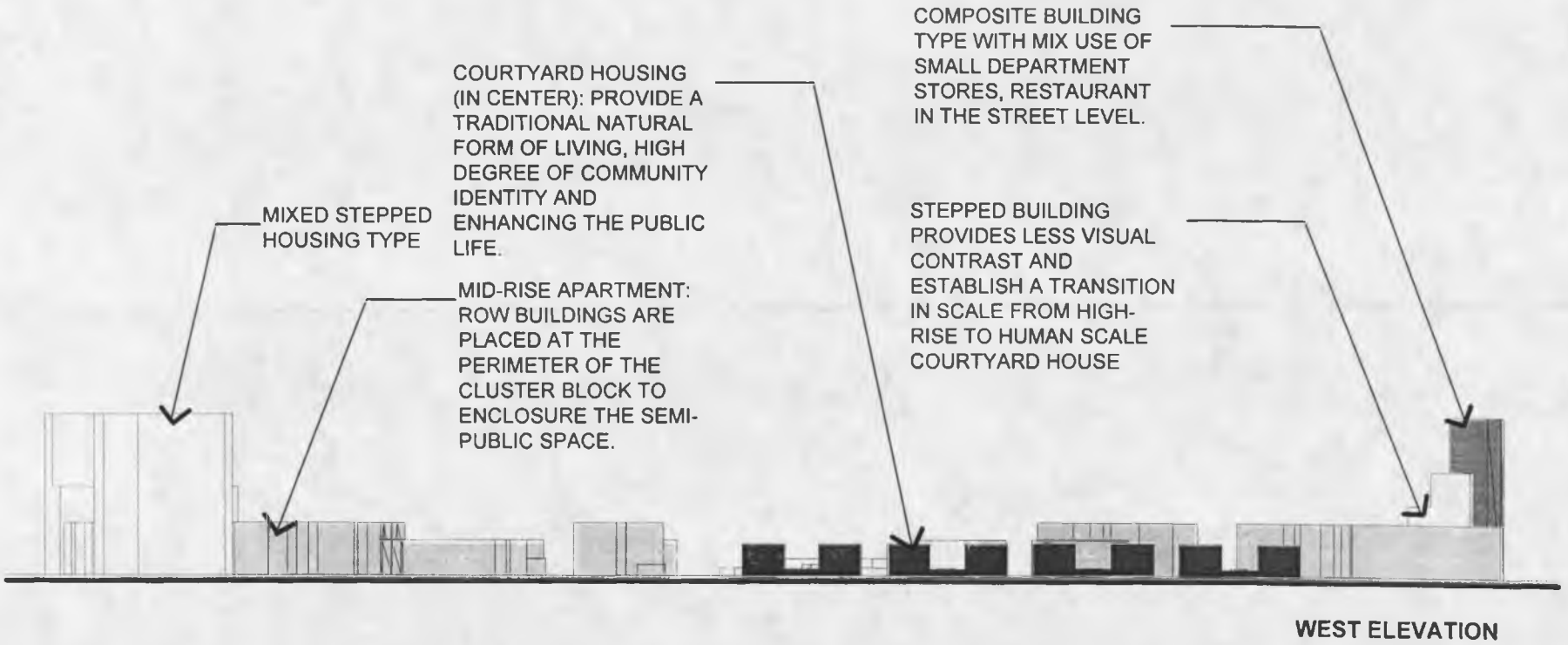
SPACE RELATIONSHIP & NETWORK CONNECTION

3. THE DESIGN OF DIFFERENT HOUSING TYPES:

A variety of housing types can be seen in two ways. First, there is the potential for the dwellers to individualize and make distinct their own residences. As densities increase, individuality becomes impossible. The variety may also be seen as a range of housing-type alternatives. Appropriate housing forms should not be limited within a site. It should be possible, for example, to find a dwelling suitable for families with children and grandparents, it should also be possible for singles, childless couples, and the elderly to have appropriate type and environment.

In a further consideration of housing for the future, the need of different housing types is because housing needs change as a family changes. This is sufficient motivation for designing housing and sites which are flexible and neighborhood accommodations which are varied. It is remarkable how often we talk about the necessity of meeting the needs of "family life" by planning and how often in practice we have neglected the simple and crucial necessity of providing for "family continuity" simply in terms of providing sufficient variety of housing to enable not only the individual family to stay in the same area but the fluctuations in the composition of the population over time to be absorbed (Westerguard, P17).

The variety of Housing types also provide visual complexity to distinguish the neighborhood from the other and create a sense of community identity.



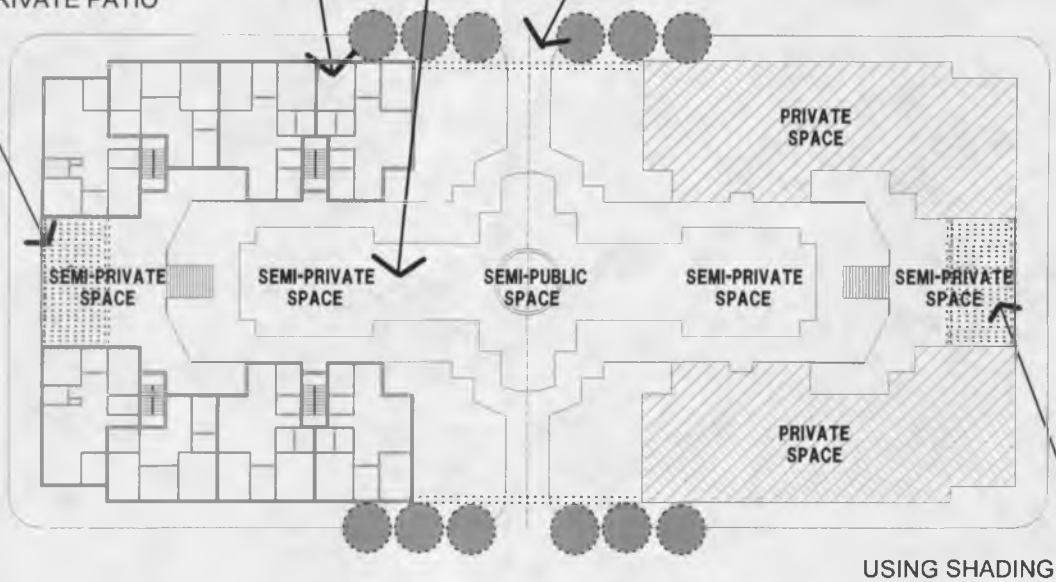
HOUSING TYPE ELEVATION

BUILDINGS ARE PLACED AT THE PERIMETER OF THE COMMUNAL SPACE TO DEFINE THE BOUNDARY.

THESE SEMI-PUBLIC AND SEMI-PRIVATE SPACES SERVE AS AN OUTDOOR "FAMILY ROOM" FOR THE RESIDENTS, A PLACE TO FULFILL A VARIETY OF DEFINED AND UNDEFINED NEEDS.

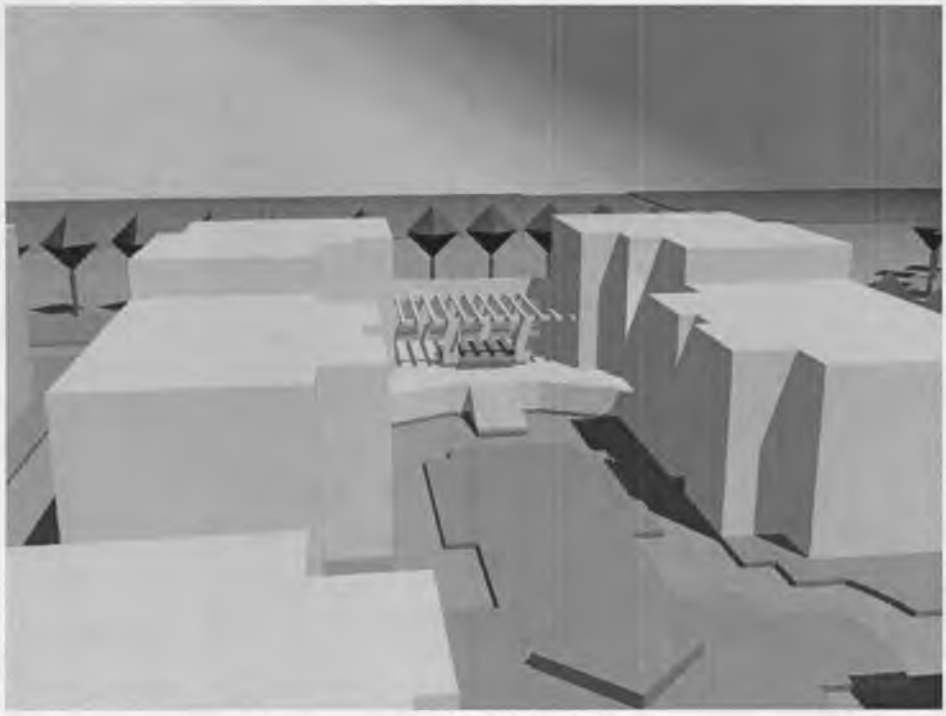
USE HEAVY LANDSCAPE AND SYMBOLIC ENTRY ARCHWAY TO COMPRESS THE ENTRY, SUGGEST A GROUP TERRITORY AND EXCLUDE OUTSIDERS

BICYCLE PARKING UNDER THE SEMI-PRIVATE PATIO

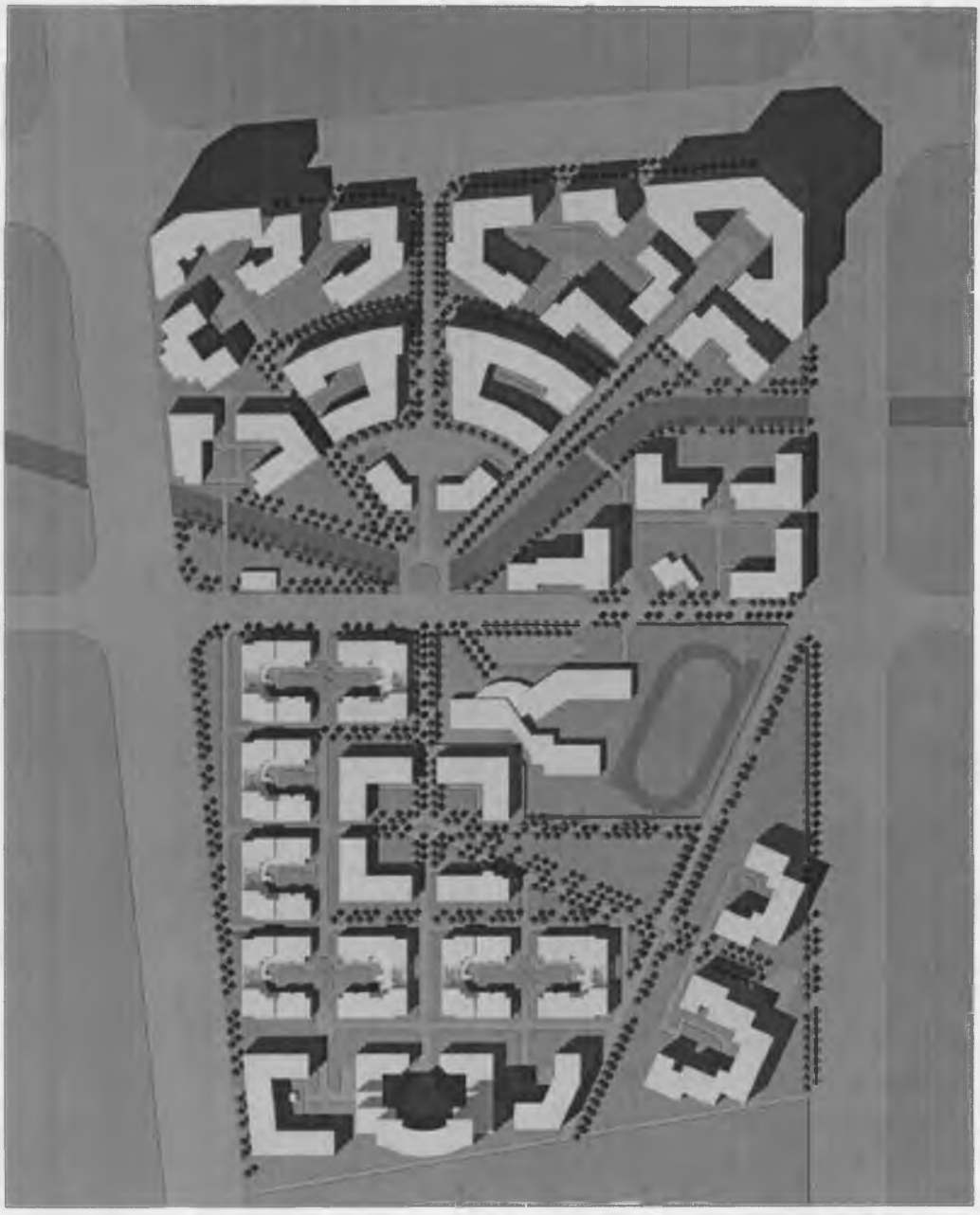


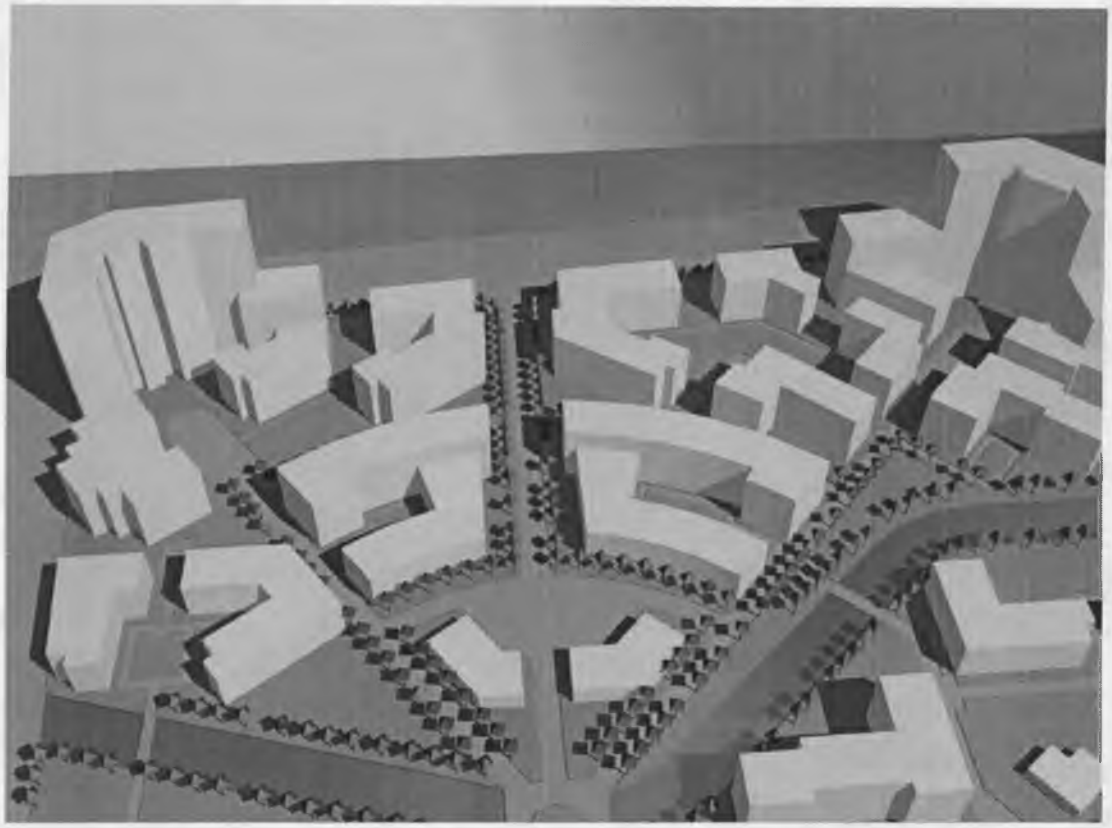
USING SHADING STRUCTURE TO CREATE CONVENIENT SITTING AREA

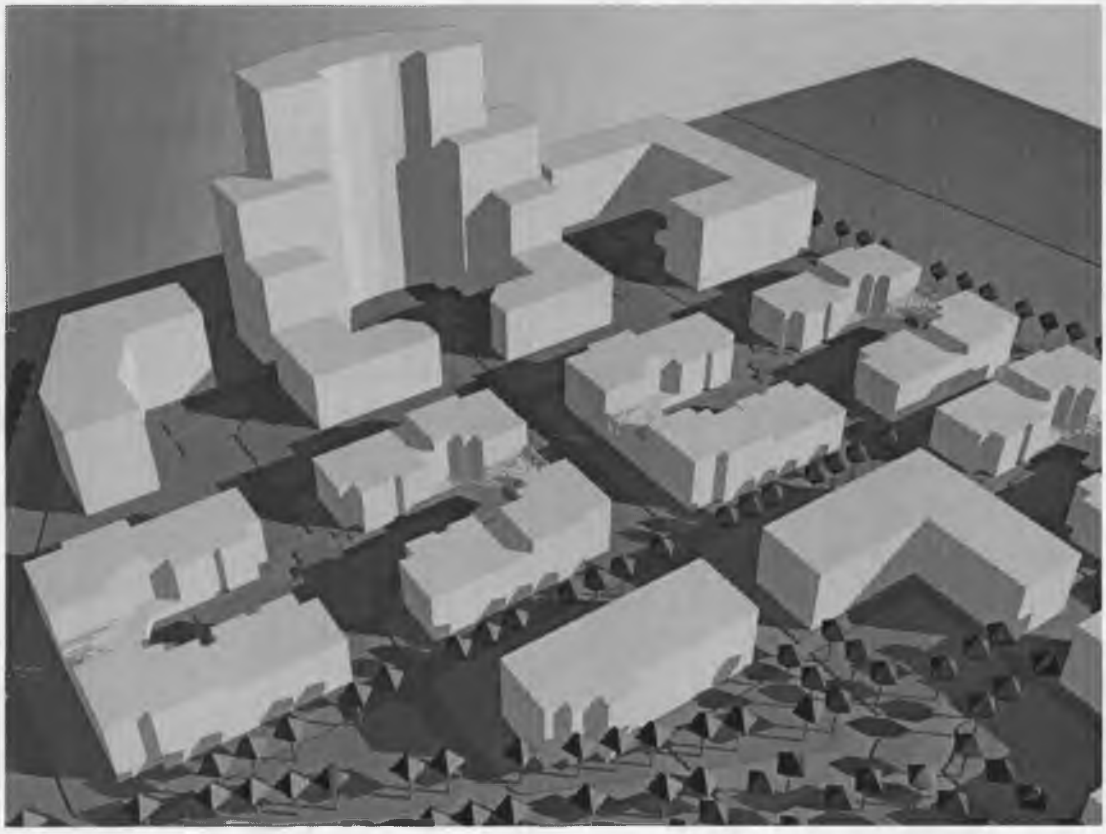
COURTYARD HOUSING PLAN



4. COMPUTER AID DESIGN IMAGES







CONCLUSION

This design is based on my previous study and analysis. By applying the design principles discussed in Part One, it successfully provides a better neighborhood environment without change the density of the original planning. The design methods that are used to enhance living environments focused on creating 1) strong neighborhood boundaries; 2) spaces with clear hierarchy; 3) variety housing types; 4) lower visual density. Therefore, it is possible to provide a more satisfactory living environment under the pressure of high density.

This project design is emphasis on neighborhood exterior space design at a site planning scale. There is not much study of the detail treatment on spaces, building style, building facade as well as the influence of climate and geographic characters to the site.

After the survey and project study, I found that to fulfill user's need, culture background should be the first issue to be considered in the future study, because social and cultural characteristics strongly influence residents' territorial behavior in semiprivate and semipublic spaces. Also, anthropologists have observed that different culture prefer difference amounts of distance between people and that have different expectations of their neighbors.

Neighborhood design is such a wide topic that includes many subjects. There are never studies to fully understand what kind of living environment

can truly satisfy all residents as culture background and economic situation varies from place to place. However, study can always help reach a more sensitive design for the people.

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