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URBAN HOUSING DESIGN IN IRAN
in Response to Socio-Cultural and Environmental Conditions

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A thesis submitted for the degree of Doctor of Philosophy

September 2001

DEDICATION

This thesis is dedicated to my parents Zahra and Yahya, and to my beloved wife Lida.

ACKNOWLEDGEMENT

This thesis owes its existence to the generous assistance, guidance and support of a great number of individuals.

Sincere gratitude, in particular, is owed to the director of studies Dr Hildebrand Frey to whom the writer is deeply indebted for his patient guidance, open door policy and invaluable ideas, criticisms and comments, throughout the course of this investigation, which provided much of the inspiration behind this work.

The writer is deeply grateful to all those who at various stages of the study provided help in acquiring the data required for this research: Professor Amos Rapoport of Milwaukee University, Harley Sherlock of Andrews Sherlock & Partners, Tom Macartney of the Crown Street Regeneration Project in Glasgow, Duncan Innes of English Partnership, Martin Hayward of GMV Construction, Geof Collines of WS Atkins, Jane Lavery of the Gorbals Neighbourhood Office, Dr Shahram Vaziritabar, Mr. Sina Rezanejad, Mr. Hamid Obeiji of Atisaz, Mr. Yaqoubi of Eskan, Mr. Tannazi of Apadana and Mr. Khalkhali of Ekbatan projects. Thanks are due to many residents and the management committee members in the settlements of Ekbatan, Apadana, Atisaz, and Eskan - the sample areas – in Tehran. Their cooperation in the survey on the housing conditions in the sample areas was invaluable.

Appreciation is also due to the numerous people both at the Ministry of Culture and Higher Education in Iran and at the University of Strathclyde for facilitating conditions under which the commencement and accomplishment of this study was made possible.

The writer wishes to express his deepest gratitude to his wife, Lida, for her infinite love, support and encouragement. The writer is most appreciative for the patience and understanding of, and the sacrifices made by, his wife and children, Alireza, Mohammadreza and Hamidreza, in furtherance of this study.

Thanks are also given to the writer's parents, Yahya and Zahra, and parent in-laws, Qorbanali and Homa, all of whom provided constant psychological support and encouragement from afar.

Finally, a word of thanks to many friends and relatives, whose names would not be possible to list here, for their understanding and moral support.

ABSTRACT

The purpose of this study was to formulate guidelines for urban housing design in Tehran based on the cultural norms of its residents and the city's environmental conditions. The initial cause of this study was the lack of a framework for the design and evaluation of new housing projects in Tehran and the aim was to investigate the suitability or otherwise of high-rise high-density housing forms for Iranian society.

In order to achieve the main objectives of this thesis, a series of studies were undertaken. The theoretical background relating to the main issues of this research was reviewed and where possible related to Iranian culture and way of life.

It is universally acknowledged that increasing the quality of the built environment will improve people's quality of life. In this regard general human needs and their interpretation in design terms are investigated. It is also known that environmental and ecological conditions have a direct impact on people's quality of life. Ignoring environmental needs results in gradual destruction of the regional and global environment, which in turn undermines the quality of urban settlements. For this reason ecological and environmental issues related to sustainable urban living and development are analysed.

In order to find out whether or not there are alternative settlement forms that could be more suitable for Iranian urban housing a number of recently developed urban settlement theories and projects are also investigated. The socio-economic background and housing conditions of Tehran were investigated. A questionnaire survey programme was developed to gather information on the degree of user satisfaction in four selected settlements in Tehran. The data collected was cross-checked with local observations and physical measurements of the areas. A detailed analysis of this data proved that there is a high degree of user satisfaction with dwellings, but about a third of the respondents were not satisfied with their neighbourhood.

The study of human needs and environmental sustainability issues, in accordance with Iranian and Islamic culture, produces a list of housing demands on which the

design of future housing in Tehran ought to be based. Based on the list of demands - the outcome of investigations on general human needs, Iranian Socio-cultural conditions, and the environmental ecological sustainability issues - a set of design guidelines for future housing in Iran are developed. Using a list of criteria – derived from the previously developed design guidelines - all the urban development projects in Tehran and the UK that were studied are compared and evaluated to determine their qualities and densities. Also investigated is the applicability in Tehran of the neighbourhood model, on which many recent British, American, and Australian development guidelines are based.

From this comparison and evaluation, the thesis concludes that in order to achieve high density it is not necessary to resort to high-rise forms as low-rise forms, if applied consistently, can achieve similar densities on a more human scale. In response to Islamic culture and environmental sustainability issues it is necessary to have access to local services and facilities within walking distance. To support their viability within a neighbourhood, a threshold population is required; in the case of Tehran this does not seem to be a significant problem. The population should be evenly distributed in order to achieve a balanced urban environment. A balanced relationship between the built up area and the countryside is essential. The translation of these key issues would form the structure of a walkable neighbourhood.

In order to achieve a high quality urban environment, housing design guidelines on a national level are required that can help the decision-making process as well as helping the relevant professionals in their work. The thesis concludes with a set of recommendations for the implementation of the design guidelines.

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INTRODUCTION

0.1. PURPOSE OF THE RESEARCH

The main objective of this research is to set up design guidelines for urban housing design in Iran. To that end Tehran was chosen for a number of case studies and it is hoped that the outcomes of this research will provide a reliable basis for the said purpose.

0.2. PROBLEM STATEMENT

With a rapidly increasing urban population in the large cities of Iran, especially Tehran, a massive number of dwellings are required to accommodate the incoming population. According to the 1986 census the annual population growth rate in Iran was 3.9% while the annual population growth within urban areas was 5.4% - mainly as a result of rural migration to the cities [SCI, 1986]. More recent data shows smaller figures but at the same time the average size of households in urban areas has also decreased. During the period 1973-77 on average 140,000 households were added to the urban population annually while between 1978-82 the number of urban households increased annually by an average of 180,000 [Iranian Architects Association, 1990, pp 9-10]. According to the IAA [1990, p37] in the next twenty years 8.5 million new dwelling units will be required to accommodate the growing population. The Iranian Government's approach to tackling the expected shortage of housing has been expressed by two consecutive ministers of Housing and Urban Development. In 1990 Kazerouni stated that "the construction of high-rise apartment blocks is the government's policy in large cities" [Kazerouni, 1990, p7]. The intention to increase urban density - intensification to make the best use of the available infrastructure as well as freeing up land in the old quarters of the large cities - appears to have been the main drive behind choosing the high-rise housing form. However, four years later - in an international housing seminar at Tehran University – Akhoundi specified the government's major plans to tackle the shortage of housing – in the Second Five-year Plan - as "savings, mass productions and smaller dwellings" [Akhoundi, 1994, p18]. As a consequence of those policies high-rise apartment blocks are mushrooming in all areas of Tehran.

Large-scale urban housing developments need the ratification of Iran's Supreme Council of Urban Development and Architecture - within the Ministry of Housing and Urban Development - where the decisions are usually made in accordance with statistics and budgets rather than quality of design and based on the personal tastes and preferences of the ever-changing panel of judges. This not only puts the members of the panel of judges in a vulnerable position, it also causes many problems for professionals and designers who have no approved framework for their design projects and have, therefore, to rely on personal experiences and hope for the acceptance of their proposed projects. Because there is no framework that would clearly define the required design qualities of the built environment, any discussions regarding design quality are usually left to personal interpretation, and are therefore considered as a luxury and usually ignored in the process of decision-making. Urgently needed are comprehensive design guidelines that could be reliably used as a base to measure the quality of proposed urban housing projects. Such a framework would help designers recognise the requirements and possible solutions for settlement design and consequently improve the quality of the urban environment in Iran.

0.3. DEVELOPMENT OF THE RESEARCH HYPOTHESIS

Having studied architecture at Tehran University as well as being involved in the design process of a number of urban-scale housing projects the author has become familiar with and interested in this subject. The academic discussions in Iran have been in favour of traditional housing forms while in practice the high-rise forms have been promoted. The works of Martin and March at the University of Cambridge in the early 1970s proved that despite initial assumptions high-rise development does not necessarily produce higher density than low-rise forms. Also the fact that, high-rise apartment blocks have been demolished in many American and European cities it seems unlikely that they will meet the needs of families especially in a Muslim society. Therefore, based on the available literature as well as the author's personal experiences, the research hypothesis was developed that '<u>new-built high-rise apartment housing does not meet user requirements in Iran</u>'.

0.4. LIMITATIONS OF THE RESEARCH

To test this hypothesis, a research programme was designed and Tehran was chosen to investigate a number of housing schemes. Since Tehran is the capital city of Iran it was expected that the required data for this investigation would be more readily accessible. This proved not to be the case. Therefore, four sample areas in Tehran were chosen. A questionnaire survey as well as local observations were carried out in those areas. Since the link between academic institutions and society is not well established, people were not very familiar with academic research outside the universities. Therefore, in many cases the respondents had to be reassured that this research was of a purely academic nature and had nothing to do with the authorities and that their responses would be treated with the strictest confidence. None the less, many questionnaires were not returned and some were incomplete and therefore had to be discarded. As a result, the survey was not based on a representative group of respondents and the number of responses was not statistically significant. Together with the results of the questionnaires this necessitated a later expansion of the research on a more theoretical basis.

0.5. STRUCTURE OF THE THESIS

This thesis is composed of an introduction, five chapters, four appendices and bibliography. The Introduction states the main objective of the study. It illustrates the research problem and sets up the research hypothesis. The scope of the inquiry and the research limitations are briefly summarised. It also provides a synopsis of the contents of the other chapters.

Chapter one reviews the impact of socio-cultural values on housing design in Iran. First, the investigation focuses on the relationship between human behaviour and the physical environment, the meaning of the built environment, the notion of human needs as well as the meaning of culture. Then social behaviour theories are studied and, where relevant, specific references are made to Islamic culture with regard to privacy and territoriality issues. Also, other social characteristics affecting housing design, including household and neighbourhood characteristics, are explored. Finally, a first draft of key qualities for good housing is generated.

Realising that people's level of satisfaction will increase as far as their needs are gratified, chapter two sets out to investigate a broader range of demands on housing. Good housing is defined as housing that improves people's quality of life by meeting all levels of human needs as defined by Maslow. An interpretation of human needs in terms of housing and settlement design is provided. The environmental and sustainability criteria of urban settlements and their impacts on housing and settlement design are also highlighted.

Chapter two also investigates recently developed settlement theories and projects in order to find out the degree to which they meet issues of sustainability. To that end Transit Oriented Development, Liveable Neighbourhood, and the Urban Task Force Report are reviewed. In addition, two prominent settlement projects – one in Glasgow and the other in London – are investigated. Finally the sustainability demands on housing and settlement levels are summarised and a comprehensive list of the key qualities of urban housing and settlement-forms is generated based on the studies of general human needs, Islamic and Iranian culture and the local survey along with ecological and environmental issues.

Chapter three reviews the socio-economic background and the housing conditions of Tehran. It studies the history and development of Tehran in three distinct periods. Physical aspects of Tehran including geographical setting, climate, ecological and environmental conditions as well as the problem of air pollution are described. The socio-behavioural aspects of the city including family structure, types of households, household size and population density are evaluated. The status of housing in the Iranian constitution as well as the latest available housing statistics in Iran are examined and the status of housing and settlement and housing needs in Tehran are investigated and discussed. It is observed that a local survey of housing conditions in Tehran and the level of user satisfaction are essential in order to provide a better understanding of the current housing situation in the high-rise high-density housing schemes of Tehran. The details of the survey programme and its findings are documented in appendices A, B, C, and D. However, a brief introduction to the housing conditions in the survey areas and a synopsis of the main findings of the survey is presented here. Furthermore, based on the analysis of findings of the local survey, the demands on dwelling and neighbourhood levels are listed.

Having studied all the demands on housing to satisfy general human needs, Islamic and Iranian culture as well as environmental sustainability issues, it became evident that all these demands reinforce rather than contradict each other and that specifically the demands resulting from Islamic culture and those of environmentalists and ecologists are strongly complimentary. It was therefore possible to amalgamate all three categories of demands into one common set of design guidelines. Chapter four provides lists of these design guidelines on the three scales of dwelling, building and neighbourhood. The list is then used as an evaluation tool for comparing the achieved qualities of the settlements in Tehran and the projects in Britain. The chapter concludes with an analysis of the applicability of the resulting guidelines in Tehran.

Conclusions and recommendations for further research are presented in chapter five. It is suggested that both Islamic cultural values and environmental as well as sustainability issues call for the return to more traditional urban values; it is nevertheless acknowledged that the achievements of the twentieth century cannot simply be ignored and that it is not possible to return to the period of urban development prior to that influenced by Modernism. What is required is a critical though balanced response to both old and new values. It is suggested, therefore, that future housing developments in Iran, rather than looking for short-term and short-sighted solutions for the mass provision of housing, ought to be based on a comprehensive set of cultural as well as environmental, ecological and functional values and demands. Only then will it be possible to provide a quality of housing that is more readily sustainable and more in tune with the very specific values of an Islamic society.

Suggestions are also made for future researches to generate comprehensive design guidelines for the country of Iran as a whole. The implementation of these design guidelines would help professionals to recognise requirements and possible solutions for settlement designs; it would also support the panel of judges in the Ministry of Housing and Urban Development of Iran in their decisions on development projects by providing a more rational and more informed framework. Finally suggestions are made as to how such comprehensive design guidelines could be implemented on local and national levels.

The contents of Appendices are described in what follows. Appendix 'A' describes the survey programme that was planned to collect the data required to test the research assumptions. It illustrates the methodology of the survey including a combination of the questionnaire, interviews, and physical measurements and observations. The selection of the samples and the survey procedures in the four selected sample areas are explained and the standards and limitations of the survey are described. This is followed by a brief description of the statistical methods and the software used to analyse the data collected. Appendix 'A' also provides a detailed analysis of the findings resulting from the interviews and the questionnaire survey. It documents the outcome of the survey on three design levels: household, dwelling, and neighbourhood. The findings of the local survey prove that despite the initial expectation of a high level of dissatisfaction with high-rise apartment housing in Iran a relatively high percentage of respondents (88.2%) were satisfied with their dwellings. However, of specific interest is that about a third of the respondents were not satisfied with their neighbourhood. This necessitates the search for alternative settlement forms that would increase the level of user satisfaction through the improvement of people's quality of life.

Appendix 'B' documents all the raw data gathered through the local survey. The responses to individual questions are tabulated individually. Respondents' answers according to their areas of residences, as well as all areas together, are presented in 104 tables.

Appendix 'C' documents the local observations and physical measurements of the four selected sample settlements. It contains an in-depth report on the physical characteristics of each neighbourhood, including roads and access, parking, public transport, pedestrian pathways, public services and facilities and walkability to services and facilities. It also illustrates the characteristics of the buildings and the types of dwellings available in each sample area. At the end of each case, comments are made on the special features of each settlement and finally a short summary discusses the schemes with regards to the density achieved and to the extent those schemes meet the criteria drafted in chapter two.

Appendix 'D' documents a copy of the English version of the questionnaire developed for the local survey.

A comprehensive list of all the references used in this study is presented in Bibliography. It is arranged in three sections for English references, Farsi references, and finally all the Internet sites referred to in this thesis. All documents listed in the Farsi references are in Farsi. The titles of these references were translated from Farsi by the author.

IMPACT OF SOCIO - CULTURAL VALUES ON HOUSING DESIGN IN IRAN

The purpose of this chapter is to provide information concerning Iranian society and its cultural background, and to raise questions regarding the approach to the problem of housing in an Islamic country.

This chapter is organised in five main sections. Section 1.1 deals with general terms such as Built Environment, Human Needs, and the Meaning of Culture, as well as the relationship between the individual, culture and environment. Iran is a country in which the cultural dimension acts as a guiding norm for the behaviour of the individual and the group. Therefore, the theories discussed in this section need to be related to the teachings of the Islamic faith and its impact on the way of life. This is essential since the study is concerned with housing in an Islamic society.

Section 1.2, discusses some of the theories and the Islamic points of view relating to the social behavioural process that affects the perception of the environment, comfort and quality. It starts with a discussion of privacy, followed by that of personal and social space, territoriality, family structure, neighbourhood and sense of community in Islamic societies.

Section 1.3, investigates the development of the Iranian contemporary architecture. The holistic approach in Iranian architecture is studied and finally the meanings of house and neighbourhood in Farsi are compared with those in English.

Section 1.4, studies in detail the characteristics of Iranian traditional settlements and housing forms. The emergence of the concept of an Islamic city is reviewed and the principles of the typical Iranian/Islamic Traditional settlement are illustrated. It is argued that the spatial organisation of traditional Iranian architecture is adapted in conformity to Iranian social structure. In this regard the Iranian traditional courtyard housing type is studied in detail.

Finally, section 1.5 summarises the discussions of the other sections, focusing on good housing. It then concludes by providing a list of key qualities required for appropriate housing in Iranian society.

1.1. RELATIONSHIP BETWEEN HUMAN BEHAVIOUR AND THE PHYSICAL ENVIRONMENT

The relationship between human behaviour and the physical environment has captured the interest of many researchers from different disciplines such as social science, anthropology, psychology, ecology, and other environmental professions. Researchers such as Rapoport (architect and anthropologist), Hall (anthropologist), Baker (ecological psychologist) and Sommer (sociologist) have recognised the work of the social and behavioural sciences since the 1950's. The works of social behavioural science researchers have influenced other professionals such as interior designers, architects, urban designers, and urban and regional planners.

1.1.1 The Built Environment

The built environment is the outcome of people's actions and behaviour. It includes buildings, neighbourhoods, cities, transportation and other systems of a man-made environment, which are usually constructed to meet the perceived needs of 'Activity Systems'. However, the layout (e.g. the location and arrangement) of environmental features, in turn, can have behavioural and psychological effects on people's activities. Activity systems embody a hierarchy of 'Behaviour Settings' linked to complement any behaviours [Chapin and Kaiser, 1979]. In the light of this statement a house can be seen as a place for sustaining activities, socialisation activities, recreational activities, social interaction activities, human development activities, etc. But, what is meant by 'Behaviour Settings'?

'Behaviour Settings' is an ecological theory that focuses on the everyday environment of people. It deals with social and built environmental issues together. A 'Behaviour setting', as discussed by Baker, is a unit combining activity and place [Baker, 1968]. Baker's definition of 'Behaviour Settings' is as a standing pattern of behaviour at any given moment along with the environmental features that surround

that behaviour. Accordingly, 'Behaviour Settings' consist of a standing pattern of behaviour to satisfy certain needs such as eating, sleeping, etc. A standing pattern of behaviour exists within a spatial environment with, at least, minimal level to afford the standing pattern of behaviour and a time period. The advantages of the 'Behaviour Settings' idea are that it adds considerable clarity to discussions of physical design and its functions since it looks at activity location. The combination of 'Behaviour Settings' and the linkages between them in certain locations reflect people's motivations and attitudes, limited by their incomes, competence, and culture [Lang, 1987].

1.1.2 Human Needs

People's motivations are the guiding force behind a given behaviour. These motivations exist in a hierarchical order from physiological needs to aesthetic needs as suggested by Abraham Maslow. Maslow pointed out that human beings have a set of basic needs that are organised into a hierarchy of relative prepotency. If the most basic need is relatively well gratified, it becomes unimportant in the current dynamics of the individual and the needs shift to less basic ones [Maslow, 1954, pp 80-106]. His hierarchical order from the most to the least basic need is as follows:

1. *'Physiological needs'* are the needs for food, water, comfort and whatever helps to maintain a constant and normal blood flow. This type of need can be gratified through certain activities such as eating, drinking, sleeping, etc.

2. *'Safety needs'* are the needs for security, protection from physical harm and freedom from psychological fear. This type of need can be gratified by means such as building shelter, controlling territory, and forming a legible environment as well as looking for a healthy environment with minimal pollution and ecological disruption.

3. *'Belongingness and love needs'* are the needs for affectionate relations with people such as those within a group or family. Such needs can be addressed by socialisation processes and by being given the right to own property. The idea of ownership serves to create a sense of belonging and leads to personal pride.

4. *'The self-esteem needs'* denote being taken into consideration by oneself and by others. Such needs include a feeling of self-confidence, strength and usefulness in the world as well as the desire for prestige, reputation and dignity.

5. *'The needs for self-actualisation'* are the needs for freedom of choice and of action. Self-determination is one example of the needs for self-actualisation, since self-determination is based on the representation of interest.

6. *'The desire to know and understand'* can be addressed through opportunities for learning, exploration and self-testing.

7. Finally, *'aesthetic needs'* or the desire for environmental beauty come from sensory, formal, and symbolic aesthetics, which serve to please the eye and inspire the spirit. In fact, space can favour conviviality or solitude depending on the way of handling and organising its elements as well as its geometrical form and proportion.

This hierarchy of needs appears to span the physiological, socio-cultural, and personal bases of motivation.

1.1.3 The Meaning of Culture

The notion of culture is rooted in the study of anthropology and sociology and has recently attracted researchers from the environmental design disciplines. It has been argued that the establishment of a cultural link is very important in designing socially meaningful and 'live' built environments. Therefore, cultural awareness has been considered as an essential part of the teaching programme of environmental design institutions. Ujam states: "without cultural awareness, any attempt to create a more sustainable environment is likely to falter" [Ujam, F., 1996, p 49].

A classical anthropological definition of culture is that it refers to and indicates the whole range of the conventional understandings that are shared by the members of a group of a certain society. Taylor [1958] reflects this classical definition stating that "Culture . . . is that complex whole which includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man as a member of

society" [cited in Bock, 1974, p 1]. Recently, culture has been defined throughout much of the social science literature in various ways. Most definitions depend on the situation and the special orientation of a particular social science discipline. These definitions stress that culture is a shared system of ideas and symbols, learned behaviour, or an adaptive system.

The anthropologist Hall offers a simple definition of culture as 'man's medium'. He explains this further: "There is not one aspect of human life that is not touched and altered by culture. This means personality (how people express themselves including shows of emotion), the way they think, how they move, how problems are solved, how their cities are planned and laid-out, how transportation systems function and are organised, as well as how economic and government systems are put together and function" [Hall, E. 1977, pp 16-17].

The term culture is difficult to define precisely, but through these definitions an understanding of its characteristics and components may be reached.

Culture and its Characteristics

The concept of culture has several characteristics that can be summarised as follows. First, it is a system composed of shared categories and plans manifested as norms, rules, and codes. These categories and plans do not exist in isolation, but serve as organisational links between people and things. People use this system to interpret and evaluate their behaviour and the behaviour of others to know whether they are using the system correctly or not [Hall, 1977]. Secondly, culture does not exist separately from people. Culture is set in the mind of people and carried by individuals while invented and sustained by a group. Thirdly, culture is not innate. It is grasped, applied, and transmitted by social learning [Bock, 1974]. Fourthly, culture is not finite. It develops in an evolutionary modification process.

Culture and its Components

Culture is the outcome of several factors combined. These factors are the mental activities of people, intellectual orientation and cosmology, and the social behavioural processes of a certain society [Altman and Chemers, 1984]. Each factor

consists of many issues and sub-issues. These issues and the sub-issues as a whole are not only inseparable, but they are also reflections of one another. In other words, each issue may serve as either a cause or an effect of another. For example, having the sense of being involved in a certain religion is the result of a feedback process of decision-making. The process involves certain classes of activities, beliefs, attitudes, intentions and actions [Fishbein and Azjen, 1975]. The first phase of this process is beliefs. The beliefs deal with information on the background of people. The second phase is the judgement or the evaluation phase that leads to a set of intentions that are considered the filter and the director of action. For example, when a rcligion becomes the identified religion of a group of people, then it may become more than intellectual orientation. It may modify certain beliefs or social activities. It may become a way of life such as the Islamic religion. Belief may affect people's choices and decisions about certain aspects of the environment. The Islamic view upholds this statement. For example, Islam prohibits keeping images (i.e. complete solid figures of humans and animals) in the environment of Muslims. This does not imply that decoration or luxury (in general) is forbidden. Muslims are certainly free to desire beauty in their environment. However, Islam disapproves of excess.

Social Behavioural Processes:

Social behavioural processes involve mediation between the environment and people's behaviour at the social level. This includes any socialisation process which people use to manage and regulate their relation to both the social and physical environments such as privacy and territoriality. Through this they achieve an optimal environment that fulfils their range of goals and needs. The needs for privacy, personal space, territory and social interaction are universal and contribute to the meeting of human needs. However, these needs are manifested differently in different societies and by different groups of people.

1.2. SOCIAL BEHAVIOUR WITH SPECIFIC REFERENCE TO ISLAMIC CULTURE

The theories discussed in this section are examined in the light of the major sources of Islamic teachings: the Qur'an and the Hadith. The Qur'an is the scripture and the

foundation of the religion of Islam, while the Hadith is the statement of the prophet Mohammed (SAWA) himself or the A'emmeh (AS).[1] The Ahadith (plural form of the word Hadith in the Arabic Language) represent the way, the practice, the rule of life, and the actions of the prophet and the A'emmeh. They are considered as a 'hidden revelation'. The Ahadith have been transmitted and narrated by Islamic scholars from generation to generation. It is important to mention here that the statements of the Qur'an and the Ahadith are highly respected and not open to dispute among Muslims. Thus, such statements will be treated here as determinants of Muslims' actions and behaviour.

It is important to point out that quotations from the Qur'an and the Ahadith will be made here to explain the Islamic point of view and teaching on certain issues such as privacy and territoriality, which are key issues for the quality of housing design in a Muslim society.

1.2.1 Privacy

Every human activity requires a certain level of privacy. The notion of that level of privacy differs from culture to culture [Hall, 1966]. Altman provides a broad definition of privacy as a " . . . selective control of access to the self or one's group" [Altman, 1975, p 18]. Privacy has been defined on different bases. Some define the desired levels of privacy based on the concepts of withdrawal and control of the flow of information to/from the surrounding environment. Other definitions are based on personal and social spaces (distances).

Westin [1967] provides a systematic analysis of privacy by identifying four levels, including withdrawal and control of information, which are associated with specific

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[1]The A'emmeh are the twelve Imams who have led the Shi'a Muslim nation after the prophet Mohammad (including Ali – the son in-law of the prophet and eleven of his descendants). Shi'as believe the twelfth imam Mahdi (AS) is alive but living out of sight. He will return and rescue humanity from arrogance and injustice.

(SAWA) stands for the Arabic phrase Salawatollah wa salamohu Alayhe Wa Alehi wa sallam – meaning 'peace and greetings of Allah be upon him and his family' - which is used whenever the prophet Mohammad is referred to.

(AS) stands for the Arabic phrase of Alayh-es/Alayhem-os Salam - meaning 'peace be upon him/them' and is used when referring to an Imam/A'emmeh.

types of activities. The four types of privacy are 'solitude', 'intimacy'- emphasising the withdrawal from other people and the seeking of isolation - 'anonymity' and 'reserve' - emphasising the idea of controlling the flow of information. Hall [1966] has identified that people in North America use four spatial zones for regulating their day-to-day social interactions. These zones include 'intimate distance', 'personal distance', 'social distance', and 'public distance'. The following sections describe the above mentioned definitions in more detail and where relevant relate them to Islamic teachings.

Levels of Privacy

Solitude: Solitude is the state of wanting to be alone and free from observation by others. An example of this type of privacy that is stressed in the teaching of Islam is that looking at Awrat (the private parts of the body) of another person is prohibited. The prophet says: "... A man should not look at the Awrat of another man, nor a woman of a woman, nor should a man go under one cloth with another man nor a woman with another woman".[2]

Intimacy: Intimacy is the state of desire to be separated from the outside world with one's family (i.e. a husband and wife or a small group of people). According to Islamic teaching, the prophet strictly forbids looking into other people's houses without their permission. "He who looks into a house without the occupant's permission, and they puncture his eye, will have no right to demand a fine or ask for punishment".[3] The prophet also says: "He who pulls the curtain and looks into a house without permission to enter has committed an offence".[4]

An example of this principle from Islamic history is when Imam Sadeq (AS) [the sixth Shi'a Imam] compelled the owner of a roof terrace that was higher than his

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[2]Reported by Muslim Abu-Dawud, and Al-Tirmidhi.

[3]Reported by Ahmad and Al-Nasai on the authority of Abu-Hurairah.

[4]Reported by Ahmad and Al-Tirmidhi

neighbour's to build a parapet or wall round it otherwise he would view his neighbour's house if he used it.[5]

Anonymity: Anonymity is the state of desiring to remain unknown in a crowd. In order to satisfy the need not to be recognised in a crowd or in a public place non-verbal modes of communication may be used such as turning ones body away from unwanted people or using a newspaper to cover one's face and so forth.

Reserve: Reserve is the state of employing a psychological barrier against unwanted intrusion. To illustrate the recognition of this type of privacy from the Islamic viewpoint, the Qur'an says: "O ye who believe! Enter not houses other than your own, until ye have asked permission and saluted those in term: That is best for you, in order that you may heed what is seemly. If ye find none in the house, enter not until permission is given to you: If ye are asked to go back: That makes for greater purity for yourselves: and Allah knows well all that ye do".[6]

This statement is a general guideline for Muslims' behaviour in recognising the importance of this type of privacy even when the one who is unwelcome is a close friend or relative. Most definitions of privacy emphasise the idea of information. Privacy does not require a physical and environmental isolation, but it may be expressed behaviourally and psychologically.

There is another type of privacy according to the Islamic way of life, which can be seen as an intense form of the state of Reserve in Islamic society. It is the Islamic value of privacy for women (known as *Hijab*[7]) as a result of Islamic teaching requiring women to cover themselves from strangers. Also, Muslim men and women are forbidden to intermingle freely unless the male is a *Mahram*.[8] 'Mahram' denotes

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[5]Koleini, M., Osoule Kaafi, Islamieh, Tehran, (Farsi translation of the original Arabic text), no date.

[6]Qur'anic verses (24:27-28).

[7] Qur'anic verse (33:59) states: "O Prophet! Tell thy wives and daughters, and the believing women, that they should cast their outer garments over their persons (when abroad): that is most convenient, that they should be known (as such) and not molested. And God is Oft-Forgiving, Most Merciful" [translated by Yousuf, A. A.].

[8]According to Qur'anic verses (24:30-31), a Mahram is a person in front of whom a Muslim woman may display her beauty (such as her hair). These are: her husband, her husband's father, her father,

a relationship either by marriage or close blood ties as identified by the Qur'an [verses 24: 30-31]. These teachings in social terms have resulted in the concept of segregation of the sexes in Muslim societies causing intolerance to mixed social functions and courtship before marriage.

Sex segregation also occurs between boys and girls of the same family in the places for sleeping, to provide complete privacy for girls. The prophet says: "Order your children to pray at seven, . . . and in sleeping separate them".[9]

As a result of the concept of sex segregation in the Islamic way of life, one may recognise the effect of this concept on the Islamic built environment, for instance in the entrance to the home or the number of bedrooms (at least three bedrooms; one room for parents, one room for boy/s and/or male guest/s, and one room for girl/s and/or female guest/s), or the visual permeability of streets etc.

Holahan identifies two psychological purposes served by privacy. The first is to manage and regulate social interaction between people, such as regulating the disclosure of personal information and maintaining group order. The second is to establish a sense of personal identity.

The notion of privacy and the desired type or degree of privacy depends on two factors according to Lang [1987]. The first is the standing pattern of behaviour in a certain culture, while the second is the personality and aspirations of the individual who is involved in that type of behaviour. Accordingly, failure to achieve the desired level of privacy may lead to negative consequences. For example, when the privacy achieved is less than that desired, then intrusion cannot be controlled. On the other hand, when the privacy achieved is greater than that desired, then isolation may occur. Both situations may lead to heightened stress levels as well as the reduction of one's self-esteem. Lang provides a summary of the definitions of privacy. He states: "Definitions of privacy have one thing in common; they stress that it has to do with

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her father's father, her son, her husband's son, her brother, her brother's son and her sister's son or small children who have no sense of shame of sex.

[9]Reported by Abu-Dawud on the authority of Amr ibn Shuaib on the authority of his father, on the authority of his grandfather.

the ability of individuals or groups to control their visual, auditory, and olfactory interactions with others" [Lang, 1987, p 145].

Personal and Social Space

Sommer defines the personal space as " . . . the space with an invisible boundary surrounding the person's body into which intruders may not come" [Sommer, 1969, p26].

Intimate distance: Intimate distance is the zone from zero to the point of physical contact (~ 45cm). According to Hall [1966] in this zone " . . . heat, smell from the other person's body, sound, smell, and feel of breath all combine to signal unmistakable involvement with another body". Therefore, this zone is reserved for people with intimate relationships. An uninvited stranger entering this zone is likely to face a strong reaction.

Personal distance: Personal distance is the zone from 45cm to 1.20m, which is considered as the proper zone for interaction between close friends. This zone allows a range of contact between people while communication possibilities continue to be rich. This zone enables people to stay in reasonable proximity or to move towards more/less intimate communication.

Social distance: This zone ranges from 1.20m to 3.50m. It is considered as the formal distance acceptable, for instance, in business settings, among co-workers, etc.

In this zone touching is not possible and most of the olfactory and heat cues are absent. Communication is this zone is made through visual or auditory cues. Outside this zone communication between people may be difficult.

Public distance: Public distance is the zone extending 3.50m beyond a person. This zone is used for very formal contacts such as those between an audience and a public speaker. Speakers often need to exaggerate their emotional expressions to keep contact and be understood by their audiences.

As mentioned earlier these zones were identified for people in North America. These however are not completely valid for every culture. They may differ, overlap, or be

defined differently from culture to culture depending on the way that people of the same culture perceive each other. Personal and social distances may be included in the intimate distance in a certain society. For example, according to Islamic teachings, Muslims during congregational prayers should stand in rows and fill the gap between them to present each row as a solid unit. Consequently, every one appears to be standing at an intimate distance to the one who is standing next to him/her. To solve the possible negative impact of this Muslims are asked to wear beautiful apparel as the Quran states: " . . . O children of Adam! Wear your beautiful apparel at every time and place of prayer . . ." [Qur'an 7:32]. Also the prophet recommended that Muslims should not eat onion or garlic without being cooked when intending to enter a mosque ". . . [those] who have eaten garlic, onion, or leek should not come near our mosque because angels are bothered by their smell as are children of Adam" ". . . if you have to eat it, then cook it first" [cited in Hakim, 1986, p147]. Another example from the Iranian community is that on Eids (special festivals) or when they meet for the first time they may kiss or hug each other.

1.2.2 Territoriality

Holahan defines territoriality as "a pattern of behaviour associated with the ownership or occupation of a place or geographic area by an individual or a group, and involves personalisation and defence against intrusions" [Holahan, 1982, p 256]. Several basic characteristics of territories have been defined by Lang [1987] which can be set out as follows:

1. A territory may be a place or an object owned personally or by a group on a temporary or permanent basis, whatever the size of the place or object.

2. A territory is often personalised or marked.

3. Defence may occur against intrusion.

4. A territory allows the fulfilment of many of the basic needs mentioned previously graded from physiological to cognitive and aesthetic needs.

According to Lang [1987] territoriality serves as a basis for the development of a sense of 'identity', 'stimulation', and 'security' as well as a basis for a 'frame-of-reference'. 'Identity' involves belonging, self-esteem, and self-actualisation. 'Stimulation' is concerned with self-fulfilment and self-actualisation. 'Security' is to be free from censure and outside attack as well as to posses self-confidence, while a 'frame-of-reference' is that which maintains one's relationship with others and the surrounding environment.

On the basis of the observation of territorial behaviour, Newman has developed the concept of 'defensible space'. He has defined defensible space as "A model for residential environments, which inhibits crime by creating the physical expression of a social fabric that defends itself" [Newman, 1972, p 3]. According to Newman, the goal of the defensible space is to translate latent territoriality and sense of community into the responsibility for ensuring a safe, productive, and well-maintained living space. Newman also identifies several characteristics of the layout of the environment in order to satisfy this goal. Some of these characteristics are:

1. Encourage people to care about their surroundings through the subdivision of the residential environment. The subdivision of the residential environment should consist of a well-defined and clear graduation of territories that are graded from private to semi-private to semi-public to public. Such a hierarchy of territories, according to Newman [1972], is essential to the feeling of well being as well as providing people with a sense of security by distinguishing a neighbour from an intruder.

2. Encourage people to keep watching over their territory- what Jacobs calls 'eyes on the street' [Jacobs, 1961] - in order to optimise natural surveillance.

Altman & Chemers [1984] distinguish three levels of territories as primary, secondary and public territories.

Primary Territories refer to spaces that are very important in the lives of their occupants such as personal room, home, etc. These territories are owned by

individuals or groups and are permanently controlled by their owners. Uninvited intrusions are considered a severe offence.

Secondary Territories bridge between primary and public territories. These are less restrictive than primary territories in the sense that they are not necessarily owned by the specific individuals or groups. But these territories are used by certain groups (community) or individuals who know each other and share common values thus involving a shared responsibility for up-kcep that gives them a certain degree of authority over the place. Examples of these territories are the internal foyer of a residential building, a cul-de-sac, a local mosque, etc. Although short time users are not totally barred from these territories they can feel the presence of the long-term users of the place by noticing that they are being watched.

Public Territories are neither owned nor controlled on a long-term basis by individuals or groups. These spaces are open to use by any member of the public on a short-term basis such as main roads, parks, Friday mosque, etc. However, even within public territories certain minimum social codes need to be observed by the users.

In Islam there is a strong emphasis on the principle of ownership that requires utmost respect for the property of the others through the Qur'an and the sayings of the prophet Mohammad (SAWA). The Qur'an lays down the basis of this principle "And withhold not things justly due to men, nor do evil in the land, working mischief" [verse 26:183]. This has been repeatedly emphasised in the sayings of the prophet of Islam for example, "if somebody plants in someone else's land without their consent, then he has no claim to it or to its initial cost" [cited in Hakim, 1987, p149]. Thus, "the ownership and integrity of a property (land, building, etc) must be respected and no action is allowed which will depress its value or usefulness or create nuisance to its owner" [ibid. p20].

Islam acknowledges different levels of the territory and defines legal jurisdictions over each one when dealing with each type of territory. In the Muslim built environment the move between public and private territories follows hierarchical levels of access from public to semi-public to semi-private to private territories. In

this case the secondary territory, which was identified as a bridge between private and public domains, is divided into semi-public and semi-private domains. Semi-public is the first area leaving public territory and entering secondary territory. Semi-private on the other hand, is the last stop before entering private territory. For example, a public thoroughfare is considered public territory, an alleyway as semi-public territory, the dead-ends off the alleyway leading to the houses are semi-private and the houses are considered as a private territory. These four levels of territory are explained in the following with attempts to relate them to Islamic teachings.

Private Territory

Private territory is owned, used, and controlled exclusively by individuals or groups. Islam approves the concept of private territory since it is important to a person or group's well-being. The prophet says: "The blood, property, and honour of a Muslim must be sacred to every other Muslim".[10]

According to Qur'anic verses 24: 27-28 (see the discussion of *Reserve* on page 16) the owner of a property is entitled to defend it when uninvited intrusions occur, even if such defence results in the death of the aggressors, since such a situation may present a threat to the owner's self-identity.

Semi - Private Territory

These areas tend to be owned, controlled, and used in association with their inhabitants. Muslim jurists always make distinctions between public spaces and semi-private spaces in judging the legality of residents' actions. For example it is agreed among all jurists that a dead-end street is considered private property in which action by any party will be permitted if all parties agree and the principle of damage is not violated. The principle of damage is established in the Hadith; as the prophet Mohammad (SAWA) says: "Do not harm others or yourself, and other should not harm you or themselves" [cited in Hakim, 1986, p 152].

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[10]Reported by Muslim on the authority of Abu-Hurairah.

Semi - Public Territories:

These areas are owned by a large number of people or by institutions. Those residing close by exercise some possession and control over them such as the throughways or the open spaces of a certain neighbourhood. According to Islamic law, action by any individual in a semi-public territory such as a throughway will be permitted as long as no one objects and the principle of damage is not violated.

Public Territories

These areas may be used by individuals, groups or by the residents of the whole village or town collectively with no exception. Such territories, according to Islamic teaching, are legally owned, used, and controlled by the public collectively and not owned by the authority in order to avoid ownership. So, public territories in urbanised areas may not be restored, improved or otherwise changed by any individuals whatever their size since they relate to the Muslims' interests; for example mosques and public streets. On the other hand, public territories such as wide streets may be used for sitting, selling, or buying goods since these does not harm the passer-by. To illustrate this, "the prophet said: . . . avoid sitting on a thoroughfare. They said it is difficult to avoid, as it is our gathering place where we spend time talking. Then the prophet said: but if you insist then you should respect the rights of thoroughfares. What are these rights, they asked. The prophet said: avoid staring, do not create harm, salute those who salute you, bid to honour and forbid dishonour" [cited in Hakim, 1986, p 147].

In general, the significance of the various types of territory is to help people to predict the types of behaviour and activities that can be expected in a particular territory. For example, one may feel released from all public obligations in private territories, whereas in public territories certain norms and obligations require certain behaviour. Moreover, territories help to develop and maintain social organisation. It is important to realise that in order to achieve and form successful territory types one should understand the nature of the man-surrounding relationship in each case since each type is usually accompanied by certain levels of responsibility.

1.2.3 Other Social Characteristics Affecting Housing

Apart from those personal and social behavioural characteristics that have been discussed earlier there are other social characteristics that affect the design of housing. These are household characteristics and neighbourhood characteristics, which are explained in the following.

Household Characteristics

One of the basic factors in housing design is to respond to changing household characteristics and the family cycle, which influence, for instance, organisation, composition, structure, and size. As a result of this change, the physical space requirement also changes. A conflict occurs with the fluctuating family organisation if it occupies an inflexible physical space at a particular period in time. For example, when a family needs an additional bedroom or more recreational space, it cannot easily increase or expand its space unless it occupies a semi-detached or a detached single-family house. But such expansions become quite difficult unless the design provides a specific spatial structure that allows expansion and contraction of the dwelling. In like manner, when the family becomes smaller, the physical space requirements diminish to a degree. Again, a situation exists where the physical space does not match the family needs.

Neighbourhood Characteristics

A neighbourhood is a complex entity. It involves a place (location, topography and natural environment) and people (demographic characteristics and patterns of social need). Aspects of the physical setting of the neighbourhood in which the family lives (for example, distances to services and facilities and proximity to the city centre) are also important.

Neighbours are persons who live in close spatial proximity to one's home base. They must be distinguished from both relatives and friends. The relationship with a neighbour is usually less intimate, personal, and involved. Moreover, while friendship is a private affair, the neighbour relation has collective social implications in a restricted spatial area.

People who live in the new housing schemes of Tehran are from many different areas of the country with different backgrounds. The result of this is that the sense of community spirit in the new settlements is not as strong as in the old settlements. In many cases people in apartment blocks do not know their next-door neighbours. In contrast, experience shows that in smaller communities almost all neighbours know each other and care about one another. It is generally agreed that one of the reasons for needing tighter security is the fear of the unknown. One feels more safe and secure in a settlement where one knows one's neighbours. This requires the provision of a friendly environment and informal places for neighbours to meet and socialise.

Neighbourhood – Community

It is relevant here to elaborate the differences in the meanings of the word 'community' and 'neighbourhood'. It is important to distinguish the differences between these two words, as often they are used interchangeably without paying attention to the fact that neither all communities are based in neighbourhoods nor can all neighbourhoods necessarily create communities. Community refers to people. It is formed by people who want to live close by others, sharing their social customs, sharing their happiness with others, caring for their neighbours and helping them in difficult situations, etc. The spirit of community motivates people to care for their neighbourhood, take part in the management of the day-to-day affairs of their neighbourhood, and creates a feeling of being part of the whole community. Membership of a community happens through understanding, accepting, respecting and abiding by the commonly agreed hidden/obvious rules and values of the community. Being a part of a tightly bound and prosperous community gives people the feelings of protection, affection and pride. Neighbourhood refers to the physical built environment that, presumably at its best, is designed by architects and is built according to people's spatial needs. Architecture, however, does not create community though it can make a difference in promoting/demoting the sense of community by providing/denying a neighbourhood the right spatial structure and sufficient services and facilities that it would require to function properly. It is believed that gaining full understanding of the socio-cultural background of the

society is vital for architects to base their neighbourhood design in a way that can help in the establishment of sustainable communities.

Social Values in a Muslim Community

Social ties: The social nature of human being gives people a strong desire for being in the company of others. Many aspects of an individual's personal characteristics would not flourish in isolation. In fact, losing the company of other people, specially loved ones, can have such depressing effects on people that offering and/or removing/obstructing companionship has long been used for the purposes of the reward/punishment of people. Some people willingly sacrifice their own personal wants to gain others' companionship. This strong desire for affiliation is further manifested in the needs for belonging to a house, to a community, to a city, etc. People adapt to living with each other in order to enjoy the benefits of living in a community. Where people live together they gradually develop social codes which, if the community sustains them for a long time, become rules that all community members are expected to acknowledge. Through these shared values the spirit of the community and a sense of belonging to a particular place are then developed. This feeling in Islamic culture is the basis of common understanding which, if achieved, results in high morality, the unity and strength of the community that is an important factor in improving people's quality of life in an Islamic society.

Spirit of the community: Muslim society is known for the close community ties among its members. The notions of brotherhood and neighbourhood have deep roots in Islamic teaching. For example, verse 33:6 of the Qur'an reads "Blood-relations among each other have closer personal ties, in the Decree of God. Than (the brotherhood of) Believers and Muhajirs: nevertheless do ye what is just to your closest friends: such is the writing the Decree (of God)" [translated by Yousef, 1983]. Also, there are many Ahadith from the prophet (SAWA) himself and A'emmeh (AS) suggesting the importance of neighbourly relationships in the Muslim community. The concept of neighbourly rights (see 1.3.4) and the definition of neighbour and scale of a neighbourhood (forty houses in each direction from one's house are considered neighbours) all show the importance of good relationships amongst

Muslims in their communities. Barati [1997, p116] argues that in large communities shared cultural values and traditions enables people from different social classes to form a coherent society. People with different status (e.g. rich and poor, farmer and worker, etc.) living side by side in a neighbourhood can create a balanced community in which religion, customs and economy are equally important to all members. For example in traditional quarters of Iranian cities neighbourhood relations that were regulated by religious values made the social group of a *mahalleh* (residential district) one big family.

Muslims are advised to be caring to one another. Just a few of the prophet Mohammad's many sayings on this are: " whoever started his day without intention of serving other Muslims is not a Muslim", " Do not harm others or yourself, and others should not harm you or themselves", "God will not provide security to the person who sleeps with a full stomach while his adjacent neighbour is hungry", "to God the best friends are those who are good to each other and the best neighbours are those who are good to each other", "Of happiness: a good wife, a spacious home, a good neighbour, and a good mount" [cited in Hakim, 1987, p149-153].

Equality: Improving morality certainly has positive impacts on strengthening the community ties amongst Muslims. Respecting the elderly, caring for the weaker members of the household and/or society, forgiving when angry, donating even small amounts, etc. are a few examples of attitudes highly valued by Islamic teachings. Islamic belief denotes that all people are equal before Allah. Therefore there is no distinction between black/white, slave/free, man/woman, wealthy/poor, tall/short, villager/urban settler, etc. The only thing that distinguishes people is their level of piety (*Taqwa*). Discrimination on the basis of, for example, wealth, appearance, colour, race, etc. is socially undesirable in Muslim society. Those who do such acts are considered ignorant and lose their social status. In particular showing off wealth to the needy is socially unacceptable in Muslim society. Instead the wealthy are ordered to give part of their earnings to the needy and this is not considered as charity but the right of the needy. The concepts of *Khoms* (a fifth of disposable annual income) and *zakat* are Islamic taxes on earnings and are different from *Sadaqat* (charity). However, the poor and needy have the right to the *Beyt-ul-mal* (treasury).

Therefore, they do not have to rely on the wealthy people's charity. Masaud [1996, p 168] argues that this system of welfare for protection of the poor and the weak was first introduced by Islam.

Waqf: The Islamic tradition of *Waqf* (endowment) is considered to be mainly rich people's way of contributing to the improvement of their societies. It has proved to be very important in the establishment of certain public institutions such as mosques, schools, libraries, hospitals, etc. in Islamic societies. This practice often includes donation of a continuous fund for a specific charitable purpose from a person's estate after his/her death; for example donation of a piece of land for building a mosque. In many cases people donate their houses or agricultural lands for the cost of maintenance of a mosque, a hospital, a school, etc. According to Islamic law a property donated for waqf can never be sold. In those instances the property is leased for a certain length of time and its revenue is spent on the specified purpose/s.

Simplicity and admiration of beauty in Islamic culture: Muslims are brought up to constantly monitor and improve their morals. The ultimate objective of a Muslim's life is to reach Allah by pleasing Him with their good deeds and avoiding arrogance. To become the slave of God is the greatest honour that people such Messengers of Allah (prophets) have managed to attain. Muslims are taught to avoid resorting to extremes in their decisions and it is always better to keep on the middle path (i.e. live in balance).

On many occasions the Quran refers to various elements of the natural environment – such as sky, earth, water, figs, olive and palm trees, camels, horses, ants, bees, as God's creations. In order to strengthen their belief, to understand His greatness, Muslims are asked to look deeply into Allah's creations. Aesthetic admiration of the nature and the built environment has deep roots in Islamic culture. The prophet Mohammad (SAWA) says "Allah is beautiful and He likes beauty" [Sahih Muslim]. Also, in many verses of the Qur'an natural and environmental terms are used to explain the beautiful characteristics of heaven. These are but a few examples to illustrate how deeply rooted is the idea of living in balance with nature and aesthetic admiration of its beauties in Islamic culture.

The inward orientation of Muslims' built environment is said to have been a reflection of Islamic teachings. While houses are very simple to look at from outside their internal spaces are beautifully arranged, which creates a highly satisfying, and at times to a degree luxurious and pleasing quality. While Muslims are encouraged to utilise all the resources God has provided them to improve their quality of life, excessive use and spoilage of the resources of nature are prohibited.

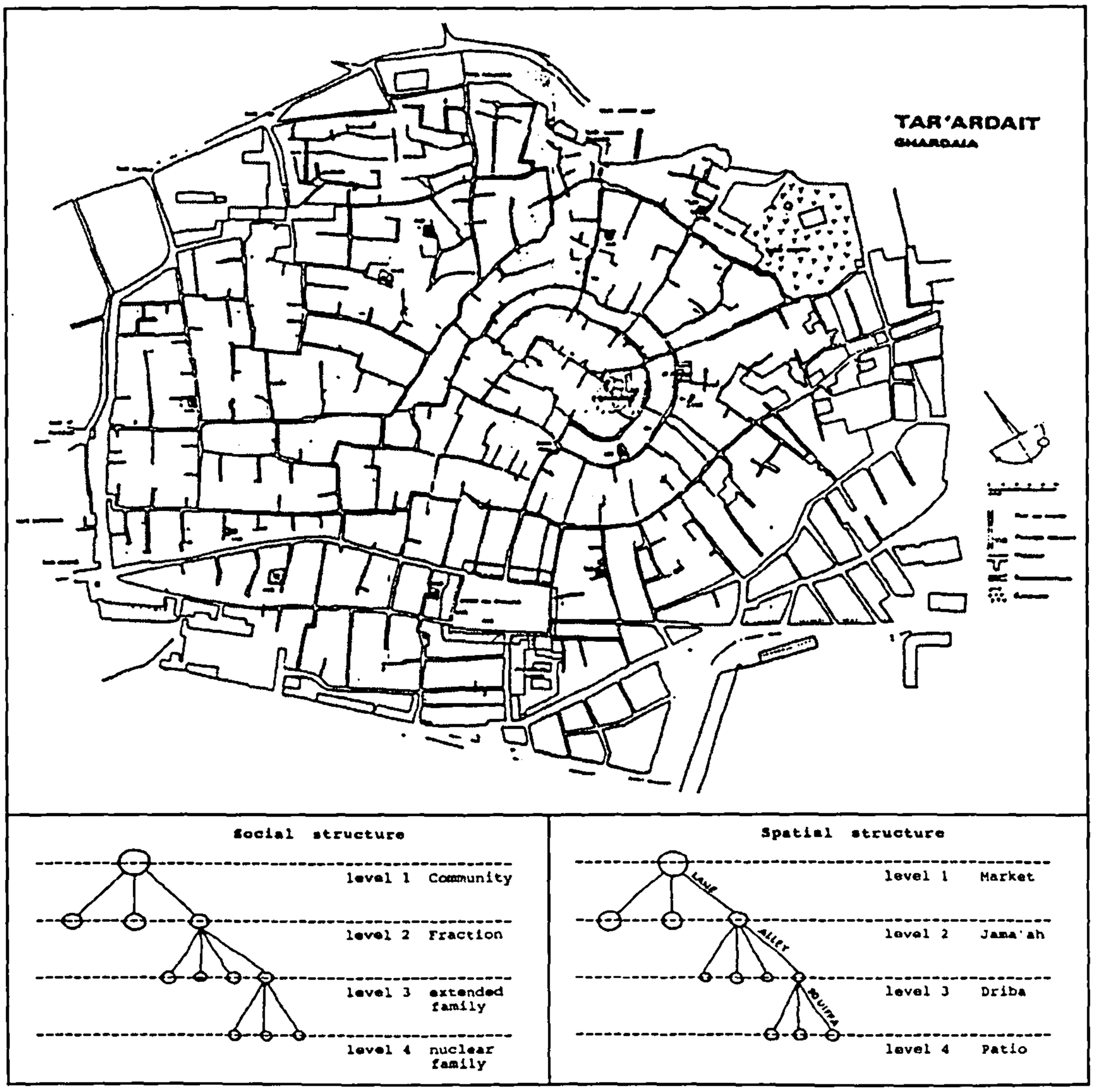

Figure 1. 1 **[Top] Ghardaia - Algeria, example of Urban spatial structure in an Islamic city. [Bottom] Illustration of the degree of conformity of the spatial structure in Islamic city with its social structure.**

Source: Frey, 2000/2001.

Muslims believe that the beauties of this world are nothing compared to what Allah has prepared in heaven for true believers. Nevertheless, Muslims are time and again reminded that strong attachment to this world distances them from their ultimate aim,

and that they need to purify their souls and prepare themselves for their final journey and rejoining the creator.

All the above mentioned values as well as many other social teachings of Islam, in one way or another, have implications for Muslim built environments. The physical forms of Muslim environments have been adapted to conform to these teachings. Dr Frey (2000/2001) argues that the social structure of Islamic society is reflected in the spatial organisation of Islamic urban settlements (see Figure 1. 1 & Figure 1. 7).

1.3. THE CONTEMPORARY ARCHITECTURE IN IRAN

1.3.1 Introduction

When the contemporary period of architecture began in Iran - about 80 years ago - it had behind it an almost unbroken 3000-year rich architectural heritage of many extremely valuable works; works that, naturally, could not be ignored. Since 3000 years ago when the most ancient building in Iran, the ziggurat of Chogha-Zanbil, was constructed (in 1250 B.C.) architecture has always been important in this country and architectural activity has always been strong. Many noteworthy works have been created in different parts of the country, works that have also played an important role in the development of world architecture at various historical periods.

Islam was introduced in Iran about 1400 years ago, and the world-view associated with it influenced architectural works in such a way that it made them qualitatively different. Yet, a strong bond persisted between pre-Islamic and Islamic eras in Iranian architecture. Both the pre-Islamic era and the Islamic period, until Safavid times, constitute important epochs in the history of Iranian architecture. Although during the 400 years that have passed since the demise of the Safavid dynasty, Iranian architecture has not been able to maintain its prominent position in the world, and in this respect it has regressed, valuable works of architecture were created up to the beginning of the contemporary period,.

Mirmiran [1999] divides the last 80 years of Iranian architecture into four distinguishable periods. During the first period (1921-1941) the government, in a rush for modernisation, hired a number of European architects to build numerous

buildings in a western style. At that time anything from the west was perceived modern and desirable and anything from home was old and unfashionable. A number of Iranian students went to European countries to study architecture. In the second period (1941 to the late 1960s) the Iranian architects who graduated from European architectural schools (mainly Beaux-arts Paris) returned home and managed to design and build a number of modern buildings in the country. During this period Iran's first modern school of Art and Architecture (later the Faculty of Fine Arts - Tehran University) was founded. In the third period (starting from the late 60s until the Islamic Revolution) the country enjoyed a period of stabilisation, and as a result of an increase in oil revenue the economy was booming. The number of architectural schools increased to three (all in Tehran) and some graduates of the Iranian architectural schools managed to create a number of monumental and memorable architectural works. The fourth period started just after the Revolution and has continued up to the present. During this period a number of Iranian graduated architects began to question the appropriateness of the previous architects' approach in their works in borrowing ideas from the west and simply mixing them with the exterior shape and form of Iranian architecture without understanding its values and the philosophy behind it which resulted in the meaninglessness of architecture, loss of identity and the breakage of the link of Iranian architecture with its past. A new movement in contemporary Iranian Architecture had begun.

Although a number of architectural schools have recently been established in some provincial capital cities, for the time being most of them only train technicians of architecture, not architects. The establishment of local architectural schools is a sign of positive change in supporting local production and strengthening the spirit of self-reliance in other cities while distancing them from Tehran dependency (the centralised system). But, it is obvious that it would take time and lots of effort for these schools to become effective in their mission. However, these facts emphasise the importance of the current position of Tehran and indicate the extent of the responsibilities of the government and Tehrani architects and urban planners in setting good examples for the rest of the country.

Mirmiran states that "the modern architecture of Iran has always kept an eye on its past architecture and has attempted to maintain its bonds with the past and to continue its traditions. This backward look of the modern Iranian architecture has been for the most part, superficial, failing to conform to its general spirit, failing to utilize and to develop its principles. This constant concern about the bonds with the past and the failure to create an architectural movement that can be a worthy continuation of the past architecture of Iran and which can contribute to the modern world architecture as well, has inspired some Iranian architects to explore new grounds on the basis of the experience gained from the past decades, forming a new movement within the modern architecture of Iran" [Mirmiran, S.H. 1999, p44]. He argues that "an analysis of Iranian architecture shows the evolution of architecture has been mostly an improvement of principles and models, used throughout history, rather than creation of new ones. If we accept this fact, the question can be asked: can we not rely on these same principles and models in contemporary architecture and creatively improve and advance them? A positive answer to this question was the impetus behind the idea of basing our work on the principles of the past architecture of Iran" [ibid. p45]. According to Mirmiran this movement strives to create works of architecture that are an evolutionary continuation of the past architecture of this ancient land, but at the same time, occupy an important position in contemporary world architecture. Since this movement has not yet found its proper forces and individuals, and has not yet expounded its viewpoints, it can be regarded as being still in the process of formation.

The architectural heritage of all humanity shows that there has always been a strong link between architecture and culture, politics, economy and the national sovereignty of the nations during the course of history. In Iran, too, whenever a powerful government managed to establish security and stability in the whole country over a long period of time, art and science began to flourish. The Khorasani (7^{th}-10^{th} centuries), Razi (10^{th}-14^{th} centuries), Azari (14^{th}-16^{th} centuries) and Isfahani (16^{th} – 19^{th} centuries) architectural styles - identified by Pirnia, [1999] - highlight the aforementioned link. In fact, choosing these names to distinguish different architectural styles is based on the names of the capital cities of the country in different times (i.e. Khorasan, Ray, Azarbayjan and Isfahan). Obviously, because of

the centralised system of government in Iran, the capital cities usually attracted the best artists and scientists of the time. The financial and political support of the government enabled them to materialise their talent in creating great pieces of work. These works, in one way or another, influenced artists in other cities in Iran. In the case of architecture, what was built in the capital city would usually be promoted and considered as desirable designs elsewhere. This in time formed the bases of a national architectural style, which spread all over the country.

To some extent the same is happening at the present time in Iran. Since two centuries ago, when Tehran became the capital city of the country its importance as the role model for other Iranian cities has been increasing all the time; especially in the second half of the twentieth century. Architects of other cities in Iran usually borrow ideas from what is built in Tehran, most of the time with minimum or no regard to local socio-cultural and environmental conditions. This is, perhaps, because until about ten years ago all Iranian schools of architecture were concentrated in Tehran. It would not be surprising if the graduates of Tehran's architectural schools, who teach or practise this profession in other cities of Iran, have constantly kept an eye on what was going on in Tehran.

The historical study of Iranian Civilisation indicates that Iran has suffered several long wars and mass destruction from either invading forces (e.g. Romans, Arabs and Mongols) or nature. But in the periods of peace and stabilisation the country was able to produce numerous architectural works which are now renowned and are internationally recognised. UNESCO now designates many of these masterpieces as *world heritage sites* belonging not only to Iranians but also to the whole of humanity. Iran's rich architectural heritage is existing evidence to the fact that Iranian culture has the potential to enable Iranian artists to adapt the latest changes of each time to the benefit of the nation and the self-improvement of Iranian culture.

The richness of Iranian culture has also influenced other nations, even the invading Romans, Arabs, and Mongol rulers. A famous example of that impact is the Mongol ruler Uljaytu (an Ilkhanid king) who was fascinated by the Iranian culture. He converted from Christianity to Shia and was eager in spreading Iranian culture while

serving the cause of Islam. He changed his name to *Sultan Mohammad-e Khoda-bandeh* (meaning Sultan Mohammad the slave of God). He built the city of Sultaniyeh and made it his capital (1304-1316). He ordered the construction of the Sultaniyeh Dome with the intention of transferring the tombs of four Shia Imams from Iraq but he cancelled his decision due to certain objections towards that move [Erfani, H. 1998]. Eventually, after his death the Dome became his own mausoleum (see Figure 1. 2).

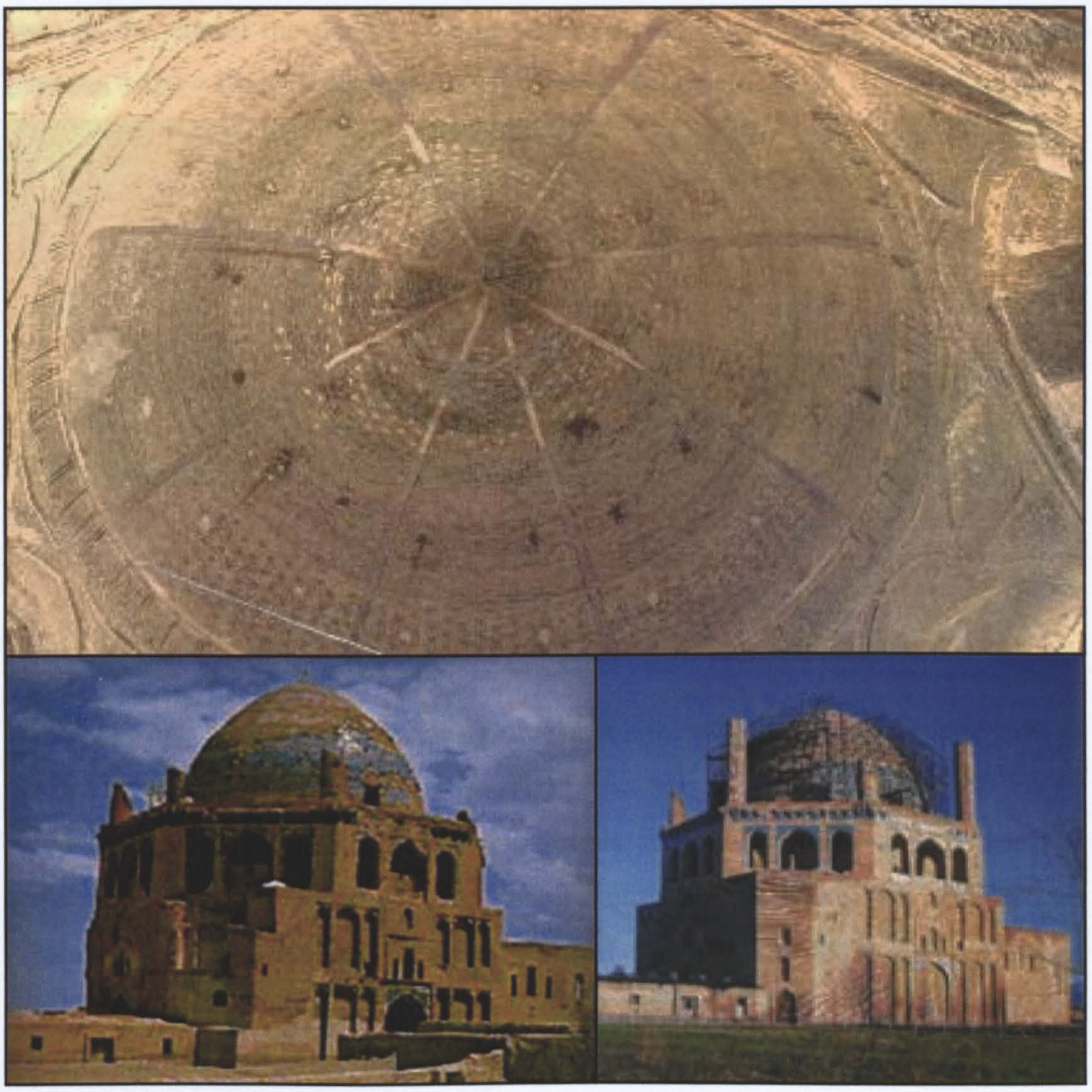

Figure 1. 2 **[Top] Illustration of a dome with its central apex.**
[Bottom] Sultaniyeh Dome, Iran.
Source: [Top] http://isfahan.anglia.ac.uk/ [Bottom,-L] www.itto.org/attract/soltan/index.htm. [Bottom-R] www.iccim.org/iran/11/z1-450.htm.

The Sultaniyeh Dome - an outstanding religious building - is a masterpiece of brick architecture, which is unique in its kind. It is intact after 700 years with a height of 52

meters, a 26-meter dome mouth, a 7-meter wide foundation and an octagonal shape. This building comes in three stories, a cellar and 32 rooms in the form of yards and vaults [www.itto.org/attract/soltan/index.htm]. The Sultaniyeh Dome is the biggest double-layer brick-dome ever built in Iran [Akbari, 1998]. It is said that in order to minimise the weight of the Santa Maria Del Fiore Dome (*cupola)* in Florence the Italian renaissance architect Filippo Brunelleschi borrowed the idea of the Sultaniyeh Dome [Mokhlesi, 1999]. With a diameter of 43m and height of 91m (30m from the base of the dome) the double *cupola* was designed in 1418 and was constructed between 1420 – 1436 [www.mega.it/eng/egui/monu/ bdd.htm].

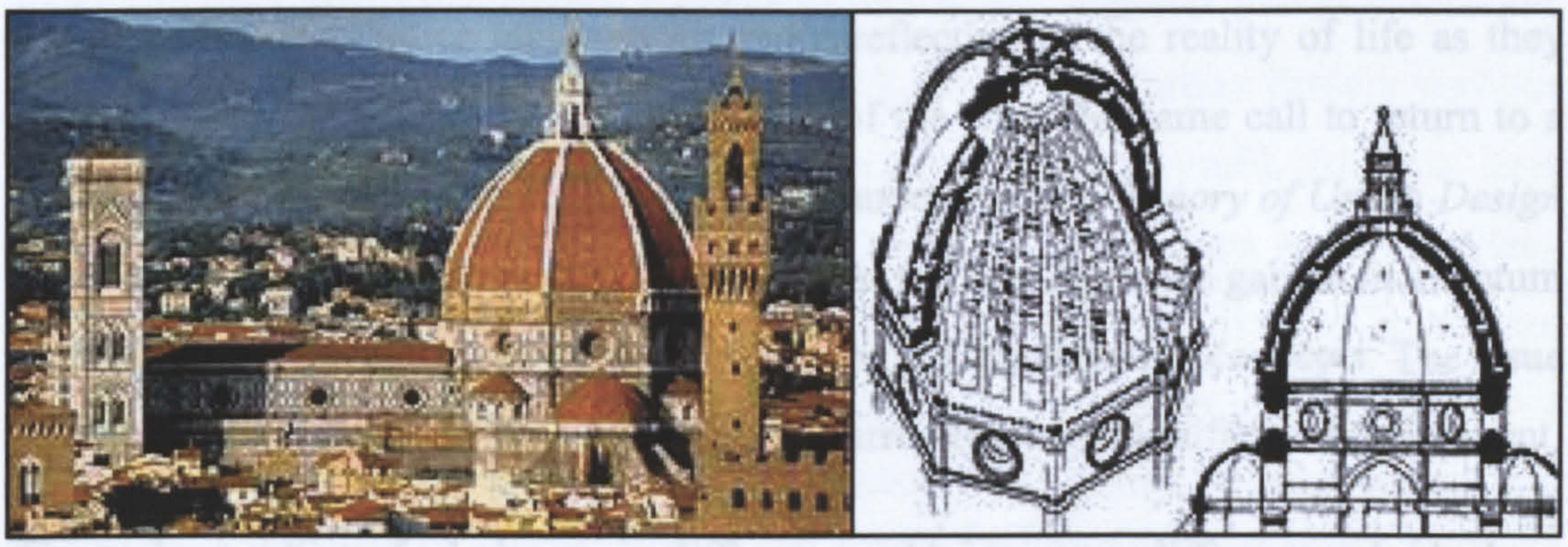

Figure 1. 3 Illustration of the Santa Maria Del Fiore Dome in Florence, Italy.
Source: www.mega.it/eng/egui/monu/bdd.htm

1.3.2 Holistic Approach in Iranian Architecture

It has been argued that Iranian architecture has traditionally had a holistic approach in the design of urban settlement and housing [Tavassoli, M. 1992 & Barati, N. 1997]. A whole entity is something more than simply the accumulation of its parts. For instance, the words individually bear specific meanings, but when put together in a poem they are elevated and create a whole that can touch one's soul and move emotions. A whole has qualities that could not possibly be seen in the constituents. To elaborate this the same thing happens in all other areas of art like painting, music, architecture, etc., Barati argues "a whole gives definition to its parts, the significance of the parts, seen individually, will not be the same as when they are embedded in the whole" [Barati, N. 1997, p199].

The holistic approach is not specific to Iranian architecture but after modernism holism had to be rediscovered in architecture. Realizing the damaging effects of the

mechanistic approach of the modern movement, which was based on an atomistic worldview in architecture, many professionals in this field began to criticize it from the 1960s. For example, Christopher Alexander in *A City is not a Tree* [1965] criticises the modernist approach in urban design for separating all the functions within a city. He argues that those cities or parts of cities that have been deliberately created by designers and planners (what he calls *artificial cities*), lack many necessary qualities as they were designed based on the visualization of the city as a tree with separated individual ends of branches. He argues that those cities which have arisen more or less spontaneously over many, many years (what he calls *natural cities*) with a semilattice structure are more reflective of the reality of life as they realise the overlaps between many functions of the city. The same call to return to a holistic approach is the foundation of C. Alexander's *A New Theory of Urban Design* [1987]. The debate on the need to see the city as a whole has since gained momentum and resulted in a widespread desire to return to traditional design concepts. The issue of holism (for instance in housing design) is currently a very significant development.

The understanding of wholeness in different worldviews may differ as each ideology explains the world according to the way it wants to see it. Barati [1997] explores in detail the Iranian view of wholeness within a wider spectrum of an Eastern view in comparison with a Western. Quoting Capra [1975], he argues that "the Eastern view of the world is organic. For the Eastern mystic, all things and events perceived by the senses are interrelated, connected, and are but different aspects or manifestations of the same ultimate reality" [cited in Barati, 1997, p213]. Although Eastern cultures have their differences in many ways they all emphasise the totality which comes from their common point of view in believing in the unity of the existence. An example of this is the ancient Chinese epistemology of the unity of the opposites such as Yin and Yang [ibid. p215].

Similar to other Eastern cultures Iranian culture also takes a holistic worldview. This view is also strengthened by the teachings of Islam, which has long been established as the main religion of the whole country. The first pillar of Islam *Tawheed* (the unity of God) firmly bases Islamic belief on the unity of existence. Islamic teachings such as "God alone is the Creator of the whole world", "*Insan* (humanity) is an image of

the Creator and His *Khalifa* (representative) on earth", and "we are all from Him and we all will be returning to him" in the Qur'an indicate the bases of the holistic approach in the Islamic worldview. In the Islamic point of view a person himself/herself is a unity, the family is a unity, society is a unity, the Muslim nation is a unity, the whole humanity is a unity, and the whole world is a unity. Barati argues that the holistic approach in Islamic art and architecture has its roots in the "unity of existence - *Wahdat-e Wujood* - in the Islamic view of the world" [Barati, pp197-198].

Since the beginning of Islam Iran has always played an important role in the Islamic World. At the time of the rise of Islam in Saudi Arabia the Persian Empire was one of the two powerful civilizations surrounding the Islamic world. Iranians have accepted the call of Islam with minimum resistance. Both Iranians and the Islamic army benefited from this. Iranian people enjoyed the freedom Islam offered them from their oppressor kings while Islam's army, mostly Bedouin Arabs, accessed a civilization with thousands years of rich cultural background. Iranian artists and architects demonstrated great ability in implementing Islamic teachings in their works. The connection between these two cultures has resulted in the creation of the bases of what is today known as Islamic Art and Architecture. Quoting Nasr (1973) Barati argues that "Persia has been regarded in Islamic history as one of the outstanding centres for what is known as Islamic art, and its architecture is one of the richest to be found anywhere. By taking the most fundamental principle of the Islamic tradition, namely unity (Tawhid), Persian architecture of the Islamic period has sought to integrate all its features as to lead to this unity" [Barati, 1997, p218].

An example of the implication of the holistic interpretation for the built environment in Islamic society is the mosque. Although believing God is everywhere the prayer hall of the mosque is symbolically the place where God and Mankind meet and can converse. The natural symbol for this is the Universe, which expresses the infinite creativity of God while enclosing mankind in a protective space. The mosque is built for the purpose of providing a calm and peaceful place for daily prayers with the intention of directing the central focus of the prayers' attention to the creator of the world, Allah. To achieve that purpose the architecture of the mosque is designed in a

way to detach the prayers' mind from earth (as a symbol of this mortal world) and guide it towards the sky (as a symbol of eternity). Amongst the innumerable ways of concretising the Universe the architects of Iran developed the concept of a dome. Choosing the shape of the dome, which ends in a point, for covering the main praying hall in the mosque has proved to serve the above mentioned purpose well. The dome is thus a shape of great symbolic importance which must be replicated through the properties of matter (see Figure 1. 2).

It has been argued that in pre-Islamic Iranian architecture domes were used in the construction of palaces to mirror the architecture of the heavens. "They took on an astrological or mystical significance in Iranian architecture and came to symbolise mankind's attempts to create a heaven on earth. The dome thus becomes a symbol of the cosmic house of God, which in turn has a dual meaning of the House that God inhabits - Heaven, and the house that encompasses Man - The Universe. The dome acts therefore as a transition between the infinite unity of its central point, through the duality of its symbolism into the materialisation of the four-sided chamber which supports it and which symbolises the fourfold nature of mankind" [cited in http://isfahan.anglia.ac.uk].

Many Iranian cities (such as Isfahan, Kerman, Yazd, Kashan, Dezful, Behshahr, Gorgan, Rey, Shiraz, etc.) can be named as practical illustrations of the holistic approach used in Iranian architecture and urban planning. Isfahan is an example originally formed in the pre-Islamic era. Some people argue that it even pre-dates Alexander the Greck conqueror. Rafiei-Mehrabadi, [1974, pp2-3] argues that Alexander rebuilt the city of Jey in the location where present-day Isfahan stands on the ruins of the previous city. In the sixteenth century the Safavid King Tahmasb II decided to transfer Iran's capital city from Qazvin to Isfahan.

The infrastructure of the new capital city, including main roads, *Chār-bāgh* (boulevards), *Maidān* (the square), *Bāzārs* (markets), *Masjid-e Jāme'* (Friday mosque), palaces, *Dārougheh* (police station), *Diwān* (administrative buildings), *Maridh-khāneh* (hospital), *Mahāllt* (districts, neighbourhoods), etc., were constructed

before the capital was officially transferred to Isfahan in the 1580s AD (see Figure 1.4).

A similar approach was taken by the Safavid King Abbas-I in building Ashraf-ol Belad (currently known as Behshahr - located in the north of Iran south of the Caspian Sea) as his second capital city, where he resided during spring and summer [Asgari, A. 1971]. In other places such as Yazd, Kashan, etc. where the city formed and gradually developed the same holistic view, development resulted in a consistency of form, while individual buildings vary considerably in form and function, creating a beautiful harmony in the entire city. For example, the general understanding of and respect for the inhabitants' private domains in old Iranian cities have resulted in the common practice where space above a certain height was considered as public domain within which buildings like mosques would be constructed. All the private buildings (e.g. houses) would respect this limit and would not exceed a certain height. The holistic approach of Iranian traditional architecture can even be seen in the design of individual houses. However, lack of identity and disharmonious developments in the modern areas of our cities such as Tehran appears to be the consequence of the loss of that holistic approach (see Figure 1. 5).

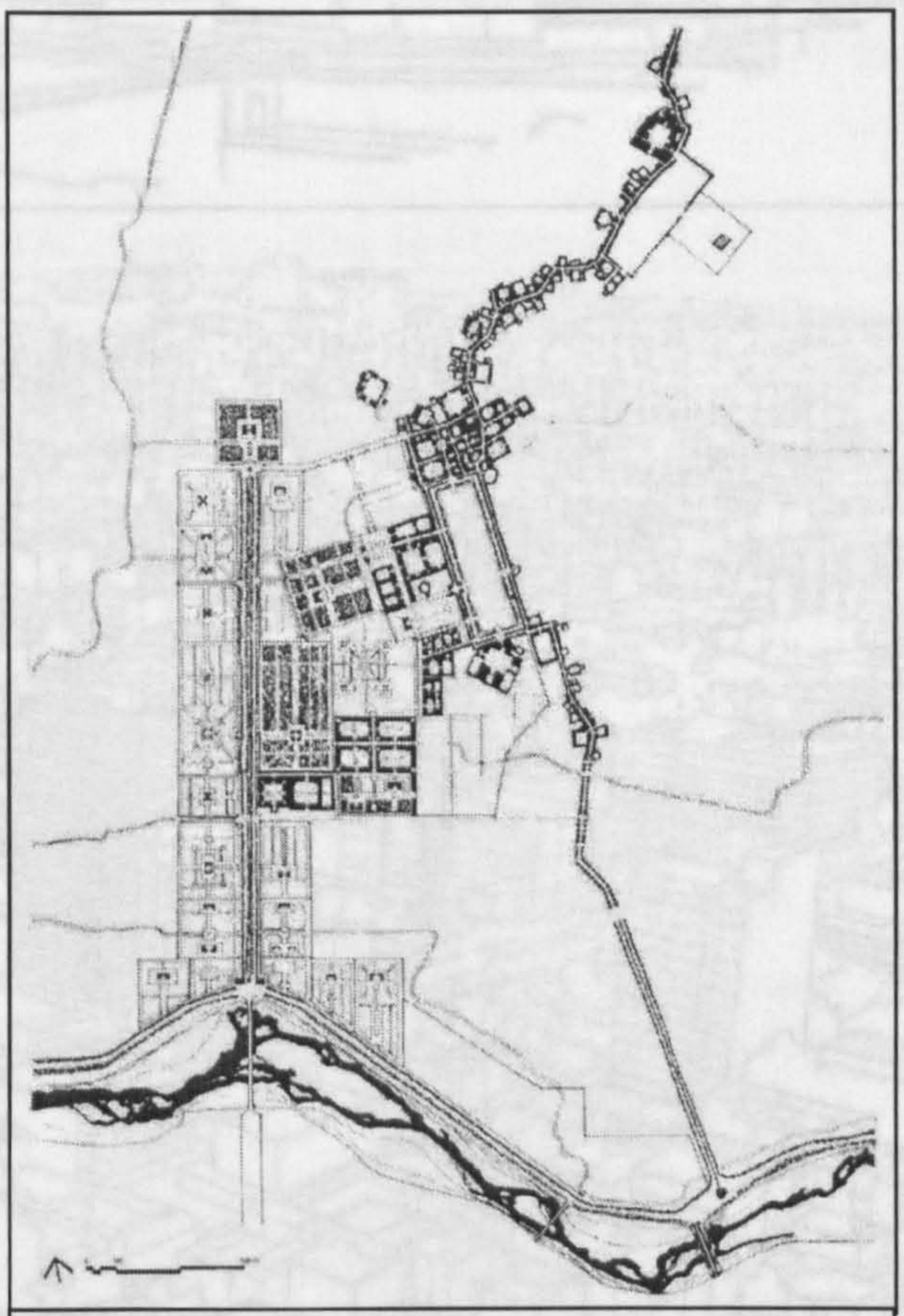

Figure 1. 4 The Plan of Safavid Isfahan.
Source: Adapted from Amirahmadi & El-Shakhs, 1993, p76.

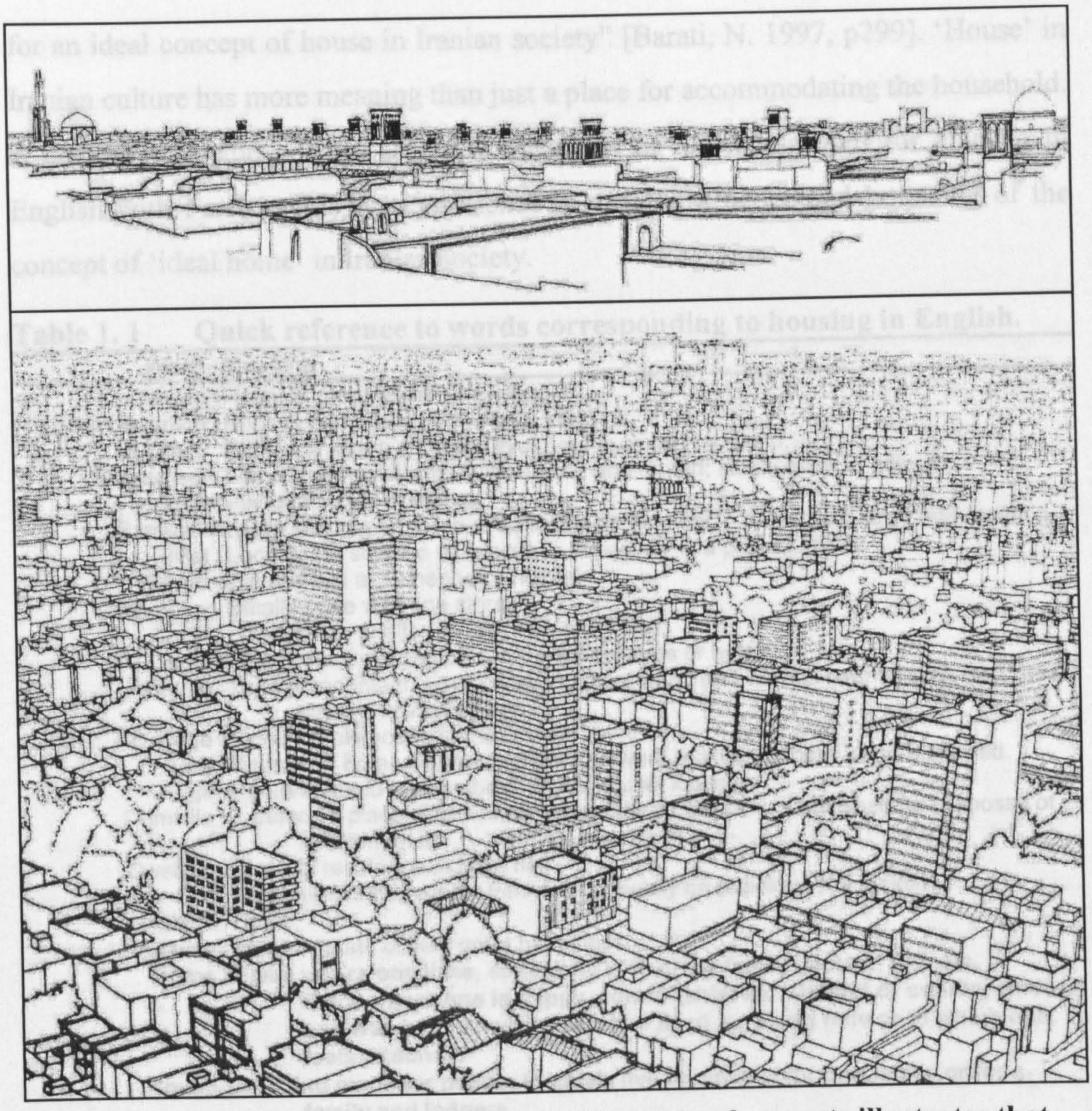

Figure 1. 5 **A visual comparison of traditional developments illustrates that horizontal as well as vertical distinction between public and private domains were fully acknowledged in old Iranian cities such as Yazd [top] where the loss of this traditional value is obvious in modern Iranian urban developments such as in Tehran [bottom].**

Source: Tavassoli, M. 1993, pp 22-23.

1.3.3 'House' in Farsi & English

Barati argues that "language has a very important role in terms of establishing environmental perception and cognition and in the transformation of meanings and symbols. Concerning the built environment, the deep meaning of a word can help us to see the differences" [Barati, N. 1997, p299]. He states that understanding "the symbolic structure of the word 'house' establishes prototypical subjective boundaries

for an ideal concept of house in Iranian society" [Barati, N. 1997, p299]. 'House' in Iranian culture has more meaning than just a place for accommodating the household. A comparative study of the semantic meanings of the words used for housing in English with Farsi in this section intends to provide a better understanding of the concept of 'ideal home' in Iranian society.

Table 1. 1 Quick reference to words corresponding to housing in English.

Word	Meaning
Abode	House; home; where one lives.
Accommodation	Room/s especially for living in; lodgings.
Address	Details of where a person lives, works or can be found.
Apartment	Flat; set of rooms usually furnished and rented; single room in a house.
Asylum	Place of safety or refuge.
Barracks	Large building or group of buildings for soldiers to live in; any large ugly building.
Billet	Lodging for soldiers or evacuees especially in a private house.
Board	Eat and live at somebody's house.
Bungalow	Small house with one storey.
Cabin	Small hut or shelter usually made of wood.
Camp	Place where people live temporarily in tents or huts.
Chalet	Type of mountain hut or cottage built of wood and with an overhanging roof; small hut in a holiday camp.
Cottage	Small simple house in the country.
Den	Room in a home where a person can work or study without being disturbed.
Digs	Room/s rented in somebody else's house; lodgings.
Domicile	A person's place of residence especially as officially established for purposes of taxation, etc.
Dwelling	Place of residence, house, flat.
Flat	Apartment, set of rooms for living in usually on one floor of a building.
Habitat	Home.
Haven	Place or state of very great happiness.
Home	**Place where one lives, especially with one's family; House; flat; etc. Place where one is happy, comfortable, etc. District or country where one was born or where one has lived for along time or to which one feels attached.**
House	**Building made for people to safely live in, usually for one family or for a family and lodgers.**
Hut	Small roughly built house or shelter usually made of wood or metal.
Lodging	Temporary accommodation; room/s (not in hotel) rented for living in.
Maisonette	Self-contained dwelling on two floors.
Place	House especially a large one in the country; home; city; town; village, etc.
Quarters	Accommodation, especially for soldiers.
Refuge	Place giving shelter or protection from danger, trouble, etc.; safe house.
Residence	House, especially a large or impressive one.
Room	Part of a building enclosed by walls or partitions, and with a floor and ceiling. Rooms are set of these usually built for living in, usually rented; lodgings.
Safe house	Where somebody can be kept without being discovered or disturbed.
Sanctuary	Any place where refuge is provided.
Shack	Roughly built shed, hut or house.
Shanty	Poorly built hut, shed or cabin; shack.
Shed	One-storey building used for storing things, sheltering animals, vehicles, etc. or as a workshop.
Shelter	Structure built to give protection, especially from rain, wind, or attack; building providing refuge.
Station	People living in a small military or naval base.
Tenement	Apartment or room let for living in; large building with apartments or rooms let to a number of families at low rent.
Villa	Large detached or semi-detached house in a suburban or residential district; country house with a large garden, house for holidaymakers at the seaside, country.

Source: Oxford Advanced Learner's Dictionary, 1991.

In English there are many words that, in one way or another, refer to housing. Collins Thesaurus [1992] provides more than thirty words as synonymous with the word 'house'. Some of the more frequently used English words referring to housing and their meanings extracted from *Oxford Advanced Learner's Dictionary* [1991] are presented in Table 1. 1.

'House', 'home' and 'ideal home' are the most significant words referring to housing in English. Although in informal language the terms 'house' and 'home' are often used interchangeably it should be noted that, as not every neighbourhood is a community, not every house is a home. The *Encyclopaedia of Housing* defines a 'house' as a physical construction, and a tangible, concrete object, but it describes a 'home' as a mental construct, and an elusive, nebulous notion. It further emphasises that "Home signifies an emotional attachment. It connotes a relatively permanent place of refuge where people find comfort, a base from where they can safely explore the outer world. It is something to which people like to return. Leaving home can be a psychologically difficult process, unlike vacating a house, which involves more pragmatic issues. Not all houses are homes to their occupants nor are all homes found in houses" [Van Vliet, W, 1998, p222].

Home also refers to a town or country where one has strong affiliations, where one is born, where one grows up, where life is sweet and successful and full of good memories of childhood, where loved ones live or are buried, where one establishes social status, where one raises one's own family/children, etc. Al-Rumi, a famous Iranian philosopher and poet [1207 – 1273 AD], in one of his poems delicately illustrates the deepness of the above-mentioned meaning in Iranian culture. It translates as: "Asked the Beloved from her Lover one-day: which city, among the many you have visited abroad have you found more enjoyable? It is the city where resides one's true love; he answered" [cited in MoT, 1992].

Houses often become homes in many different ways for instance through internal personalisation - decoration, remodelling, choice of furniture - or sometimes by changing the exterior of the house as a means of expression of self-identity. Historically, cultural norms assigned roles in the public domain primarily to men

whereas the roles and responsibilities of homemaking (transforming a house into a home) and child rearing were bestowed upon women. This still appears to be the case in many societies.

The meanings of the words 'house', 'home' and 'ideal home' vary in different societies based on their cultural backgrounds. Research in the UK revealed that even within one society, depending on their social status and personal backgrounds, people's perception of house and home varies considerably. According to Tomas & Dittmar [1995] homeless women would hardly make any real distinction between the words 'house', 'home' and 'ideal home', but securely housed women were able to give a swift definition of what they thought of 'house' and 'home' as follows: "A house is just a house – four walls and a roof. A home is a place of warmth and belonging among friends and family" [Tomas, A. & Dittmar, H. 1995, p504]. This will be further investigated in chapter two when studying Maslow's hierarchy of human needs.

According to Tomas & Dittmar a house is understood as a structural form (i.e. a shelter - four walls and a roof) that provides safety and security. But, a home carries a psychological significance that goes beyond these structural features including an experience of warmth and belonging attached to them. An ideal home, on the other hand, is perceived to be even more meaningful than a home. According to Tomas & Dittmar "one difference between 'home' and 'ideal home' was the probability of attainment" [ibid. p504]. An 'ideal home' would have extra features that a 'house' (offering safety and security) and 'home' (offering warmth and affiliation) would lack. In the definitions of 'ideal home' given by securely housed women, such material features were: "a desirable location (e.g. a cottage in the country), more space indoors and outdoors (e.g. somewhere with a big garden and plenty of room), or a greater level of material wealth (e.g. the usual – roses in the garden, honey in the cupboard)" [ibid. p504]. Therefore, it is safe to assume that in the English language an 'ideal home' is perceived as a 'house' that satisfies one's safety and security and affiliation needs, that is responsive to one's wants (desired options), and also fulfils one's esteem and aesthetic needs.

Nowadays, in many western countries, for instance in the UK, a very limited number of people will have the chance to build their own ideal homes. The majority of house buyers have no role in the design and construction of their homes. People mainly buy their houses in the form of already built products and then try to make them their home. In Iran, on the other hand, in most cities it is still a general practice that people buy a plot of land and build their houses in it. In recent decades, however, in larger cities the trend is rapidly changing in favour of buying one's house from mass production markets.

Similar to English, in Farsi there are also many words that are generally understood as synonymous to 'house', but these are different in the symbolic meanings they bear. A list of more frequently used Farsi words referring to housing and their meanings extracted from *Borhan-e Qate'* [a Farsi dictionary] and *Loghat Name-ye Dehkhoda* [a Farsi encyclopaedia] is presented in Table 1. 2.

It is obvious that the meaning of the words corresponding to housing forms has developed through the course of history. For example, the primitive meaning for shelter in Farsi is manifested in words such as Kolb-e and Kookh that refer to a small house of very simple pattern, built of reed and mud, while the word Sarā, meaning a large house, metaphorically means world. The word sarā is the shortened version of the original Persian word of sarāy. The original word has two parts 'sar' [meaning 'head'] and āy [meaning 'come over']. Putting together these two words bears the meaning 'what comes over the head' that can, simplistically, be translated as 'shelter'. In Iranian culture the sky, the heavens and the whole cosmos is seen as above our head. Therefore, in the course of history sarā acquired the symbolic meaning 'world'. In the built environment the term sarā refers to a large house that satisfies all one's housing needs that offers the highest expectation from a home - perhaps the Iranian version of 'ideal home'- an Iranian's whole world which is summarised in a heavenly house on earth.

The most commonly used word for housing in Farsi is '*Khān-e'*. The word 'Khān-e' is generally (but liberally) translated as 'home', but khān-e bears more meaning in Farsi than 'home' in English (refer to Table 1. 2). Two other Farsi words

Khānevādeh [meaning 'family'] and Khānevar [meaning 'household'] derive from khan-e, which proves its close correspondence to the concept of family. Khān-e not only offers safety and security for the family members against the outside world, it "provides a complete private world for a perfect unity for the family" [Barati, 1997, p321]. Khān-e also has a number of metaphoric meanings such as wife, self, state of awareness and state of remaining in the house and not travelling. Khān-e in conjunction with other words also refers to specific spaces within the house such as Āshpaz-khān-e (kitchen), Mehmān-khān-e (guestroom), Ketāb-khān-e (study), Bālā-khān-e (upper floor). Also, in numerous Farsi words khān-e is used as a suffix such as in Ketab-khān-e (library), Mosafer-khān-e (hotel), Maridh-khān-e (hospital), Gol-khān-e (greenhouse), Mey-khān-e (inn), Sāheb-khān-e (landlord) etc.

Table 1. 2 Quick reference to words corresponding to housing used in Farsi.

Word	Meaning
Āshyān, Āshyān-e	Nest; Place; House.
Bait	An Arabic word (derived from Latin Bita) meaning house, room or a place to stay for the night; accommodation; household.
Chārdivār	Four walls; house, four directions; world.
Dār	Arabic word meaning world; house.
Eghāmatgāh	Place of stay; domicile.
Jā – Jāygāh	Place; Space; house.
Kārvānsarā	A safe place for caravans (travellers) to rest overnight.
Khān	King; Home; kārvānsārā; Stage; level.
Khān-e	An ancient Persian word (originally Khānak =room) meaning the place where a group of people live together; A place for family (knānevad-e) to live in perfect unity, to share ritual experiences, to exercise authority, to enjoy freedom and to alleviate under the safety of family protection; Home; Homeland, motherland.
Kolb-e	Shelter; hut; cottage.
Konām	Den.
Kookh	Shanty house; Shelter.
Koushk	Palace; pavilion; a building in the middle of a large garden.
Lāneh	Nest, breeding place; house.
Ma'man	Safe and secure place; asylum; shelter.
Ma'vā	Arabic word meaning haven, place of refuge.
Manzel	Arabic word meaning place of decent, referring to a tradition of welcoming tired and thirsty travellers who descend from their horse/camel and stay a while to enjoy the hospitality of the household.
Maskan	Arabic word meaning the place where one experiences living in peace and tranquillity; House.
Sarā – Sarāy	World; house; palace; pavilion; marquee.
Sarpanāh	Refuge; Shelter; Temporary housing.

Source: Mo'in, 1951; Dehkhoda, 1956 [Translation from Farsi to English with additional comments by the author].

In terms of housing, Khān-e also has many synonyms with different semantic implications. Some of the more frequently used words are Maskan = a place for alleviating, Manzel = a place for descending, Bait = a place to stay overnight, Ma'wā = haven, Chārdivār = four directions = world, Dār = world (as in Dār-e Fāni = Mortal

world), and Sarā = world (as in Sarāy-e Bāqi = Immortal world). It is interesting to note that some of the synonyms of 'house' in Farsi include philosophical meanings while others contain information about the quality (size and type) of the dwelling (see Table 1. 2). Although each one of these words has a specific meaning and is different from the others, they all bear parts of the meaning of home. These all complement, rather than contradict, each other within the holistic understanding of the meaning of 'house' in Iranian culture.

1.3.4 'Neighbourhood' in Farsi and English

No study of housing is complete without studying the concept of the neighbourhood. Rapoport [1977] argues that in Western societies 'neighbourhood' embodies limited relations between inhabitants and their related spaces whereas in Muslim cities, such as Cairo, most relations happen within neighbourhoods. Hall [1966] argues that in Britain the relationship between neighbours is perceived as rather limited and living close to someone does not mean that you can necessarily have any relationship with them. Iranian society - as in most other Muslim societies - puts a strong emphasis on the concept of neighbourhood, although the word neighbour, as it is understood in Western societies, may not be truly reflective of what is really meant by neighbour in Iranian Islamic culture. Again a study of the meaning of the word 'neighbour' in English in comparison with Farsi will shed some light on this matter.

The Oxford Advanced Learner's Dictionary [1991] defines neighbour as a "person, thing, or country that is next to or near another". Investigating the roots of the word 'neighbour' in Latin, French, and German as well as English writings Barati concludes that "in most of these references the terms are essentially spatial and deal in no way with the kind of relationships that might exist between different parties within a place" [Barati, 1997, p323]. In contrast, the Farsi word 'Ham-sayeh' - frequently translated as neighbour - goes well beyond the physical expressions and touches the nature and the quality of the relationship between neighbours. The word Ham-sayeh consists of two words of 'Ham' and 'Sayeh'. Ham in this context can be translated as 'mate' and Sayeh is translated as 'shadow'. Therefore, what is initially understood from this combination is 'lying within the same shadow'. It is important

to mention here that the word Sayeh in Farsi also means support and protection. Therefore, the translation of 'neighbour' in Farsi reflects the interconnections and supports that neighbours enjoy in Iranian culture. This concept has strong roots in Islamic teaching, but unfortunately it is lost – or quickly disappearing - in modern urban developments.

In Iran - like many other Muslim societies - unwritten cultural values, which are mostly based on the teachings of Islam, regulate the relationships amongst neighbours. A saying from Lady Fatima (SA) [daughter of the prophet Mohammad (SAWA)] "First neighbour, then household" gives the essence of neighbourly relationships amongst Muslims. The prophet of Islam on many occasions emphasised neighbourly relationships and specified the rights of neighbours. The following quotations are only a small number of many sayings of the prophet Mohammad (SAWA) in this regard.

- "The angel Gabriel kept exhorting me about the neighbour to the point that I thought he would grant him the right of inheritance" [al-Bukhari, cited in Hakim, 1986, p152].
- "God will not provide security to the person who sleeps with a full stomach while his adjacent neighbour is hungry" [Abu Hurairah, cited in Hakim, 1986, p153].
- "He whose neighbour is not safe from his harm and dishonesty, will not enter Paradise" [Muslim, cited in Hakim, 1986, p152].
- "The neighbour has the rights of priority" [al-Bukhari, cited in Hakim, 1986, p154].
- The limit of neighbourhood is forty houses" [cited in Tavassoli, 1993, p65].
- "Do you know the rights of the neighbour . . . you must not build to exclude the breeze from him, unless you have his permission [Ibn Adi cited in Hakim, 1986, p154].

1.4. IRANIAN TRADITIONAL SETTLEMENT AND HOUSING FORMS

Iran's traditional architecture is rooted in real needs from a quality, material and spiritual point of view. It permits the architect to focus on deep and highly exquisite human feelings and artistic imaginations. And all such things are presented in extraordinary beauty and pleasant form. Qorbani states "the Iranian traditional architecture gushes from the climate, economy, aesthetic features and culture and religion and being closely connected to the inner desires of mankind it is surely preferable to modern architecture" [Qorbani, 1999, p61] (see Figure 1. 5).

The Iranian traditional architecture is distant from luxurious and extravagant expenditures and is healthy and simple. *Mardom-var* (people-like, humane) and *Boum-avard* (what comes locally) are the two most remarkable characteristics of the Iranian traditional architecture. *Mardomvar* in Farsi refers to humanly architecture (e.g. human-scale) created by people for people. *Boum-avad* refers to the local architectural style that most appropriately responds to the region's climate and is made from the locally available materials. For example, houses in the hot arid regions of Iran are usually built using soil from the same piece of land. Digging the soil from the same land for building the house would have created a large hole in the middle of the house. This space would then be intelligently formed as a *Godal-Baghch-e* (lower-ground courtyard) (see Figure 1. 6). Since it was lower than the natural ground level the rooms that opened directly into the lower courtyard's ground were cooler in summer and warmer in winter than the upper floor rooms because they were dug into the ground. The same system was used in other buildings such as public baths and mosques. In some mosques the excavated area was roofed and used as a summer praying hall. The roof of basement chambers would serve as the floor of the mosque's courtyard. A number of translucent marble stones placed carefully in strategic positions would allow some light in to the basement chambers.

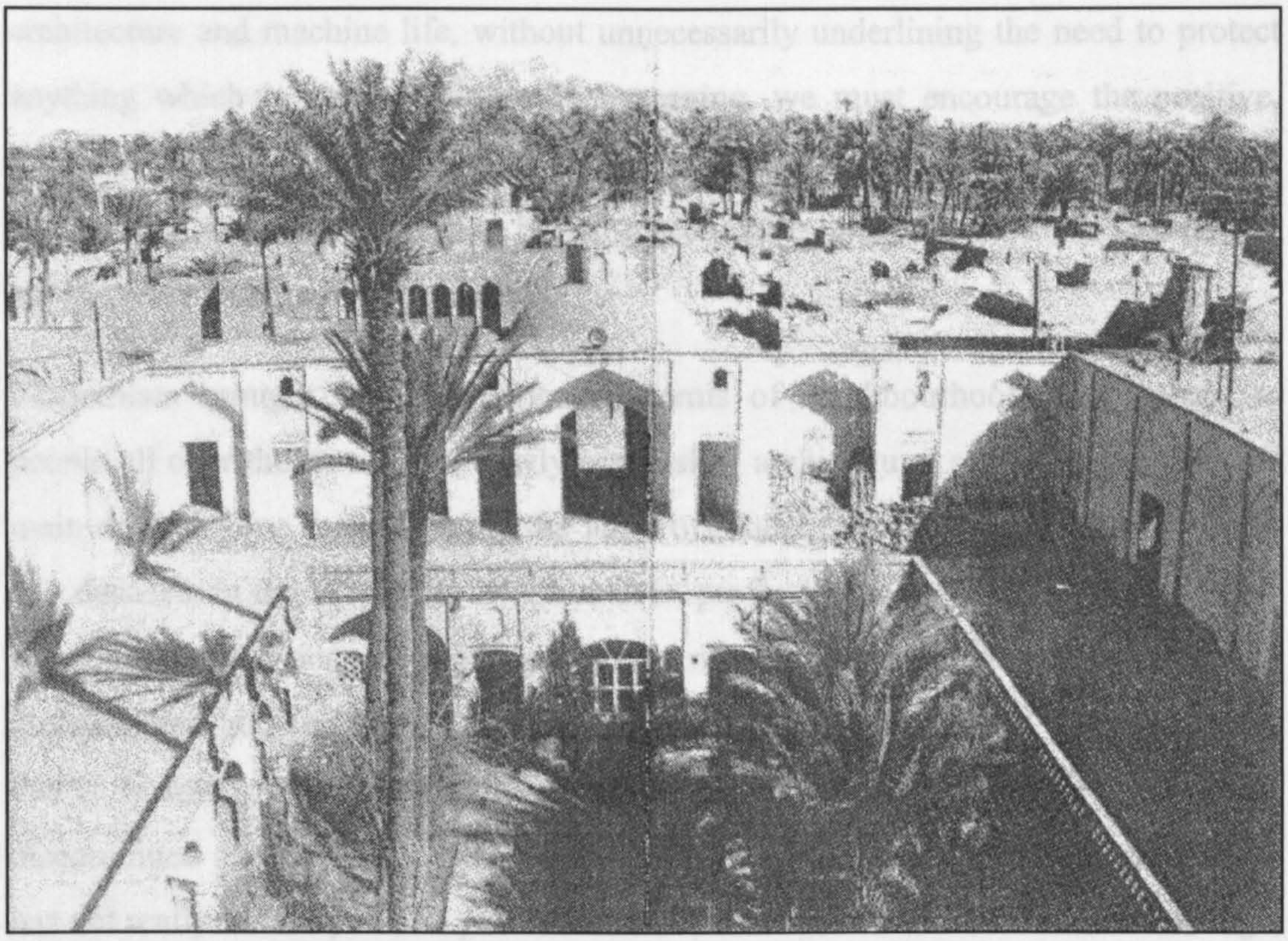

Figure 1. 6 A *Godal-Baghch-e* courtyard. Living in harmony with nature, planting trees and bringing nature right into the heart of the traditional house provides the means of protection against the burning sun and creates a pleasing environment within the house in hot arid regions of Iran.
Source: Tavassoli, M., 1992, p30.

Qorbani argues that "nowadays many people are either obliged to make economic use of their traditional residential quarters which possess cultural relics or because of being distant from traditional architecture and ignorant of its merits, they are strangers to such arts. The Traditional architecture may look a pile of unbaked bricks and mortar, which fails to respond to modern needs and is doomed to perish to the young generation who is unfamiliar or a stranger to traditional buildings. For these reasons nowadays the world needs to acquaint the people who are the real customers and users of these buildings with values of traditional and native architecture and scholars should insist to introduce their merits to the public" [Qorbani, 1999, p62]. In Iran such a need is greatly felt particularly in cities that are rich with traditional architecture. The old architecture in cities like Isfahan, Yazd, Kerman, Shiraz, etc. is typically rich, efficient and beautiful. He continues: "now that traditional architecture is damaged due to inharmonious nature of modern life and imported unknown

architecture and machine life, without unnecessarily underlining the need to protect anything which is void of beauty and meaning, we must encourage the positive, beautiful and genuine traditional Iranian architecture and perpetuation of such architecture and traditional city building techniques which are still effective and applicable to today's life" [ibid. p62].

Modernism brought new inexperienced forms of neighbourhoods and houses to people all over the world. The newly established architectural school in Iran was the main driving force for promoting the ideas of modern architecture at least for up to two decades. In the Western world, however, professionals and ordinary people alike have realised the inappropriateness of the modern movement's approach in city planning and housing form and started to return to their traditional forms since the 1970s. In Iran, on the other hand, despite widespread discussion - apart from a few discontinued attempts - a serious move towards returning to traditional architecture has not really started yet. The professionals still seem to be reluctant about reaching a consensus on this matter.

1.4.1 Iranian Traditional Settlements and the Concept of the Islamic City

The evolution of the architectural forms and spaces comes as an intelligent response to changing conditions (be they climatic, social, economic, etc.) in people's lives. It has to be mentioned here that although similarities in urban forms, structures and spaces are often found in different countries with totally different cultural backgrounds this does not necessarily mean that the cultural values of some of them have changed nor does it mean they all share similar cultural values. Although the architectural element may be similar the way urban spaces are used are different in different cultures.

It is known that the formation and development of cities is largely influenced by their physical and cultural environments. For example, in most Iranian cities the hostile climate and shortage of water are the main environmental factors determining their locations, street patterns, housing forms etc. The cultural factors (e.g. long religious

history in Iran and its rich cultural heritage) also affect the form, spatial structure and the use of urban spaces.

Frieden [1971], Mann [1974], and Bonnie [1979] have emphasised that "topography and water supply constitute the elementary principles of Iranian settlement geography" [cited in Kheirabadi, 1991, p2]. In order to survive and develop over time, most Iranian cities have had to rely on a source of water other than rainfall. Some of them (like Isfahan and Dezful) take their water from rivers. The majority of other Iranian cities, however, depend on ground water which is transferred from the foothills of mountains through qanats.[11] The main streets follow the direction of the qanats throughout the city and the branches (coming off the main water channels at right angles) formed the centreline of the alleyways.

The structure of the Iranian traditional city is in direct conformity with the region's climate. For example to adjust to the harsh climatic conditions "Iranian urban planners learned to minimise the direct impact of solar radiation, to soften the blow of harmful and unpleasant winds, and to optimise the use of shade, breeze, and water. The planners' objectives were achieved by adopting a compact urban form, developing special street patterns, and designing houses with courtyards" [Kheirabadi, 1991, p20]. As large open spaces in hot and arid regions can generate heated air during the day and cold air at night they are usually avoided in traditional Iranian cities, unless they are planted with trees and/or contain a body of water. Also wide streets as well as long straight alleyways are avoided because they function as channels for air movement and heat exchange. Instead narrow streets and twisted alleyways are used, surrounded by tall walls, oriented towards the wind, and well shaded during the hot summer afternoon. These features are created and adapted to ensure that humidity is retained, daily temperature is reduced, inhabitants are protected against dust and harmful winds and that the streets are shaded and cool during the day and warm at night [ibid. pp20-23].

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[11] "The *Qanat* is a subterranean aqueduct. It collects groundwater in the alluvial fans at the foot of high mountains and carries it, following the descent of the terrain, to settlements and fields" [Gaube, 1978, p4].

Traditionally, the streets, residential quarters, working spaces, religious buildings and public services form the main elements of a typical Iranian city. Its formal, spatial, and structural organisation respond to the contextual conditions e.g. local climate, culture (religion, customs, tastes), economic conditions, type of available building material, cultural heritage, architecture, etc. The traditional settlements in each Iranian City had features that gave them a distinctive quality. Nevertheless, they were all characterised by certain fundamental design principles that, by and large, were common to most other cities in the Muslim world (e.g. see Figure 1. 7). These will be explained in what follows.

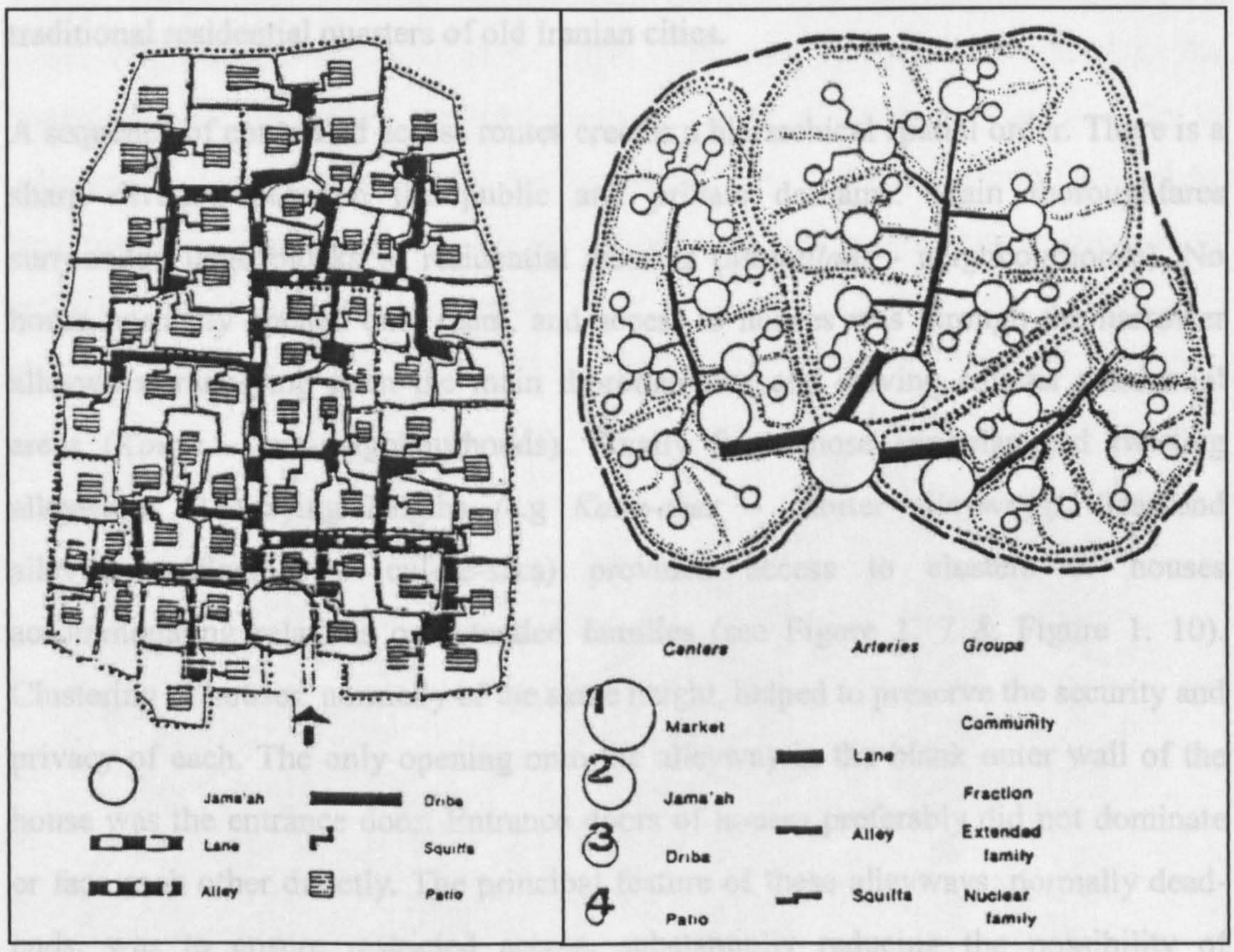

Figure 1. 7 [Right] illustration of the levels of organisation of the Ksar in Algerian Sahara. [Left] Structure of the district.

Source: Dr H. Frey, University of Strathclyde, from lecture notes for Post-Graduate Urban Design course, session 2000/2001.

The Friday mosque would act as the centre of gravity of the city. In many Iranian cities a large square (*Maidan*) is uncommon. Instead the large courtyard of the Friday mosque would act as the city's main gathering place. Roads and access ways would lead to the mosque from different directions. Shops are mainly located within the Bazar (market place) which would form the commercial and social spine of the

traditional city. The city was divided into a number of residential districts known as Mahallahs (neighbourhoods). Each mahallah was further subdivided into smaller residential quarters known as Kouy (sub-neighbourhood) which was formed of a number of Barzans (clusters of houses). The main elements of each *Mahallah* include at least a neighbourhood mosque, a *Hammām* (Public bath), a *Madrasa* (school), an *Āb-anb*ār (water-reservoir). Smaller scale provisions - such as a local mosque or a *Tekkiyeh* – Hosseinieh, a local bathhouse, a few local shops, and a *Maktab* – teaching house - were provided at sub-neighbourhood level. The same structure was, by and large, applied in all Safavid cities [Rafiei-Mehrabadi, A. 1974] and still exists in traditional residential quarters of old Iranian cities.

A sequence of controlled access routes creates a hierarchical spatial order. There is a sharp division between the public and private domains. Main thoroughfares surrounded large blocks of residential districts (*Mahallahs* - neighbourhoods). No house normally opened onto them, and access to houses was through the narrower alleyways, ramifying from the main thoroughfares and serving smaller residential areas (*Kouys* - sub-neighbourhoods). Finally from those irregular and twisting alleyways, at varying lengths *(*e.g *Kouy-ches* – shorter alleyways*)*, dead-end alleyways (*Barzans* - cul-de-sacs) provided access to clusters of houses accommodating relatives or extended families (see Figure 1. 7 & Figure 1. 10). Clustering of houses, normally of the same height, helped to preserve the security and privacy of each. The only opening onto the alleyway in the blank outer wall of the house was the entrance door. Entrance doors of houses preferably did not dominate or face each other directly. The principal feature of these alleyways, normally dead-ends, was to ensure restricted access, substantially reducing the possibility of strangers passing by. Alleyways provided semi-public territories for the resident households of clusters of houses. Most often the entry space to a cluster of houses was considered a semi-private space and was furnished with a gate to increase their inhabitants' control over them.

Although the formation of the inward-looking courtyard housing form predates Islam, because of its potential to respond to socio-cultural and environmental requirements of the Iranian life style this form of housing was chosen and adapted in

such a way that it became the predominant traditional form of housing in most Iranian cities in areas of hot arid climate until at least the turn of the twentieth century. However, it should be mentioned here that the courtyard house is not the only house type used in Islamic countries. Various forms and types of houses have been adopted in different regions with different climatic conditions, but the principles of settlement structure and spatial organisation of housing remain more or less the same. In hot humid and cold regions of Iran house types other than courtyard form are used and adapted. Also, in other Islamic countries, for instance, in Turkey and western Saudi Arabia, in hot and humid regions, traditional houses have several floors and are extroverted to allow cross ventilation that is not provided in the courtyard type. They have many windows that open to the streets, but in order to generate the required privacy for the household, the windows are fully covered by *Rowshans* (see Figure 1. 8). The deeper and higher access in those houses depends on the level of closeness to the household.

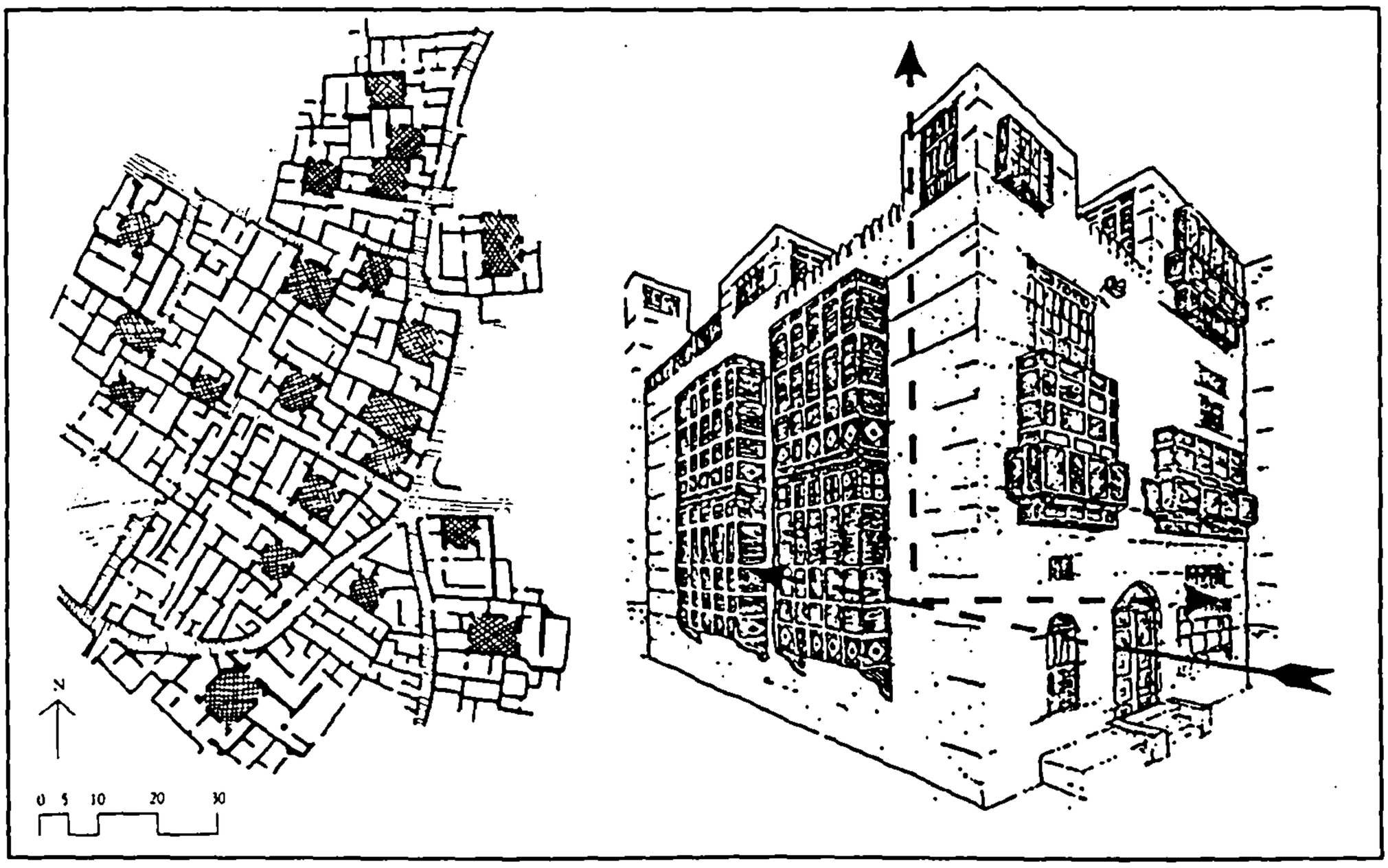

Figure 1. 8 **[Left] Cluster of courtyard houses in UR, 2000 BC. [Right] An extroverted housing form in Jeddah illustrating how windows are covered with Rowshans. The water evaporated from a large clay jar in Mashrabiehs freshens the incoming air.**

Source: [Left] After Hakim, 1987, p95. [Right] After Masaud, 1997, p162.

Islam is said to have had an enormous impact on the architecture and planning of Middle Eastern cities. It is generally held that it was Islam in the Middle East that adopted and modified the built form according to the philosophy, ideology, law, and the requirements of socio-cultural forces in Muslim life [see Hakim, B. 1986].

Gaube [1978, pp 16] argues that the Islamic city was based on two different types of cities: the oriental despotic city and the Hellenistic-Roman democratic city. Islam united a vast part of the Old World (the Roman –Byzantine and Iranian hemisphere that were divided for centuries) with the new religion of Islam, the Arabic language, the rapid development of trade between the east and west of the Islamic world and through the extraordinary mobility of population. These resulted in the development of common features (e.g. grand mosque, public bath, school, etc. often in the centre of the town) throughout the whole area of Islamic civilisation regardless of the original plans of the cities or the time they were founded. Gaube states that "presupposing a homogeneous civilisation on the one hand and a regional individuality on the other, we can speak without any hesitation of the Islamic City which was more influenced by its oriental than its Greco-Roman heritage" [ibid. pp16-17]. Rapoport states "because building a house is a cultural phenomenon, its forms and organisation are greatly influenced by the cultural milieu to which it belongs" [op. cit., p46]. Thus, religion is said to have, through socio-cultural forces, influenced and modified the built environment in general, and particularly the design of dwellings.

Since its inception, in the 19th century, the term 'Islamic City' proved to be a favoured way of referring to the cities of the Islamic world, mainly Middle Eastern cities. The idea behind it was to link the built form of the cities of the Islamic world to the religion of Islam and Islamic culture in order to understand them as a whole in a unified way. For many years Middle Eastern cities were studied in the light of Islam as an 'urban religion' and by the 1950s a model of the Islamic City was developed to explain the structural patterns of these cities [Kheirabadi, 1991, p3] (see Figure 1. 9).

Mainly based on Syrian and North African case studies the model demonstrates the elements of a traditional Islamic City and their spatial relationships. The Friday

Mosque surrounded by religious schools, a public bathhouse and the commercial district form the central core of the city. Segregated residential quarters are located around the core area of the city. This work has continued and completed all the time. With an ambition to generate comprehensive design guidelines for an Ideal Islamic City, Hakim [1986] compiled all the relevant Islamic references that he perceived, in one way or another, would have affected the Muslim built environment in a book entitled *Arabic-Islamic Cities: Building and Planning Principles*. Although his studies did not include references from Shia sources and countries like Iran, Turkey, Egypt, etc. this book is still one of the main sources of reference in this field.

However, as time passed the issue proved to be more and more controversial amongst the scholars in this field. A brief review of the background of the debate on the term 'Islamic City' may help to provide a better understanding of the issue. According to Haneda [1994] the term Islamic City dates back to the 19th century when the French colonised the Maghrib and started, for their colonial administrative purposes, systematised field surveys in the whole region including the cities. He states "French scholars described the characteristics of Maghribi cities from a variety of angles such as the urban landscape, facilities and law. Despite the fact that they were at the time concerned only with Maghribi cities, they tended to include in the titles of their papers words such as 'Islamic City', 'Muslim City' and 'Muslim Law'". He continues "they were under the influence of concepts of the medieval European City, popular at the time, attempting to describe the cities of the Islamic world as contrasting to those of Europe. This was the starting point of the concept of the 'Islamic City'" [Haneda & Miura, 1994, p4]. Until the 1960s the issue of the Islamic City was the subject of debate mainly among historians. It was not until the 1970s that the discussion expanded to include a wider spectrum of scholars of other disciplines such as geography, sociology, anthropology, architecture, etc.

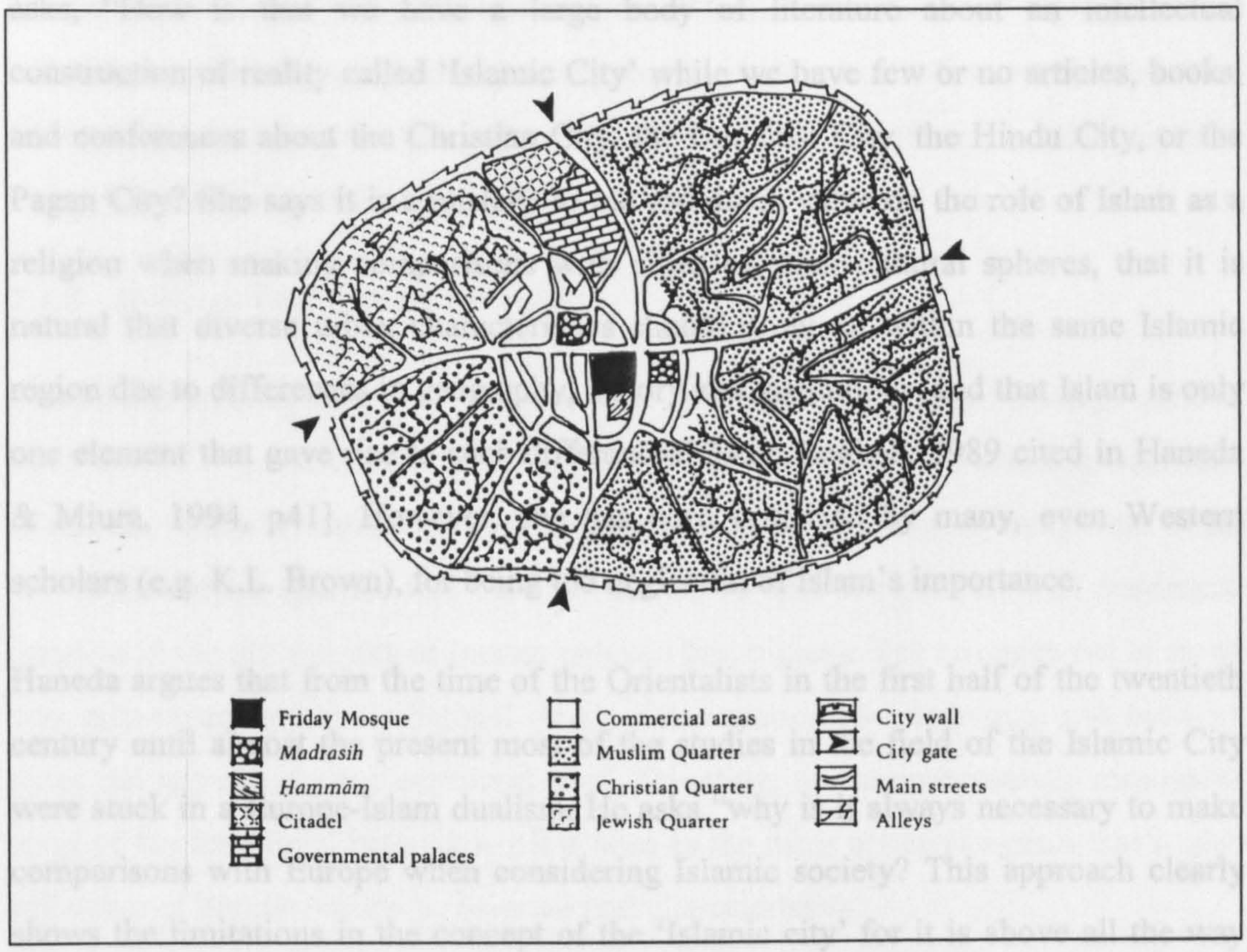

Figure 1. 9 The Model of an Islamic City.
Source: Kheirabadi, 1991, p4.

Since the 1970s the debate has gradually concentrated on the impact of the religion of Islam on urban society and urban structures in the Muslim world. Wirth and Hakim represent the two opposite ends of this debate. "Wirth made a study of common geographical characteristics of cities in Western Asia and North Africa and concluded that there were problems about calling them 'Islamic', since none of their characteristics could be directly related to Islam as a religion. Hakim, on the other hand, said that cities in the Arab lands at least could be called 'Arab-Islamic' since Islamic law functioned as the guideline for urban construction and life. . . . One says that the 'Islamic City' does not exist, and the other uses the term 'Arab-Islamic city' limited in application to the Arab lands" [ibid, p6].

Abu-Lughod's [1987] approach to the issue is different. Criticising the tradition of Orientalism in the concept of Islamic City she warns against the dangers of generalisation from single case studies. She criticises the way that the concept of 'Islamic City' was historically constructed and advocates a redefined concept. She

asks, "How is that we have a large body of literature about an intellectual construction of reality called 'Islamic City' while we have few or no articles, books, and conferences about the Christian City, the Buddhist City, the Hindu City, or the Pagan City? She says it is a mistake to put too much value on the role of Islam as a religion when making comparisons with cities of other cultural spheres, that it is natural that diverse urban characteristics should grow up within the same Islamic region due to differences in geography, history and institutions, and that Islam is only one element that gave rise to such differences" [Abu-Lughod, 1989 cited in Haneda & Miura, 1994, p41]. However, she has been criticised by many, even Western scholars (e.g. K.L. Brown), for being too neglectful of Islam's importance.

Haneda argues that from the time of the Orientalists in the first half of the twentieth century until almost the present most of the studies in the field of the Islamic City were stuck in a Europe-Islam dualism. He asks "why is it always necessary to make comparisons with Europe when considering Islamic society? This approach clearly shows the limitations in the concept of the 'Islamic city' for it is above all the way European and North American scholars seek to comprehend a foreign culture" [Haneda, 1994, 99 8-9]. He suggests that "it is possible to foresee a concept of an 'Islamic city' from the point of view of Islam, in terms of Islam not simply as a religion but as the norm influencing all of social life, making cities where Muslims live 'Islamic'" [ibid, p10].

It comes as a surprise that most of the studies on the issue of Islamic City were concentrated on Arab, mainly Maghribi, lands and Iranian or Turkish cities were almost excluded in this debate. Some argue that perhaps this was because Westerners had very little or no colonial interest in those regions. Although a number of good quality research projects were carried out on Iranian architecture (e.g. by A.U. Pope), which opened the eyes of the world to Iran's architectural heritage, they were mostly concentrated on ancient Persian architecture – in line with studies on other ancient heritage such as that of the Greek, Roman, Egyptian, etc. cultures. They did not include the Iranian cities and architecture of the Islamic era. Even until recently Iranian architects and scholars did not show a particular interest in the topic. After the Islamic revolution in Iran, however, the issue of Islamic architecture gained a

special interest amongst the later generation of Iranian architects and a great number of studies (some very good quality work) were undertaken to rediscover the values of Islamic architecture in Iran. Despite all the recent efforts in this field a comprehensive study that would include all Iranian cities is still awaited.

1.4.2 Iranian Traditional Housing

Traditional housing in Iran is often in form of one or two-storey buildings centred upon one or two courtyards. Houses are closely and compactly connected with each other. The relatively small size of houses and the need to prevent overexposure to the sun in residential quarters was the main reason for this compact form of residential quarters in the old districts of Iranian cities in arid regions. The arrangement of space was influenced by clearly defined relationships among its inhabitants and between them and society, at a socio-cultural level. Therefore, the environmentally responsive form of the traditional housing is often seen as the most practical option that is also reflective of Iranian society's socio-cultural characteristics.

Iranian traditional houses always face inward, turning blank walls to the streets and spaces outside. Rooms open onto courtyards, and windows on the peripheral walls are normally lacking or else present only occasionally, but of minimal size and above eye level. The entrance doors are neither adjacent nor opposite one another and are spaced out, but where the residents are relatives several houses use a common vestibule. In the majority of the houses the rooms/apartments are located at two or three sides of the yard. Small courtyards - usually planted with trees, water features and ponds *(Howz)* - surrounded by buildings with identical facades, the existence of summer and winter quarters in the house, wind-catcher *(Badgir)* and spaces such as a basement *(Howz-khaneh)* form the main elements of the traditional house in arid regions of Iran.

Furthermore, courtyard houses all obey another fundamental rule, that of the division of the house into semi-private and private areas – the Farsi '*Birooni' and* '*Andarooni'*- sections [Qorbani, 1998]. *Birooni* is normally the domain for men, to receive visitors and outsiders without interfering with the private life of the family,

but *Andarooni* is normally the domain for women and children, to accommodate family life as a whole.

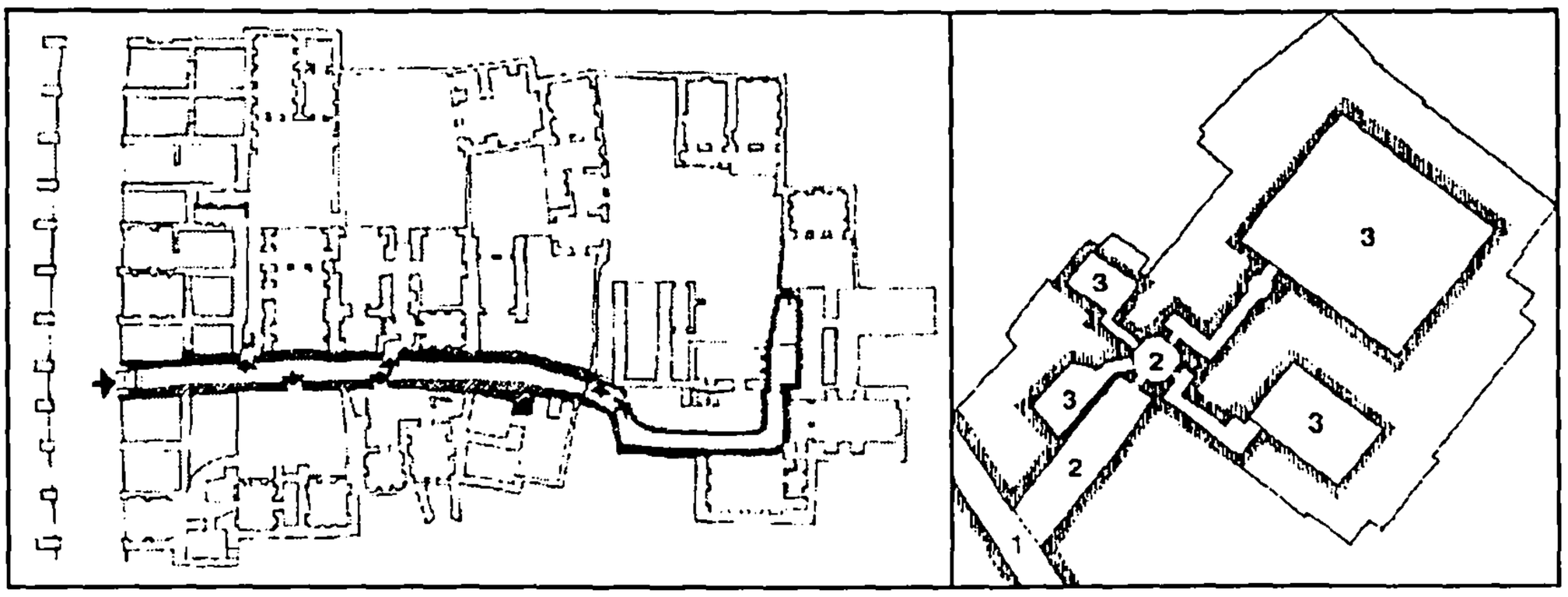

Figure 1. 10 **[Left] Semnan: A dead-end twisted alleyway, off the market-street, gives access to a controlled territory of a number of houses. [Right] Yazd – Arabs' Houses: Public street (1), A dead-end Semi-public corridor, off main street, leads to a semi-private gated Hashti (2), which in turn gives access to four private courtyards in individual houses (3).**

Source: Tavassoli, 1990, pp68-69.

The internal appearance is always more important than the external; decoration is reserved for the inside, and the outside is kept simple. Plain, restrained and blank outer walls hide social attitudes, values and status rather than reflect them. Houses preferably do not exceed two storeys. Vaziritabar argues that "this was not simply because of the belief that multi-storey buildings were symbols of pride, but also because this feature would expose information about and signify the financial status of the household to everyone, where privacy by being lost in the crowd, through being similar at least in appearance to others, was perhaps more desirable. Instead, houses reflected the financial status of families by including one or several courtyards, and differed only in size, number of rooms, constructional quality and/or internal ornaments, none of which was reflected in the appearance of dwellings" [Vaziritabar, S. 1991, Appendix A].

Many studies of the traditional architecture and planning of Middle Eastern cities have analysed, described and interpreted the inwardly-oriented housing design in the light of religion, calling and treating it as the 'Islamic' house, housing, architecture, or city [see Hakim, 1986; Haneda, & Miura, 1994]. Nevertheless, archaeological discoveries have revealed that the inward configuration of traditional houses around a

courtyard certainly predated Islam and goes back to the ancient urban dwellings of Mesopotamia, in the city of UR in current Iraq [Hakim, 1986, p95] (see Figure 1. 8).

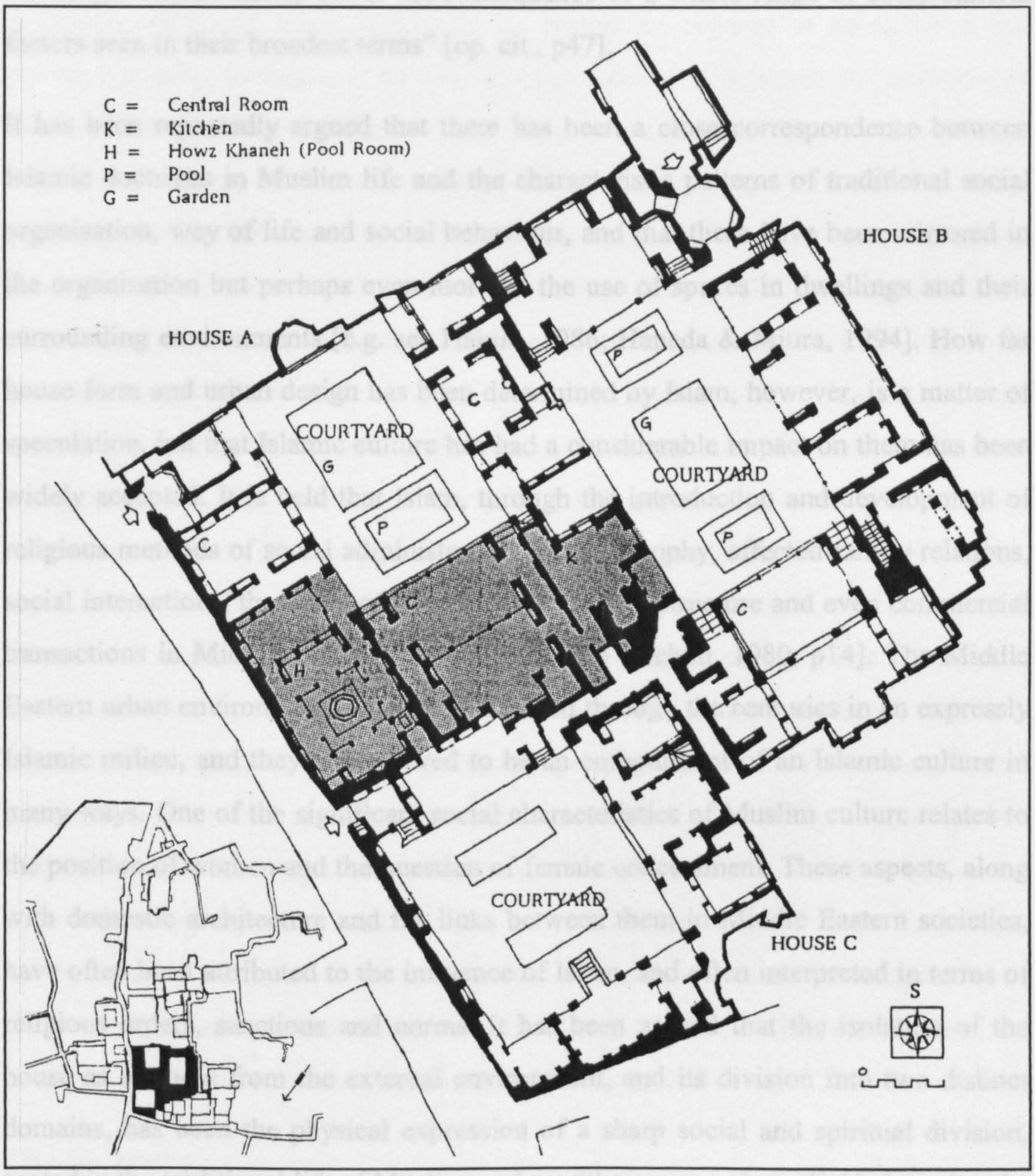

Figure 1. 11 The House of Imam Jum' a, Built in 19th Century (Qajar Period); note the entry space and the indirect access to each of three inter-related houses.

Source: Adopted from Mazumdar & Mazumdar, 1994, p 78. & MCA, 1976, p 110.

Rapoport argues that the inwardly oriented house form, independent of religion, climatic or other conditions, has been used in many other parts of the world [1969, p66]. Rezaey [1982] argues that the division of the house into male and female

domains in Iran had its roots in pre-Islamic periods. Rapoport extensively examined houses in detail, and argued "house form is not simply the result of physical forces or any single causal factor, but is the consequence of a whole range of socio-cultural factors seen in their broadest terms" [op. cit., p47].

It has been repeatedly argued that there has been a close correspondence between Islamic doctrines in Muslim life and the characteristic patterns of traditional social organisation, way of life and social behaviour, and that these have been mirrored in the organisation but perhaps even more so the use of spaces in dwellings and their surrounding environments [e.g. see Hakim, 1986; Haneda & Miura, 1994]. How far house form and urban design has been determined by Islam, however, is a matter of speculation, but that Islamic culture has had a considerable impact on them has been widely accepted. It is held that Islam, through the introduction and development of religious methods of social administration and philosophy, affected family relations, social interactions, the mode of government, political structure and even commercial transactions in Middle Eastern societies [e.g. see Michon, 1980, p14]. The Middle Eastern urban environments, therefore, evolved through the centuries in an expressly Islamic milieu, and they are believed to be an embodiment of an Islamic culture in many ways. One of the significant social characteristics of Muslim culture relates to the position of women and the question of female concealment. These aspects, along with domestic architecture and the links between them in Middle Eastern societies, have often been attributed to the influence of Islam, and often interpreted in terms of religious orders, sanctions and norms. It has been argued that the isolation of the house as a whole from the external environment, and its division into two distinct domains, has been the physical expression of a sharp social and spiritual division, rooted in the traditional life of Muslims, where "there was a sharp divide between the public world and the private world, between the man's world and the woman's world" [Warren & Fethi, 1982, p44]. Vaziritabar argues that: "the isolation of the house and its division were not due simply to the fact of feminine concealment. Though religious orders and cultural practices enriched these aspects. The origins of the problem of overlooking appear to relate to a psychological resentment about being intruded upon visually, especially for certain tasks or activities. More importantly still, perhaps, was the fact that preventing overlooking or visual interference with

private life meant preventing the flow of information about the inner and private life of the family as a whole, as well as about their property" [op. cit. Appendix A.].

A typical traditional house reflects in its design the concept of an enclosed and private life style, including at its core an open space that is intimately incorporated into the pattern of living. Apart from the above-mentioned points certain major interrelated aspects of Iranian lifestyle affect the housing form and the ways traditional houses are used. These include the migration-like movement of people about the house, and non-differential usage of many rooms. Different rooms or areas of the house, depending on the time of day and according to the time of year (season) and circumstances, are used as the main living area or space. Various activities including sitting, sleeping, eating can take place, though one at a time, in the same room or space. Living quarters in the traditional house are functionally flexible, but certain other spaces, including kitchen, toilet, storage and in particular reception, are function-specific. Factors, which facilitated the flexibility of the house, include lack of personal territories (one's own room); few personal possessions and belongings; little, light and easily movable furniture; and absence of modern and heavy furniture. For instance, beds are not present. Bedding is piled up and kept in one or more rooms and is brought in and spread when and where needed; for sitting, mattresses and cushions are used. Dining table or chairs are not present. The tablecloth is laid on the floor with everyone sitting round on the floor. Trays and small short tables suitable for the practice of sitting on the floor are also sometimes present. The physical built form and different elements of an Iranian traditional house including the entrance, the courtyard, living quarters and service sections as explained in the following.

The Entrance

The simple exterior enhances the internally directed nature of the house. The entrance is a transition from the public area into the private. Houses are often part of a larger interdependent complex composed of interconnecting units accommodating various generations of an extended family, forming a small community (see Figure 1. 11). One cannot suddenly cross the street into the private parts of a traditional house before passing through the semi-private spaces. Unlike the blank outer walls – the

dominant characteristic of the streets of traditional residential areas – the entry point to individual houses or a group of houses is usually highly emphasised with decoration and is welcoming. The entrance to a traditional house is not just a simple access door. It usually is an important part of the spatial organisation of the house including several elements such as portal, two small platforms, gate, corridor, and vestibule (see Figure 1. 10 & Figure 1. 12). These are explained in the following.

Portal: The portals are simple and at times decorated. The amount of decoration depends on the family's income or the simple or decorated form of the inside. The portal is often adorned with a tablet bearing verses from the holy Qur'an. Such tablets repeatedly remind the family to submit to God and to pray and in fact represent the purity and chastity of the family and deep love and devotion among them.

Platforms: The entrance space is usually furnished with two small platforms at either sides of the gate. These are locally called *Pirneshin* = seat for the elderly. They provide a resting-place for visitors, who perhaps had walked a long way, knocked at the door, waiting for the household's response. The platforms allow the reception of some unexpected callers or certain visitors in the entrance hall while preventing penetration, beyond a certain point, into the house. Considering the often long distance from the inner section of the house and the gate - in the absence of modern door opening systems – the pirneshin is a very practical element and would give a welcoming sense to visitors. Also elderly people and tired passers-bye would appreciate a short rest on these platforms, and perhaps a glass of water offered by the family, and would wish good health and prosperity for the residents of the house. This reflects the caring attitude of the family, which is considered as highly desirable and respectful in Iranian/Muslim culture and encourages/improves the spirit of the community within society.

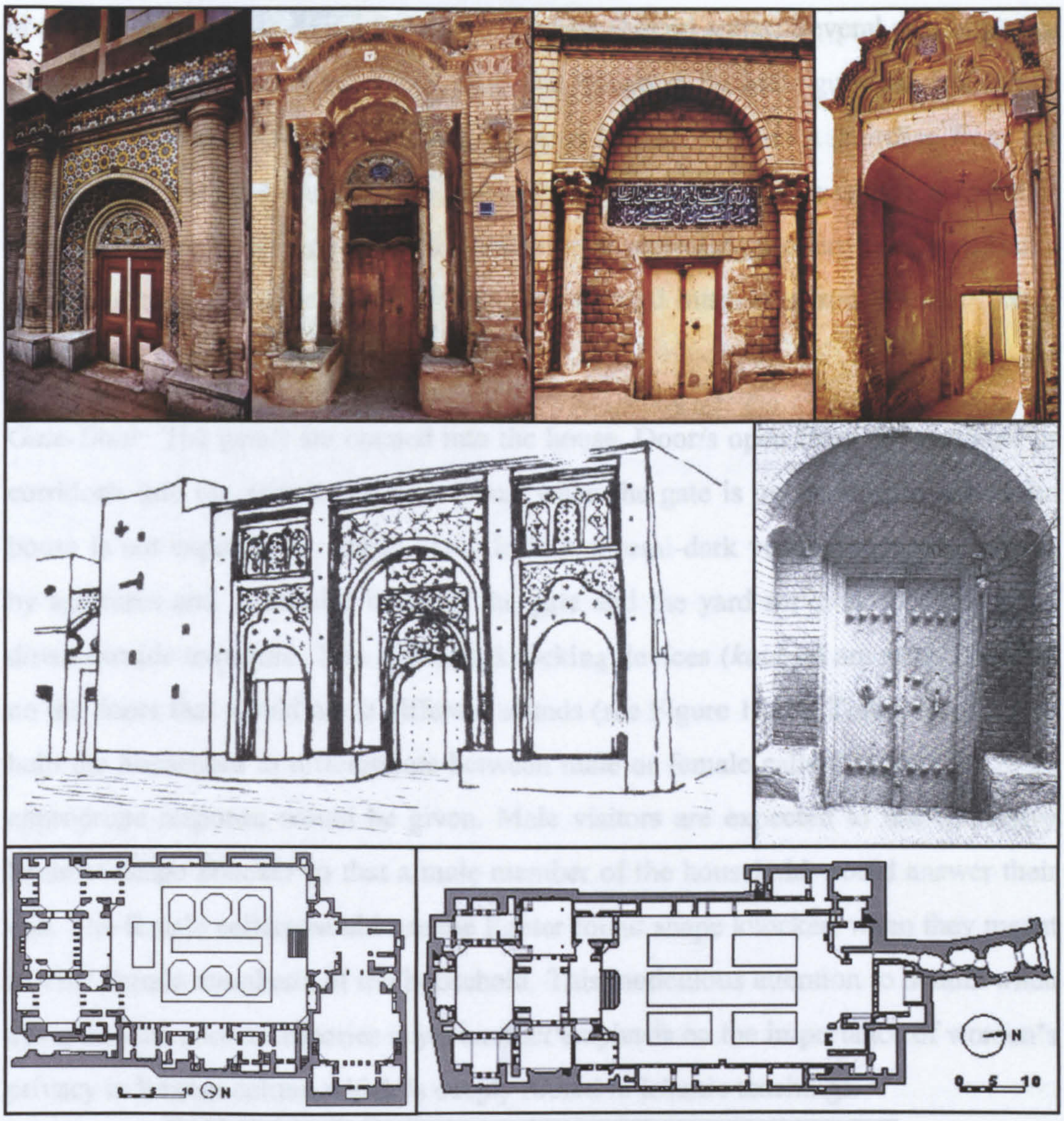

Figure 1. 12 Illustration of some entry spaces to Iranian traditional houses.
Source: [Top & Middle-R] Sultanzadeh, H. 1992, pp135-138. [Middle-L] Ahari, Z. 1992, p69. [Bottom] http://iranianarchitecture.20m.com/

Corridor/s and Vestibule: Entrance is not made suddenly and without notice in a traditional Iranian house. At times winding corridor/s (*Rahrow*), or a roofed vestibule, act as a pre-entrance space, which links the entrance to the interior of the house. This access is usually off axis and has a turning to prevent a direct view of the inside from the entrance space or the street (see Figure 1. 13). An octagonal vestibule (*Hashti*) is a roofed entrance space that functions as a separator of access to different parts of the house. It provides access to Birooni and Andarooni sections of the house. The access to the stable (for household animals and/or visitors' mounts), where applicable, is also separated within the hashti. The floor of the vestibule is often

above the yard and is connected to the yard by several stairs. Several platforms are often set in the vestibule to sit and chat. The reception for male guests is sometimes built in the vestibule. Where the reception is located upstairs a staircase from the hashti provides the required access. Antoniou [1981, p33] states that "the hashti is not simply a means of going into the house or of protecting property, but a symbolic frontier which should be sealed off from even visual intrusions from outside" [cited in Vaziritabar, 1990, appendix A].

Gate-Door: The gate/s are opened into the house. Door/s open from the vestibule or corridor/s into the private quarters. Thus, when the gate is opened the inside of the house is not exposed to outside view. In fact, a semi-dark vestibule occasionally lit by apertures and a corridor between the gate and the yard serve as a barrier from direct outside exposure. Two different knocking devices (*koub-e*) are often installed on the doors that would make different sounds (see Figure 1. 13). This is intended to help the household to differentiate between male or female callers so that the more appropriate response would be given. Male visitors are expected to use the heavy hammer shape knocker so that a male member of the household would answer their call. The female callers would use the lighter round shape knocker, when they meant to visit female member/s of the household. This meticulous attention to details when designing the door accessories is yet another emphasis on the importance of women's privacy in Iranian culture which is deeply rooted in Islamic teachings.

Figure 1. 13 Illustration of the Koub-e and entrance corridor in Iranian Traditional Housing.

Source: http://iranianarchitecture.20m.com/

The Courtyard

The courtyard is the central space for living activities in the house. Distanced from the gate and barred with a barrier (vestibule) – that prevents it from being seen from outside - it is usually set in the middle of the house and is normally square or

rectangular in shape. Many uses are made of the courtyard and it is an active area in the house. It connects the apartments in the buildings, provides lighting and air to chambers, serves as the children's playground, and is used for daily chores such as washing and assembly of elders beside the pool or the garden in summer. Moreover it improves the relationship between relatives and visiting neighbours. The pool and gardens in the courtyard, its limited area and lofty surrounding walls and trees provide ample shade at daytime and coolness in the evening. Living quarters as well as some service quarters - such as kitchen, stores, and toilet - face the courtyard. In very warm and dry weather the role of the courtyard is so vital that without a courtyard a house is not suitable for living.

Pool and trees in the garden are essential elements of a courtyard in an Iranian traditional house. They are not only functional, particularly in summer time when the daytime temperature is very high, they also have symbolic meanings in Iranian culture (see Figure 1. 14). As already mentioned, admiring the beauty of nature, respecting and caring for it and living with nature have deep roots in ancient Iranian Civilisation, which is also reinforced by Islamic teaching. Many famous Iranian gardens are built to reflect the characteristics of the heavens that are mentioned in the Qur'an. One can imagine how desirable life would be in a place where one can relax under the shade of fruit bearing fruits, watch the reflection of the skies in the fresh and calmly running water, enjoy the revitalising cool fresh breeze in peace and tranquillity along with one's family and loved ones.

Figure 1. 14 Trees and a pond are essential elements of a courtyard house.
Source: http://iranianarchitecture.20m.com/

Tree/s: A small garden in the courtyard with several trees or a single tree, serves as a private green space for the residents. Date, fig and pomegranate trees are among the most favoured plants in Iranian gardens as they are considered to be the fruits from heaven. Palm trees are ever-green and provide shade all year round while fig and pomegranate trees provide shade in summer and allow light during winter. In Muslim families children are brought up to be respectful and caring for nature. For example Ujam [1995] mentions that "children in Iraq are taught that the palm tree represents a lady from the household of the prophet Mohammed (pbuh) [cited in Masoud, 1997, p295].

Pond: The pond (*Howz*) is an outstanding feature in the courtyard. The shape and dimension and even performance of the pond differs with the size of courtyard and the type of building. The pond plays an important role in reducing the heat, preserving water and achieving ecological balance.

Ponds are built in rectangular, octagonal or round shapes. Rectangular ponds are normally built in small houses, but round or octagonal ponds are often built in large courtyards of wealthy people's houses where decoration is given priority. Decorated ponds are normally used in rich people's houses and are not very common. From the social and cultural point of view the pond's usefulness is emphasised over its decorative features.

Living Quarters

Traditional houses in Iran respond to the regional climatic conditions. For example, in contrast to hotter dryer areas of Iran, traditional houses in Tehran are adapted to a moderate climate. They often have porches, rooms that can be opened up onto the courtyard, and a shallow or no basement. Finer houses have a *Badgir* (wind-trap) and a *Howz-khaneh* (small ventilated room with fountain in the basement) for hot summer weather. The living areas of the traditional houses in Iran are usually divided into two sections known as summer and winter quarters. These are explained below.

Figure 1. 15 [Top] internal spaces of the living quarters. [Bottom] Illustration of the summer quarters in Traditional houses of different cities of Iran (Yazd & Kashan).

Source: http://iranianarchitecture.20m.com/

Summer Quarter: The summer quarter in Iranian traditional houses faces the courtyard opposite the *Qibla* (the direction in which Muslims stand and say their prayers). It is placed at the southwest of the house where it is shaded. In larger houses the summer quarter is composed of a veranda and hall and in ordinary houses which form the majority of buildings in cities it is composed of a portico or veranda. The Badgir and Howz-khaneh, which is connected with the hall, serve as a natural ventilation system. The portico or veranda is a semi-open space used as a chamber and at times connects the courtyard to adjacent chambers (see Figure 1. 15 & Figure 1. 18). The veranda is roofed and its height is higher than other parts of the building. The hall, which is set above the basement and is equipped with a badgir at the back, is set at the back of the veranda and is semi-open. It is usually large in size (4m x 6m or 5m x 3.5m) and higher than the veranda [Qorbani, 1998, p64].

Winter Quarter: The winter quarter in traditional houses is formed of chambers with three or five doors. The dimension of the chambers depends upon its angle against the sun in different seasons (see Figure 1. 16). Five-door chambers are 3m x 4m or 5m x 3.5m in size and three-door chambers are 3.5m x 2.5m or 3m x 4m in size [Qorbani, 1998, p64]. These sizes conform to the most popular sizes for Persian Carpets for ease of carpeting the rooms. The winter chambers are usually shallower than the summer quarters. Located to the north side of the house they open to the courtyard (often facing the Qibla = southwest) to accumulate more solar heat that is very welcome in winter. The chambers are rectangular, sometimes with deep recesses

which are hidden in the antechamber or at the back of the chamber. The antechamber serves as a storage area and the shelves, dug in the thick walls, serve as wardrobes.

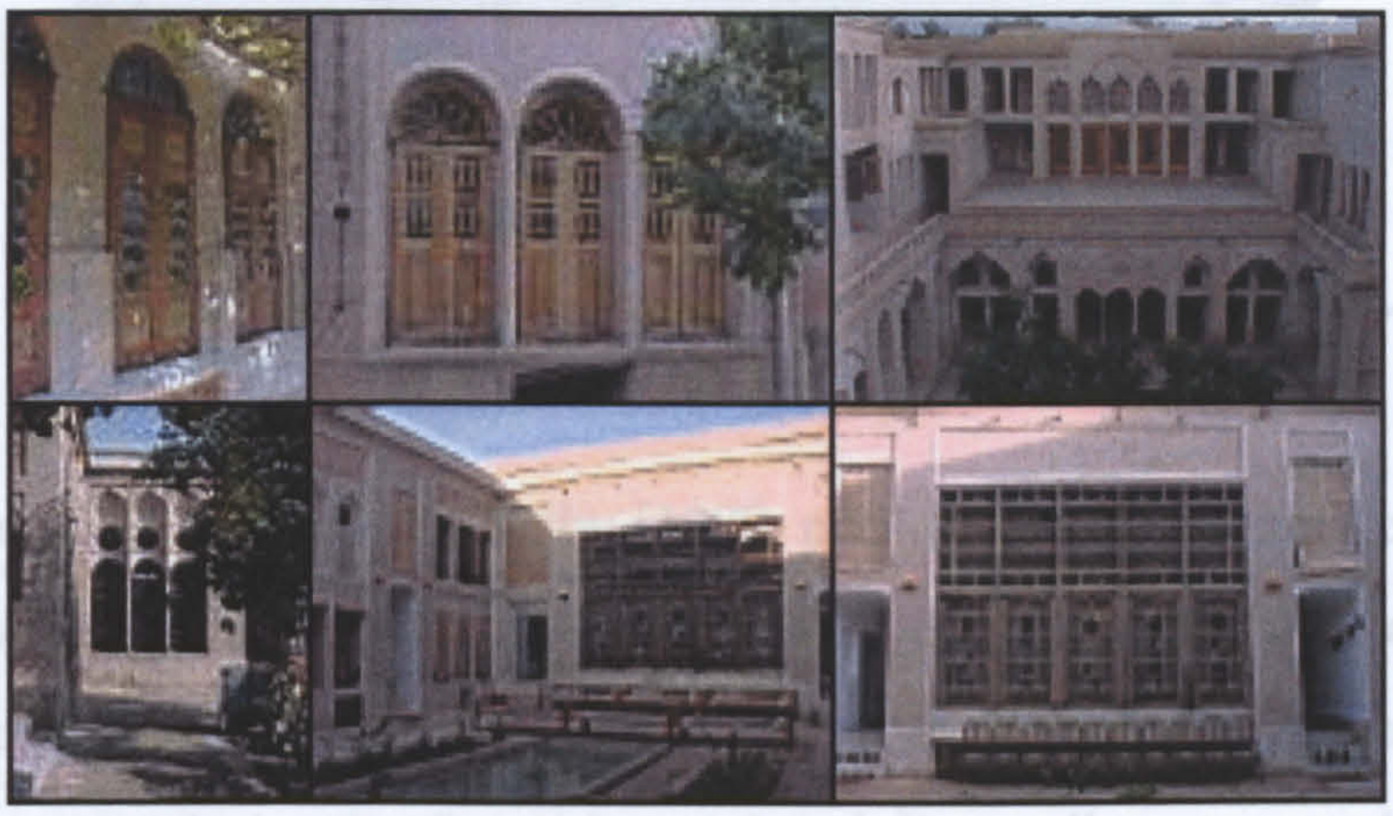

Figure 1. 16 Illustration of winter quarters facing courtyard.
Source: http://iranianarchitecture.20m.com/

Service Quarters

In traditional houses the kitchen, bathroom and stores are considered of secondary importance. These are usually placed at the margin far from the courtyard where one must walk through a corridor to reach them. The old wood-burning kitchen is not a pleasant scene and for that reason it is placed at a distance from the courtyard or basement. The Kitchen is closer to the women's quarter and is connected to it. Food is served in the hall in summers and in five-door or three-door chambers in winter. Bread cooking at home is popular. The hearth is in the kitchen or on the roof and is a semi-open place. Vestibules, courtyards corners and at times verandas or corridors serve as connecting passages that link the service sections with the courtyard. The corridors are built at the corners of the courtyard and on the two sides of the summer and winter quarters (see Figure 1. 17). One of the main elements of service quarters is the *badgir* which in arid regions of Iran is considered an essential part of the courtyard house. There has been extensive research exclusively focusing on this element of the Iranian traditional house. The following briefly explains how it works.

Figure 1. 17 Illustration of internal corridors opening to courtyard.
Source: http://iranianarchitecture.20m.com/

Badgir: According to Battle McCarthy [1999, p20] the natural system of ventilation known as the badgir was first adopted in Iran. The badgir is a fixed chimney-like element placed on the rooftop of the building. It is open at the top on four sides (occasionally on two). A pair of partitions (placed diagonally across each other down its length) divides it into four shafts, each open to a different direction. Regardless of the wind direction, one of the shafts will catch the breeze and the others will act as a chimney drawing the hot air out of the house due to the pressure difference over the chimney. When the winds are low, the badgir continues to ventilate the rooms through the effect of pressure differentials and convection alone. Badgirs are usually built facing four or eight directions. Choosing the directions and form of the badgir depends on the velocity of the wind and the financial condition of the family.

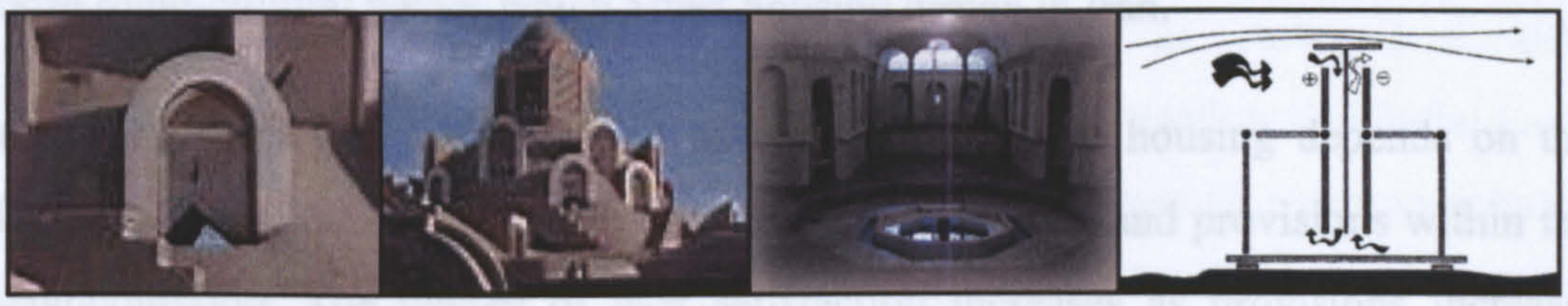

Figure 1. 18 Illustration of the Badgir and Howz-khaneh & schematic diagram of the badgir's function.
Source: http://iranianarchitecture.20m.com/ & Battle McCarthy, 1999. P20.

The natural ventilation of the house is achieved through intelligent design and implementation of a combination of the badgir, howz-khaneh, pool, and trees in the courtyard house. The air from the badgir moves down to the howz-khaneh. Moving over the water-feature cools down the air in the basement that produces a surprisingly low temperature in that hot climate. The cold air from the Howz-khaneh circulates from the basement inlet and through air ducts to the open part of the veranda and the hall. The depth of the small courtyard and its lofty surrounding walls helps it to preserve the cool night air that has descended into the courtyard for several hours into

daytime and keeps the house cool and pleasant. The pond in the middle of the courtyard, and the trees and the bushes in the garden or even single trees produce moisture through evaporation. These prevent the air inside the house from dehumidifying. Also the orientation of the summer quarter (opposite the direction of the Qibla) avoids the direct sunlight and benefits from the shade.

1.5. SUMMARY

Housing appropriate to one's needs is considered as 'the right of every Iranian'.[12] Some philosophers consider housing as one of man's basic needs. Based on his theory of motivation, Maslow categorises people's basic needs in seven hierarchical levels; the provision of all of these needs is likely to lead to a state of complete satisfaction. Since this chapter aimed to provide a general background and basis for housing design guidelines in an Islamic state, it has been necessary to review some recent man-environment studies as well as the notion of culture and its impact on man's built environment and behaviour. In addition, aspects of Islamic teachings that influence the Muslim built environment, especially housing and housing estates, have been studied and related to recent research. This has then been followed by a study of those socio-cultural values which affect housing design in Iran.

It is understood that the degree of user satisfaction with housing depends on the degree to which human needs are provided for by housing and provisions within the neighbourhood. The degree of user satisfaction increases as provisions increase. Maslow states: "man never reaches the state of complete satisfaction. Therefore, housing should, at the least, provide for all of people's basic needs. According to Maslow it is very likely that the provision of higher level needs (cognitive and aesthetic needs) will result in an increase in the degree of satisfaction. Thus, good housing should provide for more than just the basic needs if it is to improve the residents' quality of life and to achieve higher degrees of user satisfaction. Some of

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[12] *"It is the right of every Iranian individual and family to possess housing commensurate with his needs"*, Iranian Constitution, Article 31.

the most important qualities for good housing in Iran that have been discussed in this chapter can now be summarised following Maslow's hierarchy:

- Housing should provide for people's physiological needs, that is shelter to provide them with comfort and protection from hostile climatic conditions.

- Housing should provide for people's safety needs, that is security against physical, visual, and auditory intrusions.

- Housing should provide a hierarchy of accessibility from private to semi-private to semi-public to public territory, which is particularly important in Iranian culture in order to achieve the desired privacy for individuals and families on the dwelling and neighbourhood levels.

- The design of housing should be flexible to provide adaptability to a household's changing space requirements.

- Services and facilities providing for daily needs (such as shops, schools, etc.) should be located within walking distance from dwellings.

- Housing schemes should include provisions such as parks, hosseinieh, community centre, etc. within the neighbourhood area to facilitate an individual's social and cultural requirements. These should be designed in a way to enhance the community spirit while allowing the desired degree of privacy.

- A mosque should be located at the centre of the neighbourhood to satisfy people's religious needs.

- Housing should help satisfy people's needs for self-esteem and self-expression.

- Housing should be imageable and aesthetically pleasing.

More detailed discussion of these demands will be undertaken in chapter four.

DEMANDS ON HOUSING

2.1. INTRODUCTION

Since raising living standards, or in other words improving people's quality of life, has always been associated with the quality of housing design, design guidelines are, therefore, meant to be set in a way that ensures an improvement in the quality of the existing built environment. The Oxford Advanced Learner's Dictionary defines the word 'good' as "something of high quality, of an acceptable standard, satisfactory, pleasant, agreeable, healthy, strong, thorough, complete, sound, beneficial, wholesome, suitable, appropriate" etc. [Oxford, 1991, p 537]. As shown above the first definition of 'good' that comes to mind is to do with high quality. In the same dictionary the word 'quality' is defined as "degree of goodness" [ibid. p1023]. However, the degree of goodness is a variable, which depends on expectations. Frey uses the term 'good city' when talking about urban design guidelines and defines the "characteristics of a good city" [Frey, 1999, p17]. Thus, it would be appropriate to use the word 'good', or in our case 'good settlement' when the intention is to improve the quality of a community's living conditions in terms of the built environment.

The translation of human needs into housing design terms helps define the characteristics of 'good housing'. Maslow states "the good or healthy society would . . . be defined as one that permitted people's highest purposes to emerge by satisfying all their basic needs" [Maslow, 1987, p 31]. Likewise, 'good housing' can also be defined as that which satisfies more than just the basic human needs. It would be more than a shelter simply providing the user with comfort and protection from various climatic conditions. It would give the user all the basic facilities such as a bathroom, a kitchen and other rooms. It would be safe and secure against physical, visual, auditory as well as olfactory intrusions. It would provide an acceptable degree of privacy for individual members of the family or household to retreat whenever desired. It would provide the user with good communication opportunities within the

family. It would allow the user to shape his/her own environment. It would have an appropriate image. It would be well designed, imageable and aesthetically pleasing.

The translation of Maslow's hierarchical order of human needs into architectural design solutions helps to define 'good housing' more accurately. Also, in recent years the discussion of urban settlements has advanced and it is not possible to avoid more recent issues. For this reason a number of recent settlement theories and projects will be examined to establish demands on sustainable neighbourhood forms in terms of densities, distances, use pattern, services and facilities. The outcome of these studies will lead to the formulation of a set of design criteria in accordance with human needs, values related to Iranian Culture, as well as ecological and environmental sustainability considerations. The set of criteria can then be further expanded to form urban housing design guidelines for better settlements in Tehran, which not only meet general human needs, but also specifically address Iranian socio-cultural conditions as well as environmental sustainability issues.

2.2. TRANSLATION OF MASLOW'S HIERARCHY OF HUMAN NEEDS INTO HOUSING DESIGN TERMS

The basic human needs are universal and each of them can be met and gratified in many different ways. Accordingly, these needs manifest themselves differently in different societies and different groups of people. For example, in a culture like Iran most people still eat on the floor and use rolling mattresses for sleeping while in many other countries, people eat at tables and sleep in beds. This gives an insight into a society and highlights the fact that each society has its own identity and differs from other societies in many dimensions depending on their physiological character, culture, and their competencies.

Maslow [1954] pointed out that human beings have a set of basic needs that are organised into a hierarchy of relative prepotency. He argues that if the most basic need is relatively well gratified, it becomes unimportant in the current dynamics of the individual, then the needs shift to less basic ones. A general definition of individual needs – as defined by Maslow – has already been presented in chapter one,

but their implications in housing design will be investigated in detail in the following section.

It is recognised that meeting 'needs' - or having 'wants'- results in man's satisfaction. Similarly not meeting needs causes dissatisfaction. Therefore, the more one's needs are provided for the more satisfaction is expected, and the less one's needs are met the more dissatisfaction is caused. Meeting more needs requires fulfilling more desires. To fulfil more desires one needs to know and realise what one's needs are. The deeper the knowledge one has about one's needs the greater the possibility of finding proper solutions to fulfil them.

As Maslow suggested the gratification of all basic needs is required to achieve satisfaction and gratification of cognitive and aesthetic needs result in pleasure. In built environment terms, however, meeting level one and two needs is considered as minimum requirement for the functionality of the built environment although meeting all five basic needs is necessary to produce general satisfaction. In addition to the first five levels of needs meeting cognitive needs and aesthetic needs is also required for the creation of a pleasing environment that can result in higher satisfaction.

Lang states "Abraham Maslow's hierarchy of basic needs and his distinction between these needs and cognitive needs is the most comprehensive approach to the study of functionalism in urban design that is available to us today" [Lang, J., 1994, p211]. He then continues "human needs is, however, an abstract concept and must be translated into activity systems and aesthetic requirements to be made operational for urban design" [ibid.].

It is easier to provide for basic needs – in built environment design terms – as they are quite well known. It is more difficult to provide for cognitive and aesthetic needs as they vary considerably among people of different cultural backgrounds from different social strata. In fact, aesthetic values, most of the times, are personal preferences based on individuals' tastes. However, some qualities of the built environment are generally perceived as pleasing. Conversely, one can identify those

elements of the built environment that are generally perceived as undesirable (visual, sonic, olfactory and haptic) characteristics of the built environment.

The scale and order of the hierarchical quality of expectation established by Maslow can be applied to an individual chair, a room, a university campus, etc. A simple translation of Maslow's hierarchy of human needs into housing design terms is given in Table below.

Table 2. 1 Translation of Maslow's hierarchy of human needs into housing design terms.

Hierarchy of Basic Needs	Definitions in General Terms	Definitions in Design Terms
Physiological Needs	Breathing, eating, drinking, sleeping, etc. to keep alive.	A place to be in, a roof over one's head. Provision of services and facilities.
Safety Needs	Security, stability, protection, independence and freedom from fear, anxiety, chaos, need for structure, order, law, and limits.	Privacy, controlling territory, forming a legible environment. Healthy environment with minimum pollution and ecological disruption.
Belongingness and Love Needs	Giving and receiving affection, relationships with people and a place in the group or family. Neighbourhood, territory, clan, own kind, class (contact, intimacy, belonging).	Clear identity for neighbourhood, building, dwelling i.e. places for socialisation and communication with other group members. Mixed use (increases options)
Esteem Needs	Feelings of self-confidence, worth, strength, capability, being useful.	Design for prestige, reputation, and dignity – good image. Social mix (to avoid stigmatisation).
Self-Actualisation Needs	What humans can be, they must be. Freedom of choice and action (interest).	Involvement in shaping one's own environment.
The Desire to Know and Understand	Given opportunity for learning, exploring and self – testing.	Provision of services that help improve one's knowledge.
Aesthetic Needs	Space can favour conviviality or solitude depending on the way of handling and organising its elements, as well as its geometrical form and proportion.	Design for environmental beauty, to please the eyes and inspire the spirit. The quality of environmental design, imageability, well designed, human-scale, expected aesthetic qualities, colours, etc.

Lang, based on Maslow but using his own terminology, divides human needs into two categories of basic needs and cognitive needs. He categorises basic needs as physiological needs, safety and security needs, affiliation needs, esteem needs, and self-actualisation needs. He then categorises what Maslow called the desire to know and understand, and the aesthetic needs as cognitive needs.

The following sections review Lang's interpretation of Maslow's hierarchy of human needs into urban design terms. It is hoped that looking at how Lang thinks urban design can meet human needs will help to develop a better understanding of human needs in terms of urban housing design. It will help to define good housing design qualities and will later be used as a base to formulate urban housing design guidelines that can improve the quality of Iranian urban settlements.

2.2.1 Meeting Physiological Needs

Designing to meet the physiological needs of people seems an obvious area of concern for architects and urban designers. One of the reasons for creating buildings has always been to provide shelter from climatic conditions. People vary in their physiological needs. In any group of people there is a hierarchy of abilities. Wheelchair-bound people, for instance, or those who have difficulty walking find stairs a barrier; others will hardly notice stairs as an obstruction to their movement. In addition to our capabilities, the expectations we have of the environment depend on what we are accustomed to accept. These levels differ not only because of individual physiological differences, but also by social status and cultural background.

It is clear that physiological concerns in environmental design spill over into other areas of human need. Lang distinguishes four categorises of physiological need that have design implications in the built environment. These are survival, health, comfort, and physiological development needs. These are explained below.

Survival: the need to survive is the most basic of human needs. Survival needs are for air, water, food, and shelter to stay alive. In environmental design terms this means shelter and access to food, energy, and clean water. The housing design focus should be on the provision of sufficiently clean water, drainage, and the minimal

sewerage disposal processes to sustain a disease-free life (an infrastructure system). Survival and safety needs are closely linked. Buildings need to be sound enough to survive earthquakes and hurricanes. They should be constructed such that elements of their facades hold firmly and do not fall on passers-by. Channels of wheelchair movement need to provide safety for drivers and for pedestrians.

Health and Comfort: the environmental designers' concern is with the creation of salubrious environments that are comfortable rather than ones that simply afford survival. Comfort is a complex variable because while primarily a physiological state it also has strong psychological characteristics. Designing to meet health and comfort needs include two main aspects: public sanitation and a healthy place. The clearing of swamps, the designing of a sewerage system, the provision of clean water, the reduction of crowding, and the provision of services are main health issues in environmental design. To create a salubrious environment designers should make sure that sites are designed in such a way that:

- Dwellings have cross ventilation;
- Inhabited rooms obtain sunshine (South/North orientation);
- There is easy access to private outdoor space for inhabitants/users.

Open space is often provided through the use of building setbacks and site coverage regulations. Lang argues that "Model Housing Movements sought to reduce the site coverage of buildings in housing areas in order to open up rooms to sunlight and ventilation" [Lang, 1994, p220]. Le Corbusier's V*ille Radiouse* (Radiant-city) sets the city in a park to give each dwelling unit sunlight, air, and greenery. Open spaces have to be carefully located, planned and designed. Clean air and sunlight especially in areas of dense high-rise buildings are health issues in design.

Physiological development need: provision for the development and maintenance of a healthy body is important for many people. The environmental designers' concern is with providing people with opportunities to exercise their bodies and to increase their physiological competence through the self-testing of their abilities as well as enhancing opportunities for creative play. This provision of developmental opportunities in the form of playgrounds, playing fields, and sporting facilities

concerns all segments of the population: men and women, children, teenagers and the elderly.

2.2.2 Meeting Safety And Security Needs

To meet safety and security needs it is essential to know the sources of insecurity. Once the sources of insecurity, in terms of settlement, are recognised it is possible to suggest design solutions to meet safety and security needs.

Sources of insecurity can be categorised as A) physiological and B) psychological. Physiological security is attained through dealing with sources of danger to one's physiological condition in the environment that can be divided into harmful bacteria and pollutants, natural disasters, behavioural patterns and materials and machines, and sociogenic environment subgroups. Psychological security can be achieved through the attainment of an appropriate level of privacy, attention to the issue of territoriality and attaining a sense of place and of orientation.

A more detailed explanation of the sources of insecurity as well as design solutions to meet safety and security needs is presented below.

Physical Safety needs

Harmful Bacteria and Pollutants: The environmental design concern is with the location of noxious facilities and the provision of good sanitation that are needed to maintain residents' living standards.

Natural Disasters: Buildings should be designed according to fire, earthquake, flood and other safety codes and regulations. These codes need to be further developed and constantly updated as more empirical data becomes available, to minimise the effects of disasters.

Behavioural Patterns, Materials, and Machines: These three categories and their design implications are explained below.

A) *Horizontal and other surfaces to support behavioural pattern safely* e.g. guard rails around ponds, suitable materials to prevent slippery surfaces.

- Designing the surface materials of the environment to prevent accidents.
- Design solutions to prevent people (children) from falling down from upper floors.

B) *Elements of the built environment to be structurally sound* i.e. not to catch fire or collapse or have sections break off and hurt people.

- Designing for the technological and structural safety of buildings.
- Design solutions to prevent falling objects causing injury to pedestrians around buildings.

C) *Pedestrian pathways and vehicular movement arrangements;* Segregation of different speeds of movement – pedestrian, cycle, and car - within a neighbourhood can sometimes reduce the liveliness of the built environment unnecessarily. Bentley et al. argue that "the desire to separate pedestrian and vehicular routes makes both central and suburban areas far less legible for people on foot" [Bentley, et al., 1985, p43]. When incompatible uses clash, the situation can be stressful, but so can the opposite - when compatible uses are segregated. Mixed-use areas provide the possibility of having people around, which in turn provides a degree of security for others.

- Design should prevent accidents between people in moving vehicles, and between pedestrians and motor vehicles.
- Safe residential roads should be designed within neighbourhoods with priority given to pedestrians.
- There should be a hierarchy of roads and access types to facilitate different movement types within neighbourhoods.
- Through access should be given to public transport only and through traffic (if it exists) should be slowed down.
- Residential roads should have the lowest possible density and speed of traffic flow and provide access to housing only.

The Sociogenic Environment: Fearing danger causes people not to use public spaces and may eventually turn the area into an urban ghetto. It creates the need for constant supervision of children that restricts their freedom and leaves outdoor spaces

unuseable by families. In the design of neighbourhoods the following points should be considered.

- Well-lit streets and pathways discourage undesirable trespassers in a residential area as well as making locals feel more comfortable when using them at night.

- The clear definition of public/semi-public/semi-private/private spaces is important to keep undesirable people away from residential areas and to make families and children feel safe enough to use the outdoor spaces.

- The design of residential access should aim to increase the flow of people on the street, so that the need for supervision is reduced (permeability). Streets should be safe enough for pedestrians to use. It has to be noted that empty streets may also cause people to feel unsafe. Natural and artificial surveillance is the most widely practised solutions for dealing with this issue. 'Natural Surveillance' is achieved by designing the environment so as to provide the opportunity for watching out for strangers/intruders. 'Artificial Surveillance' among other means, for instance, can be achieved by using CCTV. A 'lobby man' and a 'concierge system' are other options that are widely implemented to provide a degree of surveillance over everyday life in residential buildings.

- Design for internal security from burglars, e.g. putting up iron mesh screens on shop windows, barring windows and doors of houses.

Psychological security needs

Psychological security is attained through having control over one's life - with peace of mind. To feel safe and secure people need to have control over the flow of information to and from their housing. One of the main mechanisms for attaining control is privacy. Privacy and its forms are expressed differently across cultures and throughout history, but the nature of this concept and the reality it refers to is the same. According to Rappaport [1977] attaining privacy involves two processes: A) the control of information about a behaviour given to, or obtained by, people outside the setting, B) avoiding the intrusion of unwanted information into a setting. Basically privacy in the built environment is about having control over the flow of

information to and from the immediate environment whenever and wherever required. Anything restricting or interfering with one's ability to exercise control of one's desired privacy results in dissatisfaction with the environment. Privacy is closely related to the satisfaction of housing users. According to Vaziritabar [1990, p96] many market-orientated researches in Germany, England, and Canada have proved that the concept of privacy in housing is an important factor in the users' satisfaction and subsequently the marketability of that housing.

Vaziritabar [1990] distinguishes different levels of privacy needs: personal privacy, intra–family privacy, family privacy, neighbourhood privacy and urban privacy. He categories these levels under the two forms of visual privacy and auditory privacy.

A well designed built environment should satisfy people's need to be able to carry out their activities and to have opportunities to withdraw from the people and activities surrounding them, whenever desired. In the design of housing the concern is to provide choice and to facilitate the exercise of control over the flow of visual, auditory and olfactory information to and from the dwelling, building and neighbourhood. A well functioning neighbourhood provides people with the ability to know where they are in space and time; for example a variety of different and clearly distinctive spaces varying from public to semi-public to semi-private and private space.

Privacy and Crowding: Privacy is a concept to do with safety and security needs. It is considered an important factor for comfort needs closely related to crowding. Crowding is a phenomenon that is to do with the perception of too many people around. However, crowding has to be distinguished from density that is to do with number of people within a certain amount of space. Because crowding is based on personal feelings and social background, it differs from person to person and from society to society. Rapoport argues that while a density of 150 persons per hectare might seem too high in the USA, a figure of 350 persons per hectare might be perceived as low in Hong Kong [Rapoport, 1976, p30].

Privacy and culture: The expected level of privacy varies from culture to culture. Even within a culture, people's expected levels of privacy differs according to their

social status, role in society, age, and gender. The desired level of privacy even varies amongst individual members of a family. Vaziritabar argues that "the meaning of privacy and the means and mechanisms to express it may differ, though the same impulse may be at work, regulating accessibility – inaccessibility between people" [Vaziritabar, 1990, p71]. He goes on to state "the concept of privacy is not only related to cultures and groups of people but also to individual members of a community" [ibid. pp93-94]. Cultural values are very important in the practicality and acceptance of certain forms of housing in different societies.

Islamic teachings have a great impact on the form and design of the built environment in Muslim societies. They have direct impact on design of the layout of Muslims' housing. For example the Islamic terms of *Hijab* (cover) and *Mahramiyat* (marriage/blood relationship) have resulted in the necessity of separation between the visitor/guest area and the family living areas of a dwelling, as well as specification of the bedrooms of parents/boys/girls. The religious duty of daily prayers (five-times a day) has resulted in the necessity of local mosques being constructed in every neighbourhood within walking distance from all dwellings. Also, on an urban scale the Grand Mosque or Friday Mosque is a dominant element in every Muslim City. The following summarises the minimum requirements derived from Islamic teachings on housing and neighbourhood design.

- It is a necessity for visitors to have direct access from outside to the guest area without the need to pass through the family area of the dwelling through either an entry space or separate guest/family entrances to a dwelling.

- The dwelling should have a guest/male room separate/separable from the female/family living area.

- The guest/male room should have direct access to a bathroom without the need to pass through the family area, either by careful positioning or providing separate guest/family bathrooms.

- The dwelling should have at least three bedrooms, to accommodate families with two or more children of different gender, for the separation of the bedrooms of parents/boys/girls in conformity with Islamic teachings.

Privacy and Territoriality: Territories have three characteristics. They are 'bounded', 'personalised', and 'defended'. Boundaries vary from real walls and fences to symbolic change in the surface materials. Personalisation of space may be achieved in many forms such as decorating surfaces using symbols, exhibiting personal possessions, etc. Defending territories may vary from active antagonism to strangers to simply keeping an eye on the street. Distinguishing territories have an important impact on people's affection need for their housing.

Depending on the degree of privacy they can provide, and the level of control people can have, territories can be defined in a hierarchy of public, semi-public, semi-private, and private spaces. In public spaces a wide variety of activities takes place and individuals have little control over the space. Semi-public spaces are open to the public, but local people have control over activities taking place there. Semi-private space is under the jurisdiction of a person or a group (e.g. family/friends) but no visual privacy is provided. Private space is completely under the control of the occupier and the desired visual privacy is provided.

The design implication of 'Privacy' and 'Territory' in the public realm can be summarised as follows.

- Territories need to have boundaries. Enclosure provides psychological security and a sense of belonging to a place. Some elements should be implemented to give a sense of harmony and integrity to neighbourhoods. On the other hand subdivisions can be designed in a way as to help identify a neighbourhood. An example of this may be seen in traditional Islamic cities, where districts are defined by main provisions such as a mosque, school, and public bath that gives a strong sense of belonging as well as helping residents to generate a mental map of their neighbourhood. Boundary marking elements can be streets or open spaces such as parks, rivers, hills, etc. called 'edges' by Lynch [1960].

- Good public spaces do not restrict functions. Lang argues that the objective in the design of open space is to identify any spontaneous or staged functions that are likely to take place there, then to design their fixed features i.e. steps, benches, trees, walls, and ground surfaces to enhance thc quality of the built environment.
- The goal of design is to provide a variety and thus freedom of choice to sit on one's own or in a group. Having control over personal space (territory) gives a feeling of safety and security. Where territorial demarcations are clear people take control over the area.

Newman's research [see Newman, O., 1980] showed that crime rates were lower where the environment had the following qualities.

- A clear set of territorial markers differentiating public spaces from semi-public from semi-private from private spaces.
- Little open space under nobody's clear jurisdiction.
- Opportunities for natural surveillance.
- Projecting a positive image of the residents of an area to outsiders by the use of appropriate building and landscape forms and materials.
- Locating new developments for a vulnerable population in safe areas.
- Closure and privatising of specific streets result in the stabilisation of communities and property values.
- Good lighting reduces opportunities for offenders to hide and enables people to scan the environment and has an effective impact on reducing theft in residential areas.

Lang states: "in a society where there is no crime, Newman's 'defensible space' principles are unimportant, although they may still act very well in meeting aesthetic needs. The application of these principles helps people to organise their environment in their heads, to understand the behaviour expected of them within their cultural frame and to deal with issues of control of space without ambiguity. Their application will not, however, solve the social problems" [Lang, J., 1994, p251].

In Tehran's housing schemes vandalism against the environment and buildings is very rare, if reported at all, but unprotected car parking has encouraged car theft that could easily be avoided. It seems the main reason for not having vandalism as a big

problem in Tehran's housing schemes, is that almost all dwellings are owner occupied, or privately rented, and that all residents share the expenses for the up-keep of their building and the shared spaces inside and around. The building blocks are well monitored by Block Management Committees (BMCs) who are elected by residents; BMC members are essentially residents of the same building.

The local survey in Tehran found out that the main complaint of residents in Tehran's high-rise schemes, though, was of cultural concern where people from different parts of the country with different cultural backgrounds were accommodated in one building. Many people in new schemes in Tehran complained about their neighbours for not being familiar with the requirements of living in a high-rise flat (what was locally called 'apartment living attitudes'), resulting in intrusion into their privacy and causing disturbance to their peace and tranquillity. For instance some people from rural backgrounds wanted to keep chicken in their flats, which apparently causes noise and smell (i.e. a potential health and safety hazard).

A Sense of Place - social and geographical: Another means of achieving psychological security is believed to be through a sense of place in physical form. Although being associated with a place contributes to the satisfaction of affiliation needs, it also enhances a sense of territorial control and has, therefore, a great impact the on fulfilment of psychological safety and security needs. This requires each place to bc different from other places. Each design (place) should have unique qualities rather than being a generic type. Therefore, each sub-unit of a scheme should have some elements of uniqueness to create a sense of place and identity of its own. Lang [1994, p250], however, argues that the goal that every environment design ought to have unique characteristics within its surrounding environment is an aesthetic issue for well-travelled people and architects rather than for the people living there. People may feel thcir identity and self-esteem being threatened by designs foreign to them.

A sense of orientation in place and time (way-finding): Orientation is how residents and visitors find their way around. Norberg-Schulz argues "man dwells when he can orientate himself within and identify himself with an environment, or in short, when he experiences the environment as meaningful" [Norberg-Schulz, C.,

1980, p5]. According to Norberg-Schulz "Kevin Lynch's concepts of 'node', 'path' and 'district' denote the basic spatial structures which are the object of man's orientation" [ibid. p19].

Based on Lynch's elements of node, edge, path, district and monument, Bentley, et al. [1985] define architectural solutions for the legibility of the built environment. However, the use of other visual guides for way-finding - such as signs, graphics, colors, lights, furniture, etc. - seems inevitable in today's urban living. Although these elements are most commonly used for creating an aesthetically pleasing milieu they can help to make the environment friendlier for the intended users. Way-finding is essential in today's urban living. We use visual guides in the environment to find our way in place and time (orientation). The following summarises some solutions in this regard.

- A visual guidance system should be used to ensure all users can easily find their way around their built environment.

- It is necessary for streets, buildings and individual dwellings to be properly signed, so that visitors and service providers (e.g. of deliveries, post, etc) may find their way around the neighbourhood easily.

- Signs should be placed at decision making areas (entrance, lobby, elevators, corridor intersections, etc.

- When choosing signs the main groups of users (children, elderly, visually impaired) should be considered.

- Graphics should be legible, to the point, and visible from a reasonable distance. They should be designed and placed consistently throughout the space considering standardised traffic, road, and highway signs (informational, directional, prohibitive, and instructional signs).

- Signs should be used for only the most important information, otherwise too many signs become invisible to the eye and useless.

2.2.3 Meeting Affiliation Needs

According to Lang, based on Maslow, once survival needs are met reasonably well, people feel most keenly the need for membership in a group. The group provides individuals or other groups with affiliation, support, and identity. However, it should be mentioned that the mechanism of the feeling of belonging to a place is not simply a matter of design. Many argue that people are increasingly becoming individuals with social bounds that have little to do with territory. It is commonly agreed that affiliation takes place but not in a predefined spatial setting. For example people differentiate the word 'house' with 'home'. A 'house' is where our body resides, a 'home' is where our soul/heart settles. What makes a place home, hometown, home country, etc. is a shared feeling of belongingness (see section 1.3.4). Lang argues that the goal of the environment designer at this level is to enhance people's abilities to fulfil their needs for affiliation to the extent that it is possible [Lang, 1994, p252].

Belonging to a place

One aspect of fulfilling the need for security as well as affiliation is to have a strong association with a specific place like a neighbourhood, a city, a country, etc. Lang argues that the emergence of Postmodernism was in response to the failure of Modernism to give a clear symbol of identity [Lang, 1994, p255].

Many people feel a need to belong to a place or to have roots somewhere. Since the structure of families has changed and extended families are rarely found in urban areas, the nucleus family is considered as the basis for the proposal of modern urban design theories. Although the family structure in most urban areas has changed, the affiliation need - which was the driving force behind extended families - still exists; only the form of its fulfilment has changed. Very often people seeking mutual support choose to live in close proximity to others with similar interests or cultural backgrounds resulting in the formation of the urban phenomenon of small towns within large cities e.g. China-town, the Black or Asian area, the Arab quarter, and so forth. Perhaps in this way they feel they can better secure their civil rights and foster the ability to shape their own environment.

One of the major urban design concerns has been to maintain the positive and/or historically favourite character of an area of a city as it changes. More generally the concern is with a city retaining its uniqueness as it changes. Symbolism has a great impact on establishing a sense of identity for a place. Lang [1994, p261] states "Open/green spaces give a place an identity. They can be designed to be well loved and well used if well located. People will use well-located safe places that provide them with proper levels of privacy and interest". Likewise, other public spaces such as a market place, mosque, school, sports arena, etc. can have a similar effect on residents. It is obvious that public spaces - indoor or outdoor gathering places - have a very positive impact on people's affiliation needs in relation to their surrounding environment. They are usually the main elements of identity for people who use them but it should be mentioned here that many plazas, squares, and pedestrian ways have failed to create that link with people. They have to be located where people are, or want to be, otherwise they are bound to be deserted.

Events

There are many events and situations that bring strangers together in ways that establish a sense of temporary group identity. All societies have events that bring people together. These events vary in nature in different cultures. They can be city-wide or specific to a particular group of people. Gatherings vary from simple entertainment (e.g. sports events and seasonal celebrations) to deep-rooted religious ceremonies. It is important to recognise the importance of such events in people's lives. In design an arena should be provided for such events to take place.

In Iran one of the major events that brings almost the whole nation to the streets is *Ashura* (the10th day of *Muharram* - the first month of the lunar calendar). Almost all Iranians join the celebration in memory of the martyrdom of Imam Hussein, the third Shi'a Imam, grandson of the prophet Mohammad (sawa). The celebration takes place in the form of rallies on the streets. The mourners march from their local mosques towards the *Jame'* Mosque. If that mosque is not large enough to accommodate all the mourners of the city, the mourners of each neighbourhood then walk through it and gather in a large enough open space (usually called *Musalla*).

Traditionally, mosques are one of the main elements of every neighbourhood's identity in Iran. People are usually known by the mosque which they attend for their daily prayers. The local mosque should be large enough to accommodate local prayers on special occasions (such as Eids). People visit the mosques for many different purposes, but the main function of local mosques is for performing daily prayers. Therefore, provision of a local mosque is essential in every neighbourhood. It should be located within a walking distance of no farther than 10 minutes or within about half a kilometre of all dwellings. If carefully designed and positioned, it can cater for various other social and cultural activities of the community. In that case it would function as the focal point of the neighbourhood that gives identity to the neighbourhood.

The symbols of belonging

Symbols are often used by people to identify with groups of people, either through clothes, possessions, or place of residence. Sometimes home environments and housing units or neighbourhoods themselves act as symbols. In fact the design of any element of the built environment could be considered as an act of symbol creation. Designers have to recognise people's symbols of identity and how they may be used to support their own identity. The symbolic aesthetic of the environment provides identity. Being able to personalise or to shape one's own environment has a positive impact in developing a sense of belonging to a place. However, personalising one's own home frequently means changing the colour of external surfaces of one's own dwelling, which is against the demand for uniformity which helps to create identity in the first place.

Providing an overall identity for a neighbourhood as well as providing opportunities for people to personalise the environment so that they can gain a feeling of ownership are environmental design concerns at this level. These goals can be achieved through having a uniform design in which the ingredients are consistent within a specific limit, and also by creation of a flexible architecture that can easily be adapted. Using a controlled range of materials, building heights, façade types, colours, etc., while providing options for personalisation, can give a neighbourhood an identity, which in

turn could help develop a sense of community to fulfil part of the affiliation needs of the residents.

Human Contact

According to Lang a good society is one that provides opportunities for the development of human contact. He argues that "the social design goals should . . . foster all types of positive human contacts" [Lang, 1994, p264].

To feel that one is part of a broader society one has to know what is going on in it. Therefore, people need to be provided with many opportunities to meet each other and to be able to participate in the lives of others. This does not mean that the privacy of individuals should be undermined. People should be provided with the choice and freedom to use meeting places as is convenient. The sense of security achieved by having a safe and secure environment and provision for desired privacy is a prerequisite for the development of a sense of community.

Providing people with the opportunity to meet or simply see each other reinforces their identity. This idea has led to the concept of neighbourhood units with a primary school, recreational facilities and local shops at their centre. Local shopping areas can give people a focus of attention and act as a source for identity of the neighbourhood. Local provisions must be located in such a way that people, especially the less mobile (i.e. children, elderly, disabled), have easy access.

Alexander assumes that face-to-face contact is highly desired between friends at home. Therefore, he suggests each home should have two living rooms: one for receiving friends which is visible from the road and the other for the family when they want privacy [cited in Lang, 1994, p269]. More or less the same idea has traditionally been applied in Muslim housing, only with different names for different functions. Islamic teachings discourage close contact between opposite sexes if they are not *Mahram*[1]. The implications of this teaching has resulted in the formation of a second living room in Muslim houses called the guestroom. Mostly the male guests

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[1] For a definition of Mahram see chapter 2, p14.

are received in the guestroom and the female guests are received in the family living room.

Although extroverted housing works very well in some societies it is not generally popular in Muslim societies, because of the limited privacy it offers to the residents. However, there are examples of this type of housing in traditional Muslim cities with all the windows facing a street provided with *Mushrabiye* or some kind of barrier to stop strangers looking in. Cul-de-sacs provide an enclave where people can see others come and go. In some places cul-de-sacs are often used as playgrounds. However, they reduce pedestrian and vehicle flow, which reduces the potential safety of the street. Places such as market squares, cultural facilities, etc. in residential areas all provide affordances for people with at least some common interest. Public open spaces like plazas, squares, and parks contribute to establishing a sense of community by acting as landmarks and symbols that provide opportunities for people to share the experience of being in that place. Parks, recreational facilities such as swimming pools and play-lots, and open spaces are highly desirable for subgroups of the population as places to provide people with opportunities to get together. In Islamic cities the public bath, tea/coffee room, mosque and *Hosseinieh* were traditionally used as public meeting places. Women usually did not use public places. However, that pattern has changed in Iran during the last decades. Women have been seen occasionally, in large groups, to get involved in sporting activities, and exercise in parks and open spaces.

In housing design, the family life cycle should be considered. Therefore, the population structure, which reflects the age structure of the population as a whole, should be considered in design. When designing residential areas their flexibility and robustness should be considered so that the settlement may be sustained under changing conditions.

2.2.4 Meeting Esteem Needs

Everybody has a need for self-respect or self-esteem. The need for self-esteem can be categorised as 1) the need to hold oneself in high esteem, 2) the need to be respected by others. The first can be achieved by having control over one's own life and

through the possessions one has. The second is perceived through external rewards and the reliance of others on oneself. Lang argues that "the satisfaction of both is necessary to have a feeling of self-worth and self confidence. Both are prerequisites for the fulfilment of self actualisation needs" [Lang, 1994, p280]. He then further emphasises "the provision of various activities that meet cognitive needs" as the main concern in the fulfilment of esteem needs [Ibid. p281]. According to Lang [1994, p282] there are three areas that must be covered in order to meet esteem needs. They are:

- The provision of learning opportunities for the development of abilities. This points to the importance of the social and physical environment to be educating in relation to the fulfilment of the cognitive needs.

- The provision of opportunities to display skills. This points to the importance of being able to perform, being a participant, not just a spectator in life.

- The display of the symbols of success to oneself and to others. This is related to the issues of privacy and community and emphasises the importance of being able to shape one's own surrounding environment.

2.2.5 Meeting Self-Actualisation Needs

The need for self-actualisation as defined by Maslow means to become what one can become or in other words to reach to the highest possible level that anyone may have the potential to achieve. In real life very few people reach that stage of psychological maturation.

According to Lang [1994, pp299-300] self-actualised people have the ability to turn frustrating situations to their own advantage; therefore, they are usually content and able to make themselves at home in almost any place. They respect democracy and also tend to be more concerned with the well being of others. Because of their idealist nature self-actualised people involve themselves with the problems of others and in the process of decision making. They seek to contribute to the improving of the community.

Built environments that offer learning opportunities and are rich in the provisions for cognitive and aesthetic needs serve self-actualised people well in fulfilling their desires and enhancing their quality of life.

2.2.6 Meeting Cognitive Needs

The process of learning may occur consciously or subconsciously in formal, semi-formal and informal places. Formal learning happens in formal institutions such as schools and universities under the direct instruction of teachers. Semiformal learning takes place in places that are built for educational purposes but do not offer direct instruction. For example, libraries and museums provide resources for education as well as entertainment. Informal learning may take place anywhere by looking at the actions of others, self testing, or paying attention to the surrounding environment.

Cognitive needs – Maslow described them as the need to know and understand – apply to all stages of the human life cycle, but it has been argued that "they are perhaps most critical for children of between the ages of five and twelve" [Lang, 1994, p 304]

The built environment should provide not only opportunities for formal and semi-formal learning, but also places which one can explore and in which one can test oneself and learn from others. Children need to have access to spaces that they can shape themselves. It is important that the layout of the built environment is not restrictive but offers children flexibility to move freely and safely without the need for constant supervision by adults especially when outdoors. According to Weinstein and David [1987] "children who have the opportunity and are allowed to roam independently, play, and explore have shown to have better developed intellectual and social skills than their peers" [cited in Lang, 1994, p307].

Formal educative institutions (schools, libraries, museums, etc.) should be accessible to children independently. In the design of a neighbourhood it is very important for routes to the school to be short and safe enough that children can walk to school freely and safely. Also it should be noted that low-density developments cause the distances to such institutions to become too large for children to travel independently.

Sporting facilities and playgrounds should be provided within walking distance from homes. For the sake of children's safety and freedom parents should be able to supervise their children playing outdoors from home.

There should be open spaces that afford a variety of activities. Natural landscapes create ideal places for young people to have first-hand experiences in learning about wildlife and their natural habitat.

2.2.7 Meeting Aesthetic Needs

It is in human's nature to admire beauty. The desire for a beautiful environment is universal, but "the definition of beautiful is very much culture-dependent and often highly individual" [Lang, 1994, p316]. Aesthetic needs are present at all stages of the life cycle though older people's perceptions of what is beautiful are different from that of youngsters.

The level of emphasis on aesthetic experiences differs across cultures. For example in a culture like Iran, which is highly influenced by Islamic teachings, environmental aesthetic designs are very different from those in western culture. Showing off (wealth, etc.) is not usually a socially acceptable attitude amongst Muslims. Also, Muslim women are advised to cover the marks of their beauty (such as hair) from strangers. Influenced by such Islamic teachings the Muslims' built environment is traditionally designed to be introverted. This does not mean Muslims do not appreciate beauty in their built environment, rather they do it in different way. In fact, Muslims put a great emphasis on the aesthetic aspects of their built environment. Their internal spaces are usually designed full of detail and with special attention to geometry, as an effective means of the creation of order and natural beauty; external facades, however, are usually left plain.

Inspired by the Islamic teachings of Quran 'Allah is beautiful and likes completeness', the mosque (God's house) is usually designed as a strong focal point that gives identity to the built environment. Unlike most Christian churches mosques are rarely designed as stand-alone buildings isolated from the rest of the surrounding buildings.

Also, for Muslims parks and gardens - inspired by the idea of heavens set out in the Quran - are traditionally means of appreciation of nature's beauty. Natural features like trees, and water, as well as geometry and order have long been known, and been used extensively to enrich the visual characteristics of the built environment.

The task of defining aesthetic specifications for future settlements is always difficult because it requires designing for the future based on present knowledge of people's needs. The concept of beauty is not an easy one in designing the built environment. Lang argues " translating a generic set of design actions and patterns is impossible" [Lang, 1994, p331]. Even if setting specific guidelines for the creation of a beautiful environment were not impossible it would be inappropriate to do so as it might stifle creativity. However, it might at least be possible to specify those elements that are commonly perceived as undesirable features in the built environment.

Lang states "if urban designers can design environments that meet people's expectations in terms of their affiliation and esteem needs, their aesthetic needs are likely to be fulfilled as well" [Lang, 1994,p333]. To that end, in the design of a neighbourhood, positioning the mosque as well as other services and facilities in the neighbourhood centre not only improves the legibility of the neighbourhood, it creates identity for the whole neighbourhood.

2.3. ENVIRONMENTAL AND SUSTAINABILITY ISSUES

So far, the discussion has covered human needs. However, there is a growing concern about the needs of the biogenic environment. Historically, people took good care of the natural assets of their surrounding environment as they realised their very existence depended on them. However, as people's levels of mobility increased and they were able to purchase their requirements from farther away they started to ignore the importance of the sustainability of their own immediate surrounding environment.

Sustainability arguments are of utmost importance in any built environment programme. Girardet argues "sustainable development improves people's quality of life within the context of the earth's carrying capacity" [Girardet, 1996, p177].

According to Hilman [1996, p 57] sustainability is all about resource conservation and pollution reduction. Most major cities of the world are keen to adopt sustainable development programmes that are environment-friendly and, in this regard, Tehran is no exception. Therefore, ecological and environmental criteria are essential considerations for this study, as Tehran's future housing has to meet them if it is ever to be sustainable. These need to be specified in more detail to form a complete list of demands that will serve as the basis of the evaluation tool that will eventually lead to Housing Design Guidelines for Tehran.

The twentieth century saw the fastest ever growth of the world's urban population. Rapid urbanisation caused a massive neglect of the urban environment. Almost all the large cities of the world have developed a 'greedy' manner of taking whatever they needed from their surroundings without paying attention to the needs of the biogenic environment. The product of the industrialised world for nature was pollution; pollution of the air, of rivers and seas, and of soil. The industrial world's desire for more and more workers resulted in people leaving farmlands because they were attracted to the cities where they were promised a better life. To meet the growing demand for energy, forests were cut down for firewood and fossil fuels were burnt. The consequence was the production of more and more waste and pollution of the environment beyond the earth's absorbing capacity. This has raised great concerns about the future of cities and urban living as it was expected that by the end of the twentieth century they would contain half of the world's population. Haugton and Hunter emphasise the need to "shift towards greater urban ecological self-containment where the emphasis is on reduced demand, re-use, repair, reconditioning and recycling" [Haugton and Hunter, 1994, p67].

The 1992 Rio summit [UN, 1993] raised concern for the catastrophic consequences if the issue of sustainability was not urgently taken into consideration in future development, especially by the developed countries, which are the biggest contributors to pollution. Following that warning signal, many countries developed specific guidelines for sustainable development. In Britain, for example, a number of green papers and guidelines were issued in response, most importantly the Planning Design Guidance 13 [PPG13, 1994] and the UK Strategy for Sustainable

Development [UK Government, 1994]. Many researches were carried out on sustainability at city level. Different views have been developed about how to achieve a sustainable urban form. The debates mainly developed around the centrists' and decentrists' views about the future form of urban developments. It proved that each model had its own advantages and disadvantages. The debate is still fresh and continuing. For instance, in a search for a more sustainable urban form Masnavi [2000, pp72-73] concludes that in terms of accessibility to city facilities, safety and security and reduction in private car use the compact form – with higher density - has proved to be more successful while the dispersed form – low density – provides a higher quality of living environment through aspects such as greenery, open spaces and parks. However, Frey [1999] suggests that the key issues that both groups agree upon could be used as solid bases for sustainable urban development.

Many researchers have tried to define what sustainability means. Sustainable development, according to the Brundtland Commission on Environment and Development, is "development, which meets the needs of the current generation without compromising the ability of future generations to meet their own needs" [WCED, 1987]. Sherlock states: "sustainability means living now in such a way that we do not threaten future life" [Sherlock, 1996, p293]. It requires reduction in the consumption of energy and the best way of doing this, he emphasises, is "to reduce our need to travel and the best way to reduce travel is to live in compact cities where everything is close at hand" [ibid. p293]. According to Thomas and Cousins environmental sustainability requires two key actions. These are: "resource conservation and pollution reduction. This refers to energy efficient travel and buildings and natural habitat preservation" (Thomas & Cousins 1996, p57).

According to Hillman making cities more sustainable in the future requires "reducing demand for space and water heating, power, lighting, use of motorised transport and increasing self-sufficiency in lifestyle practices, improved access to facilities used in daily life, more flexible use of buildings, more recycling, and more use of land for growing food" [Hillman, 1996, p42].

The common elements of the above in the settlement design may be summarised in the following:

- settlement patterns and housing forms should have low energy requirements;
- there should be a diversity of land uses, housing densities and layouts, which allow for economy in the provision of shared heating and waste disposal services as well as local provision centres;
- to enhance the quality of urban life public facilities and adequate open space should be provided at a scale and location which reduces the need for motorised travel;
- transport strategies should give priority to walking and cycling as well as promoting public transport use with lower speed and stricter standards on noise and pollution.

Girardet [1996] argues all citizens have a right to expect their governments to be concerned about adequate shelter and secure neighbourhoods. Adequate shelter means much more than just having a roof over one's head. It also means privacy, adequate space and security, a place in which to thrive, the structural stability and durability of a dwelling with proper lighting and ventilation, and with an adequate infrastructure for sanitation and waste management. It is also important for shelter to be located close to work and basic facilities. The following lists sustainability issues, which have implications for neighbourhood design. The summary of this section is based on the *GAIA Atlas of Cities* by Girardet, 1996.

The human scale: this disappears in many large cities, turning them into grid-pattern mazes with crystal city centres. Many smaller cities retain their spontaneous layouts and their human scale (Girardet, 1996, p 13).

Biocidic cities: those cities which simply take essentials without giving anything in return (no recycling) undermine their own existence and ultimately cause their own demise e.g. Ur, Babylon. Biocidic cities are usually associated with Linear Metabolism. In a Linear Metabolism the city that takes what it need from a vast area

and throws away the remains. Input is unrelated to output. In a linear city water is wasted and is highly polluted; sewage is discarded and pollutes the sea; the air is polluted by toxic fumes; building materials are used then discarded; trees are cut without being replaced.

Biogenic cities: those cities that replenish the land that gave them their food and timbers - by recycling - sustain, e.g. Shanghai is self-sufficient in vegetables and grains. Biogenic cities most often have a circular Metabolism. In a city with a circular metabolism every output can be also used as input into the production system. Household and factory rubbish is regarded as an asset and recycling is integral to the functioning of the city. Water consumption is low, pollution is low, sewage refertilizes the soil, fossil fuels are used cleanly and efficiently, building materials are reused and recycled, trees are replanted (Girardet, 1996, pp 22-23).

Energy: Energy production by using conventional fuels like firewood, coal, oil, and natural gas cause environmental hazards such as air pollution, contribution to global warming and rising sea levels. A large percentage of energy is wasted on transfer to the consumers. A combination of clean energy technology and energy efficiency is critical for cities to be sustainable.

Transport: to become sustainable, cities require transport policies discouraging the routine use of cars, reorganising the layout of cities, with greater proximity between home, work, and shops is a top priority (Girardet, 1996, p 24).

Population growth as a result of migration: about 20 million people migrate to cities every year (worldwide). Urbanisation, caused by industrialisation started in Europe and North America, and is now spreading all over the world. Industrial growth often offers employment and trade opportunities for rural people of the developing world, who mostly suffer from declining living standards in their villages. The main reasons for migration are either that people are *pushed* to be urbanised because of problems in rural living conditions (e.g. land degradation, unequal land distribution, natural disasters, clean water shortage, lack of modern services etc.) or they are *pulled* to the cities because of the attractive aspects/illusions of better living standards (e.g.

employment opportunities, higher income, and access to health, education and other urban services).

Reducing the urban energy flow: this is critically important for making cities sustainable. A new approach to urban energy management is crucial if cities are to become sustainable. There are two ways in which this can be done: a) by improving energy supply systems, b) by reducing energy consumption.

Combined Heat and Power stations (CHPs): if located in the city these are three times more efficient than conventional power stations, which are often located outside cities. The water that is heated, while cooling down the turbines, is piped to houses and factories, public buildings, etc. This system is highly cost effective since the electricity and hot water, produced in CHPs travel short distances from the power station to consumers. Advanced insulation systems can reduce the energy consumption by as much as 90 percent.

With a diagnostic approach Girardet first lists the problems of today's world cities. He then searches for the causes of the problems and, based on that, he suggests possible solutions. These are summarised in the following table. Inspired by Girardet's diagnostic approach and in order to avoid lengthy discussions of what is already known a summary of the main environmental and sustainability issues – those that have design implications at the neighbourhood level – is given in the table below.

Table 2. 1 Urban environmental and sustainability issues - list of problems, their causes and possible solutions

Problems & Their Causes	Possible Solutions
Crowding Feeling of over-crowding is caused by intensification and high-rise developments.	• Reducing the scale & size of developments. • Low-rise high-density developments.
Over-population Over-population is usually the result of immigration and high birth rates.	• Dealing with push factors and pull factors. • Birth control schemes & education.
Sprawling Cities Dispersed urban form causes long distances between home, work & facilities, which promotes the need to travel resulting in car dependency.	• Use of more compact (rather than dispersed) settlement forms. • Limiting the size of settlements. • Mixed use developments.

Air pollution Excessive use of the car releases massive amounts of polluting emissions into the air. Burning fossil fuels to produce energy also creates toxic fumes that pollute the air. Heavy use of concrete and tarmac on roads and buildings, air conditioning, mirrored glass, and warm see breezes cause city heat dome and greenhouse effects as well as adding to air pollution. Air pollution is hazardous to human health and damages the forests, which in turn adds to the problems of global warming, food scarcity and flooding by increased sea levels.	• Mixed use developments to reduce the need to travel. • Alternative modes of transport i.e. public transport, walking, cycling. • Alternative-fuel vehicles. • Clean and efficient use of fossil fuels. • Greening the city as much as possible. • Passive solar orientation. • Sun powered systems that produce hot water and electricity. • Alternative renewable energy, i.e. wind, solar.
Waste of energy A large percentage of energy is wasted on long distance transfer between the places of production and consumption places. Also, inefficient appliances increase the demand for production of more energy.	• Alternative forms of energy production and conservation e.g. CHPs, double/triple glazing, insulation. • Efficient use of energy resources. • Solar radiant heating and cooling. • Use of energy efficient appliances and equipment.
Noise pollution In large cities running engines causes this.	• Double-Glazing. • Promoting walkability.
Linear metabolism Input not related to output.	• Circular metabolism. • Output is also input into the production system.
Water - scarcity and pollution Water is becoming more and more scarce and highly polluted because of high wastage and careless discharge of sewage. Sewage contaminates water as well as soil.	• Introduction of a water pipeline system for gardening and washing purposes separate from the drinking water system. • Waste water renovation. • Water conservation methods including grey-water treatment for reuse systems. • Use of efficient appliances with low water consumption levels. • Treatment of black water before releasing it back to nature. • Recycling sewage to fertilise the soil. • Composting of kitchen and garden waste. • Drought tolerant landscaping and organic gardening.
Waste production The present consumption behavioural patterns not only consume resources carelessly but also produce vast amounts of waste that are usually disposed of in land fill sites.	• Waste reduction through recycling and composting. • Recycling instead of disposing of waste and reuse of materials (recycling or reuse of plastic, organic waste, aluminium, paper, etc.). • Non-toxic products that reduce hazardous waste. • General reduction of emissions (keep air, water, and soil clean).
Building materials are used then discarded Non-recyclable and/or hazardous materials (e.g. concrete, asbestos).	• Building materials reused and recycled. • Alternative materials for structures and furnishings (eco-friendly materials). • Non-toxic products that reduce hazardous waste and keep air, water and soil clean.

Damage to nature and food scarcity Trees are cut down without being replaced. Excessive food production and erosion leading to barren land and food shortage.	• Greening the city (trees, vegetation, parks, gardens, natural rather than industrial landscaping). • Integration of open spaces with the natural landscape. • Allotments.
Stigmatisation Concentration of low-income people in specific urban areas, vandalism, youth gangs, living in fear, isolation of people. Loss of identity of the city and its districts; disappearing community bonds.	• Social mix. • Mixed-use areas (a mixture rather than zoning of functions). • The opportunity for people to shape their own environment. • Getting people involved (community management). • Crime prevention.

Having recognised the environmental and sustainability issues it should be possible to incorporate them in the design of the future settlements. In accordance with Maslow's hierarchy of human needs, Frey [1999, pp 32-33] lists the commonly agreed sustainability criteria for the city and city region under four categories as: physical properties, environmental and ecological conditions, socio-economic conditions, and visual-formal quality. A similar structure is adopted here to form a list of sustainability criteria for the neighbourhood.

Table 2. 2 Translation of environmental and sustainability requirements into housing design terms.

Categories	Housing Demands
Physical properties of the neighbourhood	• A mixed use environment • Access to public transport and to provisions (a range of services and facilities) in walking distance • Safe roads (traffic calmed) • Safe pedestrian pathways (short walking distance to public transport, services & facilities) • Energy concept (clean and renewable source of energy) • Water strategy (recycling & reuse of grey water) • Waste disposal (recycling – reuse of outputs) • Green space • Allotments
Environmental and ecological conditions	• Pollution free environment • Access to countryside and wild life
Socio-economic conditions	• Social mix • Residents' involvement in the shaping and management of their neighbourhood
Visual-formal quality	• Provision of a sense of community and centrality by location of provisions and public transport modes in a central location in walking distance from housing

The applicability of environmental and ecological sustainability issues is mainly at neighbourhood level, although, to some extent, they are also applicable on dwelling and building levels (basically to do with minimising the consumption of energy and the production of waste and pollution, and renewability, recycling and reusing of energy and other materials). Following sections investigate a number of recently developed settlement theories and projects.

2.4. INVESTIGATION OF CONTEMPORARY SETTLEMENT CONCEPTS

In this section the main features and the ideas behind three prominent settlement concepts will be investigated. The concepts to be investigated, in chronological order, are the Transit Oriented Development (TOD), the Liveable Neighbourhood (LN), and the Urban Task Force (UTF). The first one is an American concept, the second is an Australian concept and the third one is the latest British settlement concept. All these concepts have been published during the 1990s.

2.4.1 Transit Oriented Development (TOD)

The concept of Transit Oriented Development (TOD) was first introduced in 1993 by Peter Calthorpe in *the Next American Metropolis*. He states "the American Dream is an evolving image and the American Metropolis is its ever-changing reflection" [Calthorpe, 1993, p 15]. Considering the changing nature of the dream and the city he emphasises that a new paradigm of development is needed to provide "a new vision of the American Metropolis and a new image of the American Dream" [ibid. p 15]. Criticising the growth patterns of the 70s and 80s for becoming more and more dysfunctional, he attempts to map out a new direction for the growth of the American Metropolis. Calthorpe admits that he borrowed from many traditions and theories of Europe and America in his work. He claims that his work "combines the utopian ideal of an integrated and heterogeneous community with the reality of our time" [ibid. p 15]. The basic assertions of his work are:

- Re-establishment and reinforcement of the public domain through designed communities;
- Human scale districts;

- Diversity of neighbourhoods in use and population;
- Integration of historic context, unique ecology, and a comprehensive regional structure through the form and identity of the metropolis.

He distinguishes American cities' real needs as the creation of neighbourhoods rather than sprawling suburbs; the creation of urban quarters rather than isolated projects; the creation of diverse communities rather than segregated master plans. Putting these all together he states "quite simply, we need towns rather than urban sprawl" [ibid. p 16].

Recognising that certain qualities of culture such as the traditional values of diversity, community, frugality, and human scale are timeless, Calthorpe argues that "these timeless imperatives must be married to the modern condition in new ways" [Calthorpe, 1993, p 16]. He suggests a modern version of the traditional neighbourhood as an alternative to sprawl. Such neighbourhoods contain parks, schools, shops, civic services, jobs, and transit stops within walking distance from houses. He calls this Transit Oriented Development (TOD). Calthorpe's design guidelines are claimed to define a new context and direction for the built environment. They are generated in accordance with to the following three principles.

1. The regional structure of growth should be guided by expansion of Transit and a more compact urban form,
2. Single-use zoning should be replaced with standards for mixed-use walkable neighbourhoods,
3. Urban design policies should create architecture oriented toward the public domain and human scale dimension rather than private domain and auto scale.

The concept of Transit Oriented Development is based on moderate and high-density housing, along with complementary public uses, jobs, retail and services concentrated in mixed-use developments at strategic points along the regional transit system [ibid. p 41]. TODs add emphasis to the integration of transit on a regional basis. The regional perspective helps define an edge for the metropolitan area, which eliminates the danger of random growth in distant sites served only by highways.

The principles of Transit Oriented Development as defined by Calthorpe [1993, pp 42-43] are:

- to organise growth on a regional level to be compact and transit-supportive;
- to place businesses, housing, jobs, parks and civic amenities within walking distance of transit stops;
- to create pedestrian-friendly street networks which directly connect local destinations;
- to provide a mixture of housing types, densities, and costs;
- to preserve sensitive habitats, riparian zones, and high quality open spaces;
- to make public spaces the focus of building orientation and neighbourhood activity;
- and to encourage infill and redevelopment along transit corridors within existing neighbourhoods.

Transit Oriented Development puts pedestrian at the core of its philosophy. TOD considers the pedestrian as the catalyst that makes the essential qualities of communities meaningful. Calthorpe argues that "pedestrians are the lost measures of a community, they set the scale for both centre and edge of our neighbourhood" [Calthorpe, 1993, p 17].

A TOD is a mixed-use neighbourhood that can aggregate at a regional scale. It makes a community work as part of a chain of communities within a network of public transport. It allows people who live on the periphery to bring their car into the neighbourhood and in case something is not available in the neighbourhood centre the city centre can provide it. TOD tries to combine the convenience of the car and the opportunity to walk or use public transport in order to reduce car dependency and support public transport. Calthorpe defines a TOD as "a mixed-use community within an average 2000-foot walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, bicycle, foot, or car" [ibid. p 56].

In general a TOD consist of a transit point at the core of the development, a commercial core developed around the transit point, moderate to high density residential areas surrounding the commercial area and a secondary area of no more than one mile from the transit point to accommodate lower density single housing, public schools, large community parks as well as low-intensity employment generating functions (see Figure 2. 1).

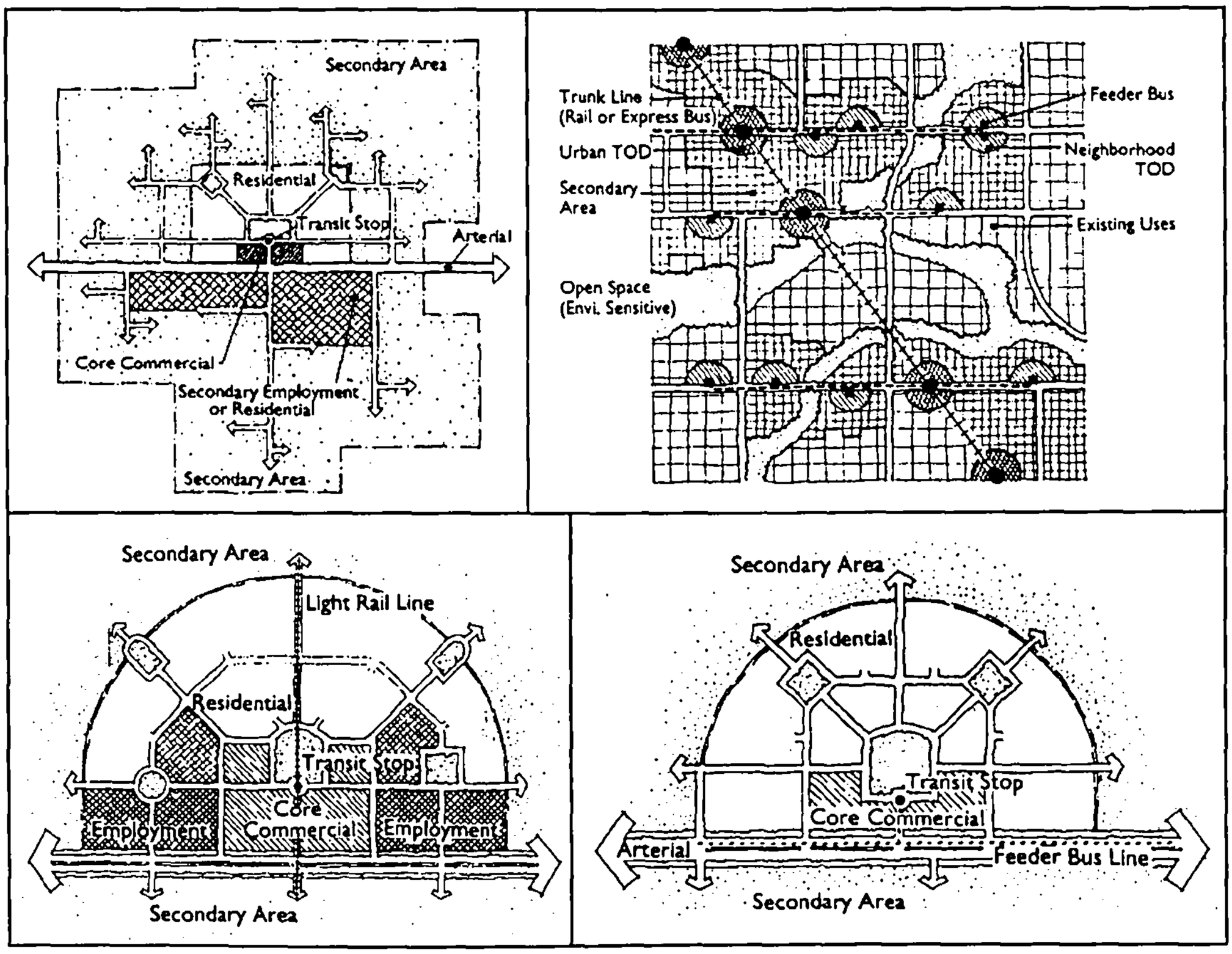


Figure 2. 1 **(Top, L) Functions within the Secondary Areas of a TOD. (Top, R) Illustrating the connection of urban TODs by an express transit system and the location of neighbourhood TODs via an arterial road connecting to the transit points within urban TODs. (Bottom, L) An Urban TOD, (Bottom, R) A Neighbourhood TOD**

Source: Calthorpe, 1993, p 57, p 60 & p 62.

Calthorpe defines two types of TODs known as Urban TOD and Neighbourhood TOD. Urban TODs are developed around a highly concentrated business and employment core with a moderate to high residential density. They should be located on the express transit routes (with light rail, heavy rail or express bus stops). Neighbourhood TODs, on the other hand, should be located on a local feeder bus line that is directly connected to an Urban TOD transit point with a distance of no more

than three miles. They emphasis on the development of a neighbourhood with a moderate residential density, services, retail, entertainment, civic and recreational uses [Calthorpe, 1993, p 57].

The density of residential areas increases with the increasing proximity of the dwellings to the transit point. Calthorpe [1993, p 59] emphasises that a TOD should have a mixture of housing types - single family homes with ancillary units, townhouses, and apartments - combined to meet an average net density of 18 units per acre (45 dwelling units per hectare). He sets a minimum net residential density for each housing type and leaves the specification of the maximum densities to local plans. He sets a minimum average net residential density for Urban TODs at 37 dwelling units per hectare while setting an average net residential density in Neighbourhood TODs at a minimum of 25 dwelling units per hectare [ibid. p 83].

It should be mentioned that although Calthorpe's suggestions would increase the residential density in American urban areas the said figures are still much lower than those in many European cities are. Although high-density development cannot easily gain energy-efficient forms and usually results in congestion, the relatively low-density of Transit Oriented Development makes it impractical for European cities. In terms of density it should be noted that American towns are generally under-achieving while in contrast Iranian settlements are mostly over-achieving.

2.4.2 Liveable Neighbourhoods (LN)

Background

The concept of Liveable Neighbourhoods (LN), or the Community Design Code, is the State of Western Australia's (SWA) attempt to achieve a sustainable urban environment by providing high quality, living and working urban developments that are environmentally responsive. It tries to respond positively to the changing nature of Western Australian communities. It aims to promote mixed land use through designing "a robust neighbourhood structure that can accommodate a range of uses and which is flexible enough to adapt to change over time" [SWA, 1997, p 19]. The main objectives of this concept could be summarised as to promote a sense of

community, to increase the energy efficiency of the settlement, and to reduce dependence on private cars.

What is Liveable Neighbourhoods?

Liveable Neighbourhoods (LN) is, basically, "an assessment tool for structure plans and subdivision for (predominantly residential) new urban development in the metropolitan area . . ." [SWA, 1997, p 1]. It is provided as an optional alternative to current Western Australian suburban policies, where the low-density suburban development model is increasingly being criticised for high cost of services, high car dependence, and limited access to public transport. While the majority of the population is in one and two person households, most of the new houses have three and four bedrooms with two-car garages. This shows that the housing stock does not reflect the needs of people in Western Australia. The high cost of service provision for rapidly expanding cities, the need for affordable housing, safety concerns, the desire for greater social, economic and environmental sustainability, the need for more locally based jobs, and the provision of more efficient public transport are serious issues that Western Australian cities are currently facing. In response to these issues LN considers how to improve the design and layout of suburban developments, as subdivisions are considered a fundamental determinant of the urban form.

Investigating recent neighbourhood design concepts, such as Transit Oriented Development, Traditional Neighbourhood Development, and Urban Villages, the SWA concludes that the underlying objective of all of these concepts is "to create liveable neighbourhoods that reduce dependency on private vehicles and are more energy efficient" [ibid. p 3]. Therefore, it emphasises the idea of "an urban structure based on walkable mixed-use neighbourhoods with interconnected street patterns to facilitate movement and to disperse traffic" [ibid. p 3].

In order to achieve the aims and objectives of this model the following conditions should apply. A cluster of neighbouring subdivisions (settlements) forms a district (town). The day-to-day needs of residents are provided for within the neighbourhood

and other services and facilities are located in the district (town) centre, which is well connected to all district settlements (see Figure 2. 2).

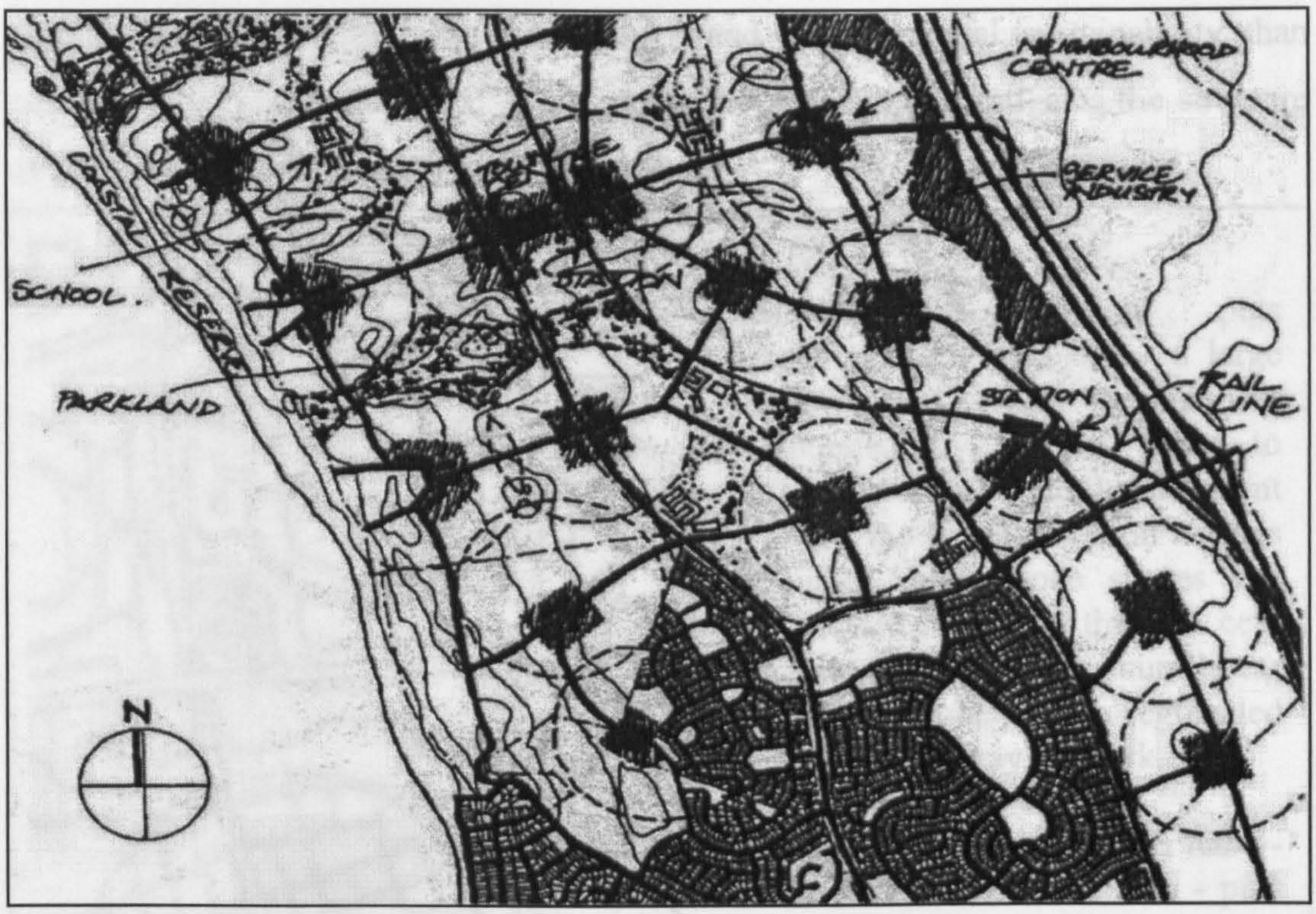


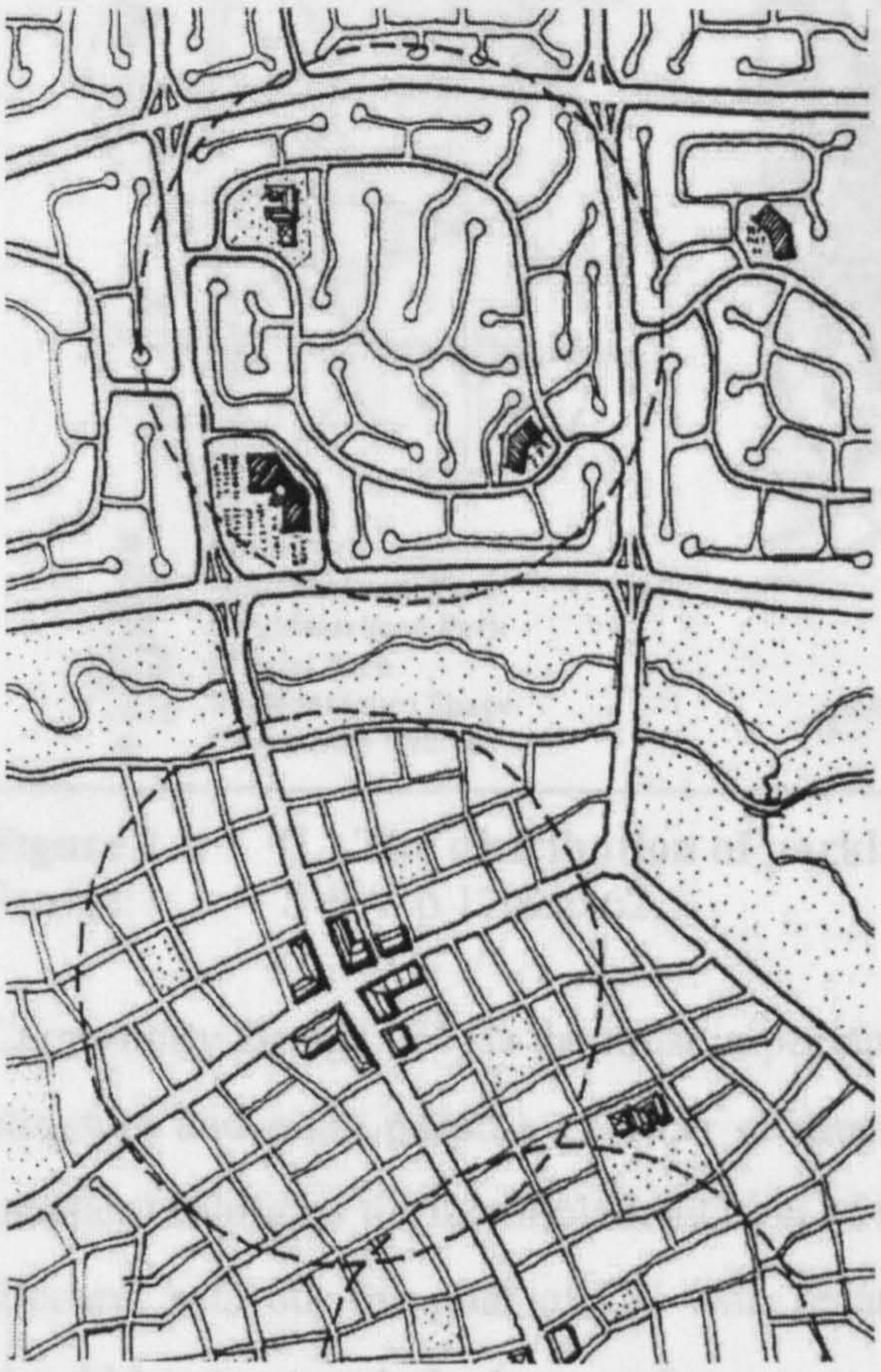
Figure 2. 2 **Cluster of neighbourhoods that form a town and the location of neighbourhood and town centre at the intersection of major roads.**

Source: Adapted from SWA, p 9.

The layout of the settlement should be permeable - in contrast to the conventional closed settlement model (see Figure 2. 3). Open public spaces including local parks and district parks should be located within walking distance - 400 meters and 600 meters respectively - to all dwellings. Civic services should be located in a walkable distance of a maximum of 400 meters to all dwellings. Transit points should be located within a maximum walking distance of 800 meters from all dwellings (see Figure 2. 4). This is to encourage walking and the use of public transport instead of private cars.

SWA emphasises the fundamental importance of increasing the density of settlements, to a level higher than at present. This is to make public services - such as public transport- more efficient and economically viable, but it fails to clearly specify the minimum required density to support the above-mentioned services and facilities.

However, SWA claims that this model of a safe, sustainable and attractive neighbourhood with a strong site-responsive identity supportive of local communities "promotes better community, employment and environmental sustainability than conventional planning practice" [ibid. p 3]. The following investigates the structure of Liveable Neighbourhoods in more detail.



Conventional planning puts neighbourhoods in a cell - a large single land use component surrounded by arterial roads to define the edge of the development - where the neighbourhood centres including shops, open spaces and schools are located within the cell. Access is through a curvilinear hierarchical street with a segregated pedestrian pathway network.

The LN concept, on the other hand - based on the mixed-use idea - puts the neighbourhood centre around the intersection of the major streets within the neighbourhood and locates parks and schools between neighbourhoods so that the walking access to the centre is not compromised.

Figure 2. 3 Comparison between conventional planning (top) and the LN concept (bottom) on settlement design.

Source: Adapted from SWA, p 19.

The structure of LN

The structure of LN (or Community Design Code) has six elements (Es). These are Community Design (E1), Movement Network (E2), Lot Layout (E3), Public Parkland (E4), Urban Water Management (E5), and Utilities (E6).

For each element there are two components called Objectives and Requirements. Objectives describe the principal aims of each element; Requirements present a range of qualitative and quantitative responses to meet the objectives. The Requirements

are set up in two ways; where there is a range of design solutions the phrase 'should be considered' is used, but where a particular response is required the phrase 'must be satisfied' is used.

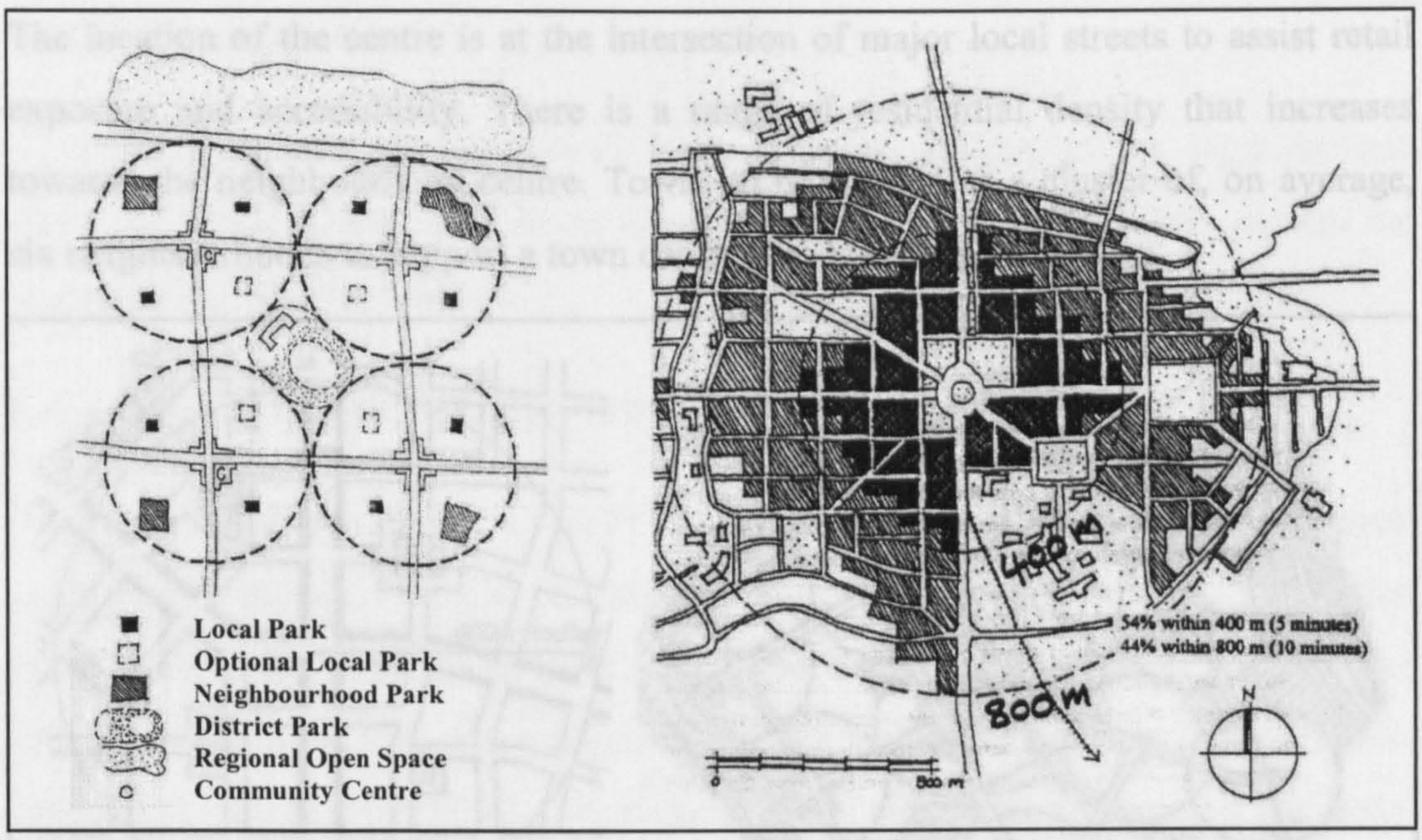


Figure 2. 4 (L) The distribution of parklands, (R) walkable catchment areas.
Source: SWA, p 17 & p 62.

Community Design (E1) is the most important element of LN. It generally defines the structure and main purpose of other elements. Other elements specify in detail the practical solutions for the implementation of the Community Design Code (LN). This Element sets out the goal of LN with regard to "how towns and neighbourhoods should be structured, the layout of street networks and block structures, the mixes of uses and facilitation of employment opportunities, the range of residential densities and other urban design issues" [SWA, 1997, p 19]. E1 is the primary tool for assessment of the new development plans. It includes eight practical Objectives and twenty-two Requirements "to guide the structure planning of neighbourhoods before applying the more detailed provisions in Elements E2 to E6" [ibid.]. Some of the major regulations of E1 that are most relevant to this study are explained in the following.

- **Structure:** The characteristics of Neighbourhood and town structure that regulate the size of the neighbourhoods, the mix of uses, the location of neighbourhood centre and variety of density. The size of neighbourhood is defined as five minutes walk -

approximately 400 meters - from a neighbourhood centre to encourage walking and cycling instead of private car use. The neighbourhood centre, supporting a mixture of uses to provide for the daily needs of residents, acts as the focus of the community. The location of the centre is at the intersection of major local streets to assist retail exposure and accessibility. There is a range of residential density that increases towards the neighbourhood centre. Towns to be formed as a cluster of, on average, six neighbourhoods to support a town centre (see Figure 2. 5).

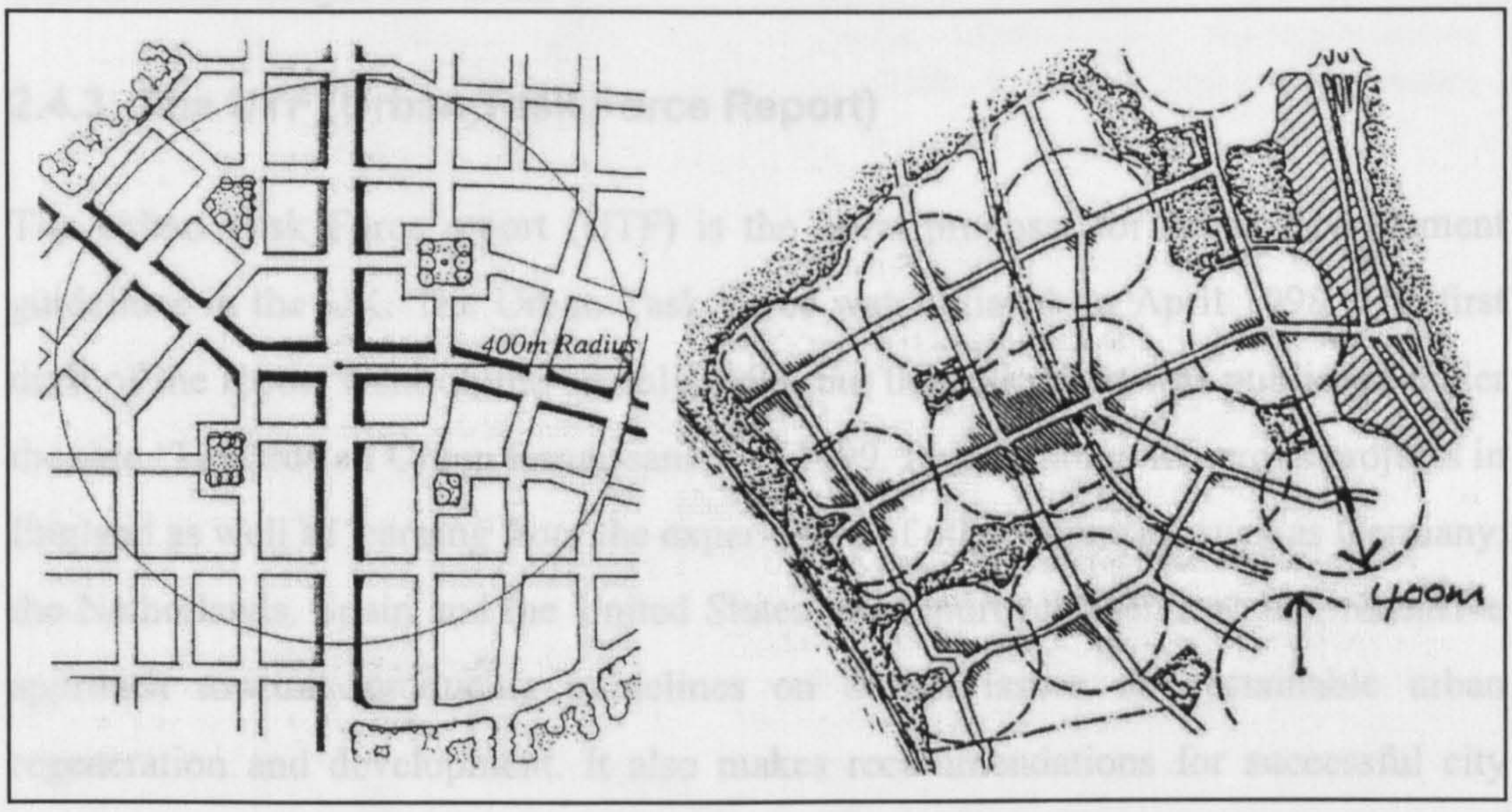


Figure 2. 5 (L) Diagrams of a Neighbourhood unit based on 5 minutes walk to centre, (R) neighbourhoods clustered to form and support a town centre.

Source: Adapted from SWA, p 21.

- **Local Identity**: Enhancing the local identity by combining the natural and culturally significant elements of the site in the layout and establishing legible streets and open spaces.
- **Energy Efficiency:** Proper orientation and sizing of lots in planning of the layout improves the energy efficiency of a LN by facilitating the sitting and design of dwelling in response to climate.
- **Mixed Use**: Provision of local jobs (mix of functions) and choice of housing (variety of different size, type, and density) with smaller residential lots and higher density housing close to the centre and transit point.

- **Safety**: Minimising the opportunities for vandalism and crime as well as increasing the safety of streets and open spaces by providing personal surveillance of streets from houses. The fronts of housing to overlook streets. Streets to be connected to allow through traffic.

- **Parkland**: Good distribution of local parks contributes to the legibility and character of LN. Location of linear open/green spaces between clusters defines the boundaries of neighbourhoods.

2.4.3 The UTF (Urban Task Force Report)

The Urban Task Force report (UTF) is the latest proposal for urban development guidelines in the UK. The Urban Task Force was initiated on April 1998. The first draft of the report went online on July 1998, but the full report was published under the title 'Towards an Urban Renaissance' in 1999. Investigating numerous projects in England as well as learning from the experiences of other countries such as Germany, the Netherlands, Spain and the United States, the report represents a comprehensive approach towards producing guidelines on design issues on sustainable urban regeneration and development. It also makes recommendations for successful city management and highlights economic as well as political requirements for successful implementation of the guidelines within the next twenty-five years. The discussion of all these issucs is beyond the scope of this study. However, those design guidelines that are relevant to settlement design will be reviewed.

The UTF emphasises "the importance of developing a higher quality urban product by creating compact urban developments, based upon a commitment to excellence in urban design and the creation of integrated urban transport systems that prioritise the needs of pedestrians, cyclists, and public transport passengers" [UTF, 1999, p 11].

The UTF underlines the importance of the quality of design in improving the urban environment. Analysing the structure of English towns and cities it discusses the importance of density, mix of uses, architecture, and the layout of public spaces in making successful urban neighbourhoods. The UTF suggests that future urban developments should be well designed, compact and connected. It emphasises that

different elements of a sustainable town or city – the local community, the neighbourhood, and districts – have to be connected to each other through a network of public routes and streets [Ibid. p 54] (see Figure 2. 6).

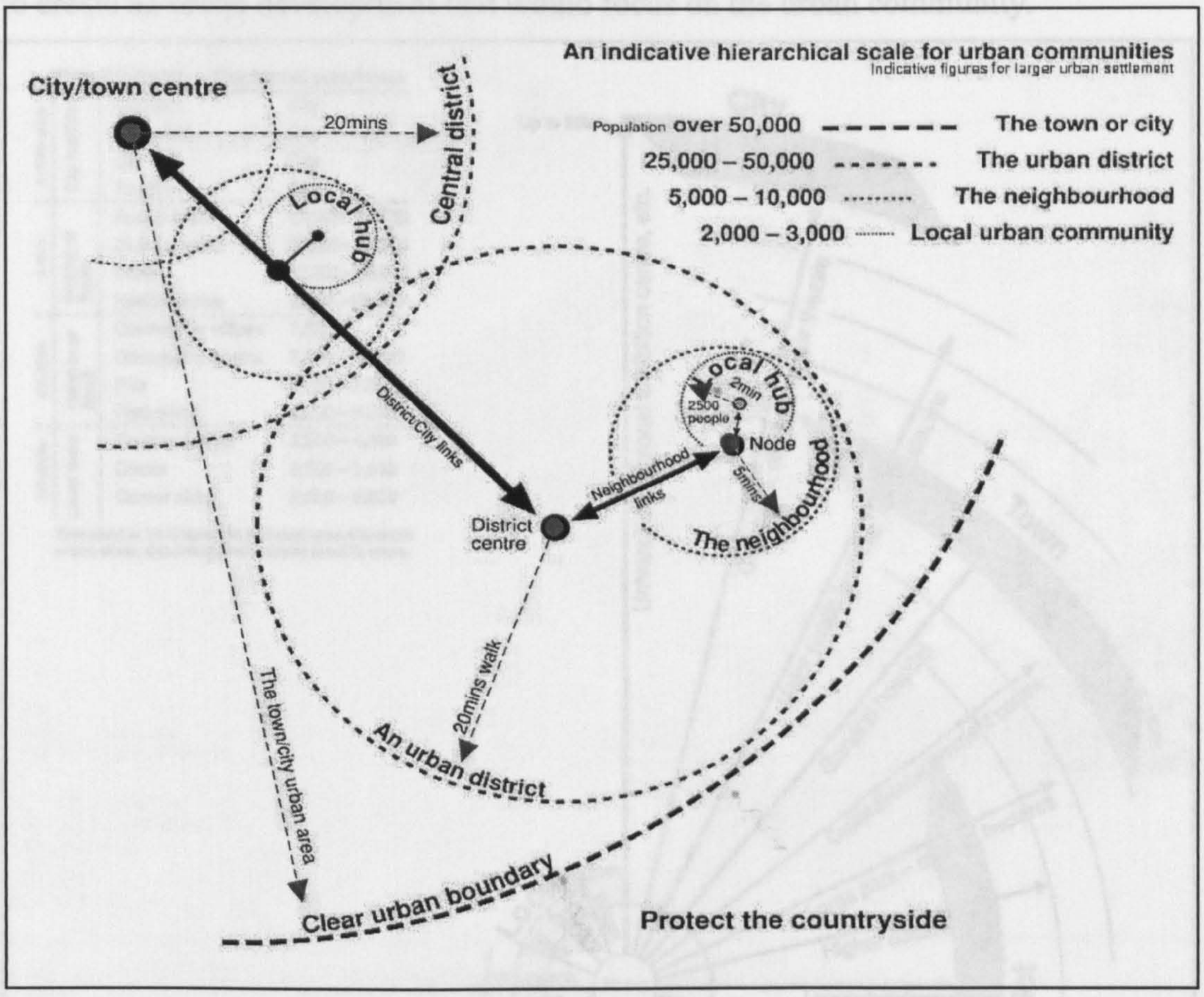


Figure 2. 6 Linking urban neighbourhoods and communities.
Source: Adapted from UTF, 1999, p 55.

The UTF emphasises that certain urban services and facilities should be located within walking distance from home. It argues "most people would be prepared to walk five minutes to reach their neighbourhood shop, school, or local bus stop before resorting to the car or other forms of transport. The wider urban district should sustain a range of commercial and social facilities, such as civic space, the leisure centre, college or park" [Ibid. p 54]. However, in order to make the provision of these services and facilities viable the UTF suggests a minimum size of population is required (see Figure 2. 7).

The UTF argues that density alone is not an indicator of urban quality. Comparing the conventional high-rise low coverage and low-rise high coverage housing development forms with medium-rise medium coverage it concludes that within the limitation of a chosen density (in this case 75 dwelling units per hectare) it is possible to create an urban development that would focus on the urban community.

		Possible facility	Catchment population
4–10km radius	City facilities	Stadium	City
		Cathedral	City
		City hall	City
		Theatre	City
2–6km	District or Town	Sports centre	25,000–40,000
		District centre	25,000–40,000
		Library	12,000–30,000
		Health centre	9,000–12,000
400–600m	Neighbourhood	Community offices	7,500
		Community centre	7,000–15,000
		Pub	5,000–7,000
		Post office	5,000–10,000
150–250m	Local hubs	Primary school	2,500–4,000
		Doctor	2,500–3,000
		Corner shop	2,000–5,000

This chart is indicative and is based upon city-scale urban areas. Catchments will vary in specific areas.

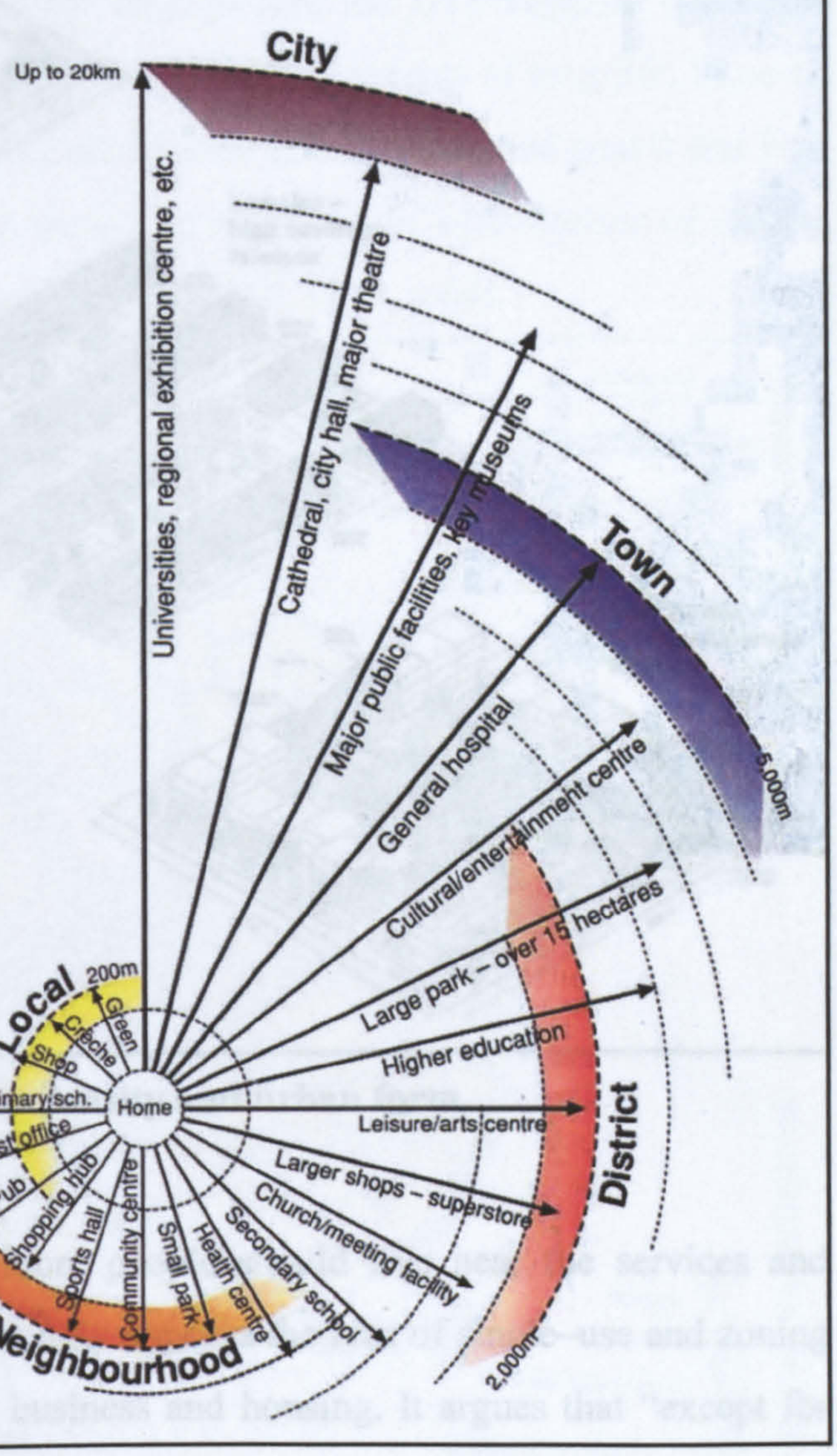


Figure 2. 7 The urban provisions, their practical distances from home and population required for their provision to be viable.

Source: UTF, 1999, p 31.

It suggests that buildings of different height should be "arranged around a landscaped open space which contains a community-based facility such as crèche or playground" [Ibid. p 63]. The commercial and public activities can be distributed at ground level to form an active street frontage along the main through-routes. As a result, more

space would be available for rear private gardens, communal areas or a park (see Figure 2. 8) [Ibid. p 63].

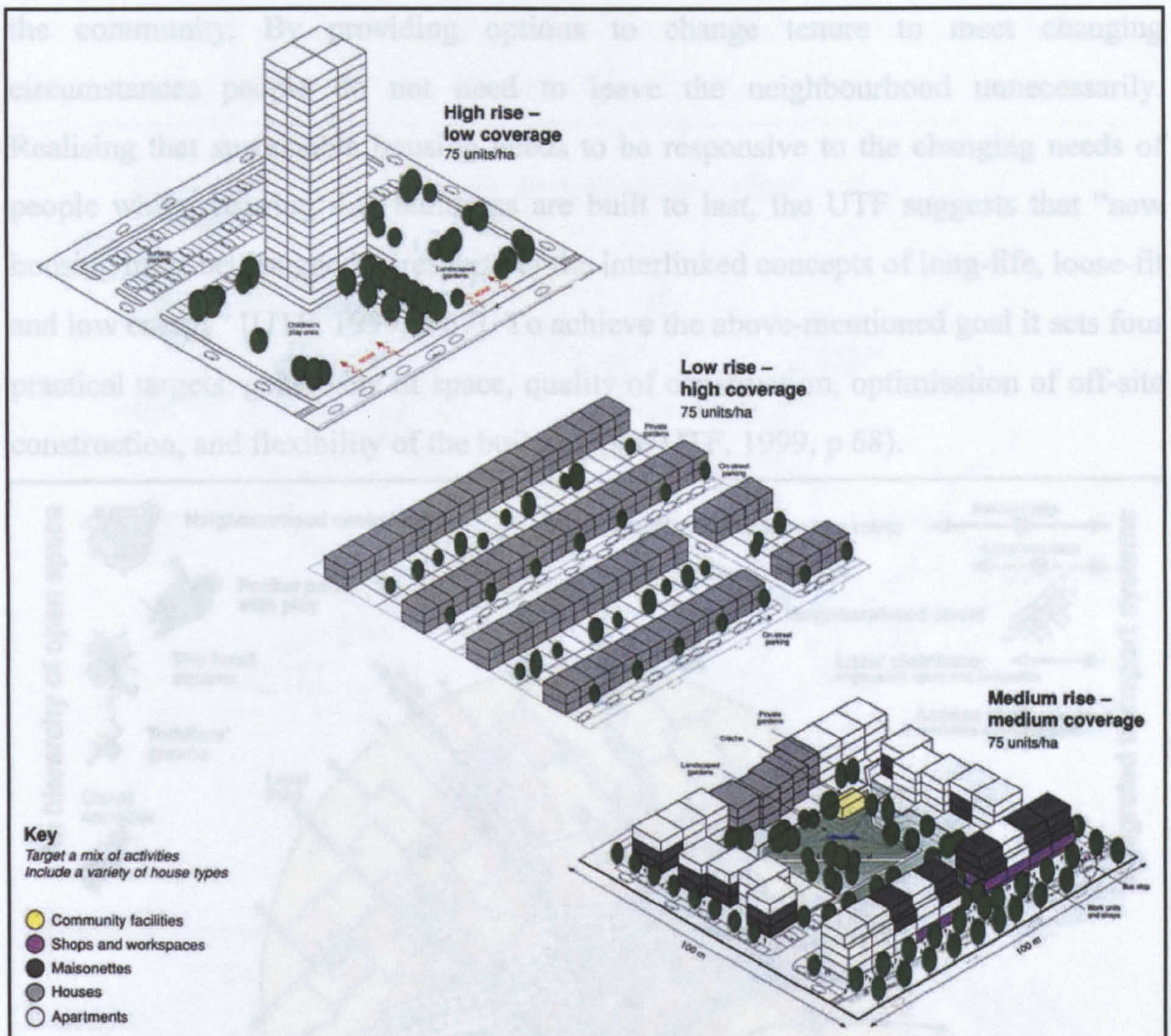


Figure 2. 8 Relationship between density and urban form.
Source: UTF, 1999, p 62.

The UTF promotes the idea that more people should live near the services and facilities they regularly require. It strongly opposes the idea of single–use and zoning of urban functions – i.e. shopping, business and housing. It argues that "except for certain industries or activities that attract very high traffic volumes or create noise at unsociable hours, most businesses and services can co-exist with housing" (see Figure 2. 9) [UTF, 1999, p 64].

The UTF also encourages a mixture of households. Social mix not only removes the stigma attached to a particular urban area, it also helps to distribute wealth more evenly within a locality. Although initially it seems not to be a design issue, a good

mix of income and tenure is important for the sustainability of the neighbourhood. It can work towards supporting viable neighbourhood facilities. It also helps stabilising the community. By providing options to change tenure to meet changing circumstances people do not need to leave the neighbourhood unnecessarily. Realising that sustainable housing needs to be responsive to the changing needs of people while ensuring that buildings are built to last, the UTF suggests that "new housing must be designed to respond to the interlinked concepts of long-life, loose-fit and low energy" [UTF, 1999, p 67]. To achieve the above-mentioned goal it sets four practical targets: generosity of space, quality of construction, optimisation of off-site construction, and flexibility of the building (see UTF, 1999, p 68).

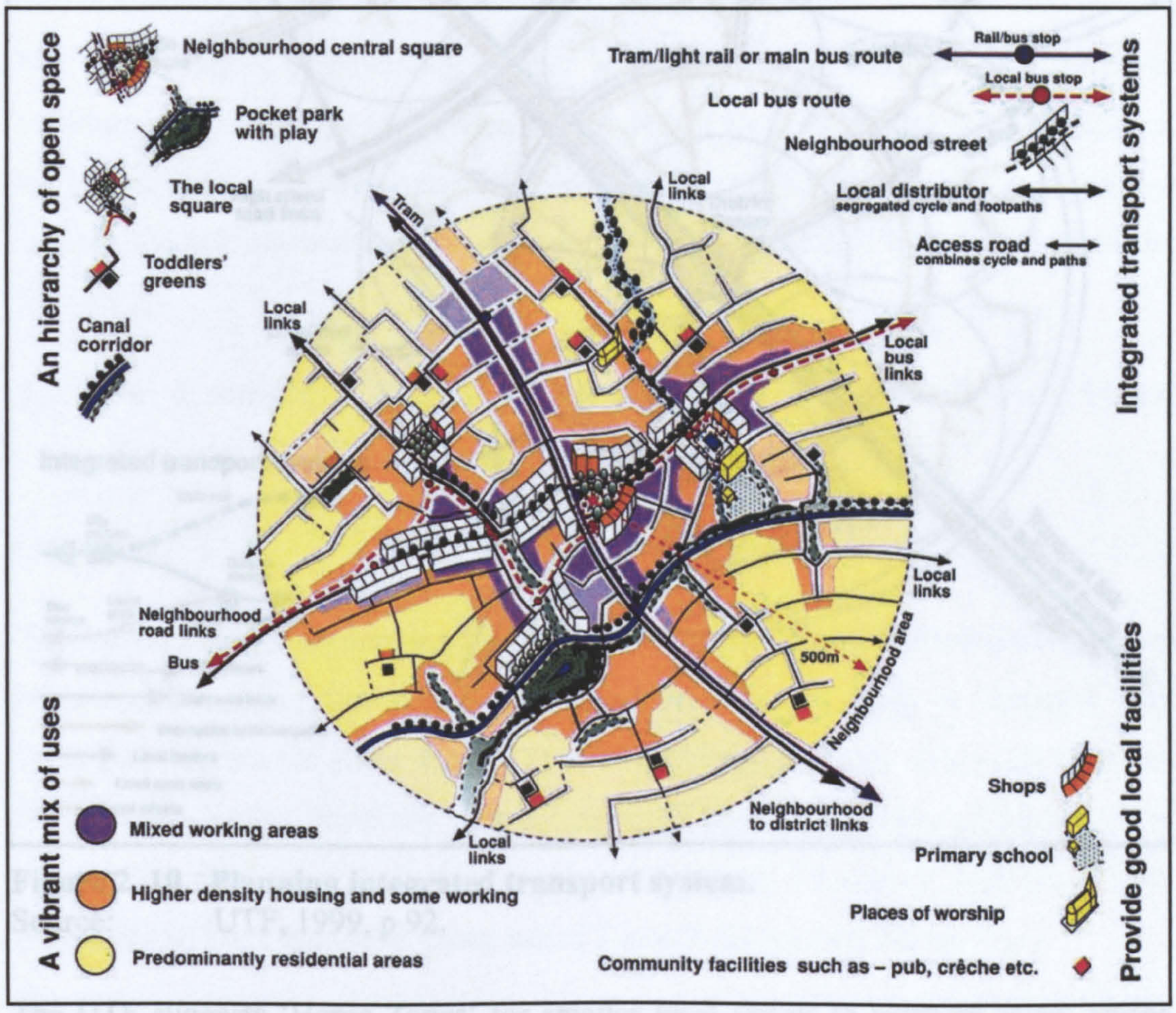


Figure 2. 9 The key components of a mixed-use urban neighbourhood.
Source: UTF, 1999, p 66.

In order to achieve sustainability within urban areas, the UTF argues that it is essential to plan for an integrated transport system. It emphasises the need for connectivity of the development to the rest of the town or city. It argues that a

neighbourhood should be well integrated with its urban context. Therefore, "it must be well connected to its immediate neighbours and provide a clear structure of accessible routes within the neighbourhood itself, which lead from one destination point to another" [UTF, 1999, p 90] (see Figure 2. 10).

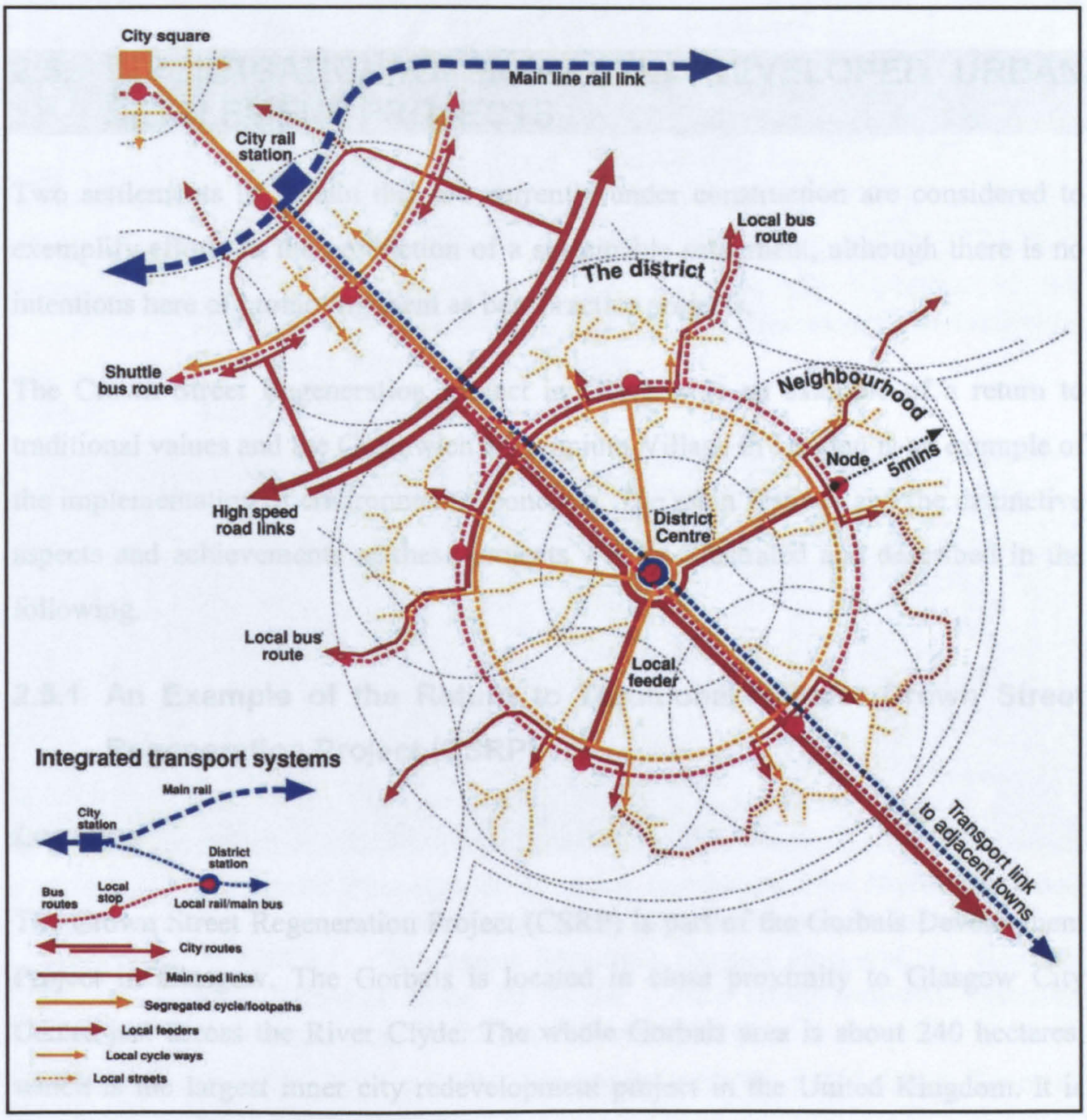


Figure 2. 10 Planning integrated transport system.
Source: UTF, 1999, p 92.

The UTF suggests 'Home Zones' for smaller local streets to work as social places [UTF, 1999, pp 93-94]. Prioritising walking and cycling, improving public transport, reducing car use and secure car parking are amongst the UTF's other suggestions to achieve sustainable urban environment.

The UTF develops a framework of ten design principles for creating more liveable spaces (see UTF, 1999, p 71). However, it underpins that on their own these principles cannot generate successful places or even good designs, but they can provide the basis for criteria for the evaluation of plans and proposals.

2.5. INVESTIGATION OF RECENTLY DEVELOPED URBAN SETTLEMENT PROJECTS

Two settlements in Britain that are currently under construction are considered to exemplify efforts in the production of a sustainable settlement, although there is no intentions here of promoting them as best practice projects.

The Crown Street Regeneration Project in Glasgow is an example of a return to traditional values and the Greenwich Millennium Village in London is an example of the implementation of environmental concepts. The main features and the distinctive aspects and achievements of these projects will be illustrated and described in the following.

2.5.1 An Example of the Return to Traditional Values: Crown Street Regeneration Project (CSRP)

Location

The Crown Street Regeneration Project (CSRP) is part of the Gorbals Development Project in Glasgow. The Gorbals is located in close proximity to Glasgow City Centre just across the River Clyde. The whole Gorbals area is about 240 hectares, which is the largest inner city redevelopment project in the United Kingdom. It is divided into four areas; three neighbourhoods - namely Laurieston, Hutchesontown, Oatlands - and one Industrial Estate called Dixon's Blazes (see Figure 2.11).

The CSRP is part of the Hutchesontown Neighbourhood. Other sub-neighbourhoods of Hutchesontown are Queen Elizabeth Square, Southeast Hutchesontown, East Gorbals, and Riverside (see Figure 2. 12).

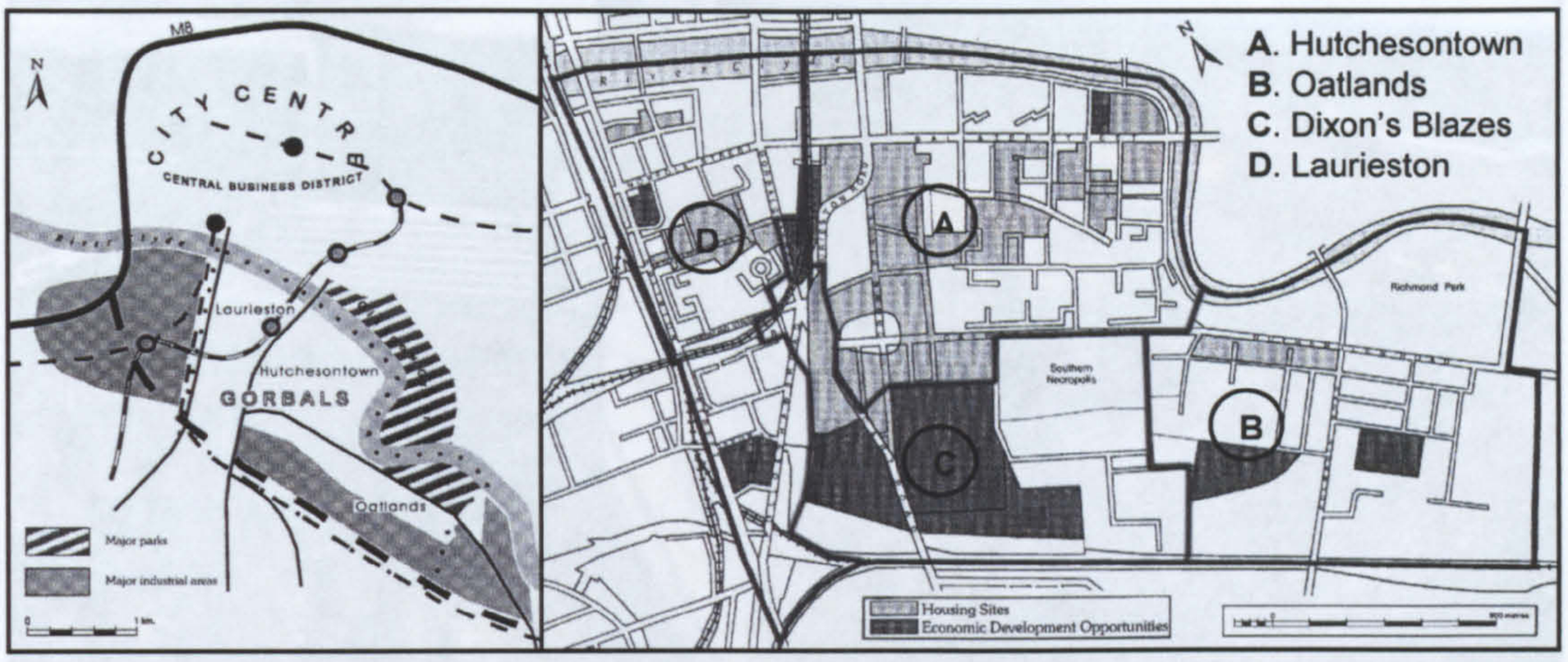


Figure 2. 11 **(L) Strategic Location of the Gorbals, (R) Location of the Hutchesontown within Gorbals; A: Hutchesontown, B: Oatlands, C: Dixon's Blazes, D: Laurieston**

Source: Adapted from GCC, 1997, pp 7 & 11.

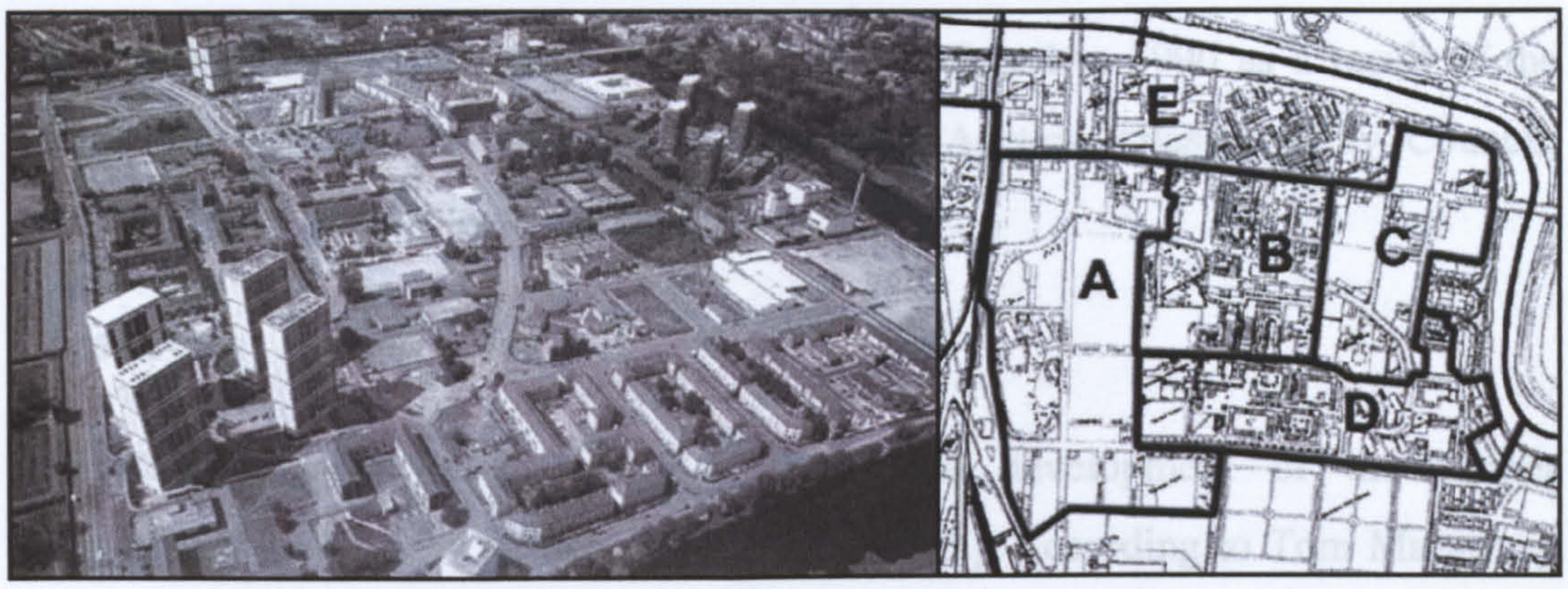


Figure 2. 12 **(L) Aerial Photograph, Looking northwest over Hutchesontown. (R) Hutchesontown Neighbourhood's Development Parcels; A: CSRP, B: Queen Elizabeth Square Renewal, C: Gorbals East Renewal Area, D: South - East Hutchesontown Housing Refurbishment, E: Riverside Developments.**

Source: (L) GCC, 1997, p 9. (R), Adapted from CSRP, 1991?, Inside Cover, & GCC, 1997, pp 64-65.

Background

The Hutchesontown 'E' consisting of twelve linked deck-access residential blocks, was built in 1968, but had to be totally vacated on 1982 due to incurable penetration of dampness, condensation, broken lifts, vandalism, and poor maintenance. Hutchesontown 'E' - locally known as Hutchi 'E' or Dampies - were finally knocked down in 1987, as a result of the local community's media campaigns, leaving ''40 acre gap site in the heart of the Gorbals'' [Macartney, 1999, p?] (see Figure 2. 13).

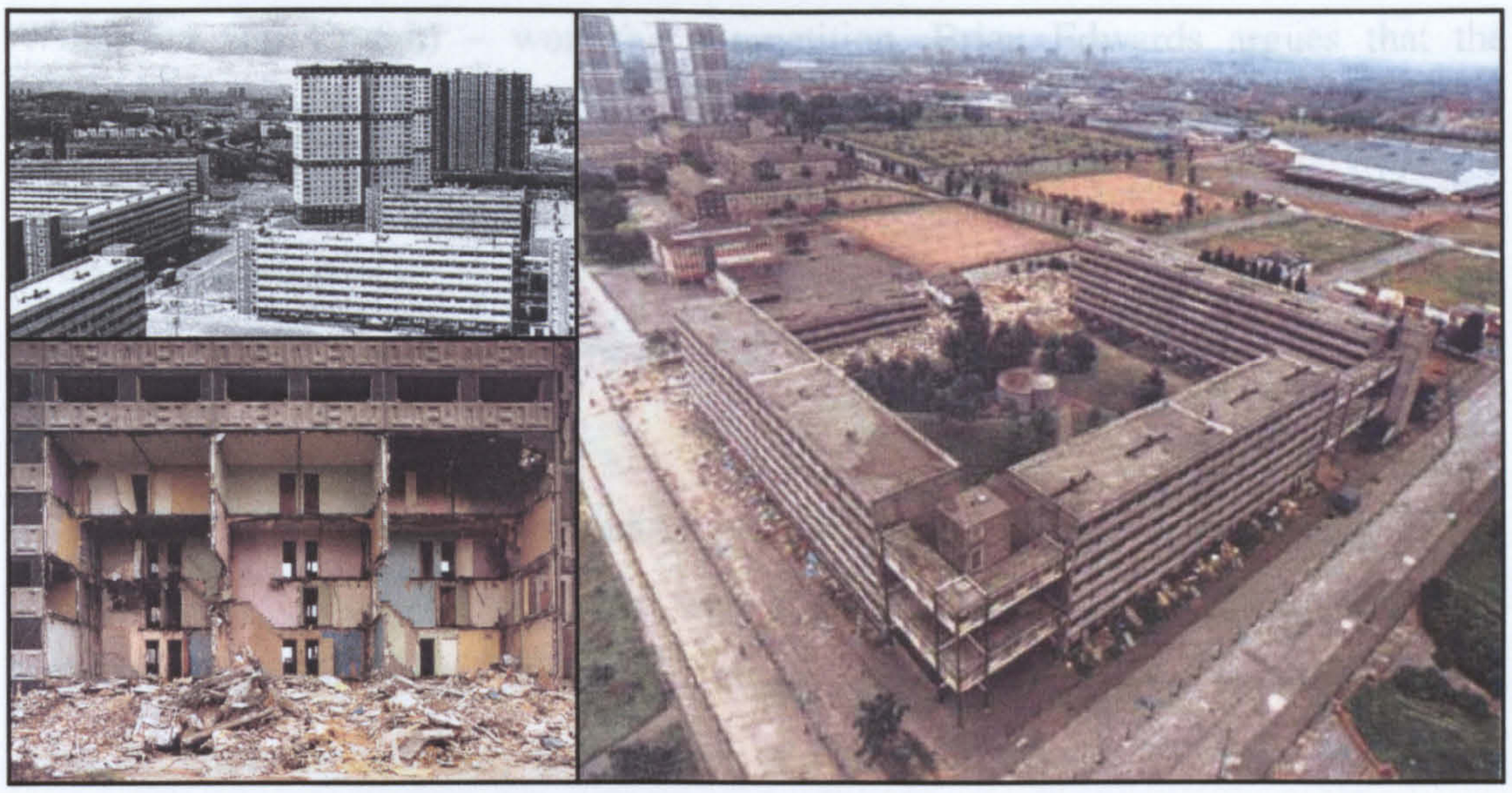


Figure 2. 13 Hutchesontown 'E' 1968 – 1982.
Source: Adapted from CSRP, 1991?, The Context.

The Crown Street Regeneration Project was established in 1990 as a result of the partnership between the Glasgow Development Agency, Glasgow City Council, Scottish Home, and the local community.

Objectives

The CSRP's task was to carry forward "the development of the former Hutchesontown 'E' site" [CSRP, 1991?, the Project]. According to Tom Macartney the Crown Street Regeneration Project "was given the aims of:

- Making the Gorbals a place in which people wanted to live;
- Developing a new and positive image for the Gorbals as a popular, balanced urban community;
- Assisting in bringing new energy and growth into the Gorbals economy;
- Integrating the new development into the social, economic and physical fabric of the existing community; and
- Providing solutions that stand the test of time" [Macartney, 1999, p?].

Following the formation of the CSRP a nation-wide urban design competition was held to draw a Master Plan that could stimulate the above-mentioned aims. The proposed scheme by a London based firm – CZWG (Campbell, Zogolovitch,

Wilkinson and Gough) – won the competition. Brian Edwards argues that the CZWG's Master Plan, although European in flavour, was intended "to resurrect the Scottish practice of wide and healthy streets and well-sanitised tenement blocks" [Edwards, 1992, p 12].

Principles

As Reed [1999] emphasises the main physical elements of the CZWG's Master Plan, driven by the 'Glasgow antecedents' were the tenement, the block, the street and the grid. However, the challenge was that "the traditional forms were to be evolved to meet the needs in the twenty-first century of a balanced Glasgow community" [Reed, 1999, p 224]. These principles, based on the idea of the 'liveable city' [Galloway, 1997, & Macartney, 1999], are explained in the following.

The Tenement

In Gorbals the ideas of high-rise and deck-access apartment blocks – what Bell calls the " 'Tracoba' method of system building" [Bell, 1993, p 11] – have failed to prove their suitability for family housing. Therefore, the desire intensified to develop an urban form that while having roots in Scottish traditional architecture would revitalise the Gorbals's historic strongly urban character. Such a form should create a positive identity for the CSRP while serving as a satisfactory modern Glaswegian family housing form.

The rediscovery of the tenement, which was a traditional building form in Scottish cities, served just that purpose. The only problem was the tenement's compatibility with the needs of "the modern family who place value on private as well as public living space'' [CSRP, 1991?, The Concept].

To overcome that problem the optimum solution was found to be the keeping of the external appearance of the tenement, as a traditional four-storey building, but modifying the design of its internal spaces (see Figure 2. 14 & Figure 2. 19).

Figure 2. 14 CSRP Tenement Block of phase one.
Source: (L) the author - April 2000, (R) GCC, 1995, Cover.

The ground and the first floors were allocated to three bedroom maisonettes, each with their own front and back door and a private rear garden. The two upper floors would have one, two and three bedroom flats accessed by a separate communal stairway - as in the traditional close. This solution could guarantee the suitability of at least half of the tenement for modern family housing.

The Block

The urban block, as defined by CSRP, is "a ring of buildings dividing the public street from the private enclosed space" [Galloway, 1997, p 28]. The problem with this internal space was that in the past they used to be very narrow and virtually under nobody's jurisdiction. As rubbish-collection vehicles as well as any member of public had access to the enclosed space, they failed to provide enough privacy and the feeling of safety and security for the families and their children to use these spaces. In CSRP increasing the width of the enclosed space and restricting access to the internal area to residents only solved this problem (see Figure 2. 15).

The central area of the block was designed as a shared communal garden where children could play in safety, as residents – only - were provided access through their secured residential entrances; the maisonettes' residents could access the communal garden through their own private back gardens (see Figure 2. 16), thus, providing a peaceful and private space for residents as a refuge from the gruelling public realm.

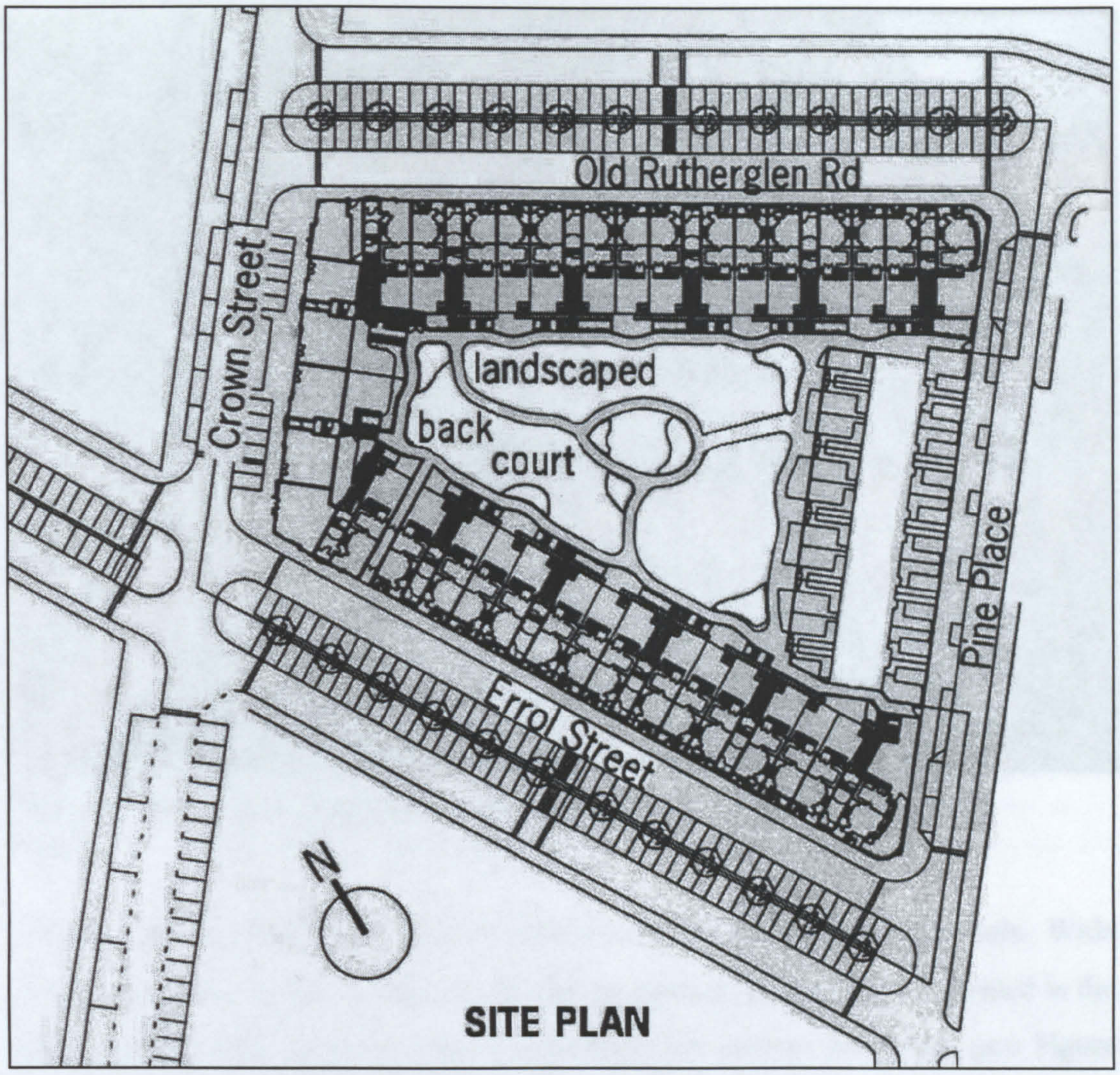


Figure 2. 15 The Site Plan of CSRP, Phase 1B.
Source: Adapted from Cooper Cromar, 1996, p 32.

The Street

Until the rejection of the tradition by the modern movement, streets have always been the basic element of city life in Glasgow. Like the tenement, the street is also being rediscovered as an important element of the liveable city, but some modifications to the traditional street are necessary to adapt it to modern city-life. Traditionally the widest streets of the city were the main traffic thoroughfares. The width of streets was specified by the volume of traffic passing through it over a certain amount of time. Consequently, the residential streets were, most often, the narrowest streets. Galloway states: "present day conditions suggest that this hierarchy should be reversed" [Galloway, 1997, p 28].

Figure 2. 16 The landscaped shared communal space within the block.
Source: the Author - April 2000.

In CSRP the widest streets are the residential streets in the form of boulevards. Wide streets - with trees planted in the centre and car parking, for residents, provided in the middle of the road - allow sunlight to penetrate the base of tenements (see Figure 2.17). Placing car parking under trees in the middle of the road opposite to each resident's house not only frees up the street sides for delivery and emergency access, the parked cars can also be more easily observed from the houses.

The Grid

The grid pattern is Glasgow's most fundamental urban form. In this case Glasgow is more similar to European cities than to English ones. Glasgow's predominantly straight streets, on an imposed grid, occasionally give way to a crescent. An important urban element, usually a church or a library building some times blocks the straight axis.

Figure 2. 17 On-site parking in the middle of street increase the parked cars' visibility by the residents as well as freeing the loading bay for emergency access to buildings.

Source: The author, April 2000.

As Macartney states: "re-introduction of a grid [into the Crown Street site] allows the street pattern to make better connection with the surrounding areas, and thereby repair a hole in the urban fabric"[Macartney, 1999, p?].

The CSRP follows the manner of Glasgow's urban form and returns to the spirit of the grid by using predominantly straight streets and a large oval-shaped park and some crescents to enliven the flat site.

The CSRP Site

The CSRP is located in a 19.4 hectare piece of land [CSRP, 1991, p 8]. However, the housing development area, which is surrounded by the Caledonia Road, Laurieston Road, Ballater Street, and Pine Place is about 16.3 hectare (see Figure 2. 18).

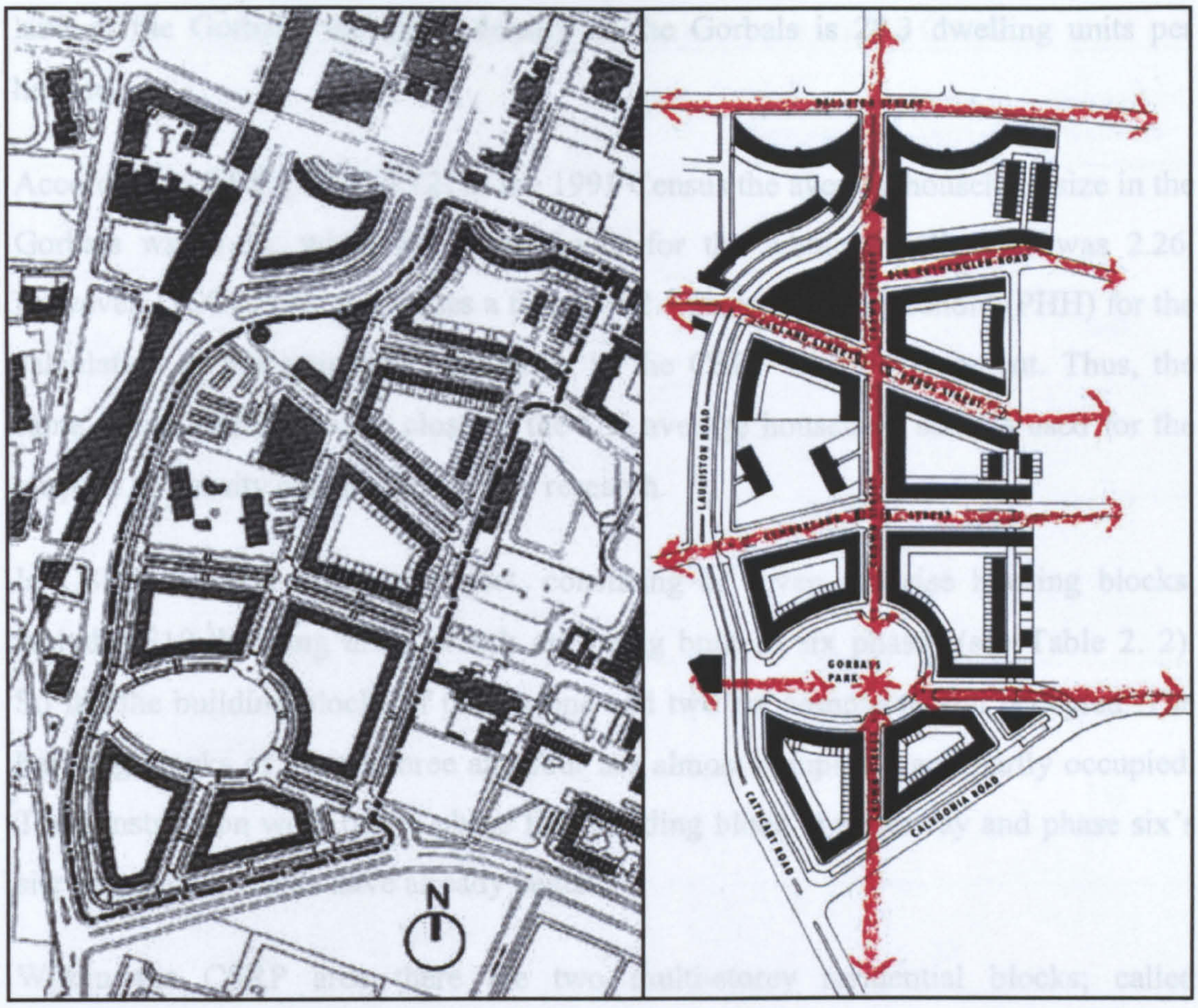


Figure 2. 18 (L) Boundaries of the 16.3 hectare CSRP.
(R) The Original Masterplan of CSRP by CZWG.
Source: (L) Adapted from Galloway, 1997, p 28. (R) CSRP 1991?, Plan.

Housing

According to GCC [1997,p 10] during the Gorbals redevelopment process a total of 2861 new dwellings are planned to be built on 44.72 hectares of land with an average net density of 64 dwelling units per hectare. Out of those 2861 new dwellings 1965 (68.7%) will be in the Hutchesontown neighbourhood, 513 (18.9%) in Oatlands and 353 (12.4%) in the Laurieston area. In total 1897 (66.3%) of the new dwellings are for sale (owner occupation) and 974 (33.7%) for social rent.

According to Jane Lavery [GCC, the Gorbals Neighbourhood Office] on 15th May 2000, in total, there were 6800 dwelling units in the Gorbals. Out of this total, 42% belonged to Glasgow City Council, 42% to housing associations and 16% were owner occupied. GCC's 42% totals 2856 Houses; these consist of 1794 multi-storey flats and 1062 tenement and deck-access houses. Considering the total 240 hectares

land of the Gorbals, the gross density of the Gorbals is 28.3 dwelling units per hectare.

According to GCC [1994, p 12] in the 1991 Census the average household size in the Gorbals was 1.86, while the same figure for the whole of Glasgow was 2.26. However, GCC [1997, p 10] uses a figure of 2.4 persons per household (PHH) for the calculation of the estimated population in the CSRP new development. Thus, the same figure, which is very close to the UK average household size, is used for the purpose of density calculations in this research.

In CSRP the new housing project, consisting of seven low-rise housing blocks, includes 810 dwelling units, which are being built in six phases (see Table 2. 2). So far, the building blocks of phases one and two are completed and occupied. The building blocks of phases three and four are almost completed and partly occupied. The construction work of the phase five building block is underway and phase six's site preparatory works have already begun.

Within the CSRP area there are two multi-storey residential blocks; called Sandiefield Flats. Each block has twenty-four floors with eight flats per floor, which make a total of 384 flats in two tower blocks. It has been decided to keep the Sandiefield Flats for the time being, in order to keep the area alive by maintaining the original population within the area, but it is planned to replace these towers by low-rise housing in the future. Eventually a tenement block with a size of about 110 dwelling units - similar to the adjacent block of Phase Two - will replace these multi-storey blocks.

According to GCC [1997, p 10] the net density of the new housing development within CSRP was planned for approximately 68 dwelling units per hectare. However, upon the completion of the housing blocks of phases five and six there will be 1194 dwelling units within the vicinity of CSRP (including Sandiefield Flats), which makes the gross density of the Crown Street Regeneration Project 73 dwelling units per hectare. Details of housing tenure and number of dwellings in each housing block of CSRP are illustrated in Table 2. 2.

Table 2. 2 Number of Dwellings and Tenure Types within CSRP.

Phase	Architect	Developer	Completed by year	Owner Occupied	Social Rent	Total No. Dwellings
1A	Holmes Partnership	Miller Homes	1995	207	–	268
1B&D	Cooper Cromar	Wimpy Homes	1995		–	
1C	Cooper Cromar	NGHA	1995	–	61	
2A	Page & Park	NGHA	1999	–	51	121
2B	Hypostyle	Tay Homes	1997	70	–	
3A	Elder & Cannon	NGHA	2000	–	26	112
3B	Cooper Cromar	Miller Homes	1999	86	–	
4A	Cormac Gracie	NGHA	2000	–	30	106
4B	Holmes Partnership	S. Milne Homes	1999	76	–	
5 & 6	Hypostyle	Tay Homes	2001	All	–	203
	Total Six Phases			**642**	**168**	**810**
	Sandiefield Tower Blocks			–	All	384
	Total CSRP Area			**642**	**552**	**1194**

Source: Adapted from CSRP, 1999, p 2. & Local survey by the author.

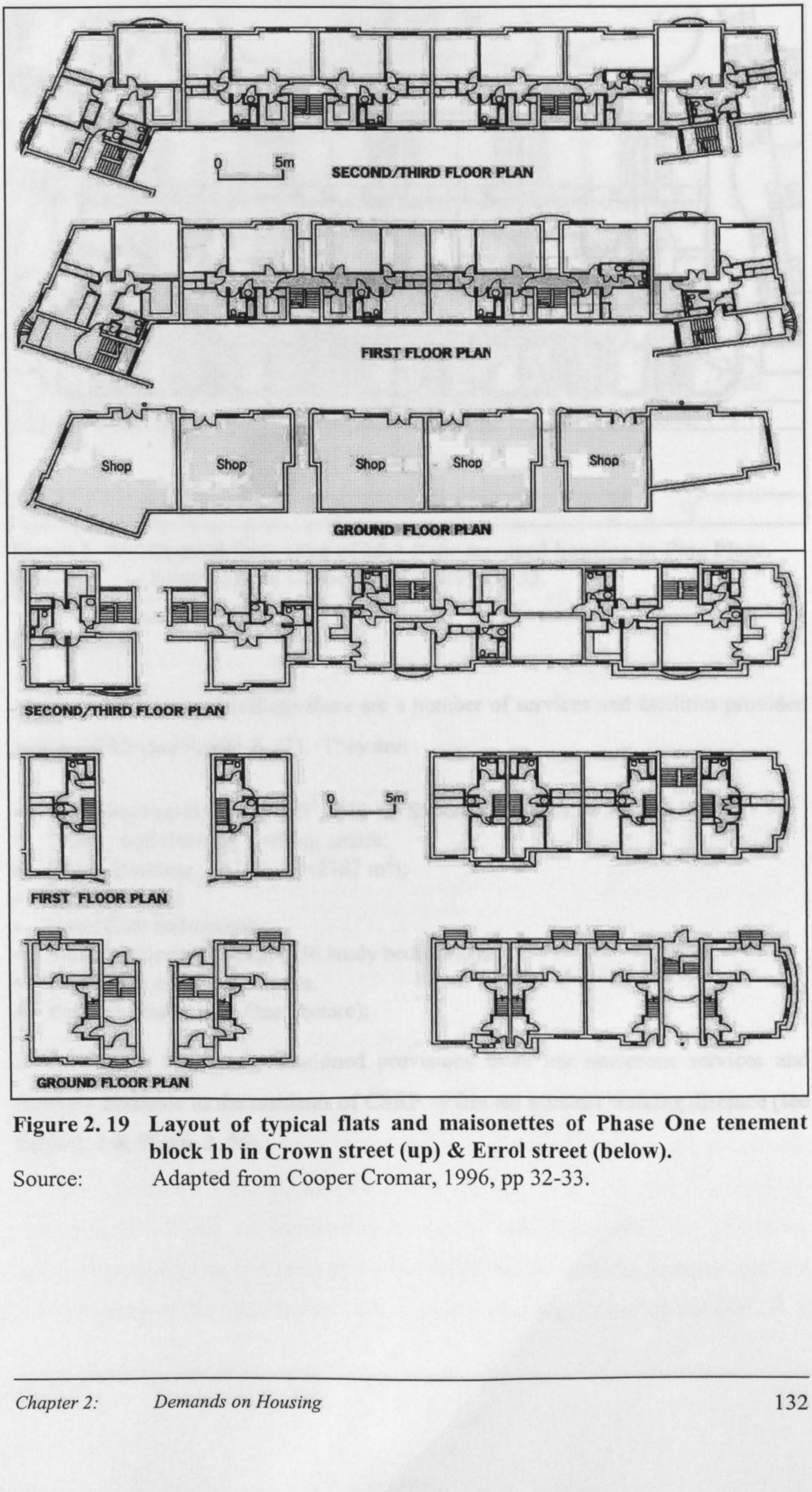


Figure 2. 19 Layout of typical flats and maisonettes of Phase One tenement block 1b in Crown street (up) & Errol street (below).

Source: Adapted from Cooper Cromar, 1996, pp 32-33.

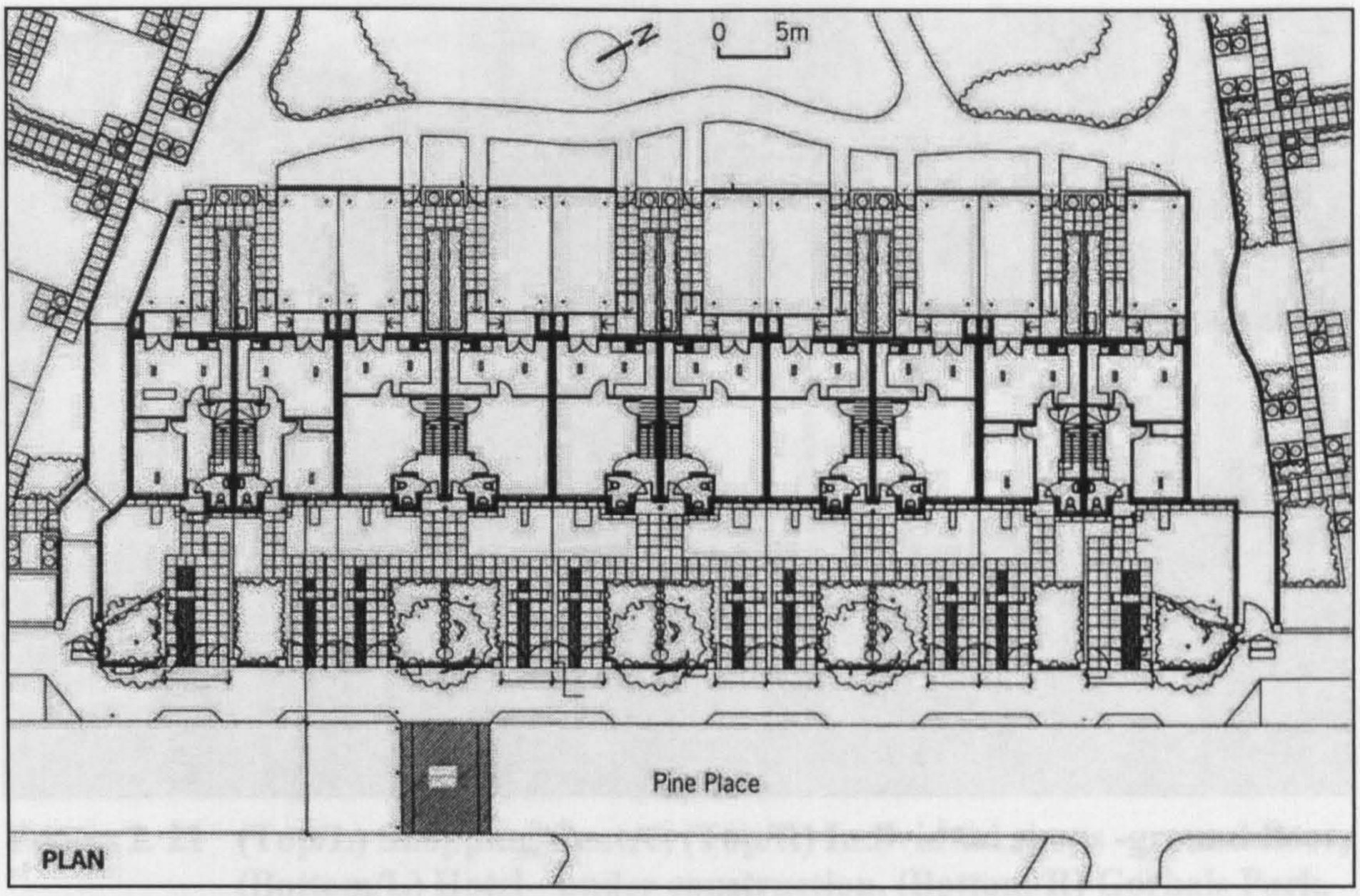


Figure 2. 20 Ground floor plan of 2&3-floor terraced housing in Pine Place.
Source: Adapted from Cooper Cromar, 1996, p 33.

Provisions

Apart from 810 new dwellings there are a number of services and facilities provided within CSRP (see Figure 2. 21). They are:

- Shopping Facility (10,000 ft^2 =930 m^2 Supermarket plus 12 Shops);
- Library and life long learning centre;
- Office Building (30,000 ft^2 =2787 m^2);
- Church (new);
- Hotel (200 bedrooms);
- Student accommodation (256 study bedrooms);
- Restaurant and Public house.
- Park (Gorbals park - One hectare);

In addition to the above-mentioned provisions there are numerous services and facilities available to the residents of CSRP within ten minutes walking distance (see Table 2. 1 & Figure 2. 26).

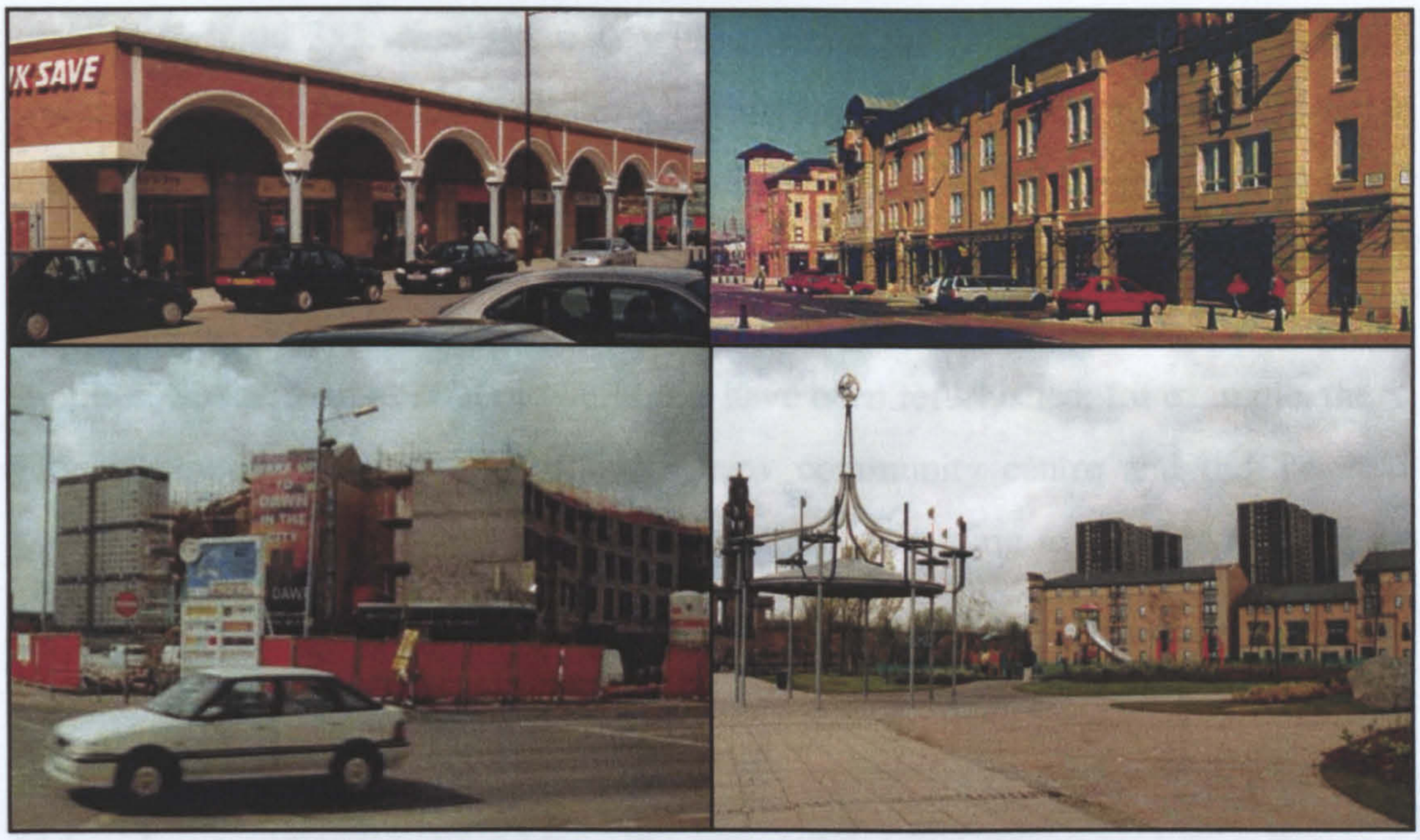


Figure 2. 21 (Top/L) Shopping Centre, (Top/R) Individual shops -ground floor, (Bottom/L) Hotel - under construction, (Bottom/R) Gorbals Park.

Source: The author, April 2000.

Table 2. 1 Other services and facilities available to CSRP residents.

Provisions within the vicinity of Hutchesontown Neighbourhood		Provisions located immediately adjacent to CSRP (within 600 m radius of Hutchesontown's centre)
• Nautical college • Primary schools (Two) • Health Centre • Police Station • Rose park • Health facilities • Church (existing) • Training workshops • Adelphi training centre	• Sports & Leisure Centre • St Francis Community Centre • Dunn Scotus Community Centre • Twomax Building (offices) • Office accommodation (railway arches upgrade, phase one - 20,000 ft^2 =1858 m^2) • Office accommodation (railway arches upgrade, phase two - 30,000 ft^2 =2787 m^2)	• Glasgow Central Mosque • Citizens' Theatre • Gorbals Umbrella Group • Legal House (offices) • Business park • Industrial units • Possible railway station

Source: GCC, 1997, p 64. & Tom Macartney (the CSRP director).

Further Development of CSRP – QES

The demolition of the Queen Elizabeth Square (QES) multi-storey concrete slabs on Sunday 12 September 1993, once an award winning project by Basil Spence, has left about 4.5 hectares of vacant land on the eastern side of CSRP site. The housing redevelopment of this site was seen as a rational continuation of CSRP. Therefore, after achieving success in Crown Street the CSRP has assumed the responsibility for redevelopment of the QES site as well. A master plan was drawn up for QES. It is

planned to build 353 dwelling units with a tenure mix of 177 social rent and 176 owner occupied dwellings. There will be different house types, similar to CSRP, to meet a variety of family housing needs. There will also be plenty of community involvement to bring the life back into the local community. To that end a number of old buildings will be refurbished and prepared to cater for the needs of modern families. So far, a number of old buildings have been refurbished; for example, the St Francis church has been turned into a new community centre and the Twomax building turned into new office accommodation. According to Tom Macartney the QES housing project is expected to commence soon.

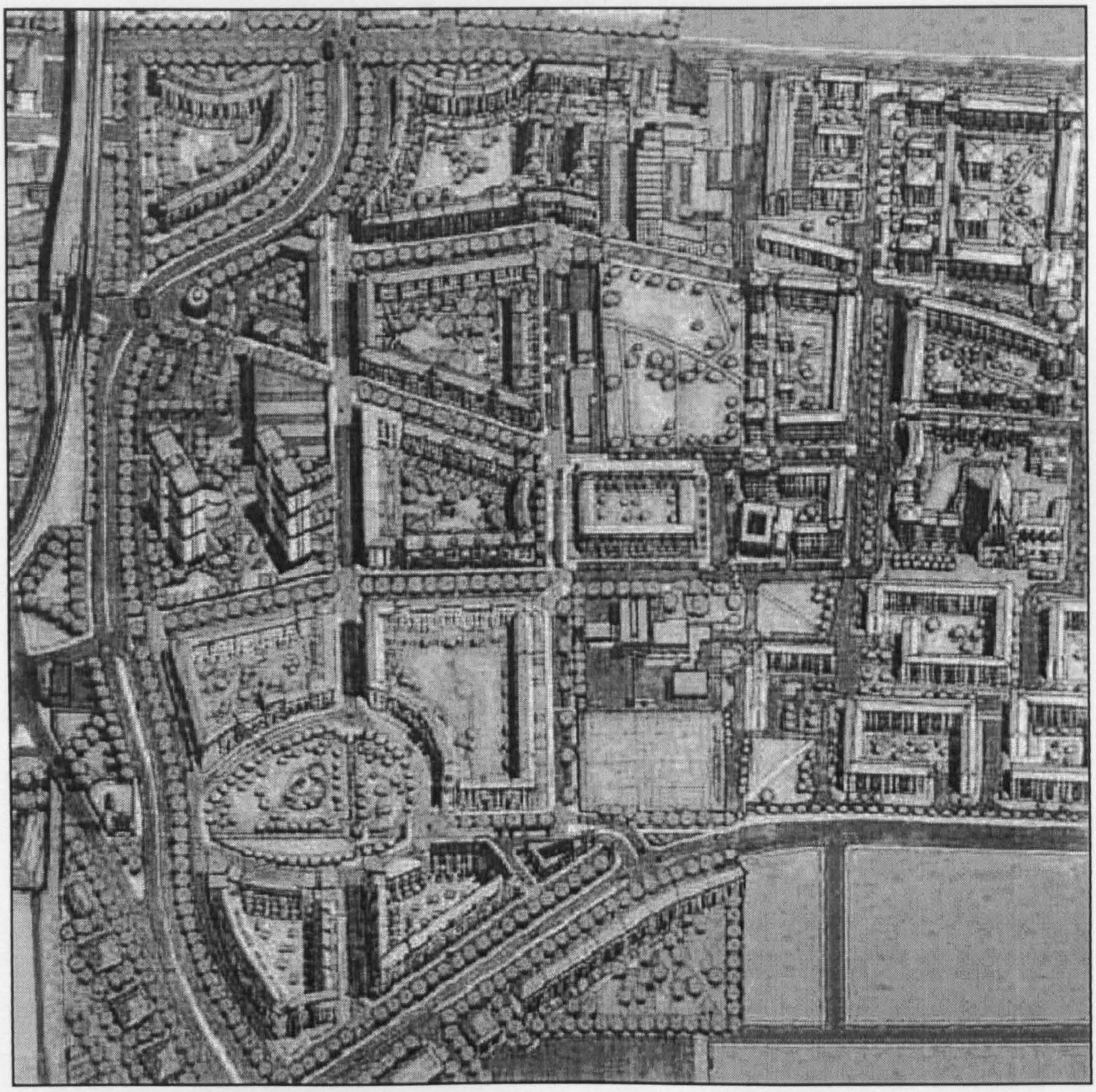


Figure 2. 22 Crown Street & Queen Elizabeth Square Regeneration Projects.
Source: Adapted from CSRP.

Mixture of Uses

The CSRP demonstrates the possibility of the amalgamation of all kinds of diversity in the design of a neighbourhood. It can be considered as a practical example of human scale, mixed-used development as Calthorpe [1995, p 27] and more recently UTF [1999] suggest.

In terms of land use residential, commercial and a variety of civic functions are present. The CSRP also has a mixture of tenure. Although initially the master plan was aimed at building 75% of the new dwellings for owner occupation eventually about 79% of all new dwellings will be built for sale and the rest for social rent.

This figure shows a big swing in the housing tenure of the area in favour of the owner occupation, while the GCC's report [1995,p 7] indicates that in 1991 only 4.2% of all dwellings in the Gorbals were owner occupied. The higher percentage of owner occupation in the new housing projects counter balances the original tenure mix of the Gorbals.

Although there are different types of tenure they are not distinguishable from outside to a passer by as all the houses are built to the highest standards with the best materials. A social mix as well as residents' involvement in the new development projects (which re-establishes their confidence in the Gorbals) remove the stigma that used to be attached to the area, and to create a positive image for the whole of the Gorbals.

In addition, to accommodate different household types and to meet different users' needs a variety of house types from villa housing, two and three floor apartments, flats and maisonettes in the form of low-rise tenements and high-rise apartments are present on the site (see Figure 2. 23)

The CSRP is also diverse in design terms. Each phase was released at a certain time for a design competition. Several architects and developers were employed to design and build different parts and parcels of each block - all based on merit (see Figure 2. 24 & Figure 2. 25).

Figure 2. 23 Variety of housing types within CSRP area.
Source: The author – April 2000.

While the guidelines of the master plan played a unifying role, different architects' tastes and styles in design gave a unique characteristic to each housing block. The result is a housing scheme which is diverse in style and design yet also displays harmonious characteristics (see Figure 2. 24 & Figure 2. 25).

Thus, as Brian Edwards [1992, pp 12-13] suggests this project can be considered as a successful example of creating an identity for the neighbourhood and a sense of place for the community. In fact, it would not be so wrong to say – as was claimed by GCC - that the renewal of the Gorbals, with CSRP at the heart of it, has played an important role in winning the title of "United Kingdom's City of Architecture and Design – 1999" for Glasgow [GCC, 1995, pp 14-15].

Figure 2. 24 Variety of entries designs to the buildings.
Source: The author – April 2000.

Although diversity of design (which made this project aesthetically pleasing) and the mixture of uses and tenure as well as people's involvement in the decision making and management (which are essential to the sustainability of the settlement) are considered as the strengths of this project, the flexibility of housing is a quality that this project lacks. However, this project paved a difficult path of urban regeneration successfully and helped the idea of the Urban Villages to reach the present level of maturity that it has achieved in the Greenwich Millennium Village, which is explained next.

Figure 2. 25 Various Block Corner designs in CSRP.
Source: The author – April 2000.

The case of CSRP in Glasgow is yet another proof of the fact that the low-rise housing has the potential for producing net density at least similar, if not even higher, to that which high-rise apartment blocks have achieved, without having the disadvantages associated with living at height for families. The example of CSRP proves that, if carefully designed and properly managed, low-rise housing cannot only achieve high density, it can also create a more aesthetically pleasing environment, create a strongly positive identity for the neighbourhood, improve the spirit of the community, and provide a more user-friendly environment (especially for families with children). In summary it can be concluded that low-rise high-density housing has the potential for creating a sustainable environment.

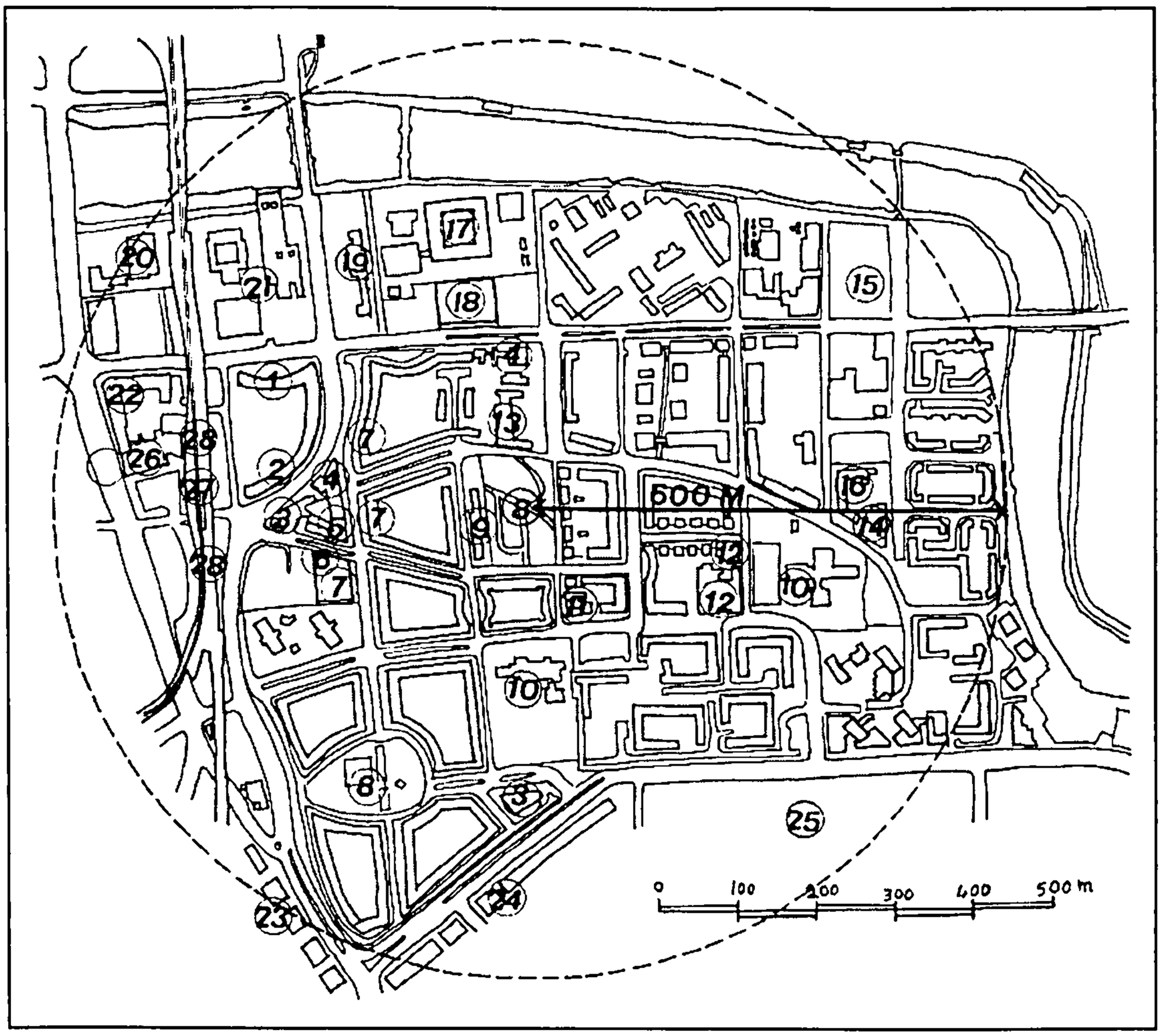


Figure 2. 26 The location of all the provisions in Hutchesontown (listed below). The map includes the proposed QES regeneration development.

1. Hotel
2. Student accommodation
3. Pubs and restaurant
4. Churches
5. Office accommodation
6. Library and life long learning centre
7. Shopping (supermarket plus twelve shops)
8. Parks
9. Health centre
10. Schools
11. Police station
12. Community centres
13. Business development centre (office)
14. Gorbals economic development centre
15. Business development (workshop)
16. Sheltered housing
17. Adult training centre
18. Gorbals' leisure centre
19. Health facility
20. Glasgow's Central Mosque and Islamic cultural activities centre
21. Glasgow College of Nautical Studies
22. Legal House (CSRP director office)
23. Business park
24. Industrial units
25. Southern necropolis
26. Citizens' Theater
27. Possible railway station
28. Railway arches (to be prepared for office accommodation)

◆ Public transport nodes (bus stops)

Source: The author (local survey).

Comments

Having many strong points, however, the CSRP has to be seen within the framework of the Hutchesontown neighbourhood. Judging by the number of projects and the

amount of money poured into this area it is safe to say that the Hutchesontown neighbourhood was given special weight in the Gorbals' regeneration program, and it is, therefore, reasonable to expect a high quality urban environment to be developed within this area. There are more services and facilities present within the vicinity of this neighbourhood than the most idealistic urban planning concept (such as UTF) recommends. Yet they are distributed in a way that are not easily accessible (within walking distance) to most of the residents of this neighbourhood. Almost all of the shopping facilities, public houses and the library within the CSRP are located at its western edge (see Figure 2. 26). Although there are many bus stops on the surrounding main roads, the new transit point (Railway Station) is beyond walking distance from the eastern half of the neighbourhood. Overall, it could be said that most of the services and facilities are concentrated in the western part of the neighbourhood while most of the social housing schemes are located in the east.

2.5.2 An Example of the Implementation of Environmental Concepts: Greenwich Millennium Village (GMV)

The proposed Greenwich Millennium Village (GMV) is a diverse mixed-use scheme being developed within the 121 hectare Greenwich Peninsula redevelopment project. Greenwich Peninsula, located in the south east of London by the river Thames, is the showcase of British urban regeneration and sets standards for brown-field site revival. A total of 3000 homes were proposed for the Greenwich Peninsula Project of which nearly half would be within the GMV.

The proposed scheme has been referred to by many different names. "The village has now been provisionally renamed *Greenwich Riverside*" reported Josephine Smit without mentioning the source of the decision [Smit, J., 1998, p 21]. David Taylor [1998] and www.greenwich-penninsula.co.uk refer to it as '*Millennium village*' while other major Internet sources such as Goldsmiths College London (www.gold.ac.uk) and the Friends of the Earth organisation (www.foe.co.uk) currently refer to it as the *'Millennium Eco-Village'*. However, Ben Derbyshire [1999] and the most recent official Internet site for the village - launched in April

2000 - (www.greenwich-village.co.uk) refer to it as *'Greenwich Millennium Village'*. Thus this study refers to this project as Greenwich Millennium Village (GMV).

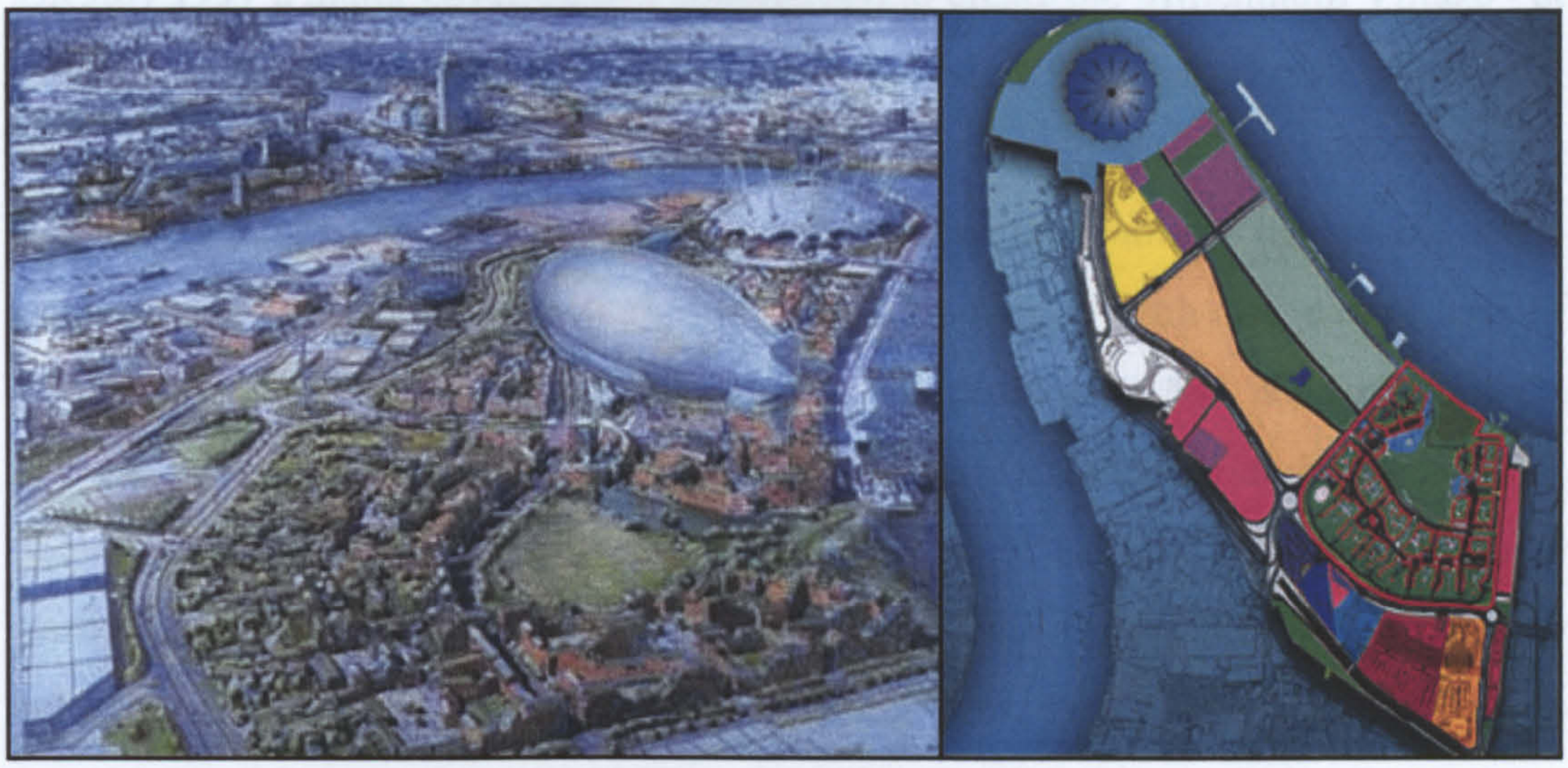


Figure 2. 27 The location of GMV within the Greenwich Peninsula.
Source: www.countrysideproperties.co.uk/

The proposed GMV is located at the southeastern side of the Greenwich Peninsula opposite the Bardons/St. Albans Sand and Gravel complex, and the roundabout at the Bugsby's Way end of Horn Lane. The GMV site, which is surrounded by John Harrison Way, Bugsby's Way, Horn Lane, and the River Thames -including the wetland -, is 213,785 square meters (see Figure 2. 27). Comprising 1377 homes, the GMV residential areas occupy around 13 hectares of the total land. According to Duncan Innes (Assist. Dev. Director - English Partnership) the completed project will have 5008 habitable rooms with a 133469 m^2 gross residential floor areas. Therefore, considering the average national household size of 2.4, the GMV will accommodate a population of about 3300. Thus, the proposed GMV will have a Gross Population Density of about 154 persons per hectare and a Gross Residential Density of about 64 dwelling units per hectare.

The infrastructure work of the development began in the autumn of 1998, but the work on the First Phase of the Village did not start until early December 1999. It is expected that the first houses will be ready for occupation by later summer 2000, with the whole scheme to be completed by 2002 [source: www.greenwich-peninsula.co.uk & www.countrysideproperties.co.uk].

Background

On July 1997 a major development competition to create the Millennium Village - at Greenwich Peninsula - was launched by Deputy Prime Minister, the Rt. Hon. John Prescott. He stated: "I want to create a number of new residential communities on the Greenwich Peninsula that will represent best practice in creating a sustainable urban environment. Good down-to-earth practicality combined with the daring use of imagination and innovations are the qualities we are looking for. We want to see a scheme which will provide quality homes and incorporate environmental principles such as high levels of energy and water efficiency. Mixed use development has a particularly important role to play, making it possible for people to live close to where they work and shop and enjoy their leisure time, thereby reducing the need to travel by car" [www.greenwich2000.co.uk/millennium/news/ news21.htm].

An international competition to draw a master plan for GMV was organised by the landowners English Partnerships, the Government's urban regeneration agency. Its objectives were announced as: to create a community built to the highest quality of architectural design, which embraces a mixed-use approach, and addresses environmental and energy conservation issues.

The winner was announced in 1988. A joint venture between the developers Taylor Woodrow and Countryside Properties, with a master plan prepared by Hunt Thomson and Ralph Erskine won the competition (see Figure 2. 28). English Partnerships claims, as a consequence of the competition to find the best development proposals for Greenwich Peninsula, that they have found the model community of the future.

Figure 2. 28 The winning design for GMV – the original Masterplan.
Source: www.greenwich-peninsula.co.uk/

The Innovative Vision

The vision for Greenwich Peninsula was to establish a new urban quarter that builds on the achievements of the past with innovative solutions, rejecting the recent trend towards single function neighbourhoods. Sustainability and renewability were the main considerations in the development of GMV in the Greenwich Peninsula. The consumption of energy and the use of water conservation techniques throughout the site were key considerations in the design of buildings and the materials used. Also significant investment in the provision of green spaces and habitats was assumed to allow wildlife to thrive. In addition, traffic management throughout the area was designed to reduce the impact of the car on the environment. Another innovation is the adoption of information technology to increase communication and improve the efficiency of the homes and businesses throughout the area. The following provides clearer idea of this innovative settlement design.

Housing at GMV

The GMV comprises a mixture of approximately 1079 apartments and 298 houses. The apartments are in blocks constructed around landscaped squares and range from four to twelve storeys high. The houses will also be constructed around landscaped squares. An oval square, which is formed by a mix of buildings - apartments, shops, offices and community facilities – serves as the focal point of the neighbourhood (see Figure 2. 29). The height of residential buildings varies in different locations in the village. The housing at the rear of the site along Bugsby's Way rises to two and three storey. The buildings along the side of park rise to seven floors and up to twelve storeys at the northeast and northwest points of the site by the river. Between these the height drops to form a valley on each side of the park (see Figure 2. 29 & Figure 2. 32).

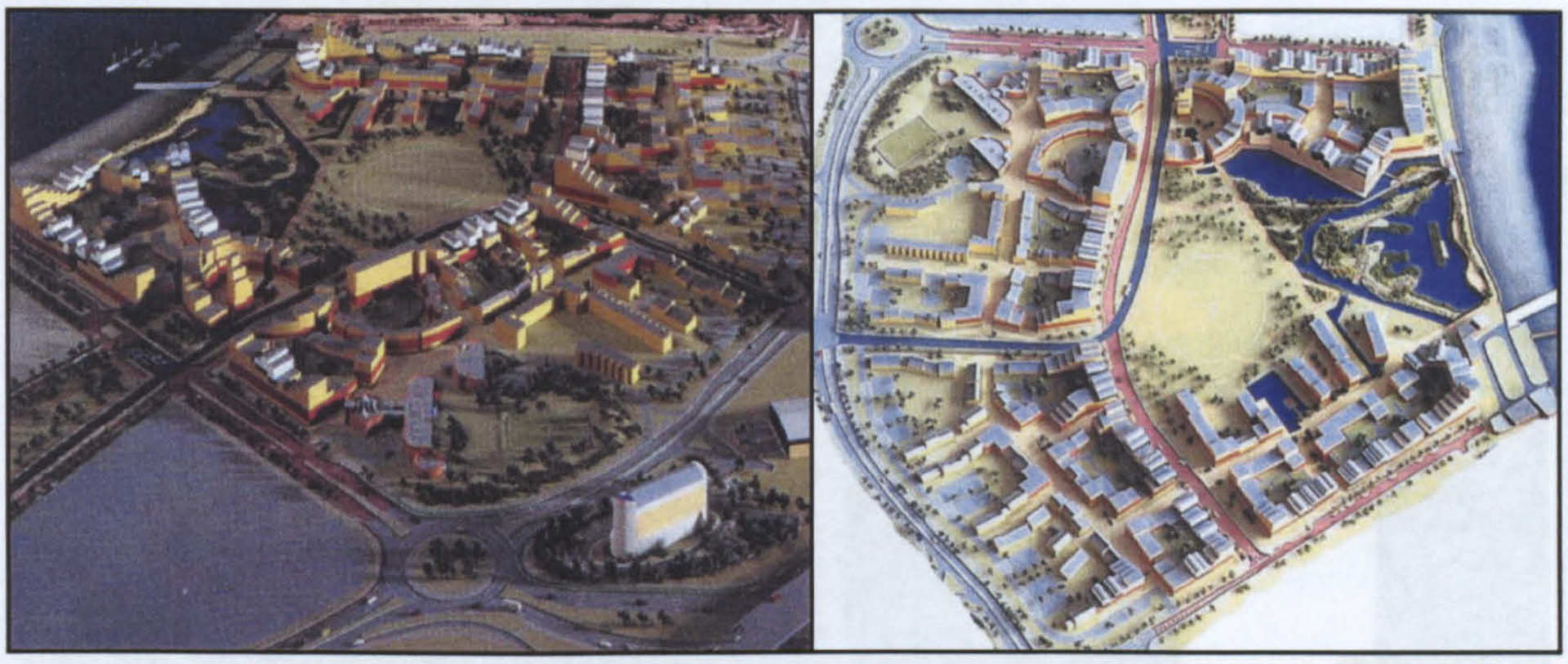


Figure 2. 29 Illustration of varying building heights on the model of GMV.
Source: (L) www.greenwich.co.uk/ (R) EP, 1999?, p 17.

The development of GMV will be carried out in several phases. So far only the apartments of phase one of the project have been released for sale. Phase one of GMV with 100 apartments, located at the northern most part of the site - between the River Thames, the new man-made lake and the oval square - is currently under construction (see Figure 2. 30). According to GMV's official Internet site, while the construction work is still in the initial stages, "all dwelling units of phase one have

already been sold out" [www.greenwich-village.co.uk]. This can be considered as an early indication of a successful outlook for this project.

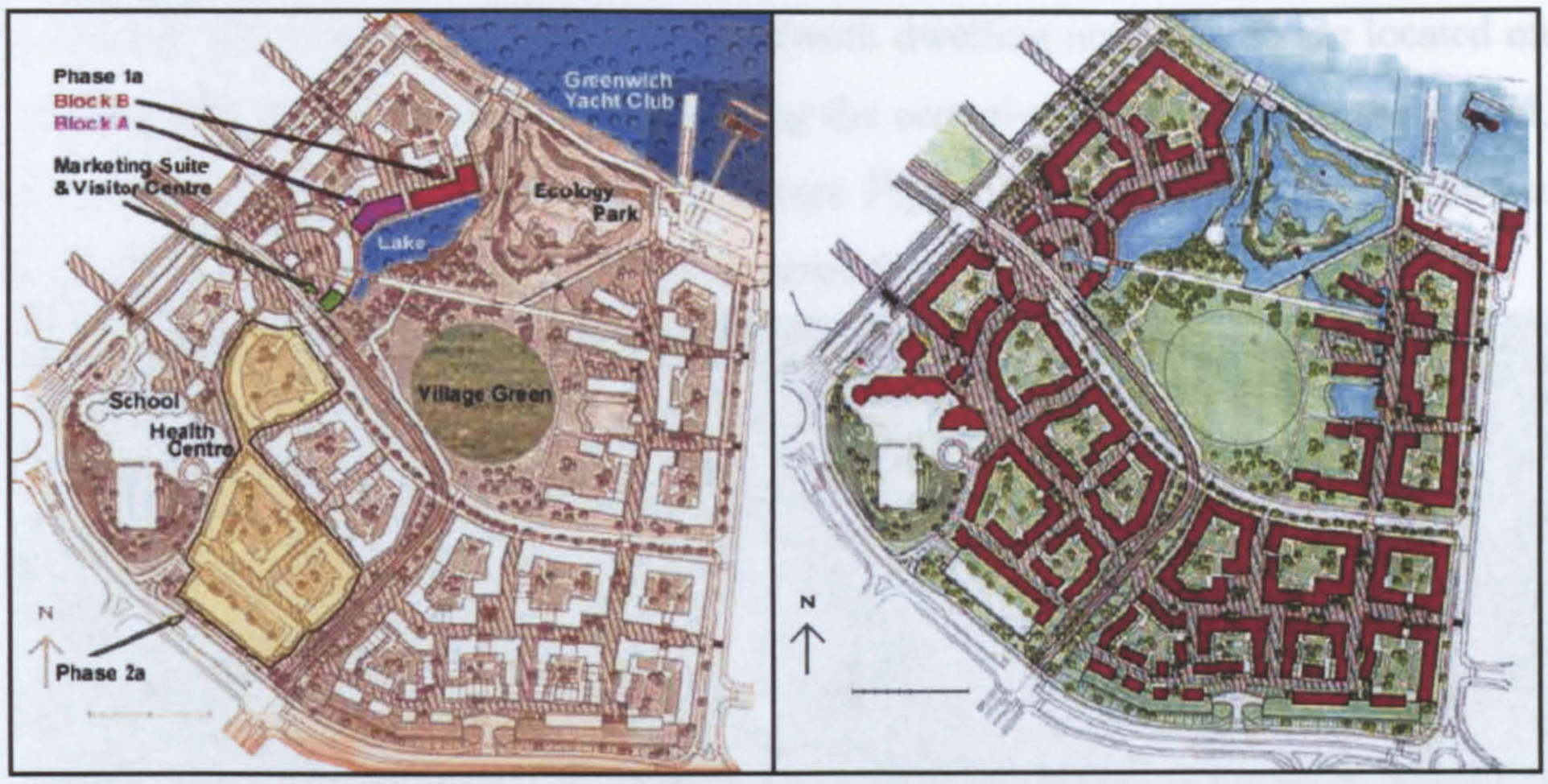


Figure 2. 30 (L) The location of Phases one and two housing in GMV. (R) The Master plan including the latest modifications.
Source: (L) www.greenwich.co.uk/ (R) EP, 1999?, p 21.

Housing in phase one is planned to have a mixture of building heights (4 to 12 floors), housing sizes (1,2 and 3 bedroom), and housing types (apartment and duplex) to accommodate a variety of residents' housing needs (see Figure 2. 31 & Figure 2. 32).

Figure 2. 31 Examples of apartment (L) and duplex (R) layout – phase one.
Source: www.greenwich-village.co.uk/

The residential blocks of phase two are planned to comprise a mixture of two-or-three storey family houses with a range of 1, 2 and 3 bedroom apartments, 2 to 3 bedroom houses plus 2 to 3 bedroom live/work dwelling units. These are located on the western side of the village, overlooking the central-park and close to the school, health centre and new rapid transit link (see Figure 2. 30 & Figure 2. 37). So far housing of phase two has not yet been released for sale.

Figure 2. 32 Artist views of the housing in GMV.
Source: Top (R), www.greenwich-village.co.uk,
Top (L), EP, 1999?, p 20, Bottom, UTF, 1999, p 79.

The houses are designed for the families with children. They have private gardens that lead onto a landscaped shared communal courtyard where children can play safely and neighbours can meet. The internal layout of houses is also flexible enough to create an extra bedroom for an extra child or a study room. Some apartments are designed with sliding interior walls, between living room and bedrooms, offering the flexibility to customize the space to meet different residents' requirements. By moving a wall a double–sized living room could be created. However, when the family grows and an extra bedroom is needed the wall could be moved back. Houses

will have a large amount of storage space that all families require. The large glazed windows, higher than average floor to ceiling heights, and large balconies are the main features that increase light and living space of housing in phase two.

A Mixed Use Community

The new community will consist of a mixed-use, residential and commercial area. A wide range of affordable housing together with essential facilities is what a vibrant community needs. The GMV will have a mixed tenure. A total of 1111 homes will be for sale and about 20% of the 1377 homes will be affordable housing; including 172 dwelling units for social rent, 54 for shared ownership and 40 available to local people on a flexible tenure basis. But one "would not be able to tell from the front door if it is affordable housing or not" [Taylor, D., 1998]. These homes will be distributed throughout GMV and located alongside homes for sale, in identical properties, to avoid stigmatisation of any particular area. The housing association partners – Moat Housing Group and Ujima Housing Association, will be in charge of the managing the affordable homes.

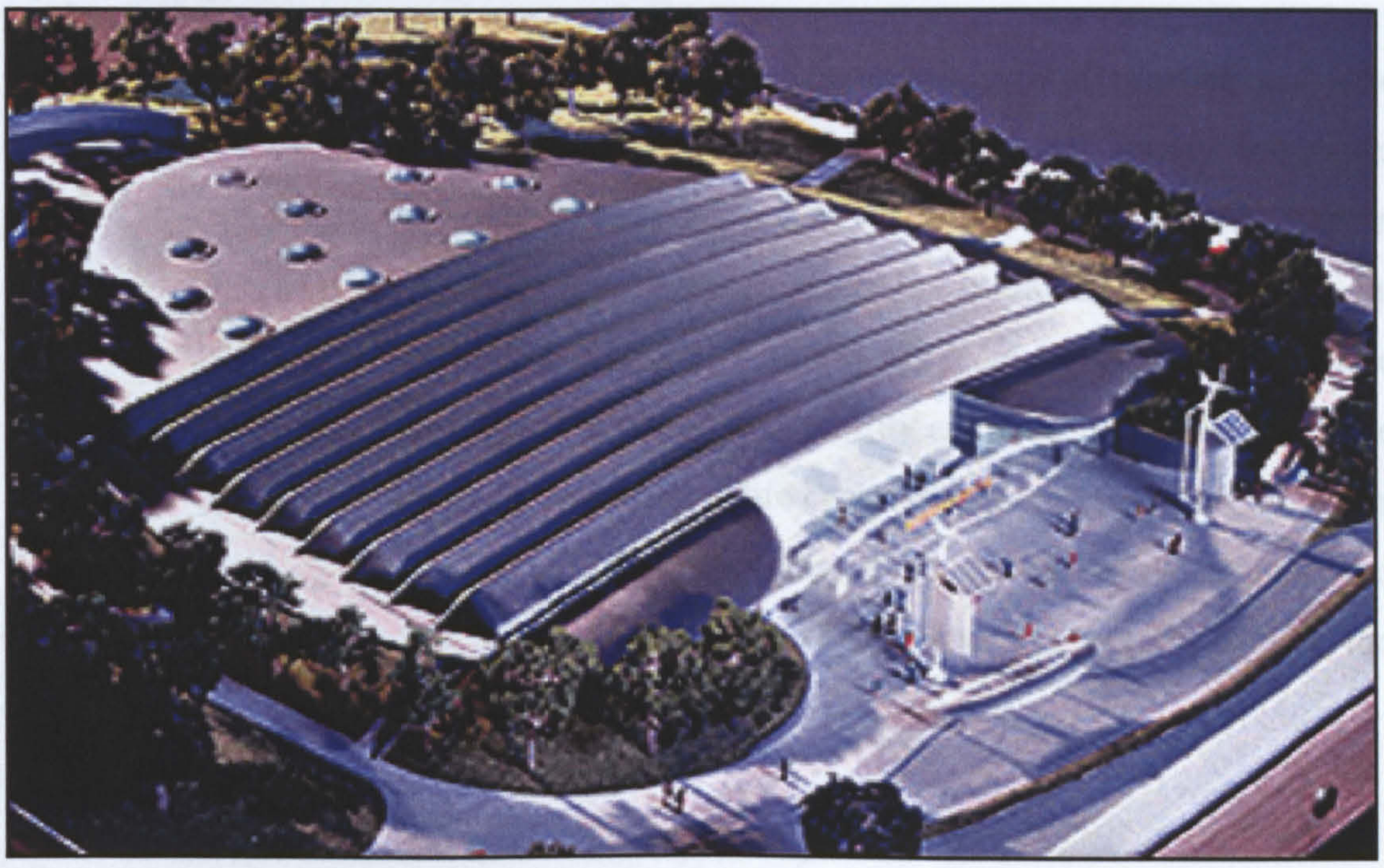


Figure 2. 33 The model of new Sainsburys Eco- superstore on southern part of the Greenwich Peninsula – just across the road to GMV.

Source: www.countrysideproperties.co.uk/

Provisions

The GMV will also contain services and facilities including approximately 5000 square metres of commercial space, cultural workshops, restaurants, offices, a school, a health centre, together with sporting and recreational provisions such as cricket and football pitches and an ecology park, a visitors' centre and a community/ tele-services centre. A network of cycle paths with extensive pedestrian routes and transit buses will link all areas of the village. There will be other services and facilities available to the residents of GMV within the Greenwich Peninsula. These include a Holiday Inn hotel, a number of new non-food retail stores, the first Sainsburys eco-superstore (see Figure 2. 33), a state-of-the-art 14-screen UCI Multiplex Cinema, Greenwich Yacht Club, plus extensive employment facilities. GMV is also served by London underground's new tube service – the modern Jubilee Line extension - at the North Greenwich Underground station as well as by a futuristic design of bus station at the north of the Peninsula [EP, 1999? pp 4-5 & www.greenwich-village.co.uk].

Construction and Materials

The homes are to be built to the highest standards, using best practice and new methods in construction techniques and incorporating advanced energy and water conservation measures. Many of the homes in GMV will be futuristic in their design and will incorporate the latest developments in modular accommodation. Prefabrication and an open building system will not only reduce the construction time but also provide the residents with maximum flexibility and adaptability for when the family situation changes during the family's life cycle. Homes can be extended in any direction through wall, floor, or ceiling. This is to enable some houses and apartments to be constructed and adjusted to suit the particular requirements of the individual occupants (see Figure 2. 34).

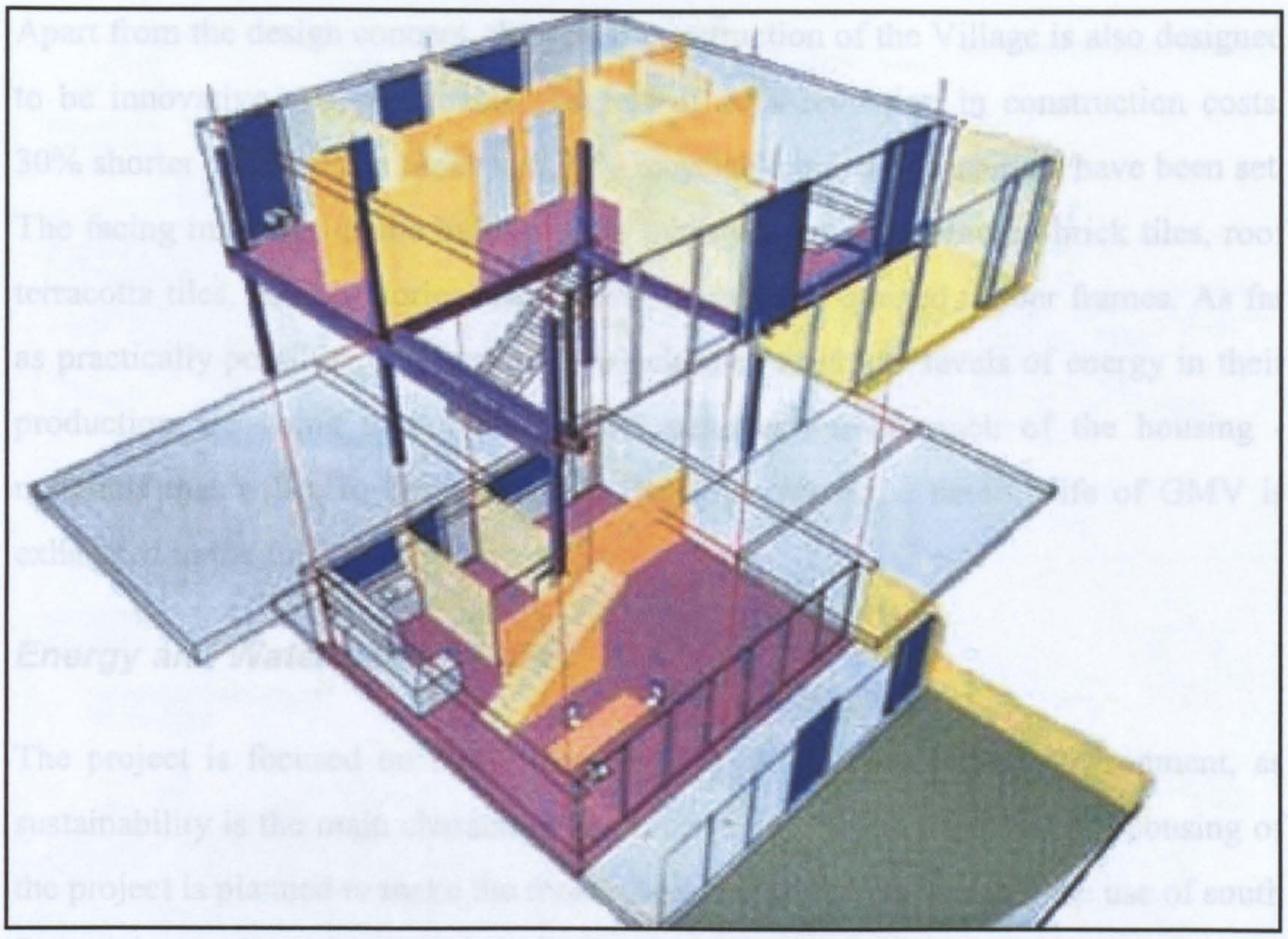


Figure 2. 34 Modular prefab system that allows flexibility and adaptability.
Source: www.countrysideproperties.co.uk/

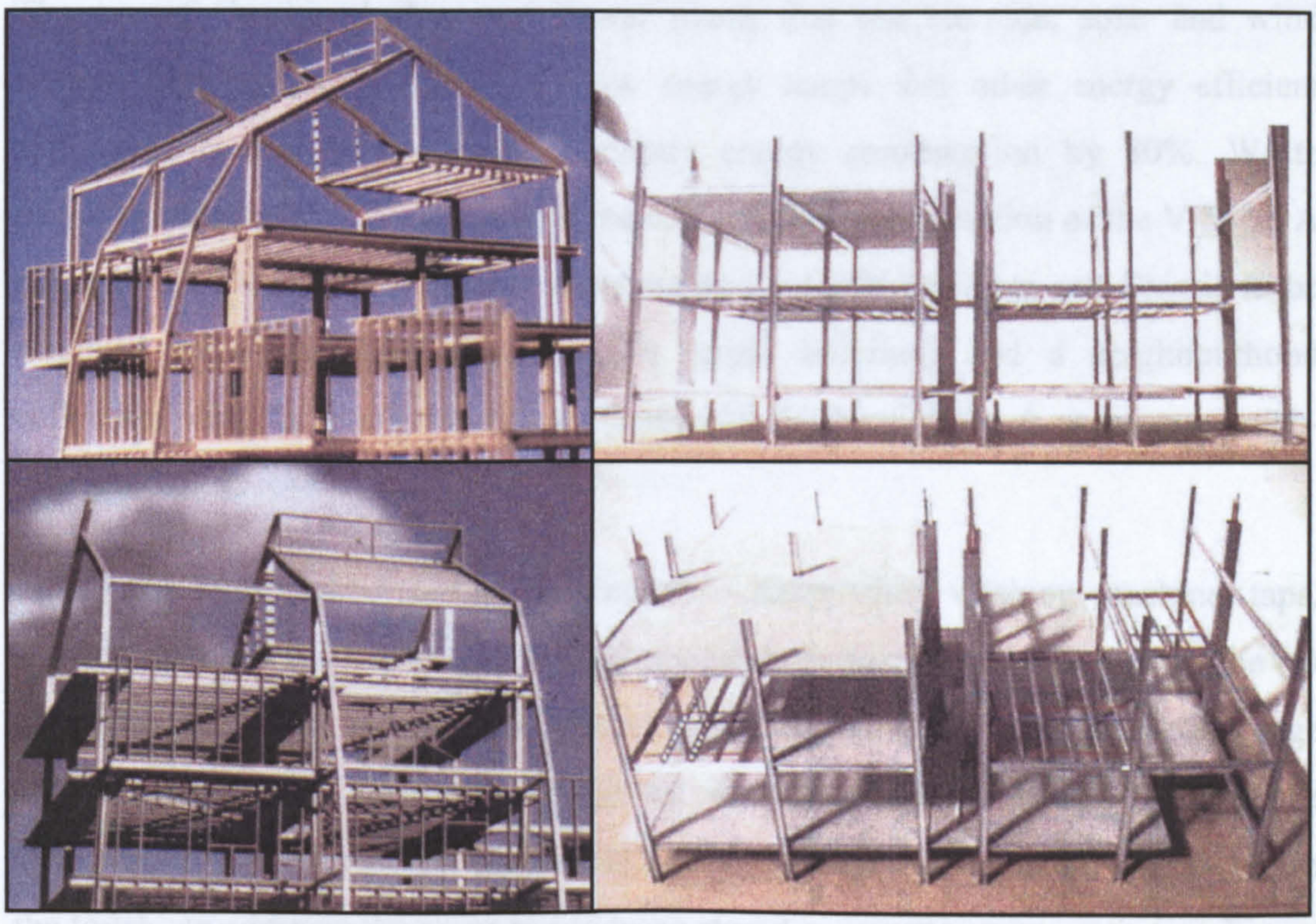


Figure 2. 35 Modular housing based on Open Building System. (L) Model of typical housing, (R) Model of modular Flat system.
Source: Battle McCarthy, 2000?b, Datasheet 7.

Apart from the design concept, the actual construction of the Village is also designed to be innovative and sustainable. Targets of 25% reduction in construction costs, 30% shorter construction times and 80% recyclable building materials have been set. The facing materials of the buildings are mainly warm red-coloured brick tiles, roof terracotta tiles, conservatories and glazing in naturally stained timber frames. As far as practically possible, only materials which have used low levels of energy in their production are going to be used in the construction of much of the housing - materials that will also be suitable for recycling when the natural life of GMV is exhausted in the future.

Energy and Water conservation

The project is focused on minimising the impact on the existing environment, as sustainability is the main characteristic of the entire project. Much of the housing of the project is planned to make the most of solar heating gain through the use of south facing glass walls and ensure that wind passage is minimised (see Figure 2. 36).

The use of Combined Heat and Power plants that use biomass, solar and wind energy, high levels of insulation, low energy lamps and other energy efficient appliances is designed to reduce primary energy consumption by 80%. Waste recycling also features highly in both the construction and operation of the Village. A target of a 50% reduction in household waste for GMV has been set. This is to be achieved by a recycling collection for larger buildings and a neighbourhood collection point for smaller buildings [Battle McCarthy, 2000?d & www.greenwich-village.co.uk/].

Fitting the latest water efficient appliances – dishwasher, washing machine, taps, shower, dual low flush WCs and minimizing the bath size - water wastage will be cut by a fifth. A grey water recycling system will serve the GMV and reed bed storage lagoons aim to save 30% on conventional water usage. It is planned to introduce Grey water cycling – treating water from the kitchen and the bath and using it to flush the toilet. In addition the rainwater is to be stored to irrigate green areas (see Figure 2. 36).

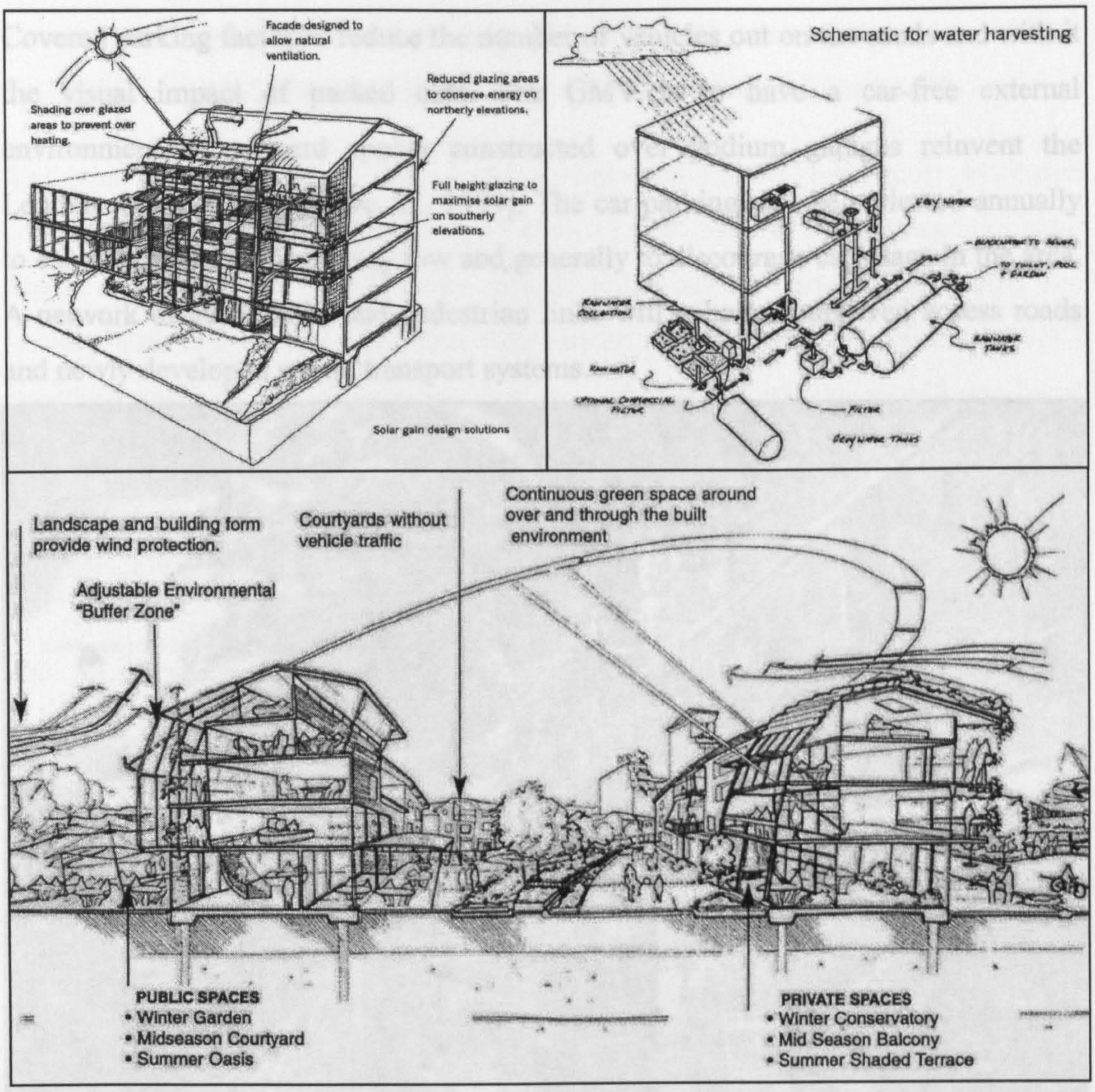


Figure 2. 36 Top (L) – Solar gain system, Top (R) – Proposed Grey Water Recycling system, Bottom - Detail of breathing façade elements.

Source: Battle McCarthy, 2000?a, c & d, Taylor, D., 1998, p 14.

Public Access and Transport System

A key aim of GMV is to reduce car dependency and maximise the use of public transport. Therefore, a network of cycle lanes, footpaths, a comprehensive public transport system and transit links are planned to reduce the need for cars on the Greenwich Peninsula. Every home will be just two minutes walk from a planned guided tram link or bus. Wherever possible vehicles will be segregated from pedestrians by locating cars in secure podium spaces under the landscaped courtyards (see Figure 2. 37).

Covered parking facilities reduce the number of vehicles out on the roads and with it the visual impact of parked cars. The GMV is to have a car-free external environment. "Courtyard spaces constructed over podium garages reinvent the London squares" [Derbyshire, B., 1999]. The car parking will be reviewed annually to ensure that the numbers stay low and generally to discourage car usage in the area. A network of cycle paths and pedestrian links will enhance improved access roads and newly developed public transport systems.

Figure 2. 37 An artist view of shops, housing and car free streets in GMV.
Source: www.countrysideproperties.co.uk/

Ecology

The area used to be a wildlife haven providing cover for numerous birds including finches and tits as well as the larger kestrels, herons and owls. The presence of many foxes used to help in keeping the rat population down in the area. To preserve this an innovative river-terracing scheme is planned. A major artificial watercourse will flow out into a large pond and wetland area before naturally exiting the site direct to the river through a salt marsh bay and reconstructed river terrace. Using the wood reclaimed from the Limehouse dock to create attractive fendering, ecological flood

barriers are being created by utilising reed beds and salt marshes to provide a flourishing area of natural beauty and a haven for wild life (see Figure 2. 38).

As part of the creation of a natural sustainable environment of great beauty, extensive green spaces including the planting of over 12,000 trees is also planned. In total twenty hectares of land have been set-asides for use as parkland, including the Ecology Park, which will help restore the natural environment of the Peninsula. All dwellings will be set amongst a new continuous Ecology Park, which will consist of canals and lakes feeding out to a beach area on the eastern edge of the site. There will be safe places for children to play and learn, and secluded areas where people can find time and space to relax.

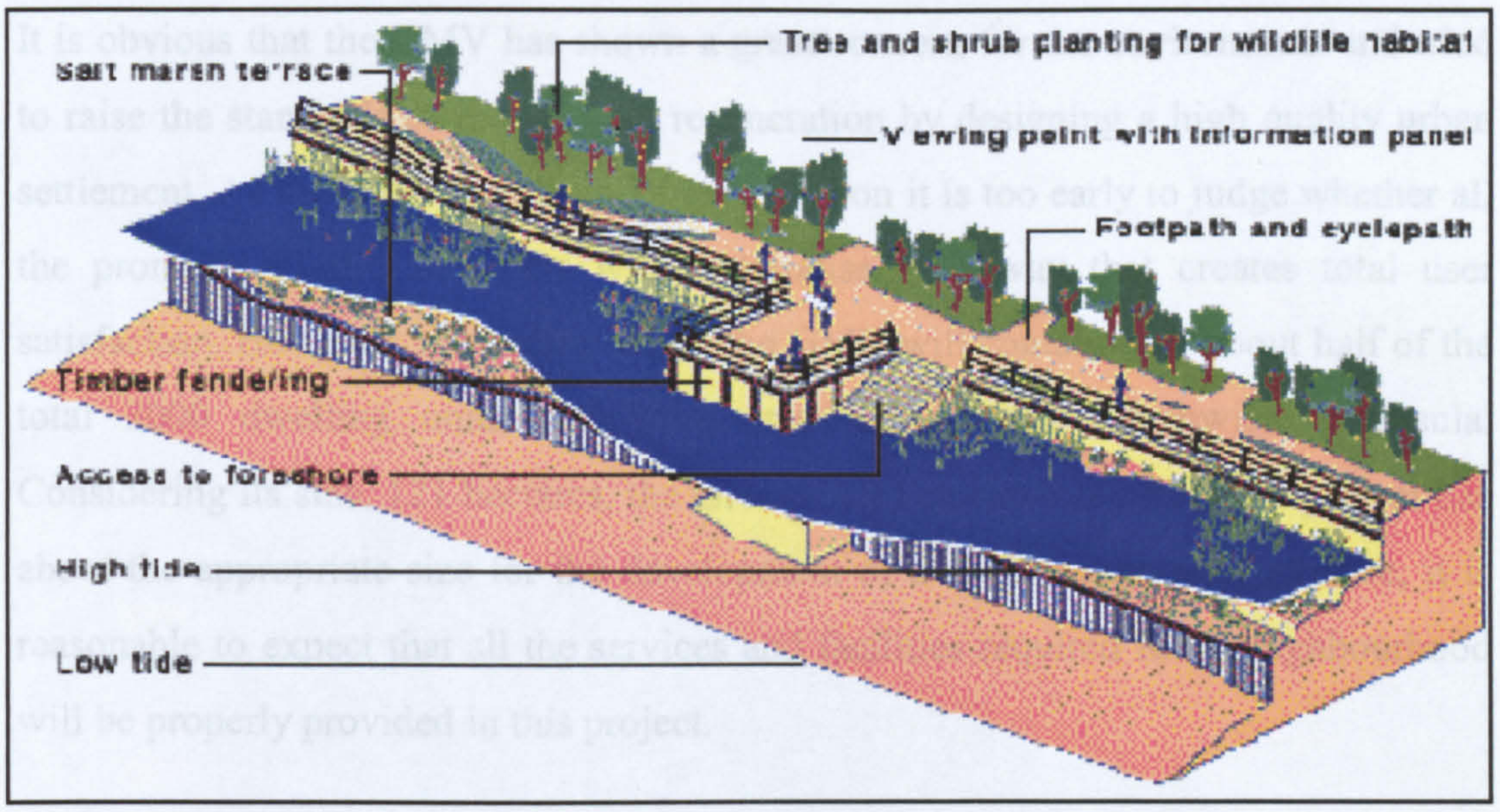


Figure 2. 38 Terracing of the bay.
Source: www.greenwich-peninsula.co.uk/

Communication network

There will be computer-controlled security, heating, lighting, entertainment, metering, and communication systems in each dwelling. To serve the community of the future by advanced communications technology all homes will be fitted with IT terminals. These will be linked to intelligent systems that control security, lighting, heating, environment, meters, and communications. They will also provide information on transport and community services through a village-wide fibre optic network. In addition to accessing the Internet, residents will be able to access a wide

range of information on local issues and exchange information, to vote on community matters and to do their shopping through the village web site. There will also be links to the school and health centre.

The security systems of every home will be linked to a community security provider and fire alarms linked directly to the local fire station. A single system will enhance efficiency and eliminate wastage by integrating lighting, heating and metering to the extent that it will even be possible to switch off lights and heating when the residents are out [www.gold.ac.uk/world/millen/planning/ecovillage.html].

Comments

It is obvious that the GMV has shown a great concern for the environment and tried to raise the standards of brown-field regeneration by designing a high quality urban settlement. As the GMV is still under construction it is too early to judge whether all the promises of the architects will materialise in a way that creates total user satisfaction. However, after completion, the GMV will contain only about half of the total 3000 dwelling units that were proposed for the Greenwich Peninsula. Considering its size, 121 hectares, the Greenwich Peninsula regeneration project has about the appropriate size for the development of a neighbourhood. Therefore, it is reasonable to expect that all the services and facilities required for a neighbourhood will be properly provided in this project.

Based on the available information from the Greenwich Peninsula regeneration project's master plan, there is a concern that the proposed services and facilities are not distributed properly to be easily accessible within walking distance from all dwelling units. The location of most of the provisions in the southern part of the peninsula puts them well outside walking distance for the residents of the proposed residential areas in the north. Also, the main transit point (the North Greenwich underground and bus interchange), located in the northern most part of the site, is well outside walking distance for the residents of GMV. It is obvious that the location and scale of the provisions in the southern part of the peninsula were intended to serve not only the neighbourhood but the district as well. Thus, the transit-route - with constant services - that runs through the GMV was planned as a

compromise way of dealing with the linear shape of the peninsula, while still connecting the North Greenwich underground with the rest of the Greenwich (see Figure 2. 39).

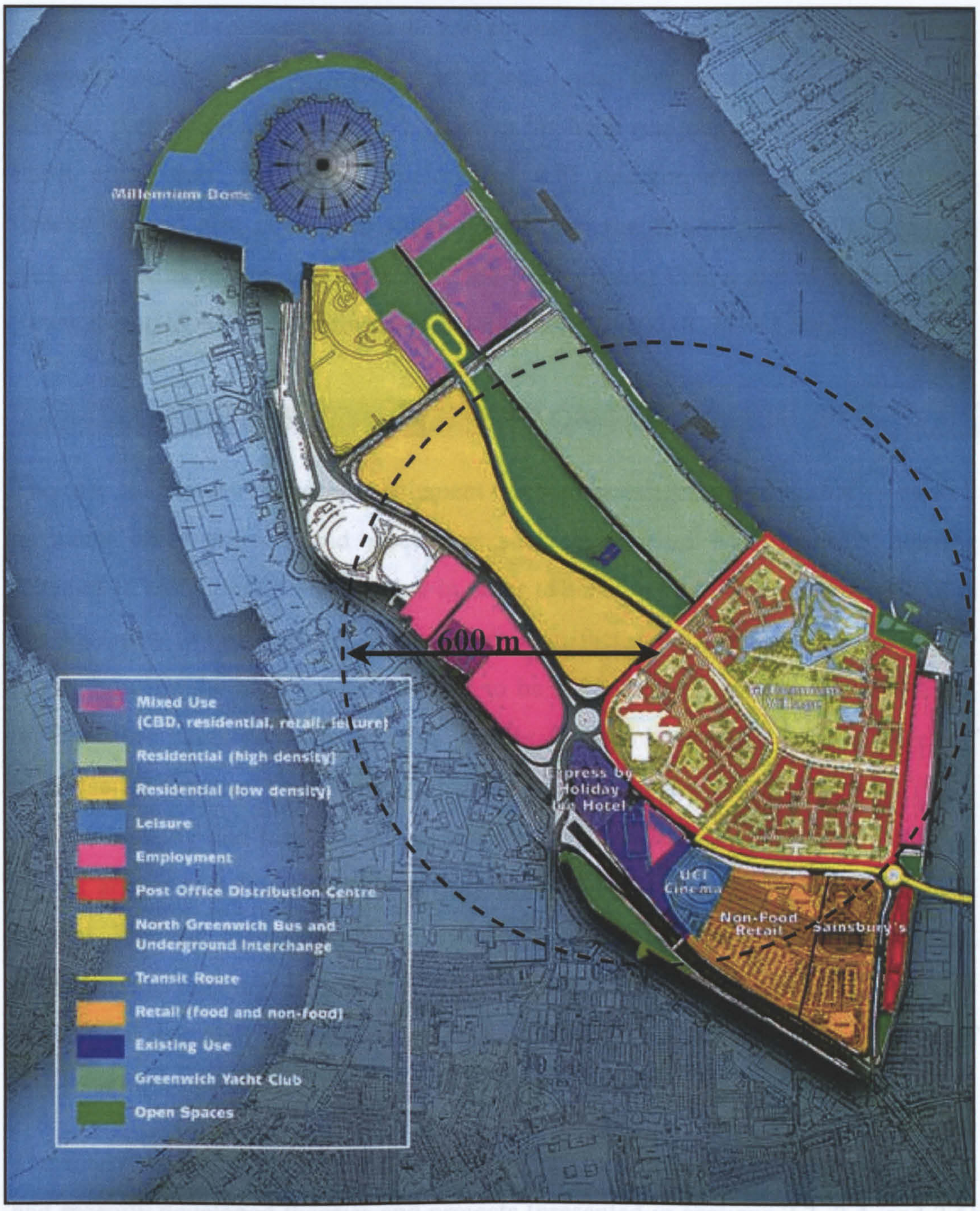


Figure 2. 39 Location of the proposed provisions according to the Master plan of the Greenwich Peninsula regeneration.

Source: Adapted from EP, 1999? p 4.

So far there have been few criticisms of the whole Greenwich Peninsula project, mainly levelled by local people and environmentalist organisations. Friends of Earth

has criticised the project for destroying the natural habitat of birds as well as damaging the local economy. They say development is divided in three sections. The Millennium dome and the Millennium Eco-village are only two parts. The third part is a large retail development, over 16,250 square metres of land right next to the Eco-village. There will be a large supermarket and a retail warehouse- type unit, together with car parking (see Figure 2. 39). Quoting the local campaigners' claim Friends of Earth argue that "the retail development will undermine local shops in East Greenwich and also new small shops planned for the Eco-village itself. Also, this part of the Millennium development is not much greener than a pile of toxic sludge" [www.foe.co.uk/pubsinfo/infoteam/pressrel/ 1998/19980218131713.html].

2.6. SUSTAINABILITY DEMANDS ON HOUSING

The case studies and the recent settlement theories investigated in this study – as well as many other projects and researches such as Richard MacCormac's housing schemes in east London – prove that in order to achieve high population density it is not necessary to use high-rise housing forms. In fact, with regards to suitability for family housing the high-rise form seems to be the worse choice. The low-rise form, on the other hand, can achieve high density without having the disadvantages of high-rise for families. Comparing high-rise high density, low-rise high density, high-rise low density and low-rise low-density housing in Glasgow, Masnavi [2000, pp 64-73] argues that low-rise high density is the most sustainable housing form. In general, low-rise high density can be considered as the form that has the most potential to afford higher quality for family housing. Therefore, it is expected that this would increase the degree of user satisfaction more than other forms of settlement development.

The following summarises existing studies of environmental and sustainability issues and recently developed theories and projects (presented in sections 2.3, 2.4, and 2.5) culminating in a list of demands that, in accordance with general human needs and Iranian/Islamic cultural requirements, sets a framework for design guidelines for future Iranian urban housing in general and for future settlements in Tehran in particular.

2.6.1 Sustainability Demands on the Dwelling

- Dwellings should be designed with an ecologically sound heating system and incorporate the use of renewable energy sources and natural ventilation. Street/ unit orientation and dimensions should cater for the layout and design, which are predominantly east west and north south oriented. The living accommodation should receive a minimum of three hours sunlight on 21 December - the shortest day of the year. Service spaces should be restricted to the north. Mixed-use developments enable energy sharing and localised heating systems to be used when appropriate.

- Dwellings should be durable over several generations of occupancy and flexible to cater for differing social and functional needs. To offer a wide range of different forms of accommodation to cater for the different needs and aspirations of their inhabitants, the layout of neighbourhoods, street and unit levels in any scheme should be flexible in order to achieve social integration. All units should be designed around a standardised yet flexible footprint, which can be manipulated to suit varying needs. The ground floor should also be able to provide accommodation for workplaces, display and storage to create an active street frontage where required.

- Dwellings should be designed to incorporate courtyard spaces and private outdoor spaces such as balconies, loggias and roof terraces. The courtyard gives the option to create private/ semi-private rooms of an internal/ external nature. Car parking should be provided in close proximity to and visible from the dwelling.

- Dwellings should make efficient use of land and infrastructure. The dwelling should also be cost efficient in terms of low energy, long-life and loose-fit. Predominantly durable and low energy materials, economical fabrication systems and ecologically/environmentally sound construction techniques should be employed.

- Dwellings should be designed with a high degree of flexibility and adaptability. These should reflect the changing patterns of space usage and have the potential to provide a house for life. Houses of standard footprints that are open to a range of internal layouts by the use of demountable partitions may enable the house to change with the needs of the occupants.

- Materials should be of a nature that can improve with age.

- The glazed openings onto semi-public external space should allow for different degrees of contact between inside and outside at different times of the day.

- Visually pleasing forms as well as aesthetically pleasing materials should be used when designing residential buildings.

2.6.2 Sustainability Demands on the Settlement

- The development of a clean, healthy and environmentally aware public image provides the potential to create a more positive bond and a greater sense of pride for the individual residents and overall community. A sense of place may become evident with the manipulation of the urban form, for example the location of services and facilities in the central area of the neighbourhood, local landmarks, an open landscape and a hierarchy of street profiles. A visually pleasing and robust urban environment should be created which provides adequate variety for the local residents and ensures that pedestrian traffic movement interconnects with main routes, nodes and landmarks. There should be public spaces at prime locations such as public buildings or formal and informal connection points to cater for pedestrian meetings or group gatherings. Active street frontages on three or four sides of each urban block help distinguish between public and private spaces.

- The neighbourhood should create a sense of community with respect to the specific site context. The boundaries of the neighbourhood should be clearly defined with open spaces at district and regional levels. The layout and the provisions within the settlement should help create a feeling of community for a thriving neighbourhood. In this regard the neighbourhood centre becomes a focal

point for local residents. This should be compatible with a mixture of users and provide for a variety of everyday needs and be supported in economic terms by the community.

- In order to promote walkability within the neighbourhood and to reduce car dependence for access to the workplace, to retail and other amenities the size of neighbourhood should be limited to an area of about 600 metres radius.

- The maximum length of a city block should be about 240 metres, resulting in necessitating the creation of sub-neighbourhoods. These should be linked to the neighbourhood centre in the most direct way possible within the limitations of the site topography.

- The access to public transport stops should be safe and direct. Frequent and reliable transport links with stops at regular intervals and appropriate locations and at a maximum distance of 10 minutes walk form dwellings should be provided in order to enable access to services and facilities on district and city levels. The distance between bus stops should be approximately 300 meters. The transportation needs of all occupants should be catered for with the development of a fully integrated public transport policy.

- The neighbourhood should cater for the daily needs of all inhabitants. Disabled access should be provided to all public services and facilities.

- The development of permeable routes and the creation of a hierarchically sound road network provide a strong identity and structure to the neighbourhood and linkages to adjacent developments. There should be external connections with adjacent neighbourhoods. Good links with neighbouring communities through arterial routes and public transport links develops the possibility of sharing amenities such as open spaces, parkland and schools.

- The urban development should be capable of providing an efficient hierarchy of interconnecting streets and green routes, which are safe and pleasing to walk, cycle or drive. A high level of interconnection provides a wide choice for the movement and dispersal of traffic, pedestrian as well as automotive. A high

degree of internal accessibility and external connectedness, with short stay on-street parking where required, can minimise the impact of traffic. In order to create a strong network of links between town and neighbourhood centres main arterial traffic routes and local streets should be clearly differentiated.

- Street and unit layout should enhance personal safety and potentially reduce levels of crime. Streets and open spaces especially on routes to schools should be fronted by housing or actively used public facilities and buildings.

- Social mix prevents stigmatisation of any particular area within the city. Also, communities of mixed-income residents cater for a more even distribution of wealth, thus supporting viable neighbourhood facilities and presenting the opportunity for disposable income to be recycled at local level. The gross population should be in a suitable region as to support appropriate local services and facilities.

- The residential buildings as well as open spaces should be human-scale and provide variety in terms of size, length and function. To cater for different residential needs a wide range of housing types should be provided. Flexibility of dwelling types provides for a mix of users and increasing densities towards the neighbourhood centre caters for the viability of local services and facilities. A minimum stable gross population density of around 60 persons per hectare is required to support the needed local services and amenities.

- Public amenities and utilities should be created in an efficient manner, in terms of both cost and time. The location of services and facilities within the central area of the neighbourhood adjacent to transport nodes creates meaningful and easily accessible central places.

- All neighbourhoods should be individually functioning and sustainable, each of them with its own public services and facilities. A cluster of neighbourhoods will form a district. Therefore, a district-centre should be created with public transport links and should provide services and facilities beyond the capacity of the neighbourhood centre. In order to share catchment areas the district centre should

be located on a main traffic route and the schools should be located on the edge of the neighbourhoods.

- Neighbourhoods should have access to the open countryside with green routes between the neighbourhoods. Green routes such as parkland, waterways and other open ground should be developed and linked.

SOCIO - ECONOMIC BACKGROUND AND HOUSING CONDITIONS IN TEHRAN

The Iranian government's policy of promoting high-rise high-density housing in larger cities, initially adopted to tackle housing shortage, is considered unsuitable for providing the essential key qualities outlined in section 1.5, and consequently it could be expected that users would be dissatisfied. To examine the above expectation an investigation of the housing conditions in contemporary urban settlement is essential. Therefore, Tehran, the capital city of Iran, was selected for case studies, as it is the largest city in Iran accommodating about a fourth of the entire urban population of the country. An examination is made of the available secondary data on the socio-physical characteristics of Tehran, focusing on the factors that have contributed to the present state of housing – e.g. the historical background, the local climate, socio-cultural and socio-economic characteristics, and contemporary housing conditions. Furthermore, the data gathered by the author through a local survey is analysed. Both studies are intended to provide an understanding of the degree of satisfaction of the users with their homes and neighbourhoods in recently developed areas of Tehran. This will help in establishing the basis for development of design guidelines for future high-density urban housing in Iran. A summary of the local survey programme and its findings including a list of demands for housing and neighbourhood in Tehran is presented at the end of this chapter.

3.1. HISTORY AND DEVELOPMENT OF TEHRAN

The city of Tehran became the capital city of Iran about two centuries ago. In this context it is very young compared to other large Iranian cities. Its rapid development during the last two centuries was so immense that it is now within the top twenty-five most populated cities of the world. A historical study of Tehran is intended to provide a general insight into the process of urban developments in Iran. Historical studies are usually based on periods of time when outstanding changes occur. There are several historical accounts of Tehran which often focus on socio-political events. The main focus of this study is the investigation of the physical development of the

city. Whilst studying the origin and historical evolution of Tehran, the author noticed two distinct events: firstly, building a wall to enclose the city in 1553; and secondly the removal of the city walls in 1930. Therefore, this study of historical developments of the city is divided in three periods: A) Pre-1553, B) 1553 – 1937, C) 1937 Onwards.

3.1.1 Pre-1553

For the first time Tehran's name is mentioned as a suburb of the ancient city of Rhaga (present Rey) in one of the books of Theodesious the Greek who lived in the second century BC. Also "Abu Eshagh Estakhri [953], in *Al-Masaalek va Al-Mamaalek* (Roads and Countries), notes the location of Tehran on the north side of Rey" [GSMM, 1992, p 10]. The oldest available Persian document shows that Tehran existed before the ninth century. "Ali Sam'ani [1160] mentions a person named Abu-Abdollah Mohammad ibn Hamed Tehrani who was from Tehran, and died in 874" [ibid. p 10]. Post-Islamic growth of Tehran is closely linked to the decline of Rey. As a consequence of this relationship, a brief account of the development of Rey will help to understand the formation of Tehran. Following the Arab conquest in 642 AD, Rey was entirely razed to the ground and a new quarter built by the Arab governor to the east of the earlier city. Under the Abbasid caliphs (8th century) it was greatly extended eastwards, its name being changed to Mohammadieh. It was rebuilt during the Dylamid dynasty (11th century) after a terrible earthquake, and under the Saljuqid dynasty (12th century) it regained its pre-Islamic importance. At this stage, the centre of gravity of the city (exemplified by the citadel) was shifted back to its pre-Islamic site to the northwest because of better climatic conditions and the availability of water (see Figure 3. 1).

Rey was the most important administrative and commercial centre of the region, and its location on important highways (such as the Silk-road and the Indian highway) gave it further significance. Numerous large bazaars in the city were served by the large caravanserais located both inside and at the city gates. By medieval standards Rey had risen to become one of the most important market and exchange centres in Iran. Rey and the surrounding area were divided into four districts that included 360

villages with Tehran as one of the most developed ones. At this time Rey was at its height, before the Mongols destroyed the city in 1221 AD.

As suggested earlier the decline of Rey was a major reason for the initial development of the surrounding satellites, which included Tehran, whose later growth occurred at the expense of other centres in the neighbourhood (see Figure 3. 1).

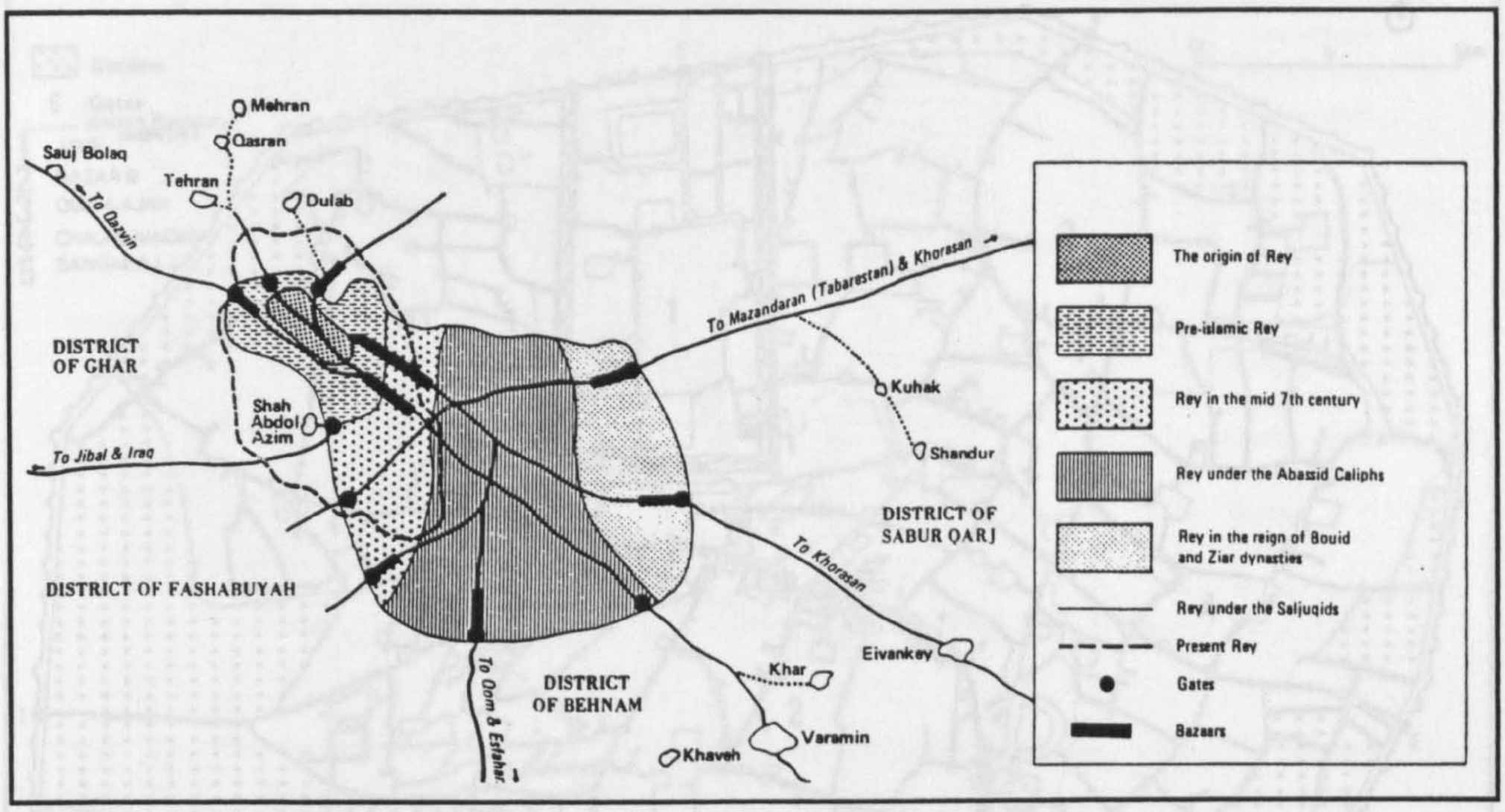


Figure 3. 1 Formation of Tehran to the North of Rey.
Source: After Bahrambeygui, 1977, p 10.

3.1.2 1553 – 1937

Tehran started to change under Tahmasb I (the Safavid king, 1524 to 1576) who built an *'Arg'* (citadel), a *Bazar* (market place) and surrounded the whole settlement with an earth wall in 1553 (see Figure 3. 2). According to Mumford [1996] having a wall in medieval times was an important factor in granting a settlement the status of city. Madanipour, [1998, p4] argues that Tehran gained the status of a city when it was surrounded by a town wall in 1553. Della Valle, who visited Tehran in 1618, called it a "town of plane trees, in which built-up areas accounted for no more than one third of the town, the reminder being under gardens" [Bahrambeygui, 1977, p 11]. Nine years later in 1627 Herbert estimated that these were 3,000 houses in the town [ibid.].

However, as the town's economy was based mainly on small scale trading and gardening, its growth continued to be slow for over 200 years. In 1796 the founder of the Qajar dynasty (Agha Mohammad Khan Qajar 1796 - 1798) chose Tehran as the national capital and repaired the city wall and the citadel. Tehran remained the capital of the country after this dynasty. From then the city started to grow rapidly.

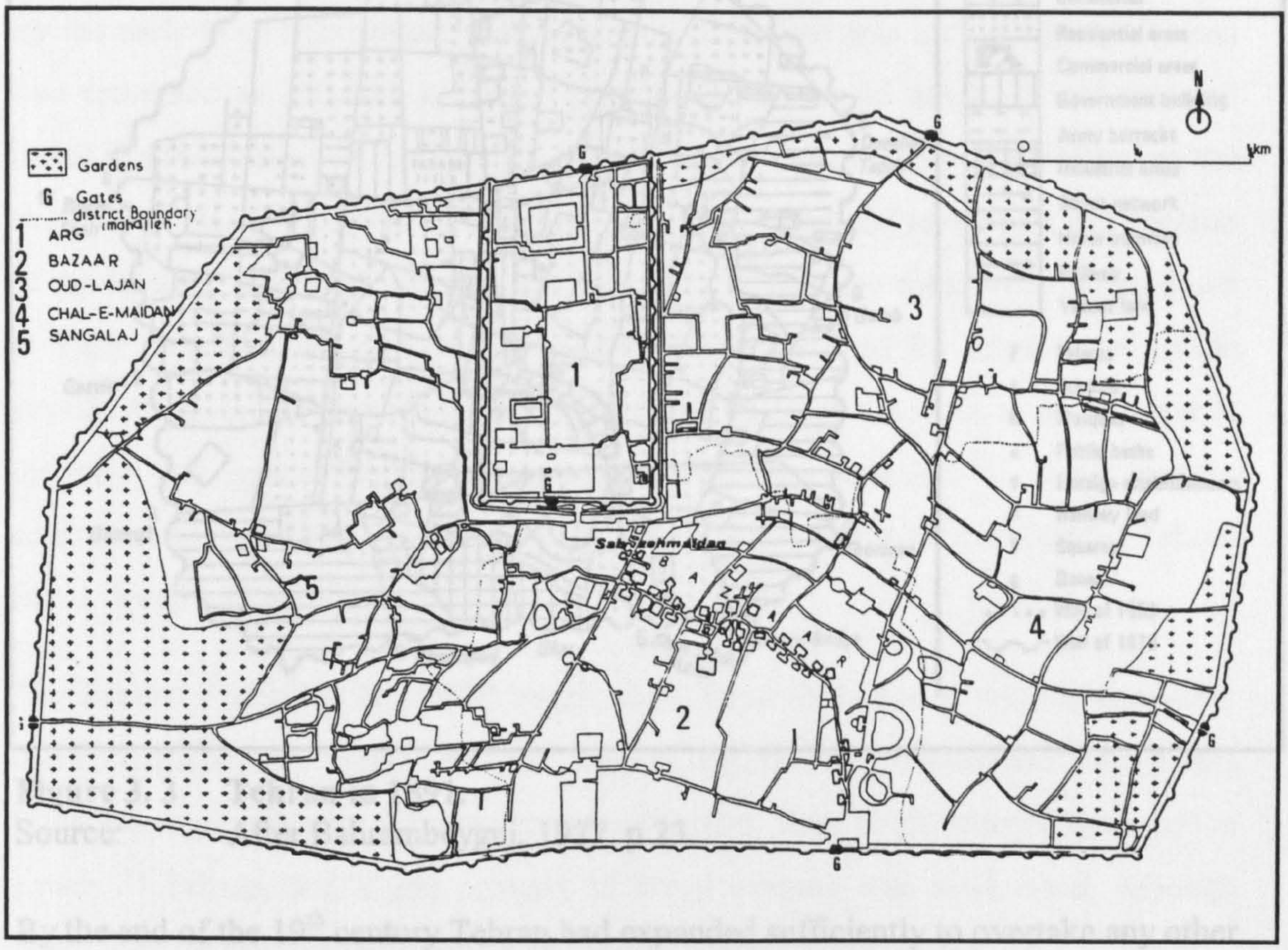


Figure 3. 2 Tehran in 1852.
Source: After Bahrambeygui, 1977, p 18.

By the mid 19th century the ever-increasing population of the city reached 60,000. In the second half of the nineteenth century the Iranian monarch Naseroddin Shah visited some European countries. On his return he introduced some social improvements to the country, such as ministerial reform, the foundation of educational institutions and the improvement of existing facilities. As a result of these changes Tehran gained greater importance than other cities in the country.

The early 1870's saw a rapid expansion of Tehran. The old ditch was filled in, the thick wall that had stood since the 16th century was pulled down and replaced by a new octagonal-shaped wall. The new wall, three times the length of the previous one,

had twelve gates and enclosed an area of approximately 20 square kilometres including all the recent built-up areas (see Figure 3. 3).

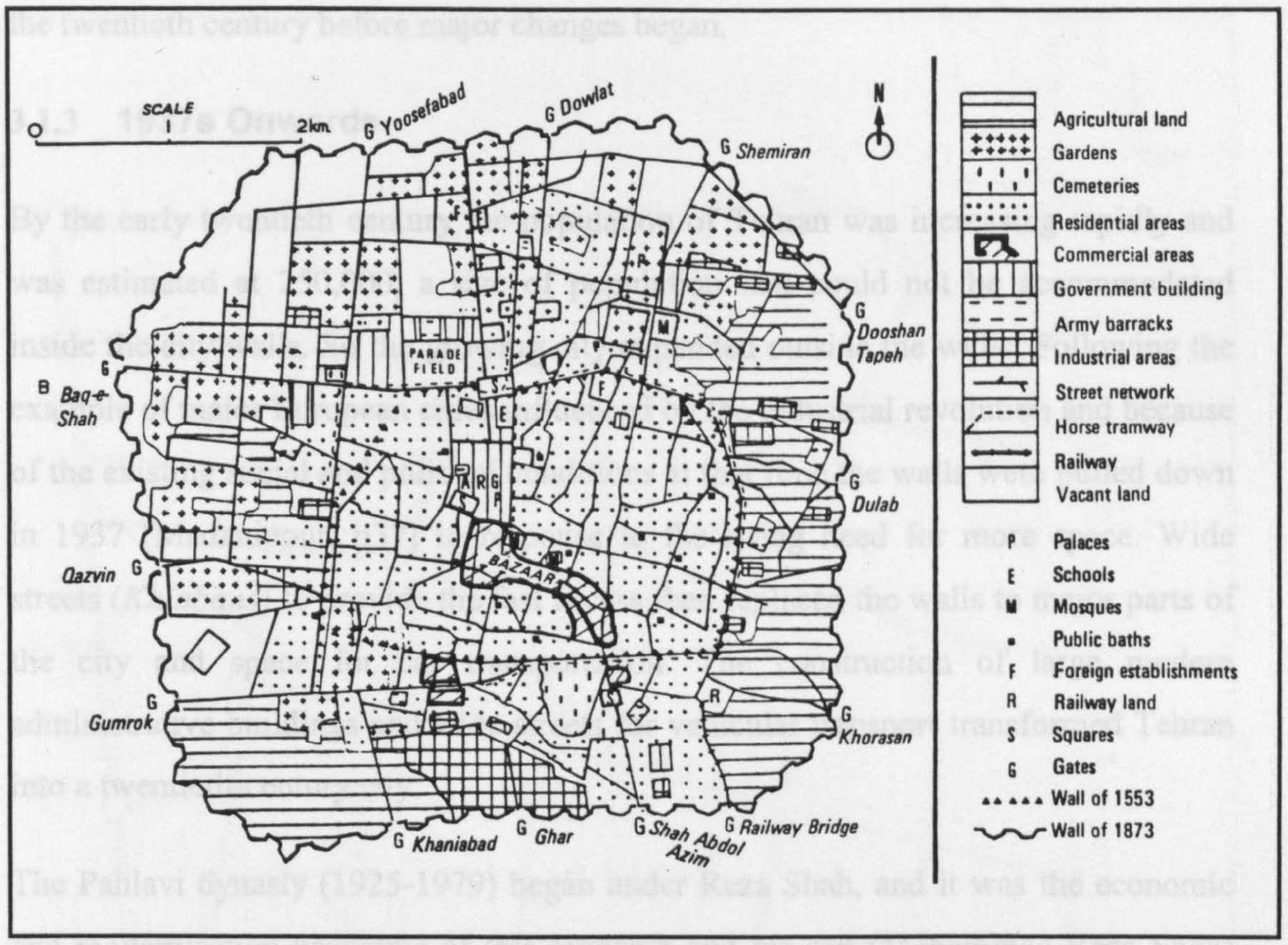


Figure 3. 3 Tehran in 1891.
Source: After Bahrambeygui, 1977, p 23.

By the end of the 19th century Tehran had expanded sufficiently to overtake any other city in the country. The foundation of educational institutions, the construction of public establishments (e.g. the Sepahsalar Mosque, the railway station, and various squares), ministerial reforms, and improvements in communication facilities were signs of the modernisation of Tehran. At this time the city's development was remarkable even to European visitors. Curzon remarks: "Shops are seen with glass windows and European titles, street lamp-posts built for gas . . . avenues bordered with footpaths and planted with trees recall faint memories of Europe" [cited in Bahrambeygui, 1977, p 23]. In any case, as the capital of Persia the city soon exhibited the magnetism created by administrative centralisation and economic control. The population estimates vary. Some estimate the number as high as 200,000, although, Bahrambeygui argues that "by the end of the nineteenth-century

Tehran certainly had over 100,000 inhabitants" [Bahrambeygui, 1977, p 181]. The city was greatly enlarged with a new city wall. Despite such growth, it was well into the twentieth century before major changes began.

3.1.3 1937s Onwards

By the early twentieth century the population of Tehran was increasing rapidly and was estimated at 250,000, a size of population that could not be accommodated inside the city walls. So the growing city expanded outside the walls. Following the example of major European cities influenced by the industrial revolution and because of the existing social and political conditions at that time the walls were pulled down in 1937 [Madanipour, p37] in response to the rising need for more space. Wide streets (*Khiabans*) to provide the fast access then replaced the walls to major parts of the city and space for car transportation. The construction of large modern administrative buildings and wide streets for vehicular transport transformed Tehran into a twentieth-century city.

The Pahlavi dynasty (1925-1979) began under Reza Shah, and it was the economic and modernisation programs of this monarch and his son (Mohammad Reza Shah) that were responsible for the great growth of Tehran. Reza Shah widened many of the streets of Tehran, and a grid network of broad avenues was established, although many of these followed an existing rectangular system (see Figure 3. 4).

Streets followed a grid of water channels that came from underground *qanats*[1] tapping the foothills of the *Alborz* Mountains. The construction of these streets occurred principally in the 1930s, and all major Iranian cities were subjected to rudimentary planning, with broad avenues being a primary concern. Extensive construction of public building and housing occurred in the capital at that time, and numerous brick production factories and other building industries were established in southern Tehran to provide the materials. Tehran also began to be linked more closely with the rest of the country as better roads were constructed and railroads

[1] 'qanat' is a Persian term for an underground tunnel, which draws water by gravity flow from beneath the water table at its upper end to a ground surface outlet and irrigation canal at its lower end.

built. These ties resulted in the beginning of the dominance of the capital and the emergence of a metropolitan centre.

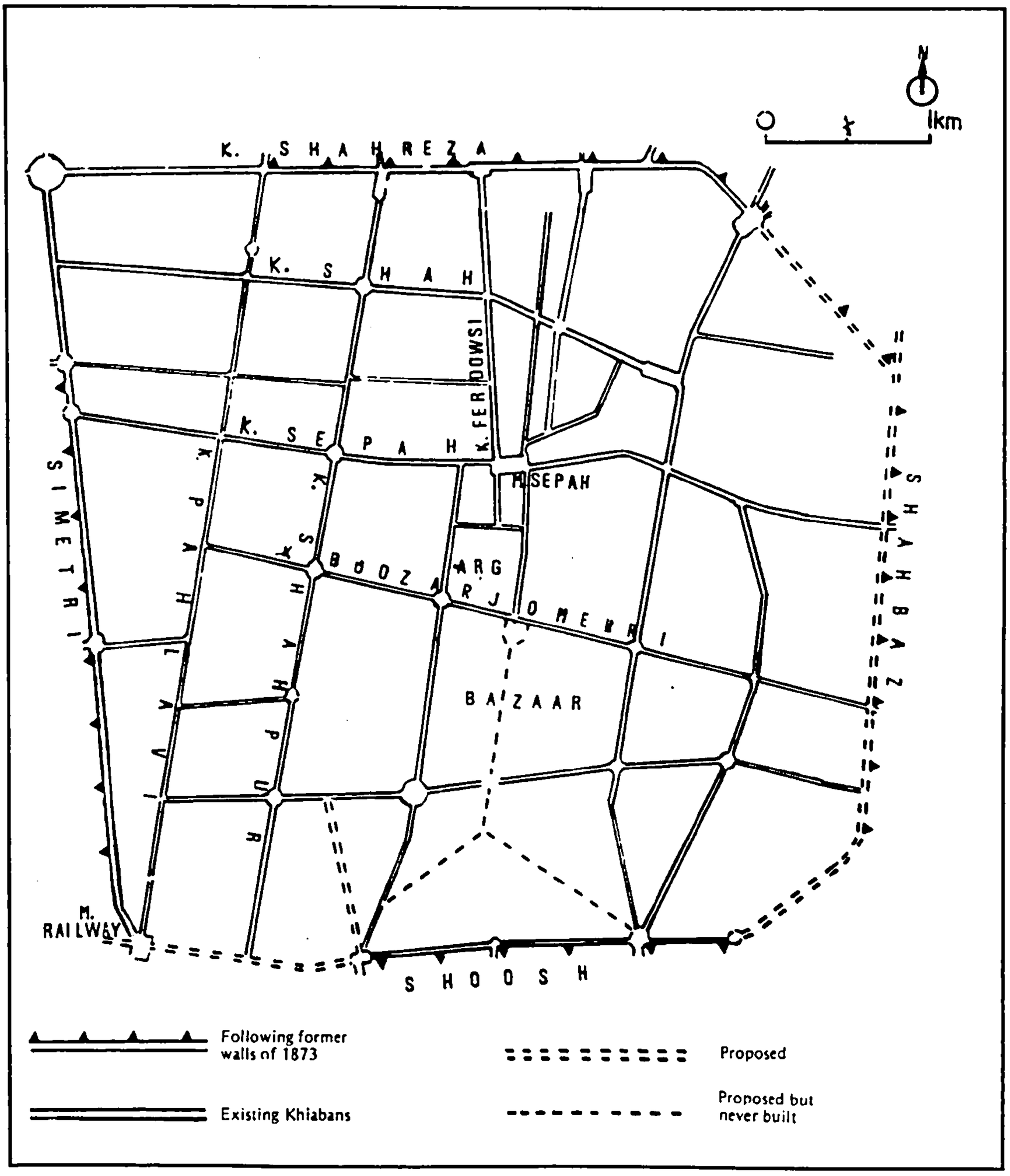


Figure 3. 4 Tehran in 1937, illustrating the existing streets and proposed developments (wide-straight streets replacing the old city walls).

Source: After Bahrambeygui, 1977, p 35.

Tehran had about 300,000 inhabitants by 1930. Nevertheless with the impetus of modernisation programs by the first Pahlavi monarch, the city had grown to half a million by the end of that decade. The city began to mushroom after World War II, as increasing oil revenues promoted more development. The population was almost one

million by 1950, 1.5 million (the first census) by 1956, and 2.7 million (the second census) by 1966. By 1980 the city had a population of nearly 6 million and dominated the country demographically and economically. No other Iranian city has even a sixth of Tehran's population. Tehran's total population makes up over a quarter of Iran's official urban population, and one out of every seven Iranians live in Tehran. The enormous growth of Tehran is partly because of Iran's highly centralised government system, with most decisions made in the capital. Although all the ministries also had offices in the provinces, the officials in Tehran made all the important decisions even those concerned with local affairs. This is still the case although the current government has shown signs of interest in changing this system. The first ever election of the Local Councils was held in 1998. The population of Tehran has continued to increase in the last few decades because immigrants have come into the metropolis for employment. The figures below illustrate the growth of Tehran during the last century.

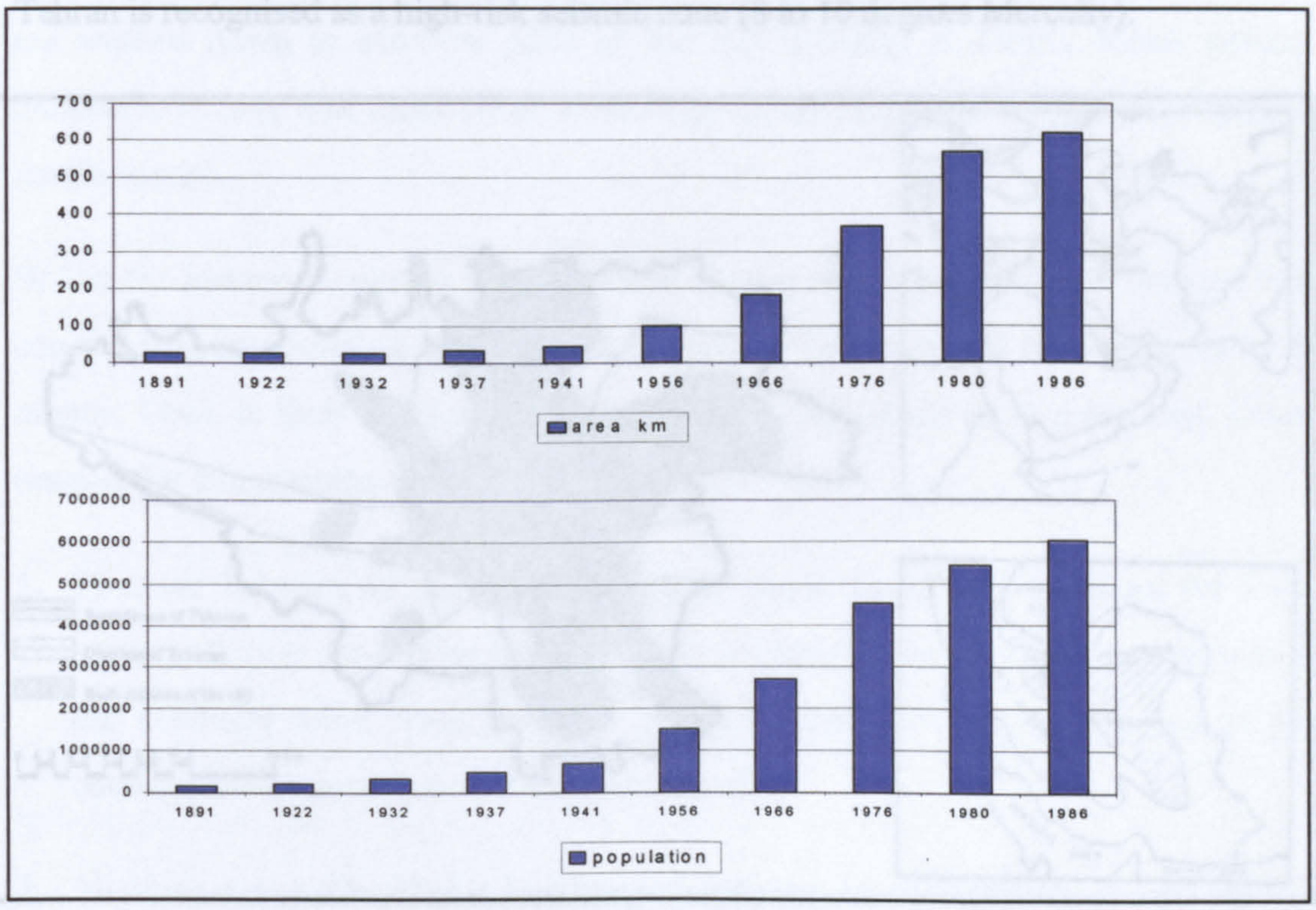


Figure 3. 5 The growth of Tehran's Area and Population in the 20th Century.

3.2. PHYSICAL ASPECTS OF TEHRAN

3.2.1 Geographical Setting

Tehran is located in the North of Iran, latitude 35°34' north and longitude 51°19' east with an average altitude of 1200 meters above see level in the central area of the city. Tehran is situated between the foothills of the *Alborz* Mountains and the northern edge of the Central Desert of Iran (see Figure 3. 6).

3.2.2 Climate

The climate of Tehran is characterised by a hot dry summer and a moderately cold winter. The maximum and minimum recorded temperatures in Tehran are 42.5° Celsius in July and -20.6° Celsius in February and the annual average temperature is 16.5° Celsius. The annual precipitation ranges between 200 to 400 millimetres, which categorises Tehran as a typical semi-dried zone. Regarding earthquakes, the area of Tehran is recognised as a high-risk seismic zone (8 to 10 degrees Mercally).

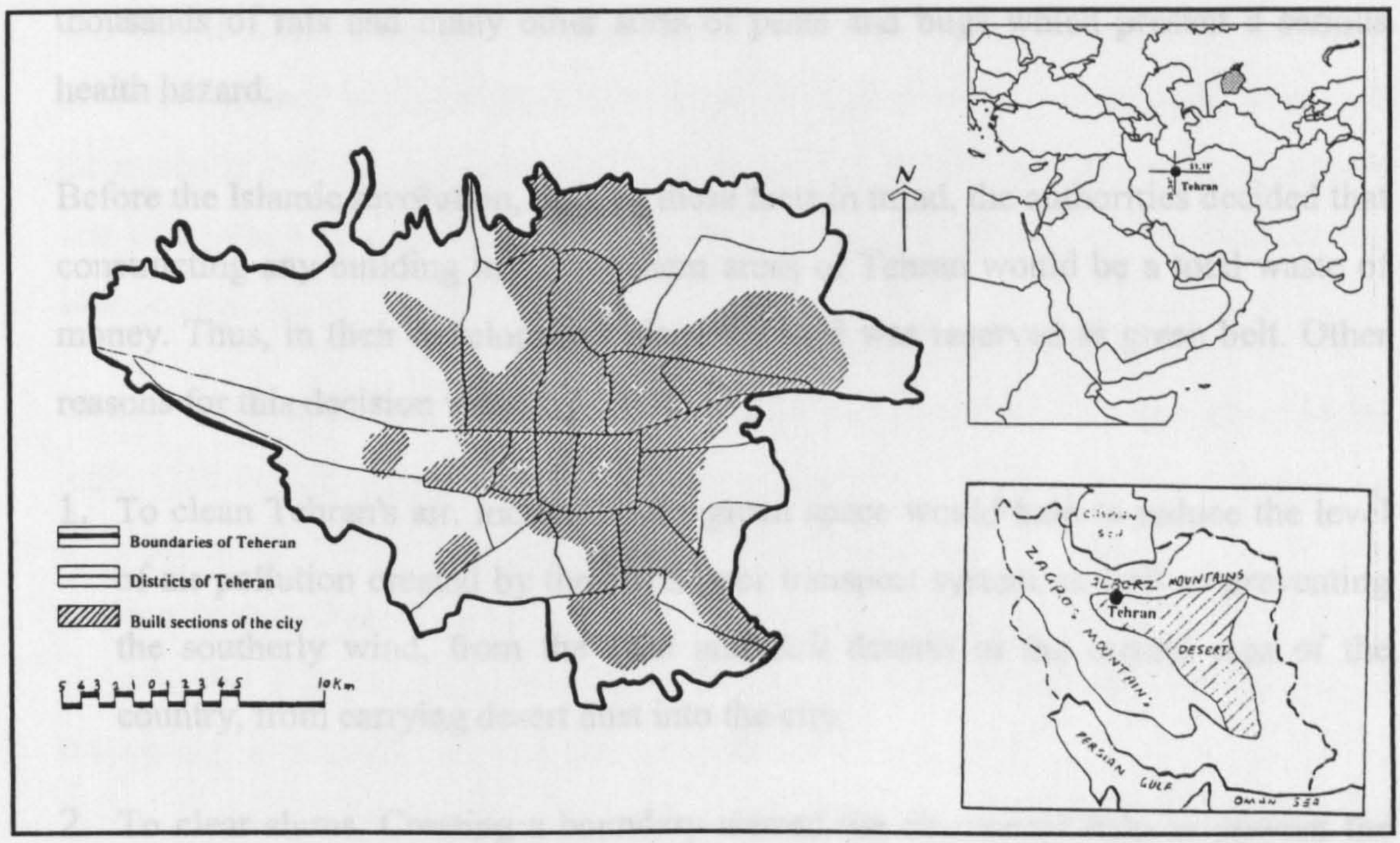


Figure 3. 6 Tehran and it's Location in Iran and in the Middle East
Source: (L) Adopted from Atek, 1990b, p 29. (R) Author.

3.2.3 Ecological Studies of Tehran

Tehran is surrounded by the *Alborz* Mountains to the north, east and southeast leaving only the west and south sides open for further development. The city's drinking water is provided by two main water reserves at the *Latian* and *Karaj* dams, which are located to the north and northwest of the city respectively. Since the city is located on a steep slope with a deep layer of sandy soil, surface-water and underground-water from the north run down to the southern areas of the city. This raises water table very close to the surface to the degree that many buildings in southern areas of the city are quite evidently afflicted with rising damp. As a result, the previously built southern areas of Tehran have to be constantly drained. The high level of underground-water is not the only reason for the southern areas' unsuitability for residential development. Open water-channels - instead of an underground sewage system – constitute another source of environmental pollution in this area of the city as well. All sorts of rubbish thrown into the open water-channels to the north, are washed down to southern parts of the city bringing pollution, which attracts thousands of rats and many other sorts of pests and bugs which present a serious health hazard.

Before the Islamic revolution, bearing these facts in mind, the authorities decided that constructing any building in the southern areas of Tehran would be a total waste of money. Thus, in their development plans the land was reserved as green belt. Other reasons for this decision were:

1. To clean Tehran's air. Increasing the green space would help to reduce the level of air pollution created by the city's poor transport system as well as preventing the southerly wind, from the *Lout* and *Salt* deserts in the central area of the country, from carrying desert dust into the city.

2. To clear slums. Creating a boundary around the city would help to prevent the poor and new immigrants from small cities and villages forming shanty -towns around the city.

The development policies of the previous regime were based on oil revenue and focused on strengthening of industrial sector and clearly weakened the agricultural sector of the country. As a result of what was called the White Revolution a country that was once self-sufficient in the agriculture had to import all sorts of foods. The policies disadvantaged the majority of villagers, discouraging them from maintaining their farms and villages. As a consequence the old producers have changed to new consumers.

The flow of thousands of villagers to major cities in search of employment to feed their families forced the authorities to realise the necessity of bringing immigration under control. The delineation of clear boundaries to the major cities was one of the solutions suggested.

There was a constant battle between the authorities and immigrants trying to gain a foothold in the city and, very often, municipal bulldozers were dispatched to demolish and clear the slums that mushroomed overnight outside the city boundary.

The concentration of all services and facilities in the cities and the unjust distribution of wealth mainly from oil revenue widened the gap between the majority poor and the minority rich in the country. Ignoring the socio-cultural background of the people was one reason for the social unrest that caused the overthrow of the Shah by the Islamic revolution.

Within the early months of the Islamic revolution, in an attempt to bring about social justice for disadvantaged people, hundreds of hectares of land within and around the boundaries of Tehran were plotted and distributed among those who had not previously owned any land or property at all. At that point the new authorities did not consider the issue of population control, and as a result hundreds of thousands of immigrants managed to acquire land and settle down in Tehran.

After a while it was realised that the policy of providing land for everybody in cities was damaging the country at large, by encouraging more and more urban immigration. Adding to the population of the cities without providing a proper infrastructure was causing great damage to cities themselves, most of all to Tehran.

The new government set a target to bring immigration under control and eventually tried to reverse the immigration process, by attempting to provide villages with the same services as the cities. Roads were constructed to all villages, even the most remote ones, in order to facilitate other services such as health and education. Unfortunately the provision of these services did not follow quickly afterward as promised. In fact, the roads helped more villagers to desert their villages even quicker than before, further adding to the problems of the cities. The main reason for the failure of the promised provision of facilities for the villages was that only about twenty months after the Islamic revolution, Iran was at war with Iraq. The war engaged millions of the country's young people, preventing them from taking part in the construction process in the country.

Eight years of war consumed most of the country's resources. The consequence of war on the housing stock of major cities, such as Tehran, is easily predicted. Millions of houses were required in a short period of time, but with the task of managing of the war in hand, meeting these requirements could not be the main priority for the government. Hence, given the quantitative shortage of housing, the quality of housing had to be sacrificed. Nowadays although substandard and overcrowded, the cost of renting a flat will take up the whole of a teacher's monthly wages (teachers are widely regarded as average employees of the public sector who have a decent job). However, one person's income is not sufficient for a family to survive. Since competing in the job market is often difficult or unattractive for many women, the heads of households may often have second or a third job to meet the living costs of the family. Many people still cannot afford to provide a decent accommodation for their families.

Before the revolution, it was said that Tehran was planned to accommodate a maximum of five million people. Now after only about twenty years its population has risen to almost three times that limit with very limited upgrading of the infrastructure. This has spelt disaster for every aspect of the city's life. Traffic congestion, air pollution, and substandard and insufficient housing are only a few examples in the endless list of the city's problems. Hundreds of residential complexes have mushroomed on the spare land in the eastern and western areas of the city. Even

those lands to the south of the city that had previously been reserved as green belt have been developed to accommodate the ever-increasing population of the capital city.

3.2.4 Air pollution

Factories located to the west of the city have continued to grow until recently these in addition to the old transport system, including millions of old cars, have contributed to air pollution. Being surrounded by mountains, on many occasions when there are no strong winds to ventilate the city, the polluted air gets trapped. This effect, called inversion, causes the harmful emissions in Tehran's air to rise more than hundred times above the permitted level. The authorities have to advise those with heart conditions and the elderly and infants to temporarily leave the city or if not, to stay in their houses and shut all doors and windows (see Figure 3. 7). The author has personally witnessed what was called the *black rain* in Tehran about ten years ago. As a result of a fire in an oil-waste field about 120 kilometres west of Tehran, the westerly wind deposited black dust all over the city. By the end of 1980s the pollution problem had put Tehran in the position of the second worst city in the world after Tokyo.

Figure 3. 7 The inversion effect happens several times a year especially during the winter.

Source: Hamshahri newspaper [electronic version], 1999, various occasions.

It was not until the war was over that the authorities started to seriously look for solutions to Tehran's environmental problems. All spare land within the city area was planted or turned into local parkland. Many highways were constructed to facilitate transport. Tough pollution-reduction policies were implemented for the factories around the city in the short term. In the long term it was decided to move all the factories to an industrial estate on the southeast side far enough away from the city's future development plans. An Underground System is under construction. Electric buses have been experimentally introduced on some routes. New buses have replaced many old ones. All taxis are now required to change their fuel systems from petrol to the newly introduced Liquid Gas within the next two years. Also the city has taken part in international healthy city projects. All these efforts have dramatically changed the appearance of the city, making it a more pleasing environment to live in, but Tehran is still far from being a truly biogenic city.

Tehran certainly has a lot to learn and benefit from the experiences of other cities all around the world such as Peking (city farming), Rottweil (CHP), Zürich (green wedges), Glasgow (small-scale vegetable production in allotments) etc. if it is ever to become an ecologically sustainable environment.

Studying all the sustainability issues of Tehran is outside the span of this research. However, sustainability issues with close relevance to housing design are studied in chapter two. They will also contribute to the formulation of urban housing design guidelines for Tehran.

3.3. SOCIO - BEHAVIOURAL ASPECTS

3.3.1 Family Structure

In Iran, the structure of families is based on two types: Firstly, the extended family, originating from the rural tradition; Secondly, the nucleus family which is increasingly being adopted at present in cities. The definition of Household and Dwelling Unit given by the Statistical Centre of Iran (SCI) is used here as follows:

"Persons living together in one residence, sharing their living expenses, and eating together constitute **a household**. A household may consist of only one person" [SCI, 1990, p III].

"**A dwelling unit** is a place where one or more households were residing at the time of census. Place refers to any enclosed space or surrounded enclosure that has one or more access to a public road (e.g. alley, street, bazaar, square) or to a private road (e.g. common corridor or staircase)" [SCI, 1990, p VI].

3.3.2 Types of Households

The vast majority of households in Tehran consist of '*nucleus families*'. Now the structure of families has changed and more people are likely to live within a small family separate from their relatives. Problems may occur when married sons and their families stay in their father's house. Therefore, young couples prefer to move into their own accommodation, if they can afford to, but in the present economic situation it proved to be very difficult. People who now have the opportunity to build new houses prefer to build the maximum number of rooms, if they can afford to, for the future benefit of their family. In this way when their children get married they can temporarily take one or two rooms from the spare rooms in the house until they can get an accommodation of their own.

3.3.3 Household Size

The purpose of the household study is to find out the social characteristics and quantitative aspects of the population in relationship to the size of the dwelling in which they live. According to the survey carried out by the author, in those high-rise and middle-rise housing schemes of Tehran studied a variety of households is found (see chapter four) ranging from 1 to 9 persons. The most common household size is 4 people (36.1%), followed by 5 people (19.7%), and 3 people (19.4%).

3.3.4 Population Density in Tehran

Density is a central concept in the description and design of cities as residential environments. It receives a great deal of attention from planners and policy makers. Density is believed to have far-reaching effects on many aspects of the quality of life.

It is, therefore, natural that many planning systems have developed tools for regulating density.

One of the expressions of population density is occupancy rate. In general, the mean occupancy rate is a function of the size of households and the number of rooms they occupy. The population density of Tehran is one of the highest urban densities in Iran.

Table 3. 1 Tehran's Population Density Between 1883 - 1986.

Year	1883	1891	1922	1932	*1956	1966	1976	1980	1986
HPD	N/A	N/A	2.1	2.4	1.0	1.6	1.5	1.4	1.2
PPD	11.7	8.9	9.7	9.7	4.5	7.7	6.8	5.7	5.2
PPH	N/A	N/A	N/A	N/A	4.5	4.9	4.6	4.5	4.4

Source: Adapted from [Taleghani, 1990, p 177] & [Taleghani, 1992, p 29-30].

***1956** The definition of dwelling unit in 1956 was different from the other years. According to the definition used in the 1956 census, the place of residence of each household counted as one dwelling unit.

HPD = Number of households per dwelling unit.
PPD = Number of persons per dwelling unit.
PPH = Number of persons per household.

According to the Statistical Centre of Iran (SCI) the country's Average Annual Population Growth (AAPG) was 3.9 percent in the national census of 1976-77. That was a serious warning message to the authorities, as the country was in no way prepared to be able to provide sufficiently for such population explosion. The trend had to be reversed. Therefore, the Childbirth Control plans as well as related educational programmes were introduced nation-wide. The programmes proved so successful that within a period of just fifteen years the AAPG decreased dramatically to 1.5 percent, reported in the national census of 1991-92, and stabilised at that level until the latest National Census of 1996-97 (see Table 3. 2).

Table 3. 2 Iran's Population and the Average Annual Population Growth (AAPG) in the 20th Century.

Year	Population	AAPG (percent)
1901-02	8613000	0.6
1911-12	9143000	0.6
1921-22	9707000	1.5
1926-27	10456000	1.4
1931-32	11185000	1.4
1936-37	11964000	1.4
1941-42	12833000	2.0
1946-47	14159000	2.8
1951-52	16237000	3.1
1956-57 census	18954704	3.1
1966-67 census	25788722	2.7
1976-77 census	33708744	3.9
1986-87 census	49445010	2.5
1991-92 census	55837163	1.5
1996-97 census	60055488	1.5

Source: Adopted from SCI [http://www.sci.iranet.net/].

Table 3. 3 Tehran's demographic status in Comparison with Iran.

	Percentage of population		Mean household size	
	1986-87	1996-97	1986-87	1996-97
Iran	100%	100%	5.1 PPH	4.8 PPH
Tehran	17.6%	18.4%	4.6 PPH	4.1 PPH

Source: Adopted from SCI, 1990 and SCI, [http://www.sci.iranet.net/].

The average size of households in Tehran is decreasing (see Table 3. 1, Table 3. 3 & Table 3. 4). 4PPH is the most common household size in all of the available national census reports. While the percentage of middle size families (3PPH, 4PPH and 5PPH) was increasing, the percentage of other household sizes was decreasing. In the year 1986 the majority of Tehrani households were 4PPH (21.7%) followed by 5PPH (17.8%) and 3PPH (16.9%) (see Table 3. 4).

Table 3. 4 Tehran's household sizes in the second half of the twentieth century.

Household Size	1956	1966	1976	1986	Trend
1 PPH	11.1 %	7.3 %	7.2 %	5.2 %	Decreasing
2 PPH	14.2 %	12.4 %	12.3 %	12.1 %	Decreasing
3 PPH	15.7 %	13.8 %	15.7 %	16.9 %	Increasing
4 PPH	15.8 %	15.5 %	18.0 %	21.7 %	Increasing
5 PPH	14.4 %	15.3 %	16.1 %	17.8 %	Increasing
6 PPH	11.5 %	13.5 %	12.8 %	12.2 %	Decreasing
7 PPH	7.9	9.9	8.6	7.2 %	Decreasing
8 PPH	4.5 %	6.2 %	4.9 %	4.0 %	Decreasing
9 PPH	2.4 %	3.2 %	2.4 %	1.6 %	Decreasing
10 PPH	2.4 %	2.9 %	2.0 %	1.3 %	Decreasing

Source: Adapted from *Tehran's Master Plan: Population Analysis*, Volume 6, p 8.

3.4. STATUS OF HOUSING

3.4.1 Status of Housing in the Iranian Constitution

Article 22 of the constitution of the Islamic Republic of Iran states that *"The dignity, life, property, rights, **residence** and occupation of the individual are inviolate, except in cases sanctioned by law"* [IPO, 1981, p 27].

Article 43 sets the objectives of the Islamic Republic of Iran's economy to achieve *"the economic independence of the society, uprooting poverty and deprivation, and*

fulfilling human needs in the process of development while preserving human liberty". Section one of the same Article specifies "*the provision of basic necessities for all citizens:* ***housing****, food, clothing, hygiene, medical treatment, education and the necessary facilities for establishment of a family"* as the first criteria governing the country's economy [www.cyberiran.com/government/constitution.html].

In addition, according to Article 3, the government has the duty of directing all its resources to a set of goals such as those mentioned in section 12: "*The planning of a correct and just economic system, in accordance with Islamic criteria, in order to create welfare, eliminate poverty, and abolish all forms of deprivation with respect to food, housing, work, health care, and the provision of social insurance for all*" [IPO, 1981, p 20].

And finally, it is clearly specified in article 31 that: *"It is the right of every Iranian individual and family to possess housing commensurate with his needs. The government must make land available for the implementation of this article, according priority to those whose need is greatest, in particular the rural population and the workers"* [IPO, 1981, p 28].

3.4.2 Housing Statistics in Iran

According to the 1986 census in Iran, "the national growth rate of population was 3.9% compared with 2.7% in 1976. Within urban areas the annual population growth was 5.4%, that is more than the national rate of 3.9%" [SCI, 1990]. This is a clear indication of immigration from rural to urban areas. According to IAA "during 1973-77 on average 140,000 households were added to the urban population annually. In 1978-82 on average 180,000 households were added to the urban population annually" [IAA, 1990, pp 9-10]. Therefore, "in the next twenty years 8.5 million dwelling units are required to accommodate the growing population of urban areas" [IAA, 1990, p 37].

3.5. REVIEW OF HOUSING CONDITIONS

The problem of housing in the large cities of Iran is considerable because the gap between demand and supply is very high. Many people in Tehran have no alternative in choosing their dwellings. Their first objective is to be housed in comfortable accommodation. Many private dwellings do not meet the national norms (see section 3.5.3), but the spatial organisation is loosely related to the needs of the families and to their socio-cultural values.

Tehran as the largest city accommodates the largest urban population in Iran; more than a fifth of the entire country's population live within the over 600-km^2 area of Tehran [Madanipour, 1998, p 109 & p 257]. Therefore, the demand for housing is huge, but the housing supply lags far behind the demand. The gap between demand and supply had its origins in the slow completion of housing projects for complex reasons such as bureaucracy, lack of materials, etc.

In Tehran there is an amalgamation of different kinds of housing. For instance, in the city centre, individual houses, blocks of flats, hotels and shops can be found. There are a great number of traditional dwellings and blocks of flats some of which the Iranian Government built recently while others date back to the Pahlavi period.

3.5.1 Housing Development

Housing development in Iran is based on three sectors: the private sector with 72.5%, the co-operative sector with 15% and the government sector with 12.5% of the total housing stock in the country [Razzaghi, 1992, p 544]. Housing schemes constructed by the government and the co-operative sectors are usually mass-produced in the form of high-rise or medium-rise apartment blocks and the private sector provides almost the only individual houses. All sectors have recently launched housing schemes on the periphery of Tehran.

Most of the new housing construction in Tehran has been in the form of large apartment complexes, and many of these are for higher income groups. Many working people spend over half of their income on housing. The price of houses has led to extensive sharing by relatives and even the letting of rooms to non-relatives.

Some housing projects have been for one single profession, such as employees of a specific ministry, teachers, or doctors, although there has been a reaction against this practice that has caused later projects to have a greater mixture of socio-economic groups with different levels of income. New estates have also been built in suburban areas in an attempt to take the population pressure off the main area of the capital (see Figure 3. 8).

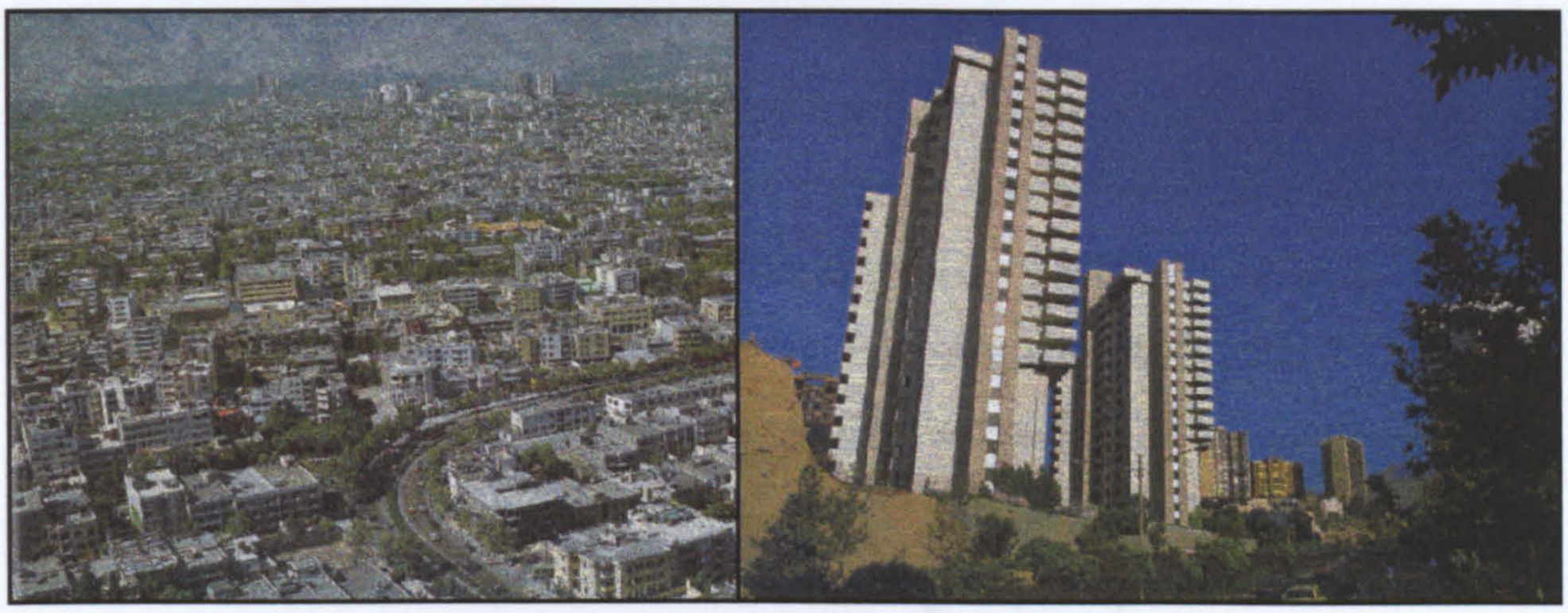


Figure 3. 8 **[Left] A view of increasingly dominant apartment housing form in Tehran. [Right] An example of high-rise apartment blocks (along Africa expressway in the north of the city), which are mushrooming all over the city especially in the north and western suburbs where there is still land available either through new developments or conversion of large villa houses to high-rise blocks.**

Source: Adopted from MoT, 1992, p 152 & p 155.

In the mid 1970s urban land prices rose so quickly that prices could be quoted only daily. Land in the southern area of Tehran was selling for about $600 per square meter while to the North of the city the land price was $4000 per square meter. Land plots for average sized houses in the North of the city were selling for several hundred thousand dollars, and houses were going for millions. Needless to say, only the wealthy could buy such land, but the higher income level increased considerably as more and more Iranians benefited from the oil wealth. But, of course, the vast majority of the population were left to struggle in the face of rising prices, and the widening gulf between them and the wealthy in the capital became increasingly unmanageable [Brunn and Williams, 1983, pp 294-299].

Because of high land prices the building and maintenance of courtyard housing is not economically viable. Although a great number of predominantly single-storey

traditional courtyard houses still exist in the central areas of Tehran they are mostly neglected as they are no longer considered viable [Madanipour, 1999, p134]. These nineteenth century courtyard houses are often neglected as most of the original owners moved away from the old districts in search of better living environments as a result of lack of proper provisions and poor services and facilities (see Figure 3. 9). The high level of pollution prevents traditional environmental solutions. For example, sleeping on the rooftops became inconvenient, the courtyard is no longer welcoming outdoor space, its vegetation can not survive the pollution and the polluted pool does not generate freshness; electrical ventilation cooling systems must be used instead. The courtyard houses were designed, in confirmation with the social structure of the nineteenth century Tehran, for accommodating extended families. These hardly exist in Tehran anymore. The courtyard houses have either been turned into business places (workshops, stores, etc.) or used for multi-occupancy renting. Immigrants, often not relatives, who are looking for inexpensive accommodation usually in southern or old central districts of the city, rent individual rooms of such houses. However, the living conditions in these houses are described as extremely unsatisfactory by the migrant residents who have to share houses with total strangers [e.g. see Madanipour, 1999, pp 147-151]. The twisting narrow alleyways in the old quarters prevent easy access for emergency services such as ambulances and the fire brigade.

The changing family structure from extended family to nucleus family meant more dwellings were needed to accommodate the same number of people. The natural growth of its population and the constant flow of immigrants who were looking for work and better living conditions in Tehran, created the historically increasing demand for housing. Furthermore, by the end of the eight years of the Iran-Iraq war (1980-88) millions of war heroes who returned home needed accommodation to begin establishing their own families. All these have intensified the demand for more dwellings in the last decade. As a consequence the price of land and dwellings as well as the cost of rented accommodation have dramatically increased in all large cities especially in Tehran [Madanipour, 1999, pp140-141].

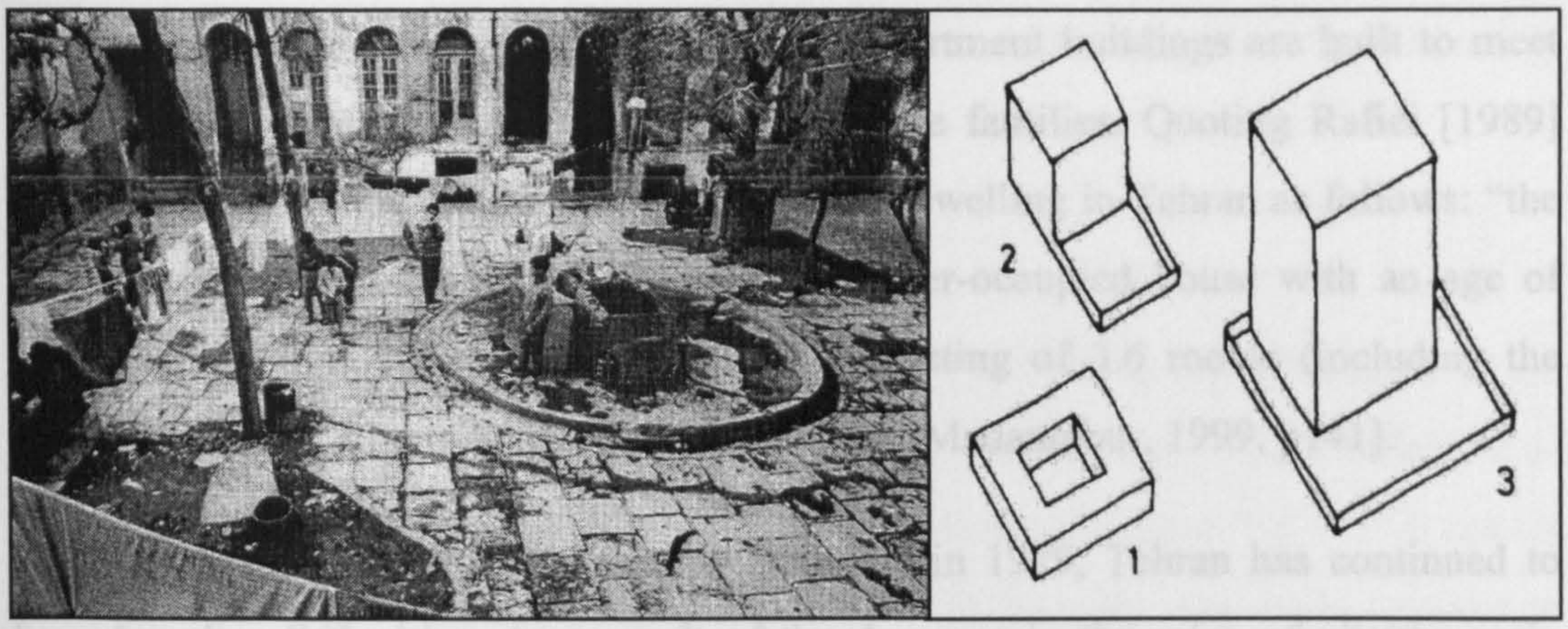


Figure 3. 9 [Left] the traditional courtyard houses have been neglected. [Right] the changing pattern of housing form in Tehran during twentieth century from (1) introverted low-rise courtyard house to (2) an extroverted low/medium-rise house with a yard, to (3) high-rise apartment blocks.
Source: Madanipour, 1999, pp125-126.

In order to bring the problem under control, and to tackle the shortage of housing at least for the short term, the municipality of Tehran implemented a number of policies. As part of its response to the increasing demands on housing the municipality of Tehran set a maximum height (four floors) for residential buildings. The homeowners welcomed that policy as extra floor/s to their houses would either accommodate their offspring or be used as a source of extra income for the family. As a result, many of the reasonably new (20 – 30 years old) houses were pulled down and replaced by new four-floor houses. Although constructing above the maximum height limit is not allowed, selling the permission for higher densities has increasingly become a source of income for the municipality (officially known as a penalty for building higher than maximum permitted height). Many housing developers prefer to pay the penalty but build luxurious high-rise houses, on the expensive land in the northern part of the city, as apartments in the north of the city are in high demand in the housing market.

The constant pressure on urban space from the ever-growing population as well as the introduction of western-style apartments and multi-storey flats has led to a new housing morphology in Tehran (see Figure 3. 9). The majority of houses built during the second half of the twentieth century are two, three, and more recently four-floor terraced housing. Dwellings are generally much smaller than the traditional

courtyard housing types. Nevertheless, larger apartment buildings are built to meet the demands of middle and upper-middle income families. Quoting Rafiei [1989] Madanipour gives the description of the average dwelling in Tehran as follows: "the average dwelling in the mid-1980s was an owner-occupied house with an age of slightly more than 10 years, with 117 m^2 consisting of 3.6 rooms (including the kitchen), housing a household with a size of 5.2" [Madanipour, 1999, p141].

Since the establishment of the Islamic Republic in 1979, Tehran has continued to have housing difficulties. As a result of the decrease in the price of oil (the main source of national income) as well as the eight years of the Iran-Iraq war and the international sanctions against Iran, the country has faced severe economic problems that are especially being felt in the capital. By 1982 there had been an enormous influx of people from villages into the city, partly due to free water and electricity being provided by the government in the south of Tehran. The price of apartments and houses dropped for a while, but rapid inflation continued while the country was suffering from eight years of war.

Recently, the Municipality of Tehran has succeeded in improving the face of the city by adding more green areas, building local sports centres, new parks, cleaning the streets, planting flowers wherever possible. Road networks have been developed and new highways have been constructed. Public transportation services have been improved – converted from diesel fuel to compressed natural gas. The level of polluting emissions have been reduced to a more acceptable level by imposing new regulations for vehicles and factories within the city, and many polluting and undesirable factories moved to industrial zones outside the city. Also the amount of green space within the city has radically improved - increasing from 2.5 to 10 m^2 per person by 1993. The above-mentioned efforts to improve the quality of the environment have won international recognition and earned Tehran UN support. According to Madanipour in the Habitat II conference (1996) "Tehran was identified as one of the 25 best practice cities highlighted for use as models for future programmes in cities world-wide" [Madanipour, 1998, pp 139-140]. Although the above-mentioned attempts were, to some extent, successful in healing the scars of

eight years of war on the image of city the problem of housing still remains and is getting worse.

3.5.2 Master Plan

Preparation of Tehran's 'Master Plan' *(Tarhi Jami')* in 1966 in effect inaugurated the master-planning era in Iran, although Tehran's first master plan was not reflective of the city's cultural characteristics. Mazumdar and Mazumdar argue "in a 1969 master plan for Tehran by a group of California architects housing was made to cater to income groups as in the USA, even though divisions along wealth and income had not been an important feature in Iran. No attention was paid to forms of groupings used locally, such as those based on kinship, ethnicity, religion or other factors. In a country such as Iran with Muslims comprising 98% of the population the master plan for a new city centre by a New York based planning and design firm did not make provisions for a mosque" [Mazumdar & Mazumdar, 1994, p 82]. However, this has now changed. At first, 'Master Plans' used to be designed for implementation over a period of 20 - 25 years. Currently they are drawn up in the form of a 1:20,000 scale-map, to guide cities' development over a period of 10 years. A 'Master Plan' is usually accompanied by a 'Detailed Plan' *(Tarhi Tafsili)*, which is an elaborate version of the same 'Master Plan' (1:2,000 scale-maps for urban centres).

The aim of a 'Master Plan' is to improve the living standards of the citizens by providing them with a better living environment through employing the best possible policies in accordance with time, place and available resources. Some examples of recently employed policies are: dividing land into areas of different land use, design of a network for infrastructure and all public facilities as well as providing general rules for better housing. In practice, a 'Master Plan' includes:

- Delineation of the boundaries of the ten year physical development;
- Preparation of land use plans and the network of the main urban thoroughfares;
- Formulation of per head land use criteria;
- Land use planning;
- And determination of the population density of districts.

'Master Plans' are usually accompanied by a comprehensive report including many chapters addressing issues such as population growth, employment, education, public health, infrastructure, traffic, building codes and ordinances and housing. The report usually ends with general guidelines to alleviate problems with which each sector and the concerned sectoral agency are engaged [MIIRI, 1990, p 15; Ghamami, 1993, p 24].

The "Ministry of Housing and Urban Development" is the body in charge of the preparation of 'Master Plans' for all cities with a population of over 30,000. The "Ministry of Interior" is in charge of the preparation of 'Guide Plans' (*Tarhi Hadi*, with a 1:5,000 scale-map) for all other cities with populations of under 30,000 [Hashemi, 1988, p 80]. A 'Guide Plan' is similar to a 'Master Plan' but at a smaller scale of city planning.

All 'Master Plans' need to be approved by the "Supreme Council for Urban Planning and Architecture of Iran" which is composed of eleven members, including seven ministers most concerned with urban affairs [MHUD, 1991, p 1].

3.5.3 Housing Needs

The housing needs depend on the size of the population, the existing housing stock, the housing standards, and housing deficiencies. According to Tehran's master plan 465,000 housing units should have been built during the First Development Plan of the Islamic Republic of Iran (20, March 1989 - 20, March 1993). This means 93,000 dwelling units needed to be constructed every year during this period. Tehran has only achieved a third of its targeted housing programmes with the construction of about 30,000 dwelling units per year.

A new program has recently been introduced to tackle the shortage of housing. It includes three major plans: the Saving Plan, Mass Production, and Smaller Dwelling Units. The Saving Plan is aimed at helping people increase their chance of buying their own home and generates resources for the construction of new housing projects. Mass Production aims at the reduction of the total cost of housing projects by

speeding the process of construction. Finally by reducing the size of each individual dwelling unit, the total number of dwellings built in the city increases.

To achieve its goal, the government has recently introduced the norm of 75 square meters for individual dwelling units in Tehran and large provincial capital cities and 100 square meters in other cities.[2] Subsidisation programmes for housing materials as well as very low percentage profit loans for buying dwellings have also been introduced to encourage people to accept Smaller Dwelling Units. Obviously those who take part in the saving plans would have priority using the facilities provided (either in obtaining subsidised materials or a loan to buy housing constructed according to the new norms).

3.6. SURVEY OF HOUSING CONDITIONS IN RECENTLY DEVELOPED HOUSING SCHEMES IN TEHRAN

Looking at Tehran's high-rise housing schemes reminds one immediately of the high-rise apartment blocks in western countries constructed during the '50s - '60s, many of which are now being demolished. Although high-rise housing was in the West accepted at first by residents, it soon became unpopular as family housing.

As Crawford [1975, p11] argues, sociologists began to question the desirability of high block living before 1967. A much stronger reaction followed the disaster in May 1968 at Ronan Point, a 23-story housing-block in the London Borough of Newham that suffered progressive collapse after a gas explosion. The demolition of Pruitt-Igoe in St. Louis USA in 1972, once a prize-winning project and now known as 'the world's most notorious high-rise housing project' [Hall, 1988, p237] put an end to the idea of high-rise as family housing. Poor design, bad structure, lack of appropriate ventilation and heating caused building failures such as leaks, condensation, explosions, lifts that did not work, etc. Also an inappropriate mixture of occupants (i.e. concentration of certain social groups e.g. low income, ethnic minorities, etc.) could cause stigmatisation of the areas resulting in the feeling of fear, isolation and alienation, and vandalism to buildings.

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[2]The average size of a dwelling unit in Tehran is 140 - 150 square meters.

Following the demolition of Pruitt-Igoe, hundreds of tower blocks have been dynamited world-wide, including places here in the UK such as London, Sheffield and recently Glasgow. Generally speaking they are disfavoured as a result of failing to meet the standards of family life. Families living in high-rise apartment blocks have experienced many problems regarding their basic demands, specifically:

- except for usually inadequate balconies, there is no direct access to outdoor space such as a front garden or back garden;
- the difficulty of supervising children in playgrounds from upper levels of the building;
- lack of privacy (i.e. sound and visual problems) due to lack of insulation between dwellings and separation of private outdoor spaces;
- Stigma (due to the high concentration of low-income earners and building failures many high-rise apartment blocks became urban ghettos);
- The destruction of community ties (as a result of the clearance of traditional homes).

Unfortunately these types of housing schemes are still being constructed in many countries, including Iranian inner city areas. Therefore, a survey program was designed to investigate the degree of satisfaction of people living in such conditions. Four high-rise high-density schemes were randomly chosen as sample areas. 600 questionnaires were distributed and the bulk of the collected data was statistically analysed. It was hoped that the outcome of this survey would provide a better understanding of the demands on housing in Tehran. The following sections intend to give a brief review of the housing conditions within the selected housing schemes and a brief account of the findings of the local survey. More details of the survey programme and the statistical analysis of findings, the data collected, the physical characteristics of the sample areas, and the questionnaire are documented in appendices A, B, C, and D.

3.6.1 Sample Areas

As Moore emphasises, 'sampling is an essential aspect of surveying' [Moore, 1983, p 30]. To reduce the extent of experimental investigation to a manageable size and to make it less costly, the survey focused on Teheran, and there on four housing schemes selected from high-density residential areas. Two out of the four areas consist of middle-rise apartment blocks (8-12 floors) at the western edge of the city, and the other two of high-rise apartment blocks (20 or more floors) located within the inner city area (see Figure 3. 10).

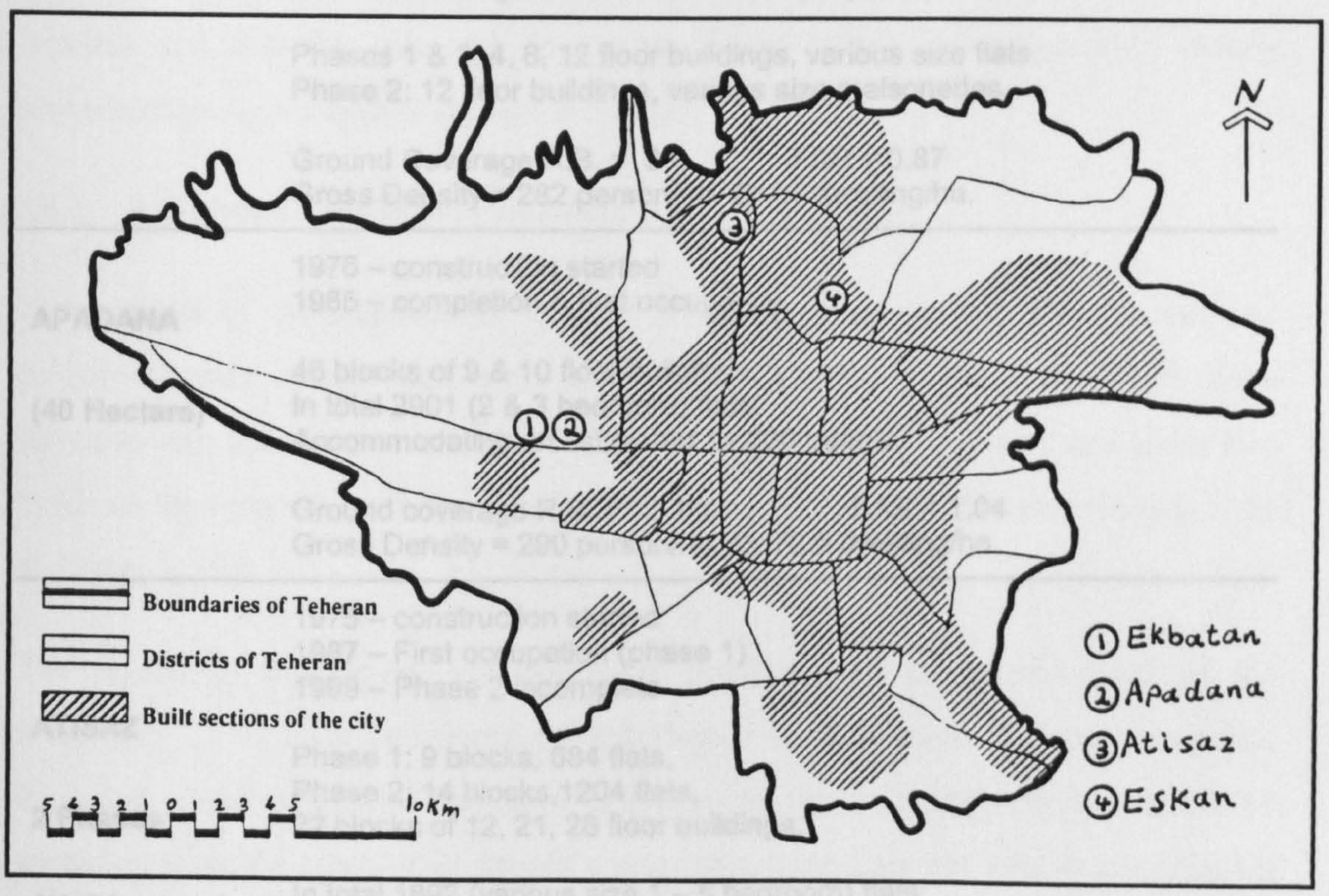

Figure 3. 10 Location of the samples in the city of Teheran.
Source: Author, adopted from Atek, 1990b, p 29.

Local observations proved to be an instrument for proper interpretation of the outcome of the local survey as it was necessary to cross-check the responses to some questions with the actual housing conditions. A summary of the physical characteristics of the four sample areas is presented in Table 3. 5. A full account of the physical characteristics of the four housing schemes is documented in appendix C.

Table 3. 5 Facts and figures of the four housing schemes in Tehran.

Project	Facts and figures
EKBATAN **3 Phases** **(220 hectare)**	1975 – Construction started. 1978 – First occupation (phase one). 1986 – Phase one: completed. 1998 – Phase three: completing. 1999 – Phase two: two blocks still under construction. Phase one: 10 blocks = 5601 dwellings, Phase two: 17 blocks = 7060 dwellings, Phase three: 4 blocks = 2086 dwelling. In total 31 blocks = 14747 flats, Accommodating an estimated 62000 people. Phases 1 & 3: 4, 8, 12 floor buildings, various size flats. Phase 2: 12 floor buildings, various size maisonettes. Ground Coverage R.B. = 9% FAR = 0.87 Gross Density = 282 person/ha. Or 67 dwelling/ha.
APADANA **(40 Hectare)**	1976 – construction started 1985 – completion & first occupancy 46 blocks of 9 & 10 floor buildings. In total 2901 (2 & 3 bedroom) flats. Accommodating an estimated 11,600 people. Ground coverage R.B. = 12.1% FAR = 1.04 Gross Density = 290 person/ha. Or 72.5 dwelling/ha.
ATISAZ **2 Phases** **(10.5 hectare)**	1975 – construction started 1987 – First occupation (phase 1) 1999 – Phase 2 incomplete Phase 1: 9 blocks, 684 flats, Phase 2: 14 blocks,1204 flats, 22 blocks of 12, 21, 26 floor buildings. In total 1892 (various size 1 – 5 bedroom) flats, Accommodating an estimated 6,800 people. Ground coverage R.B. = 14% FAR = 2.67 Gross Density = 567 person/ha. Or 157.6 dwelling/ha.
ESKAN **8000 m^2**	1974 – construction completed. Three 30-floor tower blocks, Each tower includes 23 residential, 5 parking and 2 provision floors. In total 270 flats (2,3,4 bedroom), Accommodating an estimated 810 people. Ground coverage R.B. = 35% FAR = 8.5 Gross Density = 1013 person/ha. Or 337.5 dwelling/ha.

The inhabitants of all four areas are from a mixture of different social groups. Most of the dwellings in the four sample areas are owner occupied. All the residents are involved in the management of their building blocks. The entry to the buildings is controlled by a lobby-man security service. All residents share the expenses of maintenance and repairs of their building block as well as the running costs of the services and facilities (e.g. landscaping) in the form of a monthly charge based on the size of their flats. Considering the high demand for closer access to urban facilities and land prices within the city it was assumed that middle-rise apartment blocks located on the edge of the city would mostly accommodate lower middle-income families and that the high-rise apartment blocks within the city would mostly accommodate upper-middle income families.[3]

3.6.2 A Synopsis of Main Findings

The analysis of the respondents' overall satisfaction degree with their homes and neighbourhoods reveals that more than three quarters of the respondents were satisfied with their homes in both the middle - and high-rise schemes and about two thirds of the respondents were satisfied with their neighbourhoods (see Figure 3. 11 & Figure 3. 12).

The results of the survey are clearly in conflict with the expectations of the researcher. There must be reasons for this degree of satisfaction, but no survey data exist that would explain the residents' responses to dwellings and neighbourhood. To speculate what the reasons for people's responses were does not lead to any tangible conclusions. Whatever the respondents' reason for the current high degree of satisfaction might be, it is well known that a person's degree of satisfaction is directly related to the degree of provision for his/her 'needs'. The degree of satisfaction increases as needs are provided for, but people's expectations change in time; once their basic needs are satisfied yet more is required. As Maslow states "Man is a wanting-animal and rarely reaches a state of complete satisfaction except for a short time. As one desire is satisfied, another pops up to take its place. When

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[3]The Middle-Income group covers about three-quarters of Iran's urban population.

this is satisfied, still another comes into the foreground, etc." [Maslow, 1954, p69]. It can, therefore, be expected that the current degree of satisfaction might change into dissatisfaction in time, as was observed in similar schemes during the '60s and '70s in Europe and the USA. Once people had become accustomed to the new housing standards they became aware that higher needs were not satisfied, and this resulted in the end in demolition. The same could happen in Tehran.

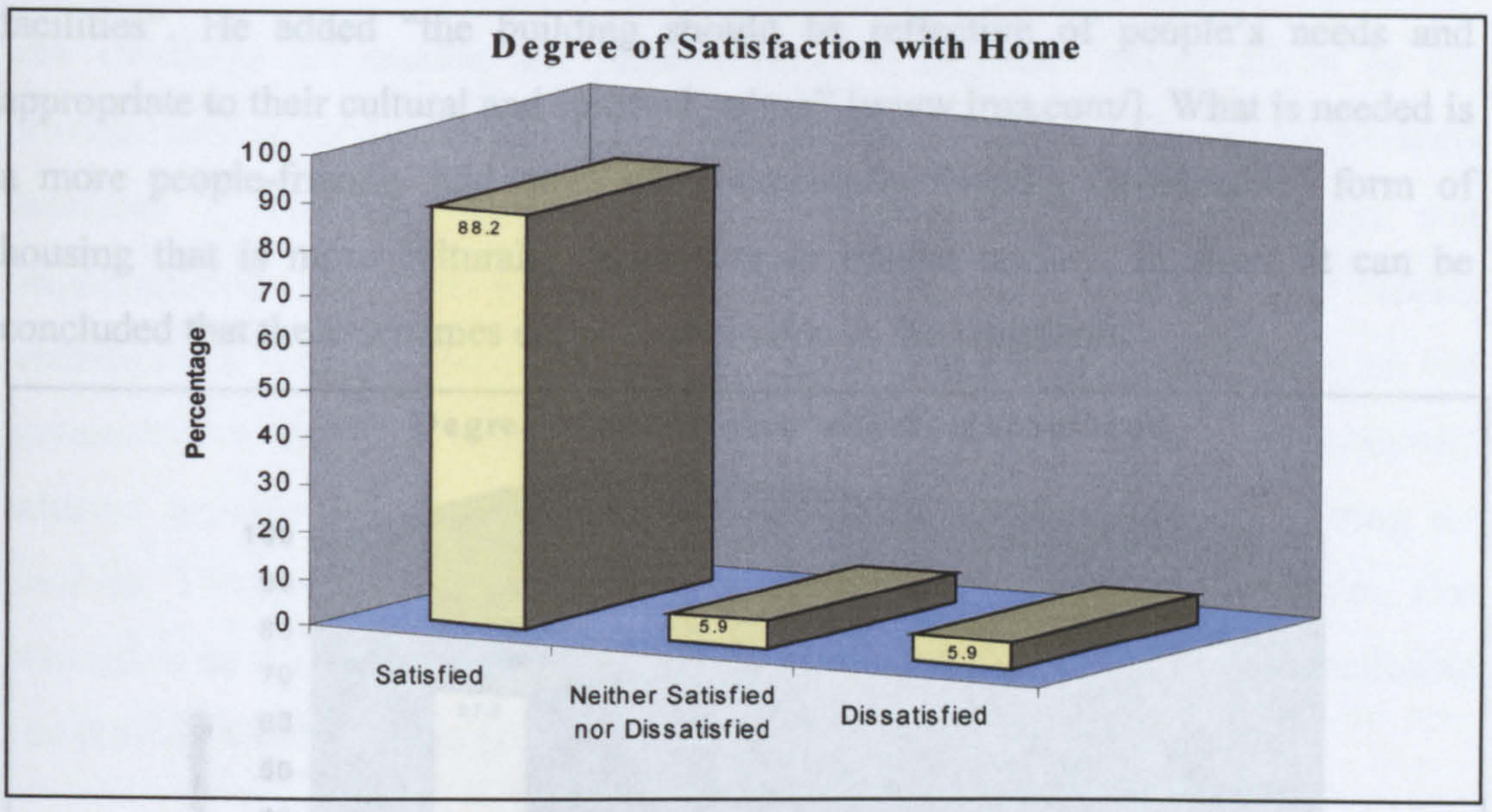

Figure 3. 11 In total 88.2 percent of all respondents in the four survey areas indicated their satisfaction with their homes.

So far, local observations revealed that the investigated housing schemes satisfy only the most basic needs of their inhabitants, but there are other problems. The schemes do not respond to today's demands for sustainable development. They are inappropriate models not only because of the form and organisation of individual dwellings, but also because of the form of the buildings and the structure of the settlement. The layout of the settlement (improper distribution of and uneven access to the available provisions) as well as insufficient provision of public transport discourages walking to services and facilities resulting in car dependency. They lack many required services and facilities - such as parks, outdoor open spaces for adults and children, educational and recreational provisions, etc. Although the internal layout of the dwellings may in some cases generate no serious functional problems all settlements lack many qualities such as humane scale and appropriate spatial organisation; they do not offer residents a chance to personalise their environment;

private outdoor spaces are inadequate; there are no energy concepts and climatic responses; etc. These issues have recently been touched on by Ayatollah Ali Khamenei, the Supreme Leader of the country, in a meeting with the officials of the Ministry of Housing and Urban Development on 14/6/2000. Underscoring the importance of building townships, he emphasised that "the township in addition to the mosques, should also incorporate security, recreational centres, and educational facilities". He added "the building should be reflective of people's needs and appropriate to their cultural and spiritual values" [www.irna.com/]. What is needed is a more people-friendly and more environmentally friendly (sustainable) form of housing that is more culturally responsive to Iranian society. In short, it can be concluded that these schemes are not sustainable in the long term.

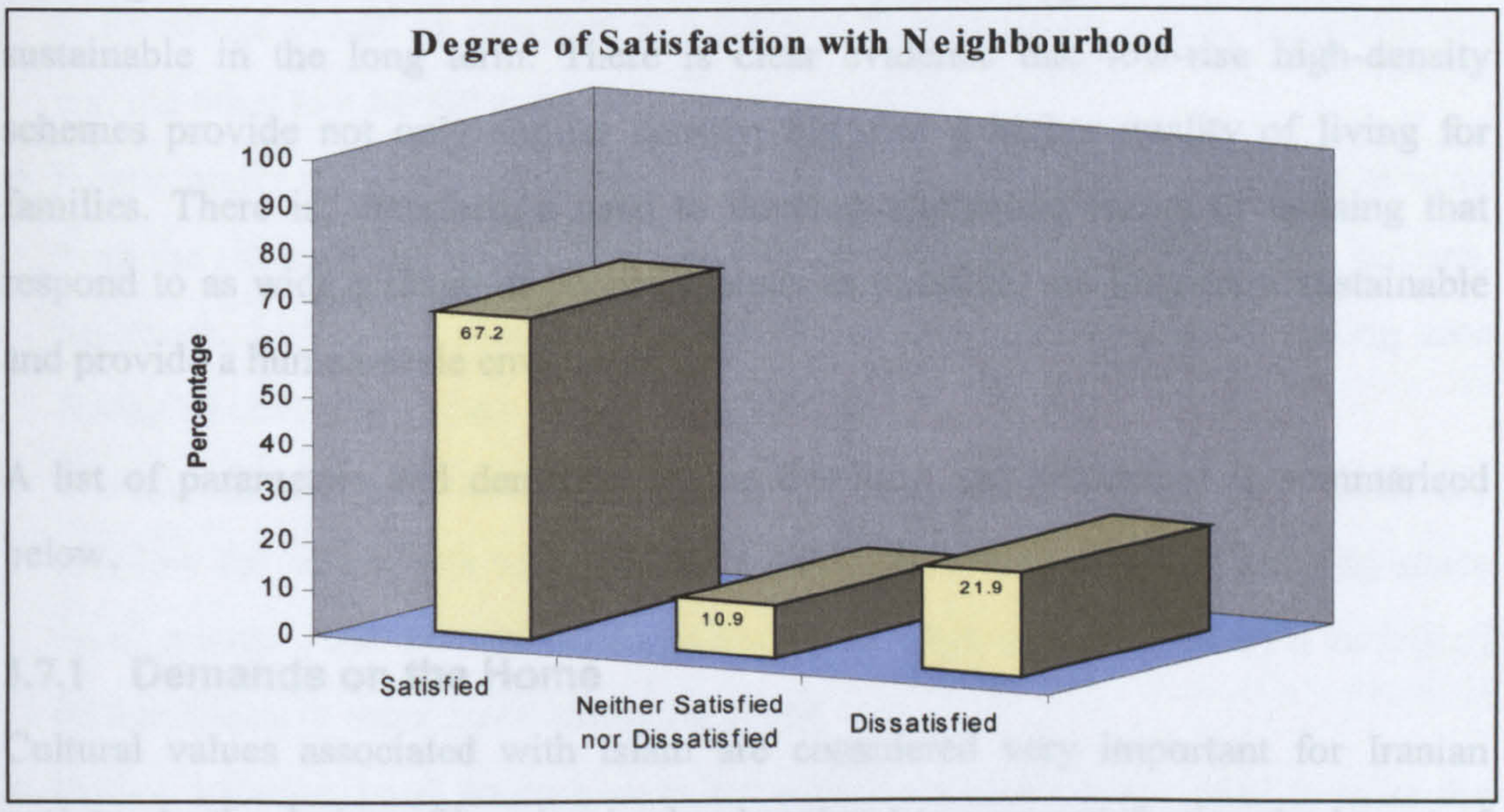

Figure 3. 12 The overall degree of user satisfaction with the neighbourhood is 67.2% which is considerably lower than that of 88.2% for their dwelling (see figure 6.4). More than 90% of all respondents think there is a need to improve facilities in their neighbourhoods. This proves that there is a direct relationship between the degree of user satisfaction with the neighbourhood and the services and facilities provided within the neighbourhood.

Furthermore, these high-rise settlements do not achieve an excessively high population density as a result of the amount of open space. The question therefore arises why the high-rise form was chosen if low-rise forms could achieve similar, if not higher, densities and in addition more culturally and environmentally acceptable housing and a more aesthetically pleasing built form and environment.

3.7. SUMMARY OF FINDINGS

The study of Tehran's historical development along with the analysis of its demographic and housing conditions permit the conclusion that the considerable shortage of housing in Tehran has caused many families to share accommodation. It is, therefore, likely that people who are able to acquire accommodation in newly built schemes (as a result of savings or loans) are likely to be happier despite the fact that new dwellings are smaller and predominantly in high-rise blocks which do not provide housing conditions suitable for families with children. Although respondents described a relatively high degree of satisfaction with their dwellings and neighbourhoods there are justifiable doubts that people's response may remain unchanged in time. Furthermore, there is no doubt that high-rise schemes are not sustainable in the long term. There is clear evidence that low-rise high-density schemes provide not only similar density, but also a higher quality of living for families. There is, therefore, a need to develop alternative forms of housing that respond to as wide a range of people's needs as possible, are long-term sustainable and provide a human-scale environment.

A list of parameters and demands on the dwelling and settlement is summarised below.

3.7.1 Demands on the Home

Cultural values associated with Islam are considered very important for Iranian society. As the design of housing is closely related to user satisfaction the layout of dwellings should reflect the residents' cultural needs. The following summarises the findings of the local survey with regard to people's homes (including the dwelling and the building).

- To provide the required privacy for the family, the access to the dwelling (private space) should not be direct from the street or shared access system - the family domain should be separated from the public domain. This is best achieved through a hierarchy of access levels from public to semi-public to semi-private to private spaces.

- Noise disturbance caused by sources outside the dwelling units could be reduced by the implementation of an appropriate mixture of the following: double-glazing of the windows (those facing highways and children's playgrounds); use of noise absorbent materials for the surfaces separating dwelling units (walls, floors); locating playgrounds and schools within an appropriate walking distance to residential buildings; the provision of a green buffer between the settlement and adjacent highways.
- For security and ease of maintenance people prefer their flats to have only one entrance door.
- The design of the entrance area of the dwellings should allow direct access to the guest section and the family space separately, if required. Therefore, the entrance to dwellings should be designed as a lobby with two doors, one to the guestroom and the other to a family room (kitchen or corridor).
- People prefer the private room area of their dwelling not to be accessible directly from the sitting room. Hence, the private room area (including bedrooms, kitchen, bathroom, and toilet) should be designed to be separated from the living area through a circulation space (such as a corridor).
- The internal layout of the dwelling should be designed with a degree of flexibility to allow the inhabitants to arrange the layout according to their changing space requirements. Also the size of rooms should be large enough to allow a variety of different uses to meet users' changing needs.
- Both a traditional and western style bathrooms ought to be provided to offer the maximum level of comfort for the variety of different user preferences.
- Outside blinds are useful elements for the provision of visual privacy as well as protection from sunray penetration. Outside blinds are a traditional part of Iranian housing. They are useful tools for designing facades to establish individual identity for buildings. They also offer feelings of safety and security inside the dwelling as well as fulfilling the aesthetic demands of users with regards to the external/visual appearance of their homes.
- A balcony or loggia is an essential element in high-density urban housing and should be sized, shaped, and organised to allow multi-purpose uses like drying

clothes, sitting outside and storage, and should be designed in a way that offers visual privacy.

3.7.2 Demands on Neighbourhoods

The Structure: The provision of services and facilities, at an affordable cost, within the neighbourhood and in walking distance from dwellings is closely related to users' satisfaction with their neighbourhood. Certain services and facilities should be located in close proximity to the dwelling while other provisions should be available within a maximum of 10 minutes walking distance (about 600 metres). This leads to the recommendation of a service-orientated structure for the neighbourhood as set out below.

- The size of neighbourhood should be limited to a maximum of about 600 metres radius. The neighbourhood should have a centre accommodating provisions for the day-to-day needs of the residents. It should be served by public transport and be well connected to other parts of the city.
- Depending on the volume of traffic, different types of roads and access should be provided within the neighbourhood.
- Pedestrian pathways should be protected from road traffic, perhaps by using trees in between, to offer maximum safety as well as shade.
- A parking place should be provided for each dwelling unit. If public parking is provided within the settlements it must be secured.
- Public transport should be provided within walking distance from dwellings.

Provisions: The provision of the following services and facilities are considered essential within each neighbourhood and in walking distance from the homes:

- a community centre and mosque - for the purpose of cultural and social activities – it would provide the religious and social focus of the neighbourhood. The appropriate size of a local mosque depends on the population it intends to serve or on the number of houses in its locality;
- shops and a supermarket for the day-to-day needs of residents;
- a primary school;

- a children's play area close, but not adjacent, to dwelling units. For access to a play area children should not be required to cross a major vehicle road. To avoid noise disturbance to residents the children's play area should not be located adjacent to residential buildings;
- a local park within each sub-neighbourhood and a larger park within the neighbourhood.
- a sports centre, but it should not be located very close to dwellings;
- a leisure time education centre;
- a post office, a bank and other public offices;
- a library;
- a health centre.

The lists of demands on housing and settlement from chapters one, two and three form the basis for the development of the comprehensive design guidelines for future housing and settlements in Tehran presented in the next chapter.

URBAN HOUSING DESIGN GUIDELINES FOR IRAN AND EVALUATION OF SETTLEMENTS

4.1. INTRODUCTION

It is acknowledged that although all communities share similar demands in terms of general human needs and environmental sustainability criteria, different communities have different desires and expectations according to their socio-cultural backgrounds. Thus, the characteristics of a good neighbourhood cannot be ultimately defined as universal but need to be adopted for individual communities based on the study of their culture and their present living conditions. Therefore, future housing in Tehran should address all of the expected qualities based on general human needs, Iranian cultural values, and environmental and ecological sustainability issues. Translations of the aforementioned issues into a list of demands on housing at the three levels of dwelling, building, and neighbourhood is the basis for the guidelines for future urban housing design in Iran.

The demands having been established, it is now possible to translate them into design guidelines for future settlements in Tehran. The following sections provide design guidelines at the three levels of dwelling, building and neighbourhood; each level is presented in a table. Design guidelines at each level are organised under several categories. The arrangement of the categories in each table follows Maslow's hierarchy of human needs.

4.2. DWELLING DESIGN GUIDELINES

The demands on dwellings are already well known and mostly gratified to a satisfactory extent. Therefore, there seems to be no need to specify what is already common ground. However, to improve the residents' quality of life, in addition to what is already in place, the outcome of this study is an emphasis on the provision of the following requirements to meet the cultural needs of Iranian society within an environmentally responsive approach. The design guidelines for the dwelling are presented in the following table.

Table 4. 1 Design guidelines for future dwellings in Tehran.

Demands	Design Guidelines
Utilities	♦ All dwelling units must be provided with a water supply, drainage, gas, electricity and an inter-communication system.
Access to outdoor space	♦ All rooms should have direct contact with outdoor space for air ventilation and daylight.
Accessibility Controlled/limited access to dwelling. Entry-space or separate visitor entry to dwelling.	♦ Residents should have full control over access to their dwellings (i.e. door locks/chains/peep-hole). ♦ Entry to each dwelling should be through a space that separates a guest/visitor area from the family domain. ♦ Direct access from the public domain to the family domain is not acceptable; therefore access to each individual dwelling should occur through a semi-private territory (e.g. a corridor inside the building, etc.).
Visual privacy Protection from visual intrusions has utmost importance for the family. Although in traditional Muslim built environments, with courtyard housing forms, the distance between two buildings was sometimes as little as about two metres; openings to streets, if any, were covered with Mushrabiahs. However, those designs are not practical in cities nowadays. Therefore, a minimum distance between two opposite buildings has to be set.	♦ Different cities and countries have different norms in this regard. For example, Kent County Council sets a minimum distance of 30 metres between two opposing windows while Glasgow City Council sets a minimum distance required between the openings of two opposite buildings as little as 18 metres (up to four floors). The minimum distance between two buildings in Tehran, however, should be based on the master plan definition. Originally set to admit sunlight into the buildings, Tehran's master plan specifies the minimum distance between two buildings in a relationship to their heights as 1.73 to 1; the effect of any slope should also be considered [Atek, 1990d, p63). For example, the minimum distance between two four-floor buildings (with 12 metres height) would be 20.8 metres, provided the buildings are on the same levels.
Auditory privacy Walls and ceilings between dwellings to minimise the transfer of sound to adjacent units.	♦ The walls, ceilings and floors of the dwellings should be soundproof enough to reassure residents that they would not hear neighbours and vice versa.
Personal privacy Provision of private rooms for individual family members to afford personal privacy whenever desired.	♦ Each individual family member should be provided with a personal space; ideally in the form of a separate bedroom for each member of the household. ♦ A practical solution is for most family houses to have at least three separate rooms, one for parents, one for boy/s, and one for girl/s. ♦ Children of the same sex may share a room. However, any individual family member over the age of 14 needs to have his/her own separate room.
Family privacy Separable family/guest domains or private/living/service zones in the dwelling.	♦ The design of the dwelling should permit the separation of family/guest or male/female domains. ♦ The guest domain should be accessible from the main entry to the dwelling without the need to cross the family domain.
Family communication	♦ Each dwelling should have a common area (living room) to facilitate face-to-face communication for members of the household.

Flexibility Flexibility of internal partitions to meet desired level of privacy and to shape internal spaces according to needs (during different stages of family life cycle).	♦ Flexibility in the design of dwellings has advantages for families, at different stages of the life cycle. At the beginning the family size is small and the space requirement is relatively low. As the family grows the space requirement increases. In the later stages of the family's life cycle, after children are grown up and leave the house to form their own family, the original family's space needs diminish provided the vacated spaces are not taken up with leisure time activities. ♦ Designing the dwelling in a way that responds to a family's needs at different stages of its life cycle would prevent the necessity for moving house several times, thus increasing the chance of meeting affection needs.
Adaptability A minimalist approach to the design of individual spaces of dwelling (e.g. bedroom, guestroom, study room, children's playroom, etc.) and provision of a fixed furniture arrangement restricts the use of individual spaces to certain activities only.	♦ The size and layout of rooms should allow a variety of activities according to different users' needs. The same room can be used as a study room, children's playroom, guestroom, living room, and dining room in the daytime, but if there is no fixed furniture it may become a bedroom at night. Providing folding beds or storage spaces in each room would cater for that purpose. ♦ Frey [1990, pB69] suggests the adequate size of a private room for one person should be 10 m^2 to allow a variety of uses. ♦ Frey [1990, pB71] suggests a minimum size of 16 m^2 for a two person private room to allow adaptability.
Private garden – Balcony A suitable outdoor space for each dwelling regardless of whether they are located at ground level or on upper levels	♦ All dwellings should have direct access to a private outdoor space either in the form of a garden, or balcony terrace loggia. The minimum acceptable depth of terrace, balcony or loggia should be set at 150 cm to afford a table, a chair and a passageway behind the chair. Balconies should be designed with the safety of children in mind, e.g. preventing a child climbing bars by designing vertical elements not horizontal ones.
Personalisation & Identity Ability to shape the external visual appearance of one's own dwelling if desired (e.g. colouring one's own front gate etc.).	♦ The exteriors of dwellings should be designed in a way that enables residents to personalise the external visual appearance of their dwelling, if they so wish.

4.3. BUILDING DESIGN GUIDELINES

The basic requirements of residential buildings are well known and sufficiently gratified through numerous different forms and design types. However, to improve the residents' quality of life, in addition to what is already standard practice, the outcome of this study is an emphasis on the provision of the following requirements to meet the cultural needs of Iranian society within an environmentally responsive approach. The design guidelines for residential buildings are presented in the table below.

Table 4. 2 Design guidelines for future residential buildings of Tehran.

Demands	Design Guidelines
Orientation Proper orientation of the building to enhance use of natural sunlight.	♦ Residential buildings must be orientated to ensure that the living areas of the dwellings have a minimum of three hours sunshine on the shortest day of the year (21 December). According to Tehran's master plan [Atek, 1990, p63] the most suitable orientation for buildings in Tehran would be within a range of between 10.5 to 22.5 degrees south-west, which - while preventing chanellisation of Tehran's dominant westerly wind - admits the required sunlight in winter.
Layout The layout of the building and its openings to allow cross ventilation.	♦ The layout of the residential buildings and the position of the openings/windows should allow cross ventilation or at least over-edge ventilation, as well as enhancing the efficient use of solar energy.
Sound Structure A safe container of people's houses	♦ The buildings should be structurally sound to provide safety for the residents
Safety measures All known construction safety measures (fire, earthquake, hurricane, etc.). Emergency escape provision.	♦ All known safety measures and construction codes for fire, earthquake, etc. must be met to the highest possible standards. ♦ All residential buildings higher than two floors should be provided with an emergency escape route in addition to the main entry door.
Parking A parking space per dwelling.	♦ A car parking space should be specified for each dwelling unit. The car parking should preferably be located inside the building (in the form of a garage or underground parking). If on-site/street parking is provided it should be located in very close proximity (i.e. in front or up to a maximum distance of 50 metres) to the dwelling unit for close monitoring and security reasons.
Security measures Securely controlled entry to building, Vandalism prevention.	♦ Entry to all residential buildings should be securely monitored/controlled by Closed Circuit TV, doorman/ lobby-man or Concierge system to make sure no stranger/member of the public has open access to the building. ♦ Internal corridors and external spaces around the building should be well lit and built with high quality material to prevent vandalism and crime.
Visual privacy Visual privacy for residents in communal spaces from people outside the building.	♦ Communal spaces inside the building should be designed to meet the desired visual privacy need of the residents from people outside the building.
Hierarchy of access	♦ Access to each individual residential building should take place through a clearly distinguishable hierarchical system - as defined in chapter two, section 2.2.2 - from public to semi-public to semi-private residents-only space. ♦ To provide residents with control over their territory semi-private territory around the building should be clearly distinguishable from semi-public and public spaces.

Outdoor space Private and semi-private communal garden, back garden, courtyard.	♦ It is essential for residential buildings that do not have their own garden to be provided with communal outdoor spaces for the residents of the same building/block in the form of a garden, back garden, courtyard, allotments, etc.
Meeting Places Meeting places for adults within the building, etc.	♦ Each residential building should be provided with a common room that could be used as a meeting place for residents.
Mixed dwelling types Variety of dwelling sizes to meet different family needs.	♦ Within each residential building there should be a variety of dwelling sizes to meet different households' needs. However, the maximum height (number of floors) of residential buildings should be defined. Referring to standard practices of the past, for example in cities like Paris and Berlin, it is suggested that the maximum height of residential buildings be seven floors, as above this height people tend to lose contact with the ground and supervision of children playing outside from inside the home becomes impractical. ♦ Provision of a lift is necessary for buildings with more than four floors, although in a seven-floor building not all residents would entirely depend on it.
External appearance External appearance of the building to make residents feel proud (aesthetically pleasing image)	♦ The design and material used for the external surfaces of the buildings should be of a high standard and good quality which, while vandal proof, provides an aesthetically pleasing image and makes residents feel proud.

4.4. NEIGHBOURHOOD DESIGN GUIDELINES

Any urban housing project should be located within a neighbourhood. A neighbourhood unit should be considered as the basic unit of urban development. Urban development should be an agglomeration of inter-related neighbourhood units.

An appropriate size for a neighbourhood, as generally agreed and used by many bodies such as the UTF [1999], is defined as a maximum 10 minutes walk, which an average person would be willing to walk to reach neighbourhood services and facilities. This gives an area of about 600 m radius or about one square kilometre, which may also be divided into sub-neighbourhoods, each with a centre to accommodate appropriate provisions at even closer proximity (see Figure 4. 1).

Housing should be located around the neighbourhood centre, with higher density housing closer to the centre and lower density housing closer to the edge (see Figure 4.1). Such a neighbourhood should have about 3000-3200 dwellings with a mixture of different types. Considering the present average household size of Tehran such a neighbourhood will accommodate about 10000-12000 people.

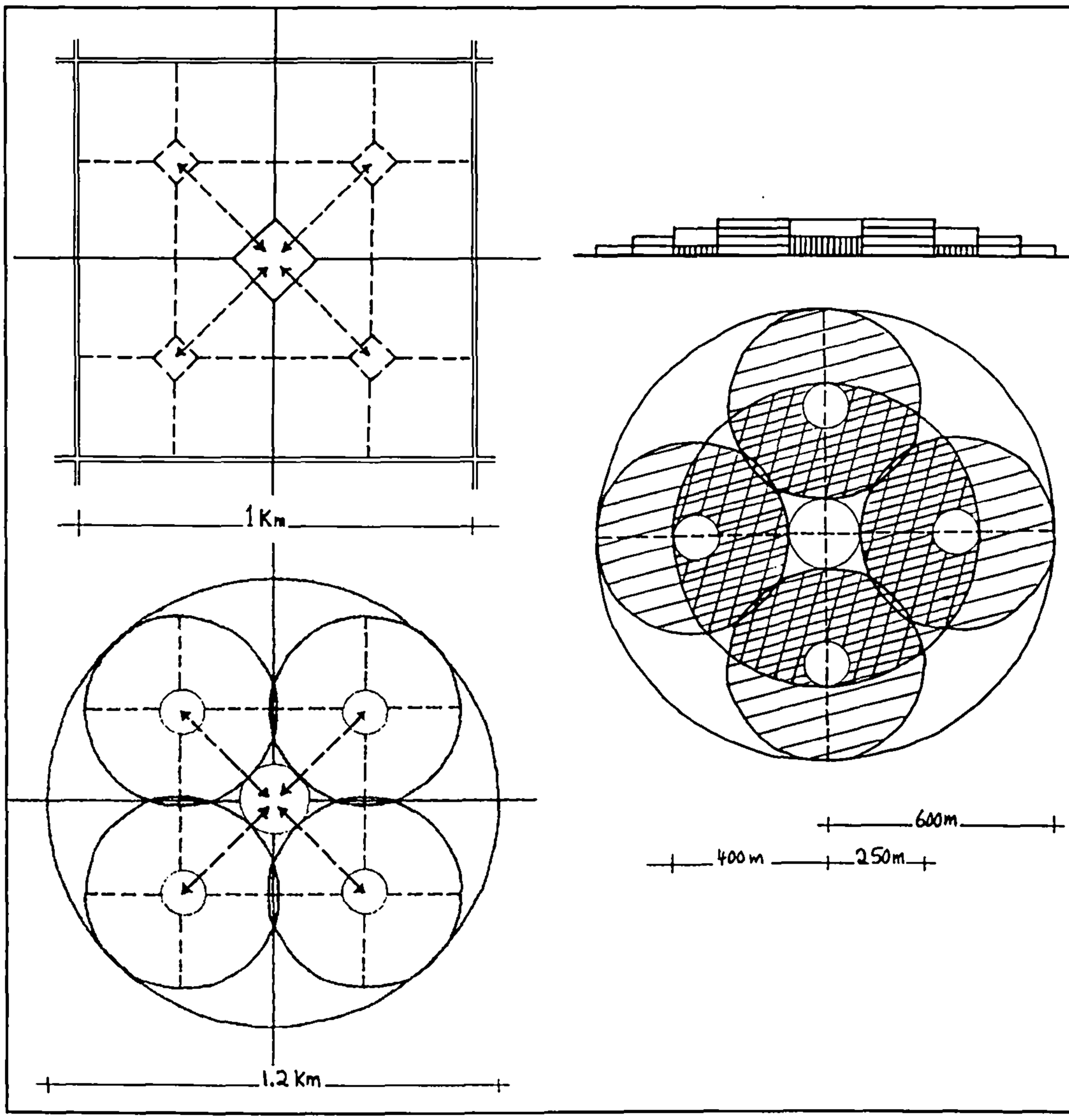

Figure 4. 1 (L) Diagram of the recommended structure of the neighbourhood including neighbourhood centre and sub-neighbourhood units, each with a local centre for provisions. (R) The location of higher density housing close to neighbourhood centre and low density housing closer to the edge of the neighbourhood.

A neighbourhood unit must have proper provisions so that the residents will not need to travel to town centres for daily requirements. These are: public transport node, shopping facilities, local mosque, primary schools, training centre, post office, bank, health facility, local business and employment facilities, leisure time education and sporting facilities, parks and nurseries (see Table 4. 3). The services and facilities should be properly located within the neighbourhood unit. Pedestrian access should have priority within the neighbourhood while the option of car access is provided to all dwellings. The neighbourhood should be identifiable as an entity. The following

table summarises the demands on neighbourhood and suggests possible solutions, as design guidelines, to meet those demands.

The following quantitative and qualitative values contained in the guidelines are based on a summary of chapters two and eight (Iranian/Islamic cultural needs, general human needs and environmental sustainability needs), that are supported by the findings of the local survey presented in appendix 'A'.

Table 4. 3 Design guidelines for future neighbourhoods of Tehran.

Demands	Design Guidelines
Neighbourhood structure	
Size	♦ The proper size of a neighbourhood is about between 110 – 120 hectares (about 600m radius – see Figure 4.6).
Density	♦ To support the services and facilities the neighbourhood should include about 3000 dwelling units (to accommodate about 12000 people).
Sub-neighbourhoods	♦ Certain functions within neighbourhoods need to be within five minutes' walking distance from each dwelling. Therefore, each neighbourhood should be divided into three or four sub-neighbourhoods, each with a sub-neighbourhood centre to accommodate the services and facilities (as defined below). The remaining provisions should be located at the neighbourhood centre.
Sub-neighbourhood provisions	
Sub-neighbourhood centre	♦ Each sub-neighbourhood should have a centre within a distance of 150 – 250 metres from each dwelling to accommodate the following services and facilities.
Nurseries	♦ There should be a nursery in each sub-neighbourhood within 150-250 metre distance from each dwelling unit.
Local community centre	♦ There should be a multi-functional community centre within five minutes' walking distance from each dwelling to meet with the cultural needs of the residents. It should have appropriate spatial arrangements and the capacity to cater for the daily Jamaah Prayers, community gatherings (e.g. on national, religious, and other social and cultural occasions) as well as community management purposes.
Local shops	♦ There should be a few local/corner shops - such as a green grocers, bakery, newsagent, etc. - in each sub-neighbourhood to provide for resident's daily needs.

Doctor	♦ In each sub-neighbourhood there should be at least one local doctor (GP) surgery.
Children's Play Area places for children of different age groups to gather and play	♦ There should be children's play areas in close proximity to dwelling units (between 50 and 100 metres). The proper location of this area is important, if it is very close to buildings the noise will cause discomfort to residents. If it is too far away it will not be possible for parents to supervise their young children while playing outside; as a result, the place will not be used by children and may gather undesirable people, adding to residents' safety concerns.
Local Park	♦ The provision of local parks and allotments are necessary in each sub-neighbourhood – to meet all the residents' need to have access to open green spaces – as dwellings above ground will not have a garden of their own. The areas between sub-neighbourhoods and land between neighbourhoods are the most suitable locations for this purpose. Ideally, all green spaces, i.e. local parks and neighbourhood parks, should be connected to form a network of green spaces that function as lungs for the city.

Neighbourhood Provisions

Mosque	♦ There should be a mosque in each neighbourhood to cater for the social and cultural activities of the community. High quality design and location in the centre can make the mosque a focal point of the neighbourhood, which will have a great impact in creating a positive identity for the community.
Primary schools	♦ Using the same school for both boys and girls is not culturally acceptable. Also the present practice of sending boys and girls to the same school at different times (AM/PM shifts) reduces the daily school time and causes one parent - usually the mother - to be stuck at home. This reduces chances of self-development and/or employment for parents. ♦ Considering the average population size of the neighbourhood and to cope with the high percentage of children between 6 and 11 years of age - there should be four primary schools within each neighbourhood, two for girls and two for boys.
Library	♦ There should be a library and life-long learning centre located in the neighbourhood centre.
Shopping Facilities	♦ There should be sufficient shopping facilities in each neighbourhood centre to avoid unduly long distances for residents from their day-to-day needs. These should include a supermarket, butcher, grocers, confectioners, tea room/coffee shop, fast foods, restaurant, video club, tailor shop, barber shop, chemist, flower shop, locksmith, shoe shops, etc.
Offices: including post office & bank	♦ A number of offices including a bank, post office and neighbourhood management office should be provided in the neighbourhood centre.

Health facilities	♦ Health services, such as GP and dental surgeries, a family clinic, perhaps in the form of a health centre, and a chemist should be provided in the neighbourhood centre.
Local business and employment facilities, Employment, etc. in walking distance.	♦ Provision of local businesses and employment opportunities within the neighbourhood will strongly contribute to its sustainability and keep residents within their neighbourhood. It will strengthen the community and in general reduce the need for inner-city transport. However, it should be noted that only those businesses and employment places may be allowed within neighbourhood that are compatible with housing, those contributing to pollution and crowding should be located outside (or between) neighbourhoods.
Leisure-time education	♦ In each neighbourhood there should be a leisure time education centre (perhaps in combination with the community centre) that provides residents with opportunities to fill their spare time with their own activities. Nowadays hairdressing, sewing, computing, arts and crafts as well as fitness classes have proved to be the most attractive leisure time activities among the majority of Iranian urban housewives. Some of them join the classes to learn those skills just for their own pleasure, while the majority aim to develop a second source of income for their families.
Sporting facilities	♦ As well as outdoor football pitches, each neighbourhood should have a sports centre including several halls to support some of Iranian society's favourite indoor activities such as wrestling, martial arts, basketball, volleyball, badminton, table tennis, chess, indoor football, body building and swimming. ♦ The swimming pool and fitness hall must be totally enclosed and offer full privacy to be suitable for use by women as well.
Road and access	
Pedestrian routes Safe pedestrian pathways	♦ Pedestrian routes should be located alongside roads (not separated) to enliven the neighbourhood. ♦ Pedestrian pathways should be well lit to improve safety on the streets. ♦ Tree planting along the streets, between road and sidewalk, physically separates the pedestrians from cars (improving safety) and helps filtration of some emissions. It also produces shade in hot summer time and makes the streets more attractive, encouraging pedestrians to walk to access services & facilities.
Wheelchair access	♦ All public services and facilities must be easily accessible for wheelchair-bound people. ♦ Pedestrian pathways must not have any obstructions that would restrict wheelchair use. ♦ All pedestrian crossings should be designed with the wheelchair use in mind.
Cycle routes	♦ Although not very popular in Tehran (because of steep streets) the choice of safe cycle routes should be provided to encourage cycling within the neighbourhood.

Variety and hierarchy of roads	♦ Depending on the volume of traffic and the use of the road, a variety of different road sections should be defined within the neighbourhood.
Road safety Safe roads (traffic calmed)	♦ Through traffic should be allowed only between neighbourhoods, not within the neighbourhood. ♦ Traffic should be slowed down (traffic calming) within the neighbourhood.
Way-finding Visual guidance systems to ensure all users easily find their way around the neighbourhood.	♦ All the streets and buildings should be properly signed (as defined in 8.3.2) so that visitors and service providers may easily find their way around the neighbourhood.
Public transport Access to public transport in walking distance	♦ A public transport node should be located within walking distance from every dwelling unit (maximum 600 metres).

Pollution-free environment

Air pollution To have a pollution-free environment it is necessary to recognise the sources of pollution, then to develop a comprehensive strategy that adopts non-polluting solutions. The idea of zoning - although appropriate for the time it was introduced to keep housing in a salubrious environment away from industrial pollution - causes unnecessary travel especially between housing and work places. The farther the distance the greater the car dependency and consequently the greater the waste of energy as well as pollution it can cause.	♦ In the case of air pollution it should be noted that a dispersed form of urban development causes the need for longer distance travels, which increases the need for car use which eventually causes car dependency and consequently air pollution. Thus, to overcome the air pollution caused by car-use the main strategy should be to minimise the car-use within the neighbourhood. This could include using a compact urban form as well as providing employment and services and facilities within walking distance of all dwellings.
Energy strategy Clean and renewable energy production & energy wastage prevention. The present energy production and consumption strategy is one of the major causes of the shortage of electricity as well as air pollution in Tehran. During summer - when electricity is needed more - it is usually cut. This is due to high consumption levels as well as wastage on transfer from power plants to dwellings.	♦ To overcome these problems locally produced clean and renewable energy sources as well as green fuel instead of fossil fuel should be considered. ♦ Considering Tehran's potential, energy production using solar panels (photo voltaic cells) is advisable.
Water strategy Water strategy (recycling & reuse of grey water). Tehran suffers from a shortage of clean water especially during	♦ Using water efficient appliances, recycling and reuse of grey water, and/or introducing secondary water pipelines to houses for landscaping and washing purposes would dramatically reduce the consumption of clean drinking water to almost half the present level.

summer time. This is partly due to consumption behaviour. Therefore, adopting a sustainable water strategy is essential.	
Recycling & renewability Waste disposal (recycling – reuse of outputs),	♦ Buildings should be built using local resources and renewable materials, which could be recycled when buildings are demolished. ♦ A construction strategy should be developed that minimises the waste of construction materials while constructing the buildings.
A mixed used environment	
Variety of Housing types Variety of building types, forms, heights to avoid monotonous external appearance, and to provide options for different family types in order to maintain residents in their neighbourhood while family needs change.	♦ It is essential that a variety of building types, forms and heights – within a limit of up to seven floors – be provided within neighbourhood.
Social mix Social mix (mixed tenure) – to avoid stigmatisation	♦ To avoid stigmatisation there should be no concentration of social housing in any one place. Although in Iranian urban areas social stratification is not a major problem, as is the case in European cities, it is important to maintain the current social mix by providing a variety of housing types.
Identity Creation of a sense of community and centrality. Clearly perceivable (limited/ controlled) boundaries for the neighbourhood.	♦ The neighbourhood unit should be identifiable as an entity. ♦ The location of provisions (e.g. mosque as a focal point) and public transport nodes in the centre and housing within walking distance around it create a strong and identifiable character for the neighbourhood. ♦ Although hardly achievable, clearly perceivable boundaries for the neighbourhood (e.g. in the form of limited/controlled access or green belt) help create an identity for the neighbourhood.
Ability to shape own environment Residents involvement in the shaping and management of their neighbourhood	♦ Residents should to a degree be able to shape their own environment. One mechanism for enabling residents to do this is by involving them in management of their neighbourhood – through the election of Community Management Team/s.
Outdoor open spaces	
Allotments	♦ Allotments should be available for dwellings above ground level.
Parks and green spaces At neighbourhood level for active and passive recreation. Access to wildlife and countryside.	♦ Each neighbourhood should have a local park to serve as a meeting place and for other outdoor activities as well as accommodate birds and other local wildlife. ♦ The neighbourhood park together with local/ sub neighbourhood parks should form an integrated network of green spaces, which work as lungs for the neighbourhood.

4.5. HOUSING EVALUATION SYSTEM

It is assumed that the design solutions for individual dwellings and buildings are already well known. There are numerous publications in these areas and there is no need to repeat what has already been done. What remains to be investigated is the question of how to group individual dwellings together and form good neighbourhoods that are user-friendly, ecologically and environmentally sustainable, and satisfy Iranian society's housing needs. Realising the shortcomings of the present housing schemes in Tehran, the current approaches of other countries will be studied to find out whether alternative solutions could be applied in Iran that would improve the quality of urban housing. To that end several case studies are undertaken and compared with case studies from Tehran. For the purpose of comparison an evaluation system needs to be developed. A simple scoring method similar to that used by Frey [1999, p66] is adopted. This is explained further in section 4.5.2.

From the housing demands listed in sections 4.2, 4.3 and 4.4, those that are relevant for settlement design will form the basis of an evaluation system; these can then be arranged in a number of categories. The case studies can then be checked against the final list to see how many of the listed criteria are met. All categories will be assumed to carry the same weight for the sake of simplifying the comparison of case studies.

4.6. COMPARISON AND EVALUATION OF DIFFERENT HOUSING PROJECTS

The case studies from Tehran will be compared category by category with the recent settlement projects described above, in terms of the degree to which each project/concept – potentially and/or practically – meets the list of criteria presented at the end of chapter two.

4.6.1 Comparison of Densities Achieved by Selected Schemes

Gross densities achieved by selected schemes in Tehran are compared with those in the CSRP and GMV. These are presented in the table below.

Table 4. 4 Comparison of Density Achieved by Selected Schemes

		EKB	APA	ATI	ESK	CSRP	GMV
1	* Gross Site Area (ha)	220	40	12	0.8	16.3	21.4
2	Gross residential floor area (ha)	192	41.5	32	6.8	13	13.4
3	** Ground covered by residential buildings (ha)	20	4.85	1.65	0.28	2.74	4.13
4	Number of dwellings	14747	2901	1892	270	1194	1377
5	Average household size *(from the local survey)*	4.2	4	3.6	3	2.4	2.4
6	Population (estimated)[4 • 5]	62000	11600	6800	810	2866	3300
7	**Gross Population Density (GPD** = Persons/ha) [6 / 1]	282	290	567	1013	176	154
8	**Gross Residential Density (GRD** = Dwelling/ha) [4 / 1]	67	72.5	157.6	337.5	73.3	64
9	Percentage of land used for residential buildings [3/1]•100	9 %	12.1 %	14 %	35 %	16%	19.3%
10	**Floor Area Ratio (FAR)** [2 / 1]	0.87	1.04	2.67	8.5	0.8	0.63
11	Average size of dwelling (m^2) [2 / 4]	130.2	143	169.1	251	108.8	97.3
12	Average space per capita (m^2) [2 / 6]	30.1	35.8	47	84	45.4	40.6

* The Gross site area includes all land uses within the boundary of the projects, excluding the main roads surrounding the projects.

** The ground coverage figures are calculated from available plans. Therefore, all measures related to the ground coverage are estimates; believed to be very close to reality.

CSRP: All calculations include the Sandiefield flats.

Eskan: All land is taken up for residential use only – no land is used for provisions – therefore, the calculated density is net rather than gross.

In general, apart from the Eskan scheme which, as explained above, is an exception here, in terms of GPD all selected schemes in Tehran are achieving about twice the density of CSRP and GMV. This is justifiable as the average size of households in Tehran is also about twice the average household in Glasgow and London. However, with more or less similar FAR, Ekbatan and Apadana achieve a similar GRD to GMV and CSRP, while GMV and CSRP provide much higher space per capita. This is yet another proof that the low-rise form has the potential for producing higher quality housing with a density not necessarily lower, if not even higher, than the high-rise form.

4.6.2 Evaluation of Qualities Achieved by Selected Schemes

In this section the design qualities achieved by the selected schemes from Tehran as well as the case studies from Glasgow and London are evaluated using the list of design guidelines derived from this research. The evaluation measures each scheme's degree of conformity with the design guidelines – or in other words it reveals the design qualities that each scheme lacks - at the three levels of dwelling, building and neighbourhood. The scale of measurement is simply (✓) for sufficient provision to meet the demand, and (-) for non-existent or inadequate provision that does not meet the demand. For each case study then the number of ticks are aggregated to a total (see tables 4.5, 4.6, 4.7). This comparison is intended to provide a visual picture of the areas in which each scheme would have benefited if the design guidelines were applied.

Table 4. 5 Comparison of case studies with respect to the degree of conformity with the dwelling design guidelines.

Demands	Ekb	Apa	Ati	Esk	Csp	Gmv
Visual privacy	✓	✓	✓	✓	-	-
Personal privacy	✓	-	✓	✓	✓	✓
Family privacy	-	-	✓	✓	✓	✓
Flexibility	-	-	-	-	-	✓
Adaptability	-	✓	-	✓	-	✓
Access to outdoor space	✓	✓	✓	✓	✓	✓
Private garden / Balcony	-	✓	✓	✓	-	✓
Allotment	-	-	-	-	-	-
Parking	-	-	✓	✓	✓	✓
Total positive points (out of 9)	3	4	6	7	4	7

Table 4. 6 Comparison of case studies with respect to the degree of conformity with the building design guidelines.

Demands	Ekb	Apa	Ati	Esk	Csp	Gmv
Orientation	-	✓	✓	✓	✓	✓
Layout	-	✓	✓	-	✓	✓
Safety measures	✓	-	-	-	✓	-
Security measures	✓	-	✓	✓	-	-
Visual privacy	✓	✓	✓	✓	-	✓
Hierarchy of access	-	-	-	-	-	-
Outdoor space	-	-	-	-	✓	✓
Meeting Places	-	-	-	-	-	✓
Mixed use	-	-	✓	-	✓	✓
External appearance	-	-	✓	✓	✓	✓
Total positive points (out of 10)	3	3	6	4	6	7

Table 4. 7 Comparison of case studies with respect to the degree of conformity with the neighbourhood design guidelines.

Demands	Ekb1	Ekb2	Ekb3	Apa	Ati	Esk	Csp	Gmv
Size	-	-	✓	✓	✓	-	✓	✓
Density	✓	✓	✓	✓	-	-	✓	✓
Sub-neighbourhood centre	-	-	-	-	✓	✓	✓	✓
Nurseries	✓	✓	-	-	-	-	-	-
Local community centre	-	-	-	-	✓	-	-	-
Local shops	✓	✓	✓	-	✓	✓	-	✓
Doctor	-	-	-	-	-	-	-	-
Children's Play Area	-	-	-	✓	-	-	-	-
Local Park	-	-	-	-	-	✓	✓	✓
Mosque	✓	✓	✓	✓	✓	-	-	-
Primary schools	✓	✓	✓	✓	-	-	✓	✓
Library	-	-	-	✓	-	-	✓	-
Shopping Facilities	✓	-	✓	✓	✓	✓	✓	✓
Offices & bank	✓	-	-	-	✓	✓	✓	✓
Health facilities	-	-	-	-	-	-	✓	-
Local business and employment	-	-	-	-	-	-	✓	✓
Leisure-time education-centre	-	-	-	-	-	-	✓	-
Sporting facilities	✓	-	-	-	-	-	✓	-
Pedestrian routes	-	-	-	✓	✓	-	✓	✓
Wheelchair access	✓	-	-	✓	✓	-	✓	?
Cycle routes	-	-	-	-	-	-	-	-
Variety and hierarchy of roads	-	-	-	-	-	-	✓	✓
Road safety	✓	✓	✓	✓	✓	✓	✓	✓
Public transport	✓	✓	-	-	-	✓	✓	✓
Air pollution (car-dependency)	-	-	-	-	-	✓	✓	✓
Water strategy	-	-	-	-	-	-	-	✓
Energy strategy	✓	✓	✓	✓	-	-	-	✓
Recycling & renewability	-	-	-	-	-	-	-	✓
Variety of Housing types	-	-	-	-	-	-	✓	✓
Social mix	✓	✓	✓	✓	✓	✓	✓	✓
Identity	-	-	-	✓	✓	✓	✓	✓
Ability to shape own environment	-	-	-	-	-	-	-	✓
Allotments	-	-	-	-	-	-	-	-
Neighbourhood park	-	-	-	-	-	✓	✓	✓
Total positive points (out of 34)	13	9	9	13	12	11	22	22

- Provisions outside the walking catchment areas in sub-neighbourhood and neighbourhood levels are considered as non-existent.
- Since the size of Ekbatan settlement is over twice the size of a recommended neighbourhood it would not be appropriate to compare it with other schemes that are much smaller in size. Therefore, 3 phases of Ekbatan scheme were considered as separate neighbourhoods for the comparison purposes.

4.7. CONCLUSION

It is obvious that people's degree of satisfaction with their built environment increases as their quality of life improves. Evaluation of the qualities achieved by selected schemes in Tehran clearly indicates that these schemes lack certain design qualities (see Tables 4.5, 4.6 & 4.7). A comparison of the degree of user satisfaction, derived from the local survey, with the results of the above evaluation is illustrated in the table below.

Table 4. 8 Degree of user satisfaction compared with degree of conformity with design guidelines.

	Ekb.	Apa.	Ati.	Esk.	Average
Degree of user satisfaction with home (%)	91	86	83	91	88
Degree of conformity with Dwelling & Building design guidelines (%)	32	37	63	58	48
Degree of user satisfaction with neighbourhood (%)	65	69	59	71	67
Degree of conformity with Neighbourhood design guidelines (%)	28	38	35	32	35

Table 4. 8 shows that an average of 48 percent conformity with dwelling and building design guidelines produced an average of 88 percent satisfaction with homes. Similarly an average of 35 percent conformity with neighbourhood design guidelines produced an average of 67 percent satisfaction with neighbourhoods. This clearly indicates that application of the design guidelines, which are intended to improve the residents' quality of life, results in increasing the degree of user satisfaction.

The comparison of two case studies from Tehran (Ekbatan and Apadana) with the Crown Street Regeneration Project and the Greenwich Millennium Village shows that all four schemes achieve, by and large, similar gross residential densities (see Table 4. 4) although the population densities of the Tehran settlements are considerably higher, the degree to which the Glasgow and London settlements conform with the developed design guidelines is about twice that of the Tehran

settlements (see Table 4. 7). This strongly indicates that the inclusion of sustainability criteria highlighting issues other than population densities is likely to achieve higher quality urban settlements with regard to access to services and facilities. If in addition other issues – such as human-scale, user-and-environmental-friendliness, the connectedness of settlements to each other and the city centre, a sense of place and affiliation, a degree of personalisation, and aesthetically pleasing design - are considered, the lack of quality of the schemes in Tehran becomes even more obvious.

Of course, the question of population density cannot be ignored, but rather than sacrificing the environmental, human and functional quality of settlements a more even population distribution throughout the city may achieve both the needed overall population density as well as high quality neighbourhoods. This issue will be explored in what follows.

4.7.1 Application of the Neighbourhood Model in Tehran (based on an average 4 PHH)

The 1996 national census indicated that the average household size in Tehran was 4.08 compared with 4.4 and 4.6 in the years 1986 and 1976 respectively. According to Tehran's master plan [1990] the overall population-density of Tehran in the built-up areas was 111 persons per hectare. The same source indicates that the city's gross population-density - including all the built-up areas plus land reserved for future developments, agricultural land, flood paths, redundant land, etc. - was about 94 persons per hectare [Atek Practice (e), 1990, p28] (see Figure 4. 2 &Table 4. 9). Based on the 1986 national census, the master plan [Atek Practice (a), 1990, p8] defines the characteristics of an average dwelling unit in Tehran as one which:

- Is about ten years old
- Is owner-occupied,
- Accommodates a family of 4.4,
- Has 3.6 rooms, including a kitchen plus 2.6 rooms,
- Has a size of 117 square metres (26.6 m^2 per person),
- Assuming a land coverage of 60%, is built on a 130-m^2 plot of land.

According to Tehran's Master plan the percentage of land use for housing in Tehran decreased from 37.7% to 30%, but average space per capita increased from 16.2 m^2 to 22.6 m^2 in the years 1976 and 1986 respectively [Atek Practice (a), 1990, pp30-31]. However, the same source indicates that considering only those dwellings that were built during 1976-86 the average size of dwelling in Tehran was about 140-m^2 [ibid. p28]. This gives an average space of 35-m^2 per capita. The fact that housing land-use was reduced while space per capita increased indicates that more dwellings were built above the ground (a tendency for increasing the height), and that the housing quality in Tehran has improved between 1976 and 1986.

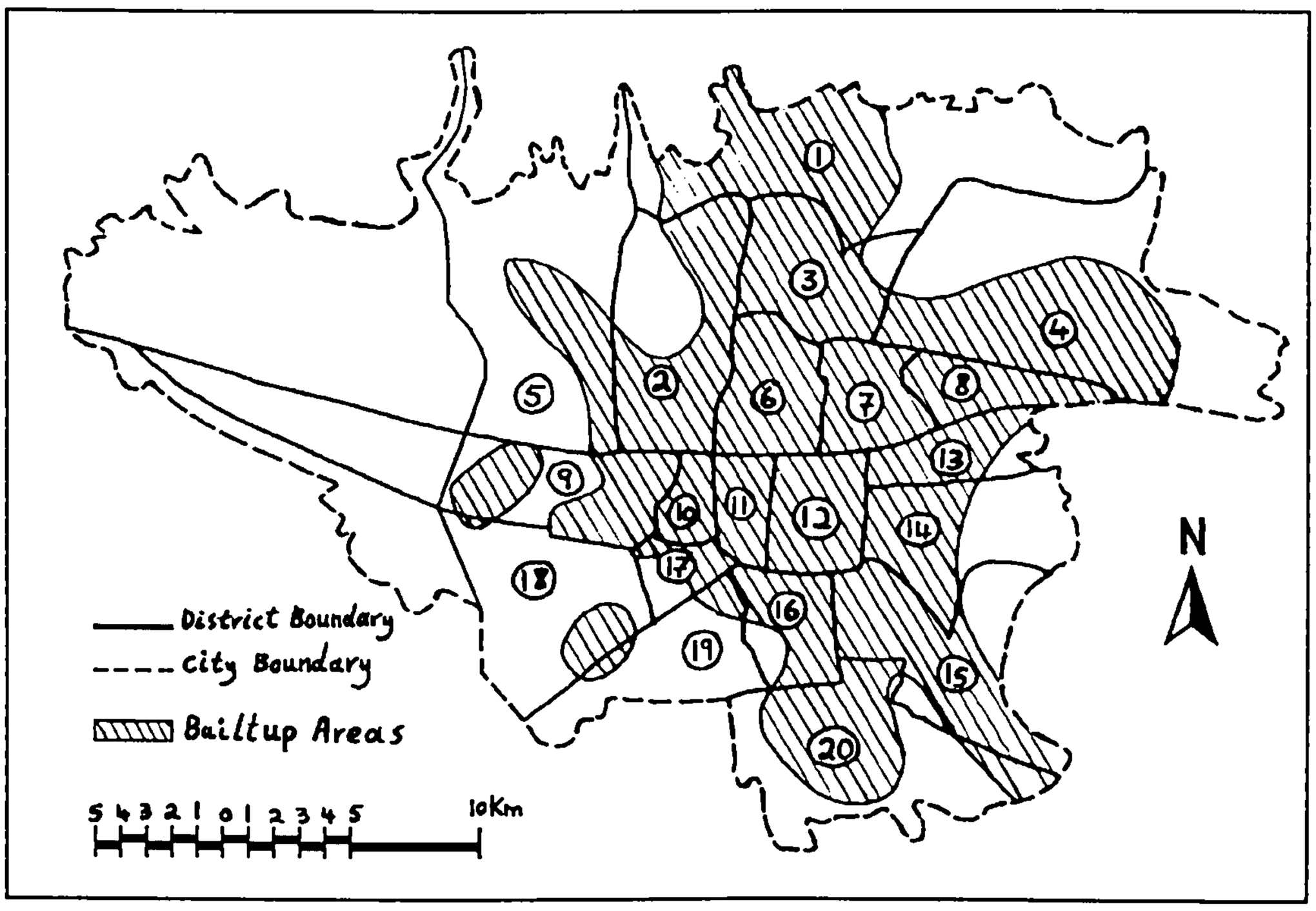

Figure 4. 2 **Tehran and its districts in 1990 [the city boundary includes the lands reserved for the future (25 years) developments].**

Source: Adopted from Tehran's master plan [by Atek Practice (b), 1990, p29 & Atek Practice (e), 1990, p60].

With an average household size of 4.08 persons in Tehran the Neighbourhood Model would allow for about 12000 people to live in 3000 dwelling units on about 110 hectares of land (600 metres radius). This gives a gross density of about 110 persons per hectare (12000 /110 ≅ 110).

If only a third of the neighbourhood's land is used for house building, the total land for housing would be 36.7 hectare (110 / 3 ≅ 36.7). Also, if the floor area ratio (FAR) 60%, then the amount of land under house buildings would be 22 hectares (36.7 * 60% ≅ 22).

Based on the average dwelling size of 140 m^2 (built in Tehran between 1976 and 1986) the 3000 dwellings would cover 42 ha (3000 * 140 = 420000 m^2 = 42 hectares). According to the above calculations, to build 42 hectares of dwellings on 22 hectares of land, the housing should be built on at least 2 floors (22 * 2 = 44).

Table 4. 9 Population density in Tehran and its 20 districts.

District	Gross density (p/ha)	Density of built up areas (p/ha)	District	Gross density (p/ha)	Density of built up areas (p/ha)
1	43.9	55.4	12	167.5	170.5
2	83.0	85.2	13	196.3	199.0
3	70.9	77.4	14	108.7	113.1
4	67.7	74.8	15	197.8	241.4
5	23.0	30.2	16	180.4	197.2
6	121.3	131.7	17	424.8	427.0
7	196.3	196.5	18	62.4	82.8
8	257.9	271.6	19	89.0	130.4
9	42.8	48.5	20	115.4	133.5
10	394.0	395.0	**Tehran**	**94.0**	**111.0**
11	213.5	220.0			

Source: Adopted from Atek Practice (e), 1990, p28.

4.7.2 Final Remarks

If the Neighbourhood Model is applied, a Gross density of 110 p/ha, which is even higher than Tehran's gross density, can be achieved by building only two-floor housing. Since a third of a neighbourhood's land is used to achieve a gross density of 110 persons per hectare the net density of housing will be 330 P/ha (110 * 3 = 330).

This proves that if this model is applied with four floors housing (which is still considered as low-rise) a gross density of double the present figure can be achieved. It is suggested that there is no need to move even towards middle-rise housing, never

mind the need to resort to high-rise housing. This is in direct contrast to the Iranian Government's strategy for tackling the shortage of housing in the large cities.

Uneven distribution of population in Tehran causes many problems. On the one hand, in parts of the city the population density is so low that provision of services and facilities in walking distance from homes within neighbourhoods becomes inviable resulting in unnecessary travel that is most likely to be done by private car. On the other hand, some parts of the city are so densely populated that the existing infrastructure becomes inefficient. The application of the Neighbourhood Model would ensure an even distribution of the population within the city, which would help the present infrastructure of the city be used more efficiently.

The Neighbourhood Model is compact enough to economically justify the provision of public transport and other services and facilities within walking distance from homes. Because of the provision of services and facilities - compatible with Iranian socio-cultural conditions - and a more environmentally responsive design approach, the quality of life of the residents would improve. Therefore, it can be expected that the users' degree of satisfaction with their settlement would increase.

This model uses the figure 140 square metres per dwelling (reported in Tehran's master- plan, 1990, as the average dwelling size for 4 PHH), which gives an average of 35-m^2 space per capita. Although this figure is lower than west Germany's average space per person - 37-m^2 in 1991, although it is expected to increase to 42 m^2 by 2010 [Spector, 1999] - it is well above the Iranian government's recommendation (100 m^2 for 4PHH or 25-m^2 space per capita).

The figure of 35 m^2 per capita was intentionally chosen to respond to the needs of contemporary Tehrani families while having future smaller households in mind; the trend shows that the average household size in Tehran has been decreasing over the last three decades. During the last decade average household size decreased from 4.4 to 4.08. Considering this rate of fall the average household size may be expected to reach 3 in about 25 years' time. Even then, this model will still be viable with 9000 people in each neighbourhood (3000 * 3 = 9000). At that time the average space available to each person will increase to 46.6 m^2 (140 / 3 = 46.4), which would be more than the present German standard.

CONCLUSIONS AND RECOMMENDATIONS

Although Iran was never colonised (like India, etc.) the industrialised world's dominating behaviours have greatly affected Iran's built environment as well as its socio-cultural conditions. By the late 19th century, with Britain's support, an army colonel (later Pahlavi I) had managed to overthrow the Qajar dynasty and claimed the throne of Iran. He then, in a race with Atatork of Turkey, speeded up the process of modernisation of the country. Somehow modernisation at that time was perceived as equal to westernisation. All requisites of the past had to be replaced with modern ones. The influx included: western style furniture; changes in the dress code (i.e. men had to wear jacket and trousers and women were forced to take off their hijab (cover) in public); the introduction of public transport and vehicular traffic; the introduction of a new administration system (bureaucracy) as well as a new architecture and design of the built environment. Many European advisors, architects, and engineers were employed to speed up the process of change. Also, the Reza Shah's (Pahlavi I) order that women should take off their hijab has eventually changed people's lifestyle affecting the level of desired personal (visual) privacy.

In the second quarter of the 20th century - during the reign of Pahlavi II - the discovery of oil and consequently the economic boom also had a great impact on Iran's socio-cultural conditions. The industrialisation of the country resulted in a massive need for workers in the newly established factories. Many young farmers left their villages in search of a job in the cities. This eventually resulted in the decline of extended families in cities in favour of the nucleus family. Iran's agriculture was ruined by the Shah's white revolution (the redistribution of land) to the extent that – in a hitherto agriculturally self-sufficient country - rice, wheat, and many other agricultural products had to be imported, mainly from the USA. The Islamic revolution of 1979 was, in this context, the Iranian people's way of expressing their deep dissatisfaction with the Shah's government and the way it handled the country's affairs. There was also - as in many other countries throughout the world - the call for the return to the traditional values of the society.

The modernisation of Iran radically changed not only living conditions but also the design and appearance of the built environment. Straight wide streets were constructed to permit car movement – and this in a city like Tehran with summer temperature of 50° Celsius where narrow streets used to provide the necessary shade. People's living accommodation changed from traditional housing to apartment housing with a large percentage of the outer wall of the housing glazed - which again contradicts Tehran's climatic conditions.

The resulting socio-economic conditions have rendered traditional courtyard housing - with its high demand on land, the lack of extended families, etc. - no longer practical in cities. According to Madanipour [1998, p150], in many cases the original residents of courtyard houses in Tehran left their houses and let them to rural migrants who now occupy them. Each migrant family rents one of the rooms in a courtyard house, which results in difficult living conditions and consequently a high degree of dissatisfaction with a traditional house form suitable only for the extended family.

In the '50s, '60s and early '70s the ecological, environmental and human factors of urban development were largely ignored. The impact of urban living on the environment was discounted and the earth's resources assumed to be limitless. As a result of a process of individualisation and competitive commercialisation, the spirit of the community was damaged if not lost. The whole city structure changed from a compact to a defused form.

Today, developed countries are eager to find solutions to tackle urban social problems and the destructive impact of cities on the environment. They are now looking back at some of their traditional values, at more compact settlement forms, which may achieve more sustainable urban living and perhaps even sustainable urban development. Although the return to more traditional urban forms started in the mid 1970s, the more recent addition of environmental and ecological concerns has created pressure for an improvement in urban life in general as well as the city's form and structure.

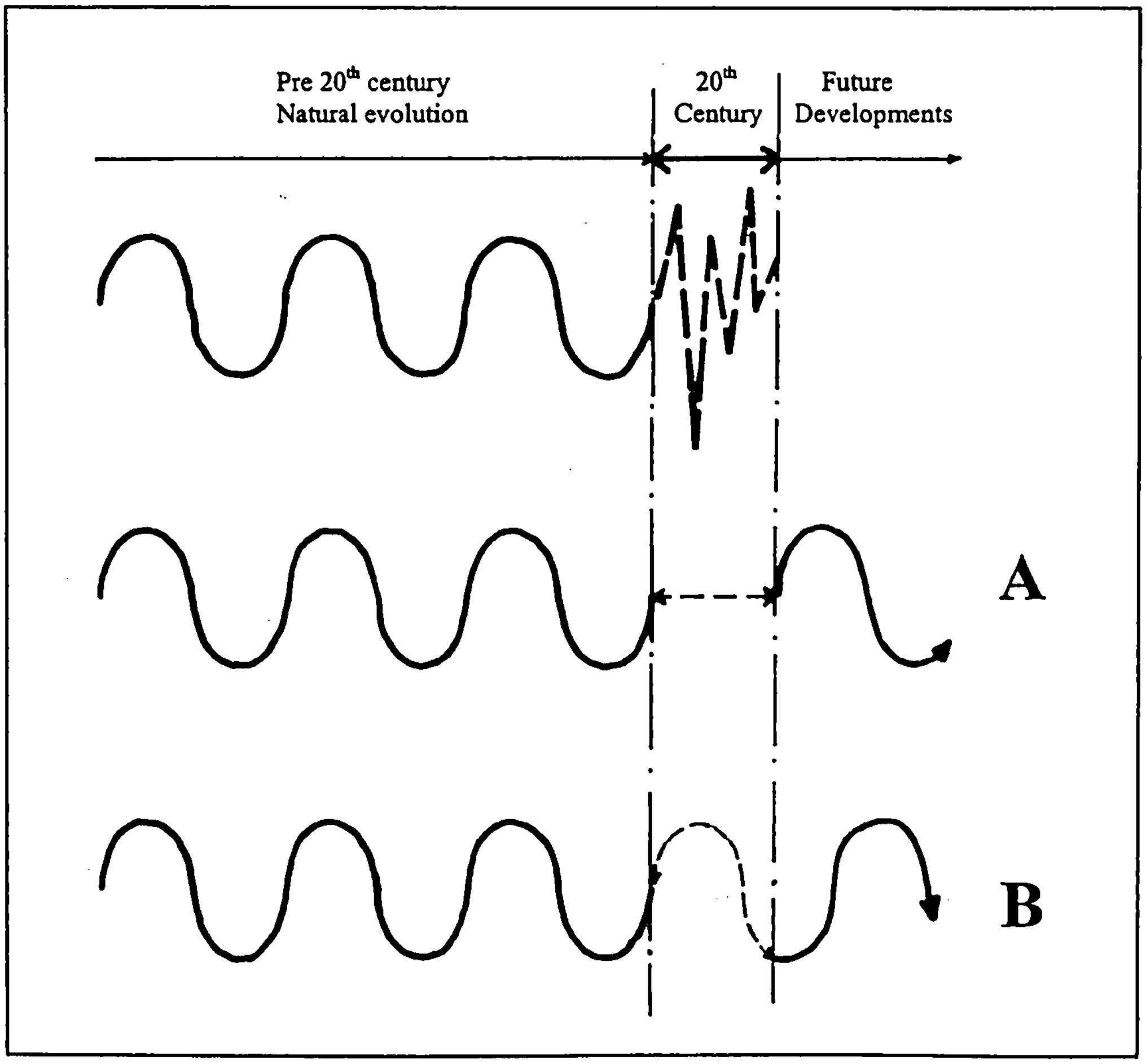

Figure 5. 1 Future urban housing in Iran should aim to create balanced urban development based on the natural evolution of Iranian cities in the course of history but employing the positive aspects of the latest innovations.

As a consequence of the thoughtless hunger for modernisation, the natural evolution of Iranian art (including architectural and environmental design) was abruptly stopped (see Figure 5.1). The question now is would it be possible to return to the period before modernisation, ignoring all subsequent developments? This question can be answered by stating that it is not possible to ignore the achievements of the twentieth century (e.g. the impact of the invention of the car and information technology on urban life and city form) whether one likes it or not (option A). Human values and life style have adapted and the culture of society has evolved as well. It is obvious that it is not possible to go back to a point where the link with the past is broken. The rational solution seems to be to study the past in order to come up

with a realistic assessment of the situation of the Iranian art today had its natural evolution not been curtailed. This would then become the starting point of further development (option B).

At one point under the influence of modernisation many changes in the built environment took place that have now proved to be ecologically and environmentally unsustainable. Having criticised the ideas borrowed from the developed world for their destructive affects on the built environment of Iran in general and Tehran in particular, it is now time to look back to traditional values and a balanced relationship between city and country to tackle the problem of unsustainable settlement form. Many developed countries have already carried out diagnostic studies. They have now realised that destructive actions against the environment have a global impact. Therefore, their experiences can now be considered useful for Iran as their environmental concerns coincide with Islamic teaching. Believers are promised life in the heavens, which according to the Quran's definitions are places where everything is in balance. Creating a balanced society has always been the main driving force behind almost all reformist social movements in the Islamic world. Many kings and khalifs have tried to build their palaces based on the Quran's definitions of the heavens, for instance the gardens of Eden.

Today, housing studies in Iran usually focus on the benefits of traditional courtyard housing without producing particular practical solutions that could be adopted for today's urban life. Meanwhile those wanting to demonstrate their newly achieved capabilities in constructing high-rise buildings dominate the housing industry. Discussions on the need to produce a more sustainable and user-friendly environment are usually criticised from an economic point of view as a luxury. The question is whether Iranian citizens are not considered worthy to live in good housing and whether they can ignore regional and global problems caused by sub-optimal cities and settlements. Unfortunately Tehran has not yet started to look back at its own traditions and is still continuing to build unsustainable forms of settlements that, even worse, are also distributed unevenly. Tehran now has the chance to learn how to move towards more social cohesion and more sustainable forms of settlements and cities.

It is hoped that this study fills a part of the huge gap between knowledge and practice in order to lead towards the creation of more sustainable urban housing in Iran, and particularly in Tehran. It has produced design guidelines for sustainable urban housing which focus on fundamental socio-cultural and environmental issues without being over prescriptive.

It is hoped that this study will also raise awareness of a house as a place of peace and tranquillity for the family (as defined in the Quran) rather than just a shelter.

It is also hoped that the design guidelines developed in this study for the city of Tehran will be used as a basis for more comprehensive design guidelines for sustainable urban design in Iran. Such guidelines would help designers to recognise the requirements and possible solutions for settlement designs. They would also support panels of judges in the Ministry of Housing and Urban Development in basing their decisions on a more rational and more informed framework rather than relying on personal taste and preferences.

To implement these guidelines successfully the following conditions should be met.

- Governmental co-operation and the training of those in large-scale decision-making positions;

- Educational programs for urban development professionals (to learn how to use the guidelines as the basis for designs) as well as ordinary people (to know about the minimum acceptable norms rather than accepting unsustainable designs).

- Educational programs for developers and specifically mass housing builders for them to understand the necessity and the benefits of returning to low-rise high density housing forms;

- Regular demonstrations of the qualities achieved by those schemes developed on the basis of the guidelines in comparison with projects developed otherwise;

- Continuous evaluation of the outcome of development projects influenced by the guidelines to improve the guidelines and the way they are implemented.

The further development research and changes in design practice and control recommended may seem rather radical, at least in view of current Iranian practice. Without them, however, the creation of a people-and environment-friendly urban form, that also reflects the socio-cultural values of Muslim society appears futile.

THE LOCAL SURVEY

The programme formulated for examining the research hypothesis, the different survey methodologies employed and the survey procedure are described here. In addition, this chapter will explain the tools used for analysing the bulk of the data collected, as well as analysis of the findings of the survey. Finally the statistical analysis of findings is presented in three levels of household, home and neighbourhood.

A.1. THE SURVEY PROGRAMME

The purpose of this survey is to provide the required data necessary for examining the hypothesis that there is a mismatch between user requirements and new-built high-rise apartment housing in Iran. To that end a methodology was adopted which would help to obtain evidence required for testing the hypothesis. The appropriate data-gathering techniques were identified. The survey sample was sclected and information was collected and recorded. The data was then processed and statistically analysed. Based on the survey data, a preliminary set of design rules was derived for dwelling, house and settlement forms. The results of the survey were compared with general socio-cultural demands on housing and a conflict between expected and received responses emerged. The list of design guidelines was then expanded to incorporate criteria representative of socio-cultural expectations. With the expanded guidelines alternative house and settlement forms were then tested (see chapter four).

A.2. METHODOLOGY OF SURVEY

Both, the nature of the problem and the research proposition strongly influenced the selection of the measurement instruments. Comparison of different approaches indicated that the most appropriate method for gathering the bulk of information required for evaluating the research hypothesis appeared to be a questionnaire survey

as major instrument for the measurement of the degree of user satisfaction.[1] It is understood that a questionnaire is not always a satisfactory tool for data collection, and in general, gathering data by one technique only is often said to have its own methodological weaknesses [Van Dalen, 1979, pp 128-131].

The use of a combination of methods has often been emphasised, in particular for data collection in human-environment studies [Canter, 1974, p 20]. Hence other methods and stages of data collection were also employed. These included interviews with a small group of users who were willing to take part, as well as detailed observations and physical measurements of the design and layout of some of the dwellings representative of the main samples. The latter were instrumental in analysing and interpreting the data gathered by the questionnaire survey.

The nature and details of the techniques of data collection used in this investigation will be considered in the following sections.

A.2.1 The Questionnaire

The questionnaire developed for the survey was intended to serve two main purposes;

1. to obtain data on Iranian socio-cultural aspects which could be expected to affect housing.

2. to obtain data on the degree of the users' satisfaction with the dwellings, the buildings and the settlements.

In order to investigate socio-cultural aspects and their influence on Iranian housing, and to collect detailed information about the Iranian way of life, family size, family cycle, family structure and other related issues the questionnaire included four items on family relationships, marriage status, sex and age groups of the household members.

The questionnaire was also aimed at obtaining the data required to evaluate the degree of satisfaction of people living in middle-rise, high-density and high-rise

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[1]Department of the Environment, [1978], Housing Appraisal Kit - A Complete Social Survey Package, Housing Development Directorate, HMSO, London.

apartment blocks with their dwellings and their immediate environment as well as assessing their general feelings and views towards certain aspects of their dwellings' design and components. Therefore, the questionnaire included direct questions with a five-point satisfaction scale as well as a set of design related questions. These were intended to determine the user requirements and the degree to which these were met by the designs. The user responses would then be incorporated in a set of rules on housing design and their associated concepts.

The questionnaire developed for the survey was designed to cover three scales: the dwellings themselves, the dwellings in relation with the outside, and the neighbourhood. Although most of the questions were designed with specified answers to be selected by respondents, some were open-ended to allow respondents to offer their perceptions in their own words and provide the opportunity to gain unanticipated answers [Van Dallen, 1979, p 155]. In this regard some questions were provided with an 'other' option at the end of the prepared answer list and respondents were asked to specify their answers. Each question was concerned with specific information in order to provide an accurate and appropriate report which would lead to the definition of housing design guidelines for high-density residential areas of Tehran that could be used as a model for other cities in Iran.

The quality of the questionnaire was, of course, very important. Therefore, much care was taken to design individual questions. The questionnaire was designed in a graphical style to make the related questions easy to follow and to avoid wasting respondents' time in reading unrelated questions unnecessarily (see Figure A. 1). Finally it was recognised that respondents might wish to pursue topics not covered by the questionnaire. Hence a question was included to allow for respondents' free opinions about their ideal house. A covering letter explained the purpose of the study and the significance of respondents' answers. Also respondents were assured of the strict confidentiality of the information they would provide. A copy of the final English version of the questionnaire along with its covering letter is documented in Appendix 'D'.

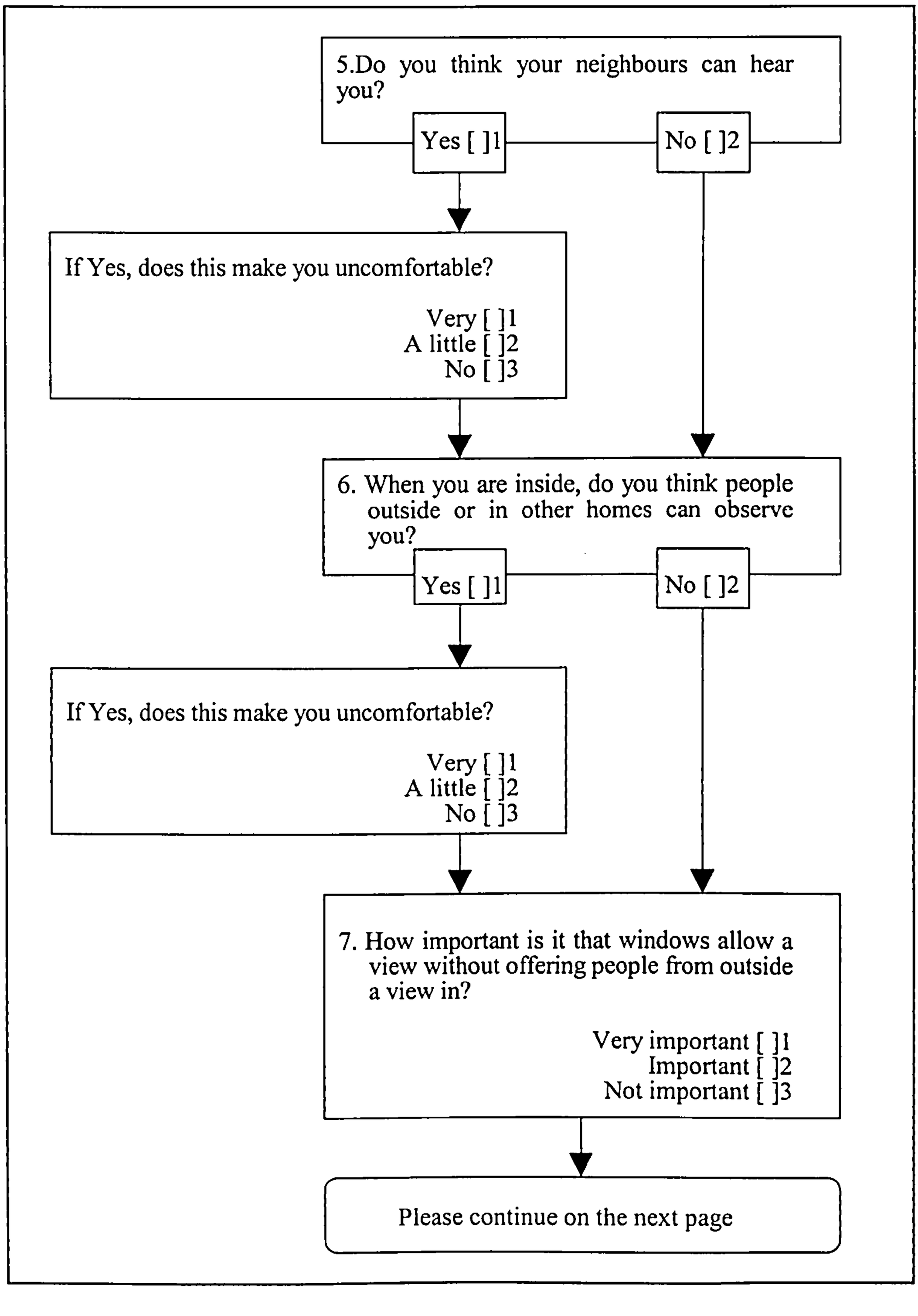

Figure A. 1 A sample of flow chart shaped questionnaire

A.2.2 Pre-Tests

Although professionals checked the questionnaire,[2] three pre-tests were conducted to test the respondents' understanding of the questions and whether the questions were unambiguous. Three pre-tests were carried out with the help of Iranian students living temporarily in Glasgow. The group may differ from test to test.

In the first test the preliminary draft of the questionnaire was administrated to fifteen Iranian students living with their families in Glasgow. The response to the questionnaire revealed some problems. Some unclear questions had to be reformulated. The questionnaire was then translated into Farsi and a second test was conducted.

The results of the second pre-test showed that the exact translation of some questions from English to Farsi was ambiguous and to some extent misleading. Also the layout of the questionnaire, then not yet in flow chart form, made it difficult for inexperienced respondents to follow. Therefore appropriate alterations were conducted to make the questions as clear as possible and more understandable for a native Farsi speaker. The final version of the questionnaire was designed like a flow chart to make the related questions easy to follow. Although the new layout caused an increase in the questionnaire's length, it was designed to save the respondents' time by passing over irrelevant questions (see Figure A. 1).

A third pre-test was conducted in order to establish the operational performance of the questionnaire for precision and accuracy, the effectiveness of the questions for their purposes, and the time required to fill in the questionnaire. The fourteen page-long questionnaire was initially expected to be unacceptable, but surprisingly respondents accepted it far more than the two previous versions that in terms of number of pages were much shorter. The covering letter and the new layout of the questionnaire encouraged respondents to carry on.

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[2]Dr. Stephen Tagg, senior lecturer in the Department of Marketing, University of Strathclyde has checked the questionnaire twice as well as Dr. H.W. Frey the research supervisor who kindly corrected the questionnaire for several times.

It appeared that the new layout was successful because the average time spent by respondents on this questionnaire was reduced to twelve minutes from the average of twenty minutes spent on the older versions.

A.2.3 Interviews

As Nick Moore, in discussing qualitative research methodology [Moore, 1983, pp 24-27], suggests the questionnaire survey was followed up by interviews. Semi-structured interviews were conducted with the chief executives of all Community Management Committees (CMC) of the selected housing schemes, and a small number of randomly selected users. This involved asking a set of major questions from the questionnaire in a systematic and consistent order, but allowing respondents the freedom to shift. It was sometimes important to ask a particular question after others had been answered - with questionnaires it is impossible to prevent respondents looking ahead to see what is coming.

Although limited resources and the inaccessibility of the large majority of respondents made it impossible to interview all users in thc sample areas, interviews made it possible to collect more complex information not anticipated in the questionnaire - more qualified answers with greater depth - making the survey much more responsive.

A.2.4 Physical Measurements and Observations

The analysis of the layout of the neighbourhoods and of the dwellings required physical measurement and observations in the sample areas. In addition, part of the data relating to users' reactions to housing design gathered by the questionnaire survey and interviews could not be analysed and interpreted without being checked against observable evidence, including design features and attributes of the dwellings and the neighbourhoods.

Moreover, the research demanded detailed information on the actual way people used space in their dwellings. Therefore, in each neighbourhood, a survey of typical dwellings and available public facilities had to be undertaken to produce information on the design and attributes of the physical setting, required amenities, and the way

people lived in and used space. Each neighbourhood was studied in more detail on three levels; I) the dwelling types, II) the buildings, III) provisions within the neighbourhood. This material is set out in section A.6.

A.3. THE SURVEY

In general, the purpose of household surveys is to provide information about the response of inhabitants to their built environment and to highlight indoor and outdoor environmental problems. The surveys here were aimed at identifying residents' needs and providing an assessment of the broad understanding of the residential area and house types.

As no data on the degree of user satisfaction or dissatisfaction was available, a survey of four recently built settlements was carried out. The selection of samples is explained in section 3.5.5. The physical characteristics of the four sample areas and the housing condition in each area are documented in appendix 'C'. The methods and procedure that produced the kinds of information required for examining the research propositions are described in the following sections.

A.3.1 The Survey Procedure

To achieve the aims of the research and to collect the required basic data within given constraints a survey, as extensive as possible, was carried out in the four selected residential areas of Teheran over a period of twelve weeks in July and September 1994.

The survey was based on the questionnaire described above, as the major instrument of data collection, and was followed by short interviews with a limited number of respondents. Physical measurements of the design and layout of typical dwellings and buildings were also conducted. Site plans of each of the neighbourhoods were collected and available amenities were recorded.

Six hundred questionnaires were distributed. In the Ekbatan, Atisaz and Eskan areas, due to security measures, direct access to individual dwellings was not possible. Therefore, the questionnaires were distributed through neighbourhood management

committees. In the end 307 completed questionnaires were collected. The following sections explain details of the procedures involved and tasks undertaken in each area individually.

Survey in Ekbatan

In the Ekbatan neighbourhood 220 questionnaires were distributed among 31 Block Management Committees (seven questionnaires for the executive members of each BMC as they were residents of the same block). Members of each BMC were called together and were informed of the academic aims of the survey. They were also encouraged to co-operate and to respond accurately to the questions. In the end 122 questionnaires were returned fully completed. Incomplete questionnaires were eliminated.

Survey in Apadana

In the Apadana neighbourhood, permission was achieved to distribute the questionnaires personally to individual dwellings. Three apartment blocks were selected randomly (each block consists of three buildings). A hundred and fifty questionnaires were distributed to the doors of all the dwellings in those three blocks. Many households were given help filling in the questionnaires. To collect the completed questionnaires each dwelling was called at least twice on average. Ninety-nine completed questionnaires were collected from the Apadana neighbourhood and incomplete questionnaires were eliminated.

Survey in Atisaz

In the Atisaz neighbourhood access to the buildings was not permitted beyond the entrance lobby for non-residents, therefore 140 questionnaires were handed to the chief executive of the CMC[3] to be distributed among residents. As the settlement is new and the CMC did not know residents by name, it was decided to leave the questionnaires with the lobby men in the foyer of each block. Those residents who

[3]CMC = Community Management Committee.

were interested took them. Also a number of questionnaires were distributed among the prayers in the mosque. They were asked to return the completed questionnaires to the lobby man of their residential blocks. As there was no record of residents who took the questionnaires, it was not possible to establish the total number of questionnaires taken. In the end 41 completed questionnaires were collected.

Survey in Eskan

In the Eskan neighbourhood, access to the buildings was not permitted beyond the entrance lobby for non-residents. Therefore the questionnaires were handed to the Area Manager to be distributed among residents. As the settlement is not new he knew many of residents by name. The questionnaires were sent to those residents in three tower blocks who were expected to be interested in helping academic research. As the questionnaires were sent to specified dwellings it was easier to collect them again. Of a total of 90 questionnaires distributed, 45 questionnaires were collected fully completed. Incomplete questionnaires were eliminated.

A.3.2 STANDARDS AND LIMITATIONS OF THE SURVEY

Taking into consideration the factors determining the suitable size of the total sample [Van Dallen D.B., 1979, pp 127-128] and the constraints on resources such as time and manpower, a sample size of 600 in total was chosen (see 3.5.5). The intention was to collect as much data as possible to add to the degree of statistical reliability of the data. It was acknowledged that within the framework of this research the manageable number of questionnaires collected would not be statistically representative for all housing schemes in Tehran, therefore, the results would have to be treated with utmost care.

Despite all actions taken to ensure the validity and reliability of data, undesirable effects from respondents may have affected it in a number of ways. There may have been a number of influences affecting the accuracy of the answers of the respondents to the questions. Some may have found it difficult to examine and analyse their feelings and experiences accurately, and some may have been unable to express their views sufficiently in words. Also some may have ignored or overlooked some

questions or misrepresented their meaning. It should be pointed out that some answers may have been influenced by existing conditions in society at the time of the survey. Respondents may also have been careful to check the socio - culturally desirable or socio - politically acceptable answers rather than their true personal views.

Although the survey may not be statistically representative for all housing schemes in Tehran, it was still necessary to give some idea of the significant design related points that affect the degree of user satisfaction. Thus, this study was a valuable, timely and appropriate method of increasing understanding of the status of high-density apartment housing in Iran. The analysis of the survey data was expected to throw light on the residents' socio - cultural life and to give some idea of the performance of the high-density housing schemes' physical features in terms of the general layout.

A.4. STATISTICAL ANALYSIS

Information collected by the questionnaire survey was statistically analysed using SPSS for Windows *version 8*. Using statistical techniques made it possible to analyse the data and to examine the propositions raised during theoretical studies of this investigation. As the nature of the data was nominal, chi-square was considered as the most appropriate statistical test [Kinnear & Gray, 1992, p 65]. In the analysis of the data frequencies, percentages and cross-tabulations were mostly used. A number of cross-tabulations statistically indicated the existence of some correlation between the pairs of variables involved. From a strictly statistical point of view, however, such correlation in a small sample size cannot be regarded as entirely reliable.

The results that emerged from this study, however, did not rely on statistics only. They were cross checked with and backed up by other measures taken involving the information collected through, and findings from, interviews and observations as well as from physical measurements; for example, respondents' answers to certain questions could not be interpreted unless cross checked with plans of the dwellings and the settlements.

A.5. ANALYSIS OF FINDINGS

In total 307 questionnaires were collected from all four sample-areas (details are given in section A.3.2). The data collected from these questionnaires was then transferred into a computer file and statistically analysed using SPSS for Windows - computer software. The findings of the local survey are tabulated in appendix 'B' in the form of frequency tables. Appendix 'C' documents the data collected from the local observation of four sample areas.

The analysis of findings of the questionnaire survey – and where applicable design implications - for household, home (including dwelling and building) and neighbourhood is presented in this section. The provisions required for a high-density settlement are also examined evaluating existing public facilities and the need to improve them.

General findings on housing satisfaction and residents' attitudes towards their homes and the degree of satisfaction of the residents with their settlements are presented in chapter three. Drawn from the results of this survey, a summary of findings, including a list of demands on home and neighbourhood design in the form of a number of preliminary design guidelines for high-density urban housing and settlements in Iran, is presented in section 3.5.5.

A.5.1 Household

Type

Nucleus families occupy most of the dwellings (94.5 %). Extended families are rarely found in the survey areas. The 5.5% in these samples are mostly widowed/separated Women living with their parents or an old parent living with his/her son/daughter or simply married couples living temporarily with their parents until they can find an appropriate place of their own and leave their parents' homes (see appendix B Table B4).

Background

About half of the people questioned were living in a courtyard house before moving into their present apartment flats (see appendix B table B7). Government housing subsidies encouraged people to move from courtyard housing to apartments. Financial considerations are the main reasons for 24% of those questioned moving into these arcas. Apart from financial reasons access to urban services, distance to work and distance to relatives/friends were other important criteria in choosing a neighbourhood (sce Table A.1).

Table A. 1 Main reasons for choosing to live in these areas.

		Ekb.%	Apa.%	Ati.%	Esk.%	All%
1	Distance to work	12.1	6.0	8.3	11.9	9.8
2	Distance to relatives/friends	10.9	8.6	4.2	10.2	9.2
3	Access to urban services	11.5	8.6	10.4	16.9	11.3
4	Financial reasons	28.5	20.8	22.9	18.6	24.0
5	No specific reasons	12.1	15.5	14.6	13.6	13.7
6	Other	24.9	40.5	29.6	28.8	32.0

Size of household

In all survey areas the mode (largest frequency) for household size was four. Putting them together, three, four and five person households (PHH) comprise about three-quarters of the survey population (73.9%) -. The household sizes in all four survey areas was as follows: 1PHH = 4.6%, 2PHH = 12.1%, 3PHH = 19.5%, 4PHH = 35.2%, 5PHH = 19.2%, 6PHH = 5.5%, 7PHH = 3.6% 8PHH = 0% and 9PHH = 0.3% (see Table A.1).

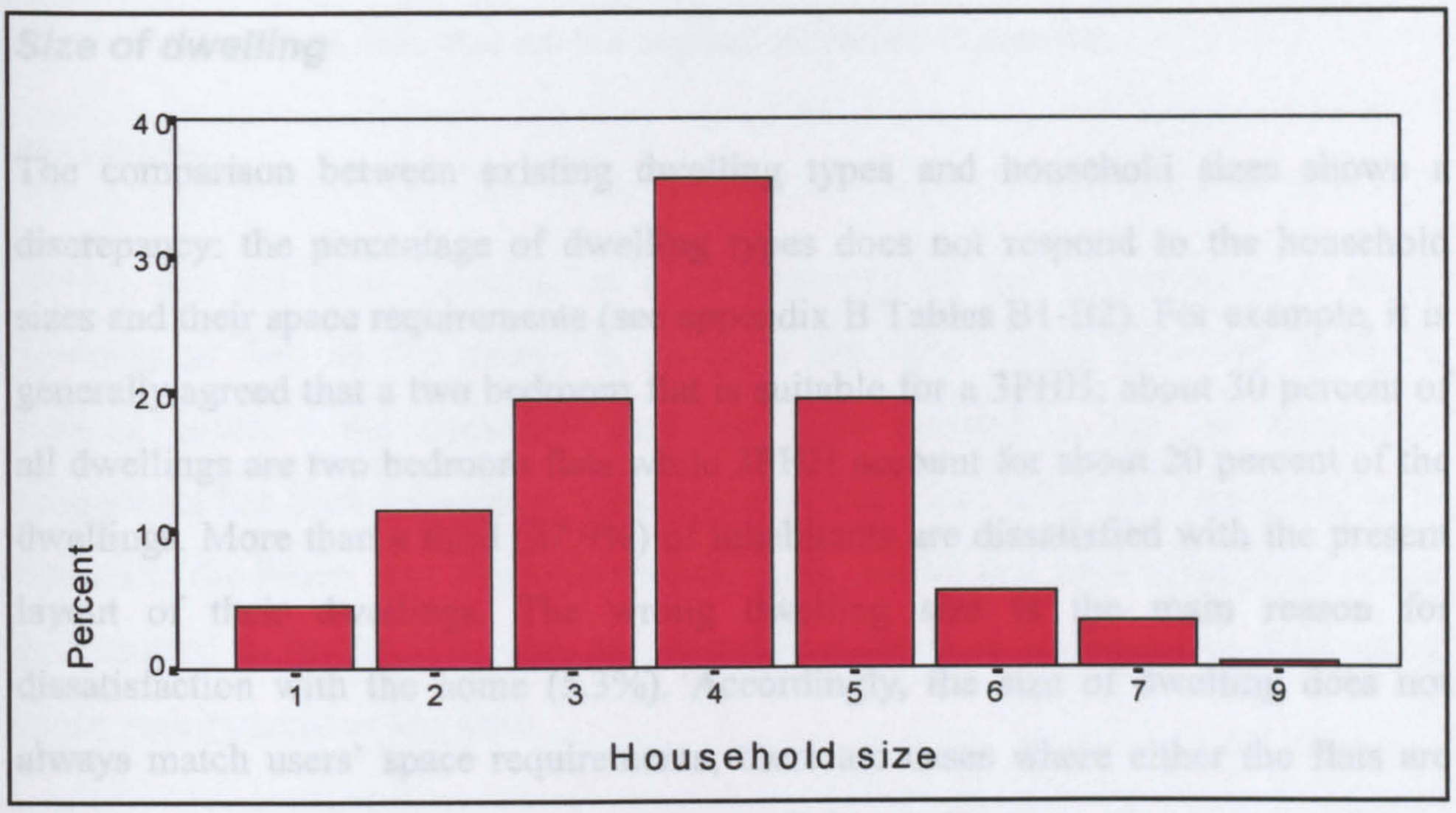

Figure A. 2 Household size in all four areas.
Source: Author, Based on local survey, 1994.

A.5.2 Home

Overall Satisfaction

In total 88.2 percent of all respondents in the four survey-areas indicated their satisfaction with their homes.

Layout

About two thirds (67.4%) of respondents are satisfied with the layout of their dwellings while 32% are dissatisfied with the layout of their dwelling. The much lower degree of satisfaction with the layout of the home (67.2%) - compared with overall satisfaction with the home (88.2%) - and the increase in dissatisfaction with the layout of the home (32.6%) - compared with overall dissatisfaction with the home (5.9%) - proves that there is a direct relationship between the layout of the dwelling and satisfaction with the home (see Table A. 2).

Table A. 2 The overall satisfaction degree with home compared with the satisfaction degree with the layout of home.

	Layout of home	Home (overall)
Satisfied	67.4	88.2
Dissatisfied	32.6	5.9

Size of dwelling

The comparison between existing dwelling types and household sizes shows a discrepancy: the percentage of dwelling types does not respond to the household sizes and their space requirements (see appendix B Tables B1-B2). For example, it is generally agreed that a two bedroom flat is suitable for a 3PHH; about 30 percent of all dwellings are two bedroom flats while 3PHH account for about 20 percent of the dwellings. More than a third (37.9%) of inhabitants are dissatisfied with the present layout of their dwellings. The wrong dwelling size is the main reason for dissatisfaction with the home (5.3%). Accordingly, the size of dwelling does not always match users' space requirements; there are cases where either the flats are larger than required or they are too small (see Table A. 3).

Table A. 3 Cross-tabulation of the causes of dissatisfaction with the present layout of the home by the overall feelings about the home

	Very Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	**Dissatisfied**	Very Dissatisfied	*Row Total*
Not enough privacy	0.0%	10.6%	2.3%	**1.5%**	0.8%	*15.2%*
Not enough natural light	0.8%	6.8%	3.0%	**1.5%**	0.0%	*12.1%*
Not good ventilation	0.0%	12.1%	0.8%	**3.0%**	0.0%	*15.9%*
Wrong dwelling size	**3.0%**	**23.5%**	**6.1%**	**5.3%**	**0.0%**	***37.9%***
Other	3.0%	12.1%	1.5%	**1.5%**	0.8%	*18.9%*
Column Total	*6.8%*	*65.1%*	*13.7%*	***12.8%***	*1.6%*	*100.0%*

In Eskan more than four fifths of the people are satisfied with the present layout of their flats and only 13.3% are dissatisfied. In 44.4% of cases of dissatisfaction in Eskan it is mainly that the size of flat does not meet the users' space requirements (see appendix Ḃ tables B42-B43). Quite a number of one person (4.4%) and two person households (33.3%) live in Eskan (total 37.7%), while only two, three, and four bedroom apartments are available there (see appendix B table B5). The main reason for people who are planning to move away from Eskan is financial (see appendix B- table B13). For them the size of the dwelling is too large, which with the proportionate community charges, they can hardly afford. This is a clear indication that due to the mismatch of dwelling and household sizes, some families have no

choice but to live in flats that are too big and therefore expensive.

Flexibility

During the last three decades, as a consequence of the introduction of family planning as well as the change in people's life style - from extended family to nucleus family - the household size has been decreasing, but the number of households has been increasing. This indicates that more small flats are going to be needed in the future. The above mentioned facts require that future dwellings should be designed to be flexible, with an adaptable number of bedrooms to meet users' space requirements at any time.

Visual privacy

Being observed by people from outside or in other dwellings makes about 95% of respondents feel uncomfortable. For 96.7% of all respondents it is important that windows allow a view, but without offering people from outside a view in (see tables B53 - B55). Therefore, having visual privacy is vital for residents.

Table A. 4 Main reasons of drawing curtain in different spaces of the flats, where there is any curtain (ranked by all respondents).

		Beauty	Visual privacy	Control sunshine
1	Reception	10.9%	**43.4%**	45.7%
2	Kitchen	25.5%	**44.7%**	29.8%
3	Toilet	3.6%	**78.6%**	17.8%
4	Bath room	25.0%	**68.3%**	6.7%
5	Sitting room	25.1%	**44.9%**	30.0%
6	Dining room	28.8%	**40.1%**	31.1%
7	Bed rooms	13.6%	**59.2%**	27.2%

Noise disturbance

Noise disturbance caused by people in neighbouring dwellings is serious. Depending on the location of the flats, more than half of the respondents suffer from some kind

of noise disturbance from sources outside the buildings. More than half of the respondents (55%) claimed that they suffer from some sort of noise disturbance, mainly by children playing outside, traffic and people in neighbouring dwellings. About half of the people surveyed think their neighbours can hear them. This causes 87.7% of them to feel uncomfortable. In Atisaz about three-quarters of the respondents indicated that they suffer from noise disturbance. There, noise is mainly caused by the construction of phase two buildings on the north side of the settlement as well as the traffic on the Chamran expressway to the east of the settlement.

In Ekbatan 57.6%, in Apadana 51.8%, and in Atisaz 46.7% suffer from noise disturbance caused by their neighbours. About half of the respondents can hear their neighbours and think they can be heard. 87.7% feel uncomfortable at hearing their neighbours and being heard. More than forty percent of the respondents suffer from noise disturbance caused by highways located beside the settlements. More than 70% of the respondents suffer from noise disturbance caused by children playing outside the dwelling, but noise disturbance caused by people outside the building is not very serious (see appendix B, tables B42 - B48).

The noise disturbance caused by sources outside the buildings could be reduced by implementation of an appropriate mixture of the following recommendations.

- There should be a green buffer between the settlement and adjacent highways.
- Playgrounds and schools must be located within an appropriate distance of residential buildings.
- The windows of the dwellings facing highways and children's playgrounds should be provided with double-glazing.
- Construction elements separating dwelling units (walls & floors) should be made of noise absorbent materials.

Entrance

More than 95% of the respondents think their dwelling should have a separate entry lobby. Only 4.8% of the respondents consider it unnecessary to have a separate lobby. In the buildings of phases one and three at Ekbatan as well as in the Eskan

residential towers, four doors open to the corners of a square semi-public lobby on each floor. In the buildings of phase two of Ekbatan six doors open to a corridor, three each side, on each floor. In Apadana two doors open to a semi-public corridor opposite each other on each floor. In Atisaz there are different design generations; two, three and four doors open to a rectangular shaped semi-public corridor of a different size on each floor (see Figure A.3).

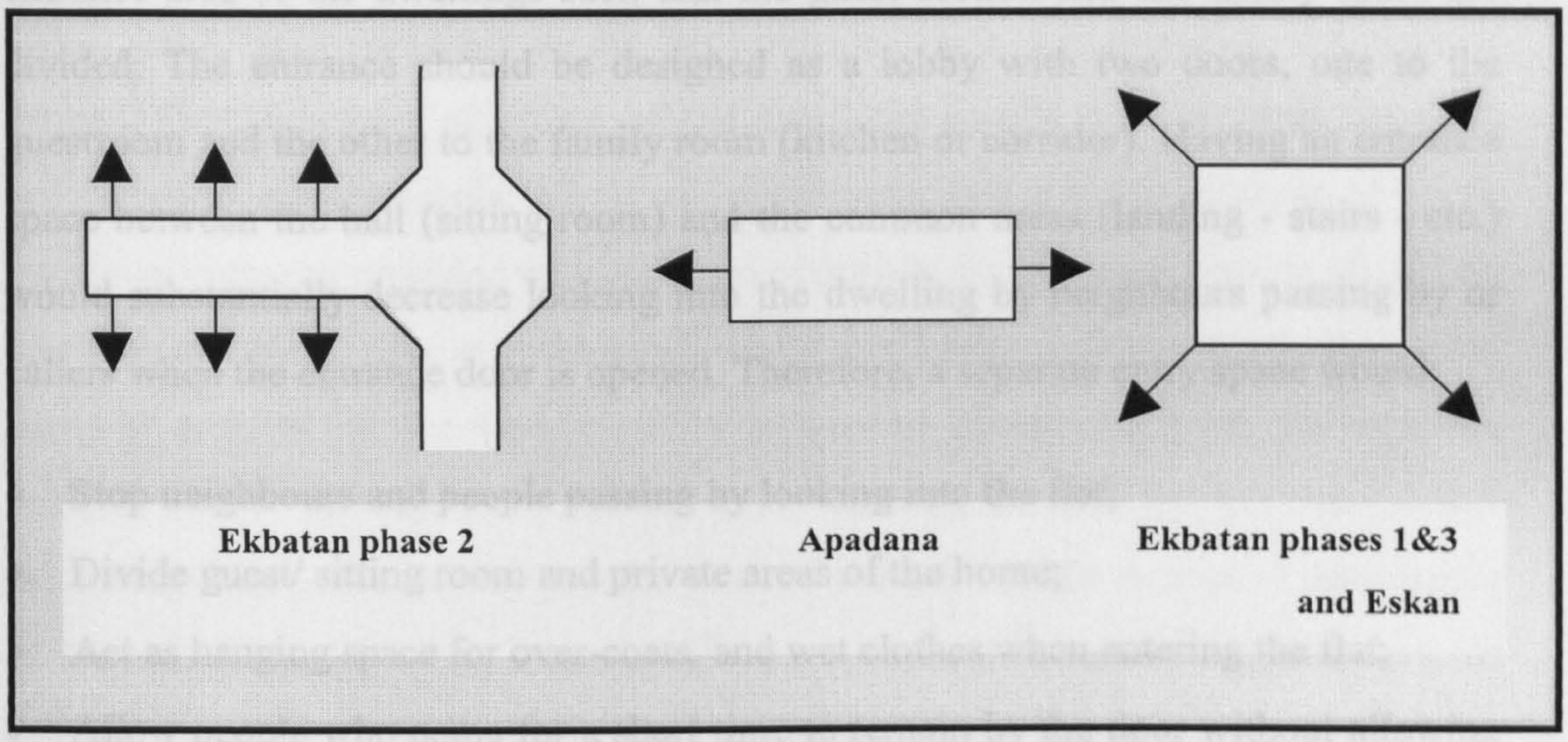

Figure A. 3 Number of dwellings accessed through a corridor in different schemes.

Only in the Ekbatan area are there some flats with more than one entrance door. These flats have one main entry door and a door to a fire escape staircase that does not count as an access door. There are no male or guest entrances separate from the family entrance in any of the four housing areas.

About three-quarters of the people questioned consider a separate male or guest entrance as unnecessary. Answers to question *B3* show, however, that more than 95% consider it necessary to have an entrance lobby separate from the hall or sitting room. Only 17.6% of those questioned have a curtain in the reception area. 45.7% of respondents who indicated that they draw curtains in the reception area mainly to control sunshine do not have a separate reception area at all. In these cases the entry door to the flat opens straight into the hall that acts as reception area, sitting room, and guestroom as well. 43.4% of the respondents who have curtains in the reception, draw curtains mainly to stop people looking into their flats and only 10.9% draw curtains in the reception area for aesthetic reasons. To summarise, the main reason

for drawing curtains in the reception area is to stop people looking into the flat wherever there is a possibility of being overlooked (see appendix B, tables B9-B11, B18-B25 and B38-B41).

It is very likely that people prefer their flats to have only one entrance for reasons of security and easy maintenance. It seems therefore that it would be better to design the entrance area of the dwellings such that the guest section and the family space are divided. The entrance should be designed as a lobby with two doors, one to the guestroom and the other to the family room (kitchen or corridor). Having an entrance space between the hall (sitting room) and the common areas (landing - stairs - etc.) would substantially decrease looking into the dwelling by neighbours passing by or callers when the entrance door is opened. Therefore, a separate entry space would:

- Stop neighbours and people passing by looking into the flat;
- Divide guest/ sitting room and private areas of the home;
- Act as hanging space for over-coats, and wet clothes when entering the flat;
- Allow people who come for a short time to remain by the door without allowing them to see inside the dwelling.

Bathroom & Toilet

In all of the four sample areas the majority of dwellings surveyed are furnished with traditional style bathrooms (shower and Iranian toilet) as well as western style (bathtub and toilet seat) in different places.

In Ekbatan 64.1%, and in Apadana 77.8% of the people questioned use the traditional style bathroom more frequently, but in Atisaz 51.5% and in Eskan 78.9% use the western style bathroom more than the traditional one. As the Eskan and Atisaz settlements were constructed earlier than the other two schemes, it might be assumed that older people live in these settlements, and obviously elderly people would prefer to use a toilet seat rather than an Iranian toilet (see appendix B, tables B16-B17).

- Both traditional and western style bathrooms should be provided to offer the maximum level of comfort for the variety of the different households and age

groups. People prefer the family room area of their dwelling (including bedrooms and bathroom) not to be accessible directly from the sitting room. The family room area should be separated from the living area through a circulation space (such as a corridor).

Outside Blinds

More than 80% of dwellings do not have outside blinds and, therefore, use curtains instead. Only windows of 16.6% of the dwellings surveyed in the four areas are provided with outside blinds. About half of those respondents, the windows of whose dwellings were not provided with any type of outside blinds, think outside blinds are essential or useful. The main reasons why those having outside blinds find them essential are: 39.7% for security, 25% to control sunshine, 23.9% for aesthetic reasons, 8% for privacy, and 3.4% for other reasons. Accordingly, the main reason for having outside blinds is to provide protection from outside sources of disturbance to the houschold. Less than a quarter of thc respondents think outside blinds are for aesthetic reasons (see appendix B, tables B26-B29).

- Outside blinds are useful elements for the provision of visual privacy as well as protection from sunray penetration of the windows on the southern and western elevation of the dwellings. Traditional Iranian houses have outside blinds. They are useful tools for designing facades to establish individual the identity for buildings to fulfil the aesthetic demands of users for the outside appearance of their living places. They also offer a feeling of safety and security inside the dwelling.

Balcony

In Atisaz and Eskan almost all dwellings are provided with exposed balconies, but in Apadana and Ekbatan the balconies are recessed behind the elevation to form loggias.

Balconies are used by more than 95% of those who have them. Balconies are mainly used for the purpose of drying clothes in Ekbatan (63.2%) and Atisaz (54.2%). In

Apadana, balconies are mainly used for the purpose of storage (71.9%). In Eskan balconies are mainly used for the purpose of sitting outside (50%). The main reasons for those who never use their balconies (4.1%) are lack of privacy (45%), and that the balcony is very narrow and small (25%). More than three-quarters of those who do not have a balcony think they need to have one (78.8%). The main purposes of a balcony for respondents who do not have one are drying clothes (60.3%), and sitting (27.8%) (see appendix B, tables B52 - B57).

- It can be concluded that a balcony or loggia is an essential part of flats in high density urban housing and should be sized, shaped, and organised to allow multi-purpose uses like drying clothes, sitting outside, storage, and should also offer visual privacy.

Bedroom

Most households with children said that their children play in their bedrooms (see appendix B table B40).

- In the design of bedrooms it should be noticed that children's bedrooms should have enough room and adaptable organisation to allow children to play and carry out other educational and vocational activities.

Image and other design qualities

For about 95% of respondents the outside appearance of their houses is very important. Also, about half of the respondents think the other specific qualities that their homes should have are: entry lobby separate from sitting room; an extra room; a courtyard; storage; separation between living area and night area; children's bedrooms large enough for them to play; the organisation of spaces - internal layout – to be adaptable to meet family needs in different situations.

A.5.3 Neighbourhood

Overall satisfaction

The overall degree of user satisfaction with the neighbourhood is 67.2% which is considerably lower than that of 88.2% for their dwelling. More than 90% of all respondents think there is a need to improve facilities in their neighbourhoods. This proves that there is a direct relationship between the degree of user satisfaction with the neighbourhood and the services and facilities provided within the neighbourhood.

Walkability

About a third go by car when they visit their friends or relatives in the same locality. About three-quarters of those who go by car to visit their friends or relatives use their car because of long distances. The majority of the respondents prefer to have the services and facilities within their neighbourhood to be provided within walking distance from their dwellings.

Public Transport

In the Apadana and Atisaz schemes there is no public transport at all, perhaps because these neighbourhoods are too small for the provision of public transport to be viable. Therefore, the majority of respondents in these two neighbourhoods require access to public transport within their neighbourhoods. Ekbatan is served by public buses specified for this neighbourhood and Eskan is located within the inner city area and provides easy access to many transport services (i.e. public bus and minibus as well as public and private taxi services). The majority of those who require public transport believe it should be provided within walking distance of their dwellings. The main problem associated with public transport was reported to be noise.

- Public transport should be provided within walking distance from dwellings and should operate quietly.

Road and Access

The majority of respondents in Atisaz demanded better road access. Although this neighbourhood is located adjacent to a highway it is very poorly served, as this neighbourhood lies 10-15 metres below the highway level. Other schemes do not show as great a concern for roads and access as Atisaz as they are already provided. The main problem associated with roads and access is reported as noise.

About a fifth of the respondents (19.9%) said they like cul-de-sacs and would like to live on one. The majority of respondents (92%) said they liked the idea of traffic calming to control vehicle speed within their neighbourhood. Only 4.3% expressed their dislike of the idea.

Most of the respondents in Eskan preferred future pedestrian and vehicular movements to be in the same street but the pedestrians to be provided with shaded paths as well as safety. In Ekbatan, Apadana and Atisaz, however, complete separation between pedestrian and vehicular movements were preferred, perhaps because they currently live in such a situation and are satisfied with it.

- Depending on the volume of traffic different types of roads and access should be provided within the neighbourhood.

- Pedestrian pathways should be clearly secured from traffic on roads, for instance by trees as a buffer to offer maximum safety and shade.

Parking

More than two thirds (71.3%) of the respondents said they have their own car. Most of those who have a car (70.6%) prefer their car inside their building. Only about a quarter prefer to park their cars in secure public parking. None of the respondents prefer to park their cars on the street near their home. Only very few (2.3%) prefer to park their cars on-site. More than 70% prefer to park their cars inside the building, mostly for security reasons. About a quarter accept the need to park their cars in a secure public parking (see appendix B, tables B).

- Demand for parking for each dwelling should be reflected in housing design. If public parking within settlements is provided it must be secured.

Neighbours' Meeting Places

More than 70% of respondents often meet their neighbours outside their homes. In Ekbatan the two major places for neighbours to meet are in the streets (39.7%) and on-site around the buildings (34.4%). In Apadana the two major places to meet are in front of their dwelling's entrance door (44.5%) and on-site around the buildings (34.8%). In Atisaz the two major places for neighbours to meet are on-site around the buildings (36.4%) and in a shop (29.5%). In Eskan the two major places for neighbours to meet are in front of their dwelling's entrance door (42.2%) and on-site around the buildings (29.9%). The major places for neighbours to meet - ranked by all respondents - are on-site around the buildings (38.3%), in the street (36.3%), in a shop (15%), in a specific meeting place (4.4%) in the home entrance (3%) and in the mosque (2.7%) (see Appendix B. Table B68).

Women's Meeting Places

More than ninety percent of respondents say there is no place for women to meet. About 60% of the respondents believe the provision of a women's meeting place is not necessary in their neighbourhood. Of the 40% of those who believe provision of a women's meeting place is necessary 29.7% prefer a completely separate building, 27% prefer a room in a leisure time education centre, 23% prefer a room in or beside the library and 14.3% prefer a room in or beside the mosque. Because it is forbidden for women to enter a mosque during their period (according to Islamic teaching), it seems a room in/beside a mosque is not practical or popular.

- Provision of a separate building for the purpose of social meetings (e.g. a community centre) located in close walking distance from dwellings should be considered in the settlement design.

Mosque

More than half of the respondents say that there is a mosque already provided in their

neighbourhoods. However, a small percentage of respondents believe that a mosque is not needed in the neighbourhood. The majority of those who think there is a need to add a mosque in their neighbourhood believe it should be located in walking distance from their home, the others are happy just to have one mosque within their settlement. The main problem associated with the mosque was reported to be ambient noise.

In Ekbatan, Atisaz, and Eskan the majority of those who believe there is a need for a mosque to be provided say it should be in walking distance of their homes. In Apadana, which is a relatively small neighbourhood, the majority of those who said there is a need for a mosque think one should be provided within their neighbourhood. Physical observation cross-checked with the area's site plan reveals that there is a mosque in the central area of Ekbatan, located in phase one, quite a distance away from phases two and three. A mosque is under construction in Apadana. There is a plan to build a mosque in Atisaz, but for the time being people use an unfinished building for community gatherings and daily prayers. There is no mosque in Eskan since the scheme is very small in urban scale and residents have to use the urban facilities available within their locality.

It seems people's desire to having a mosque close to their house depends on how often they go to the mosque. Basically, as we are planning for a Muslim community, mosque should be provided for those who want to perform their religious duty by praying three times a day. Therefore, it is rational to provide a mosque within walking distance to the houses. There should be separate research to find out why currently people do not go to the mosques three times a day. Maybe the mosque is too far away from their dwellings or, considering the conditions of modern urban life, it could be speculated that people would prefer to pray their morning prayers in their own homes and the mid-day prayers in their work places, but most people still go to their local mosques at least once a day for the evening prayers if there is a mosque in their locality.

- The maximum accepted distance for a local mosque is about 10 minutes walk from each house. The appropriate size of a local mosque depends on the

population it intends to serve or on the number of houses in its locality.

School

About two third of all respondents (62.6%) say a school is already provided. About a third (35.5%) say there is a need to provide a school in their neighbourhood. The majority of these respondents prefer to have the school within walking distance from their homes. Nobody in Ekbatan and Atisaz thinks there is no need for a school, but a very small percentage of respondents in Apadana (2.6%) and Eskan (5.9%) said there is no need to provide a school within their neighbourhoods, perhaps because it is already provided. In Ekbatan 34.6%, in Apadana 18.4%, in Atisaz 84.2% and in Eskan 11.8% of respondents said there is a need to provide a school in their neighbourhood. The main problems associated with the school were reported to be the noise generated and that it makes the area crowded.

- The provision of a primary school within walking distance from but not too close to dwellings is necessary in a neighbourhood.

Children's play area

More than half of the respondents believe there is no specific place provided for their children to play. More than 80% said there is a need to provide a children's play area in their neighbourhood. Not one in all four neighbourhoods believes there was no need. Only in Eskan did the majority of the respondents reply that there is a children's play area provided within the neighbourhood. in fact there is no play area provided specifically for this settlement, but as this settlement is located in an inner city area the inhabitants have good access to Park-e-Mellat - located in close proximity to the project. This is one of the largest parks of the city, which includes facilities such as a small zoo, children's play areas, green space etc. which makes it very attractive to local and city residents.

Of the 97.1% of those believe that a children's play area should be provided in their neighbourhood more than half said it should be located within walking distance of their homes, mainly to supervise their children while playing outside. Also about two

thirds of the respondents recommend an adventure play area while about a third of respondents prefer a supervised place to be provided for their children to play. The main problem associated with a children's play area was reported to be the noise.

- Provision of a children's play area is necessary in close proximity (walking distance) to dwellings for the purpose of supervision of children. Children should not be obliged to cross a major traffic road to access the play area. Nor should the play area be located adjacent to residential buildings, however, to avoid noise disturbance to residents.

Library

In Atisaz and Eskan there is no library, therefore most of the respondents said there is a need for a library within the neighbourhood. The majority of respondents in Ekbatan and Apadana also believe there should be a library within walking distance of their dwellings. There was no report of any serious problem associated with the library within the neighbourhoods.

- Provision of a library within a neighbourhood in walking distance of people's homes should be considered.

Leisure Time Education Centre

Certain provisions were considered essential parts of a traditional Iranian neighbourhood such as a mosque, school, hosseinieh, hammam (public bath), ab-anbar (water reserve), teahouse, etc. and were usually connected to a bazaar (market). In the modern neighbourhood, however, as a result of changes in people's life style some of these traditional provisions are impractical and unnecessary. Instead, new provisions have been introduced to urban societies such as health centres, libraries, internet cafés, post offices, telephones, sports centres and leisure time education centres. New amenities should be adapted according to Iranian society's needs based on their cultural values. The leisure time education centre – the way in which it functions in western cities - is unknown to Iranian society. Traditionally, in Muslim societies such as Iran, leisure time educational activities - mainly to do with religious

studies - took place in the mosque. Nowadays there is a variety of leisure time activities (learning new skills such as computing, hairdressing, sewing, etc) that most often take place in private institutions.

The majority of respondents in all survey areas (87%) said a leisure time education centre is needed within the neighbourhood, and no problem was reported to be associated with this provision.

- The provision of a leisure time education centre, which provides residents with the opportunity for learning new skills, is required for future neighbourhoods in Tehran.

Sports Centre

89 percent of the respondents in all four areas believe there should be a sports centre within their neighbourhoods. The figure for Atisaz is 97.4%, for Apadana 96.7%, and in Ekbatan 86%. This is because there are no sports centres or even outdoor football pitches available for the residents in these two settlements, but there are two football stadiums in Ekbatan. The demand for a sports centre is much lower in Eskan (57.5%) because a number of private sport clubs - e.g. a horse riding stadium, tennis courts, swimming pool, and outdoor open spaces in a nearby park - are already available. Also, maybe because this neighbourhood is older and the average age of the residents is much higher than the other schemes they are more concerned with the other provisions related to their needs. The picture becomes clearer when the causes of problems associated with a sports centre are studied. In total 5.8% of all respondents said it causes noise while 3.1% said it gathers undesirable people. In comparison 18.5% of the respondents in Eskan said it causes noise while 7.4% believed it gathers undesirable people.

- A sports centre should be provided in walking distance within the neighbourhood but it should not be located very close to dwellings.

Shops

Most of the respondents in all four areas require shops in walking distance of their dwellings. Some highlighted the need for shops within the neighbourhood. No one said shops are not needed within the neighbourhood; however, the main problems associated with shops are that they make the area crowded and promote the gathering of undesirable people.

- For the day to day needs of residents some shops have to be provided within short walking distance of all dwellings as well as more shops and a super market within the neighbourhood.

Health Centre

Overall, more than 85 percent of all the respondents said a health centre is needed in walking distance within the neighbourhood. In Apadana 97.8%, in Ekbatan 85.8%, in Atisaz 75.8% and in Eskan 50% of the respondents require a health centre to be provided within their neighbourhood. The reason for these large differences is that at the time of the local survey in Apadana there were no health facilities at all, in Ekbatan there were limited health facilities (i.e. doctors, private clinics, and a chemist but not located within easy walking distances from most of the dwellings). In Atisaz there was a private clinic and a health centre was under construction; in Eskan there was no health centre within the scheme but a number of doctors' surgeries as well as hospitals were available to residents within their locality.

- A health centre should be provided within the neighbourhood. The size of the health centre depends on the size of population it intends to serve.

Post office

With the merger of the two giant government corporations of post and communication, the Ministry of Post, Telegraph and Telephone (MPTT) was formed in the 1980s. Post offices in Iran do more than just move letters and parcels. Instead of going to banks and other different offices – and apart from posting their parcels - nowadays people go to post offices for many other administrative and financial

purposes as well. These include paying utility bills, changing birth certificates, applying for cars, mobile phones, Hajj pilgrimage and any other facilities the distribution of which is under governmental control. This has proved to save people's time while taking a heavy burden - of long queues - off banks' and other related offices' shoulders.

More than three quarters (77.4%) of all the respondents said there is a need for a post office within the neighbourhood. Although there is a post office in Ekbatan more than half (54.1%) the respondents asked for one, perhaps because the existing post office is not within walking distance of their dwellings. In Apadana 92%, in Atisaz 87.1%, and in Eskan 92.6% said a post office should be provided within walking distance in their neighbourhoods. No problems were reported associated with the post office within the neighbourhood.

- The provision of a post office as well as a bank is necessary within walking distance in the neighbourhood.

Police Station

Generally, the presence of police stations within the neighbourhood gives the residents a feeling of safety and security. In Ekbatan 86%, and in Apadana, 85.4% of the respondents required a police station to be provided within their neighbourhoods. Both schemes are located on the edge of the city and there is no police station provided in these schemes. In Ekbatan there is a serious problem with car theft, as the result of the provision of uncontrolled public parking.

In Eskan 38.9% and in Atisaz 66.6% of the respondents said there is a need to provide a police station within their neighbourhoods. The small size of the scheme as well as the location of one of Tehran's police headquarters in close proximity to the Eskan towers, and the location of the city's main prison (Evin) near the Atisaz scheme, are probably the main reasons for the smaller percentage requiring a police station in these two schemes in comparison with the other two. No problems were reported with the provision of the police station within a neighbourhood.

Public Lavatory

Provision of public lavatories in urban areas, especially within neighbourhood areas is not common practice in Iran. However, public lavatories adjacent to the washing space of the mosque – for ablution before prayers – are usually available for the use of the public. Also the city-scale parks are provided with public lavatories, although most of them are poorly maintained and often out of service.

There are no public lavatories, as a separate entity, within any of the four sample areas. About half of the respondents said it is not needed within the neighbourhood, certainly not in close proximity to residential buildings. Provision of a public lavatory was not recommended within a neighbourhood mainly because of sanitation and public health concerns. Thc main problem reported to be associated with public lavatories was that it gathers undesirable people.

- No public lavatory in close proximity to dwellings and no public lavatory as a separate building within the neighbourhood are needed.

Park

There are no parks provided within walking distance for the residents of Ekbatan, Apadana, and Atisaz. However, Park-e-Mellat, a well provided city-scale park, is located close to the Eskan towers. About three-quarters of the respondents said there is a need for the provision of a park for their neighbourhoods. About half (49%) said it should be located within the neighbourhood while about a quarter (23.5%) asked for the park to be within short walking distance of their dwellings. No major problems were reported associated with the provision of park except in Eskan where 7.7% of the respondents said the park made their neighbourhood crowded. This is because Park-e-Mellat is known as the best provided and one of the largest parks in Tehran and it attracts people from all around the city.

- The provision of a park within the neighbourhood is necessary in close proximity to all dwellings.

FREQUENCY TABLES

- Each table shows the results of one question of the questionnaire in each of the four case study areas of Tehran individually, as well as the results of four sample areas all together.
- Numbers in each table show the valid percentages, unless otherwise stated.
- The total in each column (individual case studies and all areas together) accumulates 100 percent.

Ekb. Stands for Ekbatan sample area.
Apa. Stands for Apadana sample area.
Ati. Stands for Atisaz sample arca.
Esk. Stands for Eskan sample area.
All presents the average in four sample areas all together.

Table B.1 Dwelling Type

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	One bedroom	9.0	0.0	20.0	0.0	6.3
2	Two bedroom	13.1	46.5	40.0	31.0	30.0
3	Three/more bedroom	76.3	53.5	40.0	69.0	63.0
4	Suite	1.6	0.0	0.0	0.0	0.7

Table B.2 Flat types and number of household

Flat type %	*Number of household %*
Suite + one bed. Flats 7%	One + Two household 16.7%
Two bed. flats 30%	Three household 19.5%
Three/more bed. flats 63%	Four/more household 63.8%

Table B.3 Location

		Ekb.	*Apa.*	*Ati.*	*Esk.*	*All*
1	Ekbatan	-	-	-	-	39.7 %
2	Apadana	-	-	-	-	32.2 %
3	Atisaz	-	-	-	-	13.4 %
4	Eskan	-	-	-	-	14.7 %
	Number of Valid Cases	122	99	41	45	307

Table B.4 How many families live in this dwelling unit?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	One	91.0	99.0	95.1	93.3	94.5
2	Two	9.0	1.0	4.9	6.7	5.5

Table B.5 How many people live in this dwelling unit?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	One	4.9	3.0	7.3	4.4	4.6
2	Two	6.6	7.1	17.1	33.3	12.1
3	Three	14.8	18.2	24.4	31.1	19.5
4	Four	36.9	41.4	31.7	20	35.2
5	Five	23.8	22.2	7.3	11.2	19.2
6	Six	8.2	6.1	2.4	0.0	5.5
7	Seven	4.0	2.0	9.8	0.0	3.6
8	Eight	0.0	0.0	0.0	0.0	0.0
9	Nine	0.8	0.0	0.0	0.0	0.3

Table B.6 How long have you been in this dwelling unit?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Less than one year	9.0	8.1	2.4	4.4	7.2
2	More than 1, less than 3 years	30.3	16.2	4.9	4.4	18.6
3	More than 3, less than 5 years	18.1	14.1	22.0	8.9	16.0
4	More than 5, less than 10 years	22.1	61.6	70.7	28.9	42.2
5	More than 10 years	20.5	0.0	0.0	53.4	16.0

Table B.7 What sort of dwelling did you live in before you moved to this home?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	High-rise apartment block	4.1	4.0	4.9	8.9	4.9
2	Low-rise apartment block	41.3	52.6	48.8	22.2	43.1
3	Courtyard house	52.9	39.4	46.3	64.5	49.4
4	Other	1.7	4.0	0.0	4.4	2.6

Table B.8 why did you move into this dwelling?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Distance to work	12.1	6.0	8.3	11.9	9.8
2	Distance to relatives/friends	10.9	8.6	4.2	10.2	9.2
3	Access to urban services	11.5	8.6	10.4	16.9	11.3
4	Financial reasons	28.5	20.8	22.9	18.6	24.0
5	No specific reasons	12.1	15.5	14.6	13.6	13.7
6	Other	24.9	40.5	29.6	28.8	32.0

Table B.9 How many entrances does your dwelling have?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	One	80.0	100.0	100.0	100.0	91.9
2	Two or more	20.0	0.0	0.0	0.0	8.1

Table B.10 Is there a guest/male entrance separate from a family/female entrance?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	0	0	0	0	0
2	No	100	100	100	100	100

Table B.11 If no, do you think it is necessary?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	25.4	26.8	36.6	11.9	25.9
2	No	74.6	73.2	63.4	88.1	74.1

Table B.12 Are you planning to move away from this home in the near future?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	25.4	33.3	39.0	37.8	31.6
2	No	74.6	66.7	61.0	62.2	68.4

Table B.13 If yes, what are the main reasons?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Distance to work	20.4	13.0	8.8	4.3	13.5
2	Distance to relatives/friends	12.2	10.9	13.0	8.7	11.3
3	Access to urban services	14.3	21.8	13.0	8.7	15.6
4	Financial reasons	20.4	15.2	13.0	47.8	22.0
5	No specific reasons	8.2	13.0	0.0	4.3	7.8
6	Other	24.5	26.1	52.2	26.1	29.8

Table B.14 Have you done or are you planning to make any alterations to the flat since you have been living in this home?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	36.1	34.3	61.0	33.3	38.4
2	No	63.9	65.7	39.0	66.7	61.6

Table B.15 If yes, what are the alterations you carried out or you think should be carried out?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Internal decoration	88.9	77.7	73.3	82.3	81.3
2	External decoration	6.7	5.6	3.4	5.9	5.5
3	Structural changes	2.2	2.8	0.0	0.0	1.5
4	Installation	2.2	13.9	23.3	11.8	11.7

Table B.16 What type of bathroom is there in the dwelling?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Traditional style	9.0	23.3	7.3	0.0	12.1
2	Western style	11.5	1.0	17.1	20.0	10.1
3	Some traditional and some western	63.9	62.7	70.7	73.3	65.8
4	Both styles in the same bathroom	11.5	10.0	4.9	6.7	9.4
5	Other	4.1	3.0	0.0	0.0	2.6

Table B.17 If you have two styles, which one do you most often use?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Traditional style	64.1	77.8	48.5	21.1	60.2
2	Western style	35.9	22.2	51.5	78.9	39.8

Table B.18 Main reason of drawing curtain in reception?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	8.7	20.0	-	-	10.9
3	Stop people looking in	52.2	33.3	75.0	-	43.4
4	Keep out sunlight	39.1	46.7	25.0	100.0	45.7

Table B.19 Main reason of drawing curtain in kitchen?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	34.5	17.0	25.0	26.9	25.5
3	Stop people looking in	40.2	59.6	42.9	7.7	44.7
4	Keep out sunlight	25.3	23.4	32.1	65.4	29.8

Table B.20 Main reason of drawing curtain in Toilet?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	-	-	-	25.0	3.6
3	Stop people looking in	75.0	100.0	85.7	75.0	78.6
4	Keep out sunlight	25.0	-	14.3	-	17.8

Table B.21 Main reason of drawing curtain in bathroom?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	20.0	47.4	3.0	23.1	25.0
3	Stop people looking in	70.9	-	12.0	76.9	68.3
4	Keep out sunlight	9.1	52.6	2.0	-	6.7

Table B.22 Main reason of drawing curtain in sitting room?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	23.7	18.3	27.0	34.9	25.1
3	Stop people looking in	33.1	61.7	48.7	16.3	44.9
4	Keep out sunlight	43.2	20.0	24.3	48.8	30.0

Table B.23 Main reason of drawing curtain in dining room?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	29.7	24.2	29.0	37.5	28.8
3	Stop people looking in	33.7	53.7	45.2	20.0	40.1
4	Keep out sunlight	36.6	22.1	25.8	42.5	31.1

Table B.24 Main reason of drawing curtain in bedrooms?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
2	Beauty & decoration	13.3	14.2	8.1	17.0	13.6
3	Stop people looking in	59.4	70.2	67.6	28.3	59.2
4	Keep out sunlight	27.3	15.0	24.3	54.7	27.2

Table B.25 Main reason of drawing curtains

		Decoration	*Visual privacy*	*Keep out sunlight*
1	Reception	10.9%	43.4%	45.7%
2	Kitchen	25.5%	44.7%	29.8%
3	Toilet	3.6%	78.6%	17.8%
4	Bath room	25.0%	68.3%	6.7%
5	Sitting room	25.1%	44.9%	30.0%
6	Dining room	28.8%	40.1%	31.1%
7	Bed room	13.6%	59.2%	27.2%

Table B.26 Are the windows of the dwelling provided with any kind of outside blinds?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	19.7	19.2	9.8	8.9	16.6
2	No	80.3	80.8	90.2	91.1	83.4

Table B.27 If yes, what are their main functions?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Privacy	7.2	11.4	0.0	0.0	8.0
2	Security	35.7	42.9	49.9	40.0	39.7
3	Shade	33.3	17.1	16.7	20.0	25.0
4	Decoration	23.8	22.9	16.7	40.0	23.9
5	Other	0.0	5.7	16.7	0.0	3.4

Table B.28 If no, what do you think of outside blinds? Are they:

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Essential	9.2	7.5	13.5	4.9	8.6
2	Useful	41.8	43.8	32.4	26.8	38.7
3	Superfluous	49.0	48.8	54.1	68.3	52.7

Table B.29 Main functions of outside blinds

Security	*Shade*	*Decoration*	*Privacy*	*Other*
39.7%	25%	23.9%	8%	3.4%

Table B.30 Do you have your own car?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	69.7	60.6	87.8	84.4	71.3
2	No	30.3	39.4	12.2	15.6	28.7

Table B.31 If you have car, where do you park it at night?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Secure public parking	44.1	0.0	13.9	5.3	21.1
2	On-site parking	21.5	93.3	44.4	2.6	41.0
3	On the street near your home	3.2	6.7	0.0	0.0	3.1
4	Parking inside the building	31.2	0.0	41.7	92.1	34.8

Table B.32 If all the above are available which one would you prefer?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Secure public parking	37.2	27.1	25.7	5.3	27.4
2	On-site parking	2.3	0.0	5.7	2.6	2.3
3	On the street near your home	0.0	0.0	0.0	0.0	0.0
4	Parking inside the building	60.5	72.9	68.6	92.1	70.3

Table B.33 If you have children, where do they most often play?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	In the living room	36.7	22.8	25.0	17.6	29.7
2	In their bed rooms	33.6	39.4	25.0	13.7	31.3
3	In a specific play area	10.9	18.3	17.5	15.7	14.9
4	No child	18.8	13.5	32.5	52.9	24.1

Table B.34 Which of the following rooms open directly from sitting room?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Bedroom (1)	9.2	4.7	10.2	2.0	7.1
2	Bedroom (2)	6.8	4.7	2.0	0.0	4.9
3	Bedroom (3)	3.9	2.7	2.0	2.0	3.1
4	Kitchen	41.7	51.4	22.5	53.1	44.0
5	Bath room	8.8	2.7	0.0	4.1	5.3
6	Toilet	17.5	22.3	4.1	10.2	16.8
7	None of the above	12.1	11.5	59.2	28.6	18.8

Table B.35 Are you satisfied with the present layout of your dwelling?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	65.6	68.7	48.8	86.7	67.4
2	No	34.4	31.3	51.2	13.3	32.6

Table B.36 If no, what are the reasons?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No enough privacy at home	16.4	17.5	6.3	27.3	12.1
2	No enough natural light	14.4	5.0	18.7	0.0	12.1
3	No good ventilation	16.4	12.5	18.7	11.1	15.9
4	Flat size doesn't meet your	36.4	42.5	34.4	44.4	39.4
5	Other	16.4	22.5	21.9	22.2	20.5

Table B.37 Satisfaction degree with layout of home in comparison with that of home.

	Overall Satisfied	*Overall Dissatisfied*
Satisfaction degree with home	88.2%	5.9%
Satisfaction degree with layout of home	67.4%	32.6%

Table B.38 Does the position of your immediate neighbours' door cause you any problems?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	13.3	13.4	19.5	0.0	12.2
2	No	86.7	86.6	80.5	100.0	87.8

Table B.39 Does your entrance door open straight into the hall?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	78.5	97.0	56.1	95.6	84
2	No	21.5	3.0	43.9	4.4	16

Table B.40 If yes, is the hall your sitting room?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	78.1	91.7	54.5	16.3	70.8
2	No	21.9	8.3	45.5	83.7	29.2

Table B.41 To what degree do you think it is necessary to have a separate lobby?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Essential	56.3	38.1	58.5	40.5	48.6
2	Necessary	40.3	55.4	39.1	52.4	46.6
3	Not necessary	3.4	6.5	2.4	7.1	4.8

Table B.42 Do you suffer from any kind of noise disturbance from a source outside your home?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	50.0	57.6	73.2	46.7	55.0
2	No	50.0	42.4	26.8	53.3	45.0

Table B.43 Suffering from noise disturbance caused by traffic?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A great deal	16.9	14.0	13.8	66.7	21.7
2	A little	13.6	24.6	20.7	33.3	21.1
3	No	69.5	61.4	65.5	0.0	57.2

Table B.44 Suffering from noise disturbance caused by playing children?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A great deal	50.8	41.1	26.7	4.8	37.3
2	A little	35.6	44.6	30.0	23.8	36.1
3	No	13.6	14.3	43.3	71.4	26.5

Table B.45 Suffering from noise disturbance caused by people outside?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A great deal	11.9	14.3	10.3	0.0	10.9
2	A little	23.7	23.2	17.3	9.5	20.6
3	No	64.4	62.5	72.4	90.5	68.5

Table B.46 Suffering from noise disturbance caused by people in other dwellings?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A great deal	30.5	19.6	30	4.8	23.5
2	A little	27.1	32.2	16.7	9.5	24.7
3	No	42.4	48.2	53.3	85.7	51.8

Table B.47 Do you think your neighbours can hear you?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	50.8	49.5	58.5	44.4	50.5
2	No	49.2	50.5	41.5	55.6	49.5

Table B.48 If yes, does this make you uncomfortable?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A great deal	33.9	46.9	41.7	20.0	37.4
2	A little	56.5	42.9	37.5	65.0	50.3
3	No	9.7	10.2	20.8	15.0	12.3

Table B.49 When you are inside, do you think people outside or in other homes can observe you?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	28.7	37.4	19.5	11.1	27.7
2	No	71.3	62.6	80.5	88.9	72.3

Table B.50 If yes, does this make you uncomfortable?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A great deal	48.6	56.8	44.4	20.0	50.0
2	A little	42.8	43.2	44.4	60.0	44.2
3	No	8.6	0.0	11.2	20.0	5.8

Table B.51 How important is it that windows allow a view without offering people from outside a view in?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Very important	78.8	72.2	78.0	64.4	74.4
2	Important	20.4	22.6	17.1	31.2	22.3
3	Not important	0.8	5.2	4.9	4.4	3.3

Table B.52 Do you have a balcony?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	23.0	81.8	97.6	97.8	62.9
2	No	77.0	18.2	2.4	2.2	37.1

Table B.53 If you have balcony, how often do you use it?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Frequently	28.6	33.3	27.5	18.2	28.0
2	Sometimes	46.4	50.6	42.5	43.2	46.7
3	Rarely	21.4	12.4	27.5	31.8	21.2
4	Never	3.6	3.7	2.5	6.8	4.1

Table B.54 If you use it, for what purpose do you mostly use your balcony?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Sitting	13.2	9.4	22.0	50.0	21.3
2	Drying clothes	63.2	7.3	54.2	32.1	57.4
3	Storage	21.0	71.9	15.3	7.2	12.1
4	Other	2.6	11.4	8.5	10.7	9.2

Table B.55 If you do not use it, what is the reason?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Lack of privacy	33.3	50.0	36.4	54.5	45
2	Very narrow and short	16.7	33.3	45.4	0.0	25
3	Dangerous for children	50.0	0.0	9.1	9.1	12.5
4	Other	0.0	16.7	9.1	36.4	17.5

Table B.56 If you do not have balcony, do you think you need a balcony?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	81.9	58.8	100.0	100.0	78.8
2	No	18.1	41.2	0.0	0.0	21.2

Table B.57 If yes, for what purpose do you think you need it?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Sitting	29.6	10.5	50.0	0.0	27.8
2	Drying clothes	58.3	57.9	50.0	100.0	60.3
3	Storage	7.4	15.8	0.0	0.0	7.1
4	Other	4.7	15.8	0.0	0.0	4.8

Table B.58 How important to you is the view of your house from the outside?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Very important	54.6	46.0	42.5	35.6	45.5
2	Important	42.0	52.6	55	53.3	48.8
3	Not important	3.4	7.4	2.5	11.1	5.7

Table B.59 Are there any specific qualities you think your home should have?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	45.1	46.5	56.1	46.7	47.2
2	No	54.9	53.5	43.9	53.3	52.8

Table B.60 How often do you meet your neighbours outside your home?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Frequently	20.0	27.3	29.3	11.6	22.4
2	Some times	56.7	41.4	48.7	55.8	50.5
3	Rarely	23.3	31.3	22.0	32.6	27.1

Table B.61 Where do you meet them?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	At the home entrance	4.3	44.6	27.3	52.2	26.4
2	On site around building	34.4	34.9	36.4	29.8	35.0
3	In the street	39.7	1.3	0.0	7.5	16.8
4	In the mosque	2.9	1.3	4.5	1.5	3.0
5	In a shop	13.4	14.1	29.5	3.0	14.6
6	In a specific meeting place	5.3	3.8	2.3	6.0	4.2

Table B.62 Whenever you plan to visit your neighbours or friends who live in your locality, how do you travel to them?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	By car	37.7	15.2	29.3	59.1	32.4
2	Walking	62.3	84.8	70.7	40.9	67.6

Table B.63 If by car, what is the reason?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Lack of pathway	4.2	12.5	16.7	6.9	7.6
2	Because of the weather	2.1	0.0	8.3	6.9	3.8
3	Distance	85.1	62.5	66.7	62.1	72.4
4	Habit	8.5	18.8	0.0	17.2	11.4
5	Other	2.1	6.2	8.3	6.9	4.8

Table B.64 Are there any specific places provided for women to meet in your neighbourhood?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	4.9	8.1	7.3	0.0	5.6
2	No	95.1	91.9	92.7	100.0	94.4

Table B.65 If no, do you think a women's meeting place is necessary?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	39.8	40.2	46.2	37.2	40.4
2	No	60.2	59.8	53.8	62.8	59.6

Table B.66 If yes, what type of place do you recommend?

		Ekb.	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	A room in a LTE centre	32.0	26.3	21.1	17.6	27.0
2	A room in/beside the mosque	9.4	18.4	26.2	11.9	14.3
3	A room in/beside the library	26.4	18.4	21.1	23.5	23.0
4	A completely separate bldg.	18.8	31.6	31.6	41.2	29.4
5	Other	9.4	5.3	0.0	5.9	6.3

Table B.67 Is there any specific place provided for children to play in your locality?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	43.4	27.3	48.8	80.0	44.3
2	No	56.6	72.7	51.2	20.0	55.7

Table B.68 If no, do you think the provision of a play area for children is necessary?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	100.0	95.9	95.2	28.9	97.1
2	No	0.0	4.1	4.8	11.1	2.9

Table B.69 If yes, what do you recommend?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	An adventure play area	69.0	54.2	47.6	50.0	59.3
2	A supervised place	28.2	43.0	47.6	37.5	37.2
3	Other	2.8	2.8	4.8	12.5	3.5

Table B.70 Do you think there is a need to improve the facilities in your neighbourhood?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Yes	90.9	96.0	97.6	80.0	91.8
2	No	9.1	4.0	2.4	20.0	8.2

Table B.71 Mosque / add amenities

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	16.7	14.8	15.8	21.1	16.3
2	Needed in the neighbourhood	15.3	22.2	7.9	5.2	15.7
3	Not needed	10.3	2.5	5.2	15.8	6.9
4	Already provided	57.7	60.5	71.1	57.9	61.1

Table B.72 School / add amenities

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	17.3	7.9	57.9	0.0	19.9
2	Needed in the neighbourhood	17.3	10.6	26.3	11.8	16.0
3	Not needed	0.0	2.6	0.0	5.8	1.5
4	Already provided	65.4	78.9	15.8	82.4	62.6

Table B.73 Library / add amenities

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	39.0	33.7	45.7	56.0	39.8
2	Needed in the neighbourhood	52.6	62.8	51.4	36.0	54.4
3	Not needed	2.1	0.0	2.9	8.0	2.0
4	Already provided	6.3	3.5	0.0	0.0	3.8

Table B.74 Leisure time education centre / add amenities

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	40.0	23.5	40.7	30.0	33.0
2	Needed in the neighbourhood	54.1	58.0	53.1	45.0	54.6
3	Not needed	4.7	7.4	3.1	15.0	6.4
4	Already provided	1.2	11.1	3.1	10.0	6.0

Table B.75 Shops / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	41.4	44.0	27.8	51.7	41.6
2	Needed in the neighbourhood	18.4	38.5	0.0	17.3	23.0
3	Not needed	0.0	0.0	0.0	3.4	0.4
4	Already provided	40.2	17.5	72.2	27.6	35.0

Table B.76 Public transport / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	38.1	44.2	58.3	10.5	41.3
2	Needed in the neighbourhood	16.7	38.4	27.8	5.3	25.8
3	Not needed	1.2	2.3	8.3	5.3	3.1
4	Already provided	44.0	15.1	5.6	78.9	29.8

Table B.77 Roads & access / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	13.0	11.8	60.1	16.6	20.6
2	Needed in the neighbourhood	17.4	16.2	13.3	5.6	15.2
3	Not needed	7.3	13.2	3.3	5.6	8.7
4	Already provided	62.3	58.8	23.3	72.2	55.5

Table B.78 Sports centre / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	39.6	26.7	68.8	37.5	38.8
2	Needed in the neighbourhood	46.9	70.0	28.6	20.8	50.2
3	Not needed	1.0	1.1	0.0	4.2	1.2
4	Already provided	12.5	2.2	2.9	37.5	9.8

Table B.79 Children's play area / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	54.8	51.2	56.7	34.8	51.7
2	Needed in the neighbourhood	32.3	33.3	16.7	21.7	29.6
3	Not needed	0.0	0.0	0.0	0.0	0.0
4	Already provided	12.9	15.5	26.6	43.5	18.7

Table B.80 Park / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	31.5	16.5	25.9	13.6	23.5
2	Needed in the neighbourhood	51.7	57.0	33.3	31.8	49.3
3	Not needed	4.5	6.3	11.1	0.0	5.5
4	Already provided	12.3	20.2	29.7	54.5	21.7

Table B.81 Public lavatory / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	19.2	7.9	25.0	15.0	15.2
2	Needed in the neighbourhood	39.7	38.2	4.2	55.0	36.4
3	Not needed	37.2	52.6	66.6	20.0	44.9
4	Already provided	3.8	1.3	4.2	10.0	3.5

Table B.82 Health centre / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	23.3	26.7	44.8	22.7	27.3
2	Needed in the neighbourhood	62.3	71.1	31	27.3	58.4
3	Not needed	1.1	0.0	3.4	4.5	1.3
4	Already provided	13.3	2.2	20.7	45.5	13.0

Table B.83 Police station / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	17.4	13.4	18.5	16.7	16.0
2	Needed in the neighbourhood	68.6	72.0	48.2	22.2	63.4
3	Not needed	5.8	12.2	14.8	0.0	8.9
4	Already provided	8.2	2.4	18.5	61.1	11.7

Table B.84 Post office / add amenities

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	Needed in walking distance	18.8	18.4	35.5	51.9	24.8
2	Needed in the neighbourhood	35.3	73.6	51.6	40.7	52.6
3	Not needed	1.2	6.9	9.7	3.7	4.8
4	Already provided	44.7	1.1	3.2	3.7	17.8

Table B.85 Main problem caused by mosque?

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	36.0	25.3	16.7	37.0	30.1
2	Gathers undesirable people	5.6	1.2	0.0	0.0	2.7
3	Makes the area crowded	1.1	0	0.0	3.7	0.9
4	Causes noise	20.2	10.8	23.3	18.5	15.9
5	No problem at all	37.1	62.7	60.0	40.7	50.4

Table B.86 Main problem caused by school?

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	10.5	0.0	68.8	25.9	16.8
2	Gathers undesirable people	4.2	0.0	3.1	0.0	2.2
3	Makes the area crowded	10.5	2.6	0.0	18.6	7.3
4	Causes noise	26.3	20.5	3.1	33.3	22.0
5	No problem at all	48.5	76.9	25.0	22.2	51.7

Table B.87 Main problem caused by library?

		Ekb. %	*Apa.*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	71.2	84.9	97.6	76.9	79.4
2	Gathers undesirable people	1.0	3.2	0.0	3.8	1.9
3	Makes the area crowded	0.0	1.1	0.0	0.0	0.4
4	Causes noise	1.0	1.1	0.0	0.0	0.7
5	No problem at all	26.8	9.7	2.4	19.3	17.6

Table B.88 Main problem caused by Leisure time education centre?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	79.3	86.9	97.5	81.5	85.5
2	Gathers undesirable people	0.0	1.1	0.0	0.0	0.4
3	Makes the area crowded	0.0	0.0	0.0	0.0	0.0
4	Causes noise	3.3	0.0	0.0	3.7	1.6
5	No problem at all	17.4	12.0	2.5	14.8	12.5

Table B.89 Main problem caused by shops?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	26.2	37.6	3.6	28.6	27.6
2	Gathers undesirable people	14.6	1.2	0.0	3.5	7.0
3	Makes the area crowded	16.5	8.2	21.4	14.3	14.0
4	Causes noise	4.8	1.2	0.0	14.3	4.1
5	No problem at all	37.9	51.8	75.0	39.3	47.3

Table B.90 Main problem caused by public transport?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	14.0	55.2	94.9	24.1	42.8
2	Gathers undesirable people	1.0	3.1	0.0	0.0	1.6
3	Makes the area crowded	10.8	1.1	0.0	13.7	5.8
4	Causes noise	9.7	7.3	0.0	31.0	9.7
5	No problem at all	65.5	33.3	5.1	31.0	40.1

Table B.91 Main problem caused by roads & access?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	16.5	13.0	48.4	20.8	20.4
2	Gathers undesirable people	1.3	0.0	0.0	0.0	0.5
3	Makes the area crowded	3.8	1.3	0.0	16.7	3.8
4	Causes noise	12.7	15.6	3.2	25.0	13.7
5	No problem at all	65.8	70.1	48.4	37.5	61.6

Table B.92 Main problem caused by sports centre?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	57.9	87.3	92.7	33.3	71.6
2	Gathers undesirable people	3.2	3.2	0.0	7.4	3.1
3	Makes the area crowded	3.2	2.1	0.0	0.0	2.0
4	Causes noise	8.4	2.1	0.0	18.5	5.8
5	No problem at all	27.3	5.3	7.3	40.8	17.5

Table B.93 Main problem caused by children's play area?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	43.0	58.2	59.5	30.8	49.6
2	Gathers undesirable people	5.0	3.3	2.7	0.0	3.5
3	Makes the area crowded	10.0	5.5	8.1	0.0	7.1
4	Causes noise	21.0	8.8	10.8	34.6	16.5
5	No problem at all	21.0	24.2	18.9	34.6	23.2

Table B.94 Main problem caused by park?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	70.3	60.2	73.7	42.3	64.2
2	Gathers undesirable people	2.2	1.1	0.0	0.0	1.2
3	Makes the area crowded	1.1	3.4	2.6	7.7	2.9
4	Causes noise	5.5	1.1	0.0	3.8	2.9
5	No problem at all	20.9	34.1	23.7	46.2	28.8

Table B.95 Main problem caused by public lavatory?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	86.5	93.4	42.5	62.4	87.6
2	Gathers undesirable people	3.1	2.2	5.0	4.2	3.2
3	Makes the area crowded	2.1	1.1	0.0	4.2	1.6
4	Causes noise	4.2	0.0	0.0	4.2	2.0
5	No problem at all	4.2	3.3	2.5	25.0	5.6

Table B.96 Main problem caused by health centre?

		Ekb.	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	68.8	96.7	82.9	40.0	78.3
2	Gathers undesirable people	0.0	0.0	0.0	0.0	0.0
3	Makes the area crowded	0.0	0.0	0.0	4.0	0.4
4	Causes noise	1.0	0.0	0.0	4.0	0.8
5	No problem at all	30.2	3.3	17.1	52.0	20.5

Table B.97 Main problem caused by police station?

		Ekb.	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	82.3	94.5	90.2	48.0	84.6
2	Gathers undesirable people	2.1	0.0	0.0	0.0	0.8
3	Makes the area crowded	0.0	0.0	2.4	0.0	0.4
4	Causes noise	1.0	0.0	0.0	4.0	0.8
5	No problem at all	14.6	5.5	7.4	48.0	13.4

Table B.98 Main problem caused by post office?

		Ekb.	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	No such amenity	48.9	95.6	100	54.2	75.4
2	Gathers undesirable people	0.0	0.0	0.0	0.0	0.0
3	Makes the area crowded	0.0	0.0	0.0	4.2	0.4
4	Causes noise	1.1	0.0	0.0	4.2	0.8
5	No problem at all	50	4.4	0.0	37.5	23.4

Table B.99 What do you think of the cul-de-sac concept?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk. %*	*All %*
1	I like it and I'd like to live in one	13.1	22.2	31.7	22.2	19.8
2	I don't like it & don't want to live in	31.1	18.2	14.6	22.2	23.5
3	I neither like nor dislike it	55.8	59.6	53.7	55.6	56.7

Table B.100 What do you think of the traffic calming idea in your neighbourhood?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk %*	*All %*
1	Like	94.2	91.7	97.6	81.4	92.0
2	Dislike	3.3	5.2	2.4	7.0	4.3
3	Neither like nor dislike	2.5	3.1	0.0	11.6	3.7

Table B.101 How would you prefer the pedestrian and vehicular movement to be in your neighbourhood in the future?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk %*	*All %*
1	All in the same street	48.7	45.6	33.3	52.6	46.1
2	Complete separation between them	49.6	53.3	66.7	47.4	52.8
3	Other	1.7	1.1	0.0	0.0	1.1

Table B.102 Are there any specific qualities you think your neighbourhood?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk %*	*All %*
1	Yes	59.0	67.7	56.1	37.8	58.3
2	No	41.0	32.3	43.9	62.2	41.7

Table B.103 How would you sum up your feelings about your home?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk %*	*All %*
1	Very satisfied	12.6	13.1	4.9	13.3	118
2	Satisfied	78.2	72.7	78	77.8	76.4
3	Neither satisfied nor dissatisfied	6.7	5.1	9.8	2.2	5.9
4	Dissatisfied	1.7	8.1	4.9	6.7	4.9
5	Very dissatisfied	0.8	1.0	2.4	0.0	1.0

Table B.104 How would you sum up your feelings about your neighbourhood?

		Ekb. %	*Apa. %*	*Ati. %*	*Esk %*	*All %*
1	Very satisfied	6.3	7.2	9.8	11.6	7.8
2	Satisfied	58.9	61.9	48.8	65.2	59.4
3	Neither satisfied nor dissatisfied	9.8	12.4	19.4	2.3	10.9
4	Dissatisfied	22.3	17.5	17.1	18.6	19.5
5	Very dissatisfied	2.7	1.0	4.9	2.3	2.4

THE SAMPLES

The physical nature of the four chosen sample areas on the levels of the neighbourhood, buildings and dwellings are documented in Appendix C.

C.1. EKBATAN

The Ekbatan scheme (*Shahrak*[1]*-e-Ekbatan)* is situated in the west-end of Teheran 2-km distant from Azadi Square[2]. It is surrounded by the Karadj expressway to the north, Aircraft Industry to the west, the Karadj road (and the Mehrabad International Airport) to the south, and the Apadana and the Kouy-e-Bimeh residential areas to the east (see figures C.2 & C.10).

Located on a 220-hectare land plot the project of *Shahrak-e-Ekbatan* is the largest new-built housing scheme in Iran. It was planned for the construction of about 15000 dwelling units to accommodate a population of about 75000 people. The gross population density of the scheme is therefore about 340 persons per hectare and the gross residential density 67 dwellings per hectare. The total floor area of all residential buildings of the scheme is 192 hectares, which gives a Floor Area Ratio [FAR] of 0.87. A FAR smaller than one is considered very low density, although one would perceive from the mass of buildings that the scheme is very high-density (see Figures C.1 & C.6).

In phase one the gross residential floor area is 73 hectares and the ground coverage of residential buildings is 9 hectares. The height of buildings varies from 5 to 9 to 13 floors with ground floors left open for through access. The land plot allocated to phase one including the provisions and half width of its surrounding streets is 60 hectares.

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[1]The word "Shahrak" in Farsi means 'small town' or 'township' and it stands for 'Residential Community' in architectural contexts.

[2]Azadi Square accommodates the most famous monument of Teheran recognised as the identifying icon of the city.

In phase two the gross residential floor area is 92 hectares and the ground coverage of residential buildings is 7.7 hectares. All blocks are 13 storey buildings with the ground floor left open for through access. The land plot allocated to phase two including the provisions and half width of its surrounding streets is 55 hectares.

In phase three the gross residential floor area is 27 hectares and the ground coverage of residential buildings is 3.3 hectares. The height of buildings varies from 5 to 9 to 13 floors with ground floors left open for through access. The land plot allocated to phase three including the provisions and half width of its surrounding streets is 24 hectares.

The total land used for the three phases, including the residential buildings and the provisions, is 139 hectares. About 80 hectares of the 220-hectare site are left as a buffer zone between phases one and two as well as to accommodate two football stadiums in the middle of the phase one area (see Figure C.2). The total ground coverage of residential buildings in all three phases is 20 hectares (11% of the site). More than forty percent of the total area is allocated for green space in an attempt to make the area look like a park and to provide a suitable place for the inhabitants for passive recreation after a day's work (see Figure C.1).

Figure C. 1 A view of phase one building blocks
Source: Teheran Reconstruction & Development Co., n.d.

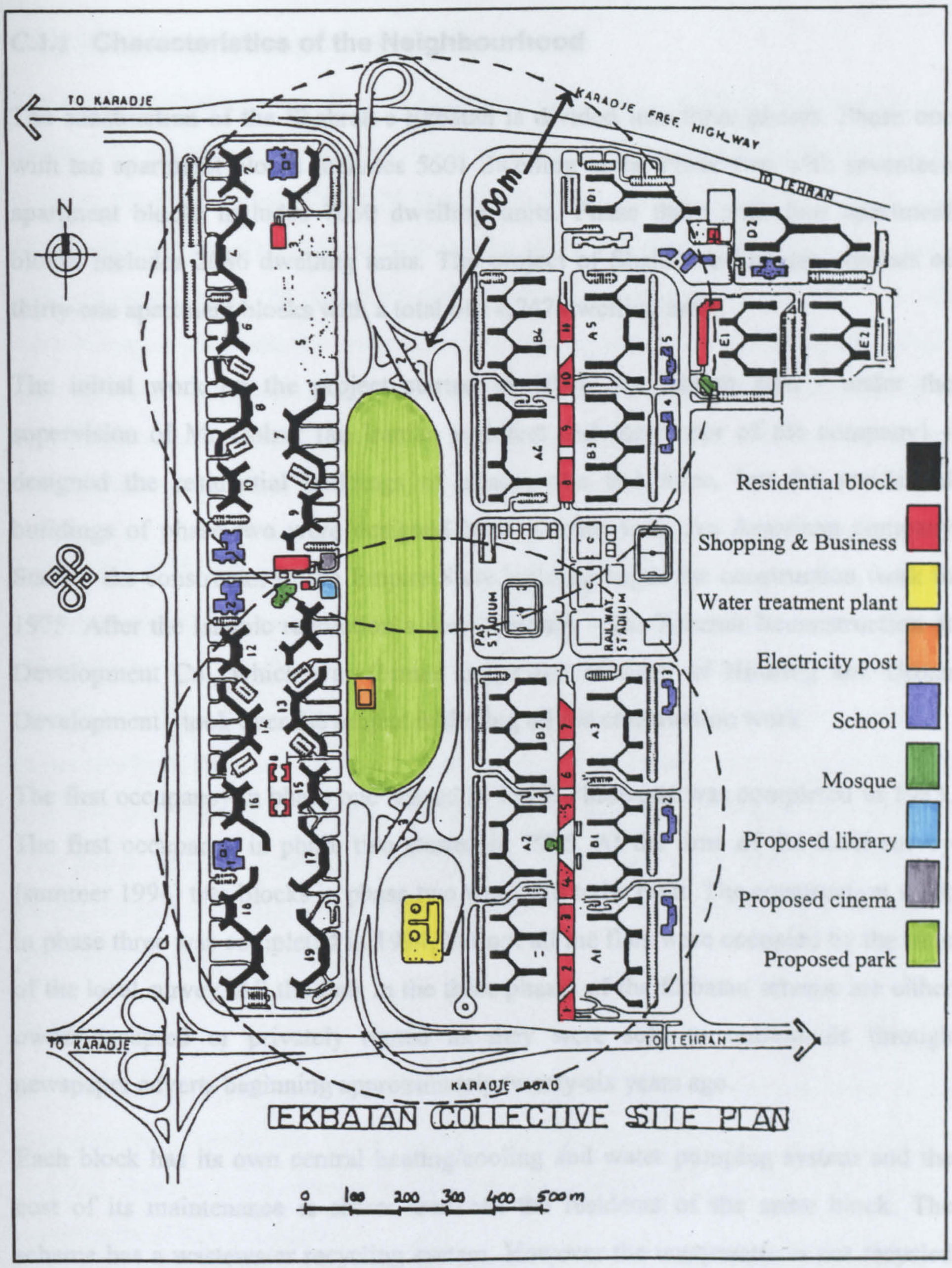

Figure C. 2 **Site Plan of Ekbatan illustrating the ring roads around apartment blocks of Phases 1, 2, & 3 and the distances to provisions.**

Source: Adopted from Teheran Reconstruction & Development Co., n.d.

C.1.1 Characteristics of the Neighbourhood

The construction of the Shahrak-e-Ekbatan is divided into three phases. Phase one with ten apartment blocks includes 5601 dwelling units. Phase two with seventeen apartment blocks includes 7060 dwelling units. Phase three with four apartment blocks includes 2086 dwelling units. The project of Shahrak-e-Ekbatan consists of thirty-one apartment blocks with a total of 14,747 dwelling units.

The initial work on the project started in 1974. An Iranian firm - under the supervision of Mr Golzar (an Iranian architect and the owner of the company) – designed the residential buildings of phases one and three, but the residential buildings of phase two were designed by a Korean firm. An American company Starit – the constructor of the Empire State building began the construction work in 1975. After the Islamic revolution a new company – the Teheran Reconstruction & Development Co., which was formed under the Ministry of Housing and Urban Development - took over the project including all the construction work.

The first occupancy in phase one started in 1975. Phase one was completed in 1983. The first occupancy in phase two started in 1985. At the time of the local survey (summer 1994) two blocks in phase two were still to be built. The construction work in phase three was completed in 1994, but not all the flats were occupied by the time of the local survey. All the flats in the three phases of the Ekbatan scheme are either owner-occupied or privately rented as they were sold to individuals through newspaper adverts beginning approximately twenty-six years ago.

Each block has its own central heating/cooling and water pumping system and the cost of its maintenance is shared between the residents of the same block. The scheme has a wastewater recycling system. However the wastewater is not recycled to a high standard that could be reused within the scheme, but it is claimed that it is suitable for watering the plants. However, the recycled water from this scheme is passed to the Firuzabad stream - through a three-kilometre covered channel - to be used in farmlands in southern areas of Tehran.

Neighbourhood Management System

The whole settlement has a Central Managing Committee (CMC) which acts as the voice of the community for external communications. The CMC also sets up uniform policies for the internal affairs of the Block Managing Committees (BMC). The BMC members are elected from amongst the residents of the same block for a year. BMC is responsible for the financial issues, the security, maintenance of the installations, repairs and the proper running of everyday life in the block. As all the flats are owner-occupied (although some are rented) the government has nothing to do with the running costs of the buildings. All residents pay their share of the running costs of each block based on the size of their flats.

Road and Access

The main access to the settlement is through the Ekbatan express way connecting the Karadj highway to the North and the Makhsous road to the South of the settlement (see Figure C.2). It provides equal access to phases one and two while separating phase two from the rest of the settlement. There is also another entry to the settlement from the Southeast corner to the Makhsous road. A ring road around the blocks of each phase separates them from other phases. Ring roads serve vehicular access to on-site car parking beside the blocks of phases one and three, and to the underground parking of the blocks of phase two.

Parking

On-site parking is provided around all the buildings of phases one and three. Phase two apartment blocks are equipped with underground parking as well as on-site parking. There is a complete separation between pedestrian pathways and vehicular movements in this settlement.

Public Transport

Limitation on the resources has forced the authorities to set up public transport only for large-scale suburban residential areas. Due to the large number of inhabitants public transportation (a bus service) has been arranged for the Ekbatan settlement.

Pedestrian Pathways

As a ring road surrounds all the buildings of each phase, pedestrian pathways are designed separate from the streets offering more security to pedestrians to walk safely within the area of a phase. The building blocks are very long, but the ground floors of all the blocks in phases one and three were left open. This facilitates short cut pedestrian access through buildings all around the site, preventing residents walking long distances unnecessarily in order to gain access to public facilities and to their relatives or friends living in other blocks. In phase two, on the other hand, a north/south wide canyon between high-rise blocks serves as the pedestrian pathway while accommodating a number of small shops (see Figure C.3).

Figure C. 3 **[Top, L & R] illustrating pedestrian pathways in block one, [Bottom, L] illustrates the main pedestrian pathway in phase two, [Top and Bottom R] illustrate fire escape stairwells in buildings of phase one.**

Source: Author, summer 1994.

Public Services and Facilities

The settlement is equipped with only the minimum of services and facilities required for such a huge residential area. As shown in Table C. 1, the available public facilities in this huge neighbourhood with an expected population of over 70,000 people are limited to 3 mosques, 8 primary schools, 4 secondary schools, 4 high schools, 1 bank and 600 individual small shops. A cinema and a library as well as a park on the vacant land between phases one and two, were also proposed for the scheme.

Table C. 1 Public Facilities available within the Ekbatan Neighbourhood.

Socio-Cultural Provisions	Availability
Community centre	N/A
Hosseinieh	N/A
Mosque	3
Women's meeting place	N/A
Children's play area	N/A
Gymnasium	N/A
Swimming pool	N/A
Cinema	Proposed
Library	Proposed
Park	Proposed
Educational Provisions	**Availability**
High school	4
Leisure time education centre	N/A
Nursery school	Temporarily some private ones
Primary School	8
Secondary school	4
Other Provisions	**Availability**
Bank	N/A
Police station	N/A
Post office	N/A
Health centre	N/A
Public lavatory	N/A
Public transport	Yes
Parking	Yes, on-site and under ground
Shops or Supermarket	Yes, 600 small shops

Walkability

Except for the schools, which are distributed evenly over the site, other existing public facilities are mostly centralised in the service zone of phase one. This provides inhabitants of phase one with easy access to all the available public facilities in walking distance to their homes, but the residents of phases two and three need to walk more than 10 minutes and cross major roads to have access to provisions. This discourages walking to services and facilities within the scheme resulting in car dependency.

C.1.2 Characteristics of the Buildings

Access to all building entries is through pathways that are connected to the public facility zones. There are two types of apartment blocks in the Ekbatan settlement with completely different designs of dwelling units. One type could be called an ordinary apartment flat and the other type is a maisonette (duplex). These are separated between the different phases as described below.

Buildings of Phases One and Three

Apartment blocks of phases one and three are very similar in design. Each block consists of a number of buildings, each with a separate entry. Each entry serves access to a twelve-floor building with four flats on each floor. The height of the buildings declines to the far end of the blocks' wings on the eleventh, the eighth, and the fifth floors which gives the blocks a step like shape (see figures C.1 & C.4).

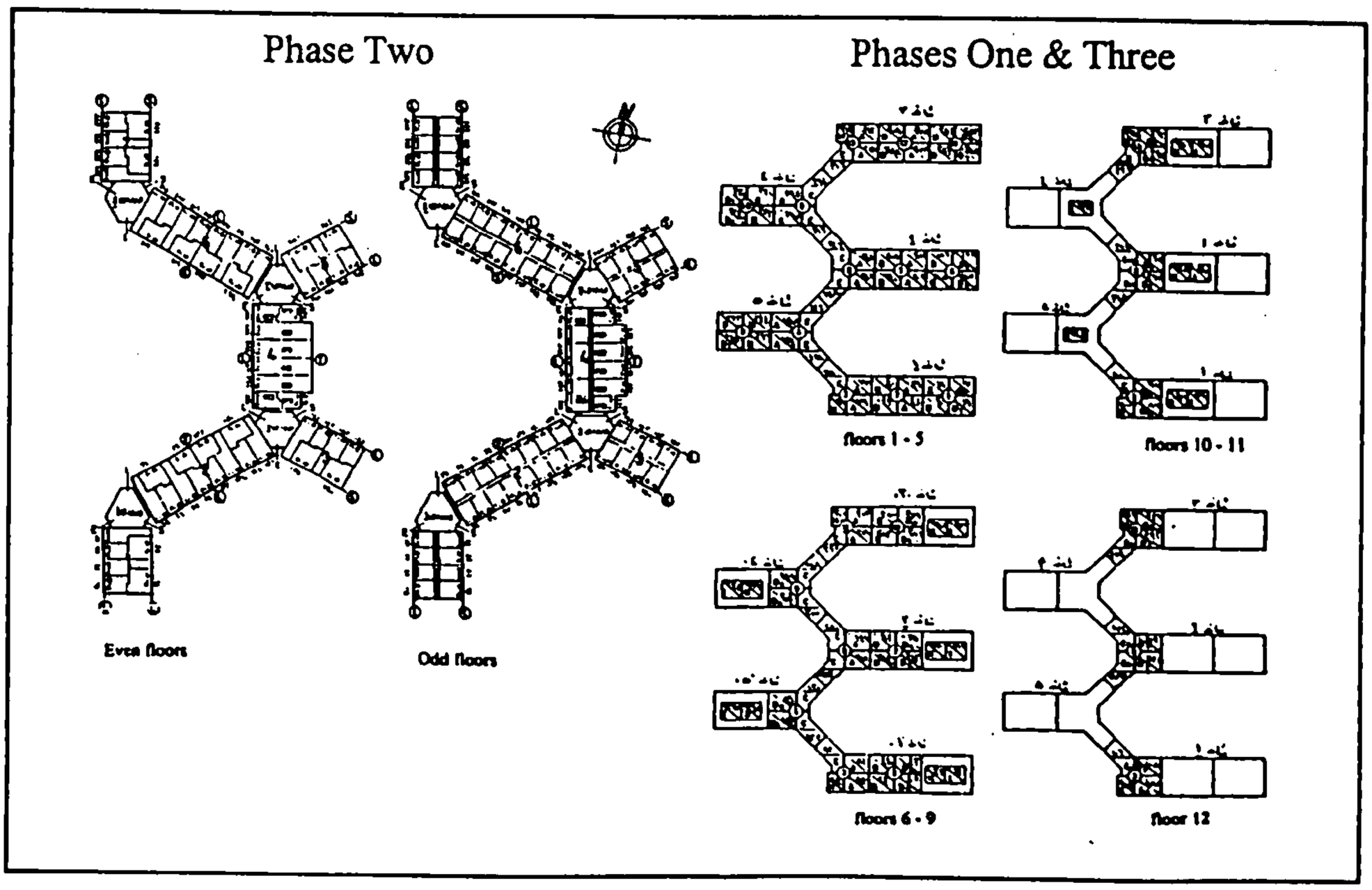

Figure C. 4 Types of Floor Plans of Ekbatan Neighbourhood.
Source: Adopted from Teheran Reconstruction & Development Co., n.d.

Buildings of Phase Two

Apartment blocks of phase two are different from those of phases one and three. They are maisonettes (duplex). All blocks are of the same height of 12 floors. All

floors are designed with only two different types of odd and even floor plans. Several entries provide access to a block. Lifts and stairs land on odd floors in a foyer that is connected to two or three internal corridors independently. At least six flat doors open to each corridor. All corridors are connected to each other on a floor. Dwelling units are located on both sides of corridors; this causes more flat doors to open into a corridor and may be economically feasible but prevents cross ventilation within individual flats (see figures C.4 & C.5).

Figure C. 5 Two Views of Phase Two Blocks.
Source: Author, summer 1994.

C.1.3 Characteristics of the Dwellings

As already mentioned, the design of the apartment blocks of phase two are totally different from that of other phases. There is also a big difference in the design of the dwellings between phase two and other phases. These are described below.

Dwellings of Phases One and Three

Most of the apartments in phases one and three have three bedrooms (see Figure C.6) although there are some one-bedroom and open-plan flats on the top floors of the buildings. There are a variety of different flat types, but all of them have more or less similar layouts; the only difference is the dimension of the rooms.

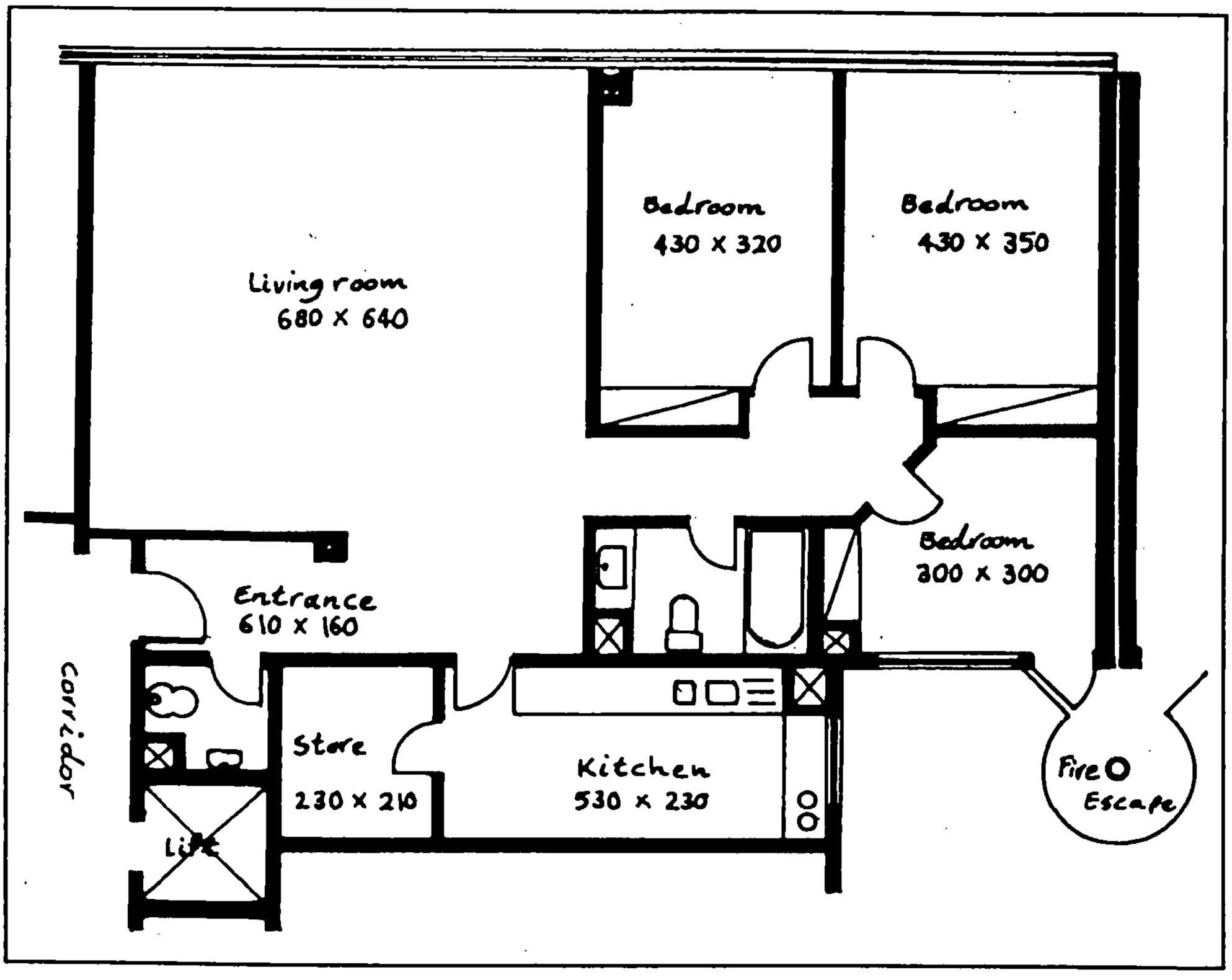

Figure C. 6 **A typical plan of a three-bedroom-flat in phases one and three.**
Source: Adopted from Teheran Reconstruction & Development Co., n.d.

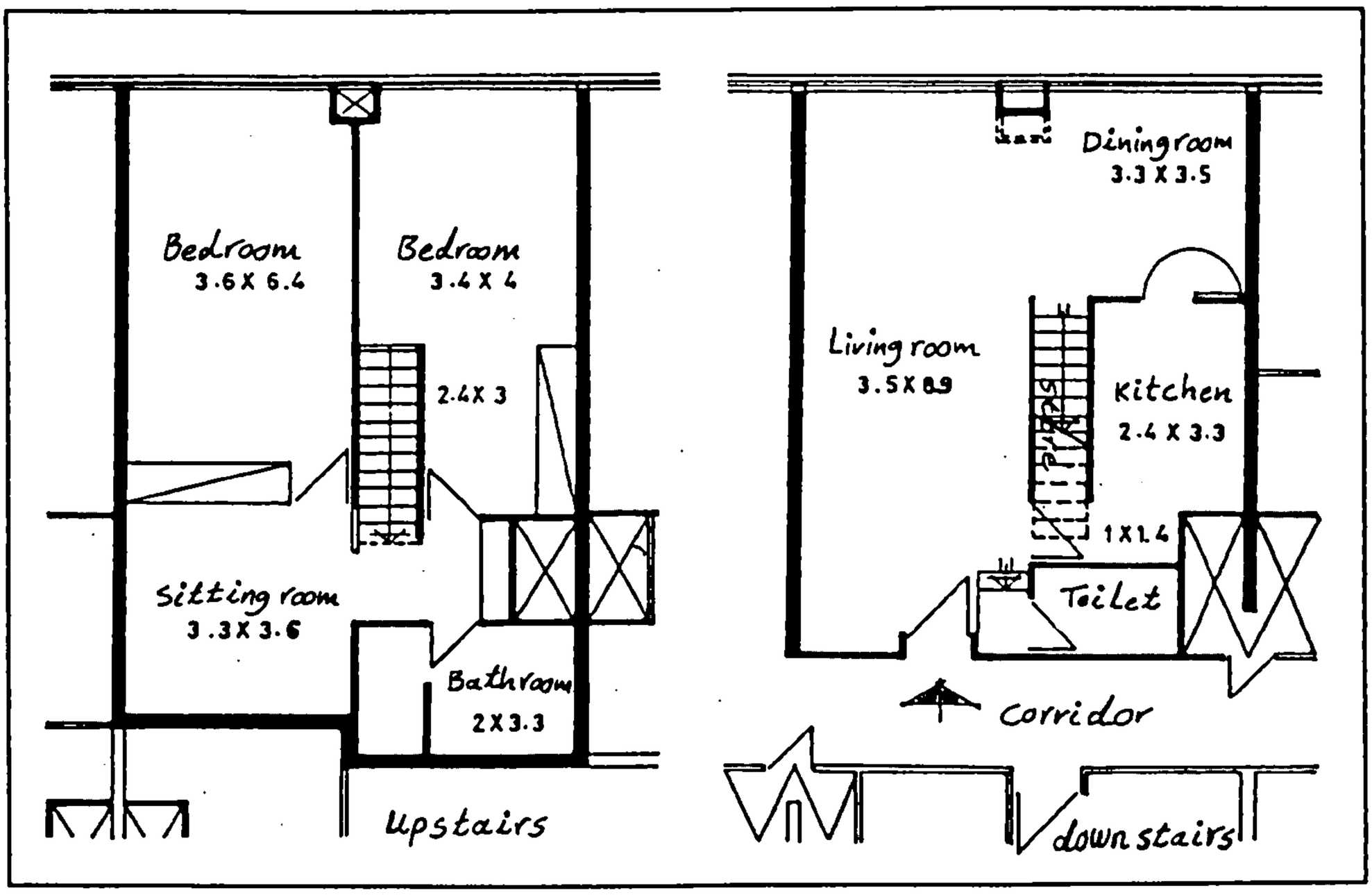

Figure C. 7 **A typical plan of a two-bedroom-maisonette in phase two.**
Source: Adopted from Teheran Reconstruction & Development Co., n.d.

Dwellings of Phase Two

Apartments of phase two are totally different from those of phases one and three. There are different flats in terms of number of bedrooms, layout, and design. Most dwellings are maisonettes with bedrooms on the upper level and the daytime living area on the lower level (see Figure C.7). A straight internal stair with eighteen steps connects the two floors. As all entry doors open into corridors on odd floors, straight stairs directly off the corridors give access some conventional and maisonette flats on even floors. These flats are not popular because of their entries (see Figure C.8).

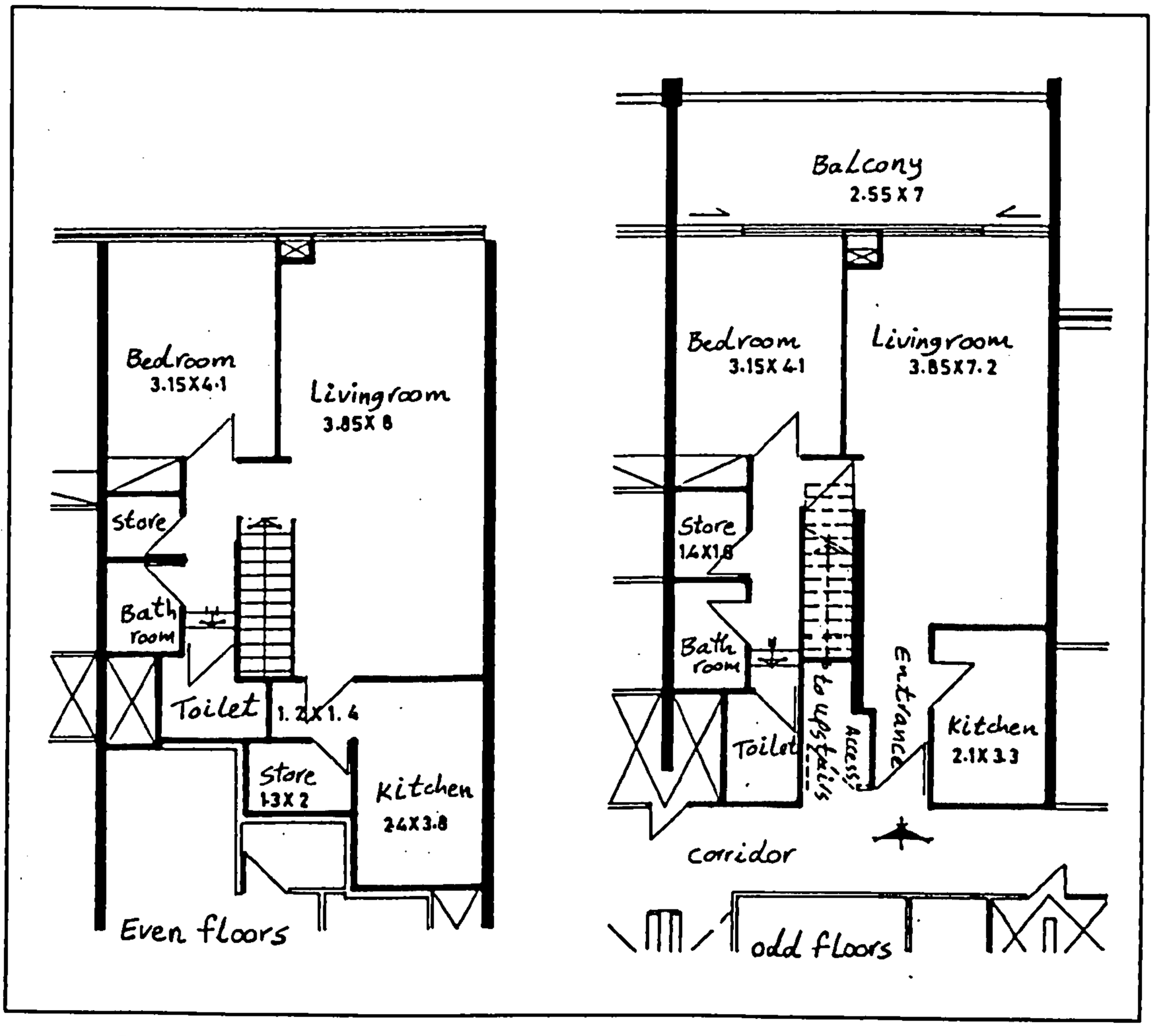

Figure C. 8 **A typical plan of two one-bedroom-flats (located on top of each other, but both with access from odd floors only) in phase two.**

Source: Adopted from Teheran Reconstruction & Development Co., n.d.

C.1.4 Comments

This scheme lacks many qualities expected from a settlement. The following identifies some inappropriate aspects of the scheme.

First of all the existing provisions are inadequate for such a large-scale settlement. Even the existing provisions are not in any way easily accessible within walking distance from all dwellings, therefore promoting car dependency.

The project is inhumane in scale and has no people-friendly image. Adding height to buildings requires more distance between them. This, in addition with the wrong orientation, has created a long north-south canyon no pedestrian would be willing to walk through during the hot summer of Tehran, when the temperature usually exceeds 40 degrees Celsius (see Figure C.3 & C.5).

The dominant east-west orientation of the building blocks of phases one and three seem to be in accordance with the recommended orientation for housing in response to climatic conditions in Tehran. The recommended east-west orientation of the house is intended to enable a house to have direct sunlight in some parts and at the same time shade in other parts. The layout of the building in these two phases, however, causes problems. As is shown in Figure C.4, there are four dwelling units in each floor of the buildings, two on the north side and two on the south side. The east-west orientation of the block causes the dwellings of the north side to have no direct sunlight at all while the dwellings on the other side have direct sunlight all day long. This layout also prevents cross ventilation.

Despite the inhumane scale of development, the scheme does not achieve an excessively high population density if compared with other high-rise development schemes specifically in the Far East (for instance Hong Kong with a density up to 1200 and more persons per hectare). There is also evidence that traditional low-rise development can achieve much higher densities than the one achieved in this settlement, for instance traditional housing in Baghdad with population densities estimated to be higher than a thousand persons per hectare [Warren & Fethi, 1982, p100]. The question therefore arises why the high-rise form was chosen if low-rise

forms could achieve more culturally and environmentally acceptable housing with a similar, if not higher, density and a built form that would be more aesthetically pleasing.

C.2. APADANA

The Apadana scheme (*Shahrak-e-Apadana)* is located one kilometre north-west of Azadi Square in the west-end of Teheran (see Figure C.9). It is surrounded by the Karadj expressway to the North, the Ekbatan scheme to the West, and the Kouy-e Bimeh neighbourhood to the South (see Figure C.10).

Figure C. 9 Apadana buildings (at the left) are visible from Azadi square.
Source: www.hamshahri.org/

The *Shahrak-e-Apadana* project was designed and constructed by a French company called S.A.E. for the Bank-e-maskan (housing bank). It was constructed in six phases. The construction work on the scheme began in 1976. The first occupants - those who bought their flats before the Islamic revolution - had moved in by 1985. The rest of the dwellings were sold gradually, through adverts in newspapers, as soon as a phase was completed.

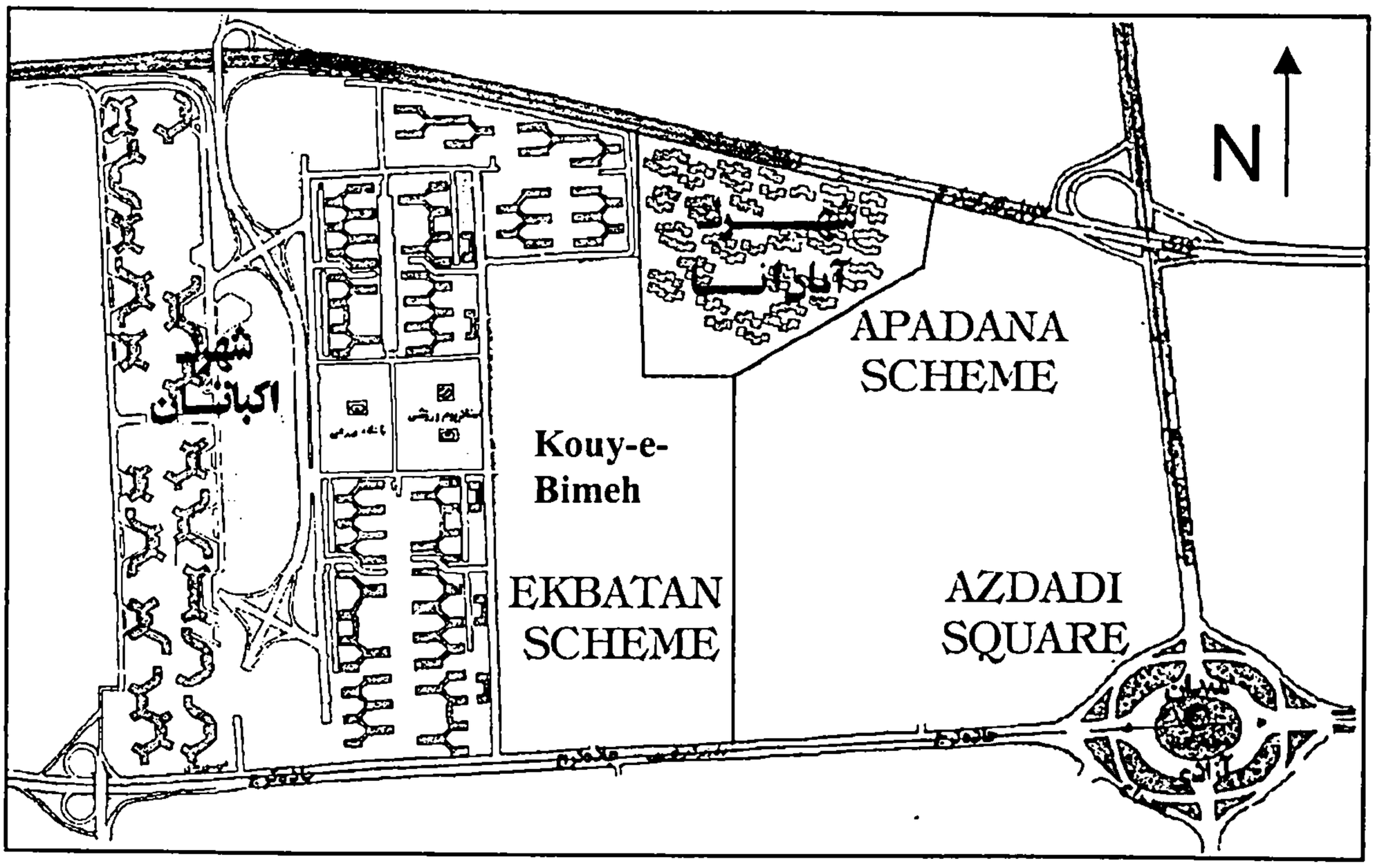

Figure C. 10 Location of Ekbatan & Apadana Neighbourhoods.
Source: Adopted from Atlas of Teheran, GSMM, 1992.

C.2.1 Characteristics of the Neighbourhood

The Apadana scheme lies on a 40 hectares plot of land. It includes 46 residential blocks, each with either 55, 66 or 68 dwelling units. In total there are 2901 dwelling units in this scheme. Considering the average household size of 4 – from a local survey - they accommodate a population of about 11600 people. The ground covered by residential buildings is 4.85 hectares (12.1% of the site) and the gross residential floor area is 41.5 hectares which gives a floor area ratio (FAR) of 1.04. The gross population density of the scheme is 325 persons per hectare and the gross residential density is 72.5 dwellings per hectare.

All blocks are connected to the central heating/cooling system through six kilometres of underground tunnels. All dwellings are provided with fan-coils that are connected to both the central heating and cooling systems.

Neighbourhood Management System

The installations and public affairs of the scheme are managed and maintained by six Phase Management Teams together with a central Neighbourhood Management Committee, all of which are annually elected by the residents of the Apadana scheme.

All residents share the expenses for the cost of running and the maintenance of the central heating/cooling system and the public amenities within the scheme, based on the number of bedrooms of their dwellings.

Road and Access

The access to the whole settlement is through the Karadj expressway to a peripheral ring road; cul-de-sacs off the ring road serve groups of blocks (see figures C.11 & C.12).

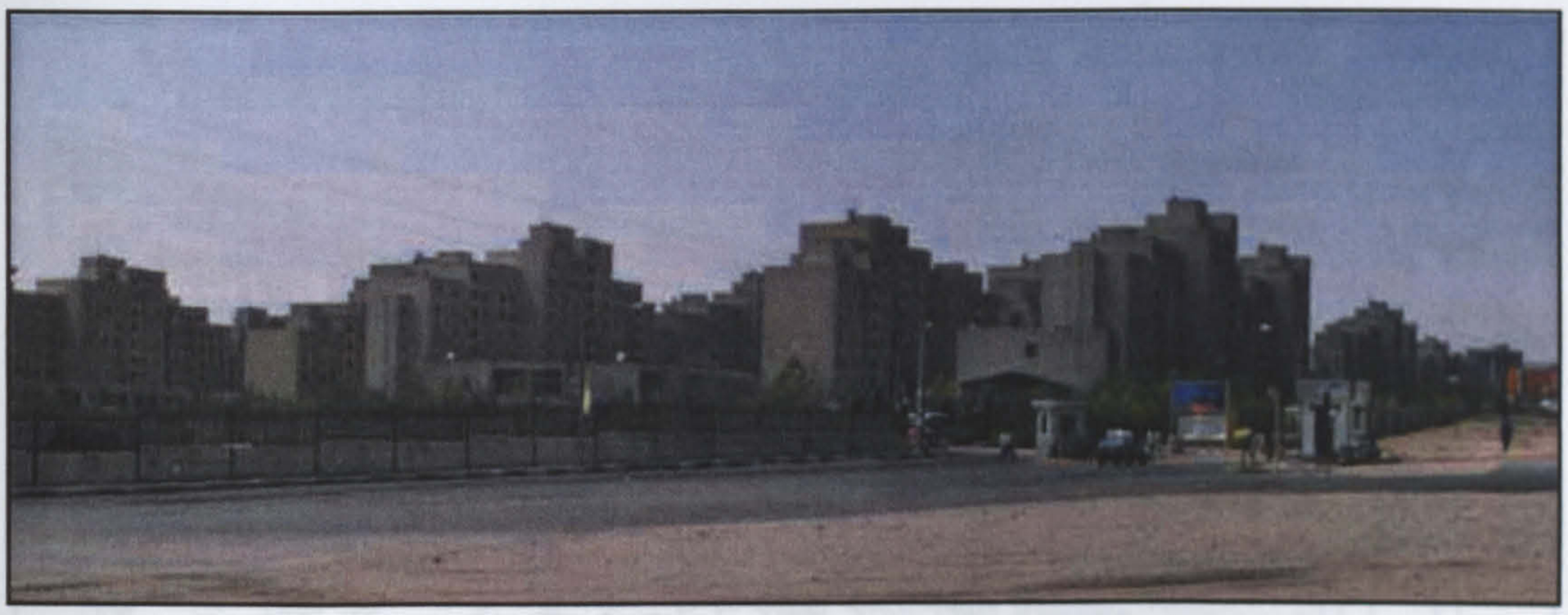

Figure C. 11 A north-eastern view of the Apadana neighbourhood illustrating the access to the scheme from the Karadj expressway.
Source: Author, summer 1994.

Parking

On-site parking around building blocks - within cul-de-sacs - is provided for all residents and visitors on a first-come first-served base.

Pedestrian Pathways

Pedestrian pathways within the Apadana scheme are provided in total separation from the ring road. However, to access some services and facilities pedestrians are required to pass through or across the cul-de-sacs. Although traffic calming on the ring road reduces car speed, too many bends and trees in the cul-de-sacs reduce visibility for drivers, which may increase the chance of accidents.

Public services and facilities

The survey proved that the area (see Figure C.12) does not provide all the required public services and facilities, which therefore need to be augmented to improve the

residents' quality of life. At the time of the survey in Apadana (summer 1994) the available services and facilities were limited to seven schools, six playgrounds and a few individual shops. At that time a mosque with a library, a health centre, two local shopping facilities and a shopping centre - that together would include 70 individual shops when completed - were also under construction. A swimming pool was also proposed for the scheme, but remained only on paper. The city's public transport network would not serve this scheme therefore the residents would have to rely on their own private transport or taxis.

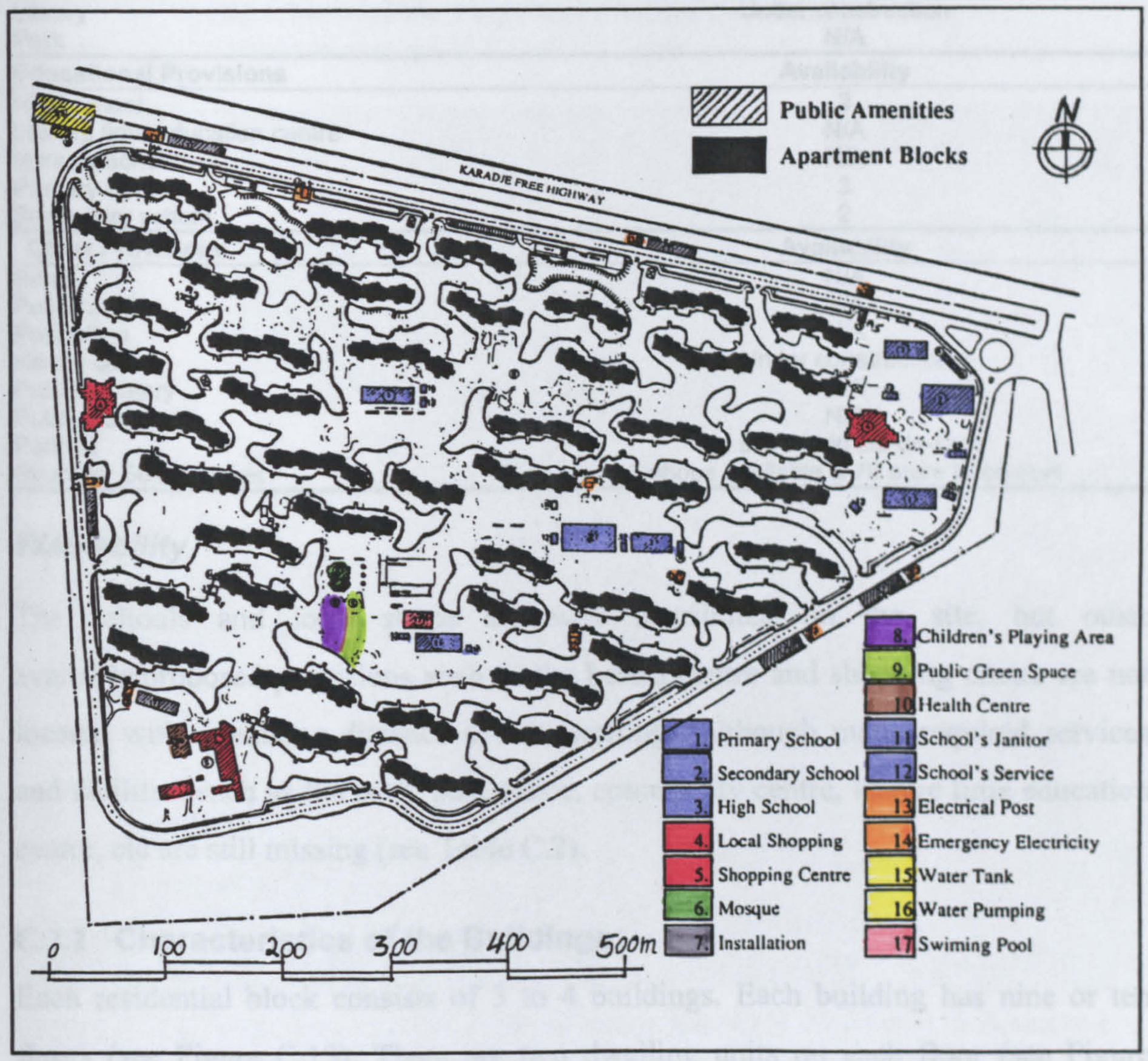

Figure C. 12 Site plan of the Apadana scheme illustrating the location of available/proposed services and facilities within the scheme.

Source: Adopted from technical office of Bank-e-Rahni, n.d.

Table C.2 lists all the available and proposed amenities within the scheme. It also illustrates the areas in which the scheme needs to be improved.

Table C. 2 Public Facilities in Apadana Neighbourhood.

Socio-Cultural Provisions	Availability
Community centre	N/A
Hosseinieh	N/A
Mosque	Under construction
Women's meeting place	N/A
Children's play area	6
Gymnasium	N/A
Swimming pool	Proposed
Cinema	N/A
Library	Under construction
Park	N/A
Educational Provisions	**Availability**
High school	2
Leisure time education centre	N/A
Nursery school	N/A
Primary School	3
Secondary school	2
Other Provisions	**Availability**
Bank	N/A
Police station	N/A
Post office	N/A
Health centre	Under construction
Public lavatory	N/A
Public transport	N/A
Parking	on site within cul-de-sacs
Shops or Supermarket	3 shops available & 70 more to be built

Walkability

The schools and local shops are well distributed on the site, but other available/proposed provisions such as the health centre and shopping centre are not located within walking distance of all dwellings, although many required services and facilities such as the park, post office, community centre, leisure time education centre, etc are still missing (see Table C.2).

C.2.2 Characteristics of the Buildings

Each residential block consists of 3 to 4 buildings. Each building has nine or ten floors (see Figure C.13). There are two dwelling units on each floor (see Figure C.15), except for the ground floor where there is only one dwelling unit. Access to buildings is through an unsupervised entry space on the ground floor (see Figure C.14).

Figure C. 13 **(L) A view of typical buildings in the Apadana scheme.**
(R) A view of the ring road around the scheme.

Source: Author, summer 1994.

Figure C. 14 **Top: Two typical views of entry spaces to buildings in Apadana.**
Bottom (L) A typical façade of the residential buildings and
Bottom (R) A typical entry space to a building.

Source: Author, 1994.

C.2.3 Characteristics of the Dwellings

Access to dwellings is through a staircase or a lift within the building. All dwelling units in the Apadana scheme are either two or three bedroom flats. Two dwelling doors open opposite each other to a small access corridor (see Figures C.15 & C.16).

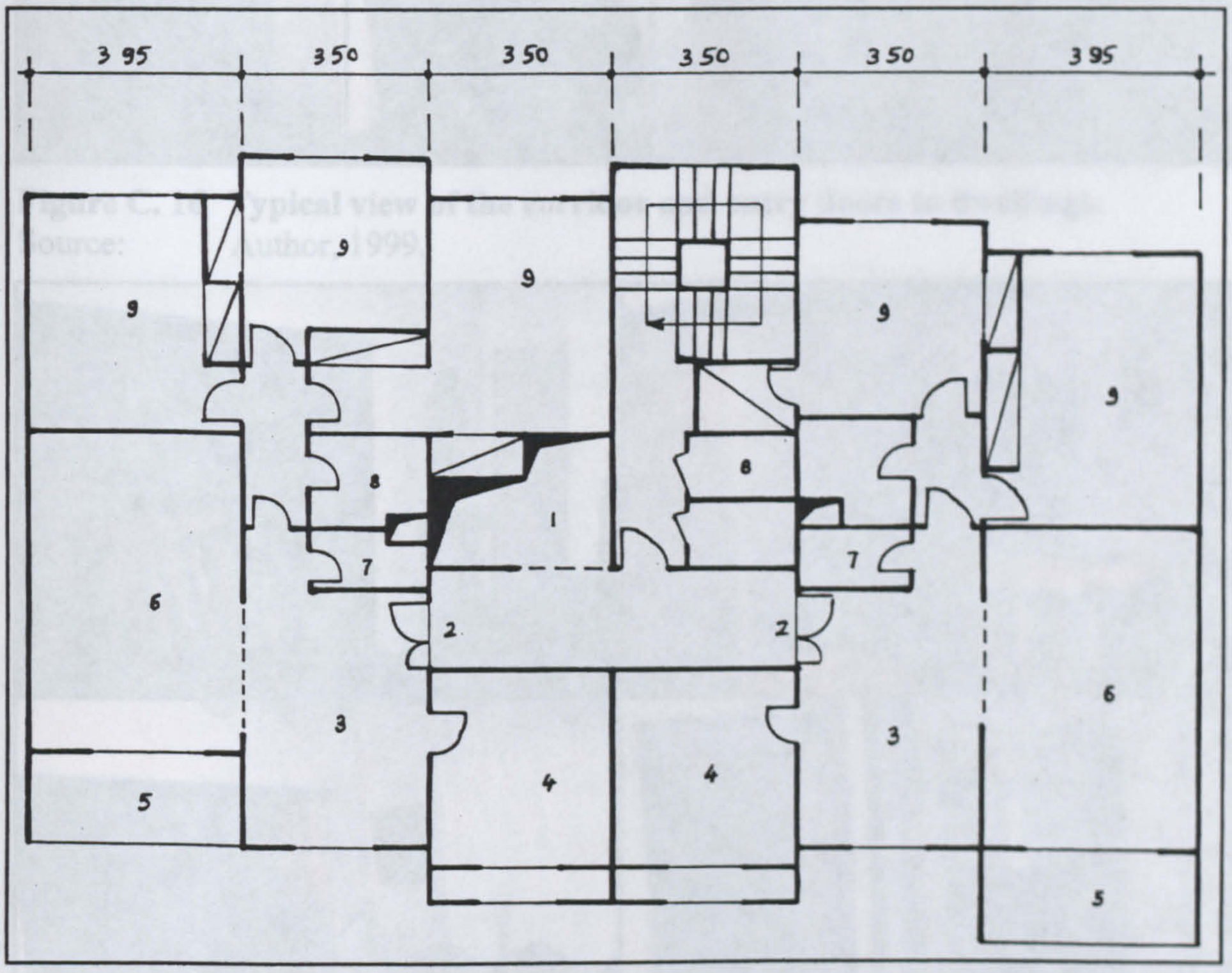

Figure C. 15 A typical building floor plan with two dwellings at east and west sides of a link corridor.

1. Lift	4. Kitchen	7. Toilet
2. Communal entrance space	5. Balcony	8. Bathroom
3. Sitting room	6. Reception	9. bedrooms

Source: Adopted from technical office of Bank-e-Rahni, n.d.

Typically, the dwelling's entry door opens directly into the sitting room. Also the kitchen, the toilet and the reception open to the sitting room although an enclosed corridor separates the bathroom and the bedrooms from the living area (see figures C.15 & C.17)

Figure C. 16 Typical view of the corridor and entry doors to dwellings.
Source: Author, 1999.

Figure C. 17 Internal views of a typical dwelling unit in Apadana.

C.2.4 Comments

Apart from lacking many provisions the scheme is enclosed by a ring road with only one entry point to the whole settlement. This has resulted in isolation of this scheme from access to provisions in neighbouring settlements. Furthermore, the small size of the settlement prevents the viability of the provision of public services and facilities such as public transport, parks and recreational facilities. The long distance to services and facilities such as the health centre and the shopping centre as well as the

lack of access to public transport severely discourages walking and results in car dependency.

Despite all these shortcomings the settlement did not achieve an excessively high population density, as did the Ekbatan scheme. Again, therefore, the question arises as why use a high-rise form while a low-rise form could produce even higher density and a more culturally and environmentally acceptable and more aesthetically pleasing environment.

C.3. ATISAZ

The Atisaz scheme is located on the north-western side of Tehran connected by the Chamran expressway to the east. It is delimited by the Grand Azadi hotel and the outlying village *Evin* to the north, the Chamran expressway to the east and vacant (derelict) land to the south and the west (see Figure C.18). Tehran's theme park and International exhibition centre are located in close proximity to the east of the scheme.

The Atisaz project was designed by two foreign firms - an Italian and French - and constructed by an Iranian company - Chakkosh Co.- for Bank-e-Omran (the development bank) before the Islamic revolution. After the revolution the project was taken over by the Bonyad-e-Mostaz'afan (a national charity fund) and the construction work continued by its Evin construction unit. All the dwellings were sold to individuals through newspaper and TV advertisements.

The project was divided into two phases. The construction work on phase one started in 1974. The first occupancy began in 1980. At the time of the local survey (summer 1994) all dwellings in phase one were completely occupied, but the construction work on the buildings of phase two was still underway and first occupancy in phase two was due to start in late 1995 or early 1996.

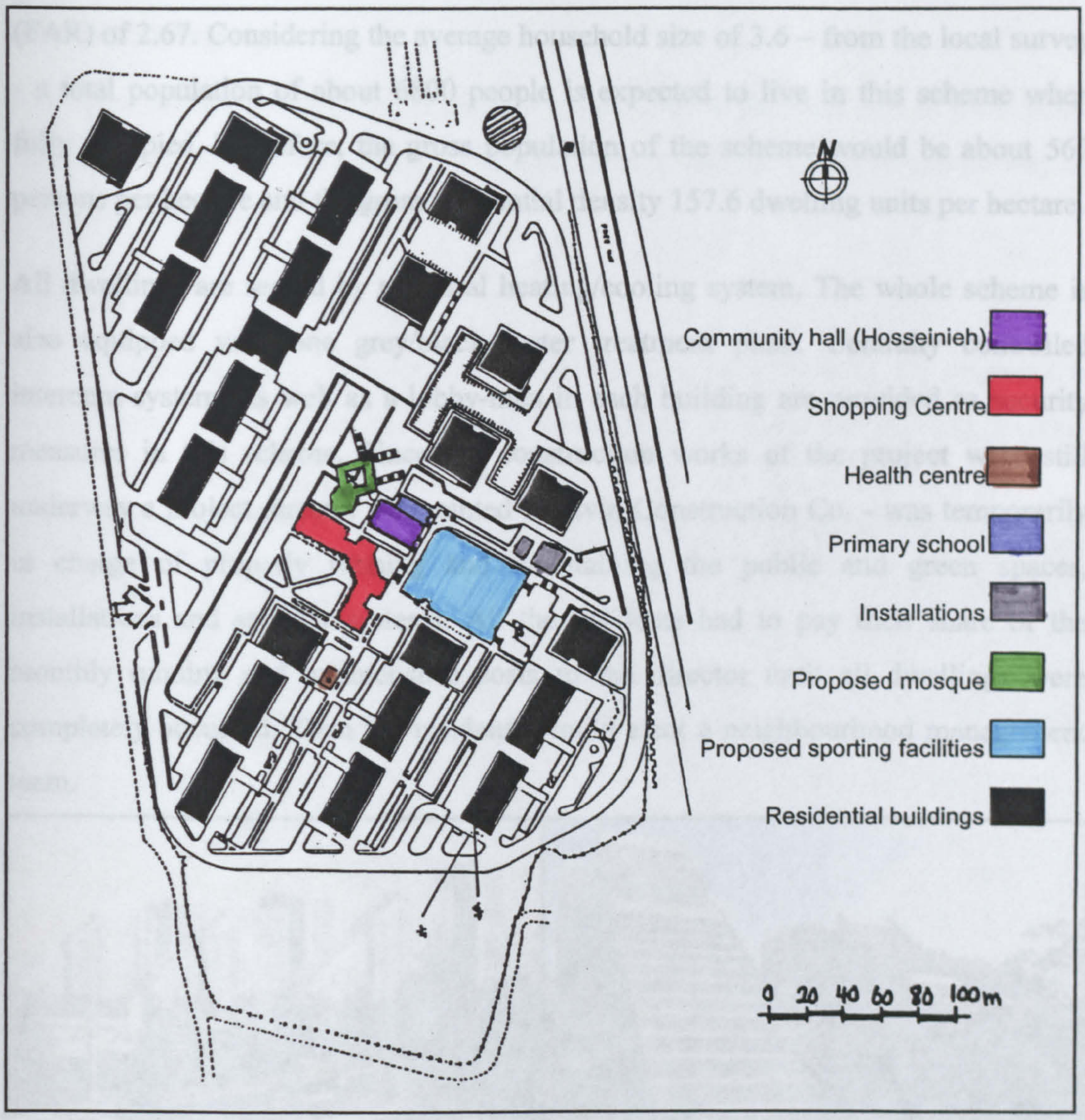

Figure C. 18 Collective site plan of the Atisaz.
Source: Adopted from Evin Construction Co., n.d.

C.3.1 Characteristics of the Neighbourhood

The Atisaz scheme lies on a 12-hectare plot of land. Centrally located services and facilities separate the two phases of the scheme. Phase one, located in the southern part of the scheme, consists of nine apartment blocks (10, 20, 22-26 floors) with a total of 684 dwelling units. Phase two, located on the northern part of the site, consists of thirteen apartment blocks (10, 20, 26-30 floors) with a total of 1208 dwelling units (see Figure C.19). In total there will be 1892 dwelling units in this scheme. The ground covered by the residential buildings is 1.65 hectares (14% of the site) and the gross residential floor area is 32 hectares which gives a floor area ratio

(FAR) of 2.67. Considering the average household size of 3.6 – from the local survey - a total population of about 6800 people is expected to live in this scheme when fully occupied. Therefore, the gross population of the scheme would be about 567 persons per hectare and the gross residential density 157.6 dwelling units per hectare.

All dwellings are served by a central heating/cooling system. The whole scheme is also equipped with one grey/black water treatment plant. Centrally controlled intercom systems as well as a lobby-man in each building are provided as security measures in this scheme. Since the construction works of the project were still underway a project director - appointed by Evin Construction Co. - was temporarily in charge of properly running and maintaining the public and green spaces, installations and security systems. All the residents had to pay their share of the monthly running and maintenance costs to the director until all dwellings were completely occupied. Then the residents would elect a neighbourhood management team.

Figure C. 19 Different angles views of the Atisaz residential buildings.
Source: Author, summer 1994.

Road and Access

Access to the whole settlement is through a local road at the west side of the scheme (see figures C.18 & C.20 & C.26), which is connected to the Chamran expressway on the north of the site.

Parking

One car parking space is assigned to each dwelling unit. Parking for residents is located either on the ground adjacent to the building or under the building. Parking for visitors is located on open space around the blocks (see figures C.20 & C.21).

Figure C. 20 **A western view of phase one buildings illustrating the Chamran expressway to east of the scheme (behind the buildings), main entry point to the scheme to the west of the scheme, ring roads around the buildings, and on-site and under building parking.**

Source: MoT, 1992, p154.

Figure C. 21 Illustration of visitors' car park around the buildings and access to residents' car park under the building in Atisaz.
Source: Author, summer 1994.

Pedestrian Pathways

All pedestrian pathways are fully separated from vehicular movement leading to the first floor of each block with a lobby-man in the foyer acting as concierge (see figures C.22 & C.23).

Figure C. 22 Pedestrian routes in Atisaz.
Source: Author, summer 1994.

Figure C. 23 Internal spaces (foyer and corridors) of a housing block.
Source: Author, summer 1994.

Public Services and Facilities

At the time of the local survey the services and facilities provided in this scheme were limited to a community hall which was temporarily used as *Hosseinieh,*[3], a primary school, an open space sports ground and a shopping centre (see figures C.18 & C.24). A health centre was under construction. A mosque, a library within the community centre, and a sports centre were also proposed (see Table C.3).

Figure C. 24 Shopping facilities within Atisaz.
Source: Author, summer 1994.

walkability

All the available services and facilities in the scheme are within a comfortable walking distance of all dwelling units simply because of their location in the central area of a relatively small size a settlement. However, it has to be mentioned that access to all other services and facilities outside this scheme requires the use of car.

[3]A Hosseinieh is a large sheltered place to accommodate public gatherings - mainly religious ceremonies.

Because this scheme is totally isolated, and no other adjacent settlements are connected to this scheme, the residents have no chance to use the provisions in other neighbouring settlements in walking distance. The only available means of public transport is one bus stop located in the far north eastern side of the scheme - on the Chamran expressway – which because of the steep slope and lack of proper pedestrian access as well as insufficient regular service is not often used by the residents.

Table C. 3 Public Facilities in Atisaz Neighbourhood.

Socio-Cultural Provisions	Availability
Community centre	Temporarily used as Hosseinieh
Hosseinieh	N/A
Mosque	proposed
Women's meeting place	N/A
Children's play area	N/A
Gymnasium	Outdoor playground
Swimming pool	N/A
Cinema	N/A
Library	Proposed, in community centre
Park	N/A
Educational Provisions	**Availability**
High school	N/A
Leisure time education centre	N/A
Nursery school	N/A
Primary School	1
Secondary school	N/A
Other Provisions	**Availability**
Bank	N/A
Police station	N/A
Post office	N/A
Health centre	Under construction
Public lavatory	N/A
Public transport	N/A
Parking	on site & under buildings
Shops or Supermarket	shopping centre

C.3.2 Characteristics of the Buildings

Basically, there are three types of buildings in this scheme, which vary considerably in height. They are locally known as 10, 20, and 30 storey buildings (for the sake of ease in referring to their heights). The 10 storey buildings have a diagonal shape. As the height increases – from south to north - the floor area (including the size of individual dwellings as well as the number of flats in each floor) decreases. This shape, which is said to have been intentionally chosen to produce an aesthetically pleasing view, is in harmony with the Alborz Mountains in the background. It has produced the possibility of creating roof terraces - for the dwelling on the south side of the buildings - which offer an unobstructed view of the city and allow sunshine

into the dwellings while maintaining full privacy. The 20 storey buildings are adjacent to the 10 storey buildings. The angular shape of the 10 storey buildings continues on the southern side of the 20 storey buildings to their roof. The 30 storey buildings – the real height varies considerably between 22-26-30 floors in different buildings – are similar to conventional residential tower blocks (see figures C.20, C.25 & C.26). The number of dwelling units per floor varies depending on the building type and the height - as the height increases the number of dwelling units per floor decreases – (see figure 27).

Access to the buildings also varies in different buildings; some of them have access through a straight staircase (see Figure C.21) and others have access via a few steps above the ground (see Figure C.26).

Figure C. 25 Eastern view of the Atisaz scheme.
Source: Author, summer 1994.

Figure C. 26 Access to the housing is closely monitored/controlled by bars at entry gate of the scheme as well as a lobby-man in each building.
Source: Author, summer 1994.

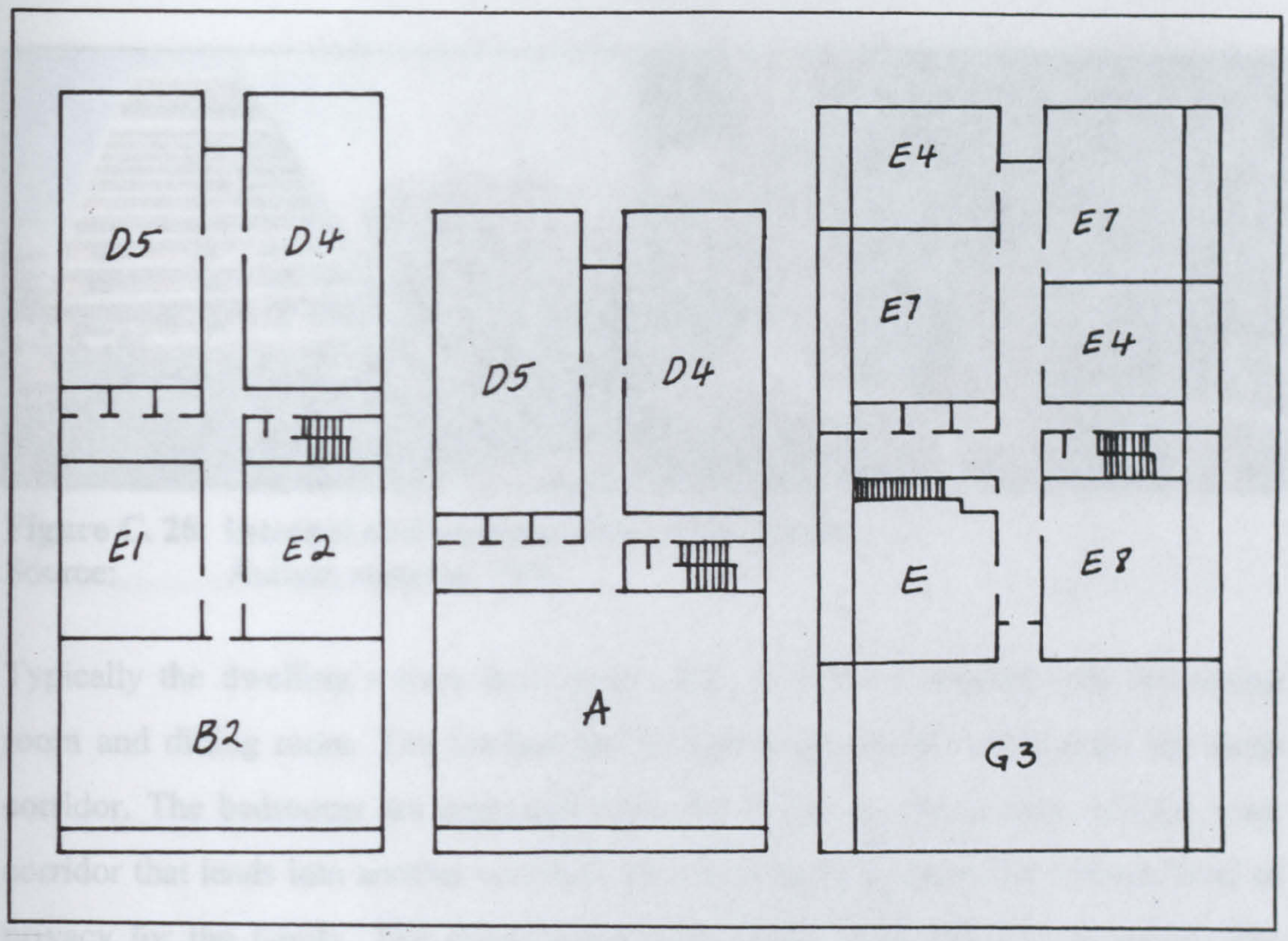

Figure C. 27 A few examples of different floor sizes and dwelling types in Atisaz residential buildings.

Source: Adopted from Evin Construction Co., n.d.

C.3.3 Characteristics of the Dwellings

Access to dwellings is through a staircase or a lift within the building. There are various types of dwellings from one to five bedrooms with the largest dwellings closer to the ground (see Figure C.27). In the 10 floor buildings, as the height of the building increases, its length decreases. With the width of the building fixed the result is a smaller floor area, therefore the number of flats in each floor as well as the size of flat decreases.

All dwelling units have various sized terraces and balconies. The dwelling units located on the south side of the buildings have the largest size of roof terraces (see Figure C.28).

Figure C. 28 Internal and external views of balconies.
Source: Author, summer 1994.

Typically the dwelling's entry door opens onto a corridor leading into the sitting room and dining room. The kitchen and bathroom doors also open onto the same corridor. The bedrooms are separated from the living area by a door off the entry corridor that leads into another corridor. This is in order to meet the desired level of privacy for the family. The sitting room and dining room are not separated. The modular structural elements of the building divide the sitting room into sections reducing the integrity of one large living room space (see figures C.29 & C.30).

C.3.4 Comments

The small size of the settlement prevents the provision of public services and facilities such as public transport, parks and recreational facilities located on site. However, being isolated from the rest of the city – not connected to other neighbourhoods - puts more emphasis on the need to provide services and facilities in this scheme, even more than other settlements of similar size within the city. This scheme lacks many educational and recreational facilities within walking distance of the dwellings such as a library, children's play area, school, and sports facilities. Also, there are no services and facilities in close proximity (e.g. within a neighbouring scheme) that the residents of Atisaz could use within ten minutes walking distance. The scheme of this size lacks a central fire alarm system and the fire escape routes are all inside the buildings.

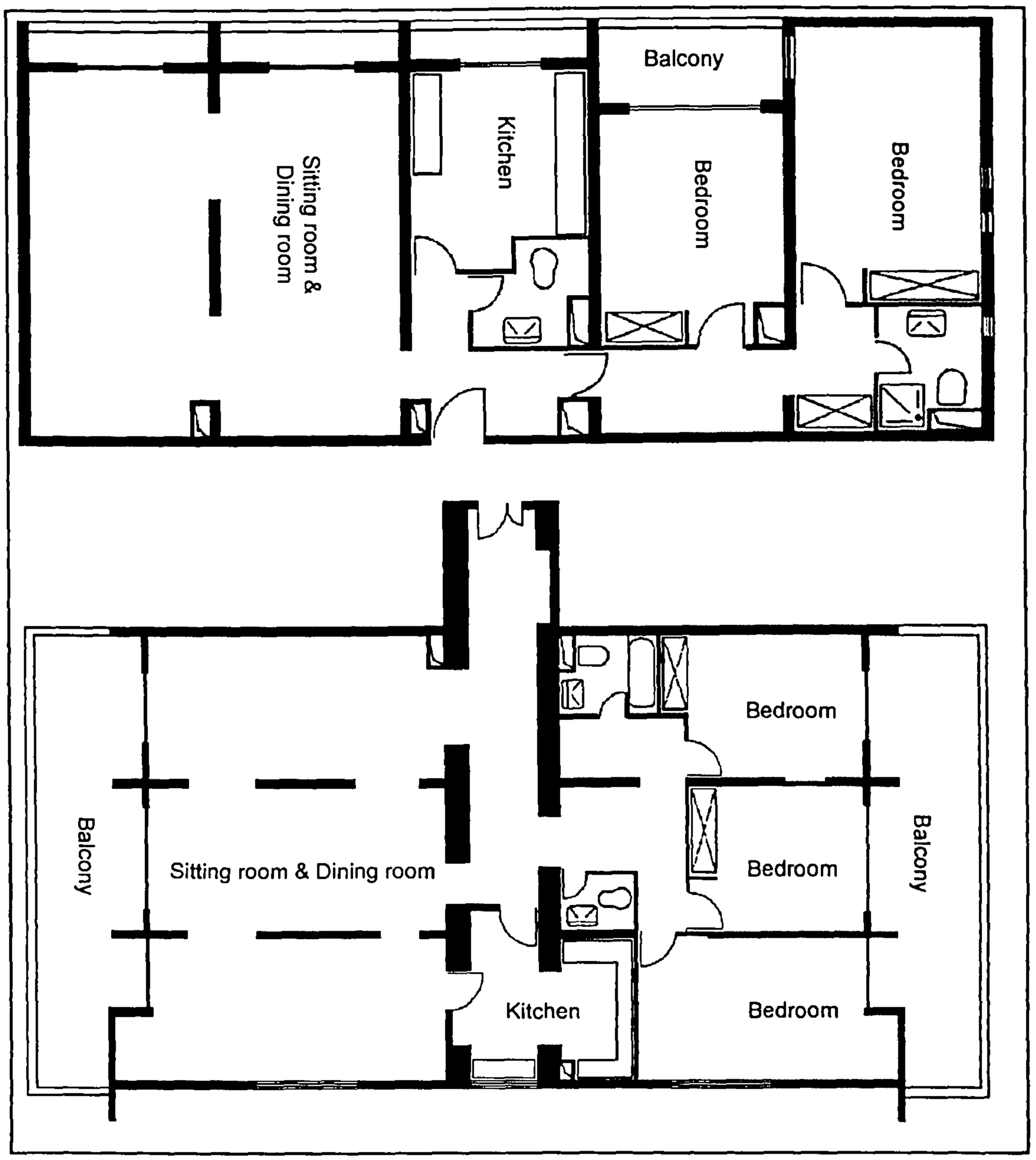

Figure C. 29 Two examples of the various types of dwelling units in Atisaz. [Top] Plan of apartments type D4, two-bedroom dwelling units, [Bottom] Plan of apartments type G3, three-bedroom flats.

Source: Adopted from Evin Construction Co., n.d.

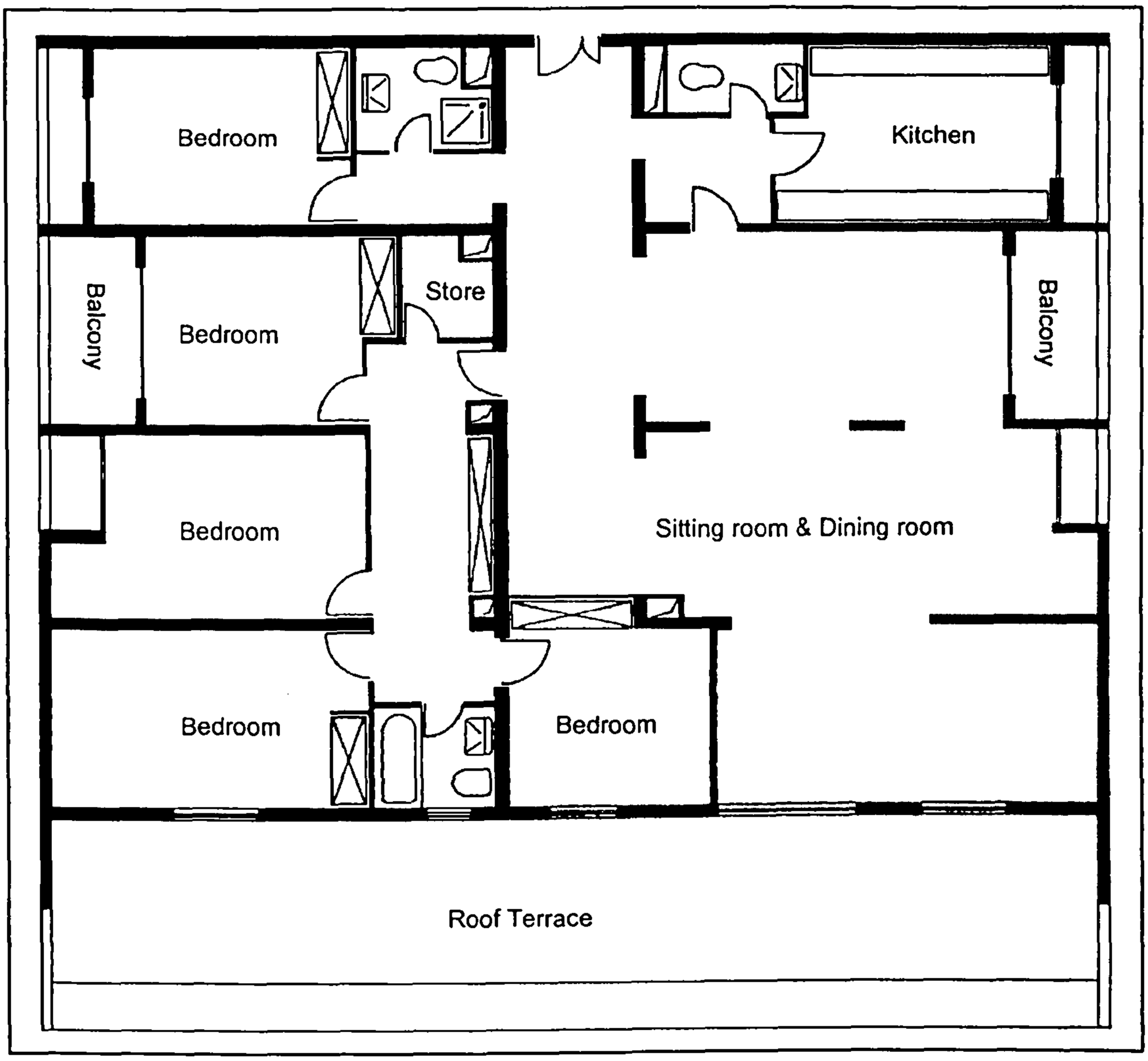

Figure C. 30 Plan of apartments type A, five-bedroom dwelling unit in Atisaz.
Source: Adopted from Evin Construction Co., n.d.

With an expected population of about 10000 people only one primary school is provided for this scheme. Therefore, most of the families are forced to privately arrange for daily transport for their children to/from schools in other parts of the city as there are no other schools in walking distance.

To access many services and facilities the residents of this scheme have to use their own cars, as there is insufficient public transport within convenient walking distance from all the dwellings. The high level of car dependency makes this scheme one of the worst examples of an unsustainable settlement.

C.4. ESKAN

The *Eskan* residential towers are located within Tehran's inner city area to the north of the city. The Eskan scheme is surrounded by two major urban roads from the south (Mirdamad Boulevard) and the west (Vali-e-Asr Street) and a local road from the north (see figures C.31 & C.32Figure C. 31). It is situated within a distance of less than one kilometre to the north of Vanak square, one of the main urban squares in the northern part of Tehran which is considered as a major urban district centre (see Figure C.31).

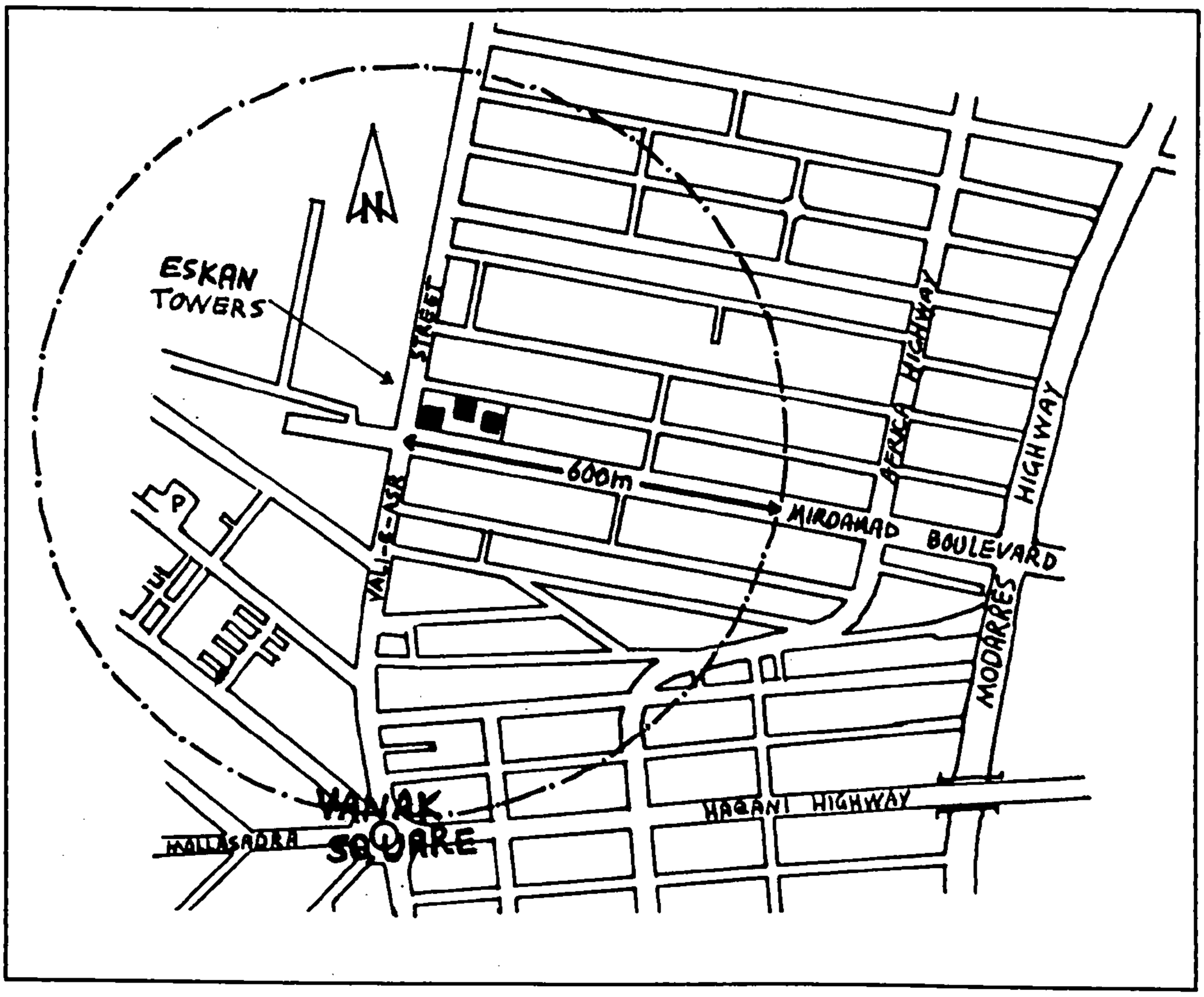

Figure C. 31 Location of the Eskan towers in the north of Teheran. Services and facilities available within 600 m radius are listed in Table C.4.

Source: Author

C.4.1 Characteristics of the Neighbourhood

Sitting on a 0.8-hectare plot of land, the Eskan towers were designed by an Iranian firm called Eskan Iran Co. and were constructed by an American company (the builders of the Empire Estate building) in 1974.

The scheme has 30 floors in total, 5-floors of parking, 2-floors of services and facilities, and three individual 23-floor residential towers. The Eskan towers are designed to accommodate a population of about 1100 persons. However, at the time of the local survey the average household size in the Eskan scheme was 3, therefore it is estimated that about 810 people were living in the Eskan scheme in 1994. Therefore, the gross population density of the scheme is 1013 persons per hectare.

The service floors and the underground parking floors use up the whole 0.8 hectares of land, but three residential towers on the whole cover 2826 m^2 of land on the ground level, which accounts for 35% of the site. Each tower covers 942 m^2 of land on the ground floor, but the residential floor area is 924 m^2 on each floor. Therefore, the total residential floor area of the three towers is 67824 m^2, which gives a floor area ratio of 8.5. In total there are 270 dwelling units within these three residential towers. This gives a gross residential density of 337.5 dwelling units per hectare. It should be mentioned here that as there are no roads, pedestrian pathways, parks and other services and facilities present on this site the calculated gross density in this scheme is in fact the net density.

A management committee - elected by the residents - is in charge of maintenance in the scheme. A lobby man security system is in operation in each tower to closely monitor all those who pass through. Since all the dwellings are privately owned all residents have to share the cost of maintenance of the scheme, which proved to be very expensive for the majority of elderly residents of the scheme.

Road and Access

The vehicular and pedestrian access to this scheme is through the Mirdamad boulevard (to the south of the scheme) but there is also pedestrian-only access to the

residential areas of the scheme from Vali-e-Asr street to the north-western corner of the site (see figures C.31, C.32 & C.35).

Parking

Five floors of 'residents only' underground parking is provided within the scheme (see Figure C.33).

Pedestrian Pathways

There are no pedestrian pathways within this scheme as the scheme is very small and all the land is taken up by construction. Also, the platform on which the high-rise blocks are located is not an accessible area for pedestrians and therefore also not available for children to play. However, the sidewalks on adjacent streets are used for pedestrian access to/from the scheme.

Public Services and Facilities

Since this scheme is relatively small very few services and facilities are provided within the scheme. A community hall, 60 shopping units, 30 business and administrative units and three banks and a restaurant are all the provisions within the scheme (see Table C.4).

Table C. 4 Public services and facilities within Eskan scheme.

Socio-Cultural Provisions	Availability
Community hall	Yes (350 m²)
Hosseinieh	N/A
Mosque	N/A (Nearby local mosque)
Women's meeting place	N/A
Children's play area	N/A
Gymnasium	N/A
Swimming pool	N/A
Cinema	N/A
Library	N/A
Park	N/A (Nearby Park-e-Mellat))
Educational Provisions	**Availability**
High school	N/A
Leisure time education centre	N/A
Nursery school	N/A
Primary School	N/A (Nearby local school)
Secondary school	N/A (Nearby local school)
Other Provisions	**Availability**
Bank	Yes (3 units = 2600 m²)
Police station	N/A (Nearby police HQ)
Post office	N/A
Health centre	N/A (Nearby Hospital)
Public lavatory	N/A
Public transport	Yes
Parking	Yes (five floors underground)
Shops or Supermarket	Yes (60 units)

As shown in Table C.4, no urban services and facilities are provided specifically for the inhabitants of these blocks, but some of the best hospitals as well as the largest park in the city *(Park-e-Mellat)* and a number of schools are close to this residence.

Walkability

As this scheme is positioned within a well-provided inner city area the residents of Eskan can use most of the locally provided urban services and facilities within walking distance from their dwelling units. However, there is no children's playground within this scheme and to access the nearest park (park-e-Mellat) as well as to go to school children have to cross the major roads of the Vali-e-Asr Street and the Mirdamad Boulevard, which most of the time have very heavy traffic flow (see Figure C.32).

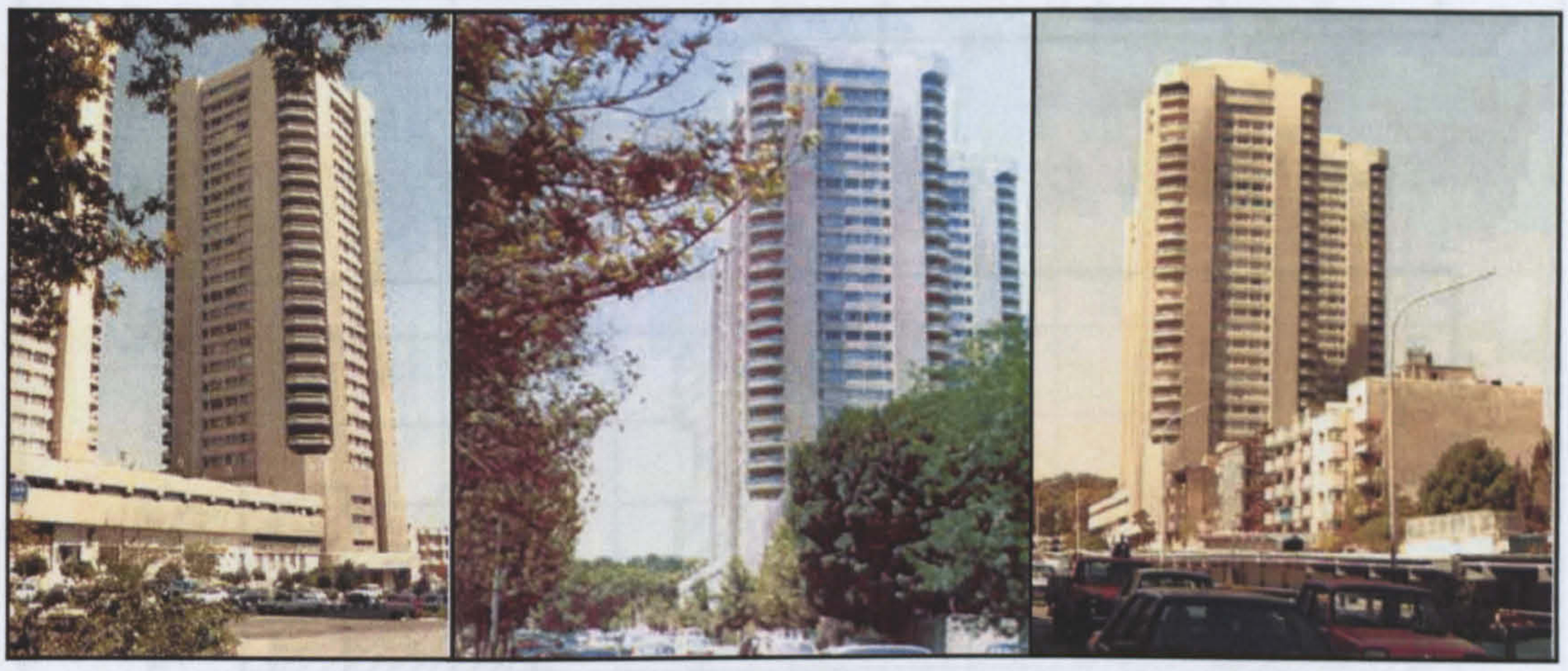

Figure C. 32 Different views of the Eskan towers from adjacent streets.
Source: Author, summer 1994.

C.4.2 Characteristics of the Buildings

Three identical individual tower blocks are connected together by the parking and service floors (see Figure C.33). The fire escape stairwells are located at the central core of the buildings, which are surrounded by flats.

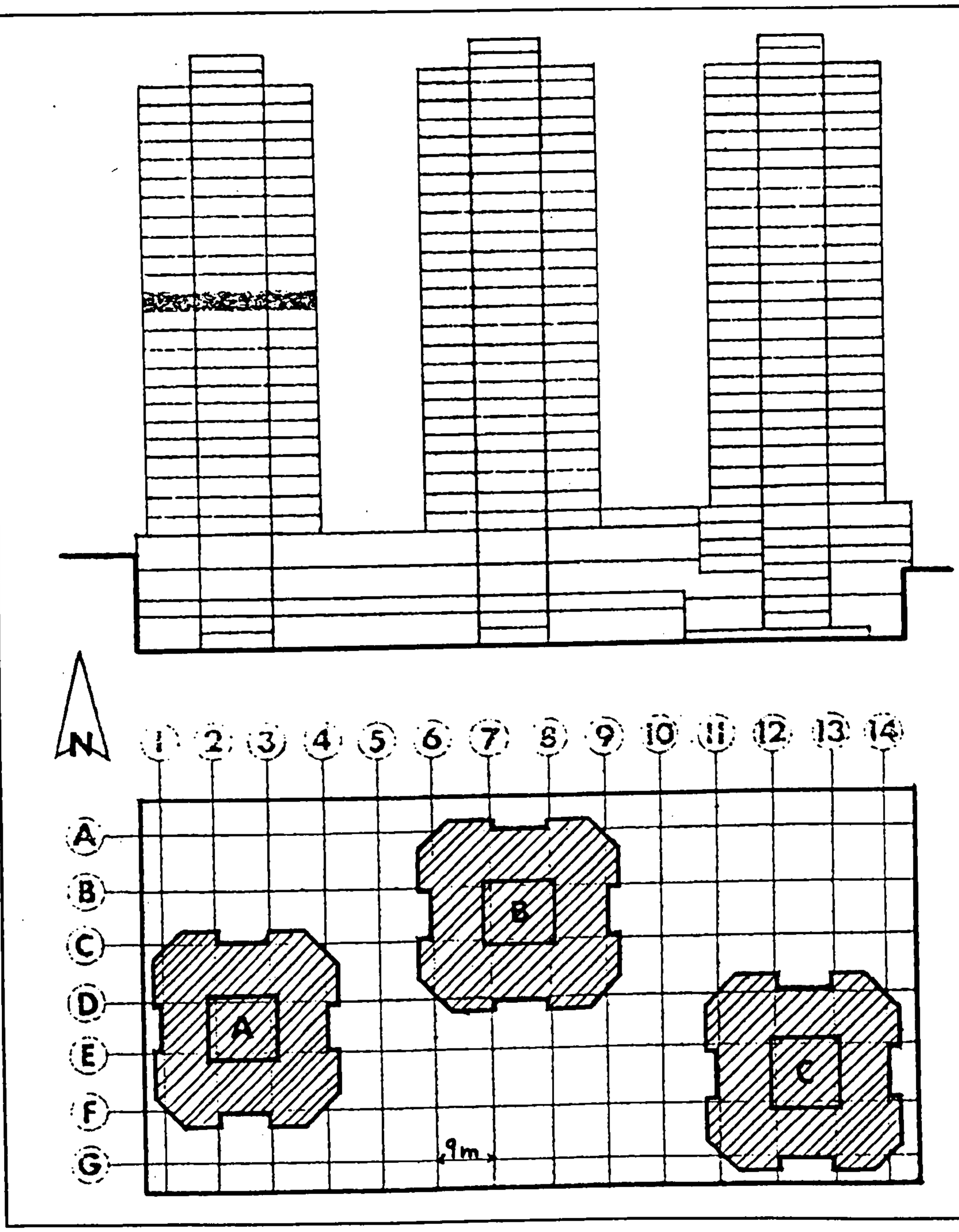

Figure C. 33 The position of three residential towers in a close proximity to each other.

Source: Eskan Building Construction Co.

The towers are positioned in such a way that no one has a direct view into the opposite flat in another tower. Most of the buildings in the locality have less than a third of the height of these towers, which provides good privacy for inhabitants of the fifth floor and above (see Figure C.34).

Figure C. 34 Different views of the Eskan inner city residential towers.
Source: Author, summer 1994.

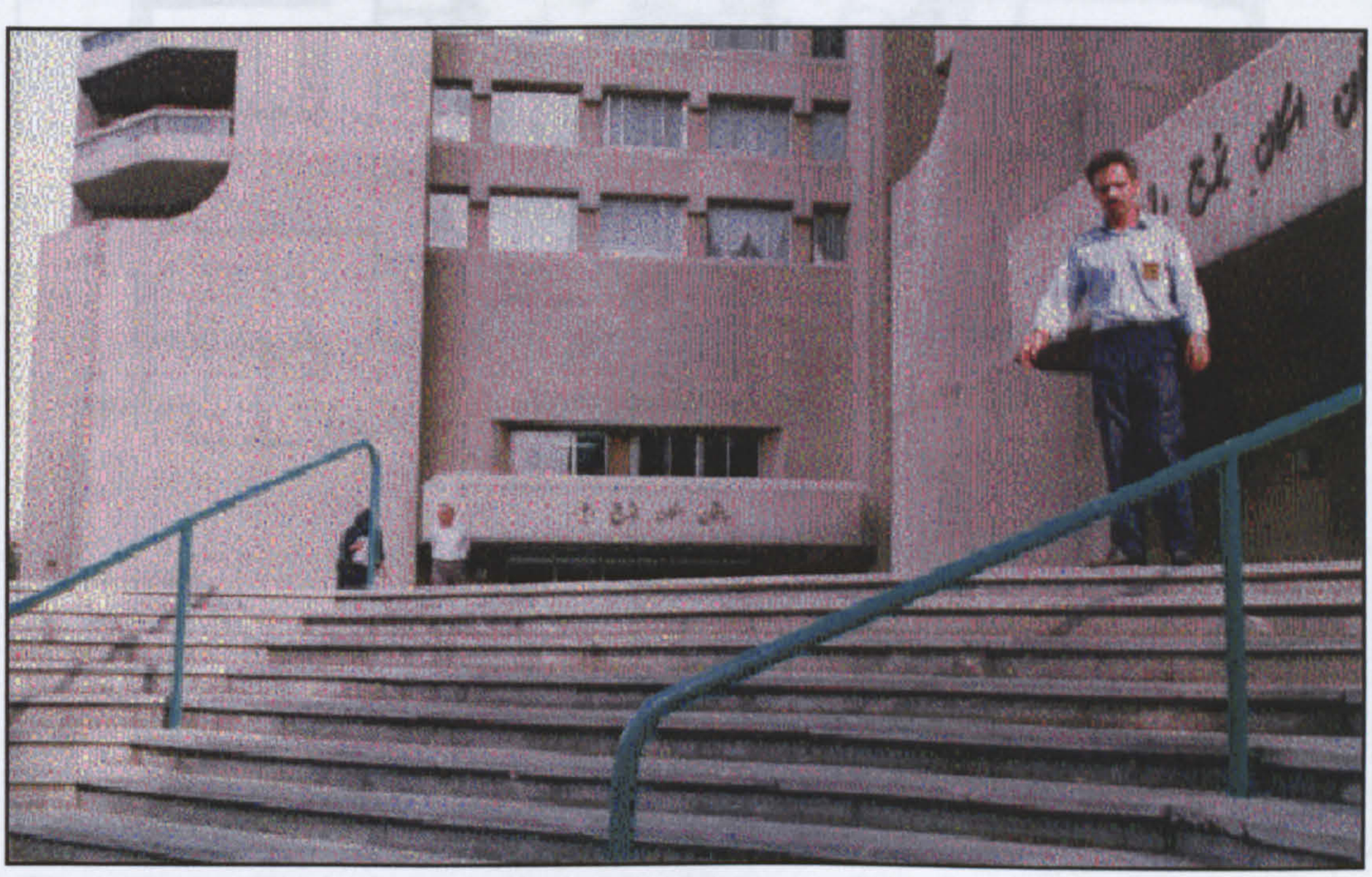

Figure C. 35 Pedestrian access to the scheme from the north-western corner of the site, which is closely monitored by a security man.
Source: Author, summer 1994.

C.4.3 Characteristics of the Dwellings

In total, there are 270 dwelling units in all three blocks, 90 flats in each block. There are four flats on each residential floor except on the 23rd floor where there are two large penthouse flats. The size of dwellings varies on each floor. Apart from the top floor there are one 2-bedroom, two 3-bedroom, and one 4-bedroom dwelling units on each residential floor (see Figure C.36).

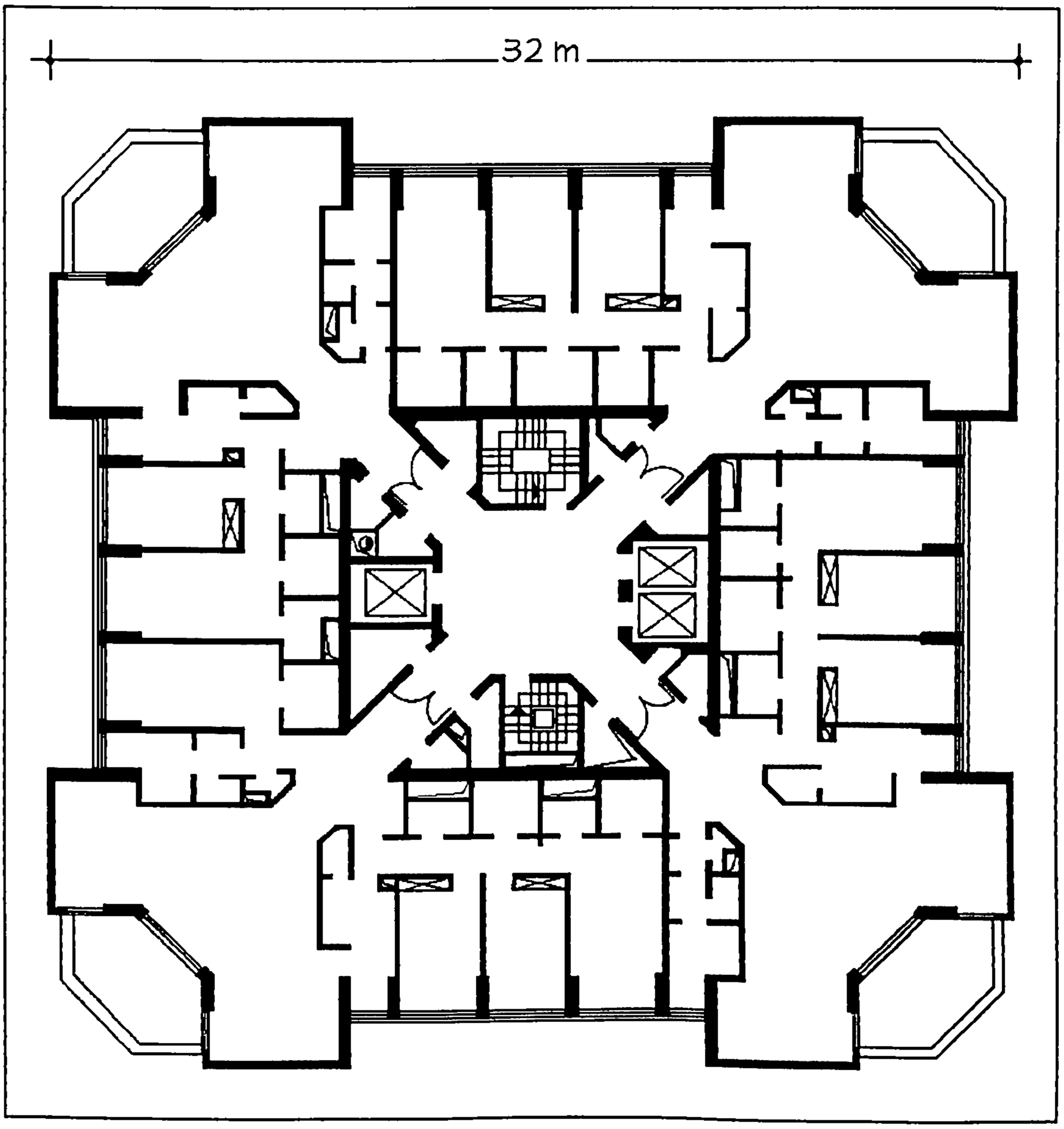

Figure C. 36 **Typical plan of a residential floor of Eskan tower buildings.**
1. Entrance, 2. Living room, 3. Kitchen, 4. Bedroom, 5.Bathroom, 6. Toilet, 7. Balcony, 8. Store, 9. Laundrette, 10. Housemate room, 11. Communal corridor.

Source: Adopted from Eskan Iran Co., 1974.

A square shaped communal corridor is located at the core of each floor. Three lifts and two staircases serve as vertical access to all floors. The entrance to individual dwellings on each floor is from the corners of the communal corridor. The entrance door opens into a short corridor that leads straight to the sitting room. Bedrooms and bathrooms - the night zone - are grouped together around an internal corridor and are separated from the living area by a door off the entrance corridor. The kitchen is located between sitting room and night zone. An extra toilet is directly accessible from the sitting room. Only the sitting room has direct access to the balcony.

C.4.4 Comments

Although many urban scale provisions are available to the residents of this scheme the lack of sufficient provision of cultural, educational as well as indoor and outdoor recreational activities is evident. Although the high-rise form creates a relatively high density in this scheme (considering that the above-mentioned high-density figure is net rather than gross density) it is achieved by compromising the quality of the living environment for the family. Going too high causes families to lose contact with the ground and increases the feeling of isolation as well as increasing the cost of maintenance. Apart from the above mentioned facts the residents of this scheme particularly suffer from the following shortcomings. Fire exit stairwells are located within the building and do, therefore, lack natural ventilation. Also, doors into the escape stairs open onto the landing. It can therefore be anticipated that there will be difficulties in case of an emergency. In the absence of a proper playground, children have no choice but to play on the area surrounding the buildings and this causes security problems for them and others. The openings above the entrances to the buildings are potentially dangerous for those who are entering the buildings, as the entrances are not properly sheltered.

THE QUESTIONNAIRE

Your Home

This questionnaire is part of a study intended to contribute to a better understanding and improvement of the environment in which all of us live. Such an aim cannot be achieved without your assistance. Your opinions about your home and its surroundings can help advise us on the design and layout of future housing.

Questions are formulated in such a way as to facilitate rapid and easy completion. If some questions are not defined in a specific answer, please write short answers and explanations. In any case, please be careful in your answer to describe reality rather than your wishes unless you are asked to state your wishes. We hope you will be able to help by answering the questions on the following pages. Some one will call to collect the questionnaire in a few days. The same person will be able to help you with any questions, which were unclear. Your answers will of course be treated as confidential and full anonymity will be preserved. Your help will be greatly appreciated.

- In answering the questions please use ticks ☑ unless otherwise asked.
- To save your time, just follow the arrows (▼) and answer only those questions appropriate to you.

Household Size and Location:

Please specify the location and type of your dwelling below by marking the appropriate box.

Dwelling Type	Location
One bedroom flat [ ] 1	Ekbatan [ ] 1
Two bedroom flat [ ] 2	Apadana [ ] 2
Three/more bedroom flat [ ] 3	Atisaz [ ] 3
Suite [ ] 4	Eskan [ ] 4

1. How many families live in this dwelling unit? . . . . . .

2. How many people live in this dwelling unit? . . . . . .

- Use this table to list all the people (both adults and children) living in this dwelling unit.
- In the column marked (*) use words such as: spouse, child, father, mother, brother, friend, none, etc.

Persons	(*) Relationship with 1 (if any)	Sex		Marriage		Age Groups			
		Male	Female	Married	Single	0-4 Yrs.	5-9 Yrs.	10-14 Yrs.	15 & above
1	Head of Household								
2									
3									
4									
5									
6									
7									

Please continue on the next page

A. Dwelling Unit

1. How long have you been in this dwelling unit? (tick only one box)

Less than one year [ ]1
More than 1, less than three years [ ]2
More than 3, less than five years [ ]3
More than 5, less than ten years [ ]4
More than ten years [ ]5

2. What sort of dwelling did you live in before you moved to this home?

High-rise apartment block [ ]1
Low-rise apartment block [ ]2
Courtyard house [ ]3
Other (specify) [ ]4

3. Why did you move into this dwelling?

Distance to work [ ]1
Distance to relatives/friends [ ]2
Access to urban services [ ]3
Financial reasons [ ]4
No specific reasons [ ]5
Other (specify) [ ]6

. . . . . .

4. How many entrances does your home have?

One [ ]1
Two or more [ ]2

5. Is there a guest/male entrance separate from a family/female entrance?

Yes [ ]1 — No [ ]2

If yes, are both entrances visually separated?

Yes [ ]1
No [ ]2

If No, do you think it is necessary to have a separate guest/male entrance?

Yes [ ]1
No [ ]2

Please continue on the next page

6. Are you planning to move away from this home in the near future?

Yes [ ]1 — No [ ]2

If yes, what are the main reasons?
(Tick as many as apply)

Distance to work [ ]1
Distance to relatives/friends [ ]2
Access to urban services [ ]3
Financial reasons [ ]4
No specific reasons [ ]5
Other (specify) [ ]6
. . . . . .

7. Have you done or are you planning to make any alterations to the flat since you have been living in this home?

Yes [ ]1 — No [ ]2

If yes, what are the alterations you carried out or you think should be carried out ?
(please tick as many as apply)

Internal decoration [ ]1
External decoration [ ]2
Structural changes [ ]3
Other (specify) [ ]4
. . . . . .

8. What type of bathroom is there in the dwelling?

Traditional style (shower) [ ]1
Western style (bath tub) [ ]2
Some traditional and some western [ ]3
Both styles in the same bathroom [ ]4
Other [ ]5

Please continue on the next page

If you have both bathroom styles, which one do you most often use?

Traditional style [ ]1
Western style [ ]2

9. If you have curtains in the following rooms what is the main reason for drawing them?
(Please tick one box for each row)

	No curtain at all	To stop people looking in	To keep out sunlight	For beauty & decoration
Reception				
Kitchen				
Toilet				
Bathroom				
Sitting room				
Dining room				
Bedrooms				

10. Are the windows of the dwelling provided with any kind of outside blinds?

Yes [ ]1 — No [ ]2

If Yes, what are their main functions?
(please tick as many as apply)

Privacy [ ]1
Security [ ]2
Shade [ ]3
Decoration [ ]4
Other (specify) [ ]5
. . . . . .

If No, What do you think of outside blinds?
Are they:

Essential [ ]1
Useful [ ]2
Superfluous [ ]3

11. Do you have your own car?

Yes [ ]1 — No [ ]2

Please continue on the next page

Please continue on the next page

If Yes, where do you park it at night?
(Please tick as many as apply)

Secure public parking [ ]1
On-site parking [ ]2
On the street near your home [ ]3
Parking inside the building [ ]4

If all the above are available which one would you prefer?

Secure public parking [ ]1
On-site parking [ ]2
On the street near your home [ ]3
Parking inside the building [ ]4

12. If you have children, where do they most often play?

In the living room [ ]1
In their bedrooms [ ]2
In a specific play area [ ]3
No children [ ]4

13. Which of the following rooms opens directly from the sitting room?
(tick as many as apply)

Bedroom (1) [ ]1
Bedroom (2) [ ]2
Bedroom (3) [ ]3
Kitchen [ ]4
Bathroom [ ]5
Toilet [ ]6
None of the above [ ]7

14. Are you satisfied with the present layout of your dwelling?

Yes [ ]1

No [ ]2

If No, what are the reasons:

-Organisation of spaces does not offer enough privacy [ ]1
-There is not enough natural light [ ]2
-There is insufficient ventilation [ ]3
-Size of dwelling does not meet your requirements [ ]4
-Other (specify) [ ]5
. . . . . .

Please continue on the next page

B. Dwelling in relation to outside:

1. Does the position of your immediate neighbours' door cause you any privacy problems?

Yes [ ]1
No [ ]2

2. Does your entrance door open straight into the hall?

Yes [ ]1 — No [ ]2

If Yes, is the hall your sitting room?

Yes [ ]1
No [ ]2

3. To what degree do you think it is necessary to have a separate lobby ?

Essential [ ]1
Necessary [ ]2
Not necessary [ ]3

4. Do you suffer from any kind of noise disturbance from a source outside your home?

Yes [ ]1 — No [ ]2

If Yes, from which source(s)?
(please tick one box for each row)

	No	A little	A great deal
Traffic			
Playing Children			
People Outside			
People in other Dwellings			

Please continue on the next page

5. Do you think your neighbours can hear you?

Yes [ ]1 No [ ]2

If Yes, does this make you uncomfortable?

A great deal [ ]1
A little [ ]2
No [ ]3

6. When you are inside, do you think people outside or in other homes can observe you?

Yes [ ]1 No [ ]2

If Yes, does this make you uncomfortable?

A great deal [ ]1
A little [ ]2
No [ ]3

7. How important is it that windows allow a view without offering people from outside a view in?

Very important [ ]1
Important [ ]2
Not important [ ]3

Please continue on the next page

8. Do you have a balcony?

Yes [ ]1 — No [ ]2

If you have balcony, how often do you use it?

Frequently [ ]1
Sometimes [ ]2
Rarely [ ]3
Never [ ]4

If you use it, for what purpose do you mostly use your balcony?

Sitting [ ]1
Drying clothes [ ]2
Storage [ ]3
Other (specify) [ ]4
. . . . . .

If you have a balcony and do not use it what is the reason?

Lack of privacy [ ]1
Very narrow and short [ ]2
Dangerous for children [ ]3
Other (specify) [ ]4
. . . . . .

If you do not have balcony, do you think you need a balcony?

Yes [ ]1
No [ ]2

If Yes, for what purpose do you think you need one?

Sitting [ ]1
Drying clothes [ ]2
Storage [ ]3
Other (specify) [ ]4
. . . . . .

9. How important to you is the view of your house from the outside?

Very important [ ]1
Important [ ]2
Not important [ ]3

10. Are there any specific qualities you think your home should have?

Yes [ ]1
No [ ]2

If Yes, please specify:
. . . . . .
. . . . . .

Please continue on the next page

C. Neighbourhood:

1. How often do you meet your neighbours outside your home?
(Please tick one box).

Frequently [ ]1
Sometimes [ ]2
Rarely [ ]3

Where do you meet them?
(Please tick the three places, where you most commonly meet them).

At the home entrance [ ]1
In the street [ ]2
In the mosque [ ]3
In a shop [ ]4
In a specific meeting place [ ]5

2. Whenever you plan to visit your neighbours or friends who live in the same locality, how do you travel to them?

By car [ ]1

Walking [ ]2

If by car, what is the reason?

-The streets are designed for cars only, so it is very dangerous to walk [ ]1
-Because of the weather [ ]2
-Distance [ ]3
-Habit [ ]4
-Other (specify) [ ]5
. . . . . .

3. Are there any specific places provided for women to meet in your locality?

Yes [ ]1

No [ ]2

Please continue on the next page

Please continue on the next page

If no, do you think a women's Meeting Place is necessary?

Yes [ ]1 — No [ ]2

If yes, what type of place do you recommend?

A room in a leisure time edu. centre [ ]1
A room in/beside the mosque [ ]2
A room in/beside the library [ ]3
A completely separate building [ ]4
Other (specify) [ ]5
. . . . . .

4. Is there any specific place provided for children to play in your locality?

Yes [ ]1 — No [ ]2

If No, do you think the provision of a play area for children is necessary?

Yes [ ]1 — No [ ]2

If Yes, what do you recommend?

An adventure play area [ ]1
A supervised place [ ]2
Other (specify) [ ]3
. . . . . .

Please continue on the next page

5. do you think there is a need to improve the facilities in your neighbourhood?

Yes [ ]1

No [ ]2

Which additional amenities do you think should be provided in walking distance from your home or in your neighbourhood?

(Please tick one box in each row)

	In walking distance	In the neighbour-hood	Not needed	Already provided
Mosque				
School				
Library				
Leisure time ed. centre				
Shops or supermarket				
Public transport				
Roads and access				
Sports centre				
Children's play area				
Park				
Public lavatory				
Health centre				
Police station				
Post office				

Please continue on the next page

6. Please indicate the main problems currently caused by these amenities in the neighbourhood?
(Please tick one box in each row)

	No such amenity	Gathers undesir -able people	Makes the area crowded	Causes noise	No problem at all
Mosque					
School					
Library					
Leisure time ed. centre					
Shops and supermarket					
Public transport					
Roads and access					
Sports centre					
Children's play area					
Park					
Public lavatory					
Health centre					
Police station					
Post office					

7. What do you think of the ***cul-de-sac*** concept (a discontinuous street which is wider at the end)?

I like it and I would like to live in one [ ]1
I do not like it and I do not want to live in one at all [ ]2
I neither like nor dislike it [ ]3

Please continue on the next page.

8. What do you think of the ***traffic calming*** idea (reducing vehicles' speed) in your neighbourhood?

Like [ ]1
Dislike [ ]2
Neither like nor dislike [ ]3

9. How would you prefer the pedestrian and vehicular movement to be in your neighbourhood in the future?

-All to be in the same street but the pedestrian should be provided with shaded paths as well as safety [ ]1
-Complete separation between them [ ]2
-Other (specify) [ ]3
. . . . . .

10. Are there any specific qualities you think your neighbourhood should have?

Yes [ ]1
No [ ]2

If yes, please specify:
. . . . . .

Satisfaction and Recommendation:

Finally taking every thing into account, how would you sum up your feeling about your home and the area you live in? (please tick one box for each)

Your Home

Very satisfied [ ]1
Satisfied [ ]2
Neither satisfied nor dissatisfied [ ]3
Dissatisfied [ ]4
Very dissatisfied [ ]5

Neighbourhood

Very satisfied [ ]1
Satisfied [ ]2
Neither satisfied nor dissatisfied [ ]3
Dissatisfied [ ]4
Very dissatisfied [ ]5

Please take a few moments to describe your idea of your future home and neighbourhood. If you could change your present housing conditions, what would you change? Use your own terms to describe these. Feel free to write whatever you like.

. . . . . .
. . . . . .
. . . . . .

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