NEIGHBORHOOD TEST DESIGN BASED ON HISTORIC PRECEDENTS

Besim S. Hakim

Abstract

There have been various attempts to emulate traditional architecture and to experiment with the form and aesthetics of building design. However, learning from precedents of urban morphology is rare. This design study is a test at the neighborhood level using the pattern of traditional courtyard housing that is prevalent in the majority of historic towns and cities of North Africa and the Middle East. The study is undertaken at five levels of design enquiry: dwelling types, dwelling groups, neighborhood segment and community center. All of which are synthesized into a full prototype neighborhood comprising of 428 dwelling units covering an area that includes circulation and the community center, of 17.6 hectares. The test demonstrates that the traditional pattern of neighborhoods that are based on the typology of the courtyard dwelling as the initial generator of urban form may be used to develop a contemporary settlement pattern that is compatible with current necessities of lifestyle, vehicular circulation, including parking and infrastructure achieving an attractive livable environment with an overall gross density, that includes a community center, of about 24 dwelling units per hectare.

Keywords

Test design, courtyard housing, neighborhood segment, prototype neighborhood.

Introduction

From the mid-seventies of the 20th century this author was working on a project on the building and planning principles of Arabic-Islamic cities towards achieving three objectives:
(1) To identify and record the building and planning principles that shaped the traditional Arabic-Islamic city, (2) To evaluate, recycle and test the traditional morphology and its organizational principles via a contemporary project to determine their validity and usefulness today and for the foreseeable future, and (3) To document the findings in a systematic and clear format so that others may benefit directly.

A manuscript for a book titled Arabic-Islamic Cities: Building and Planning Principles was completed in early 1979 and the book was eventually published in early 1986. It documents the research and findings for objectives (1) and (3). This essay is a summary of the work for achieving objective (2). The long hiatus of three decades has been an advantage, primarily to benefit from the insight of this author's and the work of others that was published in the interim. The hesitation to publish this material since then

was to avoid giving the impression that the primary benefit was to emulate the traditional morphology. It is a simplistic pursuit by many architects and urban designers that continues to this day. In fact, this author has come to the conclusion that essentially the processes underlying the traditional system are the level from which to draw the primary lessons.

In a short earlier study by this author, a framework was developed for recycling relevant aspects from the traditional experience of building and urbanism. That framework was divided into aspects related to the procedures of building, i.e. process, and to aspects related to the organizational system and built form, i.e. product (Hakim, 1989, 1991). Those related to the former considerations are by now reasonably covered by this author (Hakim, 2001, 2007), and the publications of others (Alexander, 1987). Three areas of design enquiry were identified within the product aspects of the framework: (i) Compatibility with ecology and climate, (ii) Physical organizational system and planning, and (iii) architectural design, style and decoration. Adequate studies have been published that relate to (i), and (iii) With the exception of a few studies (Petruccioli, 1998, 2007), (Kropf, 1996), very little is published about the second area of design enquiry: the physical organizational system and planning. This study is an additional contribution.

Housing is the predominant sector in towns and cities, and it is usually comprised of neighborhoods. Thus it was decided that this is the level at which a useful test design should be undertaken. The aim therefore of this test is to evaluate its outcome, a product resulting from addressing the issues and possibilities posed by the following question: Is it possible to design a contemporary built environment that achieves and embodies the best built qualities (both qualitative and quantitative) evident in traditional environments located around the Mediterranean basin and especially those in North Africa? (see Figures 1 and 2). This exploration and a reflective design approach is a pre-requisite for re-creating the desired built-form qualities and ambience found in most traditional environments of North Africa (see Figures 3 and 4). The test design was undertaken outside of a specific site, although a geographic area and cultural parameters were assumed as indicated below. The test design can thus be described as being generic and prototypical in its results. It recycles physical aspects only, and does not incorporate the sophisticated generative aspects of traditional urbanism. That kind of study waits to be undertaken.

Extensive research undertaken by this author clearly demonstrated that one of the major lessons offered by the understanding of the processes of traditional cities and settlements, found in the region mentioned above, was in the user's role in the decision-making process which affected his/her immediate built environment. Furthermore this role necessitated that decisions taken by users had to respect a framework of rules which the culture at large established, and which embody its commonly shared values and aspirations. This author was able to incorporate those aspects of the traditional experience in a project for revitalizing the heritage district of a historic town (Hakim, 2007).

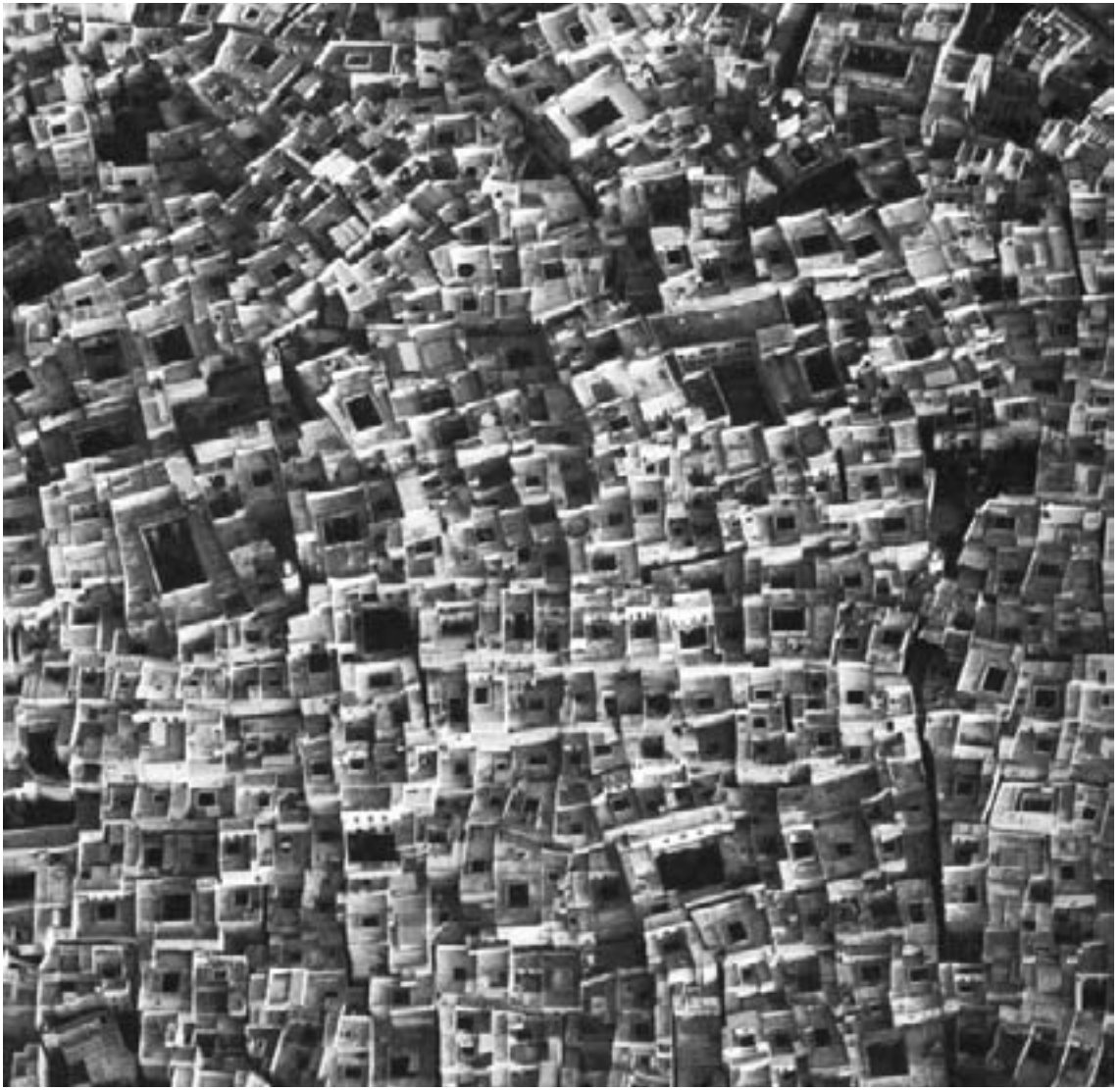

Figure 1: Ariel view of a part of Fez medina, Morocco, 1982, showing the compactness of the urban tissue. (Source: Georg Gerster).

Figure 2: A wonderful street in the village of Sidi Bou Sa'id, Tunisia, 2005, showing the high quality of the street environment (Source: Bojan Stankovski).

Figure 3: The compactness of the village of Sidi Bou Sa'id, Tunisia that shows narrow shaded pathways, roof terraces and other features that can be achieved using this morphology (Source: Kahia, Tunis in the early 1970s).

Figure 4: A simple and delightful courtyard somewhere in Morocco (Source: Photographer and date of photo unknown).

Certain lessons from the morphology of the traditional system can be explored and tested by the individual designer. It is these lessons that this test design attempts to address (see Figure 5). They are concerned with the quality, characteristics and subtleties of the physical organization, planning and design aspects of those traditional environments. This is also an essential task if we are serious in our desire to recycle and recreate those positive qualities

and lessons offered by centuries of experience. To undertake this test design certain assumptions had to be made and design parameters established for the design of a Prototype Neighborhood. These are summarized below:

Assumptions

1. It is assumed that the inhabitants would share similar values (Hakim, 1986). This assumption provides the historic linkage to the users of traditional environments in North Africa, which is the precedent used for this test design.

2. The location was assumed to be somewhere in North Africa close to the Mediterranean coast between southern Tunisia and the area west of Alexandria, Egypt.

3. The site was assumed to be flat.

4. Local building construction practice and materials are to be utilized. These include the use of load bearing brick walls and simple reinforced concrete technology for roofing and foundation footings.

Design Parameters

These are established at various levels of the project, comprising (1) Dwelling Types, (2) Dwelling Groups, (3) Neighborhood Segment, (4) Community Center, and (5) Prototype Neighborhood. The following are the parameters at each of the five levels:

1. Dwelling Types: Three generic types were used (see Figure 6), these are (i) the square shape with the courtyard in the center, (ii) the U-shape with the courtyard on one side, and (iii) Z-shape with two courtyards in opposite corners. Dimension of plots for all three types is 14x14 meters and the primary courtyard is usually 5x5 meters. These dimensions are derived from the study of traditional settlements

Figure 5: The morphology of the town of Essaouira, Morocco, located on the Atlantic Ocean. The drawing shows the manner the access system of through streets and cul-de-sacs provide access to the buildings within a compact morphology (Source: drawn by students of Professor Attilio Petruccioli and published in After Amnesia, 2007: pp. 163).

and towns, with adjustments to take into consideration contemporary life style and its requirements. Although these three generic types can generate, in principle, unlimited plans within the system's parameters, however only four types were developed and are designated for testing (see Figure 7). This is because the test was designed to be undertaken manually. If a sophisticated computer program and the skill to run it were available, it would have been possible to undertake the test with customized house plans in response to simulated individual household requirements. The following statistics relate to this level of the project:

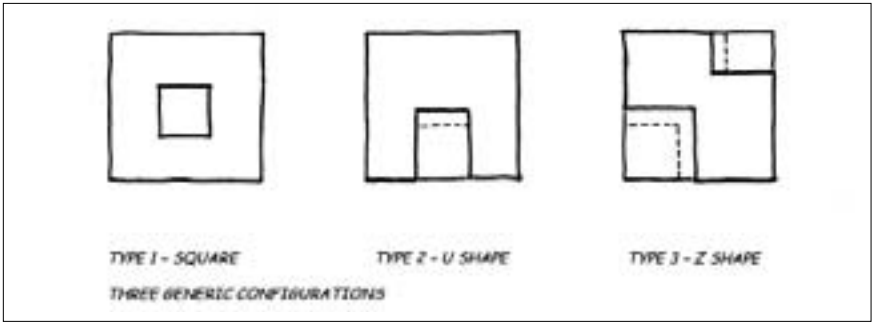

Figure 6: The three generic courtyard configurations that were used to design the four courtyard dwelling types used in the test design (Source: author).

Figure 7: The four dwelling types that were used in the test design. The drawing assumes that each dwelling is built up to its maximum three stories (Source: author).

I. Ratio of plot to the ground coverage of each unit (including its courtyards) is 1:1.
II. Ground coverage of the largest unit, type B including the courtyards, is 196 square meters.
III. Ground coverage of type B, excluding its courtyards, is 156 square meters.
IV. Assuming that up to 2.5 stories is built up, based on the four house types used in the test design and excluding courtyard areas at the ground and upper levels, the average maximum area of all units is 340 square meters.

2. Dwelling Groups: (see Figures 8 and 9): Two critical rules were followed in design at the Dwelling Group scale. They are: (a) Avoidance of creating visual corridors into the private domains of adjacent dwelling units, especially into courtyards and the roof terraces/gardens that are designed to be used by the occupants. In addition, (b) preventing, as much as possible, the tight sense of enclosure by careful design considerations within private courtyards due to the high walls on most sides, and the tunnel

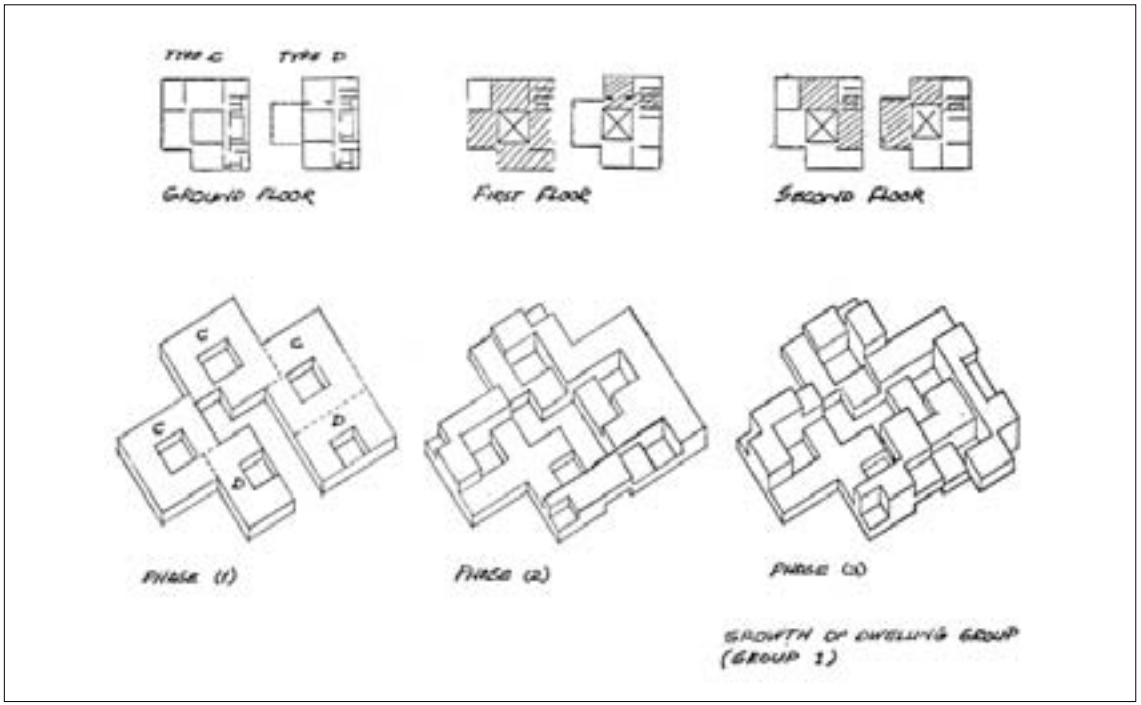

Figure 8: One of the dwelling clusters comprising 3 units of type C and two of type D in phase one of construction. Owners of each dwelling unit can later increase the area of their house incrementally upwards in two additional phases as shown (Source: author).

effects within streets due to high walls and fences that abuts them.

3. Neighborhood Segment (see Figures 10, 11, 12 and 13): Each segment consists of approximately 3.4 hectares that includes circulation, parking and open spaces. The following are highlights of the design parameters used at this scale of the test design:

I. Ratio of dwelling unit to parking is 1:1.2.

II. Separation of parking from the front door of the dwelling unit. Maximum distance allowed is 50 meters, but most front doors of dwelling units are within shorter distances. Grocery pushcarts are provided for every household at the parking cluster locations.

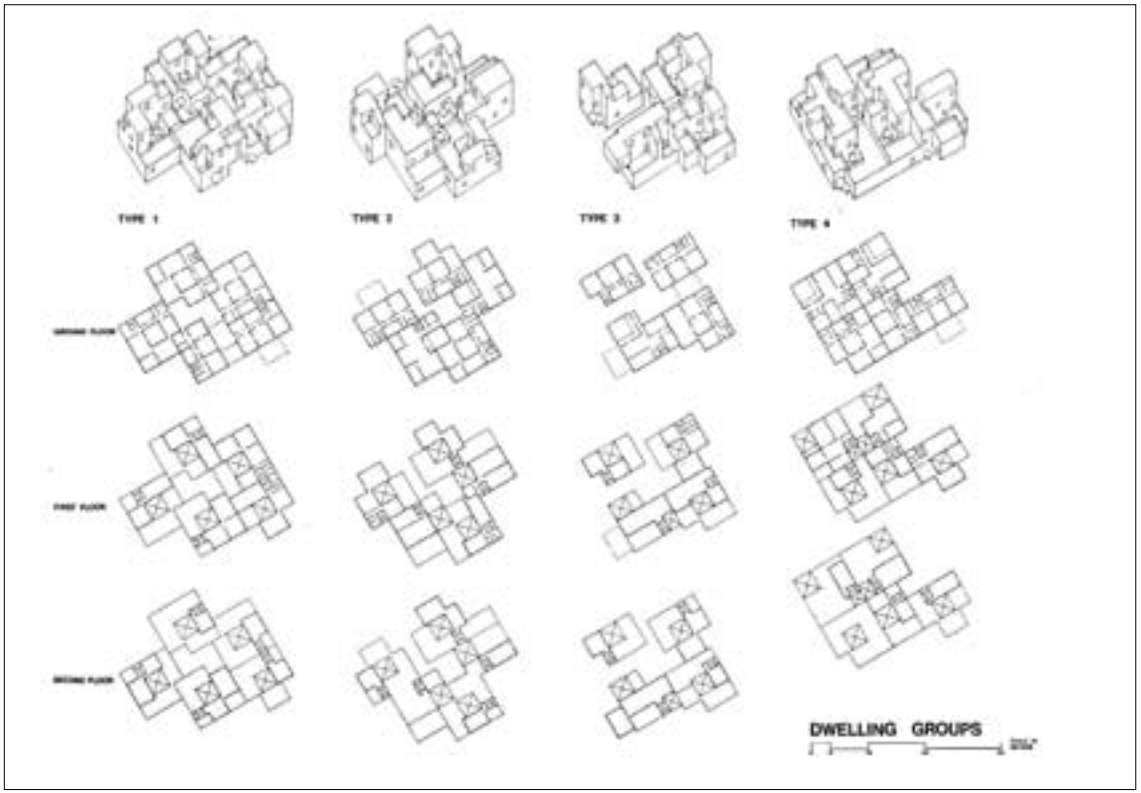

Figure 9: Four types of dwelling clusters show the increase in the area of each dwelling upwards to two additional floors for a total of three floors. The axonometric drawings for each cluster (top row) assume the maximum built up area for each dwelling (Source: author).

III. Maximum distance from any dwelling to a play area is 40 meters.
IV. Vehicular access is restricted within the segment, allowing only emergency vehicles, such as fire trucks, to penetrate the area. A maximum distance of 20 meters is allowed from a fire truck and its wheeled escape ladder to a face of a burning building.
V. Infrastructure lines are along streets and cul-de-sacs, and are not allowed to pass under buildings.
VI. Orientation: it is assumed for the test design that undesirable winds in the summer are from the south. Dwellings are rotated against this wind direction. This orientation of buildings will provide a balance of sun/shade within courtyards and the public domain. The Qibla (direction to Makkah) is taken as 19 degrees east to south, which affects the planning and design of the mosque.
VII. The concept of the Fina, which was operational in traditional built environments of North Africa, is the abutting areas to external walls up to about one meter in width and was the responsibility of adjacent owners or tenants. This concept was utilized to encourage the maintenance of a landscaped strip along the side(s) of pedestrian pathways (see Figure 14).

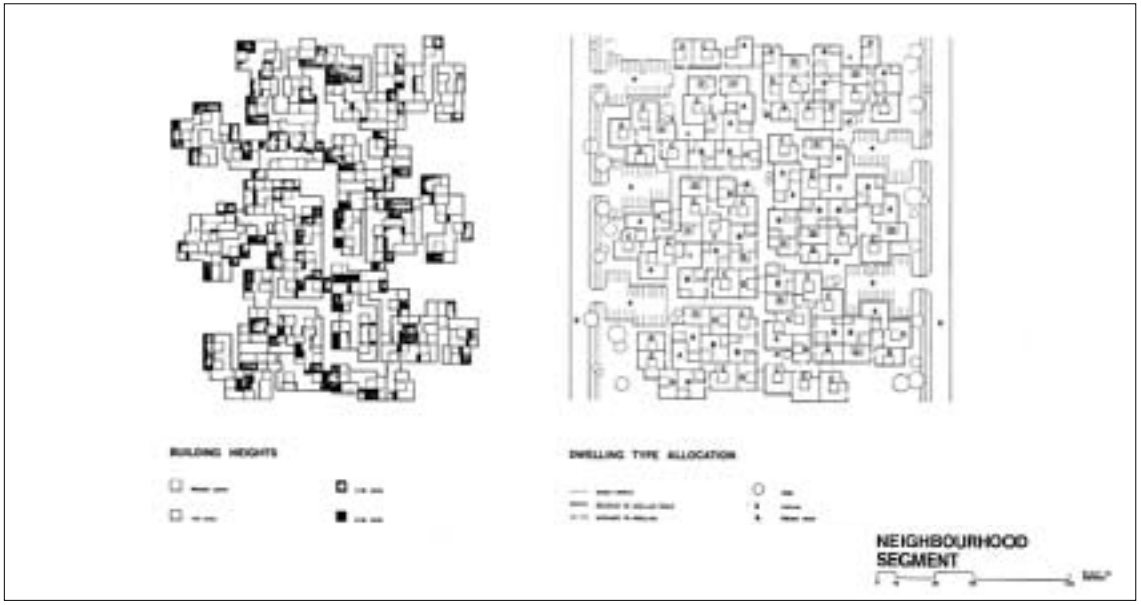

Figure 10: Neighborhood Segment: (right) Dwelling Type Allocation shows how the dwelling clusters are grouped that comprise the distribution of the four dwelling types within them and the whole neighborhood segment shows how it is accessed by streets and pathways and the location of parking, and (left) Building Heights includes the upward extension of dwellings and shows the ground, first, second, and third floors (Source: author).

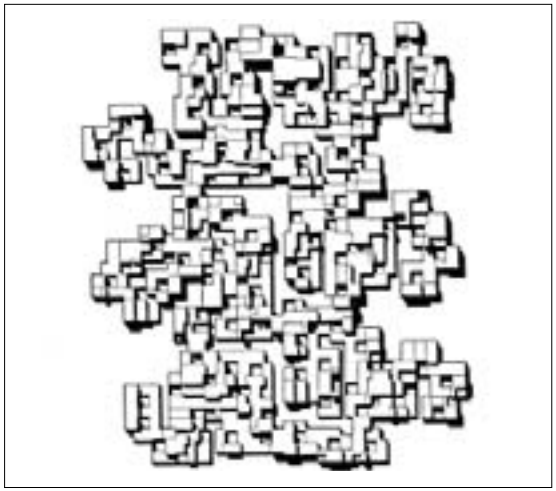

Figure 11- Neighborhood Segment built form. This drawing is based on the segment and dwelling type distribution in figure 10 and assumes the maximum built up of the dwellings (Source: author).

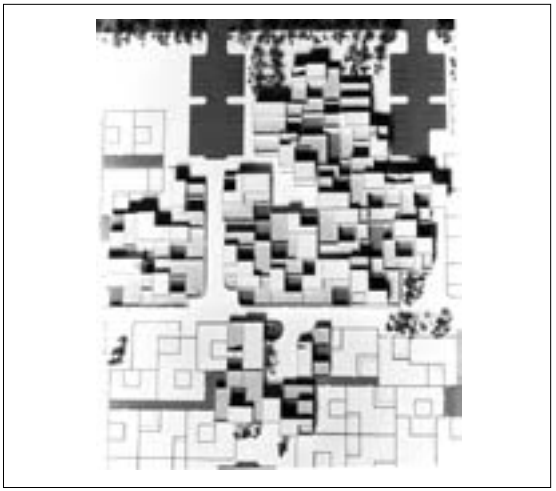

Figure 12: Partial architectural model of the neighborhood segment. View form the top showing the buildings, their courtyards, terraces, and parking areas (Source: author).

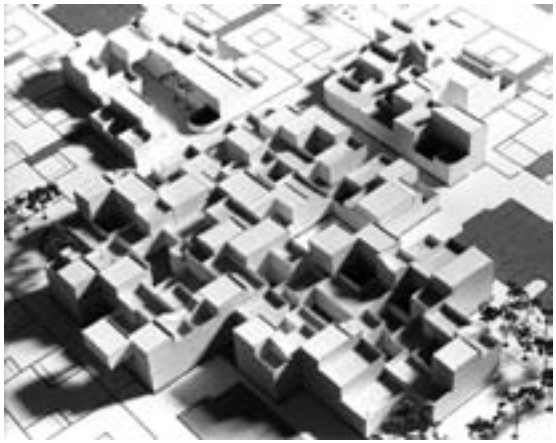

Figure 13: Oblique view of the architectural model of the neighborhood segment. The view shows how the dwelling units cluster together creating terraces for each unit that are designed not to overlook the private areas of adjacent units (Source: author).

Figure 14: Street in the village of Sidi Bou Sa'id, Tunisia, 2007, showing the use of the Fina for planting vegetation in the trough that enhances the quality and ambience of the street. Further, down the street the Fina is used to place removable plant pots (Source: Beschreibung).

4. Community Center (see Figure 15): The layout is directly influenced by the intricate and interesting physical configurations and mixture of uses found typically in the central areas of traditional towns and settlements. The orientation of the mosque and its Qibla wall versus the general alignment of major streets, which affect the planning of the neighborhood as a whole, provides a challenge for creating interesting spaces in this area. Major facilities include the mosque for the whole community, a public bath/health facility, shops of various sizes, a restaurant, two separate primary schools for girls and boys (assumed to be the preference in some communities); each can accommodate 200 pupils in six classrooms and adjacent open play fields. The Community Center covers an area of 2.5 hectares, including parking, vehicular access, open spaces and play areas. A number of considerations including for example the stipulation that the maximum distance from any shop to its service parking area is 50 meters governed its design.

5. Prototype Neighborhood (see Figures 16): The concept as presented comprises four neighborhood segments and a community center, covering an area of 17.6 hectares that includes 428 dwelling units, traffic and pedestrian circulation, parking and open spaces. Vehicular circulation is based on a hierarchy of four types: Arterial roads, Collector roads, Feeder roads and Access streets. Other streets are primarily for pedestrians and also follow a hierarchal concept as evident in the plans. The neighborhood as a prototype is responsive to repetitive growth in a variety of ways and in response to different contextual site requirements such as those found in the suburbs, in urban fringe areas or urban areas.

Figure 15: Community Center plan showing the distribution and location of the various facilities that are included (Source: author).

The gross density of the whole prototype neighborhood, including its community center, is 24 dwelling units/hectare. The density without the ground coverage of the community

center is 28 dwelling units/hectare. The public domain is 55% of the total area of the prototype neighborhood that includes all streets, parking, community center, playgrounds and opens spaces. The private domain is 45% of the total area that includes all dwelling units and cul-de-sac access.

Conclusion

The purpose of this test design, as was mentioned at the outset, was to find out through design inquiry whether or not we could recreate the desired qualities of traditional environments as those found in most regions of

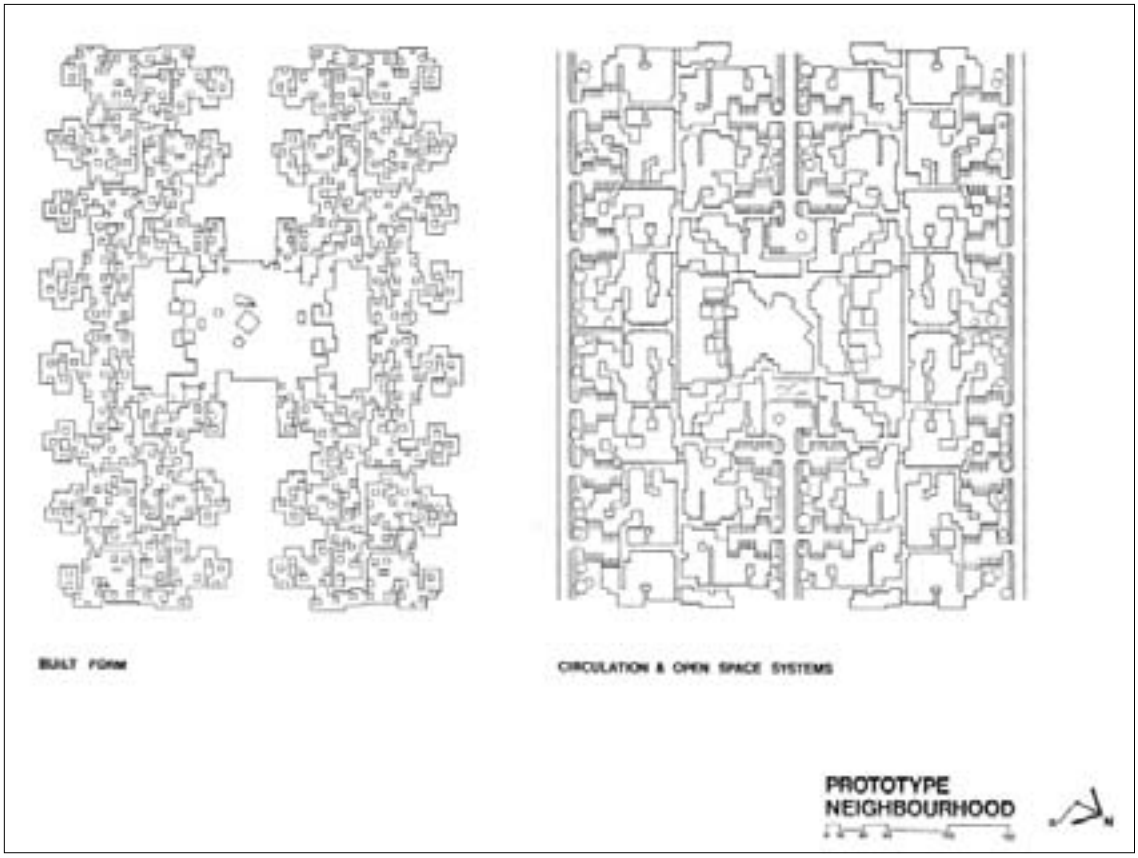

Figure 16: Prototype Neighborhood: (right) Circulation & Open Space Systems that also show parking locations, and the footprint of the built up areas, and (left) Roof outline of the built form (Source: author).

the Mediterranean. Every year those locations attract vast numbers of tourists from many countries. The evidence seems to suggest that there is a unanimous feeling among most visitors, regardless of cultural background, that those traditional built environments do offer an attractive setting for an alternative life style, and conjure up a strong feeling for a sense of place not easily found or experienced in contemporary environments.

This test design, therefore, can provide us with the opportunity to evaluate rationally its built form results in terms of qualitative and quantitative attributes and accordingly be able to consider its outcome, or its possible derivates, as an another viable alternative to our contemporary habitat and settlement patterns.

References

Alexander, C. et al., (1987). A New Theory of Urban Design, Oxford University Press, NY.

AlSayyad, N. & Bourdier, J-P. (eds.) (1989). The Courtyard as Dwelling, Center for Environmental Design Research, Vol. 6, IASTE WP06-89, University of California, Berkeley.

Amadouni, Z. (1994). Courtyard Housing: A Typological Analysis, MArch. Thesis, School of Architecture, McGill University, Montreal.

Bianca, S. (2000). Urban Form in the Arab World: Past and Present, Thames and Hudson, London.

Blaser, W. (1985). Atrium: Five Thousand Years of Open Courtyards, Translated by D.Q. Stephenson, Wepf and Co., Basel.

Blaser, W. (2004). Courtyards in Marrakech, Birkhauser, Basel.

Dunham, D. (1960). 'The courtyard as a temperature regulator', The New Scientist, 8: 663-666.

Edwards, B. et al (ed.) (2005) Courtyard Housing: Past, Present, and Future, Taylor & Francis.

Gallotti, J. (1924). Moorish Houses and Gardens of Morocco, William Helburn Inc., New York (text in French).

Hakim, B. (ed.) (1978). Sidi Bou Sa'id, Tunisia: Structure and Form of a Mediterranean Village, Technical University of Nova Scotia, Halifax. Redesigned paperback edition, 2009.

Hakim, B. (1986). Arabic-Islamic Cities: Building and Planning Principles, KPI, London. Paperback edition with additional material, 2008.

Hakim, B. (1989). Islamic architecture and urbanism. Encyclopedia of Architecture: Design, Engineering and Construction, Wiley, volume 3, 86-103.

Hakim, B. (1991). Urban design in traditional Islamic cultures: recycling its successes. Cities, 8: 4, 274-277.

Hakim, B. (2001). Reviving the rule system: An approach for revitalizing traditional towns in Maghreb, Cities, 18: 2, 87-92.

Hakim, B. (2007). Generative processes for revitalizing historic towns or heritage districts, Urban Design International, 12: 2-3, 87-99.

Kropf, K. (1993). An enquiry into the definition of built form in urban morphology. PhD dissertation in 2 volumes, Department of Geography, University of Birmingham.

Kropf, K. (1996). Urban tissue and the character of towns, Urban Design International, 1:3, 247-263.

Macintosh, D. (1973). The Modern Courtyard House: A History, AA paper number 9, Lund Humphries, London.

Nijst, A. et al. (1973). Living on the Edge of the Sahara: A Study of Traditional Forms of Habitation

and Types of Settlement in Morocco, Government Publishing Office, The Hague.

Petruccioli, A. (1998). Typological Process and Design Theory. Aga Khan Program for Islamic Architecture and MIT, Cambridge, Massachusetts.

Petruccioli, A. (2007). After Amnesia: Learning from the Islamic Mediterranean Urban Fabric. ICAR, Department of Civil Engineering and Architecture, Polytechnic University of Bari, Italy.

Rabbat, N. (ed.) (2010). The Courtyard House: From Cultural Reference to Universal Relevance, Ashgate, UK.

Reynolds, J. (2002). Courtyards: Aesthetic, Social and Thermal Delight, Wiley, New York.

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