PRINCIPLES AND APPLICATION FOR QA'A HOUSES IN MADINA

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Submitted to the Department of Architecture on May 12, 1983
in partial fulfillment of the requirements for the Degree of
Master of Science in Architectural Studies.

ABSTRACT

This thesis is a study of the concept of user participation
in the housing process. I explored how the support concept,
which was developed by SAR (Stichting Architecten Research),
can be applied to Madina. The study consists of three sections.
The first section is devoted mainly to evaluate the existing
condition and to an observation of traditional houses as well
as an analysis. The second section represents the design of
support. In the third section, I developed a tissue model
and apply this tissue model to the site.

Thesis Supervisor: N. John Habraken
Title: Professor of Architecture
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Introduction:

Madina is one of the places that Islamic pilgrims are obliged to visit. Many of them want to take advantage to make (al-Ziyarh) to the grave and mosque of the Prophet "Mohamad". Madina became the home of the first Islamic society after the Prophet's "Hejra" from Mukkah. Approximately three quarters of the pilgrims visited Madina; part of them came before, and the others came after the "Hajj".

In 1976, the majority of the old city was simply demolished. The beautiful houses that were produced in Madina, the very nice woodwork, disappeared in just a few days in dust and the sound of bulldozers. A small part of Madina still remains to the southeast of the mosque "Al-Aghwat". This is the only one that gives an idea of what the old city looked like.

The owners of the houses that were destroyed have been compensated by the government. They built new houses "villas" outside Madina and far away from the mosque. However, the former architectural unity of the city has vanished. Commercial activities were, and still are, the most important resource of the city. With the demolition of the western part of the old city, a large number of shops disappeared and had to be replaced elsewhere, such as "Quba" Street and "Bab Al-Majeedi" Street. The government also replaced the shops south of the mosque and made a new shopping center in "Darb Al-Ganaiz" Street. The government demolished this large part of the historic quarter in order to provide additional prayer space during the "Hajj" and Umera seasons.

From the previous brief description of the existing conditions of Madina, my thesis will be divided into three major sections. The first section will be dealing with the following subjects:

1.1 Historical background about Madina.
1.2 Determine the case study area and why I
chose this area.

1.3 The existing conditions of the central area of Madina.

1.4 Evaluation of the need and preservation of the old quarter such as "Al-Aghwat".

1.5 Observation and analysis of traditional houses.

The second section will deal with the following:

2.1 Why the support principle is recommended for Madina.

2.2 Support principles and methodology.

2.3 Design a support for traditional houses.

The third section will deal with the following:

3.1 Analysis of the existing situation in the tissue level.

3.2 Development of tissue models.

3.3 Fitting in the tissue models in the situation.
Historical background of Madina

Madina was the capital of the Muslims at the time of the prophet and caliphs. It is also the home of the migration "hijrah" and became the foundation base of the Islamic nation founded by Muhammad Bin Abdulah. The migration of the prophet from Macca to Madina was a turning point in history and led to a complete change in the life and organization of the community.

Madina is one of the most sacred places in the world and is truly the home of Islam. It contains one of three mosques which Muslims should visit. It is the second most important sanctuary in Islam following the "Kaaba" and contains the prophet's tomb together with those of the caliph Abu Bakr Al-Sedeyk and Oman Bin Al-Khatrab.

When the prophet entered Madina, he did not want to decide for himself whether he would settle down. Therefore, he left it up to his camel to provide him the answer. He told the "ansar" not to make the camel kneel but let it move along until the camel stopped on its own to kneel down. (1) When the camel stopped, the prophet dismounted and announced he would settle down and build his mosque on the site.

The people who accompanied the prophet from Macca, "muhajreen" settled around the mosque. The importance of the mosque is best illustrated by a quotation from the prophet, "A prayer in my mosque is better than one thousand prayers in other mosques except for the Holy Mosque of Macca, where a prayer is better than one hundred prayers in my mosque". During the remaining 10 years of the prophet's life in Madina, the city grew enormously. This growth will be considered in relation to the mosque development in Madina.
Madina's roots are very deep and can be traced back to the Ummayed and Abbasside ages. Political upheavals in the earlier centuries brought about changes in population patterns and during those times Madina would be affected although thousands of pilgrims continued to visit during the Hajj period.

When Egypt became a political force, it was soon felt in Madina through restoration programs, construction of new buildings, and the reconstruction of the mosque that had almost totally been destroyed by fire.

From the 13th to the 19th century, a clearer picture of Madina emerged as to size and structure as a result of travel accounts, both scientific and geographical. The population estimate at that time was said to have been between 16-20,000 people.

At this time the Ottoman regime held sway and Instanbul became the major capital of the Islamic world. The Ottoman regime, in 1853 decided to replace the Mosque of the Prophet by a new building. Ottoman architecture, at this time, retained many European qualities which, in turn, is reflected in the style of the mosque to the present day.

Following the collapse of the railway system in 1916, during the first World War, Madina's population fell to about 15,000, following the revolt against the Turks and the evacuation of Madina in 1918. Following the withdrawal of the Turks, a semblance of security was re-established. The population started increasing and physical expansion became evident everywhere, especially in the north-south region.

The economic boom of the Saudi economy has generated an ever-increasing number of pilgrims resulting in a very rapid rate of growth during the past two decades. This has brought great expansion, but at the same time has threatened major
portions of the old city.

Much of the old walled city has disappeared within the past few years, and in its stead, newly erected buildings have taken over but fail to retain the traditional qualities of architecture, many being copies of western models, and are weak in environmental qualities. Evidently, there seems to be a threat to Madina's historical continuity.
Existing conditions of the central area:

I am going to describe the existing condition of this area in terms of:

- Physical appearance
- Commercial activities
- Service facilities
- Traffic circulation

1. Physical Appearance: Madina experienced extremely rapid growth in the past 20 years. At the same time, the old city in the central area has disappeared. In 1970, the government decided to demolish the traditional quarter west of the mosque in order to provide temporary sheds for prayers. In 1977, a fire broke out in the As-Shuna area and cleared the rest of the traditional quarter. As a result, the majority of the old city was simply demolished. The beautiful houses in Madina, with the excellent woodwork, disappeared in just a few days in dust and the sound of bulldozers. A small part of the city still remains southeast of the mosque "Al-Aghwat" giving one an idea of what the old city looked like.

If we study the prayer space which is provided west of the mosque in relation to the number of pilgrims, we find that the total number of visitors to Madina was 687,000 pilgrims before the Hajj and 896,000 after the Hajj in 1980. (Statistic survey of the Hajj Research Center). The Saudi may remain for one or two days: Foreign pilgrims usually stay eight to ten days. That large number of pilgrims require a large prayer space, at least 200,000m². The consultant "Group of Arab Consultants for Development and Reconstruction" estimate the number of prayers on the first Friday after the Hajj of the year 1981. There were approximately 105,000 people present. That meant that the available space would be sufficient at the present time but that in the future there will be a need for more prayer space.
The Existing Conditions of the Central Area

Pedestrian street

Vehicular street

The Future of the Case Study Area

Mosque extension

Area to be developed

Old quarter recommended to be reserved

Darb Al Ganiz Street

Suhaime Street

Hantala Street

Alwar Street
2. Commercial Activity: If we look at the floor plans for houses in the central area, we find that all the ground-level space, especially the rooms on the street side, were transferred to shops. This is a direct result of the lack of space in this area, as a result of the demolition of the old quarter. Most of the houses are rented for the pilgrims during the Hajj and Umra season. All commercial activities still exist around the mosque "Al-Haram" which is considered as the main business district; this becomes very crowded, especially during the Hajj and Umra season. To rent a shop can cost a great deal. For example, a shop on King Abdul Aziz Street, one square meter will cost $300 for one year.

South of the mosque, there are many important buildings beside the "Aghwat quarter". These buildings are:

1. Madir Court
2. Imam's House

3. Aref Hikmat Library

There are also many hotels around the mosque which serve the pilgrims during the Hajj and Umra seasons. Most of these hotels are located north and northeast of the mosque. In the northeast corner of the mosque in the area of Ashuna, ablution facilities have been installed.

4. Traffic Circulation: The most critical problem in the central area is that of traffic and general movement of cars and pedestrians in the area. For example, Bab-As-Salam, main gate of the mosque, is exposed to vehicular traffic. The pedestrian links between the district of Zugag-Al-Tayer and the central area is bisected by traffic through Manakha Street. Now, however, they have solved this problem by constructing a tunnel under Manakha Street which runs from north to south to connect to Anbaria Street.

There are two major accesses from outside Madina to the central area. These accesses are:

1. **North and Northeast Access**: The northeast access is for people and pilgrims who are coming by plane or car from outside the country of Saudi Arabia, from countries such as the Gulf States or from cities inside the country such as Riyadh, Gaseem, and Dammam.

   The north accesses are for the people and pilgrims who are coming by car from countries such as Syria, Jordan, and Turkey and from Saudi cities such as Tabuk. This is a very important access and most of the pilgrims come through here.

2. **West Access**: The western access is for the people and pilgrims who are coming by car from cities inside Saudi Arabia such as Jeddah, Macca, and Taif. This is also used by people and pilgrims who are coming from outside the country by air and sea. Besides those, there are
local accesses which include the Southwest Access for people who are coming from Quba Mosque. The northwest accesses are for the people coming from Islamic University, the King's Palace, and Said-inâ Hamza "Mazaraf".

In order to reduce traffic problems in the control area, the municipality took a very beneficial decision in creating a pedestrian network around the mosque, turning these streets from vehicular to pedestrian throughways. These streets are Al-Saha Street, King Abdulaziz Street, and Manakha Street.
Determine the case study area:

We will concentrate our case study in the central area of Madina. This area is bounded by Suhaimi Street in the north, Abu Zar Street on the east, Darb Al-Ganiz Street in the south, and Manakha Street in the west. It contains these major elements:

- The Prophet's Mosque
- The old quarter "Al-Aghwat"

I chose this area as a case study for the following reasons:

1. It is the heart of Madina and therefore, must be organized carefully in order to make the whole body of Madina work properly.

2. It contains the oldest area which has special values and needs which should be studied.

3. It is considered as a "reception area" for all Muslims. They congregate during prayer time "five times" a day, therefore, many activities occur in this area and it needs to be studied and analyzed in terms of traffic circulation, etc.

Because of the decision taken by religious authorities concerning the position of Imam, e.g., that it should not be shifted to the south, there is only one part within the central area that can be developed and used for the mosque's extension. This is called the "Shouna" area, located in the south of Haram.
Evaluation of the need and preservation of the old quarter

Before we take any decision about this area, there are fundamental questions that must be asked. Why should a building be preserved? What other considerations are there? I believe that Al-Aghwat should be preserved for the following reasons:

1. Its traditional links with the past.
2. It is representative of a way of life.
3. The qualities of beauty in form and use of materials.
4. From a historical point of view, the most valuable buildings in Madina are usually concentrated in this area.
5. It is very close to the mosque.

The issue here is not to preserve the area as it is, but to keep it alive and improve the standard of living for the inhabitants by adapting modern utilities in this quarter.

Due to the poor physical condition of most houses and the lack of infrastructure such as sewage, water and electrical supplies, the present population of the quarter is very low. It is not inhabited by the original population: At the present time, it is inhabited primarily by poor and elderly people. That is one reason why we must improve the infrastructure of this area through the installation and repairing of networks without changing the traditional building structures. When a decision is made to introduce a new plumbing system, a new electrical system and sanitary equipment into old buildings, a number of questions must be faced - aesthetic, structural and economic.

Another most important matter to be considered if we wish to preserve this area intact is that we of the fire department and ambulance access to this quarter should a fire break out.
in the middle of the quarter.

There are two different kinds of building possession

1. Building owned by "Awqaf".
2. Building owned by inhabitants; some of them rented to visitors and pilgrims, and a few inhabited by the owner themselves.

We must know, from a financial point of view, who is going to fund the preservation? Will it be the owner with a subsidy from the government or the government itself?

People in this quarter usually keep their houses 'as is', with minimum maintenance. In spite of poor condition, they use the house as a source of income by renting it during the Hajj and Umra season, or as storage for the shops nearby the mosque. The question here is how we retain the original function of the old houses without destroying their structure and how we maintain it on a regular basis?

We have to improve the movements of pedestrians within this quarter because some of the streets are narrow. During the Hajj they are crowded with people: In order to improve pedestrian movement, we have to enlarge the street. But before starting that, we should make an intensive study as to which side of the street we are going to enlarge. By studying all the buildings, physically and historically, located on each side of the street, we can then enlarge that street side which has the least in historical importance or in the poorest condition.

Because there are many new buildings within this quarter, most of them located at the edges, it should be treated so as to match the character of the area. There are also a few run-down plots within the quarter which need to be redesigned so as to reflect the character of the traditional old buildings. These could be used for other facilities such as a health care unit.
Observation of traditional houses:

The analysis of traditional houses will be based upon the plan typology. These are different architectural elements which we have to study in terms of relationship and location of these elements within the house, i.e., we will investigate the relationship between the elements of the house and the elements and house as a site.

From the different plan-types of Madina's houses, it is important to observe that all plan-types share the same system, e.g. dividing the house into four units. Those units are:

1. Qa'a unit
2. Diwan unit
3. Vertical circulation - "staircase"
4. Multi-function unit - which contains the following elements:
   4.1 Mutbakh
   4.2 Majlis
   4.3 Dahliz
   4.4 Daka
   4.5 Bit-Al-Maa
   4.6 Mukhan
   4.7 Suffa
   4.8 Muakhar
First we will investigate these elements and their relationship. Then we will elucidate the local architectural vocabulary vis-a-vis the traditional Madina house, and explain the location and function of these elements.

<table>
<thead>
<tr>
<th>TRADITIONAL TERM</th>
<th>ARCHITECTURAL TERM</th>
<th>LOCATION</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majlis</td>
<td>Reception room</td>
<td>Behind entrance usually ground floor</td>
<td>Used as office and recreation room for males and friends</td>
</tr>
<tr>
<td>Matbakh</td>
<td>Kitchen</td>
<td>Usually located on ground floor</td>
<td>Cooking</td>
</tr>
<tr>
<td>Qa'a</td>
<td>Women's reception room &quot;formal&quot;</td>
<td>Generally located on ground floor</td>
<td>Used mainly as reception room. In summer used as family room</td>
</tr>
<tr>
<td>Mu'akhar</td>
<td>Room in rear of house</td>
<td>Generally located on upper floor</td>
<td>Sitting room, storage and personal things</td>
</tr>
<tr>
<td>Dahliz</td>
<td>Corridor</td>
<td>Next to the main entrance</td>
<td>A transitional area between public and privacy</td>
</tr>
<tr>
<td>Dakkah</td>
<td>Entrance hall</td>
<td>Next to the main entrance</td>
<td>Sitting area, informal reception for the male guest</td>
</tr>
<tr>
<td>Suffah</td>
<td>Ante-room</td>
<td>On the second floor</td>
<td>Sleeping, eating</td>
</tr>
<tr>
<td>Makhzan</td>
<td>Small storage room</td>
<td>In the staircase</td>
<td>Storage</td>
</tr>
<tr>
<td>Bit-al-Ma'</td>
<td>W.C.</td>
<td>In staircase or within living unit</td>
<td>Water closet, bath, washing, cleaning clothes</td>
</tr>
<tr>
<td>Tayrama</td>
<td>Storage area</td>
<td>On upper part of staircase</td>
<td>To store bed mattress in time of rain</td>
</tr>
<tr>
<td>Kharjah</td>
<td>Terrace</td>
<td>On upper levels</td>
<td>Sleeping, family gathering, drying clothes</td>
</tr>
<tr>
<td>Qabu</td>
<td>Basement</td>
<td>Underground floor</td>
<td>Storing, sitting, sleeping area in summer</td>
</tr>
</tbody>
</table>
1. **Qa'a Unit**: The Qa'a is used as the main reception room and is usually divided into three bays. The central bay, "Jila", extends up to the roof and is shielded by a movable cover. This cover is controlled from the ground floor by ropes. The two bays on the side have a lower and higher roof with one or more floors above them toned down to human scale. They are also raised one step to mark the place where one is required to remove his shoes.

With climates such as that of Madina, the temperature drops considerably during the night and the cool air is deposited in the "Jila" and flows into the rooms surrounding it, cooling the floors and walls. Access to the Qa'a is through the central bay.

The Qa'a is usually a fairly large room (3-3.5m in width and 9-10m in length) and holds a
great number of guests. There is no window for the Qa'a; its light is obtained mainly from the upper part of the central bay "Jila". The Qa'a is usually located in the middle of the house, surrounded by rooms which protect it against heat radiation from outside. During the summer the Qa'a units become the living area because they are very cool.

The Qa'a has a number of niches. There are at least six niches around the walls which are divided into three or four wooden shelves. The residents use them for personal things, such as books and flower's vases. The floor of the Qa'a is filled by stone, especially the central parts which become very cool in the summer.
2. **Diwan Unit**: This is similar to the Qa'a. It has two lateral bays; one bay is covered by the lower roof and above that there is a room. The second bay has no cover and is open all the way to the roof; from this one can view the courtyard. The Diwan has three niches in the wall and is used for the same purpose as in the Qa'a. The floor, also, is made of stone. The Diwan is always adjacent to the Qa'a and Diwan can be considered as one large unit and is the major element in the home. The Diwan has one step up where the people sit and gather.
3. **The Staircase Unit:** All plans use the same vertical circulation system which is structurally and visually arranged in such a way as to maintain maximum privacy for the user. In most cases there is one staircase. However, in some cases there may be two with one being considered as a main staircase and continuing to other floors, while the second stops at the first floor. Staircases are often adjacent to the courtyard of the Diwan. There are window openings for ventilation and lighting from the courtyard. The staircase is usually surrounded by a thick wall and is always located in the central part of the house.

4. **Multi-Function:** The entrance hall "Dahliz" is located next to the main entrance door and is traditionally the space which separates public and private section. It is the element which connects the front part of the house with the rear. The width of the entrance hall most often is equal to the half width of one room. Next to the Dahliz is
a small hall "Dakk" which has one step up and faces the street side. It has a sitting area where people can sit and look out onto the street through the Mashrabiyyah.

The main entrance door is made of wood and is highly decorated with different textures and shapes. The lintel of the entrance door is usually made of stone, while above the door there is often a small opening for ventilation. On the ground floor, adjacent to the entrance hall ("Dahliz") is located a sitting room ("Majlis") which is traditionally used as an office and reception room for the males and their friends.

On the upper floors, there is a living area with its own water-closet ("bayt-Al-Maal"). It is a multi-purpose room, used as a sitting, eating,
sleeping and recreation area.

Muakhar is a small room located at the rear of the house on the upper floor. It is used as a sitting room and for storage of personal things such as clothes.

Matbakh "kitchen" is generally located on the upper floor and used for cooking purposes. It is not equipped with modern appliances, and has a niche in the wall for the storage of dishes.

Khazanah is a small storage room usually located next to the "Matbakh" or kitchen. The ante-room ("suffa") is located on the upper floors and is multi-functional, being used for activities such as sleeping and eating.

Water-closet ("Bit-Al-Maa") is located near the staircase or within the living area of the upper floor. It is used as a water-closet for bathing, washing and cleaning clothes.

By observing the plans for traditional houses, one will observe the following:
1. All the main elements such as Majlis and living area are located in the front toward the main facade to provide those elements with light and ventilation.

2. All the rooms located on the ground floor and facing the street have flat wooden windows with vertical steel bars for security reasons.

3. All the rooms facing the street side on the upper floors are covered by a mashrabiya.

4. The solidity of structure and the richness of the facade is a result of using the Mushraiah, which indicates the ability of the local builders and craftsmen to utilize local building materials.

Walls: The width of the walls is 40-50cm at the ground level and becomes less at the parapets. The ground floor is constructed of stone while the upper floors are constructed with layers of mud brick. In some cases, the whole house is constructed of stone, providing a very solid external appearance. Due to thickness of stone walls, rooms
built of stone and mud become much cooler in hot areas than those made of other materials. The main advantage of stone and mud brick is its cheapness and availability.

Roof: The roof "satuh" of the house is built from tree branches or palm stems covered with a thick layer of mud for insulation. The palm trunks are used for roof construction and roof beams.

The climate factor leads the inhabitants to use the roofs as summer sleeping areas. In order to provide privacy for users, the roofs in all plan-types are generally divided by small brick walls so that each married couple in a house will have its own terrace for themselves and children. The roof is usually surrounded with light parapets. On the roof there is usually a storage space ("Tirama") in the upper part of the staircase, used to store the nuptial bed during the rainy days. Sometimes the roof is used for drying clothes.
Why is the support principle recommended for Madina?

More than any other city in Saudi Arabia, Madina needs an adaptable system as it is facing tremendous change. This is brought about through contact with other cultures during the Hajj season. This takes place throughout most of the year with visitors and pilgrims coming from all over the world. The houses in Madina, especially in the central area, seem to change according to the different seasons which are:

1. Hajj season.
2. Umra season: Any time during the year.
3. Ramadan season: Last 10 days of Ramadan month.
4. Rajab season: "Rajabia": One week of Rajab month.

The most changeable season is the Hajj. During this time, there are many activities that take place in the central area. The people here can be divided into two categories:

1. People rent part of the house to pilgrims. They rent the ground floor and the owner lives on the first floor or they rent one or two rooms of the house. This actually depends on the size of the house.
2. People rent the whole house to the pilgrims. In this case, the owner leaves his house and rents a small apartment for a short while outside the city. In most cases, they store all their furniture in one room of their home.

All of these changes occur in the central area rather than in any other part of the city because the pilgrims prefer to be near the mosque, even if it is more expensive.

Not all houses located in the central area meet the changing social needs of the user. Most of the pilgrims who rent a home come from different cultures. They try to make changes in the house they rent according to their needs. As an
example, the Iranian pilgrims prefer to rent a home which has two kinds of bathrooms, "toilet and bathroom". If the home doesn't have the two elements, they will ask the owner of the house to provide them, otherwise they will not rent. The function of some houses in the central area was changed from residential to commercial. Some users change their houses, or part of it, into shops, stores, offices, etc. Generally speaking, the central area has a wide variety of family composition represented by the following:

1. People living on their own. This is divided into two parts:
   a. Married or unmarried couple without children.
   b. Married couple with children in later stage of family cycle; children have left home.
2. Shop owners often live above the shop.
3. People living in Awaqat building. Most of them are single poor people and foreign.

In order to meet this demand for the variety of dwelling style, we need to build a wide diversity of dwelling forms. The support concept is the only one that can meet all the changing demands mentioned before. A support building is one that can be adapted to any changing need or desire of the user over a long period of time while also satisfying individual requirements of different users. A support is a building which offers different kinds of variations at different levels. These levels are:

1. Variation in distribution of spaces and functions.
2. Variation in distribution of equipment within space (bath, etc.).
3. Variation in room size; same function but different possibilities.

The support design should make variety on all these levels possible. This design, there-
fore, has to be done in a methodical way. In the following pages, I will discuss this method in more detail.
The support principles and methodology:

The main point of methodology is participation of the user in the housing process. Nowadays housing projects do not meet the changing social needs of the user who tends to play a minimal role in the housing process. There is no place for the individual user. The right of the occupant to have a say in the arrangement and finishing of their dwelling is no longer applied in the housing process. Participation is, indeed, a vital issue. We cannot, as an architect, tell the people what they want. This is the issue of participation in housing.

In order to meet the user's needs more exactly, we should let the user play an active and central role in the housing process. We should give him the opportunity to define his own living requirements. But the question is to what extent should the user be involved? A responsible man wants to identify with his material environment. An environment may be very beautiful and comfortable, but it is not acceptable if it cannot be a home. To dwell is to take action. Beauty and comfort cannot give identification, only action gives that. (2) A dwelling is not a thing that can be designed by architects or anyone else. A dwelling is an act - the act of the user. The dwelling should be a result of the participation of the user. A dwelling is not a thing people need. A dwelling is the result of people fulfilling the need to dwell.

The use of the support concept does provide a flexible means of meeting this human need. Furthermore, the support is designed in such a way as to provide change of floor plans over a period of time. A support should offer places that suggest possibilities for internal arrangements in unending variations and combinations. The support is not just an open structure that offers large areas of floor space with as few obstructions as possible but has a specific architecture.
However, the support is not a finished dwelling. The support is a building in which other people, who are not designers, will be able to recognize specific possibilities through the use of detachable units. Therefore, a support should not be neutral, since neutral things are hard to identify with. A support should give real form, real spaces, spaces that are not rooms yet, but nevertheless, spur the imagination and suggest more possibilities for life style than the occupant would have thought of before seeing them. (3)

In order to let the user participate in the housing and to meet his needs, "SAR" has developed a methodology for design of support and detachable units. This methodology is based on two sets of rules. The first set deals with the position and dimension of material. The second set deals with the position and dimension of space. The relation between material and space is, most of the time, an aspect of the built environment that changes occasionally. Decisions about the dimension and position of rooms depend on their function. The relation between a space and its function can change in the course of time. A specific space can be used in different ways. Once we have made space, we can investigate the kind of function for which it can be used. To determine the rules for the relative position of the space, a formal environment such as a grid or a zone distribution must be adopted. In order to design a support, certain operations and evaluations are made relative to specific parts of the support; we distinguish zoning, sectors and sector groups. In each part of the support, possible infill variations can be studied. We distinguish basic variations - having to do with the distribution of functions - and sub-variations, the final floor plans.
Sector groups
## Location of Spaces

<table>
<thead>
<tr>
<th>Layout</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Space</td>
<td>+ +</td>
</tr>
<tr>
<td>Special Purpose Space</td>
<td>- + (one &amp; min)</td>
</tr>
<tr>
<td>General Purpose Space</td>
<td>- -</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service Space</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Purpose</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>General Purpose</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- **E**: Entrance
- **Sh1**: Small Shop
- **Sh2**: Larger Shop
- **Q**: Qa'a
- **Di**: Diwan
- **R1**: Reception
- **R2**: Large Reception
- **FL**: Formal Living
- **L**: Living
- **D**: Dining
- **B**: Bedroom
- **B1**: One Person Bedroom
- **B2**: Two Person Bedroom
- **B3**: Master Bedroom
- **b**: Bathroom
- **K1**: Kitchen for Cooking Only
- **K2**: Large Kitchen
- **Sd**: Study
- **P**: Playroom
- **St**: Storage
Zoning Analysis
Sector Analysis
Basic variations

Ground Floor

Upper Floor
Sub-variations
Deformation Of the Support

Diagram showing different stages of deformation.
Rules to be followed:

1. The door of the entrance must open onto a blank wall to obstruct all view of the inside.

2. The maximum size of the Qa'a opening is ob margin + o zone, but never comes to 2 margin + o zone.

3. The Qa'a never divides to three parts or two parts. It must always be one large part.

4. The Iwan and the Qa'a never separate; always must be attached together.
First Step:

In this step, the location of the party walls will be decided. There are four possible locations for the party walls in the ground floor and one possible location in the first floor.

2nd

In this step, the decision about the staircase will be made. There are many different shapes for the staircase. Each family will decide what kind of staircase they are going to use.
3rd

In this step, the decision about the location and size of the Qa'a opening "Jella" will be made. Each family can do that by connecting the two built zones and by using floor plates.

4th

In this step, the location and the size of the courtyard will be decided by the user.
WAYS OF FILLING THE QA'A SUPPORT

1. PARTY WALLS
2. STAIRCASE
3. QA'A OPENING
4. COURTYARD OPENING

1. STAIRCASE
2. QA'A OPENING
3. COURTYARD
4. PARTY WALLS
There are four different functional spaces:

1. Qa'a space
2. Iwan space
3. Staircase
4. Multi-functional space
   4.1 Matbakh (K)
   4.2 Majlis (R)
   4.3 Dahliz (corridor)
   4.4 Daka (hall)
   4.5 Bit-Al-Maa (W.C.)
   4.6 Makhzan (storage)
   4.7 Sofa - multi-purpose
   4.8 Moakhar - room in rear of the house
Analysis of traditional quarters in the tissue levels

By observing the traditional quarter in Madina, especially Al-Aghwat, we will recognize the following:

1. There are two zones, built zone and open zone. They can be either public or private. The built zone contains built elements such as a residential building which is considered as a private built element. A commercial or institutional building is considered as a public built element. Within the built zone, there is some part which is open for light and ventilation such as the "qa'a" opening and courtyard. These open areas are private open elements. The open zone contains elements such as streets "Drob" alleys "Aziqa", and open space "square or vacant land". The streets of "Al-Aghwat" quarter have different hierarchical levels. We have two main streets running from east to west, one of them having a very important function. That activity is to connect the mosque
with the cemetery. The medium width of these streets is 2 to 2.5 meter. The cul-de-sac has the character of a semi-private street; there is a semi-private space "Fina" which is the part near the house door and it doesn't extend more than half the width of the street. It is used for activities related to domestic life as well as the community. It was also used for selling goods. Built and open elements in the quarter have different forms. They are the result of social and climatic needs.

2. The heights of the building are either two, three, or four stories high.

3. There is, sometimes, a room built over the street to connect the two houses in second floor to allow women to go to the other home without using the street.

4. The placement of doors within the street never meet opposite from one another.

5. One can realize that there is no unity in
these quarters because of the complexity of its building and space, but that is not true. We should simply not draw this conclusion without a real understanding of such a complex environment. We find that houses are built in a systematic way, higher levels, lower levels and one level between as shown in figure
These diagrams show that the Qa'a is always 3 module while the Diwan is 2 module and thr other element of the house have either 1 module or \( \frac{1}{2} \) module.
There are three different levels of the structure:

1. First level
2. Second level
3. Third level
DIFFERENT CONFIGURATION FOR SUPPORT UNIT
Tissue Types

A

B
Function models of tissue type (A)
Function models of tissue type (B)
Built Area
Non-thematic Buildings:

Motel
In the following illustration, I will show how we can place a non-thematic function such as office building, school, and motels in the tissue. There are two kinds of non-thematic function. First, non-thematic function with non-thematic form. Fig. 1,2. Second, non-thematic function with thematic form. I will show examples of the placement of non-thematic functions within the thematic form.
CONCLUDING REMARKS:

We have studied two different levels, the support and tissue level. In the support level, we explained a method which allows users to participate, a method which can accommodate different changes and requirements. We have demonstrated that a dwelling always exists in two spheres: the public sphere and the private sphere. Today, in mass housing, everything is decided in the public sphere. The support and detachable units recognize the two spheres. The support is the product made in the public sphere for the community while the detachable unit is the product made in the private sphere whereby the user can make his decision. This decision is missing today in mass housing.

In the tissue level, the analysis of the central area is carried out on the basis of SAR 73. This method is concerned with the direct dwelling environment and makes it possible to formulate the characteristics which are valid for the relationship, position, and dimensions of the spatial and build element which make up the environment. Three important recommendations are derived from this report:

- Preserve the old quarters, especially "Al-Aghwat" quarter.
- No vehicles allowed in the central area.
- Let the user have a say in the housing process.

Finally, if the government decided to demolish the old quarter, which I recommended to be reserved, the only option left is to apply the support concept in this area for the reasons explained in the second section.
Appendix

A SUPPORT is that part of a habitable structure over which the resident has no individual control.

DETACHABLE UNITS are movable components over which the resident has individual control.

A ZONE DISTRIBUTION is a system of zones and margins, the relative positions of which follow certain conventions.

AN ALPHA ZONE is an internal area, intended for private use, and is adjacent to an external wall or the courtyard.

A BETA ZONE is an internal area, intended for private use, and is not adjacent to an external wall.

A GAMMA ZONE can be internal or external but is intended for public use.

A DELTA ZONE is an internal open space intended for private use.

A MARGIN is an area between two zones with the characteristics of both of these zones and taking its name from them.

A GENERAL PURPOSE SPACE is a space that allows a combination of activities that cannot always be determined in advance.

A SPECIAL PURPOSE SPACE is a space intended for occupancy over a considerable length of time the minimum and maximum sizes of which can be determined on the basis of its function.

SERVICE SPACES are meant for short term occupancy and are utilitarian in character, the size and layout of them can be determined on the basis of an analysis of their functions.

POSITION 1 -- A space which overlaps a zone and ends in the adjoining margins.

POSITION 2 -- A space which overlaps more than one zone and ends in a margin.
POSITION 3 -- A space which begins and ends in the same margin.

A SECTOR is a part of a zone and its adjoining margin that can be planned freely.

A SECTOR GROUP is a combination of connected sectors.

A BASIC VARIATION indicates the position, in a specific sector group, of a certain group of functions, which together form a dwelling program.

A SUB-VARIATION of a basic variation is a completed layout in which the positions of the functions are the same as in the basic variation.

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FOOTNOTES
(1) Al-Hathloul, S., "Tradition, Continuity and Change in the Physical Environment."
