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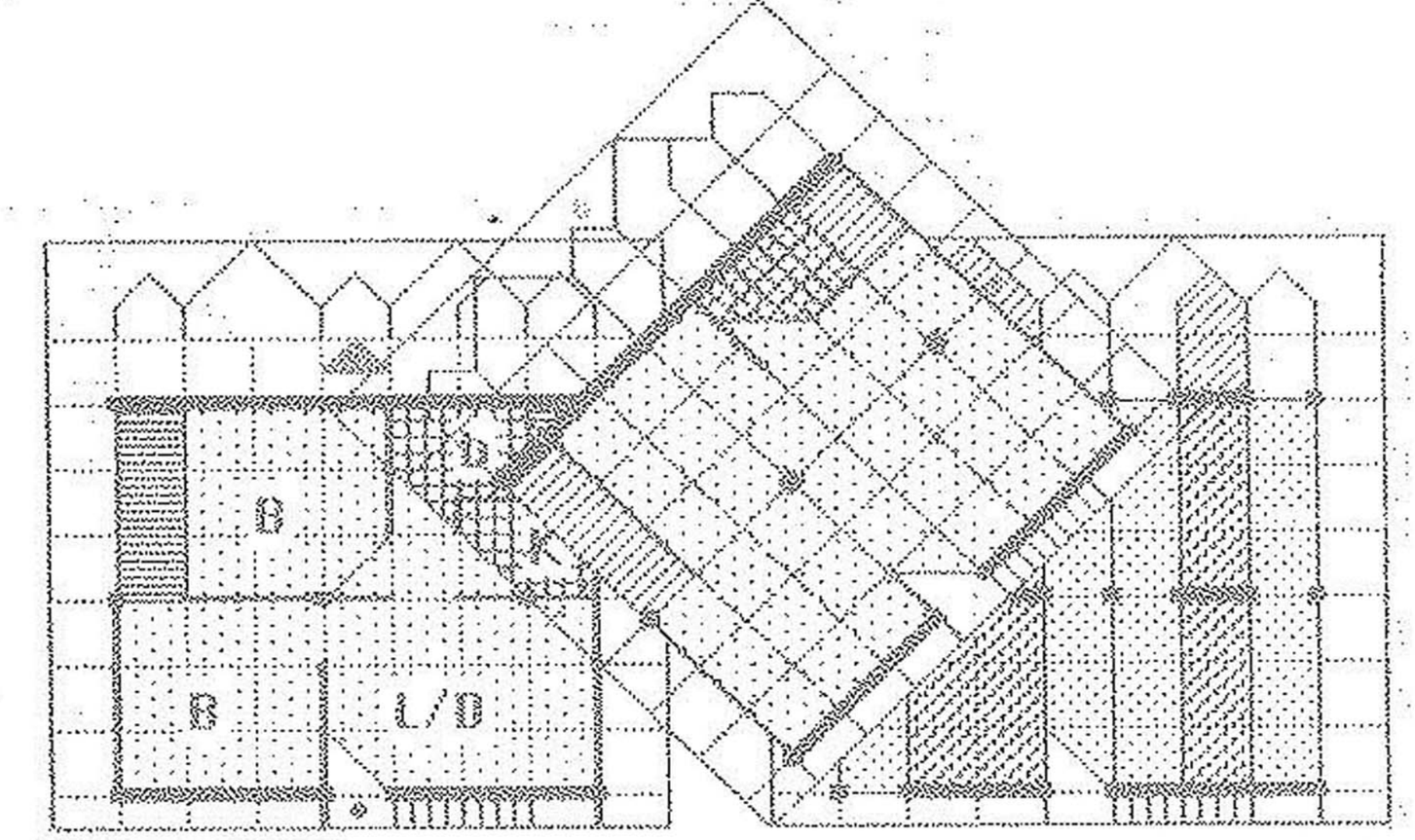

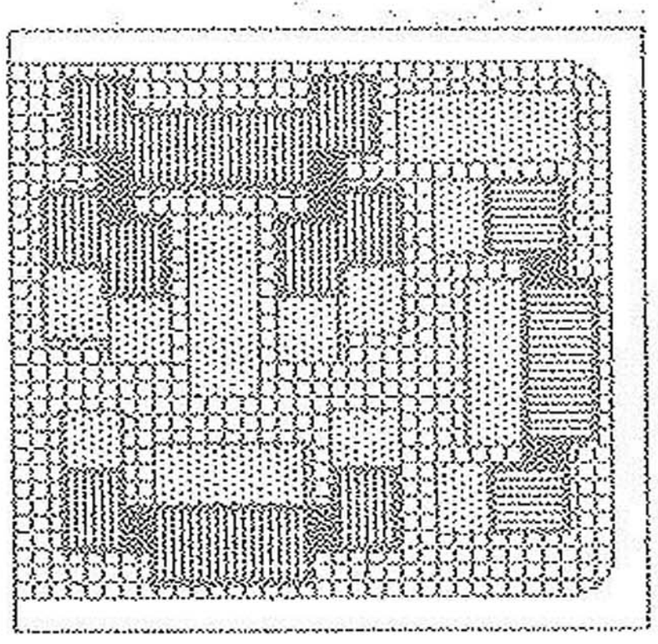

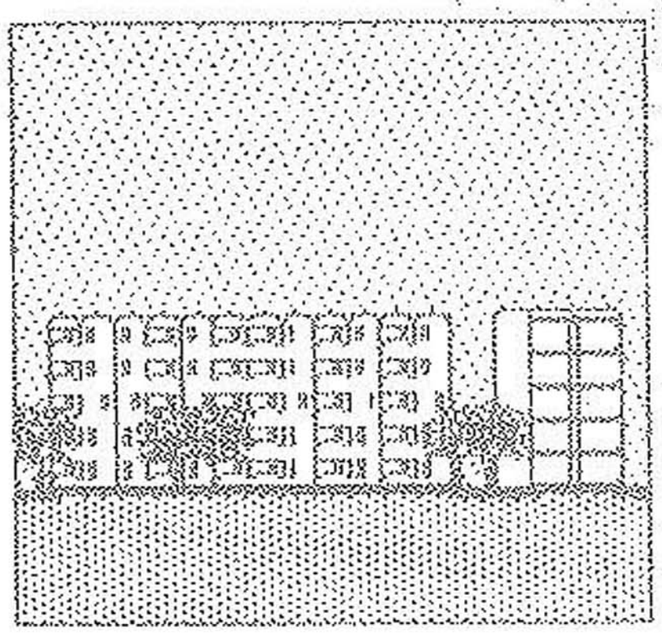

FORMAL LOW COST HOUSING PROTOTYPES

EGYPT

MONITORING, ASSESSMENT AND DEVELOPMENT

FINAL REPORT
SECOND PHASE

FAO GRANT NUMBER MS/890009
1992

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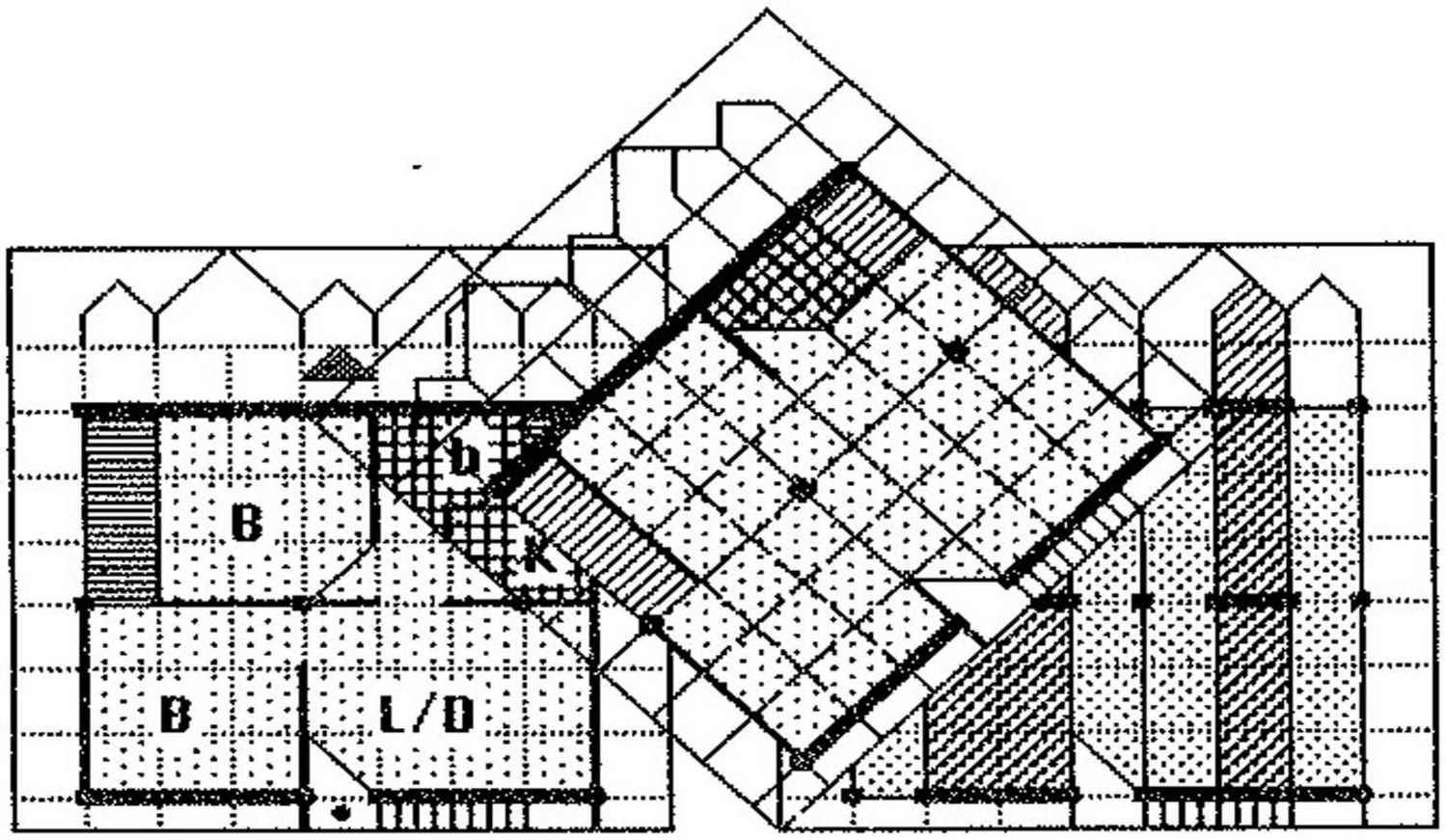

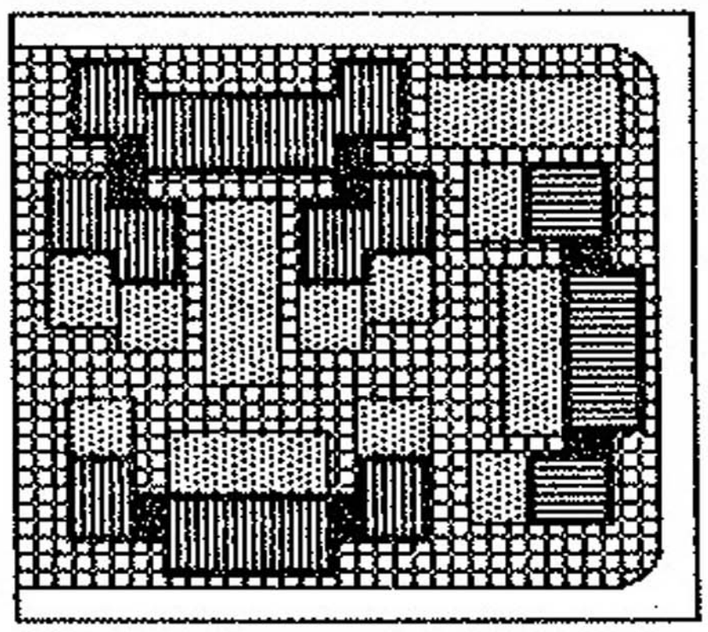

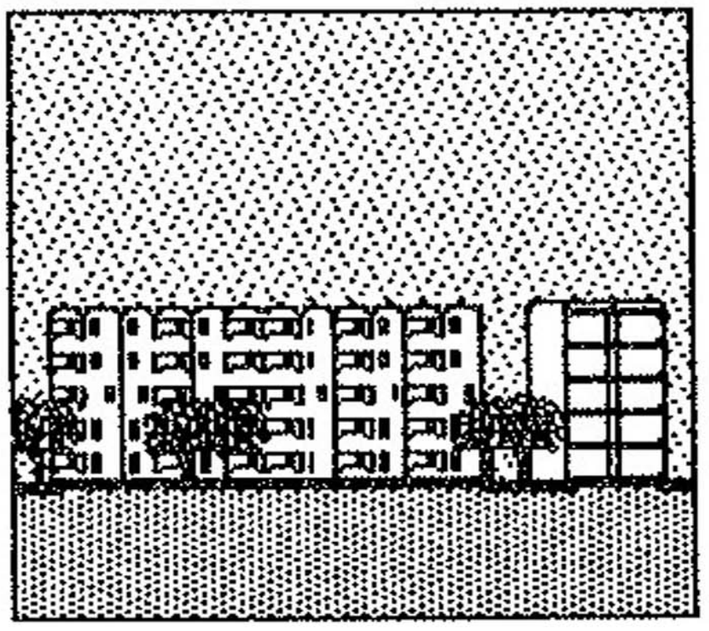

FORMAL LOW COST HOUSING PROTOTYPES
EGYPT
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FINAL REPORT
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SUPREME COUNCIL OF UNIVERSITIES, EGYPT . FACU - GRANT NUMBER MS / 89009

FORMAL LOW COST HOUSING PROTOTYPES - EGYPT : MONITORING, ASSESSMENT AND DEVELOPMENT . SECOND PHASE - FINAL REPORT - MAY 1992

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TABLE OF CONTENTS :

Abstract

The present report is the concluding document of the research project, Formal Low Cost Housing Prototypes, Egypt- Monitoring, Assessment and Development, FRCU Grant No. MS 89009. It represents the research work completed during the short extension phase of the research project, spanning the period, January - June 1992.

The objective of the extentsion phase with its relatively limited duration was to address one of the problems, that were highlighted during the first phase of the project and documented in its final report; the Supreme Council of Egyptian Universities, Cairo , Egypt, November 1991.

The problems identified during the said phase comprised; technical, environmental (contextual), organizational and socio-cultural problems.It was agreed that the extension phase would only focuss on two aspects of the technical problems and attempts to formulate a framework and practical guidelines to deal with and overcome the deficiencies of those problems.

The selected technical problem areas were:

- Possible spatial organization of the low cost housing prototypes dwelling units; the area of which vary from a mere 45 m^2 to amaximum of 90 m^2, without contradicting nor clashing with the permanent elements of the prototypes (external or internal, i.e.structural elements, utilities and sanitary installations ,etc).

- Facade treatments and generation possibilities, to overcome the problems of mechanical repitition of the initial facades of the prototypes irregard of the contextual variations (physical and socio-cultural). Furthermore to provide means of enjoying architecural character and identity without sacrificing order and economy.

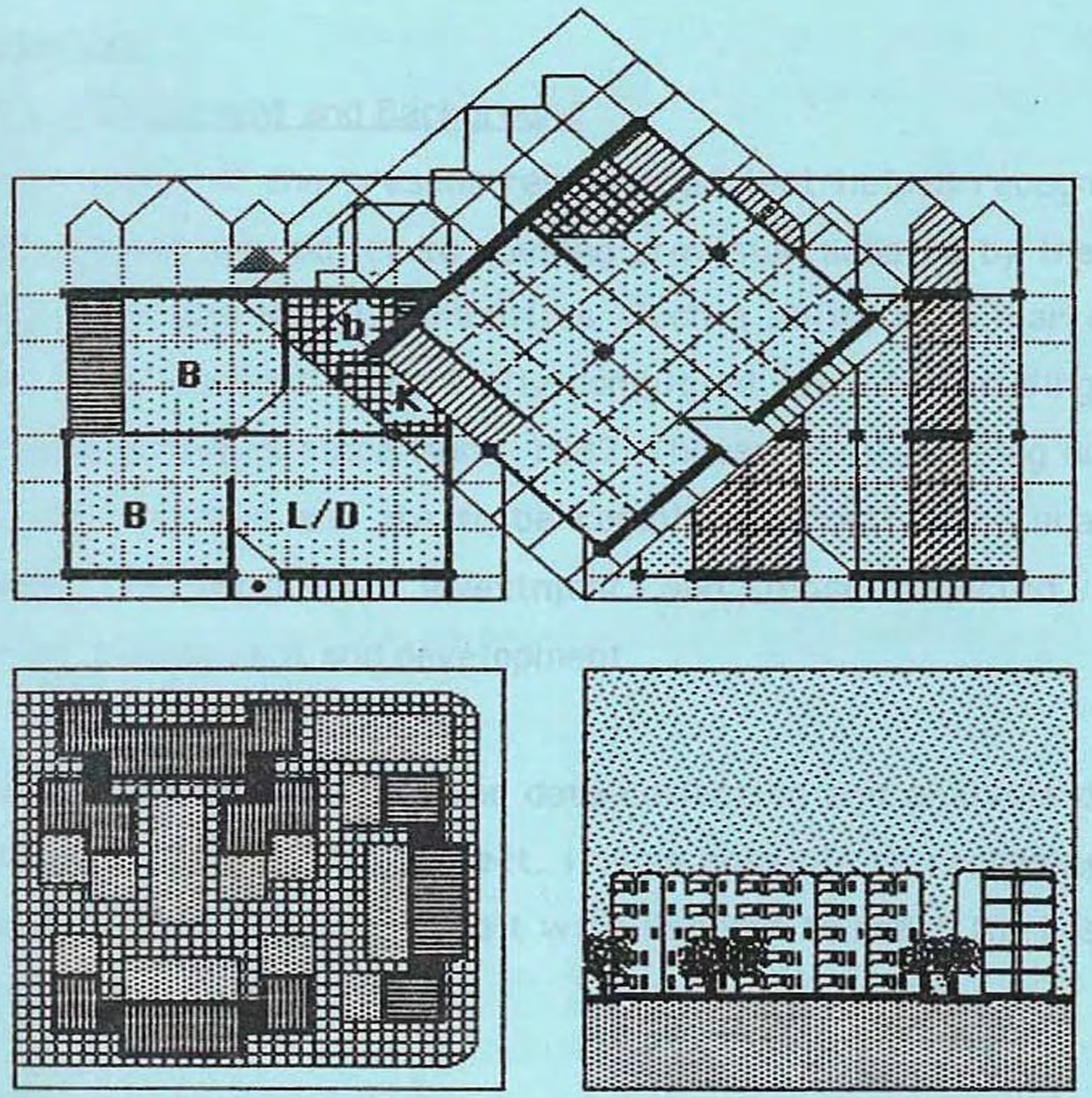
The structure and contents of the present report emanate from the said objectives and greatly benefit from the presence of the published final report of the 1st research phase in escaping from overviewsand the need to massing basic information related to the prototypes and the implementation experience.

The report comprises four chapters in an intended sequence, i..e. introducing the problem, plan variations, facade generation and conclusions & recommendations.

The framework for solving the problem of: internal organization of dwellings on the one hand and generating distinguished and contextually fit facades on the other is developed and putforward. Guidelines for dealing with the two technical problems are also highlighted. The presentation exploits the potentials of architectural graphics to enhance conceptions and to apply the guidelines.

This report provides the core of an extensive manual or a set of brochures for low cost Housing Prototypes (plan variation and facade generation), to the benefit of the local & National Housing Supply Agencies in

Egypt,(including the Ministry of Development ,New Communities, Housing and Utilities ,Egypt , the National Housing Organizations, local authorities, housing companies and public contracting companies). Its use may also extend to prospective users and project owners association.



1

INTRODUCTION

FINAL REPORT
SECOND PHASE

1992

1. Introduction

1.1 Problem Statement and Background

The initial phase of the present research project helped recognizing the potentials of the new policy to housing provision adopted by the Ministry of Development and New Communities. Such a policy was marked by the adoption of the concept of partially completed low cost housing units as the formal prototypes since April 1987. Thousands of housing units were planned, implemented and are to be completed shortly. The scale of the experiment, in terms of investment and those affected, deserves monitoring, assessment and development .

Through the extensive efforts for data collection and analysis during the first phase of the research project, it was possible to recognize some of the problems that need to be dealt with in order to reach the best results for the new ambitious policy.

Some of those problems were expected since the published material supporting the new policy was solely dependant on the integrated volume entitled "Development of Low Cost Housing Prototypes - Conceptions and Execution Document"- Cairo, April 1987. The document combines the conceptions, execution drawings and bills of quantities for seven prototypes.

Since its publication and till now, no upgrading, critical review nor modifications were carried out. Piecemeal remedies for specific site

problems or programme requirements were and are continuously put forward but never amounted to a rigourous and comprehensive development of the conception and related execution documents.

The portofolio or the mother volume does not include, inspite of its size and extent of coverage, guidelines for site organization and spacial development. Neither it contains users manuals for completing their unfinished dwellings.Furthermore no provision were made for climatic variability and the questions of local identity and appearance were not adequately covered.

Many problems were expected to show with the implementation, namely:

- technical problems.
- organizationel problems.
- socio-cultural problems.

The outcome of research undertaken in the initial phase highlighted the nature and magnitude of such problems. The conclusions of the first or initial phase could provide a strong base for future research related to the new housing policy to be undertaken by national research institutions or by the Ministry of Development and New Community itself.

1.2 Objectives of the Present Report (second phase)

The extension phase of six months (the present phase) allowed tackling just one type of the pre-identified problems which is related to the so-called technical problems:

- Problems related to the possible spatial organization of the internal layouts of the dwellings (plan variations).

- Problems related to facade treatments taking into consideration the impact of locational variations, geographical and contextual, (facade generation).

As for the first type of problems, it is beleived that the concept of gradual completion of the dwelling may present some difficulties to the owners / users. Users may not be able to recognize the potentials of the provided area, the possible alternative solutions that could be suggested for such an area. Generating alternatives for a specific area may represent a real challenge to most practicing architects. Hence it would be just fair to give the users some examples showing the potentials of their dwellings.

As for the second type of problems, it is beleived that facade treatments could be generated according to well formulated guidelines. The research deals with three main approaches for facade treatment:

- Appropriate external treatment from a climatic view point.
- A distinctive facade treatment that respects the general character of the locale (regional & vernacular architecture - macro context).
- A distinctive facade treatment that reflects the identity of the project (micro identity).

The present phase of the research project (second phase) is heavily relying on graphic presentation in order to show examples(either for plan variations or facade generation) approachable to the expected users. The graphic material provides a core of information that could be easily developed at later stages to generate sets of brochures to be distributed to:

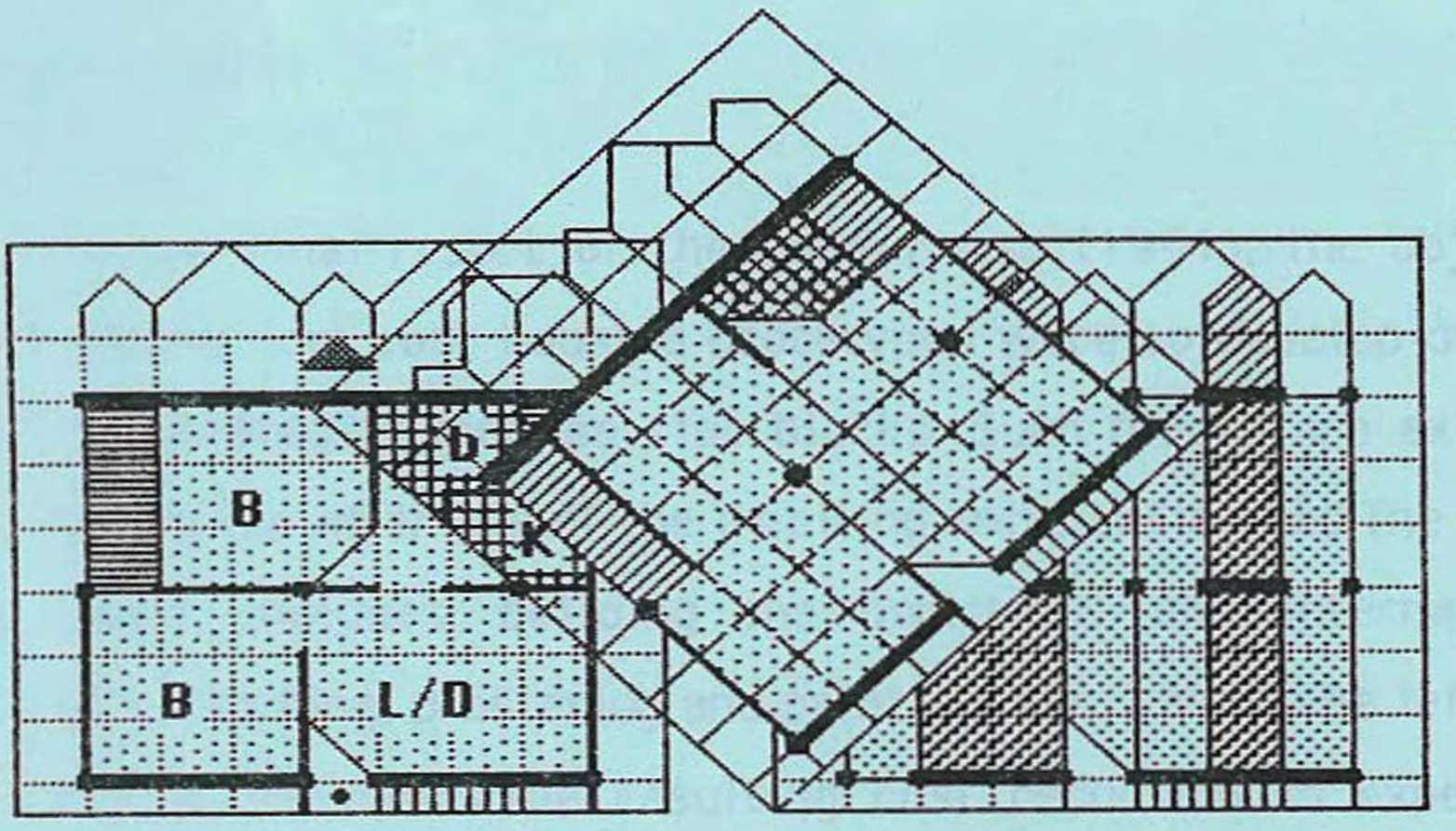
- the owners/users in case of plan variations.

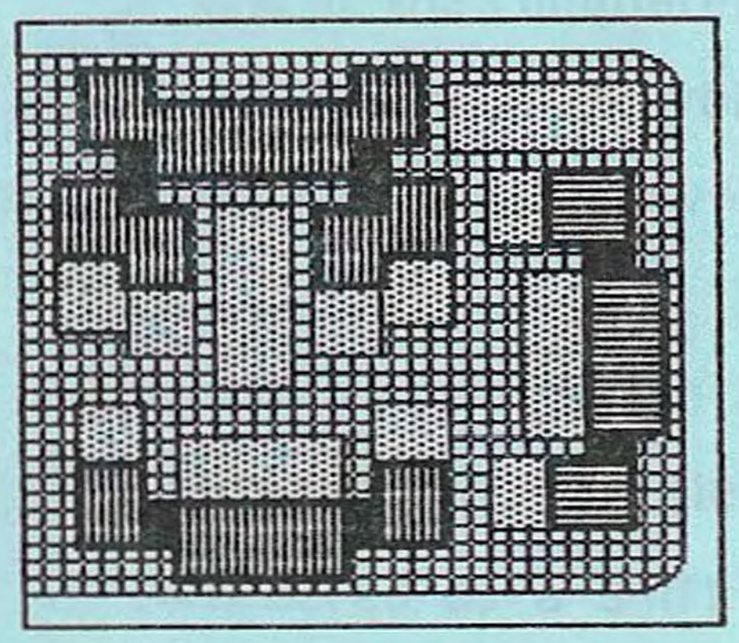
- the local authorities, housing co-operatives, housing companies, contractors and new communities organizations and agencies.

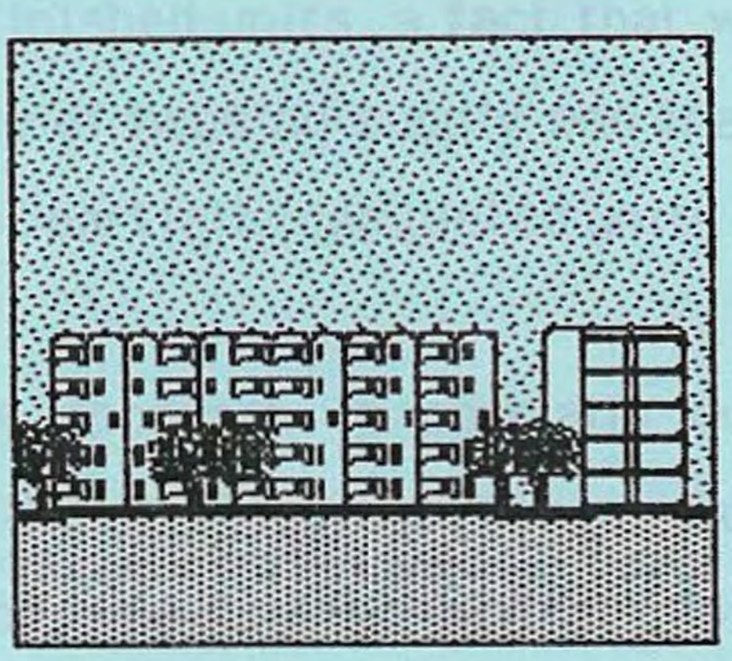
1.3 Outline of the present report

The present report thus includes four main sections as follows:

- An introduction (the present section), highlighting the background of the tackled problem, the objectives of the present phase, the outline and contents of the present report.
- Plan Variations: dealing with the concept of providing alternative solutions for the dwellings in order to help the users to appreaciate the potentials of their units. It comprises : an introduction, objectives, methodology, suggested plan variations, general directives resulting from the analysis of plan variation.
- Facade generation: presenting guidelines for facade treatments. It comprises: problem statement and objectives, initial and implemented facades, attempts of facade generation based on architectural aesthetics, architectural character and culture and context, guide-lines for facade generation.
- Conclusions and Recommendations: highlighting research findings and future lines of action.







2

PLAN VARIATIONS

FINAL REPORT
SECOND PHASE

1992

2. Plan Variations

2.1 Introduction

As stated in the final report of the first phase (1991), the objectives behind the formal low cost housing prototypes were to develop deficient housing units located in medium rise blocks. Such blocks are externally finished, leaving the interiors of the dwelling units unfinished.The interior finishing which includes: building the partitions and internal walls (kitchen walls, flooring, plastering and painting, etc..) are to be left to the owners/users of the units.The resulting cost reduction is expected to exceed 25% to 30% of the completely finished units, a fact that will have an immense repercussion on the volume of housing supply and the number of families that can afford the low-cost partially completed units.

Beside the economic merits, the new approach to partially completed dwellings recognizes the user's role in the development process. Such an approach is considered as a shift from the totally centralized process generating totally finished dwellings to a partially decentralized process benefiting from the capacity of individuals and small bodies to finance and manage the gradual development of the dwellings. Such a capacity has been highlighted in many studies related to the mecanisms of development in the informal housing areas.

However, as it has been pointed up in the conclusions of the initial phase report of the present research project (final report 1991), the idea of the gradual completion of the dwelling may present some difficulties to the

owners/users on many levels:

- Conceptual level (what are the potentials of the offered dwelling and how to generate alternative solutions for such a dwelling).
- Organizational level (how to acquire the information, how to get the necessary material, component, labour for the gradual completion).
- Technical level (what type of materials, components, tools and equipment are involved in the process of completion).

The present phase of the research project intends to adress one of the aspects of the stated problem which mainly deals with the conceptual level. Users may not be able to recognize the potentials of the provided area, the possible alternative solutions that could be suggested for such an area, the possible allocation of functional spaces and their relative areas(living space, bed area, services ares, multipurpose area, etc..). This is not to underestimate the capabilities of the users who may come up with solutions of their own, but to point up that generating alternatives for a specific area may represent a real challenge to most practicing architects. Accordingly, it would be just fair to give the users some examples showing the potentials of their dwellings. The users may then evaluate the merits of the proposed alternatives, compare them with their immediate and expected needs and select or slightly modify one of the alternatives.

2.2 Objective

Based on the previous argument, the objective of this section of the final report could be spelled out as follows:

To provide the owners/users of the partially completed dwellings some

alternative designs showing the potentials of the dwelling areas. Such alternatives are not the only solutions, however they allow the users to live the experience, to match the features of the alternative with their presesent and expected needs, to select or modify one of the alternatives or even come up with a new one after a better understanding of the real potentials of the available area.

2.3 Methodology

In order to generate alternative designs for the partially completed dwellings of the seven formal housing prototypes, it was recommended to start with a large input, to receive as many alternatives as possible, to assess such alternatives and to select the most appropriate within the preset objective of the study. The limitations of the research budget and the available time presented a strong constraint on the proposed approach. However, it has been decided to take the challenge and proceed. Accordingly, the following tasks presented a priority:

- The selection of a group of young architects who would be ready to undertake the "exercise".
- The identifiaction of the guidelines that would be respected by the team of architects in the process of generating alternative designs.
- The design of a format to be distributed among the selectedarchitects allowing them the generation and analysis of alternative designs.

As for the team of architects to participate in the exercise, it was essential to have a qualified team complying with the following terms:

- A team of Egyptian architects living within the Egyptian context and familiar with its problems and responsive to Egyptian scenarios.

- A team of qualified architects having at least three years of experience.

Such a team of architects was possible to find within the graduate students of the Architectural Department, Cairo Unitersity. These are usually affiliated to the Department according to a set of criteria allowing the selection of the best competitors.

As for the guidelines to be respected while generating alternative designs, it has been stated that:

- The alternatives should be drawn according to the final stage of completion (any alternative could be gradually completed).
- The generated alternatives should be designed for families of different sizes allowing 10 to 15 square meters of closed spaces per person.
- The generated alternatives should not alter the fixed elements of the partially completed dwelling (i.e., the bathroom, the balconies and the outer skin or facades).

As for the format designed for collecting alternative designs, see figures (2.1), (2.8), (2.15) and (2.22), it included the configuration of the plan with the location of all fixed elements (vertical bearing elements, bathrooms, balconies, external facades). On the right hand side of the page, the housing prototypes in which this plan appears are illustrated in a column . At the bottom of the page, a table allowing the description and analysis of the suggested alternative is provided. The table gives three types of information:

- Information related to the relative distribution of dwelling are aamong different functions(living, sleeping, sertvices, balconies). The figures are

expressed in terms of unit area (m^2) and percent of the total percentage.

- Information related to the size of the family that could live within the suggested alternative and the share of closed spaces allocated for each individual.
- Information related to the type of infill to be used for the proposed alternative: use of pieces of furniture or fixed partitions for spaces identification. Use of traditional or multipurpose type of furniture (sofa beds, bunk beds, expandable tables, etc..).

It should be pointed up that other types of information could have been added as well ,such as some technical and economic data. However such an information was difficult to offer at the present phase since it necessitated unavailable data related to users preferences in terms of type of materials for the partitions, market prices, dates of completion and impact on cost, and so forth. Such an information could be added later on for each alternative design through a body allocated within each housing project helping the users to reach the appropriate decisions. As for the present research project, it was beleived that the basic information given in the standard format is appropriate to serve the short term objective mainly-dealing with the potentials of the dwelling area.

The format has been distributed among a number of about eighteen graduate students, and the outcome was a real success in terms of research objectives. Many of them considered the task as a personal challange since they themselves suffer from the absence of the affordable dwelling. About 70% of the young architects did a very serious effort for

plan generation. Some of the responses were less serious. The prominent alternatives have been redrawn with minor modifications and computer graphics have been used in order to have a homogineous method of presentation for the various alternatives.The represented variations could form the core of a brochure that could be developed and handled to the expected owners/users of such dwellings.

2.4 Suggested Plan Variations.

Many plan variations have been suggested by the team of graduate students. It was interesting to review the alternatives and to see to what extent they help to recognize the potentials of the dwelling areas. The richness of the outcome proved two points ,namely:

- First, it proved that the task was rather challenging even for professionals. Accordingly, it would be rather unfair to leave the owners/users (who are not necessarily architects) without any hints about the potentials of their dwellings.
- Second, it emphasized the need for preparing a brochure ,to show some of the options for each dwelling prototype .An important task that may be undertaken by the Ministry of Development and New Communities, Egypt.

Although the exercise of generating plan variations does not cover all the possible alternatives for each dwelling of a given area, it points out some interesting indicators;as it will be shown next. For each dwelling, six options have been selected and analysed ,see figures (2.2) to (2.28).

2.4.1. Dwellings : 43 m^2 Area

- The plan variations ,figures (2.2) to (2.7 , show that it is possible to suggest that families of three to five persons may comfortably live in such a dwelling,with the share of space per person ranging between 8.5m^2 and 14m^2.
- Table (2.1) shows that the percent of area allocated for space could vary ,except for some fixed items such as the

each functional space could vary ,except for some fixed items such as the balconies (5%) and the bathroom (10%) . The areas allocated for circulation and services could represent a minimum of 15% and a maximum of 30% depending on the family acceptance for having a small kitchen open on the living area as in alternative 6 ,figure (2.7). As for a secluded bed area, it could range between 23% and 41% of the dwelling area. The living area could range between 24% and 55%. The chart illustrated in figure (2.29) shows the relative distribution of functional spaces (as a percent of the total) for each of the six considered alternatives.

- Most of the alternatives (five out of six) allow multipurpose functions for the spaces. Sofa beds and expandable tables are oftenly used.Most of the alternatives suggest the use of multipurpose pieces of furniture along with traditional pieces. As for the infill, some alternatives suggest the use of curtains or furniture for the identification of spaces.

2.4.2.Dwellings : 60m^2 Area

It was possible to suggest alternative solutions for families composed of 4 to 6 persons. The share of space per person would then be 10m^2 to 15m^2

as shown on figures (2.9) to (2.14).

- Table (2.2) shows the percent of areas allocated for each function. The initial design gives 11% of the area for the balconies and 7% for the bathroom. The suggested alternatives show that the areas reserved for circulation and services could vary between 10% and 18% depending on families traditions and acceptances. As for the secluded bed area, it could range between 22% and 50% . The living area would range between 28% and 49%. The chart illustrated in figure (2.30) shows the relative distribution of functional areas for each of the six alternatives.
- Some of the alternatives (two out of six) suggest the use of the living area for multipurpose functions as shown on figures (2.13) and (2.14). Many alternatives rely upon pieces of furniture to define the boundaries of different functional spaces as shown on figures (2.9),(2.10) &(2.14).

2.4.3. Dwellings : 79 m^2 Area

- It was possible to suggest alternatives accomodating families of 4 to 6 members. The share of space per person, ranges between 13 to 15 m^2 ,as shown in figures (2.16) to (2.21).
- Table (2.3) shows the percent of spaces allocated for the different activities. The initial design provides 8% for the balconies and 5.5% for the bathroom. The suggested alternatives show that the area allocated for circulation and services could range between 16% and 21% depending on families traditions and acceptances. As for the secluded bed area, it ranges between 16% and 49%. The living area ranges between 22% and 60%. The chart illustrated in figure (2.31) shows the relative distribution of functional spaces within each of the 6 alternatives.

- Some of the alternatives (3 out of 6) suggest the use of the living space as a multipurpose space, see figures (2.15) to (2.21) . Some alternatives use pieces of furniture to define the boundaries of different functional spaces as shown on figures (2.17) and (2.20).

2.4.4. Dwellings : 94m^2 Area

- It was possible to suggest alternatives accomodating families of 6 to 8 persons. The share of space per person is ranging between 12 and 15.5 m^2 as shown on figures (2.23) to (2.28).
- Table (2.4) shows the percent of spaces allocated for the different activities. The initial design provides 7 % for balconies and 7% for the bathroom. The suggested alternatives show that the area for circulation and services could range between 16% and 21% .As for the secluded bed area, it could range between 27% and 54%. The living area ranges between 18% and 50%. The chart illustrated in figure (2.32) shows the relative distribution of functional spaces within each of the six alternatives.
- Some of the alternatives (3 out of 6) suggest the use of the living area for multipurpose activities as shown on figure (2.25), (2.27) &(2.28) . Some alternatives suggest the use of pieces of furniture instead of traditional partitions to identify the functional spaces as shown on figures (2.24) and (2.27).

2.5. General directives resulting from the analysis of plan variations.

It is rather difficult to reach clear and well defined conclusions and recommendations from the analysis of the suggested plan variations since the number of alternatives is rather limited. However the undertaken

Table(2-5): Analysis of Functional Spaces in Dwellings(%)

Dwelling Area	43m2						60m2						79m2						94m2					
Alternatives	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Living Area (%)	24	39	27	39	36	55	28	29	28	31	36	49	22	33	38	38	54	60	18	27	30	30	47	50
Sleeping Area (%)	41	41	40	31	31	23	50	50	43	40	36	22	49	38	33	33	22	16	54	45	42	42	30	27
Circul.&Serv.(%)	30	15	28	25	28	17	11	10	18	18	17	18	21	21	21	21	16	16	21	21	21	21	16	16
Balconies (%)	5	5	5	5	5	5	11	11	11	11	11	11	8	8	8	8	8	8	7	7	7	7	7	7
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

analysis showed some of the potentials of the dwelling areas thus allowing some comments as regard the possible use of such areas; see charts figures (2.33) to (2.36).

- It could be noticed that for dwellings of a limited area (the 43 m^2 and 60 m^2) there is a strong tendency to minimize the area allocated for secluded bed rooms and enlarge the living area with the recommendation of using sofa beds and expandable tables to assure the multipurpose nature of the living space. Such a tendency could be less obvious for dwellings of larger areas (the 79 and 94m^2) where it is possible to have the two functions (sleeping and living) in segretated spaces.
- In some of the alternatives for the larger dwellings (the 79m^2 and 94m^2), the so-called living space accomodating multipurpose activities could represent a large percent of the dwelling area in order to minimize the money spent on erecting partitions and doors to create secluded bedrooms. Such a concept is not in contradiction with the possible segregation of functional spaces for different activities highlighted in the previous remark.
- Most of the suggested alternatives proposed locations for the partitions which are away of the existing columns. Accordingly, it would

be better to adopt a system of construction giving beamless slabs in order not to hinder the internal flexibility.

- In some of the alternatives suggested by the graduate students, it has been noticed that they tried to add the area of the balconies to the closed area of the dwelling (specially for dwellings of limited areas).Such a tendency could be considered by the designer who would give a type of infill allowing the enclosure of the balconies without destroying the features of the facades.

It is beleived that the modest effort produced in the present report could provide a good base for the elaboration of a set of brochures. Such brochures could be developed for each dwelling and handled to the owners / users in order to familiarize them with the potentials of their units .At a later stage, some added information could be included in the brochure as well, mainly highlighting the means of implementation of each alternative in terms of involved materials, labors and costs.

43 square meters dwelling (Available in Prototype "B")

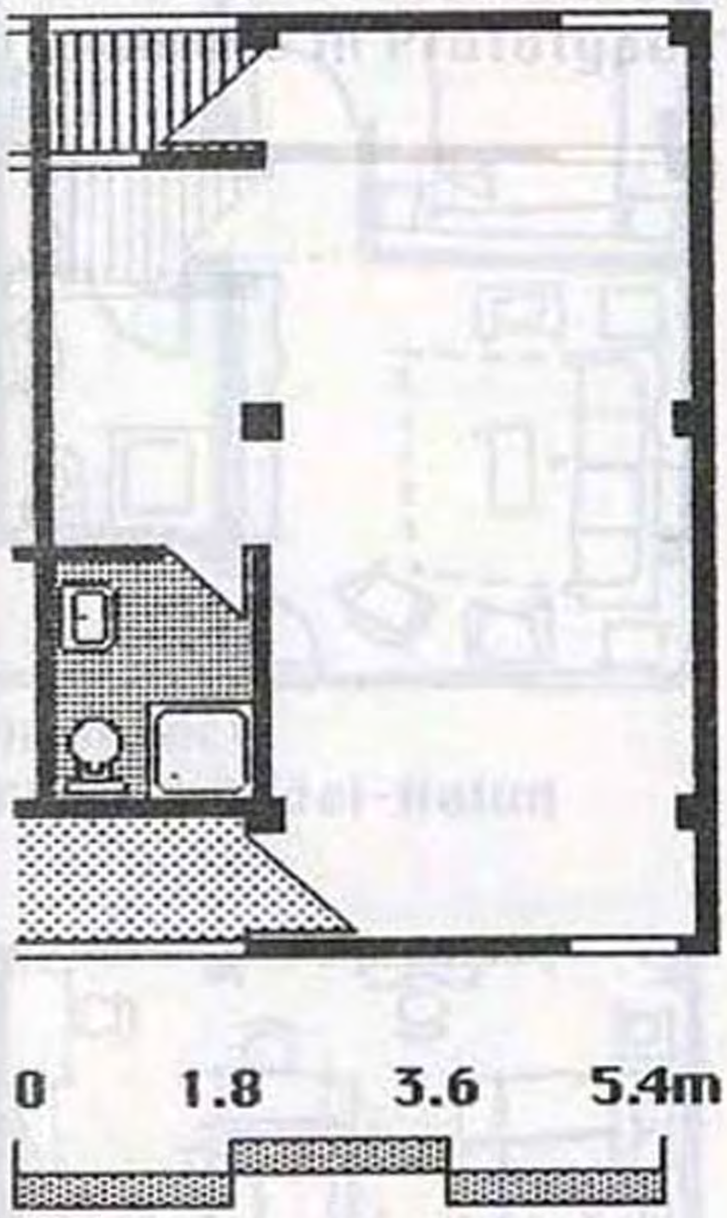
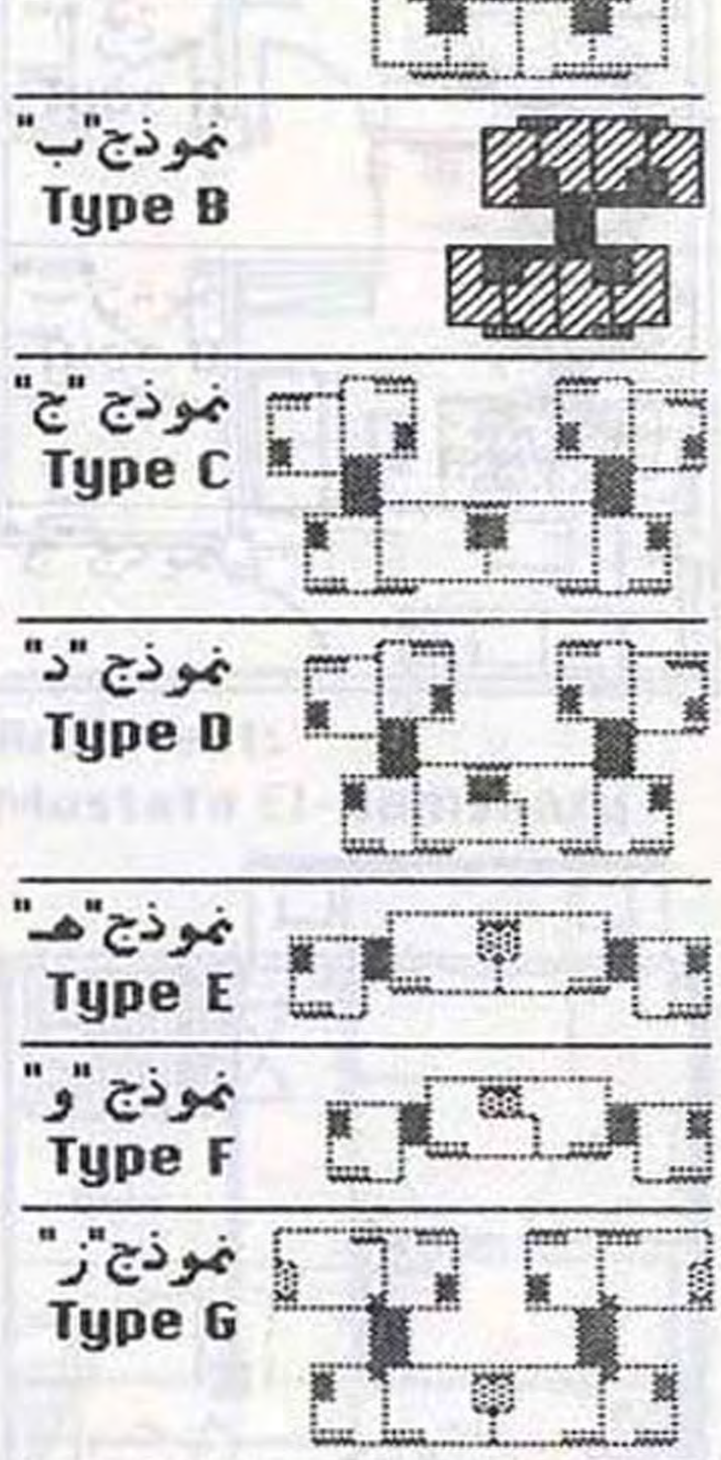


Figure (2-1)
Basic Design :
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

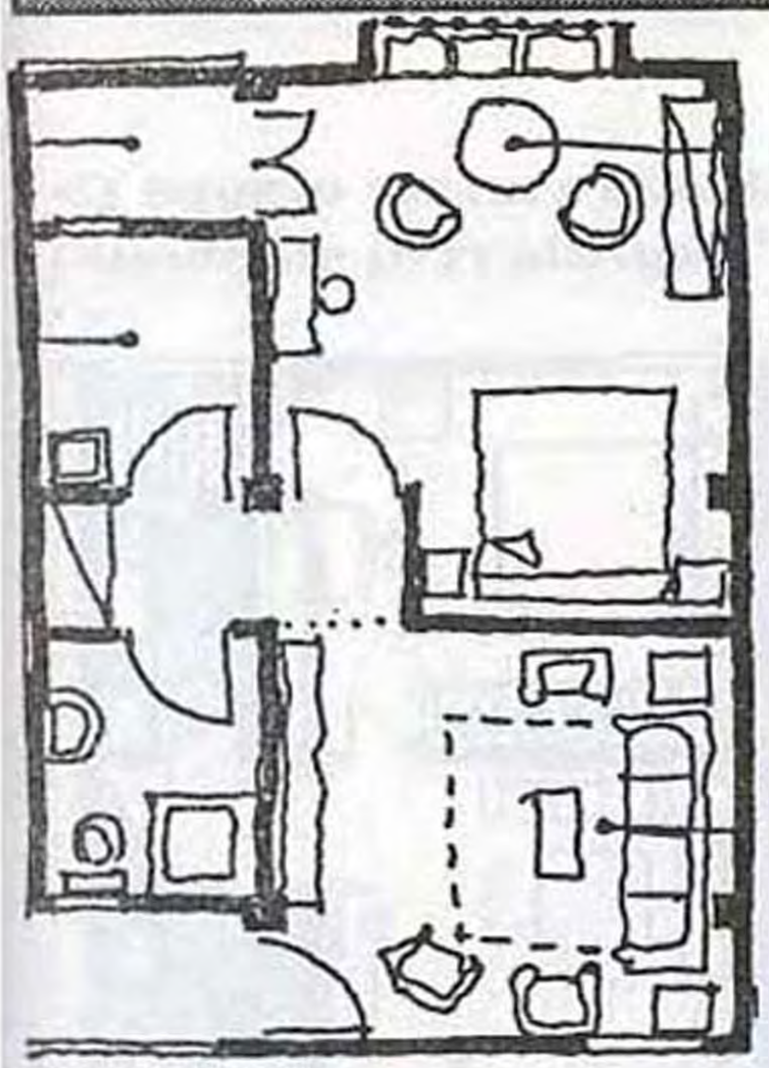
living area	sleeping area	circulation &services	balconies	total
36.5m2 85%		4.3m2 10 %	2.2m2 5 %	43m2 100%

Family Size and Shares

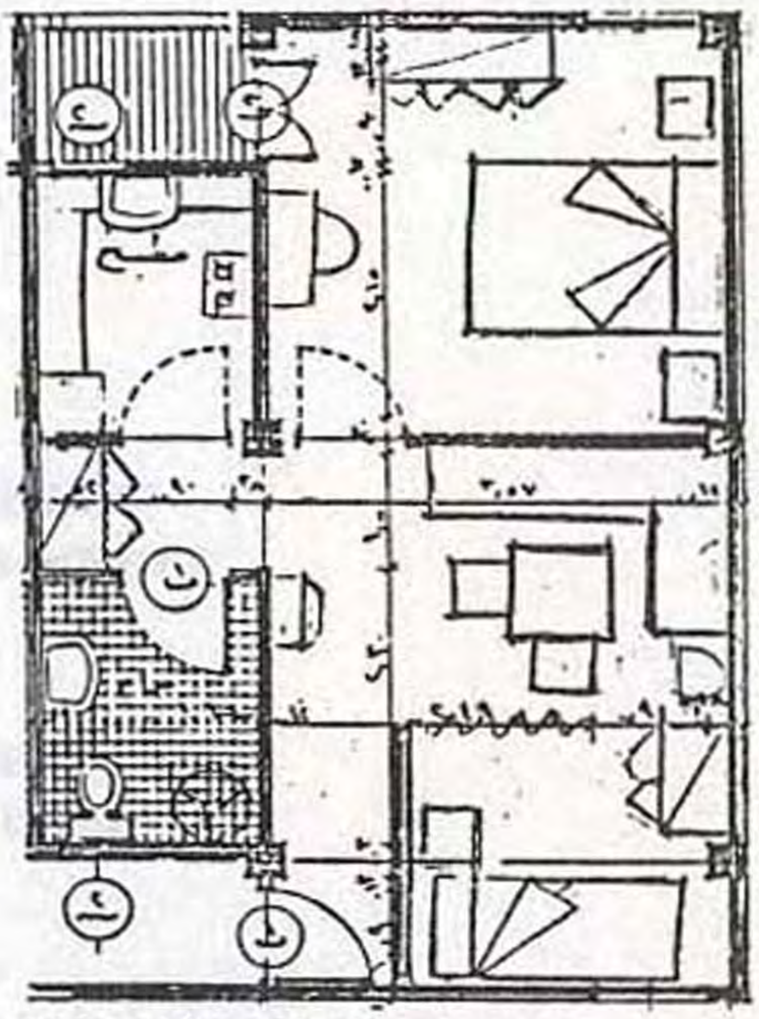
Nº of Persons per dwelling	Share of closed spaces/person
3 to 5	8.5to 14m2

Proposed Infill : Partitions and Furniture

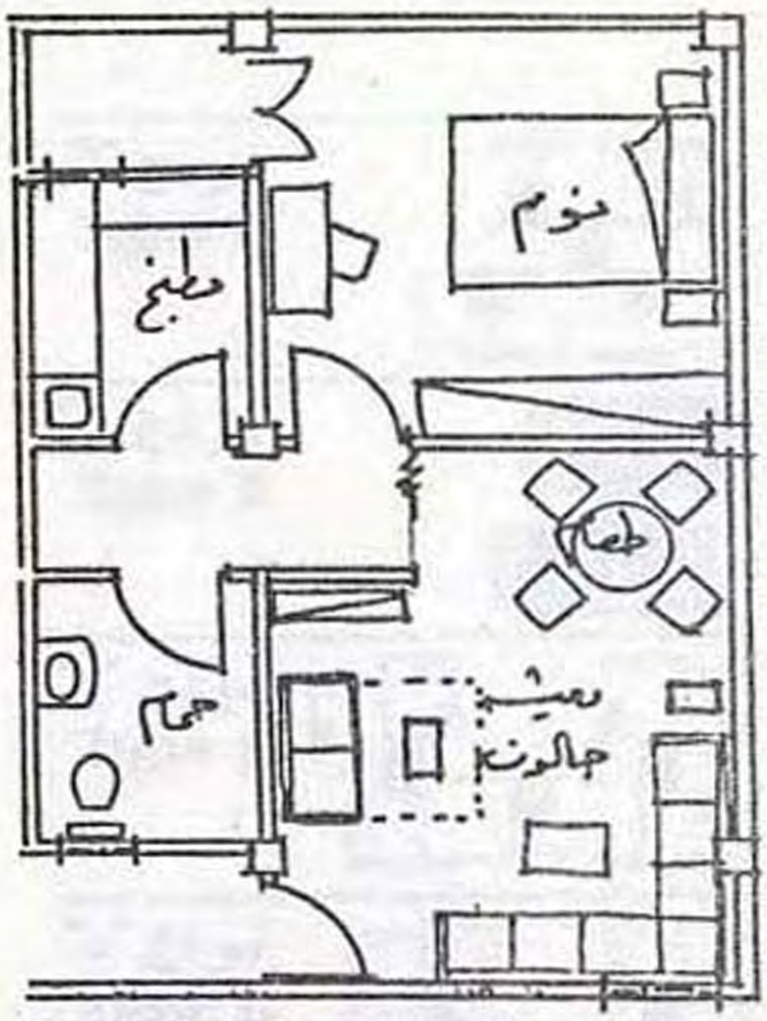
fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
⊕	⊕	⊕	⊕



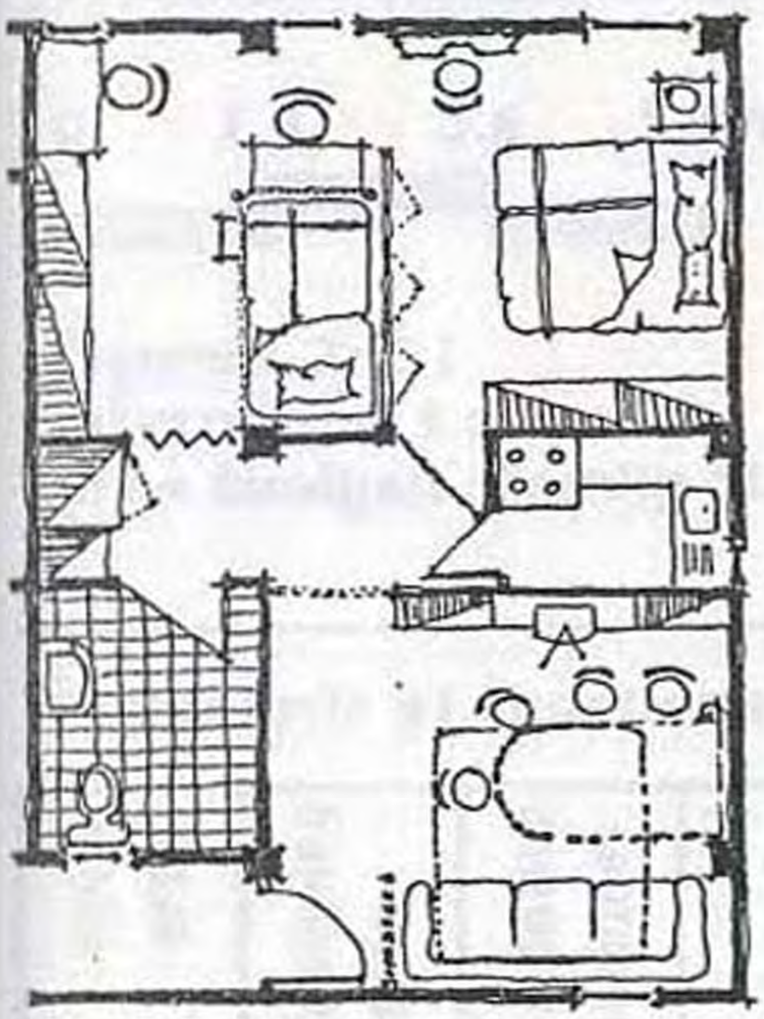
Architect:
Khaled Abdel-Halim



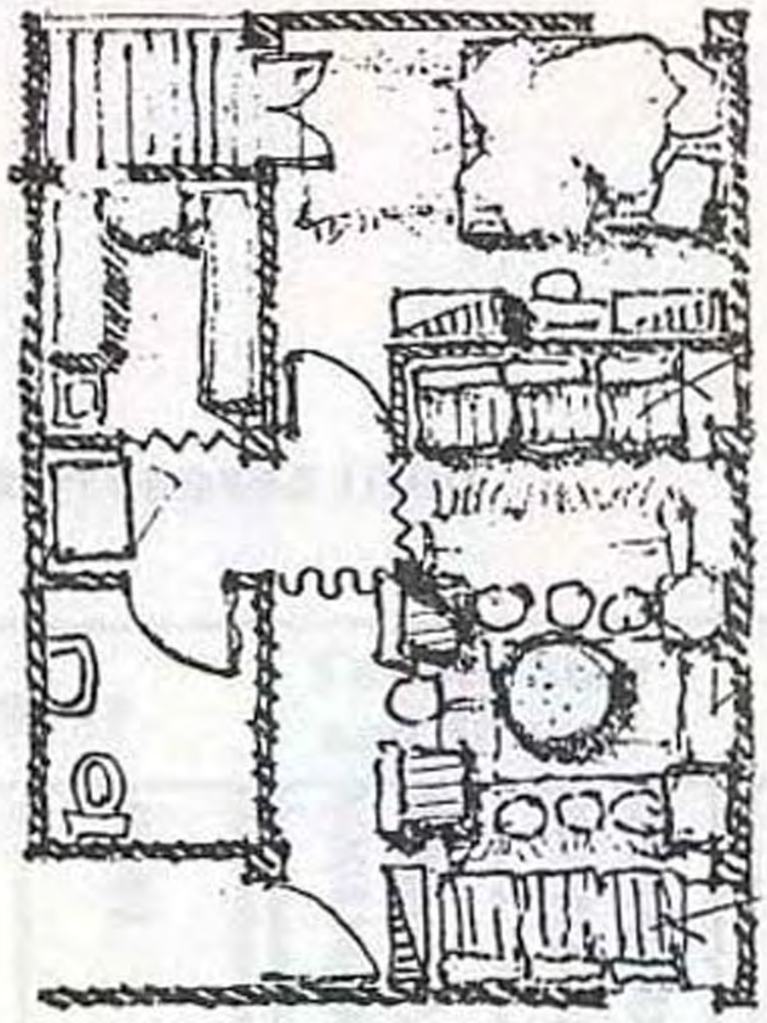
Architect:
Hany Said Gamil



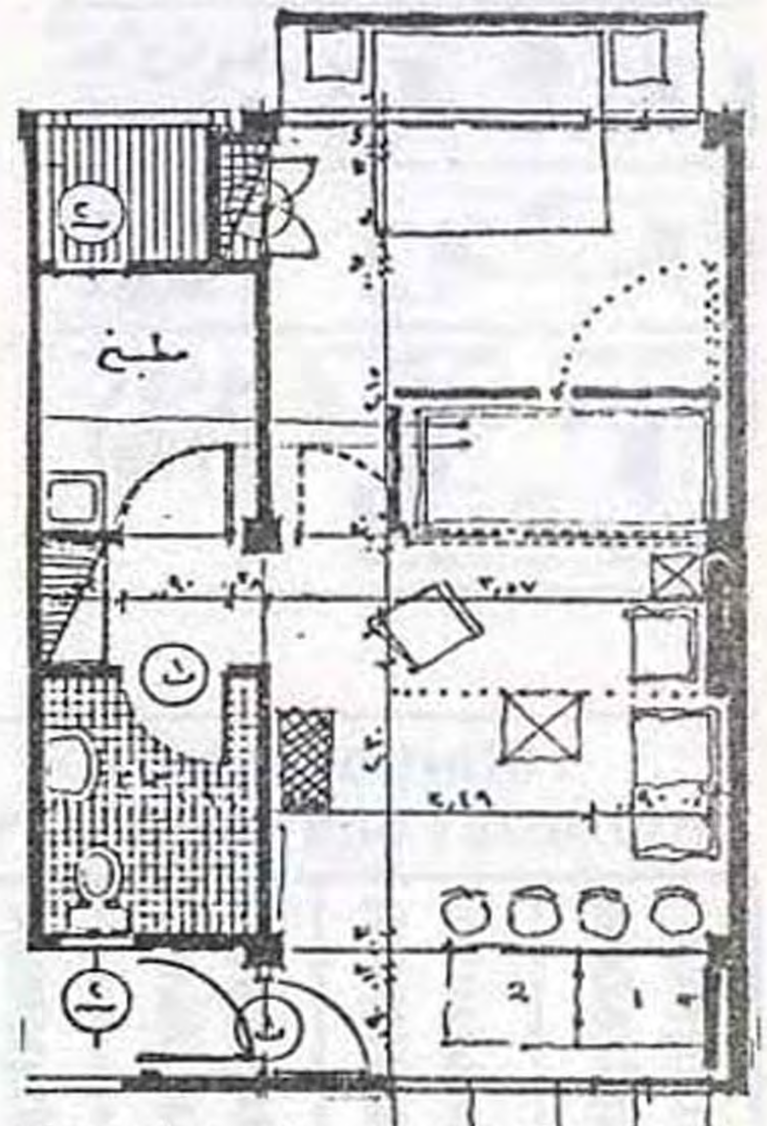
Architect:
Mostafa El-Hamshary



Architect:
Mohammad Al-Rafi



Architect:
Nashwa Ibrahim



Architect:
Wael Sabri Abdel-Moguid

Figure(2-1'):Examples of alternative plans suggested by postgraduate students for the 43 square meters dwelling.

43 square meters dwelling
(Available in Prototype "B ")

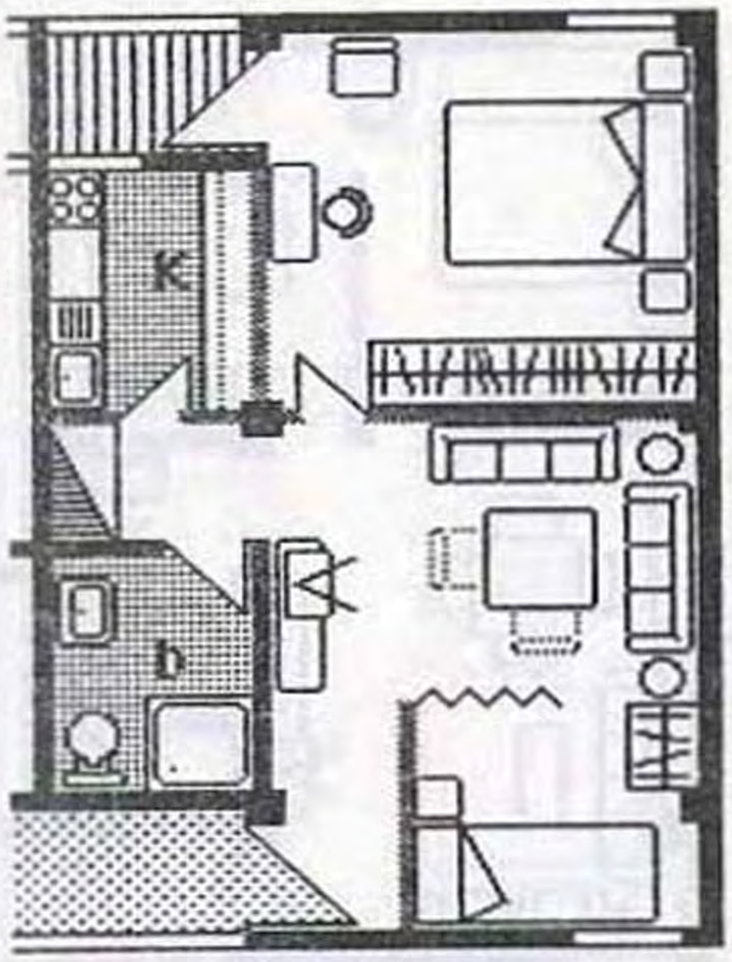
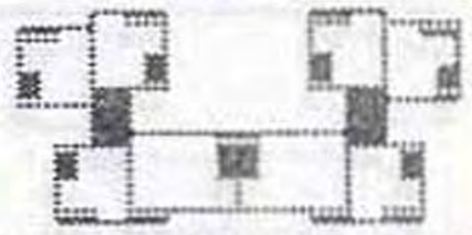


Figure (2-2)
Alternative 1 :
Area Analysis, Family Size & Proposed Infill

نموذج "أ"
Type A

نموذج"ب"
Type B

نموذج "ج"
Type C



نموذج "د"
Type D

نموذج"هـ"
Type E

نموذج "و"
Type F

نموذج"ز"
Type G

Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
10m2 24 %	17.5m2 41 %	13.3m2 30 %	2.2m2 5 %	43m2 100%

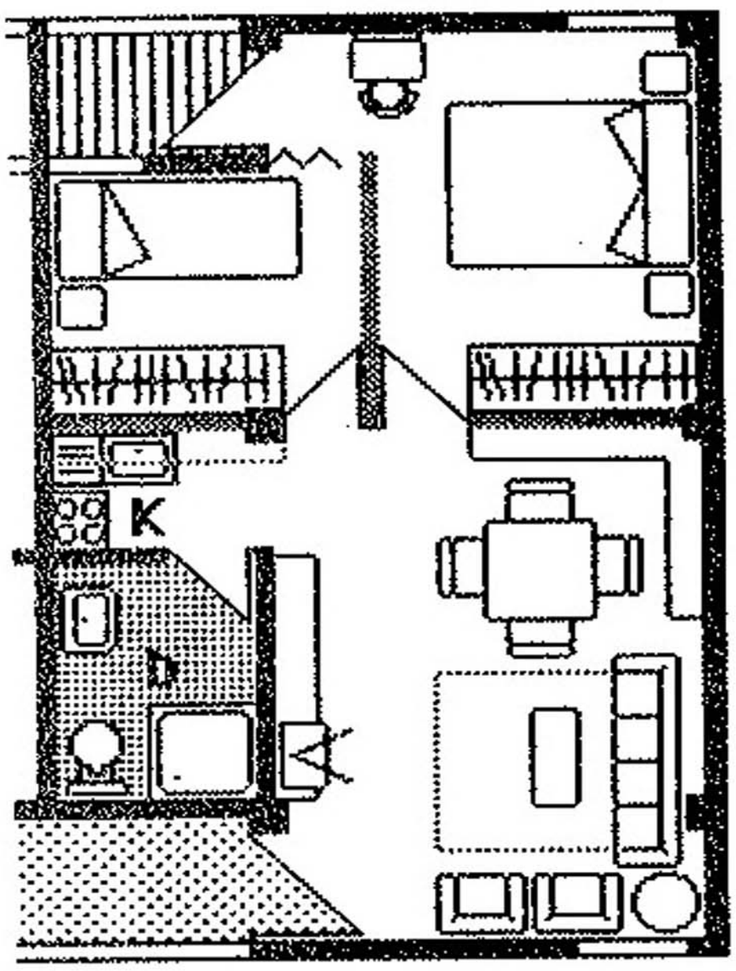
Family Size and Shares

N°of Persons per dwelling	Share of closed spaces/person
3	14m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
◔	⊕	●	⊕

43 square meters dwelling
(Available in Prototype "B ")



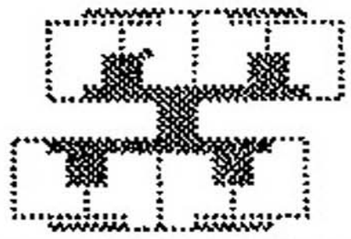
Two bedrooms

Living & dining (with sofa bed)

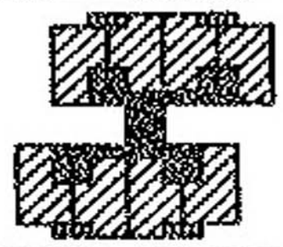
0 1.8 3.6 5.4m

Figure (2-3)
Alternative 2:
Area Analysis, Family Size & Proposed Infill

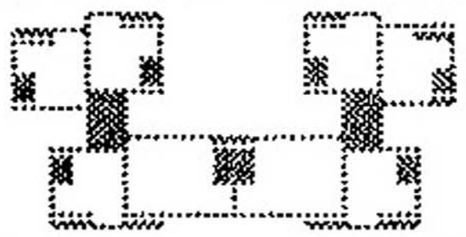
نموذج "أ"
Type A



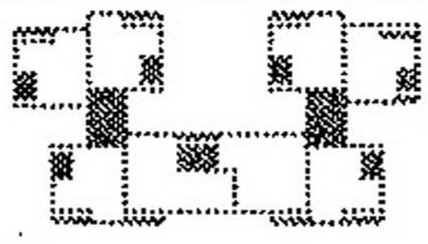
نموذج "ب"
Type B



نموذج "ج"
Type C



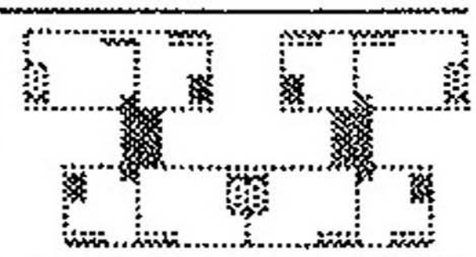
نموذج "د"
Type D



نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
16.8m2 39 %	17.4m2 41 %	6.6m2 15 %	2.2m2 5 %	43m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
5	8.5m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◔	⊕

43 square meters dwelling
(Available in Prototype "B")

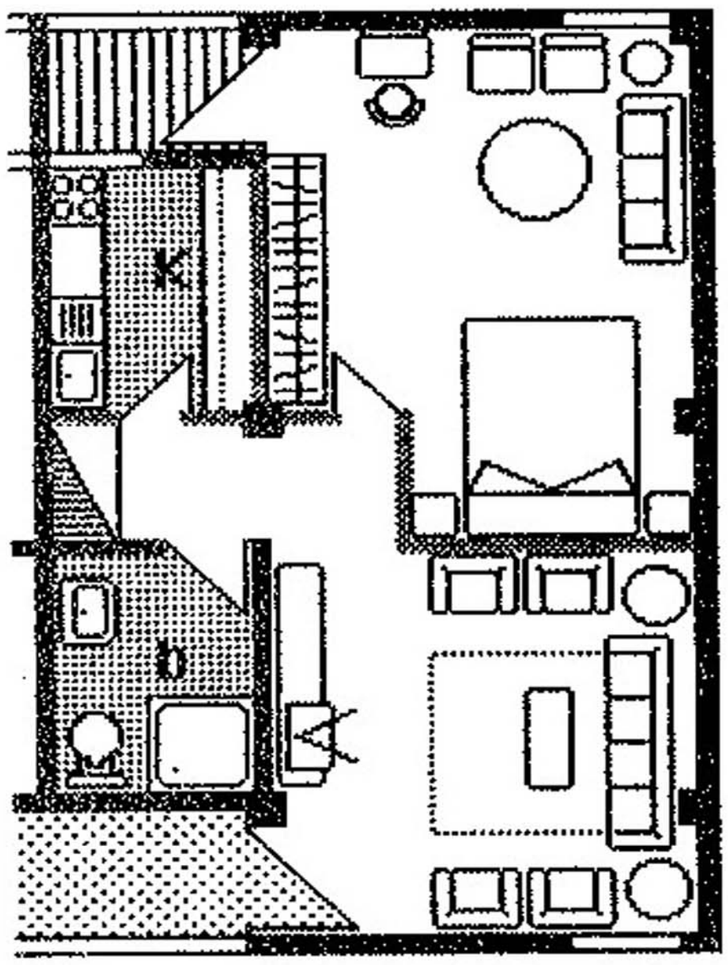
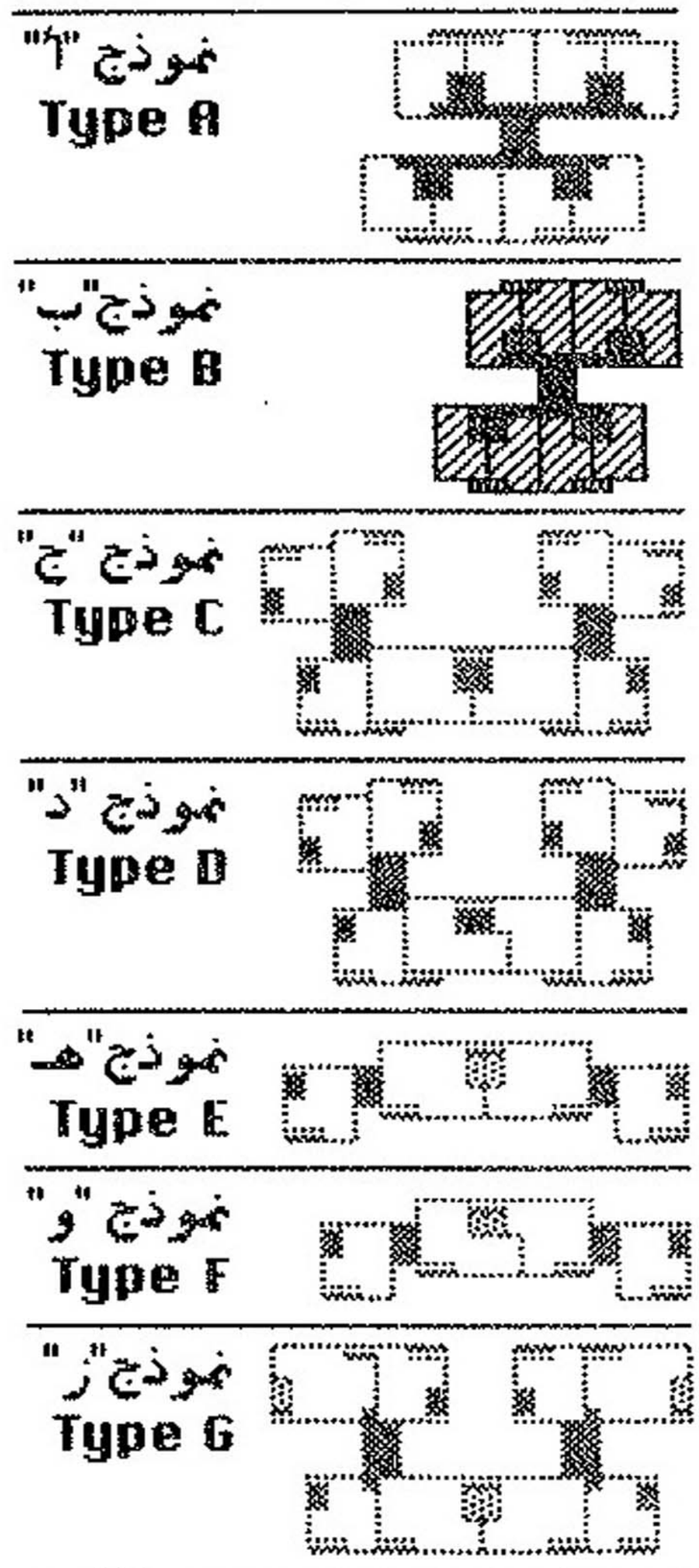


Figure (2-4)
Alternative 3:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
11.5m2 27 %	16.8m2 40 %	12.5m2 28 %	2.2m2 5 %	43m2 100%

Family Size and Shares

Nº of Persons per dwelling	share of closed spaces/person
4	11m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◕	⊕

43 square meters dwelling
(Available in Prototype "B ")

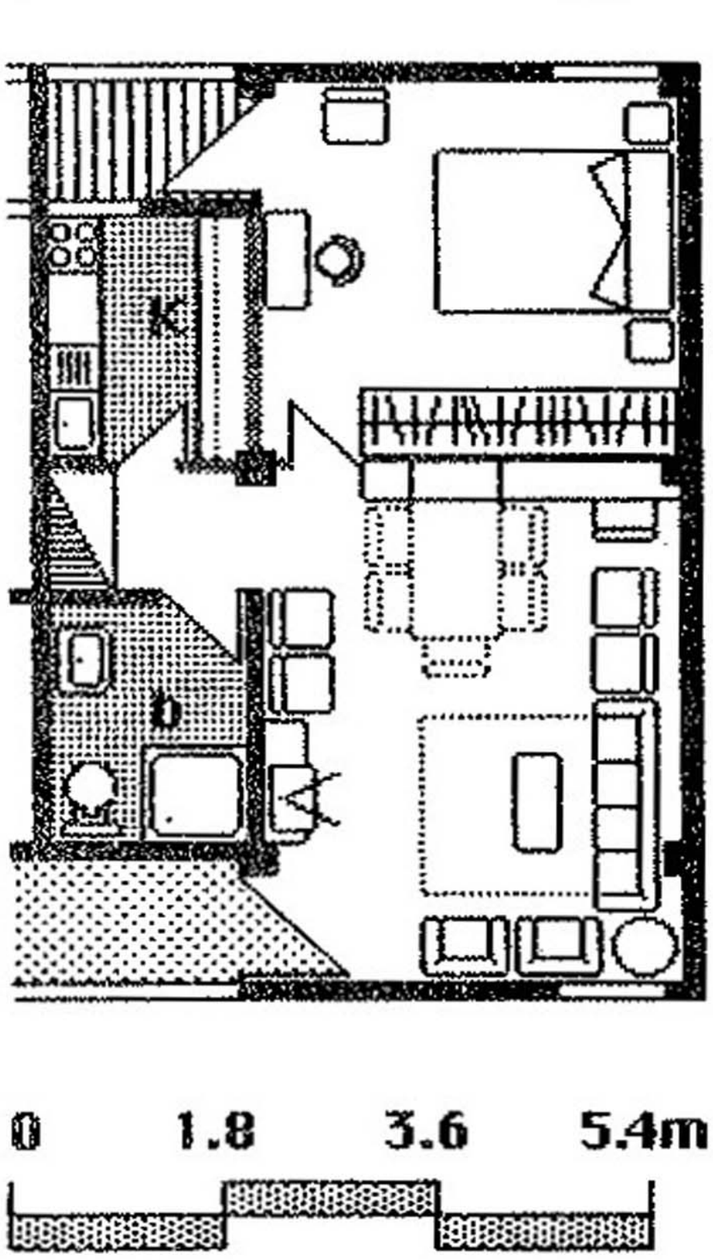
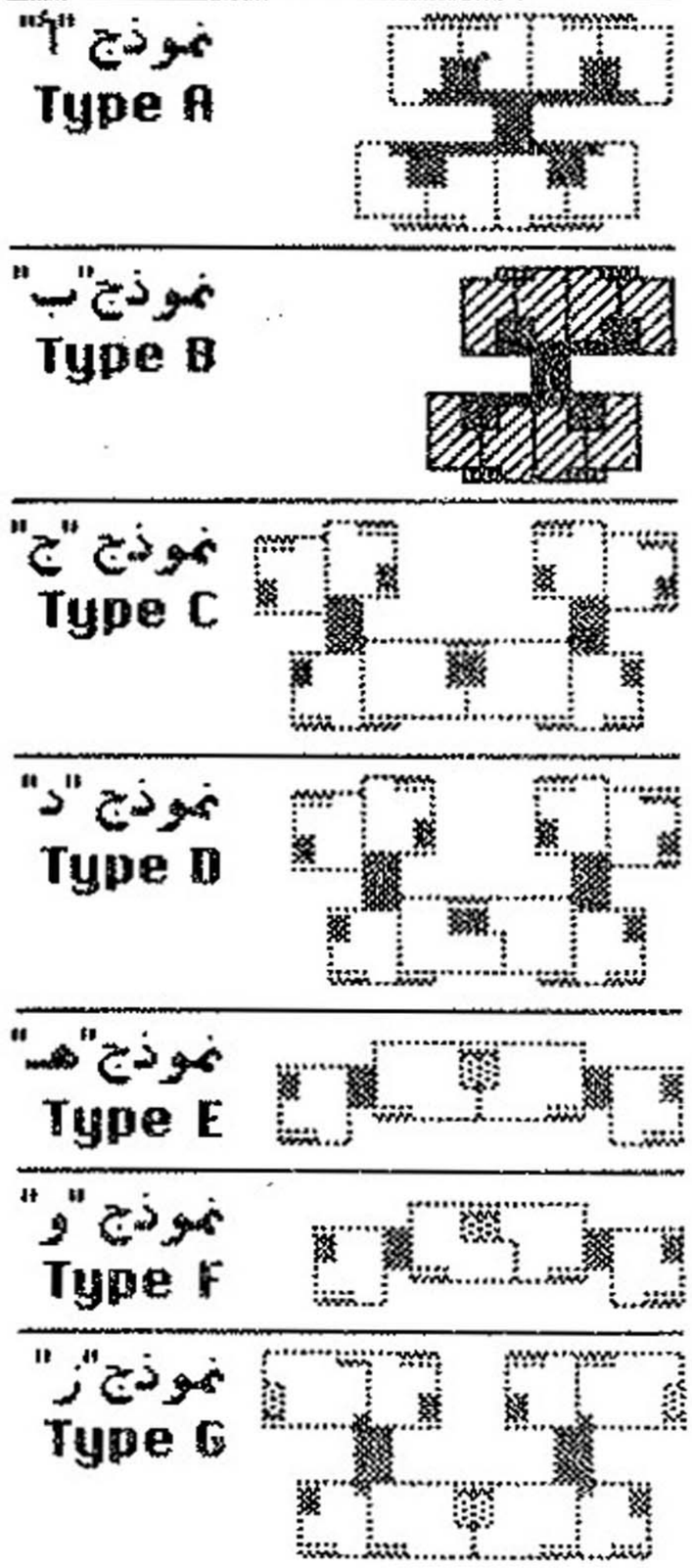


Figure (2-5)
Alternative 4:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
16.8m2 39 %	13m2 31 %	11m2 25 %	2.2m2 5 %	43m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
4	11m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
◐	◐	◐	◐

43 square meters dwelling
(Available in Prototype "B ")

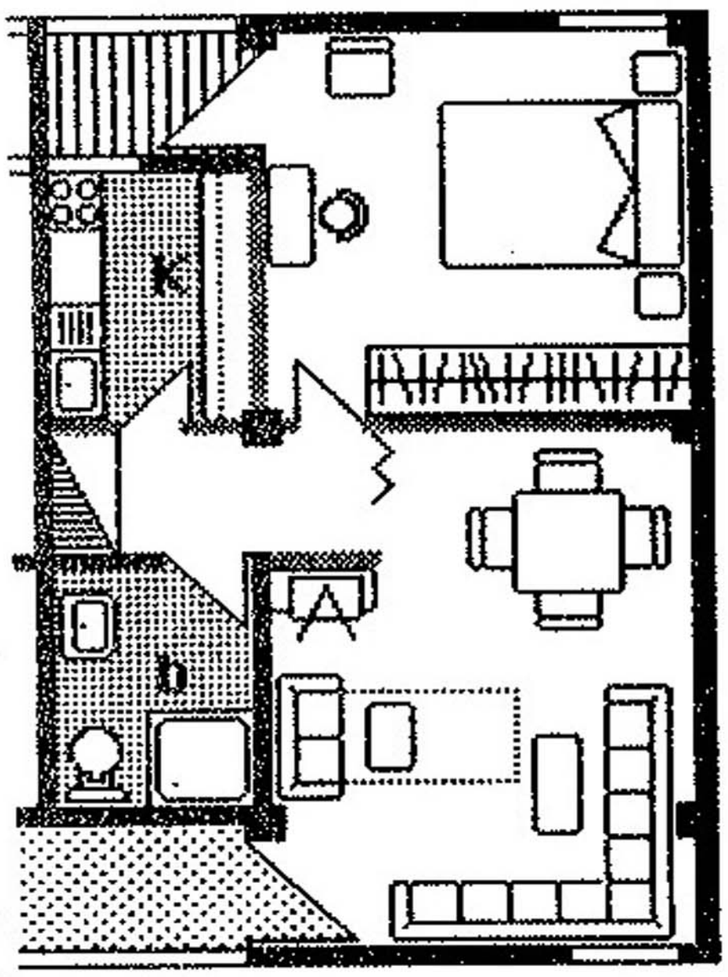
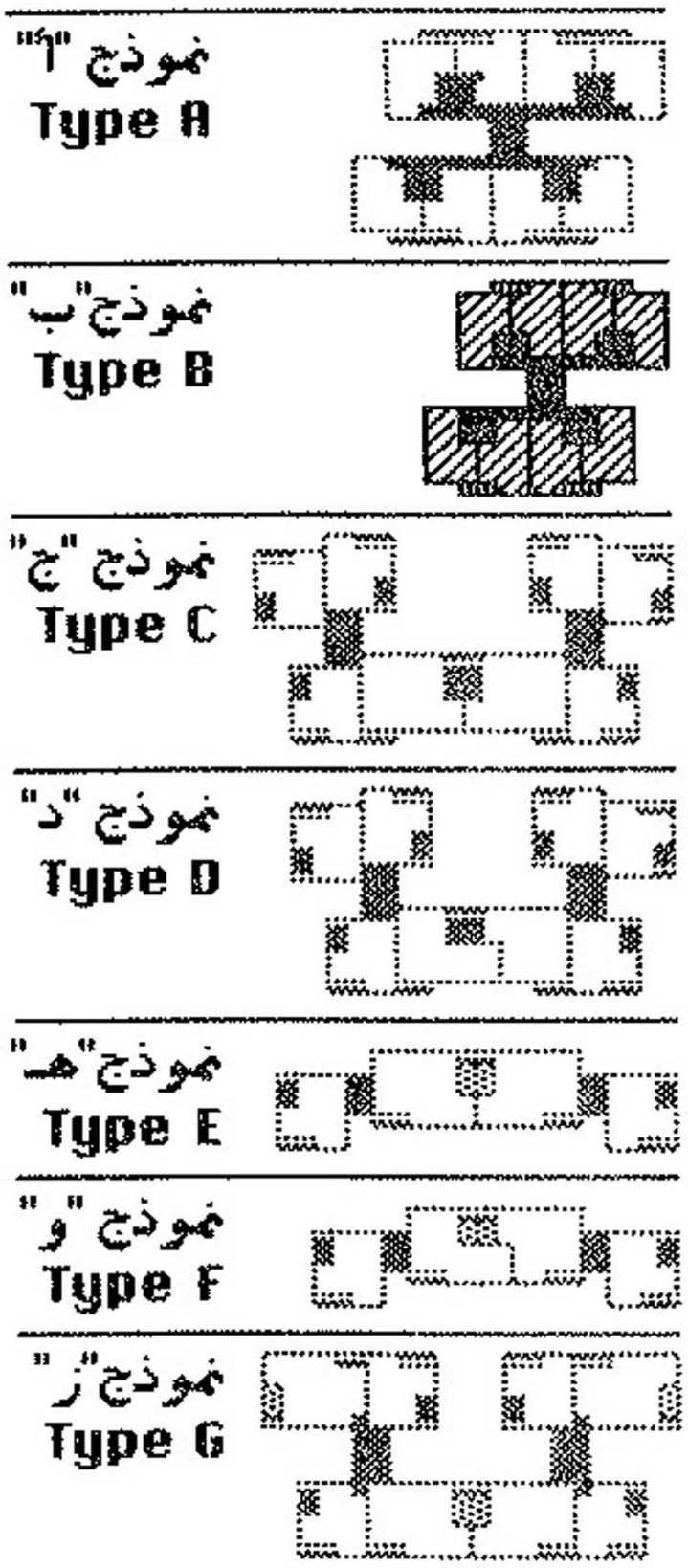


Figure (2-6)
Alternative 5 :
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &seruices	balconies	total
15.3m2 36 %	13m2 31 %	12.5m2 28 %	2.2m2 5 %	43m2 100%

Family Size and Shares

Nºof Persons per dwelling	Share of closed spaces/person
3	14m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◐	⊕

43 square meters dwelling
(Available in Prototype "B ")

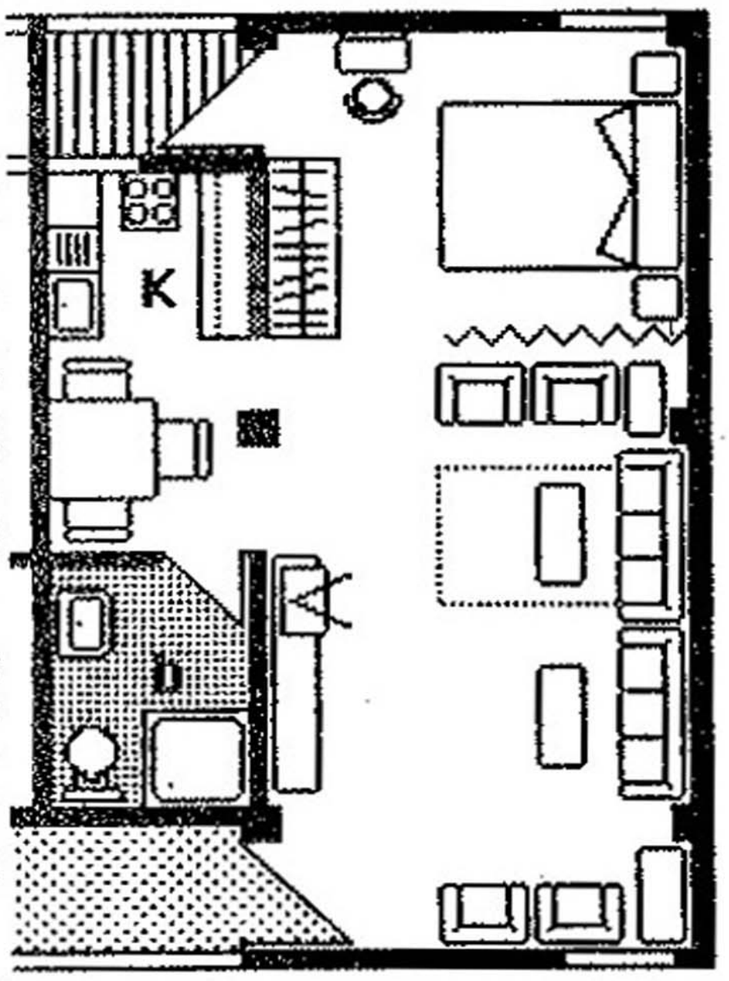
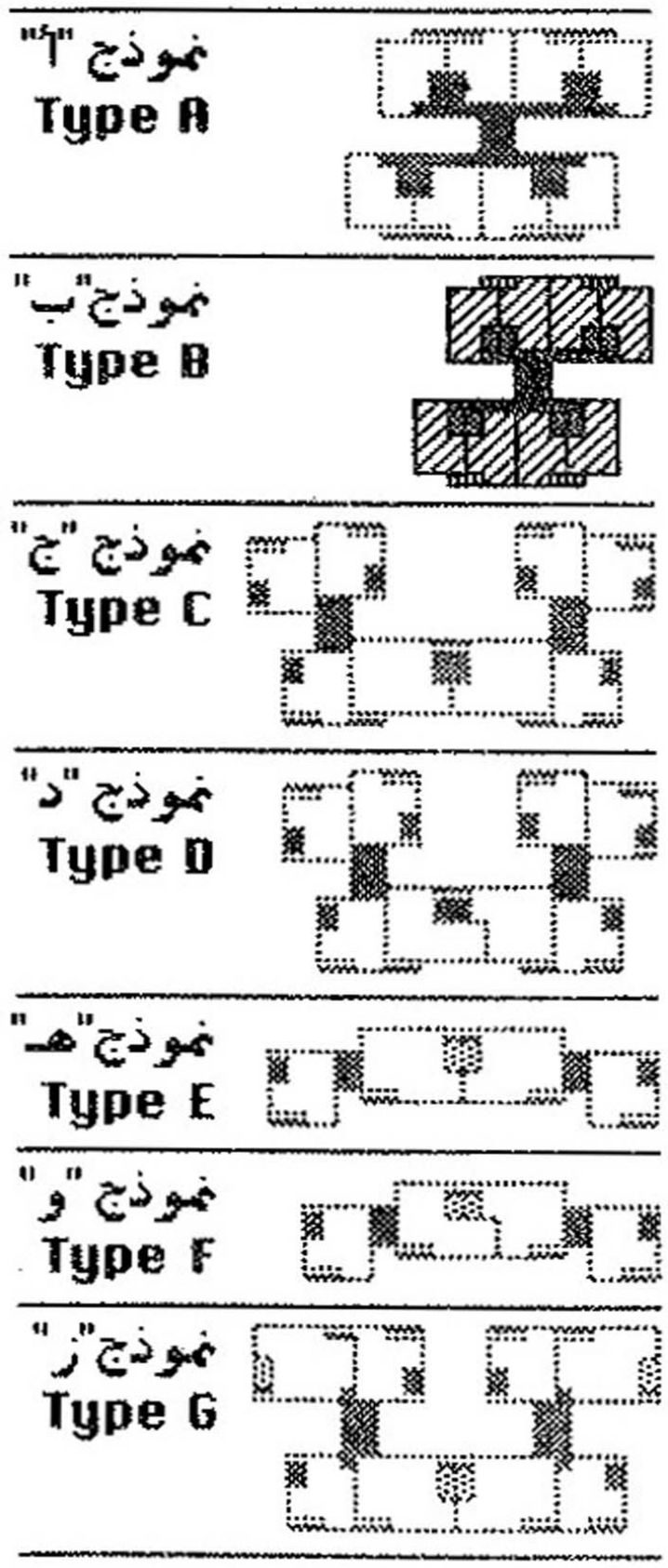


Figure (2-7)
Alternative 6 :
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
24m2 55 %	9.8m2 23 %	7m2 17 %	2.2m2 5 %	43m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
3	14m2

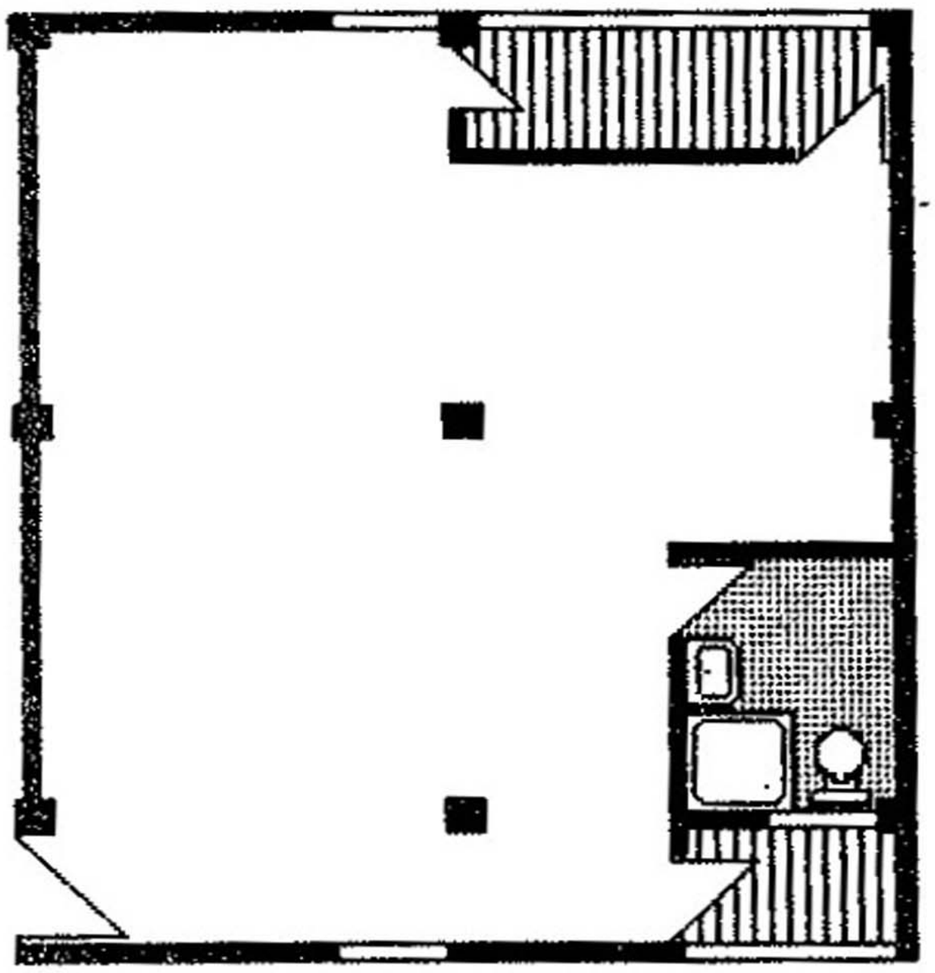
Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
◔	◑	◕	◔

	Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
	living area	sleeping area	circulation &services	balconies	total	Nº of Persons per dwelling	Share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
1	10m2 24 %	17.5m2 41 %	13.3m2 30 %	2.2m2 5 %	43m2 100%	3	14m2	◔	◔	●	⊕
2	16.8m2 39 %	17.4m2 41 %	6.6m2 15 %	2.2m2 5 %	43m2 100%	5	8.5m2	●	⊕	◕	◕
3	11.5m2 27 %	16.8m2 40 %	12.5m2 28 %	2.2m2 5 %	43m2 100%	4	11m2	●	⊕	◕	◕
4	16.8m2 39 %	13m2 31 %	11m2 25 %	2.2m2 5 %	43m2 100%	4	11m2	◔	◔	◕	◕
5	15.3m2 36 %	13m2 31 %	12.5m2 28 %	2.2m2 5 %	43m2 100%	3	14m2	◔	⊕	◕	◕
6	24m2 55 %	9.8m2 23 %	7m2 17 %	2.2m2 5 %	43m2 100%	3	14m2	◔	◔	◕	◕

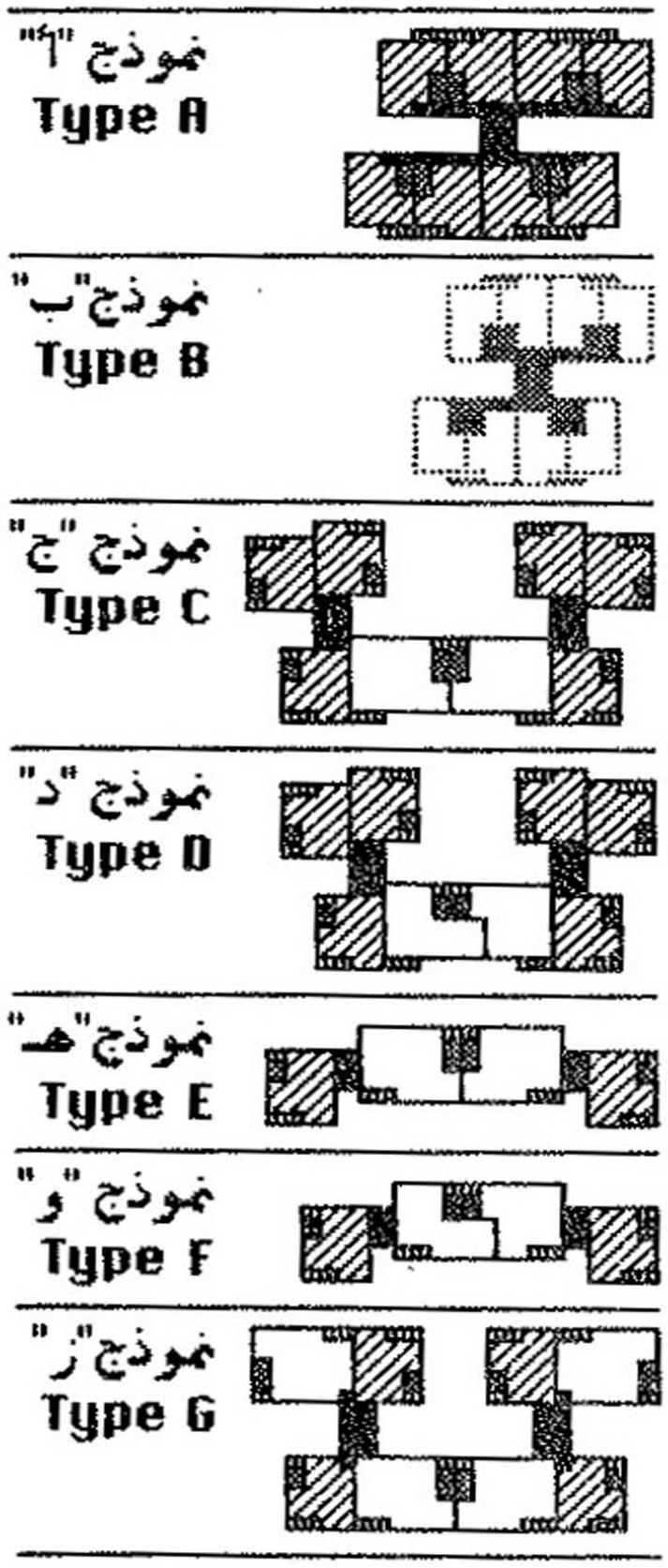
Table (2-1) :Analysis of Alternative Plans Suggested for the 43 square meters Dwellings.

60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")

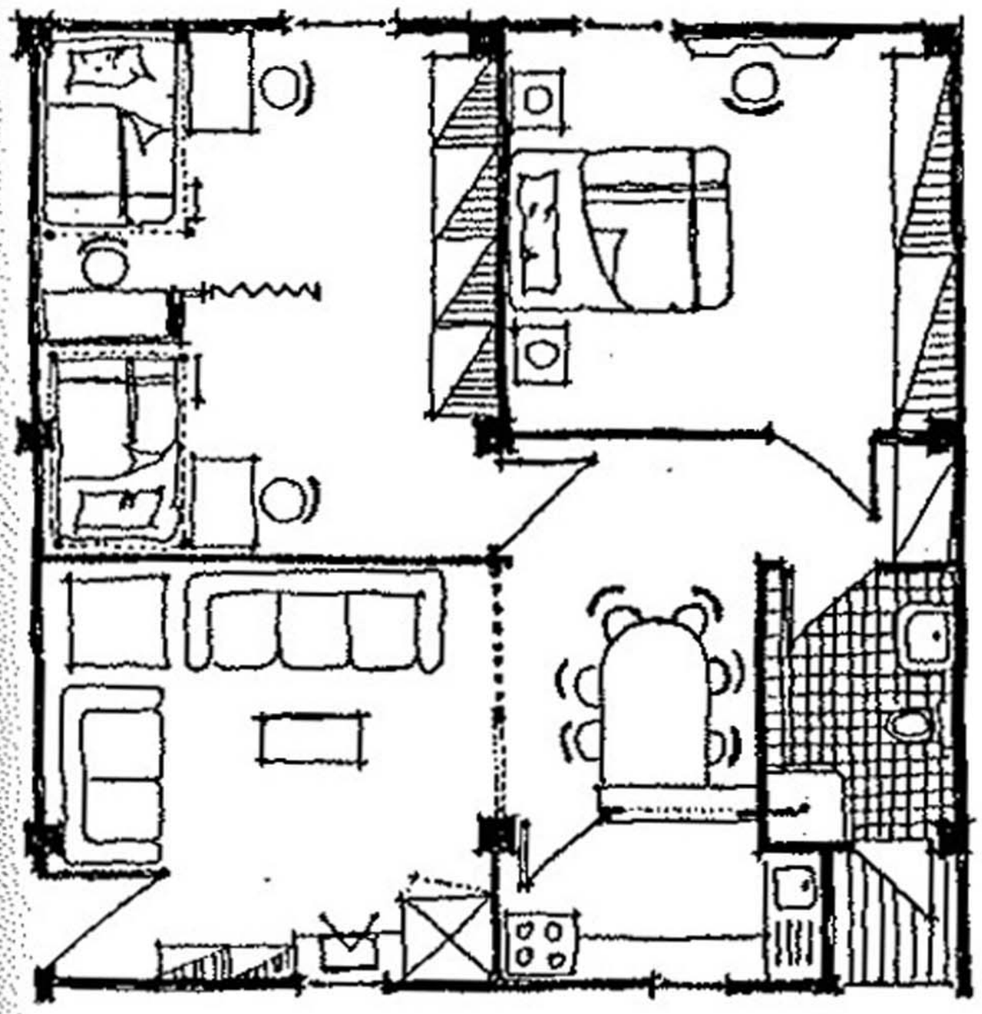


0 1.8 3.6 5.4m

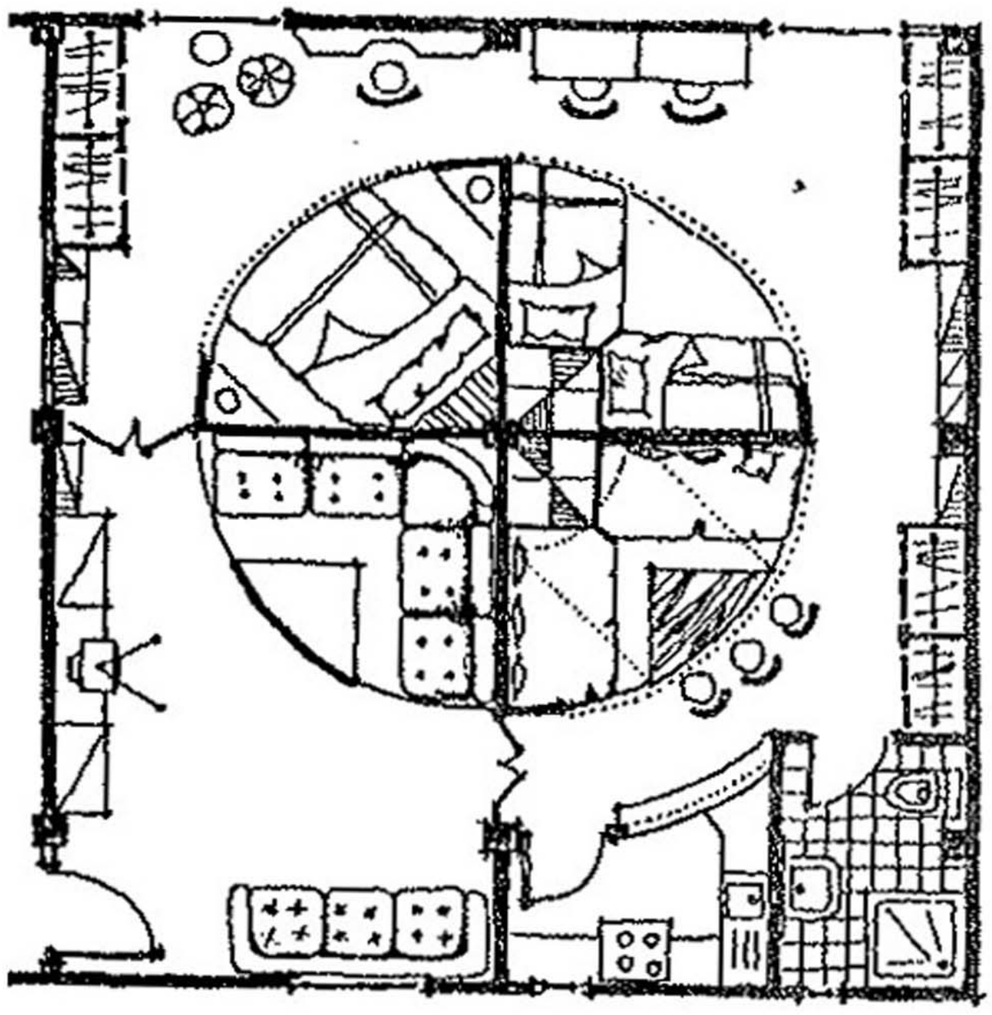
Figure (2-8)
Basic Design :
Area Analysis, Family Size & Proposed Infill



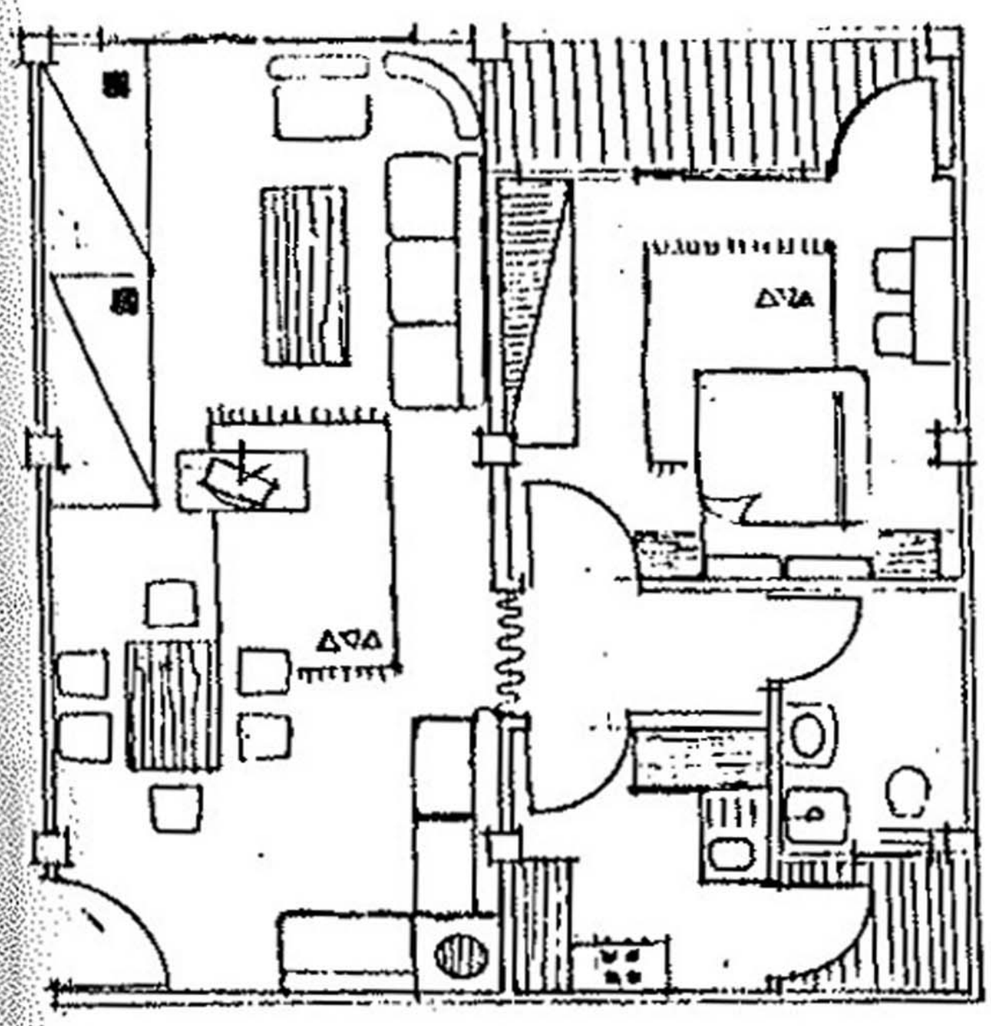
Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation & services	balconies	total	Nº of Persons per dwelling	share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
49.2m2 82%		4.3m2 7 %	6.5m2 11%	60m2 100%	4 to 6	10 to 15m2	⊕	⊕	⊕	⊕



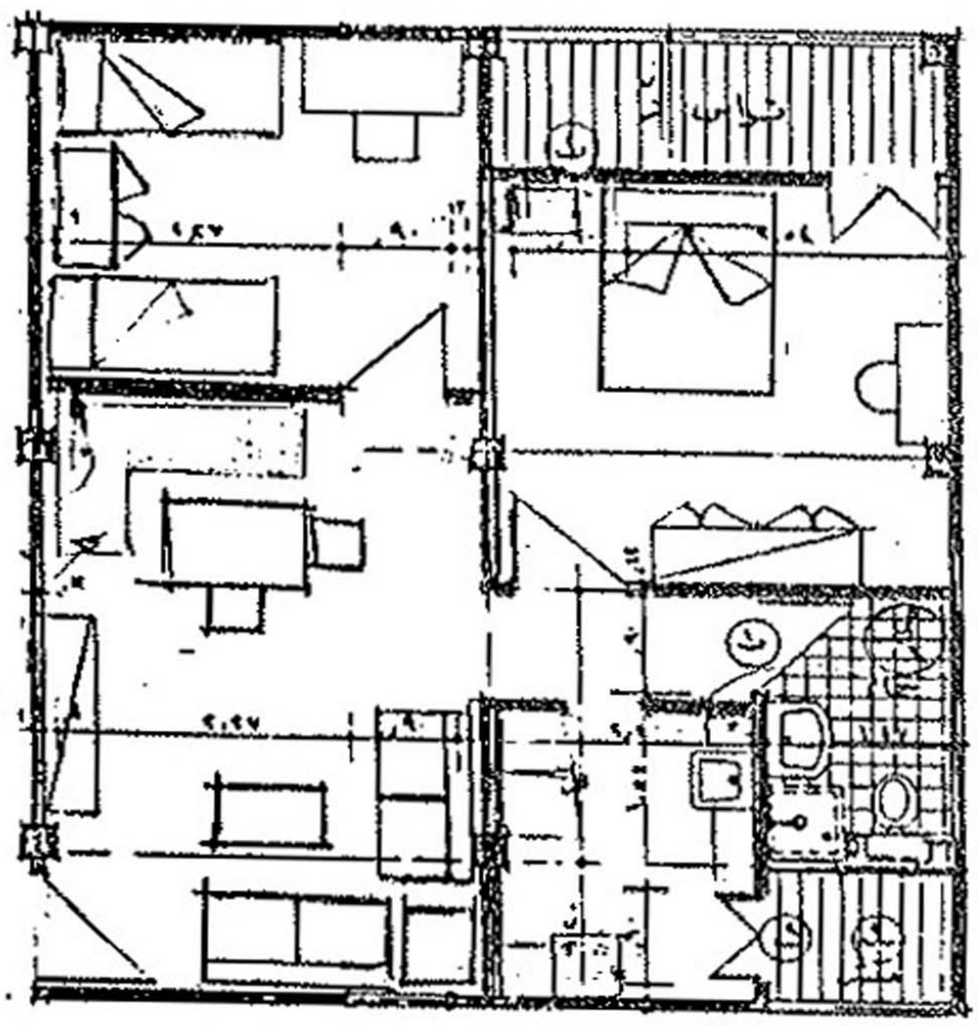
Architect:Mohammad Al-Rafi



Architect: Mohammad Al-Rafi



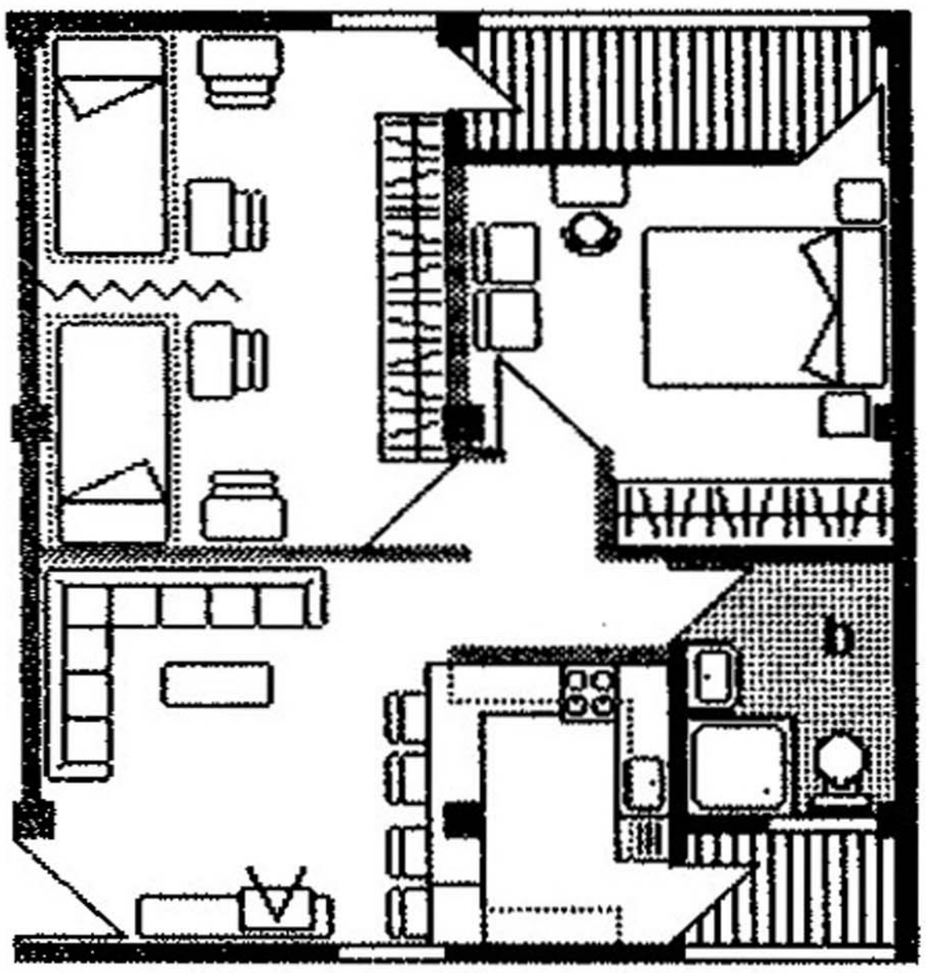
Architect:Ibrahim Al-Domery



Architect: Hany Said Gamil

Figure(2-8'):Examples of alternative plans suggested by postgraduate students for the 60 square meters dwelling.

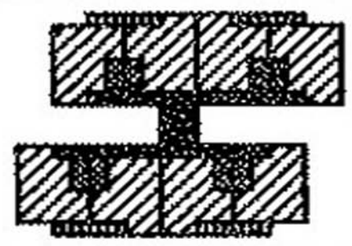
60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")



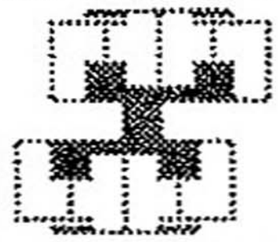
0 1.8 3.6 5.4m

Figure (2-9)
Alternative 1 :
Area Analysis, Family Size & Proposed Infill

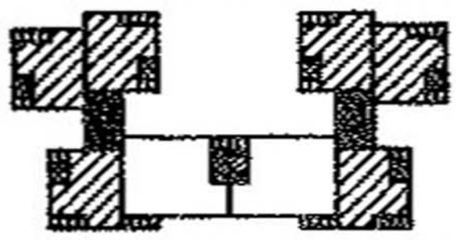
نموذج "أ"
Type A



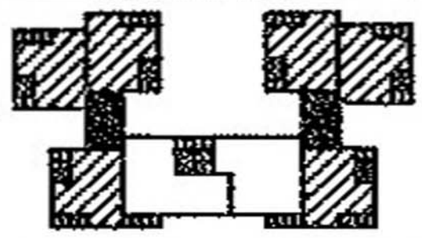
نموذج "ب"
Type B



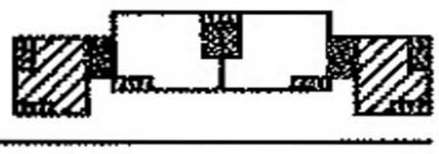
نموذج "ج"
Type C



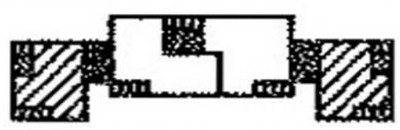
نموذج "د"
Type D



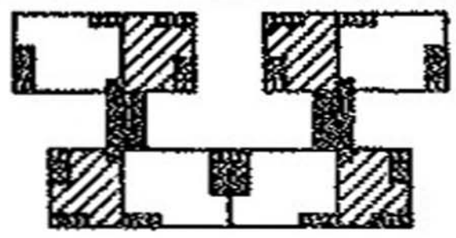
نموذج "هـ"
Type E



نموذج "و"
Type F

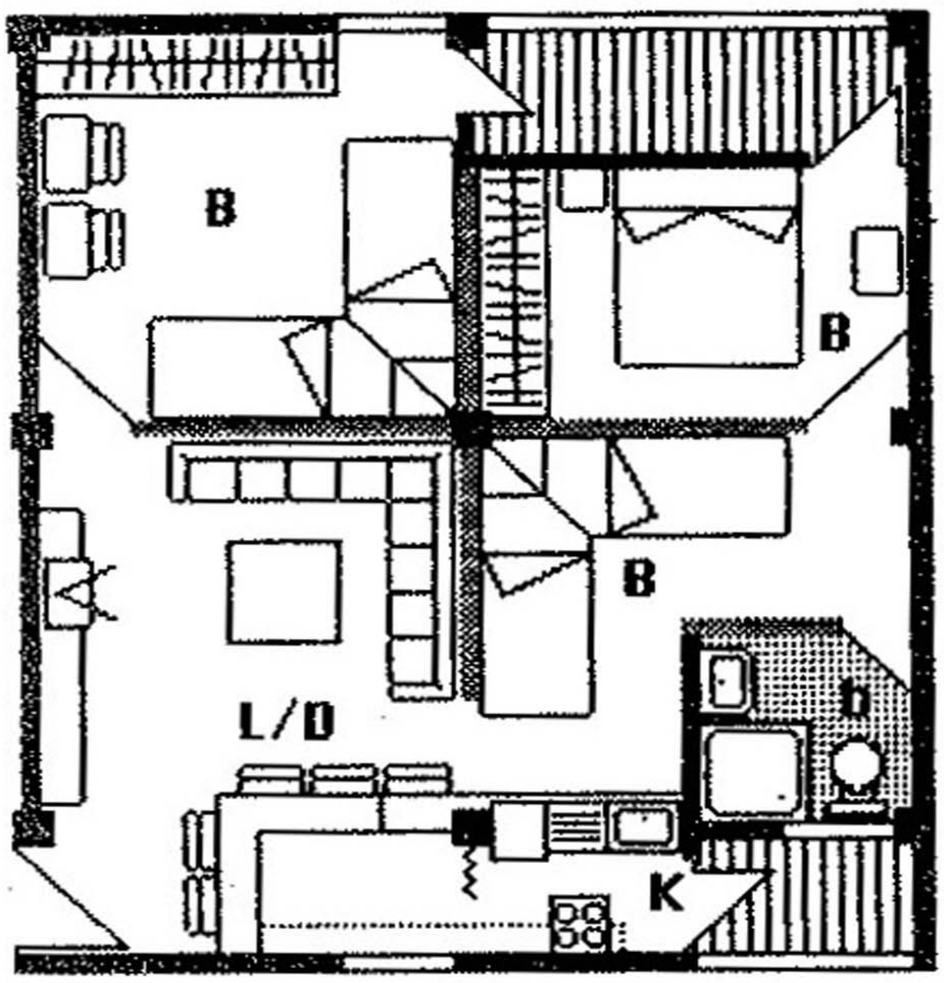


نموذج "ز"
Type G



Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation & services	balconies	total	No of Persons per dwelling	Share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
16.2m2 28 %	30.3m2 50 %	7 m2 11 %	6.5m2 11 %	60m2 100%	6	10m2	◕	◑	◕	◑

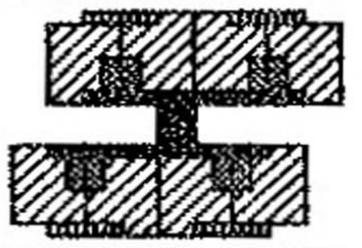
60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")



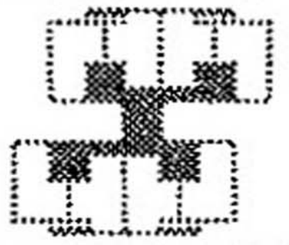
0 1.8 3.6 5.4m

Figure (2-10)
Alternative 2 :
Area Analysis, Family Size & Proposed Infill

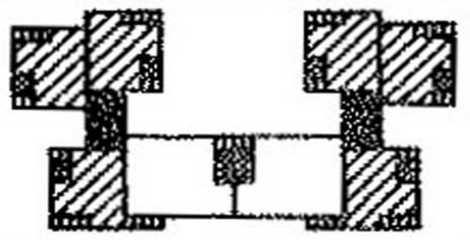
نموذج "أ"
Type A



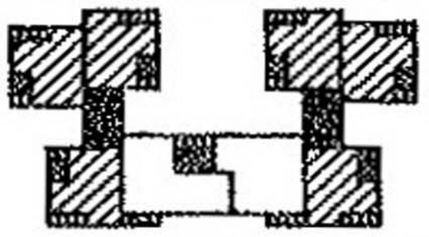
نموذج "ب"
Type B



نموذج "ج"
Type C



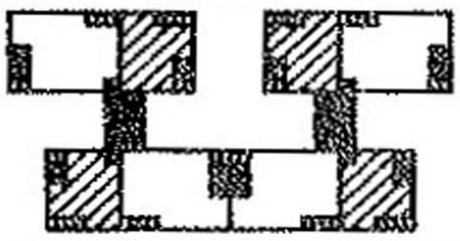
نموذج "د"
Type D



نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
17.3m2 29 %	30.2m2 50 %	6m2 10 %	6.5m2 11 %	60m2 100%

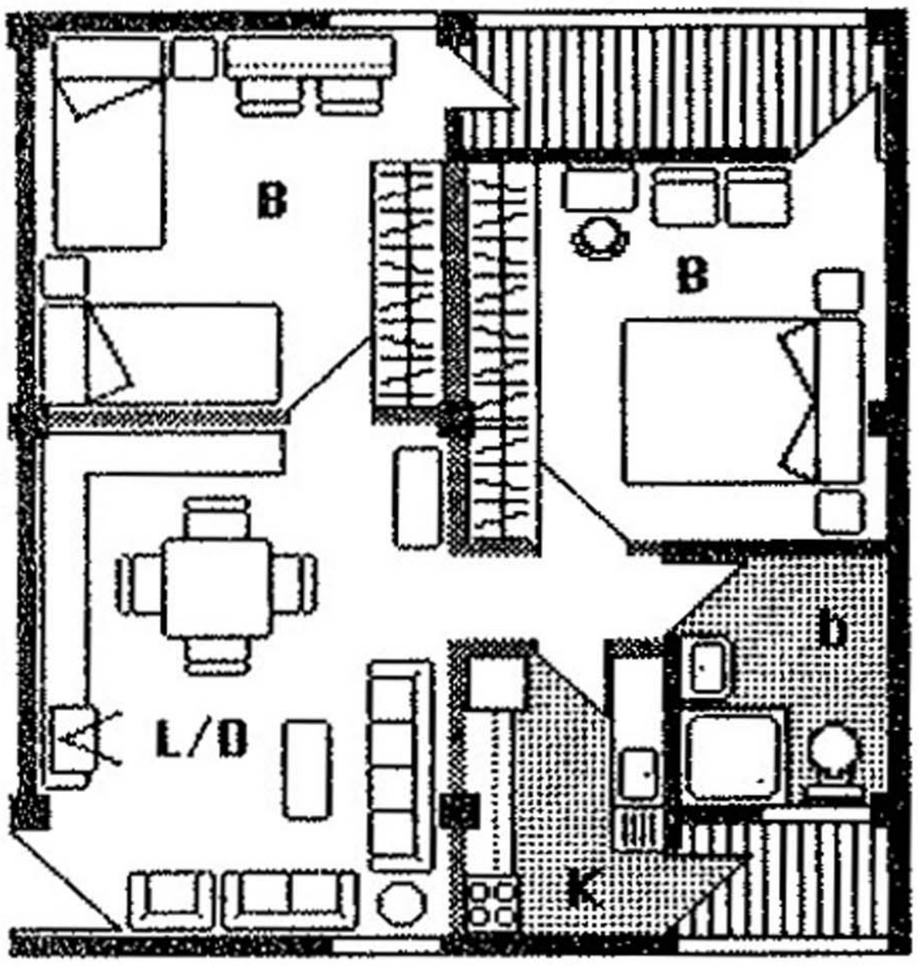
Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
6	10m2

Proposed Infill : Partitions and Furniture

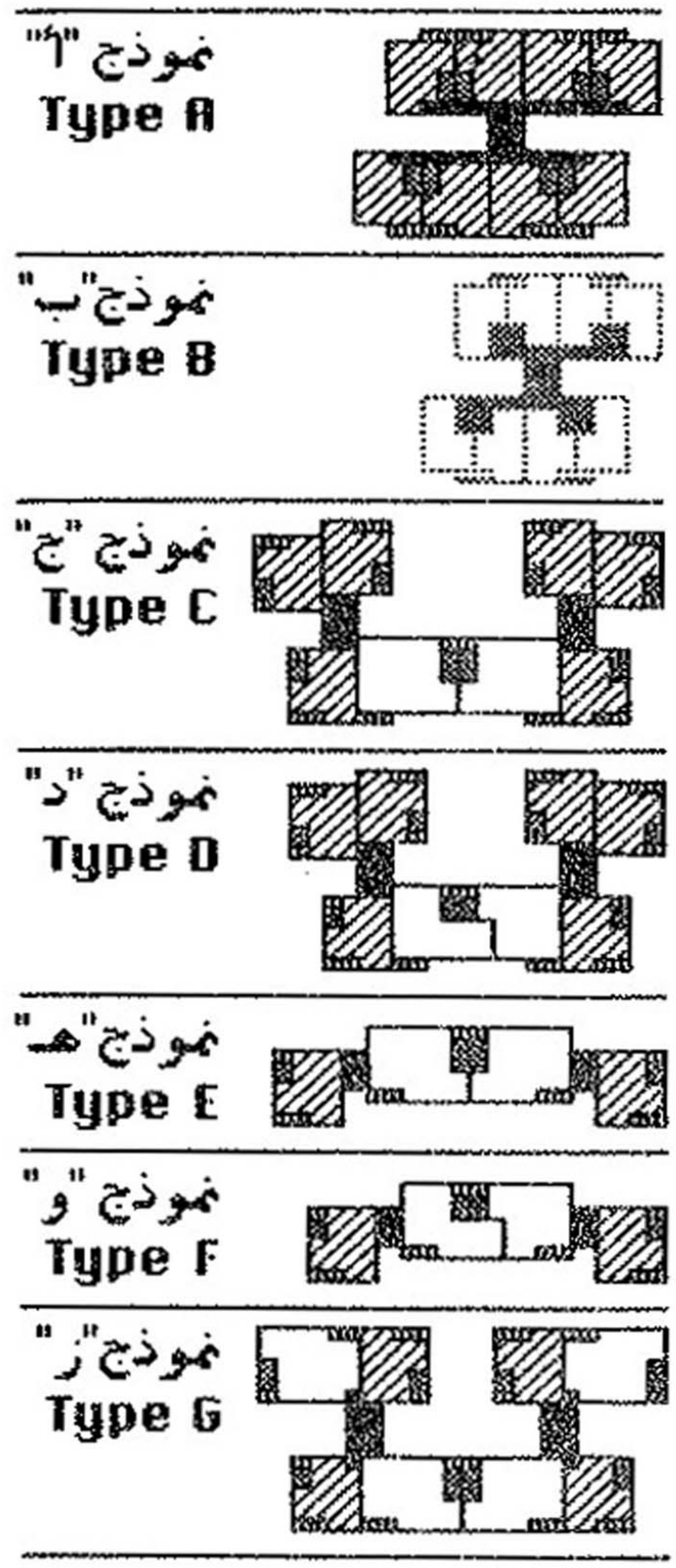
fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
			

60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")



0 1.8 3.6 5.4m

Figure (2-11)
Alternative 3:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation & services	balconies	total
16.7m2 28 %	26m2 43 %	10.8m2 18 %	6.5m2 11 %	60m2 100%

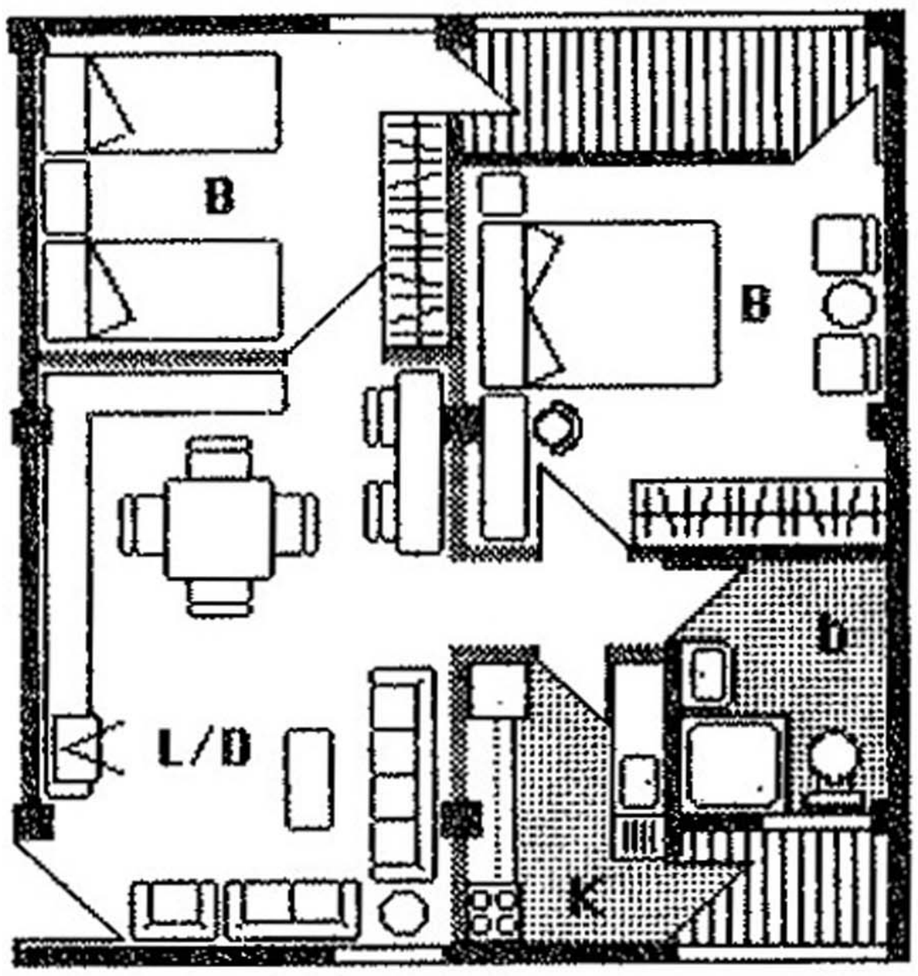
Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
4	15m2

Proposed Infill : Partitions and Furniture

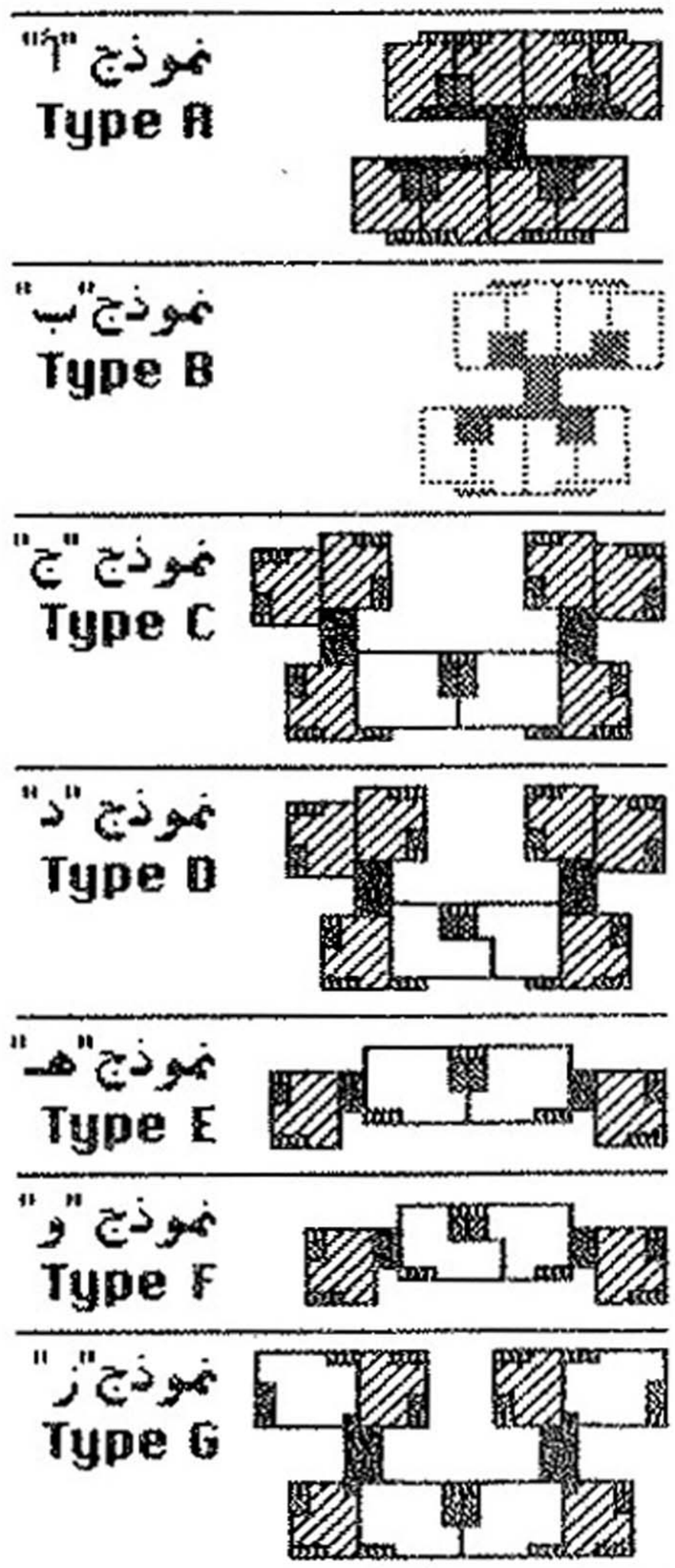
fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	●	⊕

60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")



0 1.8 3.6 5.4m

Figure (2-12)
Alternative 4:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
19m2 31.5%	23.7m2 39.5%	10.8m2 18 %	6.5m2 11 %	60m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
4	15m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	●	⊕

60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")

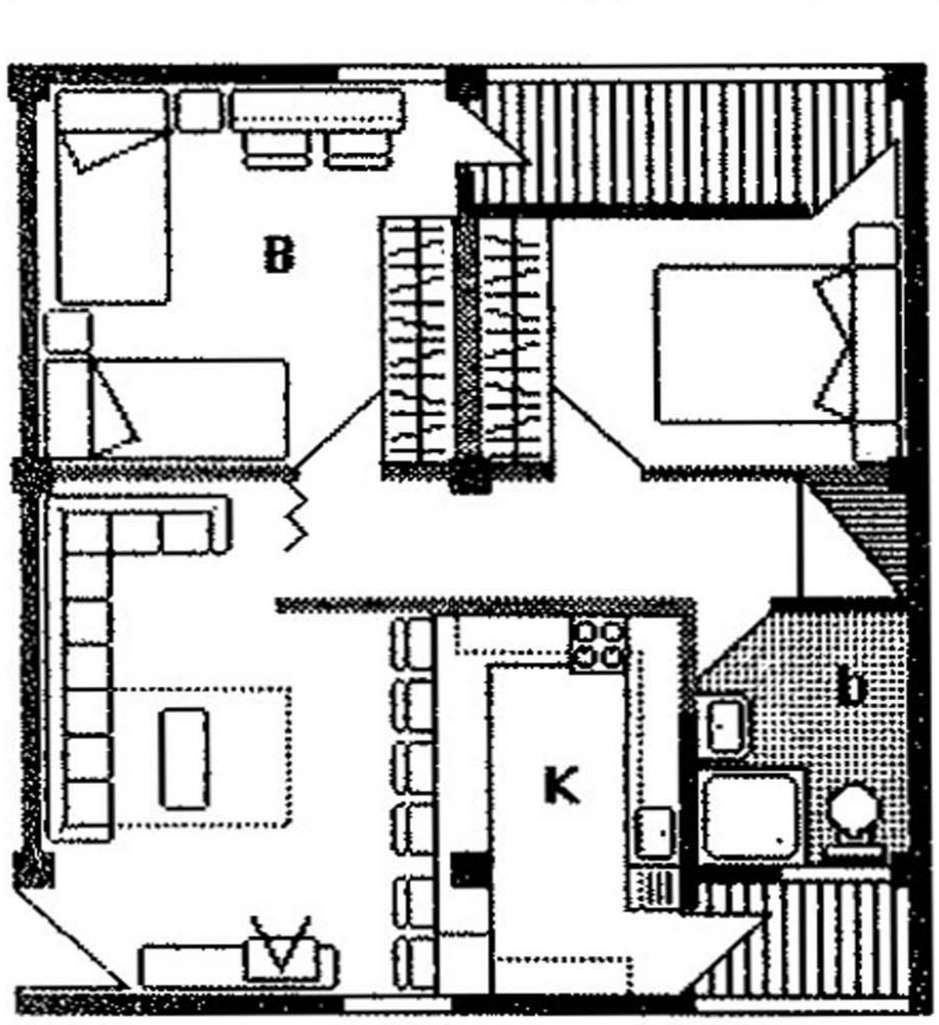
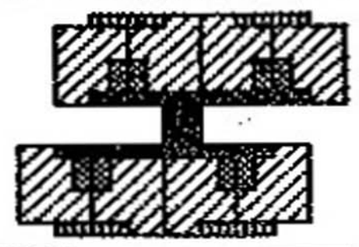
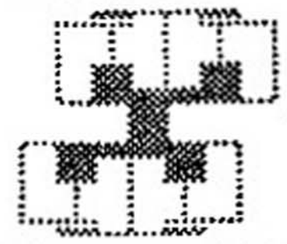


Figure (2-13)
Alternative 5:
Area Analysis, Family Size & Proposed Infill

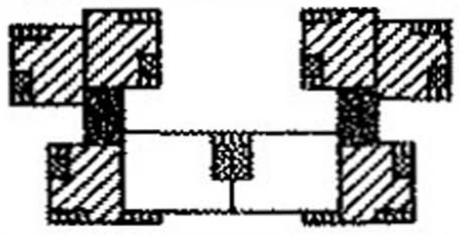
نموذج "أ"
Type A



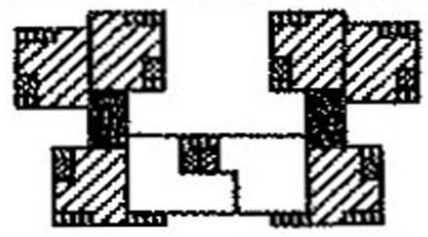
نموذج "ب"
Type B



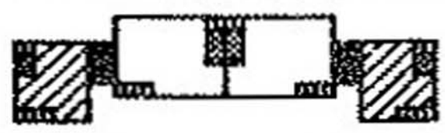
نموذج "ج"
Type C



نموذج "د"
Type D

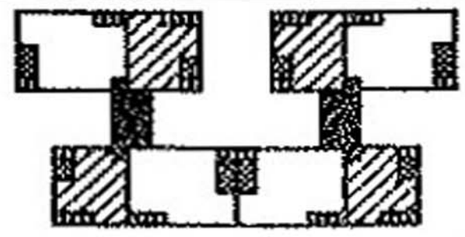


نموذج "هـ"
Type E



نموذج "و"
Type F

نموذج "ز"
Type G



Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation &services	balconies	total	Nº of Persons per dwelling	share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
21.8M2 36 %	21.7M2 36 %	10m2 17 %	6.5m2 11 %	60m2 100%	5	12m2	◔	◔	◔	◔

60 square meters dwelling
(Available in Prototypes "A","C","D","E","F","G")

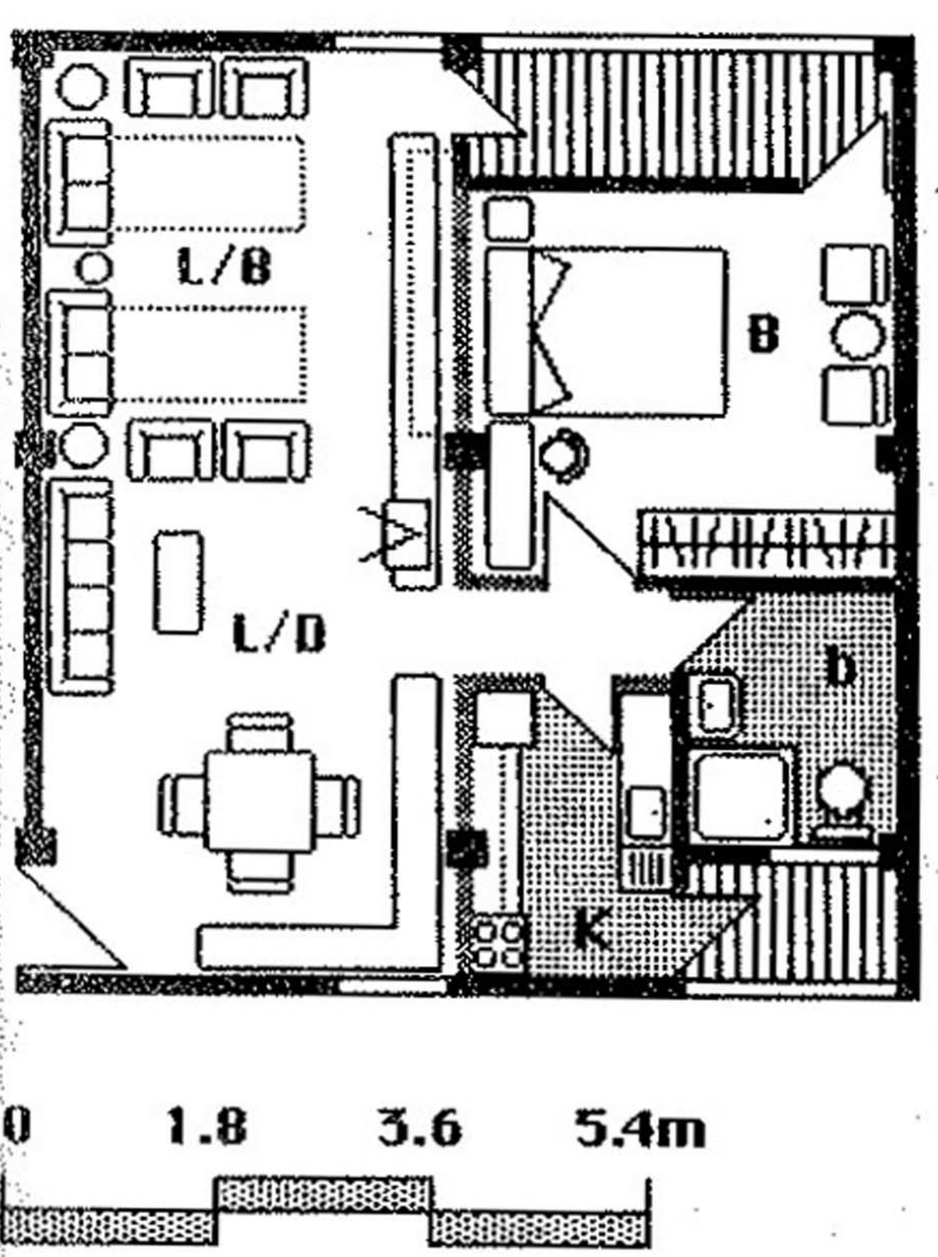
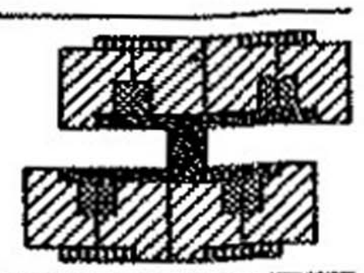
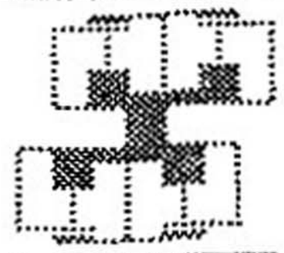


Figure (2-14)
Alternative 6:
Area Analysis, Family Size & Proposed Infill

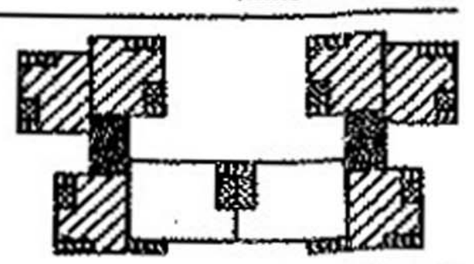
نموذج "أ"
Type A



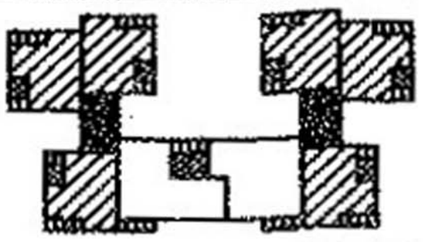
نموذج"ب"
Type B



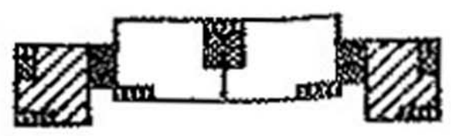
نموذج "ج"
Type C



نموذج "د"
Type D

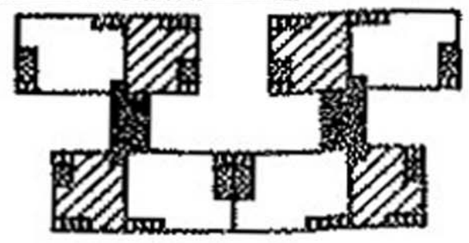


نموذج"هـ"
Type E



نموذج "و"
Type F

نموذج"ز"
Type G



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
29.7M2 49 %	13m2 22 %	10.8M2 18 %	6.5m2 11 %	60m2 100%

Family Size and Shares

No of Persons per dwelling	Share of closed spaces/person
4	15m2

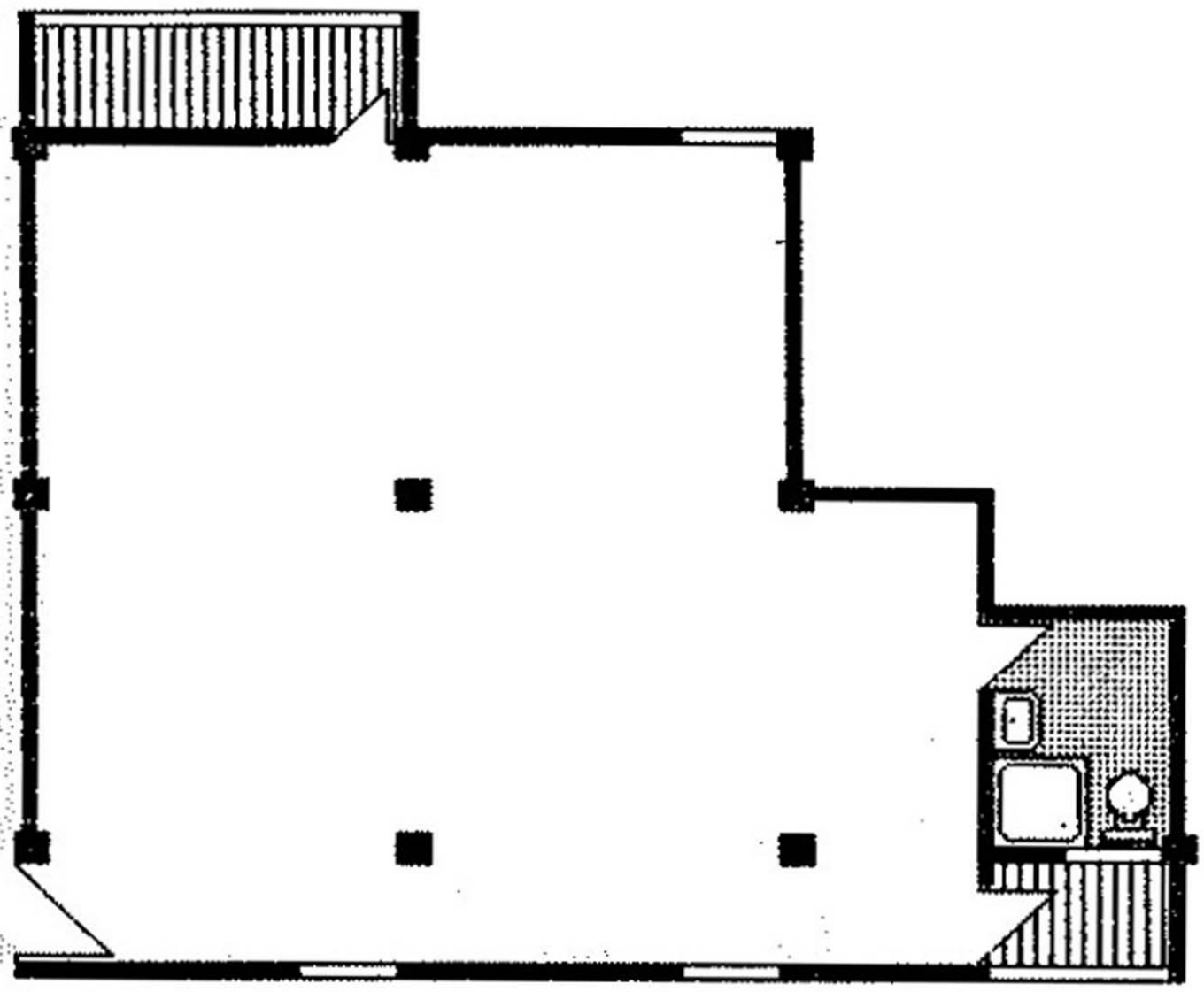
Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◔	⊕

	Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
	living area	sleeping area	circulation &services	balconies	total	Nºof Persons per dwelling	Share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
1	16.2m2 28 %	30.3m2 50 %	7 m2 11 %	6.5m2 11 %	60m2 100%	6	10m2	◔	◔	◔	◔
2	17.3m2 29 %	30.2m2 50 %	6m2 10 %	6.5m2 11 %	60m2 100%	6	10m2	◔	◔	◔	◔
3	16.7m2 28 %	26m2 43 %	10.8m2 18 %	6.5m2 11 %	60m2 100%	4	15m2	●	○	●	○
4	19m2 31.5%	23.7m2 39.5%	10.8m2 18 %	6.5m2 11 %	60m2 100%	4	15m2	●	○	●	○
5	21.8M2 36 %	21.7M2 36 %	10m2 17 %	6.5m2 11 %	60m2 100%	5	12m2	◔	◔	◔	◔
6	29.7M2 49 %	13m2 22 %	10.8M2 18 %	6.5m2 11 %	60m2 100%	4	15m2	◔	◔	◔	◔

Table (2-2) :Analysis of Alternative Plans Suggested for the 60 square meters Dwellings.

79 square meters dwelling
(Available in Prototypes "D","F")



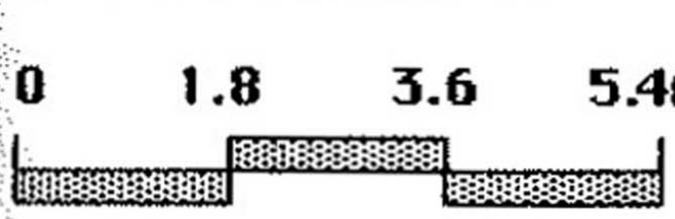
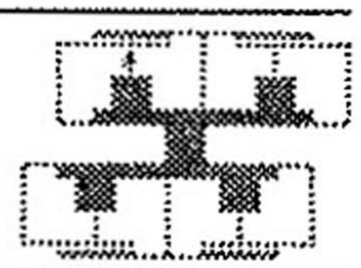


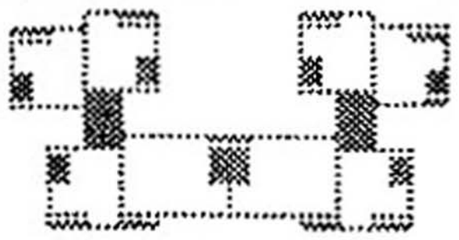
Figure (2-15)
Basic Design :
Area Analysis, Family Size & Proposed Infill

نموذج "أ"
Type A

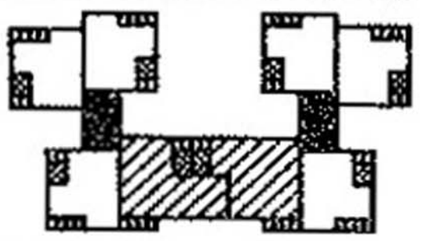


نموذج "ب"
Type B

نموذج "ج"
Type C



نموذج "د"
Type D



نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G

Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
64.2m2 86.5%		4.3m2 5.5%	6.5m2 8 %	79m2 100%

Family Size and Shares

Nº of Persons per dwelling	share of closed spaces/person
4 to 6	13 to 19m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
⊕	⊕	⊕	⊕

79 square meters dwelling
(Available in Prototypes "D","F")

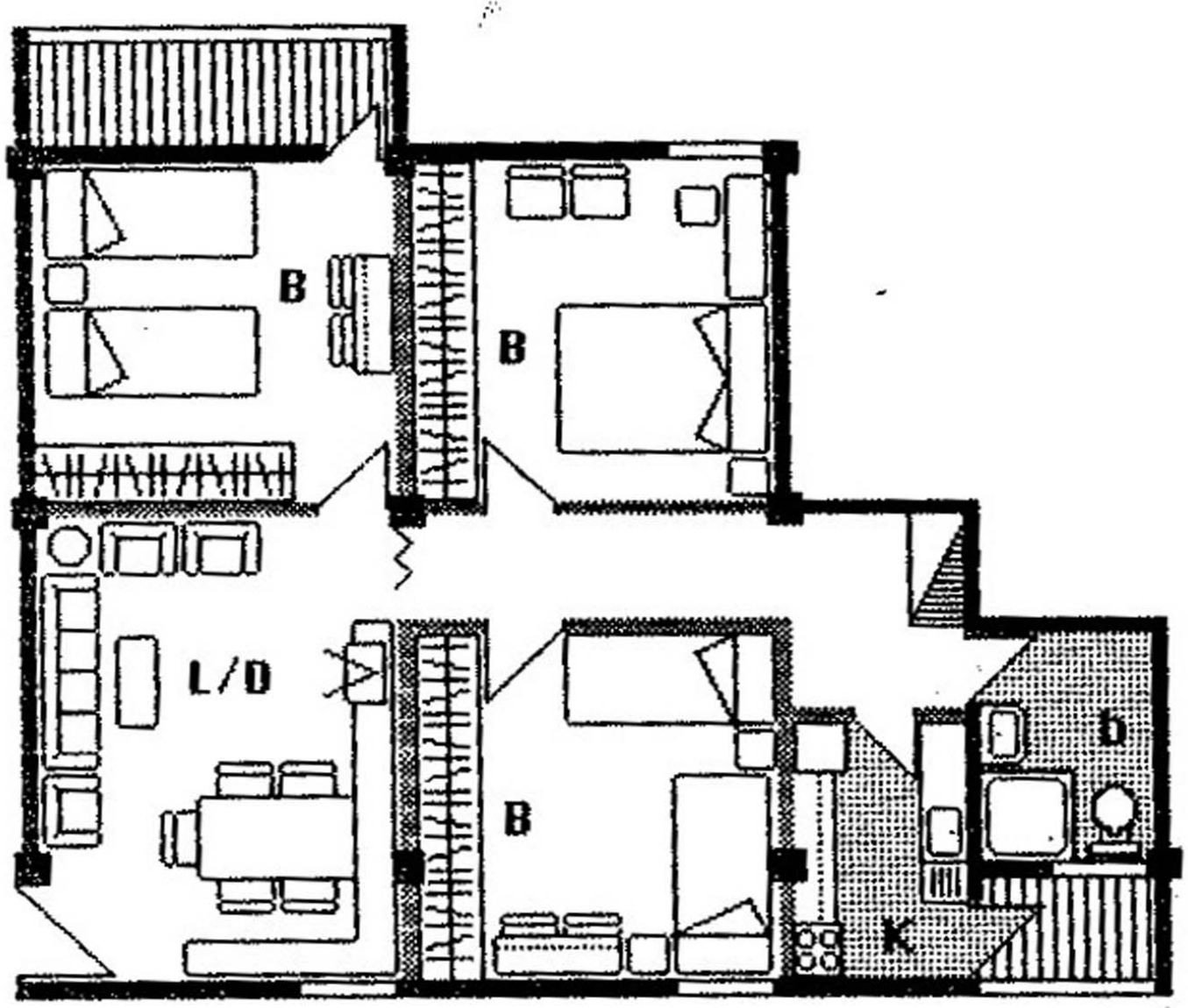
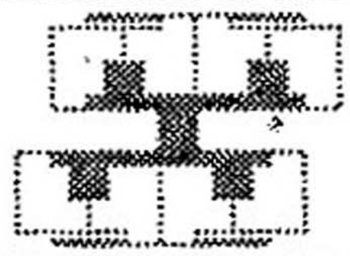
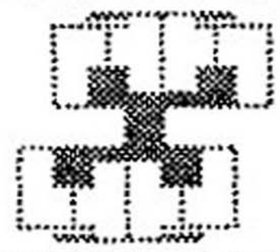


Figure (2-16)
Alternative 1 :
Area Analysis, Family Size & Proposed Infill

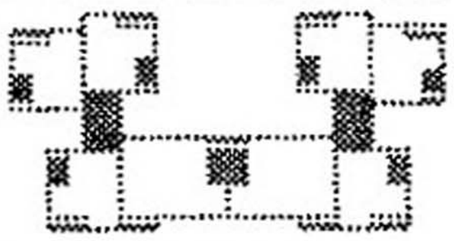
نموذج "أ"
Type A



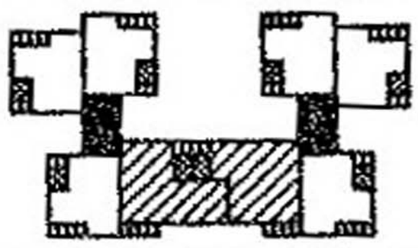
نموذج "ب"
Type B



نموذج "ج"
Type C



نموذج "د"
Type D



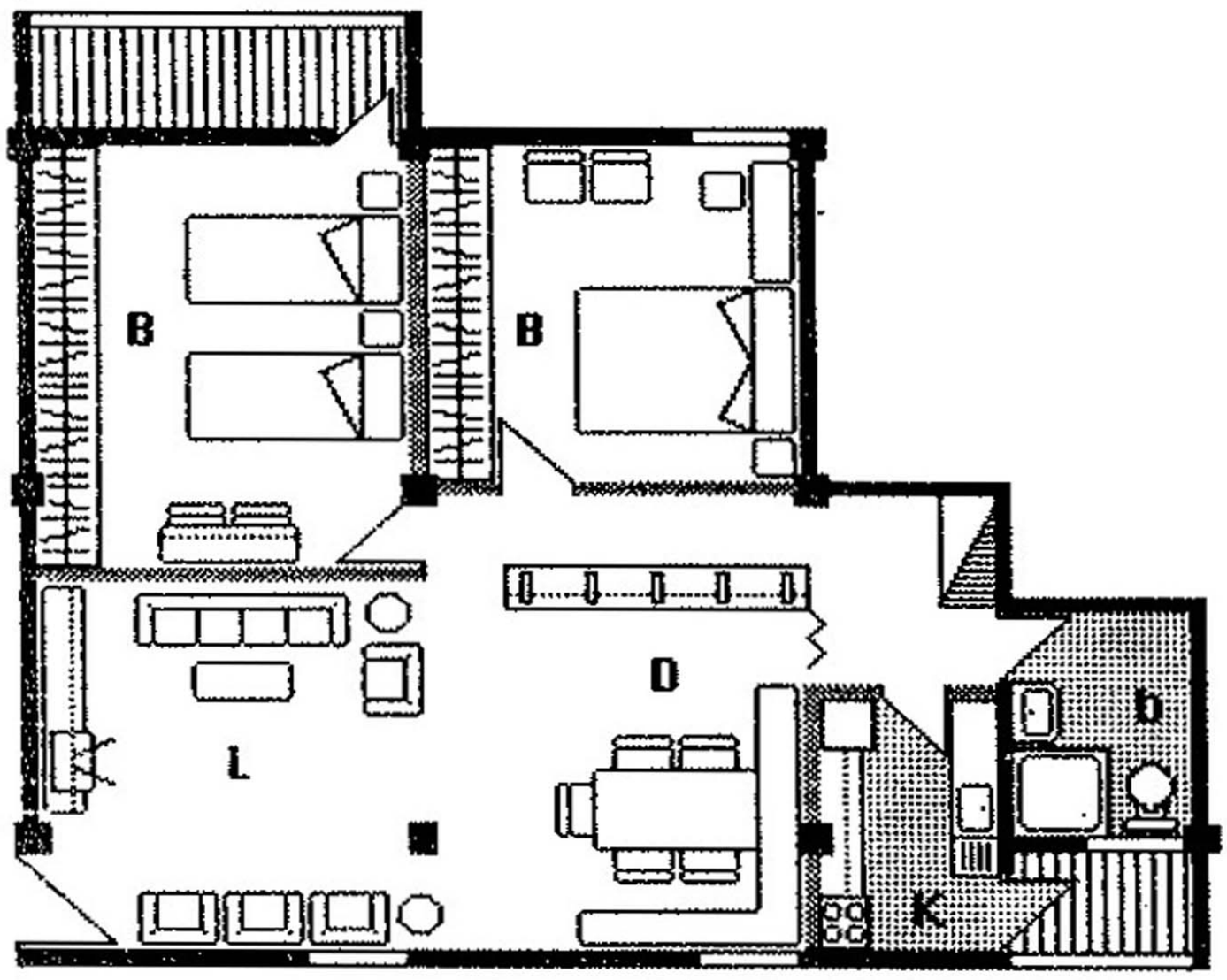
نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G

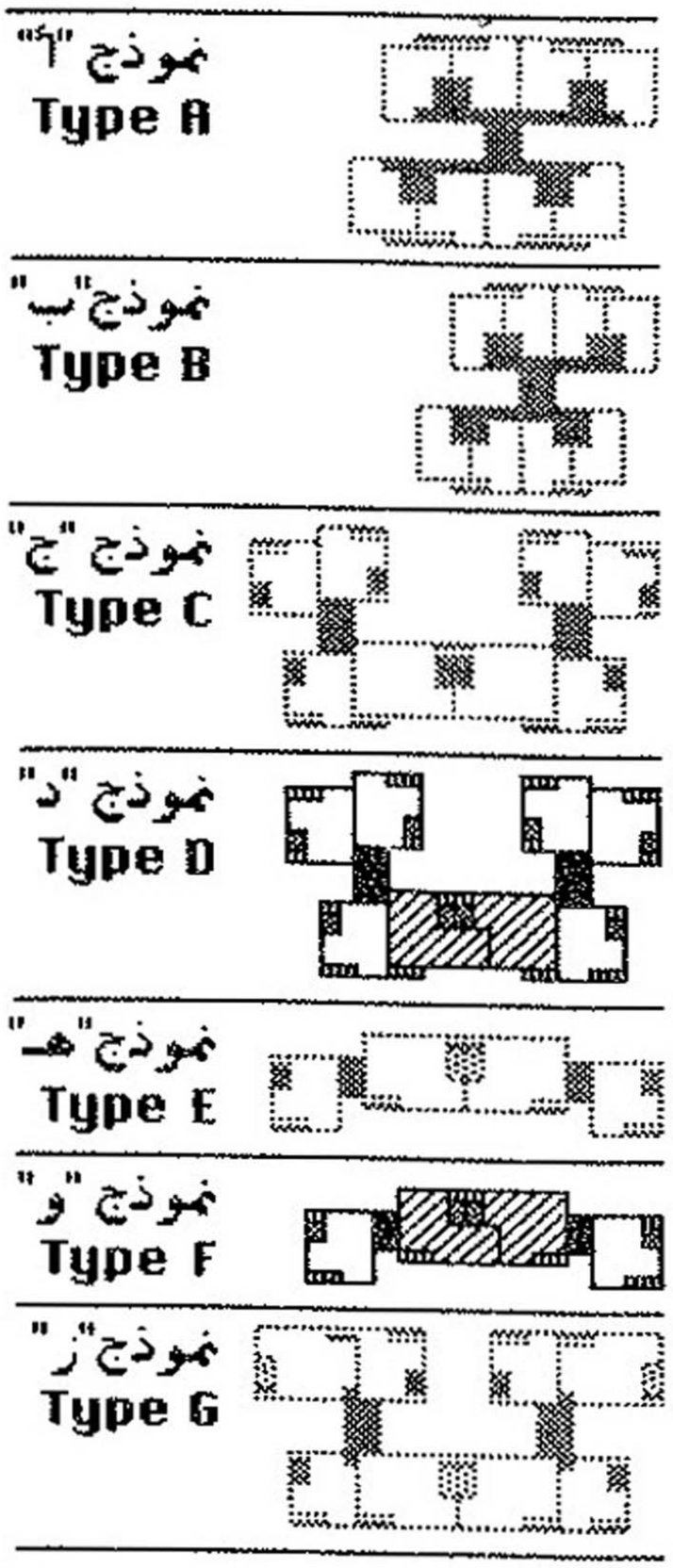
Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation &services	balconies	total	Nºof Persons per dwelling	Shareofclosed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
16.2m2 22 %	39m2 49 %	17.3m2 21 %	6.5m2 8 %	79m2 100%	6	13m2	●	⊕	●	⊕

79 square meters dwelling
(Available in Prototypes "D","F")



0 1.8 3.6 5.4m

Figure (2-17)
Alternative 2:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
26m2 33 %	29.2m2 38 %	17.3m2 21 %	6.5m2 8 %	79m2 100%

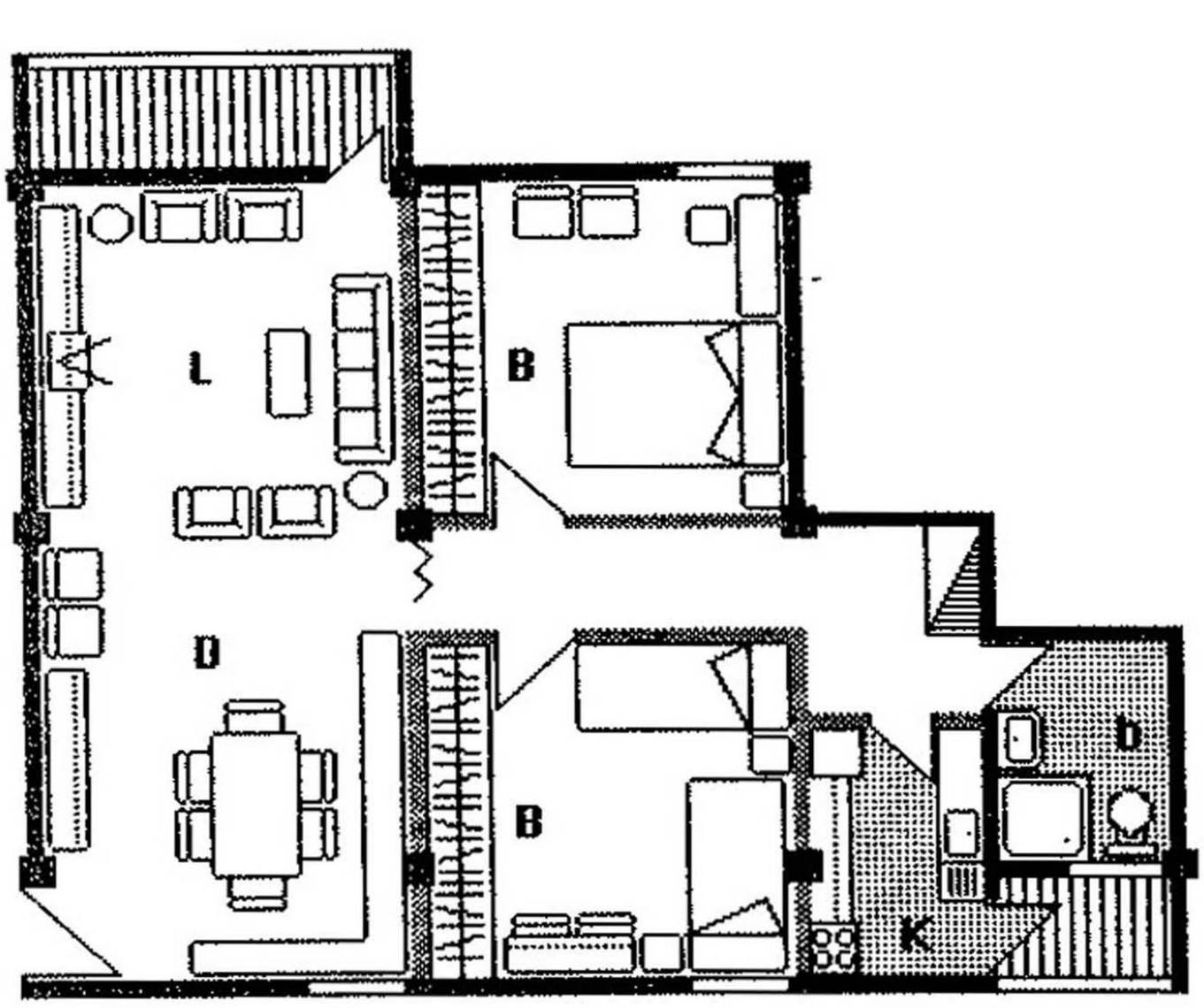
Family Size and Shares

N°of Persons per dwelling	Shareofclosed spaces/person
4	19m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
◔	◔	◔	◔

79 square meters dwelling
(Available in Prototypes "D","F")



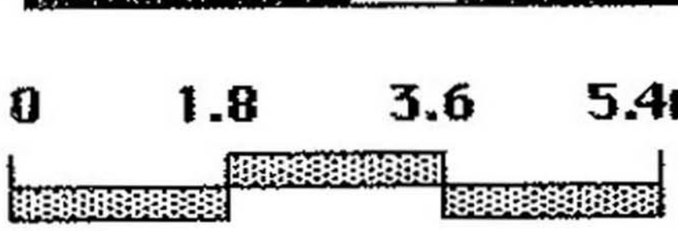
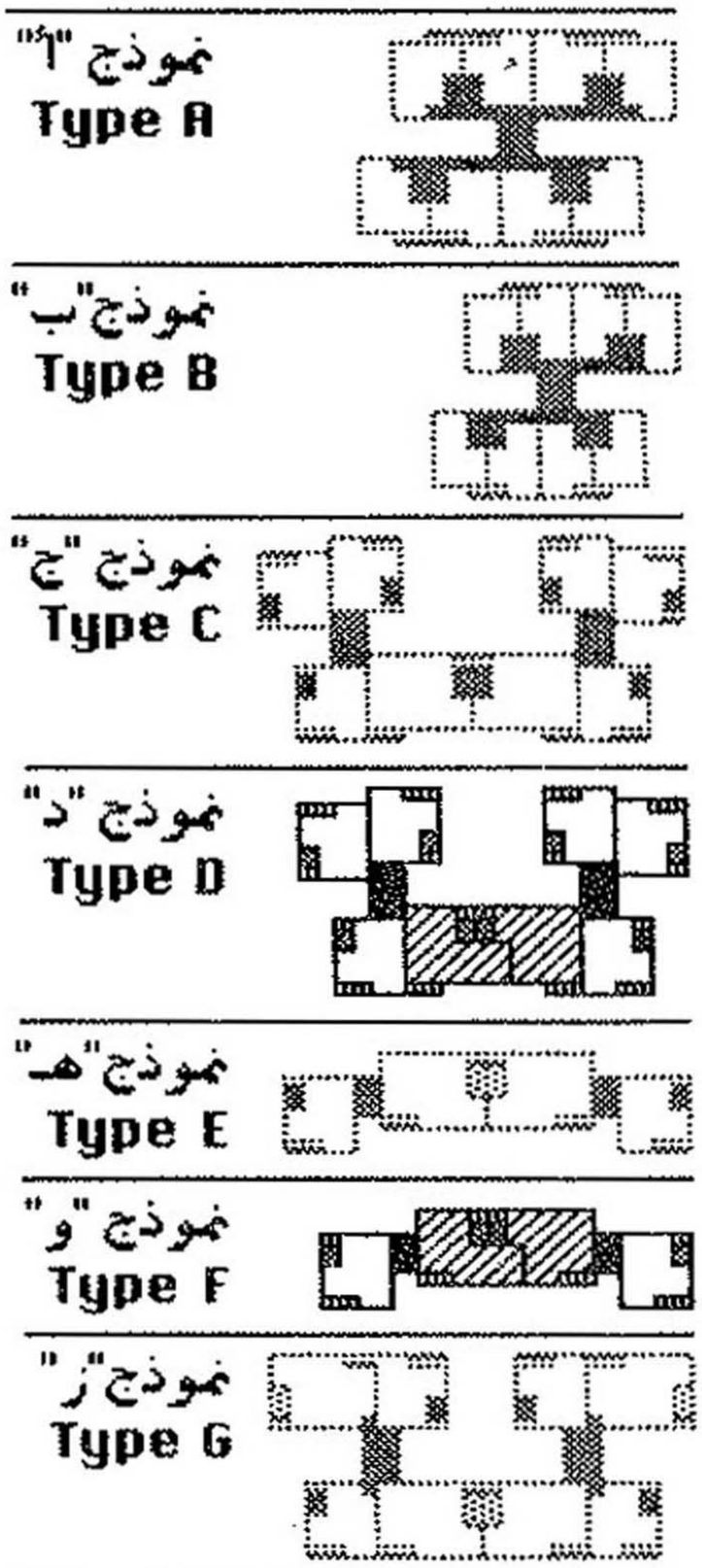


Figure (2-18)
Alternative 3:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation &services	balconies	total	Nº of Persons per dwelling	share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
29.2m2 38 %	26m2 33 %	17.3m2 21 %	6.5m2 8 %	79m2 100%	4	19m2	●	⊕	●	⊕

79 square meters dwelling
(Available in Prototypes "D","F")

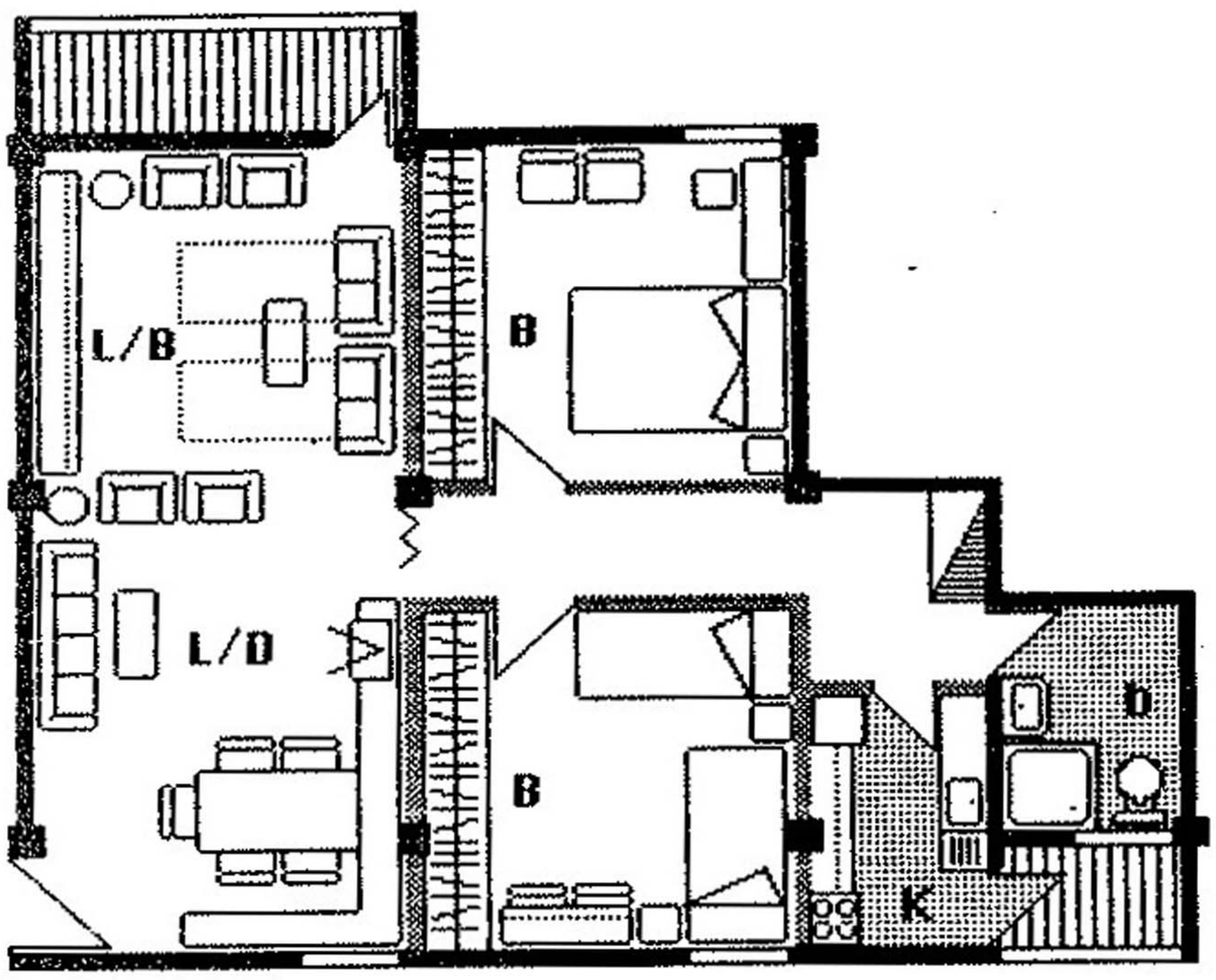
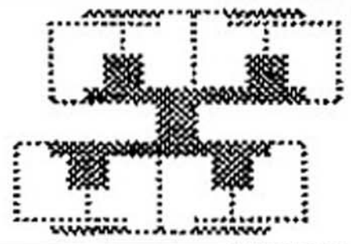
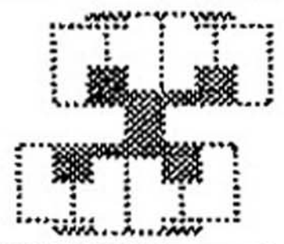


Figure (2-19)
Alternative 4:
Area Analysis, Family Size & Proposed Infill

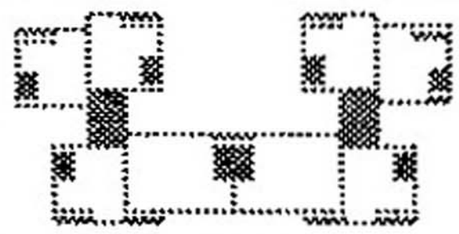
نموذج "أ"
Type A



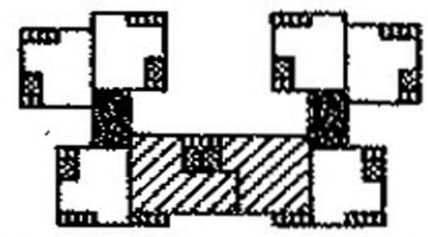
نموذج "ب"
Type B



نموذج "ج"
Type C



نموذج "د"
Type D



نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G

Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
29.2m2 38 %	26m2 33 %	17.3m2 21 %	6.5m2 8 %	79m2 100%

Family Size and Shares

No of Persons per dwelling	Share of closed spaces/person
6	13m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◕	⊕

79 square meters dwelling
(Available in Prototypes "D","F")

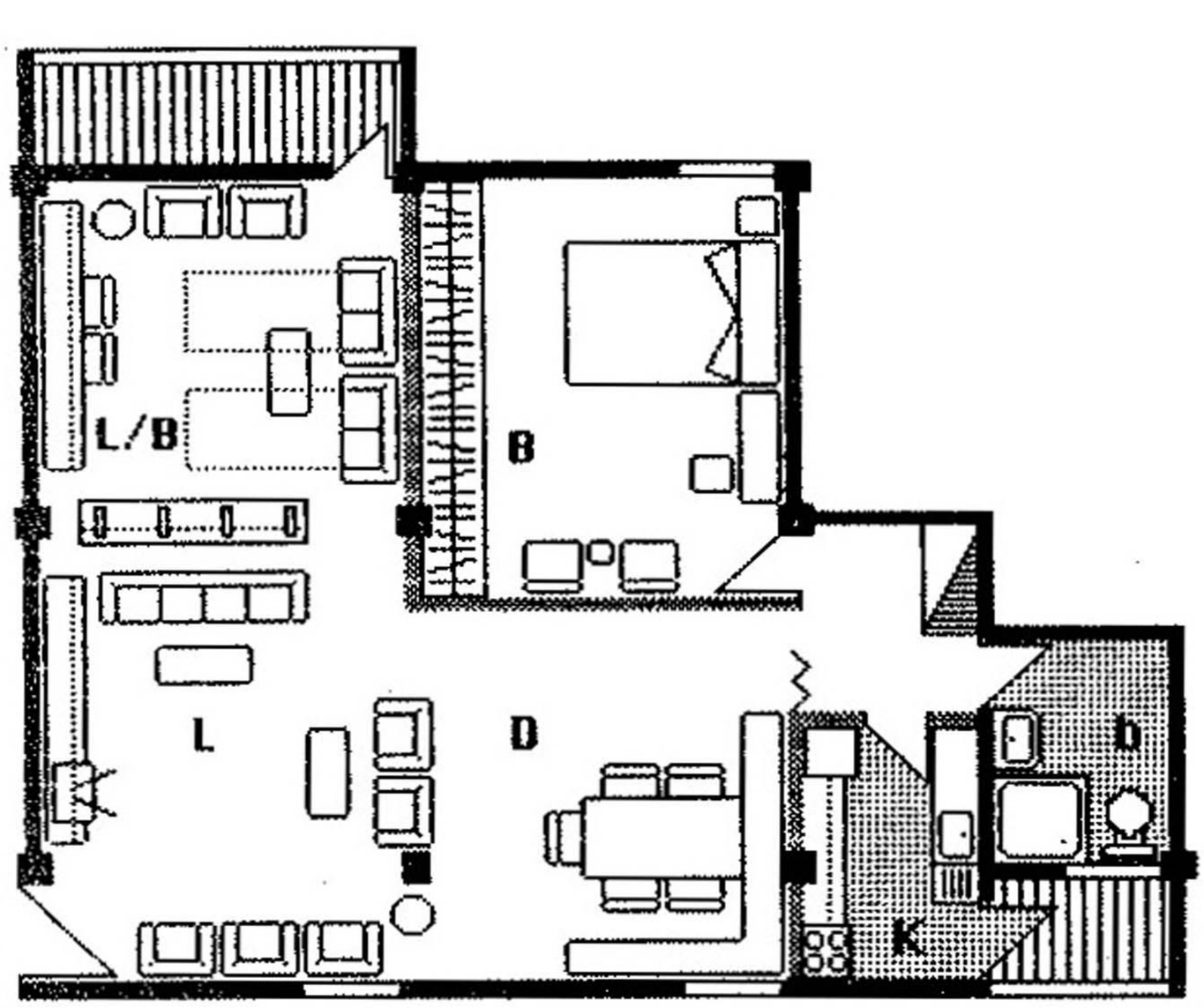
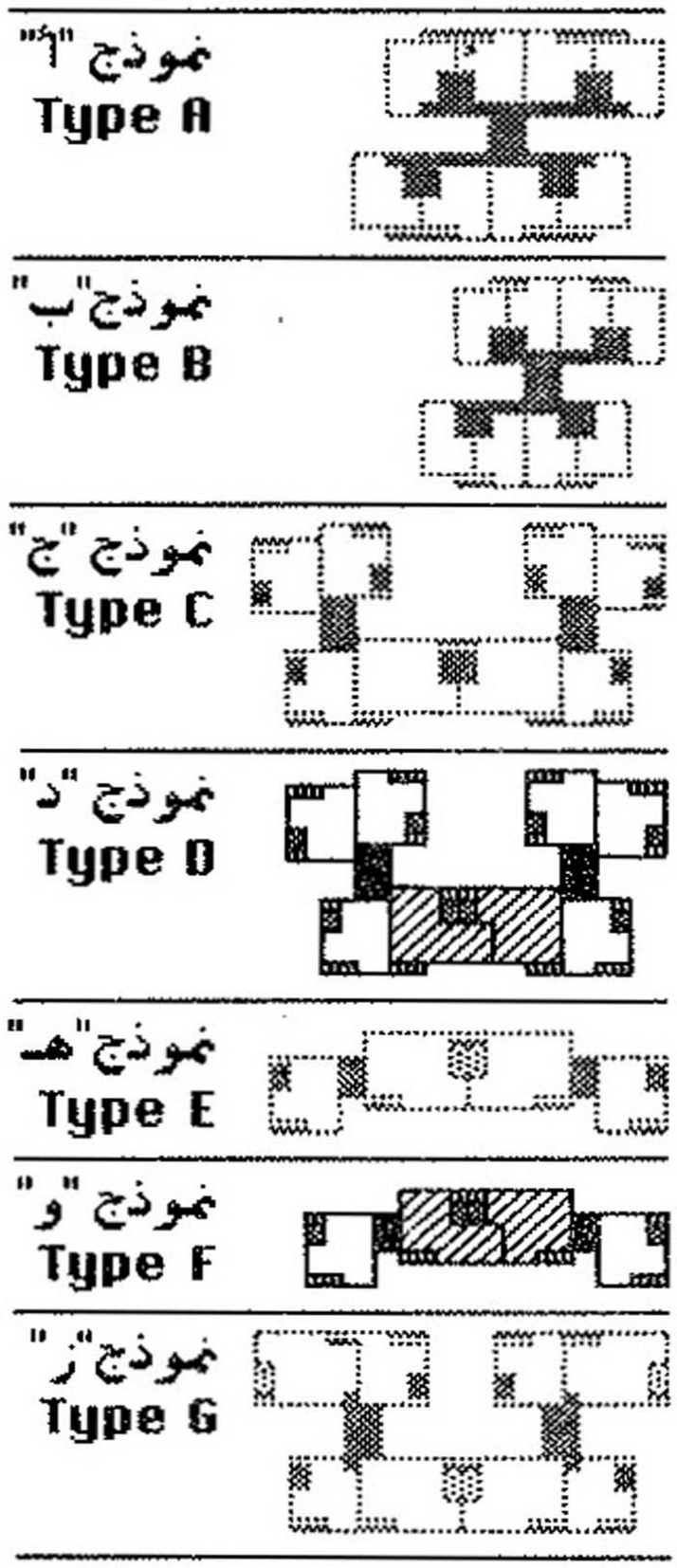


Figure (2-20)
Alternative 5:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
17.3m2 54 %	16.2m2 22 %	13m2 16 %	6.5m2 8 %	79m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
4	19m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
◐	◐	◕	⊕

79 square meters dwelling
(Available in Prototypes "D","F")

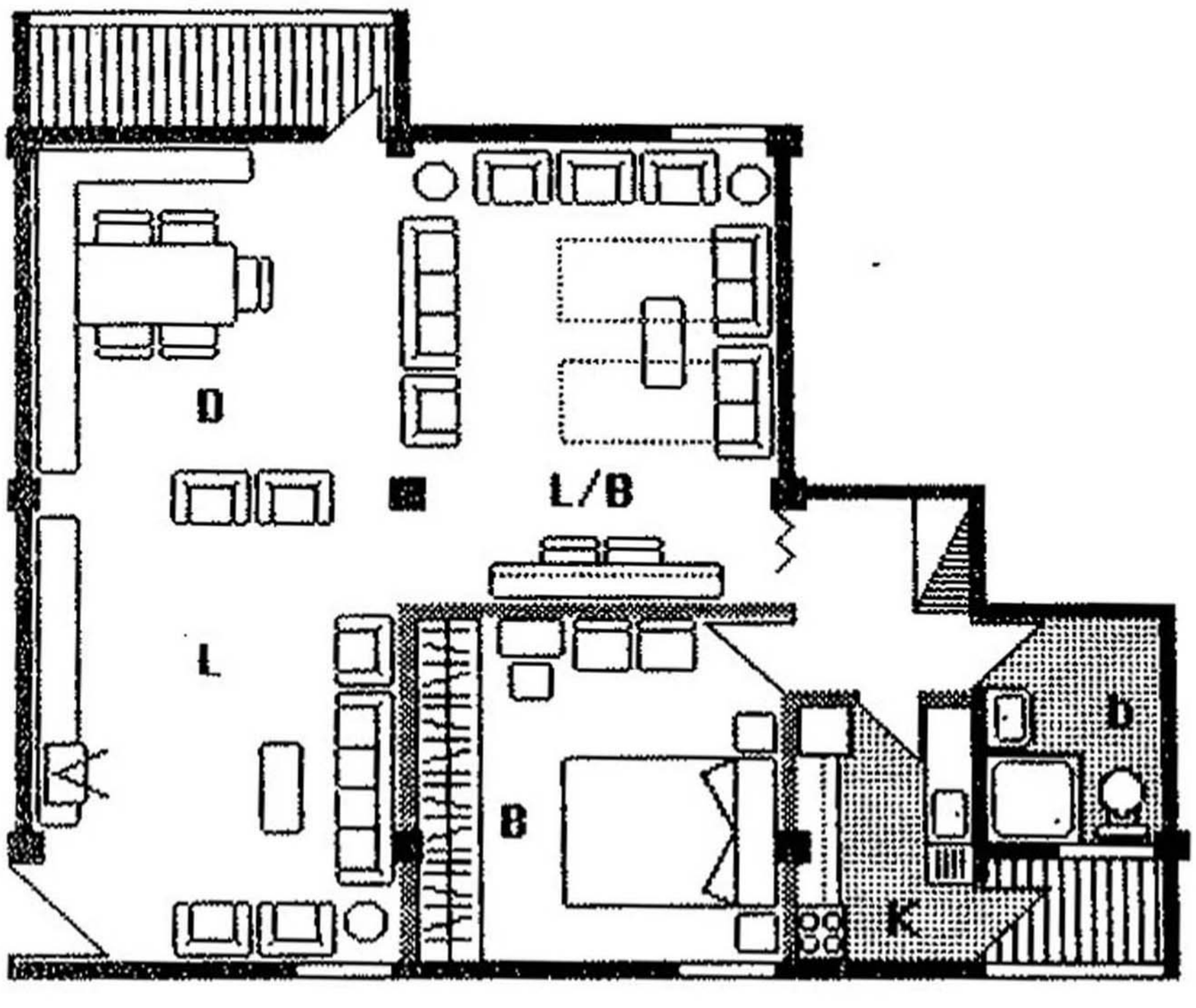
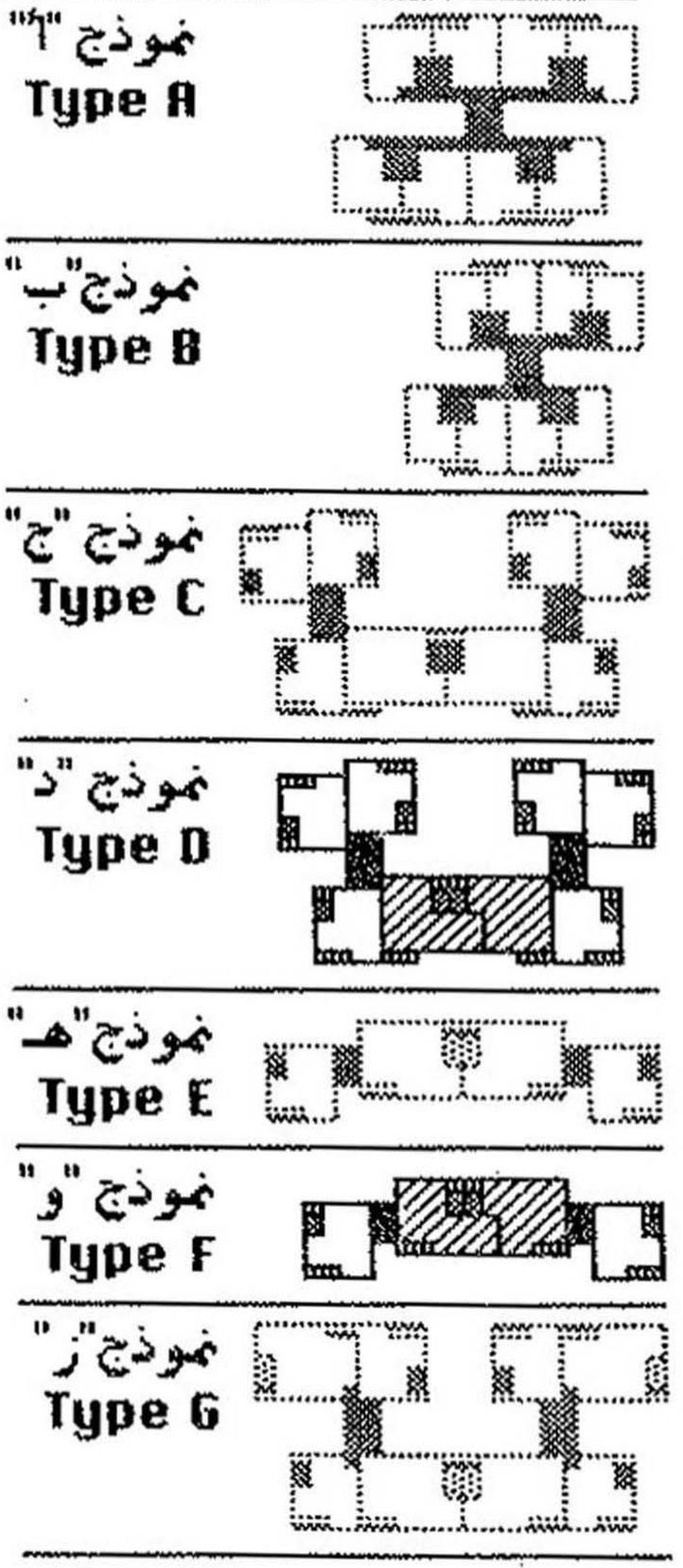


Figure (2-21)
Alternative 6:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation &services	balconies	total	Nº of Persons per dwelling	share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
46.5m2 60 %	13m2 16 %	13m2 16 %	6.5m2 8 %	79m2 100%	4	19m2	●	⊕	◑	◔

Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation &services	balconies	total	Nº of Persons per dwelling	Share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
16.2m2 22 %	39m2 49 %	17.3m2 21 %	6.5m2 8 %	79m2 100%	6	13m2	●	⊕	●	⊕
26m2 33 %	29.2m2 38 %	17.3m2 21 %	6.5m2 8 %	79m2 100%	4	19m2	◑	◑	◑	◑
29.2m2 38 %	26m2 33 %	17.3m2 21 %	6.5m2 8 %	79m2 100%	4	19m2	●	⊕	●	⊕
29.2m2 38 %	26m2 33 %	17.3m2 21 %	6.5m2 8 %	79m2 100%	6	13m2	●	⊕	●	◑
37.3m2 54 %	16.2m2 22 %	13m2 16 %	6.5m2 8 %	79m2 100%	4	19m2	◑	◑	◑	◑
46.5m2 60 %	13m2 16 %	13m2 16 %	6.5m2 8 %	79m2 100%	4	19m2	◑	◑	◑	◑

Table (2-3) :Analysis of Alternative Plans Suggested for the 79 square meters Dwellings.

94 square meters dwelling
(Available in Prototypes "C","E","G")

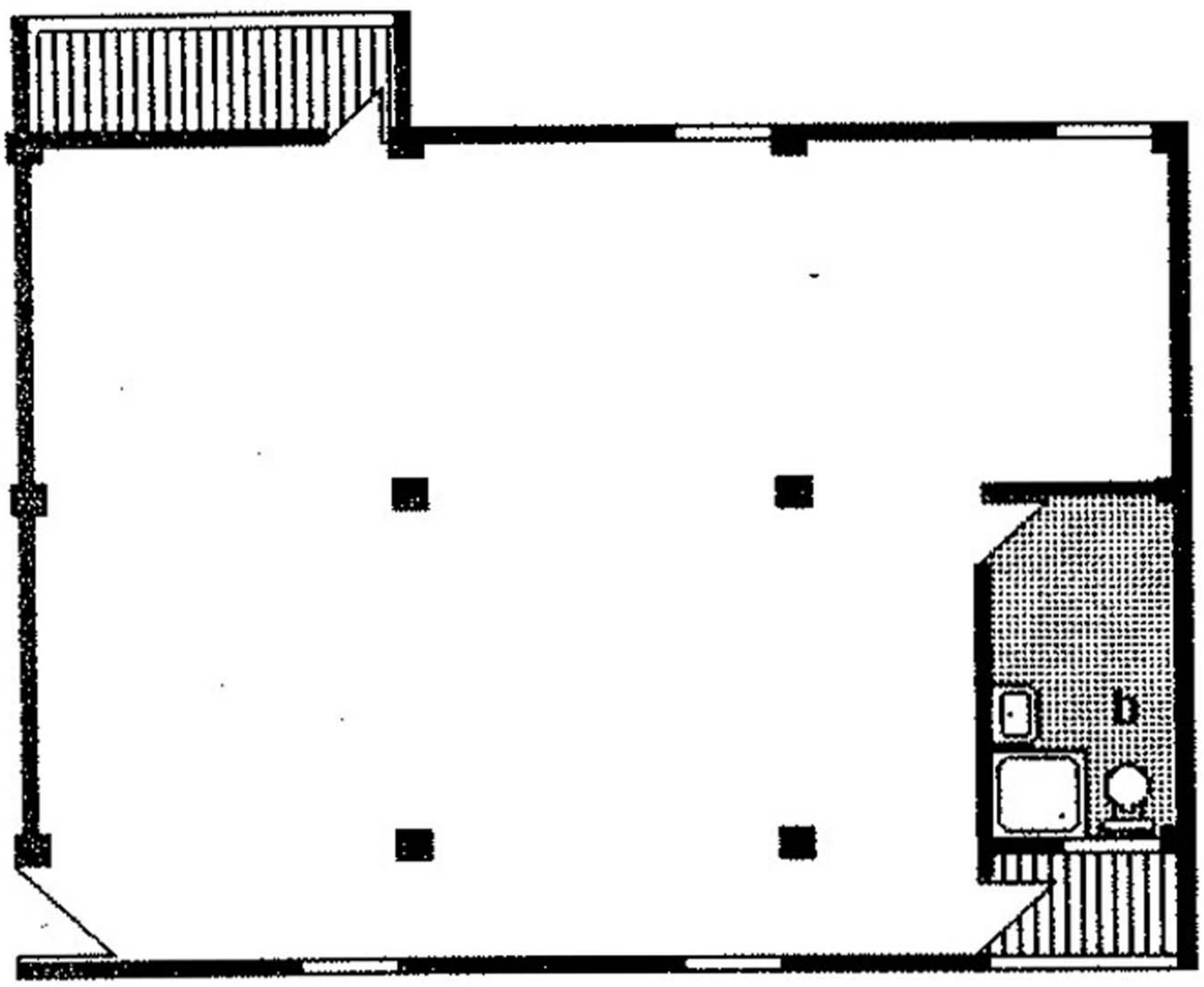
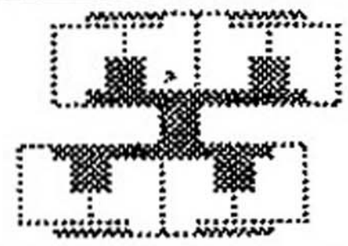
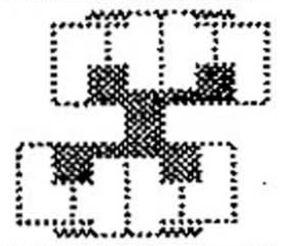


Figure (2-22)
Basic Design :
Area Analysis, Family Size & Proposed Infill

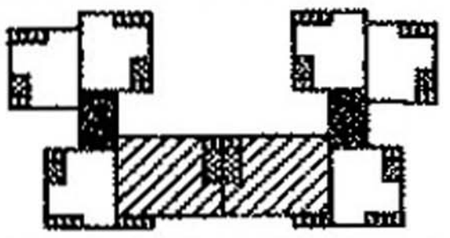
نموذج "أ"
Type A



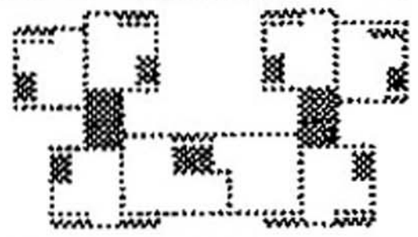
نموذج "ب"
Type B



نموذج "ج"
Type C



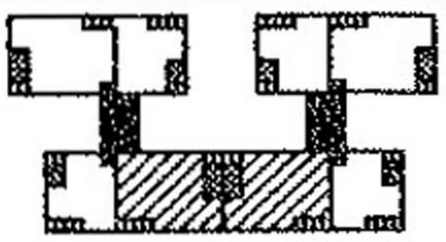
نموذج "د"
Type D



نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
81m2 86 %		6.5m2 7 %	6.5m2 7 %	94m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
6 to 8	12 to 15.5m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
⊕	⊕	⊕	⊕

94 square meters dwelling
(Available in Prototypes "C","E","G")

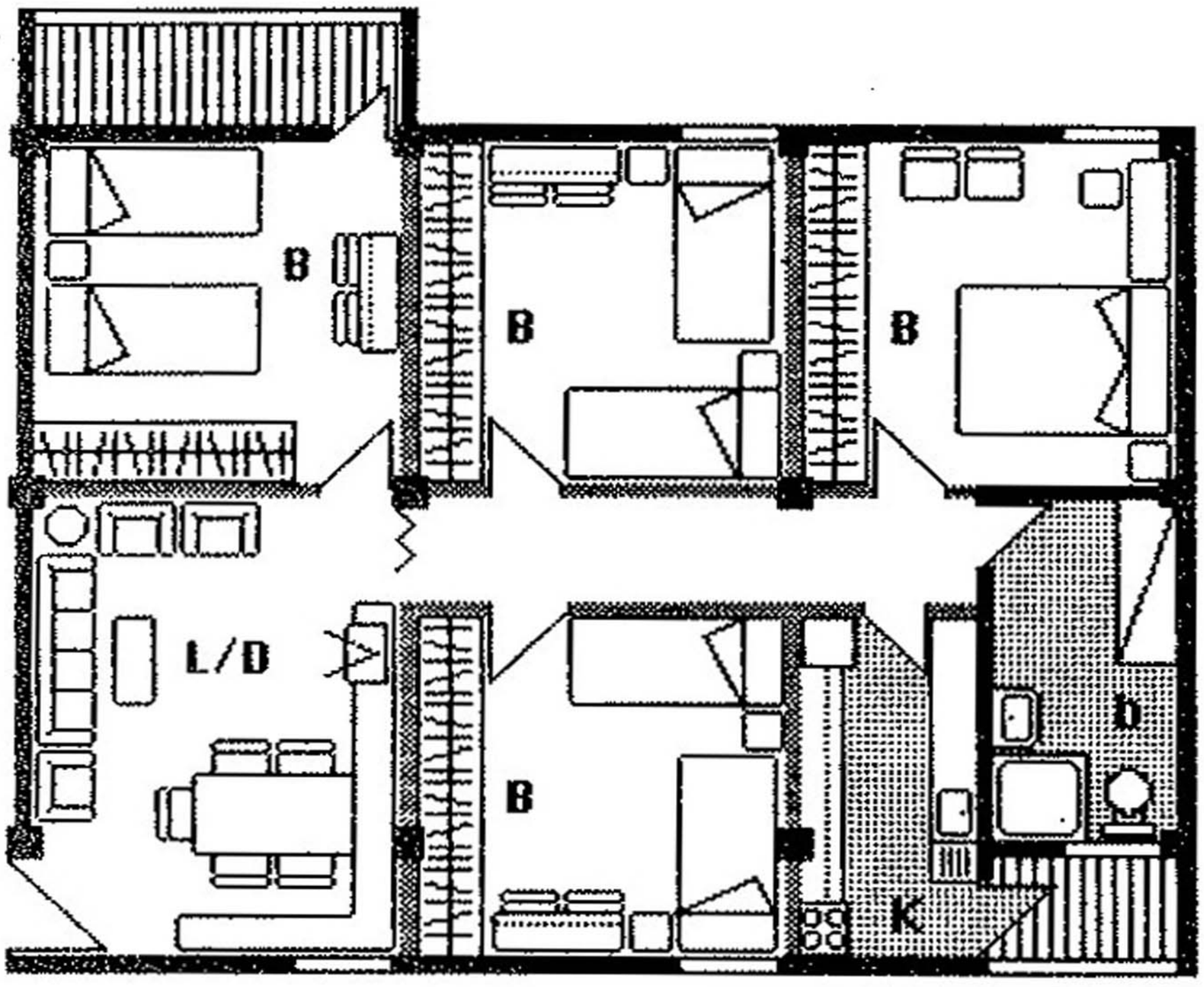
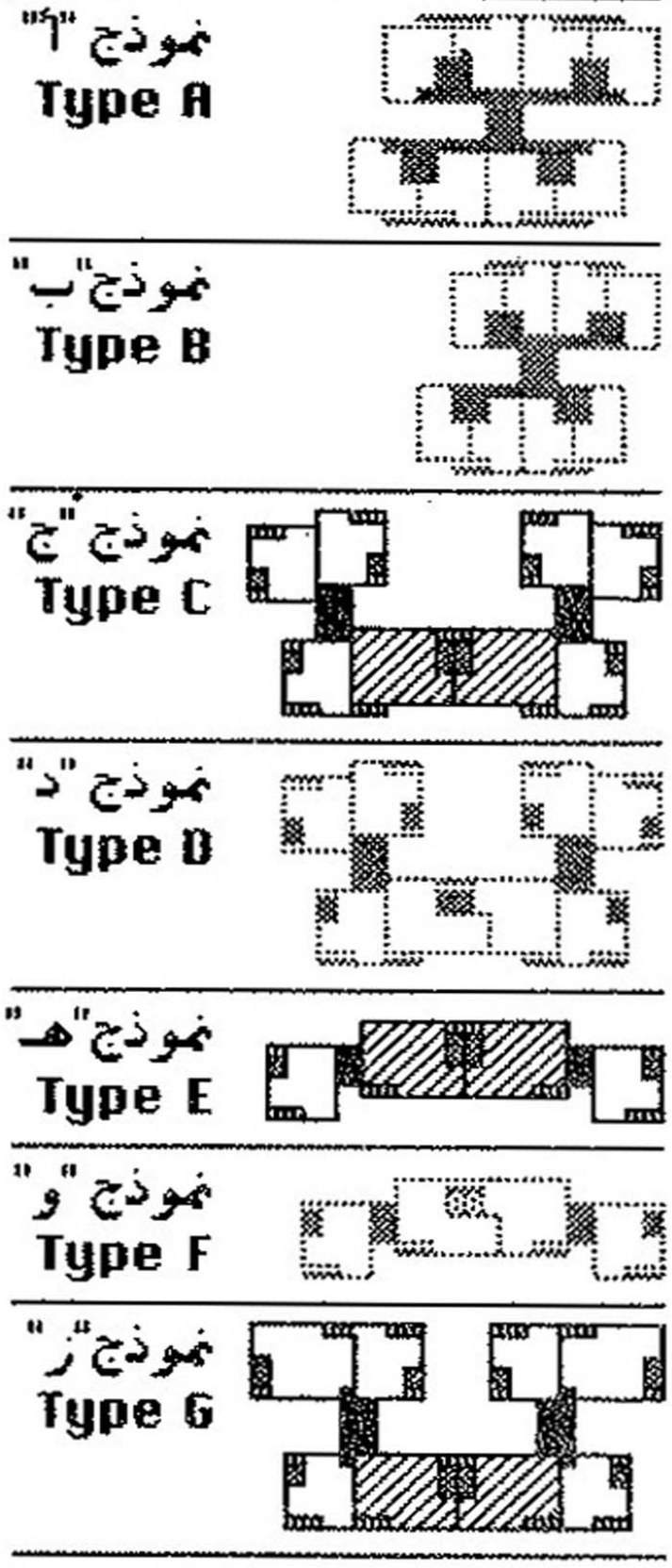


Figure (2-23)
Alternative 1 :
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
16.2m2 18 %	51.8m2 54 %	19.5m2 21 %	6.5m2 7 %	94m2 100%

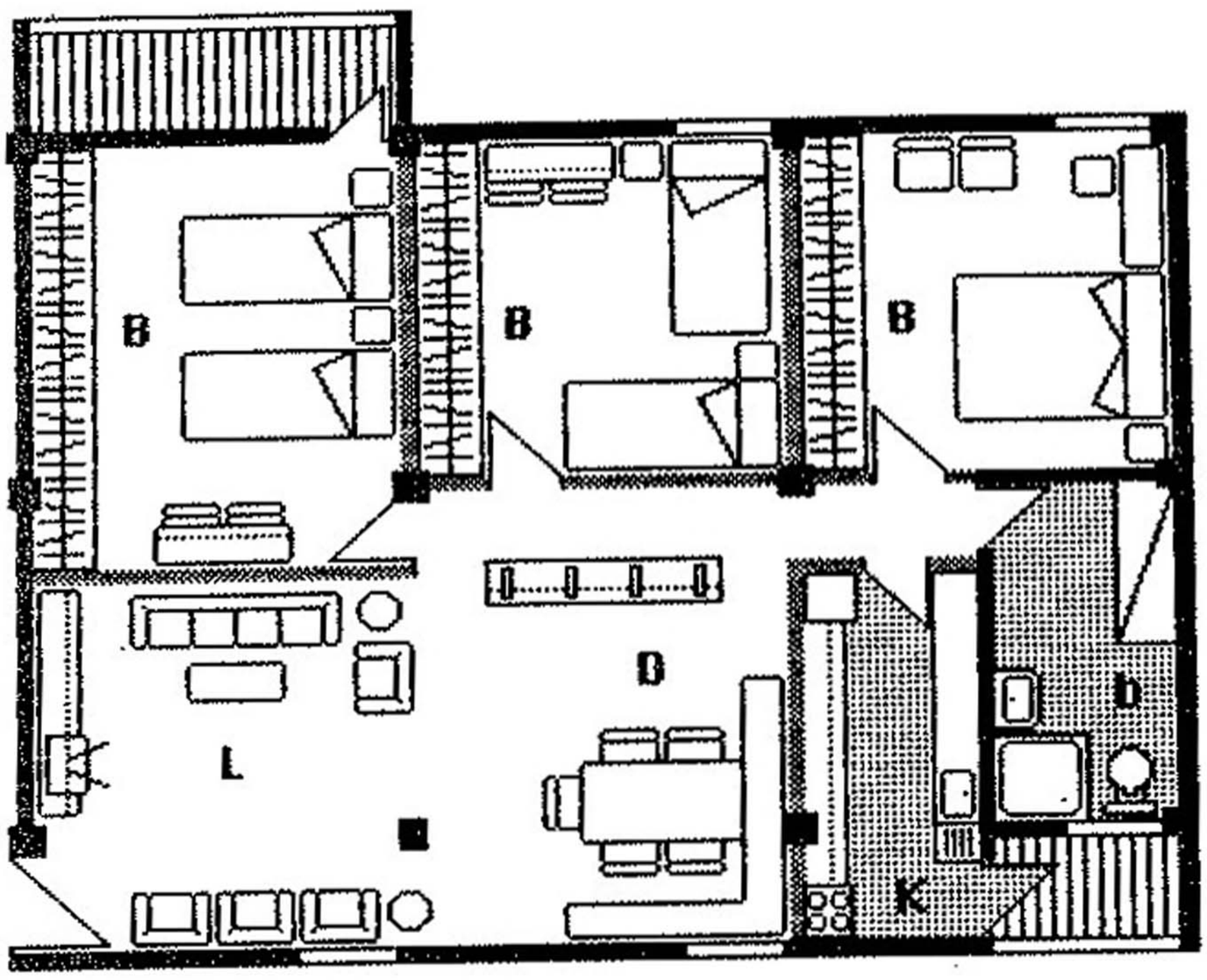
Family Size and Shares

Nº of Persons per dwelling	share of closed spaces/person
8	12m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	●	⊕

94 square meters dwelling
(Available in Prototypes "C","E","G")



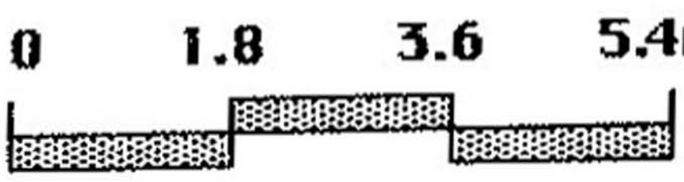
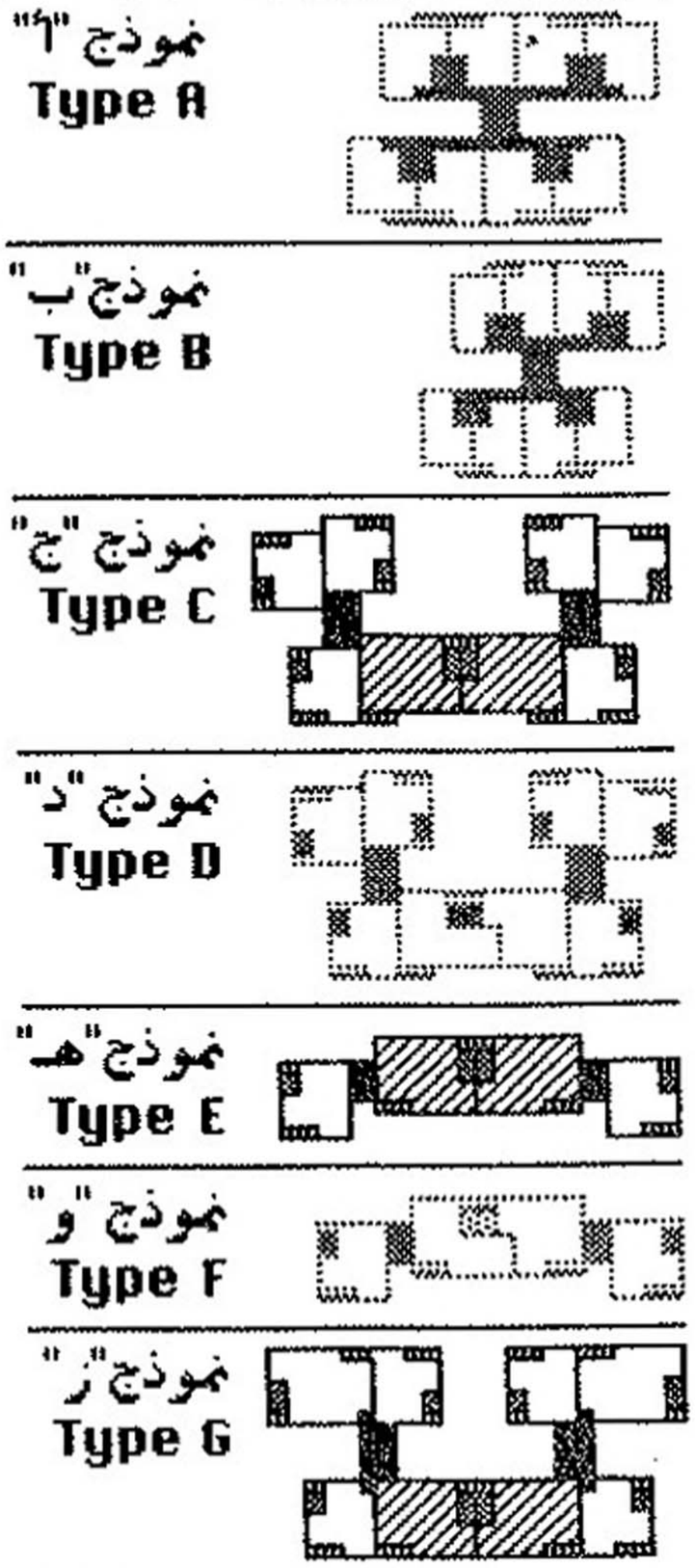


Figure (2-24)
Alternative 2 :
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
26m2 27 %	42m2 45 %	19.5m2 21 %	6.5m2 7 %	94m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
6	15.5m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
◕	⊕	◕	⊕

94 square meters dwelling
(Available in Prototypes "C","E","G")

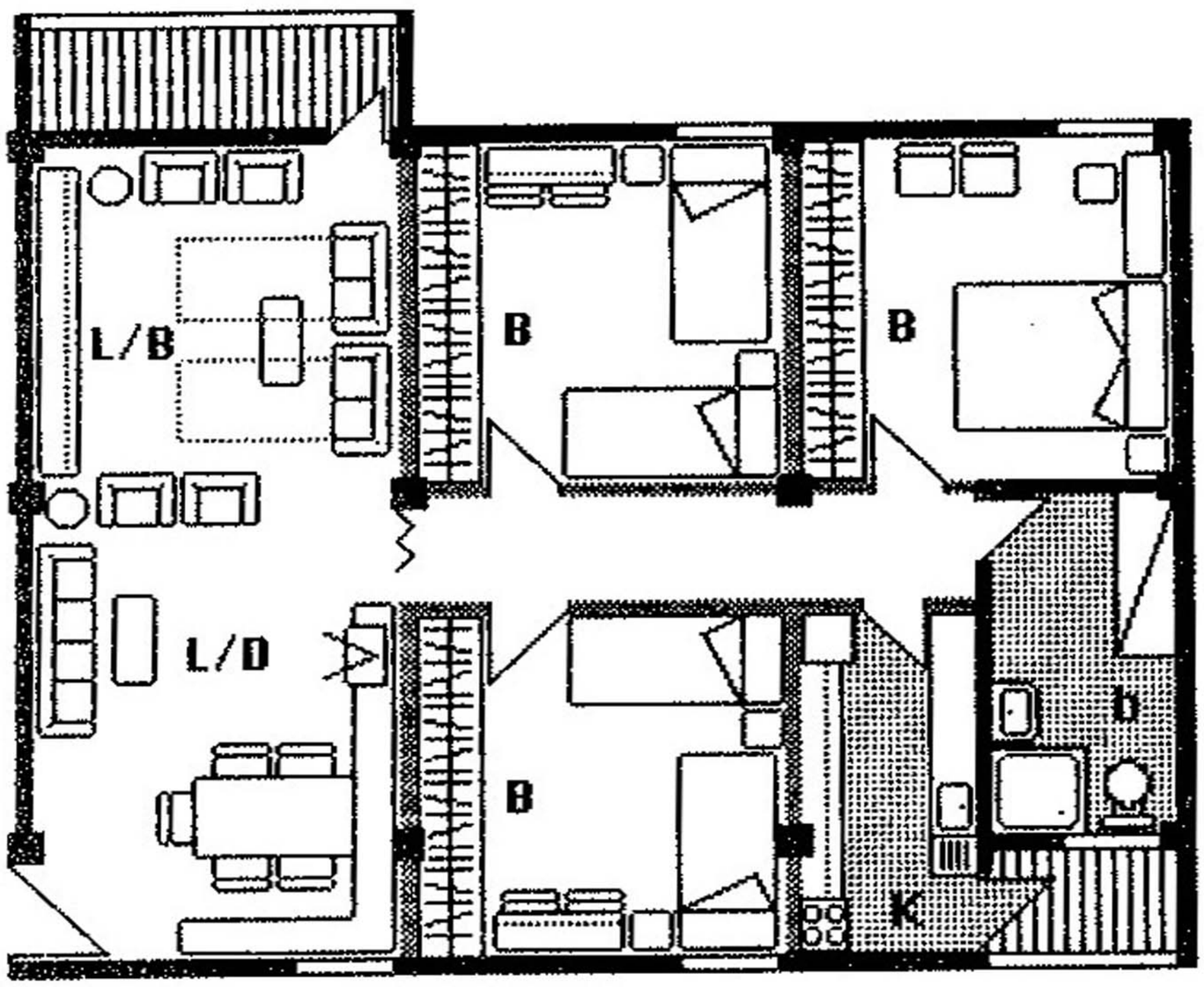
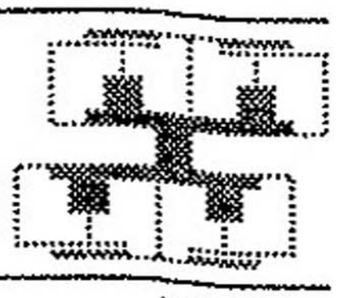
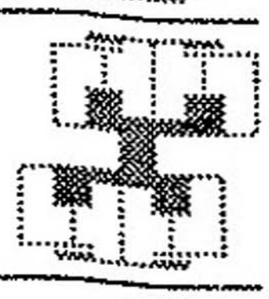


Figure (2-25)
Alternative 3:
Area Analysis, Family Size & Proposed Infill

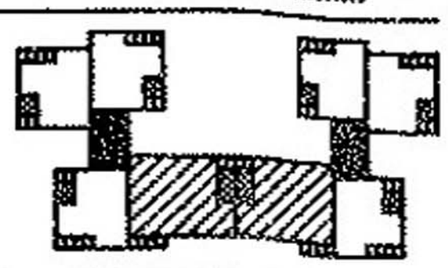
نموذج "أ"
Type A



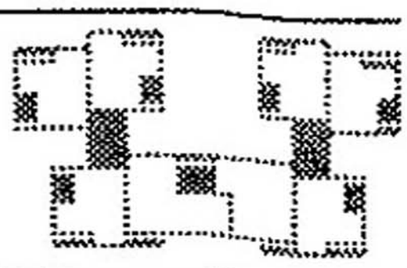
نموذج "ب"
Type B



نموذج "ج"
Type C



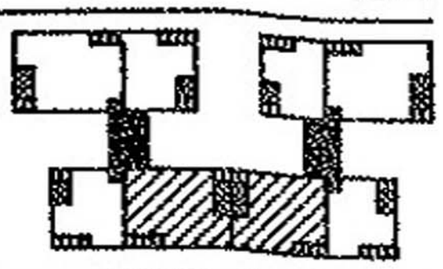
نموذج "د"
Type D



نموذج "هـ"
Type E

نموذج "و"
Type F

نموذج "ز"
Type G



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
29m2 30 %	39m2 42 %	19.5m2 21 %	6.5m2 7 %	94m2 100%

Family Size and Shares

Nº of Persons per dwelling	Share of closed spaces/person
8	12m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◔	◔

94 square meters dwelling
(Available in Prototypes "C","E","G")

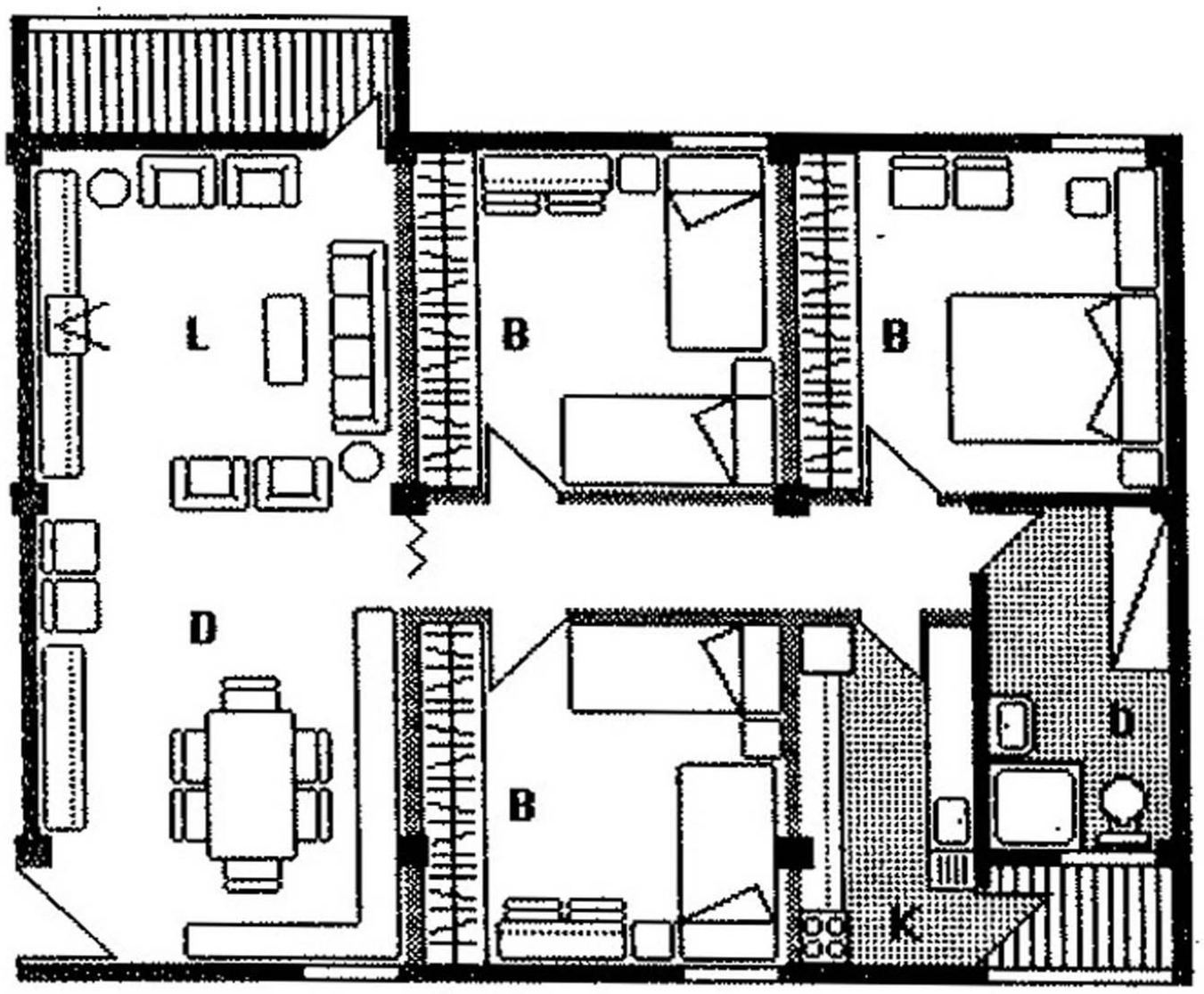
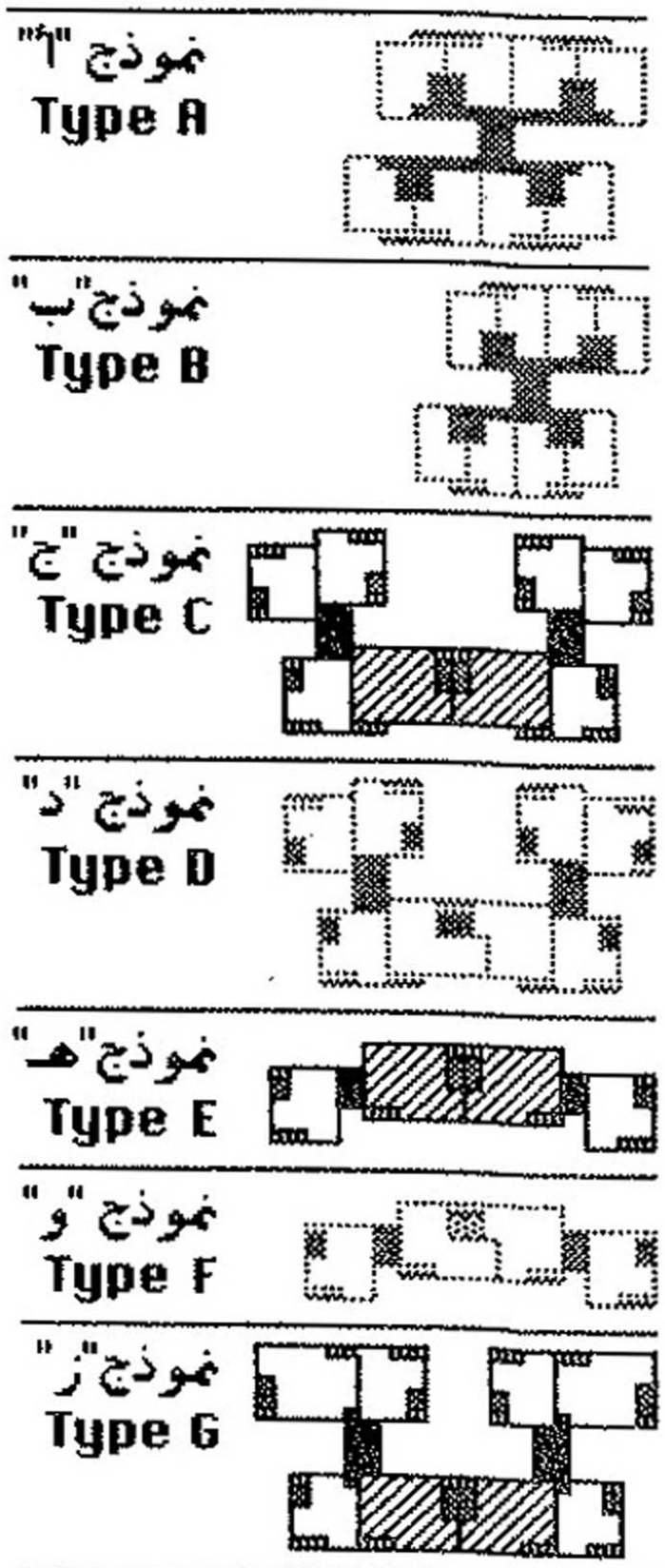


Figure (2-26)
Alternative 4:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
29m2 30 %	39m2 42 %	19.5m2 21 %	6.5m2 7 %	94m2 100%

Family Size and Shares

Nºof Persons per dwelling	share of closed spaces/person
6	15.5m2

Proposed Infill : Partitions and Furniture

fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	●	⊕

94 square meters dwelling
(Available in Prototypes "C","E","G")

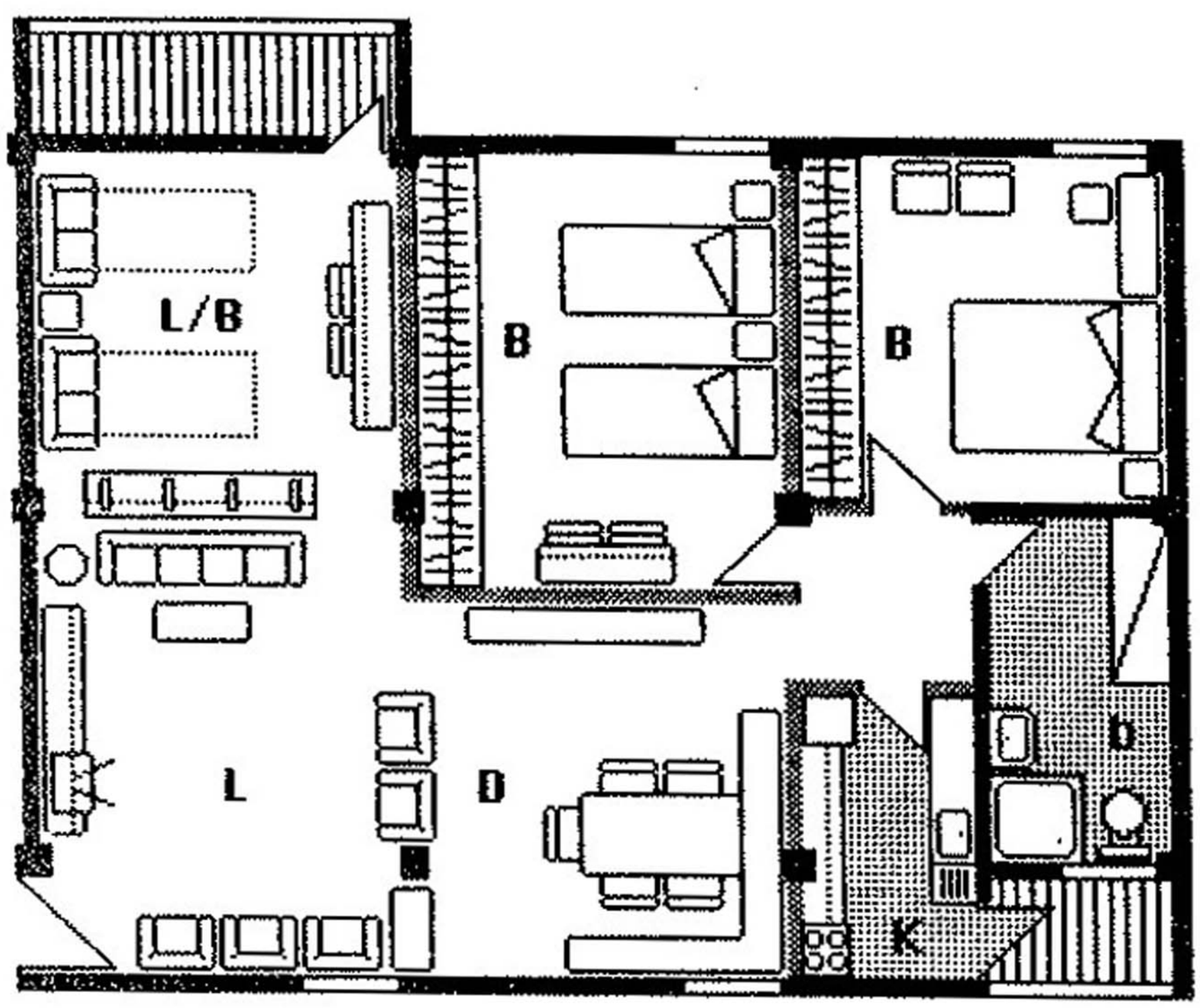
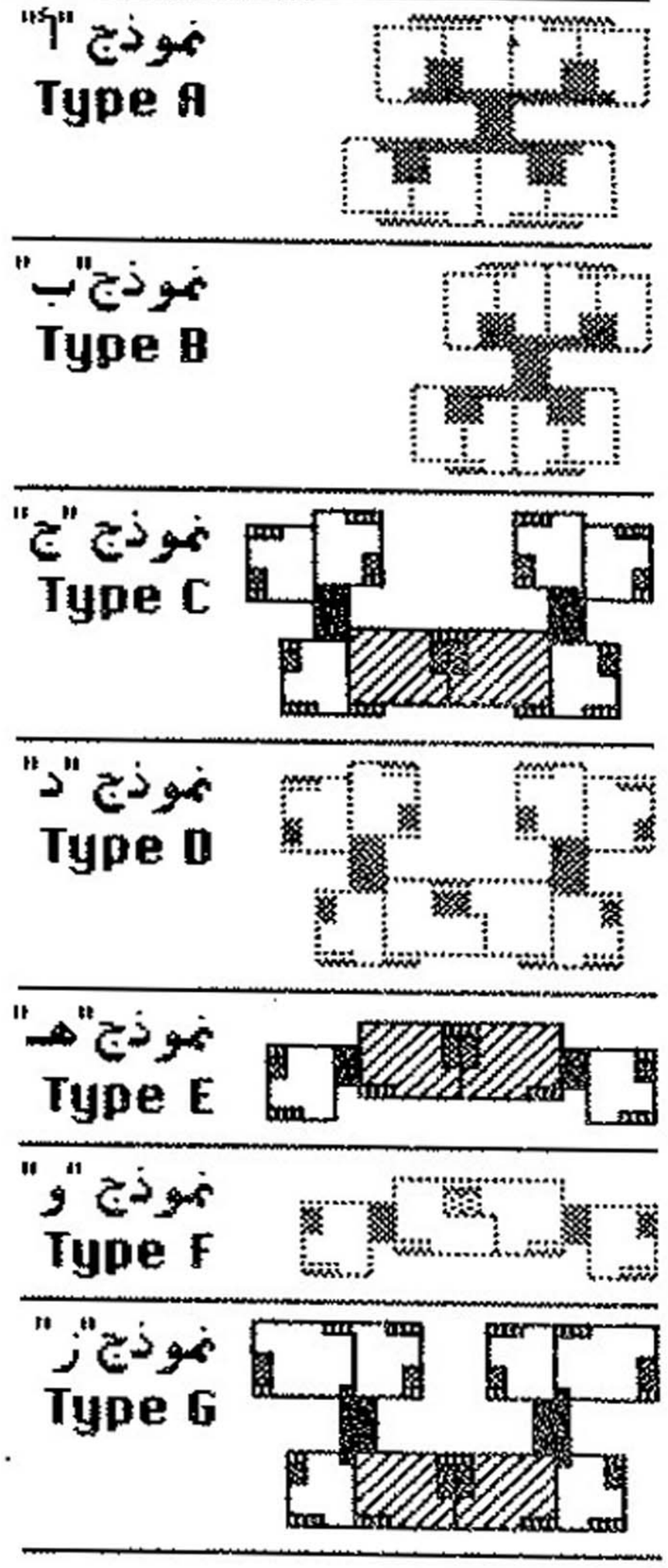


Figure (27)
Alternative 5 :
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces

living area	sleeping area	circulation &services	balconies	total
43.5m2 47 %	29m2 30 %	15m2 16 %	6.5m2 7 %	94m2 100%

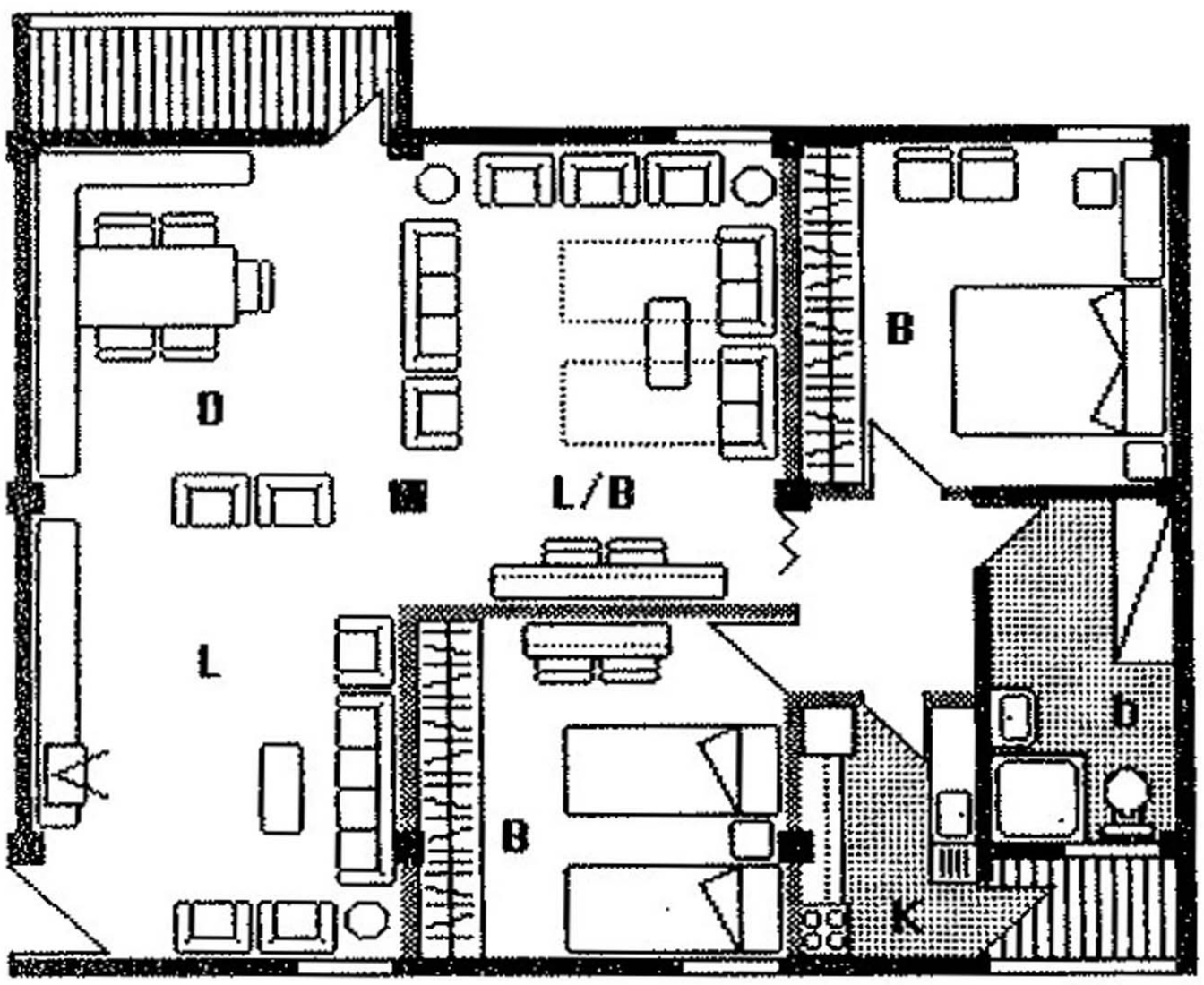
Family Size and Shares

Nº of Persons per dwelling	share of closed spaces/person
6	15.5m2

Proposed Infill : Partitions and Furniture

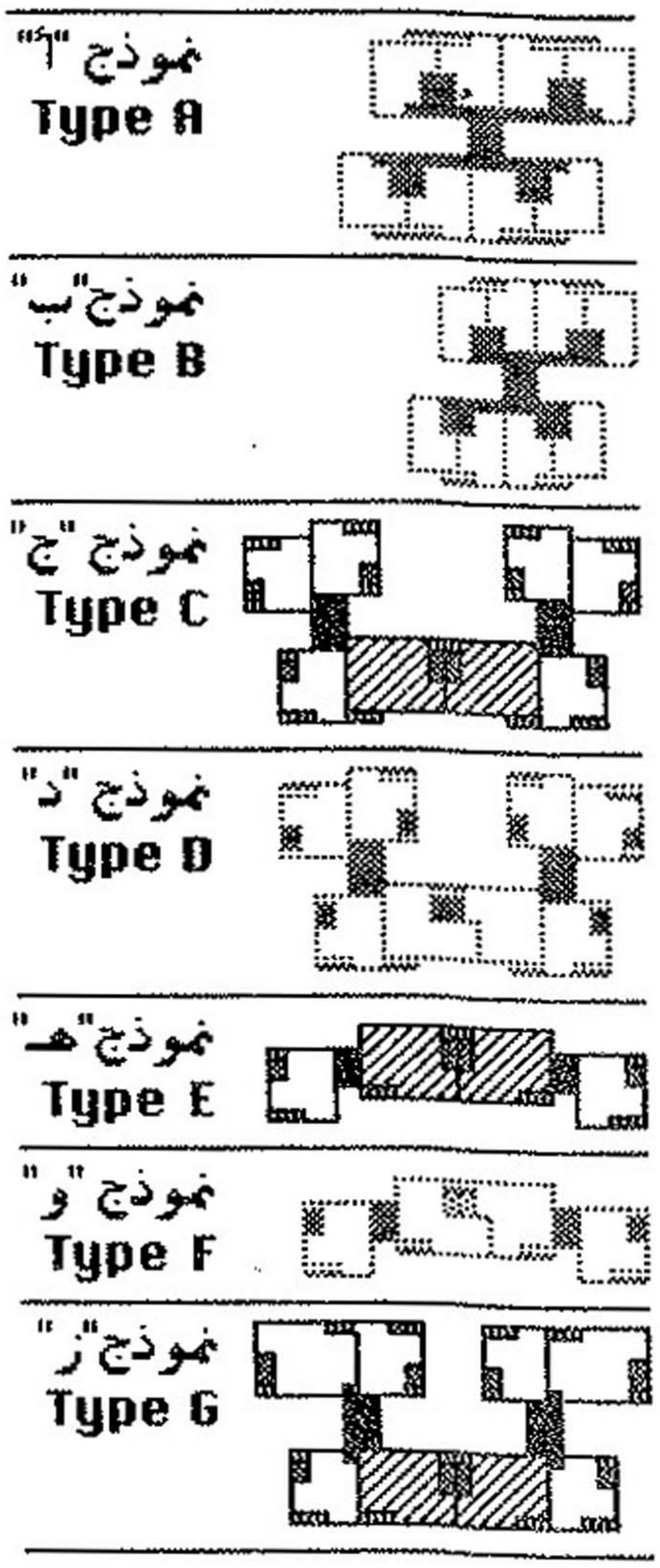
fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
●	⊕	◕	◔

94 square meters dwelling
(Available in Prototypes "C","E","G")



0 1.8 3.6 5.4m

Figure (2-28)
Alternative 6:
Area Analysis, Family Size & Proposed Infill



Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
living area	sleeping area	circulation &services	balconies	total	Nºof Persons per dwelling	Share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
46.2m2 50 %	26m2 27 %	15m2 16 %	6.5m2 7 %	94m2 100%	6	15.5m2	●	⊕	◑	⊕

	Analysis of Functional Spaces					Family Size and Shares		Proposed Infill : Partitions and Furniture			
	living area	sleeping area	circulation &services	balconies	total	Nº of Persons per dwelling	Share of closed spaces/person	fixed partitions	furniture as partitions	traditional furniture	multipurpose furniture
1	16.2m2 18 %	51.8m2 54 %	19.5m2 21 %	6.5m2 7 %	94m2 100%	8	12m2	◐	⊕	◐	⊕
2	26m2 27 %	42m2 45 %	19.5m2 21 %	6.5m2 7 %	94m2 100%	6	15.5m2	◔	⊕	◔	⊕
3	29m2 30 %	39m2 42 %	19.5m2 21 %	6.5m2 7 %	94m2 100%	8	12m2	◐	⊕	◐	⊕
4	29m2 30 %	39m2 42 %	19.5m2 21 %	6.5m2 7 %	94m2 100%	6	15.5m2	◔	⊕	◔	⊕
5	43.5m2 47 %	29m2 30 %	15m2 16 %	6.5m2 7 %	94m2 100%	6	15.5m2	◔	⊕	◔	⊕
6	46.2m2 50 %	26m2 27 %	15m2 16 %	6.5m2 7 %	94m2 100%	6	15.5m2	◔	⊕	◔	⊕

Table (2-4) :Analysis of Alternative Plans Suggested for the 94 square meters Dwellings.

Figure (2-29)

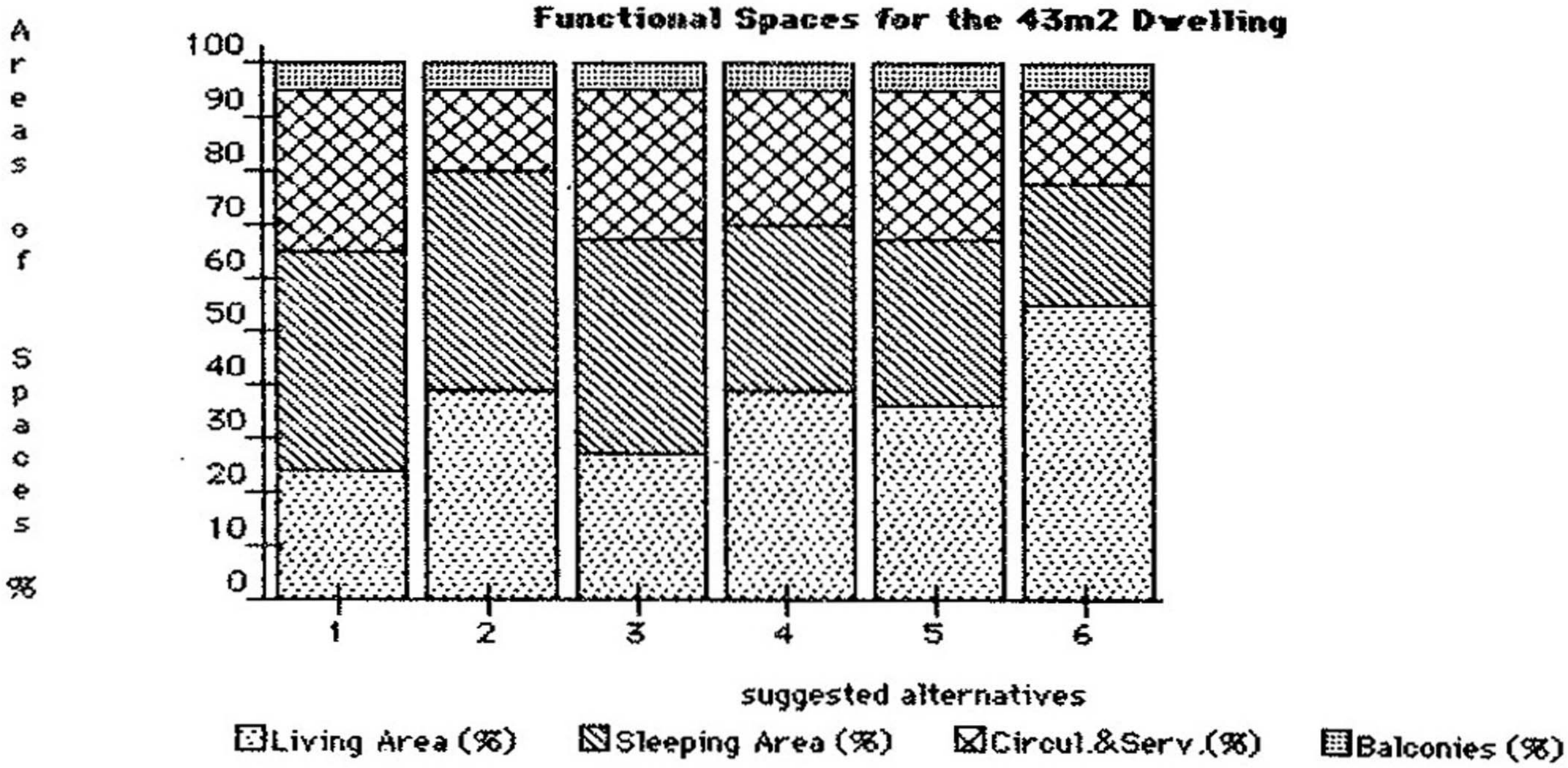


Figure (2-30)

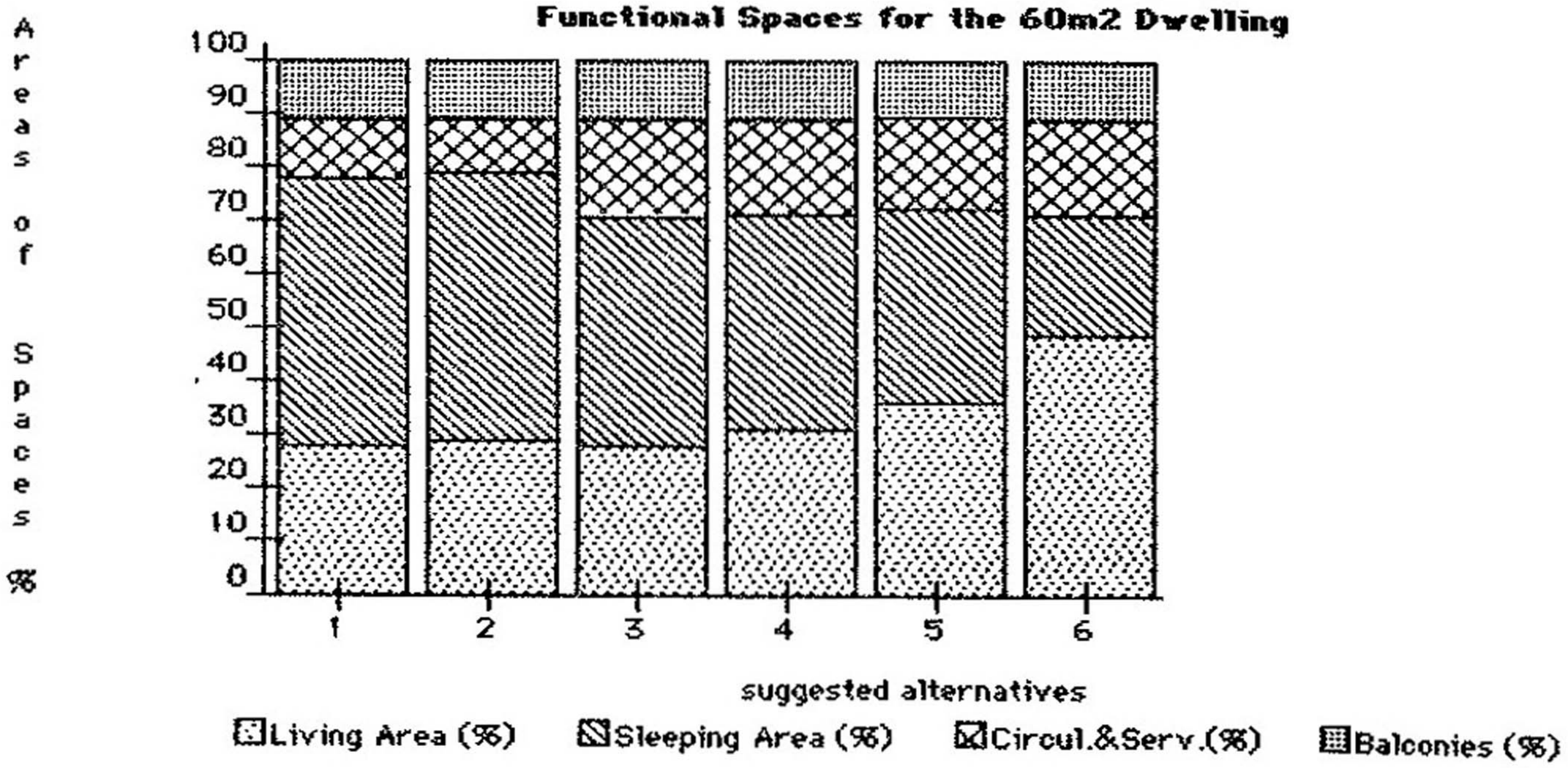


Figure (2-31)

Functional Spaces for the 79m2 Dwelling

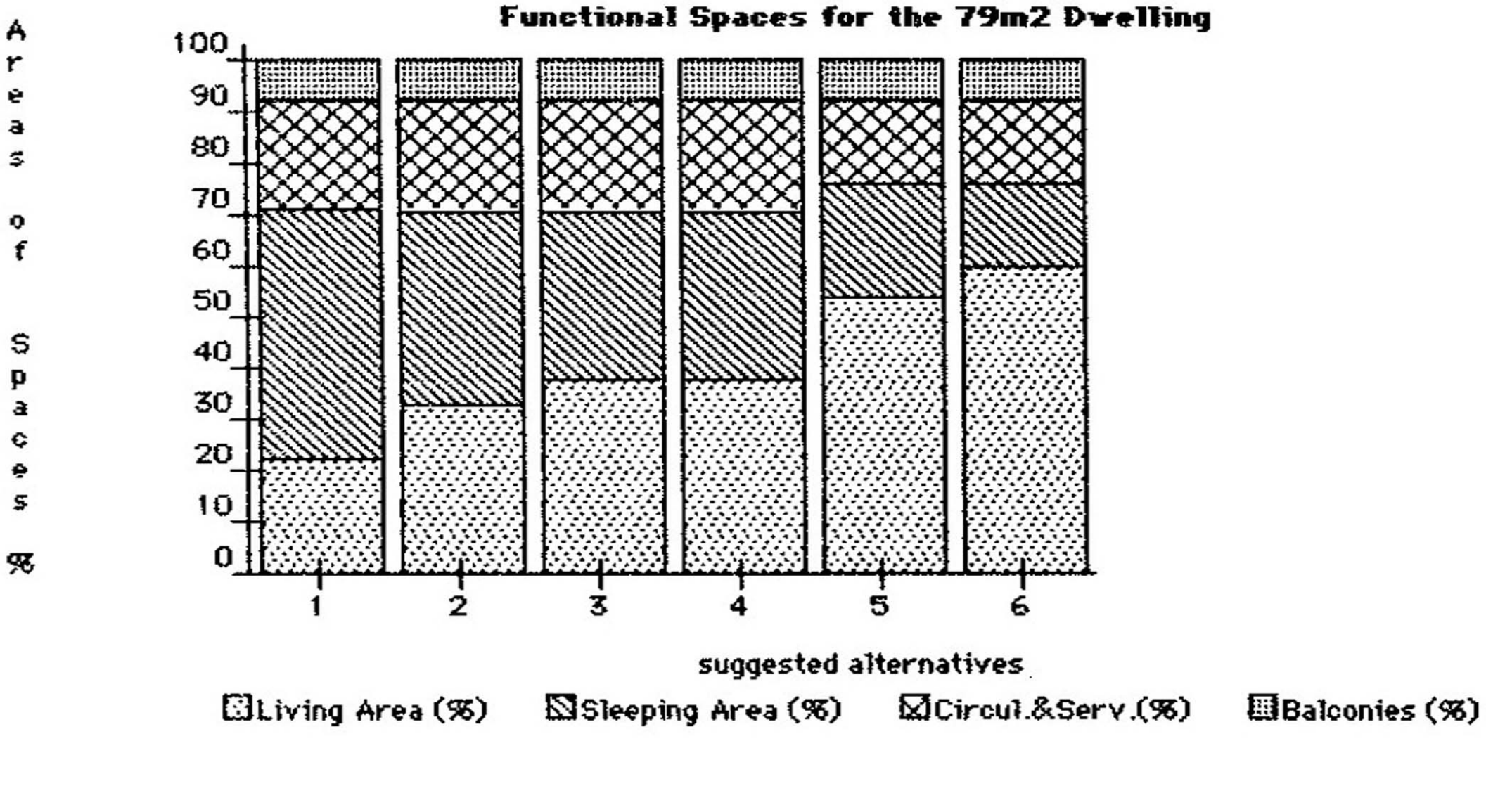


Figure (2-32)

Functional Spaces for the 94m2 Dwelling

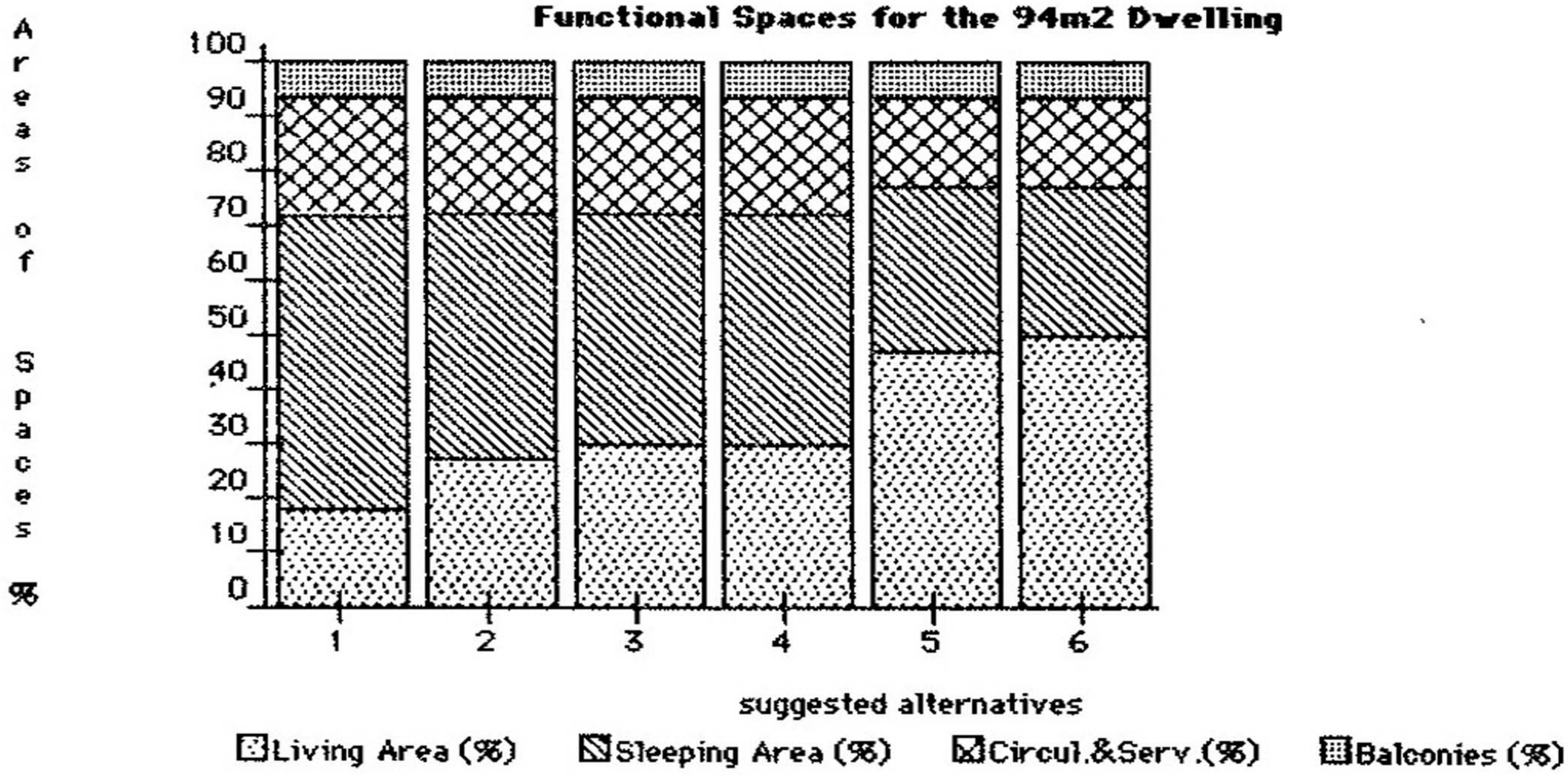


Figure (2-33)

Area Analysis for Different Dwellings

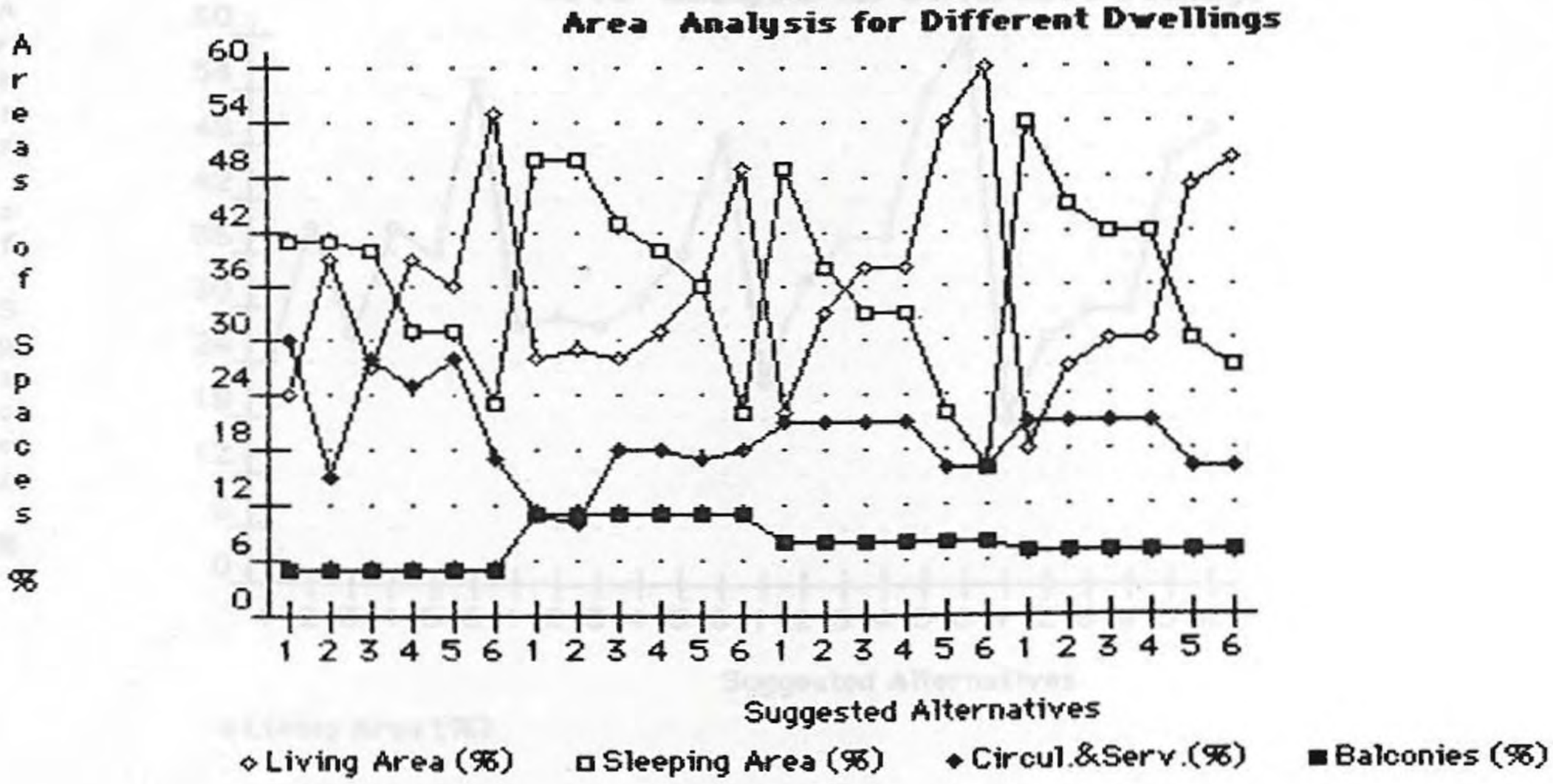


Figure (2-34)

Area Analysis for Different Dwellings

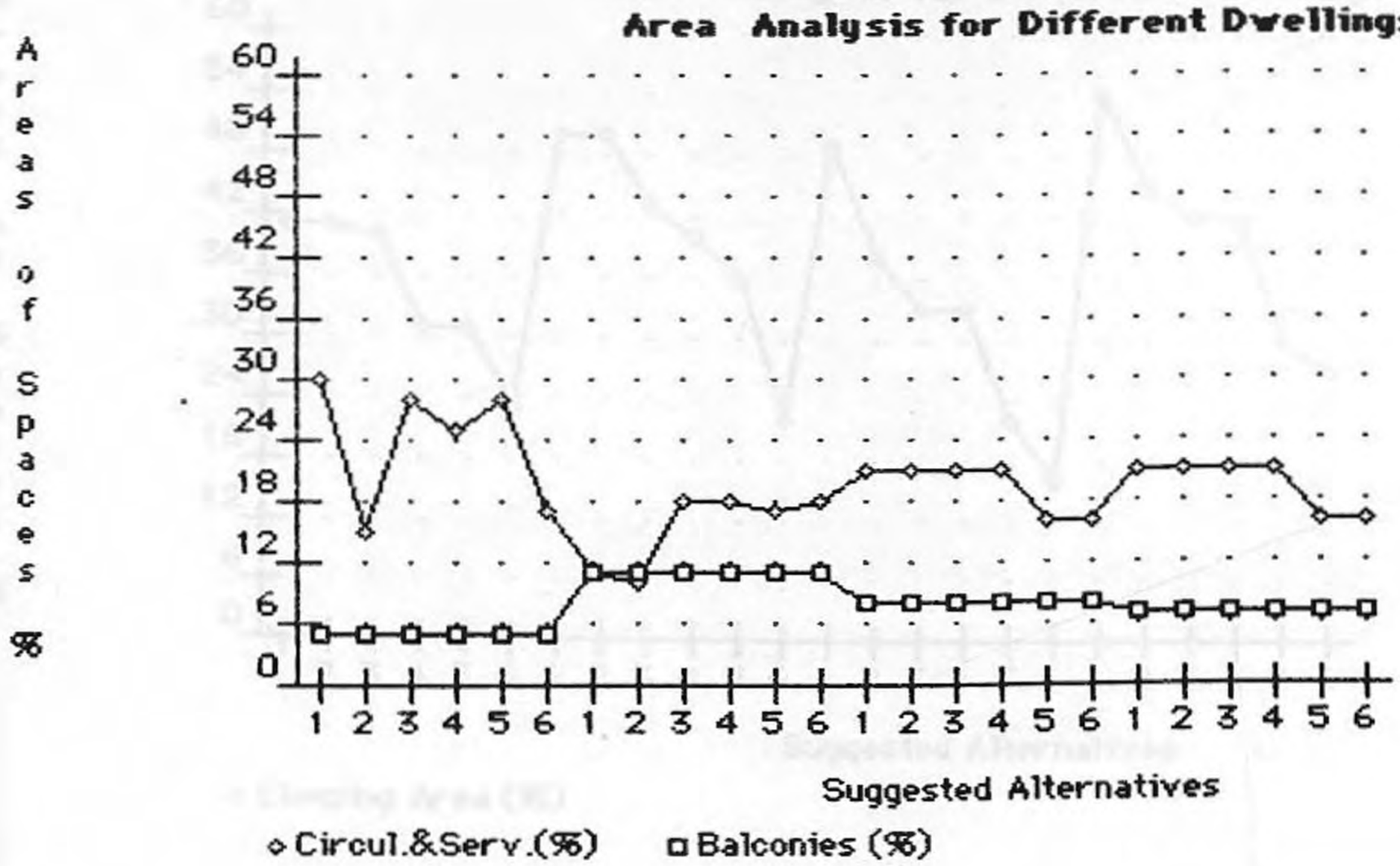


Figure (2-35)

Area Analysis for Different Dwellings

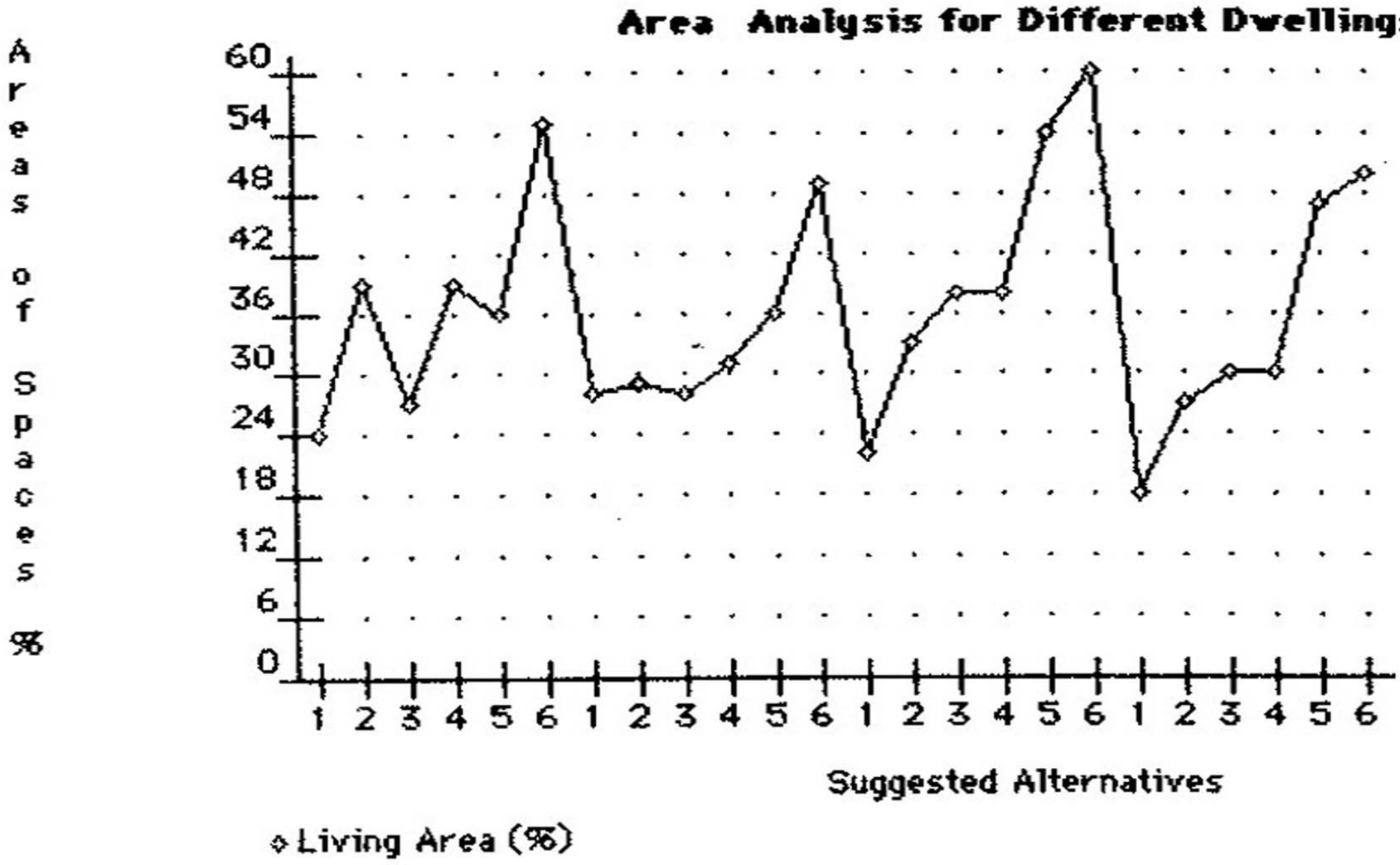
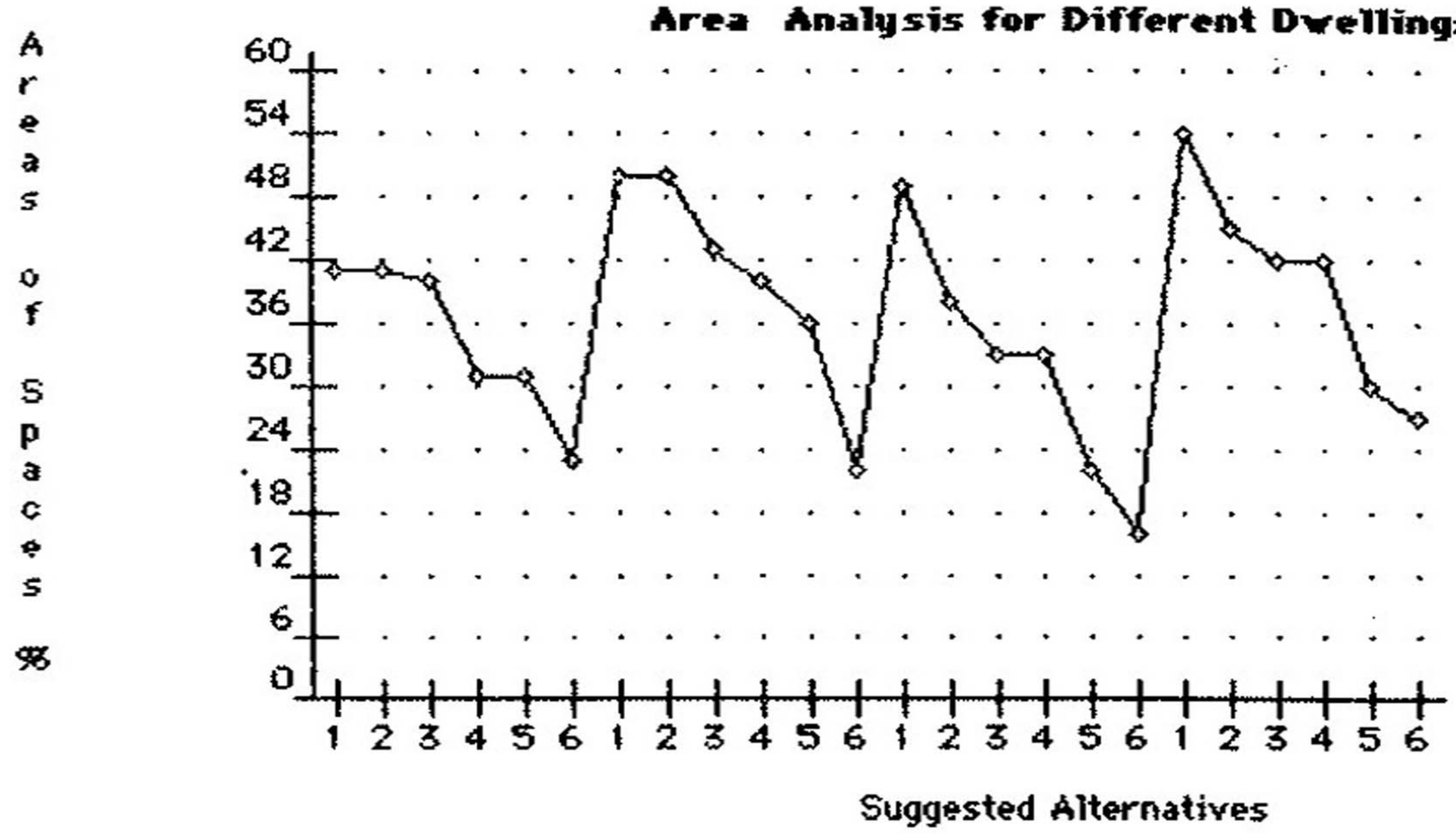
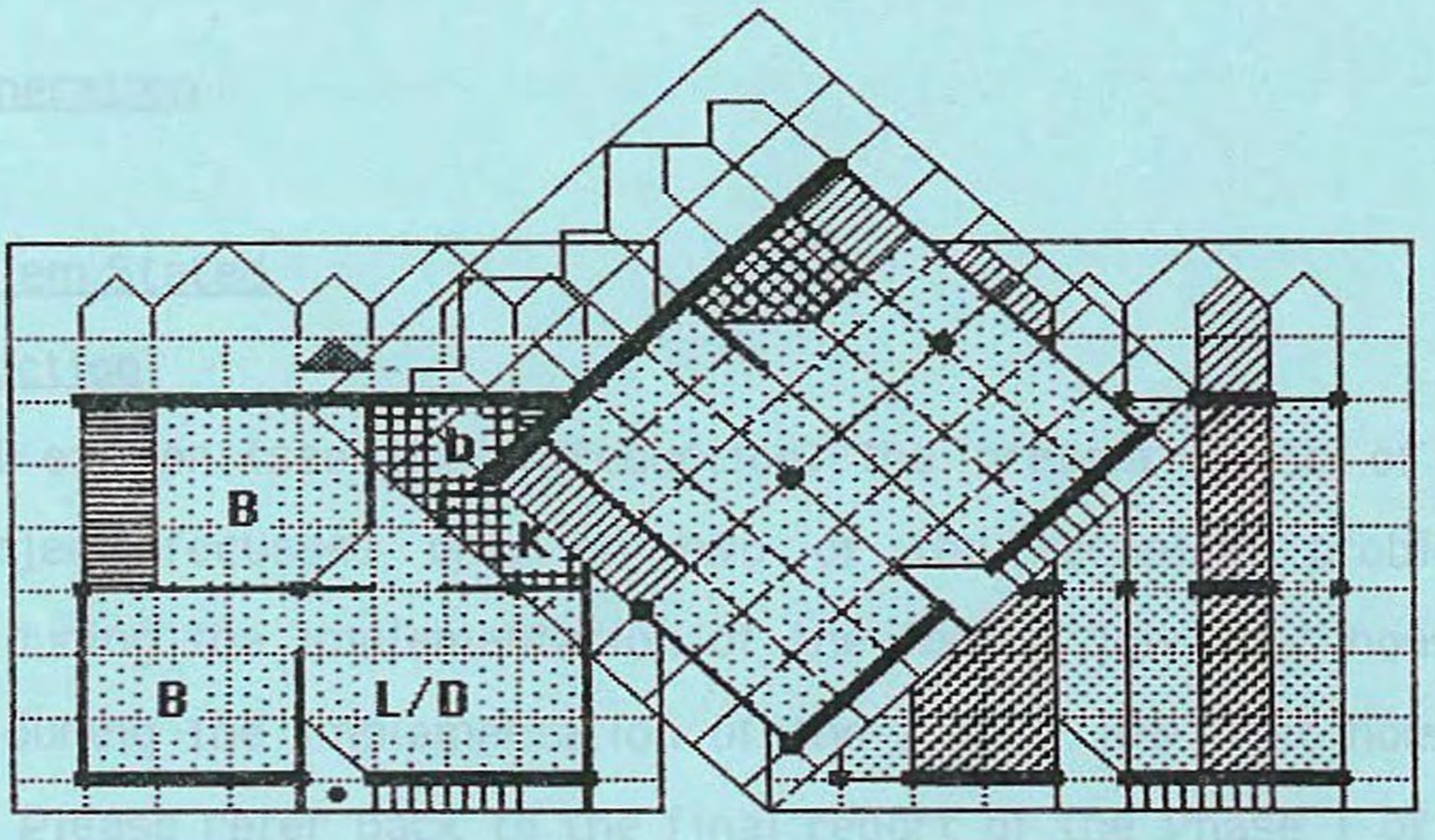
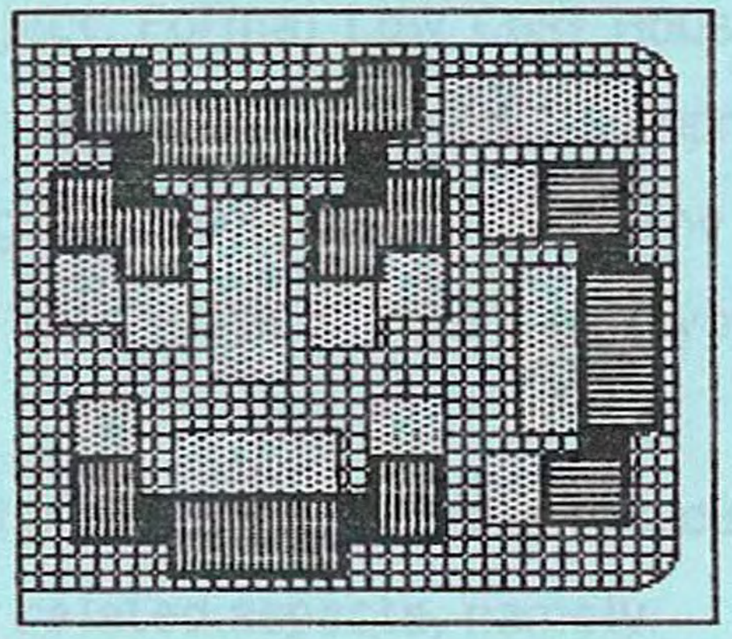


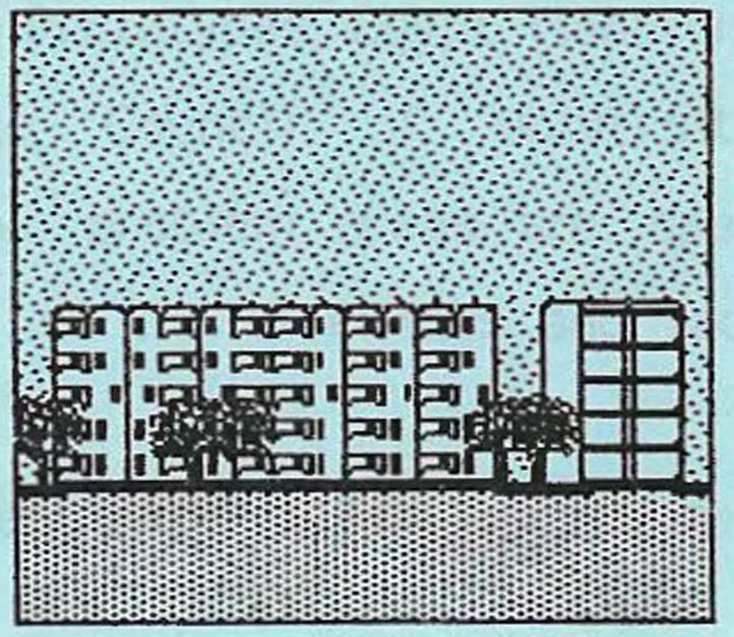
Figure (2-36)

Area Analysis for Different Dwellings









3

FACADE GENERATION

FINAL REPORT
SECOND PHASE

1992

3. Facade Generation

3.1 The Problem Stated

3.1.1. Introduction

As indicated earlier (see the Introduction) the present phase of the research project focusses only on two of the technical problems encountered during the implementation of the formal low cost housing encountered during the implementation of the formal low cost housing prototypes - Please refer back to the final report of the Phase 1 of the research project, Formal Low Cost Housing Prototypes, Egypt, Monotoring, Assessment and Development, Supreme Council of Universities, FRCU,Cairo,Egypt, November 1991. The two problem areas are: spatial organization of various internal layouts of the dwellings and facade treatments.

The technical problems related to facade treatments may be summarized in three closely related aspects, namely:

- Monotony and forced regularity and uniformity,
- Lack of character and identity, &
- Disregard to contextual considerations and determinants.

Those problems were the result of mechanical repitition of the proposed facades in the comprehensive Manual for the Prototypes , Ministry of Development, Egypt (April 1987). An almost unified treatment of external facades in the thousands of walkups built throughout Egypt, during the past five years. To make things worse, even the minor architectural treatments

in the original designs to allow variations and a touch of distinction were abondoned to a faceless, regular and characterless facade treatment.

The prototypes were built and treated in the same manner irregard of: the site location (rural, rurban or urban), the prospective users, the geographic and climatic region (Mediterranean, Inland-transitional or desert).

This Chapter is addressing this problem and attempts to formulate guidelines for its solution. Besides the formulation of a conceptual framework for such guidelines, the output of this part is graphically oriented. It comprises a wide range of alternative facade treatments that highlight the conceptions and apply the guidelines. Those examples of low cost housing prototypes facade treatments and possibilities should prove useful to the Housing Supply Agencies in Egypt (i.e. Local Authorities, Housing Co-Operatives, Housing Companies, Contractors and New Communities organization & agencies).

3.1.2 Structure and Contents

This chapter addresses a specific problem related to public housing in general and low cost housing prototypes in particular, namely: the external appearance and facade treatments.

How to extensively use the same plans in different sites and different geographic and physical locations and settings, without sacrifycing the identity and character.

In simple words each project (using the prototypes) regardless of its size should enjoy the following features:

- Appropriate external treatment from a climatic view point.
- A distinctive facade treatment that reflects the general character of the locale (Regional and vernacular architecture). (Macro-Identity).
- A distinctive facade treatment that reflects the identity of the project (Micro-Identity).

This should be achieved within the bounds of the prototypes merits and physical determinants, modularity, order, simplicity, clarity of supports and margins, low cost etc.

This chapter comprises four sections (including this introduction and problem statement). The chapter's components define the approach to deal with the problem in hand, namely:

- The problem Statement and objectives.
- The prototypes facades: initial and implemented.
- Attempts on Facade Generation. Three attempts are presented each is based and emanates from a different conception:
  - architectural aethetics,
  - architectural character.
  - culture and context.
- Guidelines for facade generation.

3.2. The Low Cost Housing Prototypes, Facades: Initial and Implemented

Figures (3.1), (3.2) & (3.3) show a selection of the initial facade designs for types A,B &C. They appeared in the comprehensive portofolio of the prototypes, Ministry of Development, Egypt (1987) they highlight the minimal visual vocabulary proposed for the prototypes.

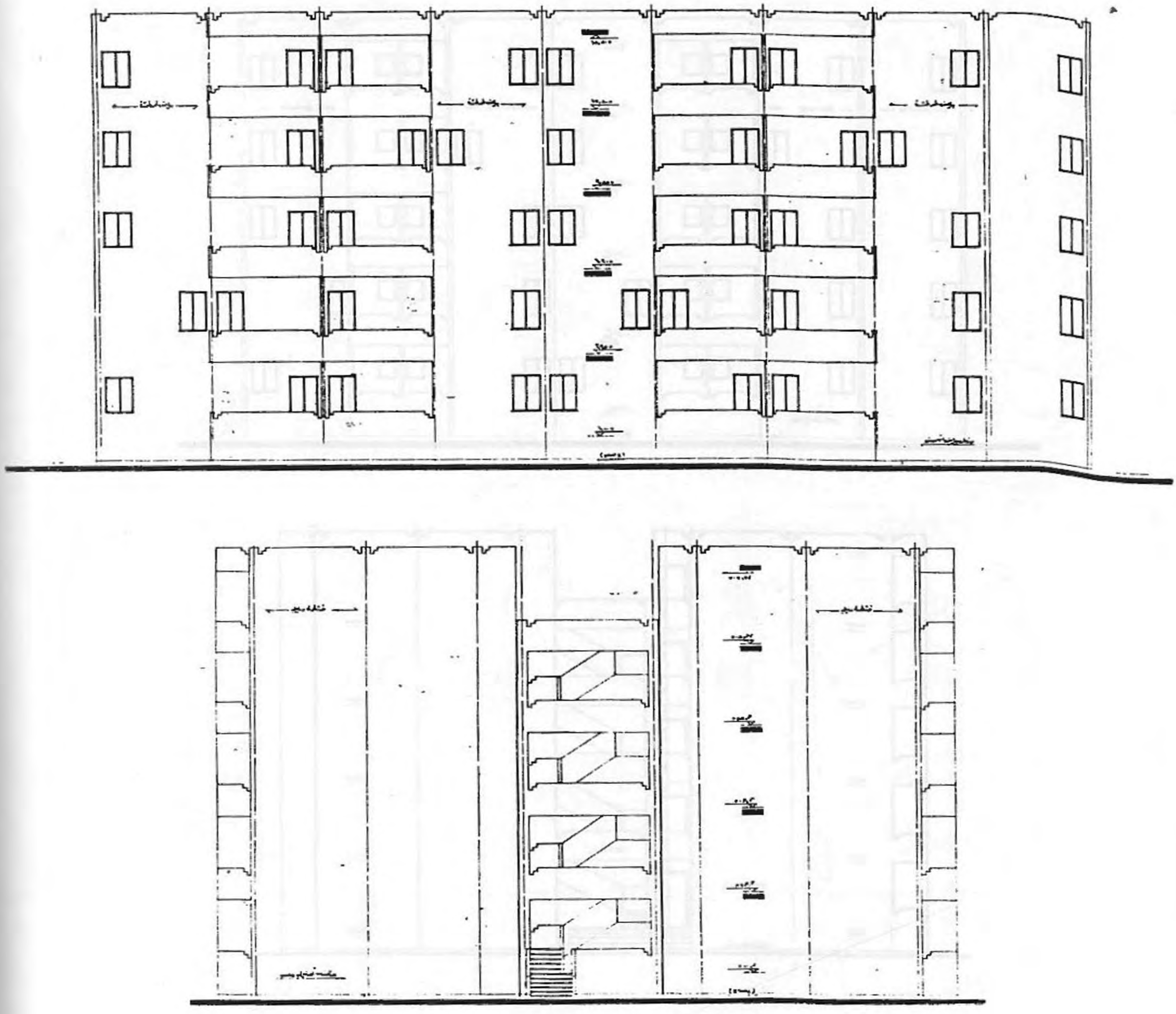


Fig.(3-1): Low Cost Housing Prototypes Initial Facades(1987)
Type A - Front & Side Elevations .

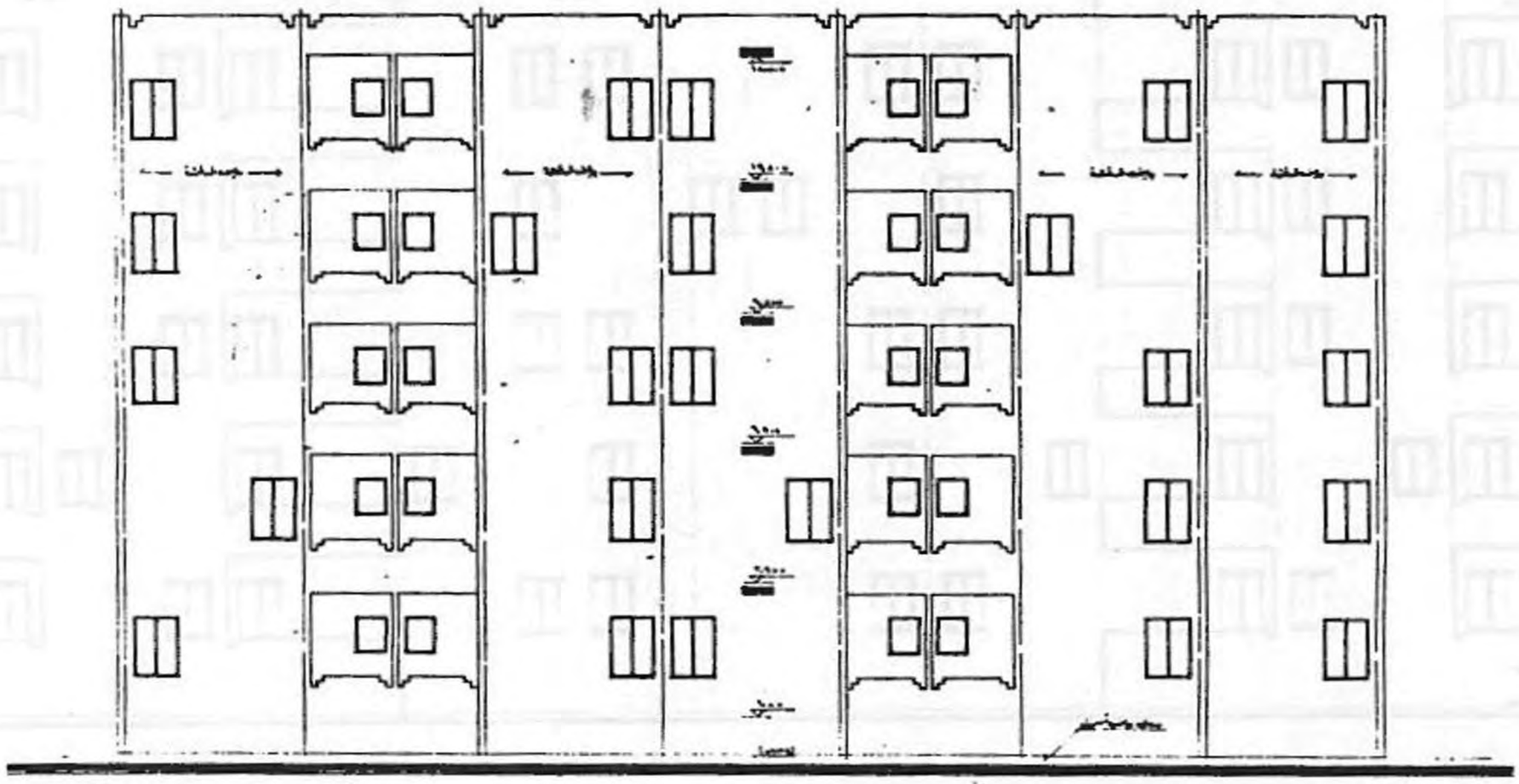


Fig.(3-2): Low Cost Housing Prototypes Initial Facades(1987)
Type B - Front Elevation , Type C - Side Elevation .

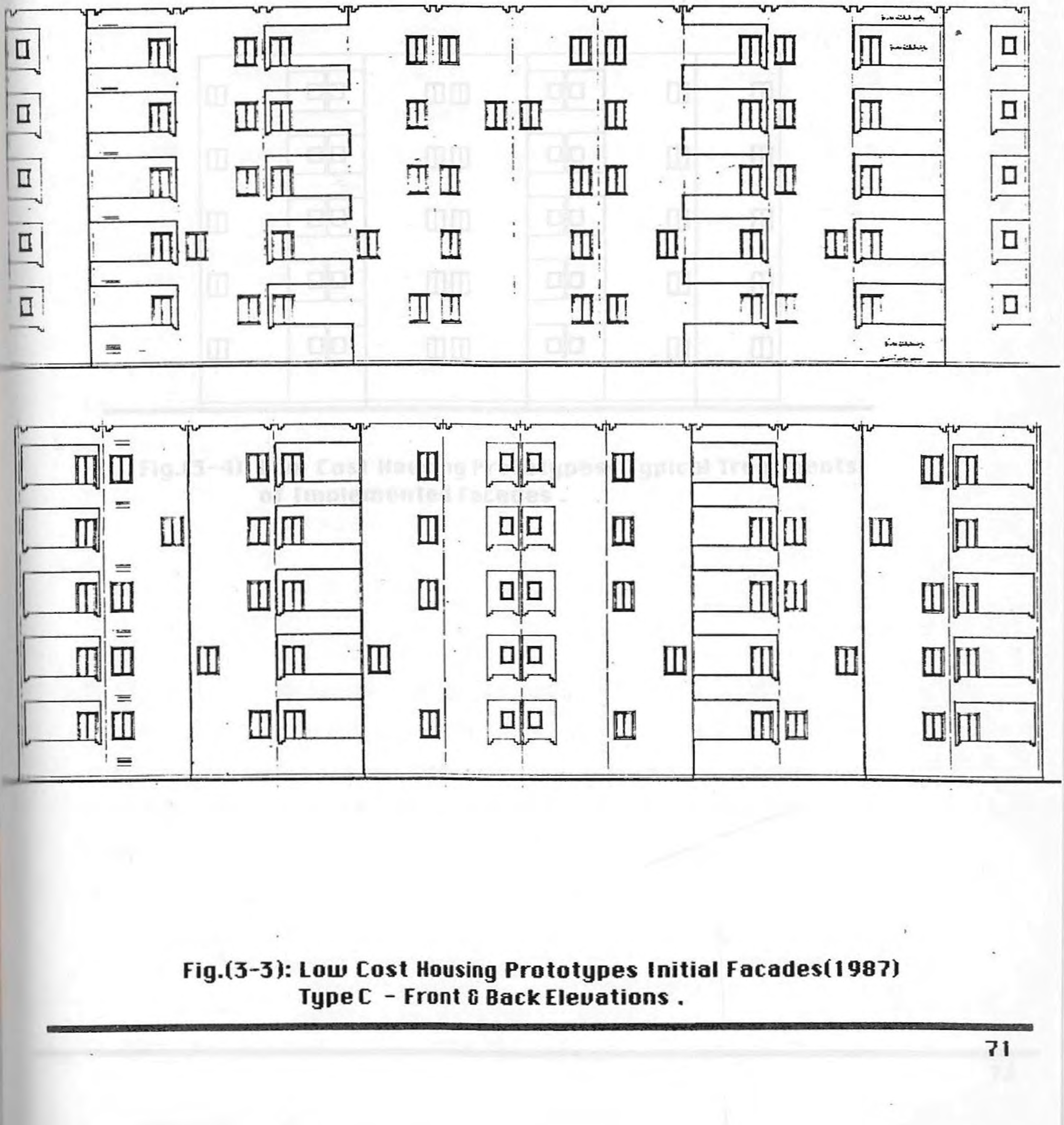


Fig.(3-3): Low Cost Housing Prototypes Initial Facades(1987)
Type C - Front & Back Elevations .

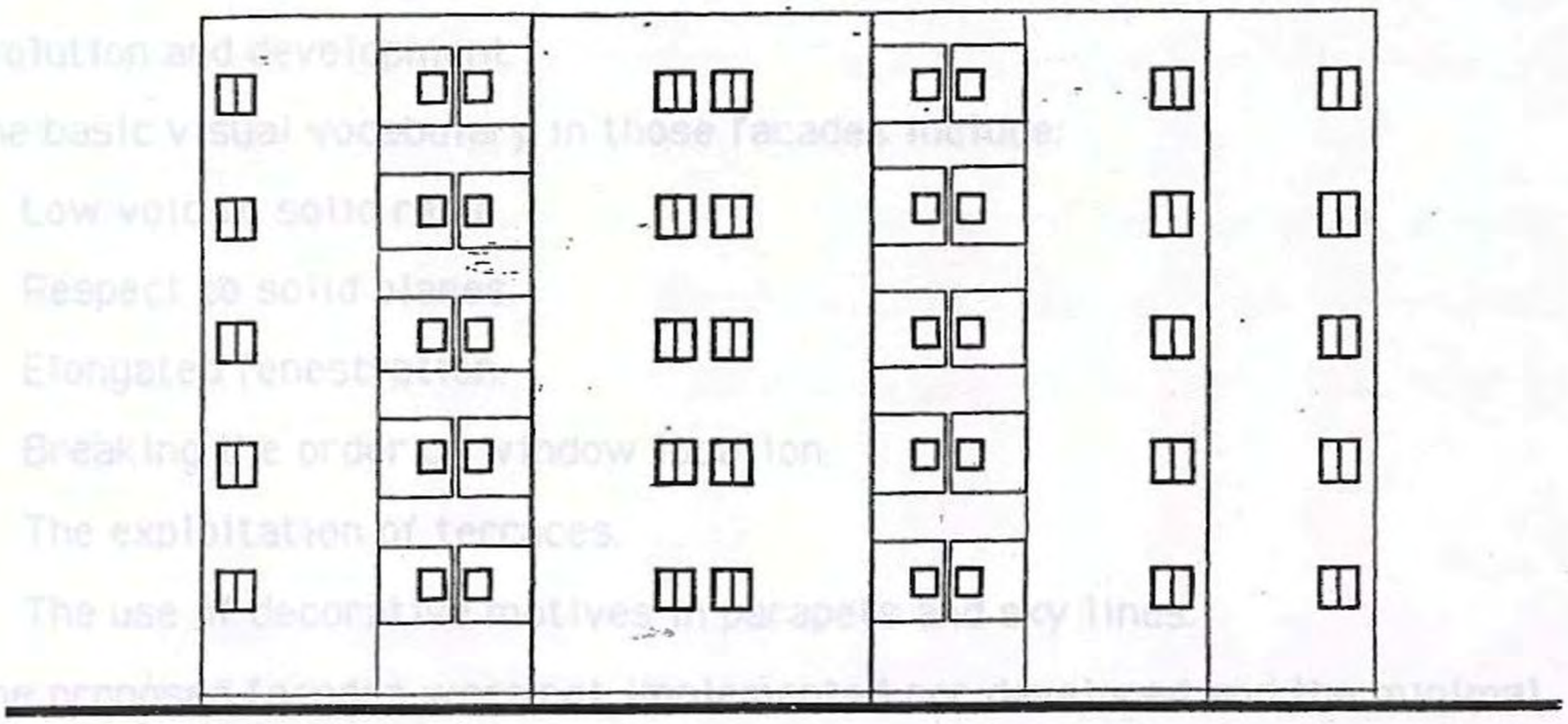


Fig.(3-4): Low Cost Housing Prototypes- Typical Treatments of Implemented Facades .

This vocabulary was carefully developed with cost, variety and identity in mind and were thought to provide a strong starting point that allows evolution and development.

The basic visual vocabulary in those facades include:

- Low void to solid ratio.
- Respect to solid planes.
- Elongated fenestration.
- Breaking the order of window location.
- The exploitation of terraces.
- The use of decorative motives in parapets and sky lines.

The proposed facades were not implemented nor developed and the minimal related treatments and vocabulary were simply ignored. Mediocre, poorly detailed and plain & characterless facade treatments were used, see Figure (3.4) , hence adding to the problems of identity and regional appropriateness.

3.3 Three Attempts in Facade Generation

The present section outlines three approaches to facade generation, with reference to the low cost Housing Prototypes. The brief to the task was simply :"within the physical and cost determinants of the low cost housing prototypes, how to generate facades that respect and secure the three fold criteria of : Regional adaptability, macro identity to differ from other developments or projects) and micro identity (to allow variety within the same project).

The exercise was undertaken by three architects from the research team

who were asked to answer "the brief " above, independently. Their contribution was to take the form of an outline framework to the conception and a visual statement. The output was then reviewed and edited to comply with the nature of the present work.

The spontaneous reactions of the three designers and the style of their presentation was respected in preparing the following three sub-sections 3.3.1, 3.3.2 & 3.3.3; hence the relative variation in style that may be discerned.

3/3/1 Academic Aesthetics

3/3/1/1 Introduction

- Appearance is among the key concerns of the designer in developing, evaluating or creating facades.
- The Architect works with volumes. masses and forms (as sculptors); with areas, hues, textures and colours (as painters).
- Architecture may thus be treated as a plastic art, as it was traditionally classified in the light of its concerns and reflection of visual aesthetics.
- Architecture is publicly judged on grounds of facial appearance (thus extends to professionals).
- Facades depend on the interaction of two sets of components/ disciplines: Vocabulary and aesthetics principles.
- Vocabulary are those key physical components of facades.
- Aesthetics principles are the criteria governing architectural composition projected on facades.

The two sets may be treated on various levels:

- Details and micro facade level, in single buildings.
- The wholistic facade level.
- Collective facades (regular, irregular) level.

See Figures (3.5), (3.6), (3.7) & (3.8).

3/3/1/2 Components and Vocabulary of Facades

(see Figures (3.5) & (3.6))

a. Form & Shape (General)

- Outer delineating lines separating facades from the external physical context (background).
- Separating peripheral outline, defining minor and major constituents of forms and facades.
- Contrast is a key factor in perceiving and appreciating forms an components; this applies to: fenestration in facades, blocks and elements (bow windows an terraces), facade levels,Fig. (3.5.

b. Sky line (see Fig. (3.5))

- the line separating the building and the environmental backdrop (sky, desert, city scape, sea scape.. etc).
- An intricate relation that affect the appearance and preception of a building and its image.
- A building may "pierce" the sky line.
- A building may interact with sky.

c. Surface, textures and coulours (Fig. (3.6))

- Surface properties is a key tool in facade composition; area, texture , details and colours are among the important - most ofsurface qualities.

- Texture allows variety and contrast, affects scale, clarity and overall image.

- Colours are simple under-used tool in forcing and securing visual identity.

d . Fenestrations (Fig. (3.5))

- Represent a dominant feature in facade composition and its visual messages.

- It reflects many contextual pressures: environmental socio-cultural and economic.

- It allows endless means of generating variety and distinct character through, areas, location, order, rhythm, treatment, details, materials etc.

- It may be used to echoe vernacular features, local character and suggest architectural styles.

e . Details (Fig. (3.6))

- Is a measure of quality and commitment, it suggests contextual awareness and results in distinct identity and visual richness.

- Details are related to all aspects of facades: general shape, skyline, fenestration, textures, colours, entrances, rails etc.

- Intricate details may subsidize and compensate modularity and repetitive features synonymous to public housing.

f. Entrances

- Represent an important feature that may positively contribute to facades and architectural image, without sacrifycing function and utility.

- Entrances provide endless possibilities in terms of: location, areas, relation to facade planes, projection, recession, planeness, details, texture, colours etc.

3/3/1/3 Architectural Aesthetics

Key factors affecting facade composition are those drawn from the basic principles of architectural composition. They include: scale, proportions, balance, unity, rhythm , expression & meaning,Figures (3.5),(3.6)&(3.7).

a. Scale

- Is a relative measure of relations physical and formal. It depends on : setting, natural and physical, reference points and marks, mental & visual mechanisms, human scale etc..

- In Architecture and housing schemes two key scale-levels interact : general scale (generic) and human scale.

- Generic scale relates the building or the facade to other buildings or facades .

- Human-related Scale, reads the building or facade in relation to human dimensions and anthropometrics.

- Scale, proportions and locations of key elements in facades are the main tools for manipulating and controlling scale.

- Texture, colour, rhythms, sky lines and profiles are other tools affecting scale and provide effective means for facade composition and variations.

b. Proportions & Scaling

- Is closely related to scale, being the hidden order or dimensional relations between lines, shapes and masses in facades.
- Adds to the quality of facades and allows perceiving its scale and scale and overall image.

c. Balance

- Is the property related to the spatial relation of facade elements and components: forms, masses, rhythms.
- Balance suggests visual weight (apparent) of facade elements.
- Balance may be respected in architectural composition or may intentionally be contradicted.
- Balance may be achieved through symmetry of visual events, or asymmetrical compositions.
- It provides dynamic means of securing identity and distinct character.

d. Unity

- Is the most common architectural aesthetic quality in successful compositions (macro & micro).
- In simple terms "unity" reflects and emanates from: hidden and apparent order, harmony, repetition of elements & components.
- Unity may be achieved through surface treatment (colours and textures), repeated use of visual elements and details, rhythmic relations of lines, surfaces and masses.
- Unity is accentuated and enhanced by "contrast".
- Grids can enhance unity, though it may lead through mediocre manipulation to monotony and boring facades.

e. Rhythm

- A quality inherent in most thematic and non-thematic visual aesthetic qualities. It closely relates time and form components or more simply is the rate and form of occurence of visualevents : lines, surfaces , shapes and masses.

- Rhythm is discerned through the repitition (frequency,intervals, order) of facade elements including: fenestration, structuralelements (columns, slabs, beams), canopies, terraces, signs etc.

- Rhythm may be simple, composite or complex.

- Successful manipulation of rhythm depends on understanding the intricate relations between the various aesthetics qualities, i.e. scale, unity & balance.

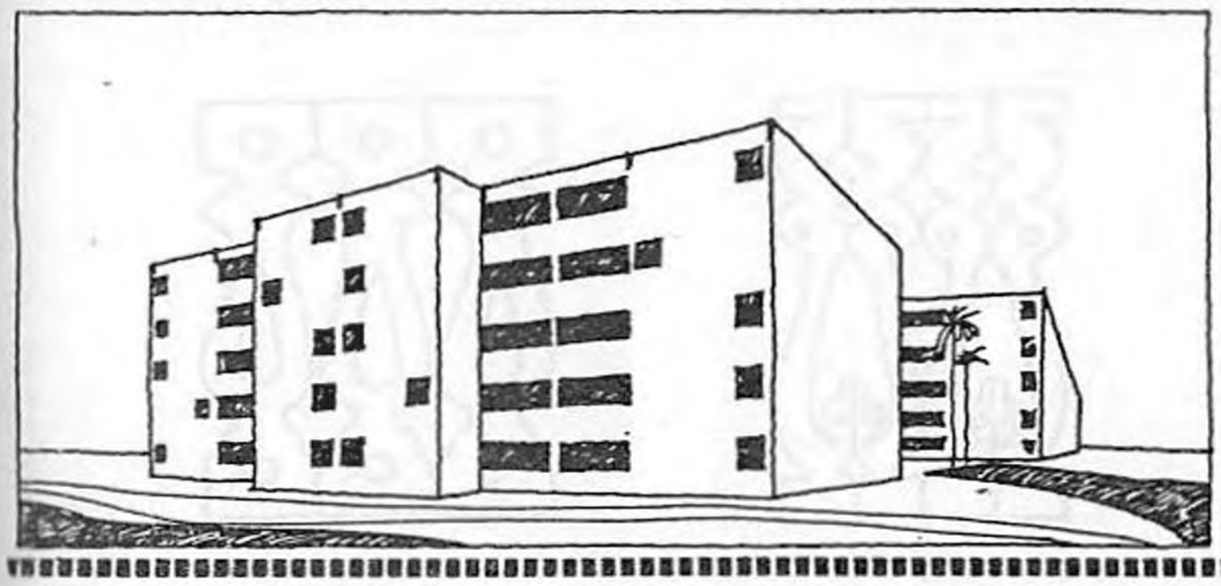
f. Expression and Meaning

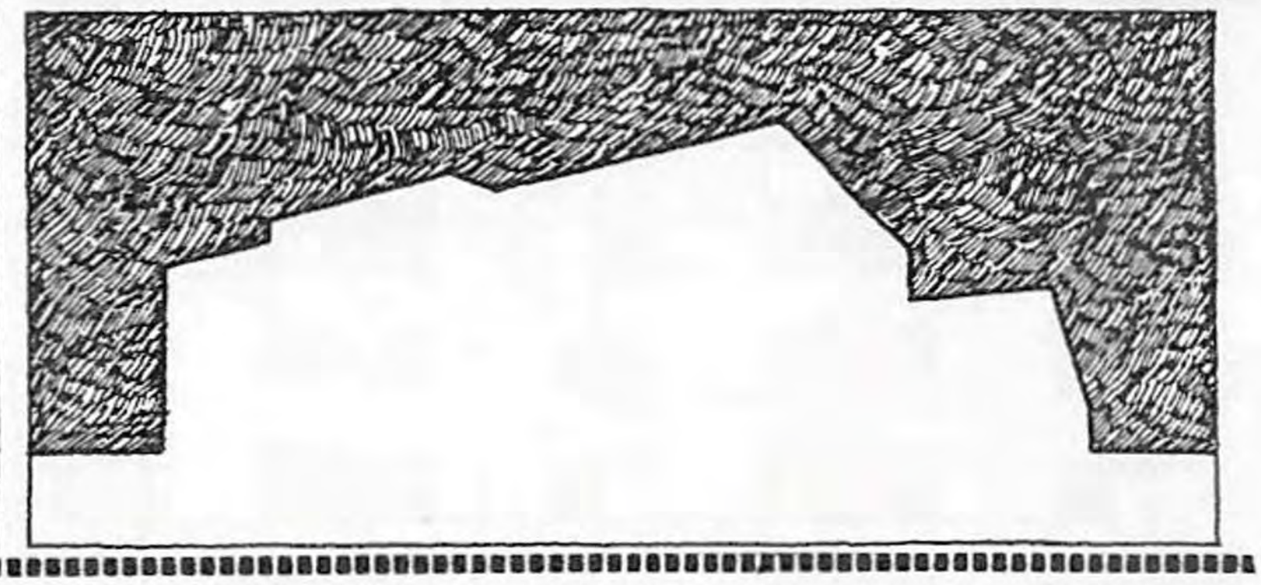
- Is an intricate aesthetic quality, illusive and controversial. It loosely suggests that the expression of functions, needs, environmental forces and cultural identity is a highly praised quality that is invariably encountered in "good" architecture and "positive" built environments.

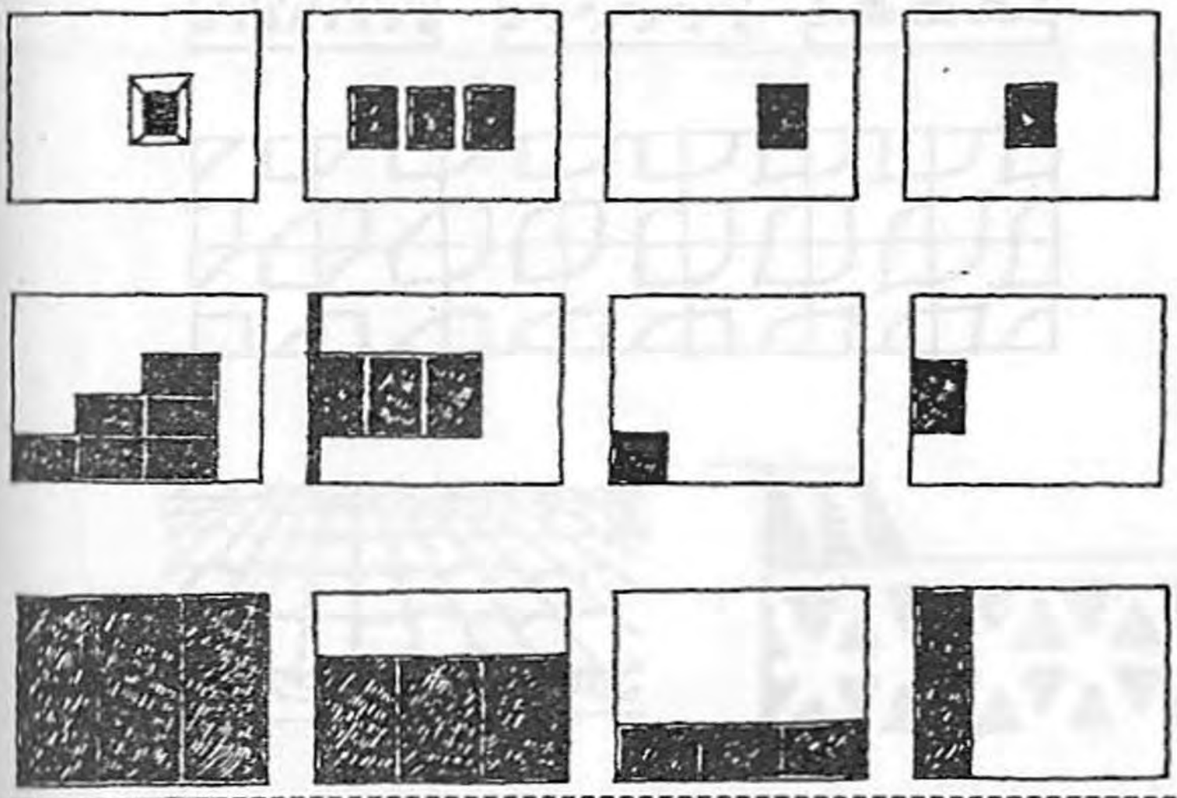
- Many argue that it is a by-product of other aesthetic qualities and even a result of efficient and logical design.

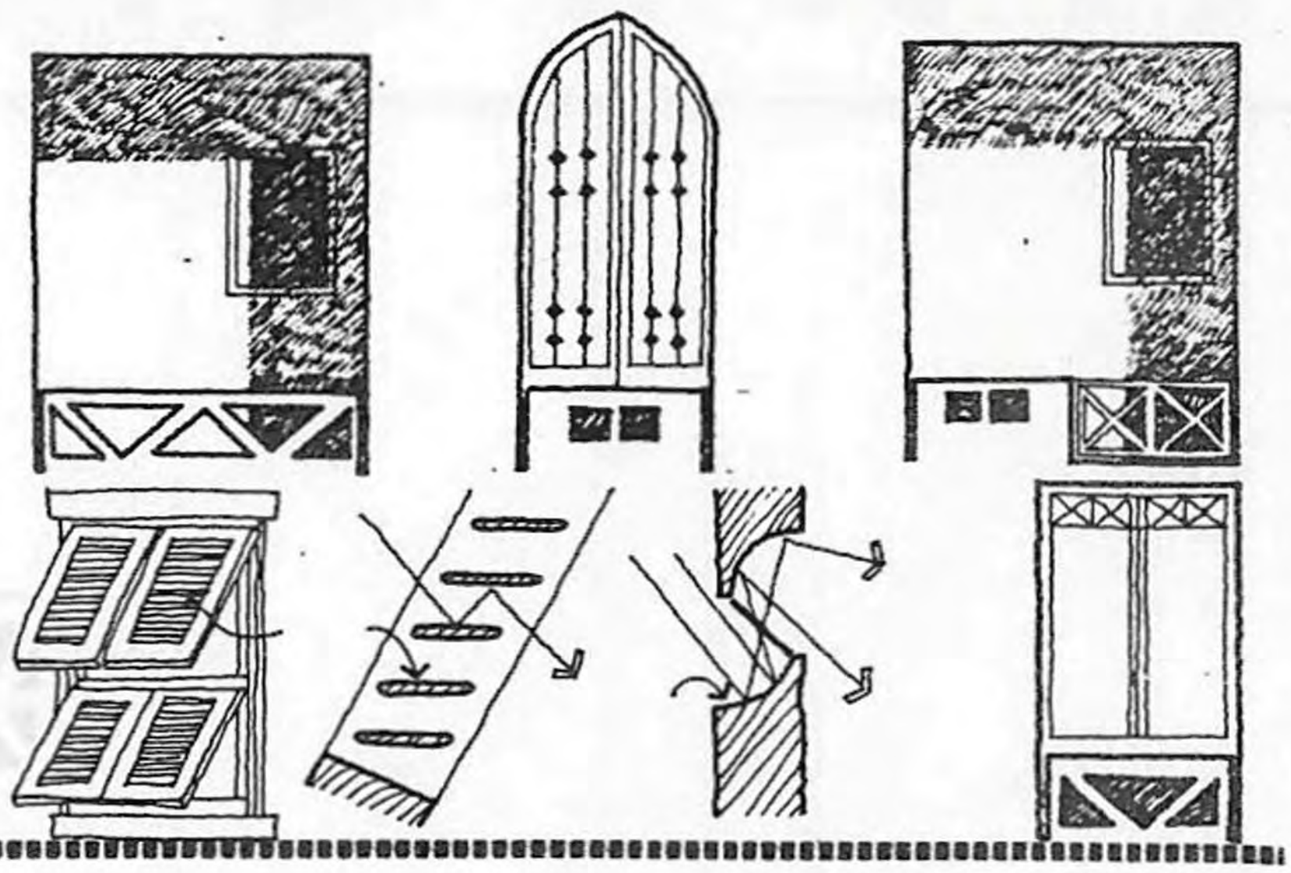
- Expression and meaning may be superficially achieved through ecclectic use of stereo-type features and traditional or architypal treatments/expressions.

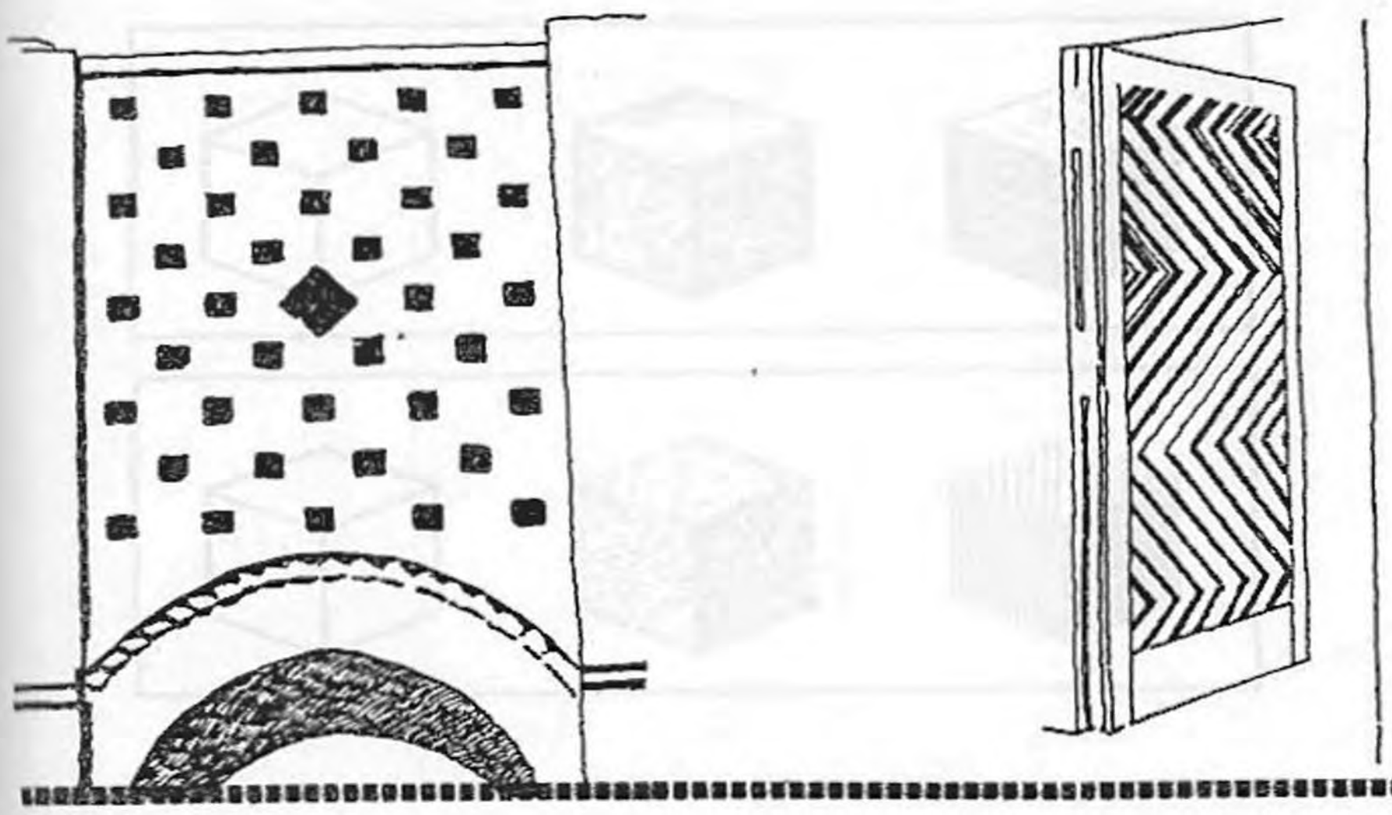
- It is enough to be aware of the potentials of architectural expression and apparent and inherent meaning of its configurations leaving intentional manipulation of those qualities to specific assignments and definite tasks, see Fig. (3.8).











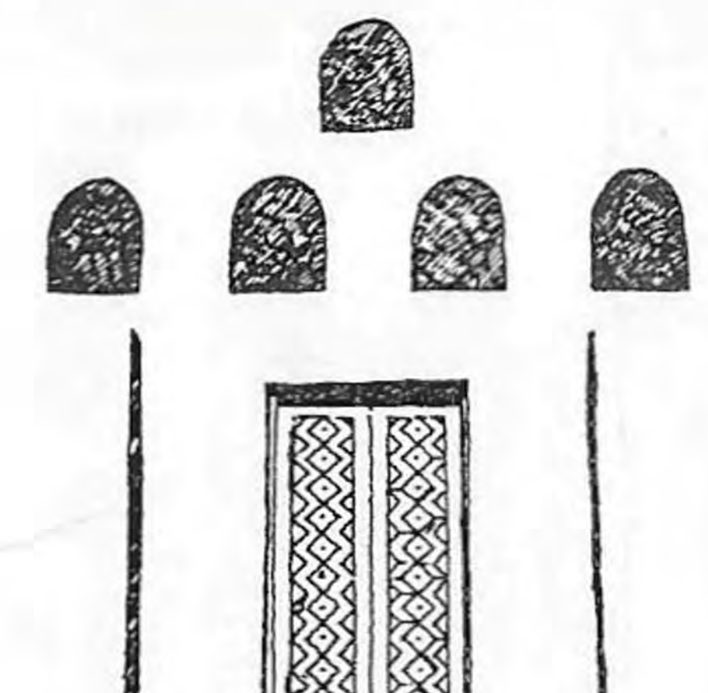


Fig.(3-5): Architectural Aesthetics _ Facade Vocabulary: Form, Skyline & Fenestration .

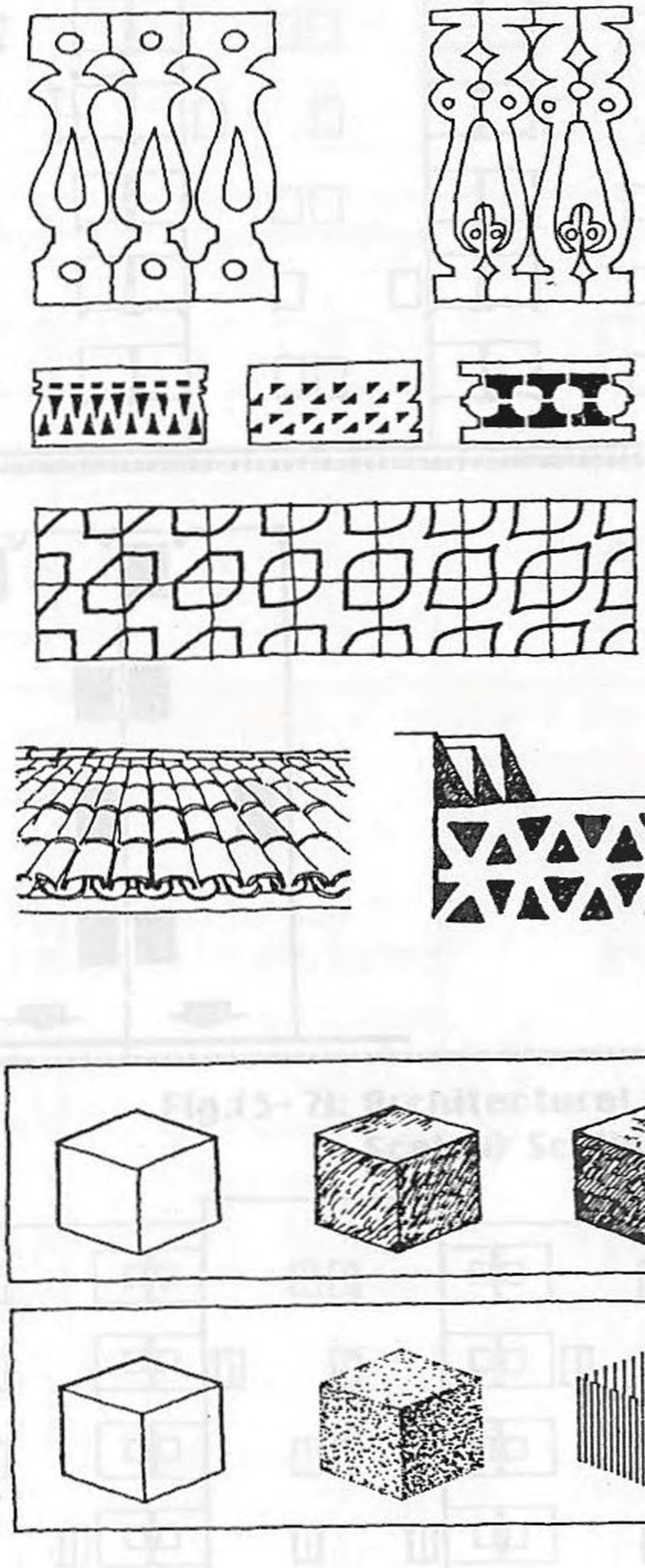


Fig.(3-6): Architectural Aesthetics _ Facade Vocabulary: Details Ornaments, Tone and Texture .

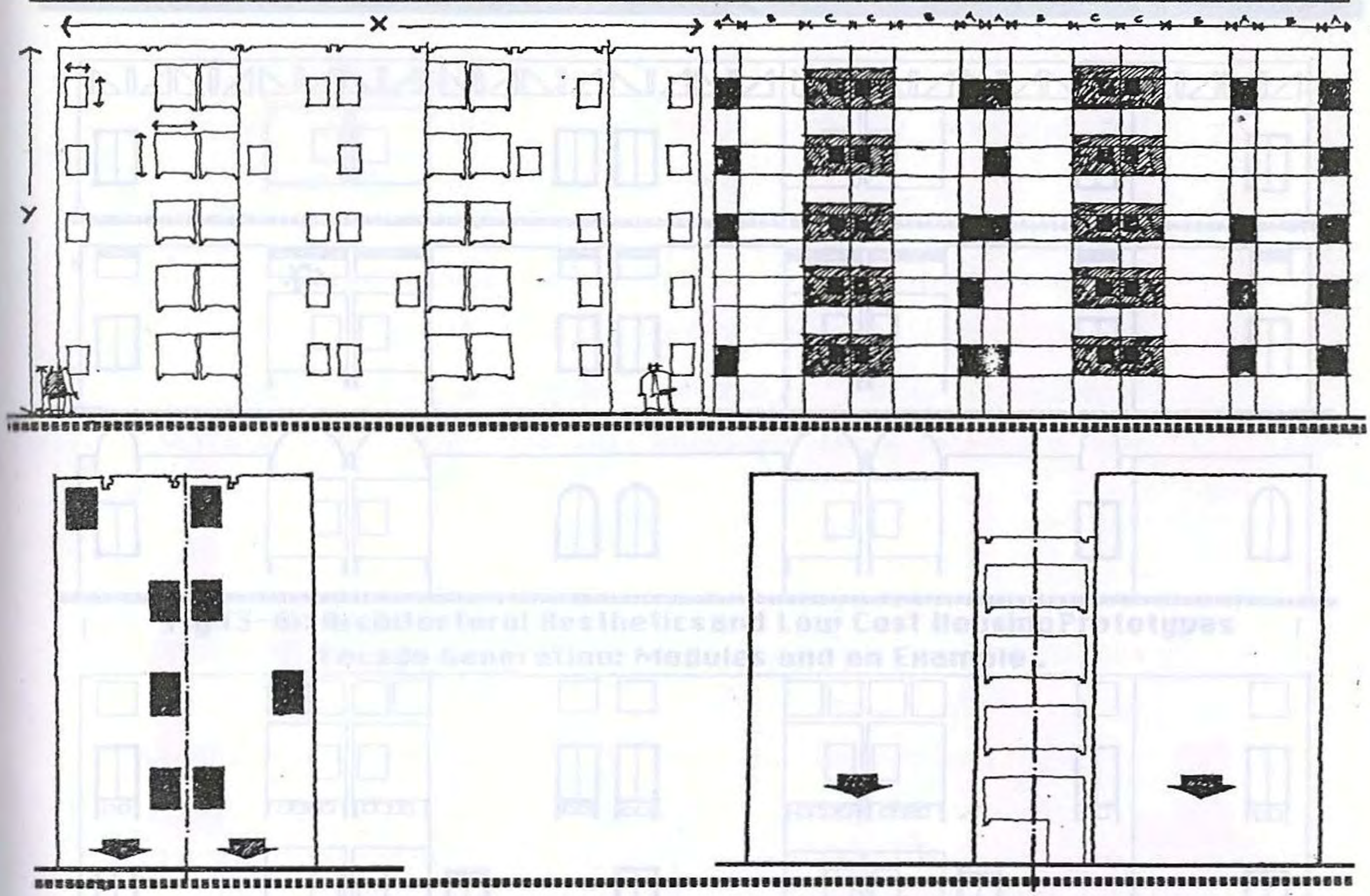


Fig.(3-7): Architectural Aesthetics _ Principles : Proportions, Scale & Scaling, Balance, Unity and Rythm .

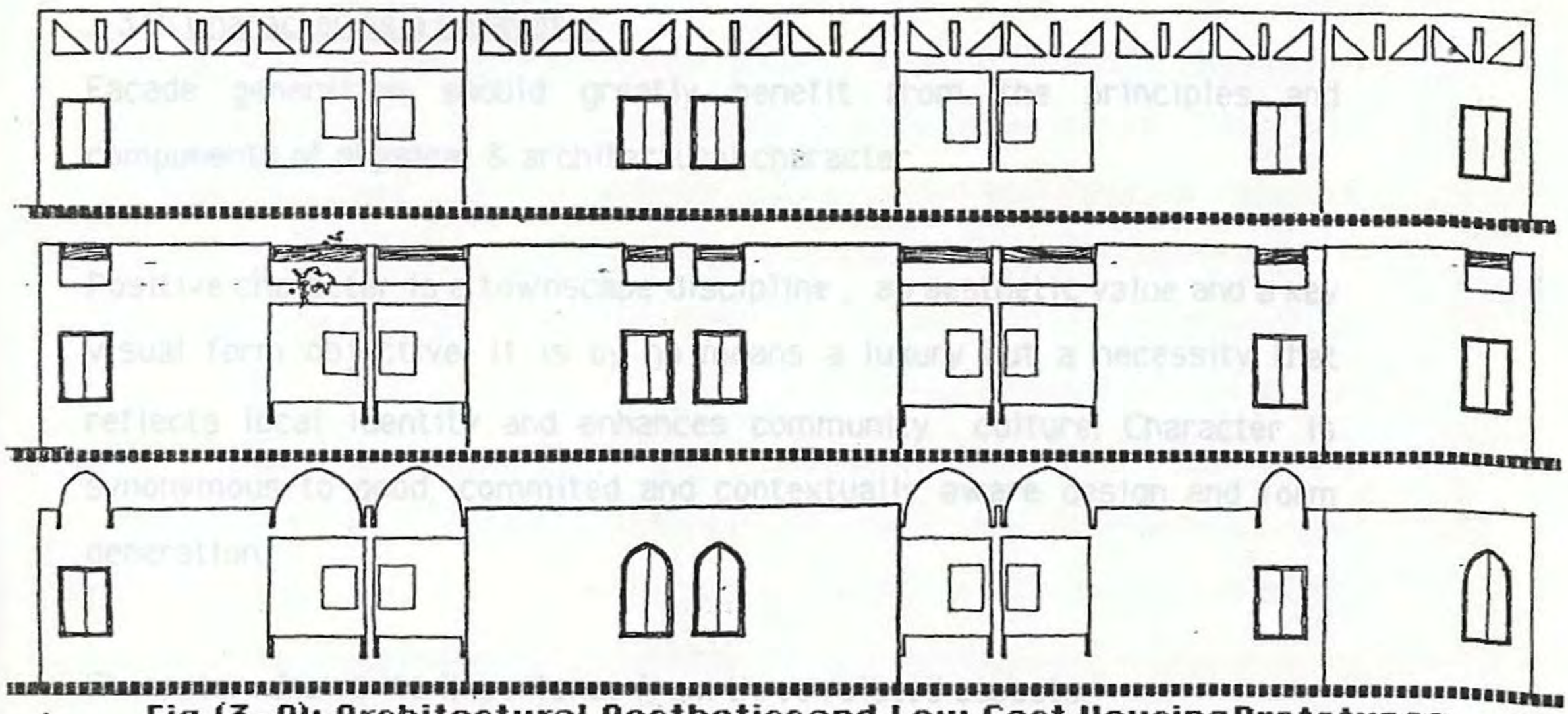
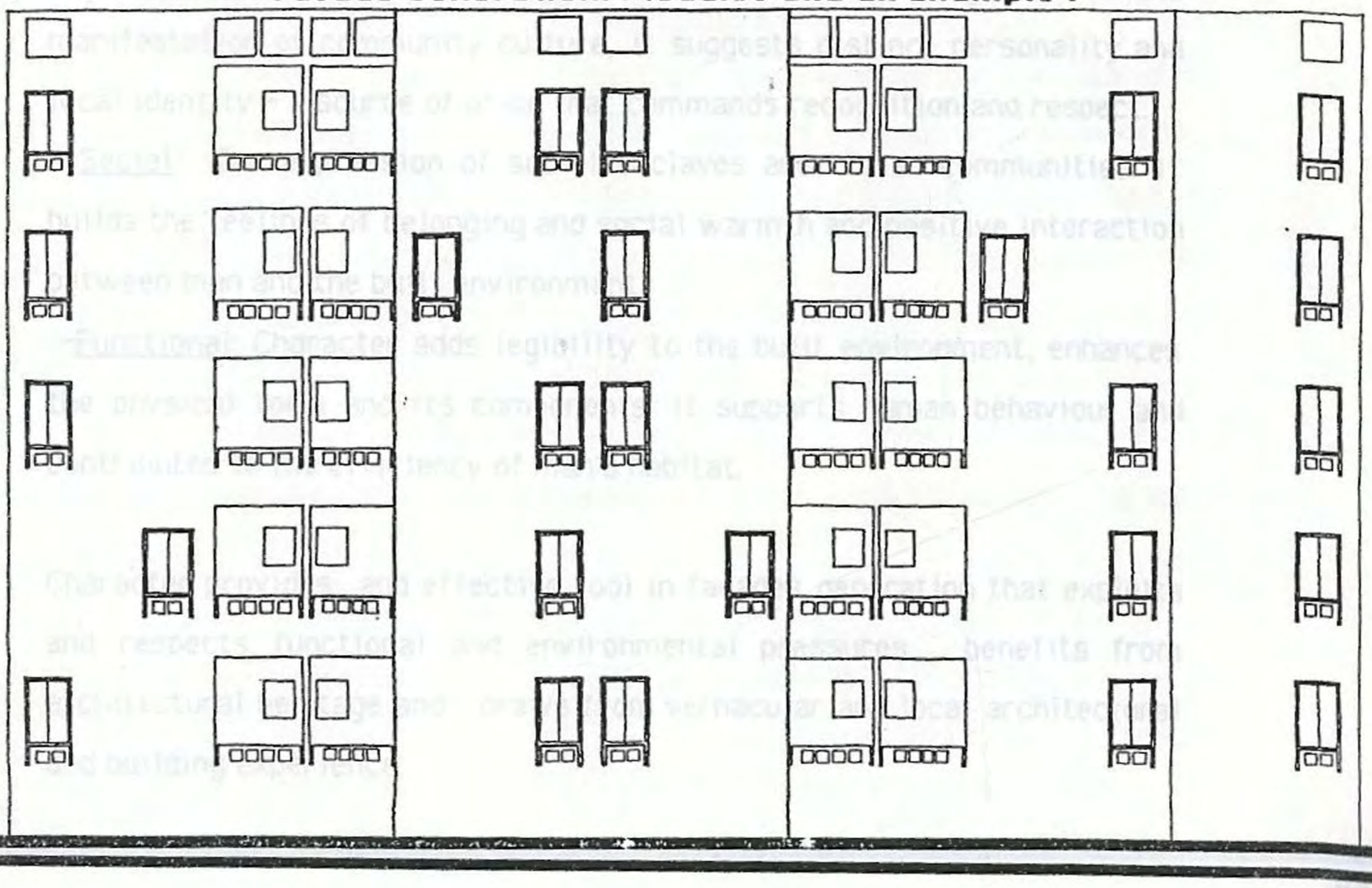


Fig.(3-8): Architectural Aesthetics and Low Cost Housing Prototypes
Facade Generation: Modules and an Example .



3.3.2 Character as a Generator

Facade generation should greatly benefit from the principles and components of physical & architectural character.

Positive character is a townscape discipline , an aesthetic value and a key visual form objective. It is by no means a luxury but a necessity that reflects local identity and enhances community culture. Character is synonymous to good, commited and contextually aware design and form generation.

Character draws its importance from three related aspects:

- Symbolism and Meaning: being the three dimensional registration and manifestation of community culture, it suggests distinct personality and local identity - a source of pride that commands recognition and respect.

-Social: The expression of social enclaves and human communities. It builds the feelings of belonging and social warmth and positive interaction between man and the built environment.

-Functional: Character adds legibility to the built environment, enhances the physical form and its components. It supports human behaviour and contributes to the efficiency of man's habitat.

Character provides and effective tool in facades generation that exploits and respects functional and environmental pressures , benefits from architectural heritage and draws from vernacular and local architectural and building experience.

3.3.2.1 On Character Ideals.

Character may be classified to three levels : General, Physical & Architectural. It may conveniently be related to three levels of the built environment and physical/spatial expressions: buildings & clusters, communities and urban areas and macro settings: Regional & National. Character is the collective result of the features and components of the physical and natural forms in a given setting (at a specific time or span of).It draws its merits from clarity, exposure & continuity . Character depends on the existence of distinct (optimum) visual components and form elements vocabulary, which are in essence a cultural and community experience store and effective mirror.

3.3.2.2. Urban Character in the Egyptian context

There is a general acceptance of the fact that character (or the lack of it) represents a major crisis in Egyptian urban settlements and communities, (existing and new). This is manifested in: the visual chaos, lack of effective control (visual and physical), poor to mediocre architectural output, the deterioration of public task and aesthetic appreciation etc. There is hardly an effective and dependable documentation and record of regional architecture and related character in Egypt (in spite of the presence of some excellent enclaves, urban and rural, of outstanding local identity and visual merits).

3.3.2.3 Towards Local Identity: Character is a facade generator.

Character provides an excellent tool for distinctive and positive facades generation. This may be achieved through three closely related steps,

namely:

a- The identification of regional character and architecture in Egypt. This may take the form of an extensive "Atlas" comprising, architectural and physical heritage, architectural vocabulary and distinct features,glossary of vernacular forms and components together within contextual features and determinants.

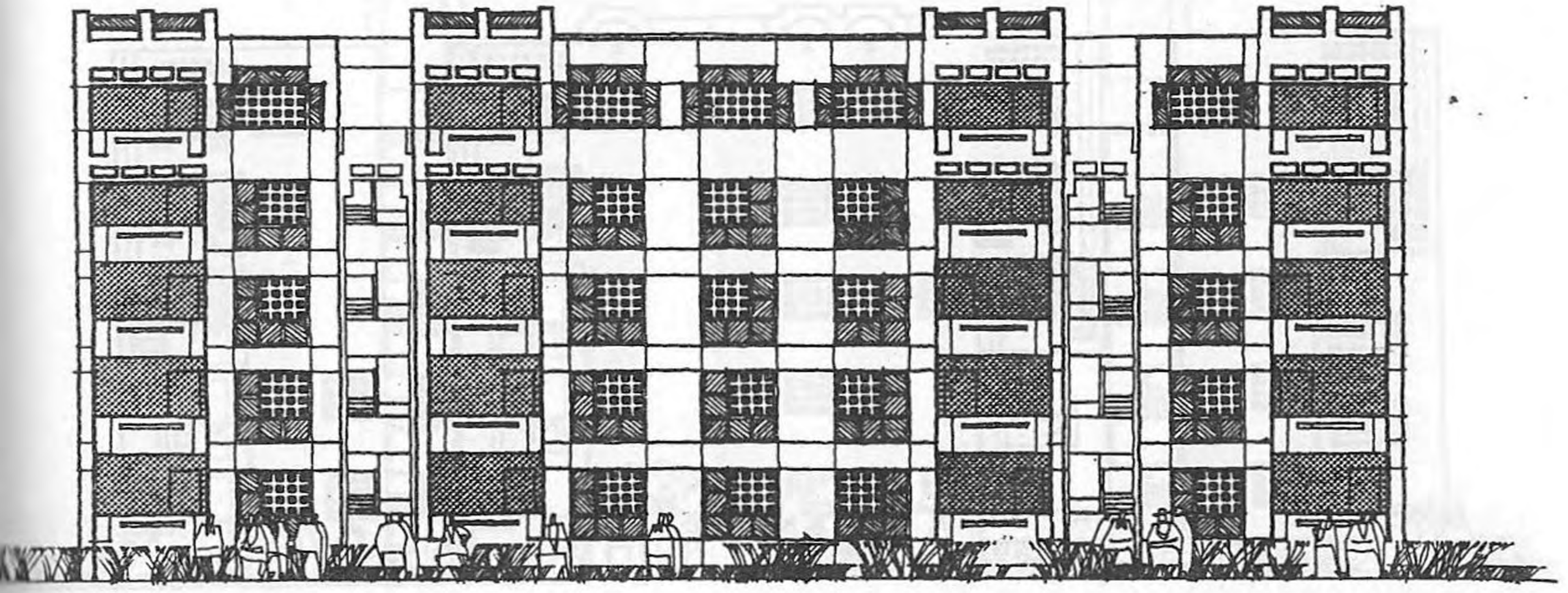
b- The drive towards settlements identity within the same region : this may be achieved through careful analysis and investigation of the settlement to identify its distinct feature and contextual determinants, which will, in turn help in developing its local character.

c- The drive towards local areas identity within the same settlement:this may be achieved through the detailed manipulation of character elements within the local context determinants.

3.3.2.4 Low Cost Housing Prototypes Facades - An Application

In the abscence of regional and local frameworks for the formulation of architectural identity in Egypt, the nationwide use of the formal low cost housing prototypes and the disregard of the housing and contracting companies to the question of appearance, distinct character and facades variation, negatively reflected on the ambitious experience and did help in further accentuating the lack of character crisis in urban Egyptian settlements.

This section within the briefly presented account on character as a generator puts forward a simple sequence for facades generation for the low cost housing prototypes. The swquence comprises six steps and is



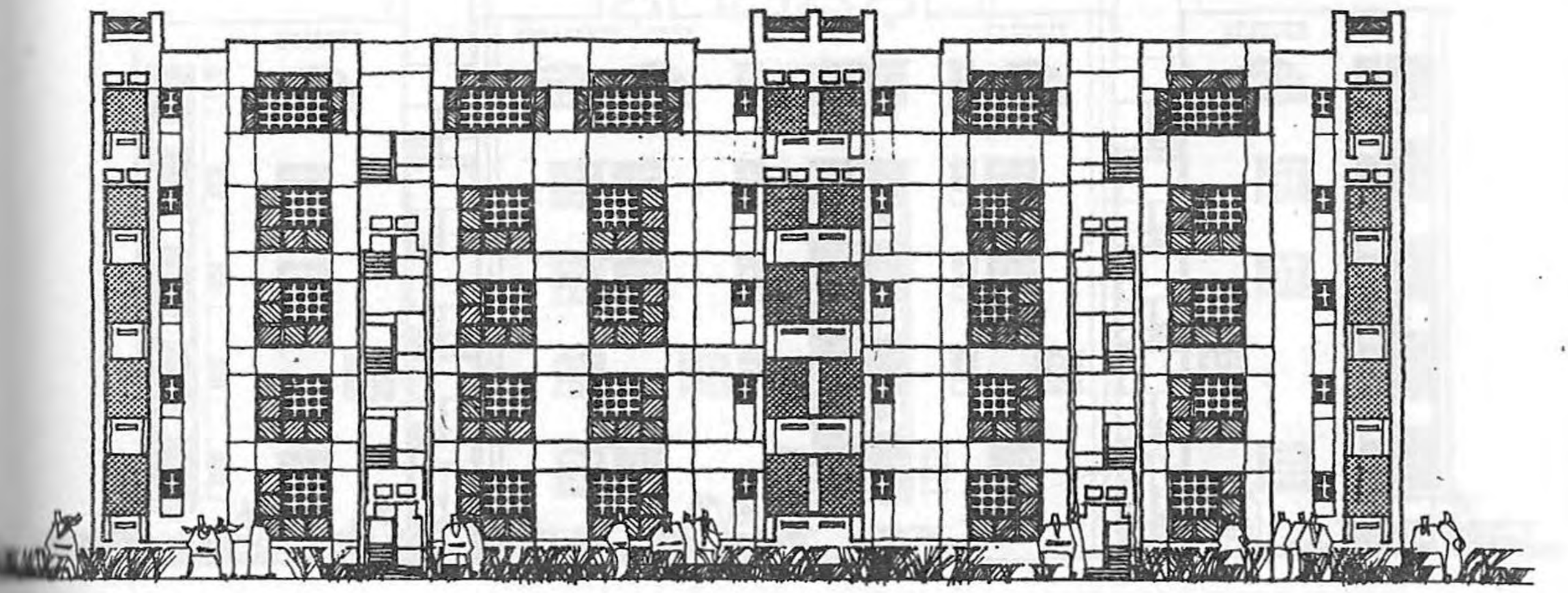


Fig.(3-9): Low Cost Housing Prototypes Facades-Character as a Generator: Variation 1 ,Front & Back Elevations .

Fig.(3-10) : Low Cost Housing Prototypes Facades-Character as a Generator: Variation 2 ,Front & Back Elevations .

Fig.(3-11) : Low Cost Housing Prototypes Facades-Character as a Generator: Variation 3 ,Front & Back Elevations .

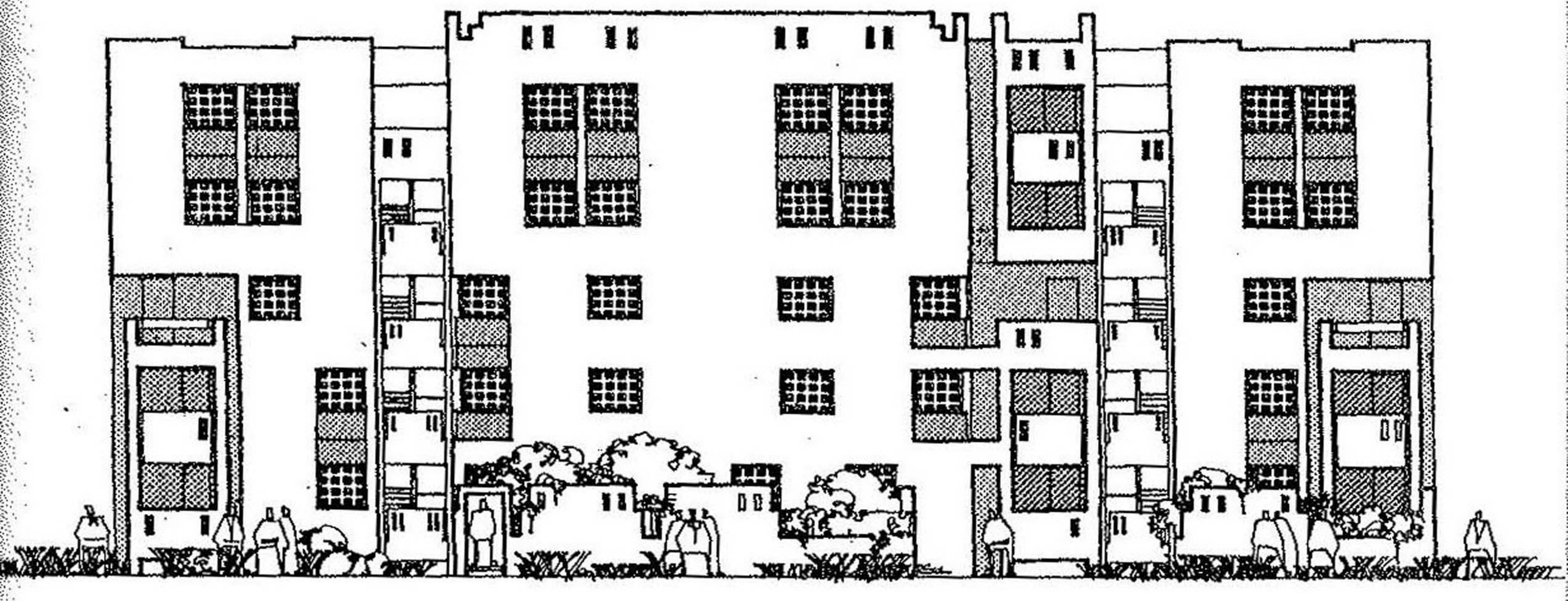


Fig.(3-12) : Low Cost Housing Prototypes Facades-Character as a Generator: Variation 4,Front & Back Elevations .

Nº	Form Elements	Alternatives			
1	Shape/Form (General)				
1/1	Facade Area	Large	Medium	Small	
1/2	Facade Breadth	Wide	Medium	Narrow	
1/3	Facade Height	Heigh	Medium	Low	
1/4	Mass & Volume	Massive	Medium	Limited	
1/5	Profile/Section	Telescop.	Proj/Rec	Straight	
1/6	Skyline	Complex	Curved	Straight	
2	Surface				
2/1	Projections & Recessions	Corse	Medium	Fine	
2/2	Solids/Areas	Corse	Medium	Fine	
2/3	Openings	Corse	Medium	Fine	
2/4	Building Materials & Finishes	Bricks	Stone	Plaster	Timber
2/5	Colours	Mono		Chromat.	
3	Fenestrations				
3/1	Areas/Ranges	Large	Medium	Small	
3/2	Materials	Timber	Metal	Alumin.	
3/3	Details	Intricate	Medium	Simple	
4	Detailing				
4/1	Nº of Floors	Many	Medium	Low	
4/2	Floor Height	High	Average		
4/3	Mass and Volume Scaling	Many	Medium	Little	
4/4	Building End (Cover)	Curved	Recessed	Flat	
4/5	Ornaments	Classic	Islamic	Modern	
4/6	Special Features	Lattice	WindCatch	Sunbreack	
5	Structural System	Post&Lin.	Prefab.	Loadbear.	
6	Finishing Quality	High	Medium	Low	
7	Maintenance Level	High	Medium	Low	
8	Building Age	New	Medium	Old	
9	Use	Res.	Public	Mix.	

Table 3-1 :
Form Elements of Building External Envelope .

№	Form Generation Principles	Alternatives		
1	General Form Features			
2	Scale			
2/1	Width	Monumen.	Medium	Intricate
2/2	Height	Monumen.	Medium	Intricate
2/3	Mass & Volume	Monumen.	Medium	Intricate
2/4	Elements	Monumen.	Medium	Intricate
3	Proportions			
3/1	Total Form	Vertical	No direct.	Horizont.
3/2	Elements/Masses	Vertical	No direct.	Horizont.
3/3	Fenestration	Vertical	No direct.	Horizont.
4	Porosity (Solid to Void)	High	Medium	Low
5	Rhythm			
5/1	Lines	Regular		Irreguular
5/2	Areas	Regular		Irreguular
5/3	Masses	Regular		Irreguular
6	Balance	Symmet.		Asymmet.
7	Architectural Treatment			
7/1	Emphasis	Vertical		Horizont.
7/2	Complexity	High	Medium	Low
7/3	Fenestration Pattern	Complex	Medium	Simple
7/4	Modularity/Modular Coordination	Yes		No
8	Form Geometry			
9	Expression	Yes		No Iern
9/1	Structural	Clear		Unclear
9/2	Associations	Historic	Vernac.	Function.
9/3	Style	Classic	Islamic	Modern

Table 3-2:
Form Elements - Building Envelope Form Generation Principles .

supported by two check lists (tables No. 3.1 & 3.2).

The facade generation sequence :

a- The development of standard architectural components, (well designed and low cost), decorative panels , casts , lintels (infill, parapet units etc), that can be used and manipulated to generate rich and intricate yet low cost facades.

b - The use of the check lists (tables 3.1 & 3.2) namely: elements of the external envelope and form generation principles, in the creation of alternative designs and facade organization.

c- The exploitation of projections and recessions, balconies and bow windows, solids and voids and structural flexibility in facade compositions.

d- The exploitation of the potentials of collective facades in enhancing variety rather than mechanical repetition of identical designs .

e- Allowing room for users participation and contributions, without sacrificing unity, order and quality.

f- The formulation of facade generation guides for the low cost housing prototypes that reflect regional, cultural variability and provide endless varieties to the developers (housing companies, contractors, local authorities and co-operatives).

See Figures (3.9), (3.10), (3.11) & (3.12).

3.3.3 Culture and Context as Generators

3.3.3.1 Introduction

These notes outline an approach to facade generation and organization of its elements to secure the complex objective of architectural identity and

character for the widely used "Formal Low Cost Housing Prototypes, Egypt".

Character & Identity may be achieved through rational & creative manipulation of the architectural features and form vocabulary of the collective facades of those prototypes. This in turn may be achieved through contextual design, or the development of the standard facades for the prototypes within the bounds of local character determinants. Local character determinants reflect the features and impact of location, geographical features, climate, building materials and cultural pressures.

To reiterate the approach suggested here stems from the identity of the local (development) context. It hence, depends on reading the contextual language : physical and socio cultural. This should lead to harmony, complexity and identity (Harmony and integration with the locale); complexity of the appearance within the bounds of order (repitition and mass production), Identity of each development project and logical variation in the place of unfrogivable & illogical adherence to a set of fixed facades irrespect of the locale and context determinants.The approach concentrates only on facade generation and accepts the limitations of the envelope, structural delineation and internal organization of the low cost housing prototypes.

3.3.3.2 <u>On Character Determinants</u>

Character determinants are the result of the context and its complex features, physical and otherwise, i.e. cultural, social, economic etc.

Contextual and Architectural Character determinants may be classified

into three main sets , namely:

- Site and location determinants,
- Socio-cultural determinants , and
- Physical (man-made) determinants.

Site & location determinants comprise natural pressures, climate, geographical factors, topography, geomorphological,natural elements, vegitation and landscape families, site features ,etc.

Socio-cultural determinants comprise; general cultural features and particular aspects of community cultural patterns and expressions.

Physical (man-made environmental) determinants include :local,vernacular or indigenous character vocabulary and determinants,;local technology, local building materials, physical setting etc.

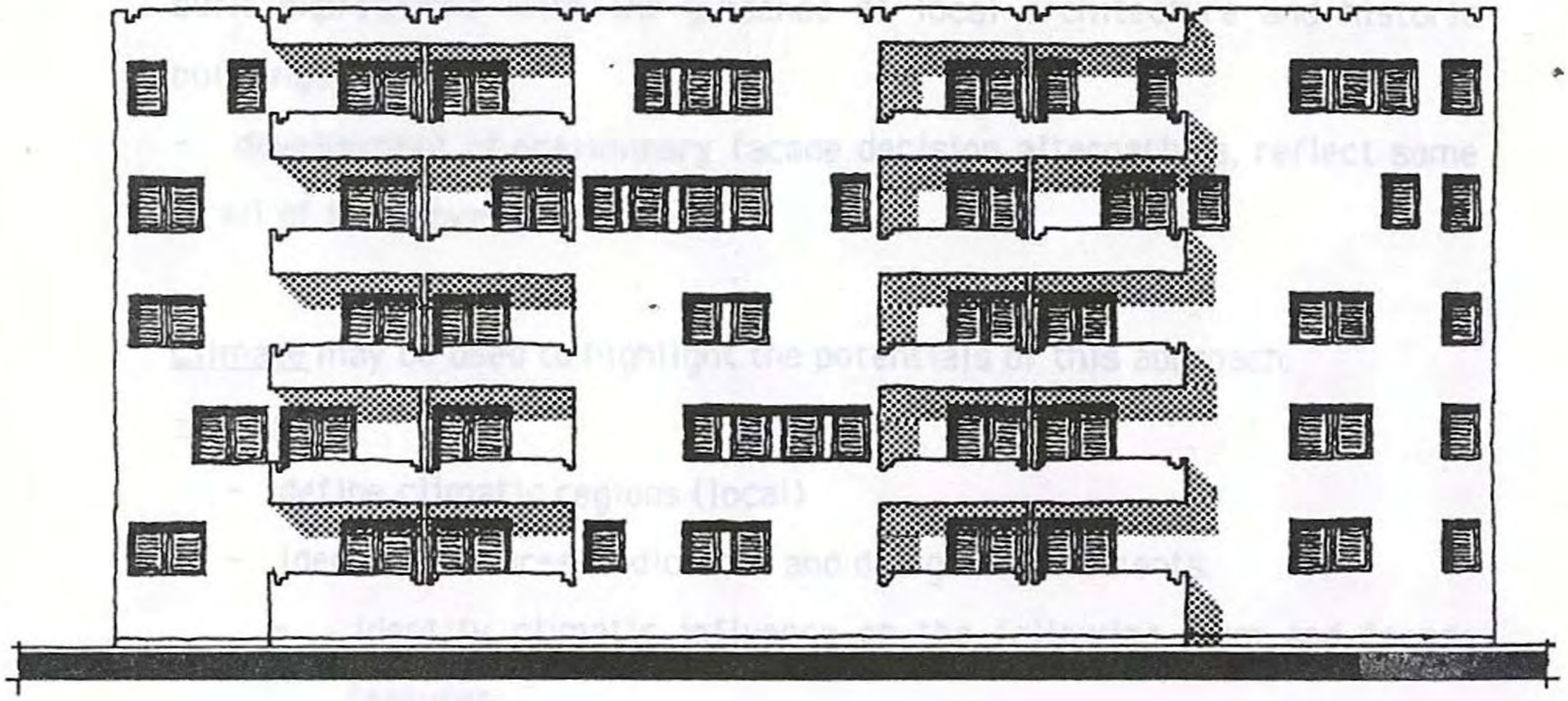
Within those determinants it is possible to point out two approaches to the generation of facades, that enjoy character & relate to localities without scacrifycing economy nor clashing with order and plan features of the low housing prototypes.

3.3.3.3 Approach I - Manipulation of the Components of Character Determinants.

This approach is based on the understanding of the constituents of each set of the determinants of architectural character and the exploration of the (Formal) answers to each constituent pressures and requirements. This may be achieved through the following sequence:

- review of the architectural character determinants and recording the features and vocabulary of its sets.
- formulation of the possible impacts of the determinants on form and

Fig.(3-13) : 1. Climatic Regions in Egypt
2. Built Form, Character and Tissue Variations in 3 Settlements, Egypt-The Effects of Location and Climate.



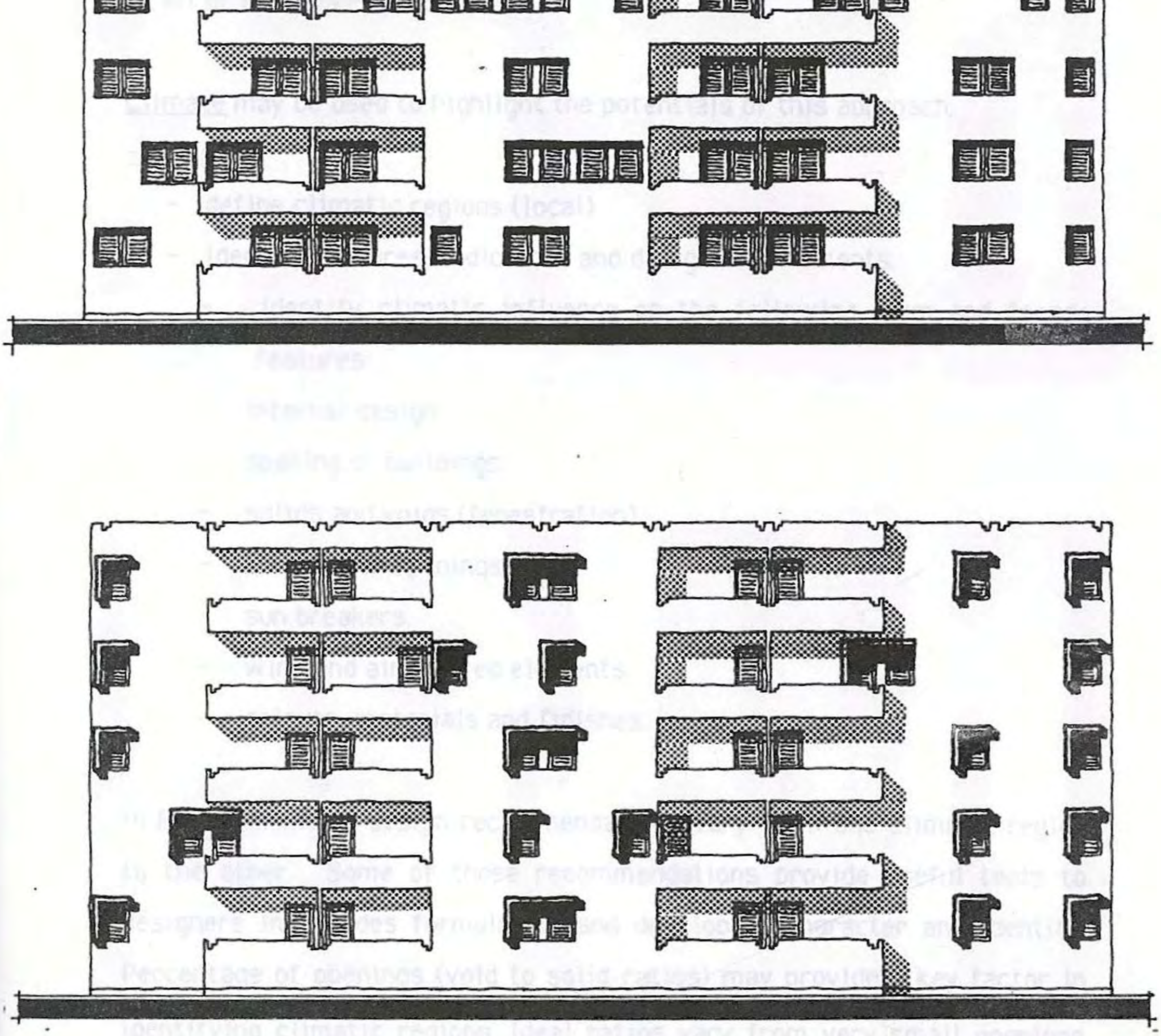


Fig.(3-14) : Context as a Generator; Climatic Effects on Facade Alternatives for the Mediterranean Region and Upper Egypt .

built expressions with the guidance of local architecture and historic buildings.

- development of preliminary facade decision alternatives, reflect some or all of the above factors.

Climate may be used to highlight the potentials of this approach.

- Climate
  - define climatic regions (local).
  - identify features, indicators and design requirements.
    - identify climatic influence on the following form and facade features:
    - internal design.
    - spacing of buildings.
    - solids and voids (fenestration).
    - location of openings.
    - sun breakers.
    - wind and air related elements.
    - colours, materials and finishes.

In Egypt, climatic design recommendations vary from one climatic region to the other . Some of those recommendations provide useful tools to designers in facades formulation and developing character and identity. Percentage of openings (void to solid ratios) may provide a key factor in identifying climatic regions. Ideal ratios vary from very small openings and ratios in the desert regions (10 - 20% of the total area) to medium openings (25 - 40% of the facade area) in the Mediterranean region.

Similar indicators may be established as regard wind, sun, insolation and provision of shadows. See Figures (3.13) &(3.14).

As regard socio cultural determinants, it is important to follow and understand the various components of community culture and emphasis should always be given to the isssues of identity and differenciation . Important most in reading the distinctive patterns of community culture are: symbols, conceptions, meanings, rituals etc..; as well as their relation to the built form.

One key design rule that may be applied in reading and implementing cultural determinants is to allow for differentiation and identity on the level of the housing unit (within an overall order). Expression of the family within the community. See Figures (3.15) ,(3.16) & (3.17).

In developing character and distinctive expression of facades in housing development, regional architecture and local built forms and language provide an inexhaustable resource.

Figure (3.18) shows examples of local architectural character in Rasheed on the Mediterranean - and Nubia, upper Egypt and the possible exploitation of the vernacular vocabulary in the facades of the low cost housing prototypes that may be developed in or near the said regions; see Figure (3.18) 1 & 2.

3.3.3.4 Approach II - The Use of the Distinct Features of Local Architecture and Popular Building Patterns.

Local architecture, popular, indeginous and vernacular represent a store of experience and dynamic interaction between community and context. it

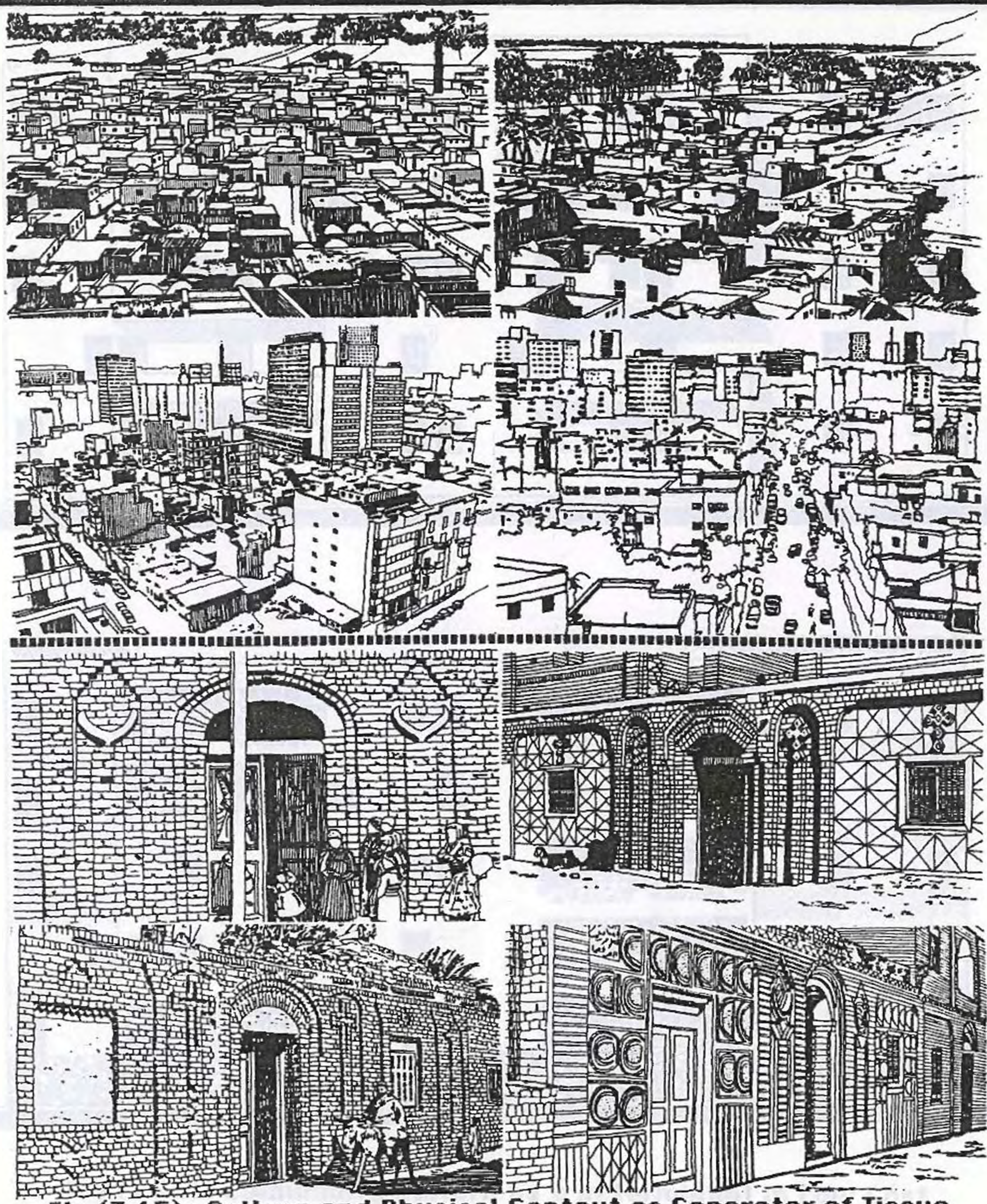
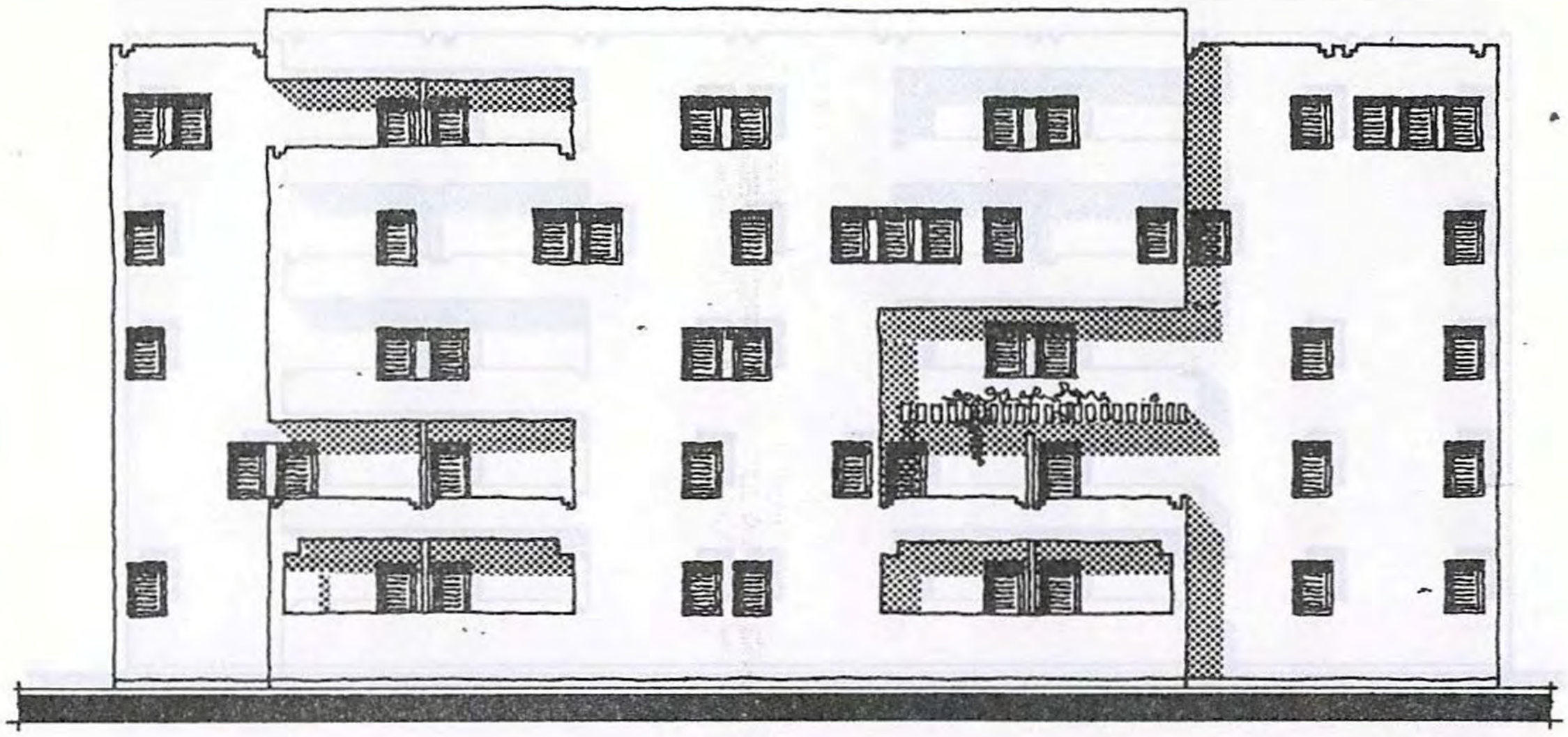


Fig.(3-15) : Culture and Physical Context as Generator of Tissue, Character and Architectural Expression-Egyptian Urban and Rural Settlements .



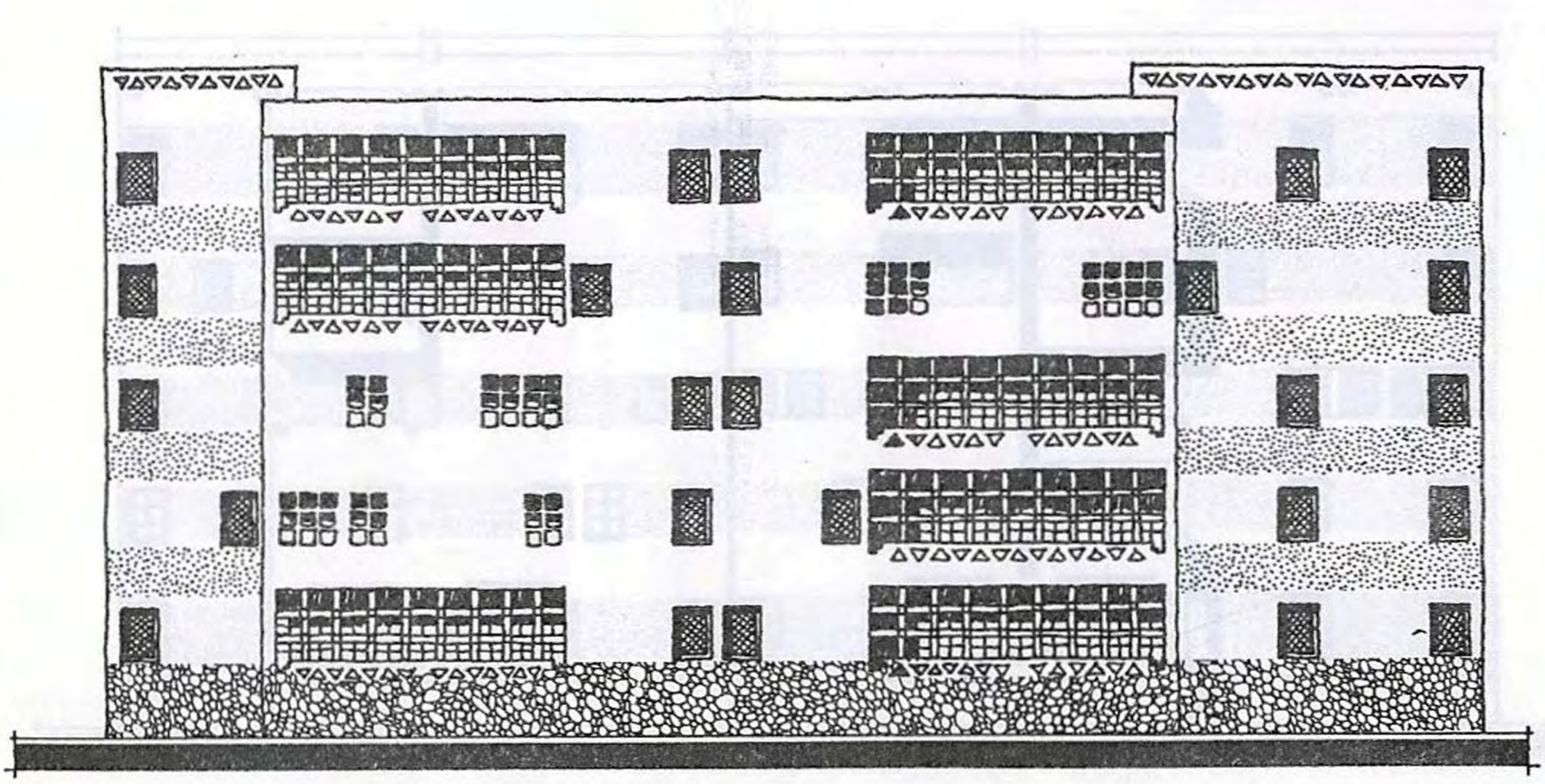


Fig.(3-16) : Community Culture as a Determinant in Low Cost Housing Prototypes Facade Generation . (Urban & Rural Communities) .

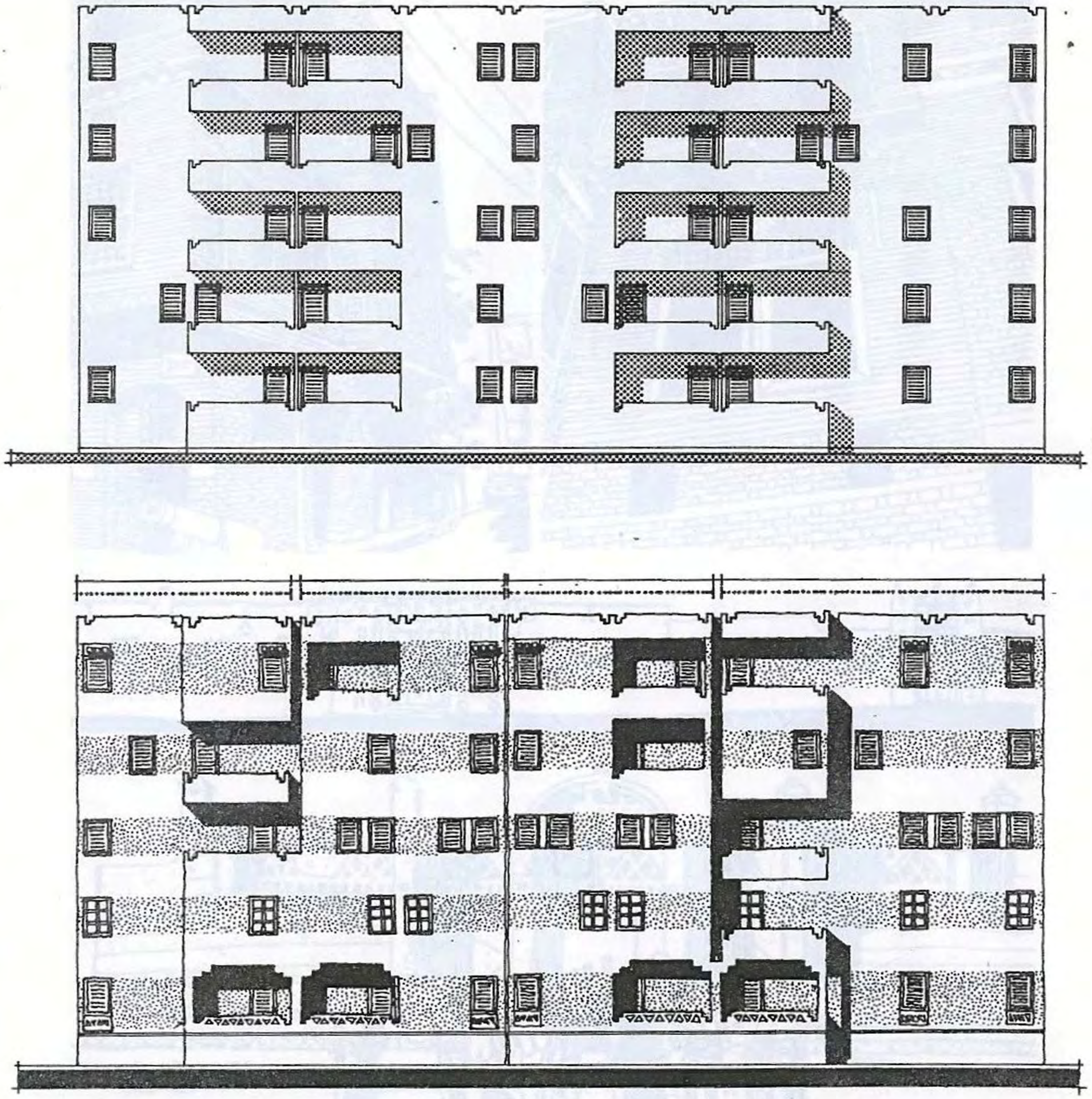


Fig.(3-17) : 1. Initia Facade Emphasizing the Block .
2. Facade Development Emphasizing the Family Domain : the House Unit .

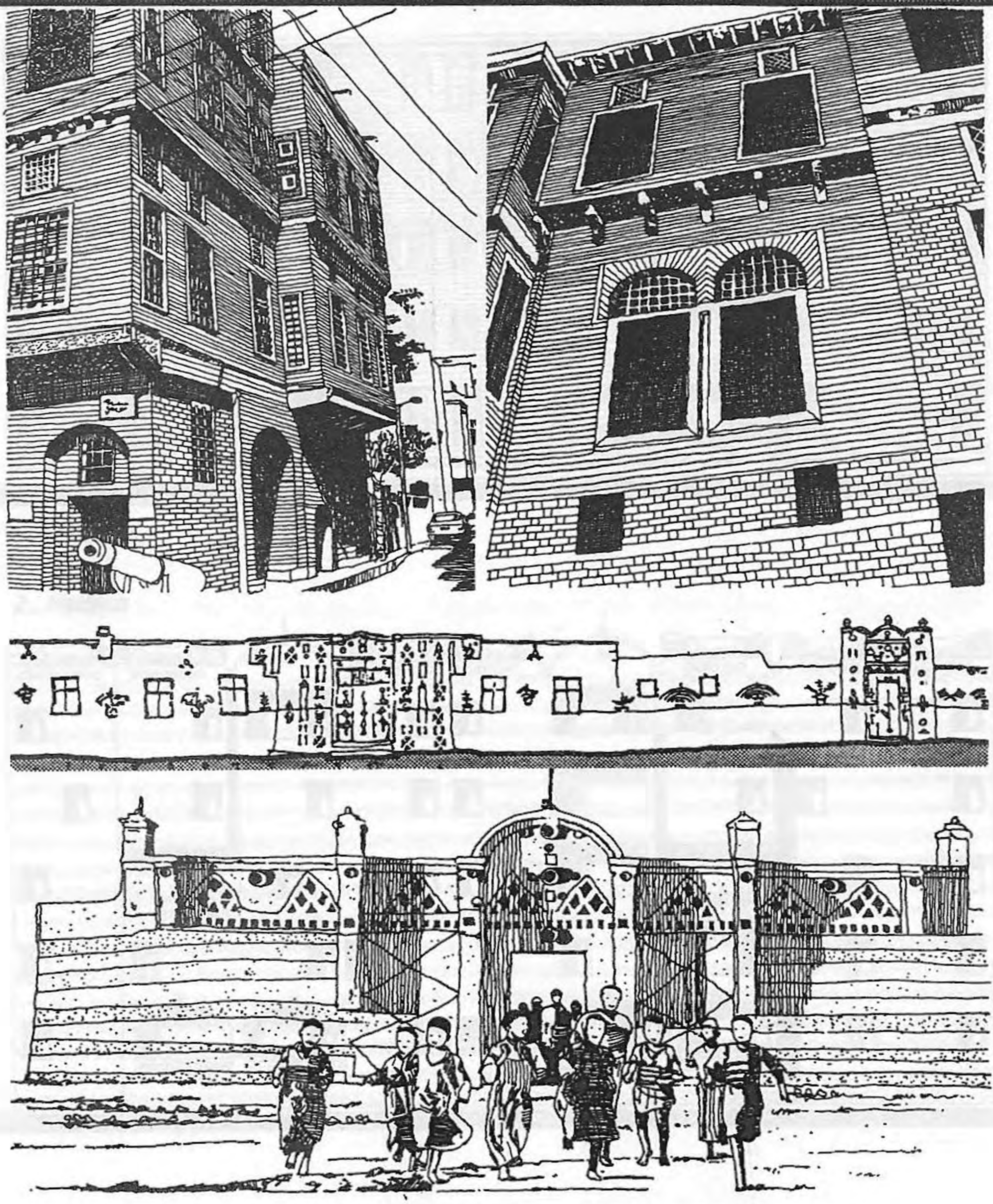
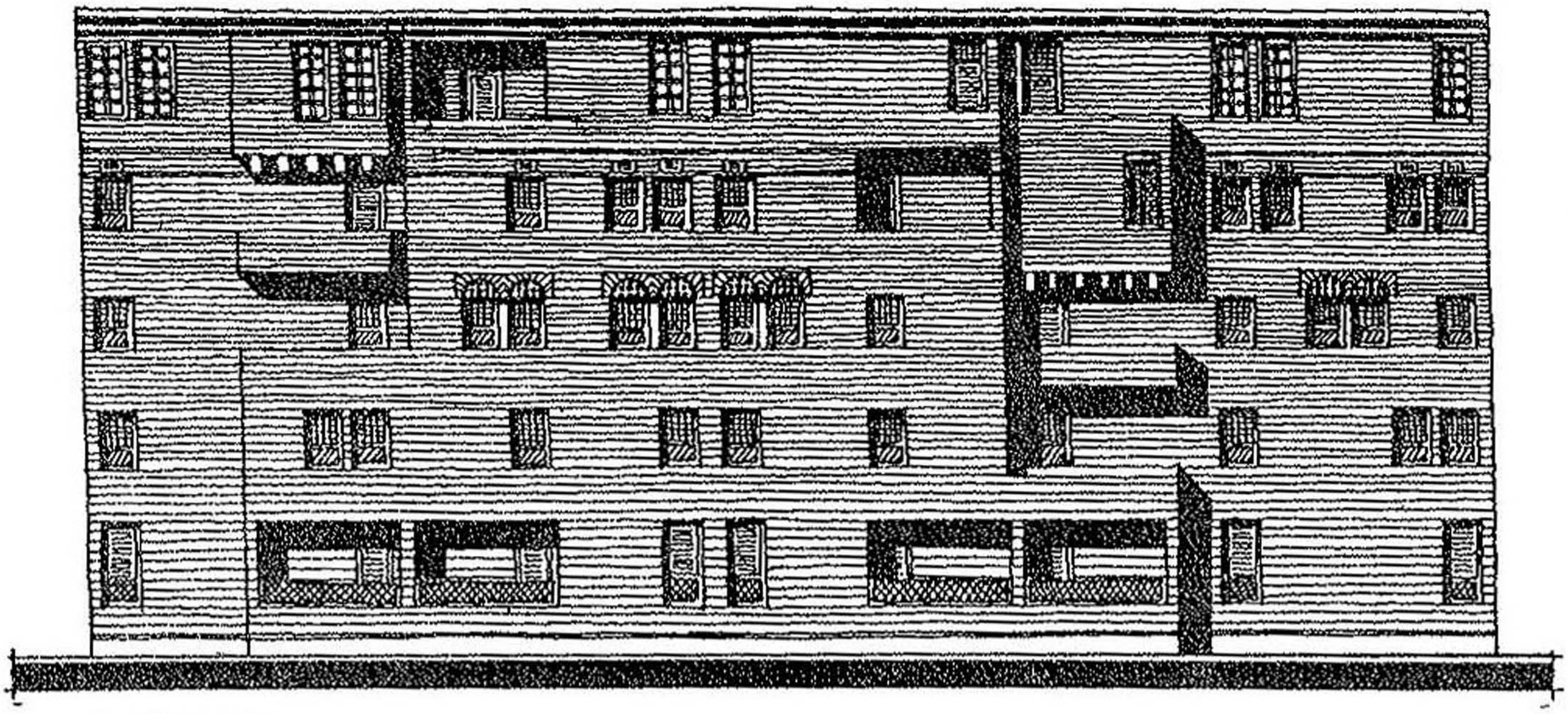


Fig.(3-18) : Examples of Vernacular Architecture in Two Egyptian Sub-Cultures: Rashid and Nubia .



1. Rashid.

2. Nubia .

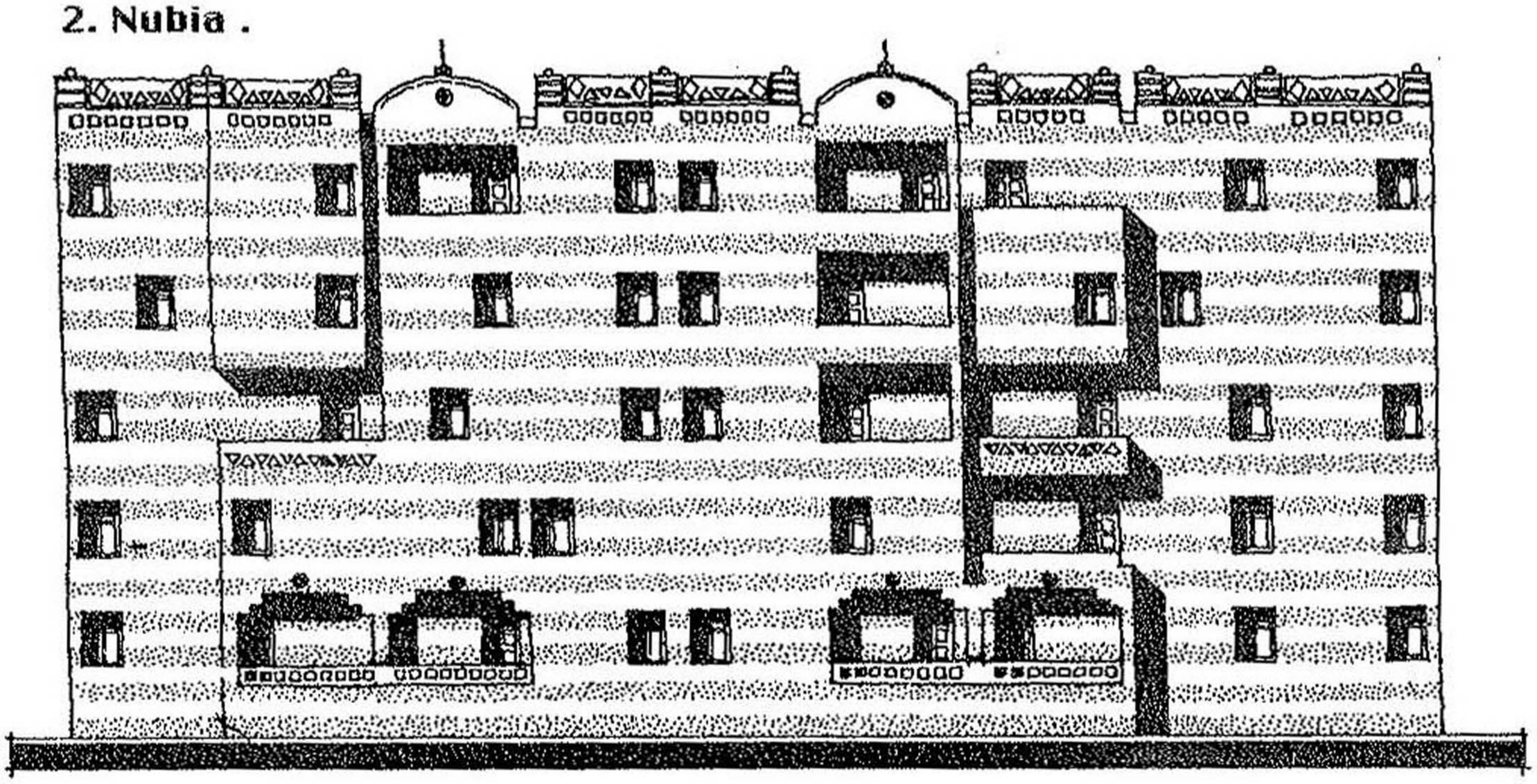


Fig.(3-19) : Low Cost Housing Prototypes Development,
Exploiting Vernacular Language and Vocabulary :

reflects the contextual pressures and their architectural expression. It enjoys identity, continuity and privacy, hence provides an outstanding glossary of features, relations, solutions and frameworks for spatial and facial organization.

This in turn may be achieved through the following sequence:

- review and record local architecture features and vocabulary (in the development context, and around it).
- pointout sets of applicable patterns and vocabulary related to facades and 3 dimensional treatments.
- develop facade alternatives in the light of the recorded local patterns and features.

The two approaches are promising and may result in achieving distinctive facade treatment. It should be noted however that the former approach I, is more comprehensive and accommodates approach II, in its structure and conception.Figures (3.14) , (3.16), (3.17) & (3.19) illustrates the potentials of the two approaches and the underlying conception,i.e. culture and context as generators.

3.4 Guidelines for Facade Generation for Low Cost Housing Prototypes.

The preceeding sections pointedout means of: creating endless facade alternatives, achieving distinction and identity and overcoming the technical problem of mechanical repitition and disregard to contextual pressures and determinants. In this section a synthesis of the conceptions, principles and tools is presented in the form of a set of guidelines for the generation of facades for the low cost housing prototypes. Following the guidelines will not guarantee the creation of distinguished facades that

enjoy visual identity and environmental appropriateness .It will however ensure a shift in the right direction towards the said objectives of: efficiency, adaptability, quality and character.

The Guidelines

a- Facades are the basic ingredient of visual identity of the built environment.

b- Variety may be achieved through the manipulation of one, two or more of the facade elements.

c- Facade generation should never clash with the plans, structure or cost limitations.

d- Understanding those limitations is the key to successful variations.

e- Variations and successful facades depend on facade vocabulary and components.

f- The richer the vocabulary in terms of appropriate design, symbolism & meanings, cultural associations etc - the better are the chances of securing identity and quality.

g- Vernacular, popular, indegenous architecture on the one hand and historic monuments and architectural heritage provide a rich resource for inspiration and learning.

h- Aesthetic principles should always be in mind, not to stifle action but to enable the formulation of sound alternatives and highlight possibilities.

i- The architectural character provides an excellent framework for facade generation. It defines a wide range of visual disciplines that inspires, guides and control spatial and formal organization.

j- Architectural character guidelines focuss on facade elements and

components and the interactive relations between neighbouring facades.

l. Facade elements affecting character include : shape,profiles, skyline, end lines, width of bay, building lines, details, fenestration, porosity, ornaments, textures, materials, projections & recessions etc...

m- Physical(urban) character is another level of visual disciplines affecting facade generation. It reflects the collective nature of townscape (the art of relationships between buildings and settings).

n- Lessons and experience of local architecture should always be reviewed and synthesised.

o- Contextual determinants help the designer to formulate facades with confidence: Design in context.

p- Contextual determinants cover all aspects of the development setting; physical and cultural, natural and man made.

q- Climatic determinants are reasonably simple to establish and incorporate.

r- Top most among climatic determinants affecting facade generation are: thermal, lighting and aerodynamics.

s- geographic and locational determinants affect orientation, porosity, height, finishes and materials etc.

t- Cultural factors are complex and rather difficult to harness.

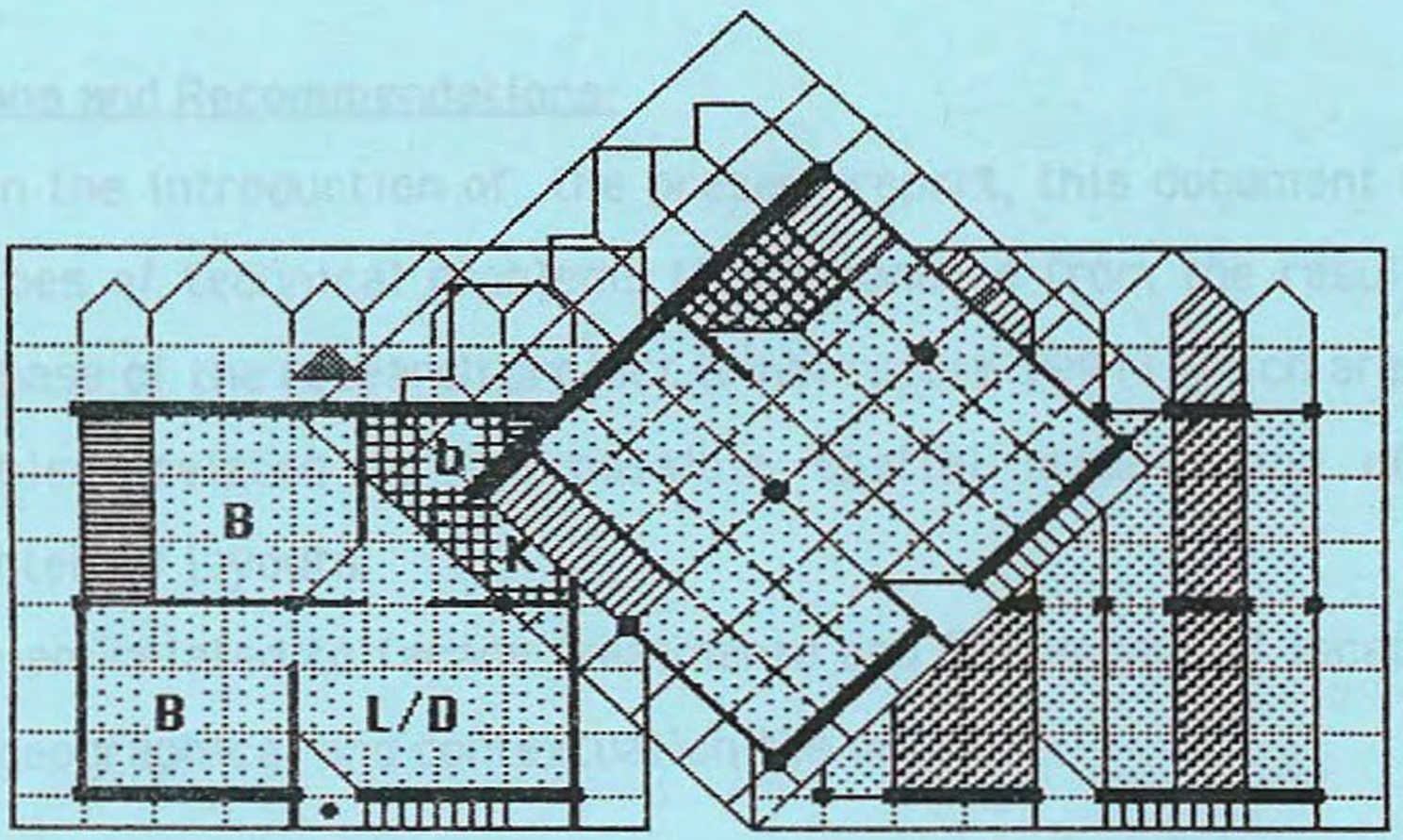
u- In facade organization cultural determinants call for identity and distinction and the expression of their community (users).

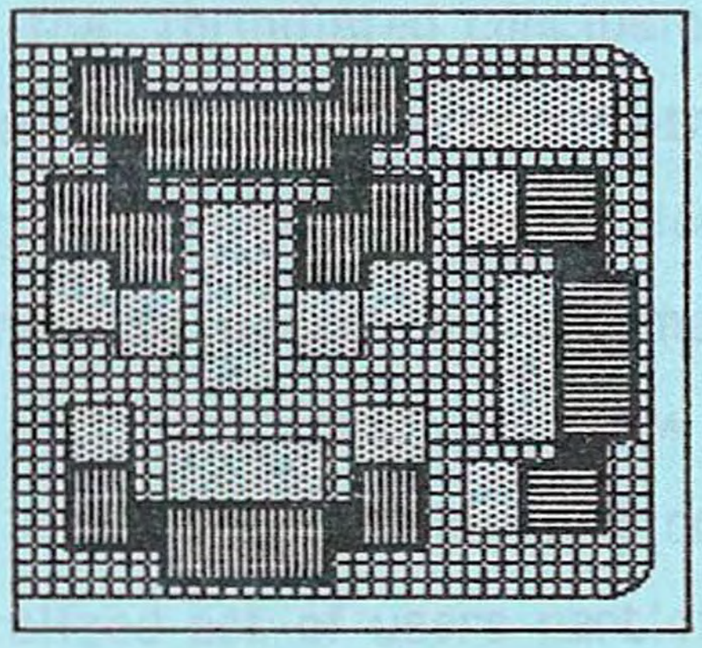
v- Culture's physical language may be discerned through the systematic scanning of local architecture.

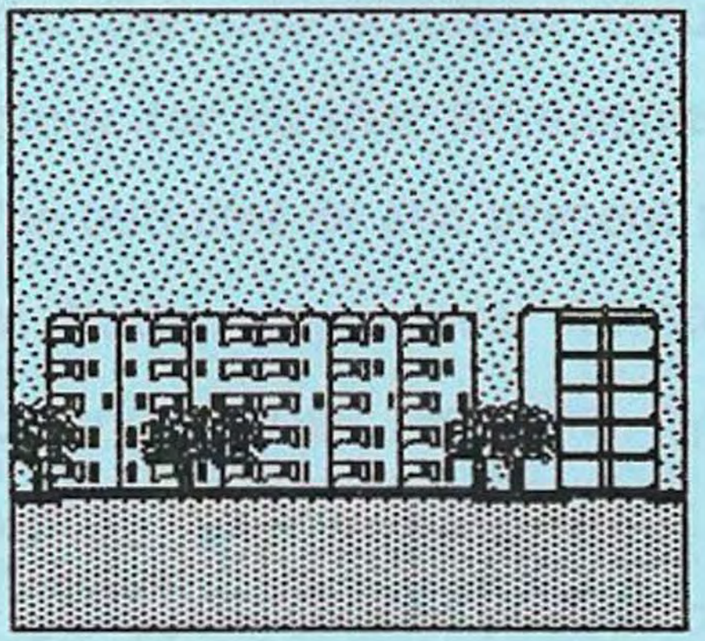
w- Regional visual codes and vocabulary provide an insight into local

culture and its built product.

x- Facade generation is among the most complex tasks in architectural composition it should be aaproached with care and supported by critical evaluation of past and present experience.







4

CONCLUSIONS & RECOMMENDATIONS

FINAL REPORT
SECOND PHASE

1992

4. Conclusions and Recommendations:

As stated in the introduction of the present report, this document deals with two types of technical problems that emanated from the results of the initial phase of the research-project (final report 1991) which are:

- the problem related to the possible spatial organization of the dwellings' internal layouts.
- the problem related to facade treatments and the impact of locational variations (geographical and contextual)on the designs.

The type of the formulated conclusions for the said problems should be considered as a step leading to a methodology for further development of plans variations and facades generation. The outcome of the present phase mainly represents a core of information that may prove valuable in enhancing and supporting the New Housing Policy adopted by the government and calling for partially completed dwellings to benefit from the decentralized act of users participation. Some of the conclusions of the two tackled problems will be outlined next, then recommendations for future action will be putforward.

As for the conclusions resulting from the suggested plan variations, showing the potentials of the dwellings and helping the owners/users with their decisions, the following points could be raised:

- The process of suggesting plan variations for a dwelling of a specific area proved to be a rather difficult and a challenging process. Accordingly, it would be rather unfair to leave the owners/users without any guidence

as regard the possible internal layouts of the dwelling area, and hence its potentials.

- It is essential to develop brochures for the benefit of the owners/ users to provide them with alternative internal layouts for their dwellings.The alternatives presented in this report may be considered as the begining of an effort in that direction.
- The analysis of the suggested alternatives showed a different attitude in the case of dwellings of limited areas (43 to 60 m^2) . In such cases, the concept of using the living area as a multi purpose area and consequently the use of convertible and expandable pieces of furniture becomes almost a necessity. In case larger dwellings are available (79 and 94 m^2), such an attitude is less obvious and there could be a clear distinction between spaces of different specific function.

As for the conclusions resulting from the part related to the development of guidelines for facade generation, the following points could be raised:

- There is no contradiction between the concept of lowering the cost and the possible generation of alternative solutions for facade treatment .
- There is no contradiction between the simplicity of the methods of construction, clarity of structural modules and the endless variations that could be generated for the facades.
- Facade generation is possible through the review of meaningful guidelines taking into consideration the impact of locational variations (geographical and contextual).
- Facade elements affecting character includes: shape, profiles, skyline, end lines, width of bay, building lines, details, fenestration porosity,

ornaments, colours, textures , materials, projections and recesses, etc.

- Contextual determinants help the designer to formulate facades with confidence. They cover all aspects of the development setting, physical and cultural, natural and man made.
- Climatic determinants are simple to establish and incorporate (thermal, lighting, aerodynamics , etc..).
- Geographic and locational determinants affect orientation, porosity, height, finishes and materials.
- Cultural factors are complex and difficult. Cultural determinants call for identity and distinction. They may be descerned through systematic scanning of local architecture.

Many graphic examples have been suggested in the present document in order to demonstrate the possible and diverse facade treatments that could emerge according to the mentioned guidelines.

The previous points should not be considered as rigidly defined conclusions, or a final product that could be directly used. They just represent concepts and guidelines that could be further developed to the picture supporting the new housing policy adopted by the government.

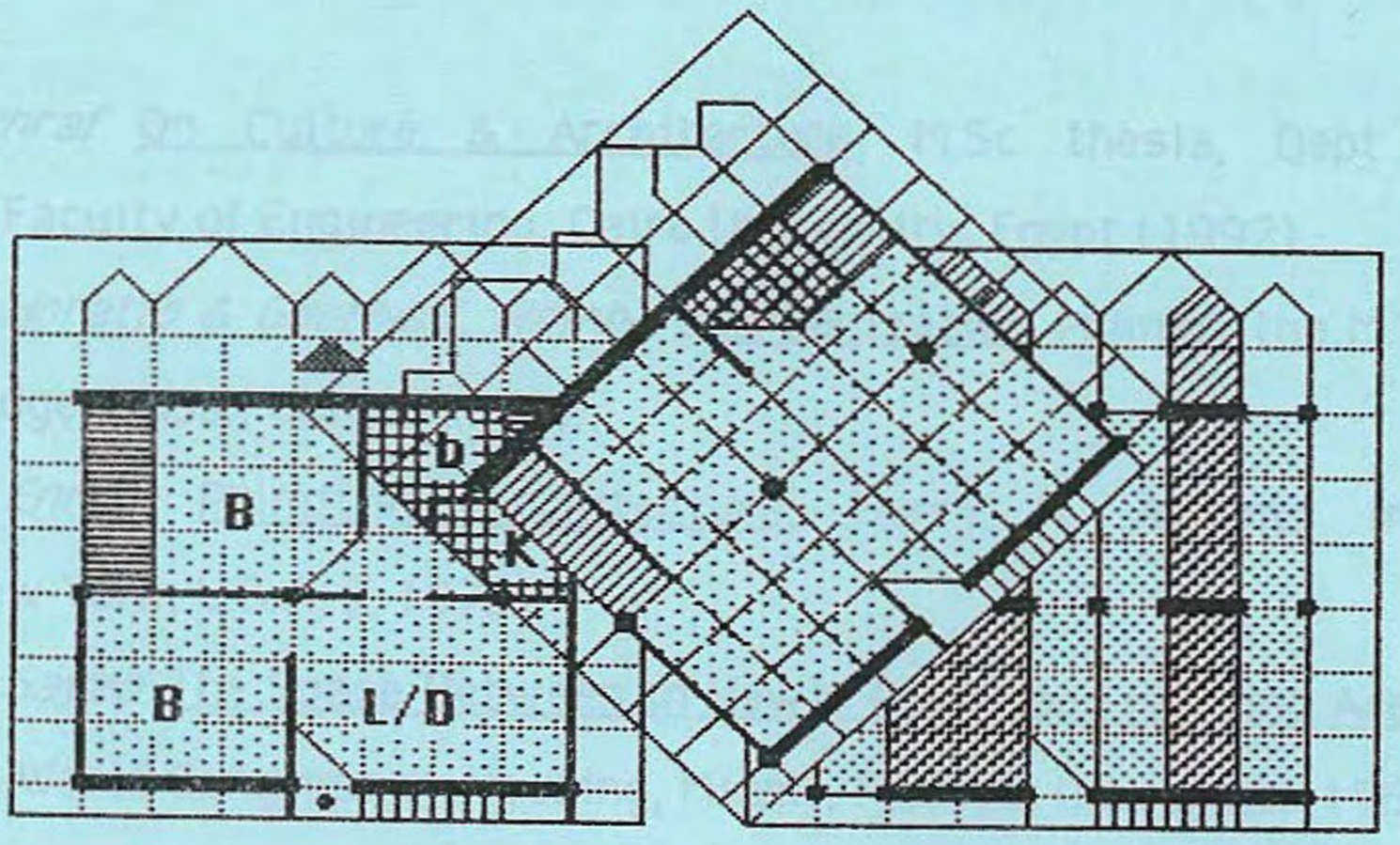
The following recommendations could thus be mentioned:

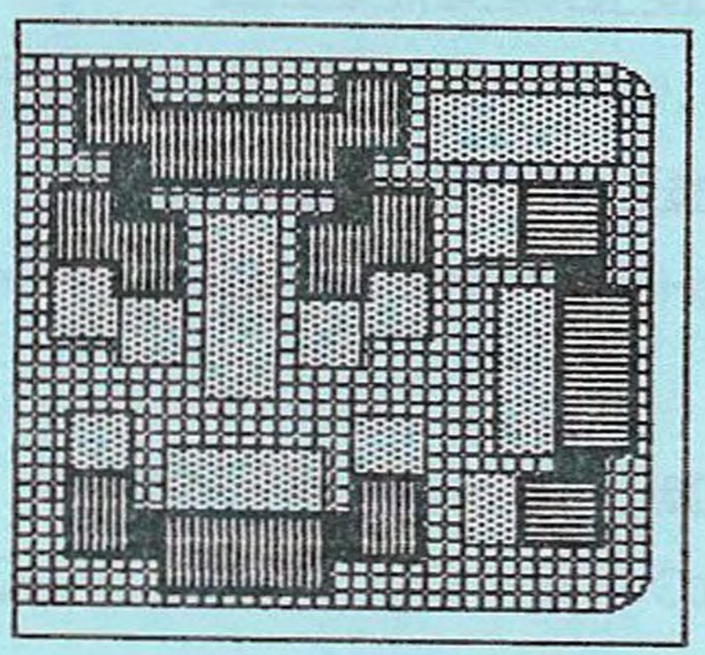
- The Ministry of Development and New Communities, Egypt, should take the lead and assure the development of brochures showing the potentials of the partially completed dwellings and helping the owners/users to take decisions as regard the gradual completion of their units. Such brochures could be enriched with additional information related to the means of

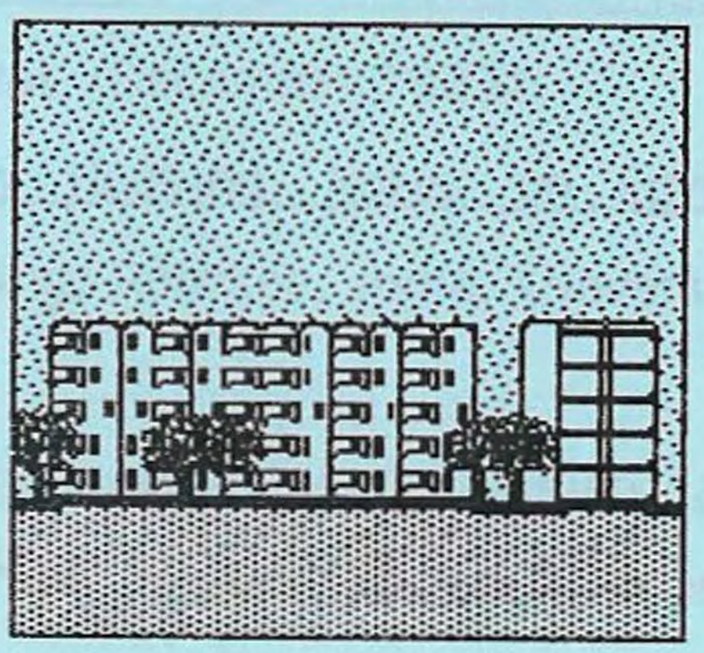
implementation of each alternative in terms of involved labors, materials and costs.

- The same initiation could be provided for facade generation. Brochures summarizing the guidelines and showing examples for facade generation could be handled to housing and hontracting companies, who would pursue the necessary drawings (conceptual and detailed) through their technical staff.
- The budget spent on such brochures is easily recrutable through selling the information to the beneficiaries.

It is believed that the modest findings of the present phase could lead the way to a much more dramatic plan of action helping the success of the ambitious new housing policy largely adopted by the government.







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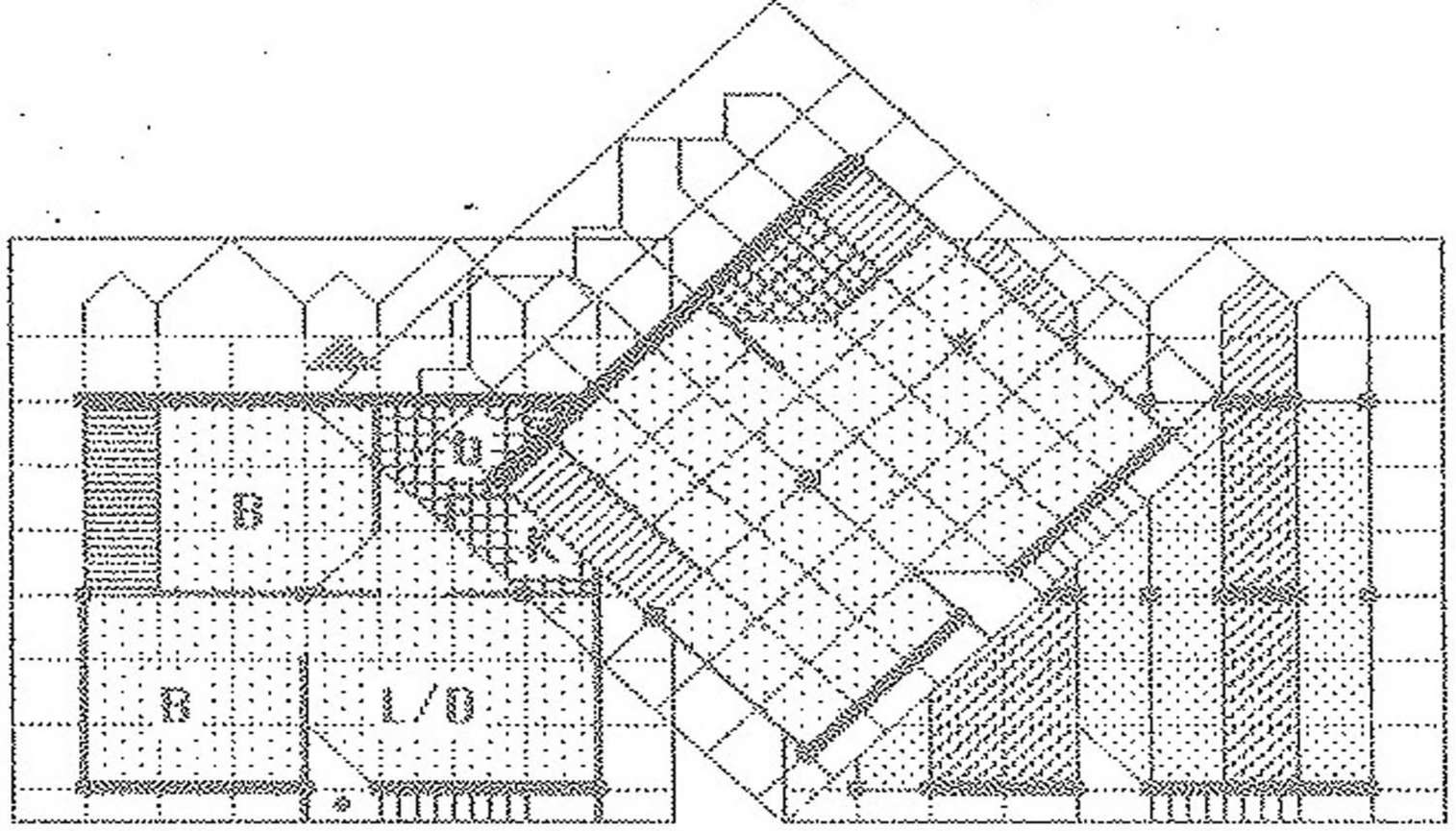

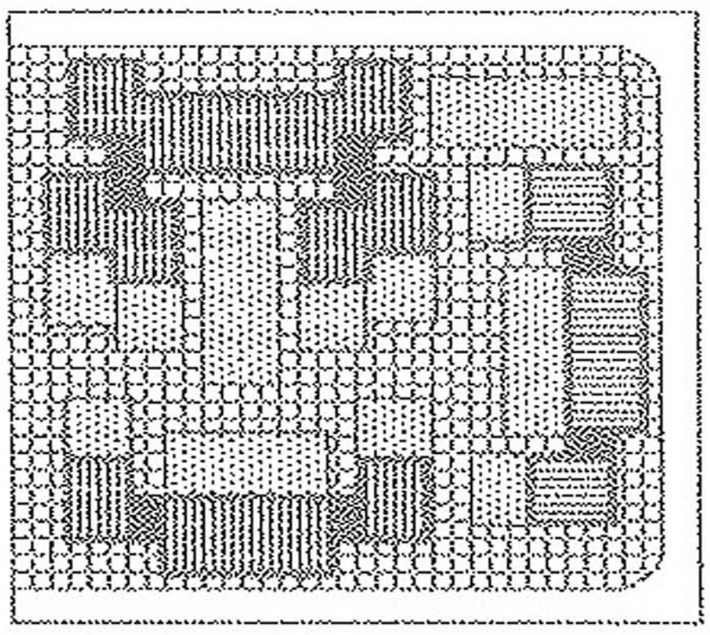

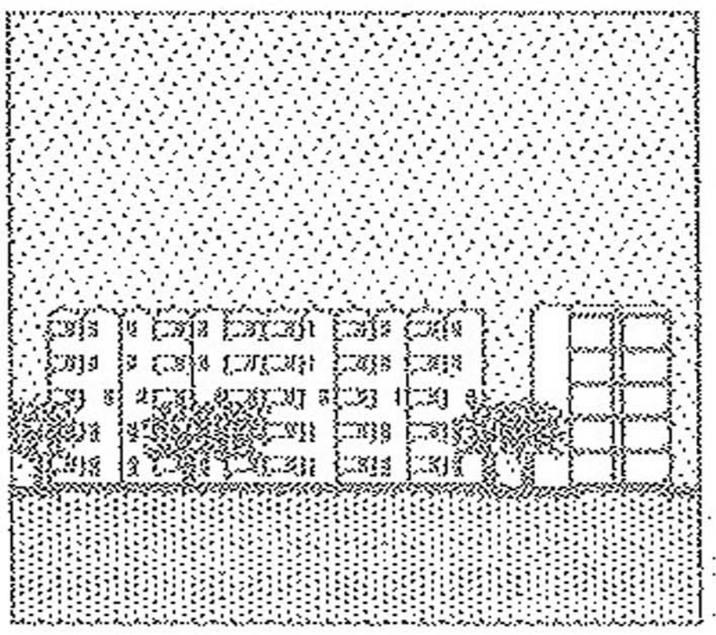

FORMAL LOW COST HOUSING PROTOTYPES

EGYPT
MONITORING, ASSESSMENT AND DEVELOPMENT

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