CENTER FOR ENVIRONMENTAL STRUCTURE

Project 46

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THE NEW APARTMENT HOUSE

by

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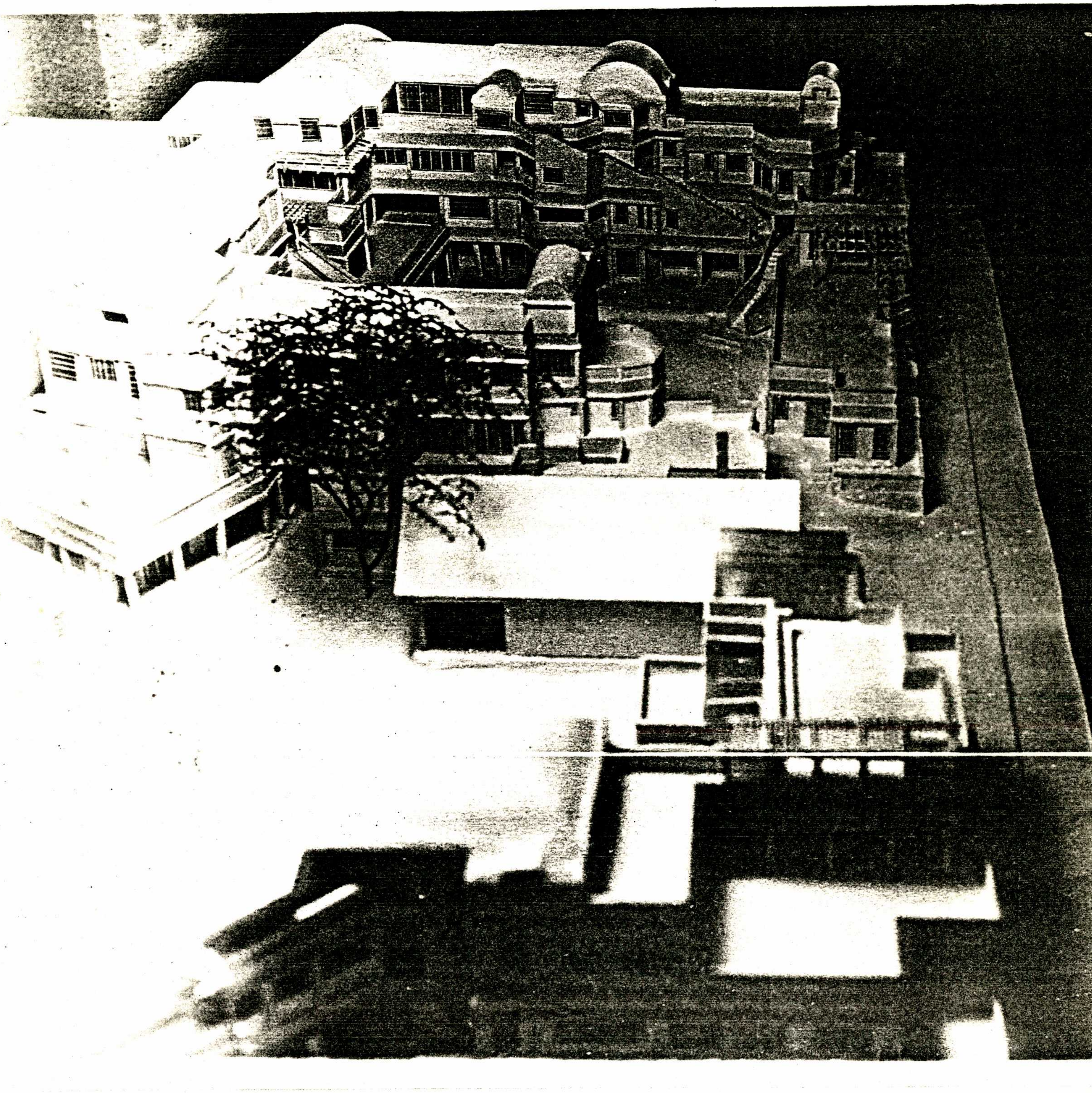

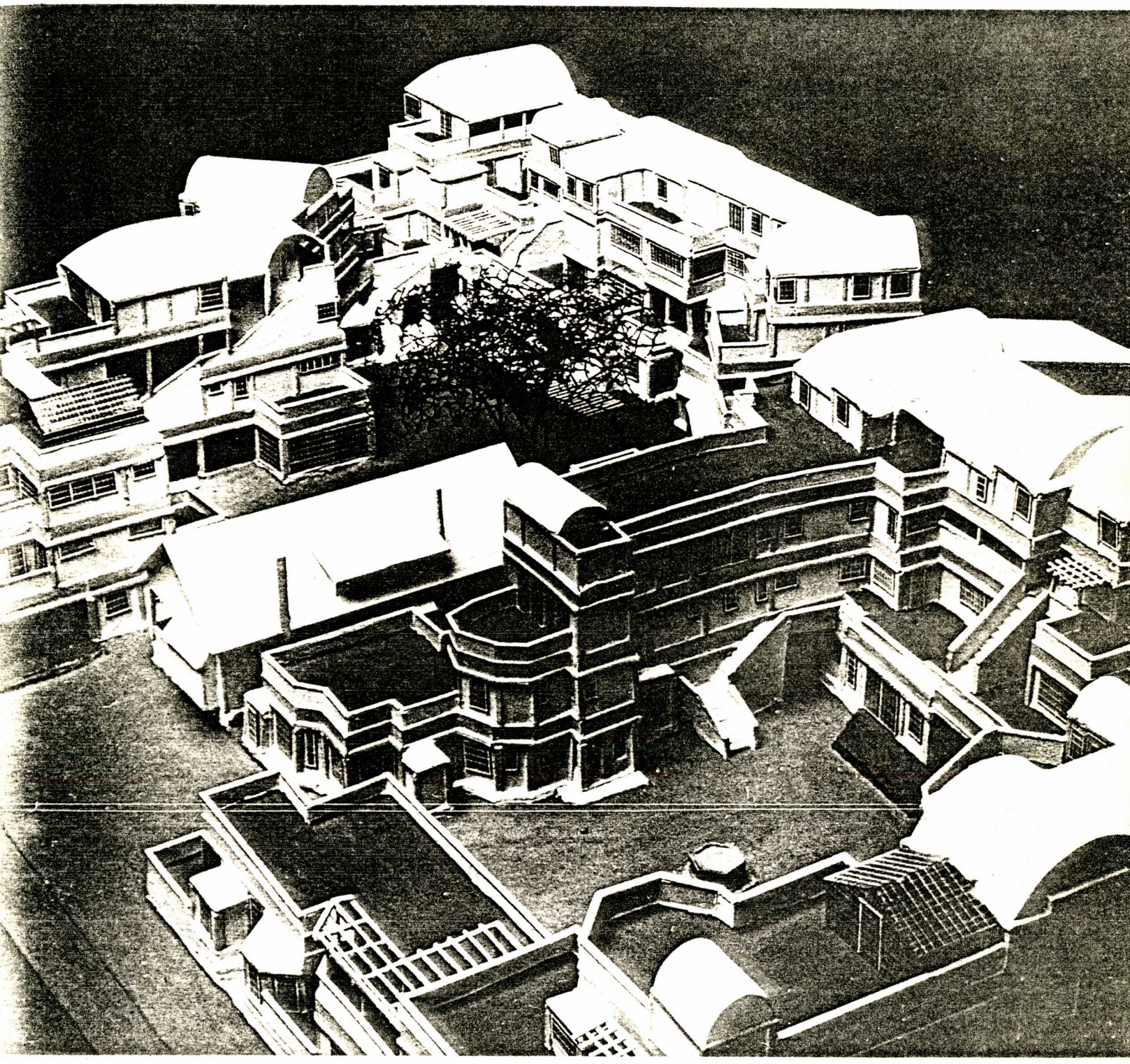

In November 1973 Madame Francoise Choay invited us to join her analysis of the very poor quality of the mass produced standard apartment buildings now being built in France. She suggested that we, the members of the Center for Environmental Structure, might undertake a "synthetic" form of analysis in which we would show, concretely, how we believe a contemporary apartment building ought to be built: in the hope that this design would both function as a criticism of the apartments now being built, by showing up their deficiencies, and would also excite enough interest, in itself, so that a French group of developers, acting in conjunction with the government, would undertake to build a prototype.

We hope to build a prototype as soon as possible.

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I: INTRODUCTION

This project describes a new form of apartment house, intended for families who own their apartments. This kind of apartment has all the life and warmth, which apartment houses built today do not have.

Imagine a neighbourhood of these apartment houses. The buildings are four storeys high, with parts of them forming terraces at the second, and third storeys; these terraces are flat; the topmost roofs are vaulted with simple white barrel vaults. Each terrace is towards the south of its respective apartment; bathed with the sun falling on it. The terraces are as large as small gardens, with bushes, hanging flowers, even a small tree, and outhouses built on them. The buildings themselves are long and narrow, so that each apartment is filled with light; high windows in the larger rooms; light on two sides of every room, at least--perhaps even great bay windows looking out onto their respective terraces. The approach to each apartment is up a rambling stair, which takes its position from the accidents of the apartments which it serves; each stair is public, a place where children play, not too steep, under canvas in winter, open in summer.

Each apartment has its own entrance, visible from the outside, approachable, directly, without passing through

any indoor common space; the entrances have porches, seats, perhaps small entrance rooms inside them; colored doors, and personal decorations round the doors.

The apartments themselves are clustered round a common space, also open to the south, filled with sun, a pedestrian place, where the different stairs begin, and people meet, and children play. On the ground floor, porches, and peoples' cottages and children play, open directly into this common courtyard.

Cars are close by. They are not underground in frightening garages, nor on the ground in a huge sea of parking lots. Instead they are arranged along a small, narrow, intimate road, which passes through the neighbourhood, always close to the apartments. This road is like a canal; it is occasionally bridged by apartments, and apartments often overlap it by ten feet or so. The pedestrian paths generally run across this road; but still the road itself is small and human, and gives access directly and simply from the individual cars to the apartments.

Every cluster has its entrance; perhaps a small workshop of corner store, on the corner where the entrance is; a public outdoor room, perhaps, where people gather; or a flower seller's corner, a tobacco shop.

Inside the individual apartments, the rooms vary in size--they are both larger and smaller than the rooms in a con-

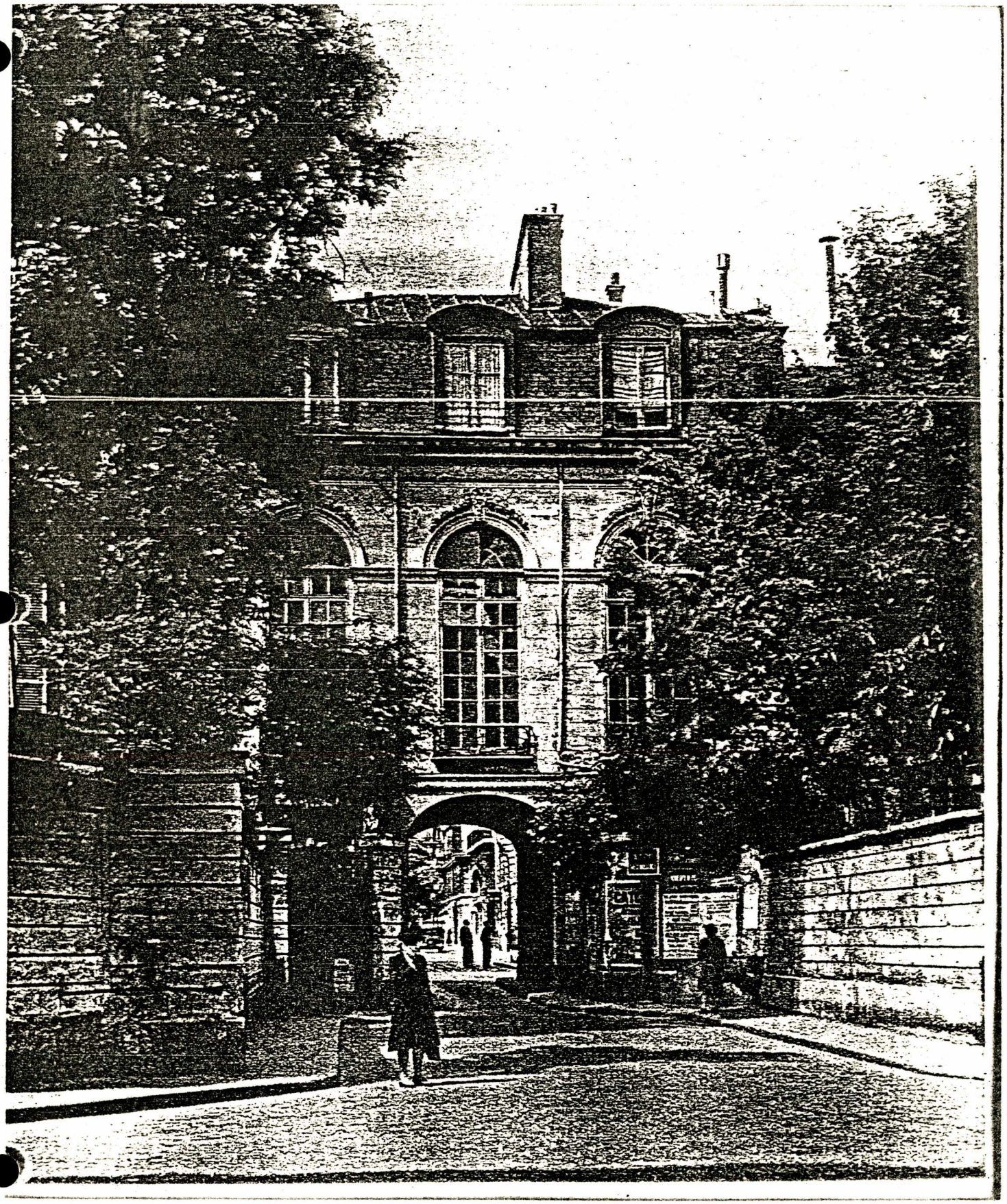
ventional apartment. Usually, there is at least one really big room, with a high ceiling, and plenty of space; and then, around it, perhaps half open, there are also small rooms, perhaps no more than alcoves, where there are beds, a library, a fireplace, a place for toys.

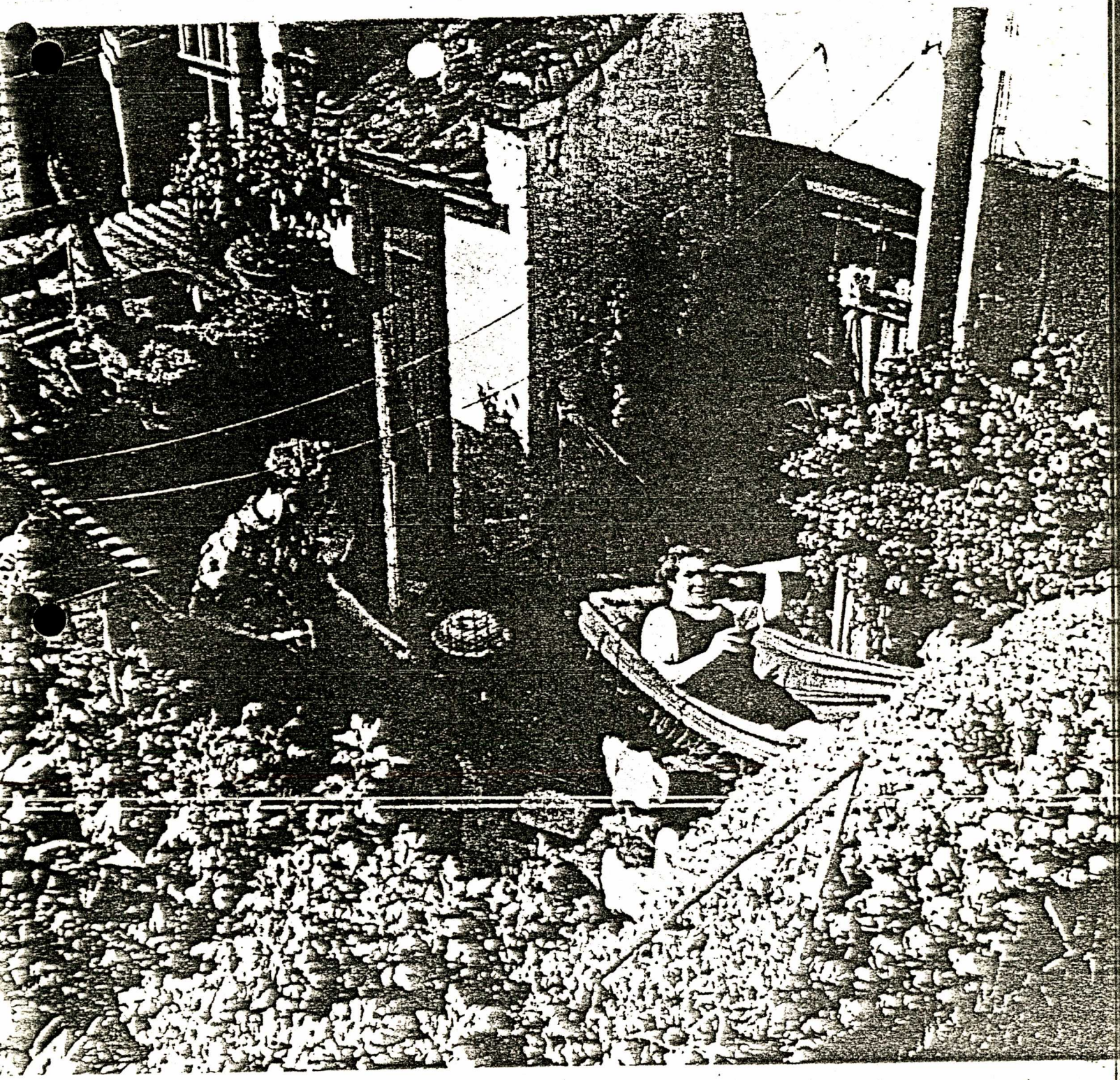
The ceilings vary in height, and they are vaulted, so that instead of the flat endless ugly ceiling of conventional apartments, each room has its own shape, created directly by the structure.

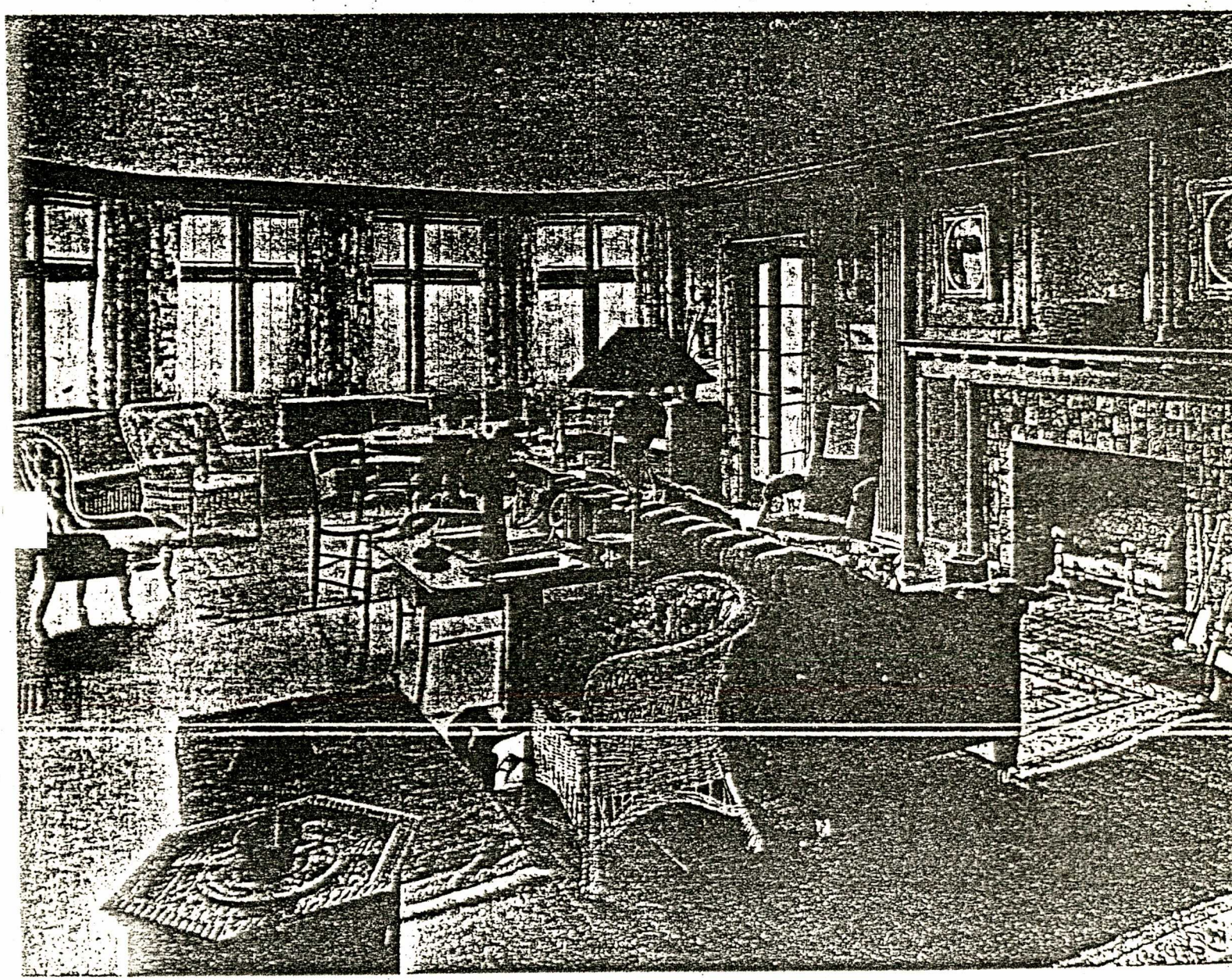
The apartments themselves are made of very simple and conventional materials--but often a little rough--white plastered walls inside; soft tile and brick outside, built a little roughly, with a slight and continual process of maintenance and repair always going on as part of the building's life--sweeping autumn leaves, whitewashing staircase balustrades, building an outhouse or a terrace wall, forming a seat with an umbrella over it.

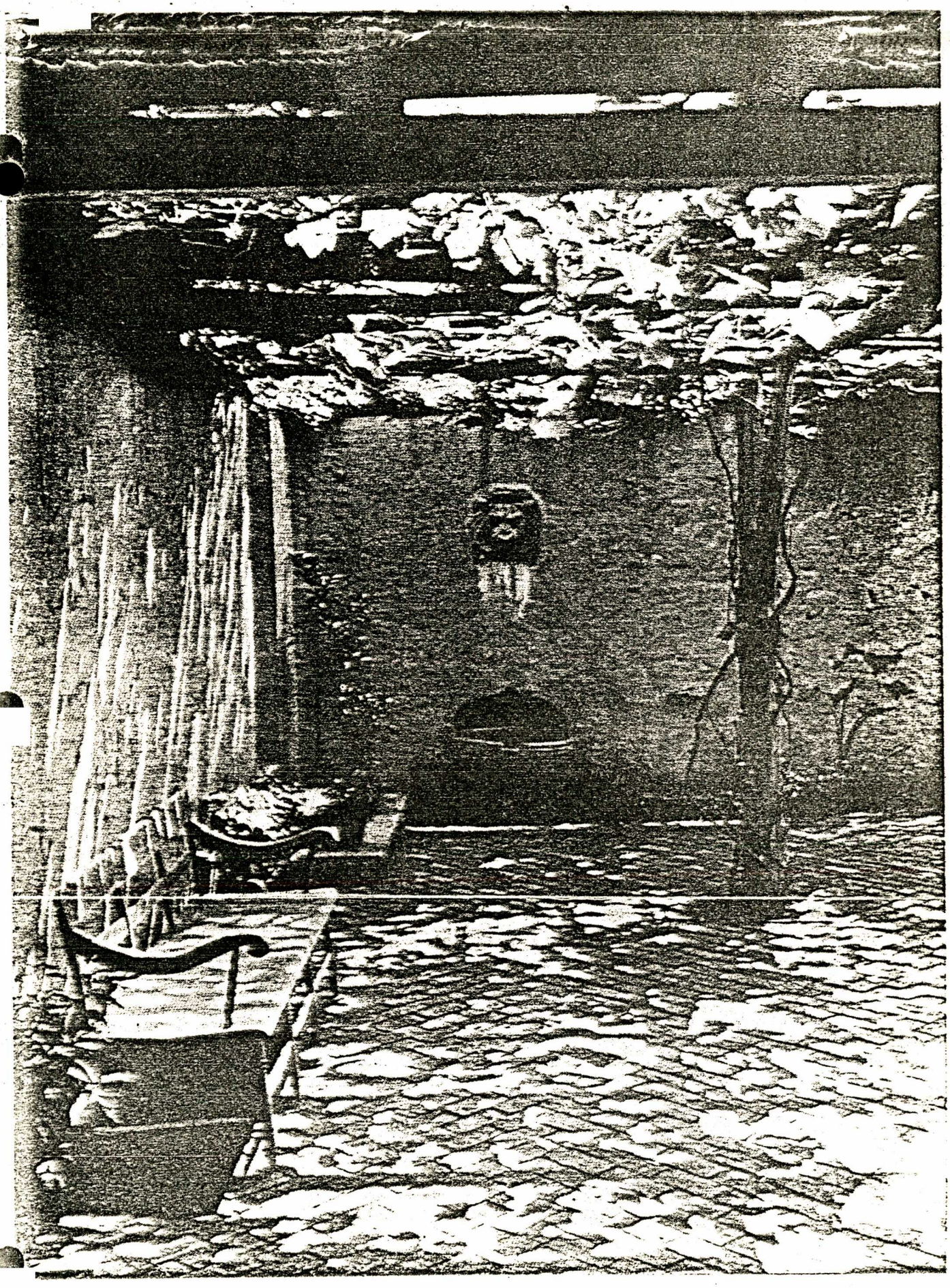
Throughout the cluster of apartments, there is a subtle and continual variety--not the artificial awkward variety created at the drawing board, but the simple organic variety created by the fact that each apartment, like a house, occupies its own territory, and follows the lines which give it the best view, best sun, best access from the common space below, best layout for the individual family . . . and this variety is visible, not in the strange or clever juxtaposition of

different shapes, but in the subtle rhythm of slightly different door widths, different placing of the windows, different window sizes, different positions for the stairs, different floor plans in the individual apartments, perhaps occasionally a genuinely surprising detail, made by an actual person, trying to create something beautiful for himself and his family--and yet all this variety is almost invisible, because the order, and materials are all the same, and it is only gradually that it becomes apparent--but it is just this subtlety which makes it live, and makes it quiet enough, and deep enough, for people to feel comfortable year after year.









II: ASSUMPTIONS

It is not hard to see, that a place of this kind would be a wonderful place to live in--much, much better than any of the terrible apartment houses being built today. But, under today's conditions, it is impossible to build buildings like this. The reason is not, as one might first imagine, economic. In fact, as it turns out, a building of this kind will cost no more than a conventional building. The reasons lie, instead, in the most fundamental assumptions about the processes which underlie the building industry.

These assumptions, taken for granted by architects, developers and government alike, are so basic that, although they actually control the character of the environment almost completely, they are at the same time almost "invisible," because they are so widely accepted without question.

So long as these basic and "invisible" assumptions are allowed to define the apartment building process, there is no way that decent apartments can be built--because these assumptions are in direct conflict with what is required--and they control the process totally.

We have been able to identify seventeen assumptions of this kind:

1. There are a small number of standard apartment units, repeated over and over again throughout the apartment building.

2. These standard units are designed by architects, on drawing boards far from the site, without knowledge of the particular families who are to live in them.
3. The buildings are assembled from large numbers of identical modular prefabricated components.
4. In order to facilitate the use of modular components, the buildings are laid out on modular planning grids.
5. The buildings are designed for high speed erection, in order to generate a large annual volume of new apartments.
6. The architects' and contractors' functions are entirely separated; the contractor makes no decisions before construction starts; the architect makes no decisions after construction starts.
7. The buildings are built in large batches--that is, several hundreds of thousands of square feet are built at once.
8. Apartments at medium-high densities are built five, six, seven, and eight storeys high.
9. Parking is provided in the form of giant parking lots around the buildings, or in similar underground parking garages.
10. Apartment buildings are typically about 60 feet wide, to make the most efficient use of elevators and internal corridors.
11. Apartment buildings are built as outward facing lumps, oriented towards the green space and parking and roads which surround them.

12. Groups of apartment buildings are themselves also oriented outwards towards the land around them, without any sense of social cohesion, or any mixed use within the blocks.
13. Apartments are usually smaller than comparable houses--typically 300-400 square feet per person, 800-1500 square feet per apartment.
14. There are no very large rooms, and no very small rooms: the rooms are all more or less medium and average.
15. Individual apartments very rarely have private outdoor space, comparable in area to a garden.
16. Any outdoor space which is provided is randomly placed with respect to sunshine, and the apartments themselves are also randomly placed with respect to sun, so that some get it, some don't.
17. The apartment is fixed in size, without room for expansion.

With a few exceptions, the layout and production of apartment houses today is always based on these seventeen assumptions. A few experimental buildings (Habraken, Safdie, . . .) have abandoned one, or two, or three of these assumptions. But there are, to our knowledge, no buildings being built today which give up more than five or six of them.

It is true that the French government has recently tried to force architects and contractors to collaborate, with the intention of changing assumption number six. It is true that

many recent designs do incorporate small terraces and gardens, thus changing assumption number fifteen. It is true that many architects have made experiments which allow users to move interior walls in their apartments, and that Habraken and others have even found ways of allowing users to design entire apartments within a fixed skeleton, thus changing assumptions number one and two. And it is true, of course, that there are apartments which are less than 60 feet wide--thus bringing more light into each apartment, and changing assumption number ten.

However, all these changes, well intentioned no doubt, still do not deal with the fundamental issues involved, and have not really altered the character of what is done. The collaboration between architects and contractors, to change assumption number six, helps cost control, but it still leaves their respective functions more or less distinct. The provision of terraces and balconies, which changes assumption number fifteen, is still almost meaningless without a parallel change in assumption number sixteen--orientation towards sunshine--a change which is never systematically made. The fact that users are allowed to change the interior and exterior partitions of their apartments still does little to alter the fundamental facts of assumptions one, two, three and four--namely, that people are still asked to live like rabbits, in huge factory-built warrens. And even in these buildings, less than 60 feet

wide, there is no systematic effort to bring beautiful daylight into every single room, for the simple reasons that there is no way that this can be done without radical changes in the building envelope and the relationships of indoor and outdoor space on upper levels.

In short, although these assumptions are occasionally challenged one by one, as a system they remain intact. The world of our apartments is still essentially controlled by the interconnected complex of these assumptions: and, whether an apartment building process accepts these assumptions, or 80% of them, or even 60% of them, the fundamental complex of "apartments as we know them," still remains essentially unchanged.

We believe that the failure of our present apartment houses to meet human needs--and, indeed, to resemble in any way the humane and beautiful environment which we have described earlier, lies precisely in this fact: that the complex of these seventeen tacit assumptions controls the form of apartment houses, and that this complex of assumptions is entirely wrong.

A radical, and decent solution to the high density housing problem will not come into being until all seventeen assumptions are challenged at the same time, and replaced by an entirely new form of living, based on seventeen opposite assumptions. We now state, and explain, these seventeen different assumptions.

1. INSTEAD OF STANDARD APARTMENTS, each apartment is unique, designed according to its position on the site and in the building complex.

One of the most devastating aspects of the "modern" apartments is the horrible sameness, the lack of identity, the fact that you can hardly tell whether you are in your own apartment or someone elses.

In order to overcome this problem, each apartment must be designed in situ, not on paper, but in the real place where it will be built, when its surroundings are built or partly built already, so that the uniqueness of the apartment is generated naturally, by the unique configuration of circumstances which it has to respond to.

2. INSTEAD OF ARCHITECT-DESIGNED APARTMENTS, each apartment is designed by the people who are going to live in it.

Another devastating feature of our modern apartments is their impersonal quality. Even when interior walls can be rearranged, there is no genuine adaptation to the idiosyncrasies of different families--each apartment still has the same collection of standard living room, kitchen, bedrooms, bathroom.

In order to overcome this problem, the apartments, if they are to be bought by a particular family, must be given the possibility of real idiosyncracy, different kinds of rooms entirely, different arrangements, based on

the real characteristics of real families. These more personal apartments will be just as easy to sell as a standard apartment--in fact, the most expensive apartments on the market are just the ones which have these lovable idiosyncracies.

Also, an apartment designed by a family, for themselves, gets much more input, more emotional energy poured into it than one of 100 apartments being designed by an architect--and, of course, once they occupy it, the members of the family have much deeper roots in this place which is the product of their own creation.

3. INSTEAD OF PREFABRICATED MODULAR COMPONENTS, we assume that the building will be built from highly sophisticated on-site processes, which create subtle variation in actual components, and allow the building to adapt to the uniqueness of individual plans.

It is generally assumed--especially in the French apartment houses we have studied, that the building will be built by assembling pre-formed factory made components; and, further, that these pre-formed components are essentially identical, so that the building is to be assembled from a large number of identical modular components.

The modular components not only contribute to the machine-like sterility already described; they also constrain the plans enormously, and make genuinely subtle

adaptations impossible. The houses in a traditional building complex are all slightly different in dimension, not because of inaccuracy, but because proper adaptation of one building to the next requires it.

We replace this assumption, with the opposite assumption: namely, that a more sophisticated technology creates the components on site, in position, according to highly sophisticated machine processes, handled by men--and that the actual components which are produced by these on-site production processes, will be unique, and adapted to the particular position in the building which they occupy.

4. <u>INSTEAD OF A MODULAR PLANNING GRID, the order of the whole is given by patterns which create organically necessary relations with respect to the individual nature of each site; in particular, corners need not be perfectly square, and walls need not be perfectly parallel: instead, they are fitted more exactly to the site.</u>

Large buildings are usually laid out on a modular planning grid: partly because it is assumed that the building will be made of modular, rectilinear components, and partly for some imaginary "planning efficiency." The perfect right angles and perfect eveness of the grid create a great deal of waste space, both in the buildings and around them. Positive outdoor space can only be created when natural spaces are formed by the buildings, according to the peculiarities of the site: and this can

only happen if the buildings themselves may vary slightly from the right angle, and from the parallel, in order to accommodate to subtle changes.

This is usually ruled out by modular construction. However, as we shall see below, with the help of the building system specified, it is perfectly possible to have buildings with slightly uneven ground plans, where adaptation to site conditions requires it, and we assume that every building complex will have some degree of this uneveness, to improve the outdoor spaces in between the buildings.

5. <u>INSTEAD OF HIGH-SPEED CONSTRUCTION ON INDIVIDUAL SITES, we assume a high volume of slow construction spread out over a large number of sites, so that even though growth on any ONE site is relatively slow, the overall speed and volume is still high.</u>

Many of the deficiencies in present day apartment house construction can be tied to the need for high speed construction and development (modular construction, for example, is often praised for its speed); and this need for high speed construction is itself based on the housing shortage, and on the need to generate a large housing volume per year. Our assumptions require a slightly slower rate of construction, and might therefore be criticized on the grounds that they cannot generate the necessary housing volume in a given space of time. <u>However, there</u>

is no inherently necessary connection between the volume of housing produced in a given year, and the rate of construction on a given site. Suppose we have to build 500 units, in a certain town, in five years. We can build one building with 100 units, on one new site each year. Here the rate of construction is high. If, instead, we have a form of apartment which only creates 10 units per year, the rate of construction is low. But to reach the same volume per year, we merely have to start this process on a larger number of sites. Thus, we may start 10 new buildings, on ten different sites, all in the first year, and let each one grow at the rate of 10 apartments per year. At the end of five years, this process will also have produced 500 apartments; the total volume it produces is also 100 units per year.

6. INSTEAD OF A SHARP SEPARATION BETWEEN THE ARCHITECT AND THE CONTRACTOR, the architect's function and the contractor's function are interwoven, so that design decisions can be made continuously, while construction is under way.

When the two functions are separate, it is necessary to prepare complete sets of drawings of a building complex, which destroys the possibility of the slow, sensitive adaptation of parts to the whole, which we have described above.

We consider it essential, therefore, that the relations between architect and contractor be revised, so

that complete drawings of huge building complexes are never made in advance, but instead, worked out as the building complex grows. This has the feature, which we consider essential, that each apartment is always designed, in the context of an existing fabric, with the result that light, open space, privacy, views, and access are all adapted to some real conditions. Any attempt to design all the apartments ahead of time will always have the result that they are not based in the real situation, and therefore not properly adapted in any of these respects. We cannot emphasize this too strongly.

7. INSTEAD OF HUGE BUILDINGS WHICH CONTAIN MILLIONS OF SQUARE FEET, buildings are built in small groups, each one adapted to the previous ones, and growing over periods of several years.

The disadvantage of building in large lumps is fully, and extensively described in The Oregon Experiment, by Alexander, Ishikawa, Angel, Silverstein and Abrams, Oxford University Press, 1975, in chapter 3 entitled "Piecemeal growth." Essentially, it is shown there, that large volumes of construction never succeed in creating adequate adaptation to the various real life circumstances which develop in and around the site, and that these adaptations can only be made under conditions where buildings are growing relatively slowly.

Suppose, as we have stated below, that there are three fundamental units:

The apartment

The cluster = 12 apartments

The neighbourhood = 8-9 clusters = 100 apartments

We propose, then, that a neighbourhood grow slowly, over a five year period: about two clusters per year. This means that each year, two buildings, each containing about a dozen apartments, are added to the growing whole: and they are always added in such a way as to increase the wholeness of the growing neighbourhood, and adapted to the needs and opportunities and deficiencies of the neighbourhood which have developed during the previous years.

8. INSTEAD OF HIGH BUILDINGS FIVE TO EIGHT STOREYS HIGH, buildings must be no more than four storeys high, but closer together, to create comparable densities, and to increase the human quality of the common land between the buildings.

High buildings do extensive social and psychological damage. This is fully discussed in A Pattern Language, under "Four storey limit." In addition, at four storeys, buildings put everyone in touch with the common land at the bottom of the buildings, do not require elevators, and permit types of construction which are compatible with the requirements of the construction process described below.

This type of construction can comfortably reach densities of 35 apartments per gross acre--the same level usually reached by the 5-8 storey buildings, in typical medium-high density developments. For the full details about the disposition of land for parking, common land, and private land, see the discussion under assumption fifteen.

9. INSTEAD OF VAST PARKING LOTS OR VAST GARAGES, the cars will be parked on shielded narrow one-way lanes which wind through among the buildings, and in small parking lots with no more than half a dozen to a dozen cars, between the clusters.

Present day apartment buildings have their parking either in large, terrible, monster parking lots, which surround the buildings, and destroy the environment--or they put parking underground, where all contact with the car is lost. On the basis of the patterns Shielded parking, Small parking lots, Looped local roads, and Car network in A Pattern Language, we consider it essential that the following criteria be met:

a. It is not necessary to walk through the parking, when approaching the building on foot, from nearby shops or neighbourhoods.

b. The cars are on streets, which are distinct from the main pedestrian streets.

c. However, cars are very close to people's apartments--no more than 150 feet.

d. The places where cars and people meet form natural nuclei of activity.

e. When cars are in parking lots, the parking lots must be very small indeed.

There is a tendency to exaggerate the evil of the car. Cars, in moderation, correctly placed, enliven the environment, because they create a natural sense of openess, the possibility of adventure and contact with the larger world. It is only when they are massed in huge parking lots, or on massive streets, that they become intolerable.

10. INSTEAD OF STANDARD RECTANGULAR BUILDINGS, SIXTY FEET WIDE, we assume that no part of any apartment building is ever more than 25 feet wide, so that every room has ample natural daylight, and all important rooms have daylight on two sides.

The standard apartment houses are, typically some 60 feet wide--with apartments in rows down two sides, or around a central elevator core. This creates terrible light conditions. One of the most fundamental differences between most houses, and most apartments, is that the apartments have less light, inferior quality in the light, and--specifically--that they have few if any rooms which have light on two sides, whereas many of the best rooms in a house do have light on two sides. This is discussed extensively under Wings of light and Light on two sides

of every room, in A Pattern Language. In order to make decent apartments, where people feel genuinely comfortable, it is necessary to increase the exterior surface of the building, and to make the buildings up from narrow wings, in which the rooms are bathed in light.

11. INSTEAD OF SOLID BLOCKS WITH LAND AROUND THEM, we assume that every dozen apartments are built to form an inward-looking cluster, built around common land which takes the form of a courtyard or a garden.

The larger apartment blocks entirely lack any form of social grouping. Fifty, 100, sometimes 500 apartments are lumped together in single huge complexes, with no sense of belonging, no sense of social order.

We, on the contrary, believe that it is necessary to make the opposite assumptions: namely, that the apartments must be grouped in identifiable clusters (we believe about 12 apartments to one cluster). This will allow people to develop an intimate sense of territory, and communality. The numbers governing the size of the clusters are taken from the pattern House cluster in A Pattern Language.

12. INSTEAD OF APARTMENT BUILDINGS GROUPED AS ABSTRACT COLLECTIONS OF UNITS, the clusters which form the individual apartment buildings are themselves grouped to form small neighbourhoods with their own shops, small public squares, workshops, offices, and other possibilities of life and action.

The abstract and non-social character of present-day apartment blocks does not only lie in the "outward facing" character of individual buildings just described, but also in the overall arrangement and land-use, which, like the smaller buildings, is essentially outward facing too, and lacks any sense of social cohesion or identity.

Small neighbourhoods, with populations of 300-1000, clearly marked boundaries, gateways, communal functions, solve these problems. They are described at length in Identifiable neighbourhoods, in A Pattern Language, and in the forthcoming book The Self-Creating Life of Neighbourhoods. At this scale, one neighbourhood will contain a minimum of 8-9 clusters.

13. INSTEAD OF BEING SMALL AND CRAMPED, each apartment is as large as a comparable house, with less money in services and finishes to make the larger space available without increasing price.

It is nowadays generally assumed that an apartment will have about 200-300 square feet per person. In a typical house, by comparison, there are 250-500 square feet per person. Yet the apartment also feels intrinsically more cramped than a house, because it is closed in, has less light, less access to usable areas around it, and fewer opportunities to play, work, sit outdoors around it.

In order to have the same feeling of generosity and comfort as a house, the apartment must, first of all,

have direct access to outdoor space (see assumption fifteen below), and it must be long and thin, so that the space has more opportunity for a variety of activities indoors (see the pattern Long thin house in A Pattern Language). But finally, and most important of all, the apartment must have at least the same absolute area as a comparable house. We consider it desirable to reach an absolute magnitude of 250-500 square feet per person. The beautiful apartments of the 18th and 19th centuries, much coveted now, all have larger rooms, high ceilings, more space, more generosity--and it is clear that when some way can be found to make more space this will have a fundamental and essential effect on the well-being of the apartment users.

It is possible to create more space, without increasing costs, by building the shell of the building (including walls and ceilings of individual rooms), but without finishes. Since finishes represent some 30% of conventional building costs, it is possible for those users who wish to pursue this option, to increase the absolute areas of their apartments by some 30% without increasing overall costs.

Informal studies and questionnaires show that people asked to choose between a small apartment that is highly finished, and a larger one that is unfinished, will often choose to buy the larger, unfinished space, with the idea that they will then finish it themselves, once they are living in it.

14. INSTEAD OF HAVING A COLLECTION OF SMALL BUT AVERAGE ROOMS ALL ABOUT THE SAME SIZE, there will be at least one really large room, and several really small alcove-like rooms.

The same sized rooms which follow from minimum area codes and concern about resale, also do a great deal to give modern apartments their pokey, confining character. None of these rooms is really large enough to enjoy as a room; nor small enough to be an "alcove" which is truly private, secret, intimate . . . The collection of even-sized rooms, and "greyness" of space which this creates makes it very hard to have apartments with any intensity of feeling in them.

We propose, instead, to make certain that there is at least one huge room, large enough to dance in, large enough for a party, to use as a studio, to use as a work-shop, to play table tennis in--to do things which need space, different, probably, for every family. And, to make up for the extravagance of this one space, we suggest also relaxing the codes, and allowing children's bedrooms, the master bedroom perhaps, a study, a library, a breakfast area, a kitchen--depending on the families' desires, to be really small with a low ceiling, and storage above.

This variety of space sizes will come about naturally, under the design by the users (assumption two), but needs

to have permission, since present-day codes make it impossible, and cramp designs severely.

15. INSTEAD OF UNUSABLE COMMON SPACE ON THE GROUND, every apartment which is off the ground has a garden, at its own level, on the roof of an apartment below, and this garden is at least half the size of the apartment which it serves.

It is commonly assumed that apartments have either no gardens, or small covered balconies, or occasionally, pitifully small terraces on the roofs of lower apartments. We assume, on the contrary, that every apartment on every level has direct access to outdoor space. This outdoor space fulfills three functions:

1. It greatly increases the sense of spaciousness of the apartments. One of the reasons apartments generally feel so cramped is that you cannot go outside from them, into the "larger" open air.
2. It creates the possibility of sun, air, plants, at every level.
3. It provides a piece of land, where the apartment can be expanded--there is room for additional rooms to be built, without interfering with neighbours.

To fulfill these functions, we have found that this outdoor space needs to be at least half the area of the apartment itself. At the density we have chosen--35 households per gross acre, this creates a set of very

specific constraints, reflected in the process which follows. The ground floor apartments do not, in this scheme have private outdoor space, because they have a commanding and easy access to all the common outdoor space.

16. INSTEAD OF OUTDOOR SPACE WHICH IS IN SHADOW, AND THEREFORE USELESS, all outdoor space, and especially all private gardens and balconies, face towards the south so that they get the sun, and every apartment has at least one big sunny room, which opens into its own garden.

In temperate climates, outdoor space is almost useless, unless it is in sun; and in many apartment complexes, the space is randomly placed with respect to sunshine. And even though some space is always in the sun, of course, our research shows that it is not really used, unless the sun falls just on that part of it which is immediately next to the building which it serves--see the full discussion in A Pattern Language, under South facing outdoors, Sunny place, and Indoor sunlight.

In our process, the sequence of construction, cluster by cluster, makes sure that each cluster is placed in such a way that its apartments get the sun, and each floor is laid out in such a way that each apartment has its garden to the south of its indoor space, so that the indoors and the garden both get the sun, and are both usable.

17. INSTEAD OF FIXED APARTMENTS WITH NO OPPORTUNITY FOR EXPANSION, every apartment has the opportunity to build on extra space.

One of the most valuable and important features of a house, is that extra space can be added later, when there is more money in the family, when the house is paid for, when extra children come, or there is a need for a cottage for parents, etc. Apartments usually make this impossible.

We assume, instead, that every apartment can be enlarged, by adding rooms on the garden terrace which belongs to the apartment--preferably, in some corner of the garden which turns out not to be used.

The overwhelming difference between these two sets of assumptions lies in the fact that the first set deals with an apartment building as an abstract product of mass production, while the second set deals with the creation of the apartment house as an on-site process. Of course, the present production of apartment buildings is also a process; and of course the apartment buildings built under the second set of assumptions will also be products. However, in a nutshell, we may say that it is this difference of emphasis which is the crux of the whole matter.

III: PROCESS

We shall now describe a step-by-step process which embodies the seventeen new assumptions stated in the last part of chapter II. This process covers the totality of the production of a new apartment house. It starts with rough planning, passes to rough design, then to detailed structural design, and finally to construction. At every stage, the process is more open than the present process is. It includes the people who will occupy the apartment buildings, at almost every step; it includes an architect-builder, who guides and steers the process as a whole, and who then takes responsibility for actual construction; it includes opportunities for change, modification, adaptation, and the correction of mistakes. It is, in short, much richer, more complex, more organic, less cut-and-dried than the processes which exist today. And, above all, it includes the unexpected; the outcome is not perfectly predictable. That is where its life comes from.

1. The Neighbourhood

The largest unit of our apartment house construction process is the local neighbourhood. A local neighbourhood has a population of about 500 people (or 100 to 150 apartments), built at a density of about 30-50 apartments per gross acre, so that each neighbourhood occupies a total area of about 3 acres.

Each of these neighbourhoods is itself made up of smaller units which we call clusters. Each cluster contains some

8-15 apartments, is four storeys high, and surrounds an area like a courtyard, or common garden, shared by all the apartments in the cluster.

The general character of the neighbourhood is given to it in large part by the relation between roads, and parking lots, and pedestrian paths, and common land.

The network of roads and parking lots lies outside the clusters, and between clusters. The network of paths and public common spaces lies within clusters, with paths that cross the roads connecting clusters to one another.

In order to keep the parked cars in a reasonable, subdued relationship to the pedestrian areas, and yet still close to individual apartments, the cars are parked along both sides of one-way local roads, and these local roads are hemmed in on both sides by the buildings which form the clusters.

To reduce the open space created by parking still further, and to shield parked cars even more, and to maintain a high density, the apartments overhang the parked cars, along the sides of the local roads, at many points along their length, so that the roads function as narrow canyons, good for driving, but not given to much activity, and not robbing the site of its vital sun and air.

Those cars which cannot be accommodated in the narrow local roads, are parked in small parking lots, never more than 10 cars at a time, placed in between clusters, in those places

where they do the most to increase the sunlight which reaches the apartments on the ground floor of a cluster.

2. The Growth of the Neighbourhood, One Cluster at a Time

A neighbourhood of this type may be created within an existing area, or on a virgin site. In either case, the neighbourhood is built gradually, one or two clusters at a time, and the entire neighbourhood takes 4 or 5 years to complete.

Each cluster is laid out to fit the surrounding buildings, in such a way as to contribute to the growth of the neighbourhood as a whole: and is also shown placed in such a way as to fit snugly with previous clusters, and any existing buildings left standing on the site, or on adjacent sites.

This cluster-by-cluster growth is controlled, essentially, by the large scale patterns for the neighbourhood, and by the diagnosis, undertaken at each increment, which shows which of these larger neighbourhood patterns need to be developed most, in any given year.

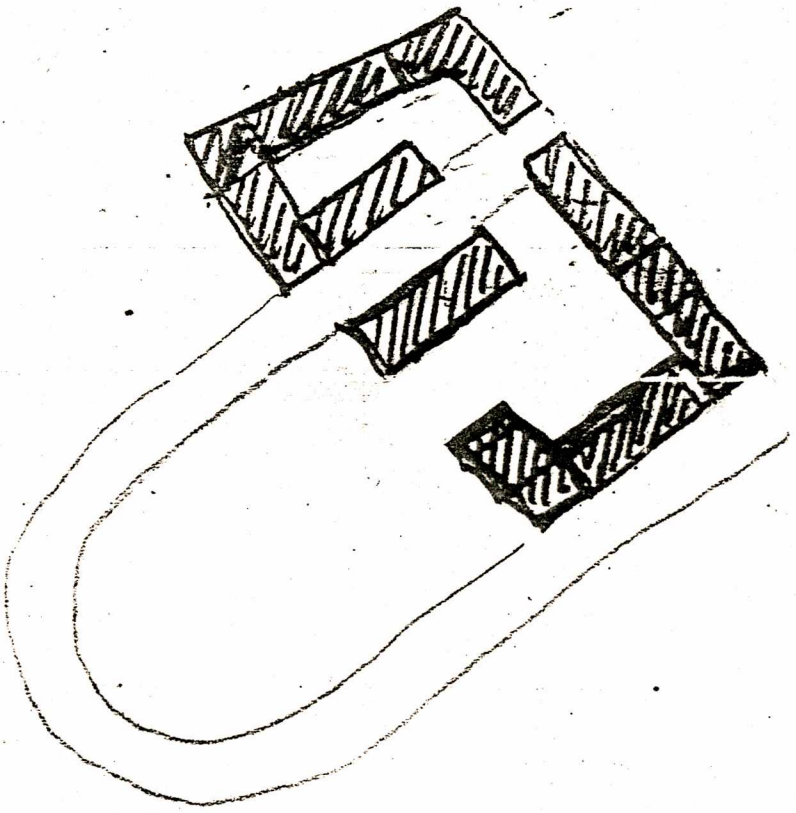
Thus, in the example which follows, the road is built in the first increment, following looped local roads. This road is a one-way loop, built in the form of a horseshoe, 30 feet wide, with parallel parking along both sides, about 700 feet long. This road will provide parking for 70 cars. Additional small parking lots which must be added gradually in later steps, to provide parking for another 30 cars, making a total of 100 cars--1 per household.

In the first year, two clusters are built on either side of this road, to form a main gateway to the neighbourhood, where the road begins. In addition, the second of the two clusters, the one in the center, has a natural role as the activity nucleus at the heart of the neighbourhood, and therefore gets developed with shops at the ground floor, and with more paths than usual leading in and out of it. Finally, the paths themselves form the beginning of a path network by crossing the road at right angles, and with the possibility of connecting slueters later, clusters later, independent of the road.

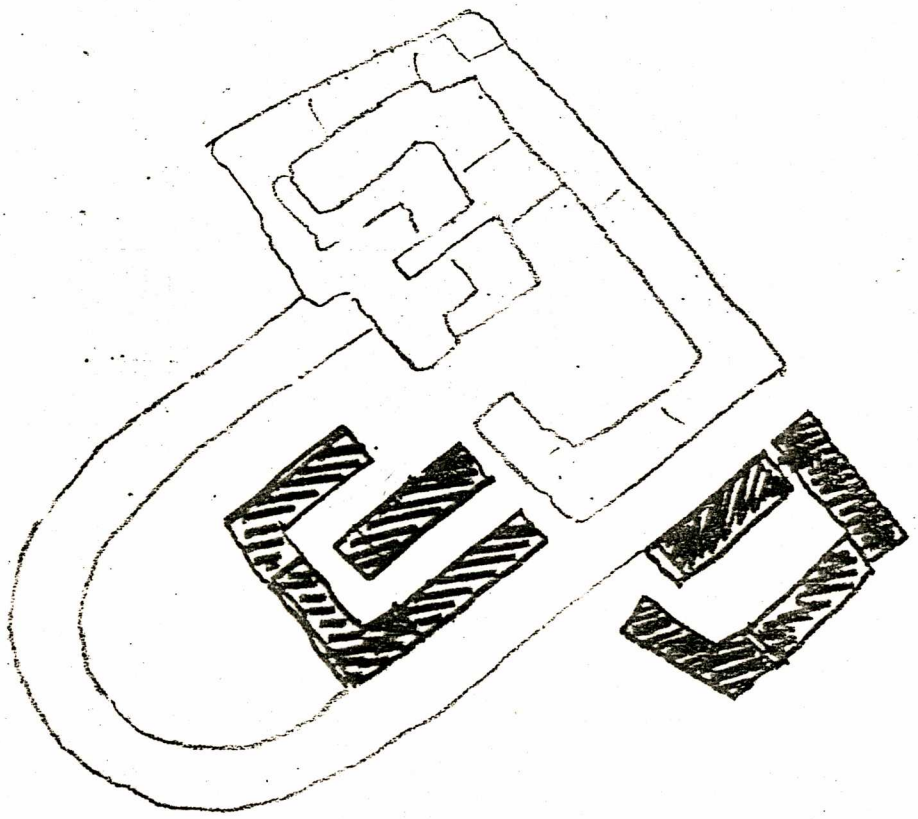
The next clusters which get added continue the development of path network; and they are placed, too, in such a way as to put small parking lots between the clusters, south of the clusters, so that the new clusters also get the sun, and are not shaded by the high part of the earlier cluster.

In general, the clusters are built, starting from south, so that each new cluster can place itself correctly, with respect to the shadows that the earlier clusters create. This allows each cluster to get the maximum benefit from south facing outdoors and indoor sunlight.

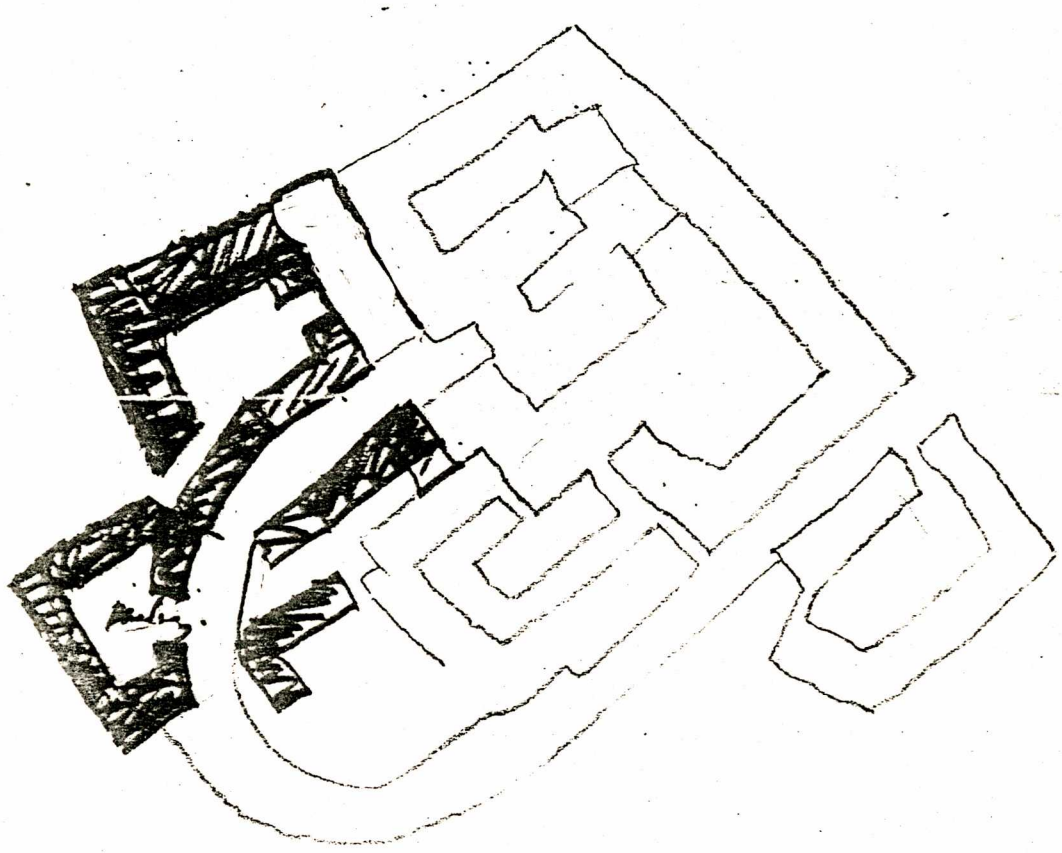
The fifth cluster, in the example which follows, is a work community. This is built, in response to the fact that every neighbourhood needs work happening in it; as a result the cluster is built with a courtyard in which cars and small trucks can park, unlike these clusters which are purely residential.



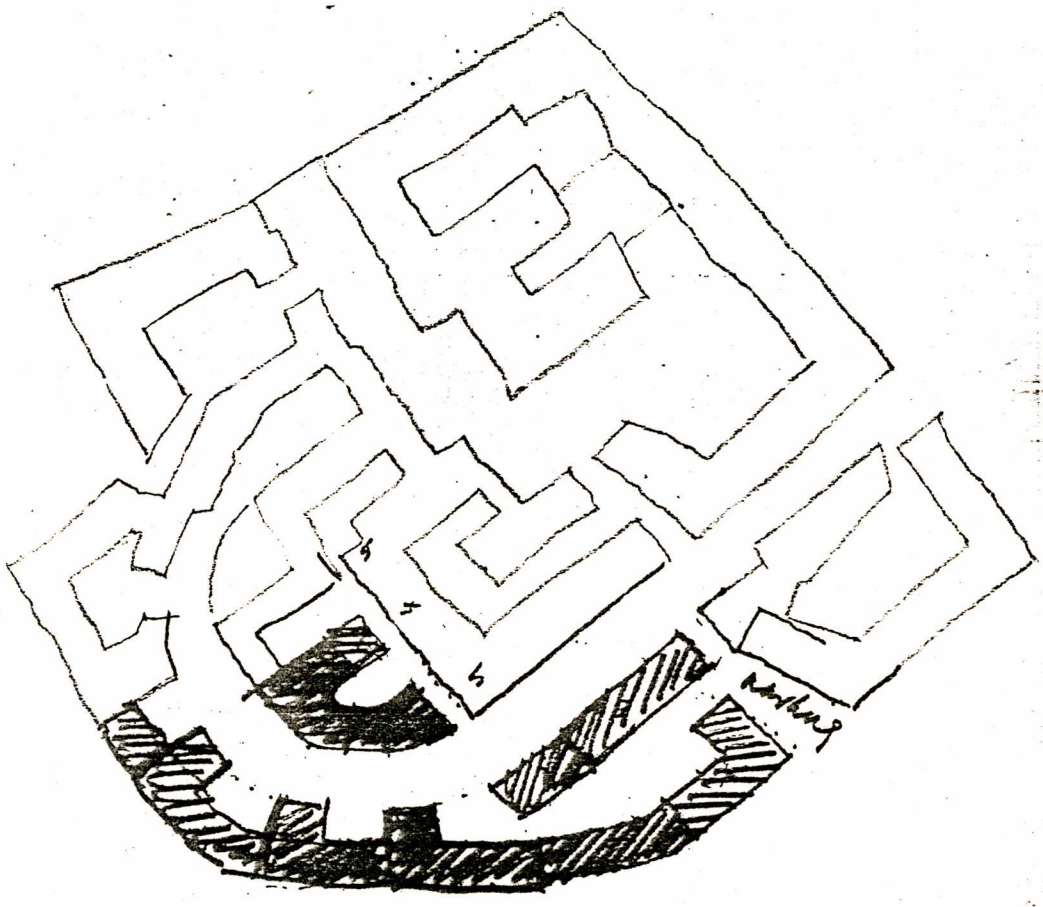
First year: two clusters



Second year: two more clusters



Third year: more clusters



Fourth year: the neighbourhood complete

And the fifth and sixth clusters, also continue the development of a pedestrian street which runs north from the activity nucleus in the second cluster, and so creates a spine, at the rough center of the neighbourhood.

The neighbourhood is complete after four years of growth.

3. The Layout of One Cluster

We shall now describe the way in which each cluster gets laid out, within the overall growth process described above. This layout process is done by the architect-builder who controls the entire growth process (see page below).

Each cluster will contain some 8-15 lots, laid out on four floors. In the example which follows, there are 13 apartments and they have areas ranging from 800 square feet to 1700 square feet, with the total area of the lots (indoor and outdoor) ranging from 1200 to 2500 square feet. These rather large areas are based on high-income California conditions. For lower incomes, or higher densities, the apartments can be much smaller. They can range from 400 square feet to 1000 square feet (with corresponding total lot areas of 600 square feet to 1500 square feet), without changing the process, or the design, in any essential way.

Two-thirds of each lot is assumed to be indoors, covered either by the floor of the lot above, or by the roof; one-third is assumed to be outdoors, open to the sky. The indoor areas will turn into apartments when the users design them;

the outdoor areas will turn into outdoor terraces and gardens. To make this work, the total areas on the four floors must have thsee ratios:

	Indoor	Outdoor
First	100%	50%
Second	67%	33%
Third	45%	22%
Fourth	30%	15%

In the particular example shown below, these area ratios generate 5, 3, 3 and 2 lots respectively, on the four floors.

The lots are laid out only roughly at this stage. The exact configuration of each lot, both its indoors and its outdoors, will not develop until the users design their own apartments, as described in the next step.

However, this rough layout does define those major patterns which are needed to make the cluster work successfully as a whole: above all the relation between common land and private lots, the location of stairs, the position of parking, position of passages which cut through the building, the area of each lot, and, perhaps most important, the relative placing of indoor and outdoor areas, within each lot.

To generate the layout for each cluster, it is necessary to do the layout floor by floor, starting with the ground floor and going upward.

The patterns which control the layout of a cluster are:

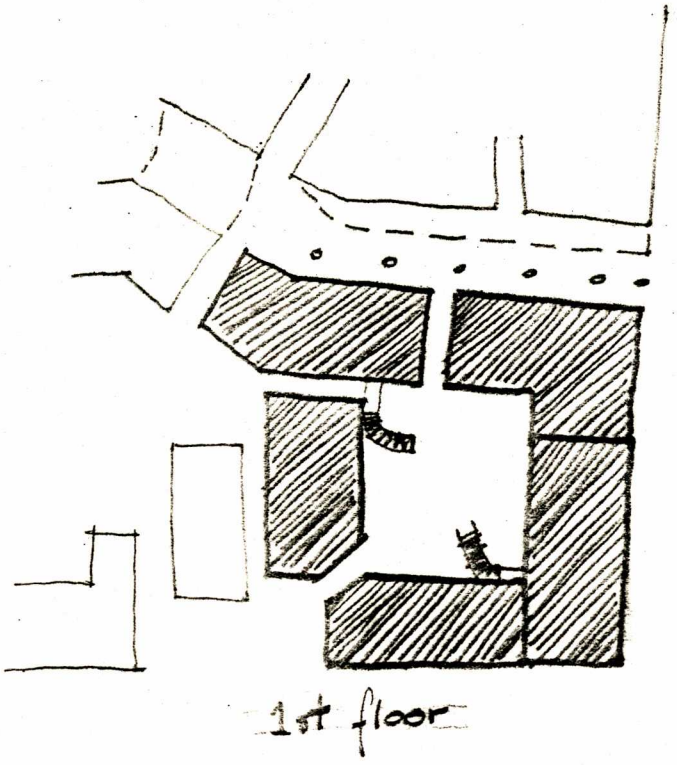
97. Shielded parking
98. Circulation realms
102. Family of entrances
105. South facing outdoors

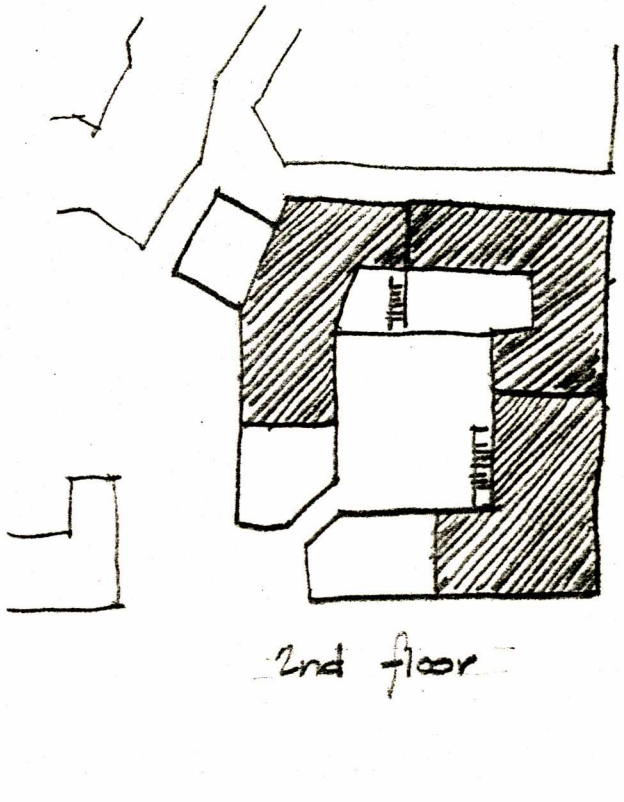
106. Wings of light
107. Positive outdoor space
108. Connected buildings
109. Long thin house
113. Car connection
116. Cascade of roofs
117. Roof gardens

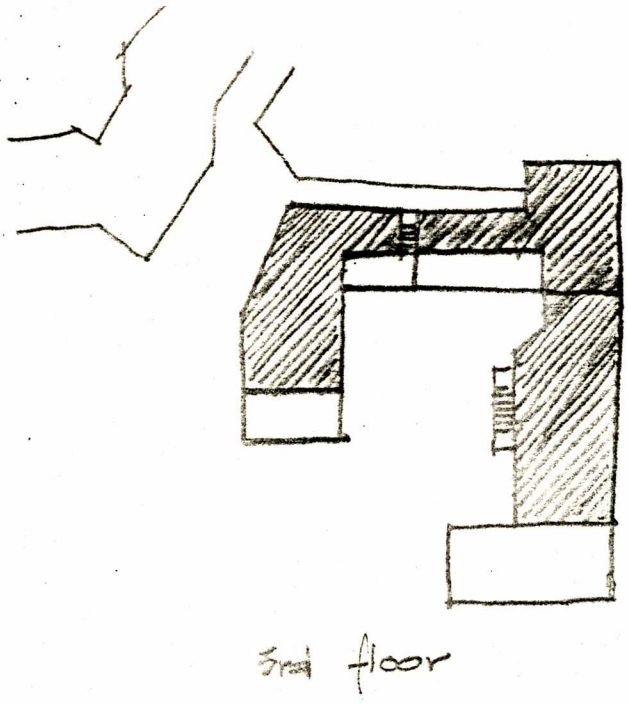
More informally, we recommend the following rules of thumb: the overall layout is done in such a way as to provide maximum sunlight for the apartments in the cluster, and to maintain sunshine in the cluster courtyard for as much of the year as possible. In the example shown, there is a beautiful evening sun, so lots and terraces are oriented slightly west of south. Each lot is approximately 25 feet wide (more on the ground, less on the fourth floor). Terraces are placed towards the south, and the main body of the outdoor space for each lot is, as far as possible, in one continuous lump.

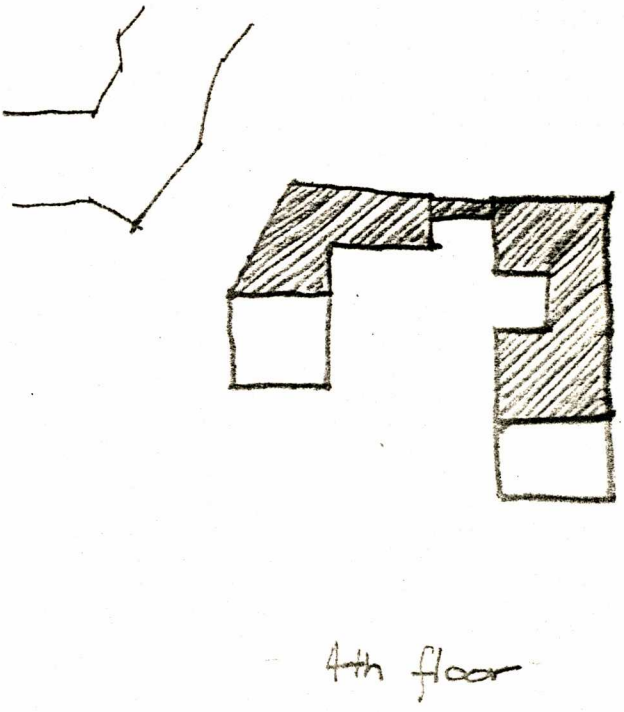
Outdoor stairs are placed to help form the common space of the cluster, and to give direct and private access to each apartment, on every floor. This means that stairs, in general, form continuous runs, with entrances to lots at the landings of the stairs; occasionally it is necessary for a stair to split. Small freight elevators (dumb waiters) are put in to serve the third and fourth floors.

Passages are made between lots, on the ground floor, in such a way as to create direct connections to parking, wherever that is, and to create the continuous path network required









The lots for one cluster

by the neighbourhood as a whole. Wherever possible, the second floor overhangs the parking along the street, so as to put the parking itself under 10-foot wide parking arcades.

Apartments on the ground floor do not have private gardens, in the same marked sense as the upstairs apartments do. Instead, they do have the right to place some private or semi-private space, in the form of a slightly raised terrace, out into the communal space.

Note, finally, that the layout of lots is quite relaxed and rough. It cannot be precise at this stage, since the boundary between indoors and outdoors may be changed, within reasonable limits, during the detailed design of apartments, and the effects of these changes will ripple unpredictably from floor to floor.

4. The Families

As soon as the overall nature of a cluster is determined, in relation to the neighbourhood as a whole, the search for future occupants begins. They may come off a waiting list, they may come in answer to advertisements: in any case, the overall mix of occupants (number of families with children, without children, shops if any, offices to be included) may be chosen to conform to some overall distribution.

In the example which we have shown, the families took part in step number three, so that the overall layout of lots was itself generated by the families, and by their interaction. In other cases, this layout is done by the architect-builder

without help from the families, and the resulting configuration of lots and terraces, put on the market.

In either case, as a result of step three, the cluster can be conceived as a three-dimensional envelope, in which indoors and outdoors are approximately placed, with points of access, outdoor stairs and elevators clearly marked. At this stage, it is possible for a family to make a preliminary contract to buy a lot within the cluster, together with the right to design the indoor and the outdoor space in detail.

If the family was not involved in the layout of the cluster, they may choose their lot from a simple block model. This allows them to visualise the three-dimensional arrangement, position area and price of each lot, before they decide which one to buy.

5. The Contract

At this stage, before the design is completed, future occupants do not yet have to enter into final contracts. They enter into a preliminary agreement, and pay a non-refundable deposit of $500, say, as a guarantee of good faith and to cover the costs of the process.

The preliminary contract has essentially two features. It specifies the area of the lot which they have chosen; and it specifies the price of the apartment which they will design, on this lot.

The area cannot be specified precisely, since the exact configuration of the lots will change, during the design

process, according to the decisions made on the floors below them. This means that the contract cannot include exact boundary lines as a legal contract normally would do. Instead, the contract specifies the position of the lot within the whole, and guarantees a certain minimum area for the outdoors and for the indoors. The contract also includes a clause which makes it clear that the contract will not become finally binding, until the apartments are completely designed, so that a family can leave the process if they are not comfortable with the various minor changes which take place during the design process.

The price of apartments has a fixed relation to the area of the lot. Suppose, for instance, that the building cost is $25/square foot of indoor area. In that case, a lot which has 1500 square feet, and which therefore obligates the owner to build 1000 square feet of indoor space on it will cost exactly $25,000 (or an equivalent monthly rent), regardless of the configuration which the family gives to it, when they come to its detailed design. If the family chooses to have the apartment built without finishes, then the cost per square foot will be lower by some overall percentage--but still precisely known ahead of time.

In either case, the family are able to design their apartment for themselves, for a known cost, simply by keeping their layout to an indoor area which is two-thirds of the area of the lot. It is an essential feature of the process that

the families can know the cost of their apartment accurately, ahead of time, before they design it.

The final contract, which commits the family financially, comes only after they have designed their apartment (and like it), and when they have had a chance to meet the other people who will be living next to them. If they do not wish to sign the final contract, they forfeit their deposit, but incur no other penalty.

6. The Design of Apartments

The cluster is now ready for detailed design, which will proceed in sequence, floor by floor. The occupants are responsible for the interior layout of their own apartments. The occupants must complete the layout of their apartments within two to three weeks, so that construction can proceed. For this to be possible, we must emphasize that the entire process relies on a building process which is approved in advance, both with respect to structural design, safety, and cost--so that construction work can proceed the moment the design is laid out on the ground, without delays caused by new approvals and permissions.

Each user will be able to accomplish this in two weeks, using the pattern language process which is described elsewhere (A Pattern Language, Oxford University Press, 1975). The architect will provide help, whenever necessary, during this process. However, it is one of the characteristics of the process that users can do it for themselves, with very

SEQUENCE OF PATTERNS FROM A PATTERN LANGUAGE WHICH MAY BE USEFUL IN LAYING OUT AN INDIVIDUAL APARTMENT

105. South facing outdoors
110. Main entrance
111. Half hidden garden
112. Entrance transition
118. Roof garden

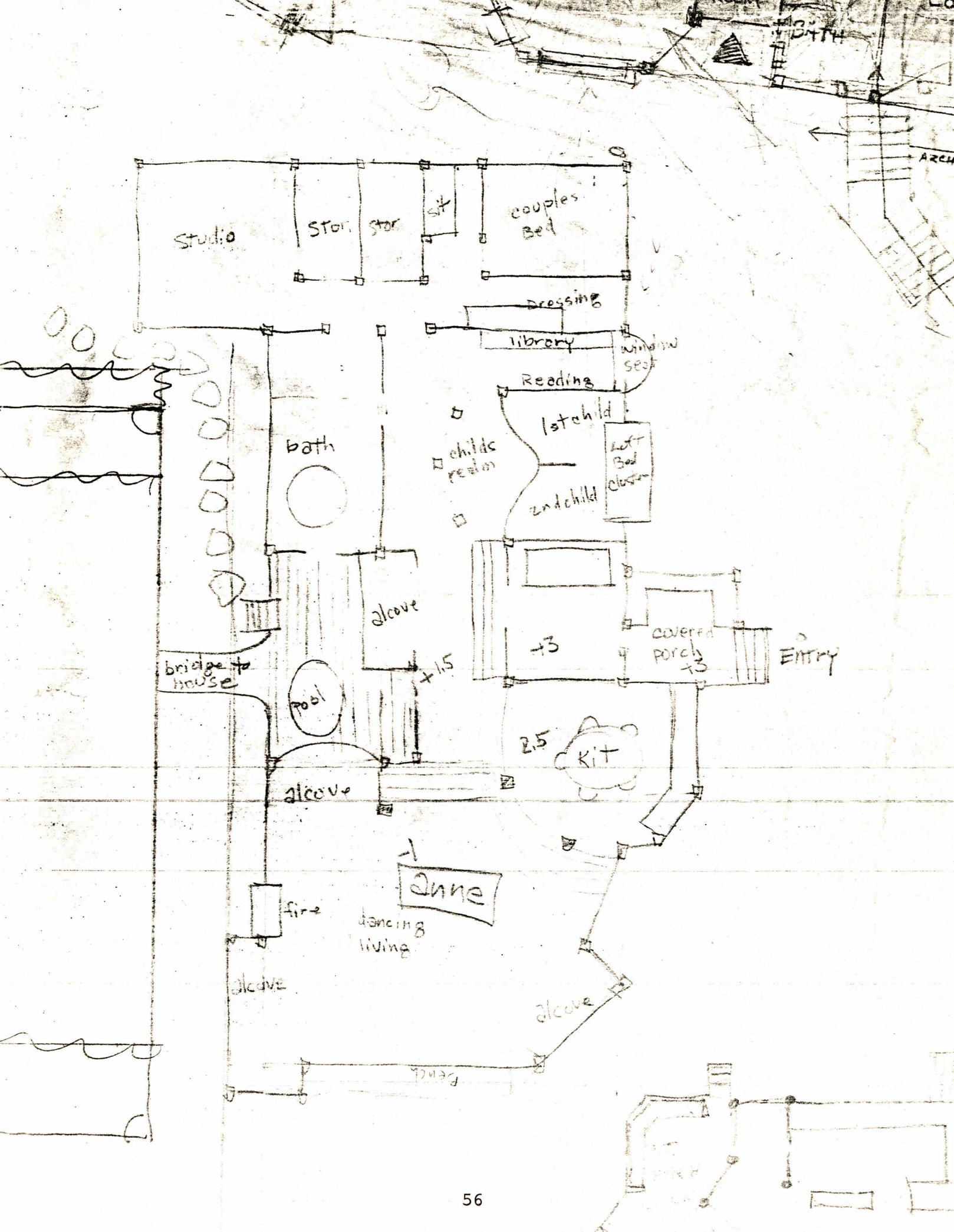
128. Indoor sunlight
129. Common areas at the heart
130. Entrance room
131. The flow through rooms
132. Short passages
134. Zen view
135. Light to walk towards

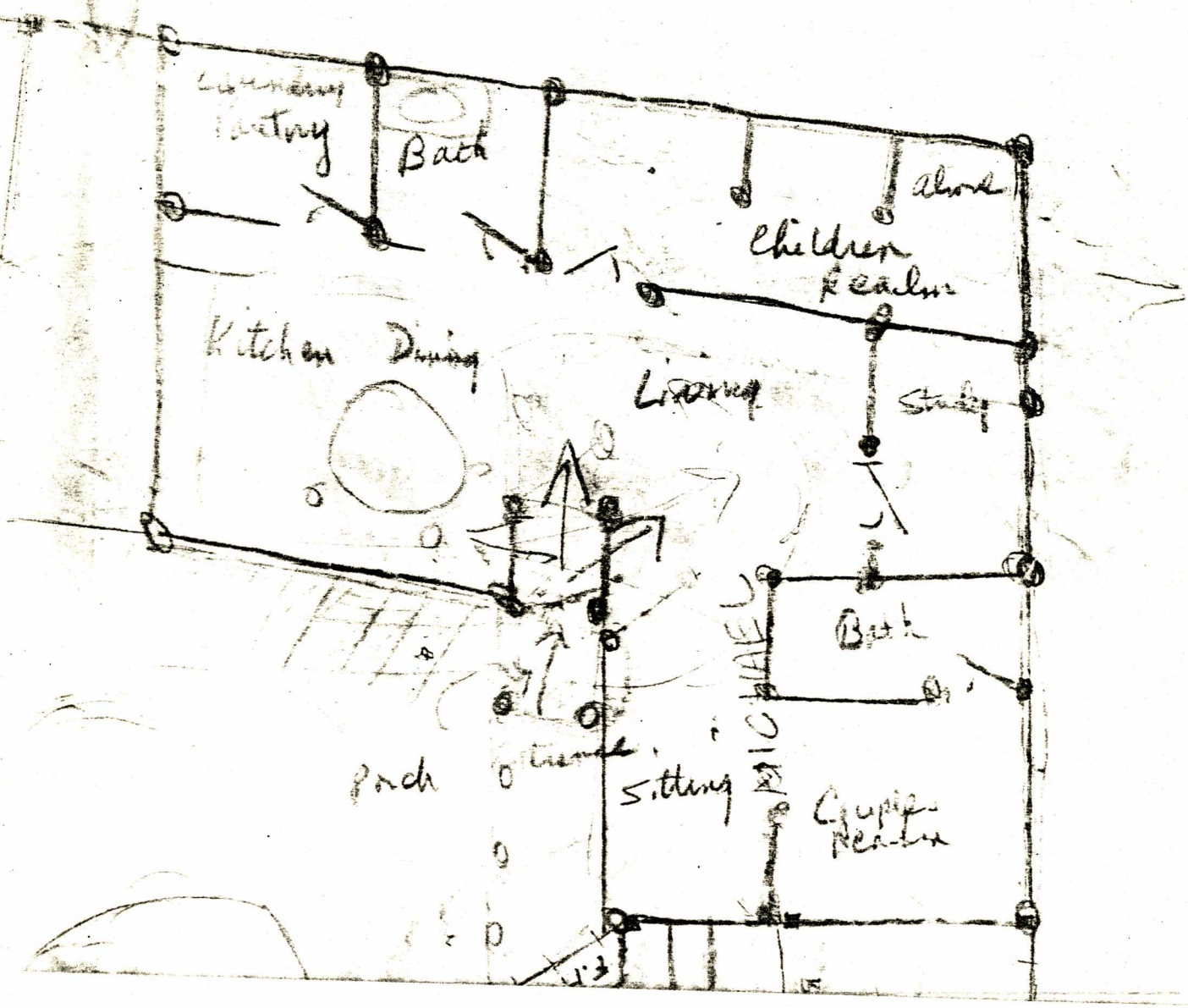
136. Couples realm
137. Childrens realm
138. Sleeping to the east
139. Farmhouse kitchen
140. Private terrace on the street
141. A room of ones own
142. Sequence of sitting spaces
143. Bed cluster
144. Bathing room
145. Bulk storage

157. Home workshop
158. Open stairs
159. Light on two sides of every room
160. Building edge
161. Sunny place
163. Outdoor room
164. Street windows
166. Gallery surround
167. Six foot balcony

181. Window place
182. The fire
184. Cooking layout
187. Marriage bed
188. Bed alcoves
189. Dressing room

190. Ceiling height variety
191. The shape of indoor space
194. Interior windows
197. Thick walls
198. Closets between rooms
199. Sunny counter
200. Open shelves


studio
stor
stor
sit
couples Bed
dressing
library
window seat
Reading
1st child
2nd child
loft Bed cluster
bath
childs reading
alcove
+3
covered porch +3
ENTRY
bridge to house
pool
+1.5
2.5
Kit
alcove
Anne
fire
dancing living
alcove
alcove
BATH
ARCH


Bath
Kitchen Dining
Bath
Porch
Sitting

little help, and with very little expense devoted to architectural fees.

At the end of this process, it is possible to lay out the corners of all rooms, the positions of windows and doors. This process is, in large part, carried out on the site itself, within the frame of reference provided by A Pattern Language. When the design is complete, the position of columns, doors and windows are marked out on the site, in chalk.

7. The Sequence of Design

Apartments are designed in sequence, floor by floor. First floor design comes first. Second floor design begins when first floor designs are complete. Third floor designs begin when second floor designs are complete. Fourth floor designs begin when third floor designs are complete. It is essential to preserve this order, since as the families lay out the detailed design of their apartments, they are allowed to depart considerably from the exact lot boundaries shown on the designs in the earlier stages. This means, then, that the designs at each floor create the context for the designs on the floor above.

It is essential to recognize, too, that in this process, the actual building envelope itself, is being created as the users design their apartments. This is quite different from those much simpler processes in which users are permitted to move interior partitions within a fixed perimeter wall.

The fact is that the successful design of each apartment hinges very greatly on the user's ability to create relationships between indoors and outdoors. It is precisely this possibility which gives the apartments which people are able to generate, within this process, their human and organic character; and it is this, too, which gives the overall building complex its fluid and relaxed organic character as a totality. The large scale building form is a direct product of the actions of the users in their individual apartments.

8. Modifications in the Boundaries Between Indoor and Outdoor Space

However, this organic process raises certain subtle legal problems, which must be smoothly resolved, in order to maintain the equilibrium of the process. Specifically, when the family begins the design of their apartment, it is essential that they should be able to modify the boundary between their indoor space and their outdoor space, since this is one of the most significant ways of modifying and improving the overall plan of the apartment. At the same time, the families on the floor above have bought the space for their apartments, with certain definite assumptions about the edge of their lot, (which is the same as the downstairs boundary between indoors and outdoors).

It is therefore necessary that the designs follow these rules:

1. Any change which increases the indoor area and reduces the outdoor area is permitted, since it does not decrease

the area of the upstairs lot. (This must be coupled, though, with the understanding that the final price will depend on the total indoor area, to discourage rampant increases).

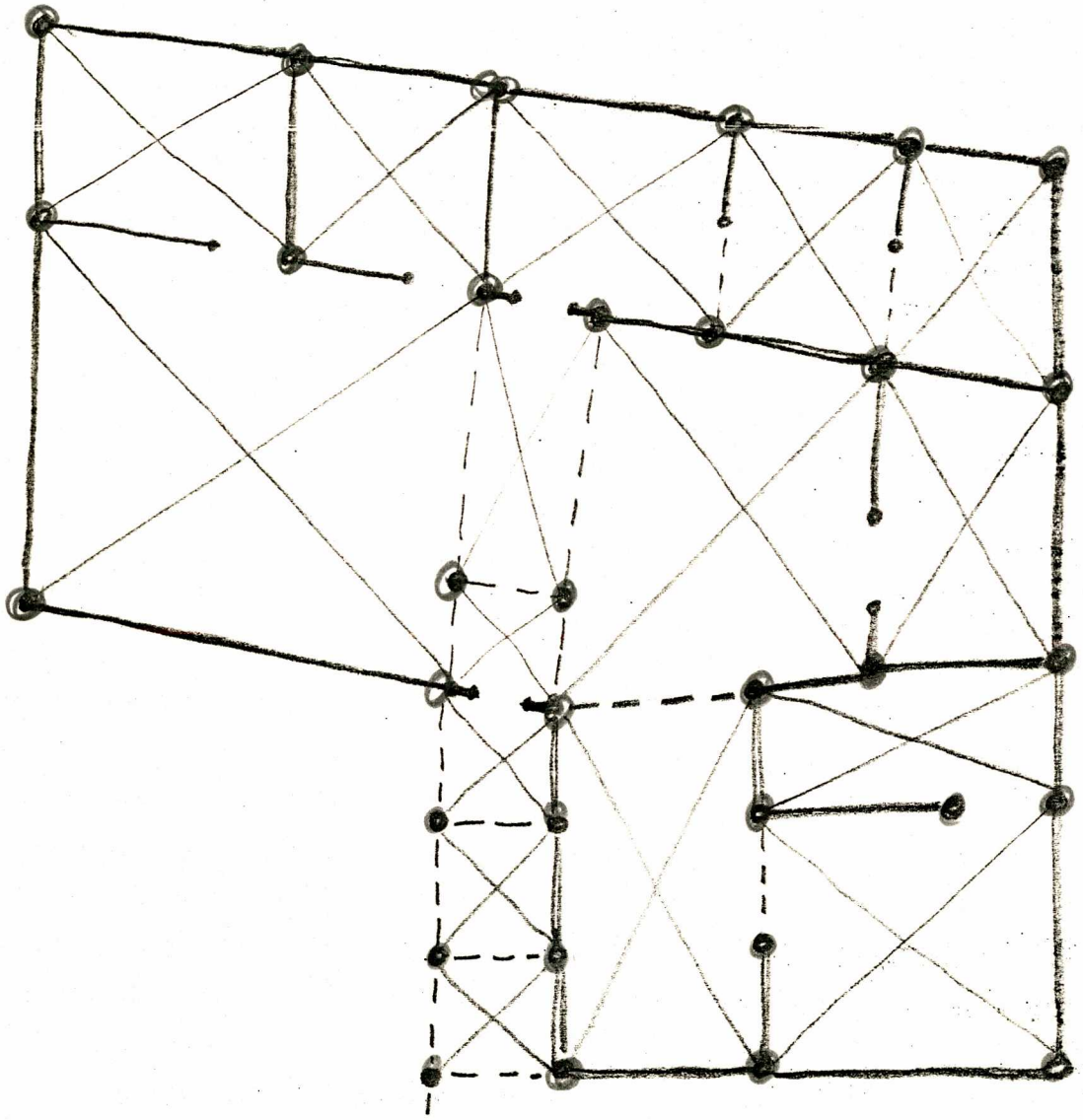
2. The boundary can always be changed inwards, provided that the floor edge remains in the same position, thus creating a porch, or gallery, which leave the upstairs lot area unchanged.
3. The actual floor edge itself can also be moved inwards, in one place, provided that it is also moved outwards in some other place, so that the total floor area of the upper lot is left unchanged.

It will also be necessary that each user make minor changes in the position of the stair which leads to his apartment, so that the location of the stair conforms to the modifications in position of terraces which he has made.

9. Structural Layout

Once each apartment is designed, it is possible to complete the building structurally, without any further redesign of rooms or floors, by using the structural system described below.

The structural system is a system of columns, beams, and vaults, designed in such a way that the layout of the vaults can conform to any arrangement of columns, and such that columns, at upper storeys, can be placed anywhere with respect to the vaults below. This means that lower floors may be planned without constraint imposed by structural considerations, or by the problem of leading forces down from the upper floors.



Structural layout of one apartment

The features of the building system which make this possible are:

a. The fact that every room has columns at its corners, and at intervals along its walls, but that these columns do not need to conform to any exact modular array.

b. The fact that there is a non-modular vault, which can be "stretched" over any room whose size and shape meet certain modest constraints, once the columns are in position.

c. The fact that upper storey columns do not need to be placed exactly over lower storey columns, but may be placed wherever they are needed, with the guarantee that the vault system will then bring the vertical loads from the upper columns to the lower columns successfully.

Engineering calculations show that the overall strength of the vault, with the infill above, can be made strong enough to resist local shear of randomly placed columns above, simply by controlling the distribution of concrete infill above the vault.

The system also lends itself to very rapid erection procedures, so that the unusual variety of configurations which appear in plan present no special construction problems, and, most important of all, do not increase the cost of labor.

The system is partly described in A Pattern Language, Oxford University Press, 1975, pages 900-1200, and is described

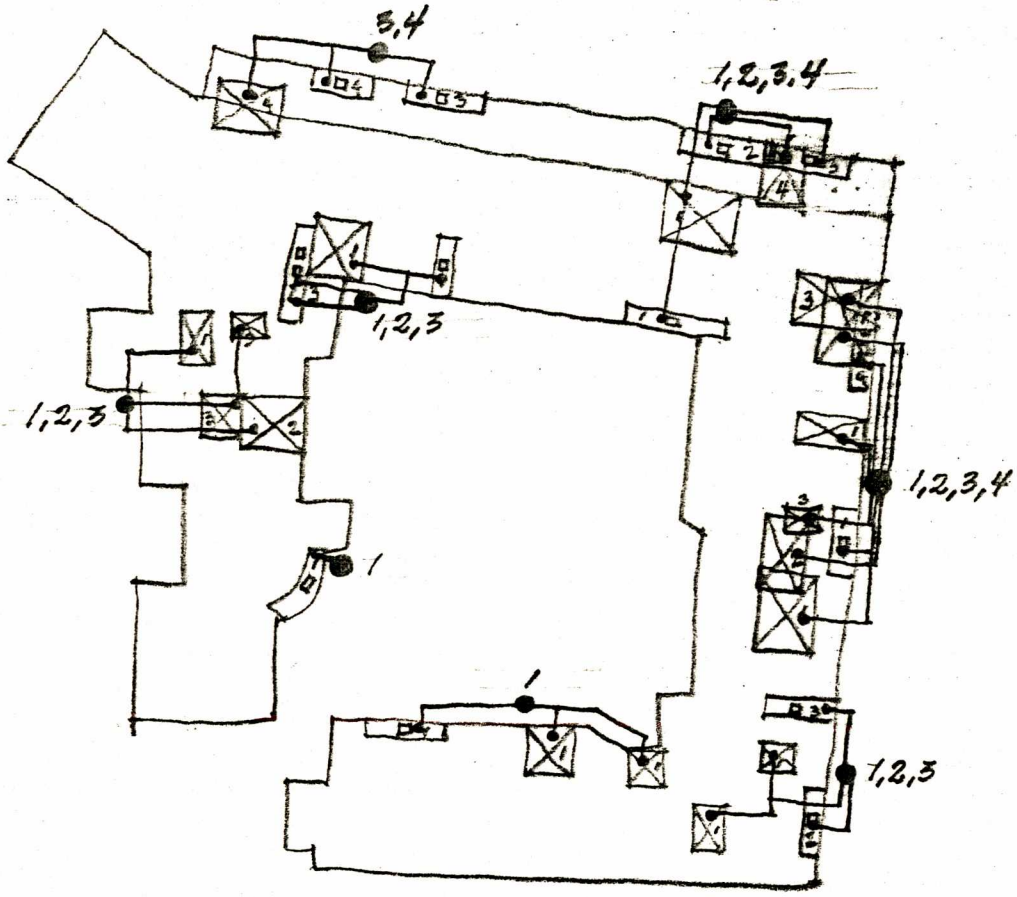
in more detail in a forthcoming work "A New Construction Process," to be published.

10. Layout of Services

In order to permit the looseness of plan which the users generate in this process, the plumbing stacks take on the following form: Each apartment has, within one exterior wall, a single plumbing stack, which carries down pipes, vent pipes, gas, water and electricity in a single duct. The ducts are placed in those positions which reduce horizontal runs to a minimum, and are grouped to serve several apartments. As the following drawing shows, one cluster can be served by a reasonably small number of ducts.

11. The Construction Process

At this stage, the building is ready for construction. It is possible to make a set of conventional drawings, and build from them in the conventional manner. However, it is much better if the construction process includes a final design stage, in which the families have the opportunity to fine tune the layout of their apartments, when they are actually standing on the ground, or on the roof of the apartment below. Experience has shown, over and again, that it is almost impossible for anyone (architects included) to understand the exact nature of an intricate three-dimensional building complex during the early design stage, when everything is still theoretical. Faced with the reality of an actual site, in an actual position in a building complex, with real sunlight,



Layout of plumbing stacks

real views, real breeze, real sounds, and the real presence of other buildings round about, people have much more subtle, and more accurate intuitions about the design of their apartments. For this reason, we propose that each family has the opportunity to modify their design, once the columns, and vaults of the apartment below are in position, with the idea that the final structural layout of their own apartment will then be built directly from the actual marks which they make, on the real site.

Specifically, during this last design stage, the following items may be changed, or modified: the exact size and position of doors and windows; the exact position of interior columns and vaults; the extent of openings in interior partitions; position of alcoves, closets, and minor spaces. As a rule, these changes may not affect the position of the boundary between indoors and outdoors, since, for reasons given earlier, this affects the lots upstairs. However, under exceptional circumstances, even small changes in these boundaries can be made, provided they have the approval of all families on the floors above them.

Specifically, then, the construction process follows this schedule:

Final layout of ground floor apartments

Construction of ground floor apartments' structural frame (including columns, walls and vaults)

Final layout of 2nd floor apartments

Construction of 2nd floor apartments; structural frame

Final layout of 3rd floor apartments

Construction of 3rd floor apartments' structural frame

Final layout of 4th floor apartments

Construction of 4th floor apartments' structural frame

Interior finishes on all four floors

Our experience shows that the final on-site layout of an apartment need take no more than a day or two; so the overall construction schedule is merely interrupted briefly between floors: and the whole construction operation can be completed at a normal rate.

Since this process requires a continuous series of minor modifications in the designs, during construction, we have developed a new type of contract drawing, in which the building is specified by a simple schematic plan, and a set of building operations, each one with an accurate quantity take off. The system permits accurate cost control and cost estimation, yet allows flexibility of design and detailing, within the estimated quantities, so that design decisions and modifications can be made continuously during construction, without the delay and increased costs caused by large numbers of change orders.

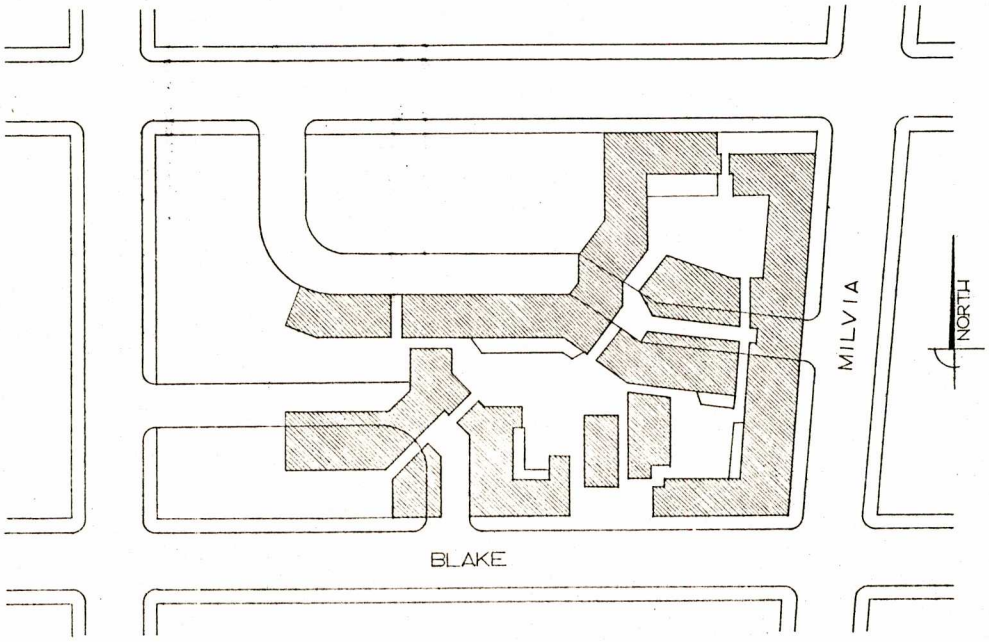
12. A Completed Building

The building complex which is illustrated on the following pages was designed by a process which simulated the

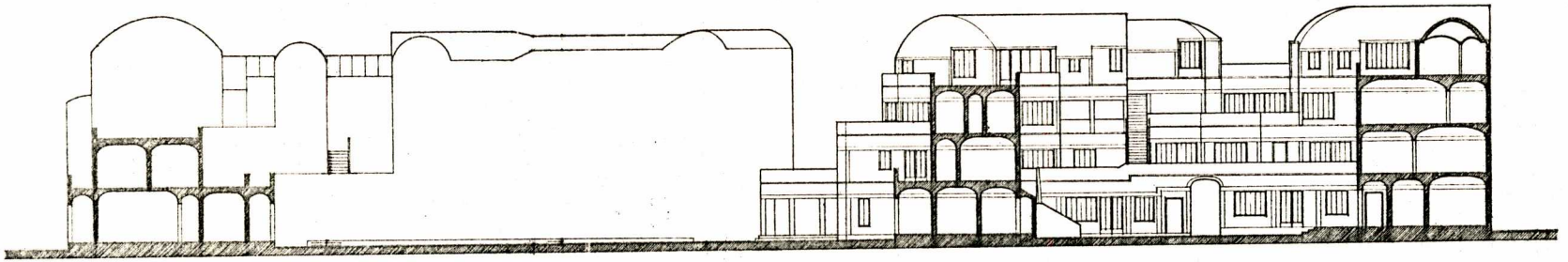
step-by-step process described, in detail. It contain two clusters, occupied by 27 families, built around an existing old house, with a walnut tree, in Berkeley, California. The clusters are placed in such a way, with respect to the existing house, that the house is preserved for use as a kindergarten and cafe.

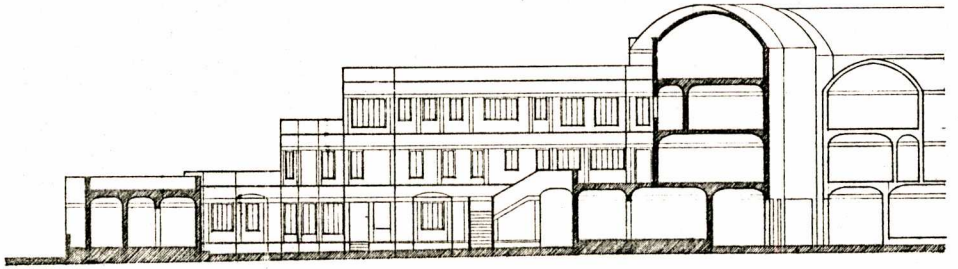
The twenty-seven families in the simulation were students in the University of California. The design was completed in 10 weeks, and during this time no one person gave more than a total of 30 hours to the design of his own apartment. This makes it clear that the user design process is perfectly feasible within the time and cost limits typical of normal apartment house construction.

USER DESIGNED APARTMENTS



Site plan





User Designed Apartments

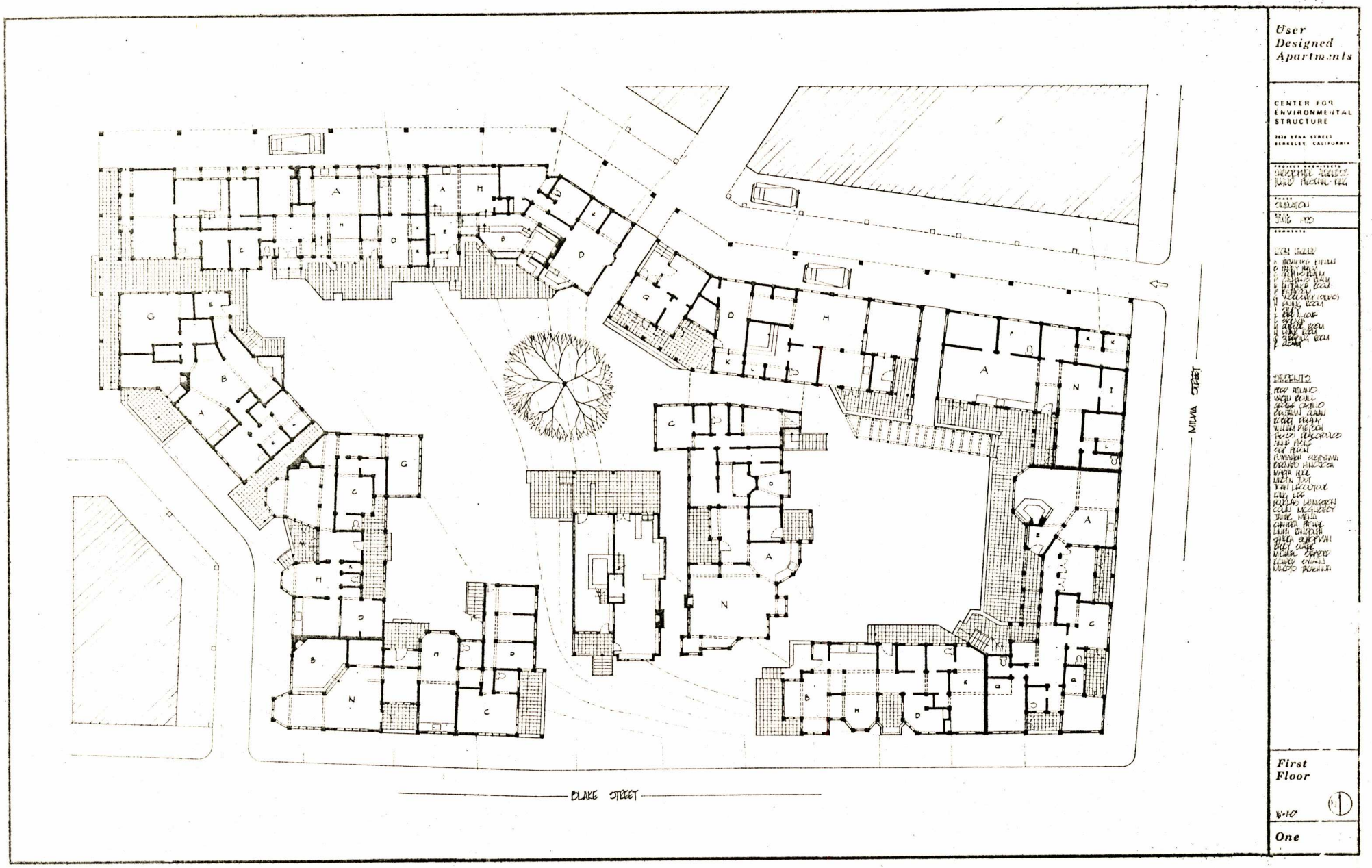
CENTER FOR ENVIRONMENTAL STRUCTURE

2619 ETNA STREET BERKELEY, CALIFORNIA

Elevations Sections

Five

Sections and elevations


BLAKE STREET
MILVIA STREET
User Designed Apartments
CENTER FOR ENVIRONMENTAL STRUCTURE
First Floor
One

First floor

User Designed Apartments

CENTER FOR ENVIRONMENTAL STRUCTURE

Second Floor

Two

Second floor

User Designed Apartments

CENTER FOR ENVIRONMENTAL STRUCTURE

2609 ETNA STREET BERKELEY CALIFORNIA

Third Floor

Three

Third Floor

User Designed Apartments

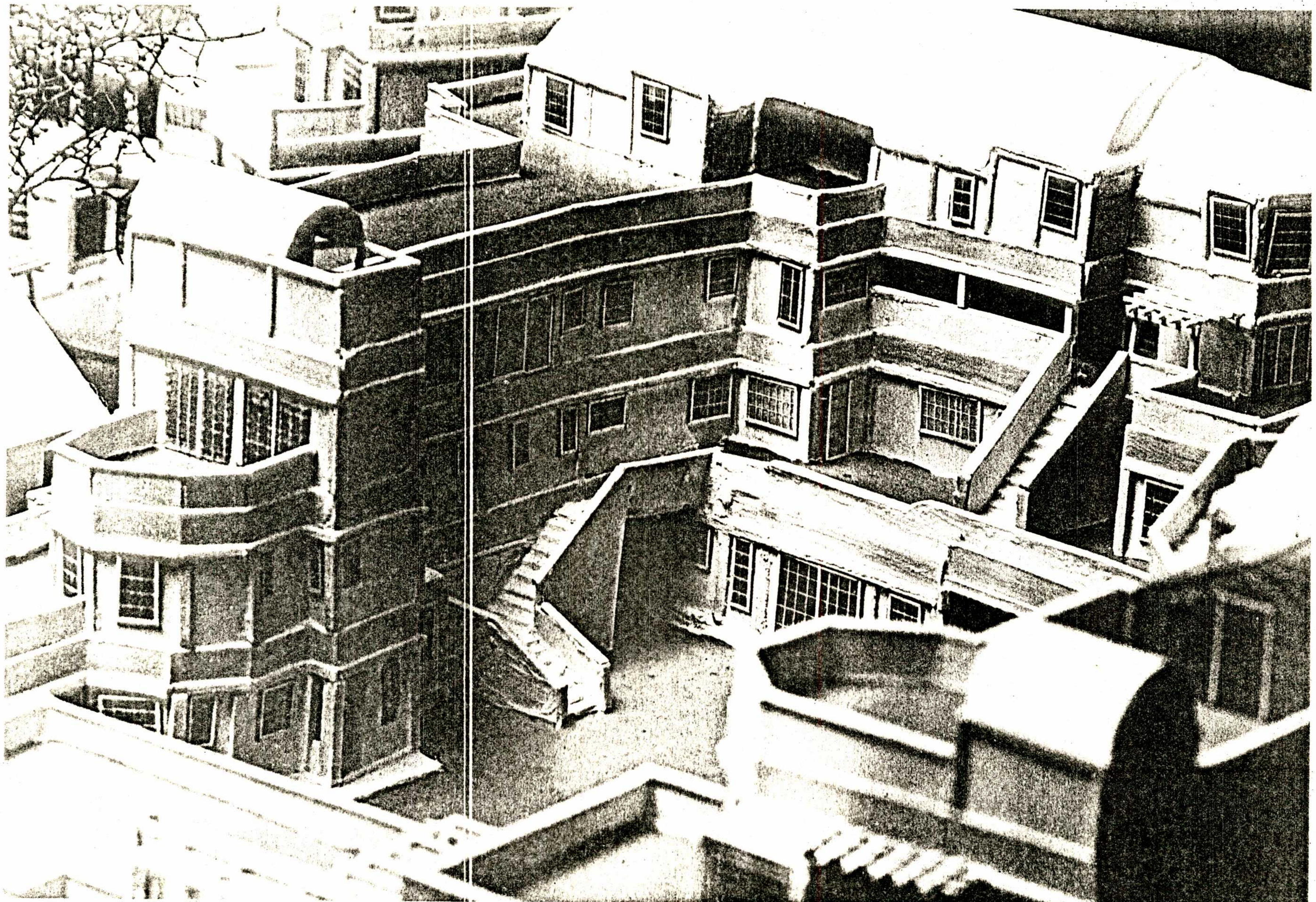
CENTER FOR ENVIRONMENTAL STRUCTURE

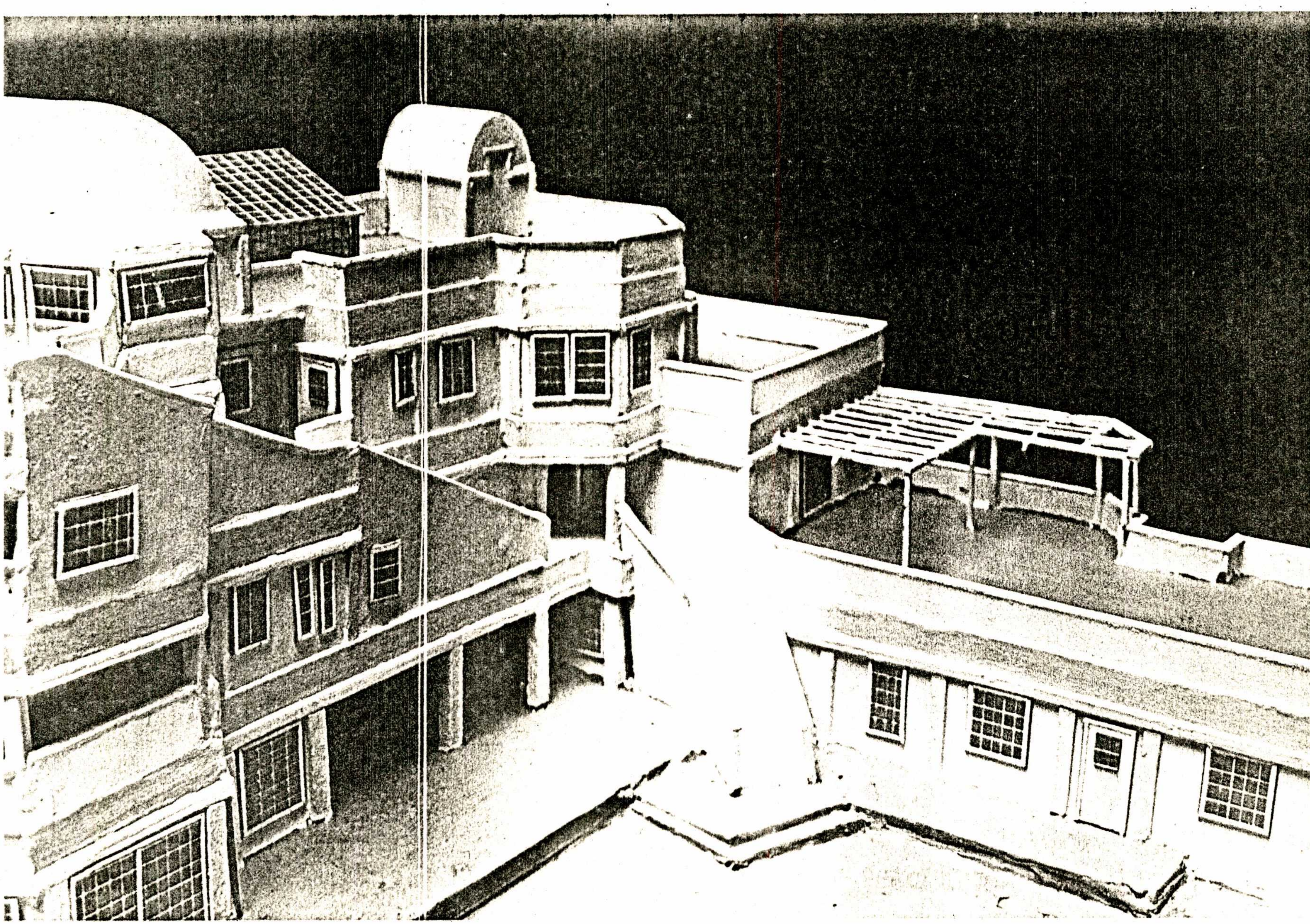
2619 ETHA STREET
BERKELEY, CALIFORNIA

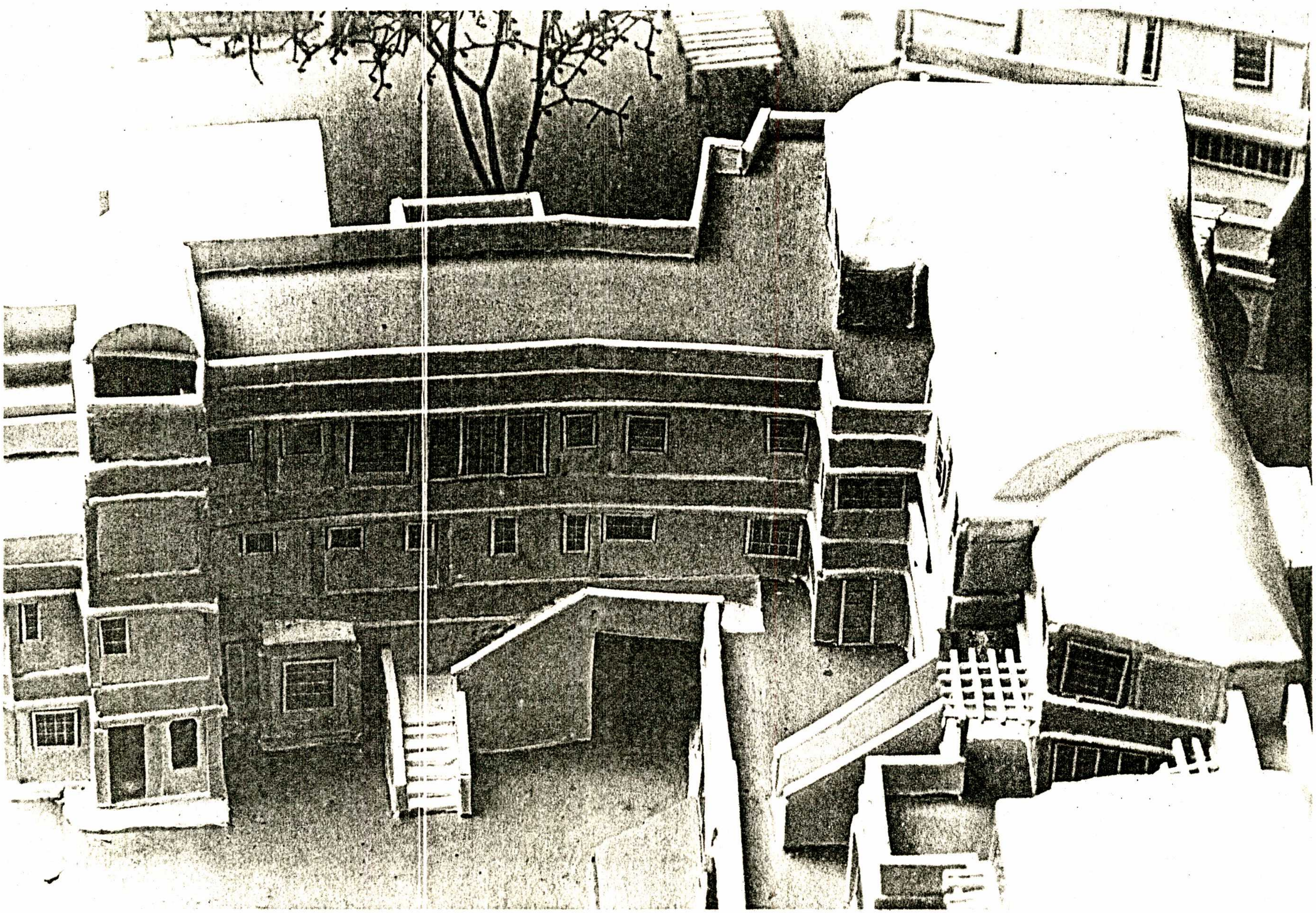
Fourth Floor

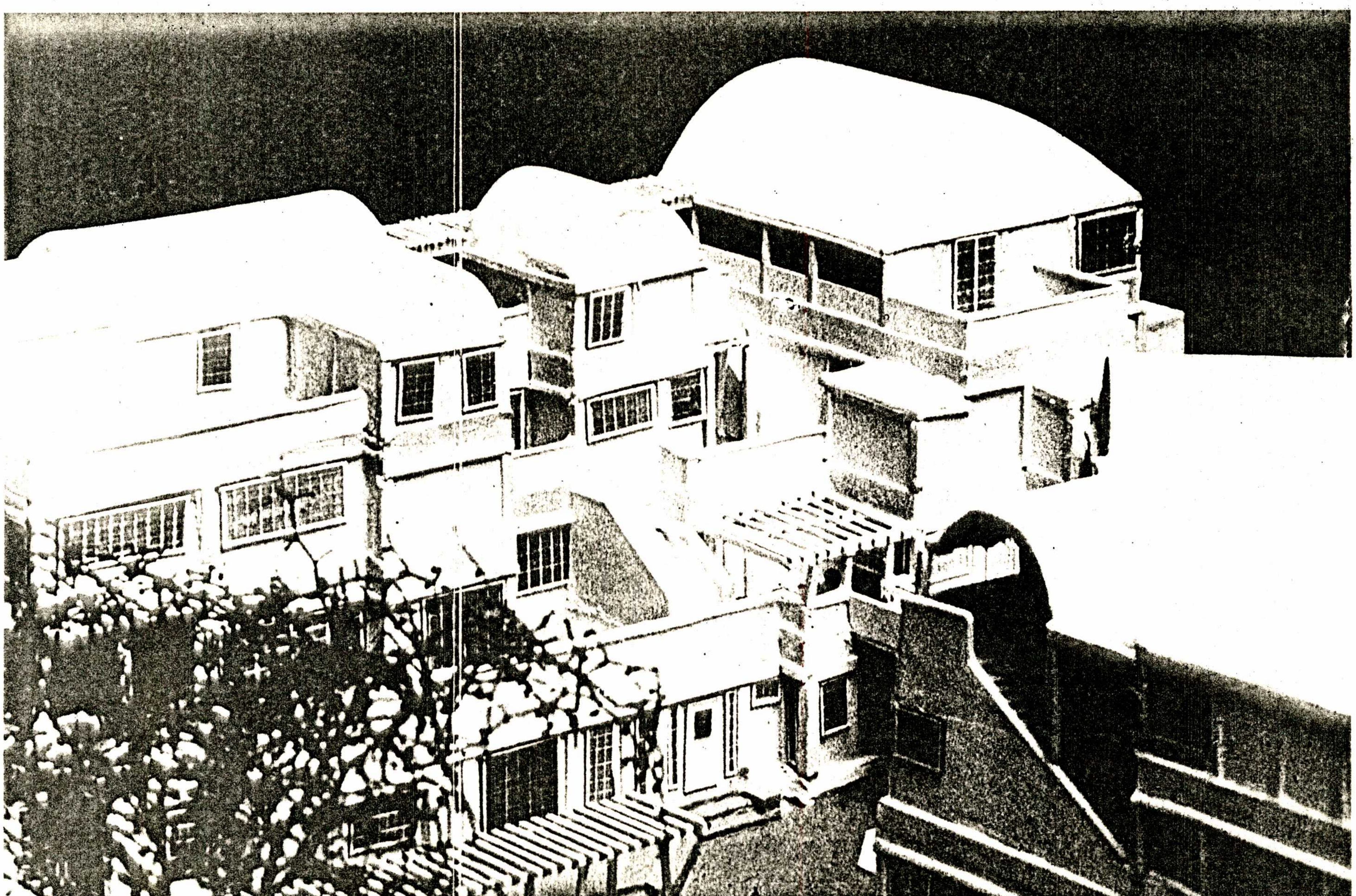
Four

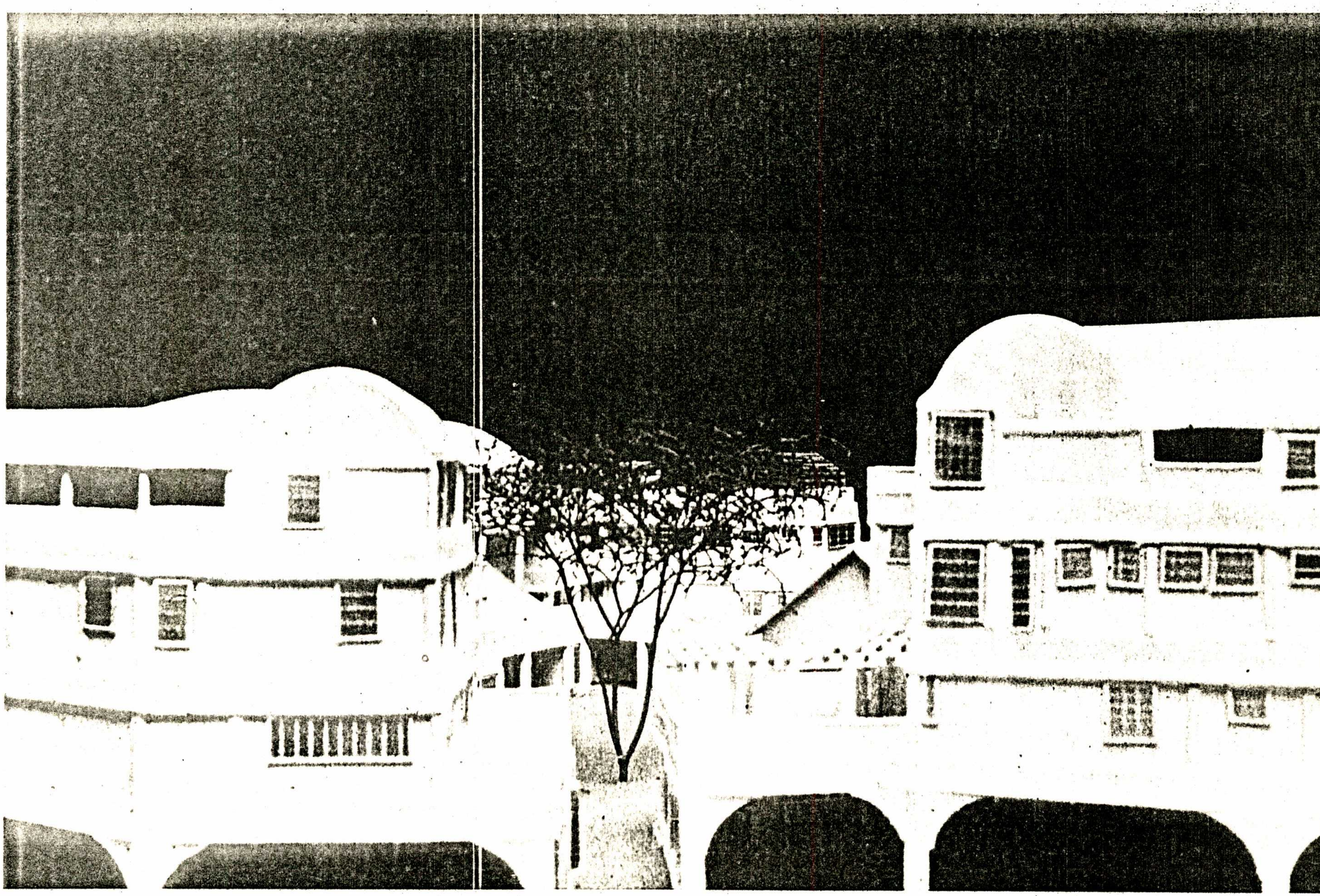
Fourth floor











IV: IMPLEMENTATION

The design and construction process which we have described in the last section raises several problems of implementation. It seems as though it might be expensive; it seems to raise problems of uncertainty during the design phase; and it requires a new kind of architect to carry it out. In this section we therefore briefly discuss the cost of such a project, in the form of contract and financing which might be used to generate the project, and the new kind of architect-builder who will be needed to coordinate a project of this kind.

1. Cost Estimates

A number of specific versions of the construction technique described in Step 9 have been taken through detailed cost estimation, for the simulated building complex shown on the preceding pages. The cheapest version came in at $22/square foot, and the most expensive at $30/square foot ($220/m^2 and $300/$m^2$ respectively). These cost estimates include the price of architectural and engineering fees, and the costs of overhead and profit for the contractor. Prices are for San Francisco, 1975.

In these cost estimates, special attention has been given to the cost of labor--which might be presumed to run high, in view of the unusual variety of configurations which occur in the different apartments. We have been able to keep prices

down, in spite of this labor problem, because the construction system we have specified gives great flexibility, and allows rapid erection procedures, regardless of plan configurations, so that both materials and labor costs stay within normal limits.

It would also be possible to reduce costs still further, by building very small, unfinished apartments, by the same technique, allowing users to finish the shell for themselves, and then encouraging them to add on more space, on the terraces. The very large terraces make it possible for people to undertake an unusual amount of expansion on these terraces: the configuration of the buildings guarantees that the expansion of any one apartment will not interfere with any other apartments.

2. Methods of Financing

There are essentially three forms of financing which may be considered:

a. A condominium, or owned apartment building, where families buy their individual territory, and they themselves take the financial risk, in a conventional mortgage.
b. Rented apartment buildings, in which the risk is taken by the government, and tenants sign long-term leases.
c. Rented apartment buildings, in which the risk is taken by a developer, and families occupy short-term leases.

a. Owned apartments. This case, in which families buy their own territory, is obviously the most amenable to the

process where families design their own apartments. As we have described in step 5 of the process, the families choose a "lot" in a new cluster, make a small $500 deposit, design their own apartments, and then decide whether to buy the apartment, or forfeit their deposit. If they stay in, they can now obtain a conventional bank loan, with a normal down payment. The drawings which have been prepared provide a sufficient basis for conventional bank loans to be issued. Those few apartments in which families do not go ahead, are modified, and then built speculatively, and sold on the open market, once completed.

b. Long-term leases. In the case where apartments are built by the government, for long-term leases to low income families, the same procedure as above can be followed, since these families usually occupy their apartments for very long terms, and there is therefore the same "permanent" relationship between family and territory.

c. Short-term leases. In the case where the apartments are to be built by a developer, and rented for short-term rental, on the open market, the situation is more difficult. However, we should like to make it clear that we believe that even in this case, the buildings produced by this process will be better than the standardized apartments usually built: and that such a building, once built, will soon pay for itself by commanding higher rents, and by encouraging renters to stay for longer than usual, thus stabilising the flow of rents.

From a practical standpoint, this third process would work like this. The developer invites potential renters to take part in the design process, simply in order to get the benefit of their individual differences, and the reality of their lives, as input to his building. This produces a building similar to the simulated cluster which we have illustrated. The building is then built for rental on the open market. Families who have taken part, are given first option on the rental of the space they have designed, but they have no obligation to do so.

Note on rental and resale. It is worth commenting on the probable resale value of the apartments which have been designed by this process. Under normal financing arrangements, the standardization of apartments is, in part, done because of the myth that standard apartments are easier to rent, and/or sell, than non-standard ones, because they appeal to a wider percentage of the market. It is true that any one apartment which is standard may perhaps appeal to a wider cross-section of people. However, when apartments are designed by individuals, actual families, as they are in the process we have described, each apartment becomes much more valuable to that smaller cross-section of the population who share the family organization and emotional character of the family which designed it.

Although, at first sight, this seems to create dangers, from the economic point of view, we feel it necessary to point out that on the contrary, it is precisely those apartments and

houses from the past which do have unique and idiosyncratic character created by actual individuals, which now command the greatest prices. In short, the fact that they are more unique, does not decrease their value, it increases their value: and, far from being hard to rent or sell, it is clear that these apartments, unique to specific families, will be easier to rent and sell, than the featureless, "grey," standard apartments which are being produced today.

3. The Architect-Builder

The process which we have described puts unusual demands on the architect and on the contractor. In order to meet these demands, it is necessary, first of all to combine these two roles, in one person, and secondly, to endow this person with an entirely new attitude towards the users and their wishes.

In a conventional architectural work, it is understood that the "clients" state their wishes, and the architect then makes a synthesis of these wishes, in his own interpretation.

In the process we have described here, something entirely different is happening. The architect sets a fluid framework for the cluster: but the users then actually design their own apartments for themselves, within this framework, and make their own contributions to the overall communal spaces too. This means that the architect must be willing to fade into the background to a much greater extent: and must be willing, and able, to exercise his responsibility for the overall building, with an unusual degree of subtlety. He is responsible

for the fact that the building forms a whole, responsible for the fact that the communal spaces work, but he must be able to derive this holistic character from the designs of the users as they actually do them.

At the same time, he is also the actual builder of the building, present throughout its construction, responsible for the actual physical fabric of the building, in a much more personal way than either architects or contractors usually experience in today's construction process.

This means that the architect, though he plays a more modest role during the early design phase, plays a far more intense role during the actual construction phase, than is usual today. His role is, in fact, much closer to that of the role of the medieval "master builder," who is both responsible for layout of the building, and for its actual construction.

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