

A BUILDING STRATEGY FOR DEVELOPMENT TOWNS IN ISRAEL:  
A SYNTHESIS OF INDUSTRIALIZATION AND USER SELF-HELP

by

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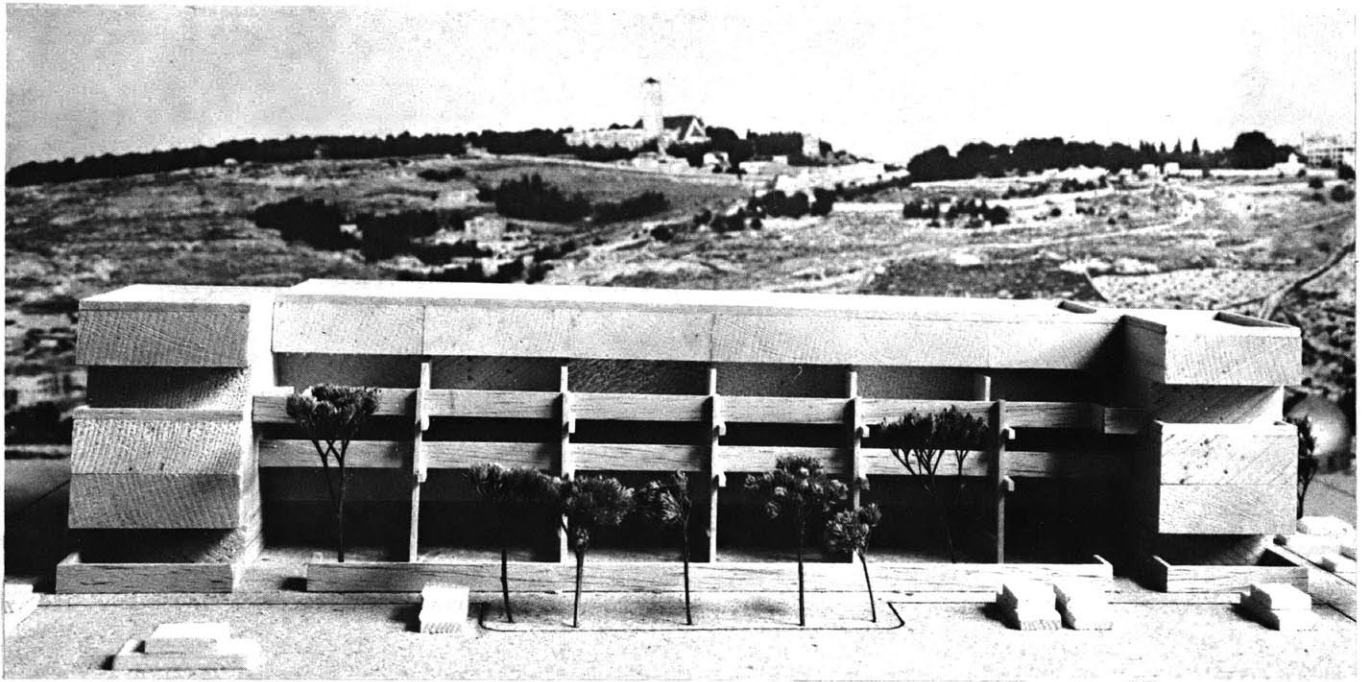
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**PAUL LIPOF  
JUNE 1974  
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ABSTRACT OF THESIS

A Building Strategy for Development Towns in Israel:

A Synthesis of Industrialization and User Self-Help

Paul Lipof

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of Master of Architecture.

Housing is an important national priority in Israel. It is one of the largest industries and the rate of production is the highest in the world: 19 units/1000 population. However, the cost of housing is exorbitantly high and, in fact, may represent ten years of a family's earnings. One of the reasons for the high cost of housing is the shortage of skilled, finish labor; which, in turn, has created a bottleneck in the supply of housing.

This paper proposes a solution to the housing shortage which is especially appropriate to Development Towns in Israel. Since 1948, the State of Israel has founded 30 development towns in sparsely populated regions of the country in an effort to reverse the trend of urbanization in the 3 metropolitan centers and create an heirarchy of urban centers throughout the land.

The building strategy that is proposed is a synthesis of industrialization and user self-help. Precast structural

components would be erected and a utility infra-structure installed, thus constituting a type of BUILT REAL ESTATE. Users would be able to finish their units or sub-contract the finishing of units according to their needs and means. The government should foster the establishment of a local industry based on the finishing of apartments by providing technical training to people while they finish their units. Thereby, government housing funds would be recirculated in the local economy.

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## I. DEVELOPMENT TOWNS IN ISRAEL

### A. BACKGROUND

Upon the establishment of the State of Israel in May, 1948, the government and the people of Israel faced severe challenges. Perhaps the two most severe were:

1. Stabilization of the security situation
2. Absorption of mass immigration from displaced persons camps in Europe and refugees from Moslem countries.

The security situation was successfully stabilized although not solved. The Yom Kippur War of October, 1973 is the most recent manifestation of the continuity of this situation.

My view is that the region has the potential for finding a solution, but big power interests have thwarted this end.

The challenge of immigrant absorption was enormous considering the small size, limited resources and security conditions of the new state. During the first four years of statehood, approximately 700,000 immigrants were accepted into Israeli society. This nearly doubled the size of the country. Between 1948 and 1963, the population of Israel tripled; two-thirds of this growth was due to immigration. The mass immigration of 1948-1951 was an immigration of distress: the remnant of the holocaust, survivors of concentration camps; and refugees from underdeveloped countries, unequipped for modern life. This was the largest relative influx of population experienced by any country in modern times.

The State has made a fundamental commitment to the absorption of these immigrants in whatever numbers they may arrive. Deliberate policy decisions have been made not to limit immigration based on the economic capacity of the State; rather to promote unrestricted Jewish immigration, the ingathering of Jewish exiles being one of the basic premises of the State of Israel. This, to be sure, presented a great strain on the economy and society, but after two-and-a-half decades we can see that the macro-scale goals have been achieved. Adequate housing, jobs, and social services have been provided with a minimum of hardship endured on the part of the immigrants. Basic needs have been satisfied, and now the more complex issues of quality of life have to be confronted.

#### B. GOVERNMENT POLICY

Since statehood, the responsibility for the absorption of immigrants has been in national institutional hands. The Jewish agency and the Israeli government shared this responsibility until the late 1960's, when the State assumed full responsibility; the Jewish agency played an auxiliary role. Because of the active and crucial role played by public institutions, a unique opportunity to implement national planning policies, and, in effect, to carry out large-scale social experiments was manifested.



The most significant program was the "Program for the Dispersal of the Population." This program developed from the security conditions of the country as well as from social planning considerations. The planning considerations consisted of the dilemma facing most developing countries: urbanization. In 1948, 43% of the population was in greater Tel Aviv; and the three major urban centers (Haifa, Jerusalem, and Tel Aviv) represented 80% of the population. The remainder of the population was spread out in small agricultural settlements and villages with very little of the population inhabiting intermediate-size towns. There existed no acceptable hierarchy of services within a region. The conceptual model Israeli planners used was the central-place theory of Christaller and Loesh, which was popular in Europe and they inherited from the British. Also, the cost of municipal services per resident was considered to rise dramatically when cities reach a certain size. Israeli planners estimated that the three major cities of Israel were approaching that "watershed" point. Finally, suitable agricultural land in Israel is in short supply and is primarily concentrated in the coastal strip running north to south from Akko to Ashdod. This strip also contains Haifa and Tel Aviv, and is the most densely populated region in the country. Therefore, a conflict in spatial needs between urban and agricultural development exists in this region. In response to these forces the "Program for the Dispersal of the Population" was established.

The principal planning aims of the program were:

1. To reverse the two major demographic trends of the country: movement to the coastal zone and to the three metropolitan centers.
2. Systematic guiding of population movement into formerly sparsely populated areas.
3. Extending the small and middle size towns in the interior.
4. Creating new towns (development towns)<sup>1</sup>.

The implementation of the program took the form of government incentives to immigrants for settling in priority areas. The urban settlements are called development towns in official parlance. In street language they are often referred to as immigrant towns, due to the large percentage of new immigrants living there. The rural settlements were usually small-holders collectives (Moshav Ovdim), based on the model developed earlier in Israel. The incentives to settle in development towns consisted of very favorable housing loans (100% loan at 3.3% payable in 30 years)<sup>2</sup> compared to those available in urban areas, and subsidized employment. The government also has an elaborate system of tax incentives, credits and provision of site improvements designed to attract private, industrial investment to development towns. The government has allocated considerable resources to this effort and plans ultimately that the growth of these communities will be self-sustaining.

### C. RESULTS

Since 1948, 30 development towns have been established. Their populations represent 18% of the total population of Israel (1970). The relative growth of the metropolitan sector has been stymied. From 1948 to 1970, Tel Aviv dropped from 43% to 34% of the total population. The share of the three metropolitan areas was reduced from 80% to 56% in the same time period. This does not mean that urbanization was reversed, rather that urban growth has centered in the small and medium-sized towns; thus filling in the urban hierarchy. The urban population is 82% of the total compared to 18% for rural population. This success on the macro-scale has not been accompanied by such outstanding results on the micro-scale, the level of the community. Results have been mixed; some experiences have been promising and some discouraging. Twenty years is a short time period in the life of a city, so it is probably premature to make judgements about the wisdom of the general program. However certain difficulties are evident and must be overcome. Most development towns are experiencing social and economic problems. As Berler states:

The basic justification for the existence of the development towns is the dispersal of the urban population in order to achieve a more balanced settlement structure in all parts of the country. Their weakness lies in the fact that they were hastily settled during the early foundation

period, and in the numerous initial difficulties that most of them had to contend with during the early fifties, when hundreds of thousands of newcomers had to be absorbed and provided with the immediate necessities of life. Some of them consequently also suffer from a lack of internal leadership and initiative, an inherent characteristic of the type of immigration that came at that period.<sup>3</sup>

Moreover, as has been mentioned earlier, these communities are dependent on government support to maintain their economic and social viability. Many Israelis consider the problems of development towns to be the new frontier in Israeli social development.

## II. IMMIGRANT SETTLEMENT IN DEVELOPMENT TOWNS

### A. DEMOGRAPHIC FEATURES

Development towns are populated by and large by a large majority of recent immigrants (post-1948) to Israel. They represent 80% of the population of development towns, while about 50% of the total population. Since children under 14 represent 30% of the population, then 85-90% of the adult population active in economic and political life of the community are new immigrants. This has far-reaching effects on the social and economic life of these communities.<sup>4</sup>

These newcomers are extremely heterogeneous with regard to country of origin and therefore cultural background. The popular categories of Ashkenazim and Sephardim Jews are misleading terminology, since strong cultural distinctions exist within both categories, especially the latter. 70% of the new immigrants in development towns are Oriental Jews. They come from underdeveloped countries (Yemen, Iraq, Morocco, etc.), unskilled in modern technology, uneducated to a large extent, and unprepared to handle the sophistication of a modern, democratic society. On the most part they came as refugees with no capital and few personal possessions. Families are characteristically large. In fact, 1/4 of Sephardim families have seven or more members.<sup>5</sup> Wide, extended families with strong kinship relationships exist; and they maintain a traditional form of authority in elders and religious leaders.

They also came with a tradition of a rigid occupational structure. Crafts were handed down through the generations from father to son. In such an environment cultural and economic stagnation is an obvious danger.

#### B. HOUSING AND GOVERNMENT POLICY

During the four years of mass immigration many of the immigrants were housed in the homes of the Arab population that fled during the War of Independence. When these quarters were filled, temporary camps were set up throughout the country. The Jewish Agency set up public works projects in the vicinity to provide employment opportunities. As apartments were finished in development towns, immigrants were allotted places. Apartments were distributed often without regard to country of origin, which quickly created a chaotic and unpleasant situation. Subsequent swapping and trading of apartments within a development town has created areas with definite cultural characteristics.

The government has assumed the responsibility for providing the housing for development towns. 40% of all public housing is constructed in development towns. This is quite large, since 60% of all residential construction in Israel is financed by the government. This housing is provided in the form of completed apartment units, usually in regular 4-storey blocks. The system is entirely product-oriented. Self-help and expandable units have not been tried on any appreciable

scale. As has been mentioned, financing is very favorable, and prices are lower than in the city. Lower prices are due to the government's ownership of land. 92% of the land in Israel is owned by the State. The 8% in private hands is concentrated in the urban centers. Due to the short supply of private land, it is very expensive and therefore constitutes a large portion of the cost of housing. Baumgart estimates that it is as much as 35% of the cost of housing in the urban centers. In development towns the cost of land can be eliminated.

Not only is completed housing provided to new immigrants, but a whole framework of social and administrative services is set up and operated by government agencies. Formerly, many government offices were involved in each development town in varying ways; creating a bureaucratic nightmare. The government has centralized many of these functions, simplifying the situation, although it is by no means simple.

As a result of these policies and the nature of the Oriental Jewish immigrants, a cycle of paternalism and passivity has arisen. The background of the Oriental immigrants has not equipped them for the social and political roles thrust upon them as citizens in a democratic, modern and dynamic state. Veteran residents and government officials are shouldering the burden of the administration and initiative of the development towns. The government is very anxious to break this cycle,

although it does not seem to know how. The problem is further exacerbated by the tendency of the more able immigrants, who are able to get ahead economically, to move out of the development town to the urban centers.

### C. CHANGES IN IMMIGRATION

After 1951 mass immigration came to an end. Nearly the entire Jewish communities of the Eastern world were transplanted in Israel. Since 1951 immigration from the Americas and Western Europe has increased. The average level of immigration from 1951 to 1968 was about 35,000 per year. International pressure and internal protest in the Soviet Union has created another wave of immigration. Since 1969 63,000 Russian Jews have already been settled. The Absorption Ministry expects another 55,000 immigrants in 1973, 2/3rds of which are expected to be from the Soviet Union. 40% of the Russian Jews are being directed to development towns by the Ministry of Absorption.<sup>6</sup>

This wave of immigration is much different than the former one; better endowed with technical skills. 43% of all immigrants since 1970 have professional or academic training.<sup>7</sup> More Soviet immigrants are in industry than other groups. 48% are either skilled or unskilled workers. The cost of absorption is quite high. The government estimates the cost of absorbing an immigrant family of three is \$33,000; half of which goes to job creation and 45% to housing.<sup>8</sup>



The settlement of Russian Jews in development towns has not met with unqualified success. Outmigration is as serious a problem with this group as it was with Oriental Jews. One-third of the Russian immigrants originally directed to development towns are outmigrating to the central urban areas, so only 28% of all Russian immigrants are actually settling in development towns. The reasons for outmigration are primarily linked with employment and the desire to live in proximity with relatives; but dissatisfaction with living conditions is also important.<sup>9</sup> The success of the program for the dispersal of the population depends on reversing this trend. Development towns must become magnets for settlement, surviving on their own resources and attracting population according to their particular assets. If the government has to continue to subsidize their existence as heavily as it is doing now, the program will certainly disintegrate. Some towns have had success in reversing this trend, notably Beersheva. But the future will probably be a tough struggle in this sphere.

Berler has noted the strong correlation between home-ownership in development towns and a low propensity for outmigration.<sup>10</sup> I think this is one area where a change in housing policy will have favorable results. The proposal will be discussed later.

### III. NATIONAL ECONOMICS AND THE HOUSING INDUSTRY

#### A. THE ECONOMY

The economy of Israel is one of the fastest growing economies in the world. Average annual growth is about 10%. The economy is in a transitional stage between a developing and full-fledged, industrial economy:

#### SHARE OF INDUSTRIES AND CRAFTS IN TOTAL EMPLOYMENT (1965)<sup>11</sup>

---

Developed countries.....	30-40%
Israel.....	25%
Development areas (Israel).....	18%
Developing countries.....	10-20%

---

This stage of transition complicates the problem of forecasting the success of various programs. Firstly, because of the variability of the economic situation, various arrays of economic factors may be altered drastically in a short period. Secondly, because our models may be based on the experience of the developed or underdeveloped world, which may on first inspection seem to fit the needs of the situation; certain crucial relationships may be missing. Israel must adapt existing models and develop its own, based on its particular needs. It must avoid the mistake of borrowing inappropriate solutions from countries whose basic requirements and capacities are different.

The most critical factor in Israel's economic development

is the lack of economically significant natural resources.

This has two major consequences:

1. Balance of payments problems

2. Development of low resource - high skill industries.

In 1970 the balance of payments deficit was approximately \$1 billion. High taxes are imposed on imported goods and incentives are granted to export and import-replacing industries to help remedy the situation.

Two low resource - high skill industries which have been highly successful for Israel are diamond cutting and rebuilding of commercial passenger airplanes. One advantage of this situation is that the industries are relatively neutral as to their placement on the countryside. They do not depend on a direct supply of raw materials or power. This has given the government the freedom to link the establishment of industries with development towns in outlying regions. The dispersal of industry along with population will prove to be a major step forward in social planning for Israel. The problem of the large, primate city, draining the countryside of its vitality can be eliminated.

Before the Yom Kippur War the economy was in the midst of a boom. Unemployment was extremely low and inflation was high. In 1972 the unfilled demand for labor was 2.7%.<sup>12</sup> The effects of the war will be considered further on in this paper.

## B. THE HOUSING INDUSTRY

The per capita output of the housing industry in Israel is the highest in the world: 16.9 units/1000 compared to Sweden the next highest 12.7 units/1000. The Ministry of Housing estimates the output for 1973 will reach 19.1 units/1000.<sup>13</sup> This represents 6.7% of the GNP and 32.2% of total investment in fixed assets,<sup>14</sup> a very large and purposeful national effort in the direction of solving the housing problem. Demand is still much greater than supply, and this is reflected in the prices.

The cost of housing has gone up 131% between 1968 and 1971. Asher Olnick, Director of Planning and Engineering at the Ministry of Housing, attributes this to a bottleneck in the supply of skilled construction labor.<sup>15</sup> He points out that between 1968 and 1971 investment of resources in building increased 211%, while the construction labor force grew by only 40%. The shortage is felt most critically in the trades concerned with the finishing of buildings (plumbers, electricians, etc.), where time is necessary for acquiring skills and knowledge. Between 1968 and 1971 the gap between house starts and house finishes tripled, from .4 million sq. meters to 1.2 million sq. meters. The time necessary for the completion of apartment buildings is long: from 18 to 24 months. The shortage of finish labor is the cause, since the structural skeleton can be erected in at most 4 to 6 months.

The pressure on the housing industry will continue to grow. The rate of immigration has risen and is remaining steady. An increased demand is being felt from young couples and low-income groups who are demanding better conditions. Luxury housing for foreign purchasers has been draining much of the resources of the housing industry. It will continue to be a sellers market for some time.

The solution which Mr. Olnick proposes and which the Ministry of Housing is actively promoting is an emphasis on the industrialization of the building process. The on-site finish work would be replaced by the factory worker and machine. The Minister of Housing, Zeev Shareff, estimates that by 1975 50% of housing in Israel will be pre-fabricated. He admits cost in real terms will rise by 10%, but predicts a reduction in completion time to 11 months.<sup>16</sup> This is a significant reduction, since the interest rate for working capital in Israel can be from 16 to 28%.<sup>17</sup> A major barrier to the development of industrialization is the conservatism of contractors. They are making substantial profits using traditional techniques and therefore are reluctant to experiment with new and so-called more rational techniques.

My reaction to this strategy is that large-scale industrialized building is not appropriate for development towns. The type of design that will be developed will probably not be supportive to people of such varied backgrounds and cultures.

Cultural context and physical space will probably not "fit." Secondly, fluctuations in demand for housing in development towns increase the risk to large capital investments. Finally, the economic shrinkage and reallocation of resources accompanying the recent war may effectively block investment in the development of industrialized building systems.

### C. THE YOM KIPPUR WAR

Predictions concerning the effect of the war are certainly difficult to make in any great precision. What is certain, though, is that Israel will increase its defense allocations, which are already extremely high. Other sectors of the economy will experience a cut-back. Capital and especially labor will be in even greater demand. As concerns housing, the number and/or quality of dwellings will be reduced.

The balance of payments problem will probably be further aggravated. Export markets (Japan, West Europe) may dry up.

This puts high priority on:

1. Low import of material
2. Low import of products
3. Low import of machinery
4. Low utilization of skilled labor force.

The State of Israel in the coming years will continue to face the same two challenges it faced at independence, security and immigration absorption. I believe the State will remain firm to its commitment to unrestricted Jewish immigration.

The issue of how best to house and settle that immigration needs to be approached with the same type of innovative creativity which has been so characteristic of the history of the State.

#### IV. PROPOSAL: MUTUAL SELF-HELP LINKED WITH INDUSTRIALIZATION

##### A. INTRODUCTION

This proposal conceptualizes housing as a process not as a product. This process exists within a complex physical, economic and social system and encompasses a large time span. Each sector of the system and the individual actors within the sectors have influences and repercussions in other parts of the system. Housing policy must be planned in terms of its human and social impact as well as for economic and physical considerations. The consequences of housing are active in our environment as long as the buildings are standing. They affect how we act, how we think, how well our children perform in the educational process, and much about our basic responses (positive and negative) to the world around us. Hasty solutions to acute crises can and have created secondary difficulties in the long run. It is always easier to make observations in hindsight, yet Israel is facing immediate challenges that must be confronted. The interrelatedness of housing to other sectors should be recognized and used as a tool for the implementation of the program for the dispersal of the population. Industrial investment and employment have greater immediate impact, but the importance of housing in the long-run quality of life is certainly significant.

From the preceding discussion of development towns, the economy and the housing industry, the following problem areas



and needs, where housing can play a role have been identified:

I. National Economy

1. Reduce demand for skilled labor in the construction industry.
2. Reduce demand for imported goods in the construction industry.
  - Materials and products
  - Machinery
3. Increase productivity
  - More dwelling units/investment

II. Community

1. Retain expenditures in construction in local economy.
2. Reduce cost of municipal services.
3. Raise quality of environment.
4. Stimulate immigration to development town.
5. Stimulate political organization and consciousness.
6. Stimulate local participation in political and social institutions of the community.

III. User

1. Promote psychological "rootedness" to the community.
2. Integrate new immigrants into Israeli society as productive citizens.
3. Provide physical space commensurate with the cultural needs of the users.
4. Provide socially and psychologically supportive neighborhoods.

5. Provide users with environments which have the potential to change and expand and accommodate changes in physical needs and economic capacity.

The housing process does not end when a dwelling is occupied. How the people live, how well they live and how the dwelling responds to their particular needs are all integral to this process. My proposal would extend and deepen the involvement of users in the housing process.

#### B. STRATEGY

I propose that a new strategy for the housing process be developed and implemented. This strategy need not be limited to development towns, although for this study I have been primarily concerned with this area. Development and implementation should progress in controlled stages to test the validity of the strategy and to make the necessary alterations.

1. This strategy is a combination of self-help and industrialization. Industrialization will be used to create structures which can be conceived of as "built-real estate," unfinished apartment-sized slabs of 1-4 stories above the ground. Each lot of built-real estate will be provided with the necessary utility infrastructure. The opportunity for user-control and participation would occur during the finishing of the apartments. Users could opt for having their apartments completed according to traditional procedures. Below is a list of the maximum split between what is provided for the user and what the user can control:

### Built-Real Estate

### User

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| - Site Work                         | - Exterior walls and windows    |
| - Foundations, drains, bomb shelter | - Interior partitions and doors |
| - Vertical structure                | - Secondary electrical          |
| - Roofing                           | - Cabinets and closets          |
| - Stairs and corridors              | - Kitchen-bath installation     |
| - Utility supply lines              | - Interior finish               |

2. Users will have a choice of methods for the completion of their dwelling units:

- a. Individual self-help
- b. Cooperative self-help
- c. Sub-contract
  - 1) To established sub-contractors
  - 2) To newly formed sub-contractors from their own midst.

This has the potential for creating a new industry in the development towns.

3. The built-real estate will be designed to offer flexibility:

- a. Spans will be generous to allow a variety of floor plans and room sizes. Professional advice and consultation will be provided to facilitate users in the design process.
- b. Columns will be used rather than bearing walls to further free room layouts.
- c. Utility connections will be centralized in a single shaft per apartment for reasons of economy. However,

a variety of kitchen-bath arrangements will be available from that basic shaft. Pre-fabricated, plug-in kitchen and bath walls will be manufactured in coordination with those arrangements and be available to users as well as to the traditional building industry.

d. The built-real estate will be zoned with regards to circulation and placement of utility shafts to provide for:

- 1) Good environmental quality
- 2) Possibility for the renovation of the building after a generation of use, Planned Obsolescence.

At the present level of national income, the amount of living space per family is small. However, as the economy grows this figure will grow as it has done in the past. From 1948-1972 the average size of a publicly financed apartment has increased from 54 M.<sup>2</sup> to 72 M.<sup>2</sup>. The structures should be planned to accommodate renovations and expansions at low cost and provide good environmental quality. This expansion would probably occur on a macro-scale where an entire building is renovated at one time.

e. A variety of life-styles should be accommodated by the system.

- 1) Young couples
- 2) Large families
- 3) Extended families

- 4) Communal living groups
- 5) Western culture
- 6) Arab and Eastern culture

4. Each family would own its lots of built-real estate and participate in cooperative ownership of communal services and public spaces. Mixed usage with commercial spaces on the ground floor is a possibility with the group sharing the rental receipts from shops.

5. The built-real estate also has the potential of serving as temporary or emergency shelter in time of crisis. Because of the mild climate, the simple erection of a tarpaulin exterior will provide the necessary protection and privacy for human shelter. Since the structure is not such an important element in the total cost of housing, it is conceivable that the Government could afford to inventory these erected units. They would be available for emergency shelter and also be available for occupancy. This is especially important in a country where housing demand can fluctuate drastically in accordance with the political conditions which influence immigration.

6. The advantages of this strategy are manifested on different levels. Firstly, users will gain control of their environments which is a distinct psychological good in itself. Secondly, the momentum of controlling one's personal environment may be translated into social and political action in the local communities. This is a common phenomenon in the self-help settlements in Asia and Latin America. By participating in the actual building of their homes, settlers of new towns would become psychologically rooted-

in and be less likely to move to the urban centers.

The finishing of apartments may become a new industry and source of employment in development towns. This is of critical importance to the hopes of development towns attaining self-sustaining economic growth. The Government should provide technical assistance and formal instruction to facilitate the finishing of apartments and the development of user groups into sub-contractors. The economic implications of this is very beneficial to the local economy, since money spent on the finishing of apartments will be recirculated in the economy of the development town. This money circulating in the local economy will in turn create more employment. Formerly the bulk of the money for public housing was circulated outside the development town, thus depriving the local economy of a tremendous boost.

This program could play a major role in the absorption of immigrants into development towns. It would minimize the disillusionment and disappointment due to lack of employment. During the time that work on dwellings is progressing the immigrants would be involved in learning the language, and the skill he acquires by finishing his own home may become his occupation.

This scheme should be especially attractive to young couples in the urban areas, who are forced to double-up with parents, because of the high cost of apartments. The cost of an apartment often represents five to ten years' salary. If the alternative is between no space and unfinished space, I'm sure many will opt for the latter. This would also be appropriate for low-income

families which are prevalently large. The ability of the whole family to participate in the building process is a great advantage. The ability to finance the finishing of apartments out-of-pocket in accordance with economic capacity will lower the cost of housing since users will not be paying the high interest rates.

Below is a chart indicating the options for finishing of apartments most appropriate to various users employment situations:

<u>User</u>	<u>Option</u>
Fully employed	Sub-contract Family participation
Part-time employed	Sub-contract Part-time self-help Partial sub-contract Family participation
Unemployed	Self-help Partial sub-contract Family participation

Significantly, each individual family will be free to decide which course of action best fits their needs. They will be able to draw on their own network of personal contacts, sources of information and materials and expertise.

Finally, the system will be able to fit the needs of various cultural groups, thereby eliminating mismatch between culture and spatial arrangements.

I do not propose that all new housing in development towns will be constructed according to this strategy. Many people have the means and the desire not to participate in this process and they should be able to exercise that option. However, the converse option should be available to that portion of the population

without the necessary means. Pilot projects of moderate scale (200-300 units) should be carried out to test the marketability of this concept and also to rectify problem areas in the original design.



## V. DESIGN OF PHYSICAL SOLUTION

### A. DESIGN PHILOSOPHY

1. As mentioned before the building strategy proposed in this paper proceeds in two stages. The first stage calls for the erection of a pre-fabricated structural skeleton and the installation of a utility infrastructure within the structural skeleton. These two components serve as a framework within which the second stage of the building strategy proceeds, installation of bath and kitchen components, erection of partitions and finishing of apartments. The design portion of this paper will be concerned with the specific design of the structural and infrastructure systems. The second stage of the building strategy will be designed with regards to possible room layouts and combinations. Suggestions concerning alternative construction processes for the second stage will be put forward.

2. In order for the structural system to be successful it must meet the following criteria:

- economy of construction
- flexible spatial planning.

The requirement of economic construction is rather obvious since I am dealing with low-income housing in a developing country. Certain generalizations can be made about how to achieve this objective:

- a. Speed of construction should be maximized to limit interest payments on expensive working capital.
- b. Produce a limited number of simple, repetitive structural elements.

c. Produce elements for as broad a market as possible so volume production can be achieved with limited risk to original investment. Therefore the building system should be an open system: an assemblage of independent components, flexible enough to be substituted into the traditional building process. It should be amenable for use in small scale rural settlements and the needs of Arab villagers. If a political settlement is made in the Arab-Israel struggle and peaceful coexistence is established, this system could be appropriate for the rehousing of Arab refugees. Market diversity can be maximized by planning and production in accordance with the Government's specifications for modular coordination.

d. Reduce dependence on skilled labor.

e. Design should minimize critical path bottlenecks.

Scheduling of trades and tasks should be simplified by proper design. The construction process should not be halted if a minor trade doesn't show up.

3. Flexibility in the system refers to the ability to achieve the following types of variety:

a. Variety of floor plans

b. Variety of apartment types

- row houses

- duplexes

- gallery apartments

- point blocks

c. Variety of topography and soil conditions

d. Variety of interior and exterior finishes to suit user preferences and add to cityscape.

## B. DESIGN CONSTRAINTS

### 1. Materials:

Concrete block and reinforced concrete are the traditional building materials in Israel. Israel produces most of its own cement although the high demand has recently resulted in the importation of cement from Romania. More plant capacity is under construction which should eliminate the need for importation. Steel and wood are both entirely imported and due to high cost are used only for special construction uses. Pre-cast, pre-stressed, hollow-core concrete floor slabs are in production in Israel. It is my decision to base the design of the building system on pre-cast, hollow-core concrete plank. These components have the advantage of being off-the-shelf items and therefore not requiring investment in plant facilities. Their spanning capacity is more than adequate and, since they are cast in forms, reinforcement can be adjusted to accommodate cantilevers of up to 1/3 of the simple span. They also meet the requirements for speed and simplicity of construction and low importation of material.

### 2. Modular Coordination:

The Ministry of Housing as part of its efforts to increase the productivity of the building industry has established a system of modular coordination specifications for building components. The specifications are based on the Danish system which proved so successful in that country. This system should facilitate the

development of industries producing building components according to the model of an open system.

The basic planning module is  $M=10 \text{ CM.}=4 \text{ in.}$  The following are the basic planning constraints relevant to this project:

- a. Floor to floor height - 2.80 meters
- b. Length of hollow-core plank =  $n \times 30 \text{ CM.}$
- c. Width of plank - 60,90,120,240 CM.
- d. Stair dimensions:
  - 1) Single flight - 720 CM. x 270 CM.
  - 2) Double flight - 480 CM. x 240 CM.

### 3. Density:

#### a. Conditions and Policies:

Israeli planners have committed the country to urban densities in new towns of at least 20-30 D.U./acre. This has developed from three considerations:

#### 1) Economics in the supply of infrastructure:

- Roads
- Utility lines
- Public Transportation

#### 2) Quality of urbanity created by higher densities:

More and better services can be supported in denser environments, schools, shops and recreation. Density is so important because the Israeli society is much less dependent, relative to western countries, on the automobile and will remain so for the foreseeable future.

#### 3) Unsatisfactory past experience with lower densities:

After independence a "garden city" approach was implemented in new towns. This was a result of the influence of

British planning concepts. The previously mentioned problems of cost of infrastructure and lack of urbanity were encountered and this approach was subsequently abandoned.

b. Design Implications:

The housing system should make sense for urban densities of 20-40 D.U./acre. I reject high-rise construction as a solution due to cost factors (elevators and earthquake construction) and more importantly the serious social problems implicit in high-rise living for low-income groups. The solution would be 4 story walk-up apartments. A fifth level could be achieved on a flat site by placing the entrance to a duplex on the fourth floor. A sixth level is conceivable on a sloping site with the entrance on the second level.

4. Site Planning:

Site planning should provide for good environmental quality:

- a. Hierarchy of public/semi-private/private spaces and land use.
- b. Integration of dwelling units harmoniously with landscape and with public and semi-private spaces.
- c. Supportive of the concept of neighborhood and social interaction.
- d. Provide centralized communal services
  - Laundry
  - Child care
  - Store
  - Adult meeting area
- e. Parking should not be an intrusive element yet should be

convenient to individual apartments. Maximum 50 meters walking distance. Assume one parking space per dwelling unit. Underground parking in coordination with the structural bay should be investigated.

f. Mixed usage of small shops and offices should be encouraged.

5. Dwelling Units:

a. All units will have cross ventilation.

b. Service balconies adjacent to kitchens will always be a planning option.

c. All utilities will be centralized in a single shaft. The shaft will be of generous size to accommodate the installation of prefabricated plumbing trees.

d. For gallery apartments, kitchens will be adjacent to the public "street in the air."

C. FABRICATION AND DISTRIBUTION

Economics of Building Systems:

In general for a building system to succeed it must have a large, stable market. The factory must work at a high level of capacity continuously. It cannot absorb large fluctuations in demand. By working at large volume, overhead is spread over many units.

Transportation costs are a significant factor. European experience has indicated that shipping costs can run to 11% of unit costs, and that a competitive radius of 30-80 kilometers can be achieved. This is not directly transferable to the Israeli situation; however, it is possible to identify a conflict between

the economies of large-scale centralized plant production and transportation costs.

Three alternative systems of fabrication can be envisioned:

- a. Central plant in the center of the country serving the whole country.
- b. Two large plants serving the north and south.
- c. Demountable site plants.

(See Map #1)

The Ministry of Housing is now in the practise of granting design-build contracts for housing which guarantee the contractor 400-600 units in a specific area over a 3-year time span. This volume can justify an on-site demountable plant for the fabrication of structural elements. However, it is not sufficient volume for a high capacity central plant. I propose that demountable site plants be the initial production facility for the structural elements of the system. Large-scale capital investment will be postponed until experience and refinement have been acquired.

On the other hand, I propose that a centralized plant is justified for the production of bathroom and kitchen components. These components have high cost to weight and volume ratios so shipping cost will be less important. Secondly, the bath and kitchen components will have a wider market and therefore a central distribution location makes more sense. However, I propose that large scale investment in automated equipment not be undertaken until experience with the problems of the system is acquired and

sufficient refinements are made. Perhaps this factory will have to operate at a loss at first by charging a price based on the estimated unit cost of production by fully automated production. This will give a more accurate indication of market acceptability of the product.

#### D. SYSTEMS AND CHOICE

This strategy toward housing is based on my assumptions about to what extent users are able and willing to participate in the housing process given the existing social and economic conditions in Israel. The extremely high cost of traditional housing will probably be the chief stimulus for users opting for this method. Under present levels of income and prices, it cost an average Israeli between 8 and 10 times his yearly salary to purchase an apartment. This is nearly incomprehensible to an American where conventional real estate wisdom pegs the affordable value of an individual's home at between 2 to 2 1/2 times annual income. Therefore the system of production that I am proposing must realize significant cost advantages in order to reach any degree of market acceptability. A user's ability to opt for this system of housing is therefore a function of the economic advantages of the system.

The system should be designed so that users may exercise choice at any point in the building process. Standard plans with the proper building components should be available so that users can choose any alternative between complete self-help and completed



apartments by a contractor. Therefore, in the worst case, if all my assumptions are wrong and user-participation is merely an architect's dream, the physical components of the system would still be highly appropriate to housing based on production according to the product oriented model.

FOOTNOTES

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2. H.U.D., International Country Report, Israel, p. 13.
3. Berler, Alexander, New Towns in Israel, p. xix.
4. Ibid., p. 66.
5. Rivlin and Szyliowicz, The Contemporary Mid-East,  
p. 380.
6. Israel Economist, July 1973, p. 213.
7. Curtis and Chertoff, Israel: Social Structure Change,  
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8. Israel Economist, August, 1973, p. 213
9. Op. cit., Berler, P. 320.
10. Ibid., p. 321
11. Ibid., p. 28.
12. Israel Economist, July 1973, p. 187.
13. Ibid., p. 182.
14. Op. cit., H.U.D., p. 13.
15. Olnick, Asher, "Industrialization of Building," in  
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16. Israel Industry and Commerce and Export News, March,  
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17. Israel Economist, November 1972.

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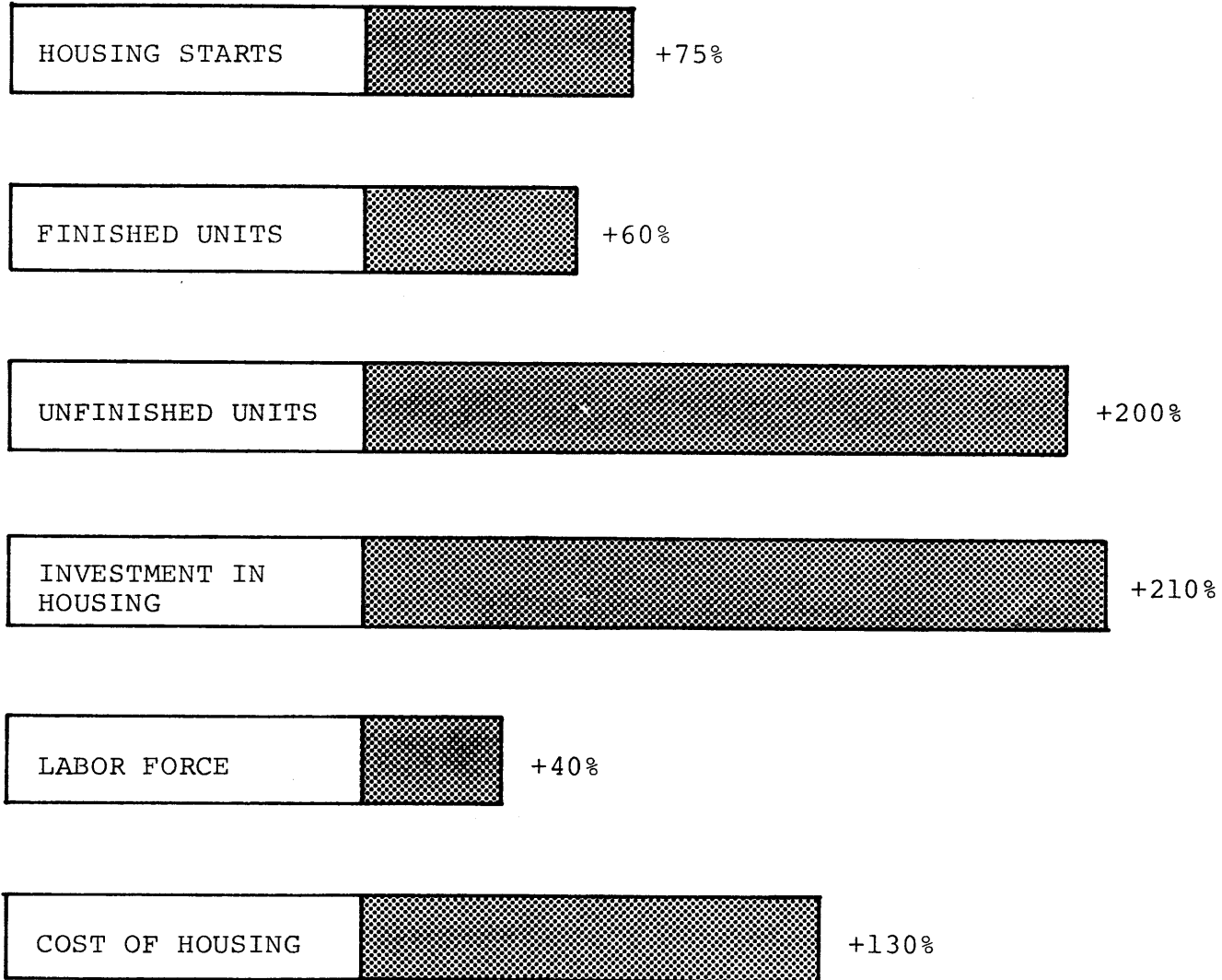
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**DESIGN STUDY**

**CONCEPTUAL DEVELOPMENT**



1968  1971

**GROWTH OF THE HOUSING INDUSTRY**

## NATIONAL ECONOMY

Chronic balance of payments problems

High cost of credit

High demand for housing which is subject to drastic fluctuations due to political influences

Economic slow-down and reallocation of resources will result from the Yom Kippur war to the detriment of the housing industry

Shortage of skilled labor has created a bottleneck in the supply of housing

Use local materials

Limit import of sophisticated equipment

Limit capital investment and risk

Use unskilled labor

increase speed of production

Increase productivity of skilled labor by industrialization

Promote development of finishing apartments as local industry

User self-labor

User participation in design decisions

Provide flexibility for a variety of floor plans

Don't use structural party wall

Develop system appropriate for variety of site conditions and building types

Develop components with diversified market

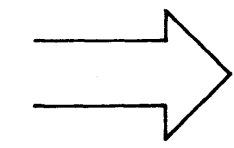
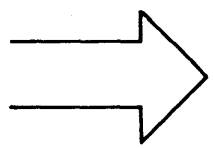
Avoid special single application items

Use concrete

Use simple prefab elements

Develop plug-in bath and kitchen components which also apply to the traditional market

Use post and beam structure



## DEVELOPMENT TOWNS

Lack of sources of employment

Need to recirculate government housing funds in local economy

Lack of rootedness to local community by individuals

Lack of political and social consciousness and action

## HUMAN NEEDS

Provide user control over their personal environment

Provide physical space commensurate with the cultural needs of users

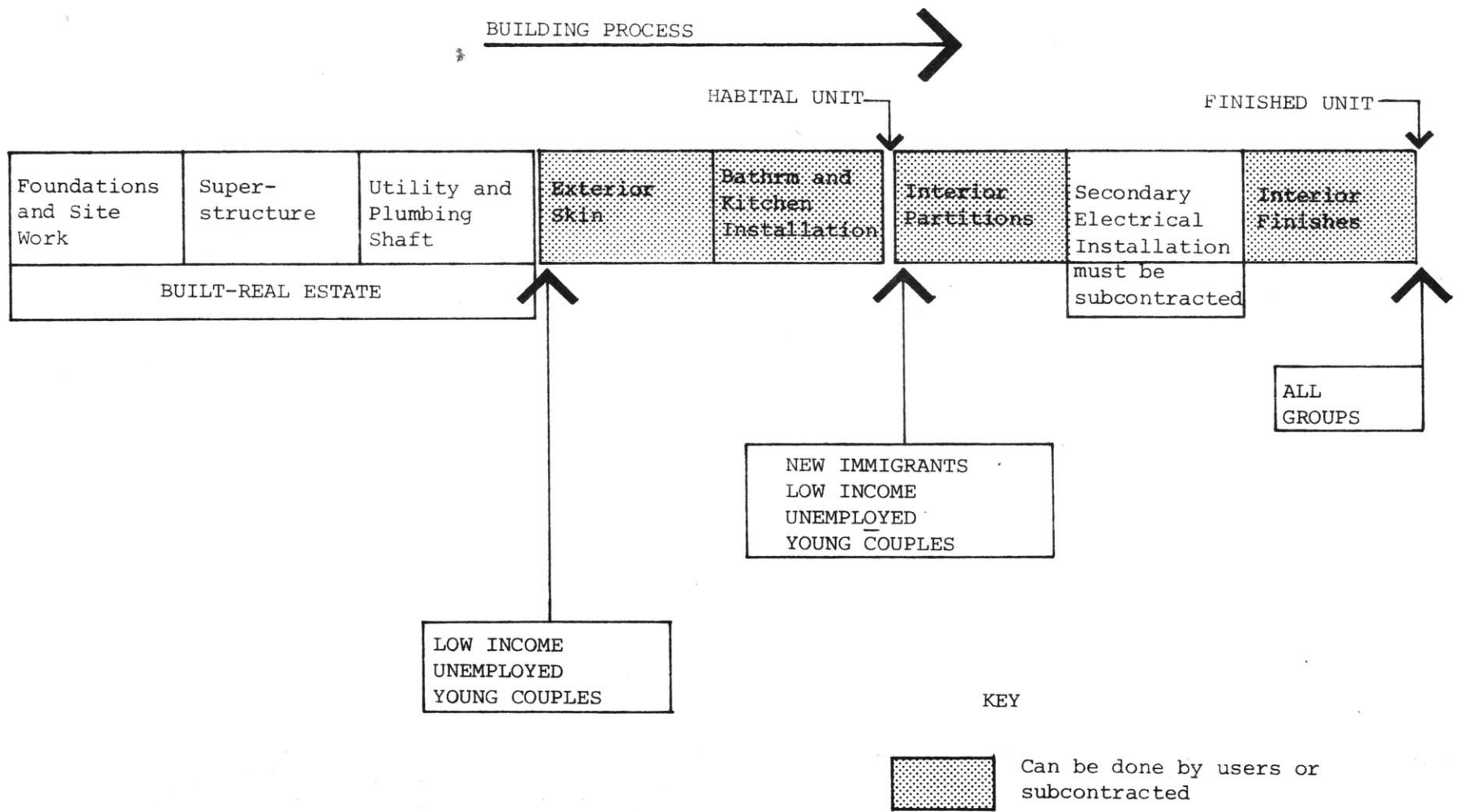
Provide for planned obsolescence as national income grows

## BUILDING SYSTEMS

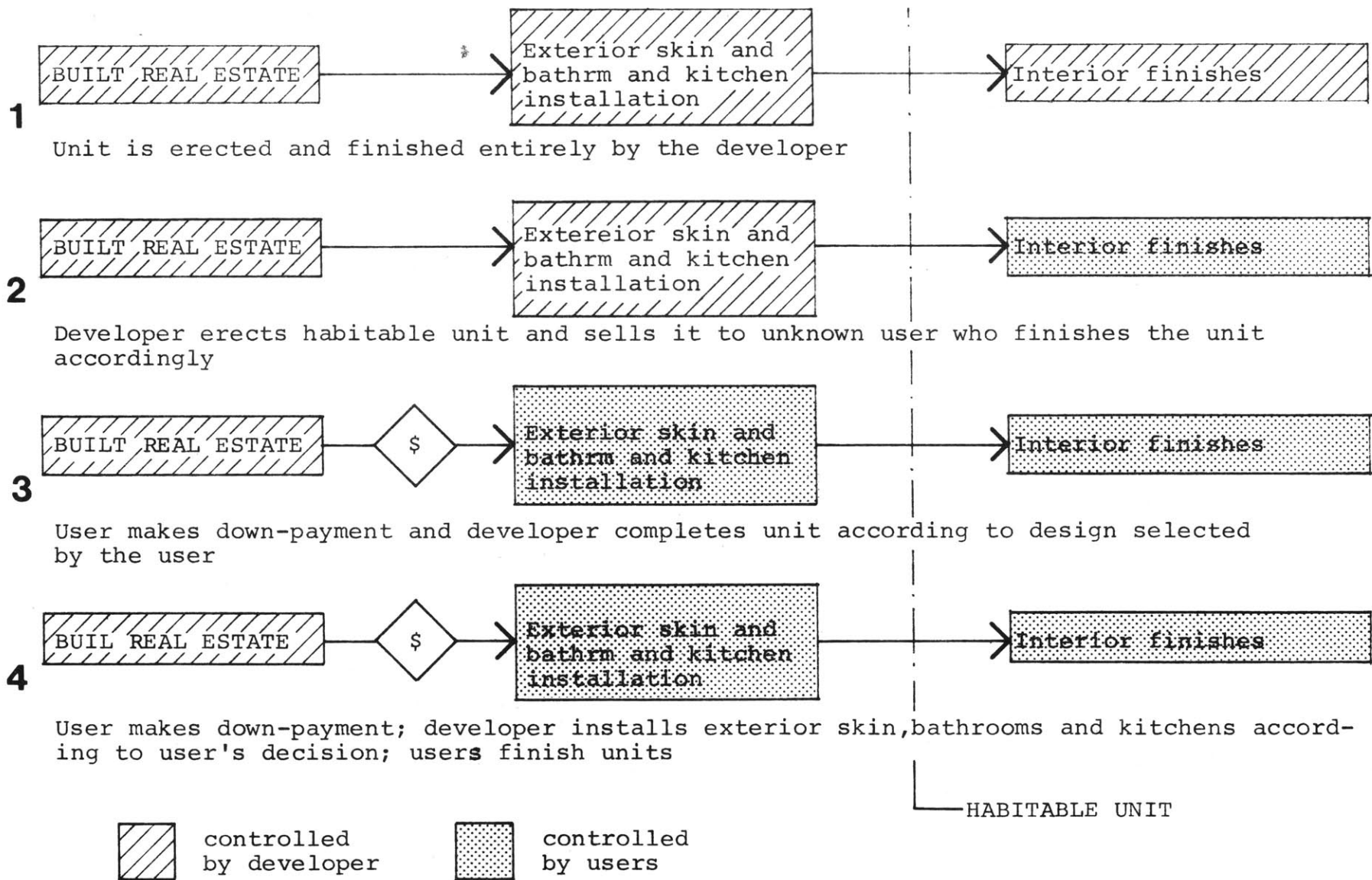
Need large and stable market

# Determinants of Building Strategy





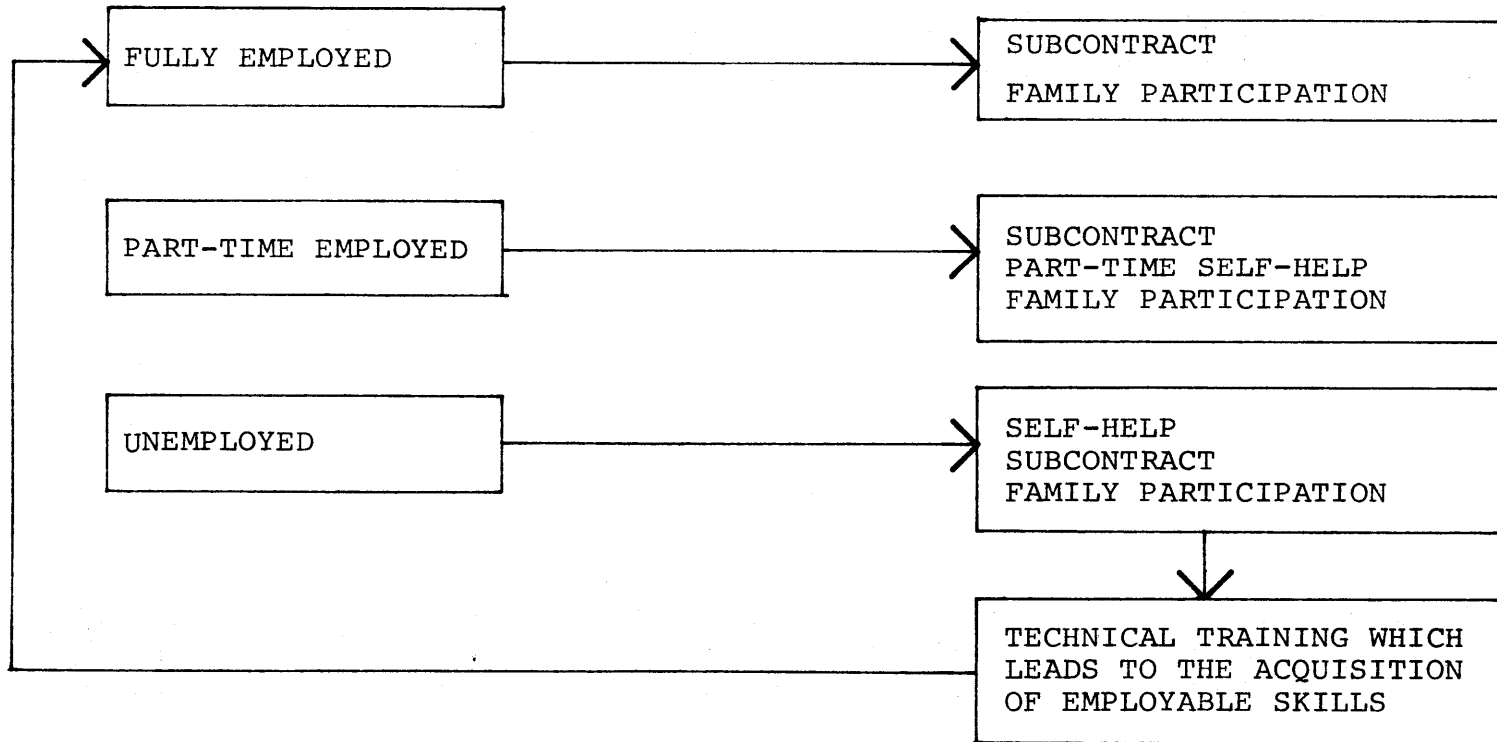
## USER ENTRY POINTS INTO BUILDING PROCESS



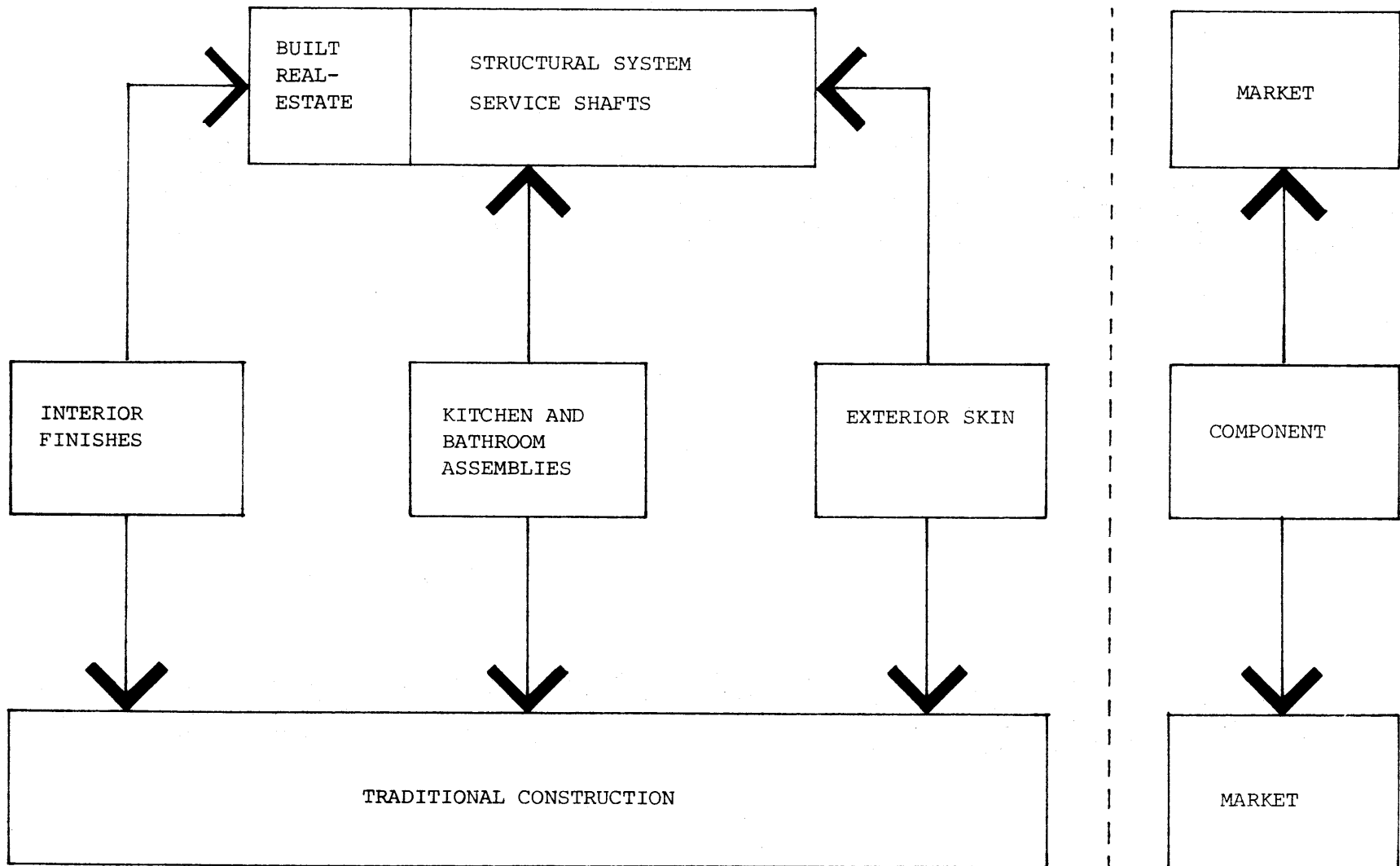
## IMPLEMENTATION STRATEGIES

USER EMPLOYMENT STATUS

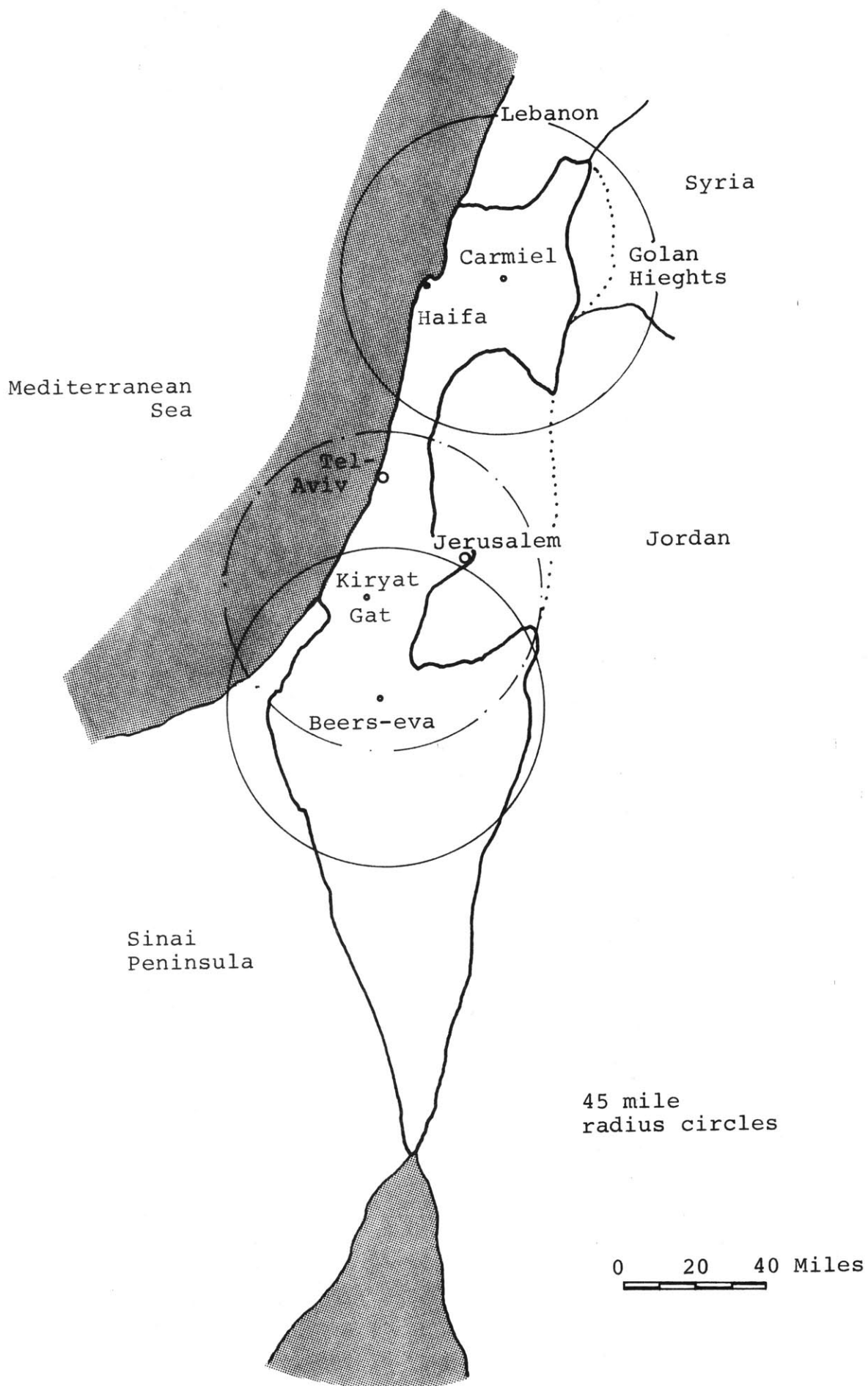
OPTIONS FOR FINISHING  
OF APARTMENTS



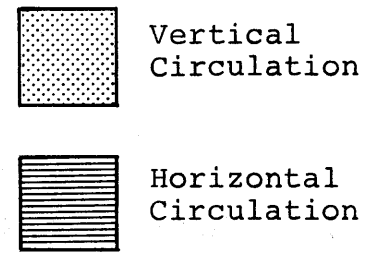
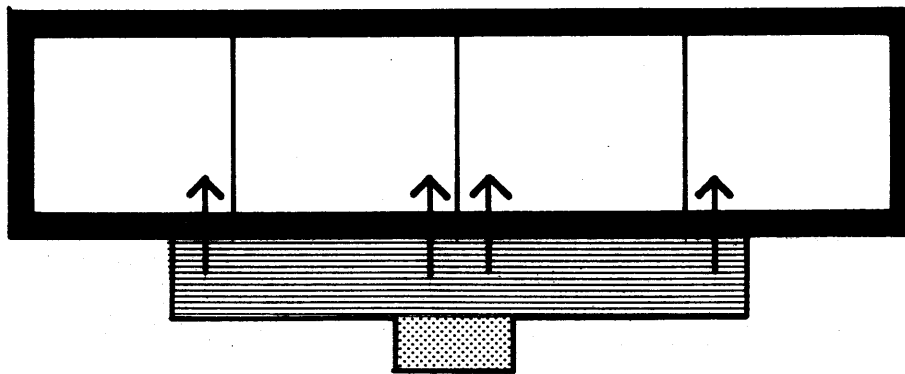
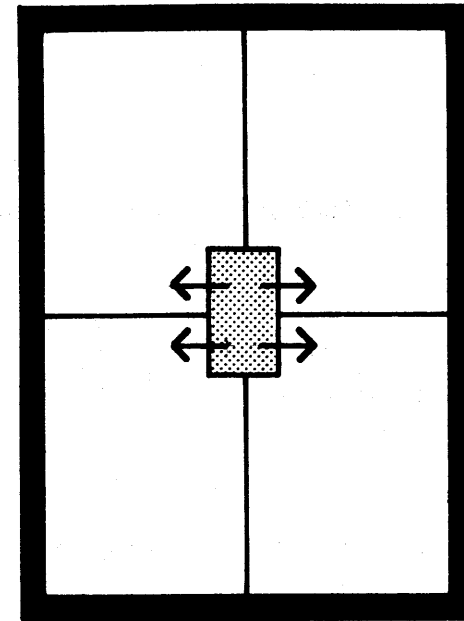
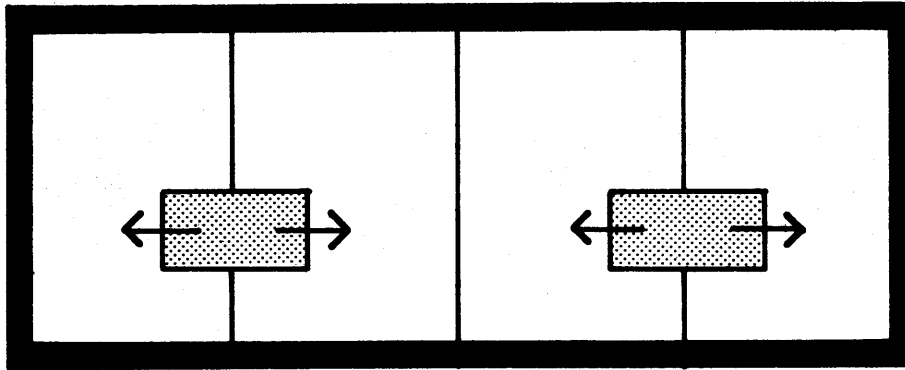
**USER OPTIONS**



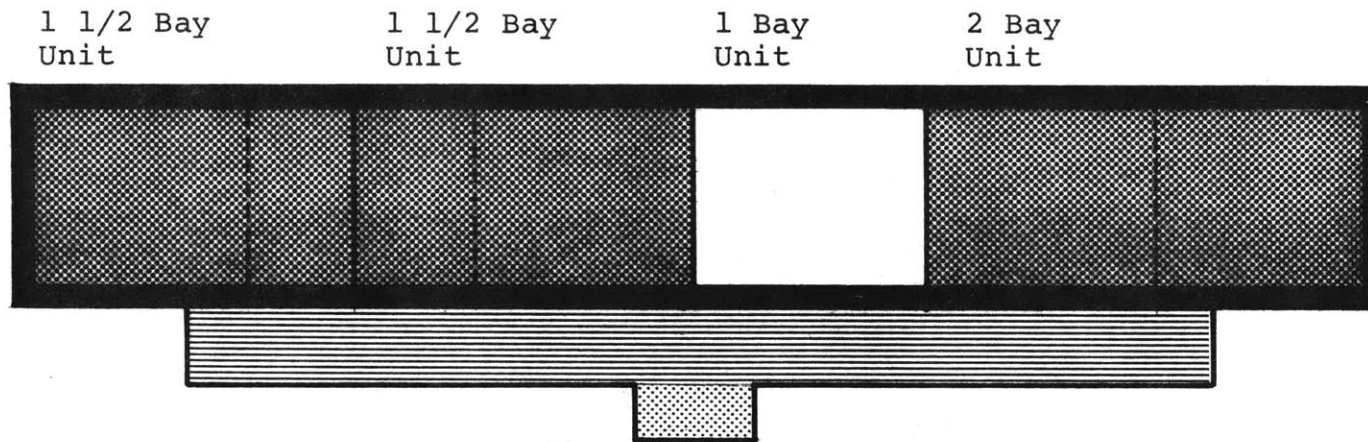
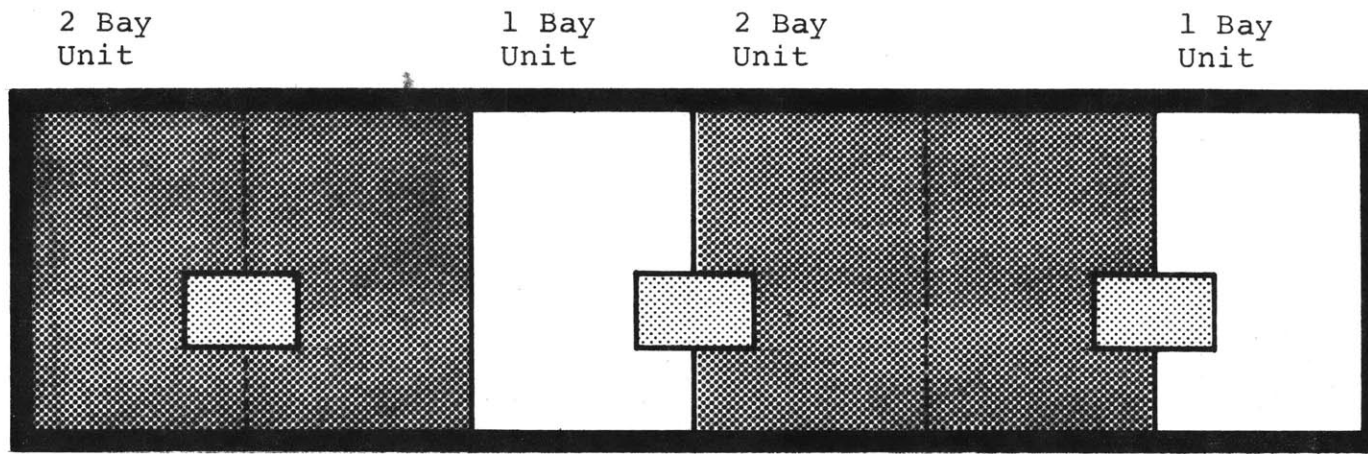
**AN OPEN SYSTEM**



**PRODUCTION & DISTRIBUTION**



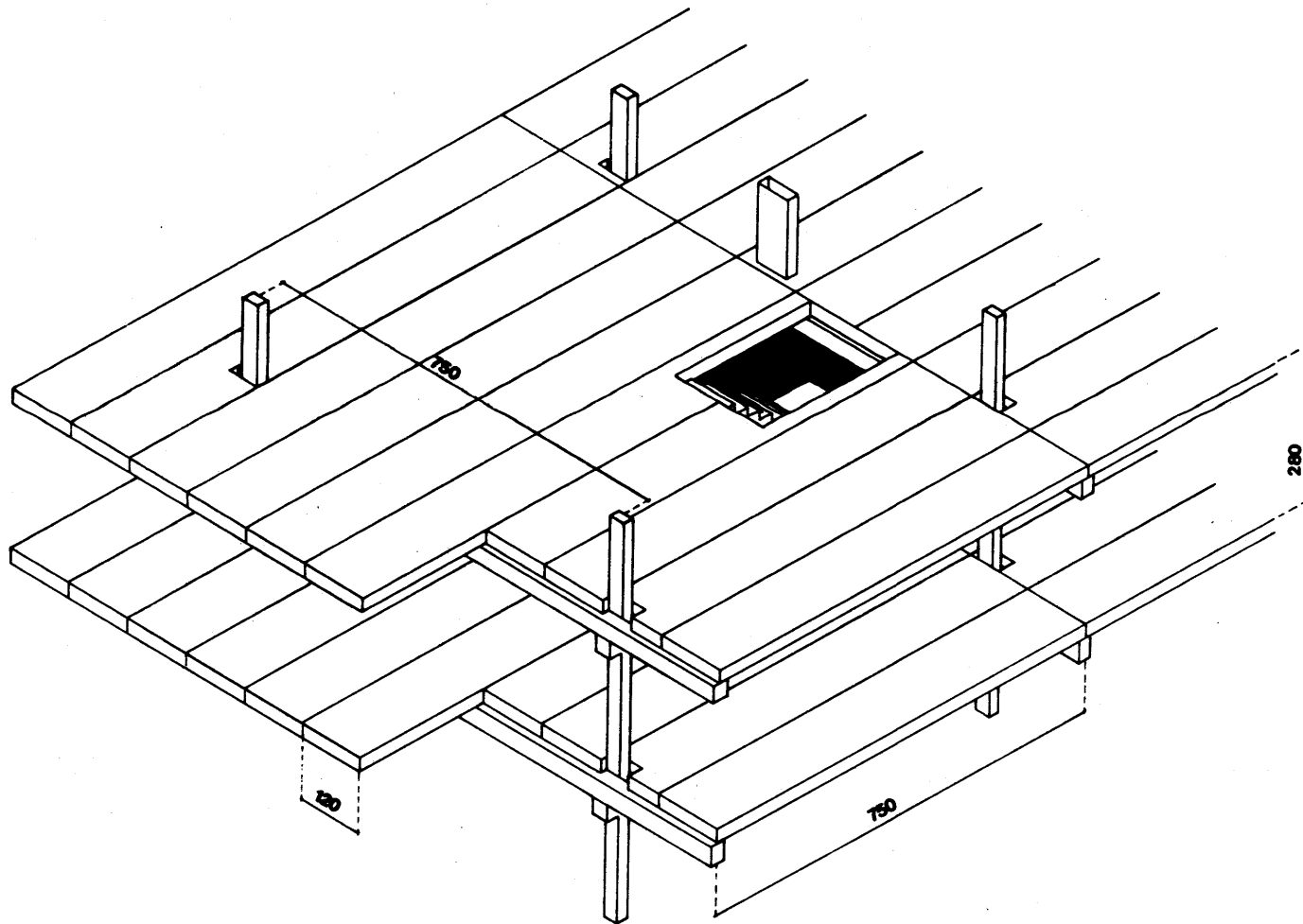
**ACCESS TO UNITS**



**EXPANSION POSSIBILITIES**

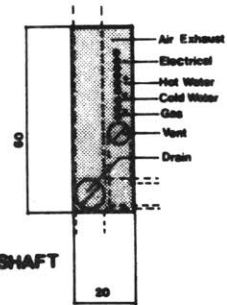
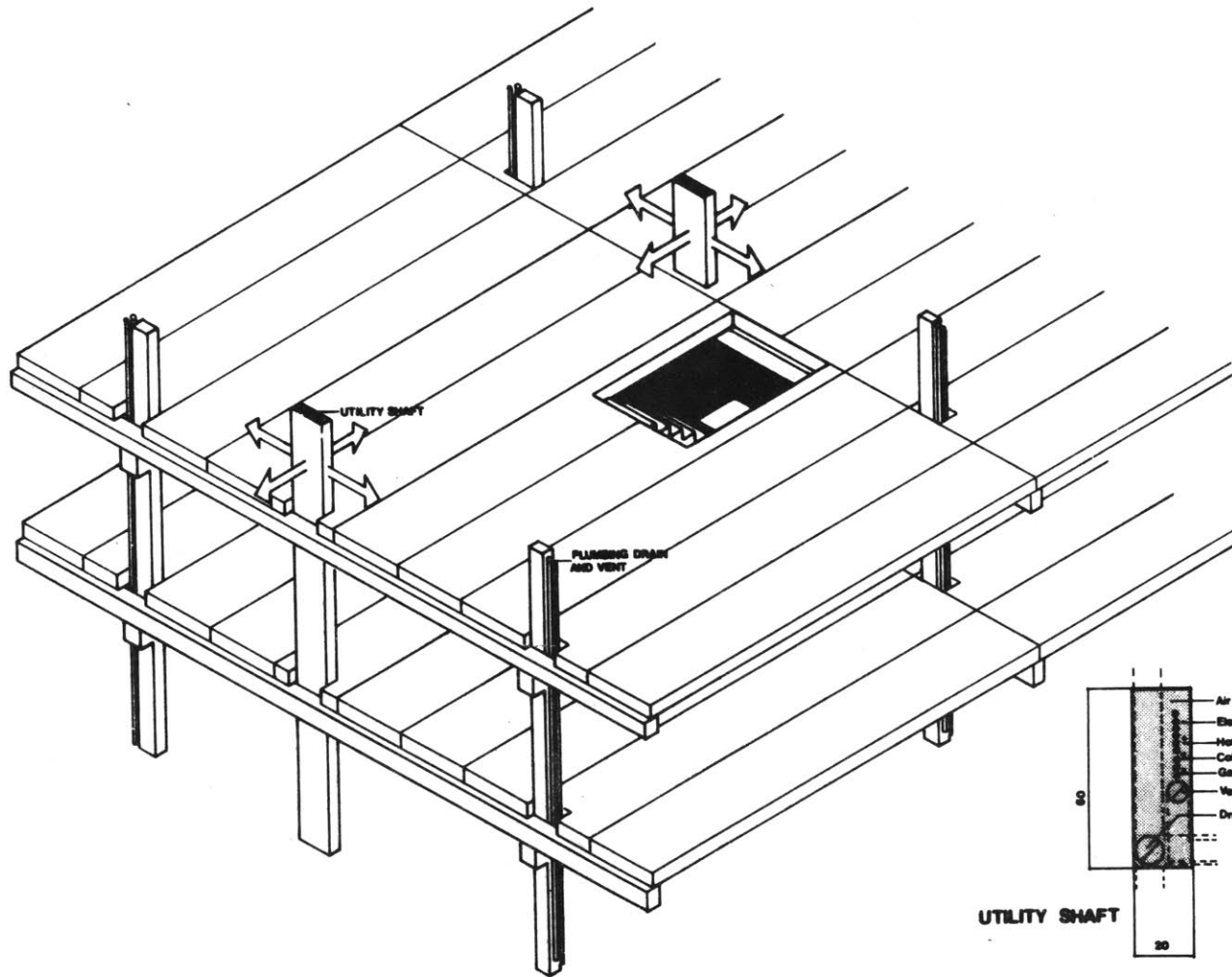
## **STRUCTURE & UTILITIES**





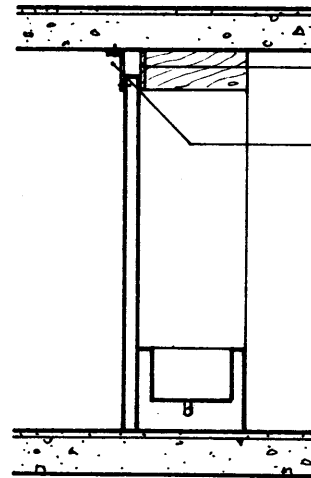
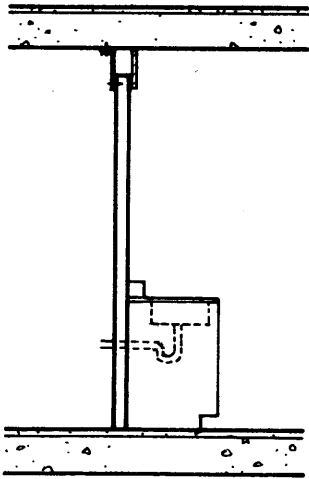
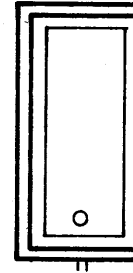
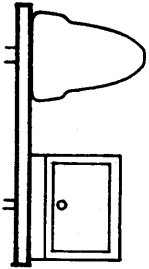
**STRUCTURAL SYSTEM**

D9



# UTILITY DISTRIBUTION

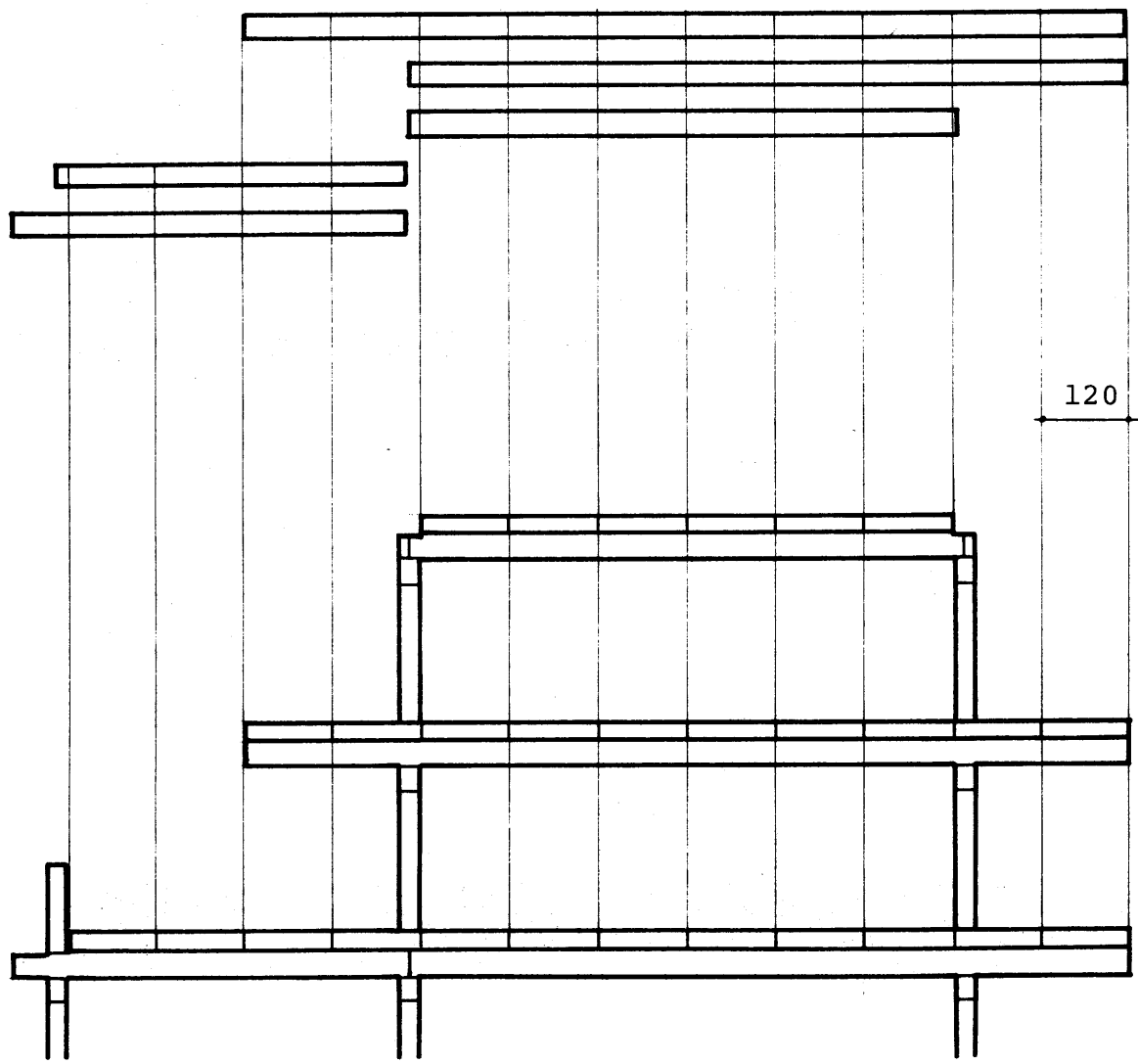
D10



Wood Filler  
Piece

Bolted  
Connection

## PREFABRICATED BATHROOM MODULES



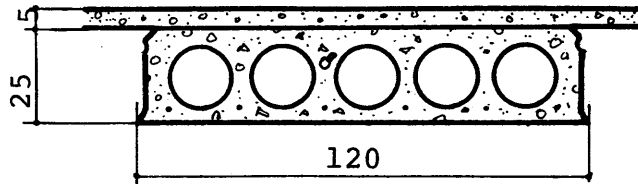
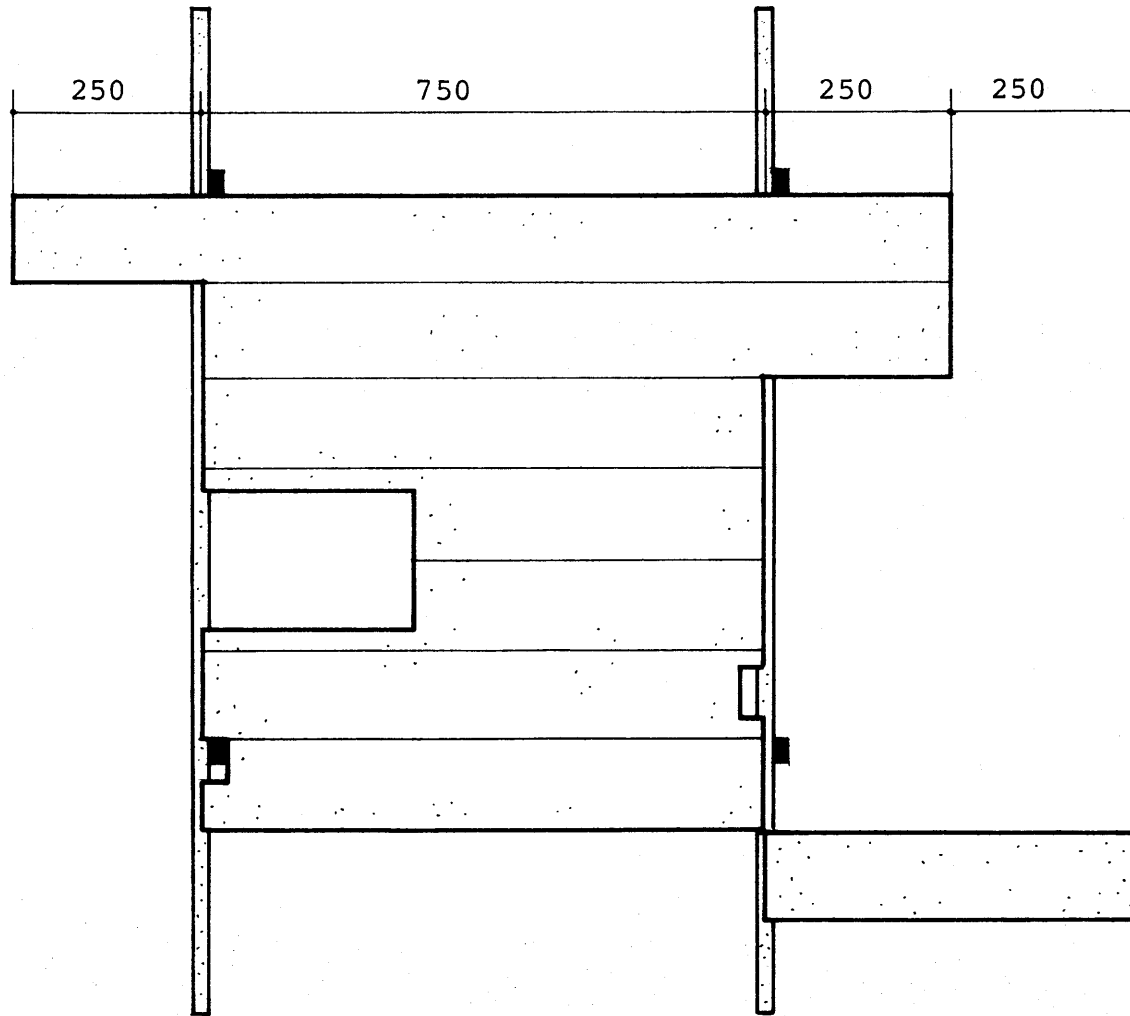
BEAMS



COLUMN

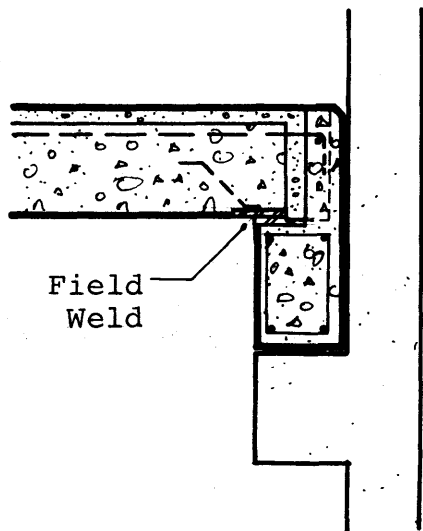
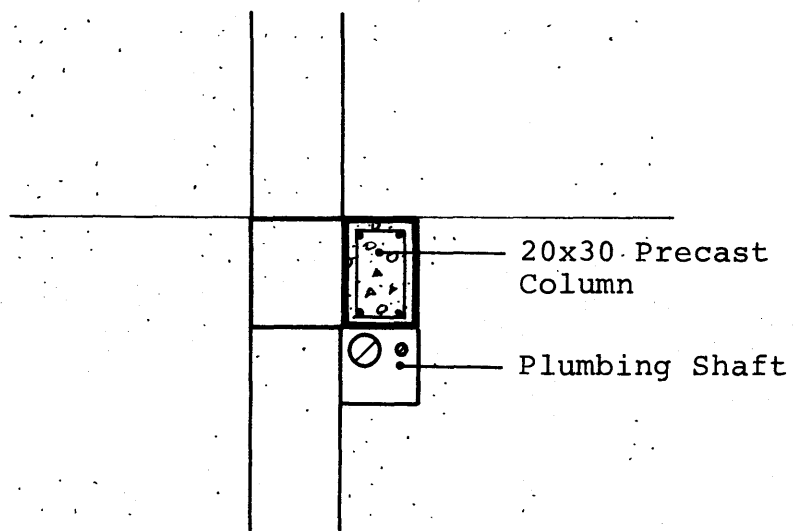
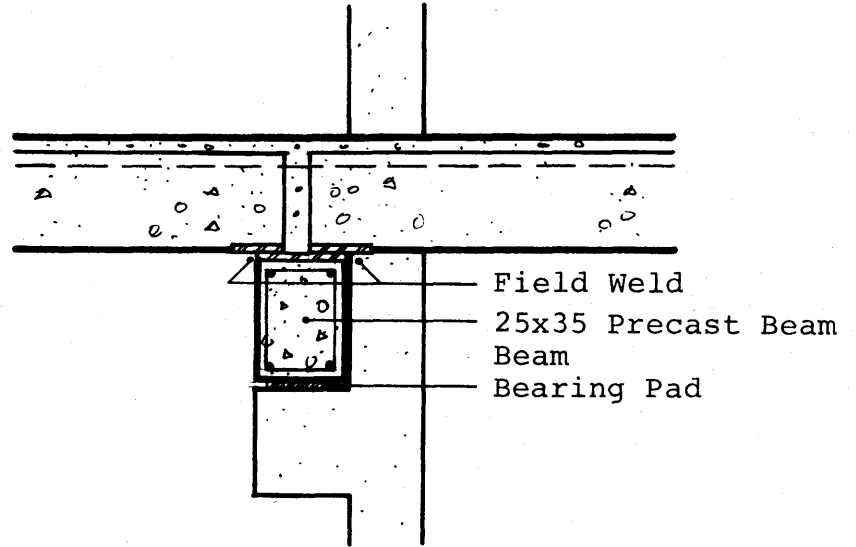
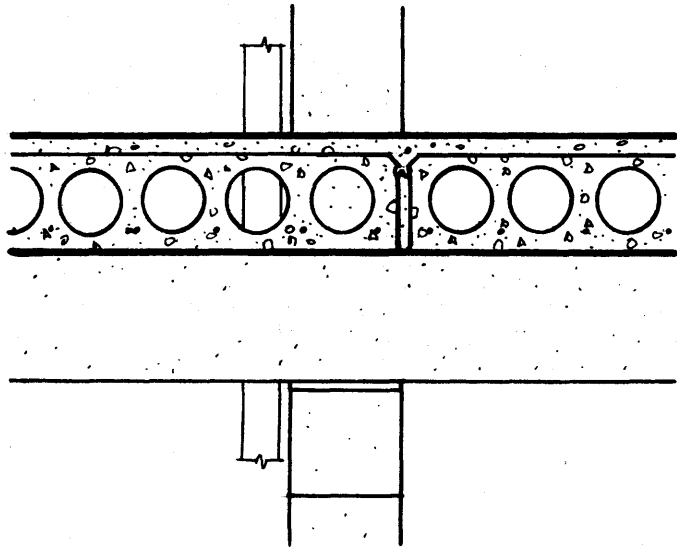
# PRECAST COLUMNS & BEAMS

D12

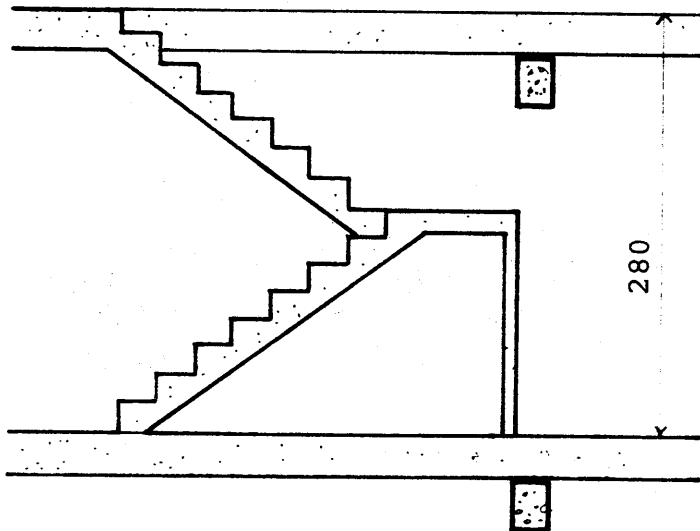
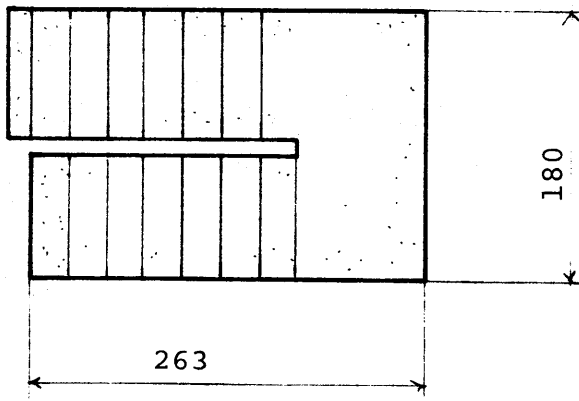


**PRECAST PLANK**

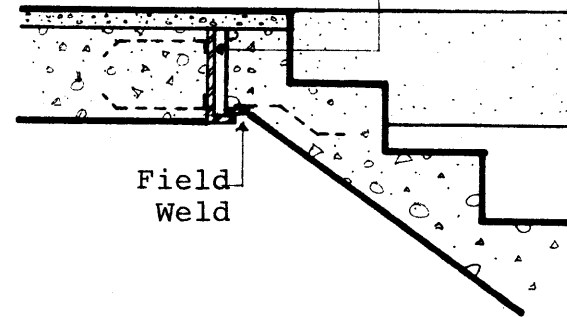
D13



## STRUCTURAL DETAILS

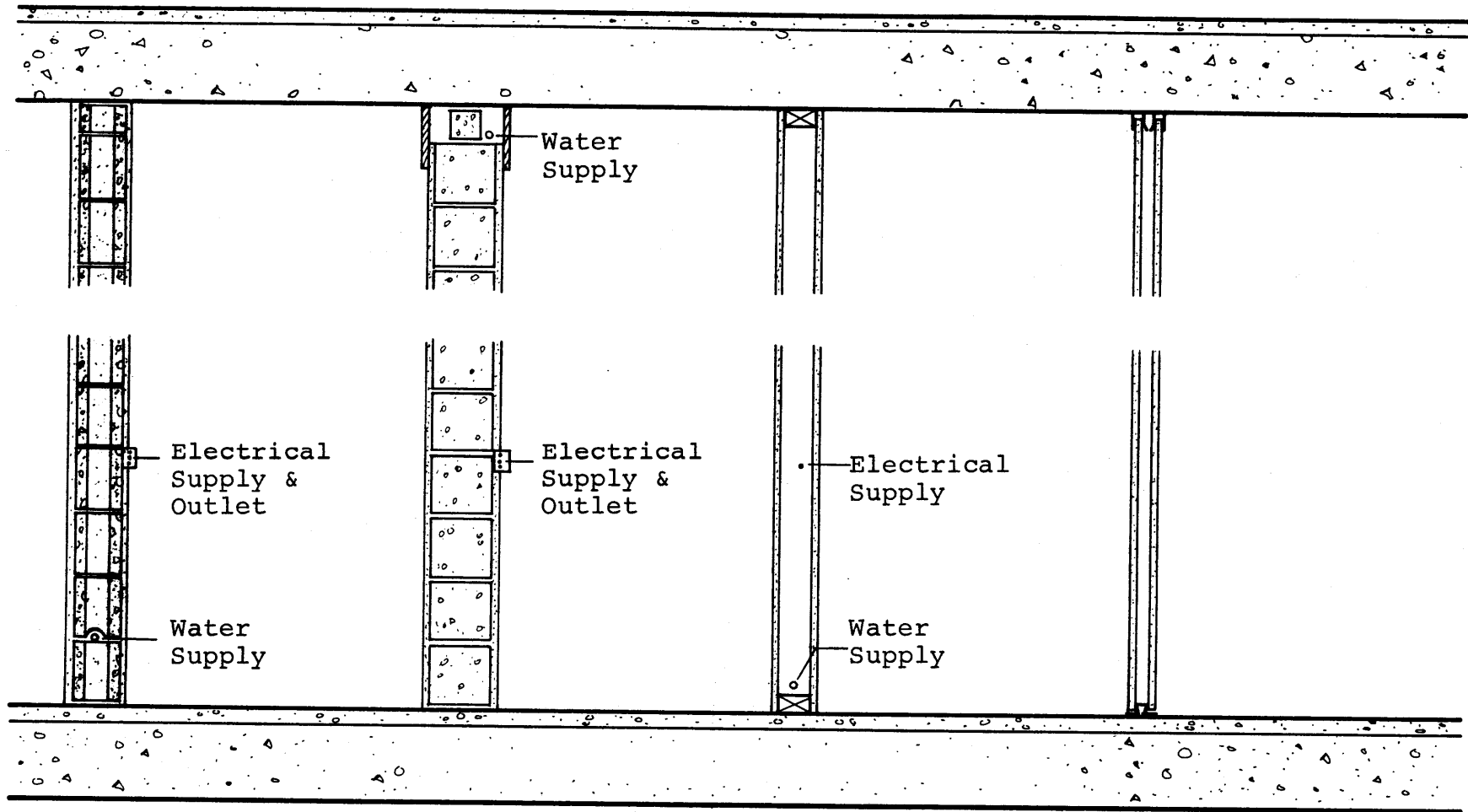


Continuous Steel Angle



Riser:  $18.64 = 7\frac{1}{4}$ "  
 Tread:  $25.40 = 10$ "

**PRECAST STAIR,  
 DUPLEX UNITS**



15 cm. Hollow  
Concrete Block,  
with Plaster

20 cm. Solid,  
Gas-concrete Block,  
with Plaster

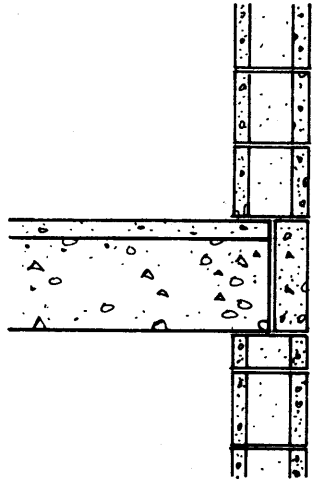
Wood or Steel  
Studs with  
Gypsum-Board

Demountable  
Gypsum-Board  
Partition

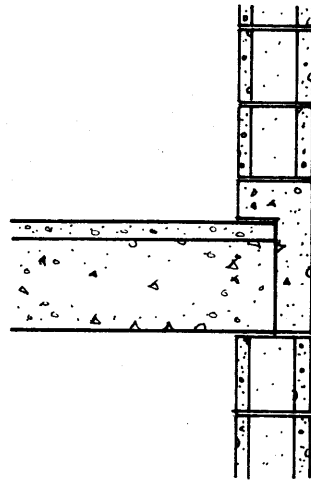


## INTERIOR PARTITION ALTERNATIVES

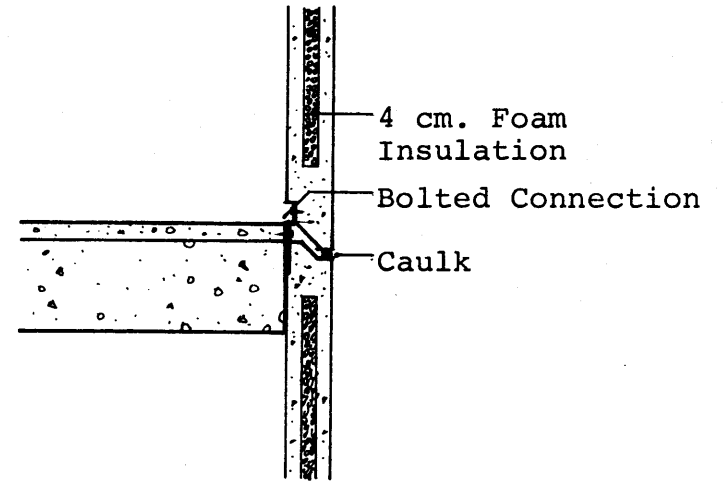




20 cm. Hollow  
Concrete Block



20 cm. Hollow  
Concrete Block,  
with Precast Starter-  
Block at each Floor

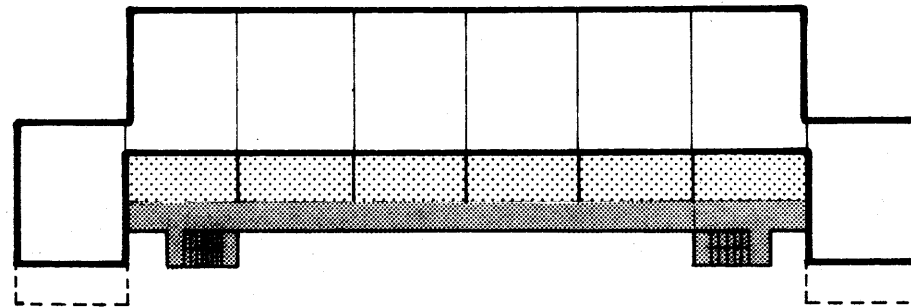


12 cm. Precast,  
Prefinished Concrete  
Curtain-Wall



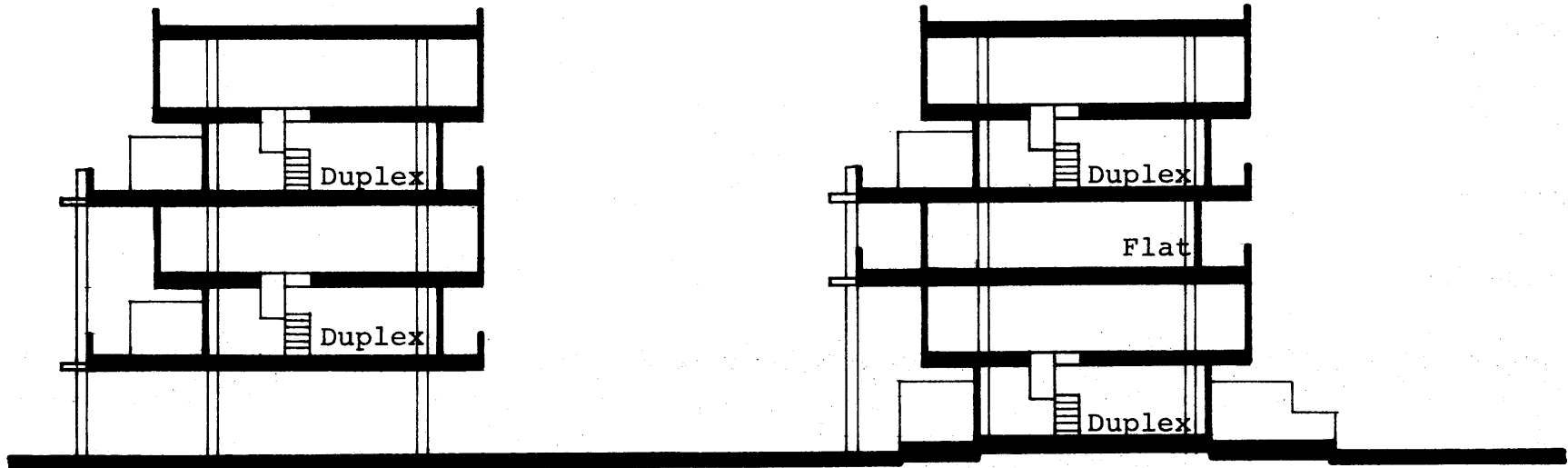
## EXTERIOR WALL ALTERNATIVES

**BUILDING TYPES**

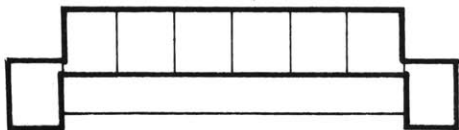
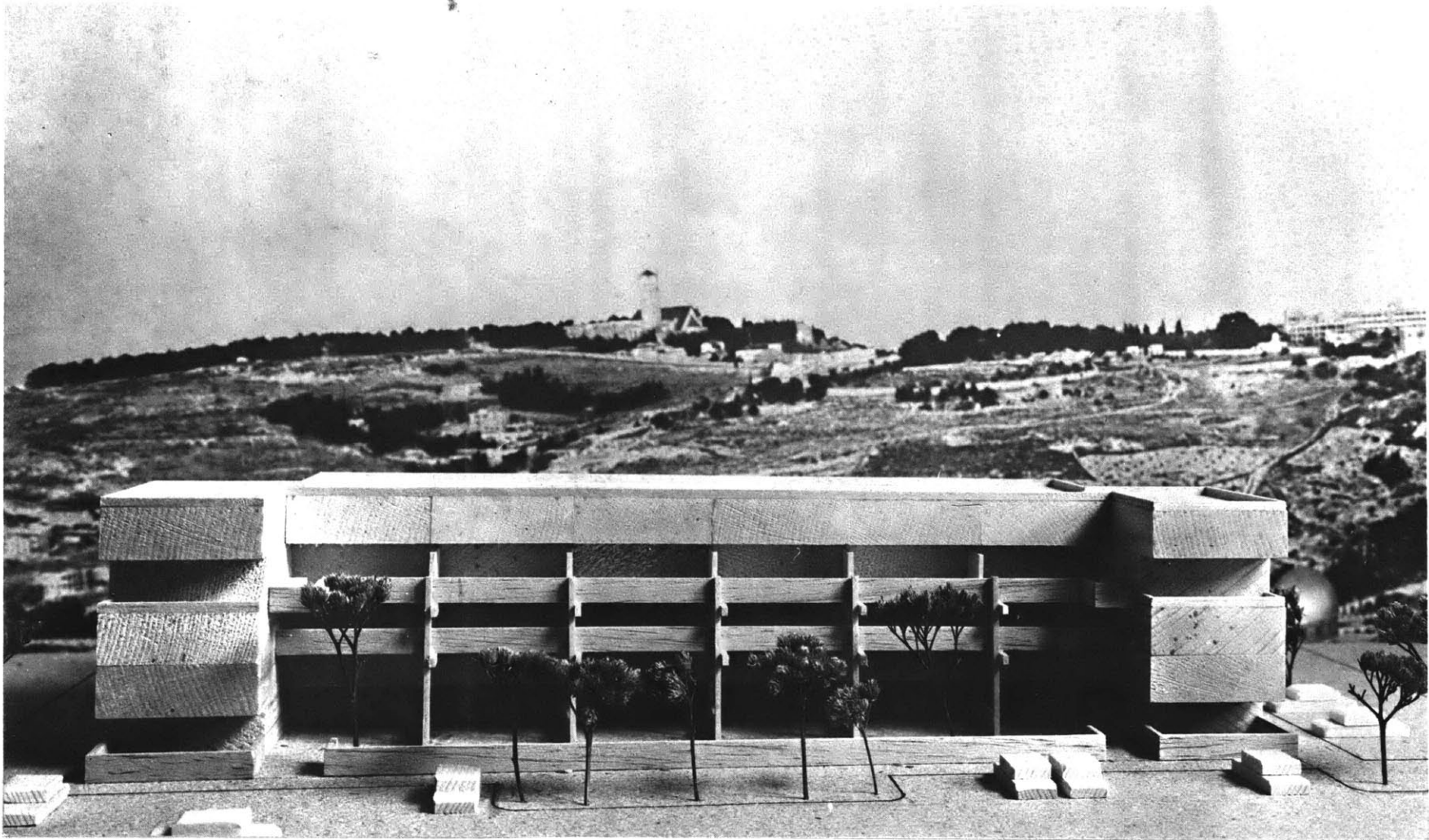


Private,  
Set-back Zone

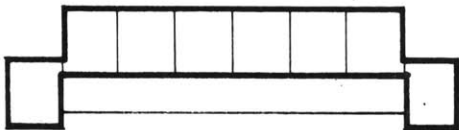
Circulation  
Zone



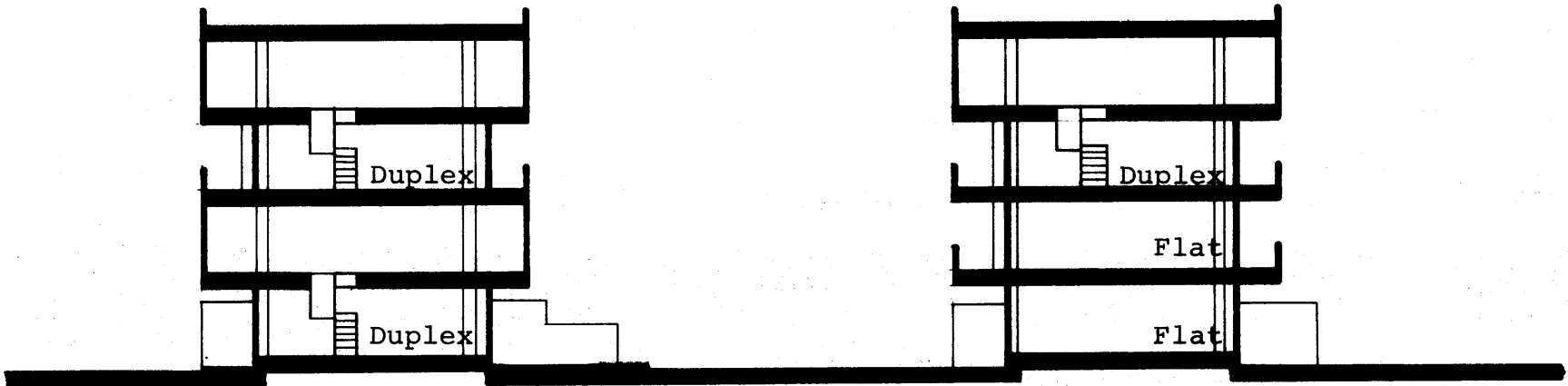
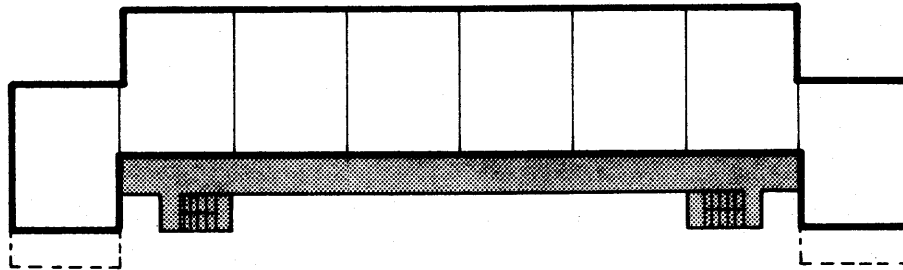
**BUILDING TYPE**



**BUILDING TYPE**

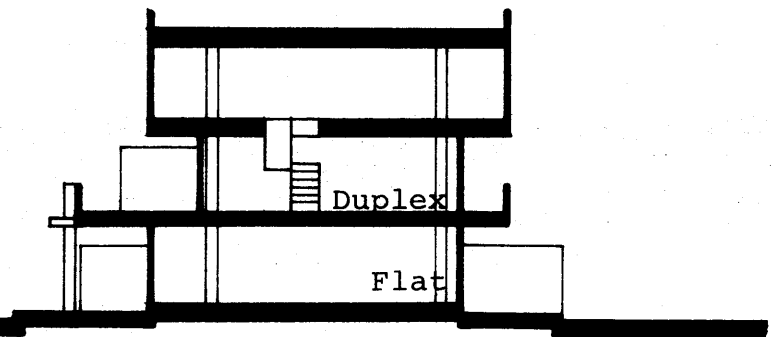
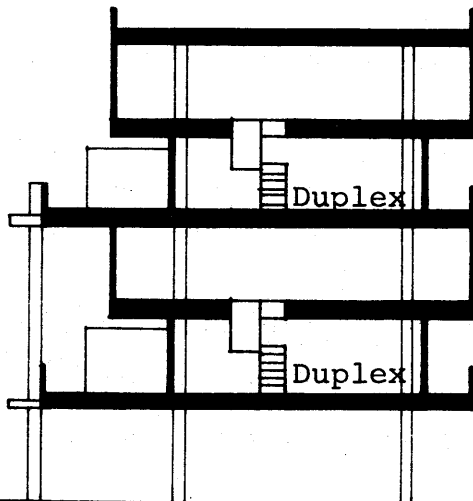
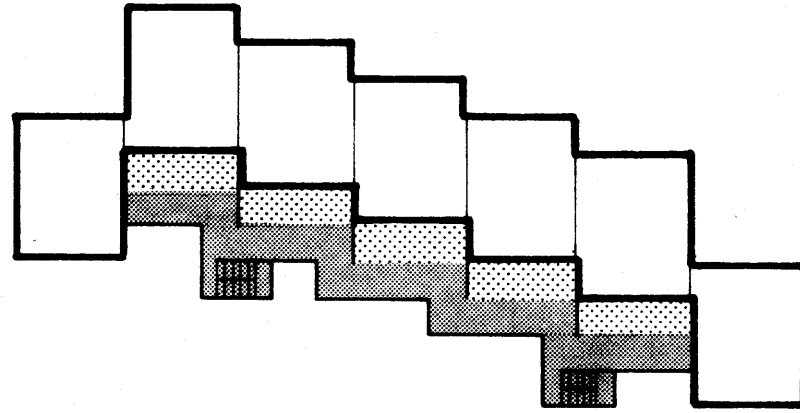


**BUILDING TYPE**



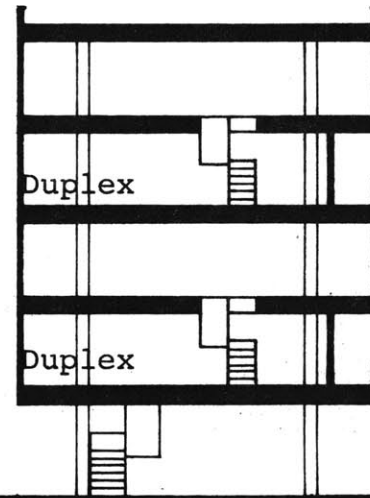
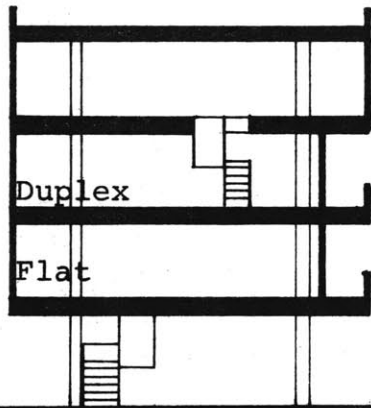
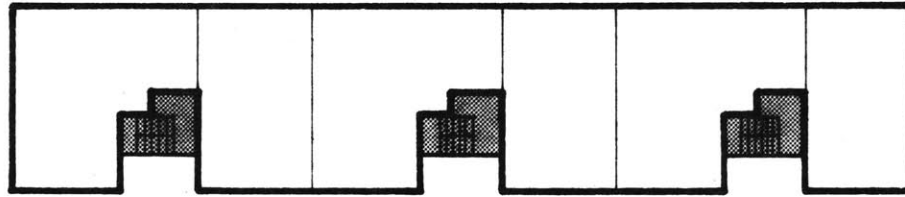
**BUILDING TYPE**

D19



**BUILDING TYPE**

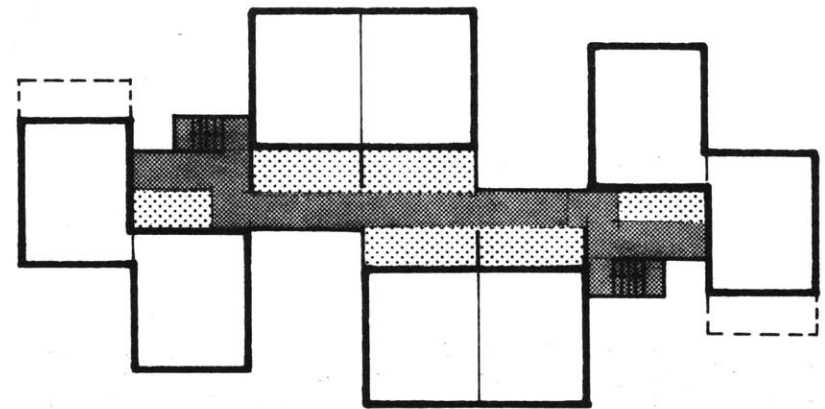
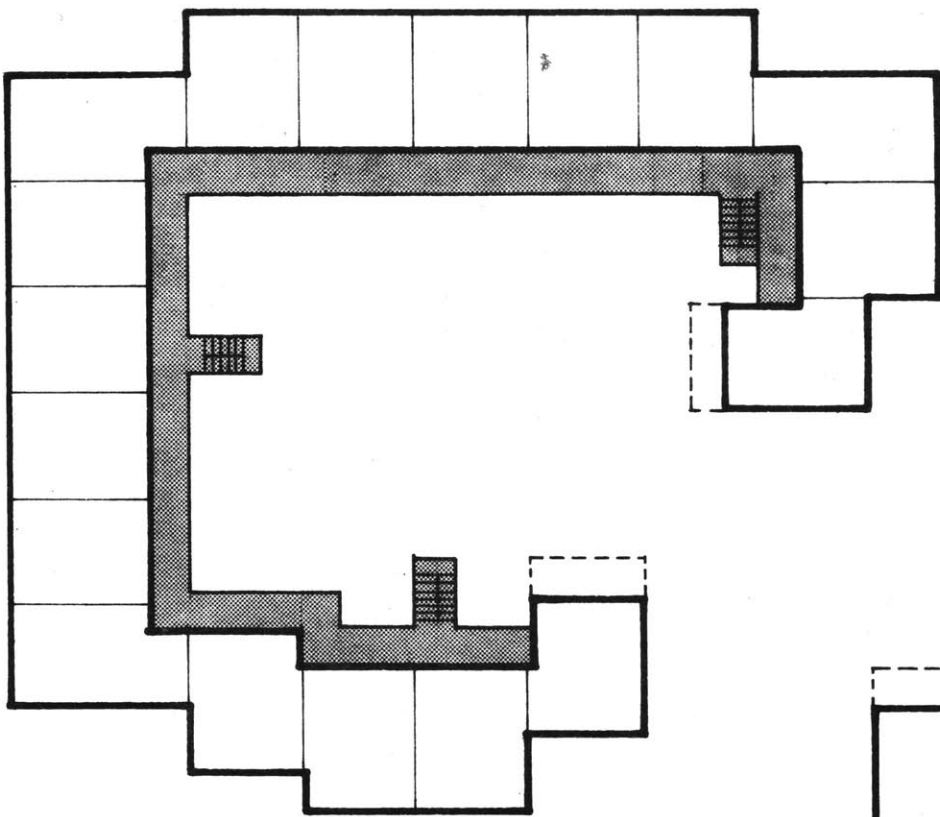
D20



**BUILDING TYPE**

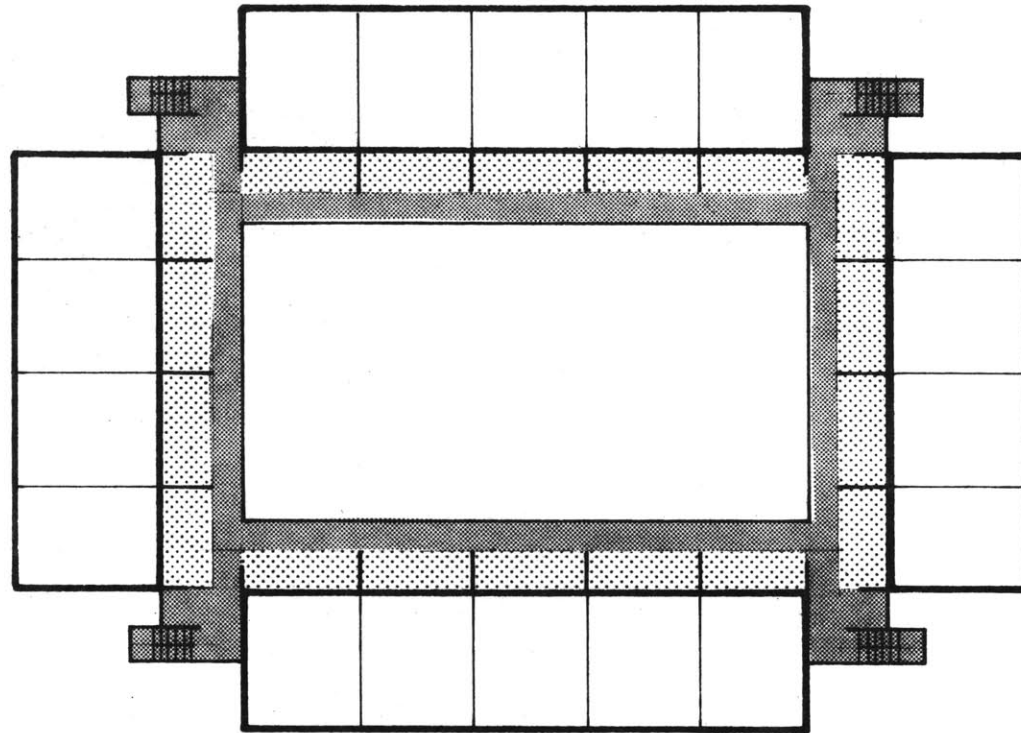
D21





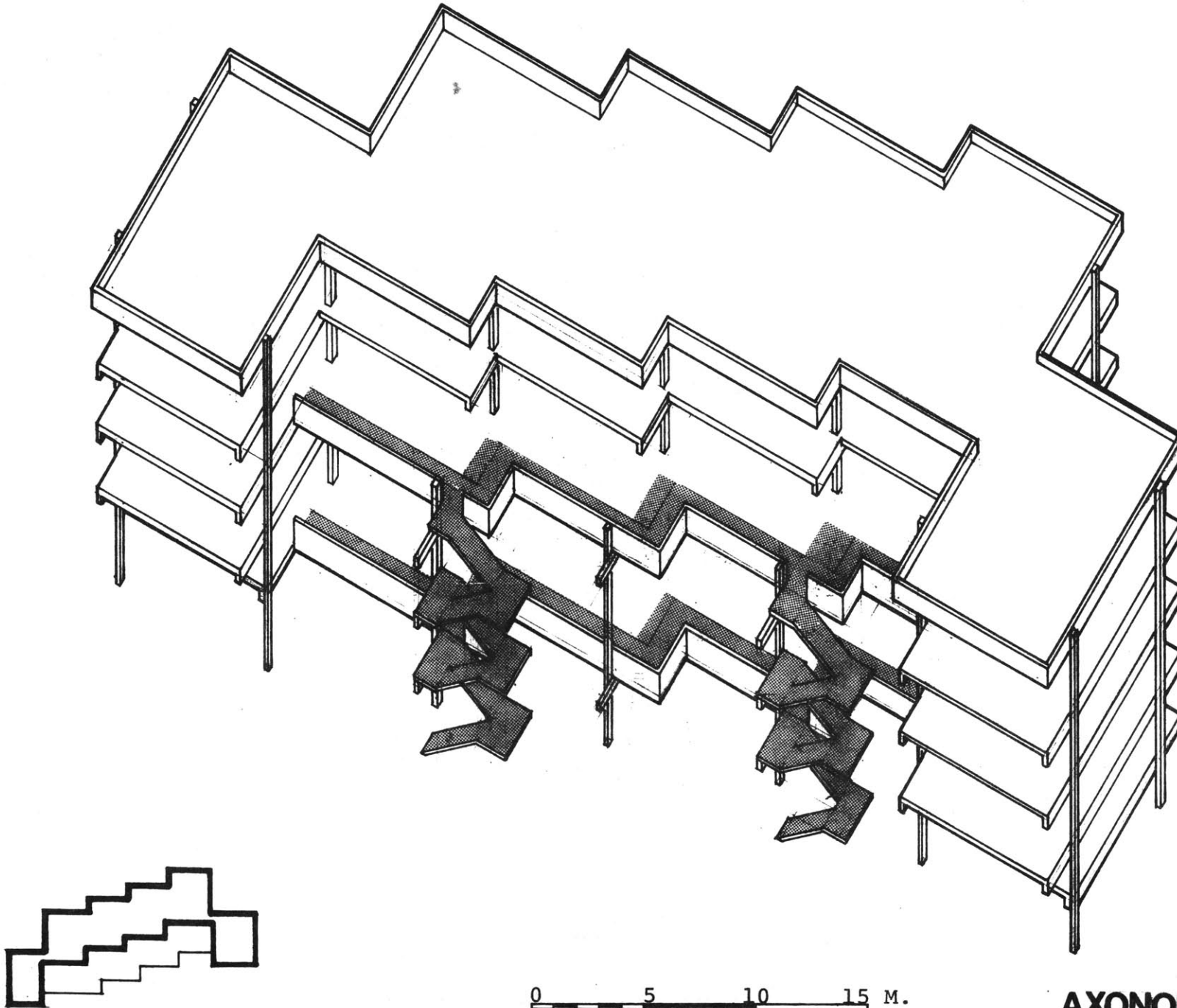
**BUILDING TYPE**

D22

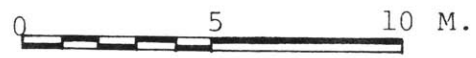
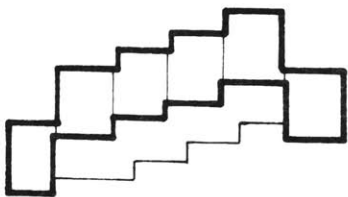
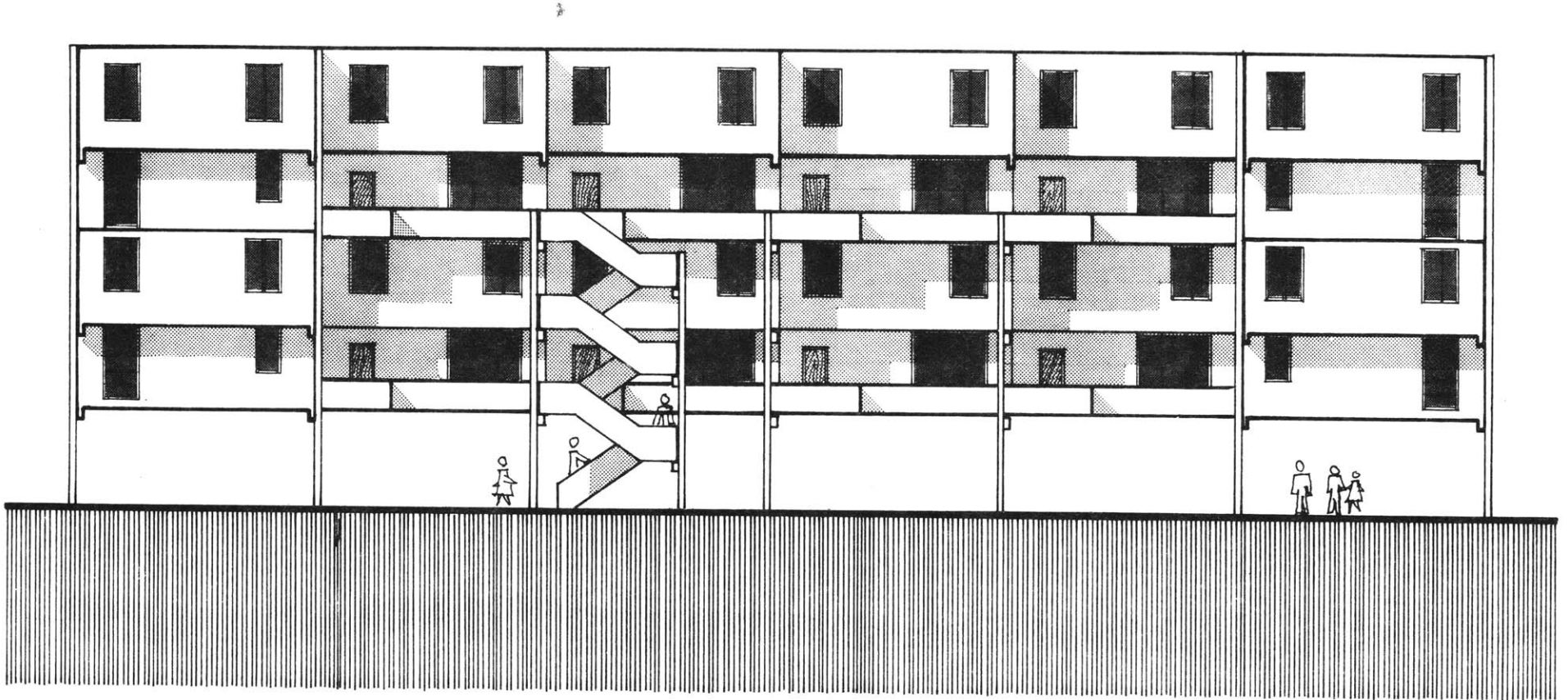


**BUILDING TYPE**

D23



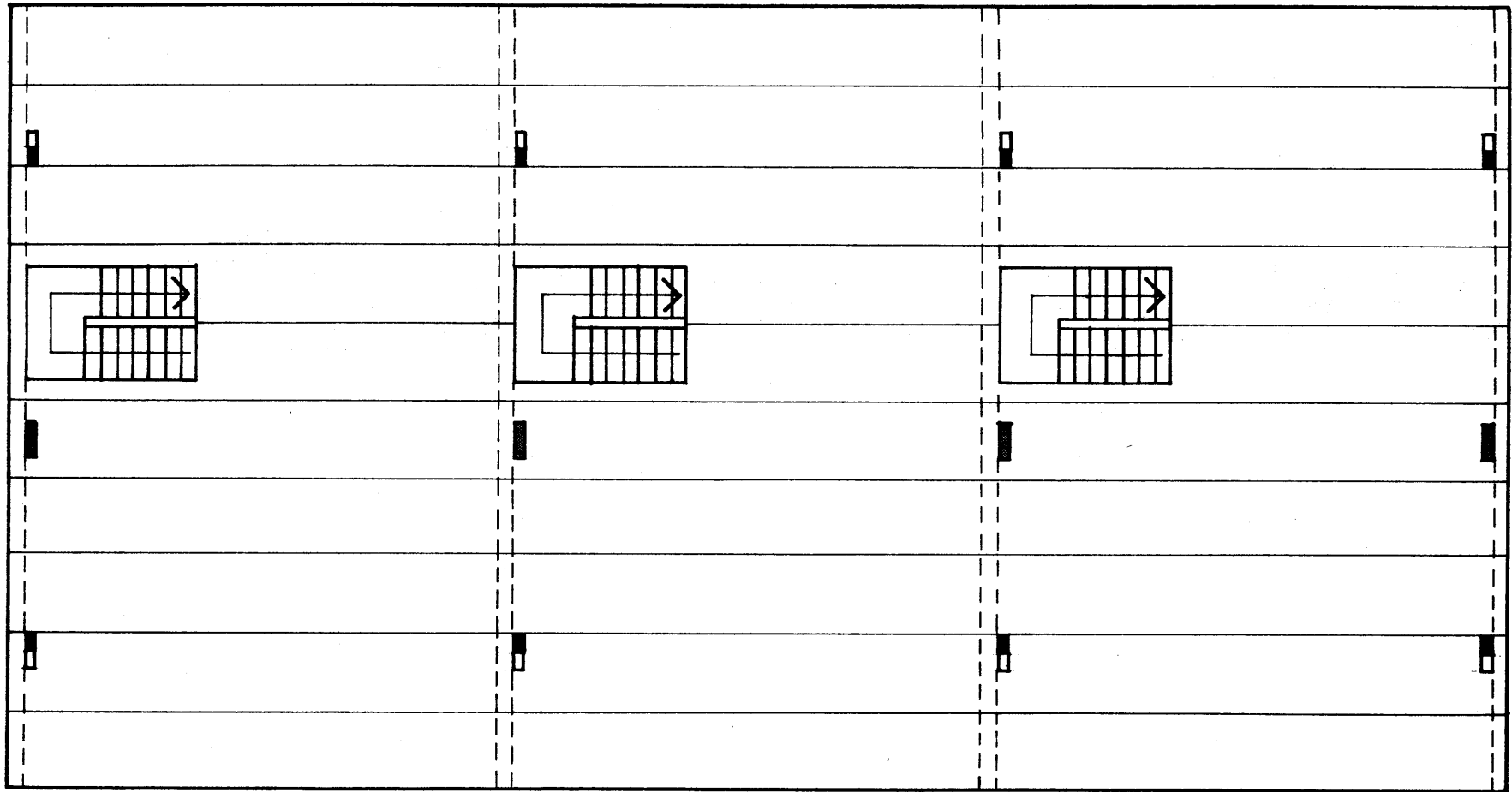
**AXONOMÉTRIC**



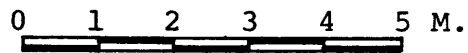
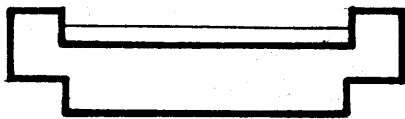
**ELEVATION**

D24a

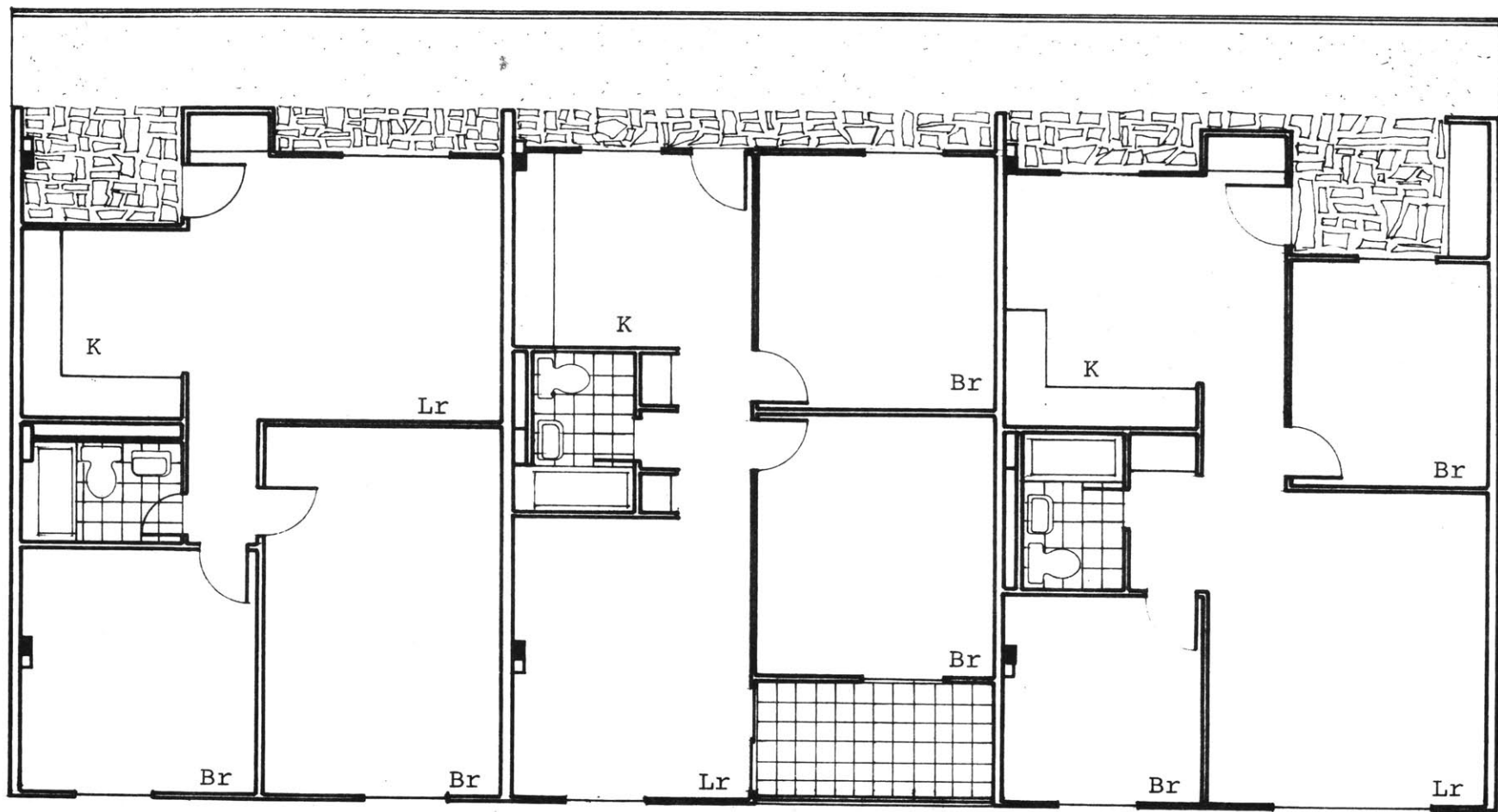
**UNIT PLANS**



FOOTPRINT OF STRUCTURE AND SERVICES



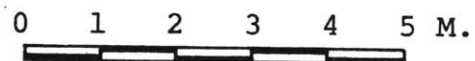
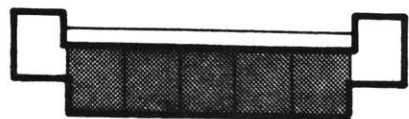
**BUILT REAL ESTATE**



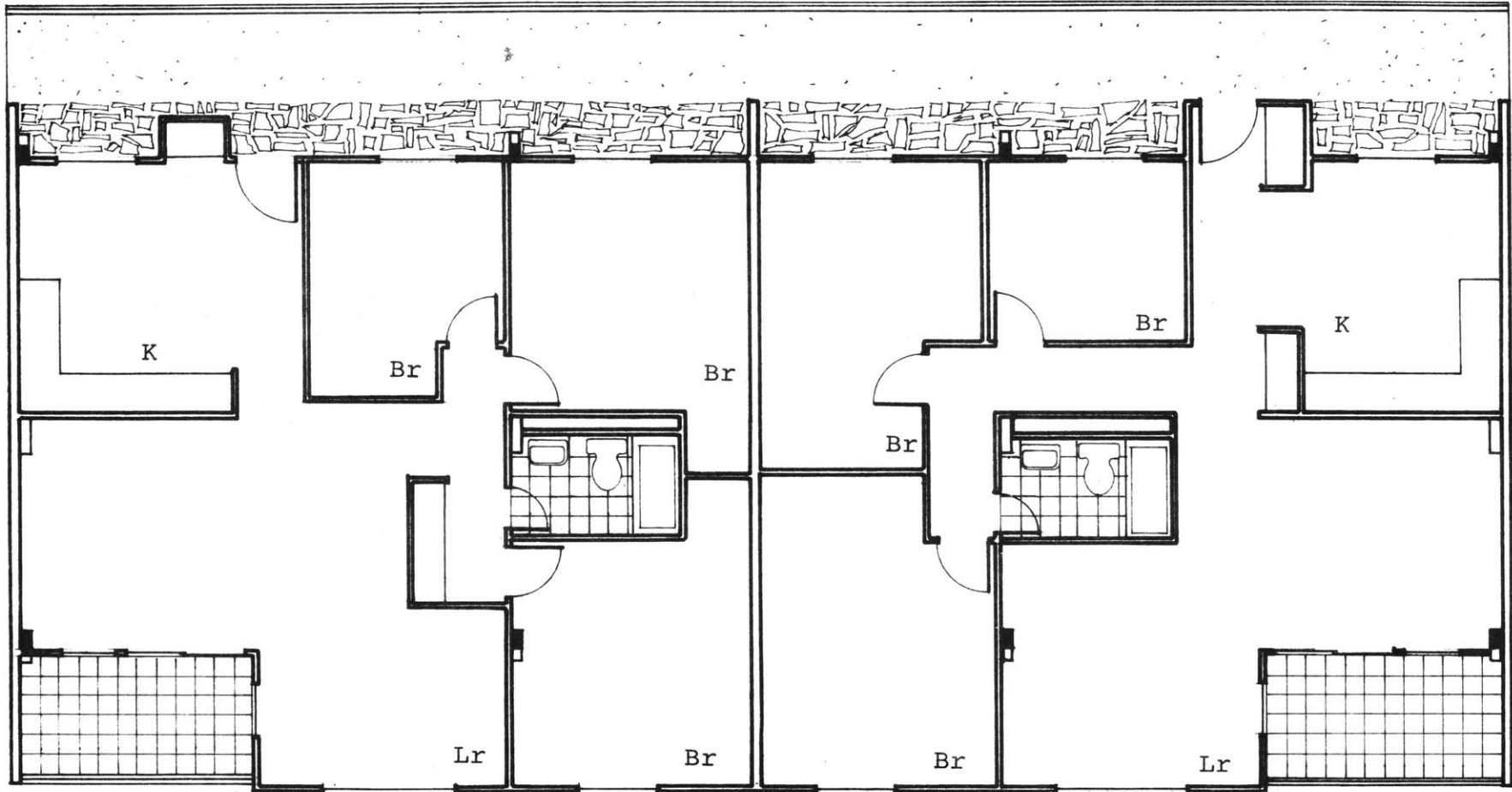
Flat  
2 Bedrooms  
75 M.

Flat  
2 Bedrooms  
75 M.

Flat  
2 Bedrooms  
75 M.

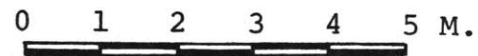
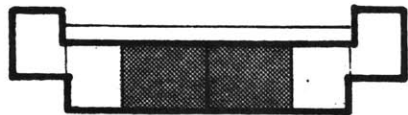


**UNIT PLANS**



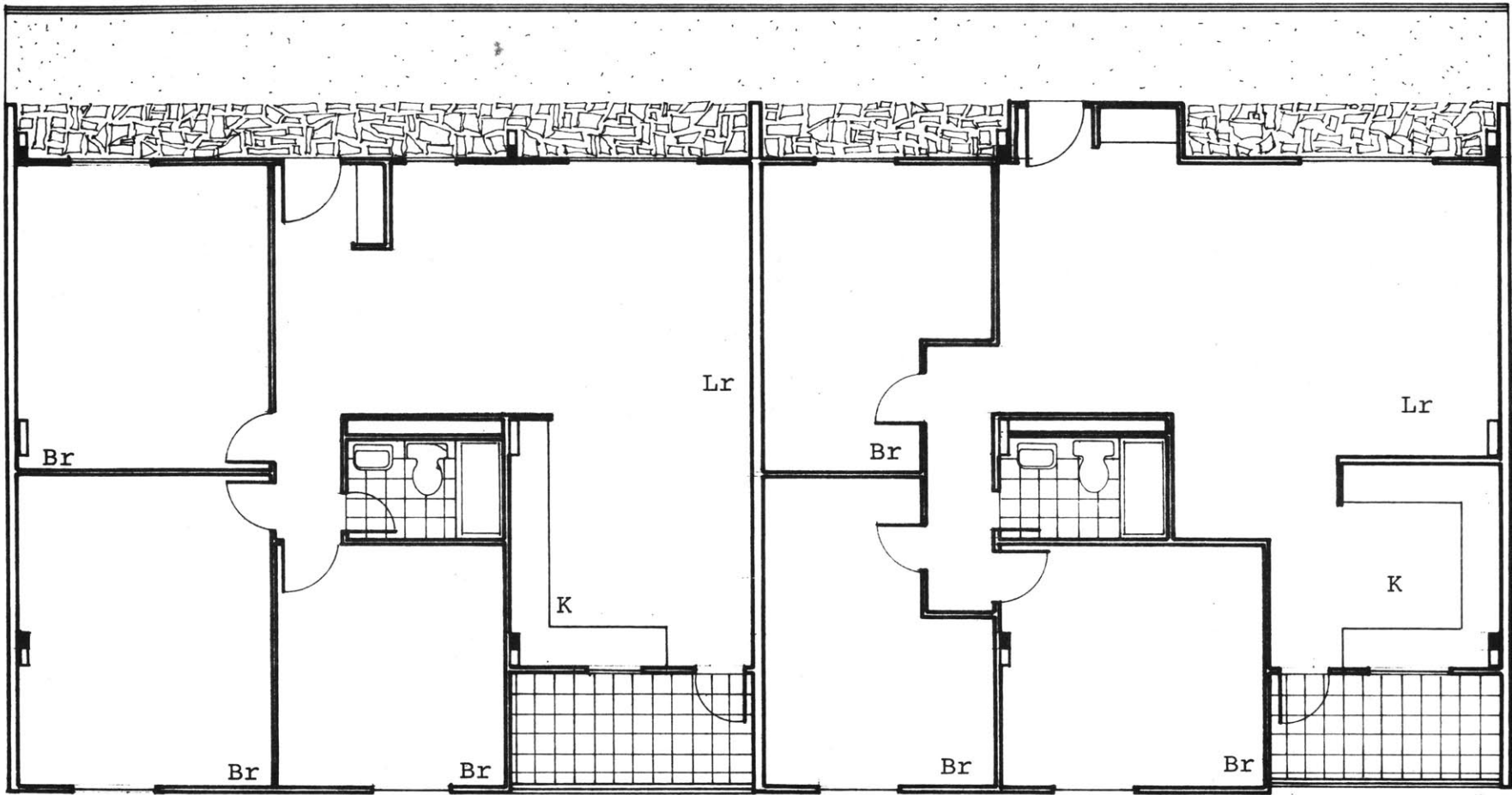
Flat  
3 Bedrooms  
105 M.<sup>2</sup>

Flat  
3 Bedrooms  
105 M.<sup>2</sup>



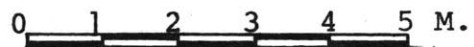
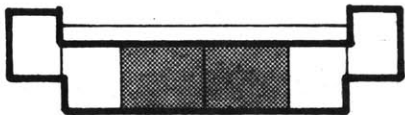
**UNIT PLANS**

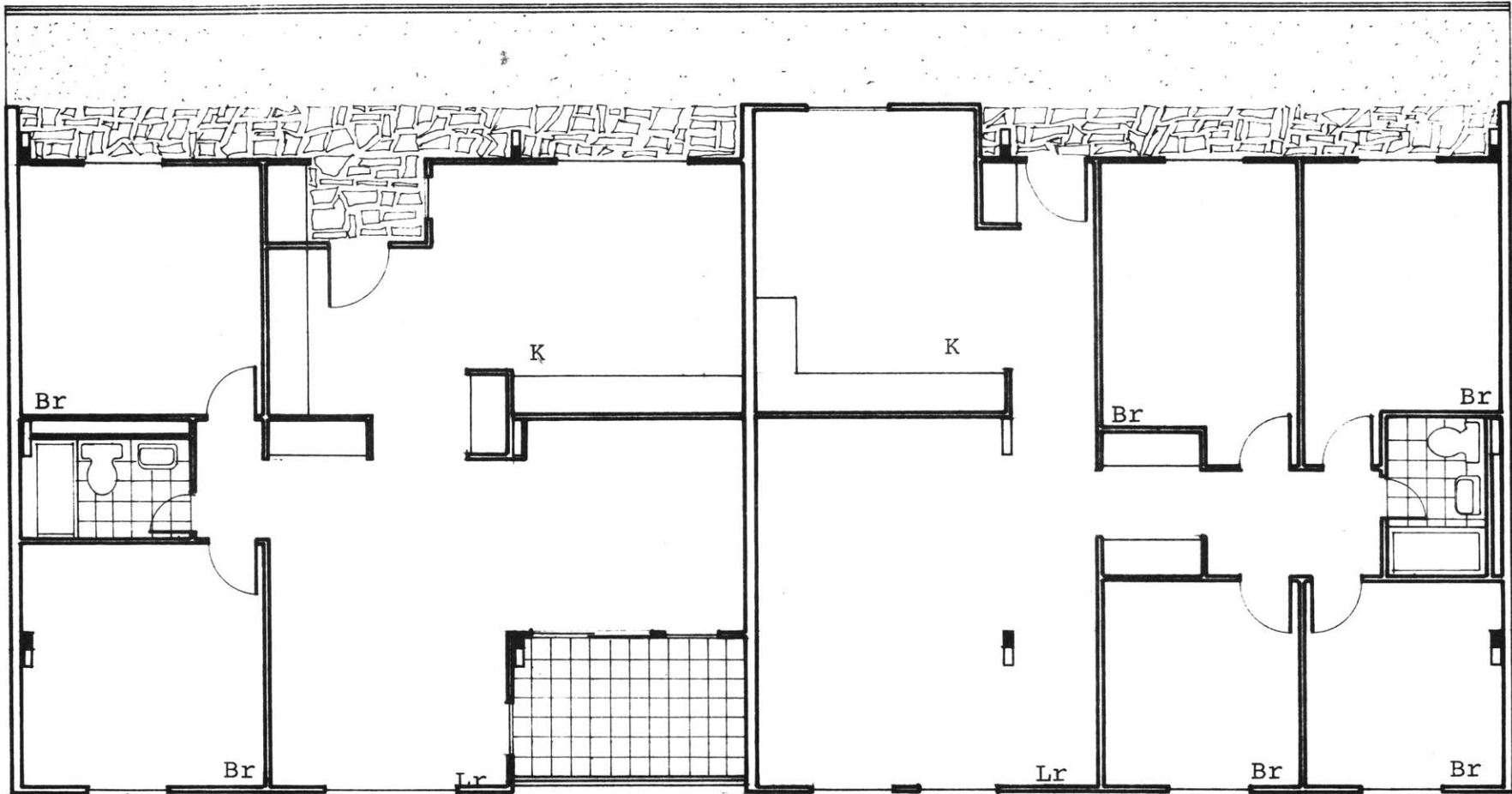




Flat  
3 Bedrooms  
105 M.

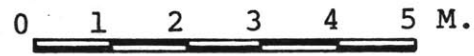
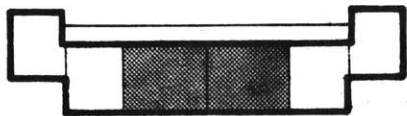
Flat  
3 Bedrooms  
105 M.



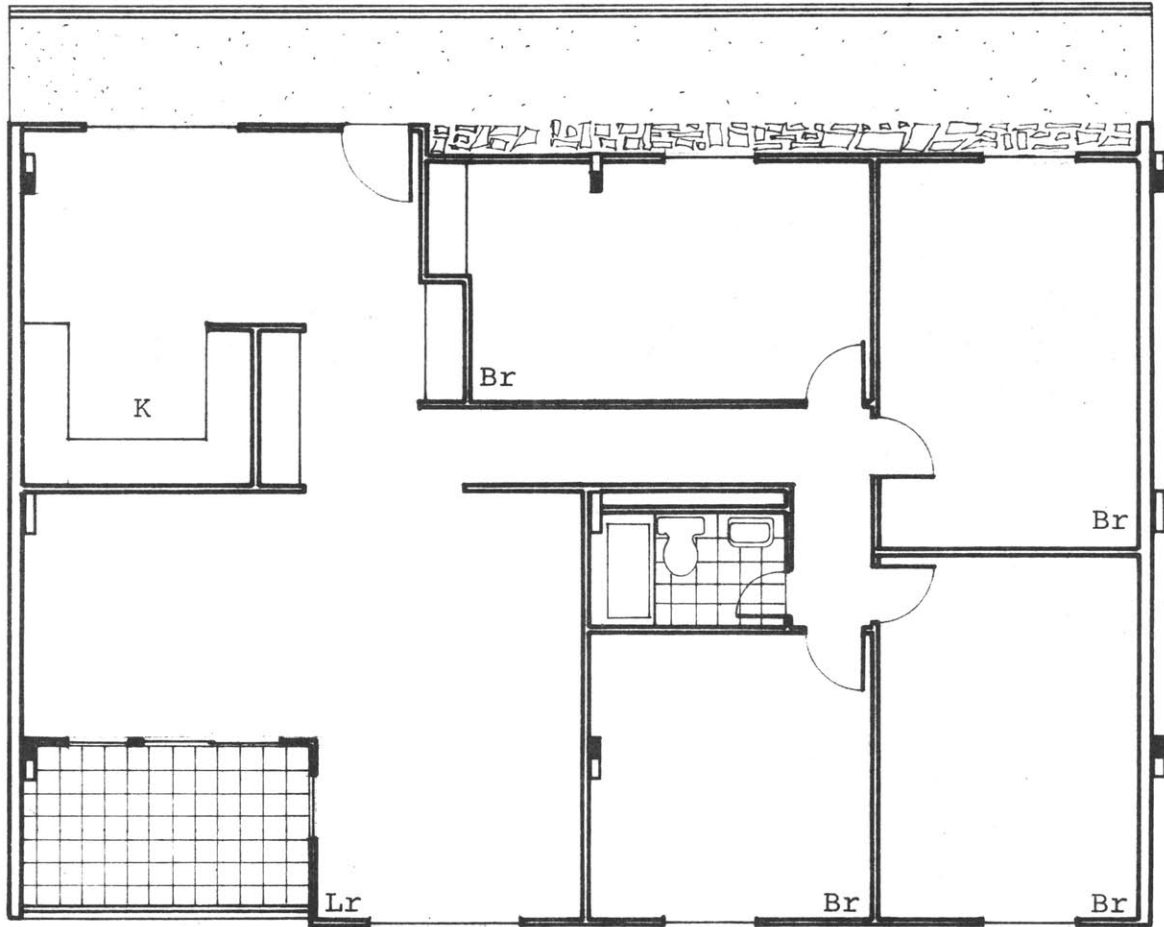


Flat  
2 Bedrooms  
105 M.

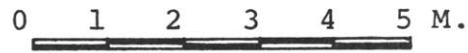
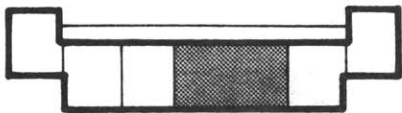
Flat  
4 Bedrooms  
105 M.



**UNIT PLANS**

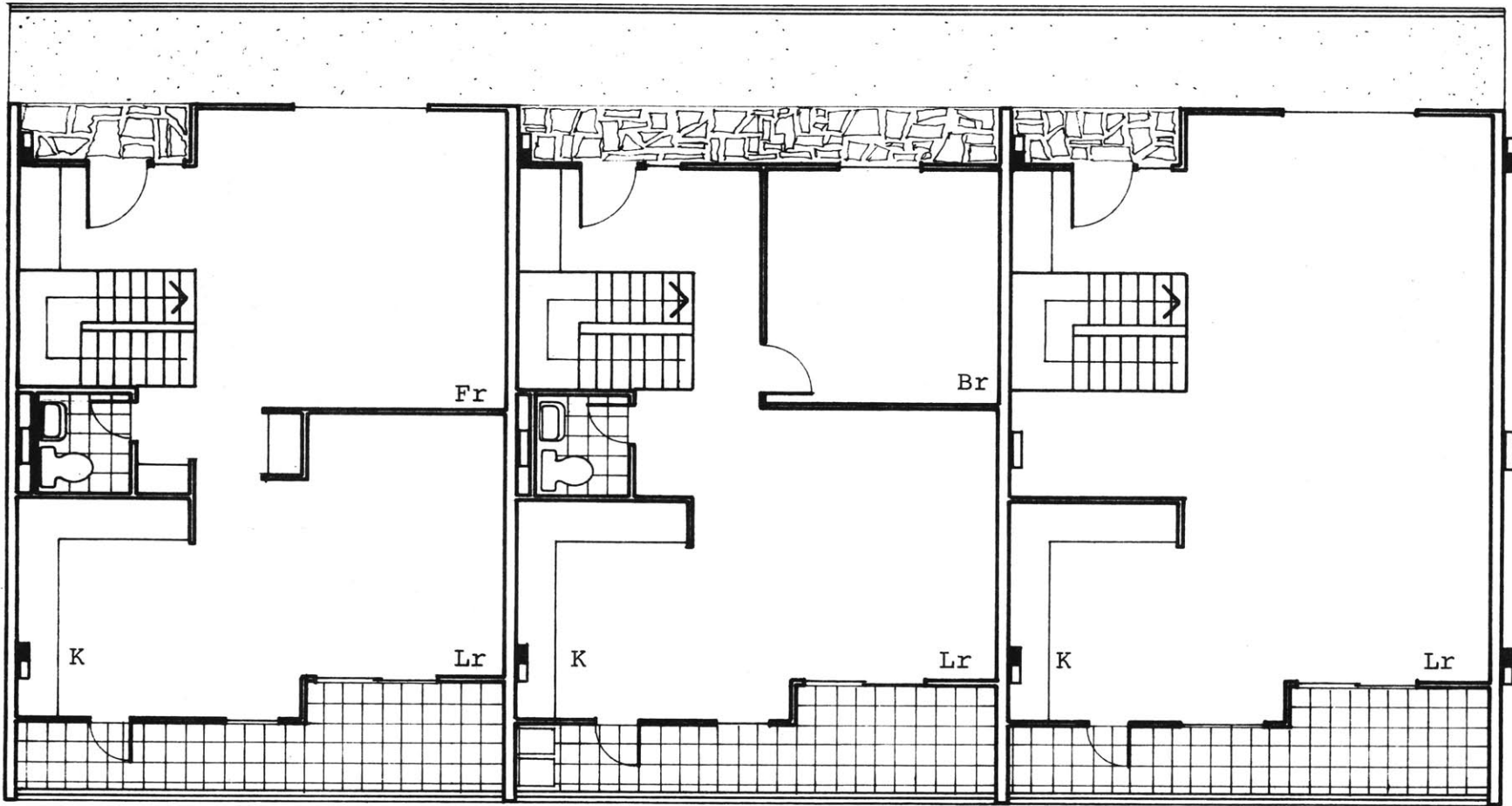


Flat  
 4 Bedrooms  
 145 M.<sup>2</sup>



**UNIT PLANS**

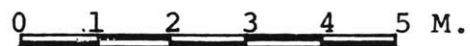
D30



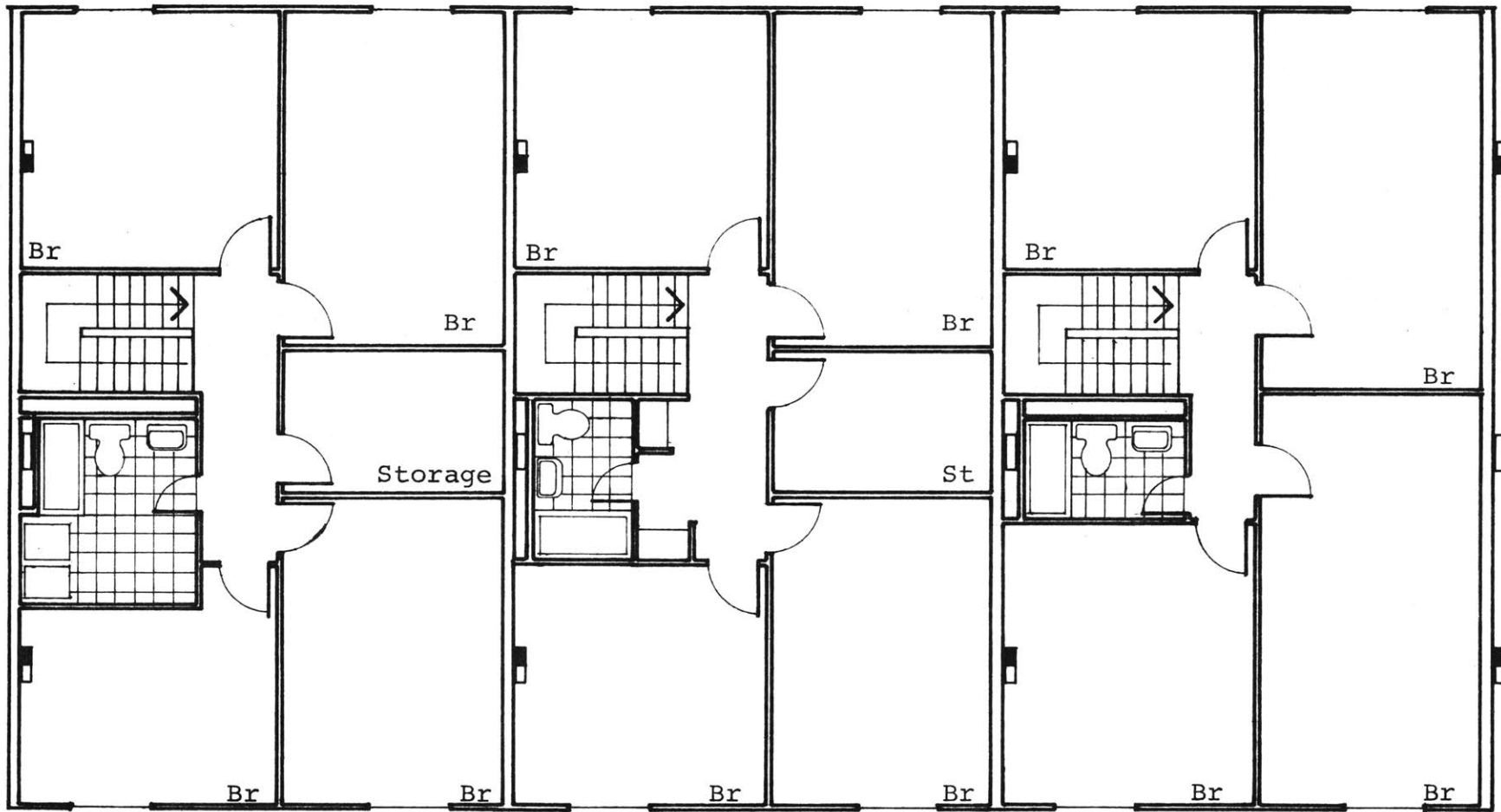
Duplex  
Lower Level  
75 M.

Duplex  
Lower Level  
75 M.

Duplex  
Lower Level  
75 M.



# UNIT PLANS



Duplex  
Upper Level  
4 Bedrooms  
88 M.

Duplex  
Upper Level  
4 Bedrooms  
88 M.

Duplex  
Upper Level  
4 Bedrooms  
88 M.



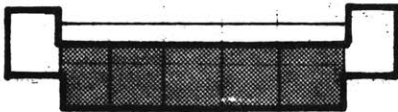
**UNIT PLANS**



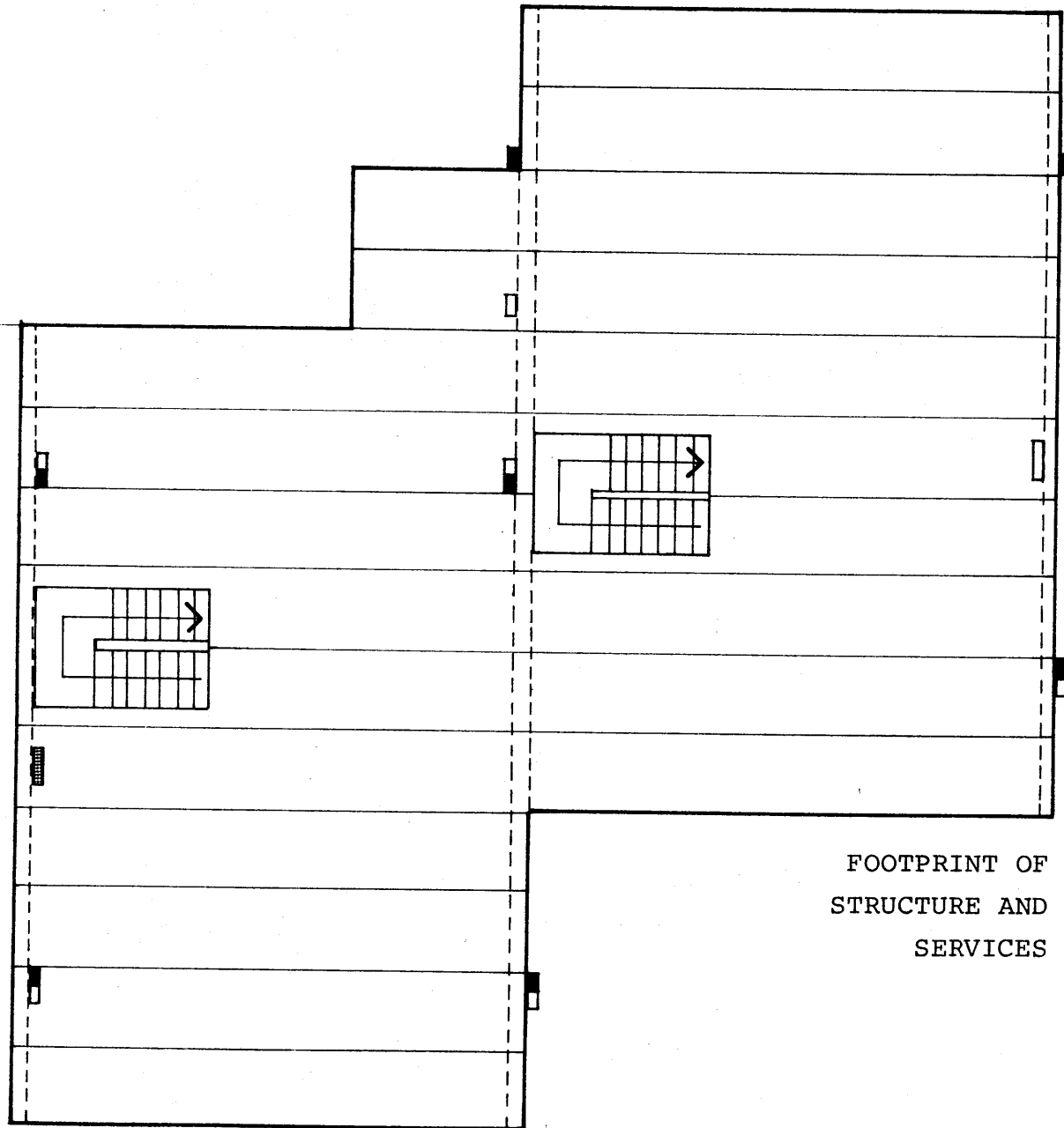
Duplex  
Upper Level  
3 Bedrooms  
88 M.<sup>2</sup>

Duplex  
Upper Level  
3 Bedrooms  
88 M.<sup>2</sup>

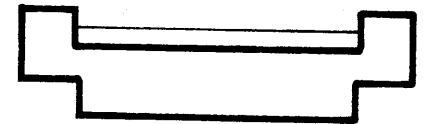
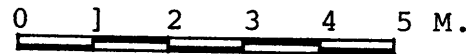
Duplex  
Upper Level  
3 Bedrooms  
88 M.<sup>2</sup>



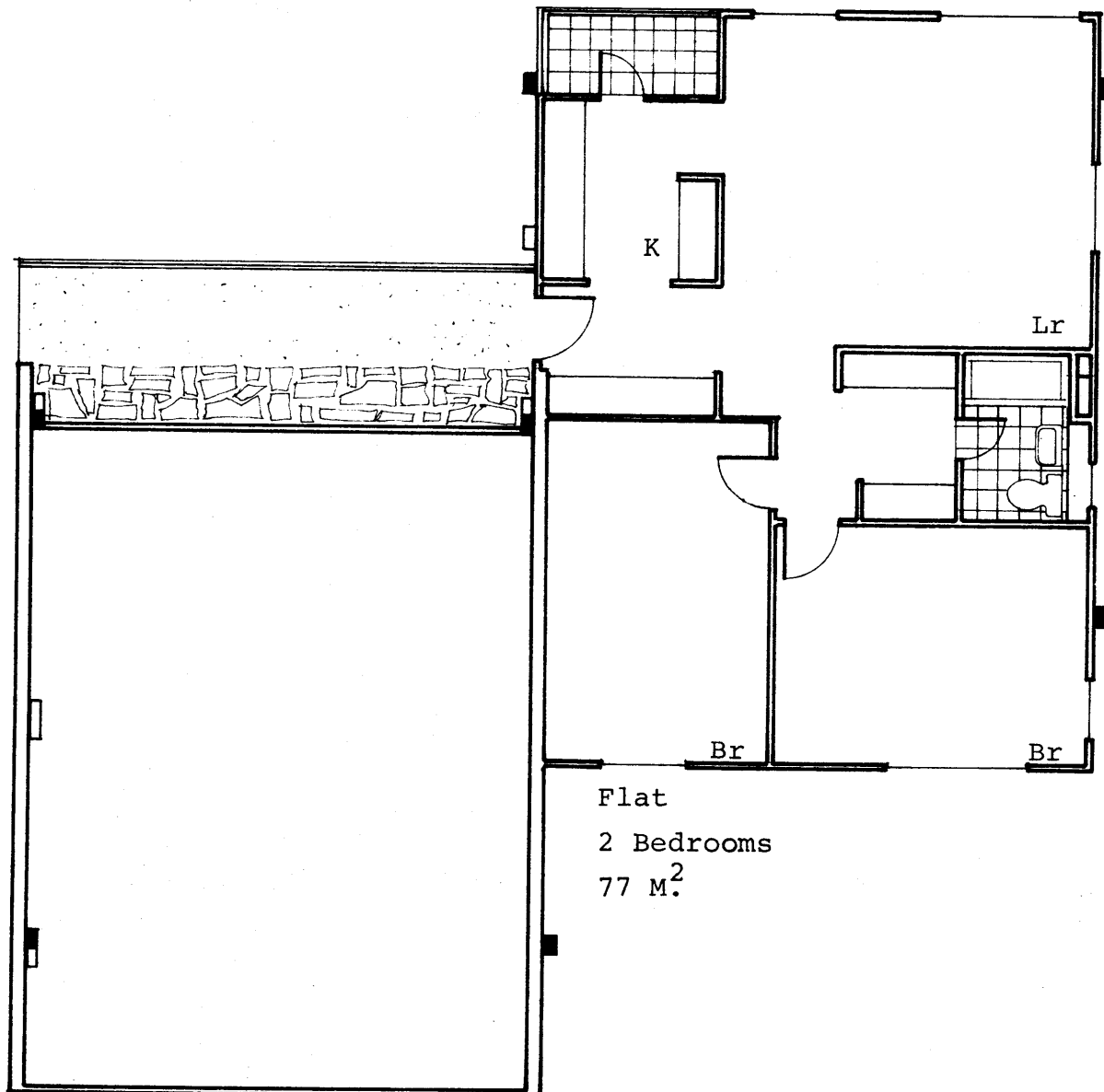
**UNIT PLANS**



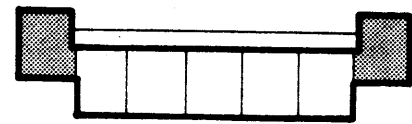
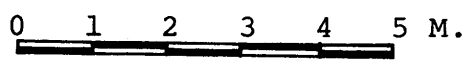
FOOTPRINT OF  
STRUCTURE AND  
SERVICES



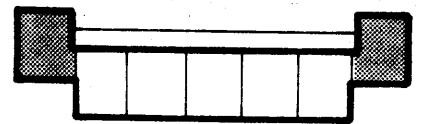
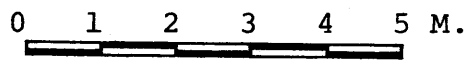
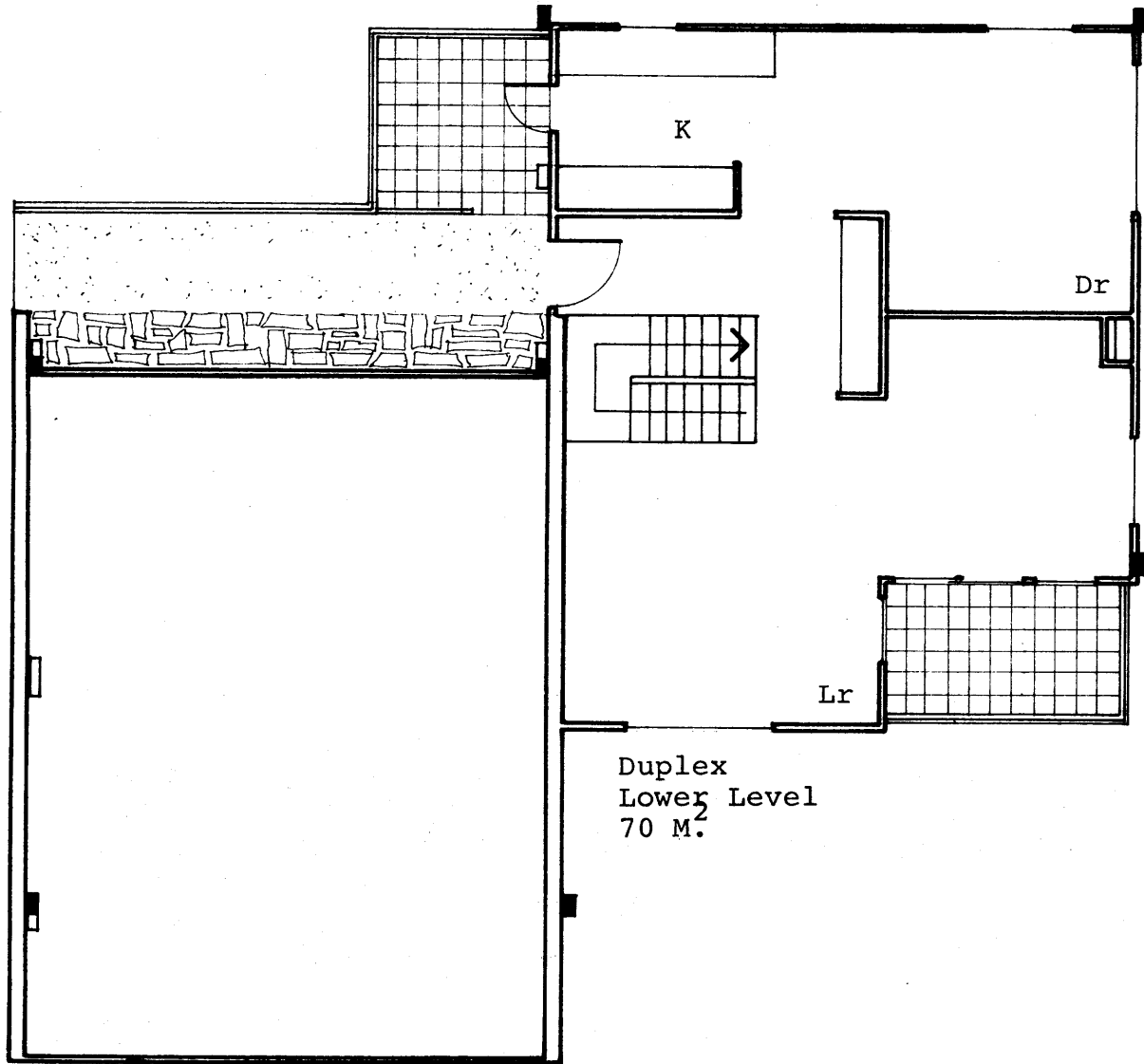
**BUILT REAL ESTATE**



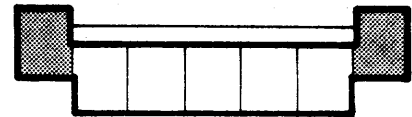
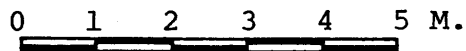
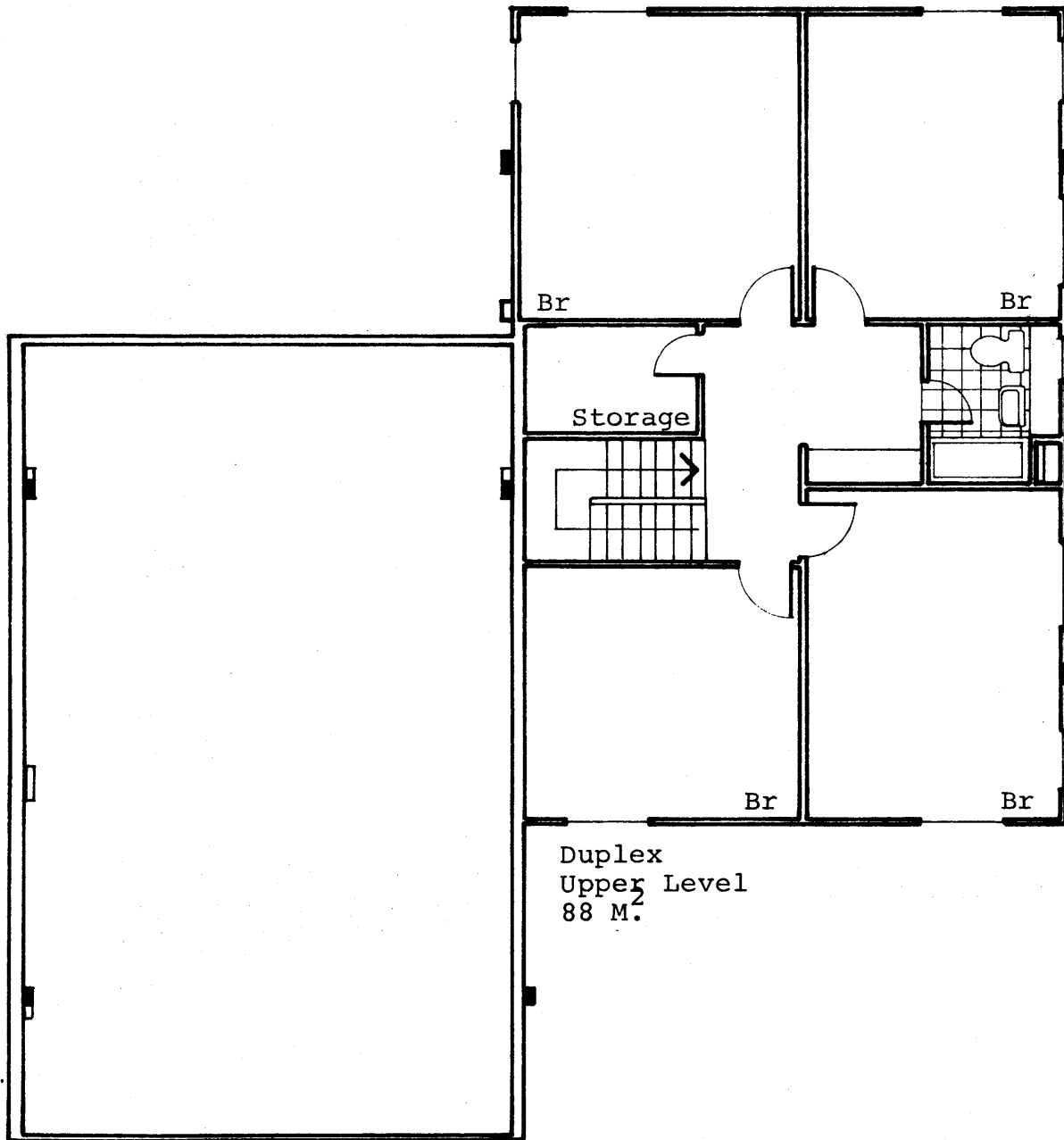
Flat  
 2 Bedrooms  
 77 M.<sup>2</sup>



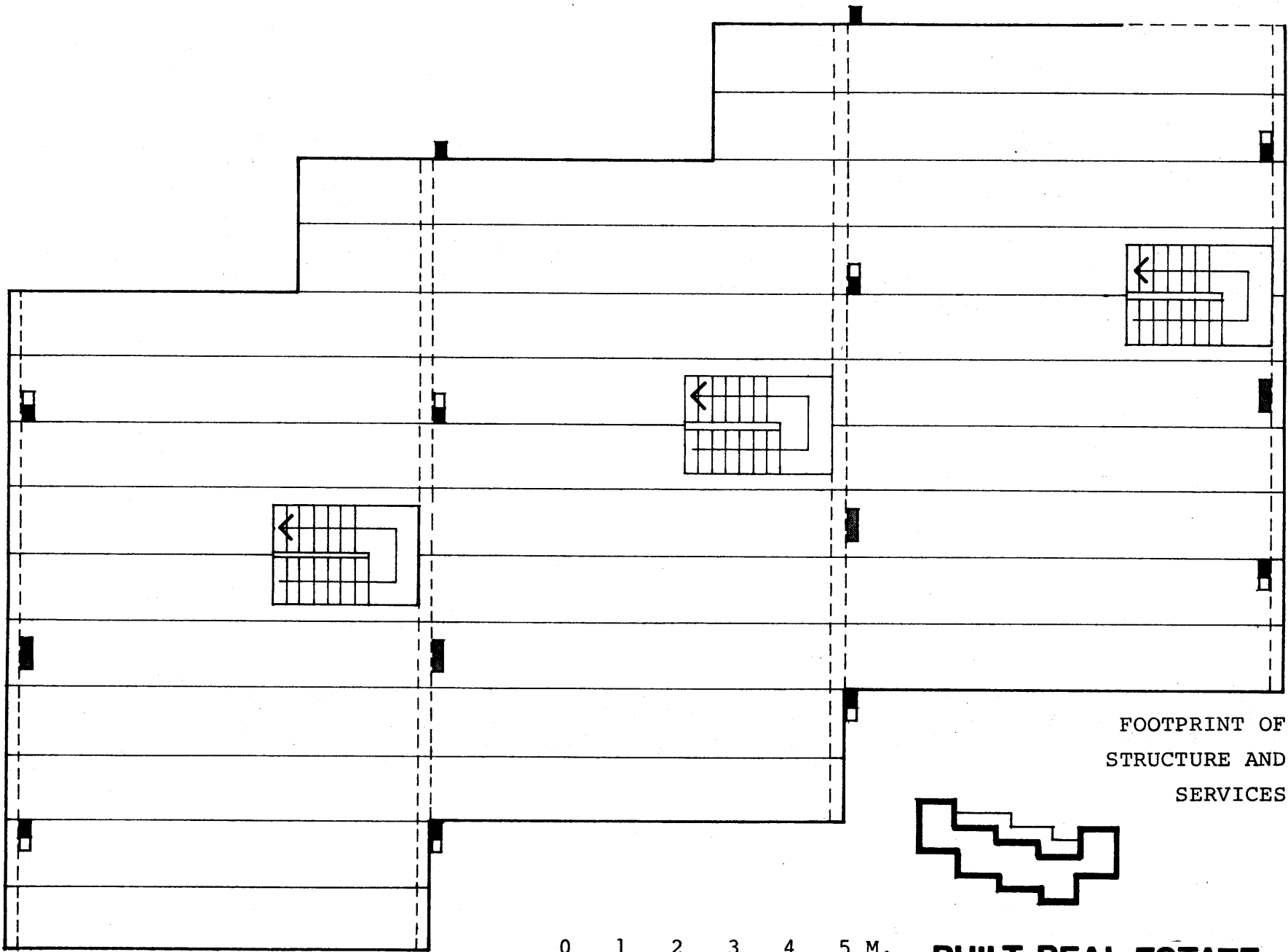




**UNIT PLANS**

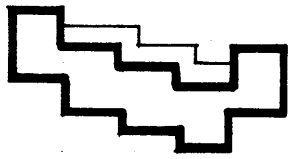


**UNIT PLANS**

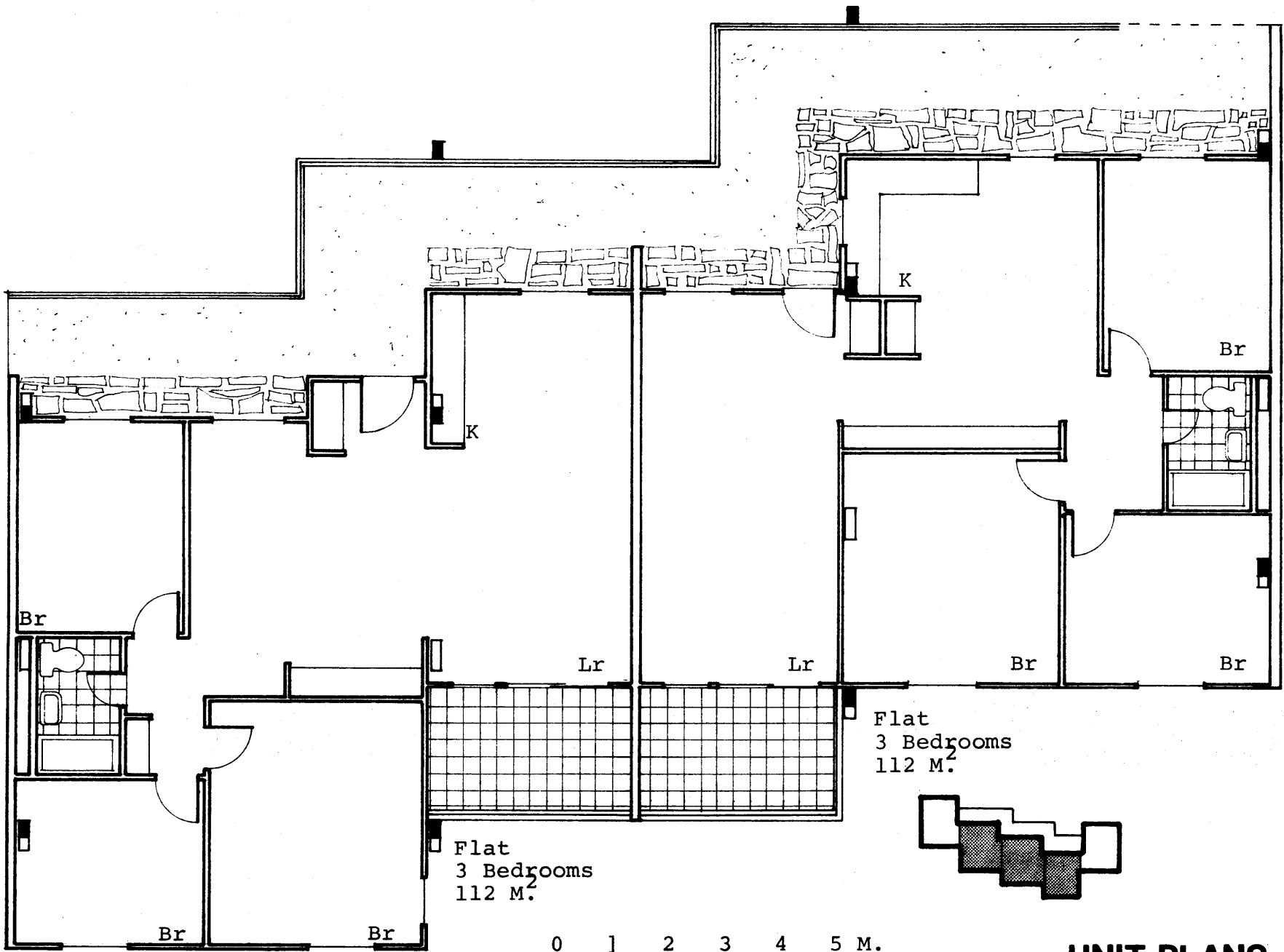


FOOTPRINT OF  
STRUCTURE AND  
SERVICES

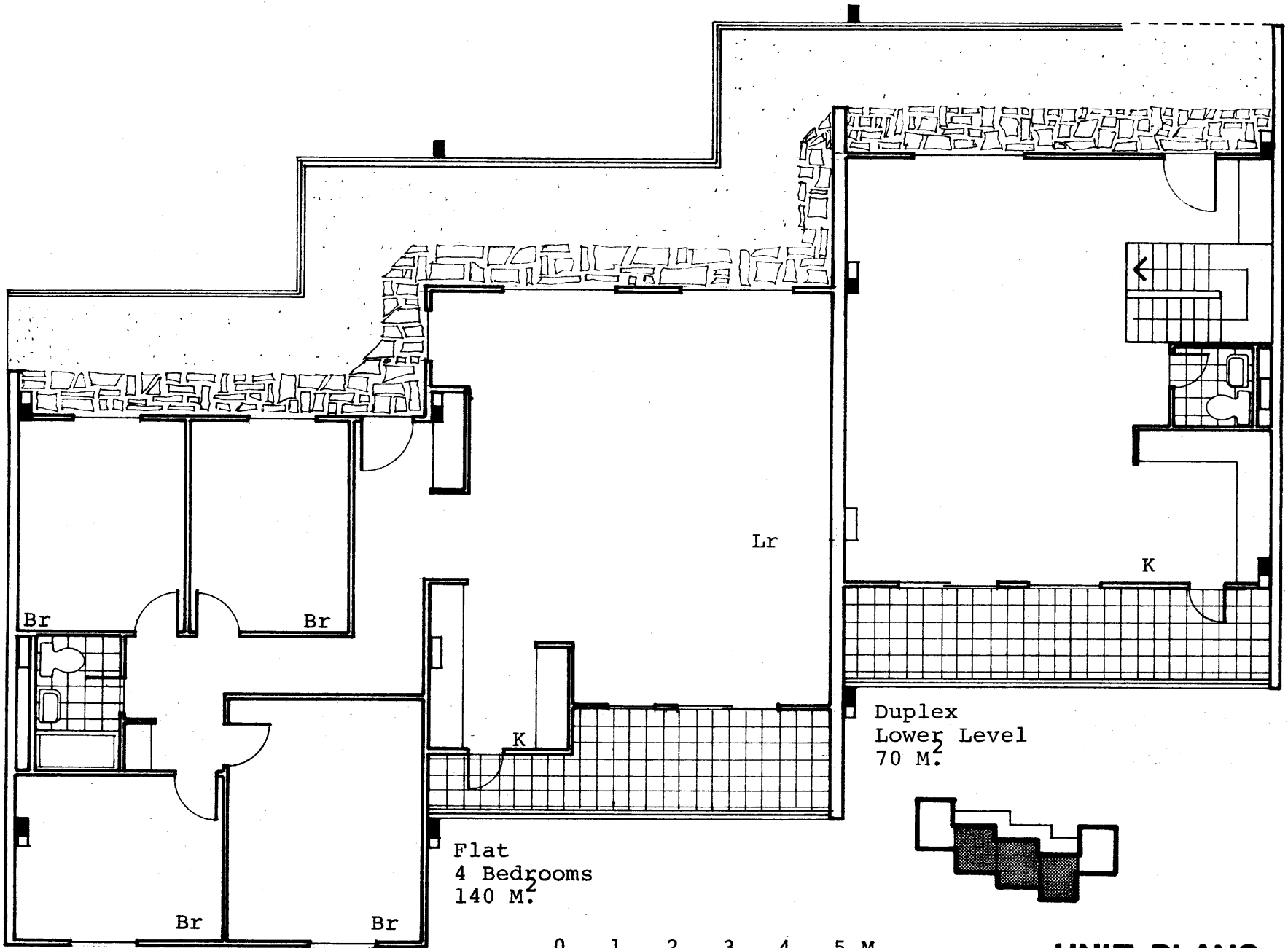
0 1 2 3 4 5 M.



**BUILT REAL ESTATE**



**UNIT PLANS**

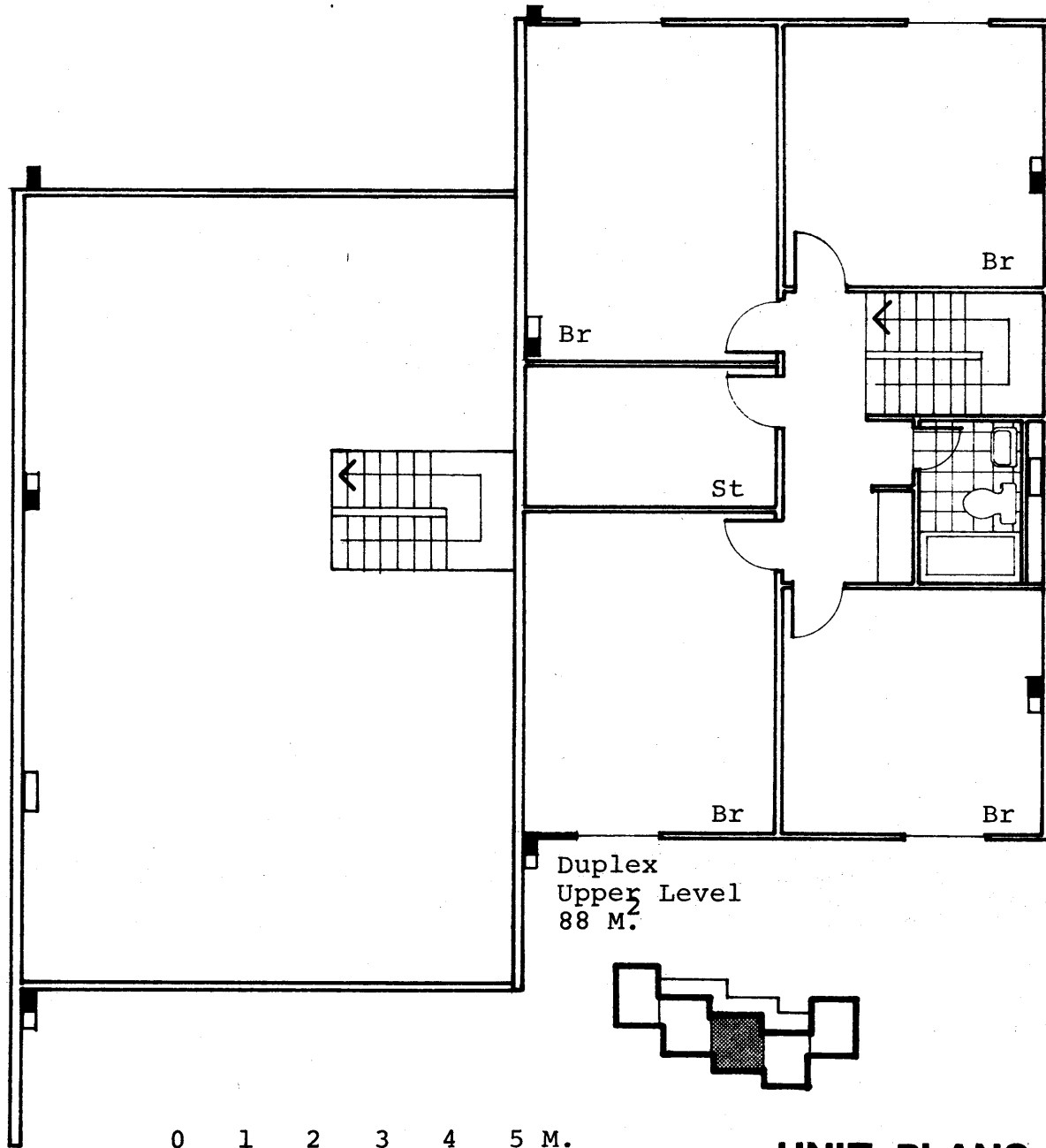


Flat  
4 Bedrooms  
140 M.<sup>2</sup>

Duplex  
Lower Level  
70 M.<sup>2</sup>

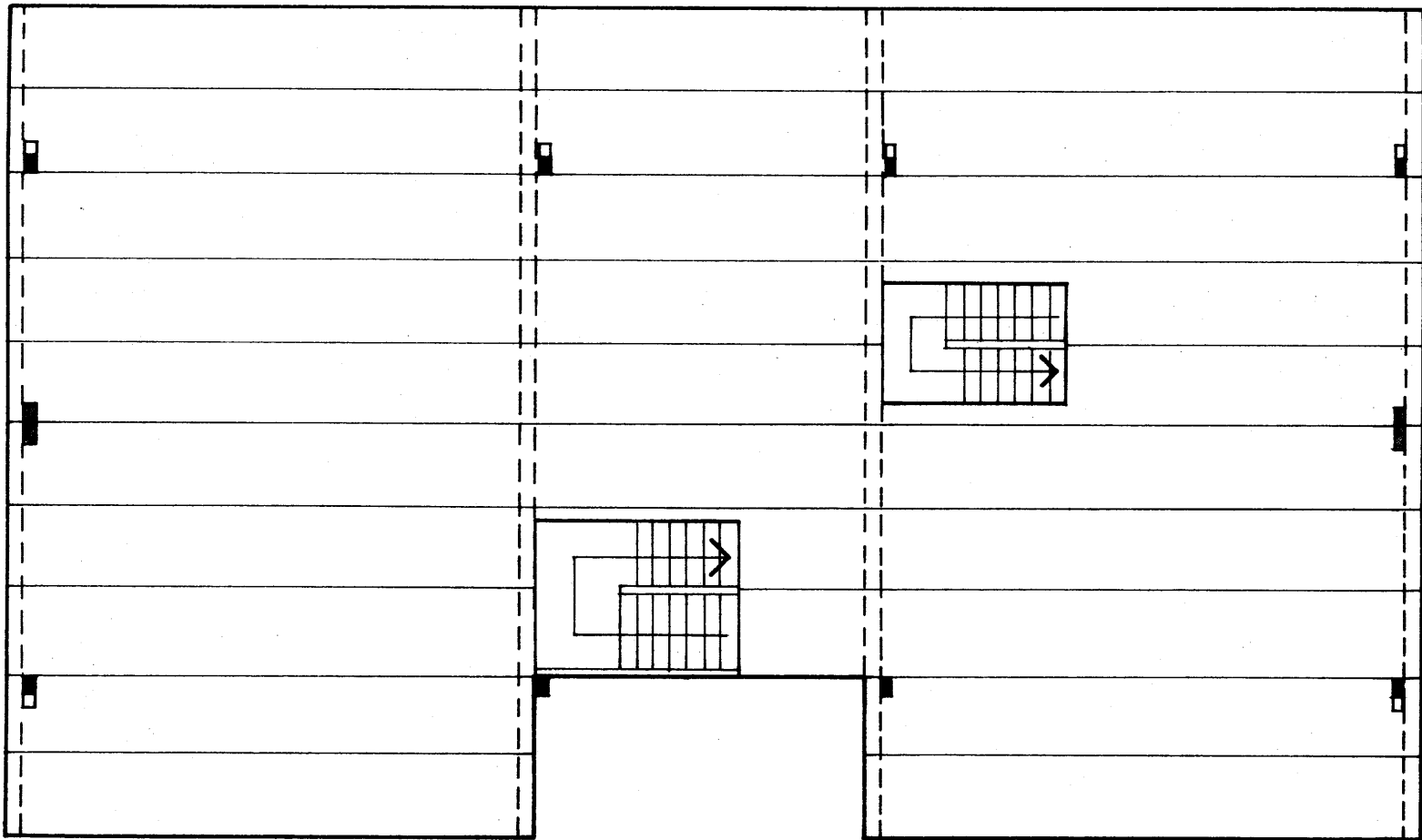
0 1 2 3 4 5 M.

**UNIT PLANS**



Duplex  
Upper Level  
88 M.

**UNIT PLANS**



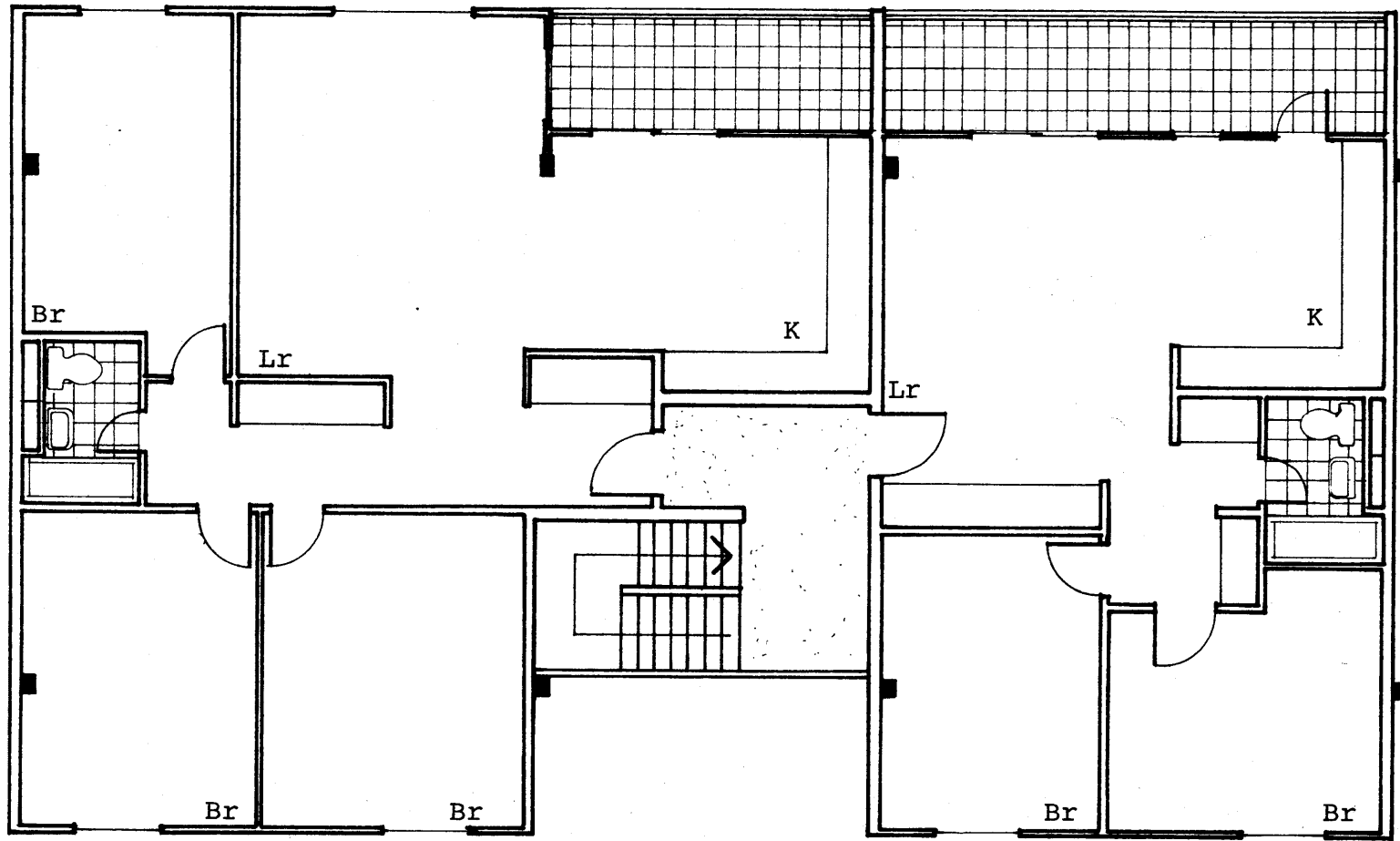
FOOTPRINT OF STRUCTURE AND SERVICES



0 1 2 3 4 5 M.



**BUILT REAL ESTATE**



Flat  
3 Bedrooms  
116 M.

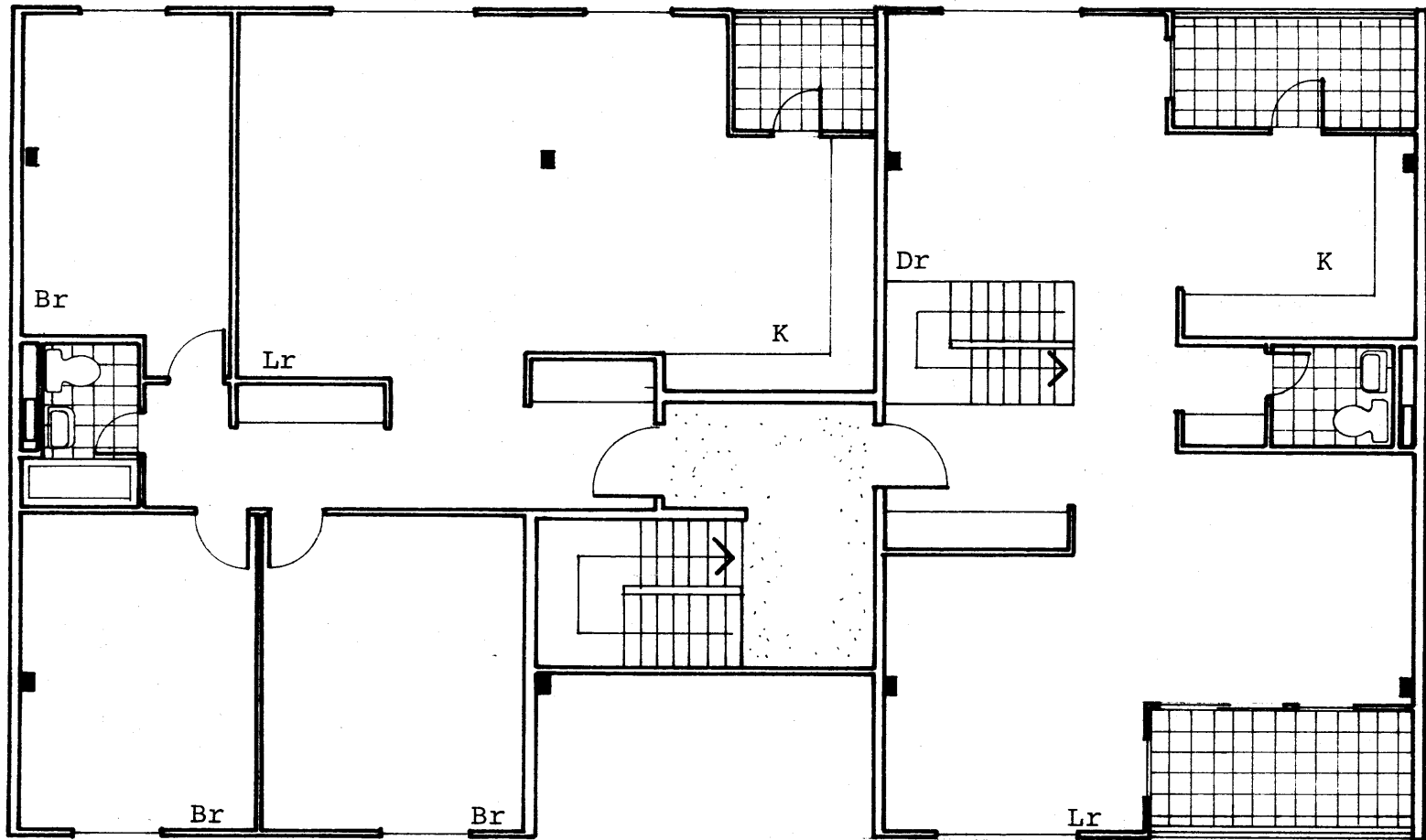
Flat  
2 Bedrooms  
88 M.



0 1 2 3 4 5 M.

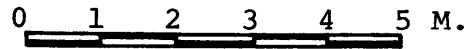
**UNIT PLANS**





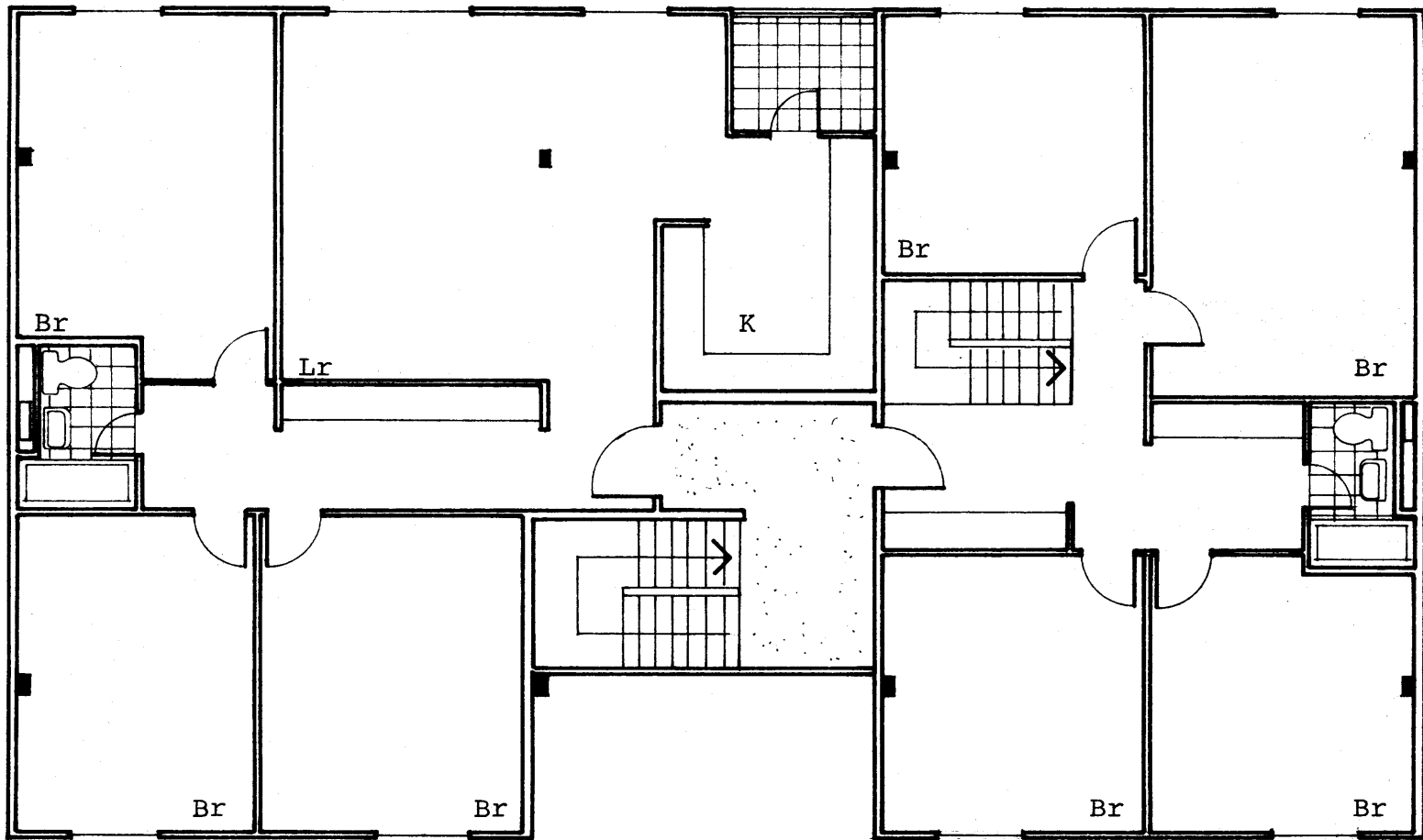
Flat  
3 Bedrooms  
116 M.

Duplex  
Lower Level  
88 M.



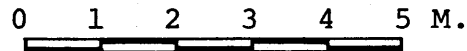
**UNIT PLANS**

D44



Flat  
3 Bedrooms  
116 M.<sup>2</sup>

Duplex  
Upper Level  
4 Bedrooms  
88 M.<sup>2</sup>



**UNIT PLANS**