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EVALUATION OF THE QUALITY OF BUILT ENVIRONMENT
IN PLANNED NEW RESIDENTIAL COMMUNITIES
CASE STUDY OF MUHAMMADPUR & UTTARA RESIDENTIAL AREA.

MD. TUGHLAQ AZAD



DEPT. OF URBAN & REGIONAL PLANNING, BUET, DHAKA.

EVALUATION OF THE QUALITY OF BUILT ENVIRONMENT
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CASE STUDY OF MUHAMMADPUR AND UTTARA RESIDENTIAL AREA.

Submitted in partial fulfilment of the requirements for
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Joint Diploma Programme 1988-90.

by

Md. Tughrig Azad

Department of Urban and Regional Planning,

Bangladesh University of Engineering and Technology, Dhaka,

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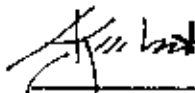
Evaluation of the Quality of Built Environment in Planned New Residential Communities Case Study of Muhammadpur and Uttara Residential Area.

A Project Report

by

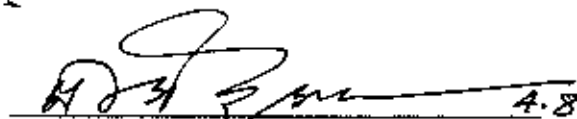
Md. Tughlaq Azad

Approved as to style and contents by:



Mr. Ajmal H. Ahmed
Associate Professor,
Dept. of URP, BUET.

Supervisor(Chairman)



Prof. Dr. Mir Shahidul Islam
Professor & Head,
Dept. of URP, BUET.

Head of the Department



Prof. Meer Nobashsher Ali
Professor,
Dept. of Architecture, BUET.

Member

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ABSTRACT

(Providing shelter for the increasing population in the cities is one of our major problem today. To meet the increasing housing demand in urban areas of Bangladesh, Public and Private Sector Organizations and housing societies have been taking "Sites and Services" schemes in urban areas to build "New Residential Communities".) Usually Low-rise Walk-up multi-family dwellings come up in these residential areas.

(In these "Sites and Services" ^{(These} projects approaches to housing issues are generally expressed in quantitative terms based on the Number of Units (No. of Plot), Area of Dwelling Unit and Width of Road etc.) In most instances the Quality of Built Environment, Living Conditions, Housing Environment etc. are overlooked. (The possibilities of exploring Planning Techniques in a creative way with a view to improve the Built Environment was never given priority.) _{over the costs and benefits}

We know, the basic objectives of land sub-division and Building Regulations (Set-Back Rules, Building Coverage Ratio etc) are promotion of health and general welfare, provision of adequate light and air, provision of privacy and prevention of overcrowding of land and undue congestion. But it is observed that the housing developed in these "Sites and Services" projects under existing regulations can not fulfil all these aspects of housing environment.

(With the increase of population in the cities there will be need for more Residential Areas for meeting the increasing need of shelter.) And under the existing socio-political condition of the country it is obvious that more "Sites and Services" projects will come up. At this stage we need to evaluate the "Quality of Built Environment" of these "New Residential Communities" which may help us to take necessary decision for future developments.

Three examples of "Sites and Services" projects in Dhaka have been undertaken for the study purpose. Two of these projects were developed by Public Sector Organization and the other one by Private Housing Society.

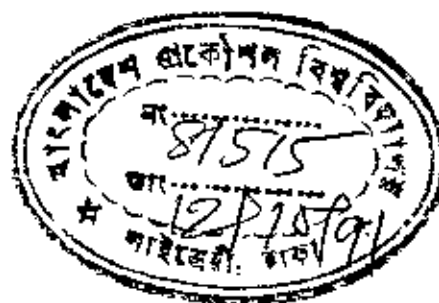
It is seen from the study that by altering some existing planning tools and methods it is possible to build "New Residential Communities" with much better Built Environment keeping the same Density Level (Units per Acre or Floor Area Ratio) under the existing Housing Delivery System.

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CHAPTER 1: INTRODUCTION



1.1 INTRODUCTION:

Land is the most scarce resource in Bangladesh. Within an area of only 1,43,988 sq.km. the 110 million¹ people of Bangladesh have to grow food and find space to make shelters. We know land once built up can not be regained for centuries. We must make efficient use of our available land.

To meet the increasing housing demand in urban areas of Bangladesh, Public and Private Sector Organizations and housing societies have been taking many "Sites and Services" Schemes in different urban areas. In these "Sites and Services" schemes usually agricultural land in urban fringe area is acquired and sub-divided into plots and sold to the public for construction of houses. The plot sizes in these schemes varies from 2 katha² upto 1 bigha³. But in recent developments most of the plots are within 2 to 5 katha in size. Many "New Residential Communities" have come up under these "Sites and Services" Schemes in the last three decades. For example in Dhaka Lalmatia, Muhammadpur, Mirpur, Banani, Uttara Residential Area are developed by Public Sector Organizations and Daitul Aman Housing, Muhammadia Housing,

-
- 1 106.6 million in 1988, estimated by Bangladesh Bureau of Statistics, B.B.S.
 - 2 1 katha = 67 sq.m. = 720 sq.ft.
 3. 1 bigha = 20 katha.

Shamoli Housing, Janata Housing, Noboday Housing, Basundhara Housing etc. are developed by private Housing Societies. Though these are new developments, the buildings that come up here are guided by same "Building Regulations" that are applicable in other already developed part of the city. Unfortunately no advantage of developing a vacant land with new and alternate possible planning tools had been tried for making a better living environment.

In this study we will evaluate the "Quality of Built Environment" in existing situation and then will try to find if there is any planning tool that can help make better Quality of Built Environment within existing density level under the existing Housing Delivery System.

1.2 STATEMENT OF THE PROBLEM:

To develop a New Residential Community the basic objectives of Plot Lay-Out and Building Regulations are to create a housing environment which can provide health, security and general welfare of the inhabitants and ensure efficient use of land. But it is observed that the "Quality of Built Environment" in these "New Residential Communities" developed under these "Sites and Services" schemes lack most of the qualities for a better living environment. These settlements lack quality of better housing both at Dwelling Unit Level and Housing Environment

Level. At dwelling unit level houses lack, adequate natural ventilation, adequate natural light, privacy and provision for green areas with plantation and trees. At housing environment level the Residential Community lacks, efficient road network, grouping of houses to form a cluster, facilities for pedestrian traffic and totality of the urban fabric. Thus, the whole community becomes a monotonous development of boxes surrounded by dark and dirty left over negative alleys.

1.3 RATIONALE OF THE STUDY:

With the increase of population in the cities there will be need for more Residential Communities, and if the present policy and housing delivery system remains, it is assumed that more "Sites and Services" projects of this kind will come up. At this stage we need to evaluate the "Quality of Built Environment" in these Residential Communities to take necessary decision for future schemes to achieve better living environment.

1.4 OBJECTIVES OF THE STUDY:

Objectives of this study is to evaluate the "Quality of Built Environment" in the housing developed in these "Sites and Services" schemes and suggest tools (if any) for possible improvement. The "Quality of Built Environment" will be studied at two levels :

1. Individual Dwelling Unit Level
2. Housing Environment Level

At dwelling unit level following points will be evaluated and tools for possible improvement will be suggested :

- a. Provision of Natural Ventilation
- b. Provision of Natural Light
- c. Privacy
- d. Provision of greens and trees.

At housing environment level following points will be evaluated and tools for possible improvement will be suggested :

- a. Grouping of Houses or Cluster formation
- b. Efficient Road Net-Work
- c. Provision for pedestrian traffic
- d. Totality of the Urban Fabric.

1.5 SCOPE OF THE STUDY:

In this study we will evaluate the "Quality of Built Environment" in the housing developed on the plots ranging between 2 katha to 5 katha in these "Sites and Services" projects and try to find if

there is any possibility of improving this Built Environment within existing housing delivery system and existing density level.

In this study we will not go into the question, whether the present Housing Delivery System in these "Sites and Services" schemes are justified regarding equity of distributions; we will not go into the question howfar the present density level is justified. In this study we will try to find if it is possible to make better Built Environment within the existing system.

✓1.6 METHODOLOGY OF THE STUDY:

(For suggesting some guidelines for planning a New Residential Community many factors are to be considered. Information are to be collected from existing examples as well as from secondary sources and literature survey.) Information on living habits of the target people, the socio-cultural conditions, the climatic factors all are to be taken into consideration.

(To fulfil the the objectives of the study following methodology would be followed:)

a. Data and information collection from primary sources:

For this project work primary information would be collected through observation of the study area and existing similar examples. Information on physical condition of the housing

environment and individual dwelling unit would be collected by reconnaissance survey and interview with the residents of the area.

b. (Information from secondary sources:

Information from secondary sources would be collected through review and analysis of relevant literature and examples.)

Literature Survey: An elaborate literature survey on the subject would be carried out for better understanding and presentation of the problem.

Example Study: Similar housing projects would be studied in detail. Housing environment, hierarchy of road network, provision for pedestrian traffic, form and layout of buildings, environment at dwelling unit level, all will be studied in detail to understand the problems and prospects of the project under study.

c. Analysis of collected data and information: The collected data and information from observation, interview, document and literature survey would be edited and summarised. After analyzing these data and information, specific recommendations would be suggested for the project.

CHAPTER 2: EXISTING SYSTEMS

2.1 ROAD NET-WORK AND PLDT LAY-OUT:

In these "Sites and Services" developments road layout is usually in grid-iron pattern (Fig.1,2 & 3). The access roads of public sector schemes of Muhammadpur and Uttara are 9.15 m.wide. Access roads of private sector developments are usually 6 m to 7.5 m wide. There is no separate provision for pedestrian traffic.

Most of the plots are North or South oriented, but there are plots which face road at the East or the West side. Plot sizes vary from 2 katha upto 10 kaktha (in some cases even bigger plots upto 1 bigha and above were allotted). In our study we will take those areas where plot sizes are within 2 to 5 katha; which is common size in most of the recent development schemes. The ratio of width and length of the plots are approximately within 1:1.5 to 1:2 in most of the cases.

2.2 BUILDING REGULATIONS:

There are some Set-back rules of Rajdhani Unnayan Kartipakkha (RAJUK) for different plot sizes (Fig. 5) which are followed in the house construction in these Residential Developments. According to these rules one building should be at least 1.5 m from the front property line. Side clearance should be at least 1.25 m from the side property line in both sides when the plot is

bigger than 2 katha. When the plot is less than 2 katha no side clearance is required. The back side clearance varies according to plot size. For plots upto 3 katha 1.5 m back clearance is required for plots upto 4 katha and plots upto 5 katha the side clearance is 1.75 m and 2.5 m respectively. These set-back rules are shown in figure 5.

The other rule is, the maximum possible Building Coverage Area (BCA) should not be more than 2/3 (66%) of the plot area and the building height is restricted to 5 story (Annexure I).

2.3 CLIMATIC FACTORS:

The climate in Bangladesh is warm humid and the wind usually blows from the south. The sun is also little inclined to the south through most of the months of the year (Fig. 4).

2.4 EXISTING DENSITY CALCULATIONS:

The density standards for residential areas provide a very useful guide for various planning calculations. Density measurements provide a uniform and objective method of estimating population loads and required areas of land for general openness and livability. It makes convenient to calculate the various possible combinations of dwelling types desired to make up a neighbourhood.

It is very difficult to prescribe the right density for a residential area. The acceptable conditions can be created over a wide range of densities. Density is usually determined by location and land value.

The intensity of residential use can be expressed by different types of density calculations : Population Density, Dwelling Unit Density, Building Coverage Area (BCA) and Floor Area Ratio (FAR) etc.

In our existing system there are problems to calculate dwelling density (Units per Acre) and population density (Persons per Acre). There is basically no existing rule to guide the dwelling density in these "Sites and Services" developments, and eventually the population density can not be measured. For example in a 5 katha plot one can make a 2 story single unit duplex house or a 4 storey 4 unit, or even 8 unit flat. There is no guiding rule to control this. The only rule existing in our situation is, controlling building coverage area and building height.

In our density calculation we will consider 4 dwelling units in one plot and 7.7 persons per dwelling unit¹ to calculate dwelling density and population density. But we will get exact figures for Building Coverage Area and Floor Area Ratio. Considering these factors density has been calculated for different plot sizes in our study area:

1 Average occupancy rate of Dhaka, Planning Commission Report - 1980.

5 katha Plot:	Plot Size	= 335 m ²
	Building Coverage Area	= 224 m ² (68%)
	Floor Area Ratio	= 0.66x4=2.64
	Net Dwelling Density ¹	= 40 Units/Acre
	Population Density	= 308 persons/Acre
4 katha Plot:	Plot size	= 267 m ²
	Building Coverage Area	= 178 m ² (66%)
	Floor Area Ratio	= 0.66x4 = 2.64
	Net Dwelling Density	= 49 Units/Acre
	Population Density	= 377 Persons/Acre
3 katha Plot:	Plot size	= 200 m ²
	Building Coverage Area	= 134 m ² (66%)
	Floor Area Ratio	= 0.66x4 = 2.64
	Net Dwelling Density	= 63 Units/Acre
	Population Density	= 485 Persons/Acre

We will usually mean Floor Area Ratio (FAR) when we mention density in this study.

2.4 FOUR STOREY LIMIT:

It is accepted that low-rise high density developments are most suitable for residential purposes. *"I will say low-rise high density is an ideal solution for this part of the world"*² Said Raj Rewal a famous architect and planner of this Sub-Continent. Also numerous surveys have shown that the four storey houses has the lowest building cost³.

So, the present development of four storey Residential Community in these "Sites and Services" projects could be justified regarding cost and building height.

-
- 1 For Net Dwelling Density the area of access road is also taken into consideration.
 - 2 "A conversation with Raj Rewal" Chetana, No.2, 1987, p.36.
 - 3 Residential Districts, p.59.

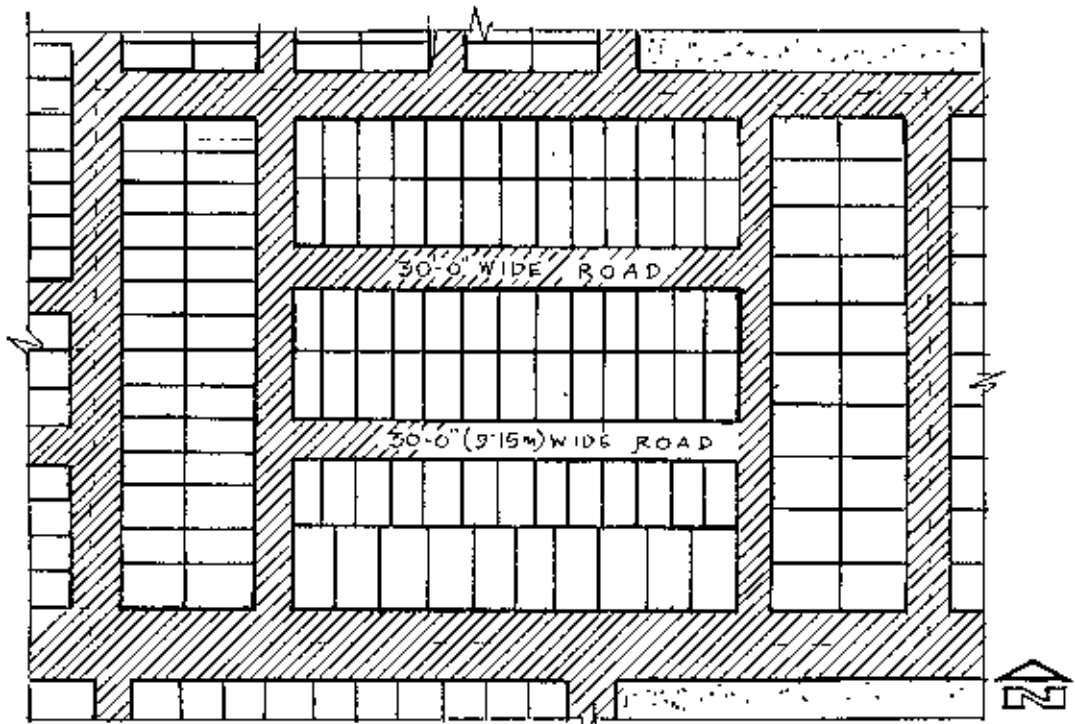


Figure 1
Plot Layout, part of Tajmahal Road, Mohammadpur.

Source: RAJUK

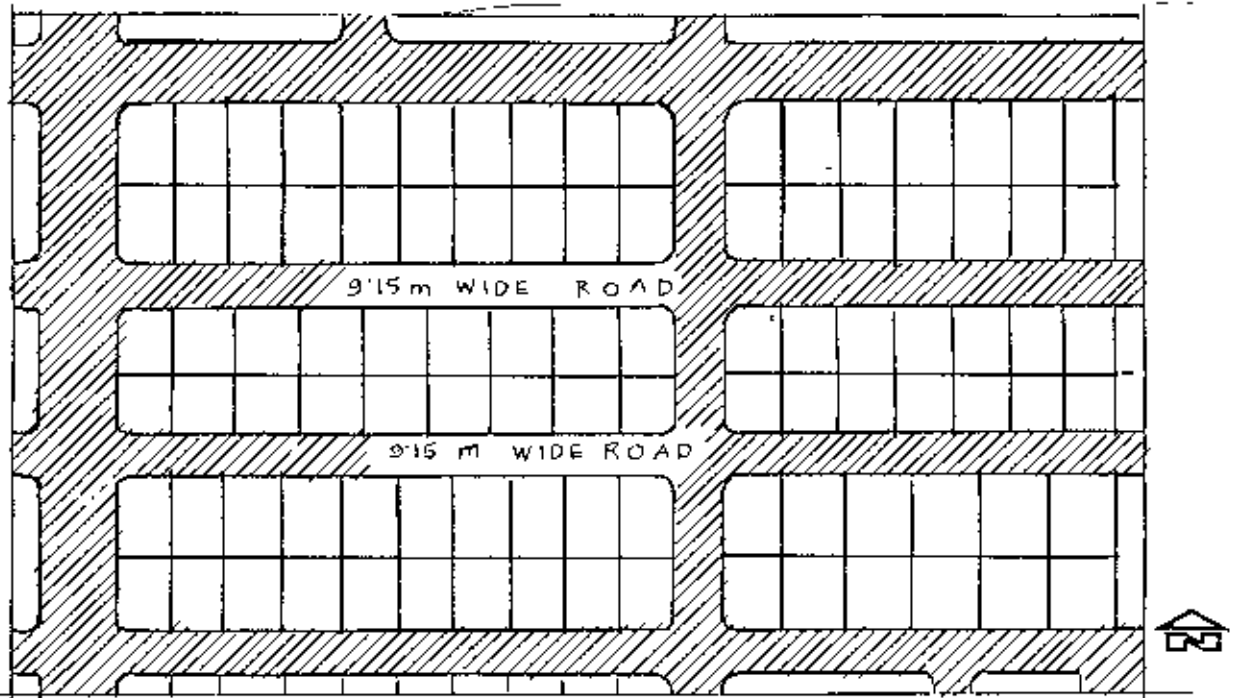


Figure 2
Plot Layout, part of Sector 4, Uttara Model Town.

Source: RAJUK

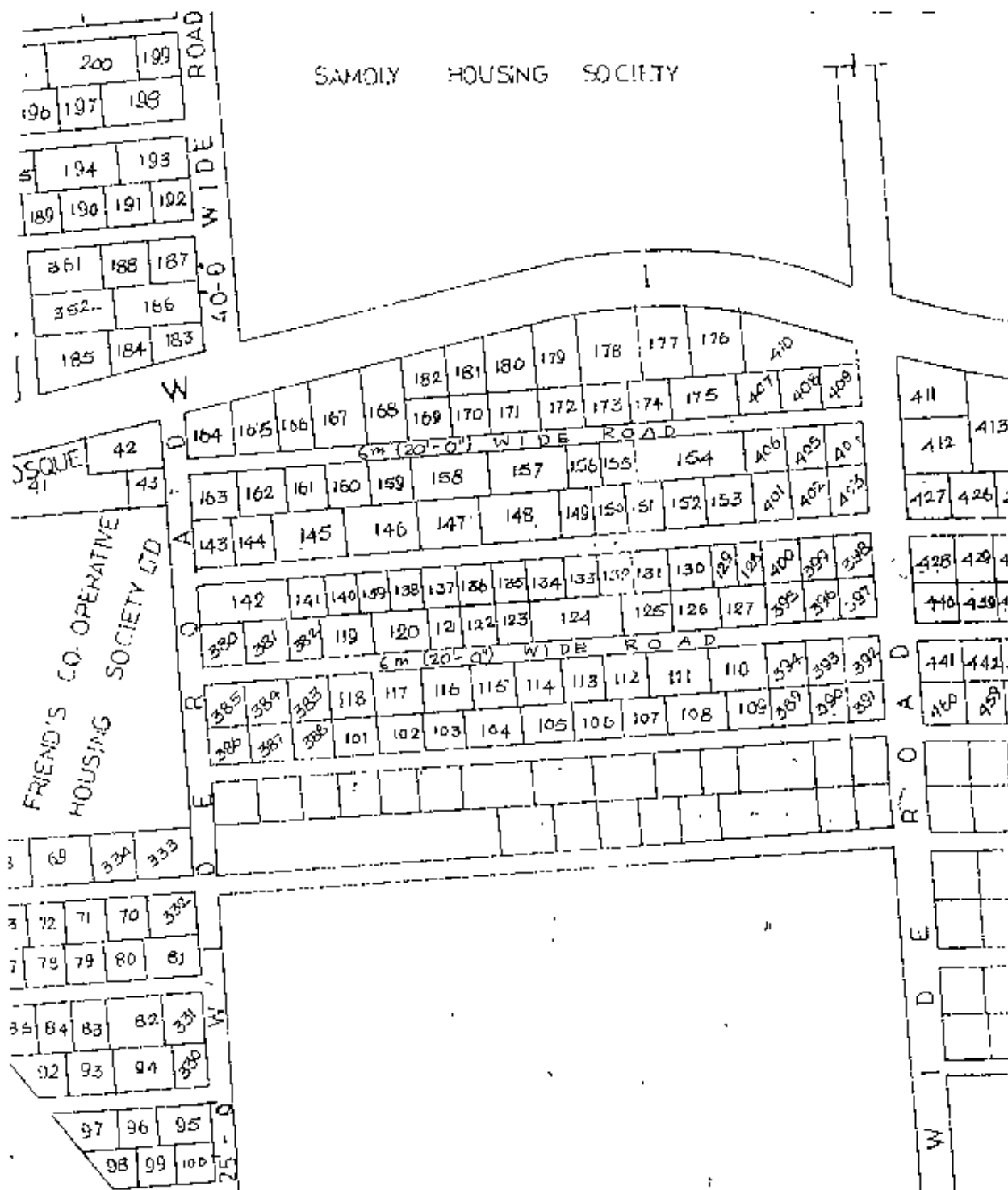


Figure 3
Plot Layout, part of Nobodoy Housing Society, Mohammadpur.

Source: Nobodoy Housing Society.

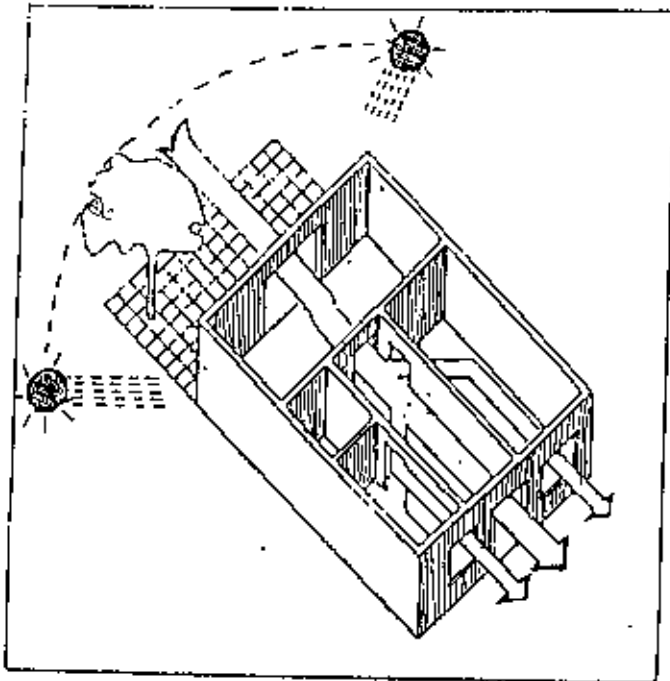
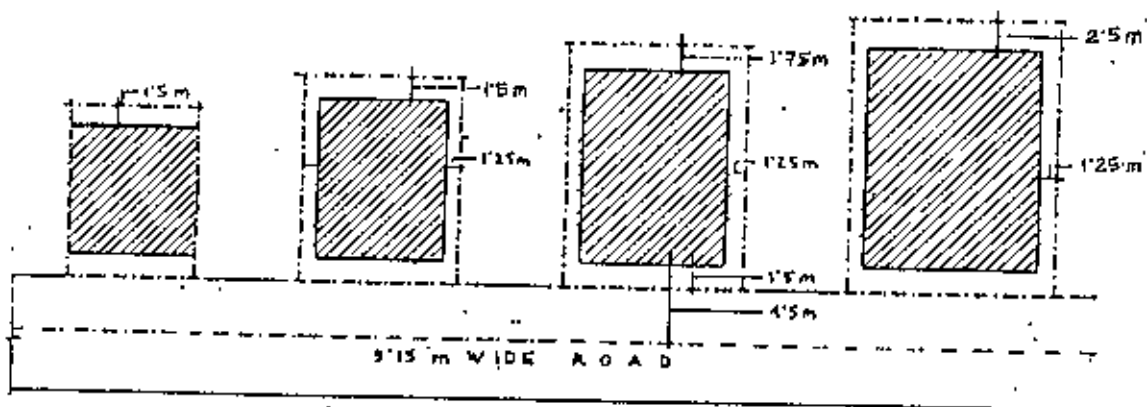


Figure 4

Climatic Factors in Bangladesh:

1. Wind blows from the South.
2. Sun in little inclined to the South.



Set-back rule of RAJUK for different size plots.

Figure 5

Source: RAJUK

CHAPTER 3: OBSERVATION AND PROBLEM IDENTIFICATION

3.1. INDIVIDUAL DWELLING UNIT LEVEL:

3.1.1 PROVISION OF NATURAL VENTILATION:

In existing system most of the plots have roads at the South or at the North of the plot, some plots have road at the East or at the West also (Fig. 1). When buildings are erected on plots according to the existing set-back rules, plots having access road at the South get adequate prevailing natural wind (Fig. 6 and 7). For example, a 4 katha plot having road at the South the next building is at a distance of 12.15 m ($1.5\text{m} + 9.15\text{m} + 1.5\text{m}$). But buildings in other plots facing road at the North do not get adequate available natural wind inside the houses. For example, for a 4 katha plot having another plot at the South, the next building is at a distance of only 3.5 m ($1.75\text{m} + 1.75\text{m}$) (Fig.7). So in existing system more than 50% plots are at disadvantaged position regarding natural ventilation.

3.1.2. PROVISION OF NATURAL LIGHT:

When plots are above 2 katha and buildings are erected on these plots according to the existing building regulations, the space that is left between two adjacent buildings is only 2.5 m ($1.25\text{m} + 1.25\text{m}$), so the lower floors of two adjacent four story houses do not get adequate natural light from side openings (Fig. 8). Also the back side clearance between two buildings are 3 m ($1.5\text{m} + 1.5\text{m}$), 3.5 m ($1.75\text{m} + 1.75\text{m}$) or 5 m ($2.5\text{m} + 2.5\text{m}$) for plots of

3 katha, 4 katha and 5 katha respectively. Thus the houses on these plots do not get enough natural light even from the back side.

3.1.3 PRIVACY:

When plots are within 3 katha to 5 katha in size and the buildings are erected according to existing regulations there remain only 2.5 m (1.25m + 1.25m) gap between two adjacent buildings. This gap of 2.5 m between two houses fail to provide reasonable degree of privacy. Houses lack both sonic and visual privacy when windows of two houses are only 2.5 m apart. One can easily overhear conversation taking place in neighbouring houses and can easily see the interior of neighbouring houses unless the window is closed or heavy curtain is drawn (Fig. 8).

3.1.4 PROVISION FOR GREEN AND TREES:

Desire for having a touch of green and trees in ones house is universal and there is no controversy that a lawn in a house improves the living environment to a great extent. But in the existing development system where plots are within 5 katha people usually build the house on the total area keeping only the set-back spaces (Fig. 6) to get maximum possible floor area in the house. So in these residential developments there is usually no provision for greens and trees which is a must for better living environment.

On one hand we are not getting any space for greens, on the other hand we are creating 1.25 m wide left-over negative space at two sides of each building which is totally wastage of valuable land.

3.2 HOUSING ENVIRONMENT LEVEL:

3.2.1 GROUPING OF HOUSES OR CLUSTER FORMATION:

In existing development system there is no consideration for grouping of houses which can form a cluster of houses and where 40/50 families can feel the sense of physical identity. And where children can play and ladies and older people can walk with the feeling of security and sense of belongingness.

3.2.2 ROAD NET-WORK:

In existing system there are some variations in the road width but it does not conform to the hierarchy of roads¹ in quality and uses. This type of Road Net-work cannot create ordered hierarchy of space from Master Plan Stage down to Sector, Cluster and on to Dwelling Unit Level. Roads in front of a house and roads which are wider and have commercial activities have almost same degree of public uses. Thorough traffic movement in all roads create hazards, hamper security and privacy of inhabitants.

The 9.15 m wide space left for Right-of-Way for access roads in public sector developments are not used efficiently. Out of

1 Time Saver Standards for Building Types, Site Planning, p.149.

9.15 m only about 5 m is paved and remaining space is left over. The 6 m wide access road in private sector developments is functioning well for the purpose of access to the houses.

3.2.3 PROVISION FOR PEDESTRIAN TRAFFIC:

In existing system usually no provision is kept for separate pedestrian movement. Vehicles and pedestrian use the same carriage way which hampers security of frequent pedestrian movement in a residential area.

3.2.4 TOTALITY OF THE URBAN FABRIC:

In existing system there is no integration of groups of buildings, all buildings stand separately and create monotonous development. Even a single building may be a good work of architecture but stands isolated and not always a positive contribution to the total urban scene. The problem of this kind of housing is, individual houses are not dispersed enough to create a sub urban character or they are not linked with adjacent houses to create any kind of dense character which is common in traditional natural development in cities. As a result houses remain as packages of boxes standing side by side which do not generate built environment of cohesive character.

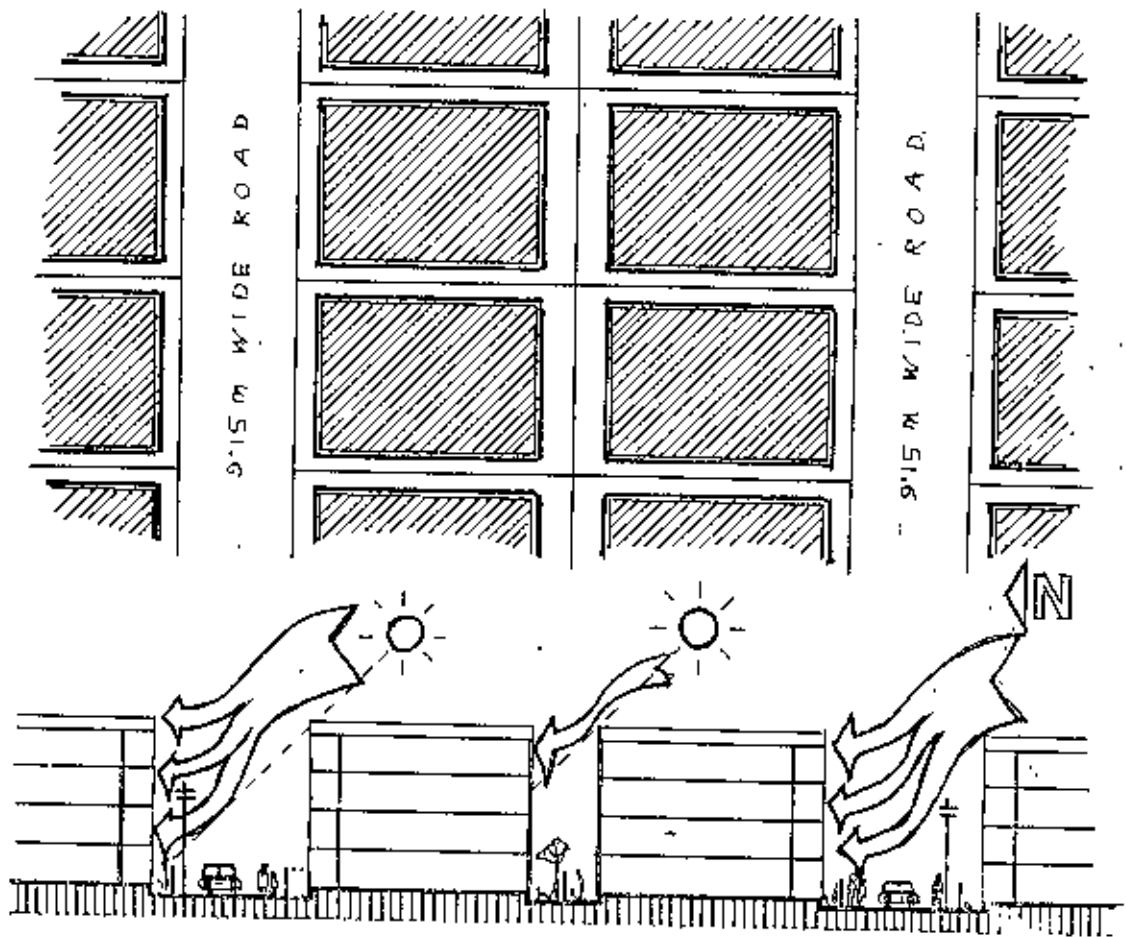


Figure 6
Plan and Cross-Section through Housing

Plots having road at the north do not get adequate natural ventilation and adequate natural light.

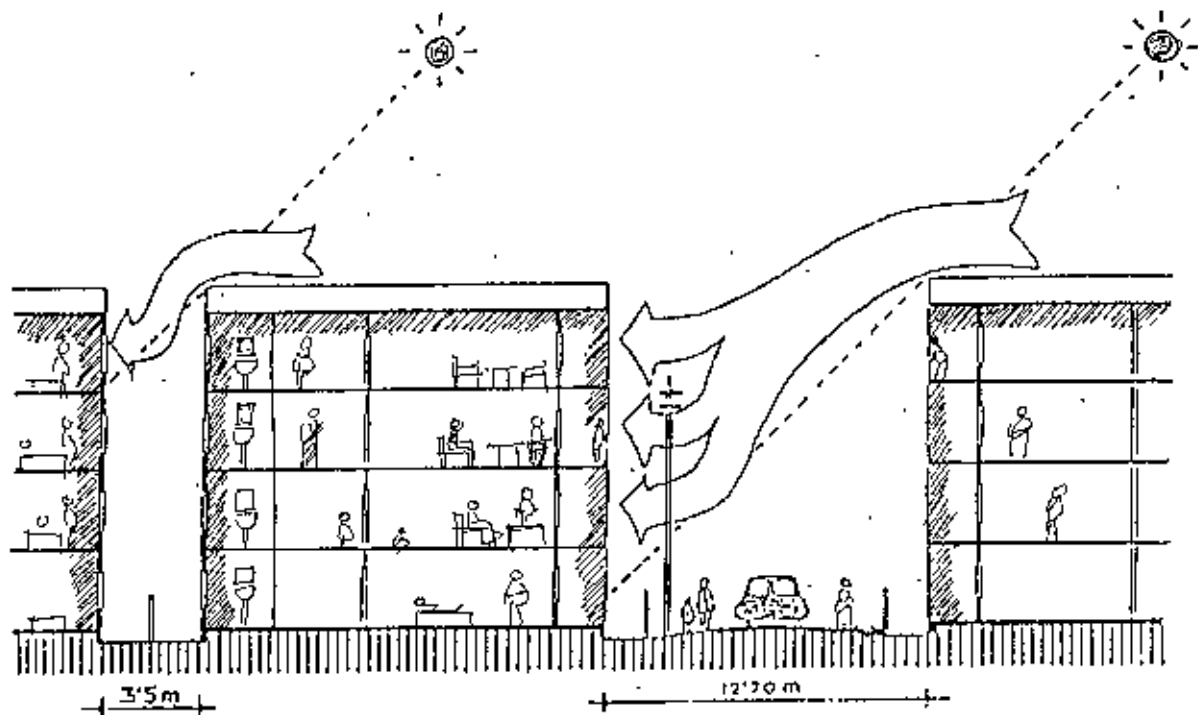


Figure 7

Longitudinal Section through houses and street.

- * Poor ventilation in all the north facing plots.
- * Less sun light in all the north facing plots.
- * Less building to building back space.
- * No land for lawn or trees.

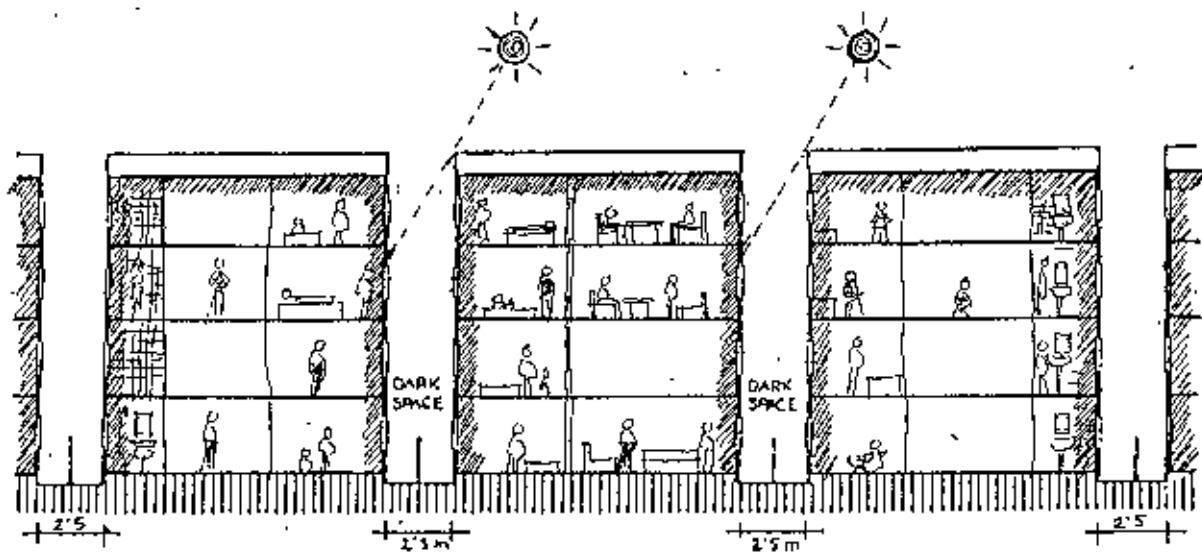


Figure 8

Side wise section through houses.

- * Poor Natural Light in lower floors.
- * Privacy Problem.
- * No use of stripe of land between buildings.

সুবর্ণ সুযোগ

প্লট! আবাসিক প্লট!

আনন্দনগর প্রকল্প

- ★ ঢাকা শহর থেকে মাত্র ৫ মিনিটের দূরত্বে ঢাকা-সাতার মহাসড়ক সংলগ্ন।
- ★ আত্মনৈতিক সুবিধাসহ বেসরকারীকৃত ৫, ৩ ও ২.৫ কাঠার প্লট বরাহ উপযোগে সড়ক যোগানো করা।
- ★ বিঃ শ্রীঃ পাবনা পানির প্রকল্পে ২.৫ ও ৩ কাঠার মাত্র কয়েকটি প্লট-বিক্রয় হবে।
- ★ অত্র প্রকল্পের সকল প্লট ফ্লোরের রেজিস্ট্রেশন ও পক্ষেপন যুক্ত সেবার আনুষ্ঠান করা হচ্ছে।

যোগাযোগ করুন:

চলন্তিকা প্রপার্টি ডেভেলপমেন্ট লিঃ
 ১২০, দারুল শালায় (পূর্ব নির্মাণ ও ব্যবস্থাপনা কেন্দ্রের বিপরীতে ও টেকনি ক্যাল ইনস্টিটিউটের কাছে)
 ঢাকা-১৩১৭. ফোনঃ ৮০১৭৪৫, ৮০১৭৪৬.

Advertisement of a Private Housing Society for "Site and Services" Project.

Source: The Daily Ittefaq, Jan. 10, 1991.

Figure 9a

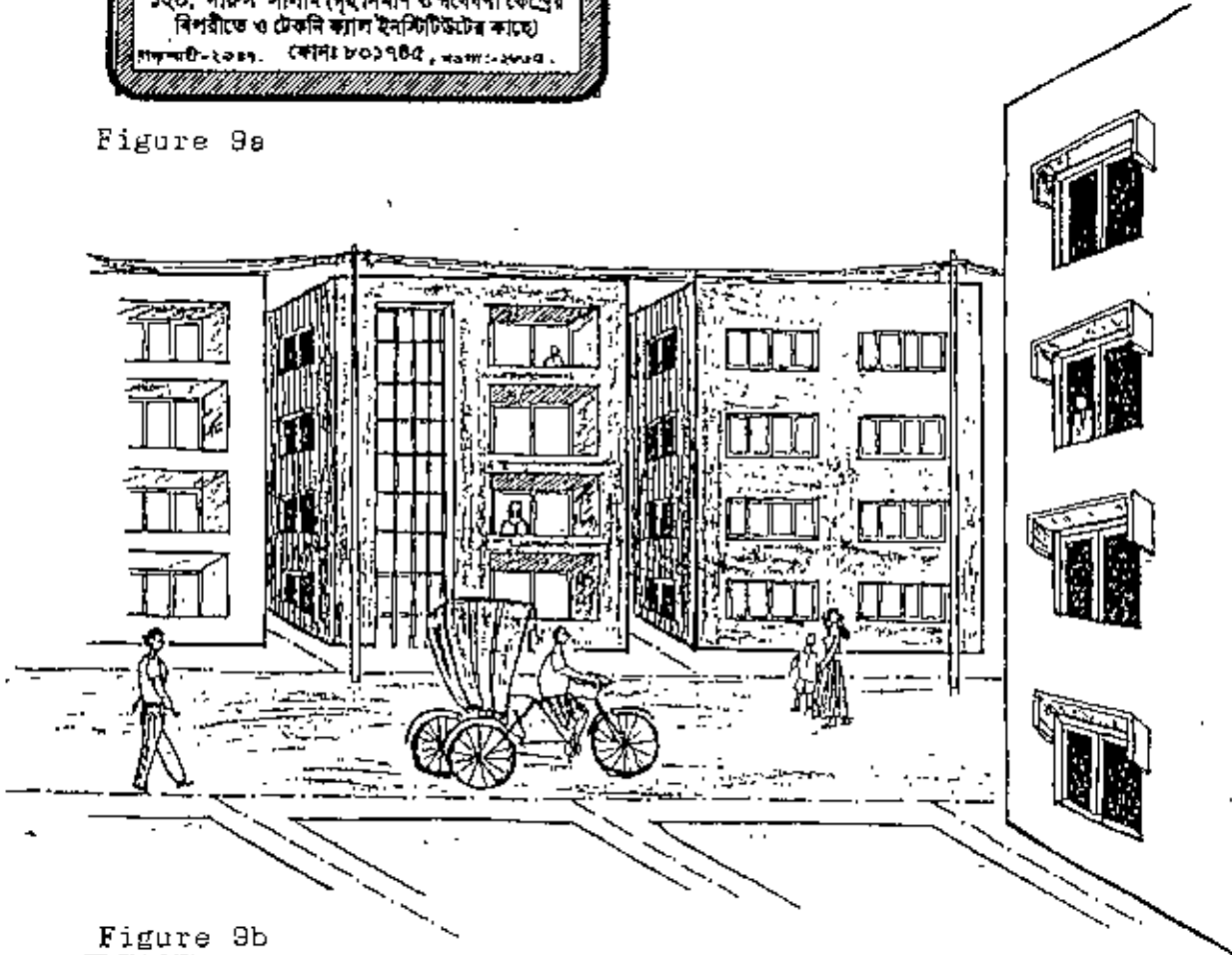


Figure 9b
General View of Housing in Development.

CHAPTER 4: REVIEW OF RELEVANT LITERATURE AND EXAMPLES:

4.1 DWELLING UNIT LEVEL:

In "A Pattern Language" by Christopher Alexander the author argued that "Above 15 houses per acre it is almost impossible to make houses freestanding without destroying the open space around them; the open space which is left gets reduced to nothing more than shallow rings around the house Row houses solve these problems At densities of 15 to 30 houses per acre, row houses are essential¹.

"..... Outdoor space is negative when it is shapeless, the residue left behind when buildings - which are generally viewed as positive are placed on the land, Outdoor spaces which are merely "left over" between buildings, will in general, not be used -- make all the outdoor spaces which surround and lie between buildings positive."²

Arguing for connected buildings Christopher Alexander says - "Isolated buildings are symptoms of disconnected sick society. in those part of town where densities are relatively high, isolated buildings and the laws which create and enforce them, are undermining the fabric of society as forcibly and as persistently as any other social evil of our time..... connect buildings up, wherever possible, to the existing

1,2 "A Pattern Language" p. 205 and p. 518.

*buildings round about. Do not keep set-backs between buildings, instead try to form new buildings as continuations of the older buildings."*¹

In "Housing, Climate and Comfort" writer Martin Evans suggests -
*"The form of dwellings can be adjusted to take advantage of the beneficial aspects of the climate, and to reduce the impact of unfavourable aspects. The form, layout, orientation and scale of dwellings and dwelling-groups should therefore be controlled in relation to the needs of the climatic zone. The design of dwelling form should not only be related to improvement of internal environment, but also to the creation of comfortable conditions in the external spaces between and around buildings. ----- Outdoor spaces should never be considered as "left-over spaces" remaining after the internal spaces are defined, although the bye-laws in many countries, with requirements to set buildings back from the plot boundary, do not help in this respect."*²

*"..... The proportions of the space between buildings will determine the quantity and quality of light falling on to the facade, as well as the availability of breeze, with wider spaces permitting increased illumination and better air movement - Since air movement is vital for comfort buildings must be well spaced."*³

1 "A Pattern Language", p. 533.

2,3 "Housing, Climate and Comfort", p. 59 and p. 61.

*"..... Double banked rooms should be used to achieve economical dwelling plans but each dwelling should have window openings to the north and south, permitting some through ventilation."*¹

From a study on houses in Dhaka by Quazi A. Mowla we find the following recommendations - *"study reveals that plan, size and shape of buildings in Dhaka should be very liberal but oriented against the sun and exposed to wind. Low-rise buildings in a row elongated in east-west direction, are thermally more efficient for Dhaka."*²

In another study we find the following recommendation - *"Now Row Housing is possible only upto 2 katha plots as per rules. The provision should be extended to larger size plots upto 5 katha to reduce wastage of space, as minimum 2.5m space is lost between two buildings."*³

4.2 HOUSING ENVIRONMENT LEVEL:

In different books and examples we get suggestions and recommendations for design and layout of new residential settlements. In "A Pattern Language" the writers suggested *"Layout local roads so that they form loops. A loop is defined as any stretch of road which makes it impossible for cars that*

1 "Housing, Climate and Comfort", p. 71.

2 "An Appraisal of Architecture in Dhaka with Reference to its Thermal Performance" Recommendation.

3 "Current Building Regulations - A Case for Review" Recommendation No.5

don't have destinations on it to use it as a short cut. Keep the road really narrow 17 feet to 20 feet is quite enough." ¹

In "The Planning of a New Town" by Greater London Council it is recommended that - *"In residential areas distributor roads would normally be loop roads entering and leaving the same town road, they would be 20 feet wide where flow might be expected to be below 250 vehicles per hour. In residential areas service roads (access roads) would be cul-de-sac. They would lead from the distributor roads wherever possible. Service roads would normally have foot paths, access to property and car parks adjoining. The design and location of these roads would be determined by detailed planning. In residential areas the minimum width would be 13 feet, for cul-de-sac and 16 feet for loop roads."*²

In "Time-Saver Standards for Building Types" by De Joseph Chiara and J.H Callendar we find the following suggestions - *"Although the standard subdivision technique of today is a vast improvement over the monotonous grid-iron plots of the past, many planners feel that it still leaves much to be desired. They believe that it is possible to preserve the beauty of the natural land, to relate the houses better to each other and to the site and provide more open, spaces, all in less cost than in today's practice."*³

1 "A Pattern Language", p. 263.

2 "Planning of a New Town", Chapter 3, Service Roads.

3 "Time Saver Standards for Building Types", p. 153.

"..... The street pattern within residential area should be designed to discourage through traffic. The widths of the interior streets should be consistent with their function and the density of housing they serve and should be no greater than necessary. Short access street, such as cul-de-sac or loop streets may have minimum paved width of 20 feet. A cul-de-sac should not be in excess of 500 feet in length."¹

"..... Row houses or as they are called, town houses are finding many advocates because of their economical use of land and low site-development costs. When developed with not more than 8 or 10 units in one group and located around a court, cul-de-sac or loop street, the monotonous appearance usually, associated with such housing disappears."²

A comparative study on different type of road-net-work is shown in the figure - 10. In this example comparative study of housing environment is done with different possible road net-work and plot division:

The subdivision plan-1 provides 280 families (9.3 families per acre) in twin houses with basement garages curving streets are an improvement over the traditional grid-iron pattern but their repetition in numerous subdivisions has created a new monotony.

1,2 "Time Saver Standards for Building Types", p. 149 and p. 147.

The curving streets only partially obscure another monotony: the uniform spaced houses. Access from both boundary highways invites thorough traffic.

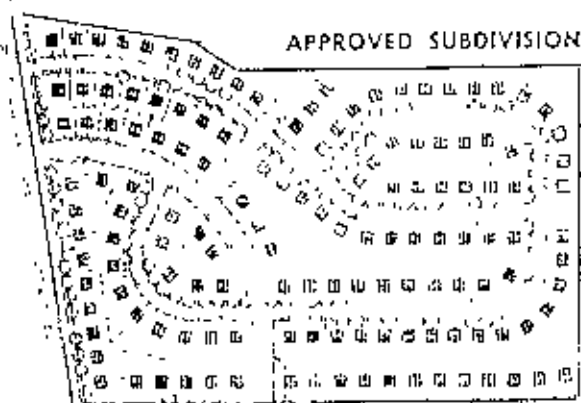
Scheme A houses the same 280 families. The new street pattern excludes through traffic. The twin house is replaced by groups of houses of varying lengths and varying set-backs. No houses face the busy boundary highways. Private gardens are supplemented by tot lots, sitting areas, a small common and parklike walks.

Scheme B also provides 280 families. Groups of houses face on courts instead of streets. Parking compounds in each court justify elimination of individual garages. As in Scheme A, tot lots, sitting areas, common areas and interior walks are provided in addition to private yards and gardens.

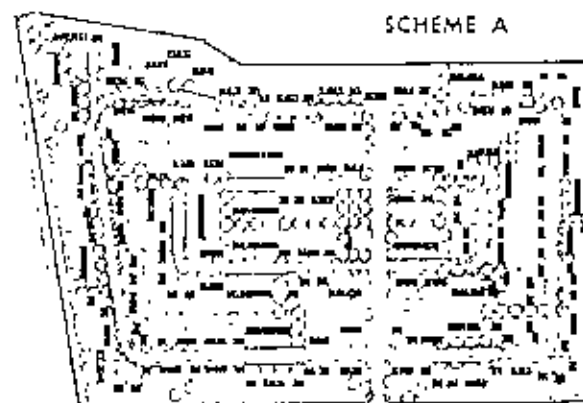
In Scheme C number of families reduced from 280 to 165. Groups of twelve houses front on pedestrian Courts. Access for cars and service vehicles is by looping drive ways behind the houses. Visitors park in the compounds at the entrance to the courts. The low density results in even more generous open space than in Schemes A and B. Through traffic is excluded from the subdivision and again the boundary streets are not used for lot frontage.

Schemes A, B and C fulfil the basic objectives of zoning, promotion of health and general welfare, provision of adequate light and air, and prevention of overcrowding of the land, and of undue congestion.

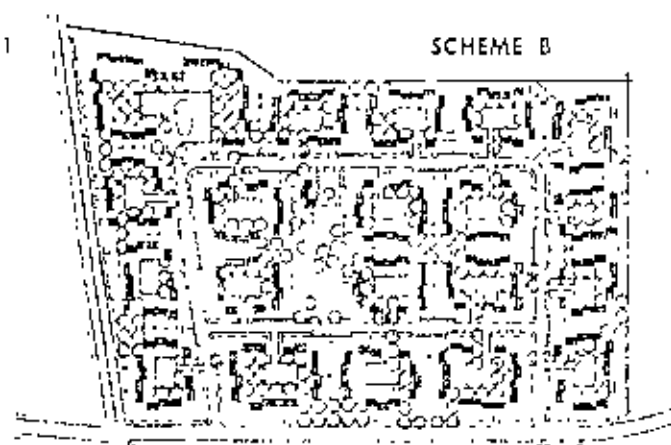
SITE PLANNING



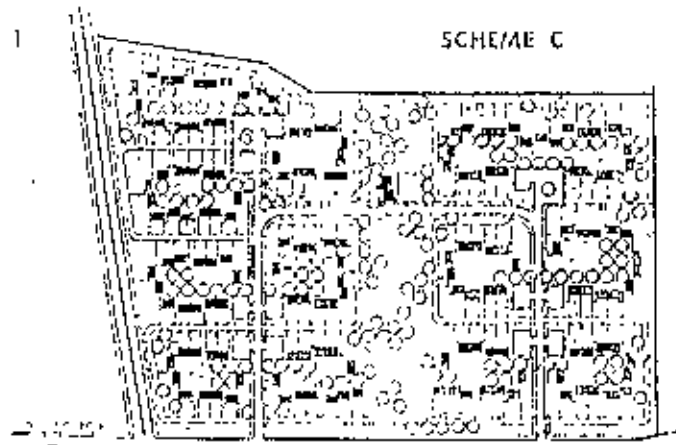
The approved subdivision represents current development practice fully conforming to most zoning and subdivision ordinances. The subdivision plan (1) provides for 280 families (20 families per acre) in twin houses with basement garages. Curving streets are an improvement over the traditional gridiron pattern, but such repetition in numerous subdivisions has created a new monotony. The curving streets only partially offset the monotony. The uniformly spaced houses arise from both boundary highway routes, through to the middle of lots, and lots of irregular contour areas are only now apparent in detail (2). Plan of the typical house, three stories above street level basement garage, is shown in (3).



Scheme A houses the same 280 families. The new street pattern excludes through traffic. The main house is replaced by groups of houses of varying lengths and varying setbacks. No houses face on the busy boundary highway. With garages out of the basements, the houses need be only two stories above street level, thus eliminating artificial terraces and giving direct access to private property which are supplemented by fat lots, sitting areas and small common and parklike walks.



Scheme B also provides for 280 families. Groups of houses form on courts instead of streets. Parking compounds in each court justify elimination of individual garages. As in Scheme A, fat lots, sitting areas, common areas and interior walks are provided in addition to private yards and gardens.



Scheme C shows the number of families reduced from 280 to 165 (5.7 per acre). Groups of twelve houses front on pedestrian courts. Access for cars and service vehicles is by looping drive ways behind the houses. Much more park in the compounds at the entrances to the courts. The low density results in even more generous open space than in Schemes A and B. Through traffic is excluded from the subdivision and, again, the boundary streets are not used for lot frontages.

Figure 10
Different kind of Plot Layout and Road Network.

Source: Time-Saver Standards for Building Types.

EXAMPLE 1:

LOW-COST HOUSING, INDORE, INDIA:

The scheme was initiated by Indore Development Authority to meet the acute housing shortage for the economically weaker sections (EWS). Some upper income plots were also integrated in order to generate surplus capital which could be used to cross-subsidize the EWS plots. Approximately 6500 plots are provided in 80 hectare land area. The smallest plot is 35 sq.m. in size and the largest 475 sq.m. In this project "sites-and-services" approach has been refined (while remaining flexible, attentive to individual resources and spontaneity) to include 'models' for future dwellers, house-types, suggested materials steps for implementation. This proposal searches a middle ground, between a "house with no rooms" (i.e. sites and services) and totally non-participatory, public housing schemes by architects alone. The suggested built form for this development is a concentrated housing clusters. In this project a hierarchy of streets was suggested which gradually diminishes in size as they penetrated the different sectors (Fig. 11, 12 and 13).

EXAMPLE 2:

ELECTRONIC CORPORATION OF INDIA LTD, HYDRABAD, INDIA.

The ECIL township was built in accordance with the government's expanding industrialization policies of the 1960s to build townships on the outskirts of existing cities. The master plan

is for 2000 houses in eight types. Community living concepts incorporated building and landscape elements. Closeknit grouping of dwelling units was designed. A central cultural spine has school, police station, shopping and recreational facilities. The architect states, *"In order to retain unity in spite of eventual changes and additions, the house must have certain basic constants. If they are respected, the housing in course of time will express unity, diversity and identity - a need of every family (Fig. 14 and 15)"*¹

EXAMPLE 3:

GUJARAT STATE FERTILIZER CORPORATION, BARODA:

In this project the architect established a pattern of diagonal roads converging on a central green. Around this were grouped some of the communal functions and a monumental water tower which acted as a focal point. The dwellings are conceived in relation to the community as a whole. House type in the township reflect income level and status. At the upper end are quiet enclaves with villas looking into their own garden courts. At the other end of the social scale are flats which are slotted into row-houses. These are laid out along quiet streets which are heavily planted with trees for shade. A net-work of pedestrian routes independent of the vehicular traffic run between houses (Fig.16 and 17).

1 B.V.Doshi, Architecture + Design, Jan.-Feb. 1989, p.

EXAMPLE 4:

ALRIBAT HOUSING, AMMAN, JORDAN:

The project ALRIBAT, consists of 30 dwelling units in suburban Amman. The usual urban Ammani housing units are separate buildings surrounded by 3 to 4 meter set-backs. ALRIBAT is trying to break this kind of planning by bringing houses closer to each other in the tradition of the old urban centres of the region (Fig. 18 and 19).

As land becomes more expensive and more scarce, architects have the choice of either building upwards or try and create concentrated housing clusters. This scheme presents one solution which is relevant for the development of new directions for contemporary housing.

EXAMPLE 5:

ASIAN GAMES HOUSING, DELHI:

The Asian Games Housing consists of 500 flats and 200 town houses in two to four story buildings, having a density of 28 units per acre. The flats vary in size from 90 square meters to a maximum of 200 square meters.

The buildings are clustered to form mohallas or neighbourhoods, each with between sixteen and thirtysix dwellings. A central pedestrian spine, modelled on traditional galis, interconnects the clusters, pedestrian and vehicular access to housing is kept

segregated but linked for convenience. Car parking in cul-de-sac is off the peripheral roads.

The houses are designed as clusters of interlocking units usually in a block of four to six flats. A typical housing unit block is so designed that it can be linked on sides and front to create clusters having a variety of enclosed spaces (Fig. 20, 21, 22, 23 and 24).

EXAMPLES 6:

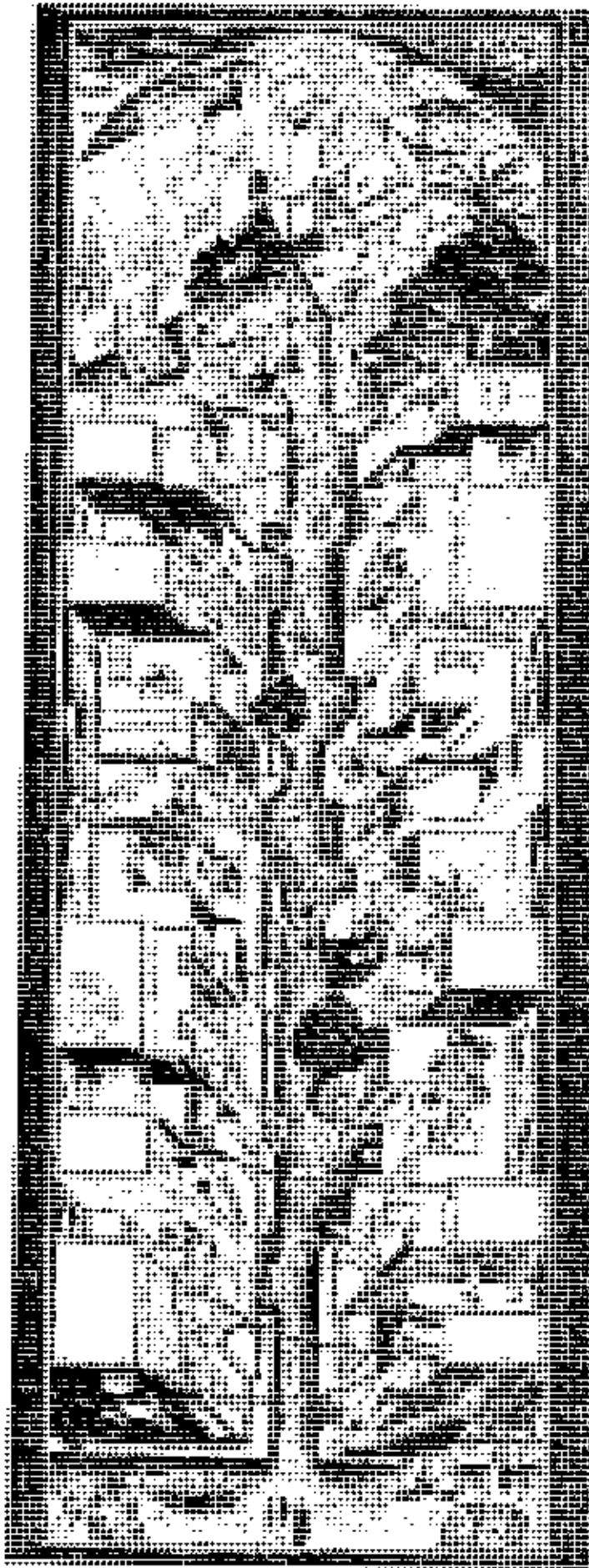
YAMUNA APARTMENTS, NEW DELHI:

Delhi the capital of India and a seat of political, educational and medical centers, attracts a large number of people from the whole country. Being a fast growing metropolis, housing is one of the problems it is facing. To accommodate this fast growing population, the Delhi Development Authority (DDA) in addition to selling constructed flats on a self financing basis, allots land to group housing societies. These societies are given land, at the rate of 90 square meters per member or an average of fifty dwelling units per acre. This has resulted in numerous stereotyped multistoreyed apartments, where no thought has been given to the creation of a community.

Yamuna apartments belong to a group housing society, which has been designed for the lower middle income group. The housing was designed as an integrated community settlement, where the

traditional housing elements were incorporated to create an "urban village" in a city.

The site allotted for the housing complex was 4.25 acres (1.72 hectares), but due to planning regulations an area measuring 0.5 acres (0.2 hectare) was required to be left as open space, at the north east corner. The intention of this open space being, to form a continuous green space with adjoining residential complexes. This green space has enabled the housing to have a nice play ground though it has made the project more challenging, as now two hundred dwelling units were to accommodate in an area of 3.75 acres (1.52 hectares) i.e. 53 dwelling units per acre. Vehicular traffic is restricted to the periphery of the development and contained in a basement. The pedestrian movement is along four radial galis where children can play undisturbed by the vehicular traffic. Plants planted along the sides of the gali, present a refreshing contrast to the external walls of the unit and liven up the galis. The dwelling units comprise of three basic plan types of varying floor area, which are grouped together in a repetitive basis, to form individual housing blocks. Due consideration has been given to the climatic conditions which is reflected in the unit plan. There is a hierarchy of open and enclosed spaces, private and semi-private areas. The unit plan has openings on two sides, thus enabling a cross-ventilation (Fig.25 and 26).

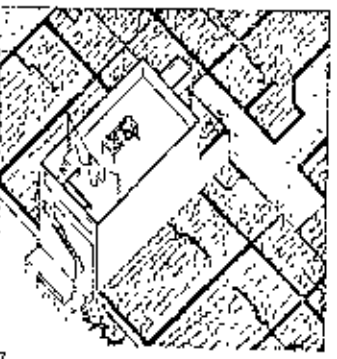
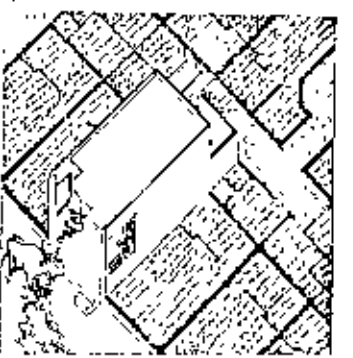
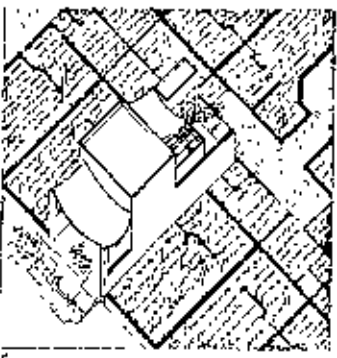
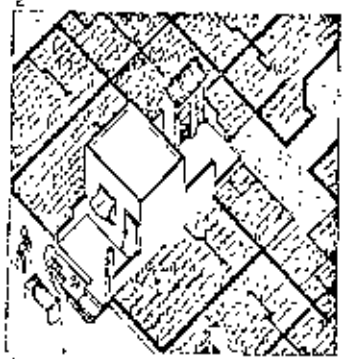
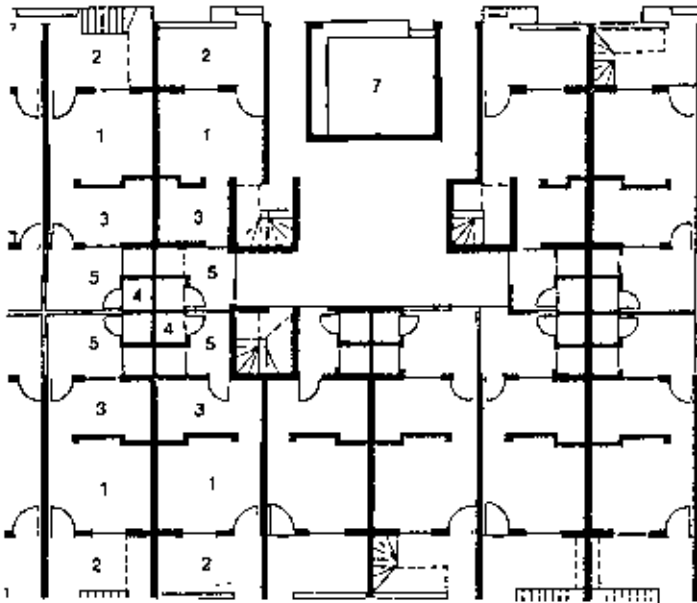
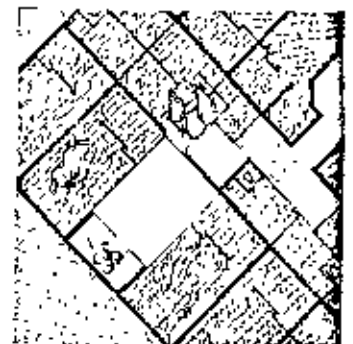
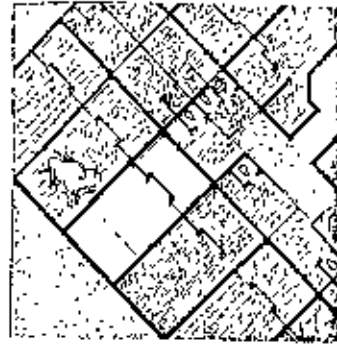
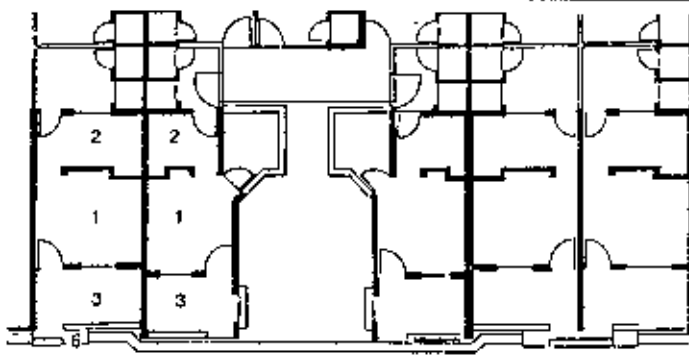


Aranya—a way of life—
clusters, streets,
bazaars, images,
people

Figure 11

Axonometric View
Proposed Township "ARANYA"
"Sites and Services" Project,
Indore, India.

Source. Indian Architect &
Builder, Jan. 1991.



GROUND FLOOR PLANS

- 1 ROOM
- 2 VERANDA
- 3 KITCHEN
- 4 TOILET
- 5 COULT
- 6 OTTA
- 7 WORKSHOP

Figure 12

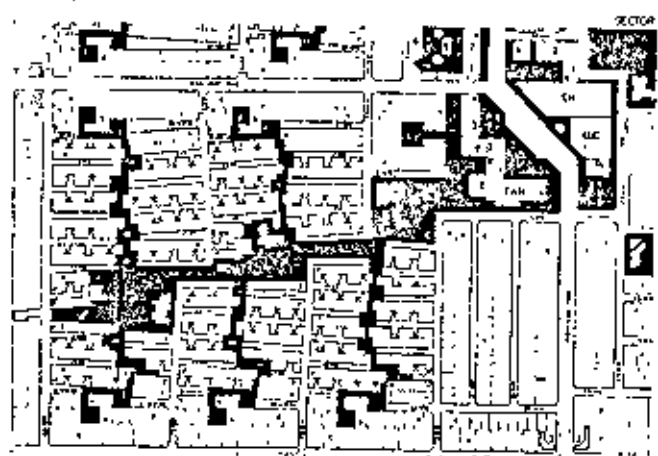


Figure 13
Low-Cost Housing, Indore, India.

STAGES OF DEVELOPMENT

Client Indore Development Authority
 Project associate H H Parikh
 Structural engineers Environmental
 Engineering Consultants, Bombay
 Contractors Departmental
 Covered area 1,00,000 sq m (6,500 plots)
 Cost Rs 1,000 lakhs

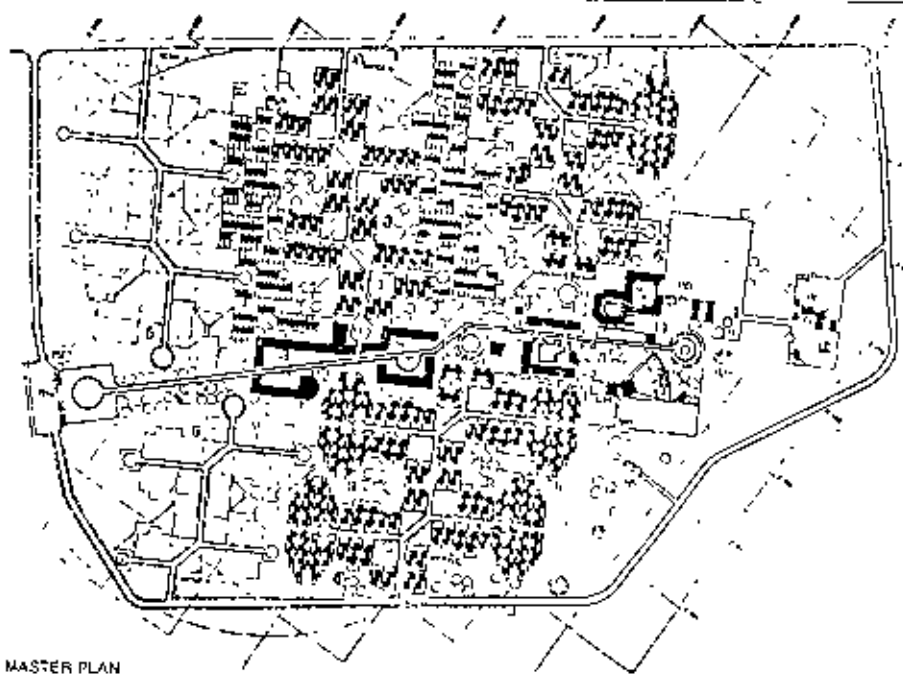
Electronics Corporation of India Ltd

Hyderabad, 1968-71

The ECIL township was built in accordance with the government's expanding industrialization policies of the 1960s to build townships on the outskirts of existing cities. This township is located on a slight slope outside Hyderabad city. Housing is designed to attract the white collar worker with all necessary community facilities being available.

The master plan was for 2 000 houses in eight types. Community living concepts incorporated buildings and landscape elements. Dwellings were constructed in pre-cast RC slab in standard dimensions in order to speed up construction time and economize costs.

Climate was a major constraint, and in response, the close-knit grouping of dwelling units and their orientation, the design of entrances, openings and courts ensure protection by tried and tested means. The approach to upper units is through a sloping staircase; flat rooms are common and meant for incremental growth. A central cultural spine has schools, a hospital, post office, police station, shopping and recreational facilities and a



MASTER PLAN

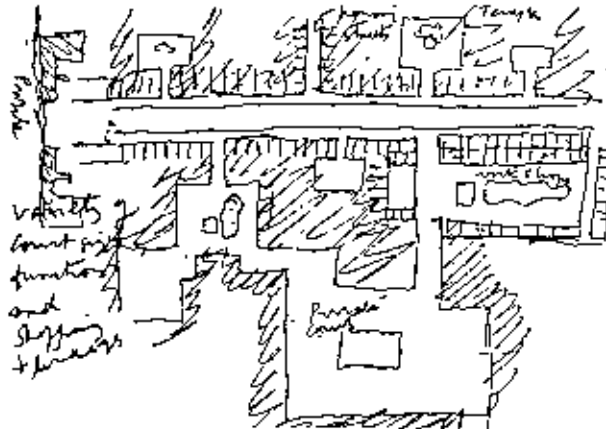


Figure 14

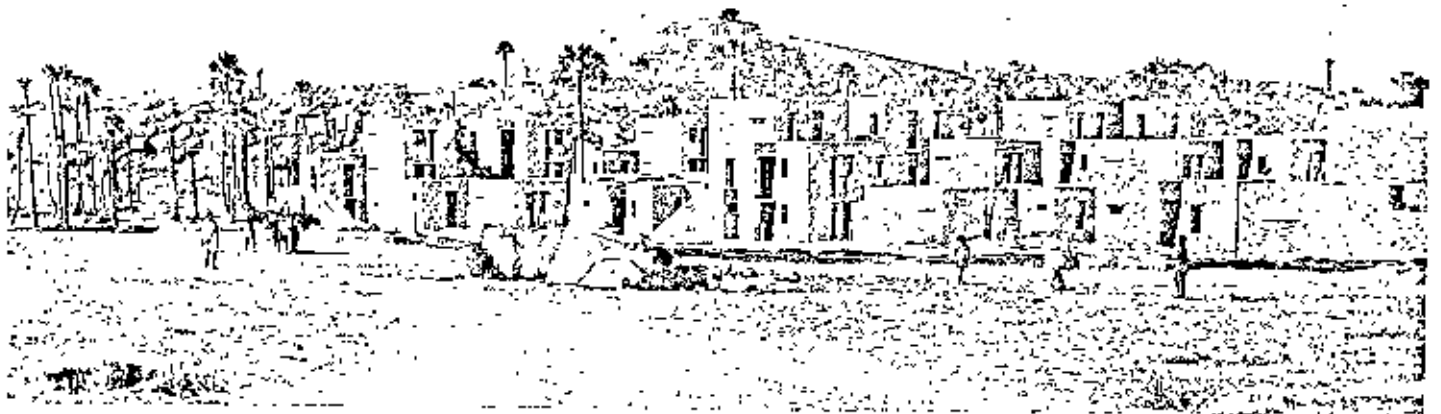
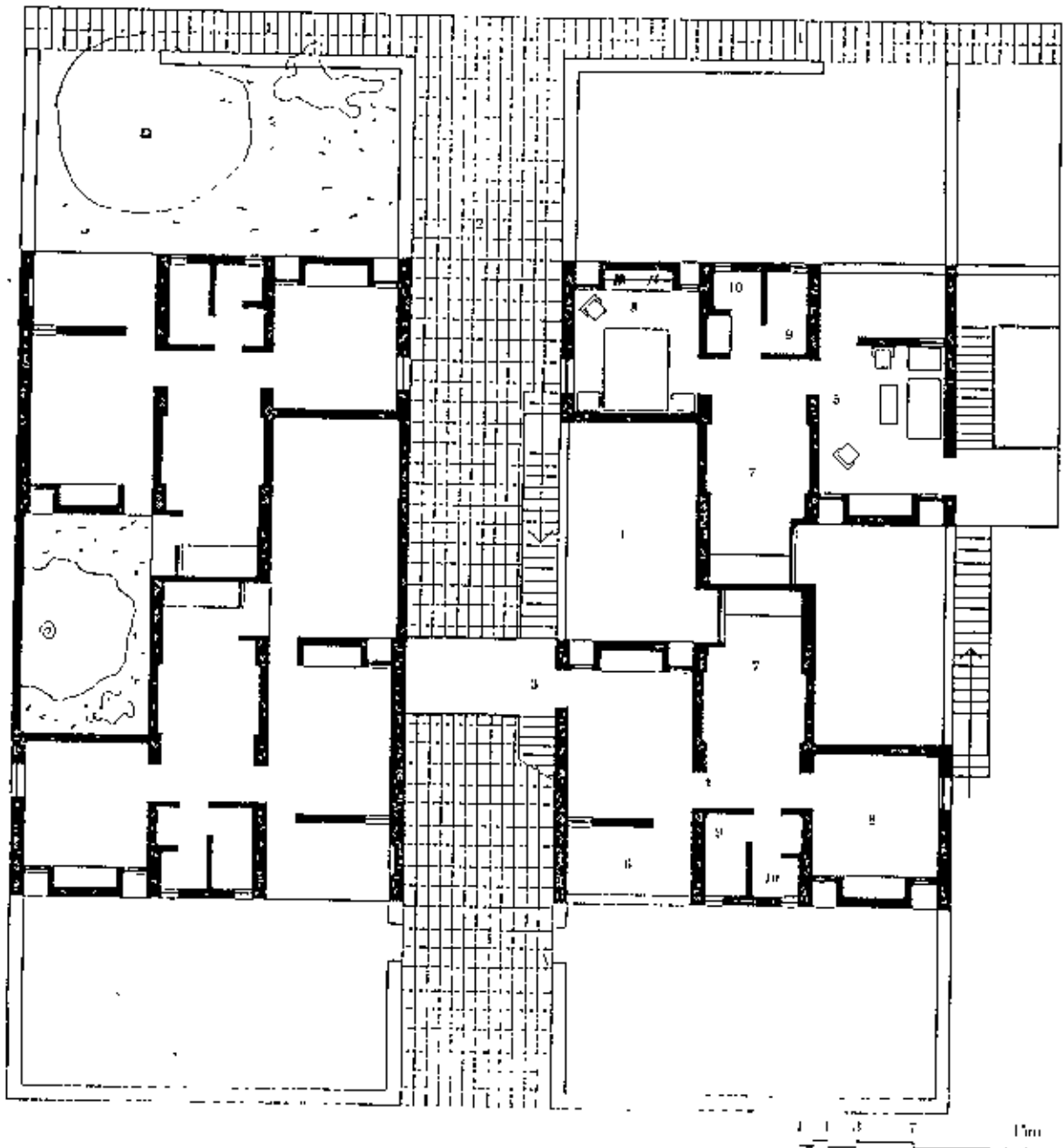


Figure 15
Master Plan ECIL, Hyderabad, India.

Source: Architecture + Design, Jan.-Feb. 1989.



- Type 7 plans
1. Street
 2. Pedestrian walkway
 3. Entry
 4. Court
 5. Living
 6. Verandah
 7. Kitchen
 8. Bedroom
 9. Bath
 10. Toilet

Figure 16
Gujrat State Fertilizer Corporation, Type 7 Housing, Plan.

Source: MIMAR BOOK, on B.V.DOSHI.



Figure 17
GSFC Master Plan, Hyderabad, India.

Source: MIMAR BOOK, on B.V. DOSHI.

Amman: Alribat Housing under construction

The project *Alribat* (a term in Arabic for the defensive buildings built by the Arabs in North Africa), consists of 30 dwelling units in a rather unpleasant suburban setting of Amman. The scheme, presently under construction, is designed by Jordanian architect, Bilal Hammad.

The usual urban Ammani housing units are separate buildings surrounded by 3 to 4 metre setbacks. *Alribat* is trying to break this

planning by bringing houses closer to each other in the tradition of the old urban centres of the region.

The idea was to build on the edges of the 3,850 square metre site, enclosing a landscaped outdoor courtyard for communal and recreational purposes, forming a defensive castle-like look from the outside. The

Right: Site plan.

- | | |
|------------------|--------------|
| 1. Villas | 5. Building |
| 2. Swimming pool | 6. Entrance |
| 3. Club | 7. Courtyard |
| 4. Garage | |

Below: Axonometric showing the central paved courtyard surrounded by dwelling units. The car parking is kept at the periphery in a garage (bottom left of sketch).

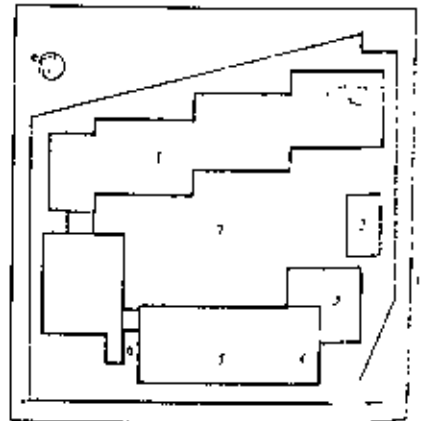
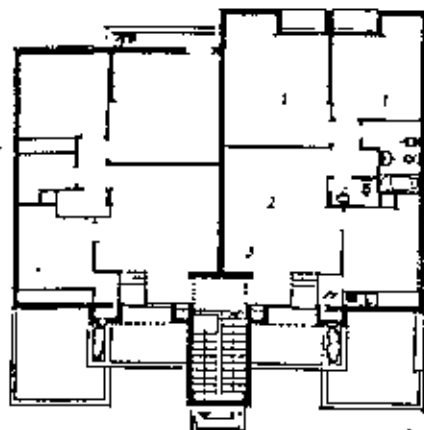
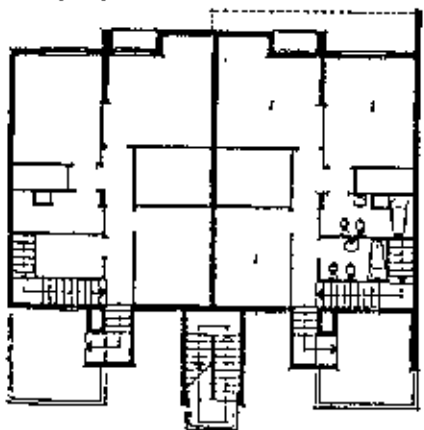


Figure 18
Alribat Housing, Amman, Jordan.

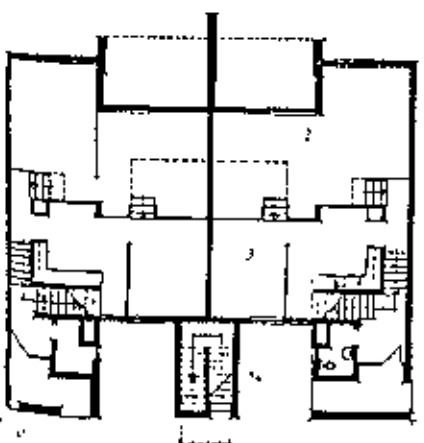
Source: MIMAR 28



Second floor plan

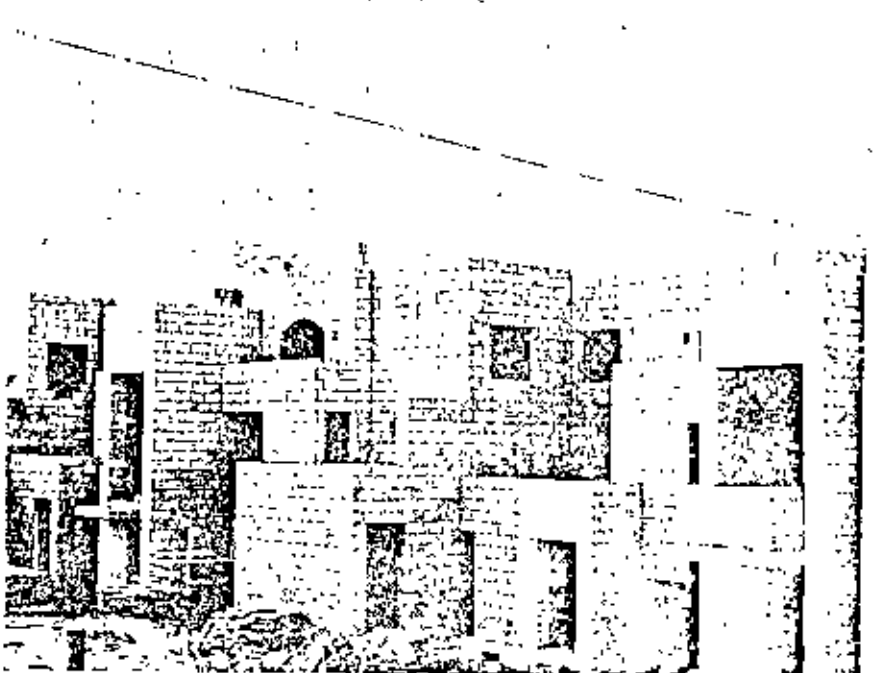
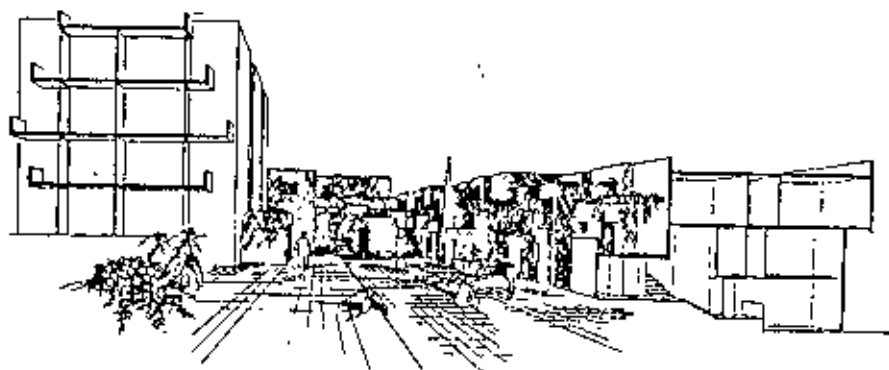


First floor plan



Ground floor plan

- 1. Bedroom
- 2. Living room
- 3. Dining



Top: Sectional perspective of Alribat.
Above: Building under construction.

architect claims that this recalls "the gates of Jerusalem, where we enter an arched gate, leading us from the outside to the court and then to the different units," all separated from the underground garages.

Hamad has given priority to the use of local materials; load-bearing walls of limestone and concrete, inside surfaces of white surfaces painted plaster, floor tiles and stairs of local terrazzo, and the concrete tiles for the courtyard, provide a contrast with the creamy-white stone walls. The courtyard has been landscaped with local plants and trees.

- It will be interesting to see what impact this different form of housing will have. As land becomes more expensive and more scarce, architects will, as in many cities, have the choice of either building upwards or try and create concentrated housing clusters. This scheme presents one solution which is relevant for the development of new directions for contemporary Jordanian housing.

Rasem Badran

Badran, himself one of Jordan's eminent younger architects and a correspondent for MIMAR, is concerned with creating a new indigenous architecture for his country.

Illustrations courtesy of H. Hamad.

Figure 19
Alribat Housing, Amman, Jordan.

Source: MIMAR 28.

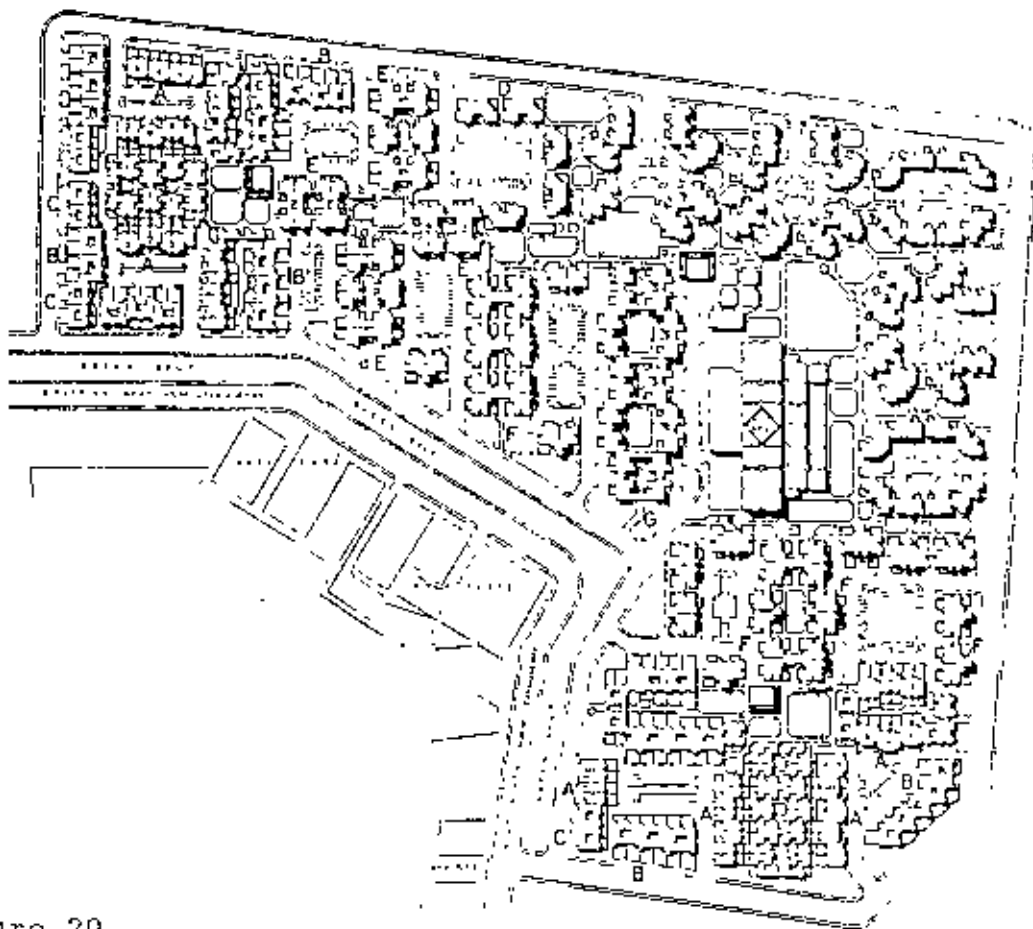


Figure 20
Asian Games Village, New Delhi,

Above: The Asian Games housing consists of 500 flats and 200 town houses, in two to four storey buildings, having a density of 28 units per acre. The housing surrounds the present dining complex which will later be converted into a commercial and residential block.

The buildings are clustered to form mohallas or neighbourhoods, each with between sixteen and thirty-six dwellings. A central pedestrian spine, modelled on traditional gatis, interconnects the clusters. Pedestrian and vehicular access to housing is kept segregated but linked for convenience. Car parking is set out off the peripheral roads.

Right: The above drawing of a typical cluster shows how the houses are designed as interlocking units, usually in a block of four to six flats.

Each cluster has its own integrity, being defined by large darwazas or doorways, which have been a feature of old city quarters in northern India. In the long term, it is hoped that such clusters will develop as own industry.

The houses and roof terraces often overlook the street (gatis) and the communal courtyard, creating a sense of participation among residents, or what the architect calls "the theatre of the street."

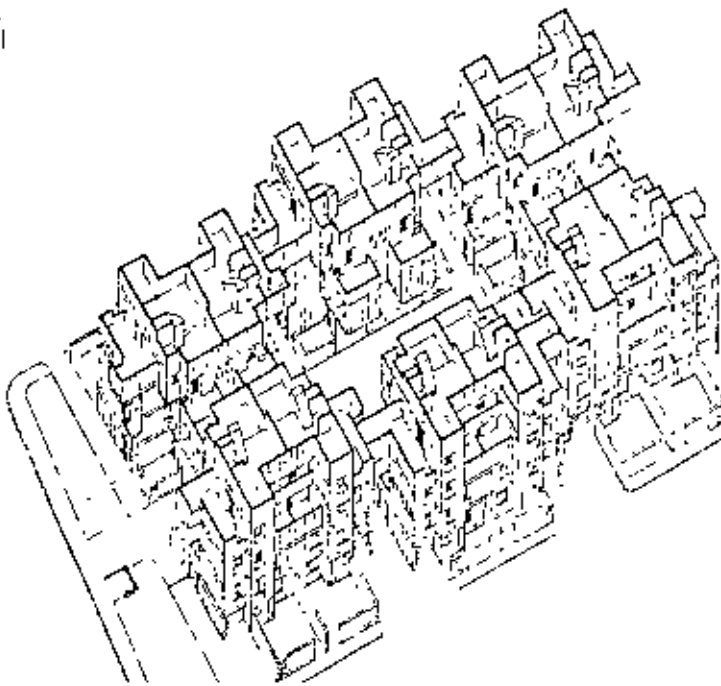
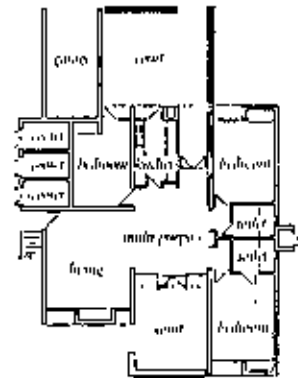
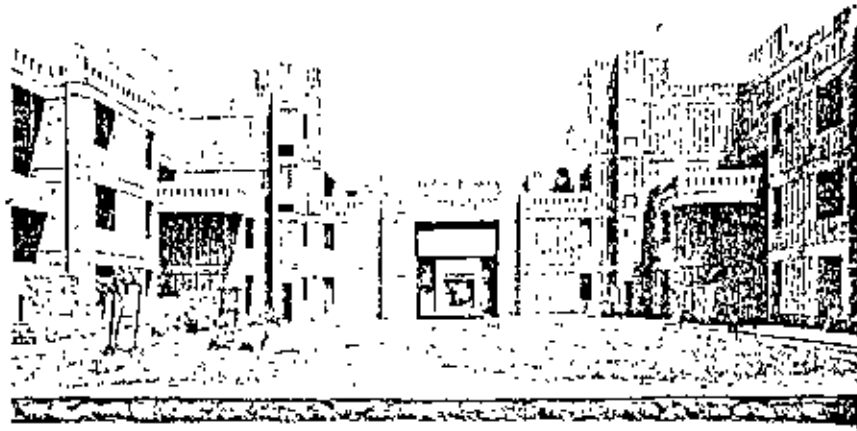
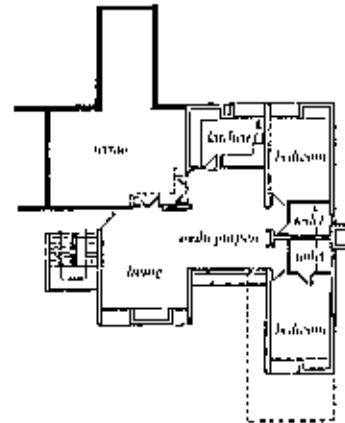


Figure 21
Asian Games Village, Cluster of Houses

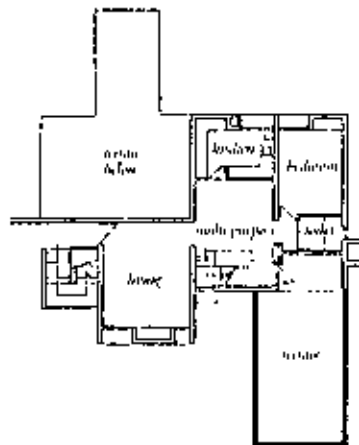
Source: MIMAR 7



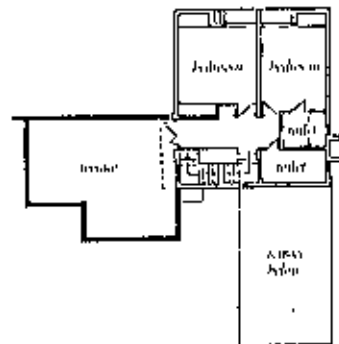
Type G1 Ground floor plan



Type G2 First floor plan



Type G3 Second floor plan



Third floor plan

Type 'G' Housing

Top: Successive courtyard in a type 'G' block illustrate the linear axial planning of the mahallas.

Top, right: Details of a gateway.

Above: Type 'G' Housing is four stories with a three bedroom flat on the ground floor, a two bedroom flat on the first floor and a three bedroom duplex unit on the top two floors. Each unit has its private open space at a courtyard or terrace.

Figure 22
Asian Games Village,

Source: MINAR 7

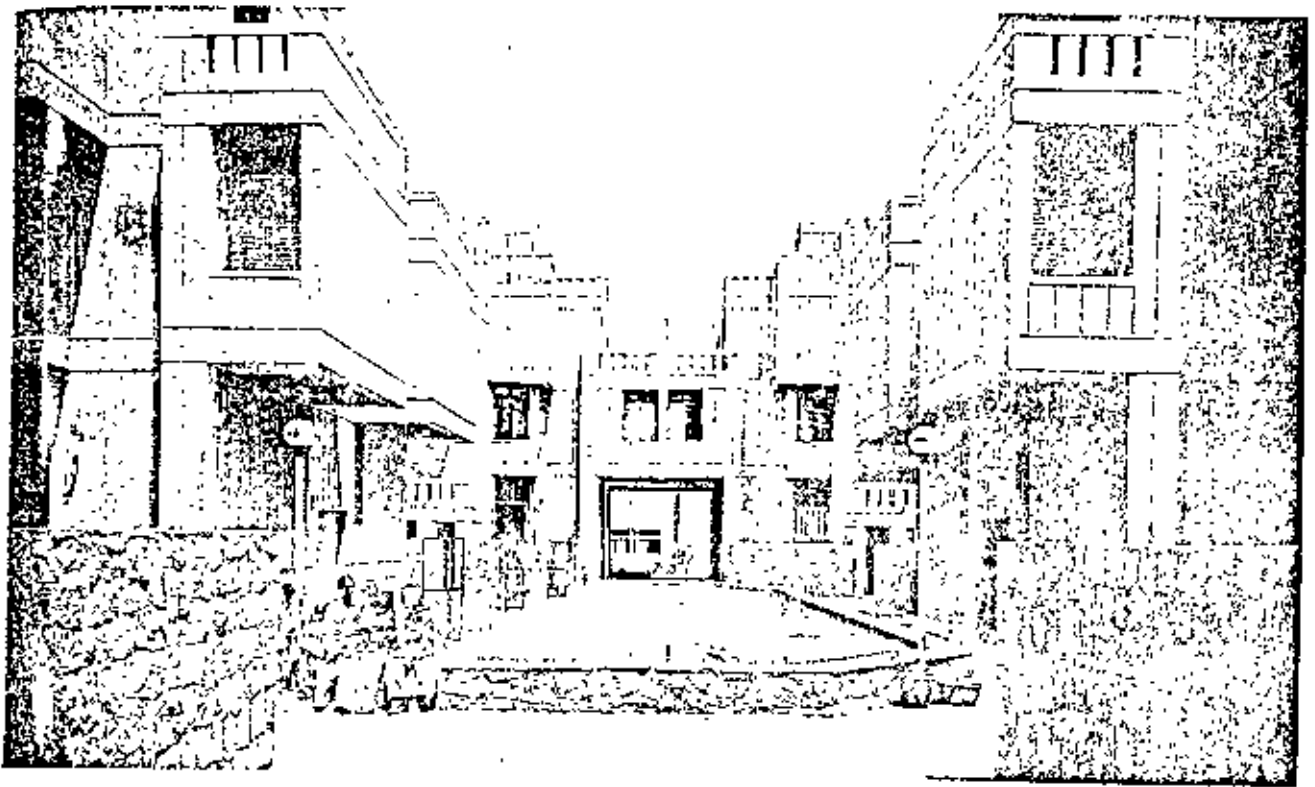
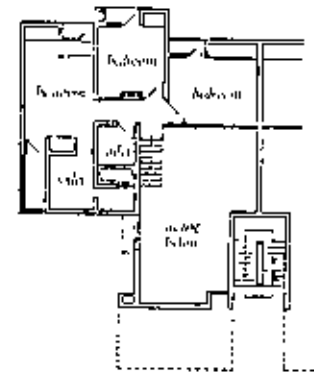
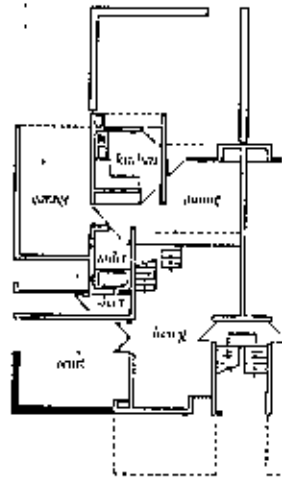
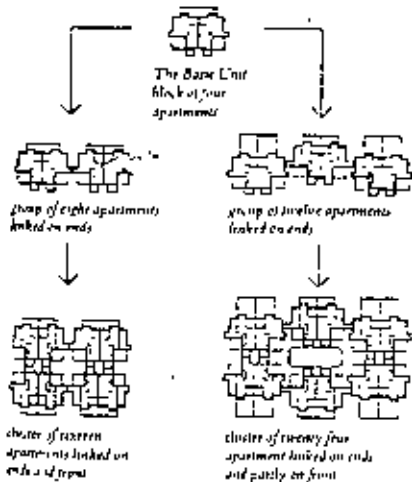


Figure 23



Type 'E' Housing

Top: View of one of the enclosed courtyards of a type 'E' unit block. The building overhangs provide shade for the pedestrian pathway. To the rear is one of the darwazas, which defines the boundary of this small mohalla.

Above: A typical housing unit block is so designed that it can be linked on sides and front to create clusters having a variety of enclosed spaces.

Right: The Type 'E' unit rises four storeys and consists of two duplex flats each having three bedrooms.

Type E1 Ground floor plan

Mezzanine floor plan

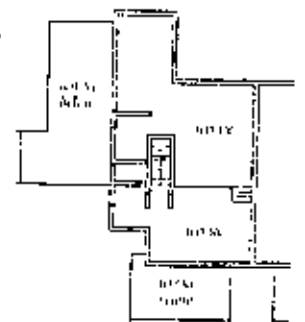
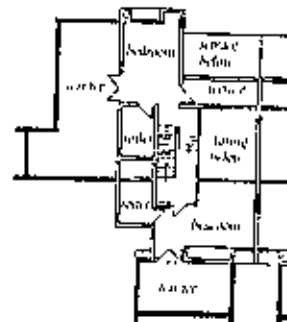


Figure 24
Asian Games Village,

Source: MIMAR 7

Type E2 First floor plan

Second mezzanine floor plan

Terrace plan

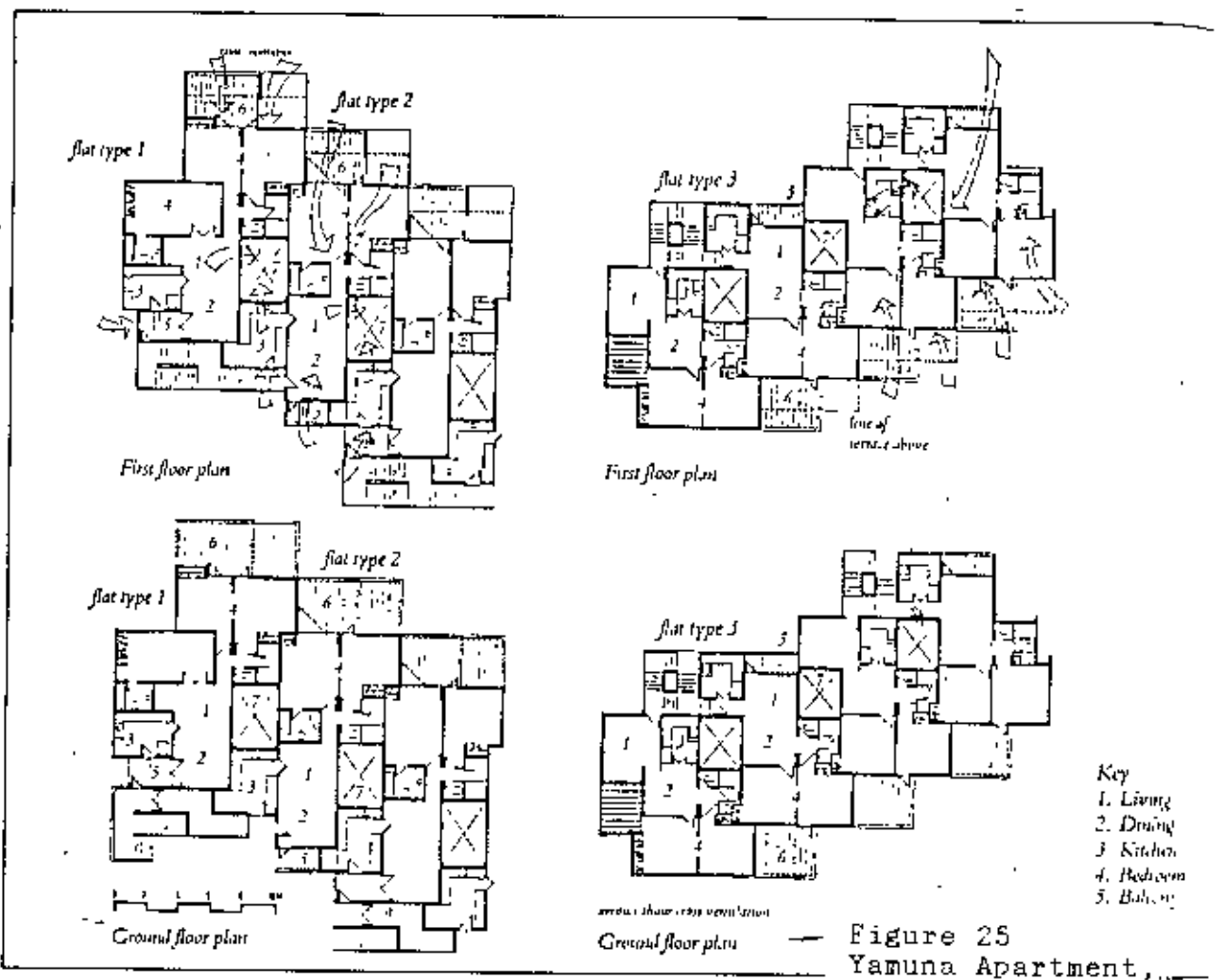


Figure 25
Yamuna Apartment, ...

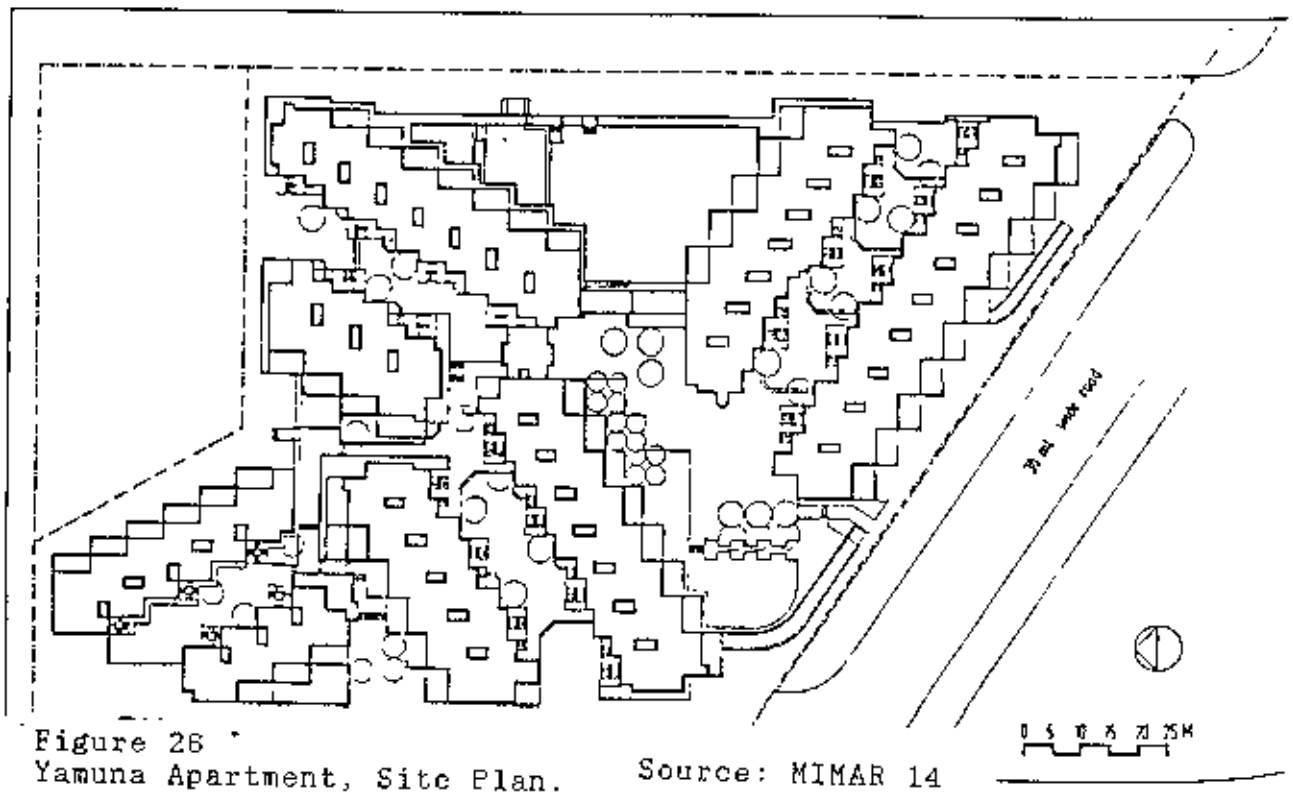


Figure 26
Yamuna Apartment, Site Plan.

Source: MIMAR 14

EXAMPLE 7:

HOLLABRUNN HOUSING, AUSTRIA:

In this project the architects developed a set of useful techniques to assist future users in designing their individual dwellings. It was found that the participants interest in the building design was so great that it grew to encompass much more than apartment layout. Prospective users become actively involved in issues of orientation, fenestration and views, selection of mechanical systems, the design of collective facilities and the quality of construction etc.

The objective of participation by future dwellers in the planning of their homes was to make housing more democratic. User must have the right to participate in design with architects and planners and to abandon the role of mere consumers. By this process, the dwelling loses much of its character as a commodity and the user participates in determining its economic value. The project had the methodology of open planning. In this project, the users were able to make the following decisions:

1. Subdividing the primary structure into individual dwellings. The outer shape of the dwellings was determined by the users.
2. Size of dwellings. As the users could determine the location of facades within certain limits, the size of

dwellings could be tailored to individual needs without interfering with the neighbouring apartments.

3. Subdivision of dwellings into rooms. The construction system permitted almost any room layout.
4. Organization of the facade. By means of a number of different facade elements that could be combined in any order, users could match the facades of dwellings to needs of floor plans.

The completed project consists of three buildings, each 51 m long. Most dwellings are oriented east to west. Their size varies from 38 to 150 m². Each building has three floors. Windows were provided in the east and west facades only.

About 70% of the units can expand outward without interfering with other dwellings. In this way the dwellings can be adjusted to family size or to increasing standards as the user's income increases.

This project shows that participation in creating and managing one's home increases the use value of a dwelling, and helps users to understand dwelling as a basic right - and not as alms granted by social welfare (Fig. 27 and 28).

EXAMPLE 8:

**HOUSING ON NURJAHAN, RAJIA SULTANA AND SALIMULLAH ROAD,
MUHAMMADPUR HOUSING ESTATE, MUHAMMADPUR, DHAKA.**

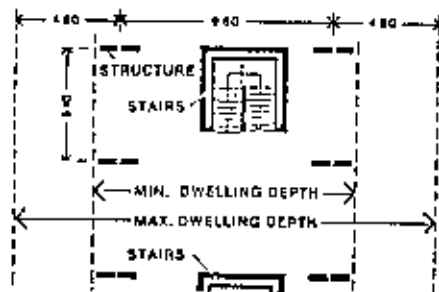
Housing on Nurjahan, Rajia Sultana and Salimullah road is part of Muhammadpur Housing Estate developed by Housing and Settlement Directorate in the 60's. Though it was a Core Housing at the beginning, now it is developing as a "Sites and Services" scheme. The plot sizes in this area are 1.75 katha or 117 m². The dimensions are 7.9m x 15.25m. The access roads are in grid-iron pattern and 9.15m wide, there is only 3.04m wide service lane between back of two plots. As these plots are less than 2 katha, attached row type housing has developed on these plots. There are 1.5m set-back space from the front boundary line but no set-back from side or back property line.

The condition of availability of Natural Light and Natural Ventilation are worse in these houses because of the long depth (15.25m) and comparatively smaller width (7.9m) of the buildings and also because of only 3.04m gap between back to back buildings. But this example shows that if "Building Regulations" permit it is possible to develop a attached row type housing on a "Sites and Services" scheme. There is no problem in the construction process.

Influence of Participation on the Design of the Project

Before the participation process started, the original concept of planning envisaged long buildings with a consistent east-west orientation and with "open" structural walls. Although we knew that the north and south sides could have had windows as well, we preferred closed end walls to achieve a clear planning concept and to give all dwellings the same status. So windows were provided in the east and west facades only. This decision was supported by clear physical requirements—that each dwelling should be surrounded by heavy construction elements with good insulating properties.

The basic design also provided a uniform supply system. The internal staircases were surrounded by U-shaped chases to which service could be con-

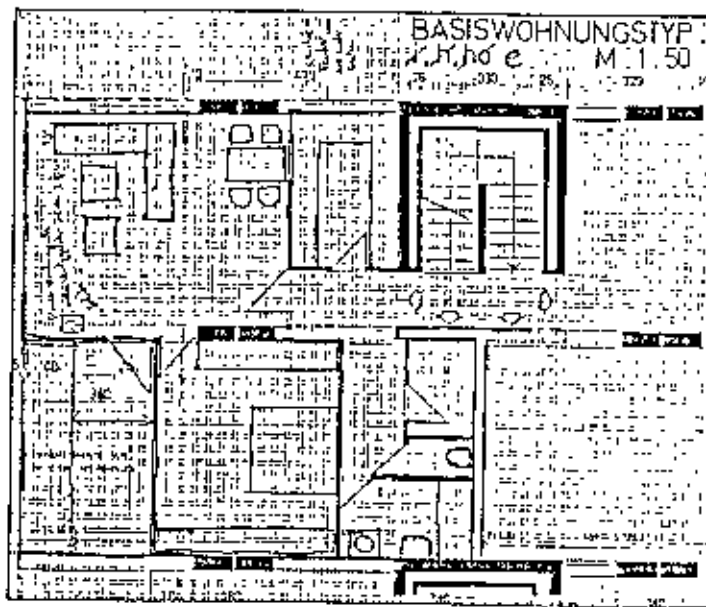


12. Basic building plan provided by the architects.

nected directly. This would have produced only interior bathrooms and kitchens. Both concepts had to be abandoned as soon as the future users started participating in the planning.

Twenty-nine out of 34 users wanted to have daylight in their kitchens. In the dwellings at the north and south ends of the buildings, most kitchens got windows in the end elevations. In some cases, even living rooms were shifted into the "dark zone" and bathrooms ended up in areas we had intended to be sleeping rooms, and vice versa.

These are just a few examples, but the users had a great number of wishes related to nearly every sphere of planning and included matters like quality of construction, heating systems, construction costs and schedules, and the design of areas of joint use. The prospective dwellers expressed their feelings very vigorously and even threatened to find other dwellings if



their wishes were ignored. Within the given technical and financial possibilities, we managed to satisfy most of them.

When construction got into the final phase of interior work, the interest of the future users in their new homes became so strong that they actually hindered the progress of work on the site by their constant visits. The problem was solved by introducing a weekly "consulting hour for users" which

13. One Family's apartment sketch

14. Overall model showing unit types, construction phasing, and occupancy progress.

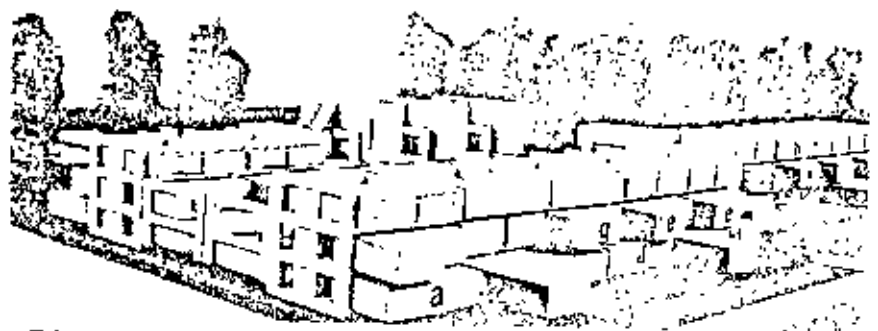


Figure 2:
Hollabrunn Housing, Austria.

Source: The Scope of Social Architecture.



Figure 28
 Hollabrunn Housing, Stages in Development.
 Source: The Scope of Social Architecture.

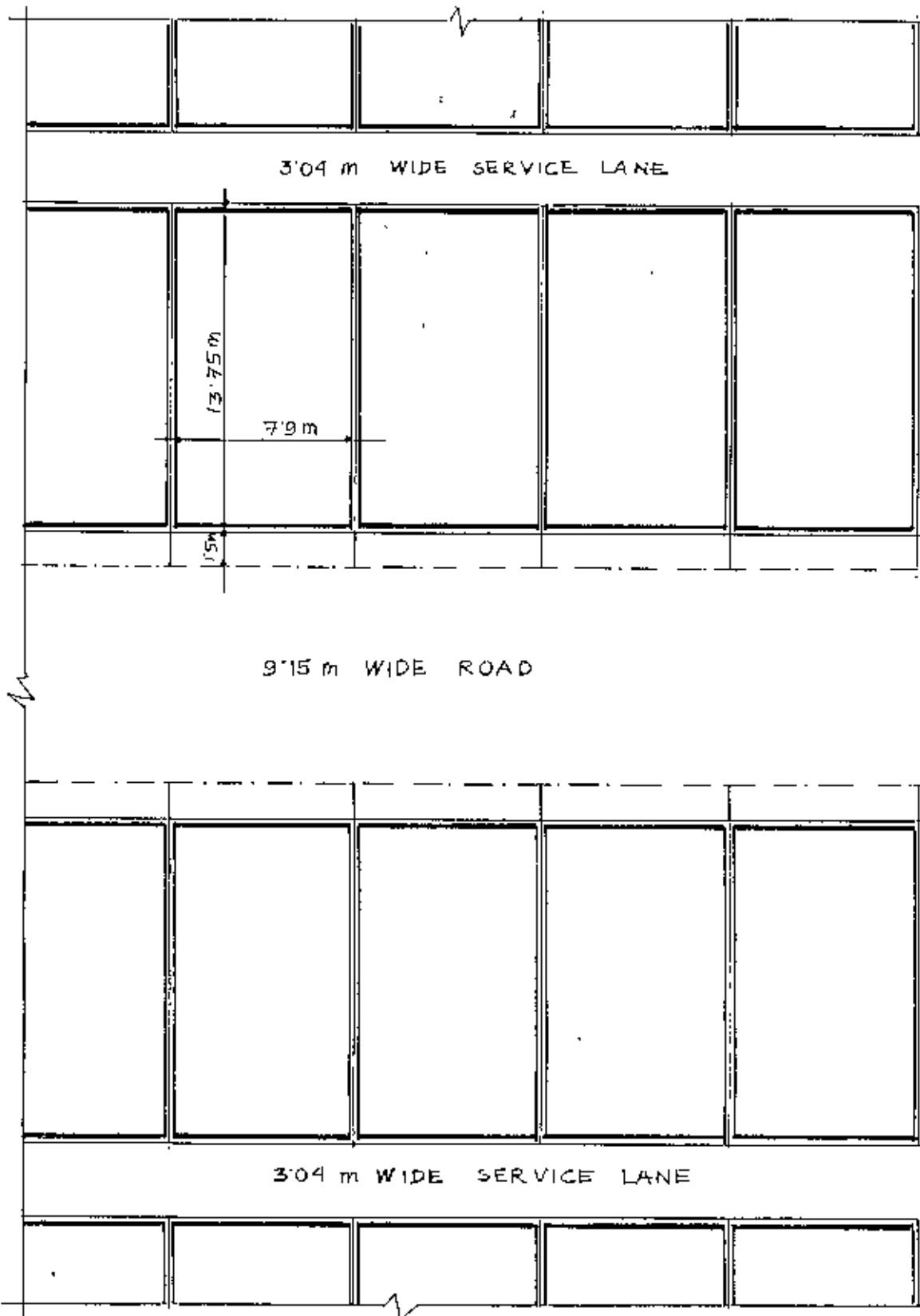


Figure 29
 Housing, Nurjahan Road, Mohammadpur.



Figure 30
Housing, Nurjahan Road, Mohammadpur.

CHAPTER 5: POSSIBLE ALTERNATE SOLUTIONS:

5.1 DWELLING UNIT LEVEL:

In existing situation, we have seen that at dwelling unit level, all the houses do not get adequate natural ventilation and adequate natural light because of less building to building gap. Also the privacy of houses is hampered because of only 2.5 m gap between two adjacent buildings.

To achieve natural ventilation and natural light, we have to increase the distance between buildings and to achieve privacy also, we have to increase the distance or should not keep any openings where buildings are closer. If we keep the same density level, it is not possible to increase the distance between buildings without joining the buildings at some part.

And also from the study of relevant literature and examples we get the idea that to achieve better "Built Environment" at this density, row housing might be the solution.

We have taken part of Taj Mahal Road and part of Sector-4 of Uttara Model Town and part of Nobodoy Housing Society for our study, In our study area we have following plot sizes - 2.5 katha or 167 m^2 (9.15m x 18.3m) ; 3.88 katha or 260 m^2 (12.20m x 21.3m) ; 4 katha or 267 m^2 (13.75m x 19.5m) and 5 Katha or 335 m^2 (15.25m x 21.85m)

Now let us see what happens if we do not keep any side clearance between buildings. On 2.5 Katha or 167 m^2 plot if we want to get same Building Coverage Area (BCA) of 101 m^2 and do not keep any side clearance the depth of the building would be 11.12m. Now if we keep the same front clearance of 1.5m, possible back side clearance would be 5.65m. So the gap between two buildings at back side at this plot size comes to 11.30m (Fig. 31).

Similarly, on 3.88 Katha or 260 m^2 plot if we want to get same Building Coverage Area (BCA) of 173 m^2 and do not keep any side clearance the depth of the building would be 14.18 m. Now if we keep the same front clearance of 1.5m possible back side clearance would be 5.5m. So the gap between two buildings at back side at this plot size comes to 11.0m (Fig.32).

On 4 Katha or 287 m^2 plot if we want to get same Building Coverage Area (BCA) of 178 m^2 and do not keep any side clearance the depth of the building would be 12.95m. Now if we keep the same front clearance of 1.5m possible back side clearance would be 5.05m. So the gap between two buildings at back side at this plot size comes to 10.1m (Fig.33).

Similarly, on 5 Katha or 335 m^2 plot if we want to get same Building Coverage Area (BCA) of 224 m^2 and do not keep any side clearance the depth of the building would be 14.70m. Now if we keep the same front clearance of 1.5m possible back side

clearance would be 5.75m. So, the gap between two buildings at back side at this plot size comes to 11.50m. This possible gap between two buildings is shown in figure 34.

So we see that if the existing set-back rules are changed even within existing sub-division and plot-layout, Built Environment at Dwelling Unit Level could be improved (Figure 35).

5.2 HOUSING ENVIRONMENT LEVEL:

At Housing Environment Level we have seen that there is problem of thorough traffic, problem of creating hierarchy of space, there is no provision for pedestrian traffic, no well thought out grouping or clustering of houses and in existing pattern there is no scope for creating a urban fabric.

From literature study and examples it is evident that this type of road net-work and plot division which is being done in our country is not in today's practice for making better housing environment. In residential developments the access roads might be cul-de-sac or loop roads, there should be separate provision for pedestrian traffic, there should be provision for clustering of houses etc. for a better housing environment.

From literature study, examples and observations it is clear that if we can avoid thorough traffic and can make cul-de-sac or loop roads, 6.0m wide road is enough for access road to the property.

Considering these factors one schematic drawings have been developed with same plot density which is shown in Figure 36. In this schematic drawing the loop access road is kept 6.0m wide. The details of this access road is shown in the figure 37.

From schematic drawings it is evident that we can develop same area with loop roads and with provision for pedestrian traffic keeping same dwelling density. But the advantage in this layout is, all the plots are north-south oriented, there is no problem of thorough traffic at the same time we could provide pedestrian path.

These schematic diagrams are just examples, but for a practical problem for a particular new residential development, the planners should have the advantage of making solutions for that particular area.

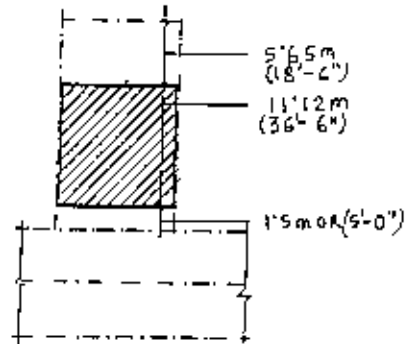
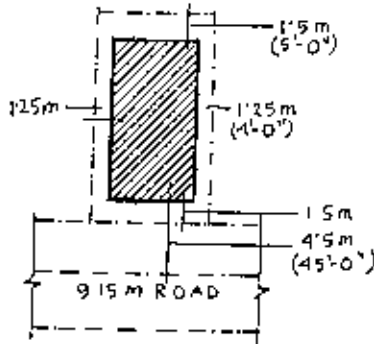
So we can conclude that a relative improvement of Built Environment at housing environment level can be achieved through proper planning of entire community.

PLOT SIZE: 167m^2 [2.5 KATHA]

DIMENSIONS: $9.15\text{m} \times 18.3\text{m}$
 $30\text{-}0'' \times 60\text{-}0''$

WITH SAME BUILDING COVERAGE AREA OF 101m^2 AND WITHOUT ANY SIDE CLEARANCE DEPTH OF THE BUILDING 8.112m OR $36\text{-}6''$

EXISTING SETBACK RULE



MAXIMUM POSSIBLE BUILDING COVERAGE AREA: $6.65\text{m} \times 15.3\text{m} = 101\text{m}^2$ OR 1086SFT
 BUILDING COVERAGE RATIO [BCR] = $\frac{101}{167} = 61\%$

WITH SAME FRONT CLEARANCE: 1.5m OR $5\text{-}0''$
 POSSIBLE BACK CLEARANCE: 5.65m OR $18\text{-}6''$
 SO GAP BETWEEN TWO BUILDINGS: 11.30m

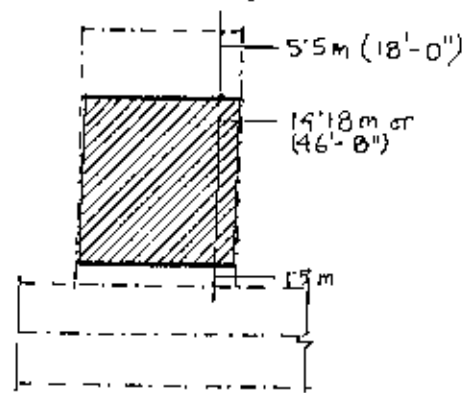
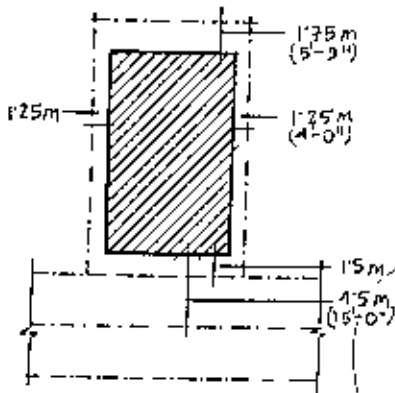
Figure 31

PLOT SIZE: 260m^2 [3.88 KATHA]

DIMENSION: $12.20\text{m} \times 21.3\text{m}$
 $40\text{-}0'' \times 70\text{-}0''$

WITHOUT SIDE CLEARANCE POSSIBLE SET-BACK RULE:

EXISTING SETBACK RULE



MAXIMUM POSSIBLE BUILDING COVERAGE AREA: $9.70\text{m} \times 18.05\text{m} = 175\text{m}^2$ OR 1883SFT
 BUILDING COVERAGE RATIO [BCR] = $\frac{175}{260} = 68\%$

WITH SAME BUILDING COVERAGE AREA OF AND WITHOUT ANY SIDE CLEARANCE DEPTH OF THE BUILDING: 14.18m ($46\text{-}8''$)
 WITH FRONT CLEARANCE OF: 1.5m
 POSSIBLE BACK CLEARANCE: 5.5m
 GAP BETWEEN TWO BUILDINGS: 11m ($36\text{-}0''$)

Figure 32

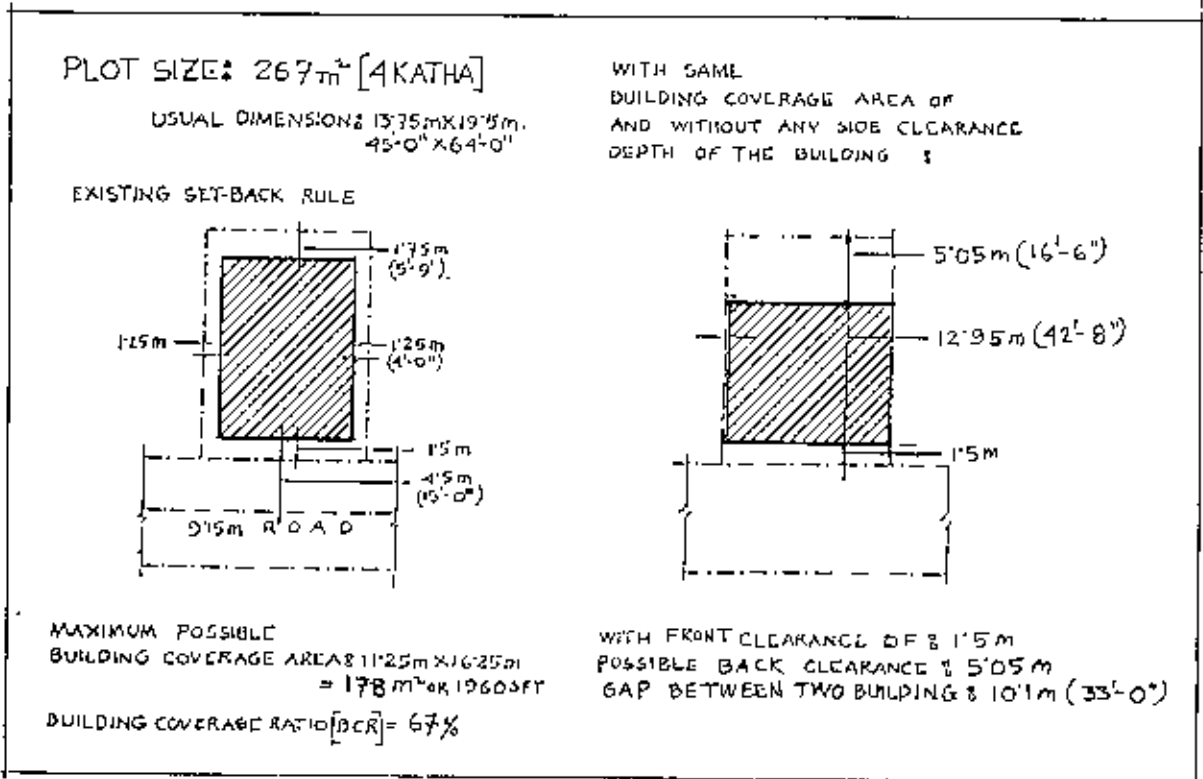


Figure 33

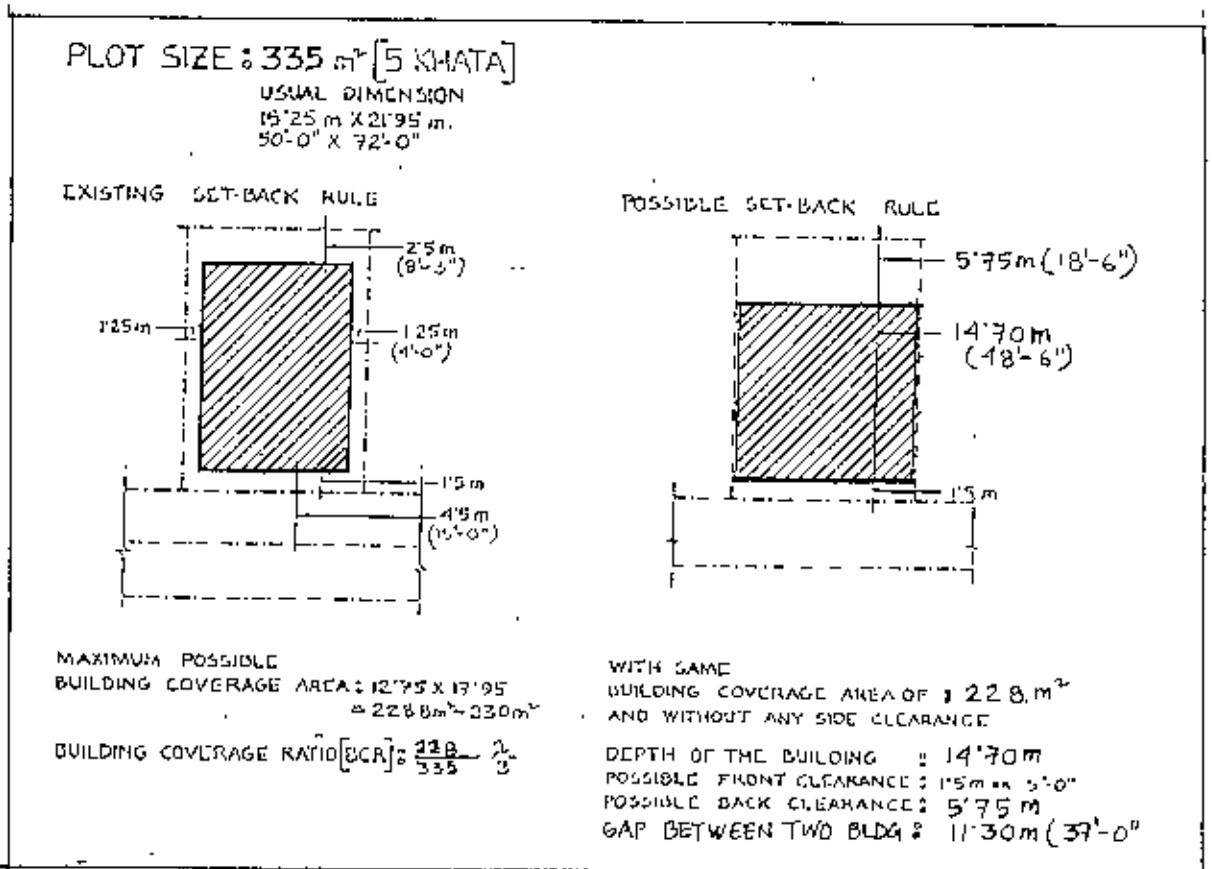


Figure 34

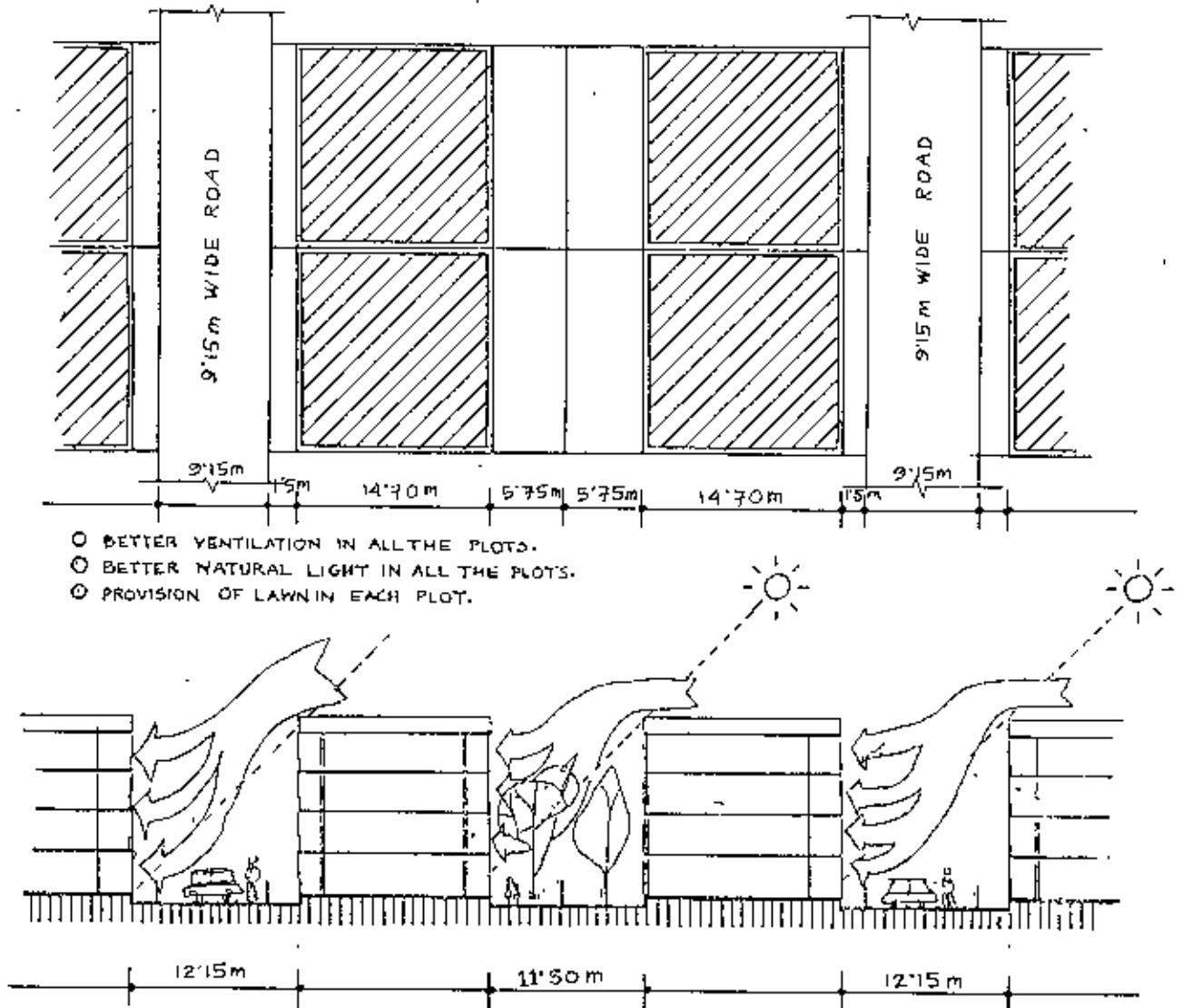


Figure 35
 Alternate possible arrangement of buildings on 5 katha plots,
 Plan and Section.

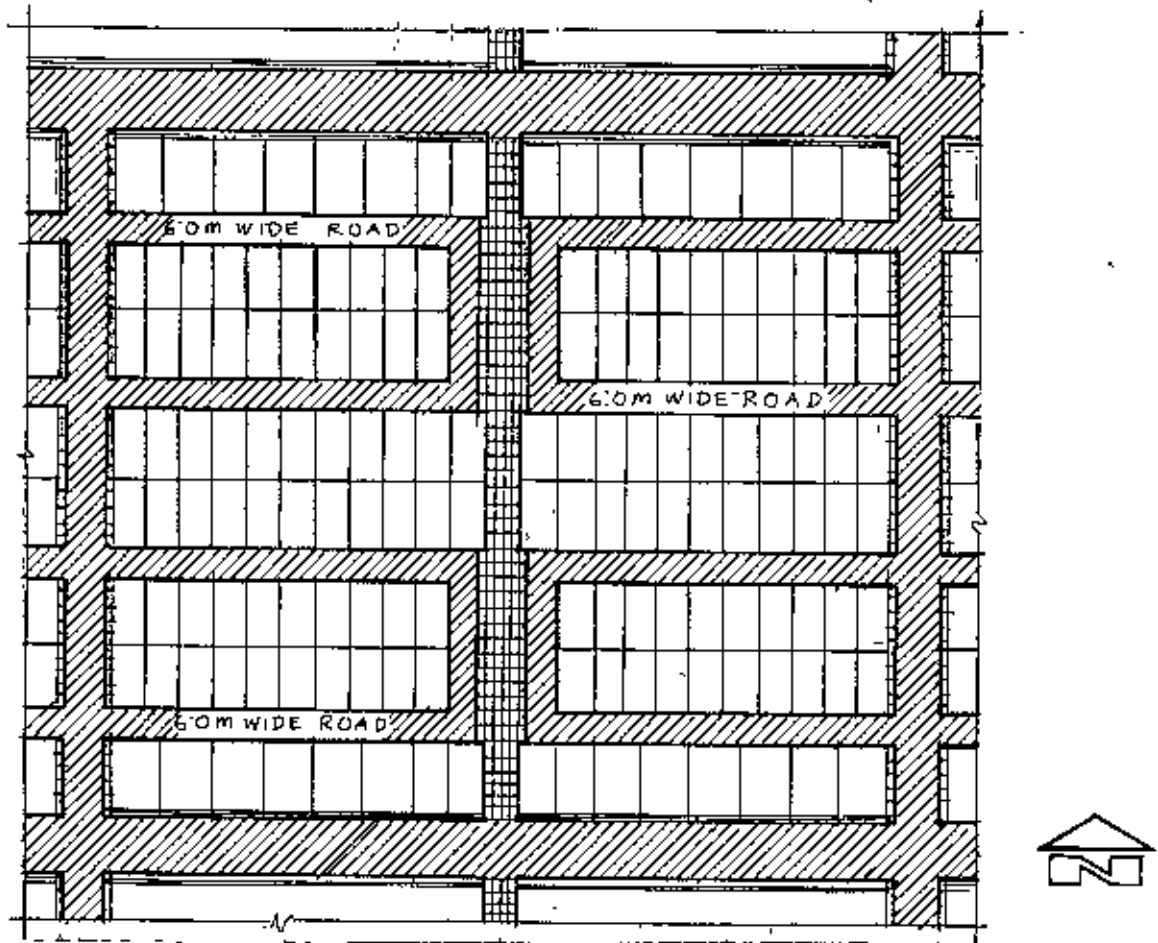


Figure 36
Alternate possible plot layout, Loop Access Road.

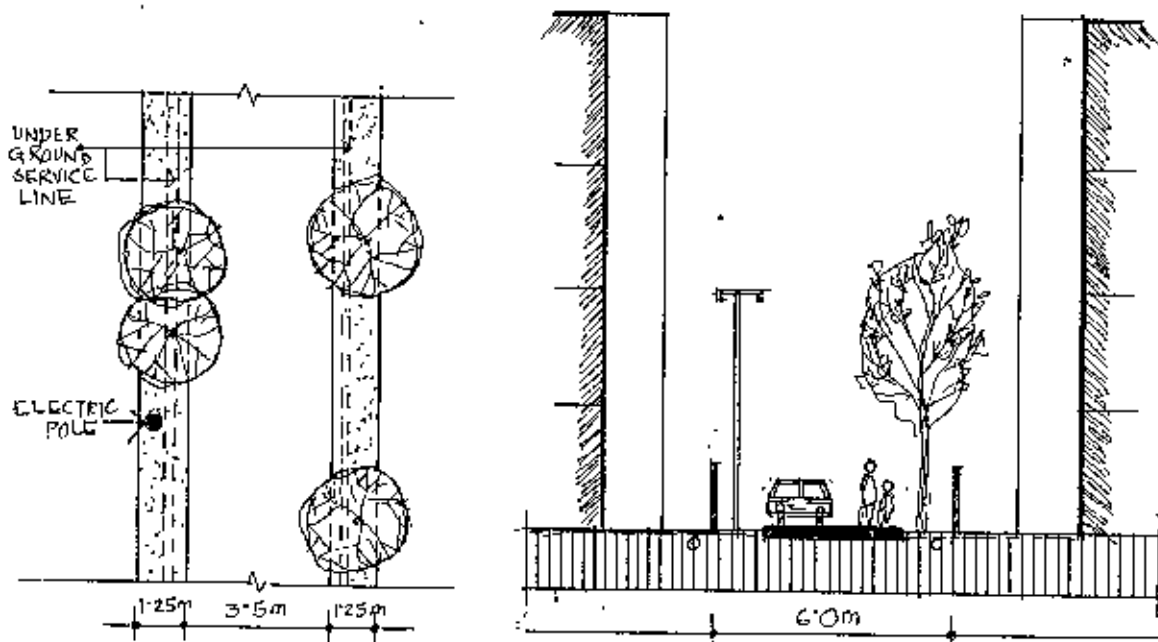


Figure 37
Details of Access Road, Plan and Section.

5.3 DETAILS OF CLEARANCE REGULATIONS AND FLEXIBILITIES AT DWELLING UNIT LEVELS:

When proposed building is fixed on the plot the "Depth of the Building" is specified only. But to improve the interior arrangement of the house, to have some flexibilities and at the same time to have some regulations in the housing environment, some compulsive rules in detail layout plan is required. Figure 38 shows some proposed detailed regulations and flexibilities at dwelling unit level:

1. "Minimum Building Depth" and "Maximum Building Depth" for specific plot would be specified. Here the "Minimum Building Depth" would be 6.0m at the centre. "Maximum Building Depth" would vary according to plot size.
2. The "Front Building Line" would be at a distance of 3.0m from the property line. (As road width is reduced to 6.0m from 9.15m in case of public sector housing the property line automatically increases by 1.5m at the front.)
3. For plots upto $267m^2$ (4 katha) the "Back Building Line" would be at a distance of 5.5m from property line. For plots upto $335m^2$ (5 katha) the distance would be 6.0m.
4. "Maximum Building Lines" would have the flexibilities of 1.5m increase. This flexibility would be allowable upto $1/3$ of the width of the plot, provided if any building takes, this advantage it will have to reduce the same area

from immediate 1.5m of the "Maximum Building Line". These increased areas would be called as "Bonus Area".

5. Any set-back from side line would be at least 1.25m which would be allowed only upto "Minimum Building Lines".
6. The proportions of width to length of the plots would be within 1:1.5 to 1:2.

Taking into consideration these proposed regulations and flexibilities, plan of one residential building has been solved on a 267m² plot which is shown in figure 39. From this example it is seen that all the problems at dwelling unit level could be avoided in the proposed plan. When this proposed plan is compared with a building plan with existing regulations (Figure 40 and 41) it is seen that the "Built Environment" at dwelling unit level with proposed regulations is much better than that of existing one.

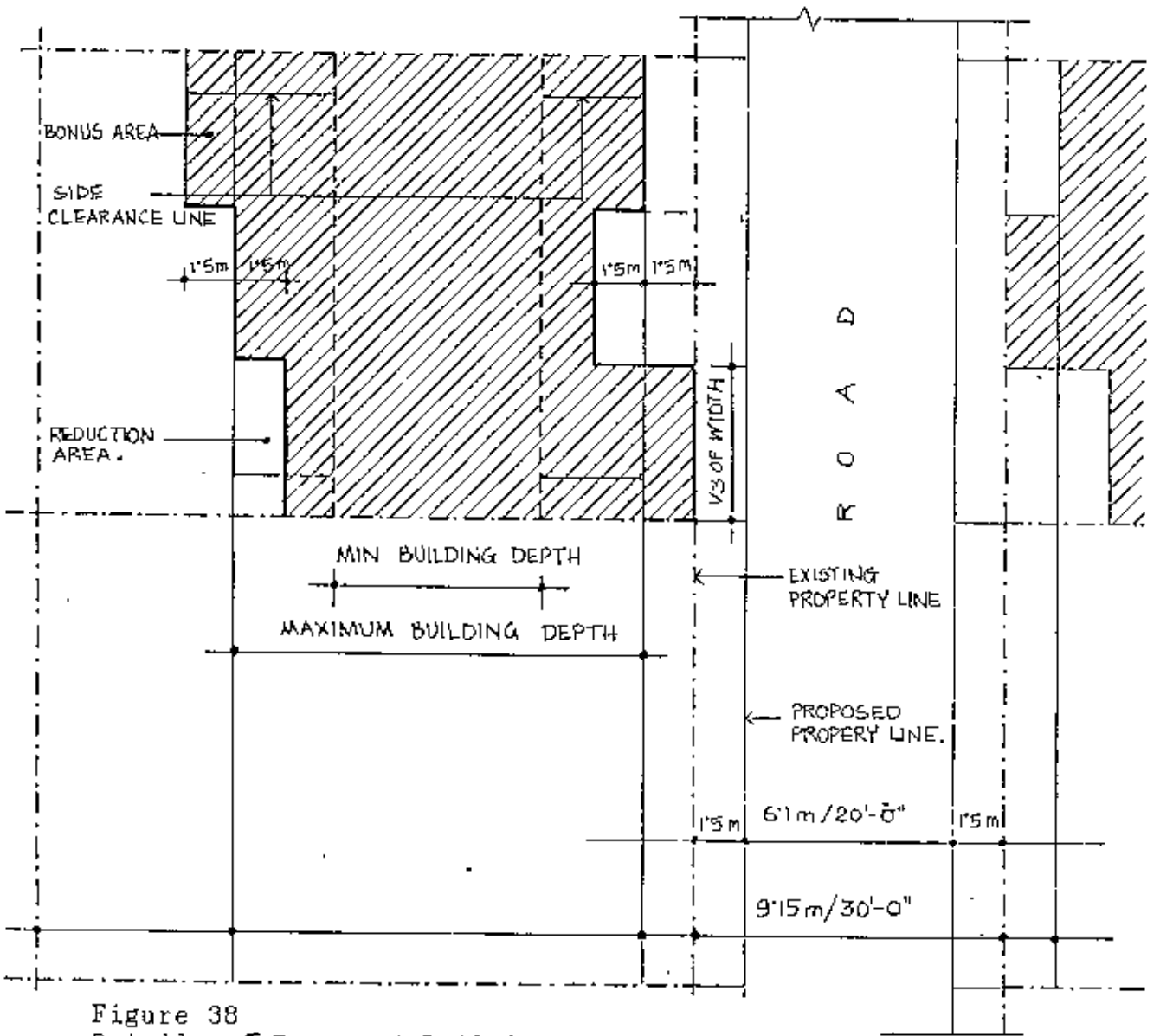
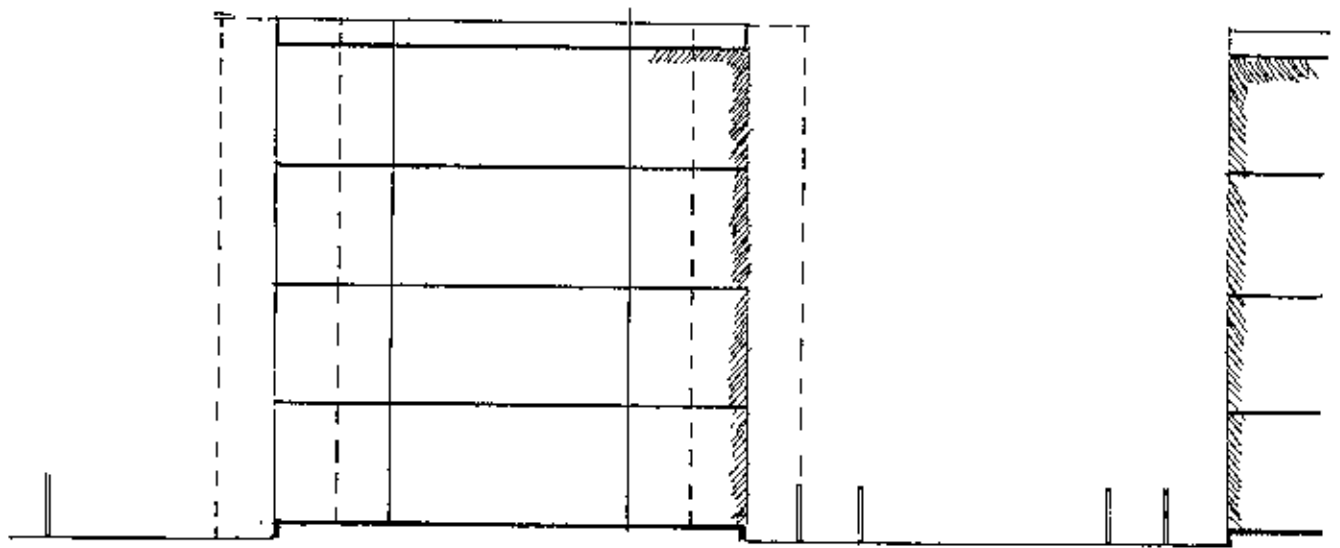


Figure 38
 Details of Proposed Building Regulations.

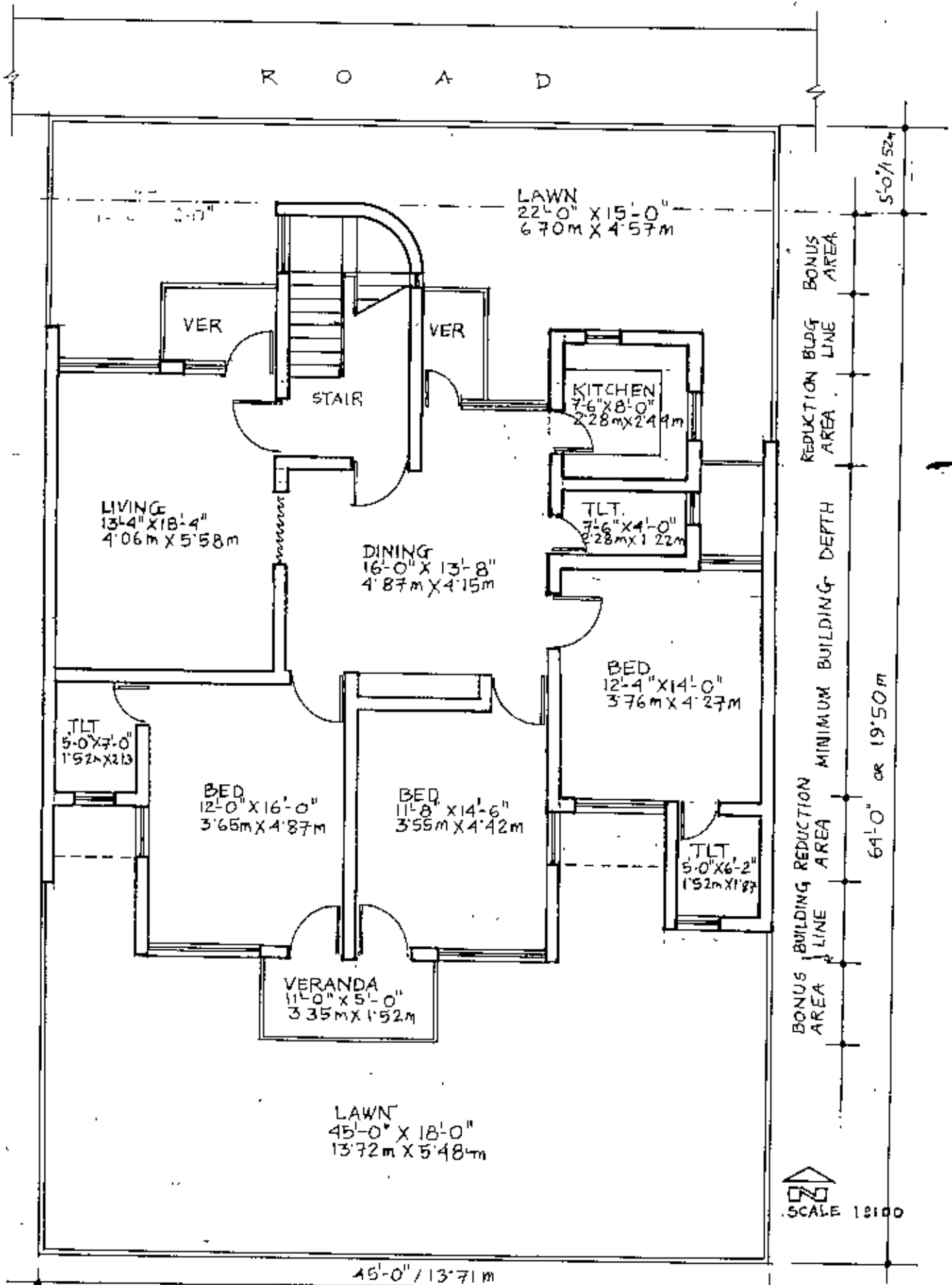


Figure 39 | Plan of a House with Proposed Building Regulations.

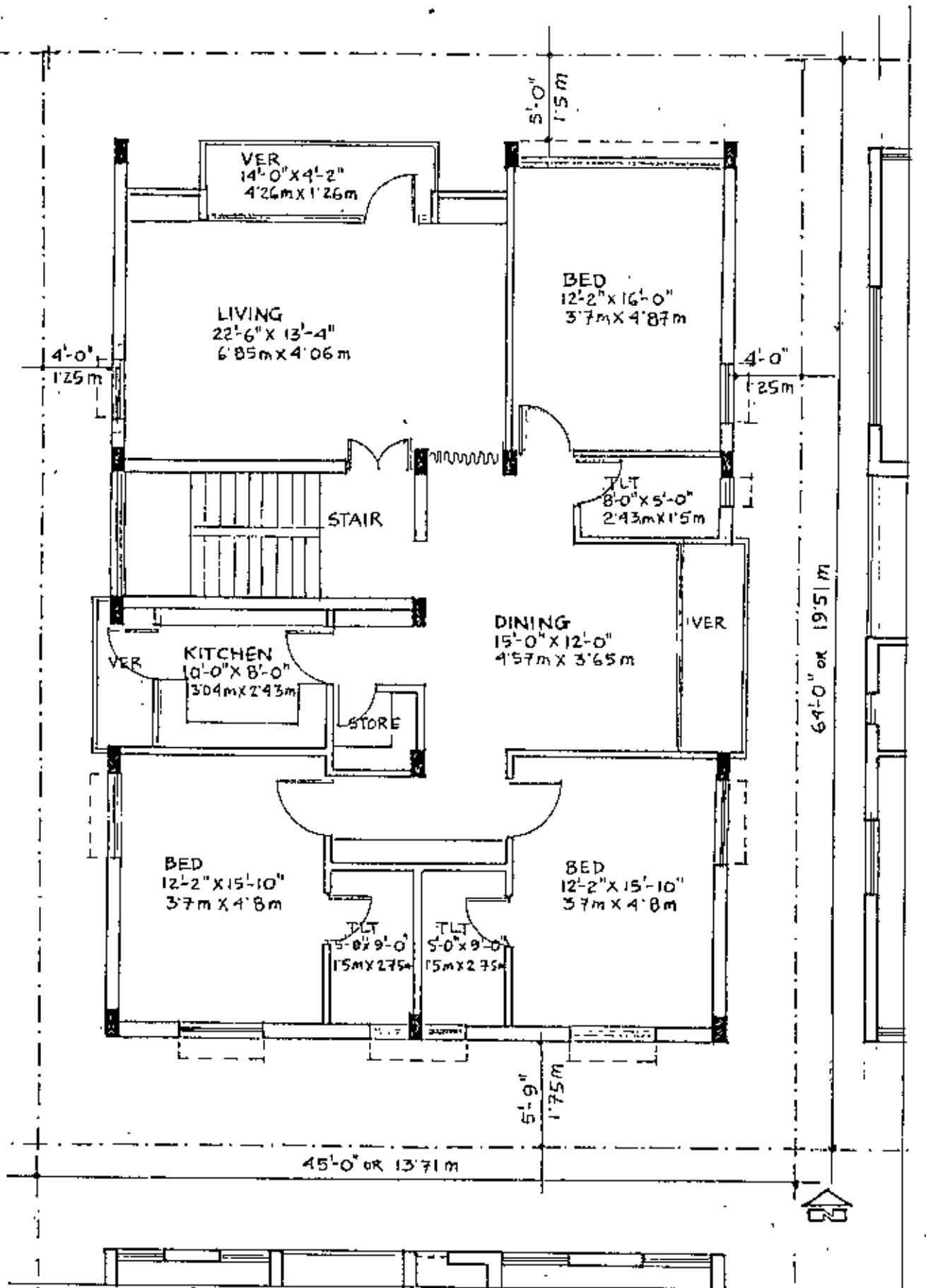


Figure 40 Plan of a House with a Existing Building Regulations.

87518

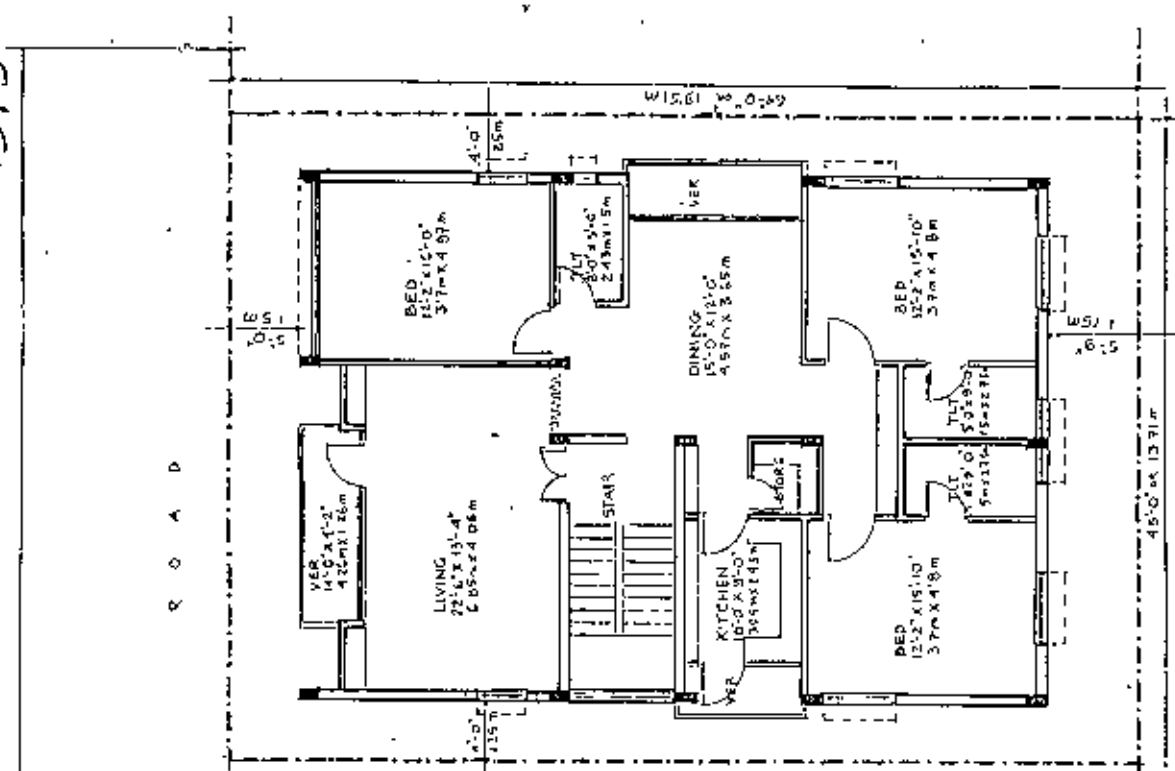
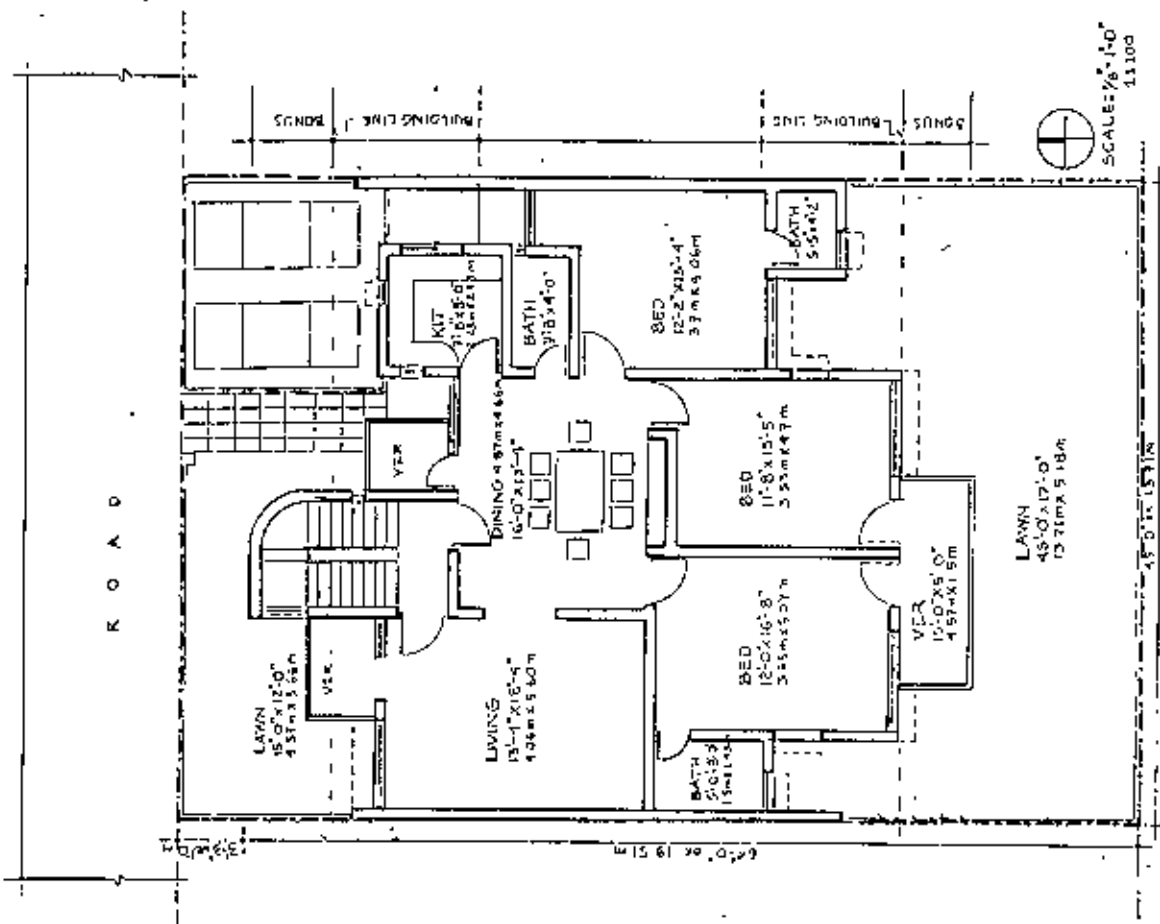


Figure 41 Comparison between Houses with Existing and Proposed Regulations

CHAPTER 6: RECOMMENDATION AND CONCLUSION

6.1 RECOMMENDATION:

DWELLING UNIT LEVEL

1. In "Planned New Residential Communities" provisions should be made for Row-Housing upto 335m^2 (5 katha) plot, instead of existing 133m^2 (2 katha) plot.
2. Depth of the "Row-Houses" should be 13.50m maximum.
3. "Front Building Line" should be at a distance of 3.0m from front property line.
4. "Back Building Line" should be at a distance of 5.5m from back property line for plots upto 267m^2 (4 katha) and 8.0m for plots upto 335m^2 (5 katha).

HOUSING ENVIRONMENT LEVEL

1. All Access Road to the plots should be either Loop Road or Cul-De-Sac road.
2. Width of these Access Roads should be 6.0m.
3. All the plots below 335m^2 (5 katha) should be North-South Oriented.
4. Proportions of the Plot Frontage to Plot Depth should be within 1:1.5 to 1:2.
5. In "Planned New Residential Communities" separate provisions should be kept for pedestrian traffic.

6.2 CONCLUSION:

With the increase of population in the cities there will be need for more Residential Communities to meet the increasing housing demand. It is obvious that under the existing socio-political conditions of the country more "Sites and Services" projects will be taken to meet the increasing housing demand. In a land and money scarce country like Bangladesh steps must be taken to optimize the use of all the resources. At the same time the "Built Environment" in the "Residential Communities", should not be overlooked, Priorities must be given to explore the possibilities of planning techniques to achieve a better housing environment. The recommendations that are suggested in this study could be a help in this regard.

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ANNEXURE: 1

Building Regulations of Rajdhani Unnayan Kartipakkha:



রাজধানী উন্নয়ন কর্তৃপক্ষ

ইमारত নির্মান বিধিমালা

১৯৮৫

তফসিল নং ১

[বিধি ৬(২) প্রক্বে]

(ইমারত নির্মাণের ক্ষেত্রে পালনীয় শর্তাবলী)

সফ ১ : আবাসিক ইমারত

- (ক) কোন আবাসিক ইমারত উহার দিকটমতী রাস্তা বা গলির কেন্দ্র হইতে ৪'৫ মিটার বা সাইটের সীমানা হইতে ১'৫ মিটার (যদি বেশী হয়) দূরে নির্মাণ করিতে হইবে।
- (খ) ইমারতের আত্মপিত অংশের আরতন সাইটের ২/৩ অংশের অনিক হইবে না।
- (গ) প্রস্তাপিত ইমারতের পশ্চাতে সাইটের সীমারেখা বক্র হইলে অথবা একই সরল রেখায় প্রকথিত না হইলে ইমারতের পশ্চাতে যে পরিসাধ স্থান উন্মুক্ত রাখিতে হইবে তাহা গড় হিসাবে নির্ধারণ করিতে হইবে।
- (ঘ) ইমারতের পশ্চাতের ৬ পারশুর যে পরিমাণ স্থান উন্মুক্ত রাখিতে হইলে তাহা নিম্নরূপ তালিকা মোতাবেক নির্ধারণ করিতে হইবে :-

তালিকা

ক্রমিক নং	সাইটের আরতন	ইমারতের পশ্চাৎ দিকের সীমানা হইতে	ইমারতের দুই পারশুর সীমানা হইতে
১	দুই কাঠা পর্যন্ত	১'৫ মিটার	—
২	তিন কাঠা পর্যন্ত	ঐ	১'২৫ মিটার
৩	চার কাঠা পর্যন্ত	১'৭৫ মিটার	ঐ
৪	পাঁচ কাঠা পর্যন্ত	২'০ মিটার	ঐ
৫	পাঁচ কাঠার অধিক	৩ মিটার	ঐ

সফ ২ : বাণিজ্যিক এবং অন্যান্য ইমারত

- (ক) বাণিজ্যিক ইমারত উহার দিকটমতী রাস্তা বা গলির কেন্দ্র হইতে ৪'৫ মিটার বা সাইটের সীমানা হইতে ১'৫ মিটার (যদি বেশী হয়) দূরে নির্মাণ করিতে হইবে।
- (খ) প্রেসাঙ্গুহ, নিলগায়তন, বিপনী লিডন, অভ্যুদীণ কেলাঘর বা অনুরূপ কোন ইমারত নির্মাণের ক্ষেত্রে গাড়ী রাখার উদ্দেশ্যে প্রতি বিগ জন ইমারত ব্যবহারকারীণ জন্য একটি কনিয়া প্রতিটি গাড়ীর জন্য ২৩'০০ বর্গমিটার স্থান রাখিতে হইবে।

মফা ৩ : শিল্প প্রতিষ্ঠানের ইमारত

- (ক) শিল্প প্রতিষ্ঠানের ইमारত নির্মাণের ক্ষেত্রে "সাইট-সংলগ্ন কোন রাস্তা থাকিলে উহাদের মধ্যে প্রধান রাস্তার সীমানা হইতে ১'৫ মিটার অথবা সর্বোচ্চ কেন্দ্র হইতে ৪'৫ মিটার (বাহা বেশী হয়) দূরে নির্মাণ করিতে হইবে এবং সাইটের অন্যান্য সীমানা হইতে ১'০ মিটার স্থান উন্মুক্ত রাখিতে হইবে।
- (খ) অপ্রয়োজনীয় পদার্থ নিক্ষেপণ ও অপসারণের উপযুক্ত ব্যবস্থা রাখিতে হইবে।
- (গ) বর্ষণযোগ্য অগ্নিনির্বাপক ব্যবস্থা রাখিতে হইবে।

মফা ৪ : গ্যারাজ নির্মাণ

নিম্নবর্ণিত শর্তাদি গ্যারাজে ইमारত-সাইটের আংশিক উন্মুক্ত স্থানে গ্যারাজ নির্মাণ করা হইবে, যথা :—

- (ক) গ্যারাজের নিকটবর্তী রাস্তার আনুভূমিক উচ্চতা দৃষ্টে গ্যারাজ বা তৎসংশ্লিষ্ট নির্মাণ কাঠামোর উচ্চতা ২'৫ মিটারের বেশী হইবে না।
- (খ) সাইট-সংলগ্ন কোন জমির দিকে কোন জানালা রাখা হইবে না।
- (গ) ব্যক্তি হইতে সরাসরি গ্যারাজে প্রবেশের কোন ব্যবস্থা রাখা হইবে না। যদি এইরূপ ব্যবস্থা রাখা হয় তবে গ্যারাজটি রাস্তার নিকটবর্তী সীমানা হইতে অন্তত ১'৭৫ মিটার দূরে নির্মাণ করিতে হইবে।
- (ঘ) রাস্তা-সংলগ্ন কোন গ্যারাজ নির্মাণের ক্ষেত্রে উহার উচ্চতা ২'৫ মিটারের অধিক হইবে না এবং রাস্তা হইতে সরাসরি গ্যারাজে প্রবেশের কোন ব্যবস্থা রাখা চলিবে না।
- (ঙ) গ্যারাজটি এমনভাবে নির্মিত হইবে যেন উহা হইতে রাজ বা অন্যের জমিতে পানি নিক্ষেপিত না হয়।

মফা ৫ : গ্যারাজের উপর কক্ষ নির্মাণ

গ্যারাজের উপর কক্ষ বা অন্য কোন কাঠামো নির্মাণের ক্ষেত্রে নিম্নবর্ণিত শর্তাদি প্রযোজ্য হইবে, যথা :—

- (ক) গ্যারাজটি ইमारতের আংশিক উন্মুক্ত স্থানের মধ্যে অবস্থিত হইলে গ্যারাজের উপর কোন কক্ষ বা কাঠামো নির্মাণ করা হইবে না।

- (ক) প্যারালেল উপবৃত্ত কোন স্থান বা খোলা জায়গা বাঘালা বা কামকনি হিসাবে
 সাধারণতঃ এখনভাবে ব্যবহার করা যাইবে না যাহাতে পার্শ্ববর্তী জনির মালিকের
 একমতের ব্যাধাত ধরে, তবে একাধি ব্যবহার করিতে হইলে উক্ত স্থানে বা
 খোলা জায়গা ঘেরিমে ১'৭৫ মিটার উচ্চতাৰিশিষ্ট পর্দা দেওয়াল নির্মাণ কৰিতে
 হইলে।
- (খ) উক্ত কোন উঠিবার সিঁড়ি এখনভাবে নির্মাণ করা যাইবে না যাহাতে উহায়ে ফলে
 পার্শ্ববর্তী জনির মালিকের একমত ব্যাধাত হয়।

ফর্ম ৬ : সানশেড নির্মাণ ও ইমারত সম্প্রসারণ

- (ক) সাইটের আংশিক উন্মুক্ত স্থানে (খ) উপ-মফস উল্লেখিত সানশেড ব্যতীত
 অন্য কোন ধরনের সানশেড নির্মাণ অথবা ইমারত সম্প্রসারণ করা যাইবে না।
- (খ) ইমারতের দরজা বা জানালার উপরে সাইটের আংশিক উন্মুক্ত স্থানে নির্মাণ
 ০'৫ মিটার সানশেড নির্মাণ করা যাইবে।

