THE APPLICATION OF PLANNING STANDARDS IN
LOW COST - LOW INCOME URBAN RESIDENTIAL AREAS

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A Thesis submitted in part fulfilment for
the Degree of Master of Arts (Planning) in the
University of Nairobi.

June, 1978
Nairobi, Kenya.
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

Candidate

Gichuki Thogo

This thesis has been submitted for examination with my/our approval as University Supervisor(s).

Supervisor

Dr. Okulo Epak
ACKNOWLEDGEMENTS

This study would not have been successful without the assistance and co-operation of many people in several institutions whom I would like to thank:-

We had discussions and exchange of ideas with planners in the Physical Planning Department - Ministry of Lands and Settlement and Planners in the Town Planning Department - City Council of Nairobi. Special debt is owed to Mr. T. Kakunda, Planning Officer in Physical Planning Dept. for the enlightened discussions we held together.

I benefited from discussions with Mr. Arst, research fellow and architect planner from the Housing Research and Development Unit. The town planning officer at Thika Municipality, Mr. Madugha assisted me with base maps and general information on Thika.

The lecturers in the Dept. of Urban and Regional Planning, University of Nairobi offered useful advice in addition to their useful instructions throughout the course.

The Chairman, Mr. A. Subberkrishniah, in the Department of Urban and Regional Planning deserves special thanks for persuading the administration at Thika to allow me conduct the study there.

My two supervisors encouraged me and gave me good guidance. Mr. Erik Petersen was the first supervisor but he had to go before I finished this work. Dr. Okulo Epak took over and guided me towards the finish. He has been encouraging and understanding.

The residents of the study areas responded positively to the interviews.

Thanks are due to D. 'vaceera Macharia for constant inspiration.

Finally, thanks are to Mrs. Redemter Obwagi and Miss Eva V'anjohi, both of Physical Planning Department, for patiently typing this work.
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The neighbourhood unit as proposed by Clasence Perry in 1929.

Typical house: Majengo - Thika

Floor Plan & Elevation Rental Scheme - T.U.D.C.: Thika

Typical Floor Plan: Site and Service Scheme 6 - Thika

Typical Floor Plan: Site and Service Scheme - DANDORA

Typical Floor Plan: Site and Service Scheme - DAHDORA

Typical Floor Plan: Site and Service Scheme - DA1IDORA

Roads with proposed Landscaping

Paths with proposed Landscaping
Kenya is experiencing a rapid urbanization growth. The population increase is both in terms of natural growth and rural-urban migration. As long as urban centres continue to offer better facilities, more employment, better housing, better health services, etc., they will still attract people from rural areas. More than 40% of the country’s population is now living in urban areas.

Urbanisation itself is inevitable. A continued rate of urban growth is both a basic condition and an inherent consequence of socio-economic development. But as the urban growth takes place pressure is put on the already scarce urban resources: land is scarce and expensive, there are various activities claiming urban land; finance is also constrained and the supply of services becomes inadequate.

The major component land uses which determine urban structure are: residential use, commercial use, industrial use, recreational use, transportation use and institutional use. Together, these use groups form the basis upon which urban living revolves.
A balance in the allocation of urban space must be sought. This is where the planner comes in. It is the planner who has a role in evaluating physical space needs and establishing space standards which are vital to the successful operation of the planning process. His knowledge is useful here since he understands the regional relationships of various plan elements: he possesses ability to locate and select sites because of his special knowledge and familiarity with the general plan; furthermore he has knowledge of the means of co-ordinating projects effectively. The planner derives planning standards for the people he is planning for according to the community structure, life styles and pattern expected.

Residential use normally takes up the largest share of urban land. In our own experience its allocation among the income groups in terms of per capita land is very disproportionate: the low income groups live in high density over-crowded residential areas; the high income groups live in spacious low density areas. This closely follows the earlier urban development pattern in pre-independence period when the White settler community lived in the more open, spread
suburbs extending over large areas of land; the African urban population was congested in small high density residential quarters, reflecting the racial discrimination of the day. Since racial segregation no longer applies, the present residential pattern is more or less based on socio-economic grouping.

The proportion to which urban land is allocated depends on various use and to the application of planning standards. The choice of planning standards should not be a matter of hit and miss affair because it would make the use of urban land highly uneconomical and disorderly.

The majority of people living in urban areas are low income groups. The requirement that most of the houses in urban areas will be for people of the low-income groups and have to be constructed by and large through self-reliance, will have a profound impact on the layout of towns, and residential neighbourhoods. These types of residential areas must of necessity be made livable environments. It becomes necessary to examine the application of planning standards in the urban low cost, low income residential development.
In this context, the criteria upon which such standards must be established should be examined. It is important to assess whether the standards applied in such areas are adequate, inadequate, or out of context for our own situation.

The author notes there are few studies done in this field. It is against this background that this study was thought necessary.
CHAPTER ONE

INTRODUCTION

1.0 Statement of the Problem

Many developing countries have adopted town planning and housing standards operating in developed western countries because of former colonial influence. The per capita incomes in developed countries are considerably higher than in developing countries. It follows that borrowed standards, especially housing standards, are unrealistically very high, unrelated to the economic and social levels of the people involved.

The application of these standards have not been evaluated on the basis of their effectiveness, acceptability, localisation and usefulness. It has been argued in other studies that housing standards are a handicap to development: they contribute towards the shortage of housing supply since high housing standards consequently lead to high building costs; and the question of affordability comes in (1.1)

Both planning standards and housing standards contribute towards the total residential environment. Planning standards are space oriented: they are space designed to order structure or activities or facilities in a desired manner. The space is specified, especially in terms of community facilities, in relation to the catchment population. Housing standards or building standards, on the other hand, pertain to the structures themselves in terms of design (engineering), sanitary and
dimension aspects. They are related to the quality of the structure and they vary from economic, utilitarian to cultural norms.

Space or planning standards tend to affect the size of the buildings considering all its dimensions. In as far as the housing standards stipulate the minimum dimensions for the sizes of dwelling units then they relate to planning standards since other spaces in a residential area are organised to serve the dwelling units.

This study, however, does not involve itself in a critical analysis of housing standards. It is felt that the quality of structures can be improved over time as people become more affluent. There is difficulty in developing a generally acceptable over-all housing standard because different population groups have different goals. Housing standards are established to reflect a minimum situation: that is, a level below which housing is considered unsuitable for habitation. The problem concerning the requirement of minimum standards is that once established, the minimum requirements tend to become maximum building standards, i.e. most houses tend to conform to the standard rather than utilizing those standards merely as abase below which the suitability of the structure is doubtful.

The study lays more emphasis on planning standards because their application gives shape to the urban
structure which once it takes place may become very expensive to alter afterwards. The importance of concern for planning standards is indicated in the case of low income urban residential areas; once the space standards are set correctly the level of services can be improved later on as finances allow.

The Planning standards applied in the Kenya urban areas are a blending of standards borrowed from Britain (former colonial master) and standards derived from local experience. It becomes difficult to make a clear cut boundary between the two. What is important is to test the applicability and relevance of planning standards, now in existence, in regard to the urban situation in Kenya and more specifically in the low cost, low income residential areas where the majority of urban population live. In so doing several factors have to be borne in mind: that the Kenya urban situation is different from British situation or any other developed country for that matter; we have different climate, different terrain, different socio-economic characteristics; in addition, our urban development is very recent as compared to the urban development in the developed countries.

When one looks at the residential pattern in most Kenyan towns, one notices the different application of planning standards reflecting and emphasizing divisions in socio-economic status, as it were. The high income people live in spacious low density areas, while the low
income people live in highly congested, high density residential areas. A survey of the urban housing needs in Kenya (1.2) shows that about 80% of the housing needed in the period between 1973-1978 will be in the low cost category, i.e. housing below K.ShS. 13,000 (see Table 1.1). The cost figure, however, is terribly out of date considering the inflationary trends that have taken place within that period (see definition 16 - low cost housing). It is to be noted that a large group, about two thirds of the urban population cannot afford the cost of a contractor-built urban core house. Most of the urban population is in the low-income category; others have no income at all. In the "modern sector" of the Kenya economy one half of the wage earners earn less than K.shs. 400 per month, and two thirds earn less (1.3) than K.shs. 600 per month. The present minimum wage spelled out by the Government for an urban worker is K.shs. 240 - 310 per month (in Nairobi and Mombasa it is K.shs. 350 p.m.). Workers in Nairobi enjoy a relatively higher wage than workers in other urban areas. All those earning up to K.shs. 600 per month may be considered as low income while those earning above K.shs. 600 per month but below K.shs. 1,200 per month may be considered as low-middle category. This is only a small number. It is expected that more residential areas will continue to be developed for the low income group and for the low-middle groups.
## TABLE 1.1 HOUSING NEEDS BY COST CATEGORY FOR MAJOR TOWNS 1973-1978

<table>
<thead>
<tr>
<th>Towns</th>
<th>Affordable cost of shelter (K.shs.)</th>
<th>Total %</th>
</tr>
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<tr>
<td></td>
<td>Upto 6000 - 13,000 - 24,000 - 40,000 Over No. of</td>
<td></td>
</tr>
<tr>
<td>Nairobi</td>
<td>33400 23,400 6,500 1,900 6,100 71,300 53.1</td>
<td></td>
</tr>
<tr>
<td>Mombasa</td>
<td>9200 7,190 2,370 650 2,000 21,230 15.8</td>
<td></td>
</tr>
<tr>
<td>Kisumu</td>
<td>3110 2,440 700 200 620 7,070 5.3</td>
<td></td>
</tr>
<tr>
<td>Nakuru</td>
<td>1560 1,130 340 90 300 3,420 2.6</td>
<td></td>
</tr>
<tr>
<td>Thika</td>
<td>1290 970 270 70 230 2,830 2.1</td>
<td></td>
</tr>
<tr>
<td>Eldoret</td>
<td>1360 910 260 80 230 2,840 2.1</td>
<td></td>
</tr>
<tr>
<td>Kitale</td>
<td>580 380 110 30 110 1,210 0.9</td>
<td></td>
</tr>
<tr>
<td>Nyeri</td>
<td>590 330 80 30 80 1,110 0.8</td>
<td></td>
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<tr>
<td>Kakamega</td>
<td>570 330 100 20 90 1,110 0.8</td>
<td></td>
</tr>
<tr>
<td>Embu</td>
<td>530 330 90 30 90 1,070 0.8</td>
<td></td>
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<tr>
<td>Kericho</td>
<td>380 310 80 30 80 980 0.7</td>
<td></td>
</tr>
<tr>
<td>Meru</td>
<td>480 240 60 10 60 850 0.6</td>
<td></td>
</tr>
<tr>
<td>Machakos</td>
<td>340 240 80 20 60 740 0.6</td>
<td></td>
</tr>
<tr>
<td>Kisii</td>
<td>330 190 50 20 50 640 0.5</td>
<td></td>
</tr>
<tr>
<td>Bungoma</td>
<td>320 160 40 10 40 570 0.4</td>
<td></td>
</tr>
<tr>
<td>Muranga</td>
<td>280 170 50 10 50 560 0.4</td>
<td></td>
</tr>
<tr>
<td>Karatina</td>
<td>140 80 20 10 20 270 0.2</td>
<td></td>
</tr>
<tr>
<td>Other/</td>
<td>8,460 5,070 1,340 370 1,310 16,550 12.3</td>
<td></td>
</tr>
</tbody>
</table>

Total No. 62,840 43,870 12,540 3,580 11,520 134,350 100
% 46.8 32.7 9.3 2.7 8.6 100

MAJOR TOWNS IN KENYA

- PRINCIPAL TOWNS
- OTHER TOWNS
- INTERNATIONAL TRUNK ROADS
- OTHER MAJOR ROADS
- RAILWAYS

SCALE > 1:6,000,000

The application of planning standards in urban low cost low income residential areas.

GICHUKI THOGO
M.A. (PIANNINC)
THESIS 1977/78

Map No 1
1.1 **Purpose or Objective of the Study**

The study proceeds by looking at general or broad objectives and then at specific objectives:

**General Objectives:**

1. The study seeks to elaborate the need and sources for application of planning standards.

2. It also examines and compares the existing planning standards in the Town Planning Department Handbook with planning standards developed by other bodies in Kenya.

**Specific Objectives**

1. The study sets to assess the current residential standards, their effectiveness and their adequacy in the low cost, low income residential areas;

2. The study looks into the basic needs and problems for housing relating to these types of communities.

3. Lastly, the study seeks to suggest guidelines for development and criteria for establishment of planning standards for application in low income residential areas so that a better environment can be produced.

The need to match standards with land, transport, housing, socio-economic levels, and also to the affordability and acceptability by the people and the local authorities is an obvious case. What is necessary is to determine whether specific planning standards are necessary or whether a certain degree of flexibility
could allowed in the application of planning standards. The problem with standards is that they tend to be static but things do change, standards change over use and time as economic, social conditions and technological know-how changes. Since planning is dynamic the planning standards should also be dynamic. Therefore time element is important in the application of planning standards. As the population increases so does the demand for urban land use increase. The supply of urban land is constrained by many factors: physical, economic, legal, political as well as social-cultural factors. It becomes increasingly difficult to judge the relevant standard in relation to the socio-economic changes, although it is a step that should be taken from time to time.

1.2 The importance of Planning Standards, their Component parts, and their relationship with other sectors of planning.

Planning standards are a compromise between conflicting claims on land. Before a physical development plan of a town is made analysis of existing land use is made. This was the case in the capital City of Nairobi in 1948 when the “Master Plan for a Colonial Capital” was prepared. Future estimates of population needed land for various purposes, the transport network, housing, etc. are made and these form the basis for formulation of planning standards. Standards so derived could be regarded as
authoritative, that is, they are associated with the idea of authority since they are regarded as having come from an authoritative source. Standards could also be advisory, for example, the adontion of roads being made conditional upon the observance of these standards.

The planning standards also incorporate in them an element of provision of services and facilities. Thus it has become necessary to group housing units in a neighbourhood so that the provision of facilities becomes convenient and economical. Having known the size of the neighbourhood the type and level of services can be given to meet the requirements that make up a satisfactory environment for living. For this reason the planning standards must have a degree of precision in order to achieve the goals. All the various factors that influence planning standards must carefully be weighed and based on adequate research. Each standard should be flexible and capable of a fairly sensitive response to changing demands. This may be accomplished by establishing a range limit and using a set of sliding or progressive standards.

1.2.1. Factors Influencing Planning Standards.

In setting out planning standards a number of influencing factors have to be considered so that the standards relate to the local situation as much as possible. These factors are:
1. Population
The size and characteristics of an urban population determine the amount of land to be allocated for residential, transport, social facilities, industrial and recreational uses as a totality of the neighbourhood. The characteristics of the population, their culture and income has to be examined so that the space requirements can be determined for establishing standards. In case of the residential areas the neighbourhood size is defined and the standards applied will determine economically and conveniently the total and specific needs of the society.

2. Land:

(i) Type of terrain: The type of terrain affects the siting of facilities in relation to the dwelling units, it also affects plot sizes and design as well as drainage pattern and communication links,

(ii) Type of Soil affecting underground water system, soil bearing capacity, and thus having a bearing on the amount of land available for building,

(iii) Ownership: The land tenure system affects legislation for the control and use of land. Land availability is constrained by legal factors, e.g. privately owned land is not
easily obtainable for urban development (compulsory purchase may have to be applied and compensation paid to the owner of the land).

(iv) Cost of the land: Land values become high with the intensification of urban development. Cost, therefore, affects the size of land that can be afforded for the given purpose and standard.

All in all urban land is a scarce resource. It is the most important resource for a physical planner. Space is given and because of this limitation modification of standards have to be made in order to accommodate the standard variables. Every parcel of land has got its own characteristics and every square metre of urban land has to be accounted for. The planner closely equips himself with information regarding the urban size, land ownership, land availability, legal and political as well as socio-cultural constraints regarding the use of urban land in order to be able to derive space standards

3. Resources:

These are individual as well as public resources to develop according to given standard and affecting the timing of the implementation. Community finances, for example municipal finances, and the incomes of the population in question, to a large extent reflect
affordability. The standards derived are either flexible, realistic, or unrealistic depending on whether they are affordable.

Cultural Values:
Behaviour of the society, their attitudes towards the standards affecting the ultimate use of structures by the population for whom they are intended. There are societal values which will have to be balanced against planning technical values, for example, there is a strong cultural attachment to land in Kenya that has influenced the provision of single storey housing on a small part of land in urban areas rather than providing high rise flats. In addition to the strong values attached to land, people need enough space, starting with the smallest unit - the house, in adequate amount; they need privacy, and in an open society like ours the most able ones are able to command more space and more privacy.

Environmental:
Main considerations regarding this factor are safety for the residents, minimization of pollution, enhancement of aesthetic values. Planning standards are aimed at producing a healthy environment.
Architectural Factors

6. Construction - services -, and space - standards as laid down in the legislation influence the design of the structures and consequently the design of the residential areas. The design criteria also influences the establishment of certain minimum standards. There is a feeling among architects that design is restricted by rigid standards.

7. Technical/engineering

Technical or engineering standards are given. They are designed for a particular capacity, volume and size for a particular "population". They are bound to change when there is demand for change for example, when the population size changes and when the economy demands higher standards to be applied.

8. Level of technology

As the level of technology increases the community is able to organise space in a different manner. Some communities are able to maintain very high densities on a limited space of land because of their financial capability and the ability to provide elevator high rise buildings.
1.2.1.1 Model followed by the planners in establishing space standards:

The following model shows the task and role of a town planner in determining the space standards for various land use in the urban areas.

<table>
<thead>
<tr>
<th>People</th>
<th>Urban size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have activities:</td>
<td>(Map of Urban area)</td>
</tr>
<tr>
<td>e.g. commercial, Residential, cultural, institutional, transportation, recreational, etc.</td>
<td>Every unit of land has characteristics of site and location</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Space</th>
<th>Estimates of future land requirements according to category use.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The activities need special space. Activities compete for space.</td>
<td></td>
</tr>
</tbody>
</table>

Urban space demand

→ Plan 4=

(Space allocation diagram: space allocation is influenced by application of planning standards by the planner.)

Approved plan

The approved plan becomes the blueprint for future development. Space standards are built in it.
1.3 Basic Assumptions

As in the case of objectives of the study in 1.1 the study proceeds on some general assumptions concerning the planning standards and then some assumptions concerning the application of planning standards in low cost, low income residential areas

1. Standards in general are instruments of good.

In industrial manufacturing, for example, the term "standard" is associated with quality control, with guaranteeing the uniformity of products and services thus achieving efficiency and reducing costs of production. For this reason some countries have established institutions which regulate and control industrial standards.

Planning standards, unlike industrial standards, cannot be determined with the same precision. They are not scientific and their establishment depends on judgement after weighing a number of factors some of them social in nature and as such very volatile. However, in planning, the observance of planning standards is supposed to improve the overall environment. Their wide ranging application as space and performance standards do ensure this objective.
2. Standards are also essential as tools of control. The need of planning standards in a democratic society serves as a compromise between conflicting and competing claims upon the use of land. In such a society the government whether central or the local government is a representative one. The implication here is that legislation which has a bearing on planning standards is not simply imposed. Relevant, committees in the local authorities have a chance of rejecting or accepting standards as formulated by the planner. Their reaction, however, may not be very much informed.

In such a society the interests of an individual are safely guarded but all the same the excesses of an individual are not allowed. In considering planning standards control is an essential element in order to obtain a guided development.

Standards have been considered as tool of control elsewhere—:

"The hunger for standards, required as guidelines for the planning of new communities (in Britain) 25 years ago persists today. A
system of standards is felt by some to be necessary as a codification of experience and to meet problems gaining new prominence (such as noise and air pollution). The feeling was expressed to us as a hope that a manual for development control, setting out the full array of standards, would be issued by Development of Environment; development control process would, it was thought be quicker, fairer and more good environmentally if backed up by a pre-established comprehensive system or set of standards'.

3. There is need to review existing planning standards from time to time so that they can relate to changing circumstances.

   The period for which the application of planning standards is suitable matters in that planning standards are a guideline only. As such they should be reviewed against the prevailing socio-economic circumstances.

4. There is need to set standards in a comprehensive manner, preferably in a manual of planning standards guidelines should be set.

   This practice would assist very much in setting guidelines for development control which would be easily referrable. It is to be noted that in developing countries there is an acute shortage
of planners and often plans for small urban centres may be prepared by people who have no background training in planning. If planning standards are set in a manual they could be used by such people when they are designing the layout of such centres.

5. The nature and use of planning standards is not well understood by the non-professional people and the politicians.

In allocating urban space the planner has to reconcile the interests of the people who may not understand why the space is limited, the government which is responsible for providing land for development, and the politicians who represent the people and who may put strong case on the acceptability or rejection of a plan.

In relation to planning standards as applied for the low income residential communities the following assumptions are made.

1. Planning standards in the low cost, low income residential areas have produced high densities, overcrowding, which is not conducive to good environment.

Planning standards in these areas have
not conformed to the social values of the communities in them. Most of the African urban population forms the first African urban generation. These people have come from the rural areas where there is unlimited space and open country. The reduction of space into very small plot size, the provision of inadequate space in and about the building give the urbanites a great dissatisfaction.

3. The application of standards backed by considerable research can result in good, healthful environment in the residential area and can relate to the socio-economic means of the community.

4. Planning for low cost, low income residential areas have been biased towards housing standards which aim at improving the quality of housing instead of emphasising on planning standards which would leave room for improvement of quality of housing later as the incomes of the people rise.

1.4 Scope and limitations of the study

Planning standards cover a wide field. It is not possible within the scale of this study to conduct a detailed research for each planning standard. On the one hand it would require a considerable length of time
to undertake such a task. On the other hand, limited financial resources prohibit such an undertaking.

This study limits itself to the residential planning standards for the low income communities in as far as space and provision of facilities in such areas is concerned. What the study does not do is to attempt to come out with a comprehensive manual of planning standards for the low income communities in urban areas to be used as a frame of reference. The author feels that this should come out as a result of team work based on research for a considerable length of time. The study does suggest, however, the criteria upon which planning standards for low income residential communities may be based. These are desirable ultimate residential density, land use profile, plot size, dwelling size, floor space allocation per capita, type of housing development, urban size and land use pattern as regards residential use, and to a less extent climate.

The study was done during the long term and short term, vacations of the academic year 1977/78.

Proceeding from the basic premise that planning standards play a vital role concerning the balancing of all urban land uses which produce the urban physical environment, it is hoped that this study will go a long way in laying down on which the choice
of planning standards for low-cost income residential areas would be made. The study hopes that if more attention is given to the low cost, low income residential areas by those who have the responsibility of allocating urban space, the areas will produce livable environment. The kind of attention called for is to lay emphasis mainly on zoning standards, affording an acceptable layout of the neighbourhood and safeguarding future extension concerning houses and public facilities; the main condition being that later upgrading will be possible.

1.5 Review of related literature in brief:

Few studies have been done on planning standards especially in this country. Two unpublished M.A. (planning) thesis have been written in the Department of Urban and Regional Planning, University of Nairobi. One of them "Planning Standards for future Urban Industries, based on the performance of the present Nairobi Industrial Area" has nothing to do with planning standards for residential areas and will not merit further mention. The second study, "A Critical Study on Housing Standards in Iringa Town, Tanzania"(1.6) comes closer to studying residential areas. The author of that report examined the qualitative nature of existing housing standards which apply in Tanzania in general and in Iringa Town in particular. His findings made him conclude
that his research hypotheses that "the high housing costs are mainly caused by unrealistically high housing standards" is true. That is, such standards are unrealistic in terms of people's economic capabilities.

A number of "user Reaction Surveys" have been carried on the National Housing Corporation rental housing and a recent one on site and service schemes by the Housing Research and Development Unit, University of Nairobi (17). These surveys mainly assess the satisfaction of residents in the respective residential areas as regards the internal space and external residential environment. The report on site and service schemes has gone further in its recommendations as to guidelines for density and space dimensions of the dwellings. The surveys have not, however, tried to alter or suggest new planning standards based on their findings.

Numerous reports have been written about low cost housing in Kenya, but these are simply socio-economic analysis. Reports about uncontrolled development, for example, case studies of Mathare Valley are also numerous and they suggest ways of improving and upgrading the uncontrolled settlements.

The United Nations Centre for Housing, Building and Planning - carried on a project aimed at identifying and recommending criteria and demand for
formulating physical planning standards for application in developing countries. The project was undertaken to provide basic guidelines and methodologies for the elaboration of realistic and feasible planning standards which may be used by settlement planners and policy makers in developing countries, and to control and maintain the quality of human settlements in their development process. This of course assumes that these developing countries have not carried research to formulate physical planning standards based on their own experience.

The project established that two or more different countries seldom adopt identical physical planning standards. Furthermore, it is inappropriate for developing countries to adopt the same standards as those prevailing in developed countries with the obvious exception of facilities such as those for certain sports or transportation facilities. The project also specified that it is not a question of which countries have "higher" and which have "lower" standards; but rather that standards are different from one country to another.

The report points out the advantages of a systematic planning approach, from the specification of goals and policies, through the preparation and implementation of standards in relation to human settlements, all standards may be generally classified as those of environmental concern'("standards of external concern"), and those dealing with internal
functioning of elements of human settlements ("standards of immediate concern") and the further subdivision of the latter category into standards of "capacity" accessibility" and "density" has been recommended. Standards have also been subdivided into performance and specification categories. Measurements applicable to various physical planning standards in relation to elements of human settlements and their components, are listed separately. A supplementary part of the report has also been prepared which is an international compendium of selected physical planning standards which is thought to be of interest to those developing countries unable, at present, to fully develop standards of their own.

Although the report gives useful comparative figures on physical planning standards it is of little practicality when individual countries want to base their own planning standards out of their own local context. It can then only be used for comparative basis to a limited extent.

1.6 Methodology and Organisation of the study

The approach to this study was undertaken through interviews, as part of fieldwork, with various individual planners in the Physical Planning Department, Ministry of Lands and Settlement, as well as planners in Town Planning Department – City Council of Nairobi
Analysis was done on the Town Planning Department Handbook, June 1971 which gave an insight into how planning standards have been applied to short term urban development plans. The analysis also revealed the planning process, the planning concepts and the fields covered by planning standards. In addition legislation influencing planning and planning standards was analysed.

Three low income residential communities in Thika Municipality were selected for survey. The forth area which is also a unique low income residential area was selected in Nairobi. These areas are typical low income communities with one room rented accommodation being the basic "housing" unit. Overcrowding is a common feature and the level of services is nearly the same. These residential areas are Majengo (Vasey Estate), Rental scheme 1, site and service scheme 6 in Thika and Dandora site and service scheme in Nairobi.

The site and service scheme 6 in Thika and Dandora site and service project in Nairobi were not complete by the time of the survey. Their study was, however, thought useful since they reflect not only the recent development but probably what projects may come in the future. The two schemes can be compared with the two existing schemes at Thika Municipality.

The survey in these areas was done in a form of checklist but not the normal household survey
questionnaire. This approach proved useful because of the exploratory nature of this study. The sample survey was 10% in each case. In each plot selected for survey (if developed) one adult individual in each room was interviewed so as to get the information on the number of people per room and the attitude towards the residential area and use of planning standards. The author noted the building and its immediate environment.

The whole study is divided into six sections. Part one is the introduction, it deals with the general aspects of planning standards; part two or chapter two looks at the basis of planning standards and how they contribute towards a residential environment; chapter three analyses the Town Planning Department Handbook of June, 1971 and looks closely at planning legislation which has influence on planning standards in Kenya. Chapter four deals with the case studies of low cost, low income residential areas; while chapter five gives examples of the relationship between housing density and cost. The last part deals with the summary and brief findings of the study and makes conclusions and recommendations for improvement and for further study.

1.7 Definition of Important Terms

1. **Standard**: Measure to which everybody must conform. It refers to degree of quality of a thing.
2. "Standards", by virtue of definition: implies a singular approach, the one best way to do, make, measure, test or define something. In other words the word standard implies a type, example or combination of conditions acceptable as correct for the time being; a criteria established as a result of scientific investigation and representing the present stage of development. The usefulness of any technique may depend ultimately upon what the technique achieves, and this in turn implies either the establishment of a standard where none existed previously or evaluation against acceptable standards. Thus standards could be established in relation to equipment, materials, environment, methods etc.

3. **Urban Planning Standards**

These are measures expressed in minimum units to be used as a guide by the planners and planning authorities when allocating urban space for various activities, and when deciding the quality and quantity in provision of urban facilities (author's definition). Urban planning standards are of three types, viz: - convenience standards, performance standards, spatial standards. Convenience standards express the basic needs for community facilities, e.g. health, education
shopping, etc.; performance standards are based on performance of certain users, notably industries, e.g. performance in a particular environment; they are more judicious and scientific; spatial standards refer to space allocated for particular activities.

4. **Habitable room** (i.e., a room which is normally used for living or sleeping in. A kitchen is only regarded as a habitable room when it is also used as a living room.

5. **Occupancy Rate:** The ratio of occupants to the number of habitable rooms in a dwelling or a group of dwellings.

6. **Net Population Density:** The total number of persons divided by the net residential area in hectares. It is expressed as persons per net residential hectare.

7. **Overall Density:** The total number of residents in a town divided by the total developed area of the town.

8. **Net Accommodation Density:** The number of habitable rooms contained in the dwelling houses and other residential buildings.
on the land divided by the net residential area of the land in hectares. It is expressed as habitable rooms per hectare.

9. **Net Residential Area**: The area of land actually developed or to be developed as dwellings, and including:
   i) the site of the house and other residential buildings and their curtilages;
   ii) any small public or private open space included in the layout;
   (iii) half the width of any street on which land mentioned in (i) or (ii) above abuts except that where a curtilage abuts upon a principal traffic road only, 6m of the width of that road is included.

10. **Gross Residential Density (1.12)**
    Includes land for primary and nursery schools, clinics, social halls, places of worship, distribution roads, local playing fields and open spaces, markets and local shops and small workshops found particularly in the higher density areas.
11. **Urban Centres**: In the 1962 Kenya Population Census, urban centres were defined as towns with total population of 2,000 and over.

12. **Low Income**: Those earning below K.shs.500/- per month (medium income K.shs.501 - K.shs.2,000/-) (High income K.shs.2,001 p.m. and over) (1.13)

13. **Housing**: It is "the residential environment neighbourhood, micro-district or the physical structure that mankind use for shelter and the environs of that structure, including all necessary services, facilities, equipment and devices needed for the physical health and social well-being of the family and the individual"

Another definition of housing is given as "housing is not "shelter" or "household facilities" alone, but comprises a number of facilities, services and utilities which link the individual and his family to the community, and the community to the region in which it grows and progresses"
14. **Infrastructure:** The complex networks designed to deliver to or remove from the shelter people, goods, energy or information (author's definition).

15. **Community facilities:**

There are three general classes of community facilities involved in planning a community

1. **Public Utilities:** water, surface drainage, sewerage collection and disposal, gas, electricity, access lan' or streets;

2. **Community services:** Schools, hospitals and clinics, health centres, police stations, transport, places of worship social welfare, fire protection, parks, playing grounds, meeting halls, museums and libraries.

3. **Communal facilities** (usually not included in public expenditures): markets,
stores, repair shops, restaurant, entertainment establishments.

16. Low Cost Housing:

In the Kenya Development Plan 1974 - 1978 it is shown that 40% of the houses to be financed by the Government fall in the real low-cost category (cost per unit limited to K.shs. 6,000) - Ref. table 1.2; whereas 73% of the number of houses should not cost more than K.shs.24,000. Due to inflationary effects this figure has become unrealistic. To make a serviced site available in the National Housing Corporation's site and service programme costs at present around K.shs.7,000. For serviced site and materials loan amounts of K.shs,14,000 are made available.

Table 1.2 Number of housing units planned for and finance required for housing 1974/78

<table>
<thead>
<tr>
<th>Cost Category Shillings per Unit</th>
<th>Units planned</th>
<th>Finance Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>% of Total</td>
</tr>
<tr>
<td>Sh .6,000</td>
<td>44,000</td>
<td>40%</td>
</tr>
<tr>
<td>Sh.15,000</td>
<td>17,000</td>
<td>16%</td>
</tr>
<tr>
<td>Sh.24,000</td>
<td>19,000</td>
<td>17%</td>
</tr>
<tr>
<td>Sh.45,000</td>
<td>20,000</td>
<td>18%</td>
</tr>
<tr>
<td>Sh.90,000</td>
<td>10,000</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: Kenya Development Plan 1974/78
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1.5 J. W. Mwangi


1.6 V. H. Mwingira

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(ii) - National Housing Corporation Rental Schemes. A technical/user - Reaction Survey and Analysis Vol.1 & 11 (June 1974)

1.8 Mathare Valley - The Case of uncontrolled Settlement in Nairobi, 1971.


1.11 Definitions 4-9 are quoted from "The Density of Residential Areas". Her Majesty’s Stationery Office (1952), U. K


1.13 Ibid:


1.15 Report of the Ad. Hoc Group of Experts on Housing and Urban Development(U.N. Sales No.63.IV.1) p.1
CHAPTER TWO

BASIS OF PLANNING STANDARDS IN URBAN DEVELOPMENT

2.0. The Origin of town planning and the need to plan:

Planning standards have evolved from the experience gained from the practice of urban planning. Urban planning itself has its roots in the search for reform of the urban environment. Indeed, it was the ideas of social reformers and Philanthropists that worked towards creating more humane urban environments in ways which have met limited success.

The attention given to urban planning started in European countries. Planning in most of these countries is the product of the last 150 years; a period characterised by the major transformation of the industrial revolution and its aftermath. During this time a variety of methods have been evolved to deal with the problem thrown up by unparalleled economic and technological developments which have left their mark on many aspects of the social organisation and environment. The physical environment is structured and adapted by man over long periods of time. Protection of people from harm or disadvantage has been necessary over the past years. The aim has been to give them better health and education, and to ensure that urban development is on the whole beneficial in various ways to the community. Planning tries to deal with expected problems and to avoid unwanted problems. For this reason, it has been important to plan ahead for various sectors of land use.
Town planning, which is variously known as Town and Country Planning, environmental planning, land use planning or physical planning, is an innovation of 19th century. It was at this time that governments started to intervene in planning. In Britain, for example, some measures of control over canal and railway development was effected new statutory regulations governed working conditions in industry: public health authorities were set up and a public health service instituted legislation dealt with insanitary housing and gave powers to build dwellings for the working classes.

Before this period, much of private industry and the commercial sector was little affected by government, either central or local. Prevailing political philosophies gave full reign to private initiative, and vigorous, uncontrolled economic expansion took place with little reference to other responsibilities in the wider community.

"Every amenity of urban life was sacrificed to the requirements of industrial production .... The impact of the industrial revolution was first felt in England. The new industrial economy brought exploitation of the poor and, with poverty slums. New slums, mechanical slums, row upon row of crowded workers' houses in the shadow of the factory, all were added
to the traditional slums of the seventeenth century in Europe. The degraded environment of the factory town hung like a cloud over urban life for the next century and half. Engrossed in the technical process of industrial production, the houses of the people were neglected.

Thus, social, housing, health and environmental problems ensued, and it was frequently left to private individuals to deal with these. It was often their initiative and effort which began to point the way to new forms of community development and urban management. Protest literature exposed the problems which so far had been inadequately tackled: poor housing, high densities, overcrowding, ill-health, large families, low pay and unemployment. Although these issues were commonly most felt in the older parts of the cities, it was not uncommon also, to find them in suburban districts where sanitary and building controls existed. In the absence of regulations, the way in which the land was laid out was unco-ordinated and hence the problems for the future accumulated.

"Influential opinion and successful achievements in a variety of respects, demonstrating the need to restrain laissez-faire urban growth and development, were nevertheless reaching receptive ears in central and local government, in commerce and industry and professions and learned societies."
Out of the ferment of concern, speculation and experiment, town planning emerged as a new promise. The term town planning was first used in 1906 in Britain.

2.1 Early Planning Legislation in Britain

Town planning in Kenya has been very much influenced by the British planning experience. For this reason it is necessary to look at the legislation which has influenced planning in Britain.

Town Planning took its statutory root in response to an Act of Parliament in Britain – the Housing, Town Planning etc, Act, 1909. The actual origins owe much to events in Birmingham where the idea was pioneered of securing low-density, cheap housing for the working classes in suburban areas through the device of "town expansion plans", later to be known as 'town planning schemes". The Act of 1909 permitted local authorities under close supervision of the local government board to prepare such schemes for 'land in course of development, or likely to be developed. The schemes regulated the layout of land, density of, and space between dwellings and reserved for new highways.

The 1909 Act was, however, relatively little used, It was followed by the Housing and Town Planning Act, 1919 which made it obligatory for local authorities above 20,000 population to prepare town planning schemes for their building land. This was one way of ensuring at least
some planned layout of land at low densities and co-
ordination of new highways.

The Town and Country Planning Act, 1932 was the first
planning legislation to include the word "country", schemes
could henceforth be prepared by authorities of any size
in urban or rural situations although the obligatory
requirments of the 1919 Act were relinquished and the
preparation of schemes reverted to a permissive power.
Other Acts followed later, all meant to make statutory
town planning effective in Britain.

2.2. Concepts of Residential Planning

Ways to improve the residential environment have
been tried. Individuals have come out with concepts
which are now adapted with some modifications by later
day planners.

2.2.1 Land Use Zoning Concept

Zoning is a device employed in land use planning
to ensure the separation of land uses and hence avoid
mixed development. Zoning may be defined as the physical
division of an urban community into "districts"
(zones/areas) for the purpose of regulating the use
and
of land/buildings, height and bulk of buildings,
plot coverage and density of population. It is a legal
instrument and is therefore enforceable.

2.2.1.1 Brief Historical Review:

Zoning is not a new principle or technique of our
times. Ever since people first started living together in organised urban settlements, they grouped together similar types of lands and buildings, though not with such legal backing as is the case today; thus creating commercial, industrial, residential and recreational areas of various types and descriptions.

"King Phillip of Spain (1573), in outlining the procedure for establishing communities in the New World, instructed his explorers that streets were to be oriented in such a manner as not to be windswept, and that slaughtering places for cattle were to be located on the outskirts of town so odours would not prove offensive to the townspeople. In Boston the segregation of the storage place for the gunpowder from the centre of the city was one of America's first recorded acts of zoning. In 1810 certain Napoleonic decrees and the Prussian codes of 1845 contained land-use regulations (2.3).

In contemporary city, this organic and spontaneous process of grouping the almost similar urban activities is, notwithstanding uncontrolled development, systematised legalised and named "zoning". In the initial stages of evolution of zoning at the beginning of the present century, zoning ordinances dealt only with the use of land for various purposes. They regulated the future urban development by zones according to land uses; sometimes a
"mixed use zone" (or free-use zone) unrestricted - use area) was created. At a later stage the scope of zoning was extended to regulate site coverage and building height. It is claimed that the first comprehensive zoning ordinance was passed by New York City (1916). It is, however, seen that zoning was well established by the year 1920 in most of the major urban centres of the developed countries.

Over a period of time, the concept of zoning has widened into a larger framework. It is now no longer thought of as a means of controlling nuisances and hazards such as stables, junk yards, abattoirs and factories, emitting smoke and odour, discharging effluent and producing noise, but as a necessary instrument and a system to ensure a proper spatial relationship between uses within a city and to channel the development effort for the present and foreseeable future. As the technology of architecture, town planning and construction have changed, the desirable approach to zoning has also shifted from one of imposing regulations that separate different uses to the creation of conditions that will permit their co-existence.

2.2.1.2 Objectives of Zoning

The main purpose of zoning is to direct and regulate development or redevelopment of a town in appropriate directions and ensure proper uses of land and building with a view to creating a healthy, efficient and
stimulating, living environment.

It includes in its scope the following aspects:

1. Broad land uses permitted in different 'districts' of the city with a view to providing adequate space for each type of development and in appropriate position;

2. the percentage of the plot (site/lot) that may be covered or built on;

3. the maximum permissible height of buildings in each "district";

4. the maximum size of front, rear, and side yards;

5. the minimum size of courts/courtyards/piazzars, and;

6. the maximum permissible density/intensity of development in terms of:
   (i) persons per unit area (ac.re or hectare), or
   (ii) dwelling per unit area;
   (iii) habitable rooms per unit area; or
   (iv) persons per habitable room.

2.3 Contribution by individuals towards planning for a better physical environment

Many people thought of ideal communities and advanced some theories to support their school of thought. Their ideas, however, have been of great value in drawing attention to the problem areas and
in helping find solutions to them. The regeneration of town and country, the rebirth of region, were causes expounded with great conviction and ferreour by Ebenezer Howard, Partick Geddes and many others. Table 2.1 gives a comparison of densities for ideal communities put forward by several reformers. Density was considered a central issue in planning since the towns had higher density than the open rural areas.

2.3.1 Contribution by Ebenezer Howard (1850 - 1928) - The Garden City

Ebenezer Howard was one of the social reformers who focused his attention to the squalor in the cities in Britain. He put forth his concept of a garden city in a book entitled 'Tomorrow: A peaceful Path to Real Reform' which was published in 1895. In his book, he pointed out that both urban and rural life had advantages and disadvantages. The book was re-issued as "Garden Cities of Tomorrow" in 1902. His main theme was development of low density, planned community combining the advantages of both town and country.

He proposed, therefore, a self-contained satellite town having a population of 32,000. The site would
<table>
<thead>
<tr>
<th>Year</th>
<th>Proposed by</th>
<th>Area Involved</th>
<th>Proposal</th>
<th>Density per Gross acre or ha.</th>
<th>Optimum Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1898</td>
<td>E. Horward</td>
<td>City</td>
<td>Book: Garden cities</td>
<td>8-12 dwelling Units/acre, or 20-30 units/ha.</td>
<td>32,000 persons</td>
</tr>
<tr>
<td>1924</td>
<td>Le Corbusier</td>
<td>City</td>
<td>La Ville Contemporaine</td>
<td>1,200 persons/acre; or 2,960 persons per ha.</td>
<td>3,000,000 persons</td>
</tr>
<tr>
<td>1929</td>
<td>Clarence Perry</td>
<td>Neighbourhood Unit</td>
<td>Neighbourhood Unit Concent</td>
<td>5 dwelling units/acre; or 12 units per ha.</td>
<td>5 - 9,000 persons</td>
</tr>
<tr>
<td>1932</td>
<td>Frank Lloyd Wright</td>
<td>City</td>
<td>Broadacre City</td>
<td>1 dwelling unit acre or 2.5 units per ha.</td>
<td>no limit</td>
</tr>
<tr>
<td>1944</td>
<td>Jose L. Sert</td>
<td>Residential Unit</td>
<td>Book: Humane Scale in City Planning</td>
<td>3 - 5 dwelling units/acre, or 7-12 units per ha.</td>
<td>5 - 10,000 persons</td>
</tr>
<tr>
<td>1945</td>
<td>Walter Gropius &amp; M. Wagner</td>
<td>Residential Unit</td>
<td>Book A program of city reconstruction</td>
<td>4-10 dwelling units/acre; or 10 to 24 units/ha.</td>
<td>5,000 persons</td>
</tr>
<tr>
<td>Year</td>
<td>Proposed by</td>
<td>Area Involved</td>
<td>Proposal</td>
<td>Density per Gross acre or ha.</td>
<td>Optimum Population</td>
</tr>
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<tr>
<td>1946</td>
<td>L. Justement</td>
<td>City</td>
<td>Hook, New Cities for old</td>
<td>10-35 dwelling units per acre; or 24 - 86 units per ha.</td>
<td>1,000,000 persons</td>
</tr>
<tr>
<td>1947</td>
<td>P. Goodman</td>
<td>City</td>
<td>Book Communitas</td>
<td>100 dwelling units per acre; or 247 units per ha.</td>
<td>6 - 8 million persons</td>
</tr>
</tbody>
</table>

Source: Adapted from De Chiara J. Planning Design Criteria
be 6,000 acres, of which 5,000 would be agricultural land surrounding 1,000 acres earmarked for urban development. He envisaged an industrial commercial city, with a balanced mixture of all social groups and levels of income. Indeed, Howard’s social city was a potential tool for social and regional regeneration. It was to be accompanied by public enterprise and public ownership of land. His dream was realised when Letchworth, the first garden city was began in 1903.

Today, town planning borrows this concept and applies it with modifications, that is, cities need not to confine themselves to the 32,000 population, but the advantages of both country and town are combined whenever possible.

2.3.2 Contribution by Patrick Geddes (1854 - 1932)

Patrick Geddes contribution towards improving the living environment was the concern he showed for planning for the people rather than prestige. He stressed the need to consider the town as whole; integrate physical planning with social and economic improvements; and to make a thorough survey and probe more deeply into urban malaise before planning. He also developed the concept of the three triads work: place: Folk which signifies the need to reduce journey to work - an important aspect especially when deciding on location for low-income communities in relation to the place of work.
2.3.3 Contribution by Clarence Perry (1929) - Neighbourhood Unit Concept.

Neighbourhood planning has generally been accepted as a basis for development as well as redevelopment of residential areas in towns and cities. The idea underlying the notion is to conceive urban place as composed of a number of sizeable units, each being a comprehensive and entity in itself which will permit a full growth of community spirit, fostered by sustained neighbourly social interactions, at the same time function as an integral part of the greater whole. In the physical sense a neighbourhood unit is the minimum geographical and planning unit, which contains the basic public utilities, municipal services and community facilities, required in common by residents and which provides a physical form conducive to development to a fuller and richer life of the individual, the family and the community.

2.3.3.1. Genesis of the Neighbourhood Idea

The words 'Neighbourhood Unit' seem to have been used for the first time in connection with a planning competition in Chicago (U.S.A.) about 1916. However, it is claimed that the full statement of the idea appears in Clarence Arthur Perry's monograph in Volume 7 of the "Regional Survey of New York", published in 1926, where Perry enunciated his neighbourhood theory. He
seems to have visualised the residential neighbourhood as a unit area, limited in its extent and population, with a distinct physical boundary and served by an elementary school. The elementary school was to be the focus of the community. The neighbourhood unit should also have shops for day-to-day shopping, parks and other organised open spaces for recreation, institutional sites and buildings for socio-cultural activities and a circulation system which would not permit through traffic to penetrate into the neighbourhood. The neighbourhood unit as seen by Perry is shown in figure 2.1.

2.3.3.2 Principles of Neighbourhood Unit Theory

The Neighbourhood Unit Theory is thus based on six basic principles (2.6).

1. "Major arterials and through traffic routes should not pass through residential neighbourhoods. Instead, these streets should provide the boundaries of the neighbourhood.

2. Interior street patterns should be designed and constructed through use of culs-de-sac, curved layout and light duty surfacing so as to encourage a quiet, slow volume traffic movement and preservation of the residential atmosphere.

3. The population of the neighbourhood should be that which is necessary to support its elementary school, (when Perry formulated his theory, this population was estimated at about 5,000 persons.
The neighbourhood unit as proposed by Clarence Perry in 1922

Communities Centre

Church

Shops & Flats

Open Space

Radius: 1/4 Mile (0.5 Km)

Roads

Source: Reproduced from Gallion Urban Pattern

Fig. 1

Gichuki Thogo
MA (Planning)
Thesis 1977/78
current elementary school size standards probably would lower the figure to 3,000 to 4,000 persons.)

4. The neighbourhood focal point should be the elementary school centrally located on a common or green along with other institutions that have service areas coincident with the neighbourhood boundaries.

5. The neighbourhood would occupy approximately 160 acres with a density of 10 families per acre. The shape would be such that no child would walk more than one-half mile to school.

6. The unit would be served by shopping facilities, churches, a library, and a community centre located near the elementary school."

2.3.3.3 Criticism on neighbourhood planning

Neighbourhood planning has been criticized on several grounds mainly by sociologists:

1. The concept of neighbourhood planning is used consciously or unconsciously, to reinforce the 'natural urge' towards class or social segregation.

2. The neighbourhood idea is sentimental in concept, reactionary in effect, anti-urban
in approach and tends towards an idealised form of village life.

3. Both private and public transport makes it easier to choose between using local shops or those at a distance, to choose to work several kilometres from home and to maintain friendships and social contacts over a wide area.

Despite these criticisms the neighbourhood planning is still applied; the neighbourhood idea constantly re-appears under different names and varying forms. Earlier failures may be attributable to the unintelligible application of the neighbourhood idea: Too large an area or too great a population was included in one unit; communal and social buildings which could have formed a focus were not provided. Neighbourhood planning can work well with smaller communities and in identifying which facility works well as a focus for each community. From observation it is clear that a primary school may be the focus of a neighbourhood in a Western community, while, a market, a shop or a church could be a focus for the African community. This submission does not in any way mean that primary schools are not of importance in an African neighbourhood.

2.3.3.4 Neighbourhood Planning in Kenya

The neighbourhood unit concept as applied in Western countries in planning residential areas was
interpreted in the 1948 Master Plan for a Colonial capital in Nairobi (2.7). Although the Plan did not admit explicitly it was based on racial segregation. It is not surprising therefore to find that one of the strongest foundations of neighbourhood concept, that is, making the primary school as the focus of the community was not applied in African quarters. Primary schools were not provided in African areas since education for the Africans was not considered necessary.

All the same the Master Plan had important implications for other urban areas as well:

"The importance of the official recognition of the neighbourhood unit concept was that the physical planning of towns would now be as concerned with making living conditions pleasant and orderly for Africans as it had done in the past for Europeans. (2.8)

Neighbourhood planning is now of wide applicability in Kenyan towns but it has its variations and does not, therefore, conform strictly to every element put down by Perry.

The 1948 Master Plan for a Colonial Capital set out residential patterns which resulted in racial group neighbourhoods but now it would appear that the neighbourhoods are based on income groups since racial discrimination is no longer allowed in an
independent Kenya. The housing units are grouped together in neighbourhood units depending on their types. The types of scheme reflects the socio-economic group for whom the scheme is meant. Thus mortgage housing schemes are suitable for the medium and high income groups who are able to pay for this type of housing. The low-income group would thus not fit in such a neighbourhood and site and service schemes are provided as an alternative or rental schemes at economic rent are provided by the local authorities for these groups. There is a disproportionate distribution of facilities and services in neighbourhoods based on socio-economic groups with the high income group getting the larger share; the development of infrastructure is also better favoured in the middle and high income residential areas while even some basic services lack in low-income residential areas. One of the arguments submitted for this discrepancy is that there is shortage of finance, unfavourable effect when considering that infrastructure in low income residential areas is developed through public finance. The municipal revenue has to be balanced against expenditure on various sectors including housing.

2.3.3.4.1 Other Variations

The merits of neighbourhood planning are that with the grouping of housing goes the provision of facilities and services. This means that services are not going to be costly
and distances to the facilities are shortened.

The tendency in Kenya is to group net residential areas around a community of services in which are housing units called neighbourhoods. The neighbourhood units need not conform to the sizes proposed by Perry. Where there is virgin land residential areas have been planned on much larger scale. The Buru Buru Housing Scheme in Nairobi is designed in 6 units, each of 5,000 population. The whole scheme is for 30,000 people: meant for middle income group. Facilities are grouped, and distributed where possibly, for use by the whole community. In the new site and service schemes in Nairobi, e.g. Dandora, the neighbourhood is regarded as a community of 20,000 people; the hierarchy of community levels comprises neighbourhood of 5,000 people.

The application of neighbourhood principle on smaller towns is based on a particular activity, for example, the paper mill at Webuye, the sugar factory at Mumias. In many small towns the addition to housing stock may be very small. In these cases housing units may be built to take advantage of facilities existing in the old residential areas.

The principle is also used in redevelopment areas especially in Nairobi at Mathare Valley.

It is not relevant to have a neighbourhood population
based on need to maintain primary school capacity. The 1969 census revealed that 21% of the population was of primary school age (6-12); assuming that 100% of these children attend school in view of the free primary education (Class 1-V), and that one stream primary school has 280 pupils (7 x 40 i.e 7 classes each with 40 pupils), a neighbourhood population of about 1,400 would be served. Splitting of neighbourhood to this level is not economical. It is possible to house this population in only a few blocks of flats which may not be considered a neighbourhood in real terms. If density is low and household size is 4, this means 350 families on a land of 35 ha., that is when the plots are large at 0.1 ha per family. This works to 10 families per ha. The size of 160 acres (64.8 ha) in Perry's proposal would accommodate more population, almost twice as the resultant population calculated to be served by one primary school above. This shows that the question of standards and population size for neighbourhood are interrelated and debatable.

Even where the threshold population does not necessitate the provision of a primary school, the school will have to be provided in the absence of any nearby existing one.

2.4 Provision of facilities seen relation to the population and seen in relation to changes in the population structure

One of the objectives of neighbourhood planning is to ensure the best use of available land providing private,
commercial and public amenities for the residents of the area concerned. Over the years it has become necessary to provide community facilities to form part of the integrated development in a residential area. Community facilities include a wide range of public and, or, semi-public facilities provided on-site. These include schools, playgrounds, health services, health clinics, dispensaries; social centres, shops and markets, police and fire stations, recreation and religious buildings. Utilities and services are also provided.

The operational scale of these facilities depend on the size of the population served. The planning standards for the facilities are worked according to the population changes both in structure and numbers, different facilities are needed. This has been the case in urban areas in Africa where between the last 10 –15 years, the towns have grown beyond imagination and are now presenting problems of maintenance and sustenance through the previously envisaged resources. Standards which the urban centres can afford have therefore to be developed.

2.5 Traffic Circulation and Traffic Segregation.

There is need for traffic circulation in towns since it is hard to imagine a town functioning without the mobility of people and goods.
In the town and in the residential areas circulation is dependent on the modes of transport. Vehicular traffic will demand more space and necessitate a hierarchy of road system for the distribution of traffic.

In a residential area it is now considered that pedestrian network is a safer network. Vehicular circulation in a residential area depends on car ownership which necessitates use of a lot of land. The proportion to which circulation must be allocated in comparison with other components of land use profile must be known in order that a proper access is maintained for the residential areas.

The role that traffic circulation and traffic segregation plays in planning standards is thus seen in the light of land use proportions. Bye-laws insist on vehicular access to the plots. This has been the case for Nairobi. Main roads define the outer limit of a neighbourhood and thus minimise the room for traffic segregation. The main roads are connected to local distributors and arteries in the neighbourhood. There is also provision for pedestrians by way of footpaths in the neighbourhood where internal traffic is slow. Along the main roads in Kenya urban centres the provision for pedestrian and cyclists has been very poor.

2.5.1 Need for traffic segregation

1. To assess and provide adequate facilities for
each type of traffic.

2. To ensure safety and efficiency in the operation of each type of traffic.

3. To co-ordinate the location and function of each type of traffic routes and terminal facilities for the purposes of convenience and time saving.

4. To derive an appropriate hierarchical classification of the highway or road network system that ensures the separation of various traffic.

5. To ensure and ascertain the provision of various environmental, safety and aesthetic amenities for various traffic and class of highway.

6. To ensure a sound environmental protection from traffic nuisance.

The principles of separation would serve a better purpose if it is done on a large scale - if possible to the whole town, rather than only to a small portion. The implication is that more urban space will be needed to accomplish traffic segregation.

Traffic segregation can be achieved through:

a) Separation of various urban functions to avoid a heterogenous mix of traffic within a particular functional area.
b) Routing traffic according to the particular classification of highway, that is limiting access to the function area to particular kind of traffic only.

c) By technically designing and constructing required facilities for each type of traffic in a manner which avoids conflict, that is cycle paths, pedestrian paths and underpasses or escalators; bus lanes.

d) Limiting the location terminals for public transport, with facilities for pedestrian traffic.

e) Timing separately, traffic signals at junctions for vehicular and pedestrian traffic.

In the Kenyan context traffic segregation has not been given emphasis. It is achieved to some extent in Nairobi using a combination of some of the above factors. In the new low income residential areas in Nairobi, e.g. Dandora site and service scheme, and the proposed World Bank project II, more attention is being given to the pedestrian circulation than has hitherto been done in other residential areas.

2.5.1.1 Early Ideas on Traffic Segregation

Contributions by various people have influenced
traffic separation.

Perry saw the necessity of separating pedestrians from moving vehicles when he postulated the neighbourhood idea. One of the objectives in his neighbourhood theory was provision of a special street system; main arterial streets were to be designed to carry heavy through traffic which was to be discouraged within the neighbourhood unit. The streets would make local circulation easy; and even after eliminating through traffic, pedestrians would be segregated from moving vehicles, and underpasses constructed where necessary.

The planning of Radburn, New Jersey (U.S.A.) which was based on neighbourhood unit principle had included the segregation of traffic.

"There was in fact to be complete segregation between the pedestrian and the motor car." (2.9)

Further work of protecting the people from the hazards of traffic was advanced by Le Corbusier in his plan for "La Ville Radiuse" which he explained in his book "Urbanisme".

"He proposed three different classes of roads, one, at the lowest level, for heavy traffic collecting and delivering goods, above these the network of ordinary access streets, above again on concrete viaducts, the two great axes of the city - arterial roads for one-way traffic linked at half mile intervals to the
lower systems. The subsidiary street pattern would be a grid-iron at 400 yards intervals, thus reducing the number of cross roads to a minimum but not exceeding the distance which could conveniently be walked" (2.10)

In 1942, Sir Alker Tripp, put up the theory of "precinct" planning. Each road would function for a particular purpose and each would be an arterial forming part of the national network. He distinguished between arterials, sub-arterials, and local road. Roads connecting the national network with towns were given the name of sub-arterials; local roads with limited access to sub-arterials and none to arterial roads. Within these system areas such as shopping, residential, industrial would be planned; each was to be served by a local system or minor roads. Each area was to be a centre of life and activity or 'precinct' as Tripp named it.

Both the traffic element in the neighbourhood theory and Alker Trip's 'precincts' can go along way in answering the traffic segregation and hence ensure safety if the principles are taken seriously. They are reinforced by Colin Buchanan's concept of "environmental areas" or environmental units" whereby towns would be subdivided into areas where vehicles only have very limited penetration and the pedestrian is dominant. The concept of environmental areas is today attracting support of many town planners, architects and engineers because of its essence of the problem of the motor-age.
It stresses the primacy of the pedestrian. While facing the new challenge posed by changing social conditions to enable the environment to suit the new needs of the motor age.

2.6 Source of Planning Standards in Kenya

Planning standards in Kenya have been based mainly on British experience. Some of the planning standards have evolved out of local experience and there is no clear cut boundary between what is borrowed and what is local. Transfer of planning technology between the two countries has been taking place through various means: textbooks on planning are mainly imported from Britain; there are expatriates working in planning institutions and in consultancy firms, most teachers in planning and town planners have had their training from British planning institutions.

Various sources of planning standards in Kenya include the Building Code (By-laws) 1968 Grade 1 and Grade 11, the Town Planning Handbook of June, 1971, development planning, policies, and bodies involved in housing development. The National Housing Corporation is one of such a body. It has set guidelines for its own site and service schemes. The Housing Research and Development Unit is charged with research for low cost...
housing. It is an active body and has suggested standards for Kibera experimental scheme and general standards for site and service schemes. The City Council of Nairobi is a special case because in addition to these sources it has its own bye-laws:—

The Nairobi Municipality Building Bye-laws 1948; recent development on planning standards has been done by the Nairobi Urban Study Group (NUSG)—Metropolitan Growth Strategy, 1973, which is now being applied in such areas as Dandora site and service scheme. The NUSG standards could also form a work of reference by the other urban centres. Textbooks such as Lewis Keeble: The Principles and Practice of Town and Country Planning, also form a basis of reference; the catchment population of schools in Kenya has been borrowed from this book. The standards from some of these sources have been given a comparative tabulation in chapter three, table 3.2.

Only the Kenya Building Code and the Nairobi Municipality Building By-laws, 1948, are pieces of legislation. The other sources are from planning institutions. To reinforce planning standards there are planning legislations which govern and control the use of urban land. These include the Health Act, Town Planning Act, etc. A brief discussion of these legislations has been given in chapter three to try/assess how they have played their respective
roles in influencing planning standards. The Building Code and the Health Act are mainly concerned with construction, building and sanitary quality.

Except for Nairobi, the other urban centres do not have zoning and subdivision by-laws.

2.6.1 Town Planning Department Handbook, June 1971

Analysis of this work has been done in chapter 3. The Physical Planning Department in the Ministry of Lands and Settlement, is charged with preparing urban development plans in the whole country. The Department performs this duty on behalf of the local authorities. Although local authorities are empowered to act as planning agencies within their own areas of jurisdiction, most of them have so far not been able to set up their own planning departments; only Nairobi and Mombasa have been able to establish full operational departments; while Thika and Kisumu Municipalities have engaged their own planners but they are more of development controllers, the long term development and short term development plans are still prepared by the Physical Planning Department.

Physical Planning examines the physical aspects of development and lays a strategy for proper siting of all infrastructure and superstructure thus setting the physical base upon which national, regional, and local economic development takes place. It is also necessary that the layout in the urban centres be
guided by space and planning standards. The Department has set a few of planning standards in the Town Planning Department Handbook.

The standards can be set locally. Site area standards for education facilities in "recognized centres (were set) as agreed between the Ministry of Education, the Commissioner of Lands and the Town Planning Adviser at a meeting held on September 8th, 1970. (2.11)

2.6.2 Policy Guidelines

Policy guidelines may also become a source of planning standards. In the Kenya Development Plan 1974 - 78 the Government’s housing policy is laid down as follows:

"The Government’s long term objective is to build as rapidly as possible a national stock of housing of a minimum standard with basic standards of privacy and security providing a healthy environment for all".

The minimum standard referred to here is as follows:’

"...housing design and construction (to) conform to Government standards and that each housing unit constructed in urban areas shall have at least two rooms, plus its own kitchen and toilet."

Any housing authority will, therefore try to conform
to this standard as much as possible.

2.6.3 **Borrowing from other sources**

The impression that the author got from his attitudinal survey among a number of planners is that the planner has a discretion as to how he applies the standards and where he borrows them when planning. In some cases even the text books may be consulted and the standards indicated in them, obviously applied in other countries, are used as a frame of reference.

2.7. **SUMMARY**

The evolution of planning standards is totally related to the development of planning itself. The objects of town and country planning have over the years become increasingly understood and accepted by the governments the world over. Primarily, these objectives are to secure a proper balance between the competing demands for land, so that the land in a country is used in the best interests of the whole people. Urban areas are man-made environment the creation of which has many variables. Planning has a relatively limited umpire role in relation to the land, the main resource for which it has some responsibility. The key issues which relate to environmental quality are:
1. Resource allocation
2. Equity and choice
3. Acceptable standards.

Better planning for residential areas arose out of the concern for urban efficiency, public health and improving the environment in which people live and work.

Later day planners have continued to improve on the concept developed by earlier planners as a basis for planning and development of better residential areas. The planners are faced with critical aspects of new development that town planning has to tackle: these are the balance of functions and facilities that are necessary for a healthy community. In doing so the planners have to formulate planning standards that act as guiding tools in allocating urban space and in providing this balance.

The acceptability of people to live closely clustered together in towns demand certain level of services, the development of infrastructure and the standards for the kind of infrastructure; demand is also laid on the design and layout of the settlement so as to provide a good environment. The formulation of standards, therefore, from the earliest beginning proves important in that it will give form to the future urban community.
REFERENCES

2.2 Gerald Burke Town in the Making Edward Arnold (1971) p.154-176
2.3 Gallion, op. cit. p. 171
2.4 Ibid, p.172
2.6 Joseph De Chiara,: Lee Koppelman Planning Design Criteria (1969)
2.9 John Tetlow and Anthony Goss Homes towns and Traffic Faber and Faber (1965 and 1968) p. 43
2.10 Ibid, pp.49-55
2.11 Physical Planning Department Town Planning Handbook, 1971
CHAPTER THREE

3. ANALYSIS OF TOWN PLANNING DEPARTMENT HANDBOOK
(JUNE 1971), AND SOME IMPORTANT LEGISLATION
INFLUENCING PLANNING STANDARDS IN KENYA

3.1 Town Planning Handbook, June 1971
3.1.1 Purpose and scope

The Town Planning Handbook, June 1971, acts as a frame of reference to the planners in the Physical Planning Department of the Ministry of Lands and Settlement and it may also be referred to by other planning agencies. The Town Planning Department Handbook is to inform on and to regularize as far as possible the day to day procedures and work of the department (3.1).

At its preparation it was intended to be subject to change and room was indicated for amendment but so far it has not been reviewed on the basis of changes of urban development which may have occurred since then.

The Town Planning Department Handbook is not a comprehensive document as it were and in this respect it does not try to go beyond outlining the trend of physical planning in Kenyan towns. In its general outline it covers areas thought necessary for urban development planning in Kenya. Such areas are: the concept concerning the hierarchy of and growth policy for towns which looks into the rank of service centres related to their functions within the national and
regional planning system; the general approach to urban plan preparation is also looked into; it also lays down the planning procedures to be observed by the planners; at the same time the types of land uses are listed down and planning standards for the future need of urban land are indicated; densities of residential areas are given a special treatment. Other aspects dealt with include planning standards for the traffic network, and methods of calculating overall land requirements for a growing town.

It is not essential for this study to go into every aspect dealt with by the Town Planning Department Handbook because to do so would merely be a reiteration of what the Handbook has said. The more crucial aspects which are of relevance to the study have been looked into below.

3.2 The Planning Process

The planning process is a dynamic and continuous process.

"Planning is a continuous process consisting of repeated cycles of goal formulation, plan generation and evaluation, capable of rapid adaptation in response to new information or new objectives" (3.2)

The idea of master planning has been applied in town planning. In itself the master plan is intended to provide the local authority e.g. a municipality
with a survey of the existing development, the guidelines for requisite expansion and its co-ordination with communications, recreational areas, service amenities and other physical elements of importance to the urban functions. The master plan is then followed by detailed development plans which are drawn up on the basis of outline plan. The object of the detailed development plan is to provide maps showing the exact locations of buildings and public works within the official boundaries of the area under consideration. Detailed plans serve as the official planning instrument for approval. They provide a basis of more rational determination of property boundaries and also exert stringent control over land use.

In Kenya a similar process of planning is followed in what is generally known as short term and long term development as will be seen in the next sub-heading.

3.2.1 Long term and Short term Development Planning

Long term structure plans are drawn up where a significant growth can confidently be predicted. At present this is being done by the Physical Planning Department so as to cover all principal towns in the country and all other major urban centres. The long term plan acts only as a guideline for future land use and need not be approved by the Commissioner of Lands.

Short term plans are drawn in order to accommodate a foreseeable urban growth. This is a short term measure,
usually meant to cover a period of five years. It is considered that detailed land use plans which attempt to cater for demands beyond this period are likely to become obsolete before they are implemented. The short term plans have to be approved by the Commissioner of Lands under whose authority the responsibility for guiding and control of land use in urban areas falls.

An approved development plan becomes an authoritative work of reference for any developer whether private or public. However, there are cases where minor amendments may have to be introduced to an approved development plan; or where there is need to cater for an urgent requirement which cannot await the production of a full development plan. In such cases part development plans are prepared and submitted to the Commissioner of Lands for his approval.

3.2.2 Implementation

The Physical Planning Department prepares the Physical Development Plans. The implementation of the plans is through other agencies, thus:-

(a) Central Government, agencies

i) Commissioner of Lands
   - he formalises the plan
   - reconciles interests in land
   - he also reconciles technical interests;
   
   the plan is circulated to the Survey of Kenya, Ministry of Works since the Ministry deals with roads construction,
to a local authority e.g. a municipality which is covered by the plan. All these different bodies put in their comments, their proposals and complaints.

- In effect the Commissioner of Lands accords the plan the legal status. The approval is in principle subject to other changes.

ii) The Health Department

- It is empowered to look into the matters affecting the health and environmental quality of a planning scheme especially those relating to housing standards and sanitary control.

iii) Administration - District Commissioner acts as a government representative and interprets the law to the people. His office can be used for enforcement of the requirements of the development plan since it can provide 'police' duties,

b) Local Authorities, Ministries, etc.

Ministries and other development agencies have the responsibility of implementing agreed policies and proposals.

The strongest powers for implementation rests with the local authorities. They are in themselves planning agencies but lack of finance has handicapped most of them in providing planning departments of
their own: They are empowered to prepare their own planning schemes and also to make their own by-laws. The local authority utilizes its resources including finance to develop, according to the plan, the area within its jurisdiction.

3.2.2.1 Weaknesses

The type of relationship that exist between a planning agency and an implementing body where the former acts only in an advisory capacity may be good to the extent that the planning agency does not have any resources to implement the plans. The Physical Planning Department serves in an advisory capacity only. It monitors the plans and also co-ordinates with the development agencies during the implementation. There is a close relationship between planning process and development process. The planner comes in development control but he lacks control on development process. Where the relationship between planning process and development process is weak the effective direction of the plan and the enforcement of planning standards by the planner becomes ineffective. Uncontrolled development is witnessed in many urban centres in Kenya. The Department does not have power to prevent such kind of development. The local authorities in whose hands such power is vested may be unwilling to stop such kind of development because of political reasory or because they do not have enough manpower to go around.
The other weakness in when the role of formulating planning standards by a national planning agency like the Physical Planning Department is considered. The question begged is which standards should be left to the local authority for formulation. A distinction is drawn between engineering standards and societal norms. Engineering standards are easily comparable and can be applied uniformly in every area. Societal norms relate to what the community wants and these should as far as possible be left to the local authority to formulate them.

3.3 Planning Process to make Land Available for Development.

The availability of land for urban development e.g. for housing, is constrained by legislation and the process mainly depends on the ownership of land. Government land is easily obtainable and is governed by the Government Land Act, or freehold land is not so easily obtainable. Section 75 of the Constitution of Kenya Act, 1969, states that no property or interest of any description shall be taken possession of or compulsory acquired for any purpose except in the interests of defence, public safety, public order, public morality, public health, town and country planning or the development or utilization of any property in such a manner as to promote public benefit. Prompt compensation is provided for and appeal is to
the High Court.

The Land Acquisition Act, 1968, provides for the compulsory acquisition of land in accordance with the above section.

It is beyond the scope of this study, to go into the details and implications of the various legislation affecting land availability for urban development. Plans for private land are prepared along with the whole development plan. This form the basis of a development control and implementation policy. Although the Commissioner of Lands does approve the short term plans his approval to a plan for private land which is not submitted by the land owners is informal and the Commissioner of Lands cannot simply give formal approval since there is no legislation which will allow him to do so.

3.3.1 Planning Process to Make Land Available for Housing

The following steps will show the planning process followed to make the land available for housing. The steps are on instruction to physical planning officers from the Director of Physical Planning (3.3).

Although the procedure set out in the letter refers specifically to site and service schemes, the procedure applies to all housing schemes and is therefore of wider importance.
After the number of units for a housing scheme are known, the planning machinery for making the land available is set in motion.

The steps are as follows:

STEP 1 The Provincial Physical Planning Officer prepares a preliminary part development plan for the purpose of site identification.

STEP 2 The preliminary part development plan is circulated to:
- the Director of Physical Planning
- the General Manager of the National Housing Corporation
- the Local Authority concerned

STEP 3 The National Housing Corporation (or its consultants) prepare a preliminary detailed plot layout plan related to the site identified by a part development plan or a site indicated in the short term development plan.

STEP 4 The National Housing Corporation circulates the detailed plot layout plan to:
- the local authority concerned
- the Provincial Physical Planning Officer
- the Director of Physical Planning

STEP 5 The Provincial Physical Planning Officer directs his comments to the Director of Physical Planning.

STEP 6 The Director of Physical Planning forwards the
comments of the Provincial Physical Planning officer, together with his own comments to the National Housing Corporation.

**STEP 7**  The National Housing Corporation (or its consultants) adjusts the detailed plot layout plan according to the comments received.

**STEP 8**  The National Housing Corporation forwards the final version of the detailed plot layout plan to the Director of Physical Planning for approval.

**STEP 9**  The Director of Physical Planning approves and adopts the detailed plot layout.

**STEP 10**  The Provincial Physical Planning Officer incorporates the (approved) detailed plot layout in the part development plan and circulates this for comments in the normal manner.

**STEP 11**  The final part development plan is forwarded to the Commissioner of Lands for his approval.

**STEP 12**  The National Housing Corporation or the Local Authority applies to the Commissioner of Lands for the land to be reserved for the intended purpose.

**STEP 13**  The plots are surveyed and development can commence.
The whole of this process go to show the procedure taken in the acceptability of the plan. In built in the plan are the planning standards which means therefore that the process is also a test of acceptability of the planning standards. The planning standards are either borrowed from the Town Planning Department Handbook or from another source altogether; the National Housing Corporation for example has developed its own space standards for site and service schemes.

3.4 Planning Standards Indicated in the Town Planning Department Handbook

The Town Planning Department Handbook has indicated some minimum planning standards to which the planner may refer to when preparing a development plan or when allocating space in an urban area.

An enquiry was made by the author of whether the standards given in the handbook have evolved as a result of local experience or were borrowed from elsewhere. It was found out that borrowing has been mainly from British experience but there is no clear cut boundary between what is borrowed and what has been evaluated on the basis of Kenyan experience. Although the application of planning standards should be localised as much as possible it is instructive to borrow from international experience, and to make comparisons of planning standards, land use allocation and those of the more developed countries who have had a longer history in planning.
Their failures and successes can enable us to reach conclusions as to the form and structure of our urban areas and draw implications for the future.

The table below gives the planning standards as specified in the Town Planning Department Handbook.

### Table 3.1 Town Planning Department Handbook Standards

<table>
<thead>
<tr>
<th>Type of Land Use</th>
<th>PLANNING STANDARD INDICATED</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petrol Service station</td>
<td>120’ x 100’ (frontage) (depth) or approx. 36.6m x30.5m (Where no service facility is provided the depth may be reduced to 50ft. (15.2m). Large vehicles may require a 70ft. (21.3m) turning circle</td>
<td>The dimensions are given in imperial system. Conversion to metric is by the author. The planning standards for all other commercial uses have not been given.</td>
</tr>
<tr>
<td><strong>Educational</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Nursery School</td>
<td>100 pupils  (0.3ha) 2500</td>
<td>i) Ministry of Education policy is to build 3 and 4 stream schools wherever possible</td>
</tr>
<tr>
<td>2) Primary School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Day School</td>
<td>350 (1 stream) 3acres (1.2ha)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>700 (2 streams) 4acres (1.82ha)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1050-1500 (3-4 stream) 6acres (2.43ha) 5000 for 2 streams</td>
<td>ii) One acre or 0.4ha demonstration site to be added where agriculture is a major element in the curriculum.</td>
</tr>
</tbody>
</table>
ii) Boarding School
- Same as for day school.
- Additional one acre or 0.4ha per 200 boarders

iii) 2|acres or 1 ha extra allowed for staff housing (30 units) if on school site

iv) No minimum distances relative to the residential areas have been given

3) Secondary School
i) Day School 720-1200 (3-5 streams)
- 15 acres (6.07ha) plus 2.7ha or 1ha for staff housing

ii) Boarding School 720 (3 streams)
- 35a (14.2ha)

1200 (5 streams)
- 45a (18.2ha)

iii) Technical
- Same as for the secondary schools

4. Teacher Training
- 500
- 35a (14.2ha)

Transportation

Road Reserves
1. Local roads
- 15m

2. Secondary distributors
- 25m

3. Primary distributors
- 30m

4. Urban freeway
- 35m

5. Regional trunk road
- 40m

Site area includes one acre

K culture education site

Includes staff housing, playing fields etc.

No population interval given

Including staff housing. Population interval not necessary as distribution is on national basis

Residential

1. Administration
- Government housing forms a particular housing of its own. The Town Planning Department Handbook has given land use requirements for Government housing at a District Headquarters as in Appendix
2. Usual Housing.

Type of Development | Plot sizes
---|---
i) detached housing | 1/16 acre (0.025 ha) i.e. 40' x 70' (12.19 m x 21.34 m)
ii) Medium density | 1/8 acre (0.05 ha) i.e. 5' x 95' (13.72 m x 28.96 m)
iii) Low density - high cost | 1 acre (0.4 ha) i.e. 24.38 m x 36.58 m
iv) Site & Service Scheme - low cost, high density | 1/16 acre (0.025 ha) i.e. 40' x 70' (11 m x 22 m)

3. Density level

- 150 persons/acre net or 370 persons/ha for high density areas.
- 80 persons/acre or 197 persons per ha in neighbourhood density in high density areas.

Most people will normally be accommodated in high density schemes, and the residential land requirement is generally calculated on this high density basis. There is a great difference between the high and low density.

Recreation

Minor open space | Between 1/4 and 1 acre i.e. 0.2 ha and 0.4 ha

To be accessible to any residential plot at a distance not exceeding 1 mile or 0.16 km.
General:

Plinth area not to exceed 33 1/3 of site area.

Minimum 5.0" or (1.524m) distance from all boundaries,

Pit latrines to be minimum 15'.0" or (4.572m) from

habitable room or kitchen. No room to be less than 75 sq.ft.
(6.968 m²) with minimum 40 sq.ft. (3.7 m²) per person with
cooking and ablution facilities to approval.

General Comment

The Town Planning Department Handbook as it were
leaves out a wide scope of planning standards that
could be included in such a text if the handbook has to
be used for reference purposes. The inclusion of a wide
list of comprehensive planning standards should not
be taken to mean that an element of rigidity has been
introduced but rather that exactness in application of
planning standards is somehow given consideration.
Planning standards are given as minimum and therefore
they should have an inbuilt flexibility.

3.4.1 Planning Standards for residential areas

The planning standards for residential areas, especially
in respect to plot, sizes and density guidelines are shown
in table 3.1.

The author discussed with some planners in the
Department so as to get the criteria on which these
planning standards have been set. It would appear from
discussions that there is a lot of uncertainty. For example, it was
unclear on what basis a subdivision
scheme is done. Subdivision has been used, especially in Nairobi, to control and regulate density. Subdivision depends on whether the scheme is comprehensive one with many units on one plot. The basis for allowing sub-
division is whether the plot is sewered or not. Where there is provision of sewerage reticulation the sub-
division can be allowed to smaller units than in the case of places served with septic tanks.

The kind of infrastructure would determine the kind of density and plot size. Serviced areas would need small plots. Where there is no sewer large plot, sizes are provided. The general guideline for plot sizes in high density residential areas is the provision of 1/16 acre, or 0.025 ha plot. In Nairobi in some cases this is going down to 1/30 acre or 0.0135 ha.

The plot sizes given by the Town Planning Department Handbook are compared with those by other bodies in Table 3.2. It shows that it is possible to have a range of plot sizes. Assuming that by-laws Grade II are meant for low cost housing and that site and service schemes are also low cost, low income housing we see that this range is given as 100m to 293.75 m. Flexibility would mean that different sizes of plots would be distributed in a residential area so that different, income levels within the low income group can be catered for.
Table 3:2 Comparison of standards in T.P.D. Handbook with standards from other sources.
\

\

Sourc«

\

\

\

Building Code
(By-Laws)1968
Grade I Grade
II

Standard foi\
plot a^ze:Area m

260

Physical
planning
Dept.
Town
planning
Handbook:
1971

S.H.C.
Technical
Branch
Manual

262(min

to be

derived

N «H•C•
Site A
Service
Guildelinea

293.75

from

Nairobi
City
Council
Zoning
Regulations

N. H. C.
Merril
Heport

HRDU 4
Site
Service
Analysis
and Report

HRDU
Eibera
Ex peri
mental
self-help
scheme

Worlid
Bank
Dandora
Site A
Service
scheme

200(Kin)
4000(max.)

168
(min)
242
(•ax)

I60(ain)

110-

100,120,
140,160

300(mar)

160

built
-Dimension

(»)

(width/depth)

9.0
(min)

-width:depth

plot use:
-coverage

-

—

of plot
area)

—

-

area)

-

X

33 max.)
25
(later)
to 33
max)

-plot ratio

(plot area/
built floor

11.Ox
22.0(min.)

0.33

0.33
(Mombasa
ft Nairobi
0.75 flats)

areax
coverage
+ sp&ce3

width of
building
plus 2.5+
1.0 or
2.5
(windows)
33 min.

7.7x
25.0,
16.0

12.5x
23.5
v,.9

v,.5
(min.)

-

%

>s.o(-x.:
50 max.

one
dwelling

6.3x15.75
7.35x
22.06

V/

I

2.5

VS.3

up to
50

33.3

0.50

0.33

50 max.

23 min.
60 max.

-50 max.

0.33

0.50
max.

0.33
-0.75
(flats)

0.50

0.23
0.60

j


- Habitable rooms/plot: 1
- Number of floors: 4
- KiniauiB distances:
  - to front boundary: 6.1 m, 1.52 m
  - to rear boundary: 2.44 m, 1.52 m
  - to side boundaries: 2.44 m, 1.52 m
  - to side boundaries (inflammable material): 3.05 m, 3.05 m
  - opposite windows: 1.52 m, 2.44 m

- By-laws II and 6.1
- Art. 152

- one to multi storey
4 to 6  
1.52

By-laws II

3 to 4

3 to 5

1.52  

By-laws II

0

Partly

One side space of 4.50 (partly)

One side space of 3.15-4.20 (partly)
<table>
<thead>
<tr>
<th>Pit latrines: min. distance to:</th>
<th>4.75</th>
<th>pit latrine of neighbour-</th>
<th>4.50</th>
<th>3.15-4.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>- plot boundaries</td>
<td></td>
<td>hood plots allowed on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- habitable rooms</td>
<td>9.15</td>
<td>plot boundary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- habitable rooms</td>
<td>9.15</td>
<td>(may be</td>
<td>18.75</td>
<td>33.0</td>
</tr>
<tr>
<td>Courtyards</td>
<td>31</td>
<td>waived by</td>
<td>2.50</td>
<td>34.0</td>
</tr>
<tr>
<td>- m.m. area m</td>
<td></td>
<td>NHC.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- min. diaens Lm* (n)</td>
<td>4.5</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Densities:

- habitable rooms per net ha. (residential land)

- low

- medium

- high

Density given gross in persons

<table>
<thead>
<tr>
<th>Density</th>
<th>per ha</th>
<th>Vol. I A II i.e.</th>
<th>45 plots x 3.5 rooms (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>more than 100</td>
<td>100-150</td>
<td>150</td>
<td>= 157</td>
</tr>
<tr>
<td>75</td>
<td>100 min</td>
<td>150 approx</td>
<td>= 206</td>
</tr>
<tr>
<td>150 (flats)</td>
<td>250 flats</td>
<td>single floor detached (type plans)</td>
<td>single floor detached</td>
</tr>
</tbody>
</table>

Recommended building type

- detached
- single floor detached
- single floor
- multi-storey
- single floor but envisages
- 2-storey
- single floor detached (type plans)
- all types (unspecified)
- single floor detached
- single floor detached
- single floor semi-detached
- single floor courtyard type
| Remarks | Art. 153-154 preclude row-terrace housing sometime interpreted ref. Grade I revision envisaged as at 1973 reflects latest developments 1976 contains old City by-laws council minimum NUSG NUSG Reports |
|---|---|---|---|---|---|

Source: Author's compilation from the indicated sources.

Abb: NHC = National Housing Corporation; HRDTJ = Housing Research and Development Unit.
3.4.1.1 Guiding Criteria for Density and Plot Sizes

Density and plot sizes are interrelated in a way. As it is in the Town Planning Department Handbook, the standards given have a tendency of being applied uniformly in all urban areas, a practice which would overlook a number of factors.

The factors which may be considered in formulating planning standards for residential areas have not been taken account of in the Town Planning Department Handbook. These factors should be seen to influence plot sizes, plot use and densities. They include:

1. Urban size and residential pattern:

In Kenya the urban centres which experience most urban problems in terms of rapid population growth and inavailability of land for housing are Nairobi and Mombasa. Other urban centres are smaller in size and the above problems may not be so acute. In fact as the strategy for urbanisation points out the urban centres would be of different sizes catering for different populations. Some centres are small; they do not have problems of land availability and they are within reach of the countryside such that when it makes sense to talk of open space in a big city like Nairobi it does not make sense to talk of the same thing in these centres. The implication here is that it would not be advisable to develop all urban areas with the same residential density.
The residential pattern in an urban area is also of prime importance. In developed western countries the distribution of density through the urban areas is quite different from what we experience here. The fundamental law (in Western cities) is that density tends to fall off as a negative exponential function of increasing distance from the centre of urban areas (3).

That is,
\[ y = Ae^{-bx} \]

where:
- \( y \) = gross residential density measured in persons/ha
- \( x \) = distance from the centre of the city in kms.
  (except in central business zone).

It will be seen that \( A \) is the density at the centre of the city, where \( x \) is zero; or rather a hypothetical density, which would be found if the observed densities were extrapolated inwards towards the centre of the city. In fact the centre of the city is mainly occupied by business and public buildings.

The coefficient \( b \), on the other hand which may vary very greatly between cities, is best considered as a measure of the spread or 'sprawl' of a city. With a high value of \( b \) the city is compact, i.e. density falls off rapidly to rural levels at quite a short distance from the centre. With a low value of \( b \) density falls off gradually and the city spreads out over a considerable distance before rural density is reached. The
The coefficient \( b \) must be determined in the first instance by transport factors. Without a cheap and adequate system of transport people are very unlikely to build their city in a dispersed manner."

This is of course quite different, from the situation obtaining in our own experience. We do not have the urban area proper - the compact high density, and fully built up area; surrounded by very low density areas where rural activities could be carried out. Instead we have the urban area proper surrounded by high densities at urban fringes where rural activities of a transitional nature are carried out. This condition has been brought about by historical as well as political reasons including the social economic factors such as the high standards required by building and planning regulations in the urban proper area. These factors have necessitated illegal and uncontrolled settlements in the peri-urban areas where the densities are high and the provision of facilities is minimal. In designating density levels and plot sizes this factor could be accommodated if those areas within the urban boundaries that are used for rural purposes do not at some future date frustrate orderly urban development.

What this section suggests is that planning standards could be formulated on a sliding scale to cater for the different zones of an urban area.
2. **Climate**

It would appear that those few planning standards in the Town Planning Department Handbook are applicable all over Kenya and no account is taken of the different climates prevailing in different areas of the country. Although the climates are not in themselves so wide ranging, it has been made clear in the Housing Research and Development Unit publication (3.5), that Kenya can be subdivided in six distinct climatic/comfort zones, namely; Coast, semi-Desert, Savannah, Lake, Highland and Upper Highland; or more simply:-

1. Temperate areas - Highlands
2. Hot-humid - Coastal & Lake regions
3. Hot-dry - Semi desert.

In these areas the requirements governing site planning, plot size, indoor and outdoor space, density levels, could vary. It is obvious from the recommendations and conclusions contained in the above report (though mainly dealing with standards of buildings) could be applicable in cases of planning standards as well, and should differ for the various zones. Fortunately most urban centres are in the temperate zone and it would be easier to formulate standards applicable in a wider area.

3. **Type of Housing Development**

It is important to relate the residential pattern with the housing development so that the required pattern can
be achieved. This is seen as a way of minimizing costs in terms of infrastructure and transport.

Site only development could be suited to areas in the outskirts of the city. The plots would be big enough to enable rural activities to be carried on them. Site and service schemes could preferably be supplied near the areas of employment and in the peri-urban areas to allow for high density. Complete housing could be provided in the urban proper areas.

In each case the density, plot sizes, would have to be different.

4. **Grouping Type**

In connection with the type of housing development the grouping of houses should be taken into account and the plot ratio, plot coverage be expressed accordingly.

Multi-storey tenements, for example, cost more to construct yet save on transport and other infrastructure costs; on the other hand, low rise housing costs less to construct but occupies more space. The point of trade off between these two can be found only when the entire urban system is examined so that grouping and allocation of space can be done in
the most economical way in total cost per family - including roads, services, schools, green areas and mass transportation systems.

Grouping of dwellings can be of two aspects

1. Vertical
   - single storey
   - double storey
   - walk-ap
   - high rise/elevator

2. Horizontal
   - detached
   - semi-detached
   - row/terraced/
   - grouped/
   - courtyard

5. Dwelling Size and Floor Space Allocation per person

The dwelling size is seen in relation to type of housing development and grouping type. It is further seen in relation to floor space allocation. The floor space allocation per person includes the indoor and outdoor space. This factor is important especially when dealing with low-cost, low income housing.

Most attempts at low-cost, low income housing perceive it only as a simplistic question of trying to pile as many dwelling units, as many cells, as possible on a given site. Provision of space for low-cost, low income housing is considered secondary to the provision of a mere shelter. The provision of minimum space standards (within the house and around the houses) should form a convenient criteria in arriving at the dwelling size and floor space allocation per person.

6. Plot area, width, depth, plot use and plot layout

In addition to the above consideration
it is important to look at plot area and determine in what dimensions it will be expressed as regards the width and depth. The width and depth have a bearing on the plot layout and cost.

7. Land use Profile

Lastly it is a good criterion to consider the land use profile in a residential area making out distinctions as to the types and grouping. The manner in which land use proportions are determined and applied will very much influence the density, plot sizes and layout.

Land use profile should show the area allocated for
1. access (circulation)
2. semi public use
3. Built up area (residential)
4. Private and open spaces

8. Densities

Establishing densities would depend on all of the above factors. In addition density would be influenced by other external factors such as housing supply and demand, cost and affordability of housing which have a bearing on occupancy rates.

Below in Table 3.3 is shown the resultant densities from dwelling size and floor space allocation. An occupancy rate of 4 persons per room is assumed since
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>plot dimension (width/depth -)</td>
<td>12x21</td>
<td>12.5x23.5</td>
<td>10x20</td>
<td>8x20</td>
<td>12.5x20</td>
<td>10x20</td>
</tr>
<tr>
<td>lot area m²</td>
<td>252</td>
<td>293.5</td>
<td>200</td>
<td>160</td>
<td>250</td>
<td>200</td>
</tr>
<tr>
<td>plot coverage %</td>
<td>33.3</td>
<td>upto 50</td>
<td>33.3</td>
<td>33.3</td>
<td>33.3</td>
<td>33.3</td>
</tr>
<tr>
<td>Built up area m² (outside measures)</td>
<td>84</td>
<td>125</td>
<td>66</td>
<td>53</td>
<td>83</td>
<td>66</td>
</tr>
<tr>
<td>non-built area</td>
<td>168</td>
<td>168.5</td>
<td>134</td>
<td>107</td>
<td>167</td>
<td>134</td>
</tr>
<tr>
<td>floor area (built up 1056 service: f)</td>
<td>76</td>
<td>113</td>
<td>60</td>
<td>48</td>
<td>75</td>
<td>60</td>
</tr>
<tr>
<td>Wo. of rooms/plot</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>So. of plot/ha</td>
<td>27</td>
<td>24</td>
<td>34</td>
<td>42</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td>So. of rooms/plot</td>
<td>1056</td>
<td>1056</td>
<td>1056</td>
<td>1056</td>
<td>1056</td>
<td>1056</td>
</tr>
<tr>
<td>So. of rooms/plot</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>So. of plot/ha</td>
<td>27</td>
<td>24</td>
<td>34</td>
<td>42</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td>Persons/plot</td>
<td>16</td>
<td>24</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>-------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Floor space per person $^2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1)outdoor</td>
<td>10.5</td>
<td>7.02</td>
<td>8.4</td>
<td>6.7</td>
<td>8.4</td>
<td>6.7</td>
</tr>
<tr>
<td>2)Indoor</td>
<td>4.75</td>
<td>4.7</td>
<td>3.75</td>
<td>3.0</td>
<td>3.75</td>
<td>3.0</td>
</tr>
<tr>
<td>Total 1+2</td>
<td>15.25</td>
<td>11.72</td>
<td>12.15</td>
<td>9.7</td>
<td>12.15</td>
<td>9.7</td>
</tr>
<tr>
<td>Density persons/ha. residential land</td>
<td>432</td>
<td>576</td>
<td>544</td>
<td>672</td>
<td>540</td>
<td>680</td>
</tr>
</tbody>
</table>

Source: Author's compilation from the above indicated sources.
Abbr. TPD—Town planning Department Handbook
HRDU * Housing Research Development Unit.
NHC • National Housing Corporation.
the standards picked are for low cost, low income housing and it is generally known for occupancy rates in such areas to be higher than 4. It is seen that the smaller the sizes of plots the higher the net residential density per hectare (832 persons/ha in case of Dandora); provision of more habitable rooms in a plot would also result to a high density since each room is occupied by a household. Where household in this case means all people living in one room.

It is beyond the scope of this study to provide empirical information on how all these variables would interplay so as to come out with planning standards that would be of application in urban areas for the low cost, low income residential areas. However, the criteria for formulating such standards is given above and considered useful.

3.5 The Building Code

The Kenya Building Code is one of the legislation that has, along with others, been instrumental in influencing planning and building standards. Although it is more concerned with housing quality and building materials, it also contributes to planning standards in that it deals with siting and space about buildings (Part 11 of Grade 1 by-laws); and minimum areas of plot and buildings thereon (Grade 11 by-laws). Thus it contributes to planning and design, regulation and control of a residential environment.
The building code of the Republic of Kenya comprises two distinct Local Government Orders:

a) The Local Government (Adoptive by-laws) (Building ) Order 1968, commonly referred to as the Grade I By-laws.
b) The Local Government (Adoptive By-laws) Grade II Building) Order 1968, commonly referred to as the Grade II By-laws.

The minimum planning standards in the Kenya Building Code are given in Table 3.4 below.

3.6 The Public Health Act (Laws of Kenya, Cap. 242)

This is one of the most powerful and influential instruments. It defines the quality of structure and the facilities that go with it. It emphasises on good sanitation thus ensuring a good and healthy environment of a residential area. It is also concerned with the engineering standards as regards the sewerage reticulation. The Act also defines the need for access.

The duty of the Medical Department as to overcrowding and density is defined in section 125.

"It shall be the duty of the Medical Department -

a) to collect, investigate and consider and publish the facts as to any overcrowding or bad or insufficient housing in the various districts of Kenya."
<table>
<thead>
<tr>
<th>PUSH IIC</th>
<th>GRADE II BT-LAVS</th>
<th>GRADE I BY-LAWS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. The plot</strong></td>
<td></td>
<td><strong>Small houses</strong></td>
</tr>
<tr>
<td>Minimum plot area</td>
<td>By-Law</td>
<td>By-Law</td>
</tr>
<tr>
<td>Maximum plot coverage</td>
<td>7 (1)</td>
<td>approved revision</td>
</tr>
<tr>
<td></td>
<td>7 (1)</td>
<td></td>
</tr>
<tr>
<td>Minimum space around buildings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to front boundary</td>
<td>7 (2) 1,525ft(^2) (5ft)</td>
<td></td>
</tr>
<tr>
<td>to side &amp; rear boundary</td>
<td>7 (2) 1.525ft(^2) (5ft)</td>
<td></td>
</tr>
<tr>
<td>Buildings of inflammable material to side boundary</td>
<td></td>
<td>94(4) 3.05m (10ft)</td>
</tr>
<tr>
<td>Exception for buildings (side and rear boundary)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (2) 3.05ft(^2) (10ft)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (2) latrine allowed on plot boundary when combined with other latrine on adjoining plot</td>
<td></td>
</tr>
</tbody>
</table>
2. Dimension of rooms

B. Habitable rooms

- minimum area
  - when more than one room, minimum area main room. 10(2)

- Minimum area per person 10(2)

- ditto when cooking in room
- ditto with two-tier bunks 2.80' (30ft) dormitories

- minimum width 10(2)

b. Kitchen

Minimum area 11

- ditto, one room dwelling
- ditto, covered cooking place
<table>
<thead>
<tr>
<th>159(4)</th>
<th>7(^{-1}) (75ft(^3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>159(4)</td>
<td>14m(^2) (150ft(^3))</td>
</tr>
<tr>
<td>159(4)</td>
<td>2.135m (7ft)</td>
</tr>
<tr>
<td>156(1)</td>
<td>5.6m(^2) (60ft(^3))</td>
</tr>
<tr>
<td>156(2)</td>
<td>3.25m(^2) (35ft(^3))</td>
</tr>
</tbody>
</table>
minimum width
• ditto,
  one room
  dwelling

* By-Law can be waived by Commissioner of Lands.
| 156(1) | 1.83B (6ft) |
| 156(5) | 1.22* Uft) |
|        | 1.37a (4 6) |
b) to inquire into the best methods of
dealing with any overcrowding or bad housing
so ascertained to exist;
c) to make or publish such recommendations as
may seem necessary in respect of the result of
any such investigation or enquiry.

Although the Medical Department is thus empowered
it appears that it has not been carrying on this duty as
witness the overcrowding in most urban areas. Nairobi
for example, has major housing problems due to the high rate
of urbanization in the last 15 years. This rate of growth
has not been matched by construction of adequate and
habitable dwellings or employment opportunities or provision
of community services. The net effect has been mushrooming
of shanties, slums, and informal employment and under-
employment in squalid and insanitary conditions for a
sizeable part of the population.

The Act also requires the local authorities to make
By-laws as to building and sanitation.

Section 126 A:-

Every municipal council and every urban and area
council may, and shall if so required by the
Minister (of Health), make by-laws for controlling
the space about buildings; the lighting and
ventilation of buildings and the dimensions of rooms
intended for human habitation.

The Medical Department has to recommend the building
and layout plans to the local authority for approval. The Department can either make objections or approve the plan. In the case of Dandora site and service scheme, which is dealt as a case study in Chapter four, the Medical Officer of Health made strong objections as to the standards adopted for Phase I and advised the Project Department to improve the standards in Phase II. The following are a few of the comments that were made by the Medical Officer of Health regarding Dandora Community Development Phase I (3.6)

1. The layout of the whole scheme lacks essential amenities and is bad in principle. For example no open spaces or recreation gardens are provided for and **the whole area will be a mass of buildings reminiscent of overcrowded camps**. The only open spaces provided for are mainly secondary murram roads, which are themselves a danger to health because of dust from speeding motor vehicles. The roads are straight and cut across the estate. The houses will be jutting into the roads. This will surely cause road accidents and deaths particularly to children who would run straight into the road when playing.
2. Dwellings, latrines, baths and kitchens are planned on a back to back fashion, making it impossible for efficient through or cross ventilation (contrary to By-law 14 of Grade 11 by-laws of the Building Code). If the purpose of this scheme is to substitute for slums and shanties thus improving people’s health, the scheme as constructed or envisaged will defeat that purpose. Such a compact mass of buildings with hardly any space for circulation of air and back to back dwellings will be the source of air borne, infectious diseases. Vermin infestations will easily spread to whole blocks from a focus and will be very difficult to deal with.

3. The general principle of providing means of inspection at all points of change of direction junctions and change of levels of drainage is not complied with Rule 35 of the Public Health (Drainage and latrine Rules).

4. Centralization of shopping facilities is unreasonable for an estate of this size. Shopping facilities should be located at several centres to serve
adequately the expected large population. There should also be provision for central refuse collection.

5. This scheme as envisaged will provide unsuitable and unfit dwellings which will be dangerous to the health of the residents and to the city generally, such dwellings will encourage air-borne, insect borne diarrhoea and other enteric diseases. Social and stress diseases ....

6. It is my strong recommendation and advice that the points I have raised above be attended to and be complied with to make the houses not built and phase 11 to comply with health standards to enable me to recommend the plans to the council for approval. Under the law I cannot approve a scheme that has so many glaring faults that infringe the Act and City Council’s by-laws. The public will also question our impartiality when we impose standards on them while we do not ourselves comply and set good example.

There were very many comments relating mostly to the engineering and sanitary standards. The few picked here are biased on planning but all the same serve to indicate the influence of the Health Act. The views of
the Medical Officer of Health may not all be true, for example, there will not be speeding vehicles in the estate which will blow dust because the design aspect does not allow this kind of traffic.

The Health Act does not have planning standards that could be tabulated as in cases dealt with earlier. It emphasises more on the quality and sanitary conditions of the shelters and the estate. For this reason it relies more on the Building Codes and Municipal by-laws. What the Act has is wide discretionary powers to approve or reject a plan on the ground of health reasons.

3.7 Local Government Regulations (1963)

The Local Government Regulations of 1963 empower every municipal and county council to plan, control and prohibit the development and use of land in the interest of proper and orderly development. However, most local authorities lack adequate staff and hence this legislation has been used only as a basis for building regulations. They have not been able to set their own planning by-laws. Probably Nairobi is the only Council which has adopted a comprehensive set of planning by-laws. Other councils from time to time enact individual by-laws to cope with particular situations.

Regulation 201 empowers local authorities to pass their own by-laws and under Regulation 210 the local authorities may adopt by-laws which may be made by the
Minister. Under this legislation, most councils have adopted building by-laws of which Grade 11 by-laws are an example. Grade 11 by-laws are adopted for specific areas where the higher Grade 1 standards are not required. The model Grade 1 by-laws do not contain a section controlling land use as in the case with Grade 11 by-laws section 4.

3.8 The Town Planning Act, 1931 (Laws of Kenya Cap. 134)

The Town Planning Act, 1931 is one of the three main sources of current town planning legislation in Kenya. The other two are: The Development and Use of Land (Planning) Regulations 1961 as enacted by The Land Planning Act, 1968, and the Local Government By-laws already discussed above.

Until recently, urban planning in Kenya has been understood as defined in the Town Planning Act, 1931.

The Act does provide for the preparation of Town Planning schemes by a "preparatory authority".

Sec. 3 (1) A town planning scheme may be made in accordance with the provision of this Ordinance (Act) with respect to any land with the general object of improving land and providing for the proper development of such land to the
best possible advantages and of securing suitable provision for traffic, transportation. sites for public buildings and disposition of shops, residence and factory areas, proper sanitary conditions and of making suitable provisions for the use or other purposes.

Section 23 of the Act provides that government owned land not within a municipality cannot be sold or leased for more than one year unless a Town Planning Scheme is approved for its site area, or where such a scheme is considered inadvisable or unnecessary the land may be leased or sold in accordance with a development plan approved by the Commissioner of Lands. This law in effect requires the Commissioner of Lands, in the case of government land outside of municipalities to abide by the uses proposed on a physical planning department prepared development plan which he has approved, when he is determining the use conditions for the leases. For one category of land (Government owned), it places his customary practice of allocating land according to a plan on a legally binding basis.

Section 24 of the Act is often interpreted as stating in essence that no land within a municipality or township shall be subdivided without the express permission of the Commissioner of Lands and then upon the conditions he shall specify. Where an approved
Town Planning Scheme exists the subdivision must be in accord with it (Mombasa is the only town with a Town Planning Scheme.)

It is the practice of the Commissioner of Lands, when subdivision proposals are submitted to him to refer them to Physical Planning Department for comments from a physical planning point of view. It is easy then to see how planning standards formulated by the Department can be incorporated in the plan and then adopted.

The Act does not provide effective means of controlling land in private ownership.

3.9 The Land Planning Act, (1968)

The Land Planning Act of 1968 has placed a lot of powers in the Central Authority. It has mainly defined planning powers but has not defined planning standards as such. The Act follows The Development and Use of Land (Planning) Regulations, 1961, except for a few minor amendments. It establishes a process for planning development wherein any proposal for development of land must be submitted for approval to an authority which must make its decision in the context of physical plans for the area.

The areas which follow under its control are
1. Areas within 5 miles (8km.) of the boundaries of municipalities, townships;
2. land within 400ft (approximately 122m) of the centre line of trunk roads except within Municipality and Township boundaries; and
3. all land in Kilifi and Kwale districts with certain exceptions.

At this juncture, it may be of use to mention that the Act is of little value in controlling development in major urban areas since it is only applicable to areas beyond town and municipal boundaries. However it can control peri-urban development.

3.10 Other Legislation

Other legislation which may be important as far as planning is concerned include the Government Lands Act, Cap.280, the Land Control Act, Cap.302, the Land Acquisition Act Cap.295.

These Acts will not be treated here as has been in other cases since it is only small sections in them that relate to planning.

The Government Lands Act empowers the Commissioner of Lands to lease Government land for either agricultural use or for urban use if the land is in an urban area. The lease is a contract and the lessee must observe all the conditions of a lease. Section 34 of the Act
restricts any subdivision, assignment, and subletting.

The Commissioner of Lands has wide powers. The most powerful means to date of achieving the use of land in accord with a local plan has been the custom of the Commissioner of Lands to implement, planning recommendations by means of a condition within all leases he provides stating the uses to which land may be put without violating the lease. The Commissioner of Lands is the agent for allocation of both Government and county council held trust land and is empowered by law to decide the provisions of the use conditions attached to leases he provides.

The Land Acquisition Act, Cap.295 of 1968 provides the procedure and sets out the purpose for compulsory purchase of private land.

3.11 General Comments

Town Planning Handbook is not a piece of legislation. It is only a source of planning standards. As it is the case with planning standards from planning institutions, the application of the standards become authoritative when the council or the Commissioner of Lands adopts and approves the plan. Different standards are being developed by other bodies and this is healthy in terms of flexibility. Since the Physical Planning Department has a responsibility for planning for many urban centres, it would be advisable to incorporate planning standards
from other planning institutions.

The existence of so many formal legislations does not result in a co-ordinated development. Legislations governing urban land policy, the use and control of urban land could be reviewed and brought under one Act. The extent to which planning standards should be backed by legislation should be indicated in this kind of legislation.
REFERENCES


3.3 Director of Physical Planning Department: letter of instruction, dated 10th December, 1977 from the Director of Physical Planning to all Provincial Physical Planning Officers, the General Manager of the National Housing Corporation, and the Permanent Secretary of the Ministry of Housing and Social Services.


3.5 Housing Research and Development Unit (University of Nairobi)

3.6 Dr. Wilson Nguithi Mugo: Health Aspects of Habitable Dwellings for low income Groups - A paper presented at Housing Research and Development Unit Seminar "Housing for the Lower-income Groups on 10th May, 1977."
STUDY AREAS

4.0 Study Areas in Thika Municipality

Three low-cost, low income housing areas have been selected for this study. These are:

4.0.1 Majengo (Vasey Estate)

This is a housing scheme which in a way resembles site and service scheme. It was built in 1951 with the assistance of finance from the National Housing Corporation. The estate consists of predominantly single storey houses which have been built by plot allottees or the landlords who let them to tenants. Each room accommodates one or more households and is let between K.shs. 60 - 150/- per month depending on its size.

4.0.2 Rental Scheme 1 (TUDC)

Rental scheme 1 is a small housing estate consisting of 9 blocks four-winged units, with each unit having 8 rooms. Each room is a housing unit on its own and is shared by one or more households, where household in this case means people living under one roof and who share a meal together. Thika Municipality owns this estate and as such the rents are low at K.shs. 48 p.m. per room. Adjacent to this scheme are other rental schemes owned by Thika Municipality.
4.0.3 Site and Service Scheme 6

This is a new scheme which is being developed on self-help basis. Although it is meant, for the low income the type of buildings being put are expensive (cost of construction was at K.shs.60,000 during the time of survey) which means that the ownership of plots has slipped into the hands of the wealthy people who are absentee landlords. They use the buildings only as a source of income.

In site and service projects, plots are allocated, levelled and connected with water, sewerage and electricity; social and public services and schools are provided. Capital required for the servicing of the land and provision of community facilities is provided by the Government; while capital for the construction of the house is the responsibility of the homeowner.

This estate is adjacent, to other site and service schemes off Garissa Road. It consists of 239 plots. At the time of the study construction of the building was still going on and the estate is rapidly being built. Since the residents of the estate would normally be low income group it was thought necessary to include this area for study. It would reflect recent development as contrasted with the old residential schemes such as Majengo and the Rental Scheme 1.

The buildings are divided into an average of 8-10 habitable rooms. Each room is let to tenants
as single housing units. The rents are high between K. shs. 120 - 150/- per month.

The study areas are as shown in the maps.

Thika and Dandora Site and Service Scheme in Nairobi have been found suitable for study because there is rapid urbanization taking place in Nairobi and Thika. The Nairobi Urban Study Group has identified the region between Nairobi and Thika as a potential area for urban development. Thika is considered within Nairobi metropolitan. People will need housing in these areas. It is seen that large-scale provision of low-cost shelter and infrastructure is essential if Kenya is to provide for its rapidly expanding urban population. Other urban centres could draw examples from the experience of Nairobi metropolitan.

4.1 General Note on Thika

Thika is situated 50 kilometres north of Nairobi; Kenya's capital. The town is at the confluence of Chania and Thika Rivers and it lies at an altitude of 1,493 metres above sea level. Its proximity to Nairobi puts it in the Nairobi metropolitan area (map No.2) and favours it for partial decentralisation especially of industries. It has an area of 9,200 ha and an estimated population of 43,000.

4.1.1 Historical Development of Thika (Planning Aspect only)

Most towns in Kenya had their origin as administrative
The application of planning standards in urban low cost, low income residential areas
or as commercial (trading posts) centre during the colonial period. The white settlers acquired land in the highlands near Nairobi, which became the capital of the country in 1905. Their main aim was to control and exploit the resources of the land.

They brought their heirlooms and knowledge, seeds, tools and new crops with which they experimented. The first coffee was planted in 1895, sisal in 1904. Both crops did so well in the area immediately north of Nairobi and south of the Thika river that a one-metre-gauge steam tramway was built in 1911 from Nairobi to Thika to serve farmers in that area. As settlement spread, the line was extended northwards.

Problems were experienced in the early planning history of Thika. In 1915 Thika was planned partly in the Ukamba and partly in Kenia (sic) province. But this actually handicapped its administration and the plan could not be implemented. In 1916 the District Commissioner wrote in his Annual Report, "There are temporary bazaars at Thika: such a state of things is highly inimical to progress .... This fact now existent for twelve years is the object of much criticism. (4.1) In 1919, conditions were described as "scandalous and the Daily Standard of 27th November 1925 called Thika a "Government Cinderella" and a horrible example of the early days of settlement", a "vast rubbish heap". These criticisms appear to have been quite constructive and may have
spurred government into action. A township layout and design was prepared in 1926, following the then existing temporary development.

4.1.1.1.2 Development

Thika experienced a slow development in the early years. By 1948 several industries, including a small fruit and vegetable cannery, were given plots in an extension to the Township designed by the Government Town Planning Adviser. In addition to this new industrial development, housing for labour, social buildings and further extension to the industrial area was also planned. It was, however, still a small town with a population of barely 4,500 (1948 population census). The upgrading of the Nairobi - Nyeri Road, rebuilt by prisoners-of-war-in the later part of the second world war (1939-1945), gave the town a development impetus. In 1963 it became a Municipality with its own municipal council. The municipality utilises the services of the physical planning department for the preparation of its development plans although it has engaged one town planner (as of now) whose main role is development control. In 1972 the long term development plan for Thika was prepared.

Since the time of Independence in 1963, the development of Thika has accelerated. Because of its established Industrial base, ample and suitable developable land, advanced service structure, rail and
ad links and the vast hinterland it serves, and in spite of its proximity to Nairobi, Thika is rapidly developing as a major industrial town. It is one of Kenya’s most rapidly growing industrial towns which is sometimes referred to as the "Birmingham" of East Africa. It falls within the Nairobi metropolitan area and is deemed to become an industrial satellite of the capital by the year 2000.

4.2 Thika in the Context of Kenya’s urban Development

Urbanization is inevitable as it is a factor of socio-economic development. The urban population in Kenya is growing at a very fast rate (see table 4.2). In 1948, there were only 17 towns with a total urban population of 2,000 or more giving a total urban population of 276,240, which represented 5.1% of the total population. By 1962, the urban population had increased tremendously to 670,950 which was 7.8% of the total population. During the latest census of 1969, the urban population was 1,082,000 or 9.9% of the total. The overall growth rate of the urban population increased from 6.6% p.a. between 1948 and 1962 to 7.1% p.a. between 1962 and 1969(4.2)

This trend of rapid urban population growth is expected to continue.

"During the past 70 years, urban infrastructure throughout Kenya has developed to accommodate and provide facilities for approximately 1 million inhabitants. During the next 25 years, however,
towns will need to be developed not only to serve a much greater rural population but to accommodate 9 million people" (4.3).

In the context of the above, Kenya has adopted an urban development strategy which aims at the development of both service centres and growth centres.

4.2.1 Urbanisation Strategies

The growth centre strategy aims at developing infrastructure in a number of selected towns so as to attract commerce and industry into them. So far there are 13 growth centres variously known as principal towns. These include Eldoret, Embu, Kakamega, Malindi, Meru, Nakuru, Nyeri, Kericho and Thika. Out of their nature and expected growth some of them like Embu and Nyeri are administrative-commercial principal towns with very little industrial activity, others like Thika and Nakuru are industrial-commercial principal towns with the two activities very much pronounced.

In the case of service centres the 1974/78 Development Plan has laid down the following strategy:—

"As in the 1970-1974 Plan, the required geographical distribution of services will be obtained by directing development into a scheduled network of centres. In this manner, the limited capital investment available from Government and private sources for the development
of infrastructure will be deployed so as to stimulate the maximum possible economic expansion and at the same time locate urban services throughout the country on a more equitable basis".

The service centers are in a hierarchical order as follows:

Table 4.1: Hierarchical order of Service Centres

<table>
<thead>
<tr>
<th>Level of Centres - highest to lowest downwards</th>
<th>Number designated so far</th>
<th>Maximum Residential population for each centre</th>
<th>Catchment population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal towns</td>
<td>13</td>
<td>100,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Urban Centre</td>
<td>86</td>
<td>5,000</td>
<td>120,000</td>
</tr>
<tr>
<td>Rural Centre</td>
<td>150</td>
<td>2,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Market Centre</td>
<td>420</td>
<td>negligible</td>
<td>15,000</td>
</tr>
<tr>
<td>Local Centre</td>
<td>1,015</td>
<td>negligible</td>
<td>5,000</td>
</tr>
</tbody>
</table>

Source: Physical Planning Department.

4.2.2 Objectives of the Urbanisation Strategy

In order to have a balanced growth both nationally and regionally, and to have a balanced distribution of urban population the following objectives are specified in the National Development Plans:

1. Maximization of rural development and raising of the standard of living of the people.

2. the expansion of several large towns, principal towns, apart from Nairobi and Mombasa as foci for immigrant-population in an effort to check
excessive concentration in these two towns and reduce attendant problems

3. adoption of standards of infrastructure commensurate with socio-economic and socio-cultural factors of society

4. establishment of a more even geographical spread of urban infrastructure in order to promote more balanced economic and social development between various areas.

5. the development of communication networks as links between various centres of economic and socio-cultural factors of society.

The strategy may not be working perfectly but the study for factors contributing to its failure is beyond the scope of the present study.

4.2.3 Thika as an urban centre

From 1962 to 1969 Thika grew at the rate of 4% p.a. In the two census years it had 2.1% and 1.7% of the total urban population, respectively, as indicated in Table 4.2.
### Table 4.2

Population of 10 largest centres 1962 and 1969:
Compiled from Population Census 1962, 1969

<table>
<thead>
<tr>
<th>Town</th>
<th>Census 1962</th>
<th>Population 1969</th>
<th>Annual growth urban population %</th>
<th>Percentage of total urban population 1962</th>
<th>Percentage of total urban population 1969</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>266,974</td>
<td>509,286</td>
<td>9.7</td>
<td>39.8</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>(347,431)</td>
<td>(569,286)</td>
<td>(5.6)</td>
<td>(51.8)</td>
<td></td>
</tr>
<tr>
<td>Mombasa</td>
<td>179,575</td>
<td>247,073</td>
<td>4.7</td>
<td>26.8</td>
<td>22.8</td>
</tr>
<tr>
<td>Nakuru</td>
<td>38,181</td>
<td>47,151</td>
<td>3.1</td>
<td>5.7</td>
<td>4.4</td>
</tr>
<tr>
<td>Kismu</td>
<td>23,526</td>
<td>32,431</td>
<td>4.7</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Thika</td>
<td>13,952</td>
<td>18,387</td>
<td>4.0</td>
<td>2.1</td>
<td>1.7</td>
</tr>
<tr>
<td>Eldoret</td>
<td>19,605</td>
<td>18,196</td>
<td>-1.1</td>
<td>2.9</td>
<td>1.7</td>
</tr>
<tr>
<td>Nanyuki</td>
<td>10,448</td>
<td>11,624</td>
<td>1.5</td>
<td>1.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Kitale</td>
<td>9,342</td>
<td>11,574</td>
<td>3.1</td>
<td>1.4</td>
<td>1.1</td>
</tr>
<tr>
<td>Malindi</td>
<td>5,818</td>
<td>10,757</td>
<td>9.2</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Kericho</td>
<td>7,692</td>
<td>10,144</td>
<td>4.0</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>574,933</strong></td>
<td><strong>916,623</strong></td>
<td><strong>85.7</strong></td>
<td><strong>84.7</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other towns</strong></td>
<td><strong>96,017</strong></td>
<td><strong>165,814</strong></td>
<td><strong>14.3</strong></td>
<td><strong>15.3</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Urban population</strong></td>
<td><strong>679,500</strong></td>
<td><strong>1,081,437</strong></td>
<td><strong>7.1</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

It has a sizeable share of wage employment as the following table will show.
Table 4.3: Percentage Distribution of total wage employment in main towns in Kenya.

<table>
<thead>
<tr>
<th>Town</th>
<th>1963</th>
<th>1974</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>53.9</td>
<td>58.9</td>
</tr>
<tr>
<td>Mombasa</td>
<td><strong>18.6</strong></td>
<td>17.9</td>
</tr>
<tr>
<td>Nakuru</td>
<td>3.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Thika</td>
<td>1.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Kisumu</td>
<td>4.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Eldoret</td>
<td>3.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Other</td>
<td>14.1</td>
<td><strong>12.2</strong></td>
</tr>
</tbody>
</table>


This has a locational advantage that assures its future growth. It is close enough to Nairobi to benefit from the latter's agglomeration economies, and it is the obvious decentralization alternative for industrialists. Thus, Thika is taking a share, and will continue to do so, of the urban development strategy which highlight the locational aspects of any investment efforts geared towards the total development of the country.

4.3 Thika Industrial Base:

Thika can be described as an agro-industrial town. Its hinterland is rich in agricultural products such as coffee, sisal, pineapples. There are industries based on the manufacture of agricultural produce. Canning for example is one of the leading industries. The industry is a monopoly of Kenya Canners Limited and it specialises in canning of many fruit juices. The company itself owns several hundred hectares of pineapple plantation.
Areas of greatest potential for development

Developed area
City boundary
Road
Railway

MAP NO.6

SOURCE • NUSG

GICHUKI THOGO MA (PLANNING)
THESIS 1977/78

The application of planning standards in low cost-low income urban residential areas
Other large industries in Thika include tanning, vehicle assembly plants and textiles. The major textile mill include Thika Cloth Mills Limited, Kenya Toray Mills Limited, and United Textile Industries Limited which altogether account for well over \( \frac{1}{3} \) third of the country’s total production of textiles. A variety of both cotton and polyester fabrics are manufactured and include drills, linen, bed sheeting, kitenges, khangas and other printed fabrics. Thika is also a centre for sisal weaving and plans are underway to set a huge synthetic fibre plant which is a joint venture between Kenya Government and India.

There are many small scale industries and also the informal sector. The agro-business and industrial acticity combine to make Thika an industrial-commercial principal town.

4.3.1 Land Availability

Land for industrial development is readily and cheaply available in Thika. Out of the total municipal area of 9,200 hectares, 2,240 hectares or 24.08% of the total land is reserved for industrial development. About 500 hectares of industrial land area is still available for new industrial development. The land is available at a 99 year lease.

The land itself is suitable for building and has an added advantage of being on a flat terrain.
4.3.2. Transport and Communication

Thika is well linked by both rail and road. A modern double carriageway highway links the town with the capital city - Nairobi, and the railway serves the town as it passes to the northern terminus at Nanyuki. There is adequate infrastructure conducive to industrial development. Telephone and postal services add to the communication network while electricity is available for all industries which require power supply.

4.3.3 Labour

There is an abundance of semi-skilled and unskilled labour. Such labour intensive industries as the textile industry do not find themselves in shortage of this type of labour.

4.4 Population

The population of Thika as recorded at the population census in 1948, 1962 and latest in 1969 show a very moderate growth of Thika. Thus:

<table>
<thead>
<tr>
<th>Year</th>
<th>1948</th>
<th>1962</th>
<th>1969</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (total)</td>
<td>4,435</td>
<td>13,952</td>
<td>18,387</td>
</tr>
<tr>
<td>Annual growth of total population(%)</td>
<td>8.5</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Annual growth of African population(%)</td>
<td>10.3</td>
<td>5.5</td>
<td></td>
</tr>
</tbody>
</table>

4.4.1 Population Projection

The municipal boundaries of Thika were, to some extent, extended in 1971. The 1969 census figure of 18,387 people
inhabiting Thika in that year is considered to be on the low side, as shortly after the census, a population count was made in August 1970 which showed a population of 23,749 people. The adjusted figure includes the urban population immediately outside the Municipality (at that time not extended).

Using the base figure of 23,749 people and assuming a low projection basis of 7.15% average annual growth, it is estimated that Thika will have around 200,000 people by the turn of the century - year 2,000. The whole population is now considered to be entirely urbanized and no distinction is made as to whether there is an urban as well as a rural population as in the case with other municipalities where boundaries were extensively extended in 1971.

Table: 4.4 Low Projection 1969 - 2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Thika Urban</th>
<th>Thika Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>23.4</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>30.8</td>
<td>43.5</td>
</tr>
<tr>
<td>1978</td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1980</td>
<td>43.5</td>
<td>199.4</td>
</tr>
<tr>
<td>1990</td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>2000</td>
<td>199.4</td>
<td></td>
</tr>
</tbody>
</table>

Growth % per annum

<table>
<thead>
<tr>
<th>Year</th>
<th>Thika</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969 - 80</td>
<td>7.15</td>
<td>7.15</td>
</tr>
<tr>
<td>1980 - 2000</td>
<td>7.15</td>
<td></td>
</tr>
</tbody>
</table>

At present (1978), Thika has an estimated population of 43,000.

4.5 Employment

According to 1969 population census, the population / employees ratio is 3.32 in Thika. In other words, of the total population about 35% are employed persons. From a survey report prepared by the Town Planning Section (Thika) for the 4th National Development Plan, 1979 – 1983, entitled "Socio-economic infrastructure – Municipal Council of Thika", it is estimated that out of the employed population 93.5% are low income earning less than Kshs.1,200 per month, 4% are medium income earning between K.shs.1,200 – Kshs.2,700 and 2.5% are High income above K.shs.2,700. The same report estimates that out of the present estimated population of 43,000 only about 15,000 people are employed. This means that the rest 28,000 people are net employed in the formal sector. This figure of course includes the self-employed people in the informal sector and about 16,000 children and students. There are therefore 12,000 unemployed adults or 28% of the population thus making a high rate of unemployment.

The implication here is that since the low-income and the unemployed ones will continue to live in low cost, low income housing areas attention should be given to such areas so that a livable environment is created for them.
4.6 Existing and Planned Land Use Pattern in Thika

Table 4.5 summarises the zoned land use according to the long-term development plan (1973) prepared by the Physical Planning Department - Ministry of Lands and Settlement

Table 4.5

<table>
<thead>
<tr>
<th>Category</th>
<th>Developed (ha)</th>
<th>Undeveloped (ha)</th>
<th>Total hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>100</td>
<td>265.1</td>
<td>365.9</td>
</tr>
<tr>
<td>Industrial</td>
<td>126.7</td>
<td>111.8</td>
<td>238.5</td>
</tr>
<tr>
<td>Education</td>
<td>64.8</td>
<td>27.8</td>
<td>92.8</td>
</tr>
<tr>
<td>Recreational</td>
<td>11.7</td>
<td>299.3</td>
<td>311.0</td>
</tr>
<tr>
<td>Public Purpose</td>
<td>78.7</td>
<td>51.9</td>
<td>130.6</td>
</tr>
<tr>
<td>Commercial</td>
<td>18.6</td>
<td>18.1</td>
<td>36.7</td>
</tr>
<tr>
<td>Public Utilities</td>
<td>36.3</td>
<td>47.7</td>
<td>84.0</td>
</tr>
<tr>
<td>Transportation</td>
<td>-</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>Deferred (zone 8)</td>
<td></td>
<td>149.8</td>
<td>149.8</td>
</tr>
<tr>
<td>Zone 1 - 8</td>
<td>430.8</td>
<td>978.6</td>
<td>1417.4</td>
</tr>
</tbody>
</table>

The above figures show that of the existing land use as at 1973, the industrial use claimed the most land at 126.7 ha., followed by residential which claimed 100 ha. An earlier "Land Use and Population Schedule" prepared by the Physical Planning Department and appearing in the Town Planning Handbook (1971), shows land use by zone
as percentage of total land use in several towns in Kenya and shows the town density using 1968 population (see appendix 2). In the case of Thika residential land use zone is 13.9% as compared to the 41.5% average for the towns referred to; industrial land use claims 38.7% as compared to the average of 7.8%. A survey of this type which reached at this figure is not adequate for various reasons. It has tended to derive the figures from the zoned land use from the physical development plans; it is not a reflection of what is happening on the ground. Sometimes land which is not suitable for development e.g. river valleys, steep slopes etc is loosely earmarked for recreational purposes. Thus the percentage figure for recreational use actually may be quite misleading.

4.6.1 Analysis of Land-use

From the Thika Development Plan, 1973, and using the estimated population then of 30800 as per table 4.4 the land use figures in table 4.6 have been worked out. It has been necessary to include own measurements of areas developed by that year. As the table shows industrial land comprises the largest user or 31.2%. This works out at 4.11 ha per 1000 persons; the residential land use is the second in the order of magnitude claiming 24.3% of the total and at 3.2 ha per 1000 persons. This is followed by public purpose whose total constitutes 18.8% and works out at 2.48 ha per 1000 persons. The overall density was 75.9 persons per hectare considering the developed part of the urban land i.e. only 405.6 ha
<table>
<thead>
<tr>
<th>DURP</th>
<th>USE</th>
<th>HECTARES</th>
<th>PERCENTAGE</th>
<th>HECT. PER 1000 PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>COUNCIL STAFF HOUSING + PRIVATE DEV.</td>
<td>7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>BONDENI RENTAL HOUSING ESTATE</td>
<td>2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>TENANT PURCHASE SCHEME 1</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>PRIVATE DEVELOPMENT (ASIAN RES. Q)</td>
<td>11.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>COUNCIL A GOVERNMENT STAFF HOUSING</td>
<td>7.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>MAJENGO</td>
<td>8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>RENTAL SCHEMES 1-5</td>
<td>11.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>010</td>
<td>RENTAL SCHEME 6 6, (ZIWANI ESTATE)</td>
<td>3.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>013</td>
<td>POLICE STAFF HOUSING</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>018</td>
<td>SITE &amp; SERVICE SCHEME 1 x 2</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>029</td>
<td>LOW DENSITY RESIDENTIAL</td>
<td>3.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>030</td>
<td>TOW DENSITY RESIDENTIAL</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>031</td>
<td>LOW DENSITY RESIDENTIAL</td>
<td>13.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>033</td>
<td>MORTGAGE SCHEME</td>
<td>11.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RESIDENTIAL AREAS TOTAL</td>
<td>98.7</td>
<td>24.3*</td>
<td>3.2 ha</td>
</tr>
<tr>
<td>1</td>
<td>BULLEY’a TANNERY</td>
<td>13.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>KENYA TANNING EXTRACT + RICE FACTORY</td>
<td>24.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LIGHT INDUSTRIES</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>LIGHT INDUSTRIES</td>
<td>5.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>LARGE SCALE INDUSTRIES</td>
<td>76.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INDUSTRIAL AREAS TOTAL</td>
<td>126.6</td>
<td>31.2*</td>
<td>4.11 ha</td>
</tr>
<tr>
<td>DURP RET.</td>
<td>USB</td>
<td>HECTARES</td>
<td>PERCENTAGE</td>
<td>HECT. PER 1000 PERSONS</td>
</tr>
<tr>
<td>-----------</td>
<td>-----</td>
<td>----------</td>
<td>------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>1</td>
<td>GATUMOINI PRIMARY SCHOOL + (2.0) CHANIA HIGH SCHOOL (7.2) ST. PATRICK PRIMART SCHOOL + THIKA PRIMART SCHOOL + MUSLIM PRIMART SCHOOL THIKA TECHNICAL SCHOOL</td>
<td>9.2</td>
<td>14.8*</td>
<td>1.95 ha</td>
</tr>
<tr>
<td>2</td>
<td>THIKA HIGH SCHOOL</td>
<td>4.9</td>
<td>8.6</td>
<td>0.87 ha</td>
</tr>
<tr>
<td>3</td>
<td>THIKA HIGH SCHOOL PLATING FIELDS</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>HUNDIA SECONDARY SCHOOL</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GENERAL KAGC PRIMART SCHOOL</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>EDUCATIONAL AREAS TOTAL.</td>
<td>60.1 (10.9)</td>
<td>14.8*</td>
<td>1.95 ha</td>
</tr>
<tr>
<td>7</td>
<td>PRIMART SCHOOLS TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>PUBLIC OPEN SPACE</td>
<td>0.5</td>
<td>0.8%</td>
<td>0.07 ha</td>
</tr>
<tr>
<td>9</td>
<td>THIKA SPORTS CLUB</td>
<td>3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>THIKA STADIUM</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>SPORTS CLUB</td>
<td>4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>RECREATIONAL AREAS TOTAL</td>
<td>11.7</td>
<td>2.9%</td>
<td>0.38 ha</td>
</tr>
<tr>
<td>13</td>
<td>BURNING GHAT.</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>SCHOOL FOR THE BLIND + HOSTEL</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DURP REP.</td>
<td>USE</td>
<td>HECTARES</td>
<td>PERCENTAGE</td>
<td>HECT. PER 1000 PERSONS</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------------------</td>
<td>----------</td>
<td>------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>‘3’</td>
<td>INDIAN WOKEN ASSOCIATION</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘4’</td>
<td>TEMPLES</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘5’</td>
<td>POLICE, TOWNHALL + MUNICIPALITY</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘&lt;6’</td>
<td>DISTRICT HOSPITAL + SCHOOL + COMMUNITY NURSING, CHURCH + PRISONER CEMETRY</td>
<td>12.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘7’</td>
<td>C/P</td>
<td>39.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘8’</td>
<td>B/P</td>
<td>39.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘10’</td>
<td>SISTERS OF THE HOLY ROSARY MAT.</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘11’</td>
<td>HOSP. + CRIPPLED CHILDREN'S JOY TOWN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘12’</td>
<td>CHURCH</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘13’</td>
<td>COMMUNITY CENTRE</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘14’</td>
<td>CHILDRENS HOME</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘15’</td>
<td>CHURCH</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘16’</td>
<td>YOUTH CENTRE</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘26’</td>
<td>BLUE POST HOTEL</td>
<td>13.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘27’</td>
<td>CHURCH</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘28’</td>
<td>CEMETRY</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PUBLIC PURPOSE AREAS TOTAL</td>
<td>76.3</td>
<td>18.8%</td>
<td>2.48 ha</td>
</tr>
<tr>
<td>DURP RET.</td>
<td>USE</td>
<td>HECTARES</td>
<td>PERCENTAGE</td>
<td>HECT. PER 1000 PERSONS</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------</td>
<td>----------</td>
<td>------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>1</td>
<td>TOWN CENTRE + BUSINESS - RESIDENTIAL</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SHOPPING CENTRE</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SHOPPING CENTRE, BUSINESSES-CUM.-RES.</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>MUNICIPAL MARKET</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMMERCIAL AREAS TOTAL</td>
<td>18.6</td>
<td>4.6*</td>
<td>0.6 ha</td>
</tr>
<tr>
<td>1</td>
<td>WATER TREATMENT PLANT</td>
<td>3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>E.A.P. 4 L. SUB-STATION</td>
<td>1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SEWERAGE TREATMENT PLANT</td>
<td>8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PUBLIC UTILITY AREAS TOTAL</td>
<td>12.4</td>
<td>3.1*</td>
<td>0.4 ha</td>
</tr>
<tr>
<td>1</td>
<td>BUS TERMINAL</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TRANSPORTATION AREAS TOTAL</td>
<td>1.2</td>
<td>0.3*</td>
<td>0.03 ha</td>
</tr>
<tr>
<td></td>
<td>GRAND TOTAL</td>
<td>405.6</td>
<td>100*</td>
<td>13.15 ha</td>
</tr>
</tbody>
</table>
4.7 Residential Pattern

Grouping of residential housing has followed the categorization of income levels, that is, high, medium, and low. Densities in these areas are also relative to this grouping with high densities in the low income areas, medium density for medium income, and low density for high income.

The desirable density for each income category is supposed to be as follows:

- 50 persons/ha : High income
- 100 persons/ha : medium income
- 300-400 persons/ha : low income

These densities are as expressed by the Town Planning Section - Municipal Council of Thika. There are no adequate reasons, however, why this has to be in that order. The provision of utilities, mainly sewerage reticulation, determines to what extent the density should be in a residential area. The better the area is sewered the more the density can be allowed to be high. In Thika this type of service does not seem to be very critical.

Generally the low income high density are near the industrial area and this is a desirable aspect in that the journey to work is lessened making it cheaper to travel for these low-income people. The high income residential areas exist west of the
existing commercial centre and new ones are proposed in the same area. The medium income groups fill in pockets between the areas of high density and low density as shown in map

4.7.1 Housing Requirements

The total number of habitable rooms in 1972 was 8,609 in the three income categories of low, medium and high. As population of Thika has increased (present estimation is 43,000), more and more people require housing.

The Town Planning Section estimates that by 1979 the following housing units will be required.

<table>
<thead>
<tr>
<th></th>
<th>Existing</th>
<th>New Units required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By 1979</td>
<td></td>
</tr>
<tr>
<td>High income</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>Medium Income</td>
<td>179</td>
<td>301</td>
</tr>
<tr>
<td>Low income</td>
<td>10,000 rooms</td>
<td>7,800 rooms</td>
</tr>
</tbody>
</table>

It will be seen that more housing units will be required for the low-income groups. Necessarily the areas that will cater for this increased housing units will be extensive and need particular attention in planning.

The medium and high income can afford the mortgage and tenant purchase schemes. Rental schemes and the site and service schemes are better suited for the low
income. They tend to develop into high density areas when problems of maintenance and misuse of facilities is experienced.

4.8 Problem of Land Availability for Low Income Housing in Kenya Urban areas:

There are two factors that affect or influence the availability of land within the urban areas:

i) the fast rate of urbanisation;

ii) the possibilities of obtaining suitable land within or in the peripheries of urban areas.

The second factor is tied up to the land tenure system in Kenya which falls under three categories, viz., customary, freehold, leasehold. The ownership derived from this system also falls into three categories:

i) Trust land vested in County Councils in whose areas of jurisdiction the land is situated,

ii) Government land;

iii) private freehold and leasehold land.

Most of urban land is held on leasehold tenure. Private ownership of land is strongly protected under Section 75 of the Constitution of Kenya and cannot arbitrarily be confiscated or expropriated. It can therefore only be made available to Government through the machinery of compulsory acquisition under the Land Acquisition Act 1968 in the case of privately owned freehold and leasehold land, or the process of setting land apart under Section 117 and 118 of the Constitution in
the case of Trust Land. In both cases adequate and prompt compensation must be paid to those whose land is compulsorily acquired or set apart. There is no limit to the amount of land one can hold.

Thus, two major constraints to availability of land for residential accommodation for the low income groups would be:

i) shortage of land which can be compulsorily acquired both within and in the peripheries of urban areas due to concentration of rural population in the peripheries of urban areas;

ii) shortage of funds for such acquisition in the face of escalating cost of privately owned land and the competitive demand for land for other purposes such as commercial, industrial, agricultural, public and special purposes.

Since Independence (1963), the Government makes most of the land at its disposal available to the local authorities and National Housing Corporation at nominal rent and free from stand premium for the development of high density (low cost) housing schemes, such as site and service, rental or tenant purchase schemes. Most of the land at Government disposal is now nearly exhausted particularly in the capital city of Nairobi and the large municipalities of Mombasa, Kisumu, Nakuru, Nyeri and Thika where the demand for land for both low cost housing and for such purposes as commercial, industrial and special purposes was very high.
Accordingly, the Government has since 1969 adopted a policy of compulsory acquisition of foreign owned agricultural land within and in the peripheries of municipalities and large townships which is then planned for development of residential accommodation of both low income and other income groups as well as for commercial, industrial and special purposes. In this respect the Department of Lands which is responsible for making Government land available for various purposes including Governmental purposes, has since 1972 made land available to local authorities and the National Housing Corporation on which residential accommodation have been built or is in the process of being built as shown below:

<table>
<thead>
<tr>
<th>Place</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>Approximately 20,000 units of high and medium density residential accommodation at Buru Buru, Dandora, Kayole, Mathare, Riruta and Villa Franca.</td>
</tr>
<tr>
<td>Mombasa</td>
<td>2,352 units at Makinda, Miritini, Chaani and Shanzu</td>
</tr>
<tr>
<td>Nakuru</td>
<td>230 units</td>
</tr>
<tr>
<td>Eldoret</td>
<td>499 units</td>
</tr>
<tr>
<td>Kisumu</td>
<td>289 units</td>
</tr>
<tr>
<td>Thika</td>
<td>1,000 units</td>
</tr>
<tr>
<td>Kakamega</td>
<td>208 units</td>
</tr>
<tr>
<td>Kitake</td>
<td>80 units</td>
</tr>
</tbody>
</table>
Kericho  
Naivasha  
Nanyuki  
Molo  
Homa Bay  
Mumias  
Maiindi  

townships 2,159 units of high and medium residential accommodation for which land has been allocated.

The pattern of land availability changes overtime. Land is scarce. Urbanisation is growing at an unprecedented rate of more than 8% p.a. resulting in tremendous demand for land particularly for residential accommodation by the new migrants in the urban areas. Land is the most important resource for the physical planner. In classical economic terms, it is not produced, it is fixed in amount; its price is fixed purely by demand and it is limited specifically by its location in space. Every parcel of land is unique and the most enlightened of plans cannot be realised without land. The availability of sufficient land supply to meet demand is necessary. As population increases the ratio of man to land changes resulting in development of higher density accommodation. In addition, as land becomes in short supply and in critical locations where competition for its use is considerable, it is likely to be expensive. As such land will remain a constraint in the provision of urban housing.

Although it is generally agreed that there is shortage of land it appears that with better management land may be released for urban development. In Nairobi
for example, one of the findings of the HRDU "Mathare Valley Study" was:-

"There is no shortage of building land in and around Nairobi. The Government should buy undeveloped land before its price inflates and sell or lease it to co-operatives and other development groups at a fair price. This would avoid development panic, [ ensure the best location and control". (4.5)

4.8.1 Land Resources in Thika

A survey carried in Thika Municipality in 1972 showed that:-

"For many years Thika will be able to develop on Government land for the majority of public development. This would no doubt include housing; and that:

"After 1985 it is envisaged that urbanisation will require the purchase of privately owned land at very high costs and profits. The shortage of funds does not enable the Council to buy land while prices are still moderate. A large expenditure should therefore be expected on land purchase for development unless the Government assists the Council/(4.6)

4.9 Analysis of the Study Areas

As indicated in 4.0 three study areas have been selected for study. They are typical low-income housing areas rented by the room thus perpetuating the prevalent situation of one
room occupied by one or more households. This does not meet the social goal of providing each household with a house.

4.9.1 Existing situation in the study areas.

The table below summarises the situation obtaining in the study areas as follows:—

Table 4.7: Brief Summary of study area in Thika Municipality

<table>
<thead>
<tr>
<th>N. Estate</th>
<th>Majengo (Va sey Estate)</th>
<th>Rental Phase 1 (TUDC)</th>
<th>Site and Service scheme 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Built</td>
<td>1951 (assisted scheme)</td>
<td>1955</td>
<td>1976 (not complete)</td>
</tr>
<tr>
<td>Areas as defined by boundary indicated in the Development Plan—Thika, 1973)</td>
<td>74,000m²</td>
<td>28900m²</td>
<td>119,627m²</td>
</tr>
<tr>
<td>Total number of plots</td>
<td>200</td>
<td>36, i.e. 288, i.e. 9 four winged blocks</td>
<td>239 (estimated)</td>
</tr>
<tr>
<td>Total number of habitable rooms</td>
<td>1,155</td>
<td>288 (estimated)</td>
<td>2,390 (when complete)</td>
</tr>
<tr>
<td>Density of plots per ha.</td>
<td>27</td>
<td>12.46</td>
<td>20</td>
</tr>
<tr>
<td>Average net plot area</td>
<td>225m²</td>
<td>89.16m²</td>
<td>325.45m²</td>
</tr>
<tr>
<td>Density in rooms per ha.</td>
<td>156</td>
<td>99.7</td>
<td>199.8</td>
</tr>
</tbody>
</table>

Source: Author’s Survey.
<table>
<thead>
<tr>
<th>MAJENGO (VALEY ESTATE); THIKA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPICAL HOUSE</strong></td>
</tr>
<tr>
<td>1, 2, 3—SINGLE ROOM UNITS</td>
</tr>
</tbody>
</table>

The application of planning standards in low cost, low income urban residential areas.

<table>
<thead>
<tr>
<th>SCALE r- 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>GICHUKI THOGO</td>
</tr>
<tr>
<td>M A' PLANNING )</td>
</tr>
<tr>
<td>THESIS 1977/7.9</td>
</tr>
</tbody>
</table>

SOURCE: FIELD SURVEY

Fig- 2
SITE & SERVICE SCHEME 6—THIKA

TYPICAL FLOOR PLAN

1, 2, 3.— SINGLE ROOM UNITS

Fig. 4

GICHUKI THOGO
M.A. (PLANNING)
THESIS 1978

SOURCE: FIELD SURVEY
The densities in plots per hectare are as a result of the following land use proportions -

Table 4.8: Land Use Profile:-

1. Majengo (Vasey Estate)

<table>
<thead>
<tr>
<th></th>
<th>m²</th>
<th>Percentage of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential net plot</td>
<td>45000m²</td>
<td>60.8%</td>
</tr>
<tr>
<td>Open space and footpath</td>
<td>10,500</td>
<td>14.2</td>
</tr>
<tr>
<td>Road Reserve</td>
<td>18,300</td>
<td>24.7</td>
</tr>
<tr>
<td>Community facilities</td>
<td>200</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Table 4.8.1

2. Rental Phase 1 (TUDC)

<table>
<thead>
<tr>
<th></th>
<th>m²</th>
<th>% total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential net plot</td>
<td>3209.76</td>
<td>11.11</td>
</tr>
<tr>
<td>Open space (incidental) +footpaths (open space around buildings)</td>
<td>19886.24</td>
<td>68.81</td>
</tr>
<tr>
<td>Road Reserve</td>
<td>6804</td>
<td>20.08</td>
</tr>
<tr>
<td>Community facilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author's Survey
Site and Service Scheme 6

Table 4.8.2

<table>
<thead>
<tr>
<th>Scheme</th>
<th>No. of plots</th>
<th>Nos observed (plots)</th>
<th>Nos. observed (rooms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majengo</td>
<td>200</td>
<td>20</td>
<td>142</td>
</tr>
<tr>
<td>Rental Scheme</td>
<td>36</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>Site &amp; Service Scheme 6</td>
<td>239</td>
<td>13</td>
<td>145</td>
</tr>
</tbody>
</table>

Source: Author’s survey

From random sampling done in the study areas a deduction was made on the total number of residents in each estate from which it was possible to calculate the density in persons per hectare.

One such sample survey is indicated in the table below (Table 4.9). The sample was chosen as a proportion of dwellings. In each plot selected for the checklist one person in each room was interviewed and the author made observation on the same plot, thus
Table 4.9

<table>
<thead>
<tr>
<th>House No. (i.e. serial No.)</th>
<th>No. of rooms</th>
<th>No. of Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>30</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>40</td>
<td>8</td>
<td>37</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>60</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>70</td>
<td>6</td>
<td>34</td>
</tr>
<tr>
<td>80</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>90</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>100</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>110</td>
<td>5</td>
<td>27</td>
</tr>
<tr>
<td>120</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>130</td>
<td>12</td>
<td>42</td>
</tr>
<tr>
<td>140</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>150</td>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>160</td>
<td>8</td>
<td>36</td>
</tr>
<tr>
<td>170</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>180</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>190</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>200</td>
<td>7</td>
<td>34</td>
</tr>
</tbody>
</table>

| Total No. of houses | 20 | Total No. of rooms | 142 | Total No. of residents | 620 |

From the above table it works out that average number of persons per house is 620/20 or 31.0 persons per house; occupancy rate or the number of people per room is 620/142 or 4.37 persons per room.

Given that there are 1155 habitable rooms in the estate it can be seen that there are 5047 there giving a net residential density of 682 persons per hectare. This density is quite high and has risen considerably since the 1969 census when net residential density was 467 persons per hectare and the occupancy rate was 3.23 persons per habitable room (Ref. Table 4.10).
Table 4.10 Density Analysis in Thika Residential Areas, 1969 Situations

<table>
<thead>
<tr>
<th>DURP REF.</th>
<th>Name</th>
<th>Type of scheme</th>
<th>ha developed</th>
<th>Persons 1969 Census</th>
<th>Plots (units)</th>
<th>rooms</th>
<th>Density persons/ha</th>
<th>Occupancy rate persons/room</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Staff Housing</td>
<td>Rental</td>
<td>(0.4) tot. 1.6</td>
<td>200</td>
<td>21</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o²</td>
<td>Council staff Housing + private development</td>
<td></td>
<td>7</td>
<td>350</td>
<td>41</td>
<td>205</td>
<td>50</td>
<td>1.7</td>
</tr>
<tr>
<td>o³</td>
<td>Bonderi</td>
<td>Rental</td>
<td>(2.0) tot. 2.9</td>
<td>200</td>
<td>37</td>
<td>94</td>
<td>100</td>
<td>2.12</td>
</tr>
<tr>
<td>o⁴</td>
<td>Tenant</td>
<td>Purchase</td>
<td>1.3</td>
<td>N/A</td>
<td>/z</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o⁵</td>
<td>Asian Quarters</td>
<td>Private development</td>
<td>(9.0) tot.11.6</td>
<td>1138</td>
<td>84</td>
<td>576</td>
<td>126</td>
<td>1.98</td>
</tr>
<tr>
<td>o⁶</td>
<td>Council &amp; Government</td>
<td>Staff Housing</td>
<td>(7.3) tot. 8</td>
<td>448</td>
<td>82</td>
<td>236</td>
<td>61.4</td>
<td>1.89</td>
</tr>
<tr>
<td>o⁷</td>
<td>Majengo</td>
<td>Assisted scheme</td>
<td>8.0</td>
<td>3739</td>
<td>200</td>
<td>1155</td>
<td>467</td>
<td>3.24</td>
</tr>
<tr>
<td>o⁸</td>
<td>Kiraathii</td>
<td>Rental</td>
<td>5.0</td>
<td>N/A</td>
<td>105</td>
<td>232</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o⁹</td>
<td>Jamhuri</td>
<td>Rental</td>
<td>1.5</td>
<td>11.0</td>
<td>5020</td>
<td>296</td>
<td>1400</td>
<td>456.4</td>
</tr>
<tr>
<td>Source: Compiled from Census data on Thika, 1969 + author's survey.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.10 gives the situation obtaining in 1969 census in the residential areas where it was possible to obtain actual census figures.

In rental scheme phase 1 (TUDC) there is an estimated 1512 people giving a net residential density of 523.18 persons per hectare. The occupancy rate is one of the highest and stands out at 5.25 persons per room.

Site and service scheme 6 is not complete. By the time of the study only 78 buildings had been completed and occupied; a visit a week later showed that 15 more had been completed but were vacant. From the observed plots an occupancy rate of 3.5 persons per room was deduced. At an average of 10 habitable rooms per plot the whole estate will have an estimated 2,390 rooms and hence an estimated population of 8365 persons. This works out at 699.4 persons per hectare.

4.9.2.1 Summary of Density in the Three Areas

The summary of density in the three areas is shown below in Table 4.11 and then compared with densities obtaining in some site and service schemes which are assumed to be for low income groups in Table 4.12.
Table 4.11: Density in the Study Areas

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Density in Plots/ha</th>
<th>Density in rooms/ha</th>
<th>Density in persons/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majengo</td>
<td>27</td>
<td>156</td>
<td>682</td>
</tr>
<tr>
<td>Rental 1</td>
<td>12.46</td>
<td>99.7</td>
<td>523.18</td>
</tr>
<tr>
<td>S &amp; S 6</td>
<td>20</td>
<td>199.8</td>
<td>699.4</td>
</tr>
</tbody>
</table>

Source: Author's survey.

Table 4.12: Comparison of Study Area with Some Site and Service Schemes.

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Nos plots</th>
<th>Density plots/ha</th>
<th>Density rooms/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Majengo</td>
<td>200</td>
<td>27</td>
<td>156</td>
</tr>
<tr>
<td>2. Rental 1</td>
<td>26</td>
<td>12.46</td>
<td>99.7</td>
</tr>
<tr>
<td>3. S &amp; S 6</td>
<td>239</td>
<td>20</td>
<td>199.8</td>
</tr>
<tr>
<td>4. Changamwe (In Mombasa)</td>
<td>110</td>
<td>27</td>
<td>146</td>
</tr>
<tr>
<td>5. Eldoret</td>
<td>49</td>
<td>21</td>
<td>114</td>
</tr>
<tr>
<td>6. Kariobangi (in Nairobi)</td>
<td>723</td>
<td>42</td>
<td>185</td>
</tr>
<tr>
<td>7. Kianjau (in Thika)</td>
<td>480</td>
<td>10</td>
<td>72</td>
</tr>
<tr>
<td>8. Nakuru 1</td>
<td>104</td>
<td>17*</td>
<td>123</td>
</tr>
<tr>
<td>9. Biafra (Thika)</td>
<td>42</td>
<td>24**</td>
<td>144**</td>
</tr>
<tr>
<td>10. Kitui</td>
<td>16</td>
<td>24</td>
<td>240***</td>
</tr>
<tr>
<td>11. Njoro</td>
<td>48</td>
<td>24</td>
<td>144</td>
</tr>
<tr>
<td>12. Kisauni (in Mombasa)</td>
<td>100</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>13. Karatina</td>
<td>94</td>
<td>28</td>
<td>84</td>
</tr>
<tr>
<td>14. Likoni (Mombasa)</td>
<td>153</td>
<td>30</td>
<td>150</td>
</tr>
</tbody>
</table>


** Estimated:

*** Two existing houses; page 58 of the report.
It will be seen that, except in Kianjau at Thika and Karatina, the density in rooms/ha is generally high. At Kianjau the "lot sizes 930m$^2$ or (30.5m x 30.5m) are the largest of any site and service scheme. The density of 218 persons/ha is low and unjustifiable for use of urban land" (4.5)

4.9.2.2 Plot ratio and plot coverage

The measure usually adopted today for the control of density is the plot ratio and plot coverage. Plot ratio represents the relationship of the total floor space in a building to the net area of the site to be developed. Plot coverage is the percentage of area built in relation to the site area.

In the case of the study areas the following plot coverage is adopted

<table>
<thead>
<tr>
<th>Scheme</th>
<th>plot coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majengo</td>
<td>50%</td>
</tr>
<tr>
<td>Rental Scheme 1</td>
<td>14.2%</td>
</tr>
<tr>
<td>Site &amp; service 6</td>
<td>40%</td>
</tr>
</tbody>
</table>

4.9.2.3 Intensity of Land Use

In these residential areas the allocation of space may be deduced to be as follows:
Table 4.13: Allocation of Space

<table>
<thead>
<tr>
<th>Description</th>
<th>Majengo Rental Scheme 1</th>
<th>Site and Service 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of persons per plot (coverage)</td>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>2. Habitable rooms per plot (coverage)</td>
<td>5.7</td>
<td>10</td>
</tr>
<tr>
<td>3. Plot area per person</td>
<td>7.3m²</td>
<td>2.12m²</td>
</tr>
<tr>
<td>4. Average size of rooms</td>
<td>10.25m²</td>
<td>9m²</td>
</tr>
<tr>
<td>5. Average living space in the room</td>
<td>2.35m²</td>
<td>1.7m²</td>
</tr>
<tr>
<td>6. Average indoor living space per person (includes courtyard; 10% of built area has been subtracted as service area)</td>
<td>3.27m²</td>
<td>1.7m²</td>
</tr>
<tr>
<td>7. Outdoor space per person (non-built area)</td>
<td>3.631m²</td>
<td>12.73m²</td>
</tr>
<tr>
<td>8. Open Space per plot</td>
<td>52.5m²</td>
<td>534.84m² (around the building)</td>
</tr>
<tr>
<td>9. Open space per person</td>
<td>2.08m²</td>
<td>12.73m²</td>
</tr>
<tr>
<td>10. Road area per plot</td>
<td>91.5m²</td>
<td>161.2m²</td>
</tr>
</tbody>
</table>

Source: Author’s survey

Because of the high occupancy rate in these areas the average living space even falls below the minimum floor space requirement of By-law Grade 11 (i.e. 3.6m² per person + 10% for service area = 4m² per person. The living space per person compares unfavourably with figures obtainable elsewhere:
"Examples drawn from the experience of some European countries show a living space of $17 - 18m^2$. In France the minimum is held to be in the region of $13 - 14m^2$ per person. In Algeria, the Central Town Planning Department suggests a standard coverage of $10.80m^2$, which appears to fit in with the habits of the North African peoples" (4.7)

The figures shown in the quotation are not necessarily meant for low income residential communities. The climate in the study areas, unlike that of temperate or cold countries, favours the pursuit of household, family and domestic activities in the open air. For this reason the living space per person could be considerably lower than that applied in European countries. In the study areas, however, the organisation of outdoor space has not been done in a manner to allow open air activities.

The allocation of open space is important in a high density residential area. The main question is how it should be organised: whether around the plot or a big area within the residential area; or further still grouping several plots round an open space. Majengo, for example, has one big open space which is not functional. As a result of study done on the use of space in grouped housing in some African urban areas it was deduced that:

"In no case should the value for per capita open space be less than for living space" (4.8)
It was further deduced that a per capita open space of $10m^2$ would be the minimum admissible, and $10m^2$ would represent the minimum per capita living space. The open space (public and private open spaces, sports and recreation grounds) is supposed to be divided up among the various activities that take place in it. There are no major provisions of open space in the study areas and as such the analysis figures from table 4.13 show the minor open spaces distributed in the estates or around the buildings.

4.10 Provision of Facilities in the Study Areas

4.10.1 Utilities and Services

The provision of basic public utilities and services is one of the most important components of a residential area. These basic utilities and services include water, sewerage, roads and storm drainage; street lighting and electricity; public transportation; car parking facilities; refuse collection; telephone, etc.

The level of these facilities differ depending on the ability of the local authority and the people themselves to pay for them.

Thika Municipality has a treated water supply system. All the study areas are served with water connections. The dwellings in Rental 1 have communal toilets, water points and baths. In Majengo and Site and Service Scheme 6 each plot is supplied with piped water. There are in most of the cases two water taps,
two toilets, two bathrooms, shared by the occupants of the whole plot in the latter areas. There is water-borne sanitation in all the areas.

The main characteristic of these areas is that the basic unit is the room, not the dwellings. As such it has not been possible to provide the services and facilities within the room. There are no kitchens provided and the occupants have to make do with what they can outside the rooms in the courtyard, or they have to fashion a small space inside the already overcrowded room where they light charcoal for fuel in a small container called "jiko".

Garbage and litter are collected by Thika Municipal Council and dumped in the centre of the town, outside the Hospital in a low lying area which will later be used as a central park after filling it up. There are no car-parking facilities provided in any of the study areas presumably because these are low income residential areas. Security lights are provided in Majengo and Rental 1 and will soon be provided in the on-going site and service scheme 6. Other facilities such as telephone are not provided on the site and can only be seen in relation to the whole town as these are higher order services requiring the individuals to be able to pay for them.

4.10.1.1 Roads and Storm Drainage

Roads provide external access linking sites to the urban transport network, internal circulation for
vehicular traffic, and pedestrian access to the users. The internal circulation also accommodates all the networks of on-site infrastructure. Both external and internal circulation networks are critical design factors during the planning of the residential area. The storm drainage system provided along walkways, roads or in ditches, serves to remove storm water run off to prevent flooding.

In the study areas the dominant mode of use of access ways is pedestrian, followed by bicycle and lastly by vehicles. The design aspect should therefore accommodate these factors.

Majengo is bounded by the busy Kenyatta Highway to the south (Road reserve 30m). Lanes for pedestrians and bicycles have not been provided in this vehicle dominated road. In the north it is bounded by the upper road (road reserve 18m). There are roads providing access to residential lots allowing pedestrians and limited vehicular circulation. These access roads are 3m to 6m wide.

Rental Scheme 1 is well served with footpaths and access roads. The access roads have a width of 8m.

In the Site and Service Scheme 6 the road design offers limited vehicular circulation and does not allow through traffic which is actually a desirable aspect. But the road reserves appear to have incorporated a factor of open space which actually makes it a poor design in that open space thus provided is not utilisable
In Majengo and Rental Scheme 1, the access roads are tarmaced while the footpaths are murramed. Site and service scheme 6 is not yet complete and as such the access roads and footpaths are still not constructed.

In each of the study areas storm drainage is through open drains constructed along the side of the roads.

4.10.2. Community facilities

Community facilities include a wide range of public and, or semi-public facilities provided on or near the site. These include schools, and playgrounds, health clinics/dispensaries, social centres, market, police and fire stations, recreation and religious buildings. These facilities need to be an integral component of the residential areas.

In providing these facilities population is an important consideration because their number and scale of operation will depend on the size of the population. In the study areas the facilities indicated above are not provided on site. They are either part of the whole town or are shared by several other residential areas. In case of educational facilities for example, there are three primary schools adjacent to Majengo (separated only by an access road), and within walking distance from the rental scheme 1. The three schools not only serve these two areas but other areas as well. The three primary schools all owned by
Thika Municipal Court are indicated below:

Table 4.14 Primary Schools adjacent to Majengo

<table>
<thead>
<tr>
<th></th>
<th>Muslim Primary School</th>
<th>Thika Primary School</th>
<th>St. Patrick Primary School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of plot</td>
<td>0.36ha</td>
<td>0.87ha</td>
<td>1.6ha.</td>
</tr>
<tr>
<td>Classrooms</td>
<td>7</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Other buildings</td>
<td>none</td>
<td>3 rooms</td>
<td></td>
</tr>
<tr>
<td>External facilities</td>
<td>1 play field</td>
<td>1 play field</td>
<td>1 play field</td>
</tr>
<tr>
<td>No. of pupils</td>
<td>419</td>
<td>604</td>
<td>613</td>
</tr>
<tr>
<td>Area per pupil</td>
<td>8.6m</td>
<td>14.4m</td>
<td>26.1m</td>
</tr>
</tbody>
</table>

It has not been possible in the study to evaluate the adequacy or inadequacy of planning standards with respect to schools. The only satisfactory thing observed in this connection is that primary schools are within walking distance of the residential area served. Standards for schools and playgrounds vary by culture, social and economic conditions, educational systems, environment, climate etc. In the words of Caminos, H.

"The area per pupil for primary schools in Latin America is 16m²/pupil; in U.S.A. it is 26 to 50m²/pupil. In England it is 71m²/pupil and in Kenya it is 20m²/pupil. The area per pupil for secondary schools in Latin America is 19m²/pupil, in U.S.A. it is 90 to 166m²/pupil, in England it is 142m²/pupil and in Kenya it is 40m²/pupil" (4.9).

The case applying for the two residential areas also applies for the site and service scheme 6.
There is one nearby primary school which is shared by the adjacent site and service schemes.

There are religious buildings adjacent to these estates. Other facilities such as health clinics/dispensaries, police and fire stations are within reach of the residents in these areas but have been sited for the convenience of the whole town rather than a single residential estate.

4.10.2.1 The market

The market holds a unique place in the African Society. It offers a forum for exchange of goods and is convenient for the small retailer and the customers.

The market is situated off Kenyatta Highway and opposite Majengo. It is adjacent to Rental Scheme 1 on the other side. The two estates are therefore well served in this regard. The market serves a wide area in and outside the town. It plays a vital role as a commercial centre in Thika. There is a wide variety not only of commodities, but also of business activities. The following is a breakdown of different types of business places found at the market:

- 35 snuff stalls
- 144 stalls—used for provision of miscellaneous
  - ConmoJiics, clothes, shoe-making, banana
  - stores, fish etc.
- 15 workshops
- 6 eating houses equivalent to restraunts
4 butcheries
56 stall-shops
8 meat and "irio" stalls
18 charcoal stands
1 Market hall for chicken sale

In addition the area encloses an open air market where all types of produce are sold in the open air market and in the sheltered retail market.

For administrative reasons, bus traffic to the market was stopped at the completion of the new bus terminal north of the commercial centre in 1969. A service with hand cars provides the transport for merchandise between the market and the bus terminal. The hand carts are creating difficulties for the traffic on Kenyatta Highway.

The site and service schemes off Garissa Road are situated far from this market and could benefit from a similar facility only if a market is provided near them whose size would be determined from a prior analysis of the area.

4.10.3 Employment facilities

There are no on-site employment facilities in the study areas. However, the areas are near places of employment and a greater percentage of the working population in these areas work in the industrial areas nearby. A greater majority of the workers walk to their places of work while a sizeable number ride their bicycles to places of work. Only a
very few use vehicles (matatus) as a means of public transport. During the night shifts the employing firms normally provide transport for their workers.

It will be seen especially in Majengo, that a number of kiosks have been conveniently placed near the buildings thus showing the necessity of having corner shops conveniently placed in the estate. Not only are they placed there for convenience but they also offer employment to the owners.

Since we are dealing with low income people it is necessary to consider the provision of on-site employment facilities. In this way the household expenditures of the low-income families on transport would be reduced. Such facilities would include small-scale industries, workshops, shops and markets meant to encourage the informal sector and also to generate employment within the residential area. These activities normally take place along major circulation roads and should be located within easy access of the dwellings. It now requires the planners to be bold and flexible so that they can include in the physical layout of the site and within individual lots and dwellings enough space to conduct small scale industrial and commercial activities.

Various advantages are gained from the informal sector. The first and foremost is that it supplements the income of the household. It is easy to operate because of the following reasons:
very few use vehicles (matatus) as a means of public transport. During the night shifts the employing firms normally provide transport for their workers.

It will be seen especially in Majengo, that a number of kiosks have been conveniently placed near the buildings thus showing the necessity of having corner shops conveniently placed in the estate. Not only are they placed there for convenience but they also offer employment to the owners.

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Various advantages are gained from the informal sector. The first and foremost is that it supplements the income of the household. It is easy to operate because of the following reasons:
i) the enterprise is owned by the family;

ii) it relies on local labour

iii) there is ease of entry into the market because of low requirement of initial capital outlay and also requires minimum land services

iv) it is regulated and highly competitive marketwise;

v) the operations are small scale

vi) it is labour intensive, requires little skills and uses simple technology.

Informal sector as a source of employment should not be ignored. The present policies tend to overlook the fact that modern sector employment opportunities are scarce and that a lot of people take up jobs in the informal sector.

4.11 Study Area in Nairobi - The Dandora Site and Service Project

Dandora site and service project in Nairobi is one of the newest urbanisation schemes in Kenya. Site and service schemes have been found as an alternative to alleviating the housing problems among the low income people. They entail the provision of serviced urbanized land to low income earners through public finance and require public participation by the plot allottees who must put up their own housing. The project was selected for study because it is one area where particular attention has been given to the application of planning standards in a low cost,
low income residential area. It was also thought necessary to study the area because it is a high density residential development and represents an example of future development especially in an area where land availability for low cost, low income housing is a major constraint.

4.11.1 General Description

The Dandora Site and Service Scheme is the largest scheme of that kind in Kenya. The site lies about 10km east of the city centre and was chosen on the basis of conformity with the city’s development, suitability for low-income housing, and easy accessibility to present and planned employment centres (journeys by bus take 25 to 30 minutes to the city centre). The fact that land is generally much cheaper on the outskirts of the city have influenced its location far from the city centre which is also a major place of work. In addition land was available on large scale rather than a multitude of small sites which would have been more costly to develop than one large site.

The site is bounded by Komo Rock Road to the south, Nairobi-Thika railroad to the east, and Nairobi River valley to the west. Two power lines running north-south on the site restrict the use of the land under them. There are also several quarries, some of which are abandoned. The site has an elongated shape, with steep slopes on the boundaries in the west and north, and more
level land in the centre. The soil is mostly murram except for some areas of black cotton soil along the ridge in the centre. These characteristics dictated the land use plan with a central spine.

The gross area of the land to be used for the project is approximately 218 ha. The proposed project with 6,000 residential lots and related circulation and community facilities will utilize a total of about 18$ha; the remainder is unusable due to quarries, excessive slope etc.

This urbanisation project has a potential population of 60,000 to 120,000 at saturation. It is being developed as a high density residential area with about 500 persons per hectare.

4.11.2 Conception of the Project and the objective of the project

The project was conceived in 1971 as an attempt by the Government and the City Council of Nairobi to provide low-cost housing to the urban poor. It materialized in 1974 when the World Bank loaned the Kenya Government $16 million. Actual construction on the site started in the middle of 1975.

The estimated cost of construction for the whole project is K£10,543m. The Government contributes the rest of the money to supplement the World Bank loan. Although the three bodies (Government of Kenya, World Bank and
City Council of Nairobi) are the major contributors towards the success of this project, the participation of the people is also called in - the allottees must put up their own houses.

The criteria for selection of plot allottees spell out the objectives of the scheme. These are:

1. Target income group earning between K.shs.280 to Shs.600/-per month.
2. Allottees must have no other property in town
3. Must be heads of families
4. Must have lived in Nairobi for at least 2 years.

The project is unique in that it is specifically aimed for the low income group or the lowest 20th percentile of the income distribution curve of Nairobi. In other site and service schemes belonging to other local authorities the plots are allocated to individuals on the basis of "ability to develop", which means that allottees are selected among the well-to-do of the applicants. The well-to-do develop the plots not to live in them but to let to the low-income people.

4.12 Background material on population, income and employment in Nairobi

Nairobi experiences a fast growth of urban population in a disproportionate measure to other urban areas. For economic and historical reasons Nairobi seems to be experiencing an ever increasing concentration of population and employment as tables 4.15, 4.16 and 4.17 show.
### Table 4.15  Nairobi Population - The past and Projected Population

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
<td></td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Africans</td>
<td>231,744</td>
<td>422,912</td>
<td>9.0%</td>
<td>502,500</td>
<td>682,300</td>
<td>969,600</td>
</tr>
<tr>
<td>Asians</td>
<td>86,922</td>
<td>67,189</td>
<td>-3.8%</td>
<td>67,000</td>
<td>61,200</td>
<td>57,900</td>
</tr>
<tr>
<td>Europeans</td>
<td>28,765</td>
<td>19,185</td>
<td>-6%</td>
<td>18,700</td>
<td>19,500</td>
<td>20,500</td>
</tr>
<tr>
<td>Total</td>
<td>347,431</td>
<td>509,286</td>
<td>5.6%</td>
<td>585,200</td>
<td>763,000</td>
<td>1,048,000</td>
</tr>
</tbody>
</table>

*Census year  
** Nairobi City Council Projects (Ref. Nairobi Metropolitan Growth Strategy, Vol.11, Appendix 1)

### Table 4.16 - Population of 10 Largest Centres 1962, and 1969

**Source:** Computed by the author from Kenya Population Census 1962 and 1969

<table>
<thead>
<tr>
<th>Town</th>
<th>Census Population 1962</th>
<th>Urban Population growth p.a. %</th>
<th>% of total urban pop. 1962</th>
<th>% of total urban pop. 1969</th>
<th>Annual growth Africa pop. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>347,431</td>
<td>5.6</td>
<td>51.8</td>
<td>47.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Mombasa</td>
<td>179,575</td>
<td>4.7</td>
<td>26.8</td>
<td>22.8</td>
<td>7.6</td>
</tr>
<tr>
<td>Nakuru</td>
<td>38,181</td>
<td>3.1</td>
<td>5.7</td>
<td>4.4</td>
<td>4.9</td>
</tr>
<tr>
<td>Ki sumu</td>
<td>23,526</td>
<td>4.7</td>
<td>3.5</td>
<td>3.5</td>
<td>8.4</td>
</tr>
<tr>
<td>Thika</td>
<td>13,952</td>
<td>4.0</td>
<td>2.1</td>
<td>1.7</td>
<td>5.6</td>
</tr>
<tr>
<td>Eldoret</td>
<td>19,605</td>
<td>-1.1</td>
<td>2.0</td>
<td>1.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Nanyuki</td>
<td>10,448</td>
<td>1.5</td>
<td>1.6</td>
<td>1.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Kitale</td>
<td>9,342</td>
<td>3.1</td>
<td>1.4</td>
<td>1.1</td>
<td>5.5</td>
</tr>
<tr>
<td>Malindi</td>
<td>5,818</td>
<td>9.2</td>
<td>1.4</td>
<td>1.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Kericho</td>
<td>7,692</td>
<td>4.0</td>
<td>1.0</td>
<td>0.9</td>
<td>6.1</td>
</tr>
<tr>
<td>Total</td>
<td>574,933</td>
<td>85.7</td>
<td>84.7</td>
<td>Average 6.8%</td>
<td></td>
</tr>
<tr>
<td>Other towns</td>
<td>96,017</td>
<td>14.3</td>
<td>15.3</td>
<td>Average 3.3%</td>
<td></td>
</tr>
<tr>
<td>Total urban Population</td>
<td>679,500</td>
<td>1,081,437</td>
<td>7.1</td>
<td>100.00</td>
<td>10.1</td>
</tr>
</tbody>
</table>
Table 4.17: Percentage Distribution of total wage employment in Main towns in Kenya

<table>
<thead>
<tr>
<th>Town</th>
<th>1963</th>
<th>1974</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>53.9</td>
<td>58.9</td>
</tr>
<tr>
<td>Mombasa</td>
<td>18.6</td>
<td>17.9</td>
</tr>
<tr>
<td>Nakuru</td>
<td>3.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Thika</td>
<td>1.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Kisumu</td>
<td>4.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Eldoret</td>
<td>3.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Other</td>
<td>14.1,</td>
<td>12.2</td>
</tr>
</tbody>
</table>

It would appear that except for Nairobi and Thika other towns experienced a decline in wage employment between 1963 and 1974. This can partly be explained by high rate of migration from other places to Nairobi, rapid industrial and commercial expansion in Nairobi and Thika, and the departure of some Asians and Europeans households from the towns to their countries of origin.

4.12.1 Annual Household Incomes

It will be seen from table 4.18 that 60% of the total population in Nairobi are in the low income group, earning between K.shs.300 and K.shs.700/- per month. Even after the income projections done for up to year 2000, the majority of people will still be in low income because the incomes are relative.

Table 4.18: Nairobi Annual Household Income 1972, 1985 and 2000

<table>
<thead>
<tr>
<th></th>
<th>1972</th>
<th>1985</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi, Total income of Households.</td>
<td>£164,000,000</td>
<td>£474,000,000</td>
<td>£1,322,030,000</td>
</tr>
<tr>
<td>No. of Households</td>
<td>135,730</td>
<td>324,000</td>
<td>670,000</td>
</tr>
<tr>
<td>Lowest 20% of Households Share of Total income amount</td>
<td>3.5%</td>
<td>2.8%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Average Income per Household</td>
<td>£5,740,000</td>
<td>£13,272,000</td>
<td>£33,050,000</td>
</tr>
<tr>
<td>Low-Middle, 20-40% Share of Total Income Amount</td>
<td>6.8%</td>
<td>8.7%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Average Income per Household</td>
<td>£11,152,000</td>
<td>£41,238,000</td>
<td>£145,420,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1972</th>
<th>1985</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£214</td>
<td>£208</td>
<td>£247</td>
</tr>
<tr>
<td></td>
<td>£413</td>
<td>£636</td>
<td>£1,085</td>
</tr>
<tr>
<td></td>
<td>L972</td>
<td>1985</td>
<td>2000</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Middle, 40-60%</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Total Income</td>
<td>13.0%</td>
<td>14.1%</td>
<td>17.0%</td>
</tr>
<tr>
<td>Share of Total Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount</td>
<td>£21,320,000</td>
<td>£66,834,000</td>
<td>£224,740,000</td>
</tr>
<tr>
<td>Average Income per</td>
<td>£777</td>
<td>£1,027</td>
<td>£1,677</td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upper-middle, 60-80%</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Total Income</td>
<td>21.3%</td>
<td>21.4%</td>
<td>24.5%</td>
</tr>
<tr>
<td>Share of Total Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount</td>
<td>£34,932,000</td>
<td>£101,346,000</td>
<td>£323,890,000</td>
</tr>
<tr>
<td>Average Income per</td>
<td>£1,286</td>
<td>£1,560</td>
<td>£2,417</td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Highest 20% of Household</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Total Income</td>
<td>55.4%</td>
<td>53.0%</td>
<td>45.0%</td>
</tr>
<tr>
<td>Share of Total Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount</td>
<td>£90,856,000</td>
<td>£251,220,000</td>
<td>£594,900,000</td>
</tr>
<tr>
<td>Average Income per</td>
<td>£3,352</td>
<td>£3,869</td>
<td>£4,440</td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Households</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Income per</td>
<td>£1,208</td>
<td>£1,460</td>
<td>£1,973</td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**1971 prices**


The information contained in tables 4.16, 4.17 and 4.18 help to emphasize the fact that urbanization problems are not going to be the same in every urban centre. Consequently pressure on land cannot he felt equally in all the urban centres. The land problem experienced in Nairobi is of necessity different from land problems in smaller urban centres and while Nairobi may develop housing areas at very high densities it may not be reasonable for smaller centres which are surrounded by open country to have a similar development.

The lowest 20th percentile command less than 3%
of the total income of households in Nairobi. Schemes such as Dandora site and service scheme may be a desirable development to meet the needs of these people.

A clear demand for this type of scheme is well illustrated by the response it received from the public. When the project was publicised and applications solicited the total number of applications sold were 21,000. Out of this 16,000 were received back out of which 9,000 were shortlisted and then 6,000 selected through a computer for allocation of the plots.

4.13 Planning Standards Applied in Dandora Site and Service Scheme

The planning standards applied in the scheme are those developed by Nairobi Urban Study Group and the Dandora Project Department. These standards are as indicated in appendix 3. It is beyond the scope to this study to look into every aspect of the planning standards given. Of more importance is the land use profile, the plot sizes and density.

4.13.1 Land Use Profile

Land use profile in a great way regulates the maximum development in an area. The following land use profile has been worked out for the whole scheme.
Table 4.19 Land Use In Dandora Phase 1

<table>
<thead>
<tr>
<th></th>
<th>Phase 1 (1,000 lots)</th>
<th>Total (6,000)</th>
<th>Average To</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha.</td>
<td>ha.</td>
<td></td>
</tr>
<tr>
<td>1. Gross Area</td>
<td>46.5</td>
<td>218.2</td>
<td></td>
</tr>
<tr>
<td>2. Unusable</td>
<td>13.8</td>
<td>32.7</td>
<td></td>
</tr>
<tr>
<td>(Area Quarries,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>excessive slope, etc.)</td>
<td>13.8</td>
<td>32.7</td>
<td></td>
</tr>
<tr>
<td>3. Area Available</td>
<td>32.7</td>
<td>185.5</td>
<td>100</td>
</tr>
<tr>
<td>for development</td>
<td>32.7</td>
<td>185.5</td>
<td>100</td>
</tr>
<tr>
<td>4. Residential</td>
<td>15.0</td>
<td>89.8</td>
<td>48*</td>
</tr>
<tr>
<td>5. Circulation</td>
<td>8.2</td>
<td>44.5</td>
<td>24</td>
</tr>
<tr>
<td>6. Community facilities</td>
<td>9.5</td>
<td>51.2</td>
<td>28</td>
</tr>
</tbody>
</table>

Effective percentage of residential land will be between 50 - 60% because of the inclusion of additional land within the spine for expansion of community facilities (Source: Appraisal of a site and service project - Kenya "Report No.607 a -KE, April 14, 1975. IBRD.

4.13.1.1 Land Use Profile in Development Phases

For the purposes of implementation of the project the whole project has been divided into two phases (phase 1 and II). The phases are in turn divided into areas. In each of the areas land use profile has been worked out taking into consideration the plot layout and the lot sizes. There is no wide ranging difference.

In phase 1 as shown in Table 4.19 about 50 - 55% of the usable land is devoted to residential lots, 20 - 25% to circulation and the remainder to community
facilities and open spaces.

**DLICS**

### 4.13.1.2 Land Use Profile in Phase II /and IV And V

The construction of phase II has not started by the time of the study. However, the consultants have developed and tested a total of eleven plot layouts and have ranked the 6.30 - 7.35/8.40 and 7.35/7.35 as the best after considering the social benefits (4.10).

The land use profile for area IV is as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>62%</td>
</tr>
<tr>
<td>Major Open Space</td>
<td>13%</td>
</tr>
<tr>
<td>Incidental Open Space</td>
<td>5%</td>
</tr>
<tr>
<td>Road</td>
<td>8%</td>
</tr>
<tr>
<td>Paths</td>
<td>10%</td>
</tr>
<tr>
<td>Parking</td>
<td>2%</td>
</tr>
</tbody>
</table>

Total: 100%

The total site is approximately 32.4 ha and the overall density is 49.2 plots/ha. This land use profile closely resembles that for schematic plot layout 6.3 - 7.35/8.40.

**Land use profile for area V:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>63%</td>
</tr>
<tr>
<td>Major open space</td>
<td>12%</td>
</tr>
<tr>
<td>Incidental Open Space</td>
<td>4%</td>
</tr>
<tr>
<td>Road</td>
<td>9%</td>
</tr>
<tr>
<td>Paths</td>
<td>10%</td>
</tr>
<tr>
<td>Parking</td>
<td>2%</td>
</tr>
</tbody>
</table>

Total: 100%
The total site is approximately 11.0 ha, and the overall density is 52.3 plots/ha.

It is important to note that a significant proportion of the land use is allocated for footpaths (10%) in each case. This is in recognition to the fact that about .96% of the population have no cars and therefore the pedestrian mode of movement is predominant. A pedestrian network of primary and secondary paths and access ways is provided and is separated from the vehicular movement.

The aspect of pedestrian movement is even more taken care of by the World Bank Urban Project 11.

Appendix 4. Primary paths have a carriage way of 9m width, **Secondary path 6m**, domestic, path 3 to 4 m.

4.13.2 Plot sizes

Plots are designed to have a maximum plot coverage i.e. 50%.

The lot sizes are small and are so designed to enable the project to achieve relatively high densities.

Of the 6,000 lots there are about 1800 lots of 100m² each
2100 lots of 120m² each
1800 lots of 140m² each
300 lots of 160m² each

Therefore average plot size is 130m².

In phase 11 areas IV and V for example, there are 2200 lots. Their distribution and options is shown in table 4.20.
Table 4.20 - Distribution of plot sizes and options: Phase 11, areas IV and V)

<table>
<thead>
<tr>
<th>Option</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>100</td>
<td>451</td>
<td>20.5</td>
<td>209</td>
<td>9.5</td>
</tr>
<tr>
<td>120</td>
<td>528</td>
<td>24.0</td>
<td>242</td>
<td>11.0</td>
</tr>
<tr>
<td>140</td>
<td>451</td>
<td>20.5</td>
<td>209</td>
<td>9.5</td>
</tr>
<tr>
<td>160</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1430</td>
<td>65</td>
<td>660</td>
<td>30</td>
</tr>
</tbody>
</table>


There are about 50 plots per ha.

Option: A - Wet core (i.e. toilet and shower)

Option: B - Wet core plus store and kitchen

Option: C - Wet core, store, kitchen and one room.

Various types plans are prepared by the Technical Division.

13 type plans have been prepared for use in phase 1 and it is up to the plot allottee to choose one type plan. The most popular three type plans are indicated in the following pages.

4.14 Expected residential density

The residential density is expected to be high, 500 persons per ha. Field survey showed that in the completed phase 1 of the project the occupancy rate per room is 4.4 persons. If this trend continues as is expected of low cost, low income areas the density in persons per hectare over the whole project will be considered higher than the 500 mark.

Below is given the density in various definitions:
SITE & SERVICE SCHEME

DANDORA

TYPICAL FLOOR PLAN

SCALE 1:200

1. 2, 3 SINGLE ROOM UNITS

GICHUKI THOGO
M.A. (PLANNING*)
THESIS 1978

FIG. 5

SOURCE: FIELD SURVEY
SITE & SERVICE SCHEME DAN DORA

TYPICAL FLOOR PLAN

SCALE 1=200

1, 2, 3. SINGLE ROOM UNITS

FIG 6

GICHUKI THOGO
M-A • ("PLANNING")

THESIS H78

SOURCE: FIELD SURVEY
SITE & SERVICE SCHEME

DANDORA

TYPICAL FLOOR PLAN

SCALE 1:200

1, 2, 3 SINGLE ROOM UNITS

FIG 7

GICHUKI THOGO
MA. "PLANNING"
THESIS 1975

SOURCE: FIELD SURVEY
Net residential density, persons/ha 500
Density, plots/ha 50
Density, rooms/ha 200

4.14.1 Allocation of Space

The model of area IV in phase 11 is taken in analysing the allocation of space and is then generalised for the whole scheme because the planning standards applied were the same, that is, those developed by Nairobi Urban Study Group and Dandora Project Department:

The allocation of space is shown in Table 4.21

Table 4.21: Allocation of space (Model of Area IV) in Dandora

No. of plots =1596; Area =32.4ha; density 49.2 plots/ha

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1. Persons per plot 16</td>
</tr>
<tr>
<td>Open space</td>
<td>2. Average number of habitable rooms per plot 4</td>
</tr>
<tr>
<td>i) Major open space</td>
<td>3. Average plot area (average of 4 different sizes) 130m²</td>
</tr>
<tr>
<td>2) Incidental open space</td>
<td>4. Plot area per person 8.13m²</td>
</tr>
<tr>
<td>Total open space</td>
<td>5. Average size of rooms 12.8m²</td>
</tr>
<tr>
<td>(1 + 2)</td>
<td>6. Average living space, per person in the rooms (occupancy rare 4.4) 2.9m²</td>
</tr>
<tr>
<td>Road</td>
<td>7. Plot coverage 502</td>
</tr>
<tr>
<td>Paths</td>
<td>8. Indoor living space per person includes courtyard, built area less 10% service area) 3.6</td>
</tr>
<tr>
<td>Parking</td>
<td>9. Outdoor space per person non-built area 4.0</td>
</tr>
<tr>
<td>Total</td>
<td>10. Open space per plot (incidental) 10.</td>
</tr>
<tr>
<td>or 324,000</td>
<td>11. Open space per plot (Total open space) 36.5</td>
</tr>
</tbody>
</table>
OVERALL LAYOUT AREA IV PLOT SIZE 6 30 - 7-35 / 8*0

SOURCE: PRELIMINARY DESIGN REPORT 1976

The application of planning standards in urban low cost, low income residential areas

SCALE: 15,000

GICHUKI THOGO
MA (PLANNING) THESIS 1977/78

MAP NO 11
12. open space (total) per inhabitant 2.08m²
(pop. 1596 x 4 x 4.4)
13. Road area per plot 15.24m²
14. Paths area per person 1.26m²
15. Parking per plot 4.06m²

Source: Author’s Computation.

As is the case of the study areas in Thika Municipality the living space per person in the rooms is very small. The open space per inhabitant is also very small. Most of the open space is provided as major open spaces such that minor open spaces adjacent to the plots are lacking. The provision of car parking space is reasonable. This facility is usually denied the low-income residential areas, such a denial is negative factor in itself; the low income residential areas are part of the whole urban system and divisions in socio-economic levels do not necessarily mean physical divisions; vehicles are also a common feature in such areas though not dominant.

4.15 Provision of facilities in Dandora

4.15.1 Utilities and services

All lots are supplied with piped water such that individual water supply to each lot to serve a water closet, a shower, an outside tap and with provision for installing a water tap and sink in the kitchen at a later date. Water service on each lot is metered.

As concerns sewerage the lots have individual wet core units with water borne sewerage facilities.

Refuse collection is done by the City Council of Nairobi.
Presently the build up plots have not been supplied with bins and the refuse is dumped on designated areas where it awaits collection by the Nairobi City Council. The Nairobi City Council will provide the necessary bins and collection services chargeable to plot holders.

Electricity is available. There is a system of street lighting and security lighting at major communal points. The centre to centre spacing for street lighting varies with a maximum spacing of about 45m. Individual metered electric connections are available from East African Power and Lighting Company.

Parking is also taken care of and is provided along the secondary roads. It is also provided in communal places at the ratio of 1 per 2 plots. Access ways could also be used for parking as car-owners prefer to park their cars near their residence for security reasons. This practice however, would eventually damage the access ways since they are not constructed to carry vehicle loads.

4.15.1.1 Roads and Storm Drainage

There is a hierarchy of road system the circulation layout of which provides a network of vehicular roads, pedestrian paths and parking areas. The main roads with a road reserve of 20m whose carriageway is 7m wide and has 3m wide footpath on both sides, include surface water drainage ditch on each side of the footpath. These roads will serve as collector roads carrying bus traffic. The carriageway will be tarmaced. Secondary roads will provide vehicular and pedestrian access to the residential lots. The road reserve
RESIDENTIAL DISTRIBUTOR WITH BUS TRAFFIC

RESIDENTIAL DISTRIBUTOR NO BUS TRAFFIC

ROADS WITH PROPOSED LANDSCAPING

SOURCE:
MUTISO MENEZES INTERNATIONAL
DANDORA COMMUNITY DEVELOPMENT PROJECT PRELIMINARY DESIGN REPORT 1976

SCALE: 1200

FIG: 8
PATHS WITH PROPOSED LANDSCAPING

SOURCE
MUTISO MENEZES INTERNATIONAL
DANDORA COMMUNITY DEVELOPMENT PROJECT, PRELIMINARY DESIGN REPORT 1976-

SCALE: 1200

GICHUKI THOGO
M. A- (PLANNING)
THESIS 1977/78

FIG. 9
is 12m with 6m wide carriageway 2.30m wide footpaths on both sides with a surface water drainage ditch on each side of the footpath.

4.15.2 Community facilities

All community facilities for the project are grouped in the spine running along the site between the two through streets. This feature of the layout takes advantage of the shape of the site and the interrelationships of the facilities. The arrangement is to allow for easy access to the users. The provision of community facilities helps add to a livable environment.

The planning standards for the Community are indicated in the Appendix 3.

The total area in the central spine is approximately 42ha. where the existing and planned community facilities are:

The following community facilities have been planned for.

<table>
<thead>
<tr>
<th>Nos.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>primary schools</td>
</tr>
<tr>
<td>6</td>
<td>markets (about 400 market stalls)</td>
</tr>
<tr>
<td>2</td>
<td>Health centres</td>
</tr>
<tr>
<td>2</td>
<td>multi-purpose community centres, incorporating day-care facilities</td>
</tr>
<tr>
<td>1</td>
<td>Sports complex</td>
</tr>
<tr>
<td>4</td>
<td>Secondary schools</td>
</tr>
</tbody>
</table>

* It is the present Government policy not to provide more secondary schools in Nairobi until the great gap that has existed between Nairobi and other regions in terms of
educational facilities is reduced. However, sites for secondary schools have been marked out and distributed in relationship to population catchment.

4.15.3 Employment facilities

There are proposed industrial areas within walking distance of the project site. These industrial areas are Dandora and Ruaraka. They will be given preferred treatment by Nairobi City Council and Government.

Commercial facilities are also provided in the central spine and are situated at the three major road junctions connecting the southern and Northern spine roads where the biggest traffic flow is anticipated. These facilities will offer employment to a few people.

There is very little on-site employment. The on-site employment is a desirable aspect when dealing with a low-income residential area.

4-16 Evaluation of Planning standards in the study areas

4-16.1 Objectives for standards for Residential Development

Residential standards are framed in keeping with the following objectives:

i) To create a physical and social environment which is conducive to healthy and decent living.

ii) To achieve a balanced land use pattern so that the planned residential areas may become an intergral
part of the overall structure of the larger community.

iii) To give easy access to the dwellings and to achieve efficient circulation in the residential areas.

iv) To afford enough privacy to each dwelling.

v) To provide adequate and suitably located spaces for the housing as well as the facilities for shopping, health, education, and recreation served by sufficient water, sewerage, power and roads.

vi) At the lowest level, the dwelling unit standards are concerned with space for members of a household. The underlying principle is that each dwelling unit shall be provided with space necessary for assuring suitable living sleeping, cooking and dining accommodation.

These objectives have not all been met in the low-cost, low income areas. The views of most residents in the study area were that they are not getting satisfaction from their residential environment. This is because of a cumulative measure of the respondents' assessment of their residential environment.

Most complaints were for lack of enough indoor space, understandably because in all areas the single room is the basic housing unit. Lack of privacy, lack of children's play area were also blamed. Noise and closeness of the
buildings at Majengo especially were rated highly as to the dislikes of the inhabitants. Long journeys to work and lack of shopping facilities were cited as unfavourable cases in the new estates i.e. site and service scheme 6 in Thika, and Dandora site and service scheme. If there were any alternative the inhabitants would not opt for the shared facilities e.g. communal water taps at Rental scheme phase 1 Thika) Majengo and site and service scheme 6.

4.16.2 Density and Environmental Quality

Density considerations are an important part of any planning undertaking, since on the one hand density is a crucial determinant of environmental quality; and on the other it affects both the case with which additional or new development can be integrated within existing development; and the level of investment expenditure in the provision of infrastructure. There may be a broad range of density categorisation, but care should be taken to avoid excesses on either extreme of the range. Too low densities though they may be pleasant in themselves, would lead to excessive urban sprawl which in turn would lead to a costly transport system, and the community facilities would become less accessible.

Extremely low densities are thus wasteful of valuable land, economically expensive to provide for; and they are an impediment to neighbourliness. Extremely high densities on the other hand can only be built at the expense of a loss of open space that results in sub-standard living conditions. Very high densities, therefore,
are normally associated with poor environment, lack of individual privacy, and they leave little room for inexpensive change should need arise as it invariably does. A balance has to be struck therefore between the need to avoid excessive outlays of expenditure, and the need to provide for healthy and efficient urban living.

Densities may be defined as the intensity of activity, or built form per unit ground area. There are net densities which refer to the immediate surroundings of the built form, and exclude shared facilities in localities; and there are gross densities which include shared facilities such as roads, parking space and local open spaces. The third type of density is the neighbourhood density which includes not only buildings and their immediate circulation, but all the necessary services and facilities at a community scale. Physical densities, normally expressed in terms of the built-form per unit area can be singly determined by physical planners using a pre-determined set of standards; however, densities which refer to the intensity of activities are not quite as easily answerable to determination by physical planners. This is so because the intensity of activity per unit areas, such as the number of people per room, is to a large extent a result of economic and social achievements of a society and will therefore be directly linked, with the level of development reached. It is common knowledge that activity densities decline
with greater economic development such that it appears
safe to conclude that prevailing density levels are a
function above all also of the living standards. Such
high densities in persons per hectare in the study areas
are a direct reflection of the shortage of housing. This
factor should be accommodated when planning for low cost,
low income residential areas. It is being suggested that
physical planning should perhaps t, crucially concerned
at this stage with the intensity of the built-form for
unit area.

In the study areas there are no high rise buildings.
In most cases people have to put up their own structure
and it has to be in the form that is inexpensive to them.
The cultural attachment to land is so strong that it is
always considered desirable to provide plots allowing for
single storey detached housing. High rise buildings
or walk up apartments could only be put up by local
authorities if their financial position allows. They could
be build in high density areas and used to accommodate
one person households.

The suitability of density varies with the situation,
the allowable costs, the habits of the group to be served
and the character of the surrounding development. When
considering density, it is important to consider the overall
pattern of settlement, the economy, functional social
organisation and the amenity of the settlement.
Each building type, moreover, has its own appropriate density, and the choice of density should therefore depend upon the building types or types most appropriate to the situation. The City of Nairobi, for example has general planning schemes which indicate both density levels and minimum plot sizes for different buildings.

Different ranges of both the allowable densities and plot sizes are desirable so that a planner can be allowed a degree of flexibility when deciding on density levels appropriate to situations. When there is restriction to one type of density as in the case of Dandora a monotonous layout is bound to result. Different types of density could be mixed to provide for visual variety and individual choice of dwelling type for the residents. Plots could be combined or even their sizes altered in the interests of appropriate levels. The main concern should be environmental quality and functional efficiency.

In this context it may be pointed out that certain density thresholds exist, and these have planning implications for the environment and circulation.

At about 30 dwelling units to the hectare, problems of noise and privacy begin to appear. This has happened in all study areas as the respondents indicated although except in case of Dandora where the density is 50 plots per hectare, other areas have density less than 30 plots per hectare. Below the 30 plots per hectare mark, it becomes difficult to provide group facilities within
very close range of the units. The point of maximum economy for urban living seems to be around 50 dwelling units to the hectare, but this only need be where the pressure of land is extremely very high. Above this mark it becomes difficult to provide for open spaces and direct access to the ground especially in the case of low rise detached housing. At around 100 dwellings to the hectare, a loss of visual intimacy and human scale occurs, whereas at the very high densities around 200 dwelling units per hectare, this becomes an acute shortage of space for landscaping and recreation. These very high densities are suitable only for special types of living in central urban areas; for those people who will accept limitations on their facilities for recreation and movement in return for central location.

It has been established in density analysis that:

beyond 500 inhabitants per hectare it is practically impossible to obtain a figure for plot area of more than 100m$^2$. Between 300 and 500 inhabitants per hectare the plot area may be comprised between 60 and 120m$^2$ (4.12)

The density in persons per hectare in the study areas is in all cases more than 500 persons per net residential hectare. Although there is an element of overcrowding such a density is not desirable in many of the urban areas of Kenya.

4.16.2.1 Controlling Density

Density cannot be a very accurate control because it is
conditioned by many variables. Density expressed in persons per hectare changes as household size changes or as the population changes.

In terms of low cost, low income residential areas characterised by the study areas the type of development is either single storey detached housing or row houses (there are no blocks of flats). This situation is likely to stay for a long time. Attempts could therefore be made to control density of the built form through plot ratio, plot coverage, houses per hectare and habitable rooms per hectare.

In Kenyan urban areas controlling density depends on the ownership of land. Government land or local authority land can be controlled through zoning, subdivision regulations, and covenants attached to leaseholds. There is no adequate legislation to control development in privately owned land.
Plate 1: Middle income housing, Thika Municipality.

Plate Mortgage housing, Thika Municipality:
also middle for income.
Ill till Low income homing
Majango - Thika,
Kota denac housing.

Mil* Its Courtyard estate.
Plate V: Outdoor space, site and service scheme 6 - Thika.

Plate VI: Competing use of outdoor space, same estate.
Plate VII & VIII: Communal water tap, Site and Service 6 - Thika. Author on left.
Plate IX & X: Back to back, poor maintenance between buildings.
Plate XI & XII: New construction
Site and Service 6 Thika. Note space between buildings.
Plate XIII: Open space used for growing maize.

Plate XIV: Open space, 2 kiosks.
Plate XV: Children utilising outdoor space.

Plate XVI: Cooking outside the dwelling
4.1 District Commissioner (Thika District) Annual Reports 1915 to 1919.

4.2 Republic of Kenya
- Population Census 1948
- Population Census 1962
- Population Census 1969


4.5 Housing Research and Development Unit, University of Nairobi Mathare Valley - A case study of Uncontrolled settlement in Nairobi September, 1971.


4.7 United Nations Housing in Africa, September, 1965 Sales No.66.UK.4

4.8 Ibid., Page 69


4.11 Mutiso Menezes Nairobi City, Dandora Community Development Project, Preliminary Design Report, June,1976

5.1. General Experience on Housing Density and Costs of Infrastructure

In the absence of proper survey data which would show the relationship between the density of housing and cost of infrastructure in Kenyan towns this chapter cites what is universally accepted to be true. The information here is considered useful in this study since the earlier section, chapter 4, mainly dealt with analysing density in low cost, low income residential areas. It is important to know at what densities the residential areas will be allowed to develop in view of the whole land use pattern in particular town. The trade-offs in between activities and spaces has to be weighed carefully.

The costs of dwellings, and of the roads and services that support them, depend to a large extent on the density of development. At very low densities the cost of infrastructure increases undesirably, and time and effort for interaction between people and various functions become too high.

The type of density referred to here is the net residential density which is normally expressed as: dwellings, habitable rooms, bedspace, or persons per hectare. Dwelling per hectare is a useful measure for assessing the requirement for roads and services, but it takes no account of capacity. Persons per hectare
reflects not only capacity, but also the way the dwellings are occupied, and is useful for measuring the need for other services, for example schools and shopping. In the study areas there is a concentrated form of low-rise or single storey housing which is a classic pattern of residential land use for these type of communities. This type of housing development is necessitated by a number of factors:

1) An individual puts up his own dwelling in most cases

2) a low-rise building has a much shorter construction period (interest cost of capital tied up during construction is considerably less) and is therefore suitable for low income people.

3) The standard of the building can be upgraded later depending on owners requirements and his earning capacity.

The costs of infrastructure are looked in relation to the above type of housing development.

Experience from abroad shows that

"The cost of site development for roads, sewers, and other public utility services fall with density. Whereas at a density of four dwellings per acre (9.8 dwellings per ha) the cost of development per dwelling is about £700, thus falls to about £150 at densities of forty-eight dwellings per acre (118.6 dwellings per ha). The costs fall rapidly as the density is increased from low to moderate levels but then fall off slowly as density goes on increasing" (!
5.1.1 Costs in relation to housing types

The type of housing development also influences the costs of infrastructure.

"Multi-storey tenements costs more to construct yet save on transport and other infrastructure costs; on the other hand, low-rise housing costs less to construct but occupies more space" (5.2)

It is important therefore to know the point of trade-off not only between the various types of housing development but also between open-to-sky space and built up construction. To do this the entire system of the urban area must be examined so that a solution is arrived at which is the most economical in its total cost per family - including roads, services, schools, green areas and mass transportation systems.

5.2 Cost of a House

The major factors affecting the costs of dwellings themselves are size, standard, and form of the dwelling, and the region in which it is built. The form of housing affects not only the costs of developing the housing estate but also affects, through density, the amount of land required and hence its cost. Standard, form and size relate to maintenance costs of the dwellings and of providing service to the estate.

The major constituents of the cost of a house in an urban area in the Kenyan case are:
1. Land Cost (10%)
   This cost is still comparatively low for residential development;

2.- The cost of superstructure and foundations, i.e. the actual building which constitutes the major component.

3. Infrastuctural costs i.e. water, sewer, electricity connections plus estate roads. (25%)
   This can constitute as much as 30% of the total cost, and

4. Fees for approvals and professional fees - stamp duties and consultants. The minimum architects fee is 6% and that for a quantity surveyor is 2.5%. The more consultants are used the higher the fees, which can be as much as 15%. On top of that extra costs such as feasibility studies and the employment of a clerk of works can be added.

The percentages are given for an urban conventional housing development (5.3). From the above percentages it can be seen that at very low housing densities, the infrastructural costs will definitely rise. The cost of construction of estate roads, sewers will depend on the length/road and distances between the dwellings; of the costs of the maintenance and servicing of estate roads are related to the length of the road.
5.3 Infrastructure Costs

5.3.1. Economic Infrastructure

Bukoba Town, Tanzania (5.4)

The analysis of economic infrastructure costs for varying densities relevant to the income distribution in Bukoba is given below. It was an estimate as a result of study done on Bukoba Kemondo Bay (Tanzania) by the Department of Urban and Regional Planning, University of Nairobi.

The estimates are done for densities of 10 units per hectare, 20 units per hectare and 48 units per hectare where the type of house is a four-roomed Swahili type with a separate kitchen/sanitary structure.

<table>
<thead>
<tr>
<th>Economic Infrastructure Costs/10 units/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tarmac road: (100 \times 10\text{m} = 1000\text{m}^2) @ 125/-</td>
</tr>
<tr>
<td>Water mains: (trunk pipe) 100m @ 50/-</td>
</tr>
<tr>
<td>Individual connections: (26m per plot)</td>
</tr>
<tr>
<td>26 (\times) 10 = 260m @ 50/-</td>
</tr>
<tr>
<td>Water metres: 10 @ 50/-</td>
</tr>
<tr>
<td>Surface water drainage: one side of roadway</td>
</tr>
<tr>
<td>100m @ 85/-</td>
</tr>
<tr>
<td>Street lighting: 1 post per 33m @ 2,500/-</td>
</tr>
<tr>
<td>Electricity: Individual connections</td>
</tr>
<tr>
<td>10 (\times) 10m = 100m @ 100/-</td>
</tr>
<tr>
<td>Pit latrines or septic tanks:</td>
</tr>
<tr>
<td>(750/- - 2000/-) Average price 1375/-</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
### Costs per plot

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (per plot)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Costs</td>
<td>18,375/-</td>
<td></td>
</tr>
</tbody>
</table>

### Total cost per unit

(density 10 houses/ha) 36,404/-

Construction costs as per locally available materials.

#### Economic Infrastructure costs/20 Units per hectare

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (per hectare)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Murram roads:</strong> 2 x 100 x 4 = 800 m$^2$ @ 20/-</td>
<td>146,000/-</td>
<td></td>
</tr>
<tr>
<td><strong>Water mains (trunk pipes)</strong> 200m @ 50/-</td>
<td>10,000/-</td>
<td></td>
</tr>
<tr>
<td>Individual connection: (26m per plot)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 x 20 @ 50</td>
<td>26,000/-</td>
<td></td>
</tr>
<tr>
<td><strong>Water metres 20 @ 50/-</strong></td>
<td>1,000/-</td>
<td></td>
</tr>
<tr>
<td><strong>Surface water drainage</strong> (one side of roadway)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200m @ 85/-</td>
<td>17,000/-</td>
<td></td>
</tr>
<tr>
<td><strong>Street lighting:</strong> 1 post per 33m = 6 posts</td>
<td>15,000/-</td>
<td></td>
</tr>
<tr>
<td><strong>Sewerage (trunk pipe) 6</strong>, 200m 052/-</td>
<td>10,400/-</td>
<td></td>
</tr>
<tr>
<td><strong>Sewerage (individual connections) 6</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(26m plot) 26 x 20m 952/-</td>
<td>27,040/-</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>123,440/-</td>
<td></td>
</tr>
<tr>
<td><strong>Cost per plot</strong></td>
<td>6,172/-</td>
<td></td>
</tr>
<tr>
<td><strong>House Costs</strong></td>
<td>18,029/-</td>
<td></td>
</tr>
</tbody>
</table>

**Total cost per unit**

(density 20 houses per ha) 24,201/-

#### Economic Infrastructure costs (48 units per hectare)

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (per hectare)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tarmac roads:</strong> 2212 m$^2$ (d 125)</td>
<td>276,500/-</td>
<td></td>
</tr>
<tr>
<td><strong>Water mains:</strong> 80 x 2m = 160 @ 50/-</td>
<td>8,000/-</td>
<td></td>
</tr>
</tbody>
</table>
Water taps: 3 taps per cluster:

6 @ 50/-  300/-

Ablution blocks: (total 8 toilets, 4 shower cabins per ha.) size of

ablation block: 6 x 4m = 24m² @ 500/-  12,000/-

Water tap in toilets: 8 @ 50/-  400/-

Showers: 4 @ 100/-  400/-

Surface drainage (both sides of local access road) 252 x 2 = 504m @ 125/-  63,000/-

Street lighting: 4 posts per local access road x 2 = 8 @ 2500/-  20,000/-

Total 380,600

Costs per plot 7,929/-
Costs per house 18,029/-

Total cost per unit (density 48 houses/ha) 25,958/-

* Services in this example are provided on a communal basis, i.e. water, toilet and showers are located in central places.

The figures show that if the infrastructure services are as shown and provided to the densities of 10, 20 and 48 houses per hectare respectively, the related per unit costs will be 18,375/-, 6,172/-, 7,929/- (cost / plot). The cost in the 20 density per hectare development could have altered to a slightly higher figure if the roads were tarmac. However, this illustration serves to
show that the lower the housing density the higher the costs of infrastructure, while the cost of infrastructure is lowered where there is high density development.

Other costs which could expectedly be increased by low housing density development are transport costs when considering the overall pattern of residential development in relation to the total city system. They have not been considered in the above case.

5.3.2 The infrastructure costs—Dandora Site and Service Scheme

The infrastructure costs for Dandora Site and Service Scheme as estimated by World Bank (the sponsor of the project) are shown in appendix . The whole project is being developed nearly at the same density, i.e. 50 plots per hectare. The housing project is being carried on a virgin land. The characteristics of the soil in the area influence the infrastructural costs as far as labour is concerned.

Table 5.1 shows the cost of construction per unit area (m²) and in case of housing units the cost is shown per unit house. From the earlier notion it follows that the cost of the infrastructure would be more if the housing density were considerably lower than 50 plots per hectare.
Table 5.1

Pandora Project - Phase 1

Cost per Sq.metre or per Unit

<table>
<thead>
<tr>
<th>Total area 127820 Sq. Metres</th>
<th>Total Units 1038 (Incl. 5 unserviced plots)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost</td>
<td>Cost per Sq.metre or unit</td>
</tr>
<tr>
<td>Kt</td>
<td>K.shs.</td>
</tr>
</tbody>
</table>

1. Site Preparation
   a. Clearing & grading  3,014  0.47
   b. Lot Demarcation (1038) Units 10,000  192.67 per unit

On-site Infrastructure
   a. Primary Road & surface drainage  69,049  10.80
   b. Secondary Roads & surface drainage  36,750  5.75
   c. Sewerage Reticulation  66,398  10.38
   d. Water Reticulation (1033) units  15,465  299.41 per unit
   e. Street Lighting  15,609  2.44
   f. Refuse Collection  15,972  2.49

3. Core Units
   a. Wet core (Type A 704)  168,084  4775.11 per unit
   b. One-room Unit (Type B 273)  136,461  9997.14
   c. Two-room Unit (Type C 56)  40,808  14,574.28

Trunk Infrastructure
   a. Design & Engineering  11,664  1.82
   b. Construction  58,323  9.12

5. Project Administration  114,688  17.94

6. Community facilities
   (Construction of one Primary school)  72,600  11.35
   834,885

Add interest during construction  288,387  4.44
TOTAL 863,272  135.00 (E6.75) ($16.87)

Source: Dandora office
An estimation of the on-site infrastructure costs for area IV and Area V in Phase II are given in Table 5.2 and Table 5.3

**Table 5.2: Cost Estimates of Infrastructure for Area IV**

**Area IV:** 32.1 ha; density 49.2 plots/ha,

No. of plots: 1596

<table>
<thead>
<tr>
<th>Description</th>
<th>Total cost (Kt)</th>
<th>Unit cost/plot (Kt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site clearing &amp; grading</td>
<td>9,000</td>
<td>5.6</td>
</tr>
<tr>
<td>Secondary Roads/footpaths,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>storm water</td>
<td>70,400</td>
<td>44.1</td>
</tr>
<tr>
<td>Sewerage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reticulation</td>
<td>110,700</td>
<td>69.6</td>
</tr>
<tr>
<td>Water Reticulation</td>
<td>48,000</td>
<td>30.0</td>
</tr>
<tr>
<td>Street lighting</td>
<td>25,000</td>
<td>15.6</td>
</tr>
<tr>
<td>Landscaping</td>
<td>3,100</td>
<td>1.9</td>
</tr>
<tr>
<td>Refuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collection</td>
<td>6,200</td>
<td>3.9</td>
</tr>
<tr>
<td>Physical contingencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>313,300</td>
<td>196.3</td>
</tr>
</tbody>
</table>

**Source:** Mutiso Menezes International - Preliminary Design Report - Dandora Project

**Table 5.3: Cost Estimates of Infrastructure for Area V**

**Area V:** 11.0 ha; density 52.3 plots/ha;

No. of plots: 576.
<table>
<thead>
<tr>
<th>Description</th>
<th>Total Cost</th>
<th>Unit Cost/plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site clearing and grading</td>
<td>2,400</td>
<td>4.2</td>
</tr>
<tr>
<td>Secondary roads/footpaths,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stormwater</td>
<td>28,000</td>
<td>48.6</td>
</tr>
<tr>
<td>Sewerage reticulation</td>
<td>44,500</td>
<td>77.3</td>
</tr>
<tr>
<td>Water reticulation</td>
<td>17,400</td>
<td>30.2</td>
</tr>
<tr>
<td>Street lighting</td>
<td>8,800</td>
<td>15.3</td>
</tr>
<tr>
<td>Landscaping</td>
<td>1,100</td>
<td>1.9</td>
</tr>
<tr>
<td>Refuse collection</td>
<td>2,200</td>
<td>3.8</td>
</tr>
<tr>
<td>Physical contingencies 15%</td>
<td>15,600</td>
<td>27.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>120,000</strong></td>
<td><strong>208,4</strong></td>
</tr>
</tbody>
</table>

* Secondary roads (here include residential roads and Access ways.

N.B. All figures rounded.

Source: Mutiso Menezes: Preliminary Design Report - Dandora Community Development Project.

In both cases the difference in per unit cost is negligible because the housing density is nearly the same.

5.4 SUMMARY

In low density housing development the infrastructure cost per unit goes up while in the high density development the infrastructure cost per unit goes down. It is necessary to know the trade-offs between the two types of development in order to determine the overall land use pattern in an urban area. This is better done taking into account
a number of crucial variables, e.g.

1. The cost of service infrastructure i.e. roads, water supply, sewer lines, etc.
2. The cost of social infrastructure (schools, hospitals, etc).
3. The construction cost of the units
4. The cost of providing mass transport
5. Some usability co-efficient for open-to-sky space, both private and communal.
REFERENCES


CONCLUSION AND DISCUSSIONS

6.1 Brief description of the findings of the study concerning residential planning standards in the urban low cost, low income areas.

6.1.1 Single room accommodation.

In the survey areas the buildings are single storey and they are so designed as to provide accommodation for different households on the basis of single room units.

The provision for one roomed units has a historical background in urban growth in Kenya. The local African population was not encouraged to live in towns during the colonial years. It was often said that "the African had one foot in town and the other in the reserve". So when planned estates for African tenants were built by Central Government, Local Authorities and large companies with varying degrees of success, they were usually one roomed units meant for the working males only. Such was the case in the Thika TUDC Rental Scheme I which was one of the study areas (built 1955)*

One characteristic that marks most of these early estates is the authorities' failure to understand the way of life of African societies and the particular consequences of their transfer to an urban environment. As only working men were allowed to stay in town, the sex ratio soon became very imbalanced.
The pattern of urbanisation in Kenya is changing especially for the African urban population not only in terms of numbers but also in composition. The pre-dominance of migratory labour has been reduced, while the urban dweller and his family have become a more common feature in town life. Yet, in the new site and service schemes which are seen as an alternative to providing housing for the urban poor, the trend of providing one roomed units continues so to speak: the houses are designed as to allow subletting which can be done on the basis of single room units. In site and service scheme 6 (Thika) the dwelling unit is divided into an average of 8 - 10 rooms. In Dandora site and service scheme (Nairobi) the dwellings are divided into 3 or \frac{3}{2} rooms and since subletting is permitted the same case applying for other areas also applies here.

6.1.2 Housing layout

The housing layout is monotonous and soulless. The aim in the design and layout of residential building sites is to create beautiful and healthy surroundings for the full realisation of family and community life. In the absence of mix of different housing types the residential areas have such a uniformity as to be aesthetically dull.

6.1.3 Density

The density is the main question in a low cost low income
urban residential area. In all the study areas the density in persons per hectare is very high. Density in plots per hectare is high in case of Dandora (50 plots/ha); it is low in Thika TUDC Rental Scheme I because of the land use proportions which does not conform to the norm. The occupancy rates per room are high – all above 3 thus differing widely from the National objective of 5 persons per 2 rooms or 2.5 persons per room. The pilot scheme at Dandora is expectedly going to have a higher density than the proposed one of 500 persons/ha. As it were, this project is a test of two aspects, namely: the acceptability by the people of the scheme i.e. notably the acceptability of planning standards especially its main features of high density and very low cost structure, and the suitability and, or, place of the scheme in a large urban area with other important but conflicting interests, on land usage, social and political considerations.

Consideration of density is crucial in determination of land use pattern. Individual developers and landowners would like to push up densities since it loads to higher profits for the former and higher land prices for the latter.
So far optimal residential patterns and densities have not been identified in the context of Kenyan urban areas and as regards low income communities. It appears, however, that even if this were done it would be another matter for the authorities to be able to stabilise densities at these levels.

6.1.44 Indoor living space and outdoor space or space about buildings.

Living in a house involves a number of activities both indoor and outdoor activities which all require space. The allocation of living space per person in the study areas is very small and does not even meet the space requirements of By-Laws Grade II. (i.e. 3.6 m²/person & 10.4 for service area = 1+0 m²/person). This is largely due to the high occupancy rate in the rooms.

100% of the interviews stated that they did not have enough space for many of their needs and seemed to resign their fate as a way of urban living; there was lack of space for furniture, fuel storage (mostly charcoal), entertaining spaces, storage for utensils and dishes, and lack of enough space for beds (the author witnessed some households in which children slept under their parents beds for lack of adequate bed space).

There are no kitchen facilities and the cooking is sometimes done outside the house, or in the
court yard, and sometimes in the already overcrowded room thus nnkiir- indoor living uncomfortable. Washing of clothing is done at communal water taps and the drying is done in the courtyard. The courtyard is used by all households on the plot for a number of purposes: cooking, washing and dryir - clothes, playspace for children, and storage.

The majority of these problems result from the shortage of new houses and consequently the existing ones are overcrowded. This is a factor that should be taken into consideration when determining the plot sizes and room sizes for a low income residential community.

There is little space about the buildings. The buildings are closely clustered together. The distance between one building to another is small thus leaving a small 'corridor' which nobody bothers to clean. Rubbish and dirty water collect there and could be a potential source of diseases.

6.1.5 Open Space

The allocation of open space per inhabitant and per plot is little as in the case of allocation for living space. The only exception is the Rental scheme I where space about the buildings seems to be overgenerous at the expense of the dwelling size.

Open space is provided in Kajengo at Thika but because of its location and lack of maintenance, it is
not functional. Small open spaces are provided at the outer edge of the estate near the Upper Road. They are used as 'shambas' for growing vegetables and maize by those residents whose plots are near the open spaces. Such open spaces do not serve a precise purpose. There is no provision of open space in site and service scheme 6 at Thika. And the provision of open space around the dwellings in Dandora is not striking. In this case the incidental open space is at the end of cul-de-sac of access roads. Major open spaces have been provided at Dandora and their use will depend on the level of maintenance by the City Council of Nairobi.

The location of open space is important. If the open space is located in small units near the plots more space around the buildings will be provided thus avoiding the dense urban housing experienced in the study areas; when open space is provided in large units and away from the dwelling units it ceases to be operational because the residents do not want to go there and make use of it for recreation purposes. The situation is worsened when the local authority does not maintain the open spaces and they become overgrown with grass and bush; and are wet due to lack of proper drainage.

6.1.6 Location of facilities

If people are to be provided with all the urban facilities normally associated with urban living in the same locality as their housing, space must be made available for local shopping, schools, recreational
facilities and to some extent employment facilities. Not all facilities will have to be provided in the residential area because of the nature of their catchment population they may need to be located elsewhere.

The location of small kiosks at Majengo shows that despite the fact that shopping facilities in this area are so near it is important to have convenience shops or corner shops or for that matter kiosks within a space of about 30 dwelling units. There are no shopping facilities at site and service scheme 6 - Thika. Although the facilities will be provided later after the completion of the whole scheme, it is necessary to provide shopping facilities simultaneously with the building of the estate. Other adjoining site and services schemes were completed earlier and their residents have been finding it inconvenient to go shopping for long distances in the absence of a shopping centre in the area. Shopping is provided at Dandora but the facilities will be inconvenient. Quoting the words of the Medical Officer of Health - City Council of Nairobi, the centralization of shopping facilities is unreasonable for an estate of this size. Shopping facilities should be located at several centres to serve adequately the expected large population.

'What is strikingly missing in all the study areas is on-site employment.' On-site employment in low-income urban communities would be useful in that it
would add income to the low-income earners and save on transport costs for them.

6.1.7 Traffic

All the study areas are designed so as to have a minimisation of through traffic and also to minimise fast traffic passing residential plots.

In the Daniora site and service scheme more attention is being given to pedestrian traffic which is considered a safer network; footpaths have been designed to link the residential plots with all types of facilities in the estate. Parking facilities has been neglected. Pedestrian network too has not been given much attention in the other study areas and footpath construction is at minimum. Where there is a main road carrying through traffic and forming the external boundary on one side of a neighbourhood there has not been provision for pedestrian and cyclist along the road. This problem is noted in the case of Kenyatta Highway which forms the external boundary of Majengo and Clarissa Road near the site and service scheme 6 - Thika. It is also noted in the case of Daniora along the Komo - Rock road.

6.1.8 Land use proportions

The land use profile in the study areas does not include community facilities since the facilities are not necessarily located in these areas. In the three study areas in Thika the facilities are located as part of an integral part of wider areas, that is,
they are shared by several estates.

The land use profile therefore gives the proportions of residential, open space, and circulation (roads). In the case of Dandora it is more elaborately given as residential, major open space, incidental open space, road, paths, parking. Since the community facilities are also situated their inclusion would reflect a truer picture of the land use profile.

Standards developed by several international agencies, academic institutions and public planning agencies suggest the following land use profile:

- Residential: 50 - 60%
- Circulation: 20 - 30%
- Public areas: 15 - 30%

It would appear that except in the case of TUDC Rental Scheme - Thika, where the percentage of residential use is very low compared to the open space around the buildings, the other areas seem to correspond roughly to this configuration. The site and service scheme 6 Thika has a sort of incomplete land use profile in the absence of open space. In Dandora site and service scheme the proportion of major open space is reasonably big 10 - but the functional value of such open space has to be: here it is a question of distribution/quest of open space rather than lack of it.

6.1.9 Plot sizes

Plot sizes are not very big. The average plot size in Kajengo is $225 \text{ m}^2$, in site and service scheme 6
it is 325.05 m²; Dandora site and service scheme has the smallest sizes ranging between 100 m² to 160 m². The latter are especially small compared to 32k m² and 210 m² in Zambia, 375 m² in Botswana (6.1), and 288 m² in Tanzania. (The minimum plot size for the high density detached housing in Tanzania is 370 m² (6.2).

Given that the occupancy rate per room in these areas is high (the average in all areas is 4.3 persons per room) the provision of plots of such small sizes contributes towards the lack of adequate living space. Also given the land use configuration it is seen that the smaller the plot sizes the higher the density when considering detached low rise housing.

6.1.10 Sources of planning standards and their application.

There are a number of sources of planning standards as mentioned earlier. These bodies do not necessarily formulate the same standards. The application of planning standards in a residential area depends on which body is doing the planning hence the monotonous layout and in some cases rigidity in the use of planning standards. If these bodies borrow from each other and allow the use of different standards in the same residen-
tial area then a certain degree of flexibility will have been achieved.

except in the case of Housing Research and Development Unit which is undertaking research in low cost housing, the planning institutions have set standards without using adequate criteria.

6.I.II Planning legislation

The existing planning legislation is silent on planning standards. As it is no adequate control for the use of urban land has been provided especially for private land. Comprehensive subdivision and zoning by-laws have not been drawn out.

6.2 Conclusion and Recommendations

6.2.1 The importance of planning standards.

Planning standards are important and essential tools not only for balancing the use of land between the various conflicting claims but also for control purposes. Planning standards are a minimum and could be usefully thought of as a system where constant review is required so that their application should be dynamic to suit new and changing circumstances.

The application of adequate planning standards helps in providing a good environment.
To be clear about the nature and role of residential planning standards one must set them in the context of planning and achieving a good housing environment. The provision of good housing environment benefits is the and standards are a means, and of course not the only means, to this end.

6.2.2 Dense urban housing and density

It is a well known fact that high density and overcrowding brings a relatively higher rate of illness in its train and puts a higher burden on health services. Research done elsewhere indicate that people with less space tend to worry more (6.3) and, in the same study another finding is that persons with lower income tend to have higher scores on the worry index. Although such a study is based on the high rise buildings its findings could be applicable to low rise development. Normally it is the low income earners who reside in high density areas.

In the study areas there is high density and overcrowding. They are typical low income residential communities in the urban areas in Kenya. People in the low income group consume much less space per capita
than the middle or high income groups in the housing market. The reasons are that they cannot afford the market value of land and since they form the majority of the urban population the public sector cannot afford to subsidize larger land sizes for them.

As a result planning standards in a residential area reflects what a particular income group can afford.

"Space standards increase as the standard of living rises" (6J+)

High density living does not conform to the social values of the people especially because they have been used to living in abundant spaces of rural areas. Concentration of large numbers of people in very limited areas is far much in excess of rural densities. The environmental quality in such problem areas is low.

The main justification for dense urban housing is to reduce the cost of "modern" services, to cut down on transport from home to work, and to reduce land consumption. But saving on land may be very little

".... tragically enough, piling people one over another does not in fact 'save' much land for the city
housing occupies about a third of most cities. Thus we see doubling the number of people on each site does not 'save' much land for the whole city (though it could mean much higher profits for the individual developer which is of course the reason it -et3 done). On the other hand, halving the density on residential plots could mean only a marginally larger city (6.5).

6.2.3. Recommendations

I. Planning standards for low cost, low income urban residential areas should be set using more elaborate criteria so that minimum space standards can be decided according to family social and functional requirements; maximum space standards should be decided according to economic density requirements. In this way housing should not be perceived as cells in isolation but as a hierarchy of activities and spaces. Within each activity there is a trade-off between spaces which are covered and those open-to-sky. The activities themselves are mutually interdependent and there can be spatial trade-off
between them. The criteria upon which these planning standards, can be established are; living space (indoors), outdoor space, floor-space and space about buildings, dwelling size, plot size and U3e, grouping type, land use profile, density, location, development type, and less significantly climate.

2. A range of desirable density (if not optimum) in the low cost, low income residential areas should be roughly between 300 and 1450 inhabitants. It does not seem reasonable to spend a lot of resources to develop such a high density area as Jandora site and service scheme. A desirable density in plots per hectare should be aimed at 25 - 30 plots per hectare. The range of 300 to 1450 inhabitants per hectare has been found agreeable elsewhere:

"Below 300 (inhabitants per hectare) the per capita values for the construction of roads find various networks may be held to be excessive; above 1450 inhabitants per hectare it is no longer possible to obtain an extent of per capita open space compatible
with the requirements of comfort (6.6). The residential areas should be developed on medium density as indicated. Despite the fact that elsewhere people with low incomes live in densely - crowded urban areas, urban development should aim at low and medium densities for the low cost - low income housing. The reason for this is that the peoples chance for adequate minimum housing can be found in self-help housing and especially in site and service schemes. The skills and financial resources of most participants in self-help schemes are limited. As such only low rise construction with a maximum of one or two stories will be feasible. At macro level, however, the location of low - cost, low income residential areas should be weighed carefully since at low densities the layout and size of town may easily lead to long distances to be travelled, or in other words, hi-h costs of transportation. People in low income need to economise on transport expense as well as on housing expenses.
Walking distance to place of work should not be more than 6 km (3.5 miles) and by bicycle not more than 10 km.

To supplement the living space a minimum of $\frac{2}{3}$ m per inhabitant should be devoted to private open space so that outdoor activities would be carried out.

The percentage of open space should be increased and the open space located in smaller units around the buildings so that a continuous dense formation of buildings is avoided. The proposed organisation of open space in a cluster of houses is shown in figure 10. Distribution of space about the buildings will provide needed play space for children near the dwellings. In addition more space about the buildings is needed for easy maintenance, and for simplifying the provision of further facilities which may be required in the future and thus reduce the risk of housing areas becoming obsolete as have the more densely planned areas.
PROPOSED DISTRIBUTION OF OPEN SPACE AROUND THE DWELLINGS

Gichuki Thogo
M.A (Planning) thesis
1377/7R

The application of planning standards in urban low cost low income resident* areas
The provision of single room housing should be discouraged as this practice encourages overcrowding by the tenants and makes it difficult to maintain desired standards of privacy. Two factors contribute towards overcrowding: the absentee landlords charge high rents (Kshs. 150 - Kshs. 300 per room), a condition made easy by provision of single room housing; and, the desire of many low-income households to save on rent for economic reasons thus accepting single room accommodation. The maximum number of habitable rooms per plot should be reduced to 6 as compared with the average of 8 - 10 rooms in Majengo and site and service scheme No. 6 in Thika. By so doing more indoor living space can be provided to the low income residents.

The provision of parking area should not be neglected in a low-income-low cost residential area. Parking area would be provided on the basis of 1 car for every 5 dwellings. Pedestrian and cyclist path should be made along the main roads forming the neighbourhood
boundary so that exposure to accidents is minimized.

8. Land use profile should closely follow the more internationally recognized pattern.

The following land use profile is suggested for residential development:

<table>
<thead>
<tr>
<th></th>
<th>Land Use</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residential/dwelling plots</td>
<td>50 - 60</td>
</tr>
<tr>
<td>2</td>
<td>Local/Neighbourhood shopping (markets)</td>
<td>3 - U</td>
</tr>
<tr>
<td>3</td>
<td>Parks, play grounds, and other organised open spaces</td>
<td>10 - 12</td>
</tr>
<tr>
<td>4</td>
<td>Roads and streets (Right of ways)</td>
<td>15 - 20</td>
</tr>
<tr>
<td></td>
<td>Public and semi public uses (schools, clinics, worshipping places, cemeteries, etc.)</td>
<td>1$ - 20</td>
</tr>
</tbody>
</table>
Recommendations for further study

This study has not established new standards on the basis of the guidelines and criteria suggested. The author feels that it would be useful to carry on such a work. More research and study is needed in order to arrive at flexible design standards necessary to cater for changing pattern of life in the future for the low income urban communities and also to meet the requirements for the development of design standards which apply to local conditions rather than the adoption of standards operating in developed countries.

Existing statistics of land in residential use are at best only crude estimates. It is necessary to collect more precise data on the amount of land being used by different income groups and on the rate and pattern of change in space use. The way people live and the type of houses they build changes all the time. An understanding of this process is necessary if one is to attempt projecting future space requirements and to formulate planning
standards for the desired development.
A study on land use pattern in Kenya towns would be useful so as to form the basis of establishing not only residential planning standards but also planning standards for other activities. At the moment the provision of space for public purposes seem to be very generous compared to other activities.
High density residential neighbourhoods could be contrasted with the more conventional detached single family neighbourhoods on several dimensions of residential life, in particular, with relative housing cost, access to facilities, and overall livability, to determine whether high density living offers families a desirable alternative to residence in more traditional detached single family neighbourhoods.
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Appendix I

CHECKLIST OF THE AREAS STUDY
CATID NO. 2 CODE COLS.

A. SPECIFIC INFORMATION ON SINGLE PLOTS AND/OR BUILDINGS.

I. Survey estate (name of area)
   1. - Va3ey estate (Majengo - Thika)  
   2. - Thika site & service scheme no. 6 
   3. - TMC Kstate Thika 
   4. - Dandora site service Scheme

2. Type of Scheme.
   1. - rental, 
   2. - site & service scheme 
   3. - Company housing 
      - mortgage 

3. Plots/building serial number

k. Type of structure
   1. - detached 
   2. - semi-detached 
   3. - terraced 
   4. - maisonette 
   5. - flat

5. Size of plot in sq.m. 
6. Length of plot m. 
7. Width of plot m. 
8. Plinth area in sq. m. 
9. Number of habitable rooms in the structure
10. Number of households in the building 
11. Number of residents in the building 
12. Is there a kitchen in the building
I. - yes  
    2. - No
13. If yes to 12, is it
    1. - shared by several households 
    2. - not shared by more than one household
14. Bathroom facilities 
   1. - bathroom for each household 
   2. - bathroom(s) shared with other household 
   3. - none 
15. Water 
   1. - piped water for each household 
   2. - communal piped water in the building 
   3. - communal piped water on the plot 
      (outside the building)
   4. - bought from water seller
16. Toilat facilities.
   1 - water closet for each household
   2 - water closet for each household outside the building
   3 - water closet shared by more households, inside building
   U - Pit latrine

17. Disposal of refuse
   1 - use refuse tin collected by local authority
   2 - dump refuse at communal pit
   3 - Throw it all over the compound

18. If refuse bins are collected by local authority, then how often?
   1 - less often than once a week
   2 - once a week
   3 - twice a week
   4 - daily

19. Type of drainage around the house
   1 - open surface drain
   2 - covered surface drain
   3 - underground
   U - none

20. Parking facilities - where are cars parked?
   1 - on the plot
   2 - on the street
   3 - special parking space
   4 - no parking facilities

21. Use of courtyard
   1 - wash and dry clothes there
   2 - for relaxation
   3 - vegetable gardens
   U - area for children to play
   5 - cooking

B. SOM5 USAA REACTION

22. Is there enough bed space
   1 - yes, 2 - no

23. Is there enough room for furniture?
   1 - yes, 2 - no

24. Is there enough space for entertaining guests?
   1 - yes, 2 - no

25. Is there convenient privacy in the house?
   1 - yes, 2 - no
26. If no to 25, why?
   1 - lack of adequate rooms
   2 - poor room arrangements, design

27. Are the houses:
   1 - inconveniently close
   2 - far apart
   3 - well spaced

26. Means of travel to work and general movement
   1 - foot
   2 - bicycle
   3 - 'matatu' or bus
   4 - private car

29. How far are these facilities from your home: U3-U4
   1. Primary school
   2. Health clinics
   3. Social hall
   4. Your Church
   5. Recreational rounds
   6. Shops

C. OPEN ENDED QUESTIONS

30. What are the disliked aspects of the estate
    1 - yes, 2 - no

31. 'What improvement could you suggest?
## Appendix 2

**LAND USE AND POPULATION SCHEDULE**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NAKURU</td>
<td>50.2%</td>
<td>13.9%</td>
<td>14.7%</td>
<td>5.6%</td>
<td>6.3%</td>
<td>4.5%</td>
<td>2.7</td>
<td>2065a</td>
<td>53,000</td>
<td>33,500</td>
<td>15,000</td>
<td>2%</td>
</tr>
<tr>
<td>KISUMUTI</td>
<td>2.7%</td>
<td>38.7%</td>
<td>5.5%</td>
<td>2.5%</td>
<td>5.1%</td>
<td>1.2%</td>
<td>5.6%</td>
<td>TTT3</td>
<td>8,100</td>
<td>10,500</td>
<td>3,600</td>
<td>36</td>
</tr>
<tr>
<td>SLDO RETI</td>
<td>1.1%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>1955</td>
<td>12,400</td>
<td>10,500</td>
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<td>36</td>
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<tr>
<td>THIKA</td>
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<td>17.3%</td>
<td>19.5%</td>
<td>12.3%</td>
<td>2.5%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>2065</td>
<td>29,500</td>
<td>20,000</td>
<td>9,500</td>
<td>36</td>
</tr>
<tr>
<td>KITALE</td>
<td>15.9%</td>
<td>11.8%</td>
<td>15.9%</td>
<td>7.9%</td>
<td>7.9%</td>
<td>7.9%</td>
<td>7.9%</td>
<td>15-0</td>
<td>15,600</td>
<td>12,140</td>
<td>3,460</td>
<td>36</td>
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<tr>
<td>JIISOLO</td>
<td>14.7%</td>
<td>19.6%</td>
<td>16.7%</td>
<td>12.6%</td>
<td>2.5%</td>
<td>6.0%</td>
<td>6.0%</td>
<td>18.0</td>
<td>19,500</td>
<td>12,300</td>
<td>7,200</td>
<td>36</td>
</tr>
<tr>
<td>T.FALLS NAIVASKA</td>
<td>5.6%</td>
<td>5.6%</td>
<td>5.6%</td>
<td>5.6%</td>
<td>5.6%</td>
<td>5.6%</td>
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<td>8,100</td>
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<td>AVK-</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>2.7</td>
<td>15,000</td>
<td>12,100</td>
<td>3,200</td>
<td>36</td>
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</table>

**Source:** Physical Planning Department
<table>
<thead>
<tr>
<th>FACILITY</th>
<th>POPULATION</th>
<th>MAX DISTANCE FROM 1 LOT</th>
<th>REQUIREMENT PER 1,000 POP</th>
<th>LAND REQUIREMENT</th>
<th>BUILDING REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY NURSERY</td>
<td>2,000</td>
<td>150</td>
<td>0.0025</td>
<td>0.005hec</td>
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<td>RELIGIOUS CENTRE.</td>
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<td></td>
<td>0.0165</td>
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<td>0.0125</td>
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<td></td>
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<td>0.1; hec</td>
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<td>SOCIAL HALL</td>
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<td>0.002hec</td>
<td></td>
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<tr>
<td>PRIMARY SCHOOL</td>
<td>5,000</td>
<td>i:00</td>
<td>0.05</td>
<td>0.75 hec</td>
<td>30-L:0 pupils (F0ss 50)</td>
</tr>
<tr>
<td>POST PRIMARY SCH.</td>
<td>10,000</td>
<td>00</td>
<td>0.07?</td>
<td>0.075: hec</td>
<td></td>
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<tr>
<td>TECHNICAL SCHOOL</td>
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<td>600</td>
<td>0.01+</td>
<td>1.0 hec</td>
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<tr>
<td>SECONDARY SCHOOL</td>
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<td>2,000</td>
<td>0.016</td>
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<tr>
<td>MAJOR SHOPPING C.</td>
<td>10,000</td>
<td>i50</td>
<td>0.025</td>
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<td>LOCAL SHOPPING</td>
<td>2,000</td>
<td>i50</td>
<td>0.003</td>
<td>0.006hec</td>
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<td>MAJOR MARKET</td>
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<td></td>
<td>0.016</td>
<td>0.1: hec</td>
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<td>0.025</td>
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<tr>
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<td>0.002hec</td>
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<tr>
<td>LIGHT INDUSTRIAL A.</td>
<td>25,000</td>
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<td>0.02</td>
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<tr>
<td>WORKSHOP</td>
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<td>0.01</td>
<td>0.25 hec</td>
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<td>15,000</td>
<td></td>
<td>0.0066</td>
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<tr>
<td>ADMINISTRATION</td>
<td>30,000</td>
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<td></td>
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<tr>
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<td>0.0012</td>
<td>0.3 hec</td>
<td></td>
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<td>POLICE STATION</td>
<td>100,000</td>
<td>K/A</td>
<td>0.01</td>
<td>0.5 hec</td>
<td></td>
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<tr>
<td>FIRE STATION</td>
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<td>0.3 hec</td>
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<tr>
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<td>0.01;</td>
<td>0.3 hec</td>
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<tr>
<td>INFANT PLAY AREA</td>
<td>200</td>
<td>75</td>
<td>0.03</td>
<td>0.03 hec</td>
<td></td>
</tr>
<tr>
<td>PLAY AREA.A.</td>
<td>1,000</td>
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<td>0.03</td>
<td>0.03 hec</td>
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<tr>
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<td>0.75: hec</td>
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<td></td>
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</table>
Appendix

Planning Standards

General planning guidelines and space standards applied in the project were based on N.'J.S.G. land use standards with small modifications of space requirements where land was a major constraint. The planning guidelines are at the same time intended to maximize efficiency of land use, yielding approximately 60% for residential plots, 20% for circulation and 20% for other public area. The hierarchy of community levels comprises neighbourhood of 5-000 people; Community of 20,000 people.

General Planning Standards World Bank Urban Project II

<table>
<thead>
<tr>
<th>Facility</th>
<th>population Catchment</th>
<th>Max Walking Distance</th>
<th>Land Requirement (ha)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Nursery School</td>
<td>2,500</td>
<td>2-300</td>
<td>0.15-0.25</td>
<td>Some integrated with Primary School.</td>
</tr>
<tr>
<td>Special Purpose area</td>
<td>5,000</td>
<td>1j-600</td>
<td>0.25-0.50</td>
<td>Religious, social hall etc.</td>
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<tr>
<td>Primary School</td>
<td>5,000</td>
<td>U-600</td>
<td>1.50</td>
<td>Combined us for open space (due to land contraints)</td>
</tr>
<tr>
<td>Local Shopping Centre</td>
<td>5,000</td>
<td>U-800</td>
<td>0.25-0.50</td>
<td>Integrated with local market</td>
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<tr>
<td>Lo’ial Market</td>
<td>5,000</td>
<td>u-800</td>
<td>0.10-0.50</td>
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<td>Playing Field</td>
<td>5,000</td>
<td>2.1-600</td>
<td>1.00</td>
<td>Combined with Primary School and open space.</td>
</tr>
<tr>
<td>Secondary School</td>
<td>20,000</td>
<td>2.1-00</td>
<td>0.2-0A0</td>
<td>Combined with open space. In upgrading areas off site.</td>
</tr>
<tr>
<td>Post Office</td>
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<td>0.2-0A0</td>
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<td>1.2-0.00</td>
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<td>0.50-0.75</td>
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General Planning Standards World Bank Project II (Cont,)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Population Catc'nxment</th>
<th>Max talking Distance</th>
<th>Land Requirement (ha)</th>
<th>Notes</th>
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<tr>
<td>Light Industrial Area (Workshops)</td>
<td>20,000</td>
<td>-</td>
<td>1.2.00</td>
<td>Combined with local or community mark.</td>
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<td>Police Station</td>
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<td>0.5-2.50</td>
<td>Part of Community centre</td>
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<td>Branch Library</td>
<td>80,000</td>
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<tr>
<td>Major Shopping</td>
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<td>Guideline only.</td>
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<td>Centre</td>
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<td>Fire Station</td>
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<tr>
<td>Commercial</td>
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</table>

The overall population density is based on

- Market sale plot: 6 persons per plot,
- Low income plot: 10 persons per plot,
- Average plot: 8.2 persons per plot.

Plot size

The plot size range will be 100-200m, average 115m, which is larger than the Dandora plots but less than the approved 210m in Grd.II By-laws. Net density will be 35/40 plots, 290-300 persons per ha. Open spaces will be provided at a rate of 9m per person on and off plot (total) Ratio of plot dimension 1:25 to 1:35 into plot frontage of 7.0m-7.5m. Plot options of 100-120m, not more than 20/j of 160-200m- not more than 10%.

Roads/Footpaths and Car Parking

Each site will have a network of primary distributor, local distributor, minor access roads and pedestrian paths. The design specification described below relates both to new site service, areas and to upgrading areas, and the roads will be in accordance with the Street3 Adoption Act.
<table>
<thead>
<tr>
<th>Minor Access road</th>
<th>Carriage way width (M)</th>
<th>Curbside permitted</th>
<th>Plot access permitted</th>
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<tr>
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<td>Secondary path</td>
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<tr>
<td>Domestic path</td>
<td>3(1+)</td>
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<td>Yes</td>
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</table>

**Car Parking/Access**

Car parking standard is 1 (one) per plot (NCC existing standard) with a maximum allowance of 50% off-plot spaces. Emergency vehicles all have plot access. Off-plot parking (communal or curb side parking) should be within a maximum distance of 60 m from the plot entrance.

**Community Facilities**

Where existing KCC design is appropriate this will be utilised for the schemes. Otherwise the following standards have been agreed upon between various departments.

**Schools**

Dandora Primary School developed by the Architect's Section will be used. The school contains 21 classrooms and associated facilities. The site will allow for a pre-primary school of 3 classrooms.

**Health Centre**

Architect's Section design for a typical Centre will be used or another design which has the equivalent standard and function as detailed in the Appendix. Saving in materials used was agreed upon. Health Centre size of 532m² with 178m circulation. Health Centre with Maternity wing of 339m² with 80m circulation. An estimated cost of Shs. 1,000 per sqm will be used.

**Community Centre**

The Community Centre for Dandora Phase II will be used with change of space for i.e. office and projector room will be included within the overall size, as detailed in the appendix.
Social Hall

Actual design will be developed. The building will include a room for Jay Children Club, a kitchen, toilets and a store room. Estimated cost Sh3.2^0,000/=.

Sports Centre

The Sport Centre a3 designed for Dandora site will be used for Kayole and Villa Franca sites. Spaces standards are detailed in the Appendix.

Market

All markets will be developed on the model of the new Jericho Market, or higher standard which includes services, surfacing, drainage, fencing, access roads and parking, an office, and adequate toilet blocks. A site for one market Per 20,000 will be reserved, and at least part of each site will be developed in the first phase.

Workshop Areas

The workshop areas will consist of a site serviced so that small all-scale employment activities can operate there. One half of each site will be serviced, fenced and demarcated in a manner similar to the market, and small working spaces will be rented out. The other half of the site will be let in slightly bigger parcels, for individual development of workshop facilities. These workshop areas will be provided at a ratio of one 0.6-I.0(Ha) site per 10,000 people. All sites will be developed in the initial phase.
APPENDIX:

KENYA

APPRAISAL OF A SITE AND SERVICE PROJECT

Source: (World Bank)

Allocation of costs

<table>
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<tr>
<th>CATEGORY</th>
<th>TOTAL COSTS *K£</th>
</tr>
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<tr>
<td>Chargeable to NCC</td>
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</tr>
<tr>
<td>Total User Fees Community</td>
<td>Recovered cost and Rates</td>
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</tbody>
</table>

1. SITE PREPARATION
   a. Clearing and Grading 37,950 7,590 30L 360
   b. Topo. and Soil surveys 10,350 2,070 8,280
   c. Lot Demarcation 69,000 69,000
   d. Fencing of Power Lines 1,150 1,150

2. ON-SITE INFRASTRUCTURE
   a. Primary Roads/Drainage 397,095 277,965 23,830 95,300
   b. Secondary Roads/Drainage 264,730 264,730
   c. Sewerage Reticulation 158,355 31,670 1b6, 665
   d. Water Reticulation 150,660 150,660
   e. Street Lighting 65,780 19,735 9,210 136,835
   f. Landscaping 11,500 11,500
   g. Refuse Collection 22,230 14,375 885 7,970

3. COMMUNITY FACILITIES

4. CORE UNITS
   a. Wet Cores 704,340 704,340
   b. One-room Units 622,800 622,800
   c. Two-room Units 179,100 179,100
   d. Demonstration Units 21,960 21,960

5. MATERIALS LOANS FUND 1,144,800 800

6. TRUNK INFRASTRUCTURE

7. TECHNICAL ASSISTANCE/3
   a. Project Unit 348,000 348,800/4
   b. Design & Engineering fees 375,950 273,830 45,865 56,255
   c. Housing Operations Study 43,000 43,000

8. PHYSICAL CONTINGENCIES (5-15%) 587,010 383,390 307690 172,930

Sub-Total 7,772,335 4,079,180 151,810 3,541,345

TOTAL COSTS/5 7,772,335 4,230,990 3,541,345

/I Estimated at 20% of net land area.
[2 To be resold at market prices.
[1] Central Government will bear the costs of monitoring (K£36,000) and future project preparation (K£40,000) in the NCC.
[1] To be apportioned among beneficiaries at the complex.

Hmncine Operations Study.
## APPENDIX 6

### LAND REQUIREMENTS FOR DISTRICT ADMINISTRATION

<table>
<thead>
<tr>
<th>Function</th>
<th>No.</th>
<th>House category</th>
<th>Suggested Plot ac.</th>
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<td>Total Ac.</td>
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<td>3a</td>
<td>1</td>
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<tr>
<td>*District Officer</td>
<td>1</td>
<td>4a</td>
<td>5/8</td>
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<td>8</td>
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</tr>
<tr>
<td>Cashier</td>
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<td>8</td>
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</tr>
<tr>
<td>Revenue Clerk</td>
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<td>9</td>
<td>1/8</td>
</tr>
<tr>
<td>Tax Clerk</td>
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<td>1/8</td>
</tr>
<tr>
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<td>4</td>
<td>9</td>
<td>j</td>
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<tr>
<td>Drivers</td>
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<td>L</td>
<td>1/8</td>
</tr>
<tr>
<td>Office Messengers</td>
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<tr>
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<td>1</td>
<td>4a</td>
<td>J</td>
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<tr>
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<tr>
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</table>

*Require low density housing

Add 25% for roads and open space.

Min. Total Govt. staff 21

Housing.
# Land Requirements for Pistorc Administration

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<tr>
<th>Function</th>
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<th>House Category</th>
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<th>Total Acre</th>
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<tr>
<td>Police</td>
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</tbody>
</table>

*Require low density housing Add 25% for roads and 16J open space.

Min. Total Govt. staff 21 ac Housing.