TJE APPLICATION 01? PLANNING STANDARDS IN LOW COST - LOW INCOME ″J.IBAN RESIDENTIAL AREAS

J O H N G I C H U K I T H O G O
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D E C L A R A T I O N

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

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

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A B S T R A C T

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 IO/S 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 scare 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, recr-jational use, transportation use and institutional use. Together, these use groups form the basis upon which urban living revolves.

A balance in the allocation o:″ urban space must be sought. This is where the planner comes in. It is the planner who hu:i 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 -roups 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 bo a matter of hit and **mis3** affair because it would make the **use** of urban land highly uneconomical and disorderly.

The majority of people living in urban areas are lov; 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, lov; 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 thourht necessary.

C H A P T E R O N E

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 require-ments 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 conern 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 imnortant 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 emnhasizing 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 grouo, 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 than K.shs.600 per month (1 3) ". The present minimum wage spelled out by the Governmont 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 thos<> 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.

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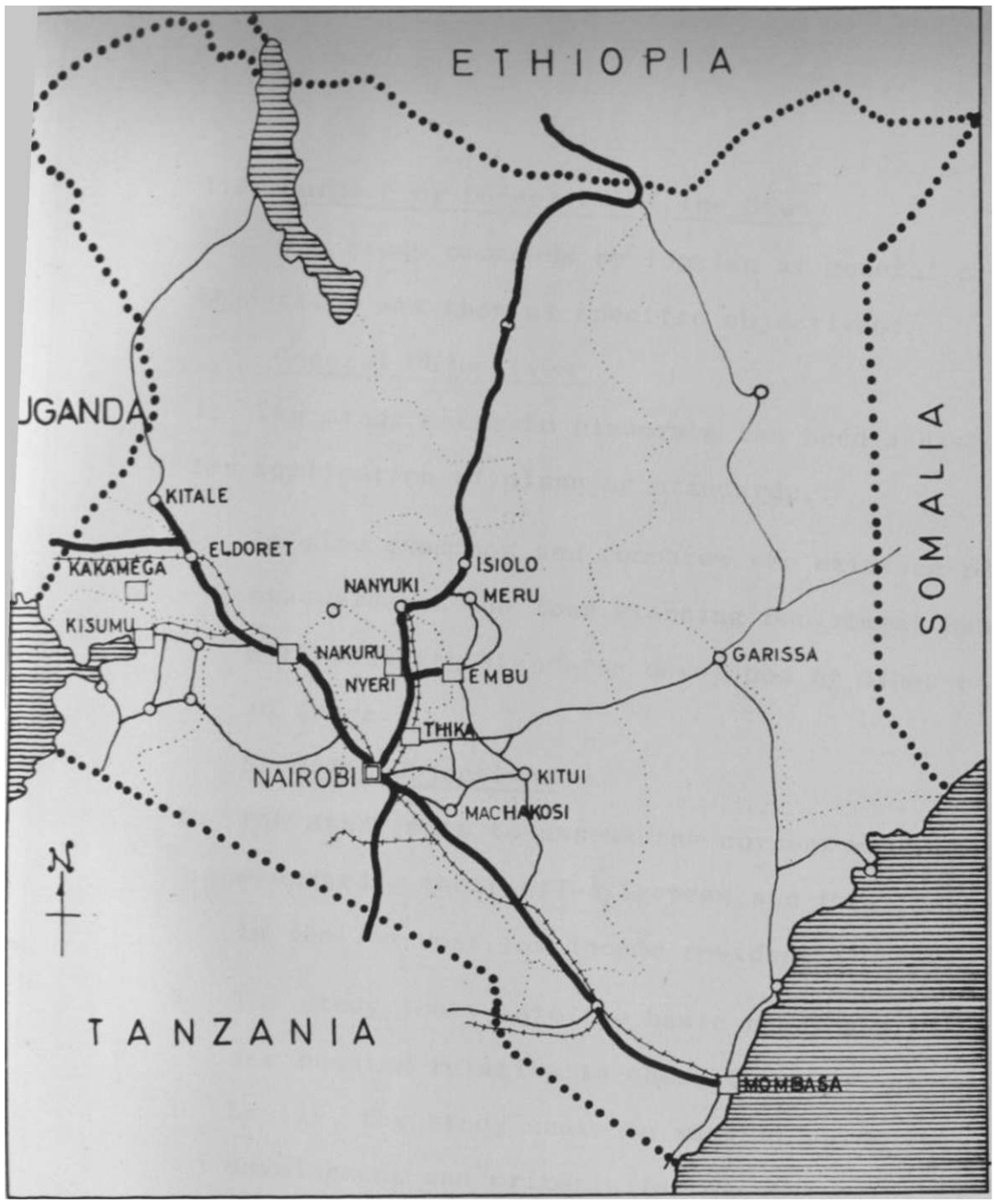
TABLE 1.1 HOUSING NEEDS BY COST CATEGORY FOR MAJOR TOWNS 1973-1978

Towns	Affordable cost of shelter (K.shs.)					Total %
	Upto 6000	6000 - 13,000	13,000 - 24,000	24,000 - 40,000	Over 40,000	No. of Homes	
Nairobi	33400	23,400	6,500	1,900	6,100	71,300	53.1
Mombasa	9200	7,190	2,370	650	2,000	21,230	15.8
Kisumu	3110	2,440	700	200	620	7,070	5.3
Nakuru	1560	1,130	340	90	300	3,420	2.6
Thika	1290	970	270	70	230	2,830	2.1
Eldoret	1360	910	260	80	230	2,840	2.1
Kitale	580	380	110	30	110	1,210	0.9
Nyeri	590	330	80	30	80	1,110	0.8
Kakamega	570	330	100	20	90	1,110	0.8
Embu	530	330	90	30	90	1,070	0.8
Kericho	380	310	80	30	80	980	0.7
Meru	480	240	60	10	60	850	0.6
Machakos	340	240	80	20	60	740	0.6
Kisii	330	190	50	20	50	640	0.5
Bungoma	320	160	40	10	40	570	0.4
Muranga	280	170	50	10	50	560	0.4
Karatina	140	80	20	10	20	270	0.2
Other/ Towns	8.460	5,070	1,340	370	1,310	16,550	12.3
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	

Source: Urban Housing needs in Kenya 1973 - 1978 - Ministry of Housing and Social Services 1974.



MAJOR TOWNS IN KENYA			
• PRINCIPAL TOWNS O OTHER TOWNS — INTERNATIONAL TRUNK ROADS OTHER MAJOR ROADS RAILWAYS SCALE > 1-6,000 000 o lOt tOOK*		The application of planning standards in urban low cost low incomp residential areas-	GICHUKI THOGO M.A. (PIANNINC) THESIS 1977/78 Map No 1

1.1 Puroose or Objective of the Study

The study oroceeds 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 Denartment 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. That 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, st andarris 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 constrai-ned by many factors: physical, economic, legal, political as well as social - cultural factors. It becomes increa-singly difficult to judge the relevant standardˆ 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 narts, and their relationship with other sectors of planning.

Planning standards are a compromise between conflic-ting claims on land. Before a nhysical 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 nrepared. Future estimates of nopulati**OP** .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

authoi itative, 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 tvpe 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 pncision in order to achieve the goals, All the various factors that influence planning standards must. carefully he 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) Ownershio: 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 recource. 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.

Envi ronment.al:

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

6. Architectural Factors

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.

People — Urban size

(Map of Urban area)

Have activities:
e.g. commercial, Residential, cultural, institutional, transportation, recreational, etc.

Every unit of land has characteristics of site and location

Space : The activities need special space. Activities compete for space.

Estimates of future land requirements according to category use.

Urban space demand

Urban space supply (a scarce resource)

-> Plan

(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 in 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, th″ 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 guide-lines 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 codi f icat.ion 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 eomprehensive system or set. of standards'

(1 4)

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 er¥ ironment.

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 urbanit.es 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 cri,(,ria 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 capabili ties.

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.(18)

The United Nation s- 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 (19). 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 "n * Vf>rsa 1 standards 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 humafi settlements ("standards of immediate concern") r 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 practica-bility 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 stxidy. The sample survey was 10% in each case. In each plot selected for survey (if developed) one adult individual in each roon 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 olanning 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[1,10]. In other words the word standare 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 definitionhUrban planning standards are of three types, viz: - convenience standards, performance standards, spatial standards . Conveneience standards express the basic needs for community facilities, e.g. health, education

shopping,etfc; 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 fillocated for particular act ivities.

4. Habitable room C[1 - 11]) · i_S 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 (1.15).

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 (1.16) in planning a community

1. Public Utilities: water, surface drainage, sewerage collection and disposal, gas, electricity, access lanˆ 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 financied 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

Cost Category Shillings per Unit	Units planned		Finance Required	
	Number	% of Total	Millions Shillings	% of total
Sh .6,000	44,000	40%	264	9.5%
Sh.15,000	17,000	16%	255	9.2%
Sh.24,000	19,000	17%	456	16.4%
Sh.45,000	20,000	18%	900	32.4%
Sh.90,000	10,000	9%	900	32.4%

Source: Kenya Development Plan 1974/78

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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 seventeeth 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 (21)'

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 (22)

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 1S09 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 lay-out 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 relinguished 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 towns-people. 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) <"241 '. 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 developement 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[1] which was published in 1895[v] (25)'. 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 tht? advantages of both town and country.

He proposed, therefore, a self-contained satellite town having a population of 32,000. The site would

TABLE 2.1 COMPARISON OF DENSITIES FOR IDEAL COMMUNITIES

Year	Proposed by	Area Involved	Proposal	Density per Gross acre or ha.	Optimum Population
1898	E.Horward	City	Book: Garden cities	8-12 dwelling Units/acre, or 20-30 units/ ha.	32,000 persons
1924	Le Corbusier	City	La Ville Contemporaine	1,200 persons/ acre; or 2,960 persons per ha.	3.000,000 persons
1929	Clarence Perry	Neighbourhood Unit	Neighbourhood Unit Concent	5 dwelling units/per acre; or 12 units per ha.	5 -9000 persons
1932	Frank Lloyd Wright	City	Broadacre City	1 dwelling unit acre or 2.5 units per ha.	no limit
1944	Jose L. Sert	Residential Unit	Book: Humane Scale in City Planning	3 - 5 dwelling units/per acre, or 7-12 units per ha.	5 -10,000 persons
1945	Walter Gropius & M.Wagner	Residential Unit	Book A program of city reconstruction	4-10 dwelling units/per acre; or 10 to 24 units/ha.	5,000 persons

Year	Proposed bv	Area Involved	Proposa1	Density per Gross acre or ha.	Opt imum Population
1946	1.Justement	Citv	Hook. New Cities for old	10-35 dwelling units per acre; or 24 - 86 units oer ha.	1,000,000 persons
1947	P.Goodr.an P.Goodman	City	Book Communitas	100 dwelling units per acre; or 247 units per ha.	6 - 8 million persons

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 interprise 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 proble 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 n<·iˆhbourhood is to conceive urban place as composed of a number of si/.eable units, each being a comprehensive and .<>mnr<-hensih! 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 condu< ive 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 tin- 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 Arthi r 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 tin- 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 |$_{1US}$ shops for day-to-day shopping, parks and other organised open spaces for recreation, institutional sites and buildings for socio-cultura1 activities and a circulation system which would not permit through traffic to penetrate hood into the neighbourhood. The nei ghbour/uni t as seen by Perry is shown in figure 2.1

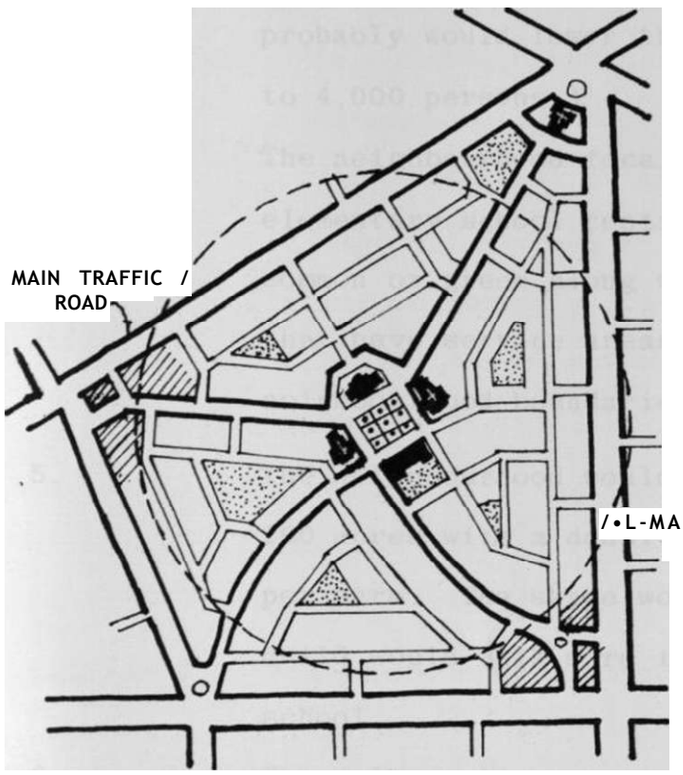
2.3.3.2 Princi£1es _<>_¥_Neighhourhood Unit Theory

The Neighbourhood Uuil 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 ol t he 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 quite, sat《. low volume I raffir 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 w:is estimated at about 5,000 persons



The neighbourhood unit as proposed hv Clarence Perry___in___1922

COMMUNITY CENTRE

CHURCH

SHOPS i FLATS

OPEN SPACE

RADIUS Vt MILE (o A Km)

ROADS

GICHUKI THOGO

MA- (PLANNING)

THESIS 1ŞTT/7«

FIG. 1

SOURCE :
REPRODUCED FROM GALL ION URBAN PATTERN

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 centraly located on a common or green .along with other institution 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 coneiously or unconciously, to reinforce the 'natural urge' towards class or social segre gat ion.

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 disproportinate 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 now 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 lake advantage of facilities existing in the old residential areas.

also

The principle is / bein<; 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 lor 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 hierachical 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 h ighway.

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 under- · passes or escallators; 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 at lent ion 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 advanred by L.e Corbusier in his plan for ″La Ville Radiuse″ whish he explained in his book ″Urbanisme″.

> ″ He proposed three different classes of roads, one, at thf 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 Tripps '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 dorminant. 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 cuty 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 B ritish 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 lor 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 lias 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 Depart-ment 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 develop-ment 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 infrastrucre and superstructure thus setting the physical bast? 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

f

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 resident.ial 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 guidirtg 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 environemnt. The formulation of standards, therefore, from the earliest beginning proves important in that it will give form to the future urban community.

R E F E R E N C E S

2.1 Arthur B. Gallion: The Urban Pattern, Van Nostrand Reinhold East-West Press (1950,1963) p.66

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

2.5 Michael Hugo-Brunt: The History of City Planning, A survey. Harvest House, Montreal (1972) p.207

2.6 Joseph De Chiara,: Lee Koppelman Planning Design Criteria (1969) Van Nostrand Reinhold

2.7 On Her Majestys: Service Nairobi Master Plan for a Colonial Capital, 1948.

2.8 Strer., R.: "The Evolution of Housing Policy in Kenya". In Hutton J. (ed) Urban Challenge in East Africa (Nairobi E.A. publishing House, 1970) P.77.

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

C H A P T E R T H R E E

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 occured 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 hierachy 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 guide-lines 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 rover 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 bo 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 proposaIs.

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 ~~it~~he 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 th(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 impor tance.

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 pari 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 Corporat ion
- 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 olan.

STEP ¥ 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

Type of Land Use	PLANNING STANDARD INDICATED			COMMENTS
Commercial				
Petrol Service station	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			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.
Educational	Enrolment	Space standard	Population interval	
1)Nursery School	100 pupils	jacre (0.3ha)	2500	i)Ministry of Education policy is to build 3 and 4 stream schools wherever possible
2)Primary School				
i)Day School	350 (1 stream)	3acres (1.2ha)		
	700 (2streams)	4iacres (1.82ha)		
	1050-1500 (3-4stream	6acres (2.43ha)	5000 for 2 streams	ii)One acre or 0.4ha demonstration site to be added where agriculture is a major element in the curriculum.

ii)Boarding School		same as for day school. Additional one acre or 0.4ha per 200 boarders	5000 for 2stream school	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)	15acres (6.07ha) plus 2Ja or lha for staff housing	25000 (1 to 4 stream)	Site area includes one acre n /K agn-culture education site
ii)Boarding School	720 (3s tream) 1200 (5s tream)	35a(14.2ha) 45a(18.2ha)	-do-	Includes staff housing,playing fields etc.
iii)Technical		Same as for the secondary schools		No population interval given
4.Teacher Training	500	35a(14.2ha)		Including staff housing. Population interval not necessary as distribution is on national basis

Transportation

Road Reserves	1.Local roads	15m
	2.Secondary distributors	25m
	3.Primary distributors	30m
	4.Urban freeway	35m
	5.Regional trunk road	40m

Footpaths and culs-de-sac have not been indicated.Road reserves have not been given in relation to volume of traffic

Residen tial

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	1/16acre(0.025ha) i.e. A0'x70 (12.19mx21.34m)
ii) Medium density	1/8acre(0.05ha) i.e A5'x95'(13.72mx28.96m)
iii) Low density -high cost	Jacre (0.10ha) i.e (24.38mx36.58m)
iv) Site & Service Scheme -low cost, high density	1/16acre(0.025ha) i.e. 40'x70'(11mx22m)

3. Density level	150 persons/acre net or 370 persons/ha for high density areas. 80 persons/acre or 197 persons per ha. 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 ¼ and 1 acre i.e. 0.2ha and 0.4ha	To be accessible to any residential plot at a distance not exceeding Jmile or 0.16km.

General:

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

f)

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 m^2) with minimum 40 sq.ft. (3.7 m^2) 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 cne discussions that there is a lot of uncertain ty . 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 >r not. Where there is provision of sewarage 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^2 to 293.75 m^2. 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.

Source / Standard for	Building Code (By-Laws) 1968 Grade I	Grade II	Physical planning Dept. Town planning Handbook: 1971	S.H.C. Technical Branch Manual	N.H.C. Site A Service Guildelinea	Nairobi City Council Zoning Regulations	N.H.C. Merril Heport	HRDU Site Service Analysis and Report	HRDU Eibera Experimental self-help scheme	Worlid Bank Dandora Site A Service scheme
plot size:- Area m		260	262(min	to be derived from built area x coverage + spaces width of building plus 2.5+ 1.0 or 2.5 (windows)	293.75	200(Kin) 4000(max.)	168 (min) 242 (·ax)	160(ain) 300(mar)	110- 160	100, 120, 140, 160
-Dimension (m) (width/depth)	9.0 (min)	—	11.0x 22.0(min.)		12.5x 23.5				7.7x 25.0, 16.0	6.3x15.75 7.35x 22.06
-width:depth	-	-	X		v,·9		v,·5 (min.) >s.o(-x.:	-	%	V 2.5 VS.3
plot use: -coverage (% of plot area)	—	25 (later) to 33 max)	33 max.)	33 min.	50 max.	one dwelling -50 max.	up to 50	33.3	50 max.	23 min. 60 max.
-plot ratio (plot area/ built floor area)	-	0.33	0.33 (Mombasa ft Nairobi 0.75 flats)	0.33	0.50 max.	0.33 -0.75 (flats)	0.50	0.33	0.50	0.23 0.60

-Habitable rooms/plot		1(ain)	4 recoa-meded 5 (max)			
·Number of floors						one to multi storey
-KiniauiB distances: 7?						
-to front boundary	6.1	1.52	1.52	6.0 in front of living room	1.52	1.52 and 6.1
-to rear boundary	2.44	1.52	1.52		By-laws II	By-laws I & II
-to side bounds ri*s	2.44 1.22 (no window)	1.52	1.52	2.5 (window, 1.0(no window)		
-to side ooundar-ries (inflamm-able material)	3.05	3.05				
-opposite windows	Art. 152 2.44 (see comp-lete text					

4 to 6	4 to 6	3 to 4	3 to 5
1.52	1.52		
By-laws II	By-laws II	0 Partly	
		One side space of 4.50 (partly)	one side space of 3.15-4.20 (partly)

Pit latrines: min. distance to:-										
- plot boundaries	4.75	pit latrine of neighbour-hood plots allowed on plot boundary	-	-	M	N	N	n	4.50	3.15-4.20
- habitable rooms	9.15	9.15 (nay be waived by NHC.)	4.50	0	N	•	waterborne	H	water-bo rne	water-bo rne
Courtyards										
- mm. area m	31	-	-	-	18.75	•	•	n	33.0	34.0
- min. diaens Lm* (»)	4.5	-	-	-	2.50	fV	N	M	4.5	3.15-4.20
Densities: ^habitable rooms per net ha. residential land)						Density given gross in persons				
- low	-	-						100	45 plots x 3.5 rooms |approx.) 36r plot	52plots x 4 rooms are per plot
- medium			75	100 min	150 approx	per ha in NUoG Vol.1 A II i.e. low 30 med. 100 High 250	more than 100	100-150		
- high			150 (flats)	250 flats				150	= 157	=206
Recommended building type	detached unspecif-ied	Single floor detached	single multi-storey	Single floor but envisages 2-atorey terace	single floor deta-ched (type plans)	all types (unspeci fied)	single floor detached	single floor ieta-ched	single floor semi-deta-ched	single floor court-yard type

Remarks	Art. 153-154 preclude row-terrace housing	sometime interpreted ref. Grade I	revision envisaged	as at 1973	reflects latest develop-ments 1976	contains old City by-laws council minimum NUSG Reports	Report 1971	approved by-HHO/ HCC 1977 (layout) only	approved by MHO/ NCC 1977 layouts)

Source: Author's compilation from the indicated sources.

Abb: NHC = National Housing Corporation; HRDTJ = Housing Research and Development Unit.

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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 ol 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 bigh 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 frff/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 zcnes. 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 nreferably 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 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	2. Horizontal
- single storey	detached
- double storey	semi-detached
- walk-ap	- row/terraced/ grouped/ courtyard
- high rise/elevator	

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

o

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 3.3. Resultant densities from dwelling size and floor space allocation. (Assuaed occupancy rate 4 persons per roon)

N^Source Standards ¥	By-Law Grade II 1968 (also adopted in T.P.D.H.	HHC Siteft Service Buidelines 1976	H.R.D.U. Site ft Service AnaljrsJLS ft Report 1971						HRDU Kibera Experimental self-help scheme 1976 (2 Blot size	Dandora (combination of 4 plot size - averages) 1976
			4 room plots		5 room plots		6 room plots			
			noraal plot	ain. plot	noraal plot	ain. plot	noraal plot	ain. plot		
plot dimension (width/depth -)	12x21	12.5x 23.5	10x20	8x20	12.5x 20	10x 20	12.5x 24	10x24	7.7x14.7 20.7	6.3/7.35* 15.75/18.9/20
lot area m^2	252	293.5	200	160	250	200	300	240	110/160	99.2/120.2 138.9/162.1
plot %overage	33.3	upto 50	33.3	33.3	33.3	33.3	33.3	33.3	50/33.3	upto 60
Built up area ^2 (outside measures)	84	125	66	53	83	66	100	80	55	60-97 (av. 78)
non-built area	168	168.5	134	107	167	134	200	160	55/105	40-65 av. 53
floor area (built up 1056 service: r	76	113	60	48	75	60	90	72	50	54-87 (av. 71)
Wo. of rooms/ plot	4	6	4	4	5	5	6	6	av. 3.5	av. 4
So. of plot8 /ha	27	24	34	42	27	34	23	28	49	52

Persons/plot	16	24	16	16	20	20	24	24	14	16
Floor space per person ^2										
1)outdoor 2)Indoor	10.5 4.75	7.02 4.7	8.4 3.75	6.7 3.0	8.4 3.75	6.7 3.0	8.3 3.75	6.7 3.0	3.9;7.5 3.6	3.3 4.4
Total 1+2	15.25	11.72	12.15	9.7	12.15	9.7	12.05	9.7	7.5; 11.1	7.7
Density persona/net ha. residential land	432	576	544	672	540	680	552	672	686	832

Source: Author's compilation from the above indicated sources.
Abbr. TPD-Town planning Department Handbook
HRDU * Housing Research A 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 intrumental in influencing planning and building standards. Although it is more concerned with housing quality :ind 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 1 By-laws.

b) the Local Government (Adoptive By-laws) Grade 11 Building) Order 1968, commonly referred to as the Grade 11 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 1he Medical Department as to over-crowding and density is defined in section 125.

" It shall be the duty ol 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 3.4: Minima Planning Standards in the Kenya Building Code.

PUSH IIC	GRADE II BT-LAVS		GRADE I BY-LAWS					
					Snail houses		(Other)Domestic Buildings	
	By-Law		By Law		By-Law		BT-Law	
I.The plot -Minimum plot area	7 (1)	26G« ^{2} |2800 fti)						
-Maximum plot plot coverage	7 (1)	approved revision **						
-Miniron space around buildings:								
- to front boundary	7 (2)	1,525M (5ft)			94(4)	3.05« (10ft) when roof of inf laoMtble material	17(1)	6.10 (20ft) including street
- to aide & re«r boundary	7 (2)	1.525« (5ft)			94(4)	3.05m (10ft)	21	1.22m (4ft) passage to one side
-buildings of inflammable material to side boundary	7 (2)	3.05″ (10ft)					18(1)	2.44m (8ft)
-exception for buildings (side and rear boundary)	7 (2)	latrine allowed on plot boundary when combined with other latrine on adjoining plot					8(3)	garage or other out buildings may be allowed on boundary

2. Dimension of roo》S		
B. Habitable rooms		
- minimum area	10 (2)	
-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		2.80ˆ (30ft) dormitories
-minimum width	10(2)	
b. Kitchen Minimum area	11	
-ditto, one room dwelling		
-ditto, covered cooking place		

		159(4)	7-^{2} (75ft^{2})
		159(4)	14m^{2} (150ft^{2})
		159(4)	2.135m (7ft)
		156(1) 156(2)	5.6m^{2} (60ft^{2}) 3.25m^ (35ft)2

-minimum width		218(4)	1.37》 (4 6
·ditto, one room dwelling			

* By-Law can be waived by Commissioner of Lands.

		156(1) 156(5)	1.83B (6ft) 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 1 and advised the Project Department to improve the standards in Phase 11. The following are a few of the comments that were made by the Medical Officer of Health regarding Dandora Community Development Phase 1 (3.6)

1. The layout of the whole scheme lacks essential amenities and is bad in principle. For example no open sapces 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 oarticularly 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 subsitute 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 Drovision 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?!he 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 **examDle.** 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, trans-portation.sites for public buildings and 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

Othe 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 Lnads 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 olanning 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.

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C H A P T E R F O U R

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, sewarage 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

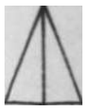
Thika is situated 50 kilometres north of Nairobi; Kenya's capital. The town is at the confluence of Chania and Thika Rivers and it lies at an altitude of 1,493 metres above sea level. Its proximity to Nairobi puts it in the Nairobi metropolitan area (map No.2) and favours it for partial decentralisation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

STUDY AREA'- THIKA RENTAL SCHEME 1

Map No- A Scale 1 : 2 000



SOURCE: GEO SUR VEY

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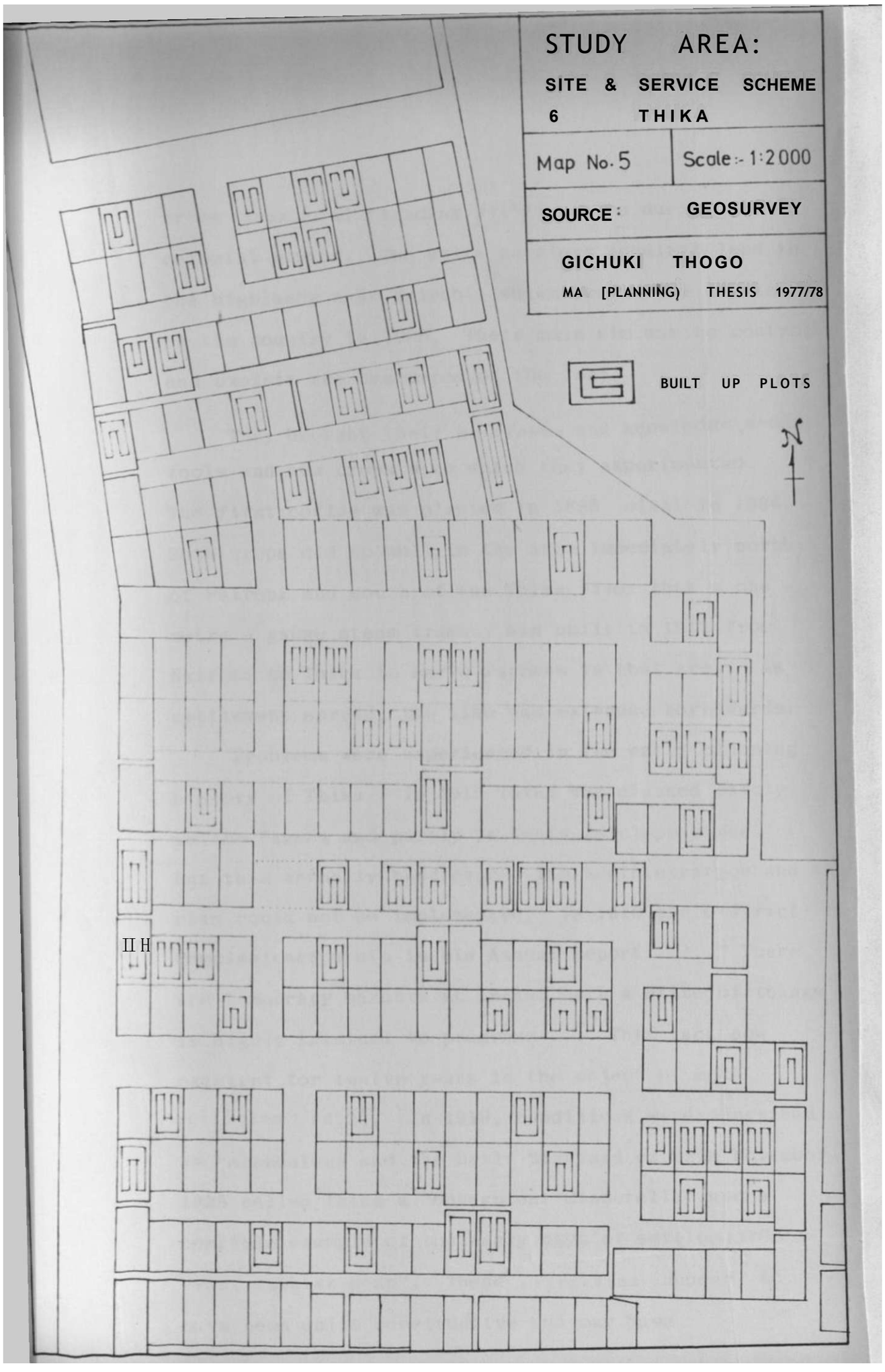
The application of planning standards in "Urban low cost, low income residential areas


STUDY AREA:
SITE & SERVICE SCHEME
6 THIKA
Map No. 5
Scale :- 1:2000
SOURCE : GEOSURVEY
GICHUKI THOGO
MA [PLANNING) THESIS 1977/78
BUILT UP PLOTS
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or as commercial (trading postsj 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

road 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 poeple" (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 aimsˆt 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 pricincipal 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 hierachical order as follows:-

Table 4.1: Hierachical order of Service Centres

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

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

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

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.

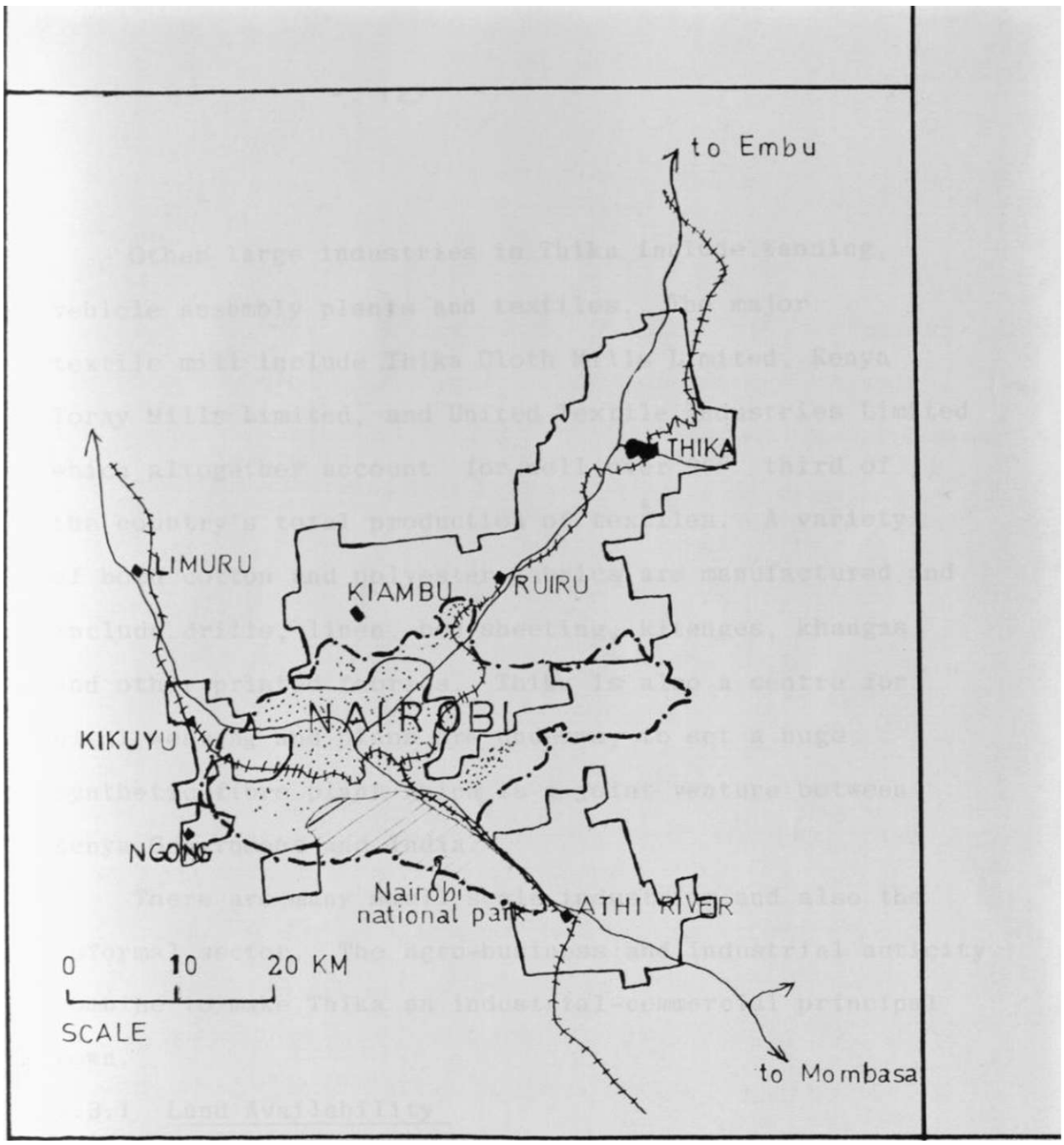
Town	1963	1974
Nairobi	53.9	58.9
Mombasa	18.6	17.9
Nakuru	3.9	3.6
Thika	1.9	2.4
Kisumu	4.3	3.1
Eldoret	3.3	1.9
Other	14.1	12.2

Source: Bureau of Statistics; Statistical Abstract, 1976 Ministry of Finance and Planning, Kenya.

This has a locational advantage that assures its future growth. It is close enough to Nairobi to benefit from the latters agglomeration economies, and it is the obvious decentralization alternative for industriaists. 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.



NAIROBI METROPOLITAN

	Areas of greatest potential for development Developed area City boundary Road Railway	MAP NO.6	tr
		SOURCE • NUSG	
•hi 1 1 l)'		GICHUK! THOGO M.A (PLANNING) THESIS 1977/7 8	

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 one 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:

	1948	1962	1969
Population (total)	4,435	13,952	18,387
Annual growth of total population(%)	8.5	4.0	
Annual growth of African population(%)	10.3	5.5	

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

	1969	1973	1978	1980	1990	2000
Pop(000)						
Thika	23.4	30.8	43.5	50.0	100.0	199.4
Urban	23.4	30.8	43.5	50.0	100.0	199.4
Rural						

	Growth % per annum	
	1969 - 80	1980 - 2000
Thika	7.15	7.15
Urban	7.15	7.15

Source: Ministry of Finance and Planning: Urban Population Projections during 1969-2000 within the context of Urban Development strategy" EPD/SC 417/01

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

Thika: Zoned Land Use (1973)

Category	Developed(ha)	Undeveloped(ha)	Total hectares
Residential	100	265.1	365.9
Industrial	126.7	111.8	238.5
Education	64.8	27.8	92.8
Recreational	11.7	299.3	311.0
Public Purpose	78.7	51.9	130.6
Commercial	18.6	18.1	36.7
Public Utilities	36.3	47.7	84.0
Transportation	-	7.1	7.1
Deferred (zone 8)		149.8	149.8
Zone 1 - 8	430.8	978.6	1417.4
		Total planned area	2833.8

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: 4.6

THIKA MUNICIPALITY : URBAN LAND USE ANALYSIS : :1973 SITUATION
SOURCE: THIKA DEVELOPMENT PUN 1973.· OWN ME ASUREMENTS

DURP RE?.	USE	HECTARES	PERCENTAGE	HECT. PER 1000 PERSONS	
02	COUNCIL STAFF HOUSING + PRIVATE DEV.	7.0			
03	BONDENI RENTAL HOUSING ESTATE	2.9			
04	TENANT PURCHASE SCHEME 1	1.3			
05	PRIVATE DEVELOPMENT (ASIAN RES.Q)	11.0			
06	COUNCIL A GOVERNMENT STAFF HOUSING	7.3			
07	MAJENGO	8.0			
09	RENTAL SCHEMES 1-5 (JAMHURI, STAREHE + OFAFA ESTATES	11.0			
010	RENTAL SCHEME 6 6, (ZIWANI ESTATE)	3.5			
013	POLICE STAFF HOUSING	0.8			
018	SITE & SERVICE SCHEME 1x2.	14.0			
029	LOW DENSITY RESIDENTIAL	3.5			
030	TOW DENSITY RESIDENTIAL	4.0			
031	LOW DENSITY RESIDENTIAL	13.3			
033	MORTGAGE SCHEME	11.1			
	RESIDENTIAL IREAS TOTAL.	98.7	24.3*	3.2 ha	
1 1	BULLEY'a TANNERY	13.0			
1 2	KENYA TANNING EXTRACT + RICE FACTORY	24.4			
1 3	LIGHT INDUSTRIES	7.1			
1 4	LIGHT INDUSTRIES	5.3			
1 6	LARGE SCALE INDUSTRIES	76.8			
	INDUSTRIAL AREAS TOTAL.	126.6	31.2*	4.11 ha	

DURP *RET.*	USB	HECTARES	PERCENTAGE	HECT. PER 1000 PERSONS	
21	GATUMOINI PRIMARY SCHOOL + (2.0) CHANIA HIGH SCHOOL (7.2	9.2			
22	ST. PATRICK PRIMART SCHOOL + THIKA PRIMART SCHOOL + MUSLIM PRIMART SCHOOL	4.9			
23	THIKA TECHNICAL SCHOOL	19.0			
24	THIKA HIGH SCHOOL	16.0			
25	THIKA HIGH SCHOOL PLATING FIELDS	5.0			
26	HUNDIA SECONDARY SCHOOL	2.0			
27	GENERAL KAGC PRIMART SCHOOL	4.0			
	EDUCATIONAL AREAS TOTAL. PRIMART SCHOOLS TOTAL	60.1 (10.9)	14.8*	1.95 ha	
51	PUBLIC OPEN SPACE	0.5			
32	THIKA SPORTS CLUB	3.3			
33	THIKA STADIUM	3.7			
312	SPORTS CLUB	4.2			
	RECREATIONAL AREAS TOTAL	11.7	2.9%	0.38 ha	
·1	BURNING GHAT.	1.5			
42	SCHOOL FOR THE BLIND + HOSTEL	13.2			

DURP REP.	USE	HECTARES	PERCENTAGE	HECT. PER 1000 PERSONS	
43	INDIAN WOKEN ASSOCIATION	0.9			
44	TEMPLES	1.8			
45	POLICE, TOVNHALL + MUNICIPALITY DEPOT + DISTRICT OFFICES	7.1			
<6	DISTRICT HOSPITAL + SCHOOL OP COMMUNITY NURSING, CHURCH + PRISOI	12.9			
47	CEHETRT	2.3			
	C/P	39.7			
	B/P	39.7			
48	SISTERS OP THE HOLY ROSARY MAT. HOSP. + CRIPPLED CHILDRENS JOY TOWN	16.0			
410	CHURCH	0.5			
411	COMMUNITY CENTRE	2.1			
412	CHILDRENS HOME	0.9			
413	CHURCH	0.5			
4U	CHURCH	0.6			
415	YOUTH CENTRE	0.3			
426	BLUE POST HOTEL	13.1			
427	CHURCH	1JO			
428	CEMBTRY	1.6			
	PUBLIC PURPOSE AREAS TOTAL	76.3	18.8JC	2.48 ha	

DURP RET.	USE	HECTARES	PERCENTAGE	HECT. PER 1000 PERSONS	
51	TOWN CENTRE + BUSINESS^M-RESIDEHTIAL	14.0			
53	SHOPPING CERTRE	1.0			
54	SHOPPING CENTRE, BUSINEBS-CUM.-RES.	0.6			
55	MUNICIPAL MARKET	3.0			
	COMMERCIAL AREAS TOTAL	18.6	4.6*	0.6 ha	
61	WATER TREATMENT PLANT	3.3			
S	E.A.P. 4 L. SUB-STATION	1.1			
64	SEWERAGE TREATMENT PLANT	8.0			
	PUBLIC UTILITY AREAS TOTAL	12.4	3.1*	0.4 ha	
71	BUS TERMINAL	1.2			
	TRANSPORTATION AREAS TOTAL	1.2	0.3*	0.03 ha	
	GRAND TOTAL	405.6	100*	13.15 ha	

as at 1973.

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 sewarage 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.

	Existing	New Units required By 1979
High income	120	200
Medium Income	179	301
Low income	10,000 rooms	7,800 rooms

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 t
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, industiral and special purposes. In -T'.iis 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:(4.4)

Place	Units
Nairobi	Approximately 20,000 units of high and medium density residential accommodation at Buru Buru, Dandora, Kayole, Mathare.Riruta and Villa Franca.
Mombasa	2,352 units at Makinda, Miritini, Chaani and Shanzu
Nakuru	230 units
Eldoret	499 unils
Kisumu	289 units
Thika	1,000 units
Kakamega	208 units
Kit ake	80 units

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 ·» anc[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 P roflts . 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 Counci1/(4.6)

in acquiring land

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.

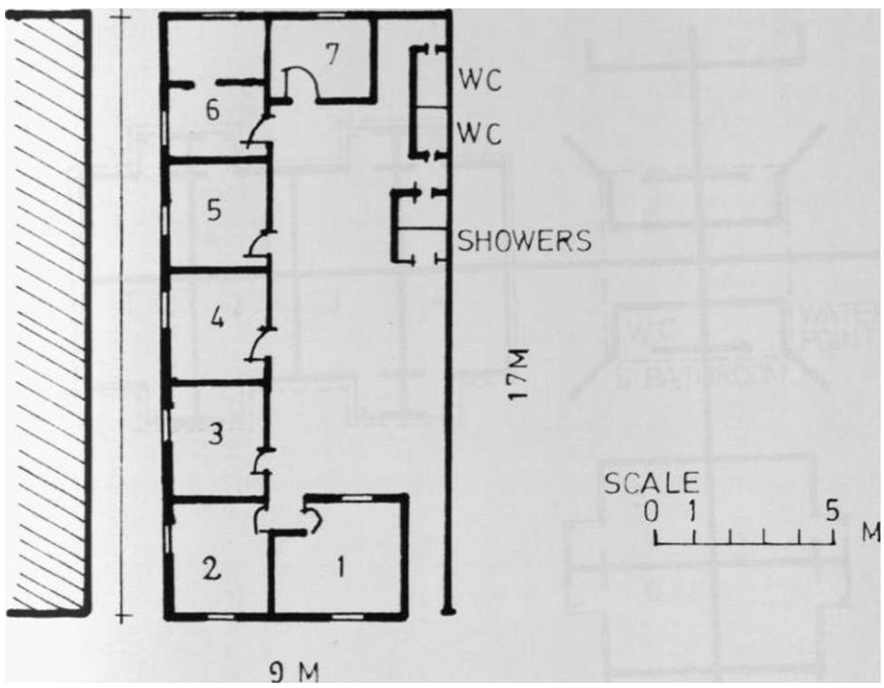
4.9.1 Existing situation in the study areas.

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

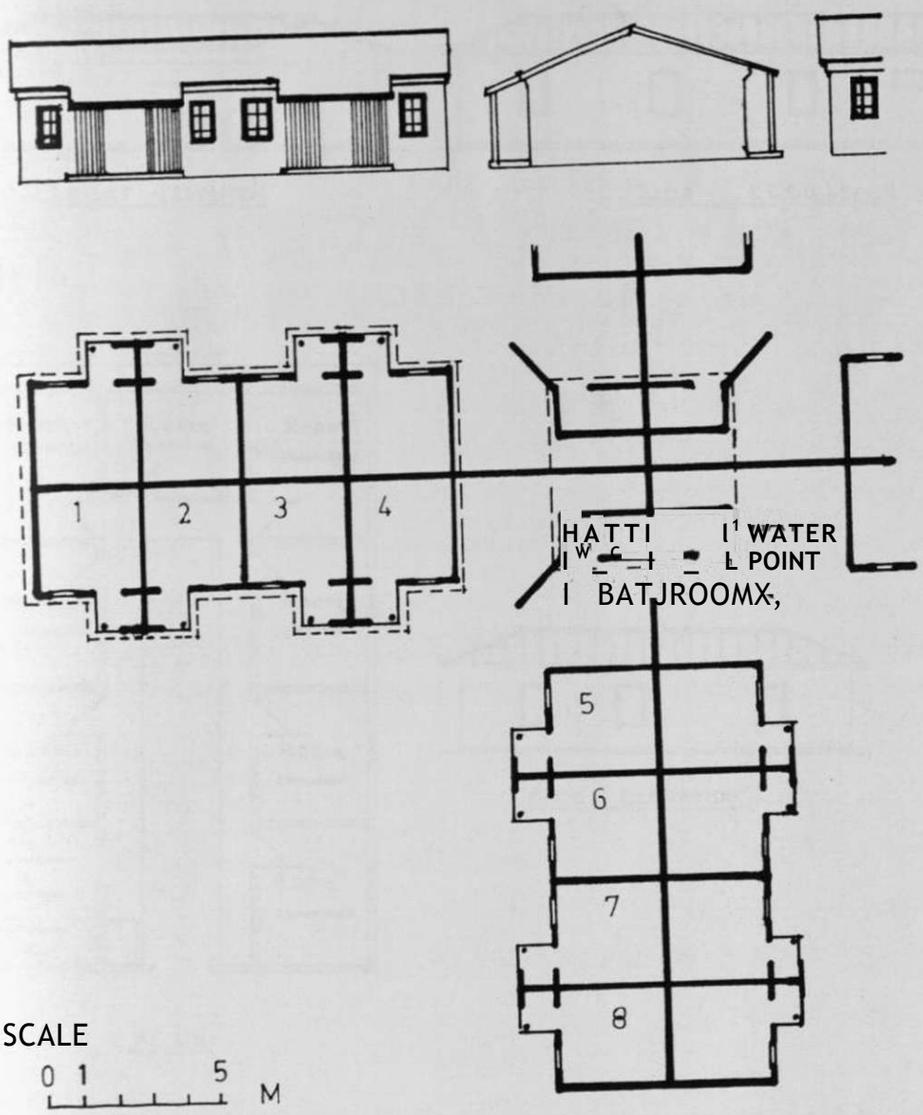
Table 4.7: Brief Summary of study area in Thika Municipality

^N. Estate N. Descript	Majengo (Va sey Estate	Rental Phase 1 (TUDC)	Site and Service scheme 6
Year Built	1951 (assisted s c heme)	1955	1976 (not complete
Areas as defined by boundary indicated in the Development Plan- Thika,1973)	74 ,000m^2 or 7.4 ha	28900m^2 or 2.89 ha	119,627m^2 or 11 . 96ha
Total number of plots	200	36, i.e. 9 four winged blocks	239
Total number of habitable rooms	1 ,155	288	(estimated) 2,390 (wlien comp1ete)
Density of plots per ha.	27	12.46	20
Average net plot area	225m^2	89 .16m^2	325 .45m^2
Density in rooms per ha.	156	99. 7	199.8

Source: Author's Survey.



MAJENGO (VASEY ESTATE); THIKA	
TYPICAL HOUSE	SCALE r- 200
1, 2,3—.SINGLE ROOM UNITS	GICHUKI THOGO M A' PLANNING) THESIS 1977/7.9
	SOURCE : FIELD SURVEY
The application of planning standards in low cost, low income urban residential areas-	Fig- 2



RENTAL SCHEME — T.U.D.C : THIKA

FLOOR PLAN & ELEVATION

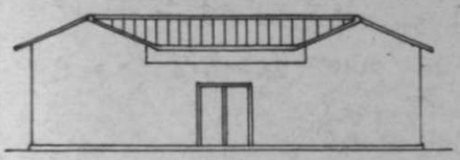
1, 2, 3 ------- SINGLE ROOM UNITS

FIG. 3

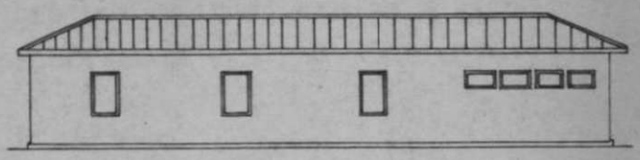
SCALE 1:200

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

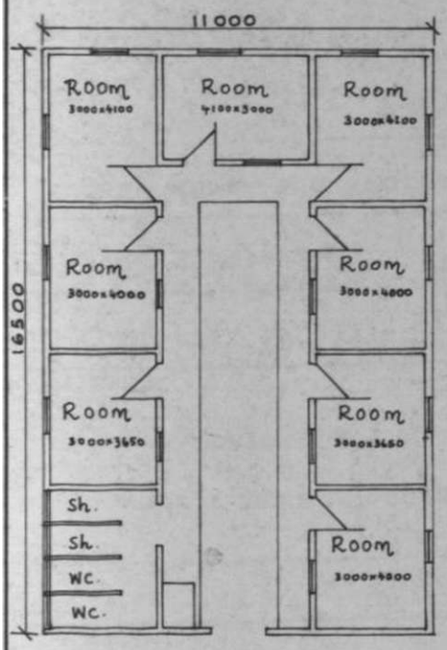
SOURCE : FIELD SURVEY



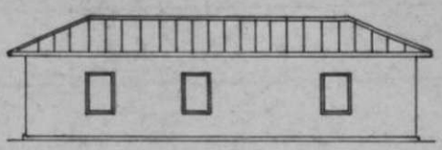
FRONT ELEVATION



SIDE ELEVATION



PLAN



BACK ELEVATION

SITE & SERVICE SCHEME 6— THIKA

TYPICAL FLOOR PLAN

SCALE 1: 200

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)

' Residential net plot area	m^2 45000m^2	Percentage of total area 60.8%
Open space and footpath	10,500	14.2
Road Reserve	18,300	24.7
Community facilities	200	0.3

Table 4.8.1

2. Rental Phase 1 (TUDC)

	m^2	% total area
Residential net plot area (net building area)	3209.76	11.11
Open space(incidental) + footpaths (open space around buildings)	19886.24	68.81
Road Reserve	5804	20.08
Community facilities		

Source: Author's Survey

Site and Service Scheme 6

Table 4.8.2

	m^2	% total area
Residential net plot area (net building area)	77783	65.05
Open Space + footpath	-	-
Road Reserve	41,844	34.95
Community facilities	-	-

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

Scheme	No. of plots	Nos observed (plots)	Nos.observed (rooms)
Majengo	200	20	142
Rental Scheme	36	4	32
Site & Service Scheme 6	239 (78 complete)	13	145

Table 4.9

Majengo (Vasey Estate): Density of Population Survey.

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

DURP REF.	Name	Type of scheme	ha deve-ped	Persons 1969 Census	Plots (units)	rooms	Density persons/ ha	Occupancy rate persons/ room
01	Staff Housing	Rental	(0.4) tot. 1.6	200	21	100	-	2.0
o2	Council staff Housing + private development		7	350	41	205	50	1.7
o3	Bonden i	Rental	(2.0) tot.2.9	200	37	94	100	2.12
o4	-	Tenant Purchase	1.3	N/A	lz	48	-	-
o5	Asian Quarters	Private development	(9.0) totll.6	1138	84	576	126	1.98
o6	Council & Government	Staff Hous-ing	(7.3 (tot.8	448	82	236	61.4	1.89
o7	Maj engo	Assisted scheme	8.0	3739	200	1155	467	3.24
o8	Kiraathi	Rental	5.0	N/A	105	232	-	-
o9	Jamhur i Starehe+ Ofafa Estate	Rental 1-5	11.0	5020	296	1400	456.4	3.59

o[10]	Ziwani	Rental 6	(1.9) Tot. 3.5	419	80	160	220	2.61
o[13]	Police	Staff Housing	0.8	-	-	-	-	-
o[18]	-	Site & Service 1&2	14.0) Tot. 14.8	N/A	124	846	-	-
0[20]	Pilot schemes	Pilot 1, Tenant" Purchase 2, site & service 3	1.2	N/A	155	334		
o[2q]	-	private	(3.5) Tot. 18.7	97	16	80	27.7	1.21
o[31]		Private	(13.3) Tot. 18.3	-	11	60	-	-
o[32]		Private	4.0					
0[33]		Private	(11.1) Tot. 12	-	-	-		-

Source: Compiled from Census data on Thika, 1969 + author's survey.

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

Scheme	Density in Plots/ha	Density in rooms/ha	Density in persons/ha
Majengo	27	156	682
Rental 1	12.46	99.7	523.18
S & S 6	20	199.8	699.4

Source: Author's survey.

Table 4.12:

Comparison of study area with some site and Service Schemes.

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

* 4.14: Extracted from "Site and service schemes, Analysis and Report "HRDU, 1971

** 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 ratic 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

Scheme	plot coverage
Majengo	50%
Rental Scheme 1	14.2%
Site & service 6	40%

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

Description \ Estate	Majengo	Rental Scheme 1	Site and Service 6
1. Number of persons per plot (coverage)	31	42	35
2. Habitable rooms per plot (coverage)	5.7		10
.3. Plot area per person	7.3m	2.12m	9.3m
4. Average size of roons	10.25m	9m	11.85m^2
5. Average living space in the room	2.35m	1.7m^2	3.39m
6. Average indoor living space per person (includes courtyard; 10% of built area has been subtracted as service area)	3.27m'	1.7m (no court-yard)	3.35m
7. Outdoor space per person (non-built area)	3.631	12.73m^2	5.58m
8. Open Space per plot	52.5m^2	534.84m^2 (around the building)	
9. Open space per person	2.08m'	12.73m^2	
10. Road area per plot	91.5m^2	161.2m^2	175.07m

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. 3.6m^2 per person + 10% for service area = 4m^2 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^o 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, sewarage, 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 Serivce 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 suty areas the dominant mode of use of access ways is pedestrian, followed by bicylce and lastly by vehicles. The design aspect should therefore accommodate these factors.

Majengo is bounded by the busy Kenyatta Highway to tb 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 intergral 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 Courfcil are indicated below:

Table 4.14 Primary Schools adjacent to Majengo

	Muslim Primary School	Thika Primary School	St.Patrick Primary School
Area of plot	0.36ha	0.87ha	1.6ha.
Classrooms	7	19	14
Other buildings	none	3 rooms	
External facilities	1 play field	1 play field	1 play field
No.of pupils	419	604	613
Area per pupil	8.6m^2	14.4m^2	26.1m^2

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 16m^2/pupil; in U.S.A. it is 26 to 50m.^{2} *t* in England it is 71m^2/pupil and in Ke-ya it is 20m^2/pupil. The area per pupil for secondary schools in Latin America is 19m^2/pupil, in U.S.A. it is 90 to 166m^2/pupil, in England it is 142m^2/pupil and in Kenya it is 40m^2/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 ConmoJiiics, 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 carls 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 tl 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 bycicles 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 industriul 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:

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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

	1962*	1969		1971.**		1975**		1980**	
	Total	Total	% change p.a.	Total	% change p.a.	Total	% change P-a.	Total	%Change p.a.
Africans	231,744	422,912	9.0%	502,500	9%	682,300	7.8%	969,600	7.3%
Asians	86,922	67,189	-3.8%	6^,000	-2.5%	61,200	·1.1%	57,900	-1.1%
Europenas	28,765	19,185	-6%	18,700	-1.2%	19,500	1%	20,500	1%
Total	347,431	509,286	5.6%	585,200	6.8%	763,000	6.8%	1,048,000	6.6%

*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:Compu ted [b]y the author from Kenya Population Census 1962 and 1969

Town	Census Population 1962	1969	Urban Population growth p.a. %	% of total urban pop. 1962	% of total urban pop. 1969	Annua l growth Africa pop.%
Nairobi	347,431	509,286	5.6	51.8	47.0	9.0
Mombasa	179,575	247,073	4.7	26.8	22.8	7.6
Nakuru	38.181	47,151	3.1	5.7	4.4	4.9
Ki sumu	23,526	32,431	4.7	3.5	3.5	8.4
Thika	13,952	18,387	4.0	2.1	1.7	5.6
Eldoret	19,605	18,196	-1.1	2.9	1.7	0.5
Nanyuk i	10,448	11,624	1.5	1.6	1.1	3.0
Kitale	9,342	11,574	3.1	1.4	1.1	5.5
Ma lind i	5,818	10,757	9.2	1.4	1.0	17.0
Ker icho	7,692	10,144	4.0	1.0	0.9	6.1
Total	574,933	916,623		85.7	84.7	Average 6.8%
Other towns	96,017	165,814		14.3	15.3	3.3
Total urban Popula tion	679,500	1,081,437	7.1	100.00	100.00	10.1

Table 4.17: Percentage Distribution of total wage employment in Main towns in Kenya

Town	1963	1974
Nairobi	53.9	58.9
Mombasa	18.6	17.9
Nakuru	3.9	3.6
Thika	1.9	2.4
Ki sumu	4.3	3.1
Eldoret	3.3	1.9
Other	14.1,	12.2

Source: Statistical Abstract (1974, 1976) Central Bureau of Statistics, Ministry of Finance and Planning.

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

	1972	1985	2000
Nairobi, Total income of Households.	£164,000,000	£474,000,000	£1^322,030,000
No.of Households	135,730	324,000	670,000
Lowest 20% of Households	3.5%	2.8%	2.5%
Share of Total income amount	£5,740,000	£13,272,000	£33,050,000
Average Income per Household	£214	£208	£247
Low-Middle, 20-40%	6.8%	8.7%	11.0%
Share of Total Income Amount	£11,152,000	£41,238,000	£145,420,000
Average Income per Household	£413	£636	£1,085

	L972	1985	2000
Middle ,40-60% Share of Total income	13.0%	14.1%	17.0%
Share of Total Income Amount	£21,320,000	£66,834,000	£224,740,000
Average Income per Household	£777	£1,027	£1,677
Upper-middle,60-80% Share of Total Income	21.3%	21.4%	24'.5%
Amount	£34,932,000	£101,346,000	£323,890,000
Average Income per Household	$1,286	£1,560	£2,417
Highest 20% of Household Share of Total Income	55.4%	53.0%	45.0%
Amount	£90,856,000	£251,220,000	£594,900,000
Average Income Per Household	£3,352	£3,869	£4,440
All Households Average Income per Household	£1,208	£1,460	£1,973

1971 prices

Source: Nairobi Urban Study Group: Nairobi Metropolitan Growth Strategy.

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

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

·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 11 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:

Residential	62%
Major Open Space	13%
Incidental open space	5%
Road	8%
Paths	10%
Parking	2%
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:

Residential	63%
Major open space	12%
Incidential Open Space	4%
Road	9%
Paths	10%
Parking	2%
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 $100m^2$ e

2100 lots of $120m^2$ each

1800 lots of $140m^2$ each

300 lots of $160m^2$ each

Therefore average plot size is $130m^2$

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)

Option	A		B		C		Total	
Size	No.	1	No.	%	No.	%	No.	%
100	451	20.5	209	9.5	0	0	660	30
120	528	24.0	242	11.0	0	0	770	35
140	451	20.5	209	9.5	0	0	660	30
160	0	0	0	0	110	5	110	5
Total	1430	65	660	30	110	5	2200	100

Source: I.B.R.D. Report No.607 a-KE,p.19.

There are about 50 plots per ha.

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

Option : B - Wet core plus store and kitchen

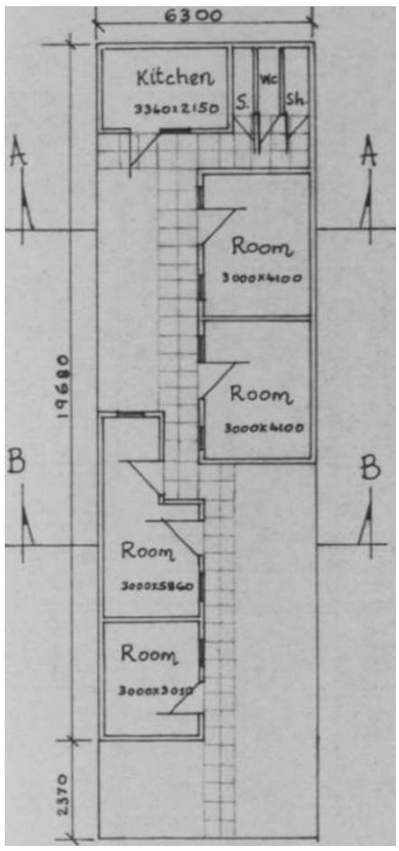
Option_ C - Wet core, store,kitchen and one room.

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.

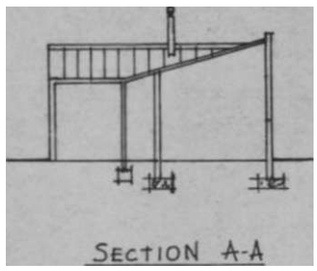
4.14 Expected fesidential density

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 :



fLOOS^ PLAtJ



ScctioM 6-B

SITE & SERVICE SCHEME DANDORA

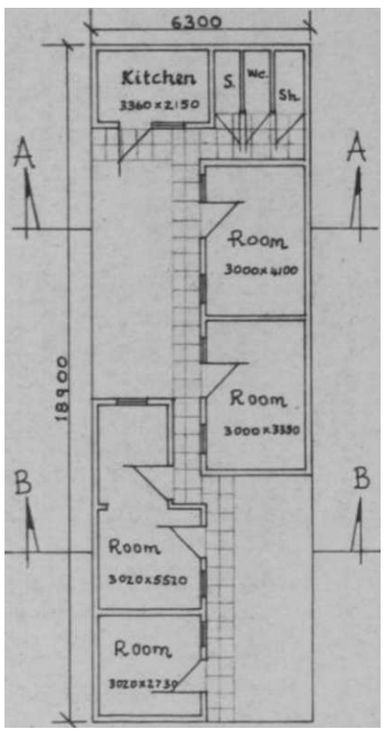
TYPICAL FLOOR PLAN **SCALE 1:200**

1. 2, 3 SINGLE ROOM UNITS

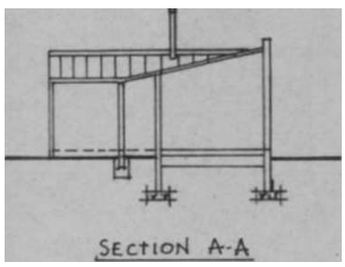
GICHUKI THOGO
M.A. (PLANNING^)
THESIS 1978

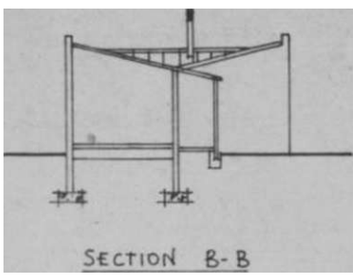
FIG. 5

SOURCE : FIELD SURVEY



fLOOf^ PLAM





SITE & SERVICE SCHEME DANDORA

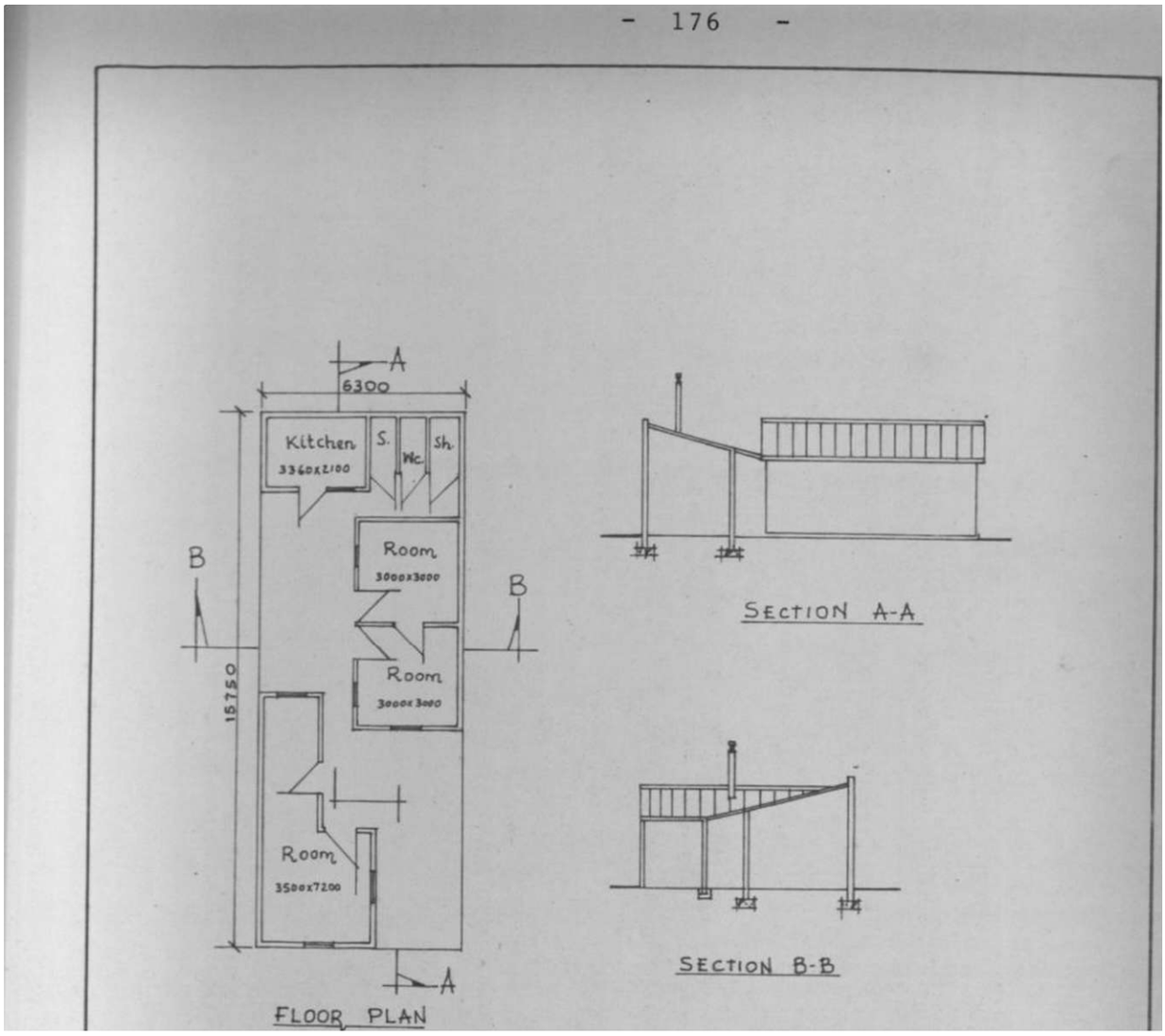
TYPICAL FLOOR PLAN SCALE 1=200

1, 2, 3. SINGLE ROOM UNITS

GICHUKI THOGO
M-A • ("PLANNING)
THESIS H78

FIG 6

SOURCE: FIELD SURVEY



SITE & SERVICE SCHEME

DANDORA

TYPICAL FLOOR PLAN

SCALE 1:200

1. 2, 3 SINGLE ROOM UNITS

GICHUKI THOGO
MA. ^PLANNING)
THESIS 197S

FIG 7

SOURCE! FIELD SURVEY

Net residential density, persons/ha 500

Density, plots/ha 50

Density, rooms/ha 200

4.14.1 Allocation of Space

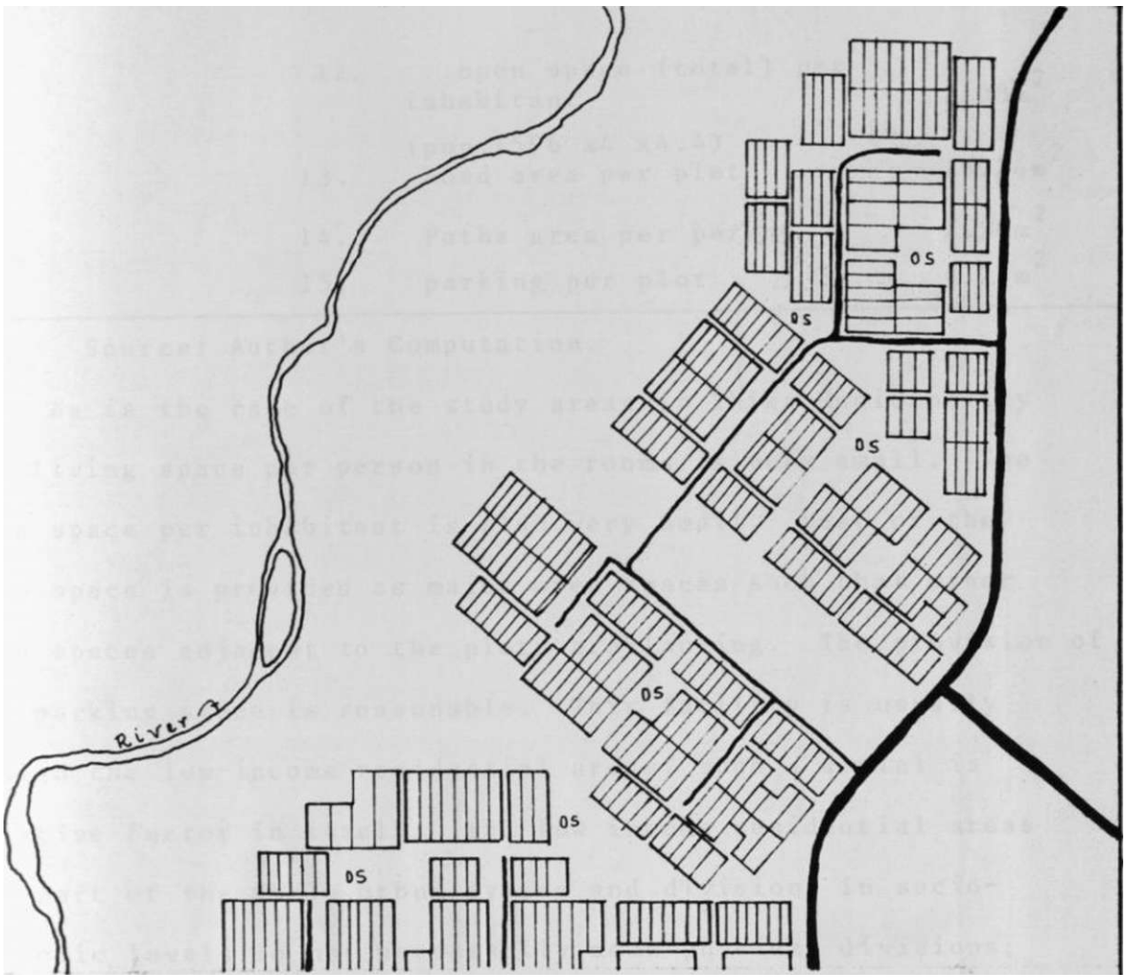
The model of area IV in phase 11 is taken in analysing the allocation of space and is then generalised for the whole scheme because the planning standards applied were the same, that is, those develoed by Nairobi Urban Study Group and Dandora Project Department:

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

Land Use		Description	
Typ«			
Residential	200,880	1. Persons per plot	16
Open space		2. Average number of habitable rooms per plot	4
i)Major open space	42, 120	3. Average plot area (average of 4 different sizes)	1 30m'
2) Incidential open space	16,200	4. Plot area per person	8.13i
Total open space (1 + 2)	58,320	5. Average size of rooms	12.8m'
Road	25,920	6. Average living space, per person in the rooms (occupancy rare 4.4)	2.9n
Paths	32,400	7. Plot coverage	502
Parking	6,480	8. Indoor living space per person includes courtyard,built area less 10% service area).	3.6
Total	324,000 or 32.4ha	9. Outdoor space per person non-built area)	4.0
		10. Open space per plot (incidental)	10.
		11. Open space per plot (Total open space.	36.5



OVERALL LAYOUT AREA IV PLOT SIZE 6 30 - 7-35 / 8*0

SOU RCE: **PRELIMINARY DESIGN REPORT 19 7 6**	**SCALE; 15,000**
	GICHUKI THOGO MA (PLANNING) THESIS 1977/78
The application of planning standards in urban low cost, low income residential areas	MAP NO 11

12.	open space (total) per inhabitant (pop. 1596 x4 x4.4)	2.08m^2
13.	Road area per plot	15.24m^2
14.	Paths area per person	1.26m^2
15.	parking per plot	4.06m^2

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 sewarage the lots have individual wet core units with water borne sewarage 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 plotholders.

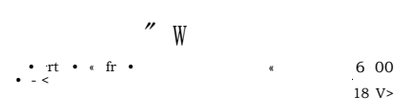
Electricity is available. There is a system of street lighting and security lighting at major communal points. The centre to centre spacing for street lighting varies with a maximum spacing of about 45m. Individual metered electric connections are available from East African Power and Lighting Company.

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 hierachy 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

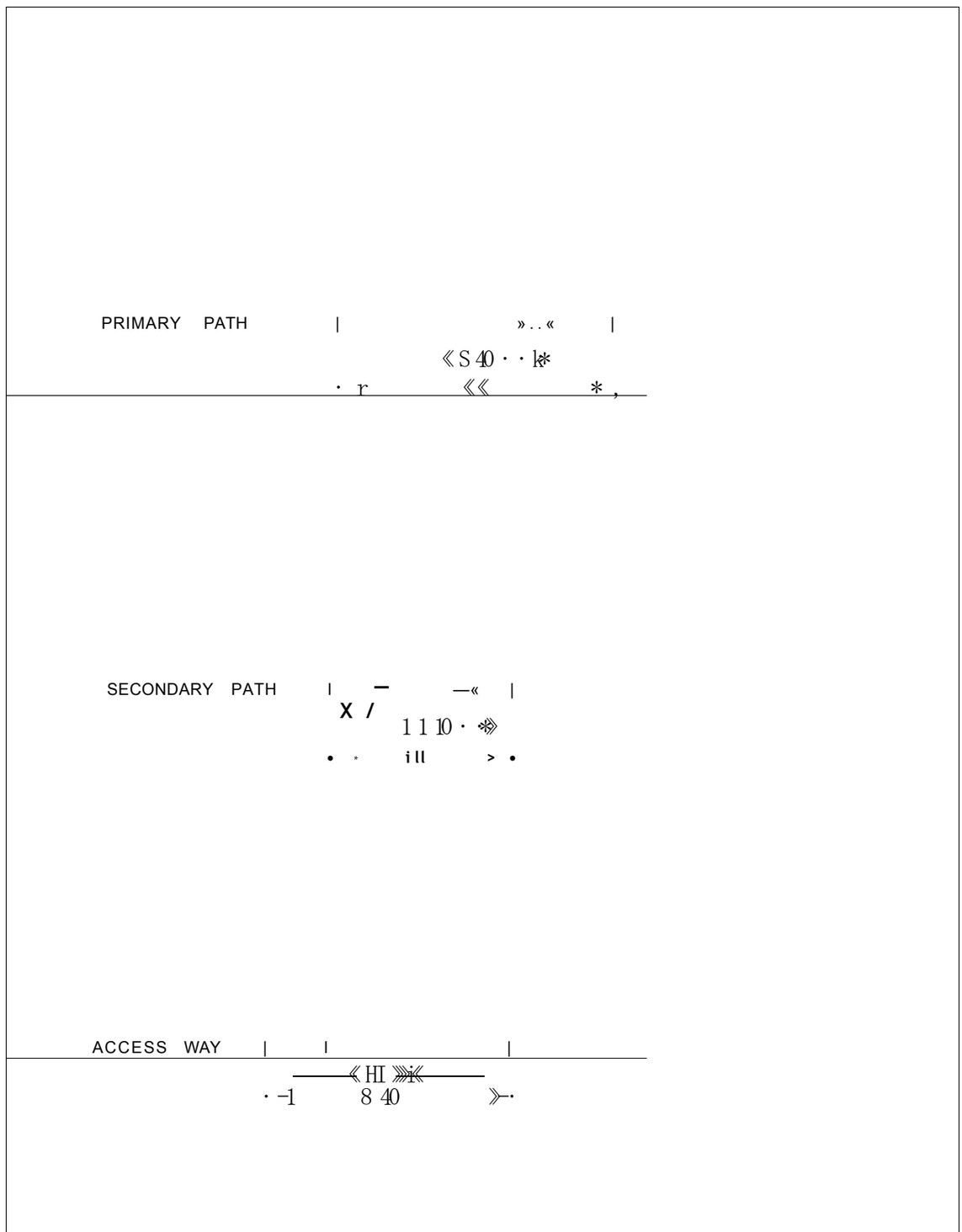
SCALE: 1200

SOURCE:

MUTISO MENEZES INTERNATIONAL DANDORA COMMUNITY DEVELOPMENT PROJECT PRELIMINARY DESIGN REPORT 1976

CICHUKI THOCO
M.A. (PLANNING)
THESIS 1177/78

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)

THESfS 1977/7®

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 apine is approximately 42ha. where the existing and planned community facilities are :

The following community facilities have been planned for.

Nos.	
16	- primary schools
6	- markets (about 400 market stalls).
2	- Health centres
2	- multi-purpose community centres, incorporating day-care facilities
1	- Sports complex
4	- Secondary schools

* 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 turms 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 over all 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, sewarage, 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 excessiblc 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 P^{er} 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 for 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 palnners. This is so because the intensity of activity per unit areas, such as the number or people per room, is to a large extent a result fo 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 physcial planning should perhaps t,e 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 expocially 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 dcnac housing.

Mil* Its Courtyard

estate.

Plate V: Outdoor space, site and service scheme 6 - Thika.

Plate VI: Competing use of outdoor space, same estate.

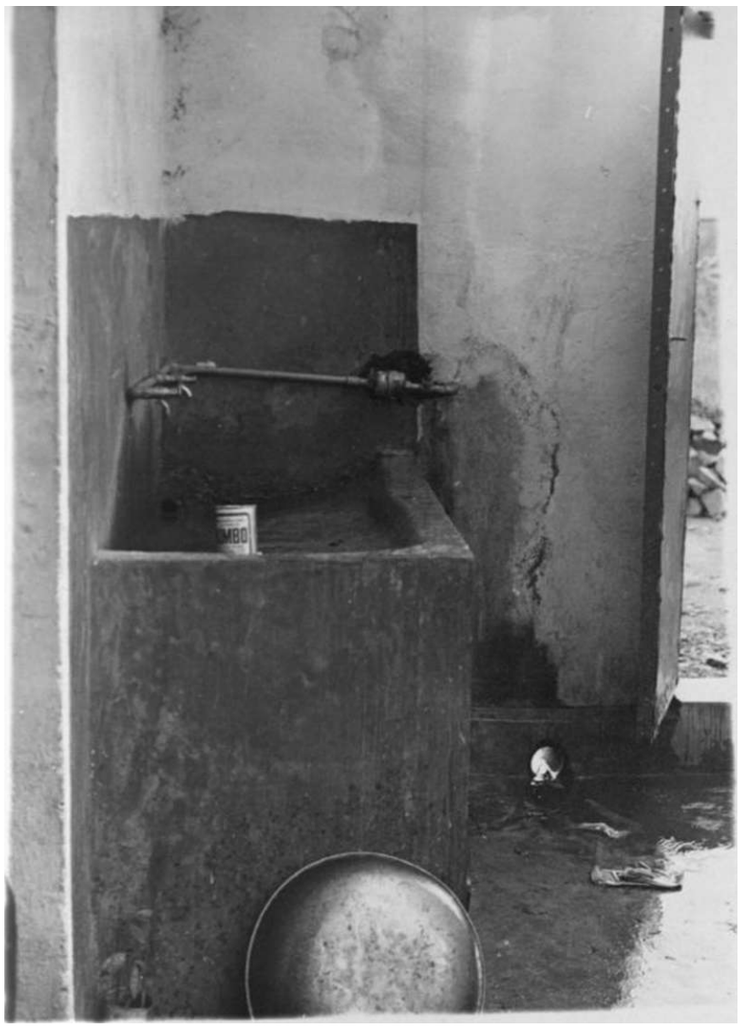


Plate VII & VIII: Communal water tap, Site and Service 6 - Thika. Author on left.

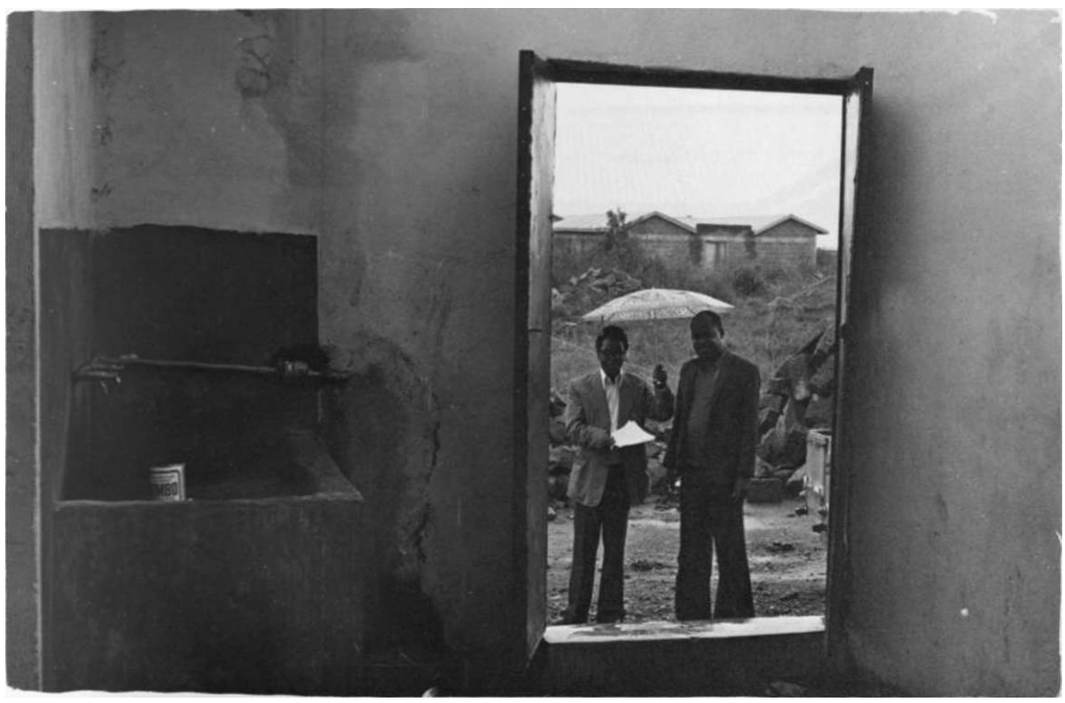


Plate IX & X: Back to back, poor maintenance between buildings.

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

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CHAPTER FIVE

EXAMPLES OF HOUSING DENSITY AND COST OF INFRASTRUCTURE

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 _/ a trade-offs in between acticities 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 patter 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 capac i ty.

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 nf 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 are 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. (55%)

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

4. Fees for approvals and professional fees - stamp duties and consultants. The minimum architects fee is 6% and that for a quantity surveryor 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. (10%)

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.

.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.

Economic Infrastructure Costs/10 units/ha

Tarmac road: 100 x 10m = 1000m^2 @ 125/-	125,000/-
Water mains: (trunk pipe) 100m @ 50/-	5,000/-
Individual connections:(26m per plot)	
26 x 10 = 260m @ 50/-	13,000/-
Water metres: 10 @ 50/-	500/-
Surface water drainage: one side of roadway)	
100m 0 85/-	8,500/-
Street lighting: 1 post per 33m @ 2,5>00/-	7,500/-
Electricity: Individual connections	
10 x 10m = 100m (i 100/-	10,000/-
Pit latrines or septic tanks:	
(750/- - 2000/-) Average price 1375/-	210,750/-
Total	183,750/-

Costs per plot	18375	18,375/-
* House Costs		18,029/-
Total cost per unit (density 10 houses/ha		36,404/-

Construction costs as per locally available materials.

Economic Infrastructure Infrastructure costs/20 Units per hectare.)

Murram roads: 2 x 100 x 4 =800m² @ 20/-	16,000/-
Water mains (trunk pipes) 200m @ 50/-	10,000/-
Individual connection: (26m per plot)	
26 x 20 @ 50	26,000/-
Water metres 20 @ 50/-	1,000/-
Surface water drainage (one side of roadway)	
200m Q 85/-	17,000/-
Street lighting: 1 post per 33m = 6 posts	
02,500/-	15,000/-
Sewerage (trunk pipe) 6″, 200m 052/-	10,400/-
Sewerage(individual connections) 6″	
(26m plot) 26 x 20m 9 52/-	27,040/-
Total	123,440/-
Cost per plot	6,172/-
House Costs	18,029/-
Total cost per unit (density 20 houses per ha)	24,201/-

Economic Insfrastructure costs (48 units per hectare)

Tarmac roads: 2212m² (d 125	276,500/-
Water mains: 80 x2m = 160 0 50/-	8,000/-

Water taps: 3 taps per cluster:	
6 @ 50/-	300/-
Ablution blocks: (total 8 toilets,	
4 shower cabins per ha.) size of	
ablution block: 6 x4m = 24m^2 @ 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 s 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 developraent·

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 (m^2) and in case of lionsing 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

Total area 127820Sq. Metres

Total Units 1038 (Incl.5 unserviced plots)

	Total cost Kt	Cost per Sq.metre or unit K.shs.
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. Construetion	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	28^387	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 11 are given in table 5.2 and table 5.3

Table 5.2: Cost Estimates of Infrastructure for Area IV

Area IV: 32.ha; density 49.2 plots/ha,

No of plots 1596

Description	Total cost Kt	Unit cost/plot Kt
Site clearing & grading	9,000	5.6
* Secondary Roads/footpaths, storm water	70,400	44.1
Sewerage Reticulation	110,700	69.6
Water Reticulation	48,000	30.0
Street lighting	25,000	15.6
Landscaping	3,100	1.9
Refuse Collection	6,200	3.9
Physical contingencies 1.5%	40,900	25,6
Total	313,300	196.3

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.

Description	Total Cost Kt	Unit Cost/plot Kt
Site clearing and grading	2,400	4.2
·Secondary roads/footpaths, stormwater	28,000	48.6
Sewerage reticulation	44,500	77.3
Water reticulation	17,400	30.2
Street lighting	8,800	15.3
Landscaping	1,100	1.9
Refuse collection	2,200	3.8
Physical contingencies 15%	15,600	27.1
TOTAL	120,000	208,4

* 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 SUM MARY

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.

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gi.'APTiSH SIX

CONCLUSION AND .tiSCOMKBNOATIONS

6.1 Brief description of the findings of the study concerning residential planning standards in the urban low C03t, low income areas.

6.I.I Single room accommodation.

In the survey areas the buildings are s ingle storey and they are so designed a3 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 Jays. 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 unit3 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 predominance 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 30 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 ¥¥ 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 i3 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 par 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 co3t 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 1Lko to puuh up densities jince i t 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, tnat even if this were ione 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 m^P/person 4. 10$ for service area = i+.0 m^P/ person). This is largely due to the high occupancy rate in the rooms.

I00/b 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 £U'.>::ts, storage for utensils and dishes, and lack of enough space for bed3 (the author witnessed some households in v:hich 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

courtyard, and sometimes in the already overcrowded room thus nnkir- indoor living uncomfortable. Washing of clothing is dono 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 tc 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 car.e 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 whoae plots are near the open spaces. Such open spaces do not serve a precise purpose. There is no provision of opnn 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 ov.-ir- to 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 arid service scheme 6 - Thika. Although the facilities wil] 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 shoppin.— facilities is unreasonable for an estate of this size. Shopping facilities should be located at several centres to serve adequately the expected large population.

'//hat 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 Dan.iora 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 ˆiven much attention in the other study areas and foot-path construction i3 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 trie case of Kenyatta Highway which forms the external boundary of Majengo and Clarissa Road near the site and service scheme 6 - Thika. It i3 also noted in the case of Danˆora 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 3hared 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 - iyfi> 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. oned

6.1.9 Plot sizes

Plot sizes are not very big. The average plot size in Kajengo is 225 m^2, in site and service scheme 6

it is 325.U5 m^p ; Dandora site and service scheme has the smallest sizes ranging between 100 m^2 to 160 m^2. The latter are especially small compared to 32k m^2 and 210 m^2 in Zambia, 375 m^2 in Botswana (6.1), and 288 m^p in Tanzania. (The minimum plot size for the high density detacheJ housing ir. Tanzania is 370 m^2 (6.2).

Given that the occupancy rate per room in these areas is high (the average in all areas is 14..3 persons per room) the provision of plots of such small sizes contributes towards the lack of ndequate living space. Also riven the land use configuration it is seen that the smaller the plot 3izes 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 belies do not necessarily formulate the sarr.e standards. The application of planning standards in a residential area depends on which body is doing the planning hence the monotonous layout ar.d in some esses rigidity in the use of planning 3tar.dards. If these bodies borrow from each other and allow the use of ifferent standards in the same residen-

tial area then a certain degree of flexibility will have been achieved.

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

6.I.II Planning legislation

The existing planning legislation is silent on planning standards. As it is no adequate control for the U3e 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 Hecomnendations

6.2.1 The importance of planning standards.

Planning standards are important and essential tool3 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 over-crowding 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 niidle or hi$_c$.h income groups in the housing market. The reasons are that they cannot afford the market value of land and sin.o« 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 residen-tial 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 poeple 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 co3t of ″modern″ services, to cut down on transport from home to work, and to reduce land consumption. Hut 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 3ee 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 i3 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 3et using more elaborate criteria so that minimum space standards can be decided according to family social arid functional requirements; maximum space standards should be decided according to economic density requirements. In this way housing should not be perccived as cells in isolation but as a hierachy ol* 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 inter-dependent 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 1|.50 inhabitants. It doos 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 1j.50 inhabitants per hectare has been found agreeable elsewhere:

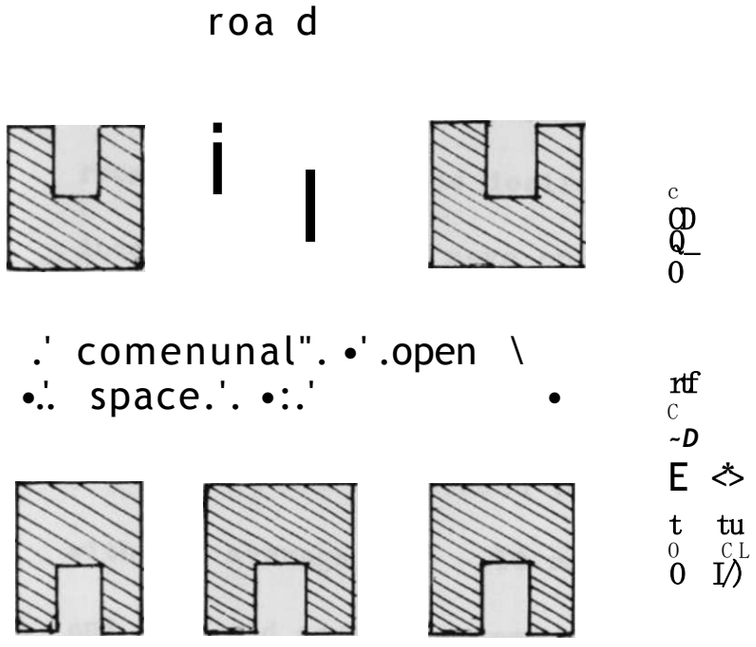
> ″3elow 300 (inhabitants per hectare) the per capita values for the construction of roads find various networks may be held to be excessive; above I4.50 inhabitants per hectare it is no longer possible to obtain an extent of per capita open space compatible

with the requirements of comfort (6.6). The rasidential 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 espe-cially 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 conts of transportation. Feople in low inoomo 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*53 miles) and by bicycle not more than 10 km.

To supplement the living space a minimum of 3 m^2 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

Fig.10
(not to scale)

Gichuki Thogo
M.A (Planning) thesis

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. Dy 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 I car for every 5 dwellings. Pedestrian and cyclist path3 should be made along the main roads forming the neighbourhood

boundary so that exposure to accidents is minlmisod.

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

The following land use profile is suggested for residential development!

	Land Use	% of Total
I	Residential/dwelling plots	50 - 60
2	Local/Neighbourhood shopp-ing (markets)	3 - U
3	Parks, play grounds, and other organised open spaces	10 - 12
k	Roads and streets (Right of ways)	15 - 20
	Public and' semi public uses (schools, clinics, worshipping places, cemetries, etc.	1$ - 20

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 statitics 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 incomo groups and on the rate and pattom of changc 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 basi3 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 ^O.i THE AREAS STUDY

CAtiD KO. 2
CODE COLS.

A. SPECIFIC INFO.S.ATION TT.SINGLE PLOTS AHD/OR BUILDINGS.

I. Survey estate (name of area)

1 - Va3ey estate (Majengo - Thika) I
2 - Thika site & service scheme no. 6
3 - T'TDC Kstate Thika
1; - Dandora iite . ervice Scheme

2. Type of Schme.

1 - rental,
2 - site h service scheme
3 - Company housing
- mortgage 2

3. Plots/building serial number 3-5

k. Type of structure

1 - detached
2 - semi-detached
3 - terraced
ij - maisonette 6
5 - flat

5. Size of plot in sq.m. 7-10

6. Length of plot m. 11-13

7. Width of plot m. 11^.-16

8. Plinth aroa in sq. m. 17-19

9. Number of habitable rooms in the structure 20-21

10 Number of households in the building 22-23

11, Number of residents in the building 2U-25

12. Is there a kitchen in the building 26
I - yes 2 - No

13. If yes to 12, is it

1 - shared by several households
2 - not shared by more than one household 27

Il|. Bathroom facilities

1 - bathroom for each household
2 - bathroom(s) shared *-ith 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) 29
Ij - bou ;ht from water seller

16. Toilat facilities.

1 - water closet for each household
2 - water closet for each householf outside the building 30
3 - water closet shared by more households, inside building
U - Fit latrine

17. Disposal of refuse
1 - use refuse tin collected by local authority
2 - dump refuse at communal pit 31
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 32
lj - daily

19. Type of drainage around the house

1 - open surface drain
2 - covered surface drain 33
3 - underground
H - none

20. Parking facilities - where are cars parked?

1 - on the plot
2 - on the street 3^4
3 - special parking space
jj - no parking facilities

21. Use of courtyard

1 - wash and dry clothes there
2 - for relaxation 35
3 - vegetable gardens
U - area for children to play
5 - cooking

B. **SOM5 USAA REACTION**

22. Is there enough bed space 36
I - ye3, 2 - no

23. Is there enough room for furniture?

I - yes, 2 - no 37

2\\. Is there enough space for entertaining guests?

I - yes, 2 - no 38

25. Is there convenient privacy in the house? 1^0
I - yes, 2 - no

26. If no to 25, why?

1 - lack of adequate rooms
2 - poor room arrangements, design i+1

27- Are the houses:

1 - inconveniently close
2 - far apart I42
3 - well spaced

26. Means of travel to work and general movement

1 - foot
2 - bicycle
3 - 'matatu' or bus
I4 - private car I45

29. How far are these facilities from your home: U3-U4

1. Primary school
2. Health clinics
3. Social hall
!(. Your Church
5. Recreational --rounds.
6. Shops

C. OPEN ENDED QUESTIONS

30. What are the disliked aspects of the estate

I - yes, 2 - no ij6

31. 'What improvement could you suggest?

Appendix 2

LAND USE AND POPULATION SCHEDULE

		NAKURU	KISUMti	SLDORETi.	THIKA by Zone	NANYUKI excl. golf army.	NYERI	KITALE	I3IOLO	T. FALLS excl. golf	NAIVASKA by zone excl. prison	AVK- I.RAGS
A.	Residential	50.2%	k5.9		13.9	14-7.9	U5.6	3^.6	;63.3	28.1	kl.2	
	Industrial	5.6	Hb.5	[2.7	38.7	5.5	2.5	5.1	1.2	5.9	u.u	t 7.6
	Educational	I3.1	.1	IU.2	18.0	12.9	17.3	19.6	16.7	27.k	18.7	
	Recreational	17.I&	15.9	I18.0	6.6	19.5	12.3	26.3	\2.5	7.3	6.0	
	Public Purposes	9.i.	I6.I	13.0	IU.0	6.1	:6.5	io.5	19.3	2i·if	21.9	15.
	Commercial	y″		TTcT		T7TT		·3				
	Pub]io Utilities	2.7,	3.6	2.7	k.h			·G	15-0		1.5	3.0’.’
B.	Tofcal Acreage(Zones 3to	2065a	I195	x55o	r^9	r^i	1*2 L2A		T W - p r r			
C.	Population 1965	53,000	33,5od	29,500	20,00q	15,600	I2.i4.0a	10,5:0	c,1|00	8,100	u,L±00	
D.	Town Density po]?.I95S	]^T″,Tppa’	··6711	TTT9	i56.0	25.9	19.5	II.0-’T^.h	’2JTU	T″-f″	1T7T ppa	
E.	Growth Rate per anrum Total 0-6	5.pa	7F	F X	T8T5″	1″6TT	T7TT	1,.0	Tf Hi 1	pTTT	cC.1 re.y	
?.	Population Increase 1968 - 73	15,000	io,5oc	10,500	ii.oool	6,200	5,700	J 1,500	J3,600	3,300	I 2,300	
G.	Growth Rate % 1968-73	2%	31	36	k8	U0			43	UI	36	

Source: Physical Planning Department

PLANNING STANDArC Appen1ix

Source: Nairobi *Urban* STady Group

FACILITY	.POPU-LATION	MAX DIS-TANCE FROM 1LOT	REQUIRE-MENT PER 1,000 POP	LAND RE-QUIREMENT	BUILDING REQUIRE-MENT
DAY NURSERY	2,000	150	0,0025	0.005HEC.	
RELIGIOUS CENTRE.	15,000		0.0165	0.25 HEC	
HEALTH CENTRE	20,000		0.0125	0.25 HEC	
MAJOR SOCIAL CENTRE	100,000		0.001;	0.1; KEC	
SOCIAL HALL	25,000		0.01	O.25 liLC i	
SUB SOCIAL HALL	5,000		0.0001;	0.002II EC	
PRIMARY SCHOOL	5,000	i+00	o.i5	0.75 LLC	30-L;0 PUPILS *(FOss* 50) ^JPILS
POST PRIMARY SCH.	10,000	00	0.07?	0.075:. EC	
TECHNICAL SCHOOL					
SECONDARY SCHOOL	25,000	600	O.01+	1.0 HEC	920 PER SCHOOL
MAJOR SHOPPING C.	25,000	2,000	0.016	*o.Li* HEC	LOCATED NEAR BRJS DISTRIBU TION
SHOPPING AREA	10,000		0.025	0.25 HEC	
LOCAL SHOPPING	2,000	i5o	0.003	0.006LEC	
MAJOR MARKET	25,000		0.016	0.1; HEC	50 STALL WALLED HARDSTAN
SUB MARKET	10,000		0.025	0.25 HEC	
LOCAL MARKET	5,000		0.001;	0.002K EC	7-?0 STN S/FENCED CENTRAL REFUSE/TO W
LIGHT INDUSTRIAL A.	25,000	1,000	0.02	0.5 HEC	
WORKSHOP	25,000		0.01	0.25 HEC	
SUB V/ORKSHOP	15,000		0.0066	0.I HEC	LOCATED NEAR MAP KET. J2ET4 OUTLETS NEC.
ADMINISTRATION	30,000	N/A		0.5 HEC	
SUB POST OFFICE	20,000	2,000	0.0012	0.3 HEC	
POLICE STATION	100,000	K/A		0.5 HEC	
FIRE STATION	100,000	N/A		0.01; FEC	
MAJOR BUS STATION	100,000	2,000		0.3 HEC	
INFANT PLAY AREA	200	75			
PLAY A. IEA	1,000	150	0.03	0.03 HEC	
PARKS	23,000		0.03	0.75 ::EC	
SPORTS CENTRE	100,000			5.0 HEC	

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, 2 f o r 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

Facility	population Catchment	Max Walking Distance	Land Requirement (ha)	Notes
Nursery School	2,500	2-300	0.15-0.25	Some inte-grated with Primary School.
Special Purpose area	5,000	1j-600	0.25-0.50	Religious, social hall etc.
Primary School	5,000	U-600	i.5o	Combined us for open 3pace (due land contra
Local Shopping Centre	5,000	U-Soo	0.25-0.50	Integrated with local market
Lo'ial Market	5,000	u-800	0.10-0.50	As above
Playing Field	5,000	JI-600	1.00	Combined us with Primar School and -eneral ope space.
Secondary - School	20,000		2-1^.00	Combined wi open space. In upgradin areas off s
Post Office	20,000		0.2-0A0	
Community Market	20,000		0.'|-0.o0	
Shopping Centre	20,000		1.-2.00	
Health Centre	20,000		0.25-0.50	
Comm mity Centre	-0,000		0.50-0.75	

General Planning Standards World Bank Project II (Cont,)

Facility	Population Catc'nxnent	Max talking Distance	Land Requirement (ha)	Notes
Light Industrial Area (Workshops)	20,000	-	I.-2.00	Combined with loca or commu>- nity mark Depend or Location of site.
Police Station	50,000	-	0.5-2.50	
Branch Library	80,000			Part of Community centre
Major Shopping Centre	100,000			
Fire Station	100,000			
Sport Centre	100,000			
Bus Station	100,000			Guideline only.
Administration	100,000			
Commercial	100,000			

The overall population density is based on

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

Plot size

The plot size range will be I00-200m^2, average II;5m^5 » which is 10'- larger than the Dandora plots but less than the approved 2lj.0m in Grd.II By-laws. Net density will be 35/^4-0 plots, 290-'j00 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-C.5m. Plot options of I00-I20m, not more than 20/j,of 160-200m'- not more than IO;.'.

Roads/Footpaths and Car Parking

iiach 3ite 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 Stroet3 Adoption Act.

	1 (oserve 1 M	Carriage way width M	Curbside permitted	Plot access permitted
Minor Access road	9	k.5-5.0	Yes	Yes
Primary path		9.0		Yes
Secondary path		6.0	—	Yes
Domestic path	-	3(1+)		Yes

Car Parking/Hoad access

Car parking standard is I (one) per plot (NCC existing standard) with a maximum allowance of 50% off-plot spaces. bJmer ;ency 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.

Comnunity r'acili ties

.'/here 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?unction/as detailed in the Appendix Saving in materials used was agreed upon. Health Centre size of 532m with I78m circulation. Health Centre with Maternity l/ing of 339m'- with 80m circulation. An estimated co31 of Shs. 1,000 per sqm will be used.

Comnunity Centre

The Community Centre for bandora Phase II will be used with change of space for i; office and projector room will be included withir. 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 srr.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

Allocation of costs

Source: (World Bank)

CATEGORY	TOTAL COSTS *K£	Chargeable to NCC		Recovered From Lots
	Total cost	User Fees and Rates	Communeity| ^ilities-	
1. SITE PREPARATION	118,450	1,150	9,660	107,640
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	I,150	1,150		
2. ON-SITE INFRASTRUCTURE	1,071,340	474,225	65,595	531,520
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	1b6,685
d. Water Reticulation	150,650	150,650		
e. Street Lighting	65,780	19,735	9,210	136,835
f. Land scaping	II,500	11,500		
g. Refuse collection	23,230	14,375	885	7,970
3. COMMUNITY FACILITIES	392,435	392,435		
4. CORE UNITS	1,528,200	--		1.528,200
a. We t Cores	704,340			704,340
b. One-room Units	622,800			622,800
c. Two-room Units	179,100			179,;oo
d. Demonstration Units	21,960			21,960/2
5. MATERIALS LOANS FUND	1,144,800			800
6. TRUNK INFRASTRUCTURE	2,163,150	2,163,150		
7. TECHNICAL ASSISTANCE/3	766,950	664,830	45,865	56,255
a. Project Unit	348,000	348,800/4		
b. Design & Engineering fees	375,950	273,830	45,865	56,255
c. Housing Operations Study	43,00	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.
!} Central Government will bear the costs of monitoring (K£36,000) and future project preparation (K£40 000) . . . i n of the NCC
I To be apportioned among beneficiafieg At the comptecx
Hnncine Ooerations Study.

APPENDIX 6

LAND REQUIREMEHXS FOR DISTRIC" ADMINISTRATION

	Function	No	House category	Suggested Plot ac.	Total Acre
Administration	*District Commissioner	1	3a	1	
	*District Officer 1	1	4a	¥	
	*District Assistants	2	5a	1	
	District Clerk	1	8	1	
	Cashier	1	8		
	Revenue Clerk	1	9	1/8	
	Tax Clerk	1	9	1/8	
	Clerks	4	9	j	
	Drivers	2	L	1/8	
	Office Messengers	2	L	1/8	
	Station Hands	8	L	J	
	Administration Police	13	L	Say 7/8	5.5/8
Agriculture Department	*District Agr.Officer	1	4a	J	
	*Farm P1.& Loans Off.	1	5		
	*Cash Crops Officer	1	5	¥	
	*Asst.Agric,Officer	2	5	1	
	Office Assistant	1	8	1	
	Clerks	2	9	1	
	Agricultural Assists.	3	9	3/8	
	Office Messenger	1	L	1/16	
	Drivers	3	L	3/16	3.5/8
Veterinary Department	Veterinary Officer	1	4a		
	Clerk	1	9	1/8	
	Veterinary Assistants	2	9	1	
	Office Messenger	1	L	1/16	1
Medical , Department	*District Educ.Offic.	1	4a	J	
	Office Assistant	1	8	t	
	Clerks	2	9	1	
	Driver	1	L	1/16	
	Office Messenger	1	L	1/16	2."78
Department	'Ji!?'1" Educ_Off' }				
	Office Assistant	18		J	
	Clerks	2	9	i	
	Driver	1	L	1/16	
	Office Messenger	1	L	1/16	1.11/8
Police	*Assiatant Superi- n-tendent	1	4a	J	
	*Chief Inspector	1	5	i	
	*Office i/c CID	1	5	)	
	*Office ilc S.B.	1	5	J	
-	Court Prosecutor	1	5	i	

*Require low density housing

Add 25% for roads and open 8paCe'

Min.Total Govt.staff Housing. 21 ac.

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APPENDIX 6
LAND REQUIREMENTS FOR PISTRIC" ADMINISTRATION

	Function	No	House category	Suggested Plot ac.	Total Acre
Administration	*District Commissioner		3a	1	
	·District Officer 1		4a	/	
	·District Assistants		5a	1	
	District Clerk		8	1	
	Cashier		8	I	
	Revenue Clerk		9	1/8	
	Tax Clerk		9	1/8	
	Clerks		9	§	
	Drivers		L	1/8	
	Office Messengers		L	1/8	
	Station Hands		L	\	
	Administration Police	1	L	Say 7/8	5.5/8
Agriculture Department	·District Agr.Officer		4a	I	
	*Farm PI.& Loans Off.		5	J	
	·Cash Crops Officer		5	J	
	*Asst.Agric,Officer		5	1	
	Office Assistant		8	/	
	Clerks		9	1	
	Agricultural Assists.		9	3/8	
	Office Messenger		L	1/16	
	Drivers		L	3/16	3.5/8
Veterinary Departmen t	·Veterinary Officer		4a	I	
	Clerk		9	1/8	
	Veterinary Assistants		9	1	
	Office Messenger		L	1/16	1
Medical , Department	·District Educ.Offic.		4a	i	
	Office Assistant		8	1	
	Clerks		9	1	
	Driver		L	1/16	
	Office Messenger		L	1/16	2-1/8
Education Department	·District Educ.Off		4a	▌	
	Office Assistant		8		
	Clerks		9	i	
	Driver		L	1/16	
	Office Messenger		L	1/16	1.1/8
Pol ice	·Assistant Superi-ntendent		4a	1	
	·Chief Inspector		5		
	·Office i/c CID		5		
	·Office i/c S.B.		5		
	Court Prosecutor		5		

·Require low density housing

Add 25% for roads and open space.

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L.Landhi

Min.Total Govt.staff Housing. 21 ac