SITE AND SERVICES HOUSING PROJECTS IN KENYA

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Title: Site and Services Housing Projects in Kenya.

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Submitted to the Department of Urban Studies and Planning on May 9, 1975, in partial fulfillment of the requirements for the degree of Master of City Planning.

This study attempts to understand, analyze and evaluate existing and planned site and services housing projects in Kenya and to suggest tentative policy and planning guidelines for future projects. Site and services is one of the alternative public housing strategies being used to meet the housing needs of the low income population in the rapidly urbanising areas of developing countries. The experiences of site and services housing projects in Africa, Asia and Latin America have been documented in a large body of literature.

The site and services experience in Kenya over the last decade is useful in investigating critical policy and planning issues in these housing projects. An attempt has been made to outline a broader employment/shelter-based strategy for future site and services housing projects. This strategy emphasizes that site and services is an approach to improve the living conditions of the majority of the population, which is poor, by providing access to employment and a piece of land with varying combinations and levels of utilities, services and community facilities.

Thesis Supervisor: John Harris, Associate Professor of Economics and Urban Studies.
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CHAPTER I.

INTRODUCTION

Most developing countries are experiencing rapid population growth. The majority of these populations, both in urban and rural areas, is poor. The needs of this majority are basic. Some of their most urgent needs are jobs, food, shelter and services.

Problems of employment, housing and urban growth have been identified and recognized since the early 1960's both at national and international levels. Various alternative development strategies have been formulated and implemented to meet the needs of the population. However, these problems have continued to grow making the task of urban and regional development planning more difficult and complex.

This study is intended to look at one such development strategy to meet the shelter needs of low income populations and developing countries - namely the site and services concept as applied in the case of Kenya.

What is "Site and Services"?

Various definitions have been used to describe the concept of site and services. Most of these definitions focus on the potential use of a piece of land that has services like water supply, sewerage, roads and storm drainage, and electricity. To a large extent "Site and Services" implies a shelter-based strategy. In other words, the major objective or goal of site and services in the past has been to provide serviced lots to meet the shelter needs of the low income population in rapidly growing urban areas.
However, when looking at the broader nature of the problem of rural to urban migration and the increasing demand for labor in industrial and commercial centers, the priorities of the low income population have been employment rather than housing.

It is appropriate, therefore, to question whether site and services, as a concept, should follow a shelter-based strategy or an employment-based strategy or a combination of the two. For the purposes of this study, site and services has been viewed as an employment/shelter-based strategy. In order to delimit the scope of this study, the following definition of site and services is used:

"Site and Services is strategy to improve the living conditions of the population, which is poor, by providing access to employment and a piece of land with varying combinations and levels of utilities, services and community facilities."

Site and services must be viewed in a broader perspective in order to understand both the nature of the problem and the priorities of low income people. The order of priorities of the majority of the low income families can be listed as follows:

1. Employment opportunities
2. Land tenure
3. Minimum utilities and services
4. Shelter and community facilities

Site and services is only one of the several alternative strategies used to meet the priority needs of the low income people. The range of the other strategies varies with the national context. However, in most developing countries, these include conventional public housing programs,
which provide complete dwellings at higher costs and which are occupied mainly by middle and high income sectors, (but originally intended for the low income sectors); and private housing developments also for the middle and high income sectors. The needs of the majority of low income sector are met by popular illegal developments or squatter areas. These settlements provide not only shelter at prices they can afford but also offer employment opportunities and a sense of community organization.

In the past, several developing countries have followed the policy of slum or squatter clearance. These efforts, in many cases have proved to be expensive to governments: Rather than solving the problems of the low income people they often created more problems. In recent years, some countries have followed housing policies that include the improvement and upgrading of existing squatter areas in their site and services programs. The International Labor Office, in their report on Employment, Incomes and Equality, makes the following policy recommendation to the construction industry in Kenya:

Perhaps the most appropriate approach to meeting the pent-up demand for low-cost housing is through the site and services schemes ..... Not only does a flexible approach of this kind offer an opportunity to low income families to provide their own housing from their own savings through self-help efforts, but it has a very favorable employment effect. ¹

This "employment effect" affects the low income people by encouraging the use of a large number of semi-skilled artisans and contractors, as well as the self-help efforts of the family and the production of various

¹ Employment, Income and Equality, Geneva, 1972, page 199
International Labor Organization
building components by the small-scale industries in the informal sector. However, the employment opportunities do not only extend to the immediate or direct impact of employment generation for the construction of the dwelling units but extend even further to include other on-site and off-site employment opportunities. Often site and services have been planned as merely "domitory projects" on the periphery of major urban centers, far away from places of work. This has resulted in low income families spending a large percentage of their incomes on transportation. In many cases, families have left the area and returned to more suitable locations near the inner ring and employment facilities. In other cases, on-site employment facilities are limited to a few shops. This unsatisfactory employment situation is often due to lack of foresight by planners who, in effect, designed inflexible layouts which do not include the possibility of commercial and small-scale industrial activities on lots along the major roads within the site and services projects. These issues of on-site employment will be discussed in detail in the later parts of this study.

In most developing countries the experience with site and services is only a decade old. (With the exception of Liberia, Puerto Rico, Kenya and Uganda.) In a study for the International Bank for Reconstruction and Development, it was stated that:

Early work on site and services was also developed in Puerto Rico (1938), Uganda (1950) and Kenya (1955) and in the late 1950's and early 1960's United Nation experts made site and services proposals for Liberia and Somalia ²

The International Bank study further reports the results of a global survey of site and services experiences in 30 countries and notes that only 13 countries had included site and services as part of their national development plans and that only 6 countries had proposed constructing 50,000 or more new serviced lots. In spite of the fact that site and services have been included as part of the national development plans in Tanzania, Chile and Kenya, a large number of these countries have not been able to complete the number of serviced lots that had been planned in their development programs. This has mainly been due to the complex nature of the problems related to national and regional housing policies, organization and finance of housing, regional disparities and political factors, and the experimental nature of site and services and squatter upgrading projects. These experiences in various countries provide useful information and knowledge which can be helpful in outlining policy guidelines and planning and building standards for future site and services housing projects.

The major roles that site and services can play in an employment/shelter-based strategy are briefly summarized as follows:

1. Generating employment opportunities, both on-site and off-site for the low income population.

2. Improving the conditions of the community environment by providing serviced lots and related community facilities.

3. Increasing official public control by the government to regulate land speculation and land use.

4. Providing loans and technical assistance to increase collective
self-help construction

5. Encouraging the development of co-operative small-scale industrial and housing organizations for community development

6. Expanding the housing stock not only in a few major urban centers but also in other urban and rural areas to overcome some of the regional disparities

7. Distributing resources and urban services equally among the low income population

8. Developing administrative links between the public agencies and the community by increasing community participation in project formulation and implementation

9. Upgrading existing squatter settlements by providing utilities, services and community facilities.

10. Assisting the overall physical and socio-economic development of the community

Areas of Study:

In order to achieve these policy objectives and to prepare comprehensive planning guidelines for site and services programs, it is important to understand the national, regional and urban development trends. The following list provides a number of subjects that need to be outlined and studied to provide basic data:

1. NATIONAL AND REGIONAL CONTEXT:

   A. Geography
   B. History
   C. Population
D. Economy

E. Government and Administration

F. Transportation and Communications

G. Urban-Rural Linkages

H. Urbanization

I. Housing.

2. URBAN CONTEXT:
   A. Geography
   B. History
   C. Population
   D. Economy
   E. Government and Administration
   F. Housing
   G. Topography, Circulation, Land Use
   H. Income distribution
   I. Urban Growth

One must also understand the various components of each of the site and services programs. The following is a list of the four most important components of these programs and their sub-components.

1. PHYSICAL COMPONENTS - Site location
   A. Land - Land utilization/density
   B. Utilities and Services - Water
      - Sewerage
      - Roads and storm drainage
      - Street lighting and electricity
- Refuse collection
- Gas, telephone
- Public transportation

C. Community facilities
- Police protection
- Fire protection
- Health clinics/dispensaries
- Schools and playgrounds
- Recreation/parks and social centers

D. Employment facilities
- Shops/offices
- Small-scale industries
- Markets

E. Dwellings
- Core units

2. ECONOMIC CONSIDERATIONS

A. Development Costs
- Site preparation/land acquisition
- Utilities and services
- Community facilities
- Employment facilities
- Lot development

B. Administrative Costs
- Planning/design
- Supervision/engineering
- Administration/management
- Technical assistance
- Contingencies (inflation, etc.)
C. Recurrent Costs
- Utilities and services
- Community facilities
- Employment facilities
- Lot development
- Administration and organization

D. Financing Plan
- National government
- Local government
- International agency
- User
- Others

E. Cost Recovery
- From users
- From others

F. User Costs/Repayments
- Household income
- Household expenditures
- Housing expenditure borne by users
- Terms for repayment of:
  - Lot costs
  - Loans
  - Monthly charges, etc.
  - Others

G. Economic Justifications
- Location
- Employment linkages
- Transport linkages
- Opportunity cost of land
- Others
H. Cost-Benefit Analysis
- Economic rate of return
- Opportunity cost of capital
- Income redistribution and employment generation
- Human and social benefits

3. SOCIAL COMPONENTS
A. National and Regional - Ministries
   Political Organizations - City councils
   - Municipalities
B. Community Development - Co-operatives
   Organizations - Task force groups
   - Voluntary groups
   - Extended families
   - Nuclear families
   - Individuals
   - Other local social organizations

4. ADMINISTRATIVE AND LEGAL COMPONENTS
A. Administrative - Project publicity
   - Lot allocation
   - Rents/loans collection
   - Community facilities
   - Training local staff
   - Project implementation
   - Project supervision
   - Monitoring and evaluation
B. Legal
- Rights, liabilities
- Transfer of rights
- Land tenure
- Security, redress of grievances

Significance of the Study:

Even though the site and services concept has been considered as one of the alternative development strategies for housing and urban development in many developing countries over the last two decades, it has only recently been given national recognition by politicians and planners. The experiences of several countries in Africa, Asia and Latin America have been observed, evaluated and documented in a large body of literature. These studies have pointed out several important theoretical and practical aspects of site and services.

However, there are several critical policy and planning issues that need to be looked into. Data from existing and proposed site and services projects provide information that identify the critical factors influencing the various components and sub-components outlined above. This study will survey and evaluate fifteen site and services projects in Kenya, with special attention to the following questions:

- How are site and services related to the overall political and economic development of the country?

3 Note: The above outline has been prepared with reference to a checklist prepared by the I.B.R.D. - Site and Services Checklist, (draft), P. Patel, Washington, D.C., 1974
-12-

. What target population do site and services serve?
. Do they always provide shelter for the planned/anticipated lowest income groups?
. Could the concept be used to provide serviced land for other income groups?
. What can be done to increase the income level of the majority of the population?
. How can they have more access to better jobs and better incomes?
. How can an employment/shelter-based strategy for site and services be useful for the majority of the population?

Some of these questions can be investigated in detail because data is available, while others can only be outlined briefly. The physical components of site and services -- such as land, utilities and services, community facilities and employment facilities -- will be dealt with in detail along with the economic, social, administrative, and legal components of these projects. The general policy aspects will be outlined briefly.

The need for such a co-ordinated, interdisciplinary approach to deal with the future of the lowest income groups in urban areas has been pointed out in several studies (such as Van Huyck, 1971; Grindley and Merrill, 1973). This study will attempt (i) to develop and outline a broad employment/shelter-based strategy to reach the poor people of the urban population; (ii) to outline the Kenyan experience of site and services in the national, regional and urban contexts;
(iii) to use the survey-evaluation of existing site and services projects in Kenya as an important source of information in formulating guidelines for future site and services projects;
(iv) to present in detail some of the physical, economic, social, and administrative and legal components of site and services programs.

Scope of the Study

The study is intended as a reference for those concerned with the program development of site and services in the rapidly urbanizing areas of developing countries and as an empirical attempt to outline an alternative development strategy for future site and services projects in Kenya.

Various international and national agencies have expressed their interest in research on site and services in developing countries. These agencies (including the World Bank; the United Nations' Center for Housing, Building and Planning; United States Agency for International Development) have provided increasing amounts of technical and financial assistance to formulate, prepare, and implement site and services projects in many developing countries. It is hoped that some of the findings of this study will be useful for those concerned about the policy and planning of site and services within these international and national agencies.
Structure of the Study;

This study is structured in seven main chapters. Chapter one contains a discussion of the site and services concept; describes the advantages, disadvantages and major roles of these housing projects; and outlines the approach used in this thesis to study the various policy and planning aspects of these projects in Kenya.

Chapter two presents the national and regional context of Kenya in terms of the geography, history, population, economy, government and administration, transport and communications, urbanization and urban-rural linkages, and housing. This chapter provides background information and points out some of the problems of urban and regional development planning in Kenya.

Chapter three outlines the Kenyan experience of site and services housing projects, by analyzing and evaluating fifteen existing and planned site and services housing projects in five of the eight provinces of Kenya. The evaluations deal with the economic, social, administrative and physical aspects of these projects. Information and data for most of these case studies is from reports and surveys of the Housing Research and Development Unit of the University of Nairobi, the Nairobi City Council and the International Bank for Reconstruction and Development. The selection of these fifteen case studies was primarily based upon what information was available at the time of this study; the provincial location of the projects; the users income groups; the type of site and services housing projects; and the levels of utilities and services.
Chapter four explores an employment/shelter based strategy for future site and services housing projects in Kenya. This chapter briefly describes the various major components and the physical, economic, social, administrative and legal aspects of this strategy. The chapter outlines some of the functions, evaluative criteria ranges of normative standards, costs and planning considerations. The various components and sub-components cover a wide range but are in no way exhaustive. The figures indicated as normal ranges for different standards are based upon the evaluative criteria and upon commonly used standards and codes from different national and international documents. They are intended to serve as a source of reference and again they are in no way exhaustive. The data on costs are mainly confined to the costs of on-site infrastructure presented as a unit cost per lot. This data has been collected from the reports of the International Bank for Reconstruction and Development, the Housing Research and Development Unit and the Nairobi City Council. No attempts have been made to refine these costs through a breakdown of value added into labor, materials, or foreign and local currency inputs.

Chapter five contains the main conclusions of this thesis and guidelines for policy issues related to the role of site and services housing projects in urban and regional development planning in Kenya.

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Chapter six contains the appendix and the glossary. This chapter includes detail data on the fifteen case studies using a comparative format; and notes and definitions not included in the main text of the study. A list of abbreviations and equivalents is also included.

Chapter seven is the bibliography. It provides a complete list of all sources used in the text and additional references arranged in an alphabetical order.
CHAPTER 2.

KENYA: NATIONAL AND REGIONAL CONTEXT

This chapter is intended to provide some basic data and background information on the national and regional context of Kenya. It outlines the development planning trends in Kenya as an overview of the growth pattern of urban and regional areas in the country.

GEOGRAPHY

Kenya is the second largest nation of the three East African countries - Tanzania, Kenya, Uganda. It has an area of 582,644 sq. kilometers, including 14,792 sq. kilometers of water. It is located between the longitudes 34°E and 42°E and latitudes 4°N and 4°S, with the equator passing 1°N of the capital city of Nairobi. It is bounded on the east by the Indian Ocean and the Somali Republic, on the north by Ethiopia and the Republic of Sudan, on the west by Uganda and on the south by Tanzania.

Kenya is a country of tremendous topographical diversity ranging from glaciated mountains to desert landscapes. The physical and climatic factors of the country have had significant effects on the man-made environment including (transportation, postal and telecommunication networks), and the growth of urban and regional centers.

Maps 1 and 2 show the physical features and the major geographical divisions of Kenya. These major geographical divisions are:

1. The Lake Victoria Basin composed of heavily eroded, nonvolcanic plateau surfaces lying between 300-1500 meters above sea-level, with reliable and evenly distributed mean annual rainfall of up to 76 cm.
Map # 1
KENYA : GEOGRAPHY
Physical Features
- 2500+ m
- 1500 - 2500 m
- 300 - 1500 m
- Sealevel to 300 m
- Lakes & Ocean
- Rivers

Map # 2
KENYA : GEOGRAPHY
Major Geographical Divisions
1. Lake Victoria Basin
2. Central Rift & Highlands
3. Eastern Plateau Foreland
4. Coast
5. Semi-arid & Arid
and mean annual temperatures from $10^\circ$ to $30^\circ$C.

2. The Central Rift and Associated Highlands composed of a series of high plateaus and volcanic surfaces lying between 1,500-2,500 meters above sea-level, with mean annual rainfall of 153 cm., and mean annual temperatures from less than $6^\circ$ to $34^\circ$C.

3. The Eastern Plateau Foreland composed of a vast plateau of ancient rock surfaces lying between 300-1500 meters above sea-level, with a low mean annual rainfall of up to 50-76 cm., and mean annual temperatures from $18^\circ$ to $34^\circ$C.

4. The coast composed of a coastal plain of marine shale, sandstone and limestone lying between sea-level, with a mean annual rainfall of up to 76-127 cm., mean annual temperatures from $22^\circ$ to $34^\circ$C.

5. The Semi-Arid and Arid areas composed of a series of sandy, dry low plateau with a low mean annual rainfall of less than 25 cm., and mean annual temperatures from $18^\circ$ to $34^\circ$C and over.

HISTORY

The time perspective of the development process in Kenya can be seen in relation to the British Colonial Period. For the purposes of this study, it is convenient to divide the history of Kenya into three periods. These are:

Pre 1500-1895: The Pre-Colonial Period
1895-1963: The Colonial Period
1963-1975: The Post-Colonial Period

A brief outline of the development of the external boundaries of
Kenya illustrates the sequential spatial and political growth of the country.

Pre 1500-1895: The Pre-Colonial Period

No boundaries existed during the Pre-Colonial Period. Arab, Indian and Portuguese traders established the first permanent trading posts in Mombasa and Malindi on the coast. The Portuguese period (1500-1700) was followed by the Omani period (1700-1850). The Sultanate of Zanzibar (1700-1850) was responsible for encouraging the growth of trading centers in the interior of Kenya for the purposes of the slave and ivory trade. The European explorers, missionaries and traders (1850-1895) wanted to end the slave trade. In 1887, a British company received the concession for the coastal strip from the Sultanate of Zanzibar, and the company was chartered as the imperial British East Africa Company in 1888.

1895-1963: The Colonial Period

External boundaries were defined and established during this period. The British government declared a protectorate over East Africa in 1895, extending from the coast to the Rift valley. 1902 marked the completion of the Kenya-Uganda Railway from Mombasa to Kisumu on Lake Victoria. (This now forms the Mombasa-Nairobi-Kisumu axis for development). In 1920, the East African Protectorate was renamed the Kenya Colony and Protectorate. Between 1886 to 1955 most of the external boundary limits were marked and surveyed.
1963-1975: The Post-Colonial Period

During the Post-Colonial Period, external boundaries as established during the Colonial period remained while the regional boundaries were redefined. In 1963, at the time of independance, the British Colony and Protectorate was abolished and in 1964 Kenya became a Republic.

The evolution of external and regional boundaries reflect the political and social factors that were dominant in determining the spatial configuration of the provinces and in influencing the growth of urban centers in the country. Map 3 shows the historical growth of towns in relation to the colonial regional boundaries of the ten provinces in 1929. A large number of the regions were separated into provinces according to the conflicting interests of the ethnic populations. According to Soja:

The drawing of rigid administrative boundaries where there had been only zones of transition or no fixed boundaries at all created a new and in many ways stronger system of cells than had existed in traditional system. The most immediate effect was the strengthening of broad ethnic identities at the expense of other forms of affiliation............
The roots of what is commonly called "Tribalism" in Kenya today lie more in this uneven and rigidly compartmentalized impact of modernization than in any set of traditional ethnic differences. 5

Even though the internal boundaries were redefined, to a large extent they still inherited some of these ethnic problems. Soja further

comments on the growth of new ethnic subdivisions based upon the
superimposed administrative units:

......Almost unanimously, the Kiambu Kikuyu were the most
economically and politically modernized and troublesome
of the Kikuyu, the Fort Hall group as the most strongly
traditional and resistant to change, beset by a multitude
of petty politicians and those from Nyen as progressive,
well-educated, and selectively traditional. Even greater
district contrasts were formed among the Kamba and Luo.
Admittedly, these distinctions often reflect traditional
tribal subdivisions, upon which the administrative structure
was built, but they have now assumed new characteristics based
upon the nature and extent of modernization. 6

These are significant impacts on the political and regional develop-
ment of the country, since these seem to have effected the three
largest ethnic groups in Kenya, namely the Kikuyus, the Luos and
the Kambas. The present provincial boundaries are shown on Map 4
and define the eight provinces - Nairobi, Coast, Central,Eastern,
North-Eastern, Nyanza, Rift-Vally and Western.

6 Soja, E.: Ibid.
GOVERNMENT AND ADMINISTRATION.

Kenya became an independent nation in 1963 after 40 years of political struggle with the former British colonial government, and was declared a republic within the United Nations in 1964. The present government has an executive parliament.

At the time of independence Kenya inherited some of the basic features of the British system of government, whereby the Parliament, the law courts and political leaders have had strong control. Government administration in Kenya at the present time is highly centralized, with a president who is popularly elected every four years. There is only one political party, which is the ruling Kenya African National Union (KANU).

At the end of 1969, the central government had 20 ministries. Each of these ministries undertakes a wide range of functions and responsibilities. In particular, Ministry of Economic Planning and Development is responsible for the coordination of development planning in the country. The present administrative boundaries (see Map 4) define the seven provinces and Nairobi, which forms a separate entity outside the provincial system. For purposes of simplicity, in this thesis Nairobi will be referred to as the eighth province of Kenya. Each of these provinces have District Advisory Development Committees, District Development Committees, Provincial Advisory Development Committees, Provincial Development Committees and Provincial Planning Offices. The Provincial and District Development Committees play an important role in the preparation and implementation of the national five-year
Map # 3
KENYA: HISTORICAL GROWTH OF TOWNS

- Pre-colonial
- Colonial
--- Provincial Boundaries
(1929 - 1961)
1. Nyanza Province
2. Nzoia Province
3. Rift Valley Province
4. Naivasha Province
5. Kikuyu Province
6. Ukamba Province
7. Masai Province
8. Turkana Province
9. Northern Frontier Province
10. Coast Province

Map # 4
KENYA: GOVERNMENT & ADMINISTRATION

--- Provincial Boundaries
(1963 - 1975)
1. Western Province
2. Nyanza Province
3. Rift Valley Province
4. Central Province
5. Eastern Province
6. North-Eastern Province
7. Coast Province

Source: Based upon map from National Atlas of Kenya, op.cit.
development plans. The Ministry of Lands and Settlement has an Urban
and Regional Planning Department (formerly the Town Planning Department)
which has been responsible for developing physical regional development
plans for the seven provinces. The development planning for Nairobi
is largely done by the Nairobi city council along with the various
ministries.

TRANSPORTATION AND COMMUNICATION.

Transportation and communications have been important elements of the
development process in Kenya. The development of these elements has
been largely influenced by the British colonial administration. Before
the entry of the European explorers and colonizers, the only trade routes
were between a series of coastal trading centers. The completion of the
Kenya-Uganda Railway in 1902 encouraged the growth of European settle-
ments and eventually the establishment of the White Highlands and the
Native Reserves. Major and minor administrative centers developed along
the Mombasa-Nairobi-Kisumu axis. Feeder railway lines and lateral
inter-connections were concentrated in the Highlands. (See map 6).

The growth of the road networks also followed the objective of the
British to provide additional administrative connection but their
primary purpose was to serve the growing areas of European settlement.
Important roads to the North Frontier District were constructed after
World War II, linking the administrative centers.

The development of postal and telecommunications closely parallels the
development of the railway and roads networks.
The growth of transportation and communications networks in Kenya, as in many other developing countries, has played a crucial role in the economic growth of the country by improving internal accessibility. The Kenya government has continued to improve and develop road, railway, air and maritime transportation networks throughout the country. The growth of these networks are crucial to the urban and regional development.

POPULATION.
The population in urban and rural areas in all the provinces can be broadly divided into Africans and Non-Africans. The African population has four major ethnic sources, namely the Bantu, the Nilotic, the Nilo-Hamitic and the Hamitic. The Non-African population are mainly the Asians and Europeans, who constituted 3% of the total population in 1969, and who live mainly in urban areas.

Kenya, like many other developing countries, is experiencing rapid population growth. This rate of growth has been estimated to be 3.3 - 3.5% per annum over the last ten years. The present population of about 11.3 million (1970 estimate) is expected to grow to between 28 million and 34 million by 2000. 

This growing population will need to be provided with employment, housing, food, schools, health services and other public utilities and services. According to the Development Plan 1974-1978, this rapidly increasing population, due mainly to the reduction of death rates through better

7 Republic of Kenya; Development Plan, 1974-78.
health care, better nutrition and better living conditions, will be one of the major factors contributing to the problem of unemployment in Kenya. The Plan states:

Although there is no accurate measure of the number of unemployed people, the grossest measure would derive from a comparison of population growth estimates with recent trends in the creation of job opportunities. Total population is expected to grow by nearly 2.3 million people over the Plan period. If average household size remains 5.6 persons, the provision of one income earner for each household implies the creation of over 400,000 income-earning opportunities during the Plan period, just to provide for the increase in population.  

The Plan further states that the new jobs to be created may range from 400,000 to 800,000 over the Plan period plus the jobs needed for those who are already unemployed. The distribution of the population, like the geographic divisions, shows a great diversity from very low density areas of less than 1 to 600 inhabitants per square kilometer. Map 5 shows the population density throughout the country. The uneven distribution of the population in the various provinces is also indicated in the Table 1, which shows the population by age, sex, area and density in all the eight provinces in 1969. According to these figures, just over 50% of the total population are children under the age of 15 years. This child population is rapidly growing and, according to I.L.O. Report, the dependency ratio (the number of children and old people who must be supported per 100 people of working age of 15-59 years) would rise to 114 by the year 2000, as compared with 106 in 1970 (See Table 2 on the

9 I.L.O.: op. cit. Page 124
Map # 5
KENYA: POPULATION DENSITY

- 300 - 600 persons/sq.Km.
- 100 - 300
- 1 - 100
- Less than 1


Map # 6
KENYA: TRANSPORT & COMMUNICATIONS

- Main Highways
- Railways

Source: Based upon map from National Atlas of Kenya, op.cit.
Table 1

Population by Age, Sex, Area & Density, 1969.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>TOTAL</th>
<th>MALE</th>
<th></th>
<th></th>
<th>FEMALE</th>
<th></th>
<th>AREA</th>
<th>DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>CHILDREN</td>
<td>ADULTS</td>
<td>TOTAL</td>
<td>CHILDREN</td>
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</table>

Table 2

<table>
<thead>
<tr>
<th>AGE GROUPS</th>
<th>1970</th>
<th></th>
<th>2000</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Total Population</td>
<td>11,247</td>
<td>100.0</td>
<td>34,286</td>
<td>100.0</td>
</tr>
<tr>
<td>Pre-School Age (0.5)</td>
<td>2,556</td>
<td>22.7</td>
<td>8,192</td>
<td>23.9</td>
</tr>
<tr>
<td>Primary School Age (6.12)</td>
<td>2,235</td>
<td>19.9</td>
<td>7,067</td>
<td>20.6</td>
</tr>
<tr>
<td>Secondary School Age (13.11)</td>
<td>1,140</td>
<td>9.2</td>
<td>3,210</td>
<td>9.4</td>
</tr>
<tr>
<td>Productive Age (15.59)</td>
<td>5,445</td>
<td>48.4</td>
<td>16,011</td>
<td>46.7</td>
</tr>
<tr>
<td>Persons 60 +</td>
<td>473</td>
<td>4.2</td>
<td>1,313</td>
<td>3.8</td>
</tr>
<tr>
<td>Potential Labor Force</td>
<td>3,818</td>
<td>33.9</td>
<td>11,215</td>
<td>32.7</td>
</tr>
<tr>
<td>Children 0-14</td>
<td>5,239</td>
<td>46.6</td>
<td>16,962</td>
<td>49.5</td>
</tr>
<tr>
<td>Dependency Ratio</td>
<td>106.6</td>
<td></td>
<td>114.1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Republic of Kenya, Development Plan 1974-78, Nairobi, 1974
population projections in Kenya). This would be twice the ratio of 55-65 which is found in most developed countries. The high dependency ratio in Kenya, and in other developing countries, creates several other problems related to employment generation and income distribution. The Kenya government's strategy, according to the 1974-1978 Development Plan, is summed up in the following statement:

The problems of employment, poverty and income distribution are deeply embedded in the economic and social structure and solutions to them are obtainable only through long-term structural change involving all sectors of the economy and all ministries of the government. There are five [sic] basic elements in the government's strategy. They are: (a) continued rapid growth, (b) Family Planning, (c) income redistribution, (d) Agricultural and Rural modernization, (e) Education Reform, (f) The Promotion of Small-scale Enterprises.10

These elements of the strategy are closely inter-related and are critical to the implementation of the government's employment policy. It is anticipated that the population will continue to migrate into urban areas at the rate of 7% per year and that by 1978, 15% of the total population (2.2 million) will be living in 59 towns, of which 52 already exist. The majority of this population is poor and will require jobs in urban areas and will have other basic needs such as food, shelter and public utilities and services. These needs should be the concern of the politicians and decision makers, who are responsible for developing effective urban and rural development strategies.

ECONOMY.

To a large extent, Kenya's economic growth after independence has continued on the lines set by the earlier colonial government. At the time of independence, Kenya inherited an economy deeply embedded with inequalities in income. In general, Europeans were in the high income groups, the Asians in the middle and high income groups and the Africans in the lower income groups. However, in spite of the effects of Kenyanization, there still remains a wide gap between present levels of the majority of the poor African population and minority of the elite African and Non-African population.

Kenya has a mixed economy in which both public and private participation is allowed, and in which foreign investments, both public and private, are encouraged. The government has been trying to promote African Socialism and place the economy increasingly in the hands of the citizens. The government also strongly believes in local community initiative through participation and "Harambee" projects.

Inequities in the distribution of income among different types of income-earners, among wage earners, between rural and urban areas, among persons of different ethnic origins, and among persons with different levels of education, have aggravated the problems of poverty. According to data collected by the I.L.O., 96% of the households in 1968-1970 had an annual income of less than $1,700 per annum. A majority of these households are composed of workers, small holders, pastoratilists, unemployed and landless

"Harambee" as a Swahili word meaning "Let us all pull together", picked by President Kenyatta as the national motto.
people in both rural and urban areas (See Table 3) earning about $170 or less per annum. Further there are inequities between rural and urban incomes. An average wage earner in the urban areas earn about $800 per annum, where as an average wage earner in the rural areas earn about $70 per annum in 1972. These figures show that the urban worker earns about 12 times the rural worker income. These inequities and imbalances have had a significant impact on the migration from rural to urban areas. This, in turn, has resulted in other social and economic problems in the urban areas.

In response to these inequities and imbalances in the income distribution, the government of Kenya has the following plans for 1974-78:

During the present plan period, real output (GDP) is projected to rise at a rate of 7.4 percent per year. If population growth can be contained at 3.3 percent per year, per capita output will rise by 4.1 percent per year. Gross domestic product is expected to reach over K pound 1,000 million (U.S. dollars$2,800 million) by 1978 or K pound 68 (U.S. dollars $190) per capita, productive sectors growing as follows:

Agriculture in the monetary sector is estimated to increase at 6.7% per year, compared to 6.5 % per year in 1964-72.
Forestry at 9.0%, Fishing at 5.0%, Mining and Quarrying at 16.9% per year compared with 6.3%, 3.6%, 6.7%, respectively.
Manufacturing and repairing at 10.2% per year, compared with 8.1%.
Construction at 7.2% per year, compared with 9.5%.
Government services at 10.1% per year compared with 9.9%.
The non-monetary sector at 3.8% per year, or the same as before.12

The above figures show a decrease in the growth of construction of about 2.3% per year as compared to the growth rate in 1964-72. This is principally because of the government's policy to reduce the growth of expenditures for

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12 Development Plan, op. cit., Page 17.
### Table 3

Household income distribution by economic group and income size, 1968-70.

<table>
<thead>
<tr>
<th>Economic Group</th>
<th>Annual Income (\mathbf{$(U.S.)})</th>
<th>Number of households (^1) (thousands)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owners of medium-sized to large non-agricultural enterprises in the formal sector of commerce, industry and services; rentiers; big farmers; self-employed professional people; holders of high-level jobs in the formal sector</td>
<td>1,000 and over. ($2801 and over)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Intermediate-level employees in the formal sector; owners of medium sized non-agricultural enterprises in the formal sector; less prosperous big farmers.</td>
<td>600-1000 ($1681-$280)</td>
<td>50</td>
<td>3.4%</td>
</tr>
<tr>
<td>Semi-skilled employees in the formal sector; prosperous small holders; better-off owners of non-agricultural rural enterprises; a small proportion of owners of enterprises in the formal sector.</td>
<td>200-600 ($561-$1680)</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Unskilled employees in the formal non-agricultural sector; significant proportion of small-holders; most of the owners of non-agricultural rural enterprises.</td>
<td>120-200 ($337-$560)</td>
<td>240</td>
<td>96.9%</td>
</tr>
<tr>
<td>Employees in formal-sector agriculture; a small proportion of unskilled employees in the formal sector; better-off wage earners and self-employed persons in the informal urban sector; a small proportion of owners of non-agricultural rural enterprises.</td>
<td>60-120 ($169-$336)</td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>Workers employed on small holdings and in rural non-agricultural enterprises; a significant proportion of employed and self-employed persons in the informal urban sector; sizeable number of smallholders.</td>
<td>20-60 ($57-$168)</td>
<td>1140</td>
<td></td>
</tr>
<tr>
<td>Small holders; pastoralists in semi-arid and arid zones; unemployed and landless persons in both rural and urban areas.</td>
<td>20 less ($56 &amp; less)</td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2340</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\(^1\) Very approximate

Source: Based upon I.L.O. Report, Table 25, p. 74.
road construction. However, it is anticipated that employment opportunities in the building and construction sector of the economy will continue to rise from 35,000 in 1972 to 45,000 in 1978 in the formal sector; with the additional employment generated by small rural contractors. The I.L.O. report further recommends that the National Housing Corporation shift the emphasis from capital-intensive public package housing to labor-intensive public site and services projects.

The implications of such a shift of policy in terms of employment and income distribution can not be easily quantified, yet it is clear beyond doubt that the low-cost housing program will have a powerful redistributive effect throughout the rural and urban areas of the economy. It is desirable to encourage low-cost housing also for the small farmer settlement schemes. No doubt site and services and low-cost housing raise serious problems of their own, but the price is sufficient to justify a major effort. 13

Some of these problems which do arise from site and services projects are political rather than economic. It is the problem of prestige in what is considered to be a politically acceptable standard dwellings even though the development costs show that the cost of a package type house is about 20 times the cost of a serviced lot. Single detached package houses have become a symbol of supremacy supported by local political leaders while practical solutions to housing demand, such as site and services projects, are not fully supported by local political leaders.

URBANIZATION AND URBAN – RURAL LINKAGES

Most urban centers, apart from the earlier coastal settlements, are a result of the British administration in Kenya. The Kenya-Uganda

13 I.L.O., op.cit., Page 199
Railway encouraged the growth of European settlements mainly in the former White Highlands, which have been the most productive agricultural area of the country. This uneven growth also resulted in unbalanced economic, social and political development based upon the segregation policies of the colonial administration. The colonial government considered the Africans as temporary inhabitants of the towns in which they worked as unskilled laborers. As a result, the urban centers had been considered in the past as a base for administrative and commercial activities, rather than as centers of "modernizing" influence for the temporary African population.

According to the 1948 census, the total urban population was about 5% and the total rural population was about 95%. There were 17 urban centers with over 2,000 inhabitants. Nairobi, the capital city, had 2.2% of the total population and 43% of the total urban population. Map 7 shows the location and relative size of the urban centers in 1948.

According to the 1962 census, the total urban population had increased to 7.8%. The number of urban centers had doubled from 17 to 34, in particular Nairobi's population had increased to 3% of the total population, then 39% of the total urban population.

According to the 1969 census, the total urban population had further increased to 9.9%. The number of urban centers increased from 34 to 48. (see Map 8) The major urban centers of Nairobi, Mombasa, Kisumu and Nakuru continued to grow. Table 4 shows the population growth of some of the main urban centers in the various provinces over the period 1948-69.
**Map # 7**  
**KENYA : GROWTH OF URBAN CENTERS**  
**1948**  
- Urban Center  
Urban Population: 276,240 5.1%  
Rural Population: 5,129,786 94.9%  
Total Population: 5,405,926 100%  
Nairobi: 118,976 2.2%  
# of Urban Centers with over 2000 inhabitants 17

0 150 Km.  
1:10,000,000.

**Map # 8**  
**KENYA : GROWTH OF URBAN CENTERS**  
**1969**  
- Urban Center  
Urban Population: 1,082,437 9.9%  
Rural Population: 9,860,268 90.1%  
Total Population: 10,942,705 100%  
Nairobi: 509,286 4.9%  
# of Urban Centers with over 2000 inhabitants 48

Table 4

Population growth of main urban centers/1948-1969; by province.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>Main Urban Center</th>
<th>POPULATION</th>
<th>% INCREASE/DECREASE (+ -)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAIROBI</td>
<td>NAIROBI</td>
<td>118,976</td>
<td>266,794</td>
</tr>
<tr>
<td>COAST</td>
<td>MOMBASA</td>
<td>84,746</td>
<td>179,575</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>NAKURU</td>
<td>17,625</td>
<td>38,381</td>
</tr>
<tr>
<td>NYANZA</td>
<td>KISUMU</td>
<td>10,899</td>
<td>23,526</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>THIKA</td>
<td>4,435</td>
<td>13,952</td>
</tr>
<tr>
<td>EASTERN</td>
<td>ISIOLO</td>
<td>-</td>
<td>5,445</td>
</tr>
<tr>
<td>WESTERN</td>
<td>KAKAMEGA</td>
<td>4,978</td>
<td>3,939</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL (URBAN CENTERS)</td>
<td>N/A</td>
<td>245,545</td>
<td>670,934</td>
</tr>
<tr>
<td>TOTAL (KENYA)</td>
<td>N/A</td>
<td>5,405,966</td>
<td>8,636,263</td>
</tr>
</tbody>
</table>
continued to grow in most cases at a high rate of growth. Table 5
shows range of sizes of urban centers in the various provinces in 1969.
With the exception of Nairobi and Mombasa in the Coast Province, all
other urban centers have a population less than 50,000 inhabitants.
Table 6 shows the percentages of rural and urban populations in the
various provinces in 1969. Nairobi and the Coast Province had over
70% of the total urban population. This reflects the dominant role of
these two major cities, in the rapid urbanization of the regions. The
small population in semi-arid and arid regions of North-Eastern Province reflects
the uneven distribution in both urban and rural areas in the country.

According to the present trends, population projections for 1980 indicate
that the total urban population will increase to 15.1% and the total
rural population will decrease to 84.9%. Nairobi and Mombasa will remain
the major cities in Kenya unless alternative strategies are developed and
implemented. The urban population is projected to grow to about 2.2
million in 1980 at the rate of 7.1% per year and the rural population is
projected to grow to about 2.2 million in 1980 at the rate of 7.1% per
year and the rural population is projected to grow about 13.6 million
at the rate of 3.0% per year.

One of the major causes of this rapidly growing urban population is the
regional disparities in terms of unbalanced growth and the uneven
distribution of social services, water supply, sewerage and road net-
works; and the availability of land for agriculture. Tables 7-10 are
included to show some of these regional disparities. Table 7 shows the
differences in the availability of primary and secondary education.
Table 5.

Population by size of urban center in each province. (1969)

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>SIZE OF URBAN CENTERS</th>
<th>Total Urban Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7,000-4,999</td>
<td>5,000-9,999</td>
</tr>
<tr>
<td>NAIROBI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>9,962</td>
<td>7,602</td>
</tr>
<tr>
<td>COAST</td>
<td>13,106</td>
<td>12,716</td>
</tr>
<tr>
<td>EASTERN</td>
<td>11,474</td>
<td>26,491</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NYANZA</td>
<td>5,318</td>
<td>6,080</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>37,625</td>
<td>12,263</td>
</tr>
<tr>
<td>WESTERN</td>
<td>4,401</td>
<td>6,244</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>81,886</td>
<td>71,396</td>
</tr>
</tbody>
</table>

Table 6.
Population of urban centers and rural areas (1969).

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>TOTAL</th>
<th>URBAN</th>
<th>RURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
<td>% OF TOTAL</td>
<td>TOTAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(KENYA/URBAN)</td>
<td></td>
</tr>
<tr>
<td>NAIROBI</td>
<td>509,286</td>
<td>509,286</td>
<td>0</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>1,675,647</td>
<td>45,955</td>
<td>1,629,692</td>
</tr>
<tr>
<td>COAST</td>
<td>944,082</td>
<td>283,652</td>
<td>660,430</td>
</tr>
<tr>
<td>EASTERN</td>
<td>37,965</td>
<td>37,965</td>
<td>1,869,336</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>1,907,301</td>
<td>-</td>
<td>245,757</td>
</tr>
<tr>
<td>NYANZA</td>
<td>245,757</td>
<td>43,829</td>
<td>2,078,216</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>2,122,045</td>
<td>148,576</td>
<td>2,061,713</td>
</tr>
<tr>
<td>WESTERN</td>
<td>1,328,298</td>
<td>10,645</td>
<td>1,317,653</td>
</tr>
<tr>
<td>TOTAL (KENYA)</td>
<td>10,942,705</td>
<td>1,079,908</td>
<td>9,862,797</td>
</tr>
</tbody>
</table>

Source: Based upon Kenya Population Census, 1969.
the provision of health services and expenditures on public housing in the various provinces in 1970. Nairobi, with 44% of Kenya's population, had about one-fourth of the total school enrollment in the country, the lowest ratios of number of people per medical practitioners and per hospital bed. Furthermore, two-thirds of the National Housing Corporation expenditures were made in Nairobi. These figures show large differences in the distribution of Kenya's resources to Nairobi compared to not only the semi-arid or arid regions, like the North-Eastern Province but also to other regions like the Western, Nyanza and Eastern Provinces.

Table 8 shows the amount of population served by a water supply in 1972. According to the Development Plan '74-'78, a total of 932,500 people in the rural population and 1,337,500 people in the urban population are presently served by a water supply of one kind or another. A majority of the rural population is in the low and medium potential areas -- i.e. areas within 4 kilometers of an improved water source.

The urban population shows the highest-average per capita consumption of water. In Nairobi, Mombasa and other major municipalities it is about 126 liters/day; In smaller urban centers it is about 108 liters/day, and in rural and market centers is 67 and 36 liters/day respectively.

Table 9 shows the amount of population served by public sewerage system in 1972 in the urban areas of various provinces. A total of 501,400 of the 1,337,500 urban dwellers served by water supply were also served by a public sewerage system. However, the figures also show disparities in terms of the various provinces. Rift Valley Province and Coast
Table 7
Distribution of social services by province, 1970.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>% of Total Population 1969</th>
<th>% of School Enrollment '70</th>
<th>% of N.H.C. Housing Expenditure 1970</th>
<th>Number of People</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Primary</td>
<td>Secondary</td>
<td>Per Hospital Bed</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>20.4</td>
<td>14.7</td>
<td>12.1</td>
<td>6.0</td>
</tr>
<tr>
<td>NYANZA</td>
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<td>13.1</td>
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<td>13.6</td>
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</table>

Source: I.L.O. Report, Table 48, p. 301.
Table 8

Population served by a water supply, 1972

<table>
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<tr>
<th>PROVINCE</th>
<th>URBAN POPULATION</th>
<th></th>
<th>RURAL POPULATION</th>
<th></th>
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</thead>
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<tr>
<td></td>
<td>Major</td>
<td>Urban</td>
<td>Rural</td>
<td>High</td>
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<tr>
<td></td>
<td>Center</td>
<td>Center</td>
<td>Center</td>
<td>Potential</td>
</tr>
<tr>
<td>CENTRAL + NAIROBI</td>
<td>600,000</td>
<td>105,400</td>
<td>41,000</td>
<td>193,500</td>
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<tr>
<td>NYANZA</td>
<td>-</td>
<td>45,700</td>
<td>7,500</td>
<td>15,000</td>
</tr>
<tr>
<td>EASTERN</td>
<td>-</td>
<td>19,000</td>
<td>24,000</td>
<td>38,500</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>-</td>
<td>-</td>
<td>10,000</td>
<td>-</td>
</tr>
<tr>
<td>RIFT-VALLEY</td>
<td>-</td>
<td>122,400</td>
<td>32,000</td>
<td>137,000</td>
</tr>
<tr>
<td>COAST + MOMBASA</td>
<td>286,000</td>
<td>-</td>
<td>30,000</td>
<td>27,500</td>
</tr>
<tr>
<td>WESTERN</td>
<td>-</td>
<td>12,500</td>
<td>2,000</td>
<td>73,500</td>
</tr>
<tr>
<td>TOTAL</td>
<td>886,000</td>
<td>305,000</td>
<td>146,500</td>
<td>485,000</td>
</tr>
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</table>

Source: Development Plan 1974-78, p. 327.
Table 9

Population served by public sewerage system, 1972.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>MUNICIPALITY</th>
<th>OTHER URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL + NAIROBI</td>
<td>321,500</td>
<td>8,400</td>
</tr>
<tr>
<td>NYANZA</td>
<td>14,500</td>
<td>2,000</td>
</tr>
<tr>
<td>EASTERN</td>
<td>600</td>
<td>3,000</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>68,500</td>
<td>20,000</td>
</tr>
<tr>
<td>COAST + MOMBASA</td>
<td>60,000</td>
<td>-</td>
</tr>
<tr>
<td>WESTERN</td>
<td>-</td>
<td>2,400</td>
</tr>
<tr>
<td>TOTAL</td>
<td>465,300</td>
<td>36,300</td>
</tr>
</tbody>
</table>

Source: Development Plan 1974-78, p. 338.
Province, which both have a high percentage of the total urban population, proportionately have much less population served by a public sewerage system than in Central Province and Nairobi.

Table 10 further illustrates in detail some of the regional disparities in 1969-70. It is interesting to note the wide range of road per 1,000 Km$^2$ from 10.6 Km. in the North-Eastern Province to 267.7 Km. in the Central Province. A high proportion of national output and income in terms of high-potential agricultural land, is generated by a few districts in the Central, Coast, Rift Valley, Nyanza and Western Provinces, while the Eastern and North-Eastern Provinces have a disproportionately small share in total economic activity.

These regional disparities along with other inequities and imbalances in income discussed earlier have had impacts on the problems of employment and economic development throughout the country.

In response to the problems of rapid urbanization, the government of Kenya$^{14}$ plans to increase development of the rural areas in order to slow down the rate of migration from the rural to urban areas. The government also hopes to develop urban infrastructure networks for urban centers other than the major cities of Nairobi and Mombasa. However, for these strategies to be implemented, the creation of job opportunities remains a crucial factor in urban and rural development. The modern sector

$^{14}$ Development Plan, op cit.
Table 10
Selected indicators of regional disparities in income and essential services, 1969-70.

<table>
<thead>
<tr>
<th>PROVINCE AND DISTRICT</th>
<th>Population (thousands)</th>
<th>Population per km²</th>
<th>Km. of road per 1,000km</th>
<th>Ranking in terms of educational expenditure</th>
<th>Percentage of population in primary school</th>
<th>Area under cash crops as % of cultivated area</th>
<th>Percentage of high-potential agricultural land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kilifi</td>
<td>302</td>
<td>24</td>
<td>56.7</td>
<td>19</td>
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<td>66</td>
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<tr>
<td>Kwale</td>
<td>206</td>
<td>25</td>
<td>60.7</td>
<td>21</td>
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</tr>
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<td>22</td>
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<td>32</td>
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<td>Mombasa</td>
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<td>-</td>
<td>200.5</td>
<td>N/A</td>
<td>10.6</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>111</td>
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<td>16.7</td>
<td>66</td>
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<td>51</td>
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<td>14.1</td>
<td>25</td>
<td>7.7</td>
<td>-</td>
<td>1.9</td>
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<tr>
<td>North-Eastern</td>
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<td>-</td>
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<td>17.9</td>
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<td>-</td>
<td>-</td>
</tr>
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<td>-</td>
<td>-</td>
</tr>
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(continued)
Table 10 (continued)

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<thead>
<tr>
<th>PROVINCE AND DISTRICT</th>
<th>Population (thousands)</th>
<th>Population per km²</th>
<th>Km. of road per 1,000 km²</th>
<th>Ranking in terms of educational expenditure</th>
<th>Percentage of population in primary school</th>
<th>Area under cash crops as % of cultivated area</th>
<th>Percentage of high-potential agricultural land</th>
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<tbody>
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<td>-</td>
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<td>-</td>
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<td>-</td>
<td>84.2</td>
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<td>-</td>
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<td>-</td>
<td>86.5</td>
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<td>-</td>
<td>28.2</td>
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<td>12.6</td>
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<td>21</td>
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<td>7.2</td>
<td>20</td>
<td>99.1</td>
</tr>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
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<td>16.8</td>
<td>13</td>
<td>82.1</td>
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<td>196.9</td>
<td>16</td>
<td>13.9</td>
<td>20</td>
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<td>176.1</td>
<td>2</td>
<td>12.4</td>
<td>13</td>
<td>92.3</td>
</tr>
</tbody>
</table>

- = magnitude negligible.

Source: I.L.O. Report, Table 28, pp. 78, 79.
employment, according to the registrations under the 1970 Tripartite Agreement\(^\text{15}\) (shown in Table 11 and Table 12), appears to be most important in Nairobi and Coast Province, where the registration as a percentage of population of working age is 17.4 and 8.0 respectively. Considering that Nairobi and Mombasa are the major urban centers, these statistics also indicate that job opportunities are likely to be greater in the larger towns. However, a large proportion of the working age population in most urban and rural market centers is employed in the 'informal sector' of the economy, and was roughly estimated to account for 25 to 30% of the total urban population. The potential role of this sector in terms of income distribution should be critically viewed in terms of employment in urban and rural market centers.

HOUSING.

For the purpose of this study, the word 'housing' has been used to describe the process or activity of housing. In the housing process both the public and private sectors, including the popular sector, play a major role.

The total population of Kenya has been projected to grow to 16 million by 1980, of which 15% will be urban and 85% will be rural. Assuming that the average family size will be 5.6 people per family (based upon the Development Plan), then the housing stock must have 428,571 dwellings for the 2.4 million urban population and 2,428,571 dwellings for the

\(^{15}\) The Tripartite Agreement of 1970 was an agreement among the Kenya Government, the employers' federation, and the trade unions to alleviate problems of employment.
Table 11

Registrations under the 1970 Tripartite Agreement, number of persons employed in the modern sector and population of working age, December 1970

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>Registrations¹</th>
<th>Numbers employed in the modern sector 1969²</th>
<th>Population of working age (15-60), 1969³</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAIROBI</td>
<td>52,000</td>
<td>163,615</td>
<td>299,674</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>40,442</td>
<td>93,800</td>
<td>702,198</td>
</tr>
<tr>
<td>NYANZA</td>
<td>39,516</td>
<td>45,722</td>
<td>962,480</td>
</tr>
<tr>
<td>WESTERN</td>
<td>26,775</td>
<td>18,761</td>
<td>561,647</td>
</tr>
<tr>
<td>COAST</td>
<td>40,504</td>
<td>84,526</td>
<td>508,131</td>
</tr>
<tr>
<td>RIFT</td>
<td>59,641</td>
<td>178,949</td>
<td>1,048,941</td>
</tr>
<tr>
<td>EASTERN</td>
<td>27,914</td>
<td>39,219</td>
<td>855,198</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>4,119</td>
<td>2,622</td>
<td>123,498</td>
</tr>
<tr>
<td>TOTAL</td>
<td>290,911</td>
<td>627,214</td>
<td>5,061,767</td>
</tr>
</tbody>
</table>


Source: I.L.O., op. cit., Table 109, p. 531.
Table 12

Proportions of registrations under the 1970 Tripartite Agreement, number of persons employed in the modern sector and population of working age, December 1970.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>Registrations as a percentage of 1969 numbers employed in the modern sector</th>
<th>Registrations as a percentage of population of working age</th>
<th>Employment as a percentage of population of working age</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAIROBI</td>
<td>31.8</td>
<td>17.4</td>
<td>54.6</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>43.1</td>
<td>5.8</td>
<td>13.4</td>
</tr>
<tr>
<td>NYANZA</td>
<td>86.4</td>
<td>4.1</td>
<td>4.8</td>
</tr>
<tr>
<td>WESTERN</td>
<td>142.7</td>
<td>4.8</td>
<td>3.3</td>
</tr>
<tr>
<td>COAST</td>
<td>47.9</td>
<td>8.0</td>
<td>16.6</td>
</tr>
<tr>
<td>RIFT</td>
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<td>17.1</td>
</tr>
<tr>
<td>EASTERN</td>
<td>71.2</td>
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<td>4.6</td>
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</tr>
<tr>
<td>ALL PROVINCES</td>
<td>46.4</td>
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<td>12.4</td>
</tr>
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</table>

Source: I.L.O., op. cit., Table 110, p. 531.
13.6 million rural population. Table 13, based on several sources, shows that by 1972, the total number and cost of housing supplied by the public sector was 45,389 dwellings with total cost of U.S. $63.8 million. This figure shows that out of the total number of 2,142,857 families both in urban and rural areas, only 2% of the total were living in dwellings provided by the public sector, and the rest were living in dwellings provided by the private and popular sectors. These are approximate figures, since no precise data are available to show the participation of the various sectors in the housing process. These figures also reflect the government’s policy to encourage the private sector to play an increasing role in the housing process. However, a large percentage of the private sector and popular sector dwellings are over-crowded and sub-standard in terms of availability of basic utilities and services.

The housing demand, as estimated in the Development Plan '70-'74, was 10,000 dwellings per year for urban areas and 50,000 dwellings per year for rural areas. However, according to the Development Plan '74-'78, there is a current housing deficit of 50,000 dwellings in urban areas, and the estimated total housing demand by 1978 will be 160,000 dwellings, which includes 110,000 dwellings required to house the increase in urban population and 50,000 dwellings required to meet the deficit. The plan further estimates that the 110,000 dwellings required over the next five years due to the population increase would include 44,000 units.

16: Development Plan, op cit., Page 506, 507
Table 13

Number and total cost of public housing by 1972.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>TOTAL NUMBER (UNITS)</th>
<th>TOTAL COST ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAIROBI</td>
<td>15,321</td>
<td>14,425,398</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>1,501</td>
<td>996,642</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>8,153</td>
<td>4,171,513</td>
</tr>
<tr>
<td>NYANZA</td>
<td>524</td>
<td>788,690</td>
</tr>
<tr>
<td>EASTERN</td>
<td>595</td>
<td>556,895</td>
</tr>
<tr>
<td>WESTERN</td>
<td>306</td>
<td>288,134</td>
</tr>
<tr>
<td>NORTH-EASTERN</td>
<td>11</td>
<td>25,066</td>
</tr>
<tr>
<td>COAST</td>
<td>2,335</td>
<td>2,982,053</td>
</tr>
<tr>
<td><strong>TOTAL (1959 - 1963)</strong> - in all provinces</td>
<td><strong>28,746</strong></td>
<td><strong>24,237,739</strong></td>
</tr>
<tr>
<td><strong>TOTAL (1964 - 1968)</strong> - in all provinces</td>
<td><strong>4,575</strong></td>
<td><strong>6,742,680</strong></td>
</tr>
<tr>
<td><strong>TOTAL (1969 - 1972)</strong> - in all provinces</td>
<td><strong>12,068</strong></td>
<td><strong>32,853,399</strong></td>
</tr>
<tr>
<td><strong>TOTAL (1959 - 1972)</strong> -</td>
<td><strong>45,389</strong></td>
<td><strong>63,833,818</strong></td>
</tr>
</tbody>
</table>

Sources: Based upon U.N. Report on Housing in Kenya (1964) & Development Plans '70-'74, '74-'78.
(40%) costing U.S. $840; 17,000 (16%) costing U.S. $2,100; 19,000
(17%) costing U.S. $3,360; 20,000 (18%) costing U.S. $6,300 and
10,000 (9%) at U.S. $12,600; and the majority of the 50,000 units due
to the deficit would cost U.S. $3,360 or less. Another significant
feature of the housing demand in urban areas is that in 1970, almost
70% of the families learning about U.S.$670 per annum or less cannot
afford a dwelling costing over U.S. $1,680 or renting for more than
U.S. $15 per month.

The major problem in housing the urban poor in Kenya will not be solved
by increasing total housing expenditures but rather by re-distributing
housing expenditures towards the low-cost dwellings for the majority
of the population.

According to the I.L.O. Report, an example of this necessary shift in
policy can be seen in the following illustration:

For example, the same amount of resources (7 million pounds
U.S. $19.6 million) was actually spent in the modern sector
in 1970, could finance the construction of 1,000 units worth
7,000 pounds (U.S. $19,600) each, 7,000 units worth 1,000
pounds (U.S. $2,800) each, or 20,000 units worth 350 pounds
(U.S. $980) each. The first price is the selling price of
houses under the mortgage schemes sponsored by the National
Housing Corporation. The second the average cost of medium-
cost housing sponsored by the public sector, and the third
the estimated cost of site and services schemes. These figures clearly point out the benefits of the site and services
approach to provide serviced lots for a large number of families at

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17 Development Plan Ibid, Page 474.
18 I.L.O. - Op cit., page 199
lower development costs as compared to conventional public sector housing. Moreover, these costs are within the range of the low income families who can afford a dwelling costing under U.S. $1,680. Since the development costs for site and services are relatively low (almost 20 times less than a complete package house) it may be argued that this approach should be used for other income groups. In reality, in fact it seems that higher income families who hire the services of a small or large contractor to build on a serviced piece of land (often much larger in area than an average lot in a site and services project) follow a similar process in terms of the land development. The main difference is that the mode of development in middle and high income private sector housing is instant since they have access to higher amounts of loan at the rates of interest they can afford.

The site and services experience in Kenya goes back to 1923 when the first site and services project in Pumwani, Nairobi, was declared as an official African location to accommodate the migrant population in Nairobi. However, this project led to serious problems of over-crowding, and it was not until 1954 that Kariobangi was suggested as a site and services project to solve the problem of illegal squatting by a working party. It was ten years later, in 1964, after independence, that this project was implemented. Since then it has been the government's policy to promote, finance and construct more site and services projects.

19 Etherton, D., Mathare Valley - A case study of uncontrolled settlement in Nairobi, Housing Research & Development Unit, University of Nairobi, 1970, Page 85.
throughout the country. The next section of this study deals in more
detail about the fifteen existing site and services projects, including
one in its final project preparation stage. Map 9 shows the location
of these projects in the various provinces. There has been much interest
expressed in the site and services approach since 1969. Table 14 shows
the projects completed by the National Housing Corporation between 1969
and 1972. This table also shows some of the regional disparities
discussed earlier in this study, e.g. The majority of the site and
services lots completed during 1969-72 were in Nairobi and the Central
Province. Table 15 further illustrates the housing expenditures during
1970-73 and shows that most of these expenditures were made in Nairobi
in terms of the value of houses completed by the National Housing
Corporation. These efforts of the public sector need to be revitalized
and strengthened by alternative short-term and long-term strategies to
increase not only the housing stock but also to create more employment
and assist in income redistribution.
Table 14


<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>COMPLETE HOUSING UNITS</th>
<th>SITE &amp; SERVICE PLOTS COMPLETED</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL</td>
<td>119</td>
<td>220</td>
</tr>
<tr>
<td>COAST</td>
<td>50</td>
<td>174</td>
</tr>
<tr>
<td>EASTERN</td>
<td>121</td>
<td>50</td>
</tr>
<tr>
<td>NAIROBI</td>
<td>1,218</td>
<td>1,341</td>
</tr>
<tr>
<td>NORTH EASTERN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NYANZA</td>
<td>173</td>
<td>4</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>199</td>
<td>192</td>
</tr>
<tr>
<td>WESTERN</td>
<td>-</td>
<td>85</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,880</td>
<td>1,290</td>
</tr>
</tbody>
</table>

Source: Republic of Kenya,
Table 15


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL</td>
<td>943,600</td>
<td>-</td>
<td>16,800</td>
<td>103,600</td>
</tr>
<tr>
<td>COAST</td>
<td>501,200</td>
<td>554,400</td>
<td>3,133,320</td>
<td>1,360,800</td>
</tr>
<tr>
<td>EASTERN</td>
<td>168,000</td>
<td>-</td>
<td>44,800</td>
<td>123,200</td>
</tr>
<tr>
<td>NAIROBI</td>
<td>4,527,600</td>
<td>4,272,800</td>
<td>8,517,600</td>
<td>2,517,200</td>
</tr>
<tr>
<td>NORTH EASTERN</td>
<td>-</td>
<td>39,200</td>
<td>81,200</td>
<td>36,400</td>
</tr>
<tr>
<td>NYANZA</td>
<td>84,000</td>
<td>47,600</td>
<td>123,200</td>
<td>2,5,600</td>
</tr>
<tr>
<td>RIFT VALLEY</td>
<td>411,600</td>
<td>327,600</td>
<td>473,200</td>
<td>249,200</td>
</tr>
<tr>
<td>WESTERN</td>
<td>201,600</td>
<td>84,000</td>
<td>-</td>
<td>1,400,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6,837,600</td>
<td>5,325,600</td>
<td>12,390,000</td>
<td>6,006,000</td>
</tr>
</tbody>
</table>

KENYA: SITE AND SERVICES

- Case Studies (Urban centers)

--- Provincial Boundaries

Nairobi:
1. Mathare Core Housing
2. Mathare Site & Services
3. Mathare Communal Site & Services
4. Kariobangi Site & Services
5. Dandora Site & Services (Proposed)

Coast: Mombasa:
6. Kisauni Owner-Builder
7. Changamwe Owner-Builder
8. Likoni Owner-Builder

Central: Thika:
9. Biafra Site & Services
10. Kianjau Estate
   - Karatina:
11. Karatina Site & Services

Rift-Valley: Nakuru:
12. Langa-Langa Site & Services
   - Njoro:
13. Ndarugu Site & Services
   - Eldoret:
14. Shauriyako Site & Services

Eastern: Kitui:
15. Kitui Site & Services
CHAPTER 3.

THE SITE AND SERVICE EXPERIENCE IN KENYA.

This chapter deals with the Kenyan experience of site and services. It contains analysis and evaluation of fifteen case studies of site and services projects from five of the eight provinces in Kenya, i.e., Nairobi and the Coast, Central, Rift Valley and Eastern Provinces. No information was available on any site and services projects in Nyanza Province, and there were no site and services projects in Western and North-Eastern Provinces, at the time of the study. Information and data for most of these case studies was collected from reports and surveys done by the Housing Research and Development Unit (H.R.D.U.) of the University of Nairobi, the Nairobi City Council (N.C.C.) and the International Bank for Reconstruction and Development, (I.B.R.D.) and field surveys from some of the projects.

The selection of these fifteen case studies was primarily based upon the information available at the time of this study; the provincial location of the various projects to get a cross-section of the site and services experience throughout the country; the type of site and services project depending mainly on the levels of on-site utilities and services; and the users' income group.

Out of the fifteen case studies, five are located in Nairobi, three in the Coast Province, three in the Central Province, three in the Rift

21 N.C.C. - Record of Building and Infrastructure Costs; Nairobi, 1972.
Valley Province. and in the Eastern Province. One of the five case studies
in Nairobi is a proposed project with six thousand serviced lots. The
remaining fourteen case studies represent a total of 2,991 serviced lots
out of the national total of approximately 4,502 serviced lots in 1972.
This gives approximately a 65% sample of all the site and services projects
in Kenya. (If the proposed project is included in the sample then the
sample size is 85% of the total), with the exception of one site and
services project (in the Central Province - Kianjau Estate, Thika) all the
other are public sector projects.

These case studies also represent a spectrum of site and services lots
ranging from those with basic minimum services to those with fully developed
dwellings built over time. The users income groups in these projects
range from very low income families earning less than $325 per annum to
middle income families earning about $4,875 per annum.

These fifteen case studies are listed below according to the locality in
the province and the urban center:

<table>
<thead>
<tr>
<th>Province</th>
<th>Urban Center</th>
<th>Locality</th>
<th>Total No. of Lots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>Nairobi</td>
<td>:1. Mathare Core Housing</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:2. Mathare Site and Services 1.</td>
<td>375</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:3. Mathare Communal Site and Services 1.</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:4. Kariobangi Site and Services</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:5. Dandora Site and Services (Proposed)</td>
<td>6,000</td>
</tr>
<tr>
<td>Coast</td>
<td>Mombasa</td>
<td>:6. Kisauni Owner-Builder</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:7. Changamwe Owner-Builder</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:8. Likoni Owner-Builder</td>
<td>153</td>
</tr>
<tr>
<td>Central</td>
<td>Thika</td>
<td>:9. Biafra Site and Services 1.</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>:10. Kianjau Estate</td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>Karatina</td>
<td>:11. Karatina Site and Services</td>
<td>94</td>
</tr>
<tr>
<td>Rift-Valley</td>
<td>Nakuru</td>
<td>:12. Langa-Langa Site and Services 1&amp;2.</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Njoro</td>
<td>:13. Ndarugu Site and Services</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Eldoret</td>
<td>:14. Shauriyako Site and Services 1.</td>
<td>49</td>
</tr>
<tr>
<td>Eastern</td>
<td>Kitui</td>
<td>:15. Kitui Site and Services</td>
<td>16</td>
</tr>
</tbody>
</table>
The detailed data on the case studies are included in the appendix. Each of these case studies is briefly described according to the following categories. Introductory descriptive notes (related to the project); physical data (related to land, infrastructure and dwellings); economic data (related to user and project); social/administrative data (related to user and community); locality block land utilization data (densities and area); and drawings (locality segment plan and typical dwelling plan). The data are presented to represent a typical situation in each of these projects. The data covers a wide range of the components discussed in the first chapter of this study. These components are, however, in no way exhaustive. The data has been structured to permit the cross-comparison of the different site and services projects and to show the relationships between the different components and economic considerations. Terms and concepts have been defined to make clear with what meaning, extent and limits they have been used. (See chapter 4 and glossary).

The approach used in this study was initially designed for the survey and evaluation of 16 urban dwelling environments in the U.S.A. and Latin America. It is still in the process of development and has been used for the survey-evaluation of existing urban dwelling environments in other developing countries. These studies have been carried out in the urban Settlement Design in Developing Countries at M.I.T. over the last six years.

years. It is a useful tool in identifying basic patterns and trends of housing, and evaluating urban layouts.

In this study efforts have been made to emphasize the economic and social aspects of a wider range of evaluation criteria related to the physical aspects of site and services projects. The data from these case studies have been used to evaluate the physical, social and economic aspects. It is compiled into matrices -- namely the Physical Data Matrix, Community Facilities, Utilities/Services Matrix; Economic and Social/Administrative Data Matrix. Summaries of Land Utilization: Patterns, Percentages, Densities and Land Utilization: Layout efficiency are also included. The matrices serve as simple quantitative checklists for understanding and evaluating existing and planned site and services projects. They can be helpful in formulating guidelines for future site and services projects by showing the strong and weak aspects of existing projects. The data from these matrices can be used to look into some critical planning questions such as:

. what are the impacts of lot sizes and land subdivision on the development costs in terms of length of utilities and services networks?
. what is the relationship between the length of circulation and utilities networks with the lot width and the amount of area served?
. how does the amount of land used for lots, roads, walkways, open spaces, community facilities effect the development costs per lot?
. what are the relative development costs for on-site infrastructure and community facilities?
These are only some of the questions which need to be answered. Although the data is based on the limited resources available, it is hoped that tentative conclusions can still be made.

EVALUATIONS: SUMMARY AND COMMENTS.

ECONOMIC DATA MATRIX (See Page 91).

This is a matrix in which the economic data from each case study are arranged to provide a ready reference. This reference provides a comprehensive view of all the case studies for comparison and determination of the existing trends.

The fifteen case studies have been grouped according to location in the five provinces and the eight cities and urban centers. Comparisons between the case studies in each province and between the case studies in all the provinces can be easily made.

The following comments on the various economic indicators in the Matrix are summarized below.

1. User-Income Group: Five income groups are considered very low, low, moderately low, middle and high. The income level is the basic indicator. Income has a direct relationship with the level of services, the size of the dwellings, the size of the lot, and the type of construction involved. Most of the users were in the low and moderately low income groups (earning $325-$1,300 per year); a few in the very low income groups (earning less than $325 per year) and some in the middle income groups (earning $4,875 per year). The lower income groups are directly involved with the development of the dwelling, while the middle income groups
are relatively less involved in the construction of the dwelling. The majority of the low income users are unskilled or skilled workers, who are employed in off-site employment areas located far from the projects. In most cases, limited or no on-site employment facilities exist.

2. User-Expenditure: The user household expenditure is considered as a percentage of income used for rent, food, children's school fee, transportation and other miscellaneous items including savings. In most cases the amount of income paid for rent ranged between 15% to 22% of the income. Only in one case (Ndarugu Site and Services, Njoro) it was less than 10% of the income. There is no clear trend but, in general, the users in the moderately low and middle income groups spent a higher proportion of their income on rent. A majority of the users spend a large proportion of their income on food-ranging between 30% to 50%.

The amount spent on transportation was generally low since most of the users travelled either by bicycle or by foot.

3-4. Development costs: The development costs considered are for site preparation, on-site infrastructure, lot development and other expenses including supervision/engineering and contingencies. These costs are presented as a unit cost per lot and as a percentage of the total development cost per lot.

The total development costs per lot show a wide range from $257 (Changamwe Owner-Builder Project, Mombasa) to $2,766 (Mathare Core Housing, Nairobi). These reflect the different levels of on-site infrastructure and land/lot development. (according to the I.L.O. Report the estimated total development cost per lot in 1971 was $350 for a
lot with individual water supply (single tap) and individual water-borne sewerage (from w.c. and shower).

The lowest figure shows that 86% of the total development cost per lot was for on-site infrastructure which included individual water supply (single tap) and individual waterborne sewerage (from w.c. and shower) and no cost for land/lot development. The highest figure shows that 73% of the total development cost per lot was for land/lot development which included a three room built unit with individual w.c., shower and kitchen.

Mathare Core Housing, Nairobi and Dandora Site and Services, Nairobi, both have relatively higher costs for supervision/engineering, etc. In general, lots with higher development costs are occupied/owned by middle and moderately low income users.

5-7. On-site infrastructure costs: The on-site infrastructure costs considered are for water supply, sewerage, roads and storm drainage, street lighting and electricity. These costs are presented as a unit cost per lot and as a percentage of the total on-site infrastructure costs. The financing of these components is also considered. The average cost of providing water in the case studies was about $45 for individual connections and $15 per lot for communal standpipes. On the average, water supply costs represented 15-20% of total on-site infrastructure costs per lot.

The average cost of providing sewerage in the case studies was about $140 for waterborne system and about $60 per lot for pit latrines.
On the average, sewerage costs represented 30-50% of total on-site infrastructure costs per lot.

The average cost of providing roads and surface/storm water drainage in the case studies was about $150 per lot for the higher standard (all roads bitumenized), about $95 per lot for the intermediate standard (main road surfaced) and about $20 per lot for the lower standard (all roads earth formed). On the average, roads and surface drainage costs represented 15-30% of total on-site infrastructure costs per lot. The average cost of providing street lighting was about $40 per lot and about $60 per lot for street lighting and electricity. On the average, street lighting and electricity costs represented 15-20% of total on-site infrastructure costs per lot.

In almost all the cases the development of on-site infrastructure was by public subsidized financing. The users paid average monthly payments of about $15 per month for all these on-site infrastructure. Most of these costs are capital costs; other economic considerations are also discussed in the other matrices.

SOCIAL/ADMINISTRATIVE DATA MATRIX. (See Page 81).

This is a matrix in which the social and administrative data from each case study is arranged to provide a ready reference. This reference provides a comprehensive view of all the case studies for comparison and determination of the existing trends.
8. User-Ethnic Origin: The ethnic groups considered are Kikuyu, Luo, Akamba and other. The first three groups represent the largest ethnic groups in the country. In 50% of the cases the predominant ethnic group was the Kikuyu; in 20% of the cases the predominant group was the Akamba; in 7% was the Luo; and in 7% were other groups.

9. User-Place of Origin: In case of Nairobi, a large proportion of the users/owners were migrants from the Central and Eastern Provinces. In case of Mombasa, a large proportion of the users were inter-regional, non-migrants, and a smaller proportion were from the Eastern Province. In Thika and Karatina, most of the users were non-migrants from the Central Province and some of the users were from the Eastern Province. In case of Nakuru, Njoro and Eldoret, most of the users were non-migrants from the Rift-Valley Province, while some were migrants from the Central Province. Finally, in case of Kitui, most of the users were non-migrants from the Eastern Province.

10. User-Reasons for Migrating: In almost all the cases the users were migrants to urban centers. About 85% of the users cited that they had migrated to urban centers in search of employment, while the rest cited that they had migrated for better housing facilities.

11. User-Family/Household Size. The household sizes are categorized as 1 to 3 persons per household, 4-8 persons per household, and 8 and more persons per household. The majority of the households were in the range of 4-8 persons per household, with an average of 6 persons.

12. User-Educational Level: The education levels of the heads of households considered are categorized as: none, primary, and secondary.
A large proportion had some form of primary education, and a very small proportion had some secondary education. However, a significant proportion of the heads of households were skilled and unskilled workers who had had some form of informal training or apprenticeship.

13.,14. & 15. Administrative- Project Publicity, Lot Allocation & Loan Collection: In almost all cases, project publicity and lot allocation was the responsibility of the local municipal or county council. Lots were allocated to individuals on the basis of the users' "ability to Develop", which implies that the people selected are among the more economically upwardly mobile of the applicants. There appears to be no clear trend between the income and the users' "ability to develop". As pointed out earlier, the very low and low income users are more directly involved in the development of the dwelling and have often completed their units in the time (usually 2 years) given by the public authorities.

For project financing, the local authority has to apply for a loan from the rational authority (National Housing Corporation) to pay for the project. The conditions on these loans are repayment over 20 years at an interest rate of 6½%. The local authorities are permitted to charge an extra ½% to the user/owner. The loans from user/owners are collected by local authority officers.

16. Administrative-Training Staff: In most cases some form of technical assistance to help the users in building the dwelling unit was offered by the local authorities. In cases where assistance was not offered, (Kianjau Estate, Thika, for example), this resulted in delays in development and financial difficulties.
17. Administrative-Legal Transfer of Rights: In most cases it was the responsibility of the local authority to ensure the legal transfer of the lots. However, from observations and experience, it appears that many lots originally allocated to the lowest income groups were transferred shortly after allocation to middle and high income people, who could afford to build but preferred not to live on the lots. In other cases the original user/owners rented the dwelling and were living in other residential areas in the urban center as absentee landlords (for example, Kariobangi Site and Services, Nairobi & Kianjau Estate, Thika).

The single room rentals units were rented to low income families. These transfers were often illegal, but no data or facts are available to explain the precise nature of these illegal actions.

PHYSICAL DATA MATRIX. (See Page 82).

This is a matrix of the physical data from each case study. This matrix provides a comprehensive view of the fifteen case studies for comparison and determination of the existing trends.

18. Land/Lot - Area: The area is considered in square meters. The lot area is one of the major planning criteria in determining the physical layout of the project and it has a significant impact on the development costs of the project. In the case studies, only one example (Mathare Core Housing, Nairobi) had lots with area of less than 100 Sq. Meters; 33% of the projects had lots with area 101-200 Sq. Meters; 33% had areas of 201-300 Sq. Meters; 13% had area of 301-400 Sq. Meters; and 13% had areas of more than 400 Sq. Meters (Kianjau Estate, Thika had 930 Sq. Meters per lot).
The average land/lot area is about 242 Sq. Meters. In Nairobi and Mombasa, most of the projects had lots between 101-200 Sq. Meters. This small lot area reflects the limited supply of urban land for development, while in the small urban centers of Kitui, Thika, Karatina the projects had lots between 301-400 Sq. Meters and some had more than 400 Sq. Meters. Most of the projects have only one size lot except in a planned project (Danora Site and Services, Nairobi) where even though a range of lot sizes are offered - 100, 120 and 140 Sq. Meters - the layout is limited and inflexible for other dwelling types which include on-site employment facilities as in tenements with shops, stores, workshops along the main roads.

19. Land/Lot - Size: The lot size is considered in terms of the width and the length of the lot in meters. The lot size defines the access and utility frontage, and is directly related to the block size, which in turn determines the on-site infrastructure costs per lot. This can be illustrated by two cases from the survey. The planned project (Dandora Site and Services, Nairobi) has an average lot area of 120 Sq. Meters with a lot size of 6.3 m (width) x 19.0m (depth) thereby having a width/depth configuration ratio of 1:3. The total on-site infrastructure costs per lot is $303 for individual water supply, individual waterborne sewerage, main roads bitumenized with open storm drains and street lighting (figure based upon 1974 estimates). The existing project (Biafra Site and Services, Thika) has an average lot area of 298 Sq. Meters with a lot size of 12.2 Meters (width) x 24.4 (depth); this having a width/depth configuration ratio of 1:2. The total on-site infrastructure costs per lot is $589 for the same level of services as in the former case.
(this cost is based upon 1964 estimates and the figures have not be
adjusted for inflation, price escalation, etc.).

In some cases (Mathare Site and Services, Nairobi and Likoni Owner-
Builder, Mombasa) the lots were served by infrastructure networks along
the larger dimension increasing the length of on-site infrastructure
per lot. In other cases (Kariobangi Site and Services, Nairobi and
Kianjau Estate Thika) the square lots (with width/depth configuration
ratio of 1:1) resulted in longer block perimeters and longer on-site
infrastructure per lot as compared to more rectilinear lots with similar
lot areas.

20. Land/Utilization: Four situations are considered: Public, Semi-
Public, Private, Semi-Private. These indicate the use and maintenance
of the land around a dwelling in relation to the user, physical controls
and responsibility. In cases where individual sanitary core units were
provided (Mathare Core Housing, Nairobi; Likoni Owner-Builder, Mombasa)
the individual user had more private control and responsibility for the
maintenance of the lot, while in cases where communal sanitary core units
were provided at the boundary crossing (Kariobangi Site and Services,
Nairobi, Shauriyako Site and Services, Eldoret), the individual user had
less private control and responsibility for the maintenance of the lot.
In the latter situations most of the users complained about the unhygienic
conditions of toilets, and about garbage and rubbish on and around the lot.
In these cases, the semi-public areas generally tends to be poorly
maintained due to poor physical design, planning and/or layout where the
land around the dwelling is small in area and cannot be used either for
the growth/extension of the unit or for open, outdoor activities, but only becomes a dumping ground for garbage, which in turn becomes a burden, financially to the local authorities who maintained the general health conditions in the project and also becomes a burden to the users.

21. Tenure: The three types of land tenure considered here are legal rental, ownership and leasehold. The pattern in most cases except one (Dandora Site and Services, Nairobi) was predominantly legal ownership. In several cases, however, the legal original owners of the lots had become absentee landlords by illegally renting all the rooms for speculative purposes.

22. Services Level - Water: Five levels of water supply are considered none (not provided on-site; but responsibility of the user to get from natural sources such as spring, well, rain); communal standpipe from local supply source; communal standpipe from piped distribution; individual connection with single tap and partial reticulation; and individual connection with multiple taps and full reticulation. All the cases had some sort of initial public water supply. In 60% of the projects, each lot had an individual connection with a single tap; 20% had communal standpipe from piped distribution; only 13% (Shauriyako Site and Services, Eldoret; Kianjau Estate, Thika) had communal standpipe from local supply source and 7% (Mathare Core Housing, Nairobi) had individual connection with multiple taps. The on-site infrastructure costs per lot for water ranged from $14 per lot (Mathare Communal Site and Services, Nairobi) for communal standpipe from piped distribution to $57 per lot (Mathare Core Housing, Nairobi) for individual connection with multiple taps. In general,
the middle and moderately low income users occupied lots with higher level of water supply and other services.

23. Services level - Sewerage: Five levels of sewerage are considered - none (not provided on-site, but responsibility of the user/owner to dig pit latrines); communal ablution units connected to septic tanks or privies; communal W.C.s connected to waterborne sewerage system; individual privy, septic tank; and individual W.C. connected to waterborne sewerage system. In 13% of the projects (Kianjau Estate, Thika & Shauriyako Site and Services, Eldoret) no public sewerage system was provided and the users had to dig pit-latrines. In 40% of the projects, each lot had individual waterborne sewerage systems; in 33% the lots had individual privies or septic tanks; and only 6% of the cases had communal privies (Langa-Langa Site and Services, Phase I, Nakuru). The on-site infrastructure cost per lot for sewerage ranged from $57 per lot (Mathare Communal Site and Services, Nairobi) for communal waterborne sewerage in a sanitary unit block of 6 W.C.s serving 20 lots to $261 per lot (Karatina Site and Services, Karatina) for individual waterborne sewerage system with a separate W.C. on each lot connected to a common oxidation pond serving the whole site. In general, the middle and moderately low income users occupied lots with higher level of sewerage.

24. Services level - Roads and Drainage: Four levels of roads and drainage are considered - all dirt paved roads with open channel drainage; main roads bitumenized and the rest gravel and dirt; main roads bitumenized and the rest gravel with full drainage system. 40% of the projects had all dirt paved roads with open channel drainage; 20% had main road
gravel and the rest earth formed with open channel drainage; and 40% had main roads bitumenized and rest gravel and dirt with drainage, mainly being the projects in Nairobi. The on-site infrastructure cost per lot for roads and sewerage ranged from $15 per lot (Karatina Site and Services, Karatina) for all earth formed roads to $340 per lot (Biafra Site and Services, Thika) for main roads bitumenized and rest gravel and earth with drainage.

25. Services level - Street Lighting and Electricity: Four levels of street lighting and electricity are considered — none (not provided but responsibility of the user/owner); Street lighting only; street lighting and distribution lines and street lighting, distribution lines and individual connections. 33% of the projects (mainly in Eastern, Rift Valley and Central Provinces) had no street lighting and electricity; 60% of the projects (mainly in Nairobi and Coast Province) had street lighting only; and 7% of the project (Mathare Core Housing, Nairobi) had street lighting and distribution lines with possible future individual connections for each lot. The on-site infrastructure cost per lot for street lighting and electricity ranged from $4 per lot (Kariobangi Site and Services, Nairobi) for street lighting only to $58 (Mathare Core Housing, Nairobi) for the highest level of this service.

26. Dwelling Unit- Type: Four types of dwelling units are considered: Shanty, room, apartment and house. The basic unit in all the projects is a room, even though a large number of the dwelling units were originally planned to be single story apartments and/or detached houses, according to the plans provided by the local authorities to the user/owner. Most of the owners rented out and sub-let rooms. This is a significant trend
with respect to the planning criteria for different housing options and lot sizes.

27. Dwelling Unit Area: The area considered is for an average room, which is the basic unit. The area per room ranged from 7 Sq. Meters (Shauriyako Site and Services, Eldoret) to 16 Sq. Meters (Likoni Owner-Builder, Mombasa). The average room area was about 11 sq. meters with an average room occupancy of 3.5 persons/room. Room occupancy varied in most projects from 7 to 11 persons per room.

28. Dwelling Unit - Tenure: Two situations of tenure are considered: rental and ownership. In almost all the projects, the users paid a rental fee (weekly, monthly) for the use of the room and the land including services. Rents varied in most projects and were mainly in the range of $4 to $8.50 per room per month.

29. Dwelling - Location: Three sectors of an urban area are considered: City center, inner ring and periphery. 60% of the projects (mainly in major urban centers of Nairobi, Mombasa and Thika) are located between the rural/semi-rural areas and urban inner ring, 5 km or more from the city center; 40% of the projects (mainly in smaller urban centers of Kitui, Karatina and Njoro) are located between the urban periphery and city center, 2.5 km to 5 km from the city center. Most of the projects in major urban centers are located away from the amin off-site employment areas and users have to travel long distances to work. On-site employment is limited to few market stalls and shops, if any on-site employment is available at all. Most of the projects are planned for predominantly low income groups and are separate and/or away from middle and high income residential areas.
30. Dwelling-Type: Four types of dwellings are considered: detached, semi-detached, row/grouped, and walk-up. Almost 85% of the projects had row/grouped dwellings with room units either grouped back to back in 4-6 room groups, or grouped in a row of 4-6 rooms or more. 15% of the projects originally had detached or semi-detached dwellings which in most cases were converted into row/grouped dwellings by the users/owners. None had walk-ups.

31. Dwelling - Area: This is the total covered area of the dwelling in square meters. This area ranged from 47 Sq. Meters (Shauriyako Site and Services, Eldoret) to 175 Sq. Meters (Kitui Site and Services, Kitui), the average built-up area was about 76 Sq. Meters. The land/lot coverage (the built-up area as a percentage of total land/lot area) ranged from 9% (Kianjau Estate, Thika) to 62% (Mathare Core Housing, Nairobi). The average dwelling coverage was about 33% of total lot area.

32. Dwelling - Number of Floors: The number of floors considered are one, two and three. Most dwellings are single floor units, mainly due to the simple form of construction in mud-and-wattle and and/or masonry and wood.

33. Dwelling-Utilization. Two situations are considered: Single and multiple. Invariably most of the dwellings were used by a group of individuals and/or families. Most of the dwellings had more than 6 persons, but generally ranged from 3 to 20 persons including users/renters.

34. Dwelling Development - Mode: Two modes are considered - incremental and instant. Most of the dwelling development by low and very low income groups were predominantly incremental while in case of moderately low and middle income groups, most were instant and/or incremental (Mathare...
Core Housing, Nairobi). In a majority of cases, either individual or communal built sanitary core units were developed by the local public authorities as instant development.

35. Dwelling Development-Developer: Two sectors are considered - public and private. In almost all cases, the private sector—which included individuals, groups or societies having access to the formal financial, administrative, legal and technical institutions for the financing, construction and operation—were the predominant developers of the dwellings while the on-site and off-site infrastructure were mainly financed, constructed and operated by the public sector.

36. Dwelling Development-Builder: Four situations are considered: Self-help, artisan, small contractor and large contractor. In majority of the projects the user/owners hired artisans for the construction of the dwellings along with some limited self-help efforts by the user/owner. In some cases, small contractors were hired to build part or the whole of the dwelling. As stated earlier in this study, site and services projects have favorable employment effects by creating on-site and off-site employment for a large number of semi-skilled artisans, small contractors and the production of various building components by the small-scale industries of the informal sector of the economy. This consideration is significant in terms of developing an employment/shelter based strategy for site and service projects and programs in the future.

37. Dwelling Development - Construction types: Six types of construction are considered: Shacks, mud and wattle, wood, masonry and wood; masonry and concrete, and concrete. Most projects had units of one or more type of construction. 75% of the projects had dwellings built of mud and
wattle construction with compacted earth floors, walls of wattle structure with mud infill, and roofs of thatch, flattened tin cans or corrugated iron sheets on a wattle structure/frame. 50% of the projects had dwellings built of masonry and wood construction with concrete slab floors, walls of concrete blocks or stone masonry without columns, and roofs of corrugated iron or asbestos sheets on wood rafters. 40% of the projects had dwellings built of wood construction with compacted earth floors, walls of rough hewn wood planks on wood frames, and roofs of flattened tin cans or corrugated iron sheets on wood rafters. The average building costs per Sq. Meter ranged from about $7 per Sq. Meter (Kariobangi Site and Services, Nairobi) for mud and wattle construction; about $17 per Sq. Meter (Karatina Site and Services, Karatina) for wood construction and about $40 per Sq. Meter (Langa-Langa Site and Services, Phase 1, Nakuru) for masonry and wood construction.

38. Dwelling Development-Year of construction: Only three of the projects were built more than ten years ago, while most of the projects were built during and after 1969. The dwellings were to be completed within 2 years after lot allocation. In most cases the users/owners kept within this time limit.

The project preparation, formulation and implementation in some cases lasted from 5 to 10 years before the users could actually build on the lots. Delays were created by the bureaucracy.

39. Dwelling Development - Density: These densities are intended as indicators for each dwelling group in the locality. Samples were taken
from selected small, homogenous areas that included the land for a group of lots and their circulation access. The areas do not include semi-public or public land for community facilities. The sample areas range from 0.5 hectare to 1.5 hectares. The densities ranged from a low of 100-250 persons per hectare with a medium density of 250-400 persons per hectare, and a high of 400-600 persons per hectare. Almost 49% of the projects had low densities, 20% had medium densities and about 35% had high densities. No project had densities higher than 500 persons per hectare. There is a general relationship between the density and the users income group. In general middle and moderately low income users occupied lots in projects with low and medium densities and the low and very low income users occupied lots in projects with medium and high densities.
### Economic Data Matrix

#### Localities

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<tr>
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#### On-Site Infrastructure

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<table>
<thead>
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<th>Water Supply</th>
<th>Healthcare</th>
<th>Education</th>
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<tbody>
<tr>
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<td>3. Total</td>
<td>4. Total</td>
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#### User

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<th>5. Source of Origin</th>
<th>6. Place of Origin</th>
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#### Administrative

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### Social Data Matrix

#### Data:

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<tbody>
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</tr>
</tbody>
</table>

#### Notes:

- **Urban Centers:**
  - N: Nairobi
  - M: Mombasa
  - C: Coast
  - CE: Central
  - RV: Rift Valley
  - E: Eastern

- **Data:**
  - NA: Not Available
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<tr>
<th>Land/Lot</th>
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<th>Dwelling Unit</th>
<th>Dwelling Developer</th>
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</tbody>
</table>

**Notes:**
- **Provinces:**
  - N: Nairobi
  - K: Mombasa
  - C: Coast
  - CE: Central
  - RV: Rift Valley
- **Urban Centers:**
  - K: Nairobi
  - M: Mombasa
  - T: Thika
  - K: Karatina
  - N: Nakuru
  - E: Eastern
  - K: Kisii
COMMUNITY FACILITIES, ON-SITE EMPLOYMENT FACILITIES, UTILITIES AND SERVICES MATRIX.

The matrix (page 85) illustrates the approximate availability of community facilities, on-site employment facilities, utilities and services in the 15 site and services housing projects. Three levels are indicated as follows (see Glossary, "Quality of facilities, utilities and services"): 

- No provision at all.
- Limited or occasional.
- Adequate or normal.

The matrix indicates that the level of availability of these facilities, utilities and services is directly related to the location of the projects and in turn related to the income levels of the users.

Cases 1, 2, 3, 4, 5 are all located in the periphery of Nairobi. The majority of the users are in the moderately low and middle income levels. In most cases the level of facilities, utilities and services is "adequate", except in terms of on-site employment facilities.

Cases 6, 7, 8 are all located in the periphery of Mombasa in the Coast Province. The majority of the users are in the moderately low income levels. The level of utilities and services is generally "adequate" but the level of community facilities and on-site employment facilities is "limited" or "none".

Cases 9, 10, 11 are located in inner ring and periphery of smaller urban centers in the Central Province. The majority of the users are in the low income levels. The level of facilities, utilities and services is
either "limited" or "none" and almost no on-site employment facilities exist.

Cases 12, 13, 14 are located in inner ring of urban centers in the Rift Valley Province. The majority of the users are in the moderately low and middle income levels (some in the low income levels in Case 14). In most cases the level of community facilities is "adequate", the level of utilities and services is either "limited" or "none", and almost no on-site employment facilities exist.

Case 15 is located in inner ring of a small urban center in the Eastern Province. The users are mainly in the low income levels. The level of community facilities is either "adequate" or "limited", the level of utilities and services is generally "limited" or "none", and no on-site employment facilities.
## Community Facilities, On-Site Employment, Facilities, Utilities and Services Matrix

### Localities

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<thead>
<tr>
<th>Province</th>
<th>Urban Center</th>
<th>Localities</th>
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<tbody>
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<td>4. Kariobangi</td>
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<td>5. Bandara</td>
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<td>E K</td>
<td>15. Kitui</td>
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### Community and On-Site Employment Facilities

- **Note:**

### Utilities and Services

- **Note:**

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**Urban Centers:**
- M: Nairobi
- N: Nairobi
- C: Coast
- CE: Central
- RV: Rift Valley
- E: Eastern
- K: Kitui
LAND UTILIZATION: PATTERNS, PERCENTAGES AND DENSITIES.

In the following pages (S7 to S9) the land utilization of the 15 site and services housing projects is graphically compared in terms of patterns, percentages and densities. The qualification of land utilization is based upon three factors: USER, RESPONSIBILITY and CONTROL (see Glossary: "land utilization").

PATTERNS.
The squares on the top row represent a segment of 1 hectare (100m x 100m) of land selected from each housing project. Land utilization is illustrated as follows:

- Public: streets, walkways, open spaces.
- Semi-public: open spaces, parks.
- Private: lots.

PERCENTAGES.
The squares on the center row represent the percentages of land utilization per hectare of each housing project. The land utilization notations are the same as in 'Patterns' above.

DENSITIES.
The squares on the bottom row represent the population density per hectare of each housing project. Each dot represents 20 people.

The graphs clearly illustrate land utilization relationships in terms of patterns, percentages and densities not only within each housing project, but also among the different projects in the different locations, and in turn the different income levels.
LAND UTILIZATION: Layout Efficiency.

Graphs (see page 98) display the data necessary to evaluate and to compare the 15 case studies in terms of land utilization percentages and residential population density.

"Physical layout is of obvious importance in determining cost levels and functional viability of a site and services development. Once designed, the layout becomes the primary determinant of subsequent commitment in terms of major cost factors such as land requirements, infrastructure lengths, administration, maintenance, as well as the overall performance of the development. Deficiencies in the initial layout plan pose an unnecessary handicap from the outset for any development."

Land utilization percentages are computed for the following areas:

1. Public: Streets, walkways, open spaced,
2. Semi-Public: Open spaced,
3. Private: Lots and dwellings.

Residential population density is the total number of persons per unit hectare. The range of average densities is 300 persons per hectare to 600 persons per hectare. This range is based upon gross population densities in existing case studies and zoning standards in different urban areas of developing countries. The range is based upon the assumptions that:

(a) The average dwelling coverage is 30-60% of the land/lot area.
(b) The average dwelling built-up area is 10-20 Sq. Meters per person.
(c) The average dwelling development is 1-3 stories per dwelling.
(d) The average land/lot area is 100-200 Sq. Meters per lot.
(e) The average household size is 3-6 persons per dwelling.

(f) The average area for lots/dwellings is 75-40% of a unit hectare.

(g) The average area for roads/walkways is 20-30% of a unit hectare.

(h) The average area for open spaces is 5-30% of a unit hectare.

The following comments are related to the land utilization percentages and residential population densities in the fifteen case studies:

1. Public - streets, walkways and open spaces: These are areas within the layout used for pedestrian and vehicular circulation. Public sector has the responsibility in initial financing, development and maintenance. The curve shows the average percentages of areas for streets, walkways and open spaces, ranging from 20% to 30%. The percentage of these areas varies slightly with density.

Cases above the curve (1,2,3,4,6,7,8,11,12,13,14,15) for financing have a high percentage of land devoted to streets and walkways. These cases constitute a great burden to the local government in terms of land,
financing, development and maintenance. The one case below the curve (10) has a smaller percentage of land devoted to streets and walkways. This area is also a burden to the local/municipal government since the roads near it serve an area that is sparsely populated. Cases near the curve, the shaded area (5,9,14,15) have a medium/average percentage of land devoted to streets and walkways.

2. Semi-public-open spaced: These are areas within the layout used for supporting facilities and services. Both public/users have the responsibility in financing, development and maintenance. The curve shows the average percentages of areas for schools, playgrounds, parks, community and employment facilities ranging from 5% to 30%. The percentage of these areas varies considerably with density.

Case above the curve (2,6,12) have a higher percentage of land devoted to open areas of undetermined use. These situations are a burden to the municipal government in terms of landscaping, development and maintenance. Since the land utilization percentages are based upon small selected block areas which did not include schools, the rest of the cases had no semi-public land within the selected blocks.

3. Private - Lots, dwellings: These are areas within the layout used for residential and commercial uses. User/owner and renter have the responsibility in financing, development and maintenance. The curve shows the percentages of areas for lots and dwellings ranging from 75% to 40%. The percentage of these areas varies considerably with density.
LAND UTILIZATION: LAYOUT EFFICIENCY

KEY
Vertical scale: Land Utilization percentages (0 to 100%)
Horizontal Scale: Residential population density (0 to 2,000) persons per hectare shown on a logarithmic scale.)
Curve: Range of average land utilization percentages.
Shaded area: Range of gross density (the intersection of the curve of range of average land utilization percentages and the shaded area of gross density shows the average operative effects and 'efficient quality' of the physical layout).
Numbered dots: The fifteen case studies.
Cases above and below the curve (1, 2, 3, 6, 8, 10, 11, 12, 13) have low densities and are sparsely populated. These cases are a burden to the local government in the development, maintenance and operation of public utilities and services. Cases below the curve (4, 7) have a very low percentage of land devoted to lots. Cases above the curve in the shaded area (5, 9, 14, 15) have a medium and high percentage of land devoted to lots.
LAND UTILIZATION: Layout Efficiency.

The urban layout is the physical configuration of a city, and it is determined by the combination of networks of circulation (highways, streets, walkways) and areas served. Networks of circulation define the lines of distribution and collection of utilities and services, and are publicly owned land. Areas served (lots, blocks) are usually privately owned. The urban layout is a major physical determinant of the costs of providing utilities and services and of their maintenance and operation.

Prof. H. Caminos has developed a simple and useful method for evaluating urban layouts. The method defines the efficiency of a network as the ratio of the length of the network to the area (s) served, and is expressed as:

\[ R \text{ Value} = \frac{\text{Network length (meters)}}{\text{Areas served (sq. meters)}} = \text{efficiency of network} \]

The R-Value varies inversely with the network efficiency: A smaller R Value indicates higher efficiency and vice versa. The layouts of the case studies have been evaluated in terms of network efficiency and are shown on page # 98.

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R-value Summary.

Cases 1, 2, 3, 4: R-values are very high, (800-1016m/hectare) due to frequent transverse streets, lots being served on two sides and by networks along the depth of the lot. In general, the physical layouts are very inefficient.

Case 5: R-value is higher than average due to frequent transverse streets; inefficient lot proportions, in general, the physical layout is inefficient.

Case 6: R-values is high due to too frequent transverse streets, very low population density and inefficient lot proportions. In general, the physical layout is very inefficient.

Case 7: R-value is higher than average due to too frequent transverse streets, and inefficient lot proportions. In general, the physical layout is inefficient.

Case 8: R-value is higher than average due too frequent transverse streets; inefficient lot proportions and very low population density. In general, the layout is very inefficient. (served by networks along the depth of the lot).

Case 9: R-value is higher than average due to too frequent transverse
streets and inefficient lot proportions. In general, the layout is inefficient.

Case 10: R-value is very high due to very large lots, low population density, and inefficient lot proportions. In general, the layout is very inefficient.

Case 11. R-value is higher than average due to frequent transverse streets, very low population density, large lots and inefficient lot proportions. In general, the layout is inefficient.

Case 12: R-value is higher than average due to frequent transverse streets, very low population density, large lots and inefficient lot proportions. In general the layout is inefficient.

Case 13: R-value is very high due to frequent transverse streets, lots being served on two sides, large lots and low population density. In general, the layout is very inefficient.

Case 14: R-value is higher than average due to frequent transverse streets, large lots and inefficient lot proportions. In general, the layout is inefficient.

Case 15: R-value is higher than average due to frequent transverse streets, large lots and inefficient lot proportions. In general, the layout is inefficient.
LAND UTILIZATION: LAYOUT EFFICIENCY

KEY
Vertical scale; R-value (Efficiency values on logarithmic scale).
Horizontal scale; lot area (m²)
Curve; Average efficient R-value (based upon values derived from lots of different areas having a width of depth ratio of 1:4, a public street serving only the short dimension of the lot, and transverse streets at intervals of 150 meters).
CHAPTER 4.

SITE AND SERVICES: An Employment/Shelter-Based Strategy and Major Components/Considerations

This chapter of this thesis outlines an employment/shelter-based strategy as an alternative, for future site and services projects in Kenya. It also briefly describes the various major components and/or considerations of these projects, i.e., the physical, economic, social, administrative and legal components.

AN EMPLOYMENT/SHELTER-BASED STRATEGY.

One of the main findings from the survey-evaluations of the existing site and services projects in Kenya is that the major objective of these projects has been to provide only shelter for the users (who are often not the target population of low income families), and that the projects have limited or no on-site employment opportunities and are located far away from other off-site employment facilities. The employment benefits in relation to the total development costs have been either overlooked or intentionally neglected during the formulation of the housing programs.

In both the Development Plan for 70-74 and for 74-78, the definition, and objectives of the site and services housing projects have not been properly defined or adequately outlined. For the purposes of this thesis, the following definition of sites and services is used:

"Site and Services can be defined as an approach/strategy to improve the living conditions of the majority of the population, which is poor, by providing access to employment and to a piece of land/lot with varying combinations and levels of utilities, services and community facilities."

This definition can form the basis of the employment/shelter-based strategy for future site and services projects in Kenya. The major goals/objectives of such a strategy can be summarized as follows:

1. To generate on-site employment opportunities by providing capital and technical assistance so as to increase collective self-help construction through co-operative housing organizations.

2. To provide easy access to off-site employment facilities by locating site and services projects closer to existing and potential sources of commercial and industrial development.

3. To develop on-site employment facilities such as small-scale industries, workshops, stores, and markets within the projects through co-operative small-scale industrial and commercial organizations.

4. To provide a piece of land with varying combinations and levels of utilities, services and related community facilities for a range of income groups with primary emphasis on the low income sector, for residential and/or commercial use.

5. To distribute resources and urban services equally among the low income population.

6. To expand the housing stock not only in a few major urban centers but also in other urban and rural areas to overcome some of the regional disparities.

7. To upgrade existing squatter settlements by providing utilities, services and community facilities.

8. To develop administrative links between the various public agencies and community organizations by increasing community participation in project formulation and implementation.
9. To increase official public legal control by the government to regulate land speculation and land use.

10. To plan the projects in order to achieve highest net values/ (benefits minus costs) so that the costs of resources inputs (land, labor and capital) result in greater benefits of the 'socially' valuable outputs (shelter, employment income, degree of social and economic integration, etc.)

The implications of a shift of strategy, from one that is shelter-based to one that is employment/shelter-based cannot be easily quantified in terms of employment and income distribution, yet it is clear beyond doubt that such a shift would have a powerful redistributive effect throughout the rural and urban areas of the economy.

A. Solomon, in his book on *Housing the Urban Poor*, outlines a dynamic formal model that determines the strategy alternative for which the net value (benefits minus costs) is the highest. Even though the model has been used to analyze and evaluate alternative housing strategies in the United States, it can be adapted to examine the benefits and costs of alternative housing strategies in developing countries. Solomon states:

"...economic welfare consists of both aggregative and redistributive effects. The government's investment in low income housing increases real national income (real individual consumption) through its direct and indirect effects on housing consumption, municipal revenue and employment. Besides contributing to economic growth, these housing investments redistribute income from corporate and higher-bracket...

taxpayers to the poor."
The final aggregate contribution of housing expenditures to social welfare by the creation of net gains in employment income would be much higher under "less than full employment" conditions such as are now being experienced in Kenya and in other developing countries. Moreover, since the construction industry in Kenya is not as highly specialized and capital-intensive as in the United States, using an employment/Shelter-based strategy would have a significant impact on the unemployment conditions by generating additional job opportunities.

On-Site Employment.

In order to increase on-site employment opportunities, the public sector has to help overcome some of the other problems facing the construction industry by acting upon some of the programs recommended by the I.L.O. Mission. Some of these recommendations are:

1. The public sector of the industry should set an example to the rest by the collection and monitoring of data on the labor content and direct import content per unit of construction, as part of an over-all policy of employment generation and import substitution.

2. Standards affecting construction should be revised drastically, to bring them into line with local conditions, essential requirements and available skills.

3. The coverage and presentation of statistics on construction inputs and outputs should be improved, with special emphasis on employment data.

4. The orientation and content of programs of technical and professional education should be revised in relation to the future needs of the country.
and taking into account the consequences of new policies adopted as a result of a new employment-oriented strategy.

These changes are essential for the implementation of any strategy for increasing labor input. They would enable the user to effectively participate in collective self-help construction of the dwellings. The public agencies can also consider to promote and finance not only individual users but also groups organized as co-operative housing organizations. These community-based organizations can be designed to promote the self-help efforts on a collective basis (similar to the Harambee schools and other projects). The structure, functions and promotion of these organizations will be discussed in the later part of this chapter.

The public sector can also consider promoting and financing co-operative small-scale industrial and commercial organizations. These community-based organizations can be designed to promote small-scale industries that provide such inputs as hand-made bricks and blocks, hand-made windows, door frames and other household goods and services, presently provided by the informal sector. The structure, functions and promotions of these organizations will be discussed in the later part of this chapter.

Off-Site Employment.

To provide easy access to off-site employment facilities by locating housing projects closer to existing and potential sources of commercial,
industrial and agricultural developments is one of the most significant planning objectives. Site and services projects should not be planned merely as "dormitory projects" on the periphery of major urban centers, far away from sources of employment. Sixty percent of the projects surveyed and evaluated in the previous chapter are located on the periphery of cities and the users have to travel long distances to work. This is true of other site and services projects developed in India, the Phillipines and in other developing countries. This mistake is often due to the tendency to utilize the cheapest possible land which is often of poor quality, located well out of towns and poorly served by public mass-transportation. These projects are often considered as "eye-sores" and thus located "out-of-sight of V.I.P.'s".

One of the major priorities of the low income families is located in terms of proximity to jobs. According to John Turner's study on squatter settlements, households in the lowest-income sector have a very high priority to get out of their poor living conditions.\(^ {29}\) The upwardly mobile very poor are generally young adults recently arrived in the city and are therefore, far more concerned about future than present security. Over time the very poor and young migrant family succeeds in acquiring a skill, a steady job and an increased family income. With dependents and with a much improved economic status to lose, the somewhat less poor exmigrant has a very different order of priorities: Security

will be by far the most important determinant of longer-term plans; opportunity will be less important for the children; identity or social recognition will also be more important and may increase in importance if opportunities for higher incomes shrink over time. The figure on the following page shows a comparison of priorities for specific needs: location in terms of proximity to inner-city areas (where the greatest diversity and intensity of low income employments are to be found); tenure in terms of the relative importance of freehold ownership; and shelter in terms of the relative importance of conventional minimum standard dwelling units (permanent structures with basic services, and utilities). These needs and priorities are shown by their relative importance to very low, low, lower middle, middle and upper income families.

From the surveys of existing site and services projects in Kenya (see chapter three), it is clear that the needs and priorities of the users were mismatched in terms of location and proximity to off-site employment areas. It is very essential for low income families to be located within easy access to existing and potential sources of commercial and industrial development in order to achieve matched priorities. The linkages of the site to these areas and to the urban area as a whole are important planning considerations when choosing a site for the development of a project. Location is often influenced by constraints due to existing urban land use patterns, zoning ordinances, government regulations; existing urban land value/cost patterns; and existing urban transportation and utilities and services networks. Transportation to and from the site to off-site employment areas is also a crucial issue for low income groups.
MATCHED PRIORITIES

ESSENTIAL

IMPORTANT

CONVENIENT

IMPORTANT

INCONVENIENT

VERY LOW MIDDLE UPPER

LOW LOW MIDDLE

INCONVENIENT

IMPORTANT

CONVENIENT

IMPORTANT

ESSENTIAL

IDENTITY

OPPORTUNITY

SECURITY

PROXIMITY TO
UNSKILLED JOBS
,LOCATION

FREEHOLD
OWNERSHIP
(TENURE)

MODERN STANDARD
SHELTER

Source: John Turner, *op.cit.*, p.167, Fig.8.
who cannot afford public transportation fares or a bicycle. These employment areas need to be located within walking distance from the site, ranging from 0 km. to 1.0 km. (or from 0 km. to 4 km. for bicycling). 30

MAJOR COMPONENTS/CONDITIONS.

This section outlines some of the functions, evaluative criteria, ranges of normative standards, ranges of relative costs, and other planning and policy considerations for the major components and sub-components of site and services projects. The various components and sub-components discussed here cover a wide range but are in no way exhaustive. The figures indicated as normal ranges for different standards are based upon functions and evaluative criteria as defined by commonly used standards and codes from different national and international documents.

The ranges of relative costs are confined to the costs of on-site infrastructure presented as unit cost per lot. No attempt has been made to refine these costs through a breakdown of value added into labor, materials, or foreign and local currency inputs. This data has been mainly collected from the reports of the International Bank for Reconstruction and Development, World Bank Group, Washington, D.C.; the Urban Settlements Design in Developing Countries Program, M.I.T., Cambridge; and the Housing Research and Development Unit, Nairobi. Other sources of information include the United Nations Center for Housing, Building and Planning, U.N., New York; United States Agency for International Development, Washington, D.C.; World Health Organization, Geneva; The Government of Kenya and the Nairobi City Council.

The tentative guidelines outlined below explain and clarify the various aspects of the employment/shelter-based strategy for site and services projects and are in no way exhaustive.

A. LAND: Land is the basic physical component that defines the boundaries, size and shape of a site. The major policy considerations for the selection of a site have been discussed in the earlier part of this chapter. The economic justification of the selection of the site includes the location of the project in relation to off-site employment, transportation, utilities and services linkages, opportunity cost of land and other factors. The cost-benefit analysis includes the determination of the costs of resource inputs (land, labor and capital) and the benefits of the 'socially' valuable outputs (shelter, employment income, degree of social and economic integration, etc.).
It is essential to analyze alternative land uses and to determine the most 'desirable' use of land with particular emphasis on the economic rate of return, income redistribution and employment generation, and environmental impacts of the proposed land use. Once the land use has been determined, the physical layout is the primary determinant of subsequent financial commitments in terms of major cost factors such as land use requirements, on-site infrastructure networks, administration and maintenance and overall performance of the project. Deficiencies in the initial layout plan during the project preparation stage create unnecessary handicaps and problems during the later stages of the project.

1. Land-size is the amount of space that the site occupies, and it determines the amount of land available for development. The shape of the site is defined by man-made barriers and/or by natural boundaries. Both size and shape are considered simultaneously with other land features such as topography and adequacy of intended use, during the project preparation stage. The size of the site may vary from 1 hectare to 300 hectares depending upon the scale of the development of the project.

2. Land-use: The primary use of the site is for a residential community with supporting on-site employment and community facilities. This is divided into three main categories: a) Public: streets, walkways and parking areas. These are areas within the layout used for pedestrian and vehicular circulation. The average percentages of areas for streets, walkways and parking range from 20% - 30% of the total area. The percentage of these areas varies slightly with density. b) Semi-public: schools, playgrounds, parks and other community facilities. These are
areas within the layout used for supporting facilities and services, including on site employment areas such as markets and employment areas reserved for future growth. The average percentages of areas for schools, playgrounds, parks, etc. range from 5% to 30%. The percentage of these areas varies considerably with density. (A small population of 6,000 people would require 3 hectares of land and a large population of 60,000 people would require about 47 hectares of land for semi-public areas). c) Private: lots, dwellings. These are areas within the layout used for residential, commercial and small-scale industrial uses. The average percentages of areas for lots and dwellings range from 75% (at lower densities) to 40% (at higher densities). The percentage, thus, varies considerably with density.

3. Land Subdivision: This is the division of the land into lots for private land uses and into lots for public and semi-public uses. The lines of circulation -- highways, streets, walkways -- (which are public land in terms of responsibility in initial financing, development and maintenance) define the private and semi-private lots. The overall configuration of lines of circulation constitutes the project land subdivision layout. The lines of circulation also define the distribution and collection networks of the utilities and services. The land subdivision and physical layout has a significant impact on the total development costs of the project. It is crucial to develop alternative land subdivision and physical layout plans during the project preparation stage to determine the physical efficiency of the layout in terms of land utilization, population densities and the ratio of the length of
circulation network to the area served. Economic and social trade-offs of each layout being considered must be taken into account. However, there are some practical planning considerations which cannot be ignored. The lines of circulation and lines of utilities and services are reduced when: a) lot areas are relatively large, b) lot widths are relatively small, c) access to lots is only on one side, along the width, d) connectors that run transverse to the lot access are less frequent. In general, the greater the amount of land for public use (streets, walkways, parking areas - greater than 30% of the total land/site area), the higher the relative costs of development per lot (assuming that each lot is served by individual water supply and waterborne sewerage, street lighting and bitumenized road access with storm water drainage).

4. Lot Size: The size is a major planning constraint that determines the subdivision/layout of the project. The lot size has a significant impact on the total development cost of the project and development costs per lot. The lot size defines the access and utility frontage of each lot and is directly related to the block size, which in turn determines the infrastructure costs per lot. (This has been illustrated by some of the case studies in the earlier sections of the study.) Lots with relatively larger widths and relatively smaller lot areas being served by access on both sides of the lots and blocks with too frequent transverse connectors have higher total on-site infrastructure costs per lot (see case studies on Biafra Site and Services, Thika and Dandora Site and Services, Nairobi). The lot size is determined in relation to the location of the lot within the block in terms of access from the street.
(exterior lots) and access from cluster courtyards (interior lots), and land/lot utilization in terms of single or multi-family use for residential and/or commercial activity, and the dwelling type in terms of tenements, row group houses, etc. Assuming that the predominant commercial growth for on-site employment facilities takes place along major circulation networks and on land with relatively higher land costs, the exterior lots are more suitable for being divided into relatively larger lots for residential and/or commercial activity in tenements and/or row group walk-ups. These lots have areas ranging from 300 square meters to 600 square meters with lot dimensions ranging from about 10m. x 30m. to about 15m. x 40m. Assuming that the predominant residential growth takes place off major circulation networks and on land with relatively lower land costs, the interior lots served by access from cluster courtyards are more suitable for division into relatively smaller lots for residential and some commercial activity in row group houses. These lots have areas ranging from 100 square meters to 200 square meters with lot dimensions ranging from about 6m. x 16m. to about 7m. x 28m. Both the lot areas and the lot dimensions provide semi-private communal use of land on two scales: within a group of rooms (tenement courts) and within a group of lots (cluster courts). 31

5. Land Tenure: This is the act, right, manner or term of holding land property. There are two basic forms of land tenure: a) land ownership, where the exclusive right of control and possession of a parcel of land

is held, b) land tenancy, which is the temporary holding or mode of holding a parcel of land owned by another. It is important that the government have maximum control on the land in order to avoid land speculation by absentee landlords, as experienced in several of the existing projects. More public control can be achieved if the land tenure is public land ownership and lots are leased to individuals or to groups of individuals (co-operative housing organizations) for a definite term of duration, ranging from 20 to 40 years, with a renewable lease. This would enable local governments to have greater control on defaulters and poorly maintained and sub-standard dwellings and avoid land speculation. The provision for the user and lease-holder to reside on the lot and to sublet rooms during the term of the lease has to be strongly stated and clearly defined in the contract. Moreover, any sale or transfer of lots after allocation should be done through the local government or municipal council, which in turn should transfer lots to households on the waiting list at a price which covers both the mortgage and the improvements. The local government or municipal council must be responsible for compensating former lease-holders for equity and labor costs invested in the lot development by the user.

6. Land Costs: This is the amount of money given or set as the amount to be given as a consideration for the sale or transfer of a lot. The real land cost is the sum of actual land cost (as determined by the users in free market competition) plus the land development costs (as determined by the cost of on-site and off-site infrastructure networks). The total investment is the sum of real land costs plus the building
In most site and services projects, the actual land costs are low since the projects are generally located on the periphery of urban centers, which are often not served by existing urban infrastructure networks. The land development costs are also relatively low since the projects generally are located on level or almost level sites. Hence the real land costs for most projects are generally low for the undeveloped site. However with the development of on-site and off-site infrastructure networks, the real land cost increases. The development costs of utilities and services are often financed by the public sector. Moreover with the development of dwellings and other buildings the total investment further increases. The development costs of the dwellings are often financed by the private sector and users with or without public subsidization. With higher land costs for a developed land/site, there is a tendency to increase the number of people who benefit in terms of shelter and employment, etc., within the public policy regulations and controls. If no local controls are enforced, it would result in land speculation and over-crowding.

7. Land-Intensity of use/Density: The gross residential population density is directly proportional to the number of lots per unit area. The costs of providing infrastructure to a project are greatest at very high densities since the cost of maintaining and operating each lot are very high. Costs are likewise high at very low densities since the development, maintenance and operation of infrastructure is for a limited
population. The range of average densities is 300 to 600 persons per hectare. It is based upon the assumptions that:

a) the average coverage is 30 to 60% of the land/lot area,
b) the average dwelling built-up area is 10 to 20 square meters per person,
c) the average dwelling development is 1 to 3 stories per dwelling,
d) the average land/lot area is 100 to 200 square meters,
e) the average household size is 3 to 6 persons per dwelling,
f) the average area for lots and dwellings is 40 to 75% of a unit hectare,
g) the average area for roads and walkways is 20 to 30% of a unit hectare,
h) the average area for schools and parks is 5 to 30% of a unit hectare.

B. UTILITIES AND SERVICES. The provision of basic public utilities and services is one of the most important components of site and services projects. These basic utilities and services include water; sewerage; roads and storm drainage; street lighting and electricity; public transportation; refuse collection; telephone; and gas. In this study only the first four are dealt with in further detail.

1. WATER: A supply of potable water for health, cleanliness and cooking is required for sustaining life. To supply potable water involves the collection of water from ground sources, surface water in lakes, rivers, etc. to form reservoirs; the transmission of this water to a treatment plant for purification for human use; and final distribution through a
closed grid network to users. The on-site water supply system deals mainly with the treatment and distribution of water. There are basically three choices for distribution of on-site water supply: a) connection to an existing system of mains and services, b) development of new distribution system of mains and services, c) development of individual system of wells or cisterns. Five levels of water supply are generally considered: i) none (not provided on-site, but responsibility of the user to get from natural sources such as springs, wells, rain), ii) communal standpipe from local supply source, iii) communal standpipe from piped distribution, iv) individual connection with single tap and partial reticulation, and v) individual connection with multiple taps and full reticulation.

The range of per capita water usage varies from a minimum of 1 liter to over 200 liters per capita for multi-tap supply systems. However, according to a study by White and Bradley, in East Africa low income families use an average of 30 liters of water per day from a piped water supply or 15 liters per day if the water has to be carried any distance from the house. However, these usage rates are relatively low when compared to the per capita water use of 156 liters per day in Nairobi. Since the quality and quantity of water to be supplied per capita are principal cost determinants of the water supply system, more realistic per

34 G. White, et.al.: op. cit.
capita standards than 156 liters per day need to be established. The minimum standards recommended by the World Health Organization are 20 to 40 liters per day from a communal standpipe, 160 liters per day from single tap connection and 180 liters per day from a multiple tap connection. The on-site water supply costs per lot are also determined by the type of layout of the reticulation/distribution network, pipe material and diameter.

According to a survey of 50 site and services projects in fourteen different developing countries, the average cost of providing water is about $U.S. $80 per lot for individual connections (compared with U.S. $57 per lot for case studies in previous section) and U.S. $30 to 50 per lot for communal standpipes (cf. U.S. $14 per lot in the case studies). On the average, water supply costs represented 20 to 30% of the total on-site infrastructure costs per lot.

2. SEWERAGE: The disposal of domestic and commercial waste is a fundamental on-site requirement for any housing development. It involves the collection of waste water and sewerage to be transported to a sewerage treatment plant where it undergoes standard treatment for safe disposal by dilution, irrigation or other systems such as septic tanks. The on-site sewerage system generally deals with all the four stages of collection, transportation, treatment and disposal. There are basically three choices for the disposal of sewerage: a) connection to an existing urban sewerage network, b) development of a new communal system serving

the site and independent of the existing urban network, c) development of
a new individual system serving a lot and/or a group of lots using septic
tanks, privies, etc.

Five levels of sewerage disposal are generally considered: i) none (not
provided on-site, but responsibility of the user/builder to dig pit
latrines), ii) communal septic tanks or privies, iii) communal W.C.'s
connected to waterborne sewerage system, iv) individual privies or septic
tanks, v) individual W.C. connected to waterborne sewerage system. The
flow of sewerage discharge is mostly measured in liters per capita per
day. The flow of sewerage is a function of existing and planned factors
such as:
- population: sewerage discharge increases as population increases.
- land use and density: sewerage discharge varies with industrial, commer-
cial and residential areas; it increases as the density of an area
increases.
- water consumption: sewerage discharge increases as the per capita con-
sumption of water increases.
- habits of people: living patterns and culture.
- type and number of fixtures: sewerage discharge increases with the
increase in the number of fixtures (kitchen sink, flush toilet, etc.).
- pressure of water supply: sewerage discharge increases due to overflow
if the water pressure is very high.

The average flow of sewerage discharge ranges from a low of 150 liters per
capita per day to a high of 450 liters per capita per day for an individ-
dual water borne sewerage system. The on-site sewerage costs per lot are
determined by type of sewerage system and the layout of the collection and transmission network. For simpler systems, labor costs in the laying of pipes, mains and drains and costs of pipes and pumps are the major cost elements. For the complicated sewerage treatment plants, the plant equipment itself and costs of skilled operators become important cost elements. 36

According to the I.B.R.D. survey, 37 the average development cost of providing sewerage is about U.S. $180 per lot for waterborne systems (cf. U.S. $261 per lot in the case studies), U.S. $110 per lot for aqua privies and U.S. $20 per lot for pit latrines. On the average, sewerage costs represented 40 to 50% of total on-site infrastructure costs per lot.

3. ROADS AND STORM DRAINAGE: Roads provide external access linking sites to the urban transportation 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 and need to be carefully planned at the project preparation stage. The storm drainage system, provided along walkways, roads or in ditches, serves to remove storm water runoff to prevent flooding.

The road system as defined by the mode of use has five categories: 38

36 Stanford Research Institute, et.al., Cost of Urban Infrastructure for Industry as Related to City Size in Developing Countries: India Case Study, California, 1968, p. 108.
38 Caminos, et.al., op. cit., p. 18.
a) Pedestrians - paths: serve primarily for pedestrian access to interior lots and communal parking facilities (3 to 4 m. wide with 80 to 700 m. spacing between transverse connectors); b) Pedestrians (dominant) and vehicles - residential streets, neighborhood streets, minor and local streets: provide access to residential lots (9 to 12 m. or 12 to 16 m. wide with 80 to 200 m. spacing between transverse connectors; c) Vehicles and Pedestrians - collector, secondary and connector streets: provide for through traffic and access to communal parking lots and serve as secondary transport routes (12 to 16 m., 18 to 22 m. 23 to 28 m. respectively with 400 to 800 m. spacing between connector streets; d) Vehicles (dominant) and Pedestrians - inter-community access, minor arterial roads: provide access to the site from major highways/roads and often form the principal focus or spine of the development (23 to 28 m., 29 to 36 m. respectively with 1200 to 1600 m. spacing between major roads; e) Vehicles - intra-community highways, major arterial roads: provide transportation linkages within the city and the region (29 to 36 m., 60 to 76 m. respectively with variable spacing). The principal cost elements of roads and storm drainage networks are: right-of-way (% of land area); earthwork and site preparation; base course; pavement or surfacing drainage and culverts; and maintenance.

Four levels of roads and drainage are generally considered for internal circulation (categories a to d above) - i) all earth formed roads with open channel drainage, ii) main roads, gravel and other all earth formed with open channel drainage, iii) main roads bitumenized and all other roads gravel and earth with partial draining system, iv) main roads
bitumenized and all other roads gravel with full drainage system.

The cost per linear meter of road in Nairobi (1972) was U.S. $102 for bitumenized main road, U.S. $26 for sealed/surfaced service street and U.S. $7 for murram/earth pedestrian path. According to the I.B.R.D. survey, the average cost of providing roads and storm drainage is about U.S. $150 per lot for all surfaced roads (cf. U.S. $340 per lot in the case studies), about U.S. $100 per lot for main surfaced roads, and about U.S. $25 per lot for all dirt paved roads (cf. U.S. $15 per lot in the case studies). On the average, roads and storm drainage costs represented 30 to 40% of total on-site infrastructure costs per lot. The bitumenized/surfaced roads require capital-intensive technology and are much more expensive than the earth/sealed surface roads which require labor-intensive technology in Kenya.

4. STREET LIGHTING AND ELECTRICITY: Street lighting is an essential component in housing developments to provide safety for pedestrians and drivers and to provide a sense of security to the users. Individual electricity connections largely depend upon the users' priorities and economic capacity to pay. However, it is essential that energy be provided to on-site small-scale industrial and commercial firms. The electricity network involves the generation of electricity by turbines, diesel, etc. and its transmission to communities via distribution stations, sub-stations and manipulation of power into desired levels of

consumption for users. Street lights in residential areas are located on alternate sides of the street at 40 to 49 meters spacing and have a height of 6 to 7.5 m. In business/commercial areas they are generally located on both sides of the street at 21 to 37 meters spacing with a height of 9 m. All intersections require street lighting.

Four levels of street lighting and electricity are generally considered for site and services projects: 1) none (not provided but responsibility of the user), ii) street lighting only, iii) street lighting and distribution lines, iv) street lighting, distribution lines and individual connections.

The cost of generating and distributing electricity is determined by many factors, the major ones being the cost of fuel and the efficient utilization of the equipment. According to the I.B.R.D. survey, the average cost of providing street lighting and electricity is about U.S. $60 per lot (c.f. U.S. $58 per lot in the case studies) for individual connections. On the average, street lighting and electricity costs represented 10 to 15% of total on-site infrastructure costs per lot.

C. COMMUNITY FACILITIES: Community facilities include a wide range of public and/or semi-public facilities provided on-site. These include schools and playgrounds, health clinics/ dispensaries, social centers, police and fire stations, and recreation and religious buildings. These

40 R. Geothert, op. cit.
41 I.B.R.D., op. cit., p. 28.
facilities need to be an integral component of the site and services projects. They have often been either intentionally neglected or overlooked (see previous section on case studies) in previous projects.

Of these facilities schools and playgrounds require larger areas. Educational facilities for the various age groups should be 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. The area per pupil for primary schools in Latin America is 16m²/pupil, in U.S.A. it is 26 to 50m²/pupil, in England it is 71m²/pupil and in Kenya it is 20m²/pupil. The area per pupil for secondary schools in Latin America is 19m²/pupil, in U.S.A. it is 90 to 166m²/pupil, in England it is 142m²/pupil and in Kenya it is 40m²/pupil.42

The costs of building, planning and constructing primary and secondary schools are generally considered in terms of cost per square meter of school building, cost per pupil, or cost per pupil space provided. The cost per square meter of school building varies with the type of construction. Presently a large number of primary and secondary schools in Kenya are built on collective voluntary self-help efforts ('Harambee' schools) using local labor and materials, usually built in mud-and-wattle construction. Government primary and secondary schools in most urban areas are built by small and large contractors often using large

42 Caminos, et.al., op. cit., p. 46.
amounts of imported materials, usually built in either reinforced concrete construction and/or concrete masonry construction. (No data on the unit costs are available.) However, in general the cost per square meter of Government schools is much higher than that of the Harambee schools.

The Kenyan educational system as a whole is undergoing change and has been criticized by the I.L.O. employment mission:

The problem of youth employment does not lie so much in the number of primary-school leavers: it lies much more in the whole philosophy of education, which mentally prepares the pupils for formal, non-rural employment in the context of an economy which has failed to generate enough employment opportunities of this sort; in the foreseeable future this will continue to do so, unless there are fundamental changes both inside the school and outside.43

Educational facilities need to be planned and developed to provide for some of these suggested changes such as emphasizing vocational training and training of other skills for technical, commercial, and agricultural jobs both in urban and rural areas.

D. EMPLOYMENT FACILITIES. As discussed earlier, on-site employment facilities such as small-scale industries, workshops, shops and markets need to be provided in order to generate employment within walking distance of the residential areas. It is important that the physical layout of the site and of the individual lots and dwellings meets the essential requirement for space to conduct small scale industrial and commercial

activities. These activities normally take place along major circulation roads and should be located within easy access of the dwelling units. This would not only reduce household expenditures of the low-income families on transport, but would also enable the users to supplement their income.

Markets have traditionally been the focus of not only economic activities but also of social activities. These markets should be planned to encourage small entrepreneurs by charging low rents for permanent legal stalls. According to a preliminary survey of the informal sector in Nairobi, the average amount of space required for small workshops for carpenters and tinsmiths is about 15 square m.; it is 6 to 9 square m. for cobblers, tailors, etc. In the past, the Government has ignored and even harassed some of these small-scale entrepreneurs. The informal sector provides goods and services for low-income households at prices which they can afford. These firms include small retail firms, restaurants; light manufacturing—construction, personal services, repair services, and transportation.

Most of the informal sector firms are presently characterized by i) ease of entry into the market due to low levels of initial capital investment, unsophisticated technological requirements, minimal requirements for land and services, ii) reliance on indigenous labor resources, ii) family ownership of the enterprise, iv) small scale of operation, v) labor-

45 Personal services include barbers, shoe-shine services, etc.
intensive and adapted technology, vi) skills acquired outside the formal school system, and vii) regulated and highly competitive markets.

By encouraging some of these activities in site and services projects in smaller urban centers it may help to reduce migration into major urban centers like Nairobi, Mombasa and Thika. Present policies ignore the fact that modern sector employment opportunities are scarce and that a large number of students and school drop-outs, who are equipped neither to compete successfully for modern sector jobs nor be satisfied with rural endeavors, take up jobs in the informal sector. However, there is an indication that these policies are changing: Kenya's most recent 5 year Development Plan ('74-'78) addresses itself more directly than previous plans to the presence of this sector and the necessity for redirecting both economic and educational strategies. Despite the increased attention given to this sector by the Kenya Government and various international agencies, including I.L.O., the workings of the sector and nature of its participants are still poorly documented and only crudely understood. The need for more sophisticated theoretical formulations and more broadly based empirical work on the regional and national levels is clear.

E. DWELLINGS. Even though the dwelling component of the site and services projects is largely the responsibility of the user/lease-holder, it is useful to outline some of the limits of actions; ranges of options in terms of dwelling unit types, area, number of floors, dwelling tenure, type of utilization, development mode, construction types, labor and
materials, etc. These ranges of options provide proscriptive limits for the user/builder regarding the dwelling development rather than prescriptive lines of action for the user/builder. The lines of action have been conventionally used before.

Dwelling Options: Three types of dwelling units can be considered, namely: rooms, apartments, houses with options of varying lot and dwelling area. A room is the basic unit that can be provided in tenements, expandable row group houses and/or apartments (walk-ups up to three stories).

Tenement court houses are aligned in larger lots (300 to 600 square meters) with rooms built around a central courtyard (semi-private space) and are often used by all income groups and have often been a practical solution to housing demand. Such dwellings permit medium and high population densities of 300 to 600 people per hectare and the land utilization in terms of private, semi-private, public areas is within the desirable range. These houses can be planned to provide adequate safety, privacy, ventilation, cooking facilities, toilets, showers and washing facilities. For 1 to 3 story tenement houses, the number of rooms varies from 8 to 48 which require W.C.'s, toilets, showers, etc. ranging from 4 to 24 (based upon 1 of each for every 2 to 3 rooms or 1 of each for every 6 to 9 people).

Expandable row group houses/apartments are aligned in narrower lots (100 to 200 square meters) around a cluster court yard (semi-private space)
and are often 1 to 3 stories. Row houses are also a traditional physical model used presently mainly by middle and high income groups but could be made accessible to low income groups in the future. It permits medium and high population densities of 300 to 600 people per hectare and the land utilization in terms of private, semi-private, public areas is within the desirable range. These houses can be planned to provide adequate safety, privacy, ventilation, cooking facilities, toilets, showers, and washing facilities. For 1 to 2 story expandable row houses/apartments the number of rooms varies from 1 to 6 which require 1 to 2 W.C.'s, toilets, showers, etc. (based upon 1 of each for every 2 to 3 rooms or 1 of each for every 6 people). Minimum room areas usually range from 9 to 12 square meters per room in both cases (3 square meters per person or per bed space).46

Construction options: Five types of construction options can be considered: shack, mud and wattle, wood, masonry/wood, masonry/concrete, concrete. (These are outlined in the glossary.)

The construction or dwelling development should be viewed as an incremental/progressive process rather than an instant/package product. The user/builder has to be given legal rights to start with a shack and eventually develop it over a given period of time ranging from 1 to 2 years. During this period it is essential that the public sector provides technical and managerial assistance to the user or to a group of users (co-operative

housing organizations). The cost of construction per square meter is a primary cost element which determines the construction type used by the user/builder.

Tenure options: Two types of tenure options for dwellings can be considered: lease and rental. Since both the tenements, court houses and expandable row houses/apartments allow for multi-family utilization of the dwellings, the user/lease-holder should be given the option to sub-let or sub-lease rooms, while also being resident in the dwelling.

Land-use options: Two types of land use options for lots are residential and/or commercial. The user/lease-holder should be given the option to use the dwellings for small scale industries, workshops, shops and stores (especially in case of the tenements along major circulation networks). Land/lot coverage could vary from 30 to 60% of the lot area, with average built-up area of 10 to 20 square meters per person.

TARGET INCOME GROUPS:

In order to develop and outline the physical, financial, social and administrative aspects/components of site and services projects, a careful market analysis is essential. This analysis would enable planners to determine the target income groups for whom the project is designed, the priorities and needs of this target population, their capacity to pay; and the size of the development in terms of number of serviced lots required, the level of services, the size of the dwellings and lots and the type of construction. Since one of the major objectives of the employment/shelter based strategy is to improve the living conditions of the majority of the
population which is poor, it is clear that the project has to match their needs and priorities in terms of location, tenure and shelter as discussed earlier. As pointed out in the survey-evaluation, almost 60% of the projects were occupied by users mainly in the middle and moderately low income groups even though the projects had been intended for the low and very low income groups.

The priorities of the low and very low income groups in order of importance are i) location in terms of proximity to employment facilities both off-site and on-site, ii) tenure in terms of legal rights to lease, rent a piece of land/lot, iii) shelter in terms of conventional minimum standard basic services and utilities and a minimum enclosure/dwelling. It is these low and very low income groups that need to be reached as the primary users/lease-holders in future projects. However, it may be beneficial to include a relatively small percentage of middle and even higher income groups to provide lots at market prices for these groups to enable the cross-subsidization for the low income groups and also to provide a 'social and economic mix' in the community. In summary, the major and minor target income groups can be considered as:

i) low and very low income groups: earning up to $325 per year. These could constitute about 65 to 70% of the project population.

ii) moderately low income groups: earning up to $1,300 per year. This could constitute about 20 to 25% of the total project population.

iii) middle and high income groups: earning up to $4,875 and more per year. These could constitute about 5% of the total project population.
The lot allocation and mortgage terms of each of these groups need to be carefully outlined to avoid any partiality and exploitation. (It is essential that the mistakes in the KARIBANGI SITE AND SERVICES, NAIROBI, not be repeated in other future projects).

The users household expenditure breakdown as a percentage of income used for rent, food, children's school fees, transportation and other expenses (including savings) need to be taken into account for each of the income groups in order to determine the amount of subsidization and for the purpose of user repayments for loans and other monthly charges.

F. POLITICAL, SOCIAL AND ADMINISTRATIVE ORGANIZATIONS: Political, social and administrative organizations are very important components in determining the 'successful' formulation and implementation of site and services programs. It is difficult to generalize specific guidelines that would be most appropriate for all the regions, but the following considerations may be useful at both the national and regional levels: 47

1. An effort should be made to decentralize the operations of the housing programs at least to the regional/provincial level if not to individual urban centers. This would require additional trained technical and managerial staff for the various provinces to form regional site and services development organizations.

2. The complete process from project preparation to project implementation should be the responsibility of each of the regional site and services development organizations.

3. The financing of the projects should be controlled by the development organizations in order to have better cost control and to tie revenue collection into the ongoing programs. It is highly desirable to avoid situations in which the construction financing comes to the regional organization by way of annual appropriations and the revenues are returned to the national government treasury. Such a system makes planning for future development extremely difficult and confuses the accountability for the project.

4. Since coordination is required among regional site and services development organizations it should be done through a national site and services development committee within the National Housing Corporation.

5. Each regional site and services development organization should be organized to support ongoing programs rather than a series of separate projects. This would mean that a steady flow of land for development must be acquired, task force groups must be on a permanent basis, special contracts could be let for work on several projects at one time, and administrative overhead could be spread over a larger program. And these elements should be designed to reduce costs through undertaking small projects.

6. The functions of these regional site and services development organizations should be project preparation, project publicity and lot allocation, project implementation and supervision, monitoring and evaluation, feedback and revision of policies and planning considerations. However, more research needs to be done in order to determine and design the structure of these organizations.
At the urban/project level, the role of community development organizations should be to provide the essential political and administrative links between the users and the beauracracy. The following considerations may be useful at the urban and community levels:

1. An effort should be made to collectivize the production and distribution of housing and employment services in the programs. This would require community leadership and additional technical and managerial assistance to form community development organizations, which include co-operative housing organizations and co-operative small-scale industrial and commercial organizations.

2. Financing and development of lots and other community facilities should be controlled by these organizations in order to have better cost control and to tie revenue collection into the community development.

3. Co-ordination of these community development organizations should be done through the regional site and services development organizations.

4. Each community development organization should be organized to support one or a series of separate projects. This would require task force groups and collective joint operations under regional and national supervision.

5. The functions of these community development organizations should be to achieve effective implementation of the project through collective efforts; to assist individual user/member to develop the lot through collective self-help construction and to promote and develop community facilities like schools, social centers, etc. through collaborative programs with the regional site and services development organizations;
and to involve the community through local leadership more fully in regional and national development programs. However, as at the regional level, broader research needs to be done in order to determine and design the structure of these organizations.

Basic to the formulation of this employment/shelter-based strategy for site and services housing projects in Kenya is the establishment of an adequate legislative base. Legislation should reflect the policy objectives of such projects. It should include not only the enabling legislation for the different regional and community organizations but also the appropriate property tax laws, building codes and standards reflecting local conditions and town planning legislation, and which would allow a more mixed use of land to meet local needs. In addition, the legislation should include housing finance laws to allow more low income families to have access to public sector loans and funds.
CHAPTER 5.

CONCLUSIONS AND GUIDELINES FOR POLICIES

This chapter contains the main conclusions of this study as well as some guidelines for major policy and planning issues related to site and services housing projects in Kenya. There are a wide range of problems which need to be dealt with at the national planning level in order that both rural and urban development strategies are adequately integrated and coordinated. These strategies have to be based upon realistic policy guidelines in order to achieve practical short-term and long-term solutions to these problems. Some of the problems outlined in this study dealing with urban and regional development planning in Kenya (Chapter 2) are (a) rapid population growth, (b) regional disparities, (c) rapid urbanization, (d) urban unemployment, (e) housing the urban poor.

The study has further outlined in more detail the last three problems and more specifically the problem of housing the urban poor by analyzing the Kenyan experience of site and services housing projects (Chapter 3). The analysis and evaluation of fifteen existing and planned site and services housing projects have been used to explore a tentative employment/shelter based strategy for future site and services housing projects (Chapter 4). The various major components of such a strategy, namely the physical, economic, social, administrative/legal planning aspects have also been outlined.

It is the intent of this final chapter to highlight the major policy and planning issues related to site and services housing projects and to
outline some guidelines for future projects. Recommendations are made to
outline how economic efficiency and desirable physical standards in these
housing projects can be achieved. It is extremely difficult to achieve
both maximum economic efficiency and desirable physical standards at the
same time. A complete balancing of all the relevant factors is not always
attainable. However, it is possible to determine the trade-offs between
some of the crucial factors with some of the main factors and policy
issues as follows:

1. LAND:  A. The location of site and services housing projects within
various provinces.
   B. The location of site and services housing projects within
various urban centers.
   C. Land use within the site and services housing projects.
   D. Land tenure.
   E. Density (intensity of land use) within the urban centers
   and within the project.

2. LABOR:  A. Unemployment and under-employment within the urban center.
   B. Access to employment areas and availability of employment
   facilities.

3. CAPITAL:  A. Making resources (land, services, capital) available
   to target income groups.

4. UTILITIES AND SERVICES:  A. Levels of utilities and services within
   the housing projects.

5. DWELLINGS:  A. Building standards.

6. MANAGEMENT AND ADMINISTRATION:  A. Centralized versus decentralized
   organization.
Each of the six main factors are outlined below with a statement of the policy issues and an outline of the problems. In addition, for each factor policy recommendations are made and the reasons for these recommendations are stated. These recommendations should be considered as guidelines for policies and of course are not exhaustive. The guidelines are intended to provide a framework for solving some of the problems related to the planning of site and services housing projects in Kenya. However, the planning of specific projects in specific urban centers in Kenya will not be dealt with here but are the responsibility of local planning officers. The extent to which these guidelines may be useful to the local planners depends largely upon the political and economic situations prevailing at the time of project preparation and implementation. The 'success' of any project will depend primarily on the attitudes and commitments of the local politicians and decision makers and planners.

1. LAND.

ISSUE A : The location of site and services housing projects within the various provinces.

Problem: About 55% of the total site and services lots developed between 1969 to 1972 (i.e. 3900 lots) were located in only one major center, namely Nairobi. 35% were located in the Central Province. The remaining 10% were located in three provinces. These provinces have about 45% of the total urban population in Kenya. (see Chapter 2)

Policy Recommendations:

(a) Locate site and services housing projects in the urban centers of all the provinces, taking into account the
effective supply and demand of low cost housing.

(b) Locate projects along 'corridors' of future industrial and commercial growth (for example along the Thika-Nairobi 'corridor' or Mombasa-Malindi 'corridor').

Reasons: The policies recommended above will help to:

(a) decentralize urban growth

(b) increase the supply of urban land, services, transport, and other community facilities in the lesser developed provinces of the country

(c) increase the housing stock in provinces other than Nairobi

(d) create more employment in the building and construction industry in smaller market and local centers

(e) slow down the rate of migration into major urban centers

(f) distribute housing services to the urban poor and raise the income level of the low income population.

ISSUE B: The location of site and services housing projects within various urban centers.

Problem: Most of the existing site and services housing projects are located far away from employment areas. According to the I.B.R.D., in 1970 in Nairobi, 68% of the urban population could not afford a housing unit which would cost $2,076 in

any part of the city; 47% could not afford a multi-family housing unit with basic services, which cost $1,156 in the periphery; 52% could not afford a multi-family housing unit with basic services which cost $1,278 in the inner ring; and 87% could not afford a multi-family housing unit with basic services which cost $4,570 in the city center. This problem, as illustrated by the statistics in Nairobi, also faced by other urban centers in Kenya, is largely because of land speculation, the differences in land values, and the general accessibility to employment areas.

Policy Recommendations:

(a) set up Metropolitan Land Corporations in all provinces with the charge of acquiring land on the periphery and inner ring of the urban centers.49

(b) provide varying levels of services to the undeveloped land and put land onto the market when and where land is needed for development.

(c) rent or lease the land (subject to specified development contracts) to the highest bidder through auctions run by the government controlled Metropolitan land corporations.50

49 G. H. Beyer, Land Speculation: Some Causes and Solutions, Urban Renewal and Housing Administration, Puerto Rico, undated.
(d) rent or lease land developed at appropriate service levels and densities to the low income people. Direct or indirect subsidies to these tenants is desirable.

Reasons: The above recommended policies will help the local governments to:

(a) have greater control over the land and would further control land speculation.

(b) provide a constant flow of sites in the urban centers for public and private development projects including future site and services housing projects.

(c) receive maximum revenue possible, since the highest-bidder would use the land for the most efficient use to get the highest rate of return.

(d) supply serviced lots for the low income people close to potential and existing industrial and commercial areas.

**ISSUE C:** Land use within the site and services housing projects.

**Problem:** In almost all of the fifteen existing projects analyzed and evaluated in this thesis (see Chapter 3) the land has not been efficiently used from an economic standpoint. The parcels of land adjacent to the major roads (i.e. the exterior lots within a block) have relatively higher land values since the infrastructure networks are closer to these lots. This land could be used for higher density housing and also for commercial and/or industrial use.
The projects as planned do not recognize the potential benefits of using
this land in ways other than its current use. This is primarily due to
the lack of foresight by planners to provide on-site employment facilities
in these housing projects.

Policy recommendations:

(a) Plan the layouts in such a way that the block has
larger exterior lots with higher levels of services,
accessible from main roads and interior lots with
lower levels of services, accessible from cluster
courts linked to the main roads.

(b) Rent or lease high-value exterior lots to the highest
bidder subject to zoning laws, through the Metropoli-
tan Land Corporation (M.L.C.).

(c) Develop the exterior lots for high density apartments
and tenements and also for small scale industrial and/or
commercial use.

(d) Rent or lease low-value interior lots to the low
income families with a specific subsidy for construc-
tion of the dwelling units.

(e) Develop the interior lots for medium and high density
low cost housing for the urban poor.

Reasons: The above recommended policies will help to:

(a) create a 'balanced' land use in terms of land utiliza-
tion with adequate land for not only residential use
but also commercial and industrial use. (see Chapter
4).
(b) ensure the highest rate of return from the more highly valued exterior lots.
(c) provide maximum revenue to the local government (through the M.L.C.) and help to cross-subsidize the low income people occupying the interior lots.
(d) aim towards a 'self-supporting' community.
(e) develop an efficient physical layout and in turn enable to lower the development costs per lot and increase the functional viability of the site and services project.

**ISSUE D: Land Tenure.**

**Problem:** In almost all the fifteen existing projects (see chapter 3) the land tenure was predominantly private freehold land ownership. This type of land tenure restricts the supply of land in the market and gives greater control to the private developer and/or to the landlords.

**Policy recommendations:**

(a) Provide two types of land tenure options: 1) rental, 2) lease. (see Glossary for definitions).
(b) Provide two types of dwelling tenure options: 1) rental, 2) lease.

**Reasons:** The above recommended policies will help:

(a) the local governments (through the M.L.C.) to have greater control on the land market
(b) the user/lease-holder to put the land to the most
efficient use, subject to zoning laws.

(c) the user/lease-holder to have the option to sub-let or sub-lease rooms while being resident in the dwelling.

(d) the user/lease-holder to build more rental units and thus add to the housing stock to meet the growing demand for single room rental units; and also add to the real income of the low income user.

**ISSUE E:** Density (intensity of use) within the urban center and within the project.

**Problem:** The rate of return with low density housing on higher-value land is economically inefficient, both within the urban center as a whole as well as within the project. Due to the scarce amount of land in the city center, any housing project developed must be high density, relatively high cost housing, such as the multi-story housing projects in Hong Kong or Singapore. Moreover, due to the provision of public utilities and services, and of public transport to undeveloped land in the inner ring and the periphery, any housing project developed must have relatively higher density for relatively low cost housing, such as site and services housing projects. Most of the fifteen existing projects in Kenya, both in the inner ring and periphery, have low densities -- generally less than 300 persons per hectare -- and within the projects the density is generally consistently low (see Chapter 3).
Policy recommendations:

(a) Develop relatively high density, high cost housing projects (such as multi-story apartments) or commercial and/or industrial facilities on the more highly-valued land within the city center, and also on the exterior lots of a block within the project.

(b) Develop high and medium density, relatively low cost housing projects (such as site and services housing) on the lower-value land within the inner ring and periphery, and also on the interior lots of a block within the project.

Reasons: (a) Relatively higher densities on high-value land that can be rented or leased to the highest bidder, will ensure a higher rate of return, and in turn will result in higher revenues to the local government and furthermore will help to cross-subsidize housing for the urban poor. Within the project, exterior lots with 3 to 4 story apartments and tenements will result in densities of up to 600 people per hectare or more.

(b) High and medium densities on low-value land that can be rented or leased to low income people, will also enable the local government to receive maximum revenue possible. Within the project, interior lots with 1 to 2 story row houses will result in densities ranging between 300 to 600 persons per hectare.
2. LABOR

ISSUE A: Unemployment and under-employment within the urban centers.

Problem: According to the Development Plan '74-'78 (see Chapter 2), migration into urban centers will continue at the rate of 7% per year and, by 1978, 15% of the total population of the country (2.2 million) will be living in 59 towns, of which 52 already exist. The majority of this population will be poor and will require jobs and other basic needs such as food, shelter, public utilities and services.

Policy Recommendations:

(a) Locate future industrial and commercial areas along 'corridors' of future growth (for example along the Thika-Nairobi 'corridor' or Mombasa-Malindi 'corridor').

(b) Extend urban public transportation and infrastructure networks to smaller urban centers.

(c) Promote small-scale enterprises in the industrial and commercial sectors.

(d) Expand supervisory and managerial skills for the building and construction industry.

(The above are only a few of the possible recommendations: This issue has been more thoroughly dealt with in the I.L.O. Report).

Reasons: The above recommendations for policy will help:

(a) to create more jobs in the modern and public sectors
and will help overcome some of the problems of unemploy-
ment.
(b) create more jobs in the informal sector and will
enable small-scale contractors and artisans to under-
take other construction projects.
(c) increase the supply of serviced land, services, trans-
portation and community facilities in smaller urban
centers.

ISSUE B: Access to employment areas and on-site employment facilities.

Problem: In almost all the fifteen projects (see Chapter 3) the
projects were located far away from employment areas and
had limited or no on-site employment facilities.

Policy Recommendations:
The employment/shelter based strategy (see Chapter 4) deals
with this problem and can be a useful approach to overcome
the problem referred to above. Some specific recommenda-
tions are:
(a) Locate industrial and commercial areas on the periphery
and inner ring and extend urban public transportation
and infrastructure networks to serve these areas.
(b) Locate future site and services housing projects close
to or within walking distance of these industrial and
commercial areas.
(c) Provide on-site employment facilities -- such as
small-scale industries, workshops, stores and markets - within the project.

Reasons: The precise nature of direct and indirect employment effects of these recommendations is difficult to predict, but some tentative approximations may be made in support of these recommendations.

(a) Depending upon the scale and nature of off-site employment facilities, and the market for casual, unskilled and skilled labor in the modern sector, the employment generated may range from 60 to 80% of the jobs for the working age group of 15 to 59 years old living in the site and services housing projects.

(b) Depending upon the scale of the project and on-site building and construction, and the market for casual, unskilled and skilled labor in the public sector, the employment generated may range from 70 to 95% of the jobs for the working age group at the earlier stages of the project development.

(c) Depending upon the scale of the project and on-site small-scale industrial, commercial and community facilities, and the market for unskilled and skilled labor, the amount of employment generated may range from 20 to 40% of the jobs for the working age group at the later stages of the project development.
3. CAPITAL.

ISSUE A: Making resources (land, services, capital) available to target income groups.

Problem: In Kenya, as in many other developing countries, legal barriers and administrative controls protect specific groups or interests, mainly those of the middle and high income groups. The flow of resources (such as land, services, capital) into the housing sector is constrained by the availability of infrastructure needed to service housing. A significant feature of the housing demand in urban areas is that almost 70% of the low income families, earning about U.S. $670 per year or less, cannot afford a dwelling costing over U.S. $1,680 or renting for more than U.S. $15 per month (according to the Development Plan '70-'74 estimates in 1970). The major problem in housing the urban poor in Kenya is not to increase total housing expenditures but to re-distribute housing expenditures towards the low cost housing projects for the target low income population.

Policy Recommendations:

(a) Provide low interest, long-term loans to the low income population by supporting housing finance with public sector or foreign aid subsidies through a low cost housing finance institution.
(b) Continue to provide high interest, short-term loans to the high and middle income population by supporting housing finance through the Central Bank.

(c) Encourage the growth of co-operative housing organizations among low income people, in order to provide access to public sector or foreign aid subsidies for housing.

(d) Encourage the growth of co-operative small-scale industrial and commercial organizations among low income people to provide access to public sector or foreign aid subsidies for small-scale enterprises.

Reasons: The above recommended policies will help

(a) low income people to have access to the necessary financing for the construction of low cost housing.

(b) low income people to have a greater saving incentive, through the existence of a low cost housing finance institution.

(c) low income people to have greater access to serviced land and financing for housing and small-scale industries, workshops and stores.

(d) local governments to receive the maximum revenue possible and to help cross-subsidize housing for the urban poor.

(e) local governments to provide a constant flow of resources (land, services, capital) into the housing sector.
(The problem of misallocation of these resources through illegal and poor management and because of political pressures has not been dealt with in this study).

4. UTILITIES AND SERVICES.

ISSUE A: The initial level of utilities and services and upgrading over time within the urban area and within the housing projects.

Problem: Capital costs of complete, fully developed urban utilities and services is high and a large percentage of the low income families cannot afford to pay for them. In the fifteen projects studied in this thesis (see Chapter 3), the lots with relatively higher levels of on-site infrastructure were occupied or owned by middle income people. According to I.B.R.D.\(^{51}\) cost estimates, 66% of the households in Nairobi cannot afford a single family housing unit with complete individual on-site services at the cost of $1,860, on the periphery, while 47% of the households cannot afford a multi-family housing unit with minimum shared on-site at the cost of $1,156 also on the periphery. Similarly there are differences in the cost estimates of different service levels in the inner ring and city center. Moreover, there is also the problem of upgrading the initial levels of utilities and services within the housing projects.

\(^{51}\) I.B.R.D., op. cit., Table 6, Annex B, p. 7.
Policy recommendations:

(a) For projects located on the periphery of urban centers, use the following initial levels of utilities and services: (i) intermediate for land (exterior lots within a block) adjacent to the main roads, and (ii) minimum for land (interior lots within a block) accessible from cluster courts.

(b) For projects located in the inner ring of urban centers, use the following initial levels of utilities and services: (i) high for exterior lots, and (ii) intermediate for interior lots.

(c) For projects located in the city center of smaller urban centers, use the following initial levels of utilities and services: (i) intermediate for exterior lots, and (ii) minimum for interior lots.

(d) Plan and co-ordinate the upgrading of the initial levels of utilities and services with the overall progressive development of the housing projects.

Reasons: (a) In all the locational situations the land (exterior lots) with higher levels of utilities and services rented or leased to the highest bidder, since the total development cost per lot for on-site infrastructure will be relatively higher, will result in higher revenues to the local government.
(b) In all the locational situations the land (interior lots) with lower levels of utilities and services rented or leased to the lower income people, since the total development cost per lot for on-site infrastructure will be relatively lower, a larger percentage of low income households will be able to afford to pay for them.

(c) In all the locational situations, the users will be able to afford higher levels of utilities and services over time since with increase in real income the households will be able to afford to pay for them.

5. DWELLINGS.

ISSUE A: The use of very high building standards adopted from western industrialized countries.

Problem: Capital costs or per unit costs are high for the high building standards that are presently being used in conventional housing projects in Kenya. According to the I.L.O. Report, the per unit cost of a mud-and-wattle housing unit in a site and services project is about $9 to 14 per square meter (using Grade II By-laws) while the per unit cost for a masonry concrete "modern" housing unit in a conventional public housing project is about $112 to 140 per square meter (using Grade I By-laws).

Policy Recommendations:

(a) Adapt and modify lower building standards (such as the Grade II By-laws) both for future site and services housing projects and upgrading of squatter settlements in urban centers.

(b) Promote the use of local building materials (especially timber) and local construction techniques (especially mud-and-wattle type of construction).

Reasons: (a) Lower building standards will help to lower the per unit costs since many of the restrictions on the use of materials (as stated in Grade I By-laws) do not affect so much the performance quality as much as they affect the cost of construction per unit area.

(b) Lower building standards will enable the user to build the type of dwellings that they can afford to pay for.

(c) Lower building standards will also have some indirect effects on employment since the lowering of standards may result in a greater incentive to small-scale contractors and artisans to participate in the building and construction industry.

6. MANAGEMENT AND ADMINISTRATION.

ISSUE A: Centralized vs decentralized organization.

Problem: In a large number of the existing fifteen projects (see Chapter 3), the serviced lots which were originally intended for low income people are presently occupied by middle
income families. In addition, in many cases the lots are owned by higher income persons (absentee landlords). The illegal transfers are largely due to poor management, corruption and bribery. In some cases, political power and pressure has been used to acquire land and other resources.

Policy recommendations:

(a) Decentralize the operations of housing programs to the regional level. Set up Regional Site and Services Development Units (see Chapter 4) for each province.

(b) Increase administrative linkages between the users and the bureaucracy. Set up Community Site and Services Development Units for urban centers in each province.

(c) Increase participation between the users in individual projects. Set up Co-operative Housing Organizations for each project.

(d) Create a separate National Site and Services Development Unit within the National Housing Corporation.

(e) Make the proposed Metropolitan Land Corporation a part of the Regional Site and Services Development Units in each province.

Reasons: The above recommended policies will enable:

(a) the local governments to increase participation in urban and regional development planning.
(b) the users to increase participation in community and urban development.

(c) the National Housing Corporation to organize and co-ordinate national plans for site and services housing projects more effectively.

(d) the local governments to have greater control on land speculation and ensure proper allocation of land and other resources.
APPENDIX: Case Studies

This section includes the fifteen case studies. Each of these case studies is briefly described in similar terms: introductory descriptive notes (related to the project); physical data (related to land, infrastructure and dwellings); economic data (related to user and project); social/administrative data (related to user and community), locality block land utilization data (densities and areas); drawings (locality segment plan and typical dwelling plan). The data represents a typical situation in each of these projects. It covers a wide range of components and has been structured to permit the cross-comparison of different site and services housing projects and to show the relationships between the different components and economic considerations.
1. MATHARE CORE HOUSING, NAIROBI

Mathare Core Housing is part of the Mathare Redevelopment Project. The project was proposed in 1969 as a solution to deal with the problems of the Mathare squatter settlements. It is located 7 Km east of the city center.

History: The project was planned and designed by the Nairobi City Council in 1969. It consists of 500 lots with built sanitary core and three rooms and kitchen, allowing further expansion of an additional room. In 1972 the Government issued instructions to discontinue the project after construction had already started.

Users: The project was intended mainly for low income groups but is presently occupied by middle income groups. Most of these are wage earners employed in the city center. A proposed market on the site may create some on-site employment for some of the low income families in the surrounding residential areas.

Serviced lots and dwellings: The lots with an area of 83 square meters (7.5m x 11.2m) are laid out back to back in rows with service alleys and automobile access to each lot. It is basically a modified grid-iron layout. Each lot is served by individual water tap connections. Storm-water drainage, tarmac roads and walkways are also provided on site. The core houses are single story semi-detached units with 3 to 4 rooms with an open yard and washing area. These units constructed in masonry concrete block walls with C.G.I. roofing were built by small contractors using semi-skilled labor. The total development cost per lot was U.S.
DISCLAIMER

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Page 158 has been omitted due to a pagination error.
$2,766 of which 73% was for lot/dwelling development and 15% was for on-site infrastructure.

Comments: The project is based upon a town/garden city row houses model imported to Africa in the 19th century by the English. It has become a symbol of prestige and supremacy supported by African political leaders. However, this model as used in this project has redundant circulation and service alleys which make the land utilization wasteful. This is also reflected by the high development costs for on-site infrastructure per lot. The use of small contractors to build the project is contrary to the objective of providing employment due to the self-help efforts of the user for site and services projects. The density of 279 persons per hectare is low.
### Economic Data

**General:**
- User's income group: Middle
- Employment: Storekeeper
- Distance to work: 5 km
- Mode of travel: Bicycle

**Household Expenditure:**
- % of income for rent: 20%
- Food: 40%
- School fees: 10%
- Transport: 5%
- Other: 20%
- Savings: 5%

**Lot/Dwelling Costs:**
- Site preparation: 42.9
- On-site services: 414.3
- Lot development: 2,020.0
- Other: 289.2
- Total: 2,766.4

**Lot/Dwelling Expenditure:**
- Financing: Public Subsidized
- Rent: -
- Mortgage: 141/month

### Social/Administrative Data

**General:**
- User's origin: Kikushi
- Place of birth: Mutasa, Central Province
- Education level: Primary

**Number of Users:**
- Married: 2
- Single: 2
- Children: 3
- Total: 5

**Migration Pattern:**
- Number of moves: 2
  - Rural-Urban: 1963
  - Urban-Urban: 1970
  - Urban-Rural: -

**Administrative/Legal Organisations:**
- Project publicity: M.C.C. (Nairobi City Council)
- Lot allocation: M.C.C.
- Rent/Loan collection: M.C.C.
- Training local staff: M.C.C.
- Transfer of rights: M.C.C.

### Physical Data

**Land/Lot Utilisation:**
- Type: Private
- Area (sq.m.): 83.6 (7.5x11.2)
- Tenure: Legal Ownership

**Initial Infrastructure Level:**
- Water: On Lot
- Sewerage: On Lot
- Storm drainage: On Site
- Roads and walkways: On Site
- Street lighting: On Site
- Electricity: On Lot

**Dwelling Unit:**
- Type: Room
- Area (sq.m.): 11.3
- Tenure: Legal Rental/Ownership

**Dwelling Development:**
- Mode: Instant/Incremental
- Developer: Public
- Builder: Small Contractor
- Construction type: Masonry-Wood
- Year of construction: 1969

**Dwelling Facilities:**
- WC: 1
- Shower: 1
- Kitchen: 1
- Rooms: 3-4

**Materials:**
- Foundation: Concrete Strip
- Floors: Concrete Slab
- Walls: Masonry-Concrete Blocks
- Roof: C.G.I. on Timber

**Locality Block Land Utilisation Data:**

<table>
<thead>
<tr>
<th>Densities</th>
<th>Number</th>
<th>Area (Hectares)</th>
<th>Density (ha/ha)</th>
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<tbody>
<tr>
<td>Lots</td>
<td>19</td>
<td>0.34</td>
<td>56</td>
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<tr>
<td>Dwelling units (3 rooms per unit)</td>
<td>57</td>
<td>0.34</td>
<td>168</td>
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<tr>
<td>People (5 per unit)</td>
<td>95</td>
<td>0.34</td>
<td>279</td>
</tr>
</tbody>
</table>

**Areas:**
- Public (streets, walkways, open spaces): 0.176
- Semi-Public (open spaces, schools, community centres): -
- Private (lots, dwellings, shops, industries): 0.164
- Semi-Private (cluster courts): -

**Total:**
- Area served (circulation, lots): 86.3 m²
- Average lot area: 500 lots

**Network Efficiency:**
- K - network length (circulation) = 800 m/ha
- A - area served (circulation, lots) = 86.3 m²

**Total No. of Lots:** 500 lots
2. MATHARE SITE AND SERVICES I, NAIROBI.

Mathare site and services (Phase I) is part of the Mathare Valley Site and Minimum Services Project. The project was proposed in 1969 as a solution to deal with the problems of the Mathare squatter settlements. It is located 7 Km east of the city center.

History: The project was planned and designed by the Nairobi City Council in 1969. It consists of 375 serviced lots with built sanitary core consisting of individual services in a built superstructure. The construction was started in 1969 and currently the dwellings are being built mainly on self-help basis by the users.

Users: The project is presently occupied by low income groups. Most of them are either self-employed on-site or wage earners in the city center. A proposed on-site market may create some additional on-site employment.

Serviced lots and dwellings: The lots with an area of 126 square meters (12.6m x 10.0m) are laid out back to back in rows with service alleys and future automobile access to each lot. Each lot is served by individual piped water supply and individual waterborne sewerage connection. Storm water sewers and street lighting are provided on site and only the main roads are tarmac while the others are gravel surfaced. The built sanitary core with W.C. and shower is located at rear corner of the lot. The total development cost per lot was U.S. $572 of which 40% was for lot/sanitary core development and 42.5% was for on-site infrastructure. This cost is one-fifth the cost of the core housing unit built at the same time in Mathare.

Comments: The project has a lot of redundant circulation and service alleys which make the land utilization wasteful. Open spaces within the
project would lead to higher recurrent costs in terms of maintenance and general quality of the environment for the Nairobi City Council. The lots are served by infrastructure networks along the depth of the lot (12.6m), which is larger than the width of the lot (10.0m). This increases the on-site infrastructure costs per lot. The density of 267 persons per hectare is low.
ECONOMIC DATA
(related to user and project)

GENERAL:

- User's income group: LOW
- Employment: RETAILER
- Distance to work: 5 km.
- Mode of travel: BICYCLE

HOUSEHOLD EXPENDITURE:

- % of income for rent: 22%
- Food: 38%
- School fees: 10%
- Transport: 5%
- Other: 15%
- Savings: 0%

LOT/DWELLING COSTS:

- Site preparation: $144.3 (47.0%)
- On-site services: $242.0 (42.5%)
- Lot development: $228.6 (40.0%)
- Other: $-5.0
- Total: $571.6 (100.0%)

LOT/DWELLING PAYMENTS

- Financing: PUBLIC SUBSIDIZED
- Rent: $-
- Mortgage: $30/m.

PHYSICAL DATA
(related to land and dwelling)

LAND/LOT

- Utilization: PRIVATE
- Area (sq.m.): 126
- Tenure: LEGAL OWNERSHIP

INITIAL INFRASTRUCTURE LEVEL

- Water: ON LOT
- Sewerage: ON LOT
- Storm drainage: ON SITE
- Roads and walkways: ON SITE
- Street lighting: ON SITE
- Electricity: TO SITE

DWELLING UNIT

- Type: ROOM
- Area (sq.m.): 12
- Tenure: LEGAL RENTAL OWNERSHIP

DEVELOPMENT

- Model: INCREMENTAL
- Developer: PRIVATE
- Builder: SLEEPING ARTISAN
- Construction type: MASONARY-WOOD, MUD & WATTLE
- Year of construction: 1969

FACILITIES

- WC: 1
- Shower: 1
- Kitchen: 1
- Rooms: 3
- Other:

MATERIALS

- Foundation: CONCRETE STRIP/CADHERED SAND
- Floors: CONCRETE SLABS
- Walls: MASONARY, MUD & WATTLE
- Roof: C.G.I. ON TIMBER PURLINS

SOCIAL/ADMINISTRATIVE DATA
(related to user and community)

GENERAL

- User's ethnic origin: EXISTENT
- Place of birth: CENTRAL PROVINCE
- Education level: PRIMARY

NUMBER OF USERS

- Married: 1
- Single: 2
- Children: 0
- Total: 3

MIGRATION PATTERN

- Number of moves: 2
- Rural-Urban: 1964
- Urban-Urban: 1970
- Urban-Rural: -

ADMINISTRATIVE LEGAL ORGANIZATIONS

- Project publicity: M.C.C.
- Lot allocation: M.C.C.
- Rent/loan collection: M.C.C.
- Training local staff: M.C.C.
- Transfer of rights: M.C.C.

LOCALITY BLOCK LAND UTILIZATION DATA

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<tr>
<td>LOTS</td>
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<tr>
<td>DWELLING UNITS (3 rooms per unit)</td>
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<td>0.63</td>
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<td>PEOPLE (5 per unit)</td>
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ARAS

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<td>SEMI-PRIVATE (cluster courts)</td>
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<td>TOTAL</td>
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</table>

NETWORK EFFICIENCY

- Network length (circulation) = 844 m/Ha
- Average lot area = 126 m²
- Total no. of lots = 373 lots
3. MATHARE COMMUNAL SITE AND SERVICES I, NAIROBI.

Mathare Communal Site and Services (Phase I) is also part of the Mathare Valley Site and Minimum Services Project. The project was proposed in 1969 along with the core housing and site and services phase I as a solution to deal with the problems of the Mathare squatter settlements. It is located 7 Km east of the city center.

History: The project was planned and designed by the Nairobi City Council in 1969. It consists of 104 serviced lots with communal services located in built sanitary core units of 6 showers and 6 W.C.s. The construction of on-site infrastructure was started in 1969 and currently the dwellings are being built mainly on self-help basis by the users.

Users: The project is presently occupied by low income groups. Most of them are either self-employed or wage earners in the city center. A proposed on-site market may create some additional on-site employment.

Serviced lots and dwellings: The lots with an area of 126 square meters (12.6m x 10.0m) are laid out back to back with back alleys and front automobile access to each lot. The lots are located within walking distance (up to 50 meters) of the communal sanitary core units. The units have piped water supply and waterborne sewerage connections, and are shared by 20 lots. Storm water sewers and street lighting are provided on-site and only the main roads are tarmac while the others are gravel surfaced. The total development cost per lot was U.S. $400 of which 35.8% was for lot/communal sanitary core unit development and 32.8% for on-site infrastructure.

Comments: The project has a lot of redundant circulation and back alleys which make the land utilization wasteful and a burden to the Nairobi City
Council; open spaces around the communal sanitary core units would lead to higher recurrent costs in terms of maintenance and general quality of the environment. The cost of on-site infrastructure ($172 per lot) together with the cost of communal sanitary core units ($143 per lot) is higher than the total on-site infrastructure cost ($243 per lot) in the Mathare Site and Services Phase I, where each lot has individual utilities. The density of 242 persons per hectare is low.
### ECONOMIC DATA

**User's income group:** Low

**Employment:** Carpenter

**Distance to work:** 2 km.

**Mode of travel:** Walking

### HOUSEHOLD EXPENDITURE:

- **% of income for rent:** 15%
- **% of income for food:** 25%
- **% of income for education:** 15%
- **% of income for transport:** 5%
- **% of income for savings:** 5%

### LOTS/DWELLING COSTS:

- **Site preparation:** 14.3%
- **On-site services:** 32.8%
- **Lot development:** 35.8%
- **Other:** 17.8%

### HOUSEHOLD EXPENDITURE:

- **% of income for rent:** 15%
- **% of income for food:** 25%
- **% of income for education:** 15%
- **% of income for transport:** 5%
- **% of income for savings:** 5%

### LOTS/DWELLING PAYMENTS:

- **Financing:** Public Subsidized
- **Rent:** -
- **Mortgage:** 828/m.

### PHYSICAL DATA

**Land/Lot**

- **Area (sq. m.):** 126
- **Tenure:** Legal Ownership

**Initial Infrastructure Level**

- **Water:** To LOT
- **Sewerage:** To LOT
- **Storm Drainage:** On Site
- **Roads and Walkways:** On Site
- **Street Lighting:** On Site
- **Electricity:** To Site

### Dwelling Development

- **Mode:** Incremental
- **Developer:** Private
- **Builder:** Self-Help, artisan
- **Construction Year:** 1969
- **Type:** Mud & Wattle, Wood

### Dwelling Facilities

- **WC:** 1 (6 per 22 lots)
- **Shower:** 1 (6 per 22 lots)
- **Kitchen:** -
- **Room:** 6
- **Other:** -

### Materials

- **Foundation:** Compacted Earth
- **Floors:** Compacted Earth
- **Walls:** Mud & Wattle
- **Roof:** C.G.I on timber

### Social/Administrative Data

**User's ethnic origin:** Akamba

**Place of birth:** Kitui/Eastern Province

**Education Level:** Primary

### Number of Users

- **Married:** 2
- **Single:** 3
- **Children:** 3
- **Total:** 8

### Migration Pattern

- **Number of Moves:** 2
- **Intra-Urban:** 1960
- **Urban-Urban:** 1970
- **Urban-Rural:** -

### Administrative/Legal Organizations

- **Project Publicity:** M.C.C.
- **Lot Allocation:** M.C.C.
- **Rents/Loan Collection:** M.C.C.
- **Training Local Staff:** M.C.C.
- **Transfer of Rights:** M.C.C.

### Locality Block Land Utilization Data

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<th>Total Number</th>
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<th>Density H/ha</th>
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<tr>
<td>Lots</td>
<td>20</td>
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<td>30</td>
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<tr>
<td>Dwelling Units (2 rooms per unit)</td>
<td>80</td>
<td>0.66</td>
<td>121</td>
</tr>
<tr>
<td>People (3 per unit)</td>
<td>160</td>
<td>0.66</td>
<td>242</td>
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<td><strong>Areas</strong></td>
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<td>SDM+Public (open spaces, schools, community centers)</td>
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<td>Private (lots, dwellings, shops, industries)</td>
<td>-</td>
<td>0.25</td>
<td>381</td>
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<td>SDM+Private (cluster courts)</td>
<td>-</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>0.66</td>
<td>1002</td>
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</tbody>
</table>

### Network Efficiency

- **network length (circulation):** 612 m/ha
- **AVERAGE LOT AREA:** 126 m²
- **TOTAL NO. OF LOTS:** 104 LOTS
4. KARIOBANGI SITE AND SERVICES, NAIROBI.

Kariobangi is the second site and services project developed by the Nairobi City Council in 1964 (the first was in Pumwani in 1923). It is located 8 Km east of the city center, and bounded by the Outer Ring Road on the west and the Mathare and Gitathuru Rivers on the north and south respectively.

History: The project was designed to solve Nairobi's illegal housing problems on the recommendations of a working party in 1954. By 1964, 723 serviced lots with communal services located at the corners of four lots were allocated to low income people on 10 to 15 year leases. Eighty-eight % of the original owners sold the lots to absentee landlords, who developed the existing mud-and-wattle dwellings and sublet them as speculative tenements.

Users: Moderately low income people presently occupy the lots instead of the planned very low income families. Employment is primarily in the nearby industrial areas and in Ruaraka, while some are self-employed and have small on-site commercial enterprises. An adjacent market also has a diverse range of small scale industries and businesses within the popular/informal sector.

Serviced lots and dwellings: The lots with an area of 167 square meters (12.2m x 13.7m) are laid out in groups of four having access from all the four sides. The communal sanitary core units are located at the corner of each group of lots. These units have piped water supply and waterborne sewerage serving each lot. Storm-water drainage and street lighting are provided on site, and only the main roads are tarmac while the others are murram surfaced. The dwellings consist of 4 to 6 rooms constructed in
mud-and-wattle by skilled and semi-skilled artisans and/or with the help of the users. The initial total development cost per lot was U.S. $268 of which 30% was for lot/communal sanitary core unit development and 68.4% for on-site infrastructure.

Comments: The project layout is a 'labor camp' row/group houses model based on colonial military camp layouts. It has become a symbol of colonialism rejected by African political leaders. Circulation all around the dwellings is redundant and wasteful. The medium/high density of 487 persons per hectare aggravates the very poor living conditions in the project.
ECONOMIC DATA
(related to user and project)

GENERAL:
user's income group: MODERATELY LOW
employment: MERCHANT
distance to work: 2 km
mode of travel: WALKING

HOUSEHOLD EXPENDITURE:
% of income for rent: 16%
food: 40%
school fees: 7%
transport: 7%
other: 25%
savings: 5%

GENERAL:
user's income group: MODERATELY LOW
employment: MERCHANT
distance to work: 2 km
mode of travel: WALKING

HOUSEHOLD EXPENDITURE:
% of income for rent: 16%
food: 40%
school fees: 7%
transport: 7%
other: 25%
savings: 5%

GENERAL:
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user's income group: MODERATELY LOW
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distance to work: 2 km
mode of travel: WALKING

HOUSEHOLD EXPENDITURE:
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other: 25%
savings: 5%

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TYPICAL DWELLING
5. **DANDORA SITE AND SERVICES, NAIROBI.**

Dandora site and services is a proposed project to be implemented in 1975-78 by the Nairobi City Council. It will be located 10 Km north east of the city center, and bounded by Komo Rock Road on the south, Nairobi-Thika railroad on the east and Nairobi and Gitathuru Rivers on the west and north respectively.

**History:** The project preparation and formulation goes back to 1969 when during the course of the Nairobi Urban Study it was proposed as an interim urbanization project as part of a co-ordinated low income housing program for Nairobi. The project is intended to provide 6,000 new serviced lots of varying sizes with individual services to each lot. At the time of this study, the Nairobi City Council and the International Bank for Reconstruction and Development have agreed to implement the project with a loan from the World Bank. Once built it will be the biggest site and services project in Kenya.

**Users:** The target income groups would be predominantly the low income households with annual incomes ranging between U.S. $350 to U.S. $1,100 per annum. On-site markets and small-scale industries and commercial facilities would be provided to generate employment. Off-site employment opportunities exist in the surrounding industrial areas of Dandora, Ruraka and Nairobi industrial area.

**Serviced lots and dwellings:** The lots ranging in area from 100 to 140 square meters (6.3m x 19.0m for a 120 sq.m. lot) will be laid out back to back in form of a gridiron layout along a central spine with community facilities. Each lot will have individual piped water supply and individual waterborne sewerage. Storm and surface water drainage, street
lighting and surfaced roads networks will be provided on site. Sanitary core units will be built on each lot and materials loan will be provided for constructing 2 to 3 room dwellings. The Nairobi City Council will also provide technical assistance to the users for self-help construction of the units. The initial total development costs per lot would be U.S. $1482 (based on 1974 estimates) of which 43.6% would be for lot/sanitary core/material loan and 20% for on-site infrastructure.

Comments: The project as formulated shows a wide range of benefits. It may be argued at a policy level as to why a project of this scale should be located in Nairobi. Would it not have an impact on the rural-urban migration? Would the planned on-site commercial facilities generate sufficient employment? How much of the population would be employed in off-site industrial and service sectors? Why should such a large project be developed when the living conditions of 60,000 squatters in Mathare Valley are deteriorating?
ECONOMIC DATA
(related to user and project)

GENERAL:
user's income group: LOW, MIDDLE
employment: - -
distance to work: - -
mode of travel: - -

HOUSEHOLD EXPENDITURES:

LOT/DWELLING COSTS:

LOT/DWELLING CAPS:

FINANCING:
PUBLIC SUBSIDIZED

lot allocation:
rent: - -
mortgage: $10 - $21/m.

PHYSICAL DATA
(related to land and dwelling)

LAND/LOT
utilization: PRIVATE
area (sq.m.): 120 (100, 140)
tenure: LEGAL LEASEHOLD

INITIAL INFRASTRUCTURE LEVEL
water: ON LOT
sewerage: ON LOT
storm drainage: ON SITE
roads and walkways: ON SITE
street lighting: ON SITE
electricity: TO SITE

DWELLING UNIT
type: ROOMS
area (sq.m.): 9.9
	tenure: LEGAL LEASEHOLD

DWELLING
location: PERIPHERY
type: ROW/GROUP
area (sq.m.): 49.6
number of floors: 1

UTILIZATION:

MULTIPLE: INDIVIDUAL/

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES

LOTS

DWELLING UNITS (3 rooms per unit)

PEOPLE (5 per unit)

AREAS

PUBLIC (streets, walkways, open spaces)

Semi-PUBLIC (open spaces, schools, community centers)

PRIVATE (lots, dwellings, shops, industries)

Semi-PRIVATE (cluster courts)

TOTAL

NETWORK EFFICIENT
R = network length (circulation) - 446 m/ha
areas served (circulation, lots)

AVERAGE LOT AREA = 100-120 m²

TOTAL NO. OF LOTS = 6,000 LOTS
LOCALITY SEGMENT: LOT SUBDIVISION

1:2500

TYPICAL DWELLING

1:200
6. KISAUNI OWNER-BUILDER PROJECT, MOMBASA.

Kisauni is a public rental project on land owned by the Mombasa Municipal Council. It is located on the mainland, off the major road connecting the island with Malindi, another urban center in the north.

History: Project preparations started in 1959 and the project was finally approved ten years later in 1969. The construction of on-site infrastructure started in 1970. The project was under construction at the time of the survey carried out by the H.R.D.U. in 1971. It had 100 serviced lots with basic minimum services. The users had to develop the dwellings within 2 years from allocation. The lots were to be allocated by a sub-committee under the Mombasa Municipal Council, after applicants had been invited through advertisements in local newspapers.

Users: Moderately low income families would occupy the lots. The project is located near off-site employment areas and has on-site shopping center to be built in the near future.

Serviced lots and dwellings: The lots with an area of 326 square meters (15.2m x 21.3m) are laid out in rows with back to back having access from one side only. It is basically a gridiron layout. Each lot has individual piped water supply and waterborne sewerage leading to common septic tanks. Storm water drains, street lighting are provided on site; and the main roads are tar sealed murram. The dwellings are 4-roomed detached units with W.C., shower and cooking space facing an open courtyard. The plan is based upon a traditional Swahili type layout. The initial total development cost per lot was U.S. $400 of which 95.8% was for on-site infrastructure.

Comments: The layout is similar to a small scale version of a model
estate for Victorian suburban cottages used originally by upper middle income groups in the 19th century in England. It has wasteful land utilization in urban areas since it demands large areas of land. (Lot sizes for the case studies in Nairobi range from 86 to 167 square meters). The density of 155 persons per hectare is low.
### Economic Data

**General:**
- User's income group: Moderately Low
- Distance to work: 
- Mode of travel: 
- Employment: 
- Households expenditure:
  - % of income for rent: 
  - Food: 
  - School fees: 
  - Transport: 
  - Other: 
  - Savings: 
- Lot/plot costs:
  - Site preparation: 
  - On-site services: 
  - Lot development: 
  - Other: 
  - Total: 

### Lot/plot costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Site preparation</td>
<td>$300.00</td>
</tr>
<tr>
<td>On-site services</td>
<td>$90.00</td>
</tr>
<tr>
<td>Lot development</td>
<td>$15.00</td>
</tr>
<tr>
<td>Other</td>
<td>$1.20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$400.00</strong></td>
</tr>
</tbody>
</table>

### Lot/plot payments

- Financing: Public Subsidized
- Rent: 
- Mortgage: 15/48

### Physical Data

**Land/lot**
- Utilization: Private
- Area (sq.m): 226
- Tenure: Legal Ownership

**Initial infrastructure level**
- Water: ON LOT
- Sewerage: ON LOT
- Storm drainage: ON SITE
- Roads and walkways: ON SITE
- Street lighting: ON SITE
- Electricity: ON SITE

**Dwelling unit**
- Type: Room
- Area (sq.m): 10.3
- Tenure: Legal Rent/Ownership

**Dwelling**
- Location: Periphery
- Type: Row/group
- Area (sq.m): 71.4
- Number of floors: 1
- Utilization: Multiple/Family, Individual
- Mode: Incremental/Instant
- Developer: Private
- Builder: Self Help/Artisan/Small Contractor
- Construction type: Mud/Wattle/Masonry
- Year of construction: 1970-72
- Dwelling facilities:
  - WC: 1
  - Shower: 1
  - Kitchen: 1
  - Rooms: 4
  - Other: Courtyard

**Materials**
- Foundation: Concrete Strip
- Floors: Concrete Slab
- Walls: Mud/Wattle
- Roof: Concrete Blocks
- Ceiling: C.C.I. on timber

### Locality block land utilization data

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Number</th>
<th>Area (hectares)</th>
<th>Density (per ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Densities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lots</td>
<td>20</td>
<td>1.03</td>
<td>19</td>
</tr>
<tr>
<td>Dwelling units (3 rooms per unit)</td>
<td>80</td>
<td>1.03</td>
<td>78</td>
</tr>
<tr>
<td>People (3 per unit)</td>
<td>160</td>
<td>1.03</td>
<td>155</td>
</tr>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.29</td>
<td></td>
<td>282</td>
</tr>
<tr>
<td>Semi-public (open spaces, schools, community centers)</td>
<td>0.99</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>Private (lots, dwellings, shops, industries)</td>
<td>0.65</td>
<td>632</td>
<td></td>
</tr>
<tr>
<td>Semi-private (cluster courts)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1.03</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Network efficiency

- \( R = \text{network length (circulation)} = 426 \text{ m/ha} \)
- Areas served (circulation, lots) = 326 m²
- Average lot area: 78 m²
- Total no. of lots: 100 LOTS.
7. CHANGAMWE OWNER-BUILDER PROJECT, MOMBASA.

Changamwe Owner-builder Project is developed on land owned by the Mombasa Municipal Council. It is located on the mainland off the major road connecting the island with Nairobi.

History: Project preparations started in 1955 and the final construction of on-site infrastructure took one year and the progressive development of dwellings has continued since 1960. It has 110 serviced lots with basic services to each lot. The lots were allocated by a sub-committee of the Mombasa Municipal Council after applicants had been invited through advertisements in local newspapers.

Users: Seventy-five % of the households were in the low income sector with annual income of less than U.S. $838 per annum and the remaining 25% had more than U.S. $1,512 per annum. A majority of the users (about 70%) were unskilled and skilled workers in the off-site employment areas. Eight % of the heads of household were unemployed at the time of the survey.

Serviced lots and dwellings: The lots with an area of 188 square meters (12.2m x 15.3m) are laid out in rows back to back having access from one side only. It is basically a gridiron layout. Each lot has individual piped water and individual waterborne sewerage. Tar sealed murram roads with open channel drainage are provided on site but no street lighting. Each dwelling is based upon a plan provided by the Council and has five rooms, W.C., shower and kitchen and stove facing an open courtyard. The initial total development cost per lot was U.S. $257 of which 15% was for site preparation and 85% for on-site infrastructure.
Comments: The layout permits medium and high population densities but has undefined open spaces which are a burden to the Council. It can be re-designed and improved by eliminating redundant open spaces and circulation. Lack of on-site commercial areas and markets along with limited public transport are some of the problems facing the community. Others have complained of lack of adequate street lighting in the project, and fear of robbers and thieves.
### Economic Data

**General:**
- User's income group: Moderately Low
- Employment: Carpenter
- Distance to work: 3 km
- Mode of travel: Bus

**Household Expenditure:**
- Percentage of income for rent: 92
- Food: 37
- School fees: 122
- Transport: 12
- Other: 22
- Savings: 8

**Lot/Dwelling Costs:**
- Site preparation: $36.0
- On-site services: $221.0
- Development: $239.0
- Total: $257.0

### Lot/Dwelling Payments
- Financing: Public Subsidized
- Rent: $-
- Mortgage: $15.5 per month

### Physical Data

**Land/Lot Utilization:** Private
- Area (sq.m.): 188
- Tenure: Legal Ownership
- Initial Infrastructure Level:
  - Water: On Lot
  - Sewage: On Lot
  - Storm Drainage: On Site
  - Roads and Walkways: On Site
  - Street Lighting: None
  - Electricity: None

**Dwelling Unit Type:** Room/Group
- Area (sq.m.): 10.5
- Tenure: Legal Ownership

**Dwelling Development:**
- Mode: Incremental/Instant
- Builder: Self-Help/Artisan/Small Contractor
- Construction Year: 1960
- Construction Type: Mud-Wattle
- Dwelling Facilities:
  - WC: 1
  - Shower: 1
  - Kitchen: 1
  - Room: 5
  - Other: Store and Court Yard

**Materials:**
- Foundation: Compacted Earth/Concrete Strip
- Floors: Concrete/Contacted Earth
- Walls: Mud-Wattle
- Roof: C.C.I or Thatch on Timber Purlins

### Social/Administrative Data

**General:**
- User's ethnic origin: Akamba
- Place of birth: Machakos, Eastern Province
- Education level: Primary

**Number of Users:**
- Married: 2
- Single: 1
- Children: 2
- Total: 5

**Migration Pattern:**
- Number of moves: 1
- Rural-Urban: -
- Urban-Urban: 1961
- Urban-Rural: -

**Administrative/Legal Organizations:**
- Project Publicity: M.M.C.
- Lot Allocation: M.M.C.
- Rent/Loan Collection: M.M.C.
- Training Local Staff: M.M.C.
- Transfer of Rights: M.M.C.

### Locality Block Land Utilization Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Area (Hectares)</th>
<th>Density (per Hectare)</th>
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<tbody>
<tr>
<td>Densities</td>
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<tr>
<td>Lots</td>
<td>20</td>
<td>0.76</td>
<td>26</td>
</tr>
<tr>
<td>Dwelling Units (3 rooms per unit)</td>
<td>339</td>
<td>0.76</td>
<td>466</td>
</tr>
<tr>
<td>People (3 per unit)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.38</td>
<td>50%</td>
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</tr>
<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Private (lots, dwellings, shops, industries)</td>
<td>0.38</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Semi-Private (cluster courtyards)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>0.76</td>
<td>100.0</td>
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</table>

**Network Efficiency:**
- R = network length (circulation) / areas served (circulation, lots)

AVERAGE LOT AREA = 188 sq.m.
TOTAL NO. OF LOTS = 310 LOTS
8. LIKONE OWNER-BUILDER PROJECT, MOMBASA.

Likoni Owner-builder Project is also developed on land owned by the Mombasa Municipal Council. It is located on the mainland off the major road connecting the island with other urban centers in the south and Tanga in Tanzania.

History: Project preparations started in 1969 by the Council staff and the project was approved in 1969. At the time of the survey in 1970 tenders had been called. The project has 153 serviced lots with basic minimum services. The lots were allocated to individuals by a sub-committee of the Council, after applicants had been invited through advertisements in local newspapers.

Users: The majority of the users were in the moderately low income groups. No detail data is available on the employment situation.

Serviced lots and dwellings: The lots with an area of 251 square meters (20.0m x 12.5m) are laid back to back along the depth of the lots. It is a poor modified version of a gridiron layout. Each lot has individual piped water and individual waterborne sewerage connected to a common septic tank. Tar sealed murram roads with storm water drains are provided on site but there is no street lighting. The dwelling is based upon a type plan provided by the Council and has five rooms, W.C., shower, and kitchen and stove facing an open court yard. No figures are available on the development costs per lot.

Comments: The project has a lot of redundant circulation and open spaces which make the land utilization wasteful. Open spaces within the project would lead to higher recurrent costs in terms of maintenance and general quality of the environment for the Mombasa Municipal Council. The lots
are served by infrastructure networks along the depth of the lot (20.0m), which is larger than the width of the lot (12.5m). This increases the on-site infrastructure costs per lot. The layout permits very low density of 120 persons per hectare and does not justify the use of land for residential development in an urban area.
ECOOMIC DATA
(related to user and project)

GENERAL:
user’s income group: LOW
employment: -
distance to work: -
mode of travel: -

HOUSEHOLD EXPENDITURE:
% of income for rent: -
food: -
school fees: -
savings: -
other: -

LOT/DWELLING COSTS:
site preparation: NA
"on-site services": -
lot development: -
other: -
total: $420 1002

LOT/DWELLING PAYMENTS
financing: PUBLIC SUBSIDIZED
rent: -
mortgages: NA

SOCIAL/ADMINISTRATIVE DATA
(related to user and community)

GENERAL:
user’s ethnic origin: L20
place of birth: NUBA/SA, COAST PROVINCE
education level: PRIMARY

NUMBER OF USERS
married: 2
single: 2
children: 2
total: 6

MIGRATION PATTERN
number of moves: 1
rural-urban: -
urban-urban: 1971
urban-rural: -
why came to urban center: -

ADMINISTRATIVE/LEGAL ORGANIZATIONS
project publicity: M.N.C.
lot allocation: M.N.C.
rents/loan collection: M.N.C.
training local staff: M.N.C.
transfer of rights: M.N.C.

PHYSICAL DATA
(related to land and dwelling)

LAND/LOT
 utilisation: PRIVATE
area (sq.m.): 251
tenure: LEGAL OWNERSHIP

INITIAL INFRASTRUCTURE LEVEL
 water: ON LOT
sewerage: ON LOT
storm drainage: ON SITE
roads and walkways: ON SITE
street lighting: ON SITE
electricity: ON SITE

DWELLING UNIT
 type: ROOMS
area (sq.m.): 15.6
tenure: LEGAL REDEMPTION

DWELLING
 location: PERIPHERY
type: ROW/Grupo (SNAWALL)
area (sq.m.): 78.2
number of floors: 1
utilisation: MUSELPLE: INDIVIDUAL/

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total</th>
<th>Area</th>
<th>Density</th>
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<tr>
<td>LOTS</td>
<td>36</td>
<td>1.80</td>
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</tr>
<tr>
<td>DWELLING UNITS (3 rooms per unit)</td>
<td>180</td>
<td>1.80</td>
<td>100</td>
</tr>
<tr>
<td>PEOPLE (5 per unit)</td>
<td>216</td>
<td>1.80</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Total</th>
<th>Area</th>
<th>Percentages</th>
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</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.90</td>
<td>50%</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>PRIVATE (lots, dwellings, shops, industries)</td>
<td>0.90</td>
<td>50%</td>
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</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>1.80</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY
R = network length (circulation) = 303 m/ha
areas served (circulation, lots) = 251 m^2
AVERAGE LOT AREA = 251 m^2.
TOTAL NO. OF LOTS = 153 LOTS.
LOCALITY SEGMENT : LOT SUBDIVISION

TYPICAL DWELLING
Biafra Site and Services Project - Phase I, is developed on land owned by the Thika Municipal Council (T.M.C.). It is located within the inner ring of the city near an industrial area on the east of the city center. History: Project was planned and designed in 1968 by the Architect's Department of the National Housing Corporation (N.H.C.). The construction of the on-site infrastructure was carried out by the T.M.C. direct labor force in 1970. The project has 42 serviced lots with individual built sanitary core units. The Town Clerk of T.M.C. was responsible for the allocation of lots to individuals with low incomes, after applicants had been invited through advertisements.

Users: Most of the users are in the low income sector, earning about U.S. $325 per annum. Most of them are skilled or unskilled workers employed in the nearby industrial area.

Serviced lots and dwellings: The lots with an area of 298 square meters (12.2m x 24.4m) are laid out back to back with automobile access to each lot. Each lot has individual piped water and individual waterborne sewerage connected to a main sewer. Tarmac roads with surface drains and street lighting are provided on site. The dwelling plans provided by the N.H.C. in most cases were modified by the users and had 5 to 7 rooms, W.C., shower, and kitchen and stove (which in some cases was converted to a bedroom and sub-let). The initial total development cost per lot was U.S. $1025 of which 42.5% was for lot/built sanitary core unit development and 57.5% was for on site infrastructure.

Comments: The dwelling plan is poor and wasteful in terms of set-backs.
from the lot boundary lines and does not permit the progressive development of the units. Even though the layout permits medium/high density of 476 persons per hectare, most of the users complained of poor living conditions including lack of electricity, poor maintenance of toilets and deteriorating conditions of the roads.
ECONOMIC DATA
(related to user and project)

GENERAL:
- User's income group: LOW
- Employment: SKILLED UNION
- Distance to work: 2 km
- Mode of travel: WALKING

HOUSEHOLD EXPENDITURE:
- 2 of income for rent:
- Food:
- School fee:
- Transport:
- Other:
- Savings:

LOT/DWELLING COSTS:
- Site preparation: $569.2
- On-site services: $57.5
- Lot development: $436.0
- Other:
- Total: $1,025.2

LOT/DWELLING PAYMENTS
- Financing: PUBLIC SUBSIDIZED
- Rent:
- Mortgage: $60.0/m.

SOCIAL/ADMINISTRATIVE DATA
(related to user and community)

GENERAL:
- User's ethnic origin: KIKUYU
- Place of birth: KIKUYU, CENTRAL PROVINCE
- Education level: PRIMARY

NUMBER OF USERS
- Married: 1
- Single: 8
- Children:
- Total: 9

MIGRATION PATTERN
- Number of moves:
  - Rural-urban: 2
  - Urban-urban: 1965
  - Urban-rural: 

ADMINISTRATIVE/LEGAL ORGANIZATIONS
- Project publicity: T.M.C.
- Lot allocation: T.M.C.
- Rent/loan collection: T.M.C.
- Training local staff: T.M.C.
- Transfer of rights: T.M.C.

PHYSICAL DATA
(related to land and dwelling)

LAND/LOT
- Utilization: PRIVATE
- Area (sq.m.): 298
- Tenure: LEGAL OWNERSHIP

INITIAL INFRASTRUCTURE LEVEL
- Water to lot:
- Sewerage to lot:
- Storm drainage:
- Roads and walkways:
- Street lighting:
- Electricity:

DWELLING UNIT
- Type: BUNGALOW
- Area (sq.m.): 10.1
- Tenure: LEGAL RENTAL/ OWNERSHIP

LOCALITY BLOCK LAND UTILIZATION DATA
- DENSITIES
  - Lots: 12
  - Dwelling units (3 rooms per unit): 72
  - People (5 per unit): 238
- Areas
  - Public (streets, walkways, open spaces): 0.14
  - Semi-public (open spaces, schools, community centers):
  - Private (lots, dwellings, shops, industries):
  - Semi-private (cluster courts):
- Total:

NETWORK EFFICIENCY
- R = network length (circulation) = 305 m/s
- Areas served (circulation, lots) = 208 m²
- Average lot area = 208 m²
- Total no. of lots = 42 lots
Kianjau Estate is a site and services project built by a co-operative society on privately owned land. It is located on the periphery of Thika Township.

History: The project was planned and developed by Kianjau Farming Cooperative Society in 1968. At the time of the survey, the Thika Municipal Council had ordered the society to demolish the project since it did not conform with the Municipal by-laws.

Users: Most of the users have rented rooms from the original landlords who are members of the Society. They are mainly in the low and very low income group earning less than U.S. $235 per annum. Most of them are unskilled and skilled workers, while others are clerks and students. Some of the heads of households were unemployed in 1970. A number of users get additional income from growing vegetables and maize and keeping goats on small farms (shambas).

Serviced lots and dwellings: The lots with an area of 930 square meters (30.5m x 30.5m) are laid out back to back in a rigid 'labor camp' type of layout in groups of four. Each lot has only one latrine and a separate enclosure for a shower. Water was sold from a common tap but most used water from a nearby swamp. There were no other services provided on site. No figures are available on the development costs per lot. The dwellings were 4 to 12 rooms without kitchens.

Comments: This is a very poor example of a project promoted, financed and maintained by a badly organized co-operative society with a large number...
of absentee landlords. A majority of the users complained about the deteriorating living conditions including lack of basic services such as water, sewerage, roads and street lighting. The lot sizes of 930 square meters are the largest lots studied and the density of 218 persons per hectare is low. These factors do not justify the use of urban land for such projects.
ECONOMIC DATA

General:

User's income group: LOW, VERY LOW
Employment: HOUSE-SERVANT
Distance to work: 3 km.
Mode of travel: WALKING

Household Expenditure:

% of income for rent: 22%
Food: 23%
School fee: 12%
Transport: 12%
Other: 38%

Lot/Dwelling Costs:

Site preparation: NA
On-site services: NA
Lot development: NA
Other: NA
Total: NA

Lot/Dwelling Payments:

Financing: PUBLIC SUBSIDIZED
Rent: $6/month
Mortgage: NA

PHYSICAL DATA

Land/Lot

Utilization: PRIVATE
Area (sq.m.): 930
Tenure: LEGAL OWNERSHIP

Initial Infrastructure Level

Water: ON SITE
Sewerage: NONE
Storm Drainage: ON SITE
Roads and Walkways: ON SITE
Street Lighting: NONE
Electricity: NONE

Dwelling Unit

Type: ROOM
Area (sq.m.): 10.5
Tenure: LEGAL RENTAL (ABSENTEE LANDLORDS)

Dwelling

Location: PERIPHERY
Type: ROW/GROUP
Area (sq.m.): 85
Number of Floors: 1
Utilization: MULTIPLE, INDIVIDUALS

On-Site Infrastructure Costs (per lot - percentage)

Water supply: NA
Sewerage: NA
Surface drainage: NA
Street lighting: NA
Electricity: NA

LOT/DWELLING COSTS:

Site preparation: NA
On-site services: NA
Lot development: NA
Other: NA
Total: NA

LOT/DWELLING PAYMENTS

Financing: PUBLIC SUBSIDIZED
Rent: $6/month
Mortgage: NA

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES

Lots

16

1.79

9

Dwelling Units (3 rooms per unit)

115

1.79

64

People (5 per unit)

391

1.79

218

Areas

Hectares Percentages

Total

1.79

100%

Network Efficiency

R = network length (circulation) = 300 m/ha
Areas served (circulation, lots) = 930 m².
Average Lot Area = 930 m².
Total 300 of Lots = 480 Lots.
LOCALITY SEGMENT: LOT SUBDIVISION

1:2500
11. KARATINA SITE AND SERVICES, KARATINA.

Karatina Site and Services is a project developed by the National Housing Corporation for the Karatine Town Council. (K.T.C.)

History: Project preparation started in 1968 and the project was approved in 1970. The construction of on-site infrastructure was estimated to have started in 1971. The project has 94 serviced lots with individual built sanitary core units. The lots were allocated by the Town Superintendent to individuals who were Kenyan citizens; had regular employment with an income of $500 to $1000 per annum; could furnish a deposit of $23 and a list of references with the application.

Users: Most of the users are in the low and moderately low income groups earning less than $1000 per annum.

Serviced lots and dwellings: The lots with an area of 242 Square meters (11.0m x 22.0m) are laid out back to back in a gridiron type of layout. Each lot has individual piped water and individual waterborne sewerage connected to a common oxidation pond. All roads are earth roads without storm drains and street lighting. The dwelling plans provided by the N.H.C. has 3-room detached unit with W.C., shower and kitchen facing a verandah. The initial development cost per lot was U.S. $511 of which 33.5% was for lot/built sanitary core unit development and 62.2% for on-site infrastructure.

Comments: The layout permits medium and high densities, but as planned it only has low density of 205 persons per hectare. The lot coverage is only 20%. The location of the built sanitary core unit and the dwelling does not permit the progressive development of the units. The arbitrary
set-backs from the lot boundary lines result in wasteful land utilization. From experience of other similar layouts, these set-backs often become dumping grounds for rubbish.
ECONOMIC DATA
(related to user and project)

GENERAL:
user's income group: LOW
employment: CLERK
distance to work: 2 km.
mode of travel: BICYCLE

HOUSEHOLD EXPENDITURE:
% of income for rent: -
food: -
school fees: -
transport: -
other: -
savings: -

LOT/DWELLING COSTS:
$ x
site preparation: -
onsite services: 318.2
lot development: 170.9
other: 21.6
total: $510.7

LOT/DWELLING PAYMENTS:
financing: PUBLIC SUBSIDIZED
rent: -
mortgage: $4 PER MONTH

PHYSICAL DATA
(related to lot and dwelling)

LAND/LOT
utilisation: PRIVATE
area (sq.m.): 242
tenure: LEGAL OWNERSHIP

INITIAL INFRASTRUCTURE LEVEL
water: ON LOT
sewerage: ON SITE
storm drainage: TO SITE
roads and walkways: ON SITE
street lighting: TO SITE
electricity: TO SITE

DWELLING UNIT
type: ROOM
area (sq.m.): 9.9

DWELLING
location: INNER RING
type: DETACHED HOUSE
area (sq.m.): 50.6
number of floors: 1
utilisation: MULTIPLE: FAMILY, INDIVIDUAL

SOCIAL/ADMINISTRATIVE DATA
(related to user and community)

GENERAL
user's ethnic origin: KIKUYU
place of birth: KARATINA, CENTRAL PROVINCE
education level: PRIMARY

NUMBER OF USERS
married: 3
single: -
children: 1
total: 3

MIGRATION PATTERN
number of moves: 1
rural-urban: -
urban-urban: 1970
urban-rural: -
why came to urban center: N/A (HOUSING)

ADMINISTRATIVE/LEGAL ORGANIZATIONS
project publicity: K.T.C.
lot allocation: K.T.C.
rents/loan collection: K.T.C. (KARATINA TOWN COUNCIL)
training local staff: K.T.C.
transfer of rights: K.T.C.

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area</th>
<th>Density</th>
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</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>16</td>
<td>0.75</td>
<td>21</td>
</tr>
<tr>
<td>DWELLING UNITS (1 room per unit)</td>
<td>48</td>
<td>0.75</td>
<td>64</td>
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<tr>
<td>PEOPLE (5 per unit)</td>
<td>154</td>
<td>0.75</td>
<td>205</td>
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</tbody>
</table>

AREAS
PUBLIC (streets, walkways, open spaces) | 0.15 | 33%
PRIVATE (lots, dwellings, shops, industries) | 0.29 | 52%

TOTAL | 0.75 | 100.0

NETWORK EFFICIENCY
R = network length (circulation, lots) = 151 m/ha
areas served (circulation, lots) = 94 LOTS

AVERAGE LOT AREA = 242 m².
LOCALITY SEGMENT : LOT SUBDIVISION

TYPICAL DWELLING
12. LANGA-LANGA SITE AND SERVICES I AND II, NAKURU.

Langa-Langa Site and Services, Phase I and II, is a public project developed on land owned by the Nakuru Municipal Council (N.M.C.). It is located 3 to 5 Km south of the city center.

History: The project was planned and designed by the Nakuru Town Planning Advisor and the Council Staff. The construction of on-site infrastructure started in 1970 and by 1971, 75% of the work had been completed. The project has 200 serviced lots (104 in phase I and 96 in phase II). The allocation of lots was undertaken by the Council's housing committee based upon the individual's 'ability to develop' and length of stay in the town.

Users: 60% of the users have annual income of U.S. $200 to $800 per annum and 35% have U.S. $1200 to $1400 per annum. Most of the moderately low and middle income people are administrators, skilled and unskilled workers. There are no on-site employment facilities.

Serviced lots and dwellings: The lots with an area of 464 square meters (15.2m x 30.5m) are laid out back to back. The interior lots have access from cul-de-sacs. Each lot in phase I has individual piped water and a built sanitary core unit of 3 aqua privies and 2 showers; these are arranged in blocks covering 4 lots at boundary crossing. All roads are initially earth roads without stormwater drains and street lighting. The dwelling plan provided by the Town Engineering Department has 7 room multi-family units with kitchen and store for phase I. In phase II each lot has 3 self-contained dwellings with individual water and individual water borne sewerage connected to a septic tank on each lot. No figures
are available on the development costs.

Comments: The lot size (464 square meters) is large and does not justify the low density of 178 persons per hectare. The arbitrary setbacks from the lot boundary lines result in wasteful land utilization and result in higher maintenance costs. There are no on-site community and employment facilities.
ECONOMIC DATA
(related to user and project)

GENERAL:
user's income group: MODERATELY LOW
employment: TEACHER
distance to work: 2 km.
mode of travel: BUS

HOUSEHOLD EXPENDITURE:
% of income for rent: 15%
food: 30%
school fees: 10%
transport: 20%
other: 10%
savings: 5%

LOT/DWELLING COSTS:
site preparation: NA
cisterns services: NA
lot development: 5%
other: 0% total: 0%

LOT/DWELLING PAYMENTS
financing: PUBLIC SUBSIDIZED
rent: ---
mortgage: N/A

PHYSICAL DATA
(related to land and dwelling)

LAND/LOT
utilization: PRIVATE
area (sq.m.): 464
tenure: LEGAL OWNERSHIP

INITIAL INFRASTRUCTURE LEVEL
water: ON LOT
sewerage: ON LOT
storm drainage: TO SITE
roads and walkways: ON SITE
street lighting: ON SITE

DWELLING UNIT
area (sq.m.): 12.5
unit: ROOM

DWELLING DEVELOPMENT
mode: INCREMENTAL
developer: PRIVATE
builder: SELF-HELP/ARTISAN/SMALL CONTRACTOR
construction type: MUD-WATTLE/CONCRETE
year of construction: 1971

DWELLING FACILITIES
WC: 3 (AQUA FRIVY PER LOT)
shower: 2 (PER LOT)
kitchen: 3
rooms: 7
other: STORE, WASHING AREA

MATERIALS
foundations: CONCRETE STRIP
floors: CONCRETE SLAB
walls: MUD-WATTLE/CONCRETE BLOCKS/STUDS
roof: C.D.I. ON TIMBER FOURS

SOCIALL/ADMINISTRATIVE DATA
(related to user and community)

GENERAL
user's ethnic origin: KIKUYU
place of birth: ELDORET, KIP-VALLEY PROVINCE
education level: SECONDARY

NUMBER OF USES
married: 2
single: 1
children: 2
total: 5

MIGRATION PATTERN
number of moves: 1
rural-urban: 1
urban-urban: 1
urban-rural: 1

WHY CAME TO URBAN CENTER: EMPLOYMENT

ADMINISTRATIVE/LEGAL ORGANIZATIONS
Project publicity: N.M.C. (NAMURU MUNICIPALITY COUNCIL)
lot allocation: N.M.C.
rent/loan collection: N.M.C.
training local staff: N.M.C.
transfer of rights: N.M.C.

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Area</th>
<th>Density</th>
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<td>DENSITIES</td>
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<tr>
<td>LOTS</td>
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<tr>
<td>DWELLING UNITS (3 rooms per unit)</td>
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<td>PEOPLE (3 per unit)</td>
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<td>AREAS</td>
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<td>PUBLIC (streets, walkways, open spaces)</td>
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<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
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<td>-</td>
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<td>PRIVATE (lots, dwellings, shops, industries)</td>
<td>0.34</td>
<td>792</td>
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<td>SEMI-PRIVATE (cluster courts)</td>
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<tr>
<td>TOTAL</td>
<td>1.26</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[
\text{A} = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}}
\]

AVERAGE LOT AREA = 104 LOTS

TOTAL NO. OF LOTS = 104 LOTS
13. NDARUGU SITE AND SERVICES, NJORO.

Ndarugu Site and Services Project is located on land owned by the Njoro County Council. (N.C.C.)

History: The project was planned and designed by the County Council Staff in 1970. The construction of on-site infrastructure was started in 1971. The project has 48 serviced lots with basic minimum services. The allocation of lots was done by the County Council after the applicants had been contacted through advertisements. Individuals were selected according to 'ability to develop' and a deposit of $56.

Users: Seventy-six % of the users are in the low and moderately low income groups earning less than $800 per annum. Twenty-four % are in the middle income group earning more than $1200 per annum. Most of them are technicians, skilled and unskilled workers. Some of the heads of household were unemployed.

Serviced lots and dwellings: The lots with an area of 298 square meters (12.2m x 24.4m) are laid out in rows with service alleys and front access. Each lot has individual piped water from a common 2000 gallon tank and individual waterborne sewerage connected to a common 1200 gallon septic tank. All roads are earth, graded and with storm water drains but no street lighting. The dwelling plan provided by the County Council has a 6 room detached unit with 2 W.C.'s and 2 showers, kitchen and stove. No data is available on the development costs per lot.

Comments: The layout has redundant circulation and open spaces, which make the land utilization wasteful. The maintenance of these areas means higher recurrent costs for the County Council. The lot size (298 square
meters) is high and the set-backs from the lot boundary provide dumping areas and deterriorate the quality of the environment. The density of 244 persons per hectare is low. There are no on-site community and employment facilities.
### ECONOMIC DATA

**General:**
- User's income group: Low, moderate, low
- Water supply: N/A
- Employment: Businessman
- Distance to work: 2 km.
- Mode of travel: Bicycle

**Household Expenditure:**
- % of income for rent: 6%
- Food: 17% (per lot - percentage)
- School fees: 15%
- Transport: 0
- Other: 4%
- Savings: 9%

**Lot/Dwelling Costs:**
- Site preparation: NA
- On-site services: NA
- Lot development: "
- Total: "

**Lot/Dwelling Payments:**
- Financing: Public Subsidized
- Rent: -
- Mortgage: N/A

### SOCIAL/ADMINISTRATIVE DATA

**General:**
- User's ethnic origin: Ekiru
- Place of birth: Nakuru, Rift Valley
- Education level: Primary

**Number of Users:**
- Married: 2
- Single: 2
- Children: 2
- Total: 6

**Migration Pattern:**
- Number of moves: 1
- Rural-urban: -
- Urban-urban: 1968
- Urban-rural: -
- Why came to urban center: Employment

**Administrative/Local Organizations:**
- Project publicity: N.C.C. (Njoro County Council)
- Lot allocation: N.C.C.
- Rent/loan collection: N.C.C.
- Training local staff: N.C.C.
- Transfer of rights: N.C.C.

### PHYSICAL DATA

**Land/Lot Utilization:**
- Type: Private
- Area (sq.m.): 298
- Tenure: Legal Ownership

**Initial Infrastructure Level:**
- Water: On Lot
- Sewerage: On Lot
- Storm drainage: On Site
- Roads and walkways: On Site
- Street lighting: None
- Electricity: To Site

**Dwelling Unit:**
- Type: Room
- Area (sq.m.): 10.4
- Tenure: Legal Rental/Ownership

**Dwelling:**
- Location: Inner Ring
- Type: Row/Group
- Area (sq.m.): 197

### Locality Block Land Utilization Data

<table>
<thead>
<tr>
<th>Total</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>12</td>
<td>0.59</td>
</tr>
<tr>
<td>DWELLING UNITS (3 rooms per unit)</td>
<td>72</td>
<td>0.59</td>
</tr>
<tr>
<td>PEOPLE (3 per unit)</td>
<td>144</td>
<td>0.59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Areas</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.23</td>
<td>39%</td>
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<tr>
<td>SIDI-PUBLIC (open spaces, schools, community centers)</td>
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<td>-</td>
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<tr>
<td>PRIVATE (lots, dwellings, shops, industries)</td>
<td>0.36</td>
<td>61%</td>
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<tr>
<td>SIDI-PREIVTE (cluster courts)</td>
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<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.59</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Network Efficiency

- R = network length (circulation) = 328 m/Ha
- Areas served (circulation, lots) = 48 lots
- Average Lot Area = 298 m²
- Total No. of Lots = 48 lots

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14. SHAURIYAKO SITE AND SERVICES I, ELDORET.

Shauriyako Site and Services, phase I, is a project developed on land owned by the Eldoret Municipal Council to resettle the squatters evicted from Kapsuswa.

History: The project was planned and designed by the Health Department of the Municipal Council in 1970. The construction of on-site infrastructure was started in 1971. The project has 49 serviced lots with basic minimum communal services. The allocation of lots was undertaken by the Council's Health Department in consultation with the Town Engineer. Individuals were selected from the evicted squatters according to length of residence in Eldoret; ability to pay rent; size of family and for not being a home-owner already.

Users: Ninety-five % of the users were in the low and very low income groups earning less than $500 per annum, and 5% were in the moderately low income group earning about $800 per annum. Thirty % of them were unemployed; 40% were skilled and unskilled workers; and the rest included clerks, businessmen and farmers.

Serviced lots and dwellings: The lots with an area of 372 square meters (12.2m x 30.5m) are laid out back to back in a grid iron type of layout. Each lot has a pit latrine built by the users. Water supply is from 3 common water taps for the whole site. Roads are earth, graded without any storm water drains and street lighting. The original dwelling plan provided by the Town Engineer's Department of the Council which had a 4-room detached unit with kitchen was in most cases extended and altered to have larger rooms along with additional rooms making the total number
of rooms to 9 or 10. No data is available on development costs per lot.

Comments: The original dwelling plans were poorly designed and the set-back from the front lot boundary line was unnecessary. The majority of the users complained about deteriorating conditions of roads, toilets and rubbish on the lots. There are no on-site community and employment facilities. The density of 373 persons per hectare is medium.
ECONOMIC DATA
(related to user and project)

GENERAL:
user's income group: VERY LOW
employment: BUSINESS MAN
distance to work: 1 km.
mode of travel: WALKING

HOUSEHOLD EXPENDITURE:
% of income for rent: 20%
food: 49%
school fees: 11%
transport: 0%
other: 12%
savings: 8%

LOT/DWELLING COSTS:
site preparation: NA
on-site services: NA
lot development: NA
other: NA
total: NA

LOT/DWELLING PAYMENTS
financing: PUBLIC SUBSIDIZED
rent: $3 PER MONTH (LOT RENT)
mortgage: N/A

SOCIAL/ADMINISTRATIVE DATA
(related to user and community)

GENERAL:
user's ethnic origin: KIKUYU
place of birth: MURANGA, CENTRAL PROVINCE
education level: PRIMARY

NUMBER OF USERS:
married: 2
single: 4
children: 4
(total): 10

MIGRATION PATTERN:
number of moves: 2
rural-urban: 1960
urban-urban: 1969
urban-rural: -

why came to urban center: EMPLOYMENT

ADMINISTRATIVE/Legal:
PROJECT PUBLICITY: E.M.C. (ELDORET MUNICIPAL COUNCIL)
LOT ALLOCATION: E.M.C.
RENT/LOAN COLLECTION: E.M.C.
TRAINING LOCAL STAFF: E.M.C.
TRANSFER OF RIGHTS: E.M.C.

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES
LOTS: 19
Dwelling units (3 rooms per unit): 96
People (5 per unit): 317
Percentages
Hectares
Public (streets, walkways, open spaces): 0.25
Private (lots, dwellings, shops, industries): 0.60

NETWORK EFFICIENCY

R = network length (circulation) = 221 m/ha
Areas served (circulation, lots) = 372 m^2

AVERAGE LOT AREA
TOTAL NO. OF LOTS

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES
LOTS: 19
Dwelling units (3 rooms per unit): 96
People (5 per unit): 317
Percentages
Hectares
Public (streets, walkways, open spaces): 0.25
Private (lots, dwellings, shops, industries): 0.60

NETWORK EFFICIENCY

R = network length (circulation) = 221 m/ha
Areas served (circulation, lots) = 372 m^2

AVERAGE LOT AREA
TOTAL NO. OF LOTS
15. KITUI SITE AND SERVICES, KITUI.

Kitui Site and Services is a project developed by the Kitui County Council.

History: The project was planned and designed by the National Housing Corporation. The construction of on-site infrastructure was started in 1971. The project has 16 serviced lots with built sanitary core units. Only 2 dwellings had been completed at the time of the survey and very limited data is available as regards the allocation of lots and other aspects of the project.

Users: The project was planned for the very low and low income groups earning less than $800 per annum. No on-site employment facilities in terms of markets or shops are provided.

Serviced lots and dwellings: The lots with an area of 298 square meters (12.2m x 24.4m) are laid out back to back in a gridiron type of layout. Each lot has individual piped water supply and individual waterborne sewerage contained in built sanitary core units at boundary crossings of four or two lots. The dwellings ranged from 9 to 11 rooms with a communal kitchen. No data is available on the development costs per lot.

Comments: The two dwellings completed had a high lot coverage of 54% and 63% of the total lot area of 298 square meters. Based upon these dwellings the density was calculated to be 480 persons per hectare - medium. The County Council officials expressed dissatisfaction with regard to the publicly built sanitary core units due to the high development costs. They suggested that these could have been built by the users or the County Council rather than the National Housing Corporation.
**ECONOMIC DATA** (related to user and project)

**GENERAL:**
- user's income group: VERY LOW
- employment: -
- distance to work: -
- mode of travel: -

**HOUSEHOLD EXPENDITURE:**
- % of income for rent: -
- food: -
- school fee: -
- transport: -
- other: -
- savings: -

**LOT/DWELLING COSTS:**
- site preparation: NA
- on-site services: -
- lot development: -
- total: -

**LOT/DWELLING PAYMENTS**
- financing: PUBLIC SUBSIDIZED
- rent: -
- mortgage: -

**PHYSICAL DATA** (related to land and dwelling)

**LAND/LOT**
- utilization: PRIVATE
- area (sq.m.): 298
- tenure: LEGAL OWNERSHIP

**INITIAL INFRASTRUCTURE LEVEL**
- water: ON LOT
- sewerage: ON LOT
- storm drainage: ON SITE
- roads and walkways: ON SITE
- street lighting: NONE
- electricity: NONE

**DWELLING UNIT**
- type: ROOM
- area (sq.m.): 10.7
- tenure: TENANT
- location: INNER RING
- type: ROW/GROUP
- area (sq.m.): 175

**DEVELOPMENT**
- mode: INCREMENTAL
- developer: PRIVATE
- construction type: MUD-WOOD
- year of construction: 1969

**MATERIALS**
- foundation: CONCRETE STRIP
- floors: CONCRETE SLAB
- walls: BAKED-SOIL BRICKS
- roof: C.G.I. ON TIMBER PURLINS

**SOCIODEMOGRAPHIC DATA** (related to user and community)

**GENERAL**
- user's ethnic origin: AKANSA
- place of birth: KITUI, EASTERN PROVINCE
- education level: PRIMARY

**NUMBER OF USERS**
- married: 2
- single: 6
- children: 3
- total: 11

**MIGRATION PATTERN**
- number of moves: 1
- Rural-Urban: -
- Urban-Urban: 1968
- Urban-Rural: -

**ADMINISTRATIVE/LEGAL ORGANIZATIONS**
- project publicity: K.C.C. (KITUI COUNTY COUNCIL)
- lot allocation: K.C.C.
- rents/loan collection: K.C.C.
- training local staff: K.C.C.
- transfer of rights: K.C.C.

**LOCALITY BLOCK LAND UTILIZATION DATA**

<table>
<thead>
<tr>
<th>Total</th>
<th>Area (Hectares)</th>
<th>Density (H/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENSITIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOTS</td>
<td>16</td>
<td>0.66</td>
</tr>
<tr>
<td>DWELLING UNITS (3 rooms per unit)</td>
<td>160</td>
<td>0.66</td>
</tr>
<tr>
<td>PEOPLE (5 per unit)</td>
<td>320</td>
<td>0.66</td>
</tr>
<tr>
<td>AREAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.18</td>
<td>272</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PRIVATE (lots, dwellings, shops, industries)</td>
<td>0.48</td>
<td>738</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.66</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**NETWORK EFFICIENCY**
- L = natural length (circulation) = 255 m/ha
- AVERAGE LOT AREA = 298 m²
- TOTAL NO. OF LOTS = 16
LOCALITY SEGMENT : LOT SUBDIVISION

TYPICAL DWELLING
GLOSSARY

Definitions of terms which are generally understood/accepted and not essential to the presentation/understanding of the text are included in the Glossary, which has been prepared by the Urban Settlement Design Program, MIT.

The criteria for the preparation of the definitions have been as follows:


Second Preference: definitions from technical dictionaries.

Third Preference: definitions from the authors, used when existing definitions did not satisfactorily make clear with what meaning, extent and limits, terms were used.

ACCESSSES - the pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems such as: waterways, airlines, etc.).

AIRPORT DISTURBANCE - the act or process of destroying the rest, tranquility or settled state of (the site by the annoyance of airport noise, vibration, hazards, etc.) (Merriam-Webster 1971).

APPROACHES - the main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context.
BARRIER - (a boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster 1971).

BOUNDARY - something (a line or area) that fixes or indicates a limit or extent (of the site), (Merriam-Webster 1971).

BUILDING CODE - "a body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use of occupancy, location and maintenance of all buildings and structures within the city and certain equipment specifically regulated" therein (ICBO 1967, sec. 102).

CLIMATE - the average condition of the weather at a particular place over a period of years as exhibited by temperature, wind, precipitation, sun, energy, humidity, etc. (Merriam-Webster 1971).

COMMUNITY - the people living in a particular place or region and usually linked by common interests; the region itself, any population cluster.

DESIGN - the arrangement of elements that make up a work of art, machine or other man-made object.

DEVELOPMENT - gradual advance or growth through progressive changes; a developed tract of land.

DISTANCE - the degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest
path adjoining them (paths of travel), (Merriam-Webster 1971)

DUST/DIRE - fine dry pulverized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster 1971).

DWELLING: The general, global designation of a building/shelter in which people live. A dwelling contains one or more 'dwelling units'.

DWELLING CONSTRUCTION TYPES - Primary dwelling construction types and materials are grouped in the following categories:

Shack
  Roof: structure - rods branches. infill - thatch, mats, flattened tin cans, plastic or canvas sheets, cardboard, scrap wood, and/or mud.
  Walls: structure - rods, branches, poles. infill - thatch, mats, flattened tin cans, plastic or canvas sheets, cardboard, scrap wood, and/or mud.
  Floor: Structure/infill - compacted earth.

Mud and Wattle
  Roof: structure - Wattle. infill - thatch, flattened tin cans, or corrugated iron sheets.
  Walls: structure - wattle. infill - mud.

Wood
  Roof: structure - wood rafters. infill - thatch, flattened tin cans or corrugated iron sheets.
  Walls: structure - wood fram. infill - rough hewn wood planks.
  Floor: structure/infill - compacted earth, wood joists, flooring.
Masonry/ Wood
Roof: structure - wood rafters, infill - corrugated iron or asbestos sheets, or terracotta tiles.
Walls: structure/infill - murram, stone, brick, block or tile masonry without columns.
Floor: structure/infill - poured concrete slab on/off grade, wood joists, flooring.

Masonry/ Concrete
Roof: structure/infill - poured reinforced concrete with tar and gravel, or terracotta tiles.
Walls: structure/infill - murram, stone, brick, block or tile masonry without columns, or with columns for multi-story dwellings.
Floor: structure/infill - poured concrete slab on/off grade.

Concrete Roof: structure/infill - poured or precast reinforced concrete with tar and gravel, or terracotta tiles.
Walls: structure - poured or precast walls or frame. infill - metal, wood, masonry, plastic.
Floor: structure/infill - poured or precast concrete slab.

DWELLING BUILDER - Four groups are considered
Self-Help Built: where the dwelling unit is directly built by the user or occupant.
Artisan Built: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services.
Small Contractor Built: where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer;
'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes.

Large Contractor Built: where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and large size of operations encompassing the building of large quantities of similar units or a singularly large complex.

DWELLING DENSITY - The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). Net density is the density of selected, discrete portions of an area (ex. including only lots).

DWELLING DEVELOPER - Three sectors are considered in the supply of dwellings:

Popular sector: The marginal sector with limited or no access to the formal financial, administrative, legal, technical, institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular sector generally for 'self use' and sometimes for profit.

Public sector: The government or non-profit organizations involved in the
provision of dwellings, The housing process (promotion, financing, construction, operation) is carried out by the Public sector for service (non-profit or subsidized housing).

Private sector: The individuals, groups or societies have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private sector generally for profit.

**DWELLING FLOORS** - The following number are considered:

One: single story; generally associated with detached, semi-detached and row/group dwelling types.

Two: double story; generally associated with detached, semi-detached and row/group dwelling types.

Three or more: generally associated with walk-up and high rise dwelling types.

**DWELLING GROUP** - The context of the dwelling in its immediate surroundings.

**DWELLING LOCATION:** Three sectors of the urban area considered:

City center: the area located within a walking distance (2.5 km radius) of the commercial center of a city; relatively high residential densities.

Inner ring: the area located between the urban periphery and the city center (2.5 to 5 km radius); relatively lower residential densities.
Periphery: the area located between the rural areas and urban inner ring (5 or more km radius); relatively low residential densities.

DWELLING PHYSICAL STATE - A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; (the shanty unit is not evaluated).

Bad: generally poor state of structural stability, weather protection and maintenance.

Fair: generally acceptable state of structural stability, weather protection and maintenance without deviation.

DWELLING UNIT - A self-contained unit or dwelling for an individual, a family, or a group.

DWELLING UNIT AREA - The dwelling unit area ($m^2$) is the built-up, covered area of a dwelling unit.

DWELLING UNIT COST - The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit.

DWELLING UNIT TYPE - Four types of dwelling units are considered:

Room: A SINGLE SPACE usually bounded by partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room. SEVERAL ROOM UNITS are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation,
toilets, kitchens).

Apartment: A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.). SEVERAL APARTMENT UNITS are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation).

House: A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.). ONE HOUSE UNIT is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available.

Shanty: A SINGLE OR MULTIPLE SPACE (small, crudely built). ONE SHANTY UNIT is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces).

DWELLING TYPE - The physical arrangement of the dwelling unit:

Detached: individual dwelling unit, separated from others.
Semi-Detached: two-dwelling unit, sharing a common wall (duplex).
Row/Grouped: dwelling units grouped together linearly or in clusters.
Walk-up: dwelling units grouped in two to five stories with stairs for vertical circulation.

DWELLING UTILIZATION - The utilization indicates the type of use with respect to the number of inhabitants/families.

Single: an individual or a family inhabiting a dwelling.
Multiple: a group of individuals or families inhabiting a dwelling.

FINANCING - The process of raising or providing funds.
Self provided by own funds. Private/Public Financed: provided by loan. Public Subsidized: provided by grant or aid.

DWELLING DEVELOPMENT MODE - Two modes are considered:
Incremental: The construction of the dwelling and development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site.
Instant: The formal development procedure in which all structures and services are completed before occupation.

EASEMENT - Servitude: a right in respect of an object (as land owned by one person) in virtue of which the object (land) is subject to a specified use or enjoyment by another person for the benefit of another thing (Merriam-Webster 1971).

ELECTRICITY - Electrification: the process (network) for supplying (the site) with electric power (Merriam-Webster 1971).

EXISTING STRUCTURE - Something constructed or built (on the site).

FIRE/EXPLOSION HAZARDS - Danger: the state of being exposed to harm;
likely to injury, pain, or loss from fire/explosion (at or near the site),
(Merriam-Webster 1971).

FIRE PROTECTION - Measures and practices for preventing or reducing
injury and loss of life or property by fire (Merriam-Webster 1971).

FUMES - Gaseous emissions that are usually odorous and sometimes noxious
(Merriam-Webster 1971).

GAS - A system for supplying natural gas, manufactured gas, or liquified
petroleum gas to the site and individual users.

INFRASTRUCTURE - The underlying foundation or basic framework for
utilities and services: streets, sewage, water, network, storm drainage,
électrical network, gas network, telephone network, public transporta-
tion, police and fire protection, refuse collection, health, schools,
playgrounds, parks, open spaces.

LAND - MARKET VALUE - Refers to: 1) the present monetary equivalent to
replace the land; 2) the present tax-based value of the land; or 3) the
present commercial market value of the land.

LAND TENURE - The act, right, manner or term of holding land property.
Types are categorized by how land is held and for what period of time.
Legal definitions are established to determine the division of property
among various owners, or the relationship between owner or occupier, or
between creditor and owner; and between private owners and the public,
and includes the assessment of taxes on private land rights and the
regulation of land use through government control.

LAND UTILIZATION - A qualification of the land around a dwelling in relation to user, physical controls, and responsibility.

Public: (streets, walkways, open spaces)  
User: Anyone/unlimited  
Physical controls: partial or complete  
Responsibility: public sector and user

Semi-Public (open spaces, playgrounds, schools)  
User: limited group of people  
Physical controls: partial or complete  
Responsibility: public sector and user

Private: (dwellings, lots)  
User: owner or tenant or squatter  
Physical controls: complete  
Responsibility: user

Semi-Private: (cluster courts)  
User: group of owners and/or tenants  
Physical controls: partial or complete  
Responsibility: users

LAND UTILIZATION: PHYSICAL CONTROLS: The physical/legal means or methods of directing, regulating and coordinating the use and maintenance of land by the owners/users.

LAND UTILIZATION: RESPONSIBILITY: The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users.

LOCATION - situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster 1971).
METROPOLITAN AREA - "an area in which economic and social life is predominately influenced by a central city, to which it is linked by common interests though not often by common policies. The metropolitan area may have one city or more as well as outlying districts or satellite communities. No physical or legal boundaries mark its borders, but roughly speaking these are the outer limits of commuting to or from the central city." (Abrams 1971).

MODE OF TRAVEL - manner of moving from one place (the site) to another (other parts of the urban context).

NATURAL FEATURES - prominent objects in or produced by nature.

NEIGHBORHOOD - a section lived in by neighbors and having distinguishing characteristics.

NOISE - any sound (affecting the site) that is undesired such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster 1971).

ODOR - a quality of something that affects the sense of smell (Merriam-Webster 1971).

PERCENT RENT/MORTGAGE - The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income.

PLANNING - The establishment of goals, policies and procedures for a social or economic unit, i.e., city.
POLICE PROTECTION - Police force; a body of trained men entrusted by a
government with the maintenance of public peace and order, enforcement
of laws, prevention and detection of crime. (Merriam-Webster 1971)

POSITION - The point or area in space actually occupied by a physical
object (the site). (Merriam-Webster 1971)

PROJECT - A plan undertaken; a specific plan or design.

PUBLIC TRANSPORTATION - That segment of URBAN TRANSPORTATION which is
available to the public without restriction. As public transport, it
may also be regulated as to its operation, charges, and profits (Abrams,
1971).

REFUSE COLLECTION - The service for collection and disposal of all the
solid wastes from a community.

RIGHT-OF-WAY - A legal right of passage over another person's ground
(land); the area or way over which a right-of-way exists such as: a path
or thoroughfare which one may lawfully use, the strip of land devoted to
or over which is built a public road, the land occupied by a railroad, the
land used by a public facility (Merriam-Webster 1971).

SANITY SEWERAGE - The system of artificial usually subterranean conduit
to carry off sewage (composed of Excreta: waste matter eliminated from
the human body; Domestic Wastes: used water from a home/community con-
taining 0.1% total solids; and some Industrial Wastes but not water from
ground surface or storm.
SETTLEMENT - Occupation by settlers to establish a residence or colony.

SLOPE - degree or extent of deviation (of the land surface) from the horizontal (Merriam-Webster 1971).

SMOKE - The gaseous products of burning carbonaceous materials made visible by the presence of carbon particles (Merriam-Webster 1971).

SOIL - soil structure: the arrangement of solid particles in various aggregates differing in shape, size, stability, and degree of adhesion to one another (Merriam-Webster 1971).

STORM DRAINAGE - Storm sewer: a system designed to carry water wastes except sewage (exclusively: storm water, surface runoff, or street wash) (Merriam-Webster 1971).

STREET LIGHTING - a service for urban street illumination to improve vision at night.

SUBSISTENCE INCOME - Average amount of money required for the purchase of food and fuel for an average family of 5 people to survive ($325/year in Nairobi, 1972).

TELEPHONE - An electrical voice communication network interconnecting all subscribing individuals and transmitting over wires.

TENURE - Two situations of tenure of the dwelling units and/or the lot/land are considered:

Legal: having formal status derived from law.

Extralegal: not regulated or sanctioned by law.
Four types of tenure are considered:

Rental: where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land.

Lease: where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization).

Ownership: where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies.

Employer-Provided: where the users are provided a dwelling unit by an employer in exchange for services; i.e., domestic live-in servant.

TOPOGRAPHY - the configuration of a (land) surface including its relief and the positions of its natural and man-made features (Merriam-Webster 1971).

TRANSPORTATION - Means of conveyance or travel from one place (the site) to another (other parts of the urban context) (Merriam-Besters 1971),

URBAN AREA - All developed land lying within the urban fringe (politically undefined development lying between the city and the country) including a central city and any of its satellite communities; it is not a political/governmental unit (Bartholomew, 1955).

URBANIZATION - The quality or state of being or becoming urbanized: to cause or take on urban characteristics.

USER INCOME GROUPS - Based upon the subsistence (minimum wage) income per year, five income groups are distinguished. (The subsistence income per
year in Nairobi is approximately $325.)

The income group with no household income available for housing, services, or transportation.

Low: (1 x subsistence level) $325/year: the income group that can afford limited subsidized housing.

Moderate Low: (4 x subsistence level) $1,300/year: The income group that has access to public/private commercial housing (rented).

Middle: (15 x subsistence level) $4,875/year: The income group that has access to private commercial housing (ownership).

High: (above 15 x subsistence level) above $4,875: The income group that represents the most economically mobile sector of the population.

VIBRATION - a quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc.) (Merriam-Webster 1971).

VIEWS - that which is revealed to the vision or can be seen (from the site) (Merriam-Webster 1971).

WALK-UP - dwelling units grouped in two to five stories with stairs for vertical circulation.

WATER SUPPLY - source, means, or process of supplying water (as for a community usually involving reservoirs, pipelines, and often the watershed from which the water is ultimately drawn (Merriam-Webster 1971).
QUALITY OF SERVICES, FACILITIES AND UTILITIES

None: when the existence of services, facilities and utilities are unavailable to the dwelling group area.

Limited: when the existence of services, facilities and utilities are available to the dwelling group area in a limited manner due to proximity.

Adequate: when the existence of services, facilities and utilities are available in/to the dwelling group area.

QUALITY INFORMATION

The quality of information given in the drawings, charts, and descriptions has been qualified in the following manner:

Tentative: when based upon rough estimation of limited sources.

Approximate: when deducted from different and/or not completely reliable sources.

Accurate: when taken from reliable or actual sources.

DOLLAR EQUIVALENTS - the value of the dollar is used as equal to:

7 Kenya Shillings

Linear Measure:

1 millimeter = 0.03937 inches

1 centimeter = 0.3937 inches

1 meter = 39.37 inches

3.28083 feet

1.09361 yards
1 kilometer = 3280.83 feet
           = 1093.61 yards
           = 0.62137 miles
1 inch    = 25.4 millimeters
           = 2.54 centimeters
           = 0.0254 meters
1 foot    = .3048 meters
1 yard    = .9144 meters
1 mile    = 1.50935 kilometers

Square Measure:
1 square millimeter = 0.00155 square inches
                     = 1973.5 circular mils
1 square centimeter = 0.155 square inches
1 square meter      = 1550 square inches
                     = 10.7639 square feet
                     = 1.196 square yards
1 hectare = 10,000 square meters = 2.4711 acres
1 square kilometer  = 0.386109 square miles
                     = 247.11 acres
1 square inch       = 645.2 square millimeters
                     = 6.452 square centimeters
1 square foot        = 0.0929 square meters
1 square yard        = 0.836 square meters
1 acre               = 0.4087 hectare
1 square mile        = 640 acres = 258.9 hectares
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