

PLANNING FOR HOUSING IN MACHAKOS:

A CASE STUDY OF OLD MACHAKOS TOWN.

B Y

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THE REQUIREMENT FOR THE DEGREE MASTER OF
ARTS IN URBAN AND REGIONAL PLANNING, FACULTY
OF ARCHITECTURE, DESIGN AND DEVELOPMENT.

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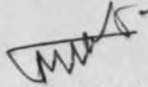
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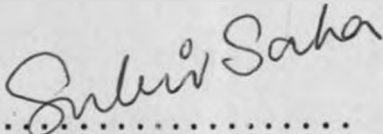
D E C L A R A T I O N

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

Signed 

(Candidate)

This thesis has been submitted for examination with my approval as University Supervisor.

Signed 

(Supervisor)

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A C K N O W L E D G E M E N T S .

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A B S T R A C T

The rapid urbanisation taking place in the third world is accompanied by various problems, housing being one of the major problems. Housing has become a problem in that the available limited resources and housing policies have reached a point whereby the need for housing is more than the demand. The supply of housing is therefore less than the need. This has led to a situation where many people in the towns, especially those in the low income group, have had to live in substandard housing where overcrowding and lack of basic sanitary facilities is experienced.

This study therefore set out to examine the housing condition in Machakos, one of the urban centers in Kenya. It has been found that a housing problem does exist in the town as was evidenced by the uncontrolled settlements and lack of some basic facilities in the area. The problem has come about as a result of low incomes which do not allow a substantial percentage of the town's population to own or rent decent housing. Adherence to conventional housing has also added to the housing problem since the majority of the people cannot meet the requirements. Another approach is therefore called for if the housing condition is going to be solved.

Recommendations have therefore been made as to how the present and future housing need in Old Machakos can be met. These point to a housing

policy whereby both the individual and the public authorities can join in the provision of housing using whatever meagre resources are available. It is therefore the major conclusion of this study that a new approach to housing in Old Machakos is necessary if the housing problem is going to be alleviated.

This approach calls for preparation of short and long term land use development plans on time so that areas for future housing expansion are known in advance. The land can then be bought from the private owners if it is not already public land. This will make sure that housing development is not delayed by lack of land. The environmental approach is also called for so that the housing unit does not have to be built of permanent materials as long as the quality of the environment is made good through the provision of basic infrastructure and community facilities. The community effort in housing should also be encouraged through self-help activities with the help of community development officials and housing technicians. This will help the people in the construction of their own housing. Ways of utilising the local building materials will also be sought through research by the relevant institutions such as the Housing Research and Development Unit.

CHAPTER 1: I N T R O D U C T I O N:

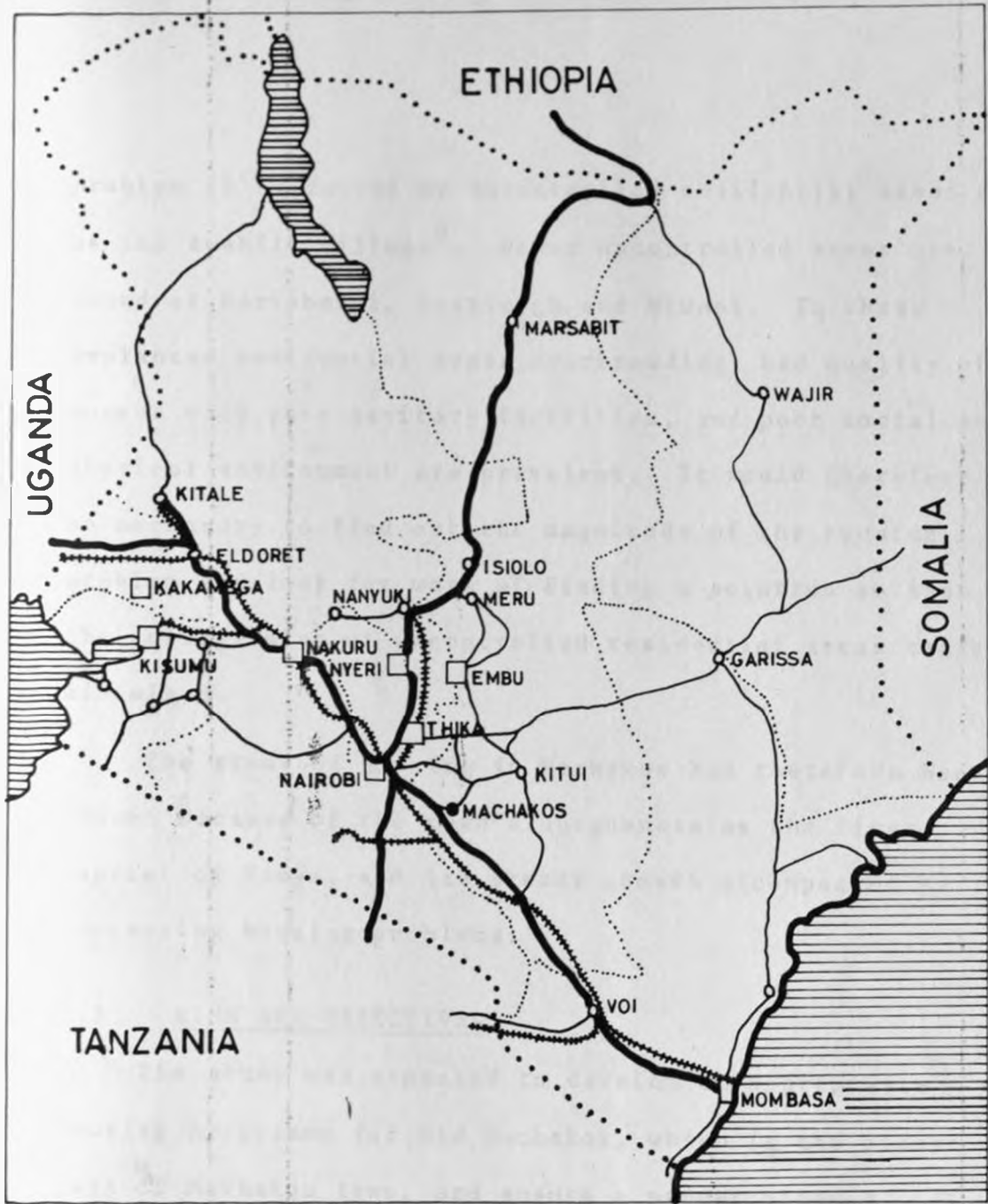
1.1 NEED FOR THE STUDY:









In the third world, urban development is characterised by utter inadequacy both qualitatively and quantitatively.¹ Overcrowding and lack of elementary sanitary facilities are the order of the day in the urban centres, especially to the low income groups who cannot afford any conventional housing. The search for housing by the low income group has led to the springing up of unplanned residential areas in the urban centres.²

Studies³ done in Kenya have shown that Kenya is not immune to the housing problems being faced by other third world countries. Kenya has therefore its share of housing problems which have led to the springing up of unplanned settlements in the urban centres such as Mathare Valley⁴ in Nairobi and the Swahili Village in Machakos.⁵ It is therefore with the housing problems in mind that the present researcher chose to look at the problem of housing in Machakos.

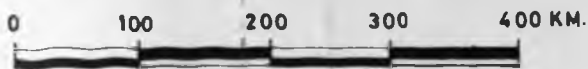
Since its founding in 1889 Machakos, the first capital of Kenya, has grown slowly but steadily. It is now the administrative, commercial and social centre of Machakos District. Since the growth of the town has not been very fast, one would not expect a serious housing problem, but a problem does exist. This

THE LOCATION OF MACHAKOS IN KENYA



- | | | | |
|--|---------------------------|---|---------------------|
|  | PRINCIPAL TOWNS |  | NATIONAL BOUNDARY |
|  | MACHAKOS TOWN |  | PROVINCIAL BOUNDARY |
|  | OTHER TOWNS | | |
|  | INTERNATIONAL TRUNK ROADS | | |
|  | OTHER MAJOR ROADS | | |
|  | RAIL ROADS | | |

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problem is evidenced by uncontrolled residential areas such as the swahili village⁶. Other uncontrolled areas are found at Kariobangi, Eastleigh and Miwani. In these unplanned residential areas overcrowding, bad quality of houses with poor sanitary facilities, and poor social and physical environment are prevalent. It would therefore be necessary to find out the magnitude of the housing problem and look for ways of finding a solution so that the springing up of uncontrolled residential areas can be minimized.

The study of housing in Machakos has therefore been chosen because of the town's uniqueness as the first capital of Kenya, and its steady growth accompanied by increasing housing problems.

1.2 AIMS AND OBJECTIVES.

The study was expected to develop an appropriate housing programme for Old Machakos, which is the oldest part of Machakos town, and ensure a proper planned development of housing in the area. It was therefore necessary to find out the present housing condition with a view to finding solutions to the present and future problems/needs.

The study also aimed at finding how to accelerate housing development by using both private and public funds and promoting the self-help housing and the use of locally available materials for the construction of houses.

Hence utilising the local human, financial and material resources.

1.3 METHODOLOGY:

So as to reach the desired aims and objectives it was necessary to establish the existing housing conditions. The total number of housing units was established and then grouped into various types of housing based on the materials used for the construction of the housing unit. Thus three housing categories - permanent, semi-permanent and temporary were established.

The present population was established and projections done for the next twenty two years up to the year 2000. Household incomes were also examined. The present level of community facilities and services were also looked at. This would help to establish the needs. Population projections helped in indicating what future population was to be planned for. The household incomes helped in finding out who live in certain housing units and determining the affordable housing of the various income groups.

Methods of financing housing and sources of building materials were also looked at with a view to finding out their adequacy and weaknesses so as to suggest solutions to the pitfalls.

By finding the housing need and the housing demand it was then possible to point out how:-

1. To develop an appropriate housing programme and ensure proper planned development of housing in Old Machakos.
2. To promote self help housing and the use of locally available materials.

So as to collect primary data, the study area was divided into five zones and questionnaires were administered to 111 households. Secondary data such as the Town Council files and other written materials were also used.

1.4 LIMITATION:

Machakos town covers a large area - 320 sq. km. and as such given the time and resources available it was not possible to cover the whole town. The study was therefore limited to the area covering Old Machakos town. It is in Old Machakos that most urban development is concentrated and it is also the area with the major housing problem. Uncontrolled housing is found here in places like the Swahili village and Kariobangi. The study therefore concentrated on this area which has a significant housing problem.

1.5 ORGANISATION OF THE STUDY:

Chapter 1 gives an introduction to the study. Chapter 2 deals with the physical Environment of Machakos detailing factors like location and physical

features such as rivers, hills, vegetation, geology and soil. It also describes the climate of Machakos.

Chapter 3 gives the socio-economic characteristics of the study area. This includes the history, population and economic activities pertaining to the area. In chapter 4 housing analysis in the study area is done. It deals with factors such as land ownership, type of housing unit, building materials, sanitary facilities, garbage disposal, water supply, drainage and accessibility. The chapter also examines the occupancy rate, residential densities, rent patterns, and the relationship between income and the quality of housing. The construction sector and sources of housing finance are also examined.

Chapter 6 illustrates the planning of a high density residential area in the study area.

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CHAPTER 2: THE PHYSICAL ENVIRONMENT OF MACHAKOS TOWN.

2.1 LOCATION.

Machakos Town lies between longitudes $37^{\circ} 22'$ and $37^{\circ} 08'$ East and latitudes $1^{\circ} 38'$ and $1^{\circ} 22'$ South. The town is approximately 70km South-East of Nairobi, the Capital of Kenya, on a plain 1000 metres above sea level. It lies between the Iveti hills on the East and Mua Hills on the West. These hills rise up to 2100 metres above sea level.

2.2. CLIMATE:

Climatically Machakos Town lies in the highland zone¹ and it has an average annual rainfall of 800mm distributed over the year in two rainy seasons, March/July and October/December. The maximum temperature annual mean is 22°C ² whereas the minimum temperature annual mean is 14°C . There is an average of 6.9 sunshine hours daily. The mean annual relative humidity at 1500 hours is 48%. The climate is exceptionally agreeable with regard to human comfort.

During the rainy season the vegetation is lush green whereas during the dry season it is perched brown and the atmosphere in Machakos town is dusty in spite of the tarmac roads in the town centre.

2.3 PHYSICAL FEATURES:

2.3.1 Geology and Soil:

In terms of geology the area is underlain by

precambrian basements and tertiary sediments.³ The tertiary sediments are found in the Northern part of the town whereas the precambrian basements are found in the other parts of the town.

The soil in Machakos town is well formed deep red friable clay⁴ which is a well drained soil.

2.3.2 RIVERS:

Machakos Township is well drained by a number of rivers and streams. The permanent rivers are Ikiwe and Maruba. Ikiwe river flows South East of the township whereas Maruba river flows southerly through the centre of the town. There are a number of permanent streams the major ones being Kyandu, Kyanguli, Unyoleni, Muwongoni Wawikuyu and Liyini. Seasonal streams include Kaingoto, Kalua Uki, Katilini, Mavoloni and Mbanyani. Other minor streams also exist as can be seen in map number 2.

It can therefore be noted that Machakos is well drained by the rivers and the streams.

2.3.3 HILLS:

To the South-East of the Township is the Kiima Kimwe hill which rises to 2000 metres. On the East are the Iveti hills and on the West are the Mua Hills. These hills rise to approximately 2100m.

2.3.4 VEGETATION:

In the North East is the Iveti forest which is the property of the Ministry of Natural Resources. From here timber is obtained for uses such as in the construction industry where windows, doors and other building

components are made. The timber is also used for making of furniture such as chairs, tables, and cupboards. In the Southern and South Western part of the township there are scrub bushes. This area is mostly used for mixed farming, for example, this is where we find the Konza ranch, Kilima farm, Ketelembu farm and Kiima Kimwe Cooperative Society farm. There are scattered trees all over the Northern part of the township.

2.4 ENVIRONS OF MACHAKOS:

Machakos is an important service centre for the surrounding densely populated agricultural area. There is a large open market and a closed modern market, in the Eastern part of the town. There are shops and workshops for different commodities, hospitals, banks, nightclubs and other facilities such as social halls. The approach to Machakos from Nairobi is a good tarmac road across a rolling plain with large farms owned by individuals or Co-operatives where coffee is grown and cattle raised.

The main streets are tarmaced and lined with shops and bars. Commodities such as maize meal, sugar, rice and clothing are sold. There are open drains on the sides of the roads and most of the access roads in places such as the Swahili/^{Village} and Kariobangi in the Eastern part of the town, Eastleigh in the Southern part of the town, Miwani on the West and Mutituni in the North are

not tarmaced.

The town is served by four major roads, all tarmaced. These are the Nairobi-Machakos road, the Machakos-Kangundo road, the Machakos-Konza road and the Machakos-Kitui road. There are other minor roads such as the Mau-hills roads, the Maruba dam road and the Kathiani road.

Other than the Old Machakos town, there are other shopping centres in the town. These include Mutituni, Ngomeni, Kamuthianga, Thinu, Kithanyoni and Mua hills in the North. In the South are other centres such as Katoloni, Kimutwa, Mangauni, Kivandini and Kiundwani. Machakos town therefore has 11 market centres which serve the densely populated agricultural area.

All the markets are situated in fertile agricultural zones where crops like coffee, maize, vegetables and fruits are grown. In fact the Kenya Orchards Limited factory which deals with dehydration and canning of fruits is situated in this zone, near Mutituni market. Three coffee factories are also found in this zone - one to the South of the Old town and two in the Northern part of the town. The presence of these factories show the importance of agriculture in this town.

The large open market to the East of the Old town attracts many people especially during the market days. The market days are Mondays and Fridays. People come from all over the district and even beyond as far as Muranga District.⁵ People come to sell or buy commodities

such as fruits, vegetables, livestock, ropes and maize. Other than the major market centres shops are now springing along the major roads thus forming a ribbon development. This could be good for bringing shopping facilities near the people, but these shopping centres are unplanned and therefore bound to increase planning problems. This therefore calls for proper planning so that the mistakes which have already been allowed to happen are corrected and not allowed to continue.

2.5 LAND USE:

This section has a general overview of the various land uses in the study area (Old Machakos).

2.5.1 Commercial

There are a total of 697 commercial establishments in the study area. Of these 270 are in the informal sector e.g. shoe shining, hawking and selling charity sweepstake. 427 are commercial establishments in the formal sector. In this category are the small shops employing only one person and the big commercial concerns employing up to over 50 workers.

Most of the commercial shops are found in the Central Business District with a few in the residential areas.

There are three banks all located in the Central Business District. These are: the Kenya Commercial Bank, the Standard Bank and the Cooperative Bank of Kenya.

There is also a large open market and a modern closed market in the eastern part of the study area. Both these markets are open throughout the week but their busiest days are during the market days which are held on Mondays and Fridays. Here commodities, such as food-stuff, clothes and livestock are sold.

2.5.2 Industrial:

Machakos is characterised by lack of big industries. The biggest industry is the Kenya Orchards Limited (KOL) which is situated 8km north east of the study area. The industry deals with fruit canning and the manufacture of fruit products such as jams and sweets. It has a labour force of 330.

In the study area 30 smaller industries exist. These include a saw mill in the Central Business District which has a labour force of 50. There are also light engineering industries dealing with welding and making of steel products such as windows, doors, beds and local 'jikos'. There are two hides and skins stores, a maize and produce store, Kenya National Trading Corporation store and a depot belonging to the Kenya Breweries Limited. There is also a small sweet manufacturing industry (Moons Limited) in the southern part of the study area. The Kenya Industrial Estates (KIE) have offices and workshops whereby they are trying to promote industry in the town by offering assistance in terms of training and

other facilities such as workshops and loan facilities. The industrial zone is on the southern part of the study area.

2.5.3 Educational:

There are 2 nursery schools, 5 primary schools and 3 secondary schools. 2 of the secondary schools are owned by private individuals and only one, the Machakos Boys' High School is owned by the government. It has classes from Form 1 to Form VI. However there are two other government schools just by the boundary of the study area. These are the Machakos Girls' High School (from Form 1 to Form VI) and the Machakos Technical High School (Form 1 to Form VI).

The study area also has a college - the Machakos Teachers College which is fully government maintained.

These educational institutions serve the local population as well as the rest of the district and even outside the district. This is more so in the government institutions which are national in character and they include the Machakos Boys' High School, Machakos Girls' High School and the Teachers College.

2.5.4 Public Purposes:

There are two hospitals in the study area. These are the Machakos Eastern Province Hospital and the Machakos Nursing Home which is private. The Machakos

hospital has a labour force of 804 including 24 doctors. It caters for the whole Machakos district and also cases from all over the Eastern Province since it is a Provincial hospital.

The Machakos Nursing Home which is a private institution has a labour force of 30 and has 65 beds. There are six other private clinics in the area - these usually have one doctor and one nurse.

There are 2 mosques, 1 temple and 5 churches. These cater for the moslems, Hindus and Christians' but most of the population is Christian as can be seen by the predominance of churches.

There is a cemetery in the southern part of the study area and a burning ghat on the Western part. A new large modern Post Office is an excellent landmark.

Eleven government ministries are represented in the study area. They are located in the Central Business District.

2.5.5 TRANSPORTATION:

There is a Country Bus Station near the Provincial Hospital and another bus park between Ngei and Mutonga Roads. These parks are not tarmaced and are either too muddy during the rainy season or too dusty during the dry season.

The major streets in the commercial area are tarmaced but none of the access roads and footpaths



Plate No.1

A house in the Swahili Village



Plate No.2

The Bus Station at Machakos

in the residential areas are tarmaced. The modes of transportation are cars, motorcycles, bicycles, buses and walking. 87% of the people walk to their places of work, 10.5% use cars, 0.5% use motorcycles, 1.0% use bicycles whereas 1.0% use buses. There are 7 petrol stations.

2.5.6 RECREATIONAL

Recreational facilities include the golf course located West of the Kangundo Road, the Machakos Sports Club just opposite the golf course, the Hindu Sabha Sports Club and the Kenyatta Open Air Stadium. A green belt exists in the Eastern part of the study area.

Sports facilities exist in all the nursery schools and primary schools, the Teachers' College and Machakos Boys' High School. There is also a cinema hall and a social hall in the study area.

2.5.7 PUBLIC UTILITIES:

The whole of the study area is well connected to piped water from Maruba dam. Most of the area is fairly well served with electricity except some parts of the Swahili Village and Kariobangi on the Eastern part. There are telephone facilities in the Central Business District, the Southern and Northern parts. There is a sewerage system in the Central, Southern, and Western areas. The Northern part and some parts in

the East are not served with a sewerage system.

2.5.8 RESIDENTIAL:

The residential land use will be dealt with in chapter 4.

The use of the developed urban land in Old Machakos is given in the following table.

Table 2.1 Developed Urban Land within Old Machakos

Type of Land Use	Developed land in hectares	% of total Developed land
Residential	80.20	24.33
Industrial	9.60	2.91
Educational	101.93	30.90
Recreational	19.90	6.04
Public Purpose	55.50	16.83
Commercial	55.40	16.80
Public Utilities	6.03	1.83
Tranportation	1.20	0.36
Total	329.7	100.0

Source: Measurements based upon the field survey by the researcher.

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CHAPTER 3: SOCIO - ECONOMIC CHARACTERISTICS

3.1 HISTORY OF MACHAKOS TOWNSHIP:

Machakos is in East Central Kenya. It was the first State Capital of Kenya from 1895 to 1899¹ when the capital was moved to Nairobi. Machakos is now the administrative, social and commercial centre for Machakos District in the Eastern Province of Kenya. It is the District headquarters for Machakos District which covers an area of 14,183 sq. km² with a population of about 1,000,000. The town grew slowly but steadily after being founded as the first up-country European trading post in East Africa.

The present site of the town was at first occupied by the Akamba in the 16th century. They later retreated to the surrounding hills - Iveti and Mui hills - due to the constant raids by the Maasai¹. Later Arab trade caravans passed through here and since the area was rich in agricultural products such as vegetables, maize and beans, honey and other products, a barter trade was started between the Akamba and the Arabs. However no permanent settlement was established. The caravans would replenish their supplies of food and water and then continue on their way to or from the rich areas in the west especially the shores of Lake Victoria.

It was only in the late 19th century that a nucleus of a permanent settlement was started by the Imperial British East Africa Company (IBEACO). Machakos began as a station of the IBEA Company in 1889. It was established as a trading depot by the company and

a fort was built as a supply point at which to replenish the food supplies before caravans set out across the sparsely populated areas between the highlands and Lake Victoria. The fort was also to act as a deterrent to slave trade.

At this time the population was very small - only a handful of Europeans, all administrative officials, the rest of the population was composed of a few Sudanese and Swahili porters and askaris with one or two local African interpreters and labourers. The population figures for this period are not obtainable.

Only when John Ainsworth arrived as Company Administrator in 1892 did the station become properly planned, with a separate location for the growing number of swahili people, on the very place where the swahili village is now located, and another location for Europeans in the present high cost residential area in the town. Asians also started arriving in 1895 when Ainsworth persuaded two traders from India to set up stores promising them suitable stores and living quarters. By then Machakos had become an administrative centre, military barracks, and commercial centre for the whole of up country British East Africa.

During the time of the building of the Kenya Uganda Railway (1895-1901) there was a continuous growth of the station, even though the railway did not pass through Machakos itself. In 1898 the Kenya-Uganda

Railway by-passed Machakos by 32 km. and this was considered a major blow to the growth of the town. As a result of this, Machakos today has no big industries while Athi River, only 48km away but on the railway line has a meat processing plant and a cement factory. But Machakos remained, although with its sphere of influence reduced to local level, as administrative and commercial centre for Machakos District after the IBEA Company's headquarters were moved to Nairobi in 1899.

The first phase in the township's development is marked by virtual absence of African participation in wage economy. The Africans were more concerned with their farms and cattle. However, the period between the removal of central administrative functions to Nairobi in 1899 and Independence in 1963 is marked by consolidation of racial segregation and increasing incorporation of Africans in the monetary economy. Also increasing pressure from Africans to reverse the status quo of the colonial regime, and the gradual erosion of economic and administrative differentiation by race which culminated in Independence.

Until 1906 there was only the European built fort and a line of huts for the Nubian askaris and swahili porters. As Asians began to arrive they built shops leading to the fort. A Market (the present open market) was established where the Akamba brought foodstuffs and

livestock for sale.

In 1903⁴ Machakos was gazetted as a township under the East African Township Ordinance of the same year with a boundary of 2.8km. radius from the fort. Some swahili cattle traders settled in the town. Other swahili from the surrounding European farms also settled in the town after being granted some plots. In 1922 the township was demarcated into African, Asian, and European residential areas.⁵ The population of the township still kept on increasing steadily. In 1897 the population was 300, in 1909 it was 557 and in 1919 it was 890. From 1919 the population is not recorded until 1948 when it had grown to 2028. In 1962 the population was 4553 and in 1969 it had grown to 6312. The estimates for 1978 show that the population had risen to 80,000. This increase between 1969 and 1978 can be explained by the natural increase, migration and the extension of the township boundary from 19 sq.km. to 320 sq.km.

Below is a table depicting the population growth.
Table 3.1 Population growth of Machakos Township.

YEAR	AFRICANS	ASIANS	EUROPEANS	TOTAL
1897	-	-	-	300
1909	424	126	7	557
1919	580	297	13	890
1948	1524	454	50	2028
1962	3464	758	131	4553
1969	5772	467	73	6312
1978	-	-	-	80,000*

Source: Land, Brian: Migrants, Commuters and Townspeople, Ph.D Thesis University of Edinburgh, 1974: *Estimate by the Town Council.

By 1920 there were 44 shops, 141 residential houses, 2 religious buildings and 2 offices all making a total of 189 buildings in the town⁶. Most of the buildings (97) were owned by Asians and the rest by Europeans and Africans.

In 1954 Machakos was gazetted as an urban centre and its area increased from 8 sq.km to 19 sq. km. Another boundary extension was done in 1972 making the area of the town 320 sq. km. In 1973 Machakos achieved the status of a Town Council.

It can thus be seen that the town grew to its present status due to its administrative and commercial functions.

3.2 POPULATION

As stated in an earlier part of this study, the population of Machakos has been growing steadily since it was founded. According to the 1969 census, the growth rate of the town since 1962 has been 7 per cent. This increase in population is as a result of the natural increase and the migration into the town by migrants who are in search of better economic opportunities.⁷ Since the natural increase is 3.5 per cent it can be concluded that the rate of immigration is 3.5 per cent thus making the 7 per cent growth rate.

The table below shows the population growth of

Old Machakos town from 1897 to 1978. Population figures for the years between 1919 and 1948 and between 1948 and 1962 have not been available.

Table 3.2 Population growth of Old Machakos

YEAR	POPULATION
1897	300
1909	557
1919	890
1948	2028
1962	4553
1969	6312
1975	9473*
1978	11730*

Source: Lang, Brian: Op. cit.

*Estimates by the researcher.

The 7 per cent growth rate shows that Machakos Town is growing fast since the average growth rate for all the towns in Kenya is 5 per cent. According to the 1969 census the population structure was as follows:

Table 3.3 Population structure of Machakos

AGE	MALE	%	FEMALE	%	TOTAL	%
0-9	855	13.5	830	13.1	1685	26.6
10-14	232	3.8	271	4.3	503	8.1
15-19	304	4.8	343	5.4	647	10.2
20-24	534	8.5	430	6.8	964	15.3
25-29	463	7.3	286	4.5	749	11.8
30-39	629	10.0	273	4.3	902	14.3
40-49	378	6.0	109	1.7	487	7.7
50-59	168	2.7	56	0.9	224	3.6
60+	97	1.5	54	0.8	151	1.3
Total	3660		2652		6312	100.0

Source: 1969 Census

3.2.1 Household size:

According to this study 2300 housing units were identified and it was found that the average household size for each unit was 5.1 people. The study area therefore has a population of 11,730 this figure is calculated by multiplying all the housing units by the average household size.

The household size ranges from one person per household to sixteen persons per household. Below is a table showing the distribution of household sizes for the households in the study area.

Table 3.4 Household size of the study area

Household size	No. of households	% of households
1	10	9.0
2	8	7.2
3	9	8.1
4	15	13.5
5	18	16.2
6	14	12.6
7	13	11.7
8	8	7.2
9	6	5.5
10 and over	10	9.0
Total	111	100.0

3.2.2. Population Projections:

In the population projections it was assumed that the rate of growth of the study area will keep on decreasing. The assumption was made due to the current government policies which aim at reducing the rate of migration to the urban centres and the rate of population growth in Kenya. People are being discouraged from migrating to the urban centres so that a strain is not put on the infrastructure and other services in these urban centres. Rural development is therefore being encouraged, for example, through the

growth centre policy^B which aims at taking the needed services and infrastructure to the rural people through concentrating these facilities in some designated service centres. Since people migrate to the urban centres in search of better economic and social opportunities, it is hoped that eventually migration to the bigger urban centres will be reduced due to increased social and economic opportunities in the rural areas.

Family planning is also being encouraged in the country so as to reduce the rate of population growth. The success of the family planning programme will therefore lead to a decrease in the natural population increase. Several growth rates have been used in the population projections. These are:-

1. 7 per cent growth rate which was the growth rate for Machakos between 1962 and 1969. This growth rate is used for the years 1978 to 1983.
2. 5 per cent growth rate is used for the years 1983 to 1993. This was the national average population growth rate for towns in between 1962 and 1969.
3. 3.5 per cent growth rate which was the national average population growth rate for both towns and rural areas between 1962 and 1969. This growth rate is used for the years 1993 to 2000.

In assuming that the growth rate for Old Machakos will decrease, the trend of decreasing population growth rates in the developed countries was also considered. For example, Austria has a population growth rate of 0.5 per cent and East Berlin has a negative population growth rate of -0.7 per cent⁹. Since Kenya is a developing country, it could also follow a similar path, hence a decrease in the growth rate for Old Machakos.

The following formula has been used.

$$P_t = P_o (1 + r)^t$$

where

P_o = the census count for the earlier
census

P_t = the census count for the later years

r = the average annual rate of growth

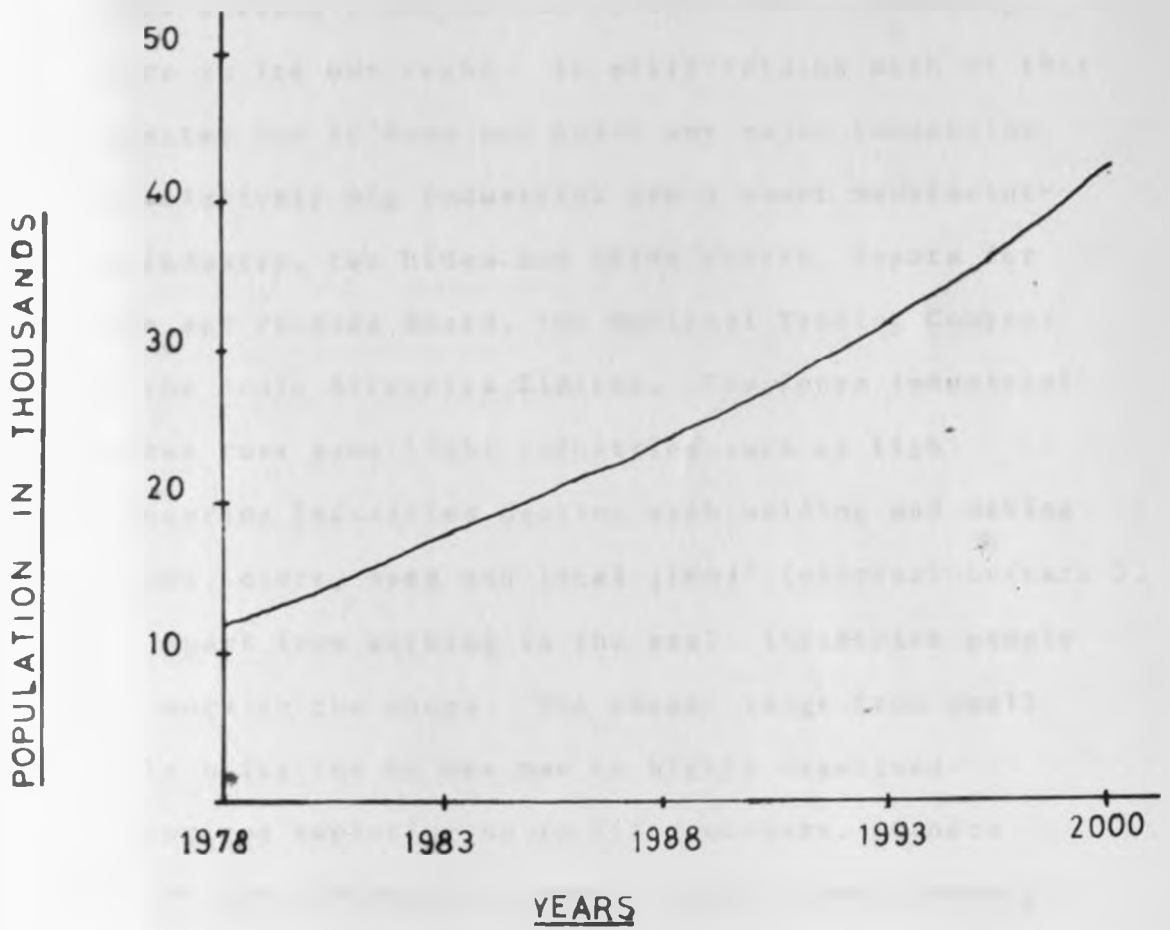
t = the interval in years.

Table 3.5 Population Projection for Old Machakos

YEAR	POPULATION
1978	11,730
1983	17,603
1988	23,589
1993	31,611
2000	41,625

These projections are used in a later part of this

FIG-1 POPULATION PROJECTIONS



study as a basis for calculating the future housing needed in the study area.

3.3 ECONOMIC ACTIVITIES:

As has been already pointed out Machakos was originally started as an administrative and commercial centre serving a hinterland rather than a producing centre in its own right. It still retains much of this character for it does not boast any major industries. The relatively big industries are a sweet manufacturing industry, two hides and skins stores, depots for maize and Produce Board, the National Trading Company and the Kenya Breweries Limited. The Kenya Industrial Estates runs some light industries such as light engineering industries dealing with welding and making windows, doors, beds and local jikos' (charcoal burners).

Apart from working in the small industries people also work in the shops. The shops range from small stalls being run by one man to highly organised enterprises employing up to fifty workers. Others work in the government, county council, and township offices.

Below is a table showing the distribution of wage employment in the town in 1976.

Table 3.6 Employment by sector as Percentage of total employment.

Sector	No.of people	%
Agriculture and Forestry	615	21.2
Manufacturing	175	6.0
Construction	85	2.9
Wholesale, Retail, Hotels, & Restaurants	443	15.2
Transport and Communication	458	15.8
Finance, Insurance, Estate, and Business services	58	2.0
Community, Social & Personal Services	1072	36.9
Total	2906	100.0

Source: Kenya Statistical Abstract 1977.

As can be seen from the table above, the public sector, (Communication, social and personal services) employs the most number of people (36.9%). The other sectors which employ many people are: Agriculture and Forestry which employs 21.2%; Transport and Communication which employs 15.8%; and the Commercial sector (wholesale, retail, hotel and restaurants) which employs 15.2% of those in wage employment. It can be seen that the construction sector is very weak in that it employs only 2.8% of those in wage employment.



Plate No.3

The modern market at Machakos



Plate No.4

A highrise residential house at Machakos Hospital

The income distribution of the household heads is shown in the table below.

Table 3.7 Income of household heads per month.

Kshs.	No. of people	%
100	2	2
100-199	3	3
200-299	7	6
300-399	2	2
400-599	30	27
600-999	37	33
1000-1499	14	13
1500-1999	9	8
2000+	7	6
Total	111	100

Source: Planning for Housing in Machakos Survey, September, 1978.

From the above table it can be seen that the income of the household heads ranges from under Kshs.100 to over Kshs.2,000 per month. 11% earn less than Kshs.300 per month, 29% get between Kshs.300 and Kshs.600 per month, 33% get between Kshs.600 and Kshs.1000 per month, 21% get between Kshs.1,000 and Kshs.2,000 per month whereas 6% have incomes of more than Kshs.2,000 per month.

We can divide the income into low, medium and high income categories. Low income includes those earning less than Kshs.600 per month, medium income those earning between Kshs. 600 and Kshs.2,000 and high income those whose income is above Kshs.2,000 per month. The corresponding percentages will be 40, 54, and 6 respectively. It would therefore be difficult for the 40 per cent low income group to meet their housing requirements without some substantial subsidy. Incomes are of vital importance in housing for without money even if there are wonderful housing policies, they cannot succeed. This will be looked into in a later part of this study.

It can also be noted that according to the findings of this study 59% of the population are children below the age of 19. They either go to school or college and so do not have any income. 17% of the adults are also not in any wage employment. Among these are those in search of employment and the housewives. It can therefore be seen that 76% of the population depend on the 24% who are in wage employment. The dependency rate is therefore high and this can affect the affordability of housing by the various households for most of the income is used in supporting the dependants.

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CHAPTER 4: HOUSING ANALYSIS

4.1 GENERAL APPRAISAL:

The Physical layout of Old Machakos symbolises the colonial past, with graduated housing standards and other facilities grouped in areas still recognizably the former segregated housing zones. The best houses are found in the former European residential area - northern part of the study area along the Machakos -Kangundo Road. These are followed by the houses in the former Indian residential area in the south. The former African area, the Swahili Village has the worst housing in the study area. However, after independence in 1963 this racial segregation no longer exists but economic segregation has now taken over - the poor living in substandard housing and the rich in well planned housing.

4.1.1 Planned Housing:

With the help of the National Housing Corporation the Town Council has been able to complete three housing schemes. These are the St. Mary's Tenant Purchase Scheme, Swahili Tenant Purchase Scheme and Ngei Estate.

The St. Mary's Tenant Scheme has 38 housing units. It was built for the middle income group - those earning between Kshs.300 and Kshs.1,500. It was built at a cost of Kshs.900,000 thus each housing unit cost Kshs.23,684. The repayment of the mortgage is at a rate of Kshs.203 per month.

The Swahili Tenant Purchase scheme which was built at a total cost of Kshs.375,840 has 12 housing units. Each unit was built at a cost of Kshs.31,320. It also caters for the medium income group. The monthly repayment of the mortgage is Kshs.315.

Ngei Estate which has 24 housing units is a rental estate run by the Town Council. It was built at a total cost of Kshs.328,000 thus each housing unit cost Kshs.13,666. The rent per month is Kshs.250.

It can be seen that the above mentioned rents and monthly repayments for these schemes are rather high - between Kshs.203 to Kshs.315. The only people who can afford to spend this money in housing are those earning over Kshs.800 per month assuming that a person is prepared to spend 20 per cent of his monthly income on housing¹. The low income group cannot therefore afford to live in these houses.

Other planned housing in the study area includes the Medical Estate built by the Ministry of Works for senior medical staff in the Machakos Provincial Hospital. The Estate has 16 units. Other planned residential areas are found in the study area along the Machakos - Konza road in the south and also in the North. These houses have been built by private

developers. The Central Business District also has commercial-cum-residential houses. At the back of some shops, there exists some living quarters which are either rented or occupied by the owner of the shop.

4.1.2 Unplanned Housing:

The Swahili village and Kariobangi Estate which are on the Eastern part of the study area are unplanned. Houses here are built by private developers and no proper planning is done.

The Swahili village is almost as old as the town itself. It was started in the 1890's as a residential area for Africans (mainly Swahili) who had been encouraged to come to help the imperial British East Africa Company in administration.² The Swahili village is the most unplanned growth in the study area. It is the 'Mathare' of Machakos town.

Kariobangi Estate was started in 1968 as a move to ease the Swahili village of some of its population and perhaps prepare it for demolition. Individual owners were given plots to develop. But this does not seem to have solved the problem for Kariobangi is now almost as crowded and filthy as the Swahili village.

Having dealt with the general appraisal of housing of the study area will now embark on a detailed analysis of the housing situation.

4.2 HOUSING ANALYSIS:

For the purpose of analysis, the study area was divided into five zones. Zone number one covered the low density residential area in the northern part of the study area. Zone number two covered the Swahili village whereas zone number three covered the Kariobangi Estate. Both zones two and three are high density residential areas on the Eastern part of the study area. Zone four is a medium density area on the Southern part and zone number five is the Central Business District.

The study area had a total of 2300 housing units and 111 of these were examined. A questionnaire was administered to each of these 111 households and details of the housing structure were noted down. Other relevant information such as rent, ownership and financing was collected. This information will be analysed in this section.

4.2.1 Land Ownership

Table 4.1 Plot ownership in Old Machakos*

Type of Ownership	Z O N E S					Total	%
	1	2	3	4	5		
Public	10	-	-	6	4	20	18.0
Leasehold	11	23	30	4	20	88	79.0
Freehold	-	-	-	-	-	-	0.0
Not sure	-	3	-	-	3	-	3.0
Total	21	26	30	10	24	111	100.0

* All the tables in this chapter are from data collected in the Housing Survey conducted for this study at Old Machakos Town

As can be seen in the above table, 18% of the plots are on public land. These are houses like the government houses and County Council and Town Council owned houses. 79% of the houses are on leasehold plot whereas 3% of the houses are on plots which are not public, leasehold or freehold. These are found in zone two which includes the swahili village. This is a clear indication of the complex land ownership in the area. The people who can occupy these plots have never been given any leasehold contracts and as such they are unsure of the nature of their status as concerns these plots. This is one of the reasons why people fear risking building a permanent building in a certain plot because they do not have any security of tenure. This factor could encourage poor housing due to the insecurity felt by the plot occupier.

Since the land in the study area belongs to the government through either public ownership or leasehold ownership, it would be easier to have development control because the township authorities have the authority to do so.³

4.2.2 Occupants of the Housing Unit.

Table 4.2 Persons living in the house

No.of persons per zone							
Persons in the house	1	2	3	4	5	Total	%
Owner	13	-	-	1	4	18	16.0
Rented	8	25	28	3	20	84	76.0
Staff house	-	1	2	6	-	9	8.0
Total	21	26	30	10	24	111	100.0

Only 16% of the houses are owner occupied whereas 76% are rented. 8% are staff houses which are rented by the emp'oyer, for example, the Banks for their senior staff. From the above analysis it can be seen that most of the residents of the study area do not own houses but stay in rented ones. However

studies done have shown that it is good to encourage ownership of housing since most people keep their houses better maintained if they own them.⁴ It might therefore be necessary to encourage house ownership in the study area.

4.2.3 Type of Housing Unit

Table 4.2 Type of House:

Type	Z O N E S					Total	%
	1	2	3	4	5		
Detached	7	7	3	7	3	27	24
Semi-detached	8	6	2	2	6	24	22
Flat (storey)	1	-	-	-	-	1	1
Terraced	5	13	25	1	15	59	53
Total	21	26	30	10	24	111	100

24% of the houses are detached whereas 22% are semi-detached. 53% of the houses are terraced and 1% of the houses are highrise. The detached and semi-detached houses are found mostly in the medium and low density residential areas. There are only two highrise residential houses and these are found in the zone 4 in the Southern part of the town. So highrise buildings are new in Old Machakos and this perhaps signifies the new trend in institutional housing for these highrise buildings are occupied by the Machakos Provincial Hospital staff.

The terraced houses are the most type of housing in the study area. These houses are in most cases found in the high density residential areas. One long housing block is built and divided into many small units which are occupied by different households. This leads to congestion since one single unit is normally divided into these smaller units without allocating enough space for each. For example a unit of 6 sq. metres can be rented by two people. Thus an area can have a population that exceeds its services such as water supply and sewage disposal facilities.

The detached and semi-detached houses are usually better and have more space but they are more expensive to rent or to own. So most of the low income earners are excluded from these houses.

4.2.4. Building Materials

Table 4.4. Foundation Materials

Materials	Z O N E S					Total	%
	1	2	3	4	5		
Stones	19	21	28	10	24	102	92
Concrete	1	-	-	-	-	1	1
Poles	1	5	2	-	-	8	7
Total	21	26	30	10	24	111	100

93% of the housing units have a strong permanent foundation made of either stones or concrete. The remaining

7% have a weak foundation made of digging holes in the ground and fixing wood poles in the holes. These holes are then covered with soil. It can therefore be noted that the foundation of most houses are permanent but the temporary foundations should be of concern to the planner since the houses need to be improved.

Table 4.5. Floor Materials

Materials	Z O N E S					Total	%
	1	2	3	4	5		
Cement	20	20	28	10	24	103	93
Earth	1	6	2	-	-	8	7
Total	21	26	30	10	24	111	100

93% of the houses have floors plastered with cement. The remaining 7% of the houses have earth floors. Therefore most of the houses have good floors. However the few houses with earth floors can easily be a health hazard. The houses can become dusty and this makes them suitable for some insects such as jiggers to grow and these are dangerous to human health. These houses therefore need to be improved and made more conducive to the residents' good health.

Table 4.6 Wall Materials

Materials	Z O N E S					Total	%
	1	2	3	4	5		
Concrete Blocks	4	7	12	7	5	35	31
Burnt Bricks	3	3	-	3	-	9	8
Stones	14	11	16	-	19	60	54
Mud plastered	-	3	1	-	-	4	4
Mud unplastered	-	2	1	-	-	3	3
Total	21	26	30	10	24	111	100

From the above table it can be seen that 31% of the houses have walls made of concrete blocks, 8% are made of burnt bricks whereas 54% are made of stones. 93% of the houses therefore have walls made of permanent materials the most used materials being stones.

4% of the houses have mud plastered walls whereas 3% have mud unplastered walls. These walls are temporary although the mud plastered walls are better than those which are unplastered. Zones 2 and 3 - Swahili village and Kariobangi respectively - are the only zones with houses that have temporary walls. These walls, especially those which are unplastered are difficult to clean and they provide an easy hiding place for vermin such as cockroaches and rats. The houses with these temporary walls need to be improved.

Table 4.7 Roof materials

Materials	Z O N E S					Total	%
	1	2	3	4	5		
GIS	15	20	30	2	24	91	83
Asbestos	2	-	-	6	-	8	7
Tiles	4	-	-	2	-	6	5
Beaten GIS	-	6	-	-	-	6	5
Total	21	26	30	10	24	111	100

83% of the houses have a roof made of galvanised iron sheets whereas 7% have asbestos roofs and 5% roofs made of tiles, 95% of the houses therefore have roofs made of permanent materials, that is, galvanised iron, asbestos or tiles. Galvanised iron sheets are the most used material. Iron sheets are cheaper than tiles or asbestos roofing, hence their predominance as roofing material. The iron sheets are also more readily available in the hardware shops in Machakos town.

5% of the houses have temporally roofs made of beaten tin. Zone two is the only zone where temporary materail is used for construction of the roof. However in this zone there is the Swahili village women group that helps to build houses with permanent roofs on a self-help basis. The women contribute money and help each other in town in the construction of a permanent

roof. This self-help group has therefore responded to their housing problem in this constructive manner. Their efforts will help them in alleviating their housing problem.

Table 4.8 Category of housing unit

Category	1	2	3	4	5	Total	%
Permanent	20	19	28	10	24	101	91.0
Semi-permanent	1	1	2	-	-	4	3.6
Temporary	-	6	-	-	-	6	5.4
Total	21	26	30	10	24	111	100

From the table above it can be seen that 91% of the houses are permanent. Permanent here means that the foundation, floor, wall and the roof are made of permanent material like stones for the foundation, cement for the floor, concrete for the walls and galvanised iron sheets for the roof.

3.6% of the housing units are semi-permanent, that is, either the foundation, the floor, the walls or the roof is made of temporary material. Like poles for the foundation, earth for the floor, mud for the wall and beaten CIS for the roof. These houses could be improved by replacing the temporary material with a permanent one.

5.4 % of the housing units are temporary, that is all the housing unit is made of temporary materials, for example, the foundation can be poles, the floor can be made of earth, the walls made of mud and the roof can be made of beaten GIS. All the temporary units are found in the swahili village. These housing units need complete replacement.

Thus in the study area 3.6%, that is, 83 housing units, need to be improved for they are semi-permanent whereas 5.4%, that is 124 housing units need to be replaced for they are temporary.

4.2.5 Sanitary facilities

Table 4.9 Kitchen Location

Location	Z O N E S					Total	%
	1	2	3	4	5		
Main house	14	6	23	8	24	75	67.6
Separate building	2	-	-	1	-	3	2.7
None	5	20	7	1	-	33	29.7
Total	21	26	30	10	24	111	100

67.6% of the housing units have kitchens located in the main house whereas 2.7% of the units have kitchens located in a separate building. The kitchens located in a separate building are found in zone one along the Machakos - Kangundo Road, and zone four

along the Machakos-Konza Road. Both of these zones are medium and high income areas and so these people can afford to have a separate building for the kitchen since there is more land than in the low income areas.

29.7% of the houses do not have any kitchen at all. The zone affected most is zone 2, the swahili village, for 77% of the housing units in the zone do not have kitchens. The least affected zone is zone 5 for all houses have kitchens. If a house does not have a kitchen, it means that one of the living rooms has to be used as a kitchen or a common kitchen is shared by two or more families.

Table 4.10 Kitchen use

Use	Z O N E S					Total	%
	1	2	3	4	5		
Private	15	6	23	9	24	77	69.3
Shared	1	-	-	-	-	1	1.0
None	5	20	7	1	-	33	29.7
Total	21	26	30	10	24	111	100

69.3% of the houses have their own kitchens which are privately used. 1% of the houses use common kitchens which are shared between two or more households. 29.7% of the households do not have access to any kitchen at all. These therefore are the households

who use their living rooms for both cooking and living purposes. This could lead to congestion and other inconveniences in the living rooms used especially if a charcoal burner is being used in a room which is congested and not well ventilated the concentration of carbon dioxide (Co₂) can rise above the recommended maximum of 0.1%.⁵ Proper kitchens are therefore needed for healthful housing.

Table 4.11 Toilet location

Location	Z O N E S					Total	%
	1	2	3	4	5		
Main building	9	18	12	8	21	68	61.3
Separate building	11	8	17	2	3	41	36.9
None	1	-	1	-	-	2	1.8
Total	21	26	30	10	24	111	100.0

61.3% of the houses have toilets located in the main building. In the detached and semi-detached houses together with the flats this means that every housing unit has its own toilet. However, in the terraced housing where one building is occupied by many households each occupying one or two rooms in one long building, this means that there is one toilet, usually at the back of the building which is shared by all occupants. These toilets which are in the main building are either waterborne or bucket latrines.

36.9% of the housing units have their toilets built in a separate place other than in the main building. So the toilet itself is a separate structure. These are normally pit latrines which have to be built some distance away from the main building because of hygienic considerations. These can bring some problems of security, especially during the night if one wants to go to the toilets.

1.8% of the housing units do not have any toilet facilities at all. This means that the occupants have either to share with their neighbours or result to unhygienic disposal of their human waste. This could lead to health problems.

Table 4.12 Toilet Use

Use	Z	O	N	E	S	Total	%
	1	2	3	4	5		
Private	10	12	1	9	1	33	29.7
Shared	10	14	29	1	23	77	69.4
None	1	-	-	-	-	1	0.9
Total	21	26	30	10	24	111	100.0

99% of the households have an access to a toilet. Of these 29.7% have their own private toilets just for the use of one household whereas 69.4% have shared toilets. The use of shared toilets is common especially

in the low income housing. At times these toilets are left to become very dirty since none of the users feels directly responsible for the proper maintenance of the toilet. In some of these toilets one is constantly struck by the strong rotten smell that comes from them. The sight can also be disgusting because of the human waste one sees lying in the toilet room. These shared toilets need a lot of improvement in terms of cleanliness.

4 0.9% of the households do not use any toilet facilities at all. These are along the Machakos-Kangundo Road and there are some bushes near the housing units. The people can therefore have an easy access to the bush for disposal of their human waste. These households should be encouraged to have proper toilets since disposing of the waste in the bush is a great danger to the health of the community, especially if any epidemics break.

Table 4.13 Bathroom

Location	Z O N E S					Total	%
	1	2	3	4	5		
Main house	11	19	12	8	23	73	65.8
Separate building	9	7	17	2	1	36	32.4
None	1	-	1	-	-	2	1.8
Total	21	26	30	10	24	111	100,0

65.8% of the houses have bathrooms located in the main

house and 32.4% have bathrooms located in a separate building. So 98.2% of the houses have bathrooms whereas 1.8% do not have any bathroom.

Table 4.14 Bathroom Use

Use	Z O N E S					Total	%
	1	2	3	4	5		
Private	11	12	-	9	3	35	31.5
Shared	9	14	29	1	21	74	66.7
None	1	-	1	-	-	2	1.8
Total	21	26	30	10	24	111	100.0

31.5% of the households use a private bathroom whereas 66.7% use a shared bathroom. 2% do not use any bathrooms and therefore they either use some of the rooms in the housing unit for washing and bathing or they wash and bathe outside the houses. This is a danger to the proper health and the cleanliness of a place and its occupants. If one bathes in the other rooms in the house it makes the rooms damp and this could bring about coldness which can affect one's health.⁶ Also dirt could get into the various things like utensils if the kitchen is used. It can also be noted that if a room has not been designed for bathroom use, it lacks proper drainage and hence there will be a drainage problem.

Communal bathrooms were found to be generally dirty with a slippery paste on the floor. This could also lead to a health hazard. Drainage from bathrooms was also found to be inadequate. Pools of water could be seen outside most of the bathrooms. This acts as an environmental hazard for it is a breeding ground for mosquitoes and this could cause diseases such as malaria.

Generally the private bathrooms were found to be clean and properly maintained.

4.2.6 Sewerage System

Table 4.15 Method of sewerage disposal

Method	Z O N E S					Total	%
	1	2	3	4	5		
Public Pipes	2	14	2	4	1	23	20.7
Septic Tank	18	-	1	4	3	26	23.4
Pit latrine	-	5	26	1	20	52	46.9
Buckets	-	7	-	1	-	8	7.2
None	1	-	1	-	-	2	1.8
Total	21	26	30	10	24	111	100.0

As can be seen from the above table 20.7% of the household dispose their human waste through public pipes. 23.4% use septic tanks and 46.9% use pit latrines. 1.8% do not have any method of human waste disposal so they just dispose their waste in the bushes. These are found in the northern and eastern parts of the study

area.

The study area is served with a sewerage system which covers the central area, the Southern area and some parts of the eastern and Western areas. The Northern part and some parts like zone 3 (Kariobangi) and the Western part are not yet served by a sewerage system. Even some houses in the area served by the sewerage system have not yet been connected to the main sewerage pipes.

Septic tanks are basically used in zone 1 which is a high income area and is not yet served by the sewerage system. Bucket and pit latrines are used in the other areas which do not have a sewerage system. It is difficult to keep the bucket latrines clean and this leads to generally poor sanitation. The bucket latrines were found not to be properly maintained.

4.2.7 Garbage Disposal:

Table 4.16 Garbage disposal

	Z O N E S					Total	%
	1	2	3	4	5		
Town Council	9	26	12	5	24	76	68.5
Private	7	-	16	5	-	30	27.0
None	5	-	2	-	-	5	4.5
Total	21	26	30	10	24	111	100.0

68.5% of the garbage disposal is done by the Town

Council. 27% of the disposal is done by individuals privately whereas 4.5% do not have a proper way of disposing their garbage and therefore just throw it away in any way. This could be the garbage that is found scattered in the residential areas.

The Town Council authorities collect garbage from the various parts of the town during some specific days in a week. In the Central Business District and the Machakos Hospital the garbage is collected every day of the week. In the Western part, the area covering Machakos Boys' School and the Teachers College, garbage is collected three times per week- Mondays, Tuesdays and Wednesdays. The Swahili Village is also served with garbage collection at the same time with the Western part. The area covering the administration offices and the southern part of the study area is served on Tuesdays, Thursdays and Saturdays. Some parts like the South Western part and the north eastern part are not served by the Town Council and so the owners themselves must dispose of their garbage.

A conservancy fee of Ksh.120 per year is charged by the Town Council and if the fee is not paid one's garbage is not collected. The Council provides dustbins to those who pay the fee. It is now planning to introduce public dustbins.

Some Town Council employees are sent to burn the garbage from where it has been collected in the

residential areas or the garbage is carried and taken to a sanitary land fill. One open tipper vehicle and a tractor are used for collecting the garbage. Those who dispose of their garbage either burn it or put it in holes which they have dug in the residential areas. The garbage is at times not collected, burnt or buried regularly and dogs and other animals get access to the garbage and spread it around thereby creating nuisance and odor problems.

4.2.8 Water Supply

Table 4.17 Source of Water

Source	Z O N E S					Total	%
	1	2	3	4	5		
Private Piped	10	11	-	8	3	32	28.9
Piped Communal	11	15	30	2	21	79	71.1
Total	21	26	30	10	24	111	100.0

28.9% of the households have private piped water whereas 71.1% have access to piped communal water. The communal piped water is usually used by many households who live in the same housing block. As water pipe is put somewhere within the building where all the households living in the nearby housing units can go and fetch their water. There are also community water points where water kiosks have been constructed. People go there and buy water from the kiosk attendant at a cost of 10 cents per 18 litres. The swahili village is the only area with such water kiosks.



Plate No.5

A water kiosk in the swahili village.



Plate No.6

The modern Post Office In Machakos.

Having water near or in the house can be useful because it can be used for domestic work as well as keeping the house clean. A lot of time is also saved in which more useful economic work can be done.

Machakos gets its supply of water from the Maruba dam which is 6 kilometres South of the study area. There are also two boreholes in the area. The dam has a capacity of 1730m^3 per day whereas the boreholes have a daily capacity of 250m^3 , and the daily water consumption is 1500m^3 . The water stock left is therefore only 480m^3 . However, plans to triple the present capacity of the dam to 5190m^3 per day are now complete. Machakos will therefore have sufficient water for industrial, domestic and other uses.

Treatment of the water is done at the treatment works in the dam. These consist of flocculation, sedimentation, rapid gravity filtration and chlorination. It is then pumped to tanks North of the study area and from here it gravitates to the town. However there are times especially during the dry seasons - August/October and January/March - when water shortage is experienced. It is therefore hoped that this problem will be solved after the capacity of the dam is increased.

4.2.9 Accessibility:

The major streets in the study area are served with all weather tarmaced roads. Tarmaced roads

lead to the southern, northern, eastern and western parts of the town linking Machakos with the outside towns. However there are no tarmaced roads in the residential areas. The roads are muddy and at times especially during the rainy season in March/July and October/December they can become impassable. This problem is more serious in the southern part of the study area where vehicles often get stuck in the mud during the rainy season. Otherwise there are sufficient roads which only need to be upgraded to all weather roads. This would ensure easy accessibility to the home and the place of work.

4.2.10 Drainage:

The study area is drained by the Mitheu and Kathome (iiyini) rivers. The street drains are of the open channel type cast in concrete or lined with stone or concrete blocks. At road crossings or intersections concrete pipe culverts have been passed under the roads. However in some residential areas in the Southern and Eastern part of the study area drainage is not sufficient. The problem is more acute during the rainy season for some low lying areas allow storm water to collect and small pools are formed. This is a health hazard as mosquitoes start breeding here. This also leads to some considerable nuisance due to the odour and interference with accessibility.

The open drains are also a hazard to both human and

vehicular traffic and they also collect rubbish and are generally showing signs of age. Underground pipe drains would be the best.

4.2.11. Electricity:

Electricity is readily available for any new developments in Old Machakos. The town gets its electricity from the Nairobi-Mombasa electricity supply. The present situation is that electricity supply has been extended to all areas except Kariobangi (in zone 3), but not all housing units have an electricity connection. There is also lack of sufficient street lighting in the study area.

4.2.12 Posts and Telecommunications:

The postal and telephone services are concentrated in the Post Office building in the Central Business area. The telephone services are mainly found in the various offices in the area, but in a few cases telephone services have been extended to individual residential units in the high income areas. The postal services are concentrated in the post office building and no other minor postal offices exist in the study area.

4.2.13 Household size

Table 4.18 Household size

	Z O N E S					Total
	1	2	3	4	5	
Households	21	26	30	10	21	111
Population	110	150	174	45	105	584
Household Size	5.2	5.7	5.8	4.5	4.3	5.1

The average household size in the study area is 5.1. This is calculated by dividing the total population with the total number of households in each zone. The household size has been used in this study to calculate the present population by multiplying the total number of housing units in the study area by the household size because one housing unit represents one household.

The term household in this study has been used to refer to the people who live and share the facilities in a single housing unit, for example, cooking and eating together.

4.2.14 Occupancy Rate

Table 4.19 Occupancy Rate

	Z O N E S					Total
	1	2	3	4	5	
No. of rooms	58	47	59	20	38	222
No. of people	110	150	174	45	105	584
Occupancy Rate	1.9	3.2	2.9	2.3	2.8	2.6

The Occupancy rate is for determining the extent of overcrowding. This is calculated by dividing the total number of habitable rooms by the total population in the study area. The occupancy rate for the study area is 2.6, that is 2.6 persons per habitable room.

The occupancy rate is lowest in zone 1 which is a high income residential area and highest in zone 2 which is the low income area. Zone 4 which is a medium income area also has a low occupancy rate of 2.3 whereas zone 3 a low income area has an occupancy rate of 2.9. Zone 5, the Commercial Business District has an occupancy rate of 2.8. Occupancy rate is therefore related to income those with high income having the lowest occupancy rates whereas those with the low income have high occupancy rates.

According to the Kenya Government Development Plan⁷ an occupancy rate of 2.5 is the standard the government has recommended in housing. It can therefore be seen that zones 2, 3, and 5 are overcrowded. The average occupancy rate (2.6) for the study area also gives an indication of overcrowding. The zones with most overcrowding are those where low income people live.

4.2.15 Densities:

The study area has a residential density of 29 housing units per hectare. This leads to a density of 149 people per hectare. There is therefore no congestion according to the national suggested density.⁸

4.2.16 Rent;

In the study area rents range from Kshs.30 per month to Kshs.1200 per month. 12% of the households do not pay any rent. This is so because they either

own the house and have finished repaying any loans they might have borrowed, or they built the house from their own savings. The houses could also be free staff housing as is the case with senior staff of the Standard Bank of Machakos.

88% of the households pay monthly rents or other housing repayments every month. The distribution of this rent is shown in the table below according to the zone and amount paid each month.

Table 4.20 Rent according to amount paid and zone.

	Z O N E S					Total	%
	1	2	3	4	5		
100	4	8	9	-	1	22	22.4
100-199	-	3	10	-	7	20	20.4
200-299	2	7	8	2	8	27	27.6
300-399	2	8	3	1	5	19	19.4
400-499	1	-	-	-	2	3	3.1
500-599	2	-	-	1	1	4	4.1
600-699	1	-	-	-	-	4	1.0
Over 700	1	-	-	1	-	2	2.0
Total	13	26	30	5	24	98	100.0

The above table shows that zones 2 and 3 have the lowest rents (less than Kshs.400) whereas zones 1 and 4 have the highest rents (above Kshs.700). This is so

because zones 2 and 3 are low income high density areas and so rents are bound to be cheaper due to the poorer quality of housing. Zone 1 is high income low density area whereas zone 4 is medium income density area. These areas have better houses hence the higher rents.

The average monthly house rent amounts to Kshs.365 per household whereas the average monthly income per household is Kshs.1025. The household heads therefore spend 35.6% of their income on housing. It can thus be seen that a big proportion of their income is spent on rent. The percentage of income spent on rent is almost double the percentage (20%) which is supposed to be spent on housing.

Below is a table showing the relationship between rent and income.

Table 4.21 Income according to amount of rent paid.

Rent in Kshs.	Income in Kshs.									
	100-199	200-299	300-399	400-599	600-999	100-1499	1500-2000	2000	Total	
	%	%	%	%	%	%	%	%	%	%
100	100	100	83.3	100	20	11.8	-	-	-	22.4
100-199	-	-	16.7	-	23.3	32.4	15.4	-	-	20.4
200-299	-	-	-	-	26.8	29.4	61.5	14.3	33.3	27.6
300-399	-	-	-	-	20.0	23.5	23.1	14.3	-	19.4
400-499	-	-	-	-	3.3	2.9	-	-	-	3.1
500-599	-	-	-	-	-	-	-	57.1	-	4.1
600-699	-	-	-	-	3.3	-	-	14.3	66.7	1.0
700	-	-	-	-	3.3	-	-	-	-	2.0
Total %	100	100	100	100	100	100	100	100	100	100.0
Total No.	1	3	6	2	29	34	13	7	3	98

There is a clear relationship between the monthly income level and the amount of income spent on rent. The lower the income the higher the percentage spent on rent. This suggests that demand for housing is inelastic with respect to income. For example, the households with an income of between Kshs.100 and Kshs.199 spend as much as 50% of their income in rent whereas the households with an income between Kshs.1000 and Kshs.1499 spend 27% of their income in rent.

4.2.17 Income and Housing

Table 4.22 Income and type of housing unit.

Monthly income in Kenya Shs.	Type of Building			No. of House- holds
	Permanent	Semi- Permanent	Temporary	
100	-	1	1	2
100-199	1	1	1	3
200-299	2	1	4	7
300-399	2	-	-	2
400-599	29	1	-	30
600-999	37	-	-	37
1000-1499	14	-	-	14
1500-1999	9	-	-	9
2000	7	-	-	7
Total	101	4	6	111
%	91	3.6	5.4	100.0

The above table shows that all semi-permanent and temporary housing units are occupied by the low income earners. Those with an income of over Kshs.600 occupy permanent housing units. Income therefore determines the type of housing one occupies.

Table 4.23 Income and Method of Sewage disposal

Monthly Income Kshs.	Disposal Public Pipes	Method Septic Tank	Pit Latri-nes	Bucket Latri-nes	None	No. of Households
100	-	-	1	1	-	2
100-199	1	-	-	1	1	3
200-299	1	-	3	2	1	7
300-399	-	-	1	1	-	2
400-599	6	2	19	3	-	30
600-999	5	13	19	-	-	37
1000-1499	6	2	6	-	-	14
1500-1999	3	4	2	-	-	9
2000	1	5	1	-	-	7
Total	23	26	52	8	2	111
%	20.7	23.4	46.9	7.2	1.8	100.0

This table shows that the method of sewage disposal is related to income. The households without any method of sewage disposal have an income of less than Kshs.300 per month. The higher the income the more likely it is for a person to live in a house with modern sewage disposal

facilities. For example of the 16 households with an income of over Kshs.1500 per month 13 (18%) use either the public pipes or septic tanks. Of the 12 households with an income of less than Kshs.300 per month only 1 (8%) uses a public pipe or a septic tank.

Table 4.24 Income and Kitchen Ownership

Monthly income in Kshs.	Ownership			No. of Households
	Private	Shared	None	
100	-	1	1	2
100-199	1	-	2	3
200-299	1	-	6	7
300-399	-	-	2	2
400-599	8	-	22	30
600-999	37	-	-	37
1000-1499	14	-	-	14
1500-1999	9	-	-	9
2000	7	-	-	7
Total	77	1	33	111
%	69.3	1.0	29.7	100

The above table shows that ownership of a kitchen is related to income. 33 (75%) of those earning less than Kshs.600 do not have a kitchen whereas 67 (100%) of those earning over Kshs.600 have a private kitchen.

Table 4.25 Income and Bathroom Ownership

Monthly income in Kshs.	Ownership			No. of households
	Private	Shared	None	
100	-	1	1	2
100-199	-	3	-	3
200-299	-	6	1	7
300-399	-	2	-	2
400-599	-	30	-	30
600-999	5	32	-	37
1000-1499	14	-	-	14
15000-1999	9	-	-	9
2000	7	-	-	7
Total	35	74	2	111
%	31.5	66.7	1.8	100.0

Bathroom ownership is related to income. All the housing units without a bathroom are those occupied by people earning less than Kshs.300. Also bathrooms are shared by those with low income, for example 42 (57%) of those who share bathrooms have an income of less than Kshs.600 per month. The remaining 32 (43%) have an income of between Kshs.600 and Kshs.999 per month. All those who have an income of over Kshs.1000 have a private bathroom so the more income one has the more likely it is for him to have a private bathroom.

Table 4.26 Income and Occupancy Rate

Monthly Income in Kshs.	No. of People	No. of Rooms	Occupancy Rate
100	15	4	3.8
100-199	19	5	3.8
200-299	39	10	3.9
300-399	14	4	3.5
400-599	163	67	2.4
600-999	194	73	2.7
1000-1499	63	24	2.6
1500-1999	42	19	2.2
2000	35	16	2.2

The occupancy rate is higher for low income households (from 3.5 to 3.8) than it is for the high income households (from 2.2 to 2.7)

From the above tables (table 4.22 to table 4.26) it can be concluded that income determines the quality of housing a household is likely to occupy.

4.3 THE CONSTRUCTION SECTOR

The construction sector has a work force of 85 people. There are no local contractors and so Machakos is served by contractors from Nairobi, the National Capital. The work force is mainly composed of unskilled workers.

Laterite soil-cement blocks are made in self-help basis by the women group in the swahili village. These blocks are made with hand-operated block presses which are

manufactured in the workshop of the Kenya Industrial Estates at Machakos. Approximately 2000 blocks are manufactured in this way every month.

Burnt bricks are also used as a building material. These are made outside the study area, but the most frequently used building materials for the construction of the walls and foundation are stone blocks and concrete blocks. The stone blocks are quarried from near Kimutwa Market which is about 14km. from the study area. The cement blocks are made of sand concrete and cement. The sand is taken from Ngwani river which is 25km south east of the study area. Cement is bought from Athi River where there is a cement factory.

Galvanised iron sheets are bought in Nairobi. Timber is obtained from the saw mills in the town or Nairobi.

There are five hardware shops selling construction materials. There is one concrete block making factory in the study area and two just outside the study area. These make a total of approximately 5,000 blocks per month.

It can therefore be seen that the construction sector in Old Machakos is very weak in that it lacks sufficient building materials and skilled manpower. Machakos therefore relies heavily on Nairobi.

4.4. SOURCES OF FINANCE:

The houses in the study area have been built through public, semi-public or private funds. 22% of the houses have been built from public funds or semi-public funds

whereas 88% have been built with private funds.

Public houses include the houses which have been built by the Central Government, the County Council or the Town Council. The Ministry of Works is responsible for constructing government institutional and pool housing. Semi-public housing is built by parasitatal organisations such as the East African Posts and Telecommunications Corporation. In the study area there are 507 public and semi-public houses.

Private houses are those which are fully owned by individuals. The individuals either utilize their own savings or get loans from a bank or a building society. Below are the different methods which have been used to finance the houses in the study area.

4.4.1 RENTAL:

Local authority rental schemes are normally financed from government loans through the National Housing Corporation at a 6.5 per cent intrest over a 40 years period. Sometimes local authorities use their own resources or bank loans. In the study area there are 64 local authority rental houses.

Institutional and pool housing have been financed from government development funds. These are not loan funds as only nominal rents are paid and the goverment provides additional funds for maintainance to the Ministry of Works. There are 393 such houses in the study area.

The study area therefore has a total of 457 public and semi-public rental houses.

4.4.2 Tenant Purchase:

This is normally financed from government loans of 6.5 per cent interest over a period of 20 years. A deposit of 10 per cent is required. There are 50 such houses in the study area.

4.4.3 Private financing:

The rest of the houses in the study area (1793) have been built privately either through savings or private loans. The Swahili women self-help group is also doing a lot of the construction of houses in the Swahili village. So far it has constructed 14 houses. The contribution by the individual to housing is therefore very important and ways need to be sought to involve the individual in a larger well organised scale.

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CHAPTER 5: NEEDS AND RECOMMENDATIONS:

5.1 HOUSING NEEDS AND DEMAND:

In this section the study will focus on establishing the housing need in the study area from 1978 to 2000. Housing demand in the same period will also be established according to the various income groups in the study area.

Housing need will refer to the quantity of standard housing units which the people in the study area need so as to have sufficient and decent housing. To get the housing need, the population projections in Chapter III will be used.

Housing demand here refers to affordability of housing. Demand is therefore determined by the number of households who have the income to pay for the housing units needed. It is assumed that 20% of the monthly income can be spent on housing. It is also assumed that households can afford a house costing 2.5 times their annual income.¹ The following costs of construction estimate by the National Housing Corporation can give an indication about the costs of some housing types.

Table 5.1 Construction costs of residential houses.

T Y P E	ESTIMATED COST OF CONSTRUCTION IN 1977
Site and Service	Kshs. 9,000
Site & Service + basic material	" 15,000
Core Housing	" 24,000
1 roomed house	" 27,000
2 roomed house	" 40,000
3 roomed house	" 70,000
4 roomed house	" 90,000

Source: National Housing Corporation.

Another assumption made is that the composition of the income groups in the study area will remain constant. It is also assumed that the family size will change with the change in the population growth rates. The fact that the family size will be affected by both a decrease in the natural population increase and a decrease in migration into the study area has been taken into account. So the household size will be 5.1 between 1978 and 1983, 4.4 between 1983 and 1993 and 3.9 between 1993 and 2000.

So as to get the number of households at a certain time in the future the projected population is divided by the family size for it is assumed that each household will need one housing unit.

Table 5.2 Projected Population, household size and number of households.

YEAR	POPULATION	HOUSEHOLD SIZE	NO. OF HOUSEHOLDS
1978	11,730	5.1	2300
1983	17,603	5.1	3452
1988	23,589	4.4	5361
1993	31,611	4.4	7190
2000	41,625	3.9	10,673

The number of households in the above table is used in the table below to calculate the number of households in the various income brackets and the related housing types.

Table 5.3 Future households in the various income brackets, and related housing types.

Income group in Kshs.		100	100/ 199	200/ 299	300/ 399	400/ 599	600/ 999	1000/ 1499	1500 1999	2000	Total
% of households		1	3	6	2	27	34	13	8	6	100
No. of households	1978	23	69	138	46	621	782	299	184	138	2300
	1983	35	104	207	69	932	1174	499	276	207	3452
	1988	54	161	322	107	1447	1823	697	429	322	5361
	1993	77	216	431	144	1940	2442	934	575	431	7190
	2000	107	320	640	213	2881	3629	1387	854	640	10673
Maximum monthly rent in Kshs		20	40	60	80	120	200	300	400	400	
Cost of affordable house (2.5 times of annual income)		3,000	6000	9000	12000	18000	30000	45000	60000	60000	
Type of house demanded		unserviced subsidized		site and service		site & service + basic materials	core housing	Rental	Mortgage		

As can be seen from the above table in 1978 a total of 2300 housing units were needed. Of these 2300 units, 124 (5.4%) were temporary and so needed to be replaced and 83 (3.6%) needed to be improved upon for they were semi-permanent. So for the year 1978 only 124 new housing units were needed. These would be high density houses for according to this study all those in temporary houses have a monthly income of less than Kshs.300 (see table 4.22).

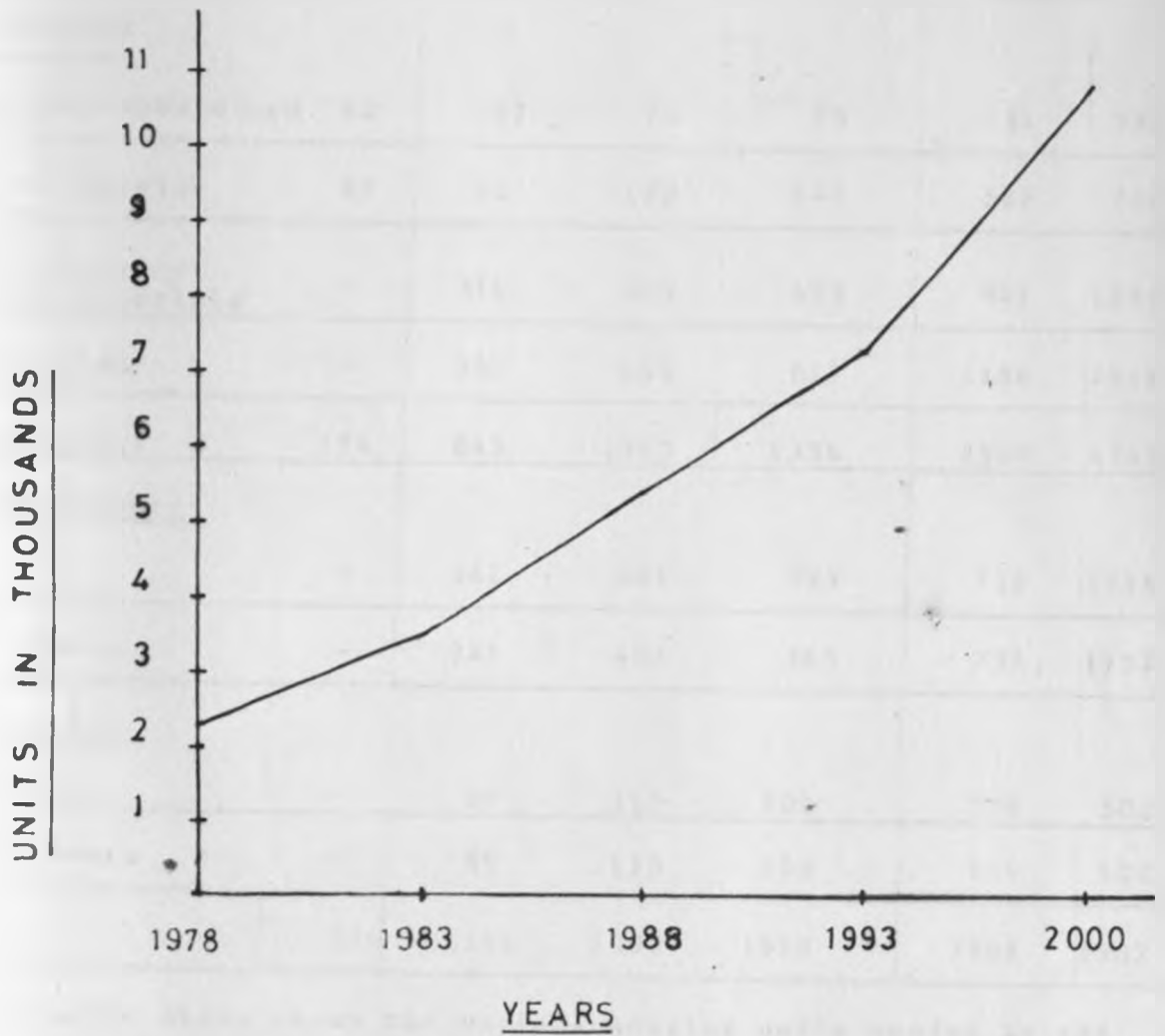
For the period between 1978 and 1983, 1152 new housing units will be needed and for the period between 1983 and 1988, 1909 new housing units will be needed. For the period between 1988 and 1993, 1828 new units will be needed and for the period between 1993 and 2000, 3489 housing units will be needed. So a total of 8502 housing units will be needed from 1978 to 2000. The table below summarises the housing need.

Table 5.4 Additional Housing Units Needed

YEAR	TOTAL UNITS NEEDED	ADDITIONAL UNITS NEEDED
1978	2300	124
1978/83	3452	1152
1983/88	5361	1909
1988/93	7190	1828
1993/2000	10673	3489
		8502

These housing units will be distributed among the

FIG-2 HOUSING NEED 1978 - 2000



various income groups as shown in table 5.3 and the housing demanded is also shown in the same table.

Table 5.5 Additional Housing Units for the period 1978/2000

Housing by Density and housing type	1978	1978/83	1983/88	1988/93	1993/000	Total
<u>High Density</u>						
Unserviced subsidized	62	47	76	78	134	397
Site and Service	62	92	153	146	287	740
Site & Service + basic materials	-	311	515	493	941	1949
Core Housing	-	392	649	619	1186	2246
Total Units	124	842	1393	1336	2548	6243
<u>Medium Density</u>						
Rental	-	241	401	383	732	1756
Total Units	-	241	401	383	732	1757
<u>Low Density</u>						
Mortgage	-	69	115	109	209	502
Total Units	-	69	115	109	209	502
Total	124	1152	1909	1828	3489	8502

The table above shows the various housing units needed by the year 2000. The total number of housing units, the type of housing scheme and the housing densities are shown. For example by 2000, a total of 6243 housing units will be required in the high density residential areas. Of these housing units 2846 will be core houses, 1949 will be site and service plus basic materials, 740 will be site and service houses and 397 will be unserviced subsidized housing. 1757 medium density mortgage houses and 502 low density houses will be required.

5.2 Land Requirements for Housing 1978 - 2000

Future land requirements for residential purposes is calculated on the basis of the type of housing type and the density needed as shown in table 5.5 above. In calculating the land required for housing, the projections for total number of housing units by each income group are used. The following densities have been adopted.

1. High density for those with a monthly income of less than Kshs.600. A total of 82 housing units per hectare or a population density of 320 to 420 people per hectare determined by the various family sizes (5.1, 4.4 and 3.9) is expected.
2. Medium density for those with a monthly income of Kshs.600 to Kshs.2000. A total of 49 units per hectare or a population of between 190 and 250 per hectare determined by the household size is expected.
3. Low density for those with a monthly income of Kshs.2,000 and over. A total of 25 housing units

or a population of between 96 and 126 per hectare determined by the household size is expected.

The table below shows the amount of extra land needed for each type of housing by the year 2000.

Table 5.6 Land Requirement for Housing 1978 - 2000

Type of Housing Scheme	Land in Hectares				Total
	1978/83	1983/88	1988/93	1993/2000	
Unserviced subsidized	2.8	1.9	1.9	3.4	10.0
Site & Service	3.9	3.9	3.7	7.2	18.7
Site & Service + Basic Materials	8.0	13.0	125	23.8	57.3
Core housing	9.9	16.4	15.7	30.0	72.0
Rental	12.2	20.3	19.4	37.4	88.9
Mortgage	7.0	11.7	11.0	21.2	50.9
Total	43.8	67.2	64.2	122.6	297.8

The above table shows that by the year 2000, a total of 297.8 additional land will be required for housing. 10 hectares will be required for unserviced subsidized housing, 18.7 hectares for site and service housing, 57.3 hectares for core housing, 88.9 hectares for rental housing and 50.9 hectares for mortgage housing.

The land required is more than the land in the study area and so the Town Council will have to buy the land from the

private owners in the extended boundary of the town. The future possible area for expansion is shown in map number 8.

5.3. PROBLEMS IDENTIFIED:

In this study it was found that quite a number of housing problems exist in the study area. A summary of the major problems is made in this section.

HOUSING:

Not all the housing units in the study area comply with the official housing standard as stipulated in the Grade 1 and grade 11 Housing By-laws.² Some of the building materials used is temporary such as poles for the foundation, earth for the floor, mud for walls and beaten G.I sheets for the roof. 5.4 per cent of the housing units are built using purely temporary materials. Also in 3.6% of the housing units a mixture of both permanent and temporary material is used. Thus the wall might be built of mud whereas the roof is built of corrugated iron sheets. 9 per cent of the housing units in Old Machakos are therefore substandard as far as the building materials are concerned and so need to be either replaced (as is the case with the temporary units) or improved (as in the case with the semi-permanent units.)

1% of the households do not have any access to a toilet whereas the remaining 99 per cent have access to either a private or a communal toilet. The 1% therefore deposit their human waste unhygienically and

this can lead to a health hazard. These households should therefore be encouraged to make use of toilets instead of using the trees and bushes in the northern part of the town (this is where the households are). Also 7% of the households use bucket latrines and these could be breeding places for flies if they are not properly kept clean. The general cleanliness of these toilets was found to be rather poor. It is therefore advisable to connect these toilets to the sewer lines. The 69.4% of the communally used toilets were also found to be generally dirty. Private toilets would therefore be the solution since each household would be responsible for its own toilet or the number of people sharing a toilet could be reduced.

30% of the households do not have kitchen facilities. They therefore use one of the living rooms as the kitchen. This could make the room unhealthy as a living room since it is not designed to serve kitchen purposes. Water can make the living room damp and the amount of smoke in the room due to the frequent use of 'jikos' (charcoal burners) which are used by 90 per cent of the households can make the room unhealthy - the concentration of carbon dioxide is expected to rise above the recommended 0.1%.³

2% of the households do not have access to either a communal or a private bathroom. They therefore use a room which is not designed to serve bathroom purposes

as their bathing and washing place. This could make the room unhealthy. It was also found that 66.7 per cent of the households use communal bathrooms. Generally these bathrooms were allowed to become dirty at times leading to the collection of water in stall pools outside the bathrooms due to poor drainage. These pools are dangerous as mosquito breeding places. It is therefore necessary to encourage private bathrooms or reduce the number of households sharing a bathroom.

5.3.2 Community facilities:

Old Machakos has sufficient health facilities when we consider the Provincial Hospital, the Nursing Home and the other clinics. There are also enough educational facilities except at the nursery school level. There are only 3 nursery schools and at least 4 nursery schools are needed for the current population. 2 nursery schools therefore need to be started.

Some of the land zoned for recreation is left uncared for. This land could be improved by planting flowers and trees so that it can develop to a park where people can go to relax. At the moment the so called park in the town is just an empty land.

5.3.3 Services:

Drainage: Due to lack of proper drainage some of the low lying areas collect water and form small pools. This usually happens during the rainy season

when there is a lot of storm water. Also in some parts of the study area, notably Kariobangi in the Eastern part, drains are often blocked with refuse and human waste. This is a health hazard as mosquitoes breed here and also because of the potential epidemics from the human waste. This also leads to a lot of nuisance because of the bad smell and interference with accessibility.

There is therefore need for introducing drainage facilities where they do not exist now and underground pipe drains should be considered even where open drains exist now these would be costly but they could be introduced on an incremental basis, for example starting with the areas with the most drainage problems.

Accessibility:

The roads in the residential areas are not all weather roads. They are muddy and make accessibility difficult especially in the rainy seasons - March/July and October/December. The roads should therefore be upgraded progressively to all weather roads. This would ensure easy accessibility to home and place of work at all times of the year.

Sewerage:

he existing sewerage does not cover the whole Old town. Some areas in the North, East and West are not served by the sewerage system. However plans are

now underway to connect the remaining areas. This will make the Sewage disposal method more efficient, for example, by doing away with the bucket latrines.

Garbage Disposal:

The Town Council collects garbage from 68.5% of the households. The rest are left to dispose of their garbage the way they want. 27% burn or bury their garbage whereas 4.5% dispose of their garbage unhygienically by throwing it away anyhow. The town council should therefore be collecting all the garbage so as to make all the town clean.

5.3.4 Housing Finance:

22% of the housing units in the study area are either public or semi-public. The remaining 78 per cent are owned by individuals. It can therefore be said that the individual has a large part to play in the provision of decent standard housing. However when we examine the incomes of the household heads it is found to be low. For example, 10 per cent of the household heads have an income of less than Kshs.300 per month. If we assume these people can afford a house costing 2.5 times of their annual income, the cost of the house they need will have to be less than K.shs.9000. But according to the National Housing Corporation construction costs estimates the cheapest housing unit costs over Kshs.9000. These people cannot

therefore afford any standard housing. They would need subsidy from public funds if their housing need is to be met.

It has also been noted that the construction sector is weak and in order to meet the housing need in Old Machakos a way of financing the construction of housing is needed so that the housing problems can be solved.

This is so because even those who can meet the costs of housing need an access to loans and a healthy construction sector. According to this study between 1978 and 2000, 8502 new housing units will be needed. An attempt to show how these housing units can be provided is done below.

5.4 A HOUSING POLICY FOR OLD MACHAKOS:

5.4.1 INTRODUCTION:

The prime objective of the government policy⁴ in Kenya is to move towards a situation, where every family in Kenya will live in a decent home, whether privately built or state sponsored, which provided at least the basic standards of health, privacy and security. The government notes that poor housing and overcrowding brings an unacceptably low standard of environment with a danger of epidemic diseases and fire. It is therefore the government's objective for every household to have a basic minimum requirement of a housing unit composed of 2 habitable rooms built of permanent material and a separate kitchen and basic sanitary facilities such as a toilet and showers compartment.

However so far the government does not seem to be anywhere near meeting its objective on housing. Housing is still a pressing problem, more so in the ever growing urban centres.⁵ As has been shown in this study Machakos is one of the urban centres facing housing problems. Section 5.3 summarises the problems found in Old Machakos. These problems include lack of sufficient funds for financing housing, a weak construction sector, lack of cheap building materials and lack of sufficient infrastructure and community facilities. It is also noted that between 1978 and 2000, 8502 new housing units will be needed (table 5.5) The policy recommendations will therefore take into account the above problems.

5.4.2 Policy Recommendations:

The housing policy for Old Machakos should aim at providing an improved environment and maximising the housing stock so as to meet the needs of the population, especially the low income group. Below are some recommendations on how the housing problem can be alleviated.

1. The government should make sure that there is always enough land for housing development. This therefore calls for preparation of short and long term development plans on time so that the areas for future housing expansion are known in advance

rather than waiting until overtaken by events. this will help in making sure that people do not put up their structures anywhere and in anyway.

After the future areas for expansion are mapped out, the land can be bought from the private owners if it is not already public land.

2. Since according to this study it was found that 39% of the people cannot afford any type of conventional housing, some re-thinking has to be done on the present official housing standards. The government can lower the housing standards so as to make it possible for the environmental approach to housing.

In the environmental approach some community facilities such as water supply, sewerage and garbage disposal facilities, and the provision of health and educational services will be supplied to an area. People can then be allowed to build some cheap houses using some temporary materials. The houses can then be improved progressively as more funds become available. So the major emphasis should not be on the materials used to construct the housing unit but the environment in which the housing unit is being built.

There should therefore be an optimum healthful living environment through provision of:-

- a. Adequate water supply.
- b. Proper sewage and waste disposal facilities.
- c. Adequate drainage
- d. Proper accessibility
- e. Suitable recreational facilities
- f. Insect, rodent and nuisance control.

All the above facilities would ensure a healthy housing environment,

3. In this study it was found that the construction sector lacks skilled personnel. The government can therefore participate in solving this problem by providing a team of technicians who can involve the local people in the construction of houses. These technicians could be trained in the various colleges of technology such as the Kiambu Institute of Science and Technology. In this way skills can be passed from the technicians to the local people who will then help in the construction or improvement of their houses.
4. The study found that there was lack of cheap building materials in the study area. The area depends to a large extent on building materials from Nairobi. The use of local building materials should therefore be encouraged so as to make the building costs cheaper. For example, the

government and the Town Council can make funds available to the Housing Research and Development Unit of the University of Nairobi so as to see how best the laterite blocks used in the town can be improved. Eventually the use of laterite blocks will be cheaper than using the concrete blocks and this can reduce the housing construction costs hence lead to an increase in the construction of houses in Old Machakos.

5. The study area lacks strong organisations which can help in the provision of housing. This problem can be overcome by forming workers organisations, cooperatives, and self help groups so as to make it easier to purchase or build houses. When people are in a group it will be easier for them to get an access to the available loans for housing. They can also pool up their meagre contributions and help one another in building houses. A good example in the study area is the swahili women self help group which has already built 14 houses for its members. The women make their own building laterite blocks on self help basis and buy the other building materials. They then hire some local contractors with whom they build the house. The fact that the women contribute their labour make the building costs cheaper.

Workers organisations, Cooperative or self help groups should therefore be organised in the study area on the basis of where people work or on the

lines such as neighbourhood ties. The government can help by providing Community Welfare personnel who can help in organising the people so as to tap their resources for the provision of housing.

6. Therefore so as to help in financing housing in old Machakos the following financing methods should be taken.

- a. For the low income group government subsidies and community effort in making the people participate in constructing their own housing is needed. The environmental approach to housing is recommended.
- b. For the medium income groups loans should be made available through the Town Council. These loans could come from the Town Council, the Central Government, and bodies like the Commonwealth Development Corporation and the United States Agency for International Development. These bodies have in the past helped in supplying funds for housing.

If the medium income group has sufficient housing they will not encroach on the housing available for the poor.

- c. The high income group can meet their housing need through getting loans directly from the banks or through mortgage arrangements, for example, with the Housing Finance Company of Kenya.

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CHAPTER 6: PLANNING A LOW COST AREA:

6.1 I N T R O D U C T I O N:

After conducting the study of housing in Old Machakos, one area was chosen to demonstrate how housing can be planned in the area. This chapter therefore deals with the preparation of a plan for a high density low cost residential area.

6.2 L O C A T I O N:

The site is located 1 km South of the Central Business District. On the Western side of the site is the industrial area. On its Eastern side is a medium density area. A major road - the Machakos-Konza road separates the two residential areas. On the Northern side there is a road to the industrial area which separates the site from the medium density residential area in the North. On the Southern part runs another road to the industrial area.

Because of its proximity to the industrial area and the Central Business District, the site is an appropriate residential area for the low income group. All the land is government owned and so the fact that the land will not have to be bought from private owners will reduce the cost of development.

6.3 F I N A N C I N G:

The scheme is intended for the low income group in Old Machakos. These are the people whose income is less

than Kshs.600 per month. Material and limited financial loans and technical assistance will be provided by the Town Council with the help of the National Housing Corporation.

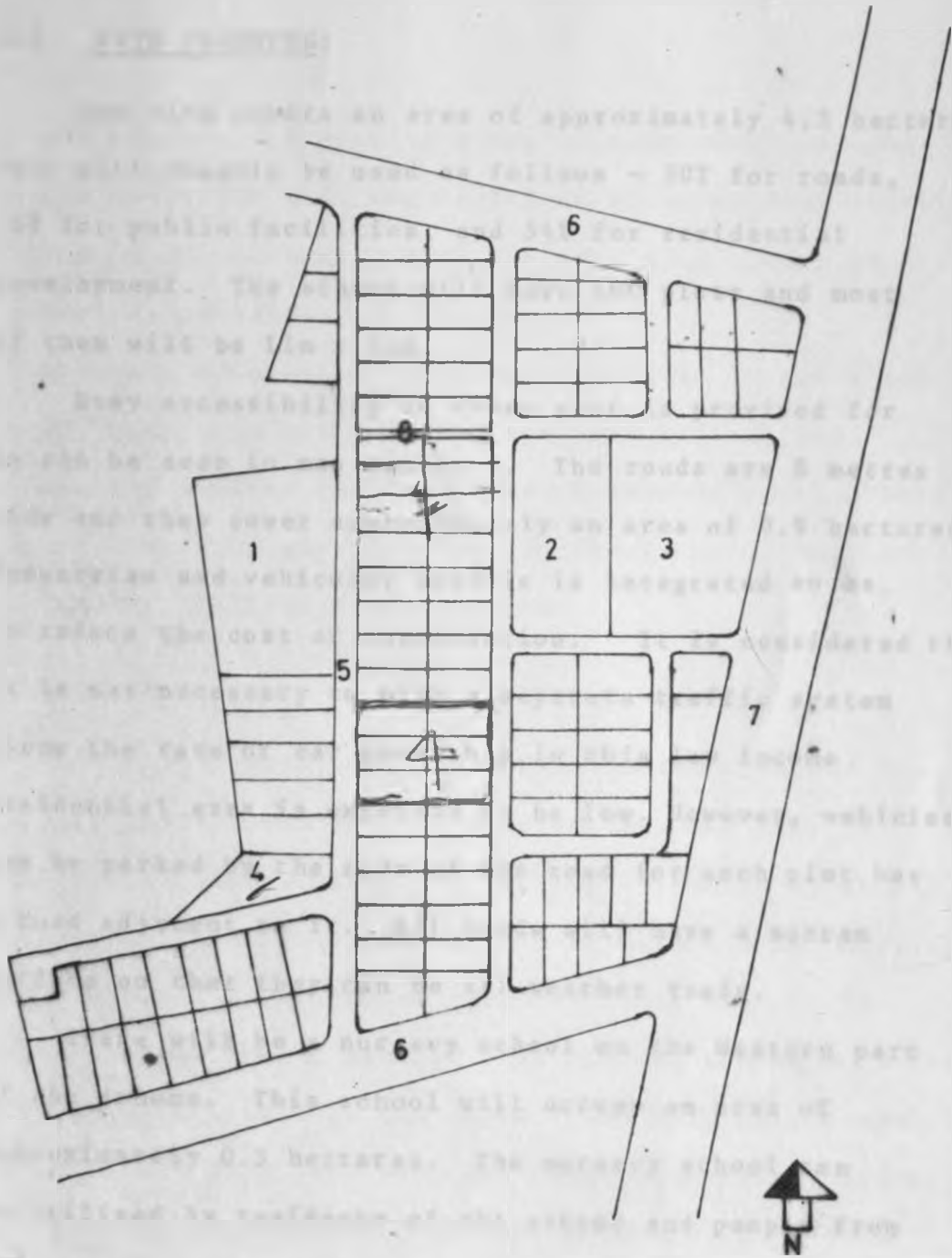
The residents are expected to help in the construction of the houses through self help - contributing their labour and financial resources. The people will be organised in small self-help groups of about 10 people (the Swahili Village women self help group is an example). They can then be constructing their houses when not doing their normal work. The team of technicians will be helping them on how to build.

By encouraging the involvement of the people in the construction of houses, expenses will be reduced hence making it possible for low income people to have their own planned houses.

At first the houses need not be built of purely permanent materials. Only the foundation and load bearing walls or columns need to be made of permanent materials such as stones, bricks and concrete blocks. The use of the laterite soil cement blocks made in the study area is also recommended. The temporary materials used can be replaced progressively as one's income increases.

The Town Council will provide the basic infrastructure such as roads, the sewerage system, drainage, water supply and other community facilities such as the clinic, the nursery school and the shopping centre.

SITE PLAN



- | | |
|---|--------------------------|
| 1 | NURSERY SCHOOL |
| 2 | CLINIC |
| 3 | SHOPS |
| 4 | OPEN SPACES |
| 5 | ACCESS ROAD |
| 6 | ROADS TO INDUSTRIAL AREA |
| 7 | KONZA ROAD |
| 8 | FOOTPATH |

SCALE 1:2500

MAP NO- 9

6.4 SITE PLANNING:

The site covers an area of approximately 4.5 hectares. They will roughly be used as follows - 20% for roads, 26% for public facilities, and 54% for residential development. The scheme will have 100 plots and most of them will be 11m x 22m.

Easy accessibility to every plot is provided for as can be seen in map number 9. The roads are 8 metres wide and they cover approximately an area of 0.9 hectares. Pedestrian and vehicular traffic is integrated so as to reduce the cost of construction. It is considered that it is not necessary to plan a separate traffic system since the rate of car ownership in this low income residential area is expected to be low. However, vehicles can be parked by the side of the road for each plot has a road adjacent to it. All roads will have a murrum surface so that they can be all weather roads.

There will be a nursery school on the Western part of the scheme. This school will occupy an area of approximately 0.3 hectares. The nursery school can be utilised by residents of the scheme and people from the nearby residential areas for at the moment there is no other nursery school in this Southern part of Old Machakos.

A clinic and a shopping centre have been planned on the Eastern part of the scheme. These have been located in such a way that accessibility from both the

scheme and the surrounding areas is made easy. At the moment there are no other health or shopping facilities on this part of the town. Both the uses will occupy an area of approximately 0.7 hectares.

Public open spaces have been provided in the scheme. There is an open space in the Northern part of the scheme and another one in the South Eastern part. These cover an area of approximately 0.2 hectares. They can be used by children as playgrounds.

6.5: CONCLUSION:

In this scheme both the public authorities and the private individuals will be able to join and help in the provision of housing for the low income group in Old Machakos. This will also help in alleviating the housing problem which is now being faced in the town. It is hoped that by taking part in this housing scheme both the public authorities and the individuals will gain a useful experience. They can then use their acquired knowledge and help in the provision of more houses.

A P P E N D I X :HOUSEHOLD QUESTIONNAIRE:

1. Number of Persons in the household
2. Number of males
3. Number of females
4. Number of adults (over 18 years old)
5. Number of Children (under 18 years old)
6. Number of working adults
7. Number of unemployed adults
8. Income (in Kshs) of household head
 1. 0-99
 2. 100-199
 3. 200-299
 4. 300-399
 5. 400-599
 6. 600-99
 7. 1000-1499
 8. 1500-1999
 9. 2000+
9. Plot ownership
 1. Public
 2. Leasehold
 3. Freehold
 4. Squatter
 5. Not known
10. Ownership of dwelling
 1. Owner occupied
 2. Rented
 3. Staff house rented
 4. Staff house free
 5. No information.

11. House rent/repayment per month

12. Type of house

1. Detached
2. Semi-detached
3. Flat
4. Terraced
5. Other (specify)

13. Method of financing

1. Own savings
2. Tenant purchase
3. Mortgage
4. Bank loan
5. Inherited
6. Other ways (specify)

14. Kitchen location

1. Main house
2. Separate building
3. None

15. Kitchen Use

1. Private
2. Shared

16. Toilet location

1. Main house
2. Separate building
3. None

17. Toilet Use
 1. Private
 2. Shared
18. Bathroom location
 1. Main house
 2. Separate building
 3. None
19. Bathroom Use
 1. Private
 2. Shared
20. Sewage disposal
 1. Public pipe
 2. Septic tank
 3. Pit latrine
 4. Bucket
 5. None
21. Garbage Disposal
 1. Town Council
 2. Private
 3. Other (specify)
 4. None
22. Sources of water
 1. Private piped
 2. Piped communal
 3. Borehole
 4. Well
 5. Stream

23. Foundation materials

1. Stones
2. concrete
3. Poles

24. Floor materials

1. Cement
2. Wood
3. Earth

25. Wall materials

1. Concrete
2. Burnt bricks
3. Sundried blocks
4. Stones
5. Timber
6. Mud plastered
7. Mud unplastered

26. Roof materials

1. GIS
2. Asbestos
3. Tiles
4. Grass
5. Beaten GIS
6. Other (specify)