UNIVERSITY OF NAIROBI
DEPARTMENT OF ARCHITECTURE AND BUILDING SCIENCE
SCHOOL OF THE BUILT ENVIRONMENT

"TOWARDS IMPROVING PROVISION AND MANAGEMENT OF ROAD INFRASTRUCTURE IN URBAN SITE AND SERVICE SCHEMES: CASE STUDY OF DANDORA – NAIROBI".

BY

MUNGAI JULIUS MBUGUA
B.Sc. (Hons) (Civil Engineering), Nairobi; AMKIM

RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF URBAN MANAGEMENT DEGREE IN THE UNIVERSITY OF NAIROBI

2008

DECLARATION

This research report is my original work and has not been presented for a degree in any other university.

Signed:..... Date:.....1/9/08.....

Mungai Julius Mbugua

This Research Project has been submitted for examination with our approval as the university supervisors.

Dr. Samuel Obiero Date 5/9/2008

Mr. Silvester Kasuku Date 8/9/08

DEDICATION

To my wife, Wairimu Mbugua and Children – Njeri Mbugua, Nyambura Mbugua and Mwangi Mbugua.

ABSTRACT

Rapid urbanization in the world particularly in countries in the south is straining the public sector's ability to provide and manage essential infrastructure facilities and services. The inability of cities to provide and manage these services severely affects the productivity, living and working environment of their populations. The public sector in Kenya has been willing to provide infrastructure services to its urban area citizens, as seen in various Development Plans, Sessional Papers and Strategies. However, the real situation on the ground in most of the urban areas is pathetic.

This research report endeavours to look into the issues that affect the effective delivery and management of infrastructure services in urban areas. The research is conducted in Dandora, one of the biggest site and service schemes in Kenya and indeed in the region. The research aimed at examining the existing nature of road infrastructure in Dandora and evaluating the existing policy framework in infrastructure provision and management in Kenya, including identifying any gaps. The research was also geared towards identifying the various actors and to examine the roles they play in the provision and management of road infrastructure in urban areas. Based on the research findings, recommendations on ways of improving on management of urban road infrastructure were to be made.

A data matrix identifying data needs, the sources of data, method of data collection, method of data analysis and method of data presentation was formulated. This was followed by identifying an appropriate sample frame and sample size. The sample size was done through random cluster sampling with simple random sampling being used within the cluster to select the households. Primary data was obtained from the study area while secondary data was gathered through the relevant literature on urban infrastructure provision and management. Indepth analysis of both primary and secondary data provides useful insights on the existing situation in Dandora.

The finding of the research include the establishment that physical infrastructure in Dandora especially roads, footpaths, bicycle paths, parking, storm water drainage and street lighting area in a state of disrepair. The study has also established that Dandora has witnessed phenomenal growth in its population over the years without any expansion in the initially provided physical infrastructure cited above. The study established that various actors were involved in implementation of the Dandora project and that involvement of all stakeholders in the whole cycle of a project like Dandora is crucial to the successful management of infrastructure services. The study notes that different stakeholders possess different forms and levels of assets which could be employed to create synergy and consequently deliver infrastructure services in a sustainable manner.

The report however notes that whatever strategies are employed, aspects of the external environment will always bear on the successful management of infrastructure services. Recommendations to improve on management of urban physical infrastructure are made. They include aspects on capacity building and awareness; institutional; fiscal, economic; policy and political aspects.

ACKNOWLEDGEMENTS

This study has been made possible through the assistance of a number of people and institutions to whom I wish to express my sincere thanks and appreciation.

I wish to thank the management of the University of Nairobi and in particular the former Housing and Building Research Institute (HABRI) for starting the Master of Urban Management Programme in which I was privileged to be one of the pioneer students. Many thanks also to the management of the City Council of Nairobi for the support in various forms during the entire course period and in particular while carrying out this study.

I wish to particularly thank Dr. Samuel Obiero and Mr. Silvester Kasuku, the study supervisors, for the extremely good guidance throughout the period of carrying out the research. Their comments contributed greatly to the final output of this research project. I would also like to thank other members of the School of the Built Environment, who commented on the original research proposal. To this end, many thanks to Mr. Maleche of the Department of Urban and Regional Planning whose initial comments, in addition to those of my supervisors, shaped my focus in the study.

I cannot forget to thank members of both teaching and non teaching staff and fellow students at the former HABRI for their co-operation, help and encouragement. Thanks too to my former colleagues at the City Council of Nairobi for providing all the data I needed and for their encouragement. Many thanks are due to my research assistants who sacrificed their time to collect and manage the research data and also to Miss. Pauline Mugo and Miss. Lucy Kathure who typed and organized this report.

Finally many thanks to my family for their understanding and encouragement.

Table of Contents

LIST OF TABLES

LIST OF BOXES

LIST OF FIGURES (MAPS, DIAGRAMS AND PHOTOGRAPHS)

LIST OF MAPS

LIST OF PLATES

LIST OF ABBREVIATIONS AND ACRONYMS

ADB	-	African Development Bank
AFD	-	Agence Francaise de Developpment
B.O.O	-	Build, Own, Operate
B.O.T	-	Build, Own Transfer
CBD	-	Central Business District
CBOs	-	Community Based Organizations
CGR	-	City Garbage Recyclers
CIDA	-	Canadian International Development Agency
DCPD	-	Dandora Community Development Department
DCDP	-	Dandora Community Development Project
DFID	-	Department of International Development
EEC	-	European Economic Commission
EMCA	-	Environmental Management and Coordination Act
ESAs	-	External Support Agencies
GDP	-	Gross Domestic Product
GoK	-	Government of Kenya
GTZ	-	German Technical Cooperation
HDD	-	Housing Development Department
IBRD	-	International Bank for Reconstruction and Development
IDA	-	International Development Association
ILEG	-	Institute for Law and Environmental Governance
IMF	-	International Monetary Fund
JICA	-	Japanese International Cooperation Agency
KfW	-	Kreditanstalt fuer Wiederafbau (German Bank for Reconstruction)
KLGRP	-	Kenya Local Government Reform Programme

KRB	-	Kenya Roads Board
KWS	-	Kenya Wildlife Services
LAs	-	Local Authorities
LATF	-	Local Authorities Transfer Fund
LGA	-	Local Government Act
LGLA	-	Local Government Loans Authority
MIP	-	Municipal Infrastructure Programme
MOPW	-	Ministry of Public Works
MOT	-	Ministry of Transport
NCBDA	-	Nairobi Central Business District Association
NCC	-	City Council of Nairobi
NCCK	-	National Churches of Kenya
NEMA	-	National Environment Management Authority
NGOs	-	Non Governmental Organizations
NHC	-	National Housing Corporation
NMGS	-	Nairobi Metropolitan Growth Strategy
NUSG	-	Nairobi Urban Study Group
OP	-	Office of the President
OM	-	Operation and Maintenance
PPA	-	Physical Planning Act
PPIAF	-	Public Private Infrastructure Advisory Facility
RMLF	-	Road Maintenance Levy Fund
SIDA	-	Swedish International Development Agency
SMEs	-	Small and Micro Enterprises
SOT	-	Security of Tenure
SPSS	-	Statistical Package for Social Scientists

UNCHS	-	United Nations Commission of Human Settlements (HABITAT)
UNDP	-	United Nations Development Programme
UNEP	-	United Nations Environment Programme
UNICEF	-	United Nations Children's Fund
UNIDO	-	United Nations Industrial Development Organization
USAID	-	United States Agency for International Development
WB	-	World Bank
WHO	-	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Overview

The rapid pace of urbanization in developing countries is creating a lot of challenges especially to urban managers. The greatest challenges for developing countries will be to satisfy the increasing demand for urban services and infrastructure that result from rapid population growth (Rondinelli, 1990). Studies indicate that urbanization will be one of the major factors of human existence in the 21st century (UNCHS, 1996). The rate of rapid urbanization in both developing and developed countries has been a long process. At present it estimated that about 50 per cent of the world's population lives in settlements that can be classified as urban (UNCHS, 1996). Africa is one of the least urbanized regions in the world with 35 per cent of its people living in urban areas. However, with an urbanization of 5 per cent per annum, the continent is recording the fastest growth rate in the world. It is estimated that by 2020, 52 per cent of the continent's population will be living in urban areas (Amoako, 2000).

From Table 1.1, it is evident that between 1950 and 2000, the percentage of the population of the developing countries living in urban areas was projected to more double from 16.9 per cent to 39.5 per cent. In Africa, the percentage of the urban population was projected to triple from 14.5per cent to 41.3 per cent over the same period. The urban population in Africa will increase from 129 million in 1980 to more than 765 million by the year 2020, an increase of over 260 per cent. In the developed countries on the other hand, a higher percentage compared to the developing countries is noted in the earlier years 1950 (53.8 per cent) increasing only marginally by less than one and a half times to 74.8 per cent in the year 2000 (UNCHS-Habitat, 1990; Obudho and Juma, 2002).

Table 1.1: The world growth of population and proportion of urban population (1950 – 2025)

	1950		1975		1990		2000		2025	
	Total Pop (Million)	Urban Pop (Percentage)	Total Pop (Million)	Urban Pop (Percentage)	Total Pop (Million)	Urban Pop (Percentage)	Total Pop (Million)	Urban Pop (Percentage)	Total Pop (Million)	Urban Pop (Percentage)
Africa	224	14.5	415	25.3	64.8	34.4	872	41.3	1581	57.8
Asia	1374	16.4	2353	25.3	3108	29.9	3698	34.9	4889	52.9
Latin America	165	41.5	323	61.4	448	72.3	540	77.2	760	84.8
Northern America	166	63.9	239	73.8	276	74.3	295	75.0	333	77.9
Oceanic	13	61.3	21	71.8	30	70.8	39	71.0	39	75.2
Europe	39.3	56.3	474	68.8	498	73.1	508	76.0	512	82.3
U.S.S.R	180	39.3	255	60.0	288	67.5	308	70.6	352	74.0
Developing Countries	1683	16.9	2984	27.3	4087	33.9	4989	39.5	7114	56.9
Developed Countries	832	53.8	1096	68.8	1205	72.6	1262	74.8	1352	79.0
World	**2515**	**29.1**	**4080**	**38.4**	**5292**	**42.7**	**6251**	**46.6**	**8466**	**60.4**

Source: (UNCHS- HABITAT, 1990)

Demographic studies of urbanization have identified the main driving forces underlying changes in urban areas to include rural – urban migration due to changes in the countryside, natural increase of population due to high rates of fertility and reduced death rates and reclassification of urban areas (Gilbert and Gugler ,1981). While in the developed world urbanization is associated with innovation, progress and development, in Africa it has been taking place in the context of negligible industrial and economic growth rates (Amoako, 2000.). The rate of urbanization in Africa does not correspond to that of economic development, social change and technical advancement (Obudho and Juma., 2002).

As urban population increase and as cities come to play a greater role in national economic development, so is the increase in demand for urban services and infrastructure. Provision and maintenance of urban services and infrastructure are crucial aspects of urban development as they contribute to social welfare and improve the capacity of cities to contribute to national production and trade (Rondinelli, 1990).

In most developing countries provision of urban services and infrastructure has primarily been the work of the public sector in general and central government in particular. This has been through either taxation, borrowing from banks or from loans and grants from international bodies. However Abuodha (1997) argues that there is a limit on the amount of taxation which can be imposed on the population without stifling the economy and creating discontent. Public sector borrowing is also limited for the same reasons. He continued to argue that there is generally a squeeze on government coffers from other social demands like education and health. Local governments, on the other hand, often

lack incentives, adequate funds, technical expertise and management capacity to provide services and infrastructure facilities effectively and efficiently (Rondinelli, 1990; World Bank 1992, Smoke 1994, UNDP 1996). Some services are provided haphazardly by the informal sector and community based organizations often with insufficient resources to cater for large numbers of people. Maintenance of physical infrastructure has often been wanting in many cities in the developing world, mostly in the south (Weissman, 1992).

Due to the above constraints the World Health Organization (WHO) estimates in 1983 showed that one – quarter to one – half of the urban population in developing countries does not have basic water and sewerage services and that about 15 to 30 per cent of the urban population in Latin America, Africa and the Middle East lack access to potable water. The same scenario applies to more than one third of urban dwellers in Asia and the Caribbean. About two thirds of the urban population in West Africa lack basic sanitation as do more than half in Asia, Central America, Latin America, North Africa and the Middle East (Rondinelli, 1990)

Table 1.2: Urbanization Trends in Africa 1960 – 2020

	1960		1980		2000		2020	
Region	**Number (Millions)**	**per cent of Total**	**Number (Millions)**	**per cent of Total**	**Number (Millions)**	**per cent of Total**	**Number (Millions)**	**per cent of Total**
Eastern	5.9	7.3	21.5	15.1	77.5	32.0	206.0	42.6
Middle	5.9	18.0	16.4	31.6	43.9	51.4	95.3	61.7
Northern	20.9	32.1	43.0	39.9	88.8	50.6	154.1	63.0
Southern	8.8	42.3	16.3	49.6	33.2	60.9	59.3	71.0
Western	11.2	13.8	32.0	22.2	96.7	34.9	250.8	50.0
Total	**52.6**	**18.8**	**129.3**	**27.0**	**340.1**	**42.3**	**765.6**	**52.2**

Source: (Obudho and Juma, 2002)

lack incentives, adequate funds, technical expertise and management capacity to provide services and infrastructure facilities effectively and efficiently (Rondinelli, 1990; World Bank 1992, Smoke 1994, UNDP 1996). Some services are provided haphazardly by the informal sector and community based organizations often with insufficient resources to cater for large numbers of people. Maintenance of physical infrastructure has often been wanting in many cities in the developing world, mostly in the south (Weissman, 1992).

Due to the above constraints the World Health Organization (WHO) estimates in 1983 showed that one – quarter to one – half of the urban population in developing countries does not have basic water and sewerage services and that about 15 to 30 per cent of the urban population in Latin America, Africa and the Middle East lack access to potable water. The same scenario applies to more than one third of urban dwellers in Asia and the Caribbean. About two thirds of the urban population in West Africa lack basic sanitation as do more than half in Asia, Central America, Latin America, North Africa and the Middle East (Rondinelli, 1990)

Table 1.2: Urbanization Trends in Africa 1960 – 2020

	1960		1980		2000		2020	
Region	**Number (Millions)**	**per cent of Total**	**Number (Millions)**	**per cent of Total**	**Number (Millions)**	**per cent of Total**	**Number (Millions)**	**per cent of Total**
Eastern	5.9	7.3	21.5	15.1	77.5	32.0	206.0	42.6
Middle	5.9	18.0	16.4	31.6	43.9	51.4	95.3	61.7
Northern	20.9	32.1	43.0	39.9	88.8	50.6	154.1	63.0
Southern	8.8	42.3	16.3	49.6	33.2	60.9	59.3	71.0
Western	11.2	13.8	32.0	22.2	96.7	34.9	250.8	50.0
Total	**52.6**	**18.8**	**129.3**	**27.0**	**340.1**	**42.3**	**765.6**	**52.2**

Source: (Obudho and Juma, 2002)

Table 1.3: Kenya Rural and Urban Population 1948 – 1999 (Population Thousands)

Year	Total	Rural	Urban	Urban as per cent of Total	Number of Urban Centres
1948	5,406	5,121	285	5.2	17
1962	8,636	7,965	671	7.8	34
1969	10,943	9,861	1,082	9.9	47
1979	15,327	13,020	2,307	15.0	90
1989	24,000	20,120	3,880	16.2	215
1999	28,700	18,703	9,997	34.8	277

Source: (Obudho and Juma, 2002)

Despite considerable progress in improving and extending water supplies in the South during the International Drinking Water Supply and Sanitation Decade that began in 1980, by the end of the decade 245 million urban dwellers continued to use contaminated water. This was despite the primary goal of the decade being the provision of full access to water supply and sanitation to all inhabitants in the south by 1990 (UNHCS-Habitat, 1996).

In 1991 approximately one third of the south's urban population had no means of disposing of excreta while an even greater number lacked adequate means to dispose of waste waters. Estimates for 1994 indicate that the number of people lacking adequate sanitation had increased considerably during the early 1990's to 558 million in urban areas. It was estimated that by the year 2000 about 846 million urban dwellers would be without adequate sanitation (UNHCS-Habitat, 1996).

In most cities of the South, between a third and a half of the solid wastes generated within urban centres remains uncollected. Solid waste collection and management in most municipalities in the South consume between 20 to 40 per cent of municipal revenue and

Table 1.3: Kenya Rural and Urban Population 1948 – 1999 (Population Thousands)

Year	Total	Rural	Urban	Urban as per cent of Total	Number of Urban Centres
1948	5,406	5,121	285	5.2	17
1962	8,636	7,965	671	7.8	34
1969	10,943	9,861	1,082	9.9	47
1979	15,327	13,020	2,307	15.0	90
1989	24,000	20,120	3,880	16.2	215
1999	28,700	18,703	9,997	34.8	277

Source: (Obudho and Juma, 2002)

Despite considerable progress in improving and extending water supplies in the South during the International Drinking Water Supply and Sanitation Decade that began in 1980, by the end of the decade 245 million urban dwellers continued to use contaminated water. This was despite the primary goal of the decade being the provision of full access to water supply and sanitation to all inhabitants in the south by 1990 (UNHCS-Habitat, 1996).

In 1991 approximately one third of the south's urban population had no means of disposing of excreta while an even greater number lacked adequate means to dispose of waste waters. Estimates for 1994 indicate that the number of people lacking adequate sanitation had increased considerably during the early 1990's to 558 million in urban areas. It was estimated that by the year 2000 about 846 million urban dwellers would be without adequate sanitation (UNHCS-Habitat, 1996).

In most cities of the South, between a third and a half of the solid wastes generated within urban centres remains uncollected. Solid waste collection and management in most municipalities in the South consume between 20 to 40 per cent of municipal revenue and

often suffer more than other municipal services when budget allocations and cuts are made. This results in the uncollected garbage accumulating in open spaces, waste lands and streets, often causing serious health and environmental problems (UNHCS-Habitat, 1996).

A considerable increase in the number of cars worldwide over the years is noted, from 53 million cars in 1950 to 400 million in 1990. Many cities in the south experience many traffic related problems. These include congestion, traffic related air pollution, increased travel time to and from work and high transport costs (UNHCS-Habitat, 1996).

A study done in Dar es Salaam in1998 revealed that physical infrastructure installations were old and poorly maintained, daily supply of water was less than 70 per cent of demand and water shortages were common, with only 20 per cent of households having individual piped water. Only 22 per cent of solid waste was collected in Dar es Salaam in 1980. Most of the urban roads were in very poor condition and storm water drainage blocked mainly because of the shortage of construction and maintenance equipment and finance. (Rakodi and Devas, 1993). A major challenge for urban management therefore is the re-orientation of the objectives, goals, policies and strategies of municipal management in order to meet the needs and improve the living and working conditions of the majority in a sustainable manner.

1.2 Statement of the Study Problem

Kenya, like many countries in the south, has been experiencing rapid urbanization over the last few decades. As in evident from Table 1.3, the growth of urban centres both in numbers and population accelerated after independence when Africans were allowed to

often suffer more than other municipal services when budget allocations and cuts are made. This results in the uncollected garbage accumulating in open spaces, waste lands and streets, often causing serious health and environmental problems (UNHCS-Habitat, 1996).

A considerable increase in the number of cars worldwide over the years is noted, from 53 million cars in 1950 to 400 million in 1990. Many cities in the south experience many traffic related problems. These include congestion, traffic related air pollution, increased travel time to and from work and high transport costs (UNHCS-Habitat, 1996).

A study done in Dar es Salaam in1998 revealed that physical infrastructure installations were old and poorly maintained, daily supply of water was less than 70 per cent of demand and water shortages were common, with only 20 per cent of households having individual piped water. Only 22 per cent of solid waste was collected in Dar es Salaam in 1980. Most of the urban roads were in very poor condition and storm water drainage blocked mainly because of the shortage of construction and maintenance equipment and finance. (Rakodi and Devas, 1993). A major challenge for urban management therefore is the re-orientation of the objectives, goals, policies and strategies of municipal management in order to meet the needs and improve the living and working conditions of the majority in a sustainable manner.

1.2 Statement of the Study Problem

Kenya, like many countries in the south, has been experiencing rapid urbanization over the last few decades. As in evident from Table 1.3, the growth of urban centres both in numbers and population accelerated after independence when Africans were allowed to

migrate to the urban areas without any legal and administrative restrictions(Obudho and Juma, 2002). During the 1962 – 1969 intercensal period, the urban population almost doubled. Again between 1989 and 1999 the urban population more than doubled. Between the intercensal period 1989 – 1999 urban population increased by approximately 160.5 percent from 3.8 million to 9.9 million (GoK, 2002)

This rapid urbanization in Kenya which has taken place against a declining economy (Table 1.5) has been a source of many problems in the urban areas. These problems include the proliferation of urban informal settlement; insecurity and violence; environmental degrading; deteriorating public health standards; unemployment, underemployment and misemployment; shortage of conventional housing; urban sprawl with attendant deterioration in quality of life; destruction of community life and weakening of social relations; increase in land speculation; overcrowding; poverty, increase in street families and general urban decay. (Gilbert and Gugler, 1992; Kiamba, 1992; Mbogua, 1992; UNDP 1996; Obudho and Juma, 2002, GoK ,2002). This rapid increase has also resulted in increased demand for infrastructural services in urban areas. However, even in situations where infrastructural services have been provided they have continued to deteriorate in many aspects.

The high population increase and urbanization has led to high consumption of natural resources and generation of substantial wastes. Most local authorities are unable to collect, treat and dispose of waste due to inadequate capacity and financial constraints. For example, only about 50 per cent of the 1600 tonnes of solid waste generated in Nairobi daily is collected and taken to the approved dumpsite (GoK, 2002). The areas

inhabited by the poor are virtually ignored in garbage collection (JICA, 1998). It is estimated that only about 79 per cent of the urban population in Kenya has access to safe drinking water and only about 30 per cent of the urban areas in Kenya have sewerage systems. The sewerage systems are prone to constant breakages and leakages due to inadequate capacity to handle their full sewerage load occasioned by overloading by the growing population (GoK, 2002). While addressing the 3rd World Water Forum recently, the Permanent Secretary in the Ministry of Water Resources of Kenya indicated that Mombasa alone needs US $ 200 million (about KShs. 16 billion) to improve its water handling! (Daily Nation, 19th march 2003).

The urban road network currently covers approximately 10,000 km or 7per cent of the total road network in the country. Out of the 7,000 km of urban road network in all local authorities in 1997 only 45per cent could be described to be in good and fair condition. Problems include heavy traffic congestion especially during peak hours, overloaded passenger transport, inadequate parking spaces, inadequate supply of public transport, wastage of time and fuel, high vehicle operating costs, high fares and unstable delivery schedules. Other bottlenecks include lack of other infrastructural facilities such as foot paths for pedestrians, separate lanes for cyclists or Non – Motorized Transport Modes (NMT) and street lighting (GoK, 2002).

The primary factors for the deterioration of the road network are inadequate public funding and lack of coordination of road development and maintenance (GoK, 2002). Nairobi's population has been increasing rapidly from 11,512 persons in 1906 to 28,864 persons in 1926 and to 49,600 by 1936. At the first national census of 1948, Nairobi's population had risen to 119,000 persons. In 1962, the population was 347,000 increasing

to 509,000 in 1969. In 1979 the population of Nairobi was 828,000 persons, increasing to 1,325,000 persons in 1989. The population of Nairobi stood at 2,143,254 persons in 1999 (Ndegwa, 2002).

Table 1.4: Percent of urban population of selected Urban Centres in Kenya 1948 – 1999

Urban Centre	1948	1962	1969	1979	1989	1999
Nairobi	43.2	39.8	47.1	35.9	34.1	43.6
Mombasa	30.7	26.8	22.8	14.8	11.9	13.5
Nakuru	6.4	5.7	4.4	4.8	4.2	4.6
Kisumu	4.0	3.5	3.0	6.6	5.0	6.5
Thika	1.6	2.1	1.7	1.8	1.5	2.2
Eldoret	3.0	2.9	1.7	2.2	2.9	4.0
Nanyuki	1.5	1.6	1.1	0.8	0.6	0.9
Kitale	2.3	1.4	1.1	1.2	1.5	1.7
Malindi	N/A	0.9	1.0	1.0	0.9	2.4
Kericho	1.2	1.2	0.9	1.3	1.3	1.9
Nyeri	1.0	1.2	0.9	1.6	2.3	2.0
Other urban Centres	5.3	13.2	14.4	28.9	33.8	16.7
Total Urban Population	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: (Obudho and Juma, 2002)

Table 1.5: Average Annual Growth Rates of Real GDP (per cent)

Sector	1964 - 73	1974 - 79	1980 - 89	1990 – 95	1996 - 2000
Agriculture	4.6	3.9	3.3	0.4	1.1
Manufacturing	9.1	10.0	4.8	3.0	1.3
Finance, Real Estate	9.8	12.4	6.7	6.6	3.6
Government	16.9	6.5	4.9	2.6	1.0
Services	3.5	14.5	10.0	10.3	5.6
Private Households	-	8.8	7.7	3.6	2.3
Other					
GDP	**6.6**	**5.2**	**4.1**	**2.5**	**2.0**

Source: (GoK, 2002)

In Nairobi, a United Nations report indicates that nearly 200,000 cubic meters of treated and piped water is lost daily through leakages and illegal connections. This is about 50 per cent of the city's water whose normal production currently is 380,850 cubic meters a day against an output capacity of 524, 700 cubic meters. This wastage implies that there is insufficient water to the over 2.0 million residents of Nairobi (Daily Nation, March 21st, 2003).

The City Council of Nairobi (NCC) service delivery system is constrained by many problems which include poor governance, bloated workforce characterized by insufficient number of high quality professionals and technical staff, inadequate incentives, limited management capacity and unhealthy financial position (UNDP, 1996). The NCC estimates for year 2001/2002 indicate an expenditure of KShs. 3.482 billions against a revenue of KShs. 2.91 billion. Its financial position as at 30th June 2001 showed its net obligations and liabilities at KShs. 14.5 billion. About 87 per cent of the total revenue of the City Council is spent on staff emoluments and other benefits, currently standing at approximately KShs. 300 million per month leaving very little to be spent on service delivery (UNDP 1996, NCC, 2001).

The Kenya Government, NCC and other agencies have in the past recognized the underlying problems manifested in the deteriorating infrastructural services in the city (National Development Plans, Sessional Papers, Council Minutes, UNDP 1996).

In Nairobi, a United Nations report indicates that nearly 200,000 cubic meters of treated and piped water is lost daily through leakages and illegal connections. This is about 50 per cent of the city's water whose normal production currently is 380,850 cubic meters a day against an output capacity of 524, 700 cubic meters. This wastage implies that there is insufficient water to the over 2.0 million residents of Nairobi (Daily Nation, March 21st, 2003).

The City Council of Nairobi (NCC) service delivery system is constrained by many problems which include poor governance, bloated workforce characterized by insufficient number of high quality professionals and technical staff, inadequate incentives, limited management capacity and unhealthy financial position (UNDP, 1996). The NCC estimates for year 2001/2002 indicate an expenditure of KShs. 3.482 billions against a revenue of KShs. 2.91 billion. Its financial position as at 30th June 2001 showed its net obligations and liabilities at KShs. 14.5 billion. About 87 per cent of the total revenue of the City Council is spent on staff emoluments and other benefits, currently standing at approximately KShs. 300 million per month leaving very little to be spent on service delivery (UNDP 1996, NCC, 2001).

The Kenya Government, NCC and other agencies have in the past recognized the underlying problems manifested in the deteriorating infrastructural services in the city (National Development Plans, Sessional Papers, Council Minutes, UNDP 1996).

Table 1.6: SELECTED KENYA GOVERNMENT'S STATEMENTS ON INFRASTRUCTURE

SOURCE	STATEMENT
Sessional Paper No. 1 of 1986 on Economic management for renewed Growth PP 47	• To facilitate the timely provision of urban land for industrial, commercial, residential and government purposes, and to assist local authorities in promoting orderly urban development, funding for the Government Estates Development Fund, administered by the Department of Lands will be restored to earlier levels and the fund will resume its activities. • To promote the orderly development of residential areas and to facilitate the role of the private sector in the provision of housing, the tenure among existing sub-divisions, and will introduce more appropriate standards for the construction of housing which permits the use of low cost technologies and local materials especially by the informal sector. • Ministries and Local Authorities will be instructed to adopt and follow more appropriate engineering standards for the construction of infrastructure such as roads, water supplies and sewerage systems. • Resources will be concentrated on those projects which offer lower construction and maintenance costs per beneficiary • Government agencies will be urged to charge market prices for the services and facilities they provide • Policies will be formulated that encourage the involvement of the private sector in the provision of facilities and services • Gorvement will encourage the mobilization of additional resources for urban infrastructure that supports productive activities through the steering of resources of NGOs towards investment in urban infrastructure, seeking aid for such projects, setting up of autonomous financial institutions to raise private capital, restructuring the Local Government Loans Authority (LGLA) and strengthening the financial capacity of local authorities, particularly for maintaining services and facilities
Sessional Paper No.1 of 1994 on Recovery and Sustainable Development to The Year 2010	• The Government will provide basic infrastructure on cost recovery basis whenever this is feasible • Operation and maintenance must increasingly rely on user charges • A strategy to address maintenance, rehabilitation and upgrading of roads will be developed. • The provision of public infrastructure is a critical incentive that will be utilized to influence the spatial location of private investment • Reforms will be introduced that expand and strengthen the fiscal base of local authorities • Systems for the operation and maintenance of services and facilities provided by local authorities will be improved • Local authorities will be required to revise the pricing of utilities and services to ensure that they reflect the real costs of operation, maintenance and long term capital stock improvement. • Government will review the enabling Act Cap.270 for LGLA

Sessional Paper No.2 of 1996 on Industrial Transformation to the year 2020	• Government recognizes that the provision of infrastructure is one of its major functions and responsibilities and will make budgetary provision for construction and maintenance of the same • Government will convene a task force to investigate the legal and institutional reforms required before the private sector can exploit new opportunities in the sector. • The immediate priority for public infrastructure investment will be maintenance, rehabilitation and reconstruction of existing facilities and satisfying demand. • There is a pressing need to coordinate infrastructure provision and maintenance to ensure both optimum use of existing facilities as well as optimum coordination for efficient provision of new infrastructure. • In order to effectively coordinate the maintenance of road network, the government is currently exploring the possibility of harnessing operations of the different road agencies
Poverty Reduction Strategy Paper for the Period 2001 – 2004	• The provision of quality infrastructure is essential if poverty reduction and economic growth targets are to be met. • In order to improve on the road infrastructure the government will improve the management of interventions in the roads sub-sector through the operationalisation and facilitation of the Kenya Roads Board (KRB) and District Roads Committees (DRCs.) • Local Communities will be actively involved in the design and implementation of road projects.
National Development Plan 1966 – 1970	• The execution of an extensive programme for the development of all types of roads will be undertaken to enable communication to keep pace with social and economic development in Kenya. • Improvement and Maintenance of minor roads are the responsibility of the respective local authorities.
National Development Plan 1994 – 1996	• Alongside the inadequacies of water and sanitation services especially in the urban areas is lack of basic infrastructural facilities such as poor road networks, which greatly reduces the economic and social fluidity of the centres, mainly due to lack of storage of water and sewerage structure to prevent flooding during the rainy season. There is therefore an urgent need for expansion and rehabilitation of such facilities and structures to improve human settlements environment and the government is firmly committed to undertake appropriate measures during the plan period and beyond. • Priority will be given to the provision of adequate funds for the maintenance of the present road network so as to ensure the sustainability of the existing roads. • To achieve a sustainable urban transport system, attention will be focused on increased investment in urban road network and an increased expenditure on the maintenance of urban roads. • Programmes will be undertaken with emphasis on the rehabilitation and maintenance of Nairobi roads, improvement of traffic circulation through better traffic management, devising an appropriate institutional framework for raising the level and quality of "Matatu" services, construction of critical missing links in the road network and the provision of adequate paths and other facilities for pedestrians, cyclists, the disabled, non-motorized transport and the enhancement of road safety.

Sessional Paper No.2 of 1996 on Industrial Transformation to the year 2020	• Government recognizes that the provision of infrastructure is one of its major functions and responsibilities and will make budgetary provision for construction and maintenance of the same • Government will convene a task force to investigate the legal and institutional reforms required before the private sector can exploit new opportunities in the sector. • The immediate priority for public infrastructure investment will be maintenance, rehabilitation and reconstruction of existing facilities and satisfying demand. • There is a pressing need to coordinate infrastructure provision and maintenance to ensure both optimum use of existing facilities as well as optimum coordination for efficient provision of new infrastructure. • In order to effectively coordinate the maintenance of road network, the government is currently exploring the possibility of harnessing operations of the different road agencies
Poverty Reduction Strategy Paper for the Period 2001 – 2004	• The provision of quality infrastructure is essential if poverty reduction and economic growth targets are to be met. • In order to improve on the road infrastructure the government will improve the management of interventions in the roads sub-sector through the operationalisation and facilitation of the Kenya Roads Board (KRB) and District Roads Committees (DRCs.) • Local Communities will be actively involved in the design and implementation of road projects.
National Development Plan 1966 – 1970	• The execution of an extensive programme for the development of all types of roads will be undertaken to enable communication to keep pace with social and economic development in Kenya. • Improvement and Maintenance of minor roads are the responsibility of the respective local authorities.
National Development Plan 1994 – 1996	• Alongside the inadequacies of water and sanitation services especially in the urban areas is lack of basic infrastructural facilities such as poor road networks, which greatly reduces the economic and social fluidity of the centres, mainly due to lack of storage of water and sewerage structure to prevent flooding during the rainy season. There is therefore an urgent need for expansion and rehabilitation of such facilities and structures to improve human settlements environment and the government is firmly committed to undertake appropriate measures during the plan period and beyond. • Priority will be given to the provision of adequate funds for the maintenance of the present road network so as to ensure the sustainability of the existing roads. • To achieve a sustainable urban transport system, attention will be focused on increased investment in urban road network and an increased expenditure on the maintenance of urban roads. • Programmes will be undertaken with emphasis on the rehabilitation and maintenance of Nairobi roads, improvement of traffic circulation through better traffic management, devising an appropriate institutional framework for raising the level and quality of "Matatu" services, construction of critical missing links in the road network and the provision of adequate paths and other facilities for pedestrians, cyclists, the disabled, non-motorized transport and the enhancement of road safety.

National Development Plan 1997 -2001	• An efficient network of physical infrastructure in both rural and urban areas is a crucial requirement for the economy to achieve an annual GDP growth rate of 5.9per cent during the next five years • The government's recognition of the overriding importance of this sector is demonstrated by the heavy investment it has made in it since independence • The government will continue to give priority to the rehabilitation and maintenance of existing roads. • Intensified efforts will be made during the plan period to provide adequate financial resources for road maintenance as a matter of its first priority. • During the plan period, the government, through the MPWH and the MOTC will establish an autonomous Executive Roads Board to manage the RMFL and road maintenance. • Action will be taken to strengthen the technical and policy capacity of the MPWH and MOTC. • Government will encourage the use of labour based methods for road maintenance and construction whenever these are cost-effective • Government will guarantee urban local authorities a share of the RMFL revenues raised within their jurisdiction • With the assistance of the International Development Association (IDA), government will continue implementing a major reform programme covering 26 towns in Kenya
National Development Plan 2002 – 2008	• During the plan period the government will undertake initiatives to make the transport system efficient and sustainable. • The Government will encourage the involvement of the private sector in the development and management of selected roads • During the Plan period the government will prepare a comprehensive policy on service delivery by Local Authorities which will aim at encouraging councils to privatize and commercialize their non- core function. For some services such as infrastructure development, (roads, markets, stadia, recreational parks etc), councils will be encouraged to enter into agreement with private developers for a Build, Operate and Transfer (BOT) arrangement • To complement the limited resources of local authorities, civic responsibility will be instilled in the citizen through civic education and public awareness campaigns • During the plan period government will: - Strive to increase the fiscal transfers and recurrent expenditure to LAs from 5per cent to at least 20per cent of total government capital and recurrent expenditure - Develop modalities and legal framework for revenue sharing between LAs and KWS with the aim of transferring at least 25per cent of gate fees to Las - Increase RMF transfers to LAs from 20per cent to 50per cent for urban access road development and maintenance

Source: (GoK 1966, 1986, 1994, 1996, 1997, 2001, 2002)

As is evident from Table1.6 the Kenya Government has over the years since independence recognized the important role played by infrastructure in the overall development process. Various policy initiatives have been outlined in various Sessional papers and National Development Plans towards these goals. However, there is considerable gap between the policy statement and implementation. For instance, the restructuring of the Local Government Loans Authority (LGLA) by reviewing the enabling Act Cap 270 has not been done to date despite the governments' intention to do so since 1986. There has been little attention to the maintenance of urban roads and involvement of other actors in the same is negligible.

The 1973 Nairobi Metropolitan Growth Strategy had made various recommendations geared towards accommodating and providing services to a population of 3 million people by the year 2000. These included among others, extending the city boundary to the west and north –east and placing restriction upon the growth of the Central Business District (CBD) and industrial area by linking it with a policy of the development of additional industrial employment centres at Dagoretti, Karen/Langata, Wilson Airport, Dandora, Ruaraka and Kasarani. It also envisaged locating workers housing near employment centres and restricting the growth of car ownership and also the development of a cheap and efficient public transport service and the establishment of special bus ways.

The strategy also recommended staggering employment hours in the CBD and formulation of a realistic housing programme that would result in an increase in the

proportion of the city's total resources invested in private housing and the reallocation of public housing investment towards lower income groups, improvement of existing squatter settlements and the yearly provision of sufficient serviced sites to accommodate the lower income groups. It also recommended the establishment of public land reserves well in advance of development needs for low and moderate income housing, industrial estates, major commercial area, transport and other public services (NCC, 1973)

Some of these recommendations, for instance the expansion of the city boundary and the establishment of other industrial areas like Ruaraka and Dandora have been implemented. Amaya (2002) however argues that the 1973 strategy faced many constraints in its implementation. These included the lack of adequate financial resources; lack of citizen and stakeholder participation in the preparation and implementation and hence ownership of the strategy; too much involvement of consultants and technical officers and sidelining of the political wing; inadequate involvement of development partners in the preparation and implementation of the strategy; poor institutional framework for preparation and implementation of the strategy and inordinate stress of physical planning approach and on comprehensive planning rather than strategic planning.

Recent Government policies include the establishment of the Kenya Roads Board and the Kenya Local Government Reform Programme (KLGRP). The objectives of the KLGRP include the improvement of local service delivery, the enhancement of governance and the alleviation of poverty through increased efficiency, accountability, transparency and citizen ownership (HID and DAG, 1997).The KLGRP is focusing on four major components namely; rationalizing the central – local financial relations, improving local authority financial management and revenue mobilization, strengthening participatory

planning and stakeholder ownership and improving governance in local authorities by revising the Local Government Act Cap 265 to enhance autonomy, efficiency and accountability.

Despite past and current efforts both by the national, the local government and the City Council of Nairobi, it is the author's argument that infrastructural services have continued to deteriorate in the city. The study will examine one of the most comprehensive site and service scheme as envisaged by the 1973 Metropolitan Growth Strategy and investigate what may have gone wrong. Dandora site and services scheme will form the focus of this study as a detailed case. Dandora was the first and largest of the site and service schemes started by the Kenya Government with the assistance of development partners in the 1970s and the idea replicated in other major towns throughout the country.

1.3 Research Questions

This study therefore raises the following questions, which are expected to be addressed through the research:

1. What is the current condition of road infrastructure in Dandora Estate in the Eastlands of Nairobi?
2. Who are the various actors in the provision and management of infrastructure and what are their roles and responsibilities?
3. What is the existing policy framework with regard to urban infrastructure management and are there any gaps?

4. Which options exist in the provision and management of urban road infrastructure?
5. Which is the appropriate institutional framework for managing urban road infrastructure?

1.4 Objectives of the study

The primary objective of this study is to identify an appropriate framework of road infrastructure provision and management in urban areas with a particular focus on site and service schemes. The specific objectives are:

1. To examine the existing nature of infrastructure in Dandora site and service scheme in the Eastlands of Nairobi
2. To evaluate the existing policy framework in infrastructure provision and management in Kenya and identify any gaps.
3. To identify the various actors and examine their roles in the provision and management of infrastructure in urban areas.
4. To recommend ways of improving road infrastructure provision and management in urban areas.

1.5 Study Assumptions

Availability of infrastructure and its efficient operation are major determinants to the cost of production, quality and timeliness of response to product and service demand. Provision and sustainability of a quality infrastructure is a prerequisite to economic growth and an essential ingredient in poverty reduction measures (GoK; 2001).

This study hinges on the assumption that from available statistics the urban population will continue to rise, hence exerting greater demand for infrastructure services. It also assumes that the central government as well as local authorities are not well positioned both financially and in management to continue providing and managing urban infrastructure services and facilities including basic human needs such as water and sanitation.

1.6 Justification of the Study

Deficiencies in infrastructure provision and management in urban areas have been cited in various reports such as Government Development Plans, Sessional Papers and UNDP, 1996, among others but without an elaborate framework of how to tackle the same. Such a framework will include the various stakeholders in infrastructure provision and management. These include the national government, local governments, the private sector, the informal sector, service users, non- governmental organizations and external support agencies.

Benefits to be derived from quality infrastructure are many and varied. Waste management for instance, is critical as it has important implications on public health, hygiene and reduction of harmful emissions. The National Health sub- sector Strategic Plan (1999 – 2004) identifies major causes of morbidity in Kenya as diseases and conditions arising from poor environmental management and hygienic conditions including lack of safe drinking water, hygienic sanitation and waste disposal systems that result in water borne diseases like typhoid and cholera (GoK 2002).

Apart from being a major concern to the government as seen from its various strategies and policies, efficient and sustainable infrastructure is also in line with the aspirations of Agenda 21 (Saturday Nation, March 22nd 2003). The City Council of Nairobi, for example, is currently engaged in developing a Strategic Metropolitan Plan. It is hoped that the outcome of this study could be entrenched in that plan and the same could be replicated in other local authorities. This should be followed by action plans in various aspects of infrastructure provision and management.

Dandora Site and Service Scheme is chosen for the case study as it represents an urban area suffering from deteriorating road infrastructure and an ever increasing population. The increase in population is reflected in the emergence of informal settlement like Canaan, Ex- Muoroto, Ex- kibarage, Gitari Marigu, 'Sharp Corner' and others within the formal Dandora Settlement.

1.7 Research Methodology

1.7.1 Variable and Spatial Scope of the Study

Due to the time limit and inadequate financial resources this study will be limited to physical infrastructure and in particular roads, storm water drainage, footpaths, parkings and street lighting. Other aspects of infrastructure will be highlighted when necessary as they impact on the former and also to reinforce the deficiencies. The study area is limited to the Dandora Site and Service Scheme in the Eastland of Nairobi.

1.7.2 Data Needs

In order to establish the need for a framework towards improving urban road infrastructural provision and management in the study area as described further in chapter four, pertinent data had to be collected, collated, analyzed and presented. These data included the history of the area; the physical environment; settlement patterns; demographic structures; housing; other buildings and structures; infrastructural facilities and services; land use patterns and characteristics; community services and facilities; production and economic systems and community structures.

The data matrix as shown in Appendix 1 summarizes the type of data required; the corresponding data needs; the sources of data and method of data collection. Methods of data analysis and presentation are indicated for each type of data.

1.7.3 Sample Frames, Sample Size and Sampling

The target population of this study was the entire residential land use sub-system constituted by the spatial unit represented by Dandora Site and Service Scheme, its residents, and government; community based organizations and Non- Governmental Organizations.

Due to financial and time constraints and also the wide geographical area, it was found prudent to select the sample size of the accessible population through random cluster sampling since this is the most appropriate method under such circumstances (Alreck and Settle, 1995, Nachmias and Nachmias, 1996)

The sample frame constituted all the residential households in Dandora. This was obtained from the residential units register provided by the Housing Development Department. Physical, environmental, social, cultural, economic and institutional framework aspects that characterize the area were considered. Observations were made in the study area to justify the need for a broad based and participatory partnership framework for sustainable urban road infrastructural management.

The units of observation comprised of a sample of 100 households. Relevant information was also obtained from NCC, the central government, the informal and formal private sector, community based organizations and Non- Governmental Organizations.

Random cluster sampling was used in selecting households. This was done by choosing blocks of similar housing units in a particular residential phase. Within the cluster, simple random sampling was used as the technique gives an equal chance to each household of being included in the sample (Mugenda and Mugenda, 1999).

1.7.4 Data Sources

Secondary data has been obtained through the relevant literature on urban infrastructure provision and management. These included mass media reports; World Wide Web; local and national government archival records; library records; government abstracts, sessional papers and national development plans as well as maps.

Primary data was obtained from the study area in order to provide empirical evidence of the existing status and the immediate problem; felt needs and concerns. The various data needs and sources are illustrated in Appendix 1.

1.7.5 Data collection, Analysis and Presentation

The main tool used for the quantitative data collection was a semi – structured household questionnaire (Appendix II). Participant observation, photographs, drawings and field measurement were useful for collecting data on the existing nature of the physical and environmental concerns. Maps and demographic data for the study area were useful in the analysis of land intensity and population densities.

Open-ended questions and interview schedules with households and key informants such as the local provincial administration, community leaders and elders, civic leaders, civil society organizations, leaders and heads of relevant department of the NCC were useful in getting a deeper understanding of the historical evolution of the study area including the deteriorating infrastructure.

Qualitative data was mainly obtained through interviews and observation by the researcher.

Data collected from the structured household questionnaire was coded, cleaned and analyzed using the Statistical Package for Social Scientists (SPSS). The analysis of both qualitative and qualitative data collected is presented using simple frequency distribution and analytical tables. The analysis of the qualitative data collected is presented by the use of maps, plans, sketches, illustrations, photographs, tables, cross-tabulations, pie-charts, line graphs, bar graphs, etc. The in- depth interviews are analyzed and organized.

The overall information is finally interpreted and synthesized and recommendations made.

1.8 Limitations of the Study

The basic limitations in carrying out this study included inadequate time and limited financial resources. The study area was also relatively large with diverse characteristics which may affect the generalizability of the results.

1.9 Definitions of Key Terms and Concepts

Urban Management: Refers to the process of efficiently and effectively utilizing resources to provide satisfactory living and working conditions for the urban position and facilitating economic production and growth in urban areas. The process essentially involves the formulation of appropriate objects, goals, policy and strategy; and the mobilization and efficient use of resources (including personnel, organizational, information, finance and land resources) in order to develop, maintain and provide essential urban infrastructure and services (including water, sanitation, electricity, refuse collection and removal, roads, education and health) for both domestic consumption and economic production purposes(UNCHS,1994).

Urbanization: The process of growth in the proportion of the population living in urban areas. (UNCHS, 1994)

Sustainable development: Refers to that development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It

contains within it two concepts: the concept of "needs" in particular the essential needs of the worlds poor, to which priority should be given; and to the idea of limitations by the state of technology on the environment's ability to meet present and future needs(UNCHS,1991).

Governance: The institutional capability of public organizations to provide the public and other goods demanded by a country's' citizens or their representatives in an effective, transparent, impartial, and accountable manner, subject to resource constraint (World Bank, 2000).

Social capital: Refers to the norms and network of civic engagement, which are a precondition of economic development and effective government. Includes all that goes into enhancing people's propensity to cooperate, work together and network such as governance systems, religion, traditions, institutional capacity and culture.

Natural capital: Comprises nature's free goods and services such as land, water, mineral wealth, climate, fisheries. etc.

Financial capital: Comprises stocks of readily available money for investment.

Human capital: Includes all that goes in improving the status of quality of human beings such as technical skills, medical care and education.

Physical capital: The end product of manipulating these other four capital forms and comprises all forms of infrastructure development by humans in the provision of development.

Civic engagement: Refers to all those community activities that are the product of social and cultural associations within the community. These activities ensure that citizens in such communities are engaged in public issues rather than in patronage.

In other words social capital refers to features of social organization such a networks of civic engagement, norms and trust that facilitate co-ordination and co-operation for mutual benefit (Mabogunje, 1999).

Community participation: The voluntary involvement of people in making and implementing all decisions affecting their lives, with or without outside assistance to improve their living conditions (UNCHS, 1991). Participation in infrastructure management is a process whereby people as consumers and producers of infrastructure services, and as citizens, influence the flow and quality of infrastructure services available to them (Schubeler, 1996).

Decentralization: Refers to the decongesting or de-concentrating of the center by handing over some administrative authority or responsibilities to lower levels within a hierarchy or bureaucracy of central government. It involves shifting of workload from central government officials based at national headquarters to staff or officers based in the field (Mitullah, 2001).

Devolution: Refers to the distribution and re -distribution of authority to make decisions and take action by local government independent of central government administrative oversight (Amaya, 2001 Mitullah, 2001).

Contracting out: Refers to the placing of a contract by a public agency to an external private company (Gidman, Et al, 1995).

Franchising /concession: Refers to the arrangement whereby a private partner takes over responsibility for raising finance for investments as well as running the service and collecting charges (Gidman, Et al, 1995).

Affermage: Refers to the arrangement whereby a public authority controls the construction of a system but contracts out its operations, maintenance and the collection of service charges to a private partner (Gidman, Et al, 1995).

Privatization: With reference to infrastructure provision and management is defined as a non- government role in the production and provision of services (Fox, 1994).

Management contract: Is an arrangement in which a private organization agrees to take over the responsibility for managing a service to specified standards but using the staff, equipment, vehicles and buildings of the authority responsible for the infrastructure utility. (Gidman, Et al, 1985).

Build, Own and Operate (B.O.O.): Is a partnership between the public and private sectors whereby a private firm, through turnkey contracting, may build, own and operate a facility which will be used by the general public.

Build, Operate and Transfer (B.O.T.): Is similar to B.O.O. but at the end of the specified period the ownership of and right to operate the facility will transfer to urban authorities.

Contestability: The vulnerability of an activity to competition from new entrants in market.

Leasing: Is an arrangement whereby a private party (the lessee) contracts with a public authority for the right to operate a facility (including the right to a flow of revenues from providing a specific service) for a specified period of time. The facility continues to be owned by the public authority (World Bank, 1994).

Management of infrastructure: Is a cyclical process involving the formulation of goals, planning and programming, operation and maintenance; monitoring and evaluation; and application of information derived from monitoring to planning and operational functions (Schubeler, 1996).

Off-site Infrastructure: Infrastructural services outside the project site benefiting population larger than the project area.

On- site Infrastructure: Infrastructural services within the project site, including the individual lots.

Routine Road Maintenance: Operations required to be carried out once or more per year on a section of a road.

Periodic road maintenance: Operations that are occasionally required on a section of a road after a period of a number of years.

Urgent road maintenance: Certain unforeseen situations necessitating remedial action to be taken as soon as possible.

1.10 Organization of the Report

The scope of the study is limited by the design of its structure, which is covered in five chapters. Chapter one provides an introduction to the genesis of the infrastructure problem in urban areas, which leads to the need to carry out this study. The methodology of carrying out the study including sampling, data needs, and methods of data collection, analysis and presentation is also carried out in this chapter.

Chapter two is devoted to literature review and begins by defining infrastructure types and the importance of infrastructure. Various methods of infrastructure provision and management and also financing are then explored, including cases of good practice from various regions. The policy framework of managing infrastructure in Kenya including the institutional arrangements is explored in this chapter. A conceptual framework of managing urban physical infrastructure is then developed.

Chapter three is devoted to the study area. It beings with a historical development of the City of Nairobi followed by Dandora. The existing situation with regard to population, housing, other buildings, various infrastructure, community services and community organization is then presented.

Chapter four covers the results and the discussion of the case study while in chapter five a synthesis of the findings is made. This is followed by conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK OF THE STUDY

2.1 Introduction

Infrastructure has been defined in various ways by different scholars. To some, infrastructure should be regarded as the 'social overhead capital' of a society, those parts of the national stock of resources created and administered by public agencies which service the private sector and households as well as enterprises (UNCHS, 1989; World Bank, 1994) while Jochimsen (UNCHS, 1989) defined infrastructure as the sum of all basic material structures, institutional conditions and human resources available to a society needed for the functioning of the economic sector. Herskovitz (1963) on the other hand defined infrastructure as the basic capital investments in human and technical resources essential to social and economic development all of which usually require large scale investments and inputs and are for use by the whole society rather than by private interest.

Fox (1994) defined infrastructure as those services derived from the set of public works traditionally supported by the public sector to enhance private sector production and to allow for households consumption. Infrastructure defined in this way includes services such as roads, mass transport, water systems, sewer systems, solid waste management, drainage and flood protection, electric installations and telecommunications. This definition focuses both on infrastructure's role in production and in consumption. It is imperative also that infrastructure defined in this way be seen in the two dimensions of the services drawn from the physical facilities and the physical facility itself.

2.1.1 Types of Infrastructure

According to the World Bank (1994), infrastructure is usually classified into three broad categories –physical infrastructure; social infrastructure and entrepreneurial or economic infrastructure.

Physical infrastructure includes roads and transport networks including related cyclist and pedestrian footpaths, street lighting and storm eater drainage; water and sanitation systems; solid waste management; electricity supply and telecommunications. Social infrastructure accounts for education and health services, recreational and cultural amenities like social halls, stadia, libraries and worship places. Also included in this category are markets, slaughter houses and fire services.

Entrepreneurial or economic infrastructure on the other hand includes services and facilities that allow a wide range of economic transactions to take place in urban space. These include such facilities and services like banking, legal and other professional services and real estate. This kind of infrastructure determines the commercial life of an urban community (World Bank, 1994).

2.1.2 Importance of Infrastructure

The World Development Report (1994) recognizes some major trends in infrastructure. It notes that infrastructure can deliver major benefits in economic growth; poverty alleviation and environmental sustainability – but only when it provides services that respond to effective demand and does so efficiently.

a) **Infrastructure Links to Economic Growth**

Infrastructure is viewed as the engine and the 'wheels' of economic activity. Input-output analyses have shown that in most successful economies of the world infrastructure like telecommunications, electricity and water have been used in the production process of nearly every sector and that transport is an input for every commodity. Users demand infrastructure services not only for domestic consumption but also for raising their productivity by reducing the time and effort needed to secure safe water, to bring crops to the market or to commute to work.

The GoK in Sessional Paper No. 1 of 1994 on Recovery and Sustainable Development to the Year 2010 notes that accelerated industrial, commercial and agricultural growth is dependent upon the availability and quality of infrastructure (GoK, 1994).

There is evidence that there is a strong positive association between the availability of certain infrastructure – telecommunications, power, paved roads and access to safe water and per capital Gross National Product (GDP). Infrastructure variables are positively and significantly correlated with economic growth in developing countries.

It is however noted that investment in infrastructure alone does not guarantee growth. It is the efficiency with which infrastructure services are provided that is the key to realizing potential returns.

b) **Infrastructure Links to Poverty**

Infrastructure is important in ensuring that growth is consistent with poverty reduction. One of the basic criteria for defining welfare is access to at least minimal infrastructure services. The poor, to some great extent, may be seen as those who are unable to consume basic quality clean water and who are subject to unsanitary surroundings, with extremely limited mobility or communications beyond their immediate settlement.

As a result they have more health problems and fewer employment opportunities. Most squatter communities surrounding most cities in developing countries typically lack formal infrastructure facilities. This arises from their non-permanence of tenure. Access to piped water and electricity are associated with de facto tenure security in most cases (World Bank, 1997).

Access to clean water and sanitation has the direct consumption benefits in reducing mortality and morbidity. It also increases the productive capacity of the poor. Access to transport and irrigation can contribute to higher and more stable incomes. The benefits of transport and communication include the access they provide to other goods and services especially in urban areas. The construction and maintenance of some infrastructure especially roads and water works can contribute to poverty reduction by providing direct employment.

c) **Infrastructure Links to the Environment**

Provision of infrastructure leads to modification of the immediate natural environment. Communities modify their physical surroundings through provision of infrastructure in order to improve their comfort, productivity and to protect themselves from the elements as well as to conquer distance.

Activities generated by the use of infrastructure facilities impact on the environment either positively or negatively. However, the relationship between each infrastructure sector and the environment is complex. The most positive impacts of infrastructure on the environment concern the removal and disposal of liquid and solid wastes. A study by the WHO (Habitat, 1989) suggested that diarrhoeal morbidity in young children can be reduced by between 16 per cent and 37 per cent through improved water sanitation. Provision of sewerage without waste water treatment on the other hand could lead to severe downstream pollution. Poor management of solid waste may lead to clogging and stagnation of water in urban street drainage creating breeding ground for disease carrying mosquitoes.

Expansion of power plants may lead to increased incidence of air pollution in cities. Expansion of transport infrastructure may result in reduced total pollution loads as congestion falls, average speeds rise and routes are shortened. However, expansion and improvement of roads may encourage increased vehicle usage and hence more emissions. Therefore additions to infrastructure capacity are only part of the solution. What is required in

improved management of traffic and land use and promotion of non motorized modes, cleaner fuels and greater reliance on public transport.

2.1.3 Infrastructure Service Indicators

Service indicators for physical infrastructure cover two aspects, namely, coverage and performance. Indicators of coverage include the extent, type and condition of the physical facilities in each infrastructure sub-sector. Direct measures of coverage are based on household surveys of actual access - the location of services relative to the population.

Performance quality is looked at in two dimensions, from the providers' and users' perspectives. Indicators from the providers' perspective measure operating efficiency (such as power system losses, unaccounted-for water, and transport availability), capacity utilization and financial efficiency (e.g. cost recovery). Indicators from the users' side would be a reflection of the effectiveness of the service delivered. The World Development Report, 1994, offers some definitions of key physical infrastructure indicators. These include: -

2.1.3.1 Roads

Coverage indicators include spatial road density - a country's road length divided by the land area and per capital road density, measured by dividing the length of the road network by the population size. Performance on the other hand is given by the condition of the paved roads, defined as roads substantially free of defects and requiring only routine maintenance.

improved management of traffic and land use and promotion of non motorized modes, cleaner fuels and greater reliance on public transport.

2.1.3 Infrastructure Service Indicators

Service indicators for physical infrastructure cover two aspects, namely, coverage and performance. Indicators of coverage include the extent, type and condition of the physical facilities in each infrastructure sub-sector. Direct measures of coverage are based on household surveys of actual access - the location of services relative to the population.

Performance quality is looked at in two dimensions, from the providers' and users' perspectives. Indicators from the providers' perspective measure operating efficiency (such as power system losses, unaccounted-for water, and transport availability), capacity utilization and financial efficiency (e.g. cost recovery). Indicators from the users' side would be a reflection of the effectiveness of the service delivered. The World Development Report, 1994, offers some definitions of key physical infrastructure indicators. These include: -

2.1.3.1 Roads

Coverage indicators include spatial road density - a country's road length divided by the land area and per capital road density, measured by dividing the length of the road network by the population size. Performance on the other hand is given by the condition of the paved roads, defined as roads substantially free of defects and requiring only routine maintenance.

2.1.3.2 Water

A measure of coverage is given as access to safe water. The World Health Organization (WHO) defines access to sage drinking water as access to piped water or a standpipe within 200 meters of a housing unit. Water losses include physical losses, as a result of pipe breaks and overflows, and commercial losses either from meter underregistration, illegal connections and legal uses such as fire fighting (usually not metered).

2.1.3.3 Sanitation

Access to sanitation is defined as the percentage of population with access to sanitary facility for human excreta disposal in the dwelling or located within a convenient distance from the user's dwelling (Habitat, 1997).

2.1.3.4 Solid Waste Disposal

Access to solid waste collection is defined as the percentage of households with regular (for example, weekly) waste collection, (World Bank, 1997).

2.2 Infrastructure Provision and Management

2.2.1 Actors

Many categories of actors are involved in infrastructure provision and management either as service users, service providers, intermediaries or as regulators. They include individuals, groups and organizations. The interests, agendas, roles and limitations of these groups are varied.

Table 2.1 Road Defects

Item	Sub-item	Defects
Paved Roads (Bitumen)	Surface	Cracking, potholes Rutting/deformation Heaving/shoving Stripping/fretting Bleeding/grazing Edge damage/warning Obstructions
	Base course Sub base Sub grade	Spot failure Spot failure Spot failure
Concrete Roads		Loss of surface texture Cracking Joint settlement
Unpaved Roads		Loss of camber Rutting, potholes Corrugation, erosion gullies Soft spots Obstructions Loss of gravel depth
Shoulder		Obstruction High vegetation Scour Shoulder/carriage way step Rutting Depressions Potholes
Slopes		High vegetation, erosion Earth slip/landslide Rock avalanche Collapse of slope protection
Embankment		Collapse, settlement
Drainage	Culverts	Silting Blockage by debris Settlement cracks Erosion of stream bed at culvert outlet Headwall/apron/wing-wall damage, collapse of culvert
	Ditches and drains	Obstruction, silting, erosion at drainage outfall Ponding in ditch or on shoulder Invert and sides of ditches are eroded Ditch lining is damaged
	Manholes and drainage pipes	Water is flowing up at manhole Manhole cover or grating is missing Manhole is covered with soil and vegetation Catch pit sump is silted up
Structure	Drifts and causes ways	Settlement Erosion, debris Guide posts are damaged or missing
	Retaining walls/stone masonry	Settlement Cracking, collapse
Road furniture		Dirty Damaged Missing
Footpath		Potholes Depression Obstructions

Source: - (GoK, 2003)

2.1: Glossary of Road Terms

Term	Definition
• Highway	Is a way over which the public have the right to pass and repass
• Road	Is any length of highway or any other road to which the public have access and includes bridges over which a road passes
• Road Reserve	The area within the road limits over which members of the public have the right to pass and repass
• Road Furniture	Road or street furniture include traffic signs, traffic board, traffic signal, lane marking, guard rail, street lights etc.
• Carriage Way	The part of the road used by vehicular traffic
• Culvert	A duct, usually rectangular or circular, for carrying surface water under the road
• Camber	The traverse slope applied to the carriage way on a section of straight alignment
• Catch Pit	A covered, accessible chamber with a sump for collection of silt forming part of the drainage system and permitting inspection and maintenance of underground drainage pipes
• Drainage	The interception and removal of ground and surface water by artificial or natural means
• Ditch	A long narrow excavation designed or intended to collect and drain off surface water
• Headwalls	The walls located on the top of outlet/inlet of culvert
• Inlet	The point at which surface water enters a pipe culvert or box culvert
• Invert	The lowest point of the internal cross section of a ditch or culvert
• Shoulder	Paved or unpaved part of the road next to the inner edge of the pavement
• Surfacing	Top layer of the pavement
• Alligator Cracking	Is a series of interconnecting cracks creating an interconnected pattern
• Potholes	Are small bowl shaped depressions on the pavement surface/base course, usually less than one meter in diameter
• Rutting	Longitudinal depressions in the pavement surface that usually occur in the wheel paths of a roadway
• Heaving/Shoving	Irregularities associated with deformation and subsistence usually occurring on either side of the wheel tracks
• Stripping/Fretting	Is the wearing way of the pavement structure caused by the dislodging of aggregate particles and loss of asphalt binder
• Bleeding	Is a film of bituminous material on the pavement surface which creates a shiny, glass-excessive amount of asphalt cement in the mix and/or low air void content
• Glazing	Wear or embedment of chippings in the surface giving a smooth, shiny appearance
• Edge damage	Is the difference in elevation between the pavement edge and the shoulder and occurs along the edge of the pavement
• Waving	Undulations in the road surface of a longer wavelength than corrugations
• Obstruction	Rocks, trees or tree branches, soil heaps, wind blown sand, debris and abandoned vehicles on the road surface
• Scour	Loss of edge support to pavement
• Road Avalanche	Displaced rock material falling by gravity

Source: - (GoK 2003)

2.2.1.1 Households, Communities and Other Service Users

The main concerns of households are to receive effective and dependable services at prices they can afford. When household are poorly served, they often form community based organizations (CBOs) to upgrade local conditions, improve service, and/or petition the service provider for service improvements. When properly organized CBOs can become valuable partners in financing and managing infrastructure services at the local level. Some of the infrastructure services that can be financed and managed at the local level include solid waste management and operation and maintenance of storm water drains.

2.2.1.2 Non-Governmental Organization (NGOs)

NGOs operate between the private and government domains. Often originating outside of the communities in which they work, they are usually motivated by humanitarian and/or developmental concerns rather than an interest in service improvement for their own members.

NGOs play a major role in awareness raising, advocacy, capacity building, decision-making, providing access to credit, implementing and in operation and maintenance of infrastructure facilities. NGOs are however usually unable to undertake large infrastructure programmes and often operate in a defined project area (Gidman, Et al, 1995).

2.2.1.3 Local Government

In most countries both developed and developing, local governments are under obligation to protect the rights of citizens, to provide services and facilities which are not specific to an individual but are for the common good, or to provide a service or

facility which cannot be provided in any other way. Besides their legal obligations local governments are normally motivated by political interests.

Many local governments worldwide are however unable to adequately respond to the demand for infrastructure services. They are plagued by many problems that include unwieldy bureaucracies, management failures, inefficient workforces, lack of investment or finance and political interferences in the management process (Gidman, Et al, 1995).

2.2.1.4 National Government

National governments are responsible for establishing the institutional and legal framework for infrastructure provision and management. They are also supposed to ensure that the local governments have the necessary authority, powers and capacity for effective and efficient management.

National governments have for a long time been involved in infrastructure provision but due to financial and other constraints their role is gradually changing from that of providers to that of enablers. This has an emphasis for government to have ability to act as: -

- **Regulators** – monitoring service quality, ensuring equitable access and limiting monopolistic pricing;
- **Catalysts** – providing incentives and streamlining procedures and regulations.

- **Partners** – contributing to project finance directly or through incentives and credit enhancements (World Bank, 2002).

2.2.1.5 Private Sector Enterprises

These vary from small and micro enterprises (SMEs) to large business establishments. They may be active in many different aspects of infrastructure provision and management. The private sector is responsible only to its shareholders or owners and to its clients. The main objective in infrastructure provision is to generate a profit on their investments. Due to their access to financial resources and their potential ability to operate more efficiently compared to the public sector, the private sector enterprises can play a role in the financing and provision of certain infrastructure services and in construction and maintenance of relevant facilities.

2.2.1.6 The Informal Private Sector

The informal private sector comprises unregistered, unregulated activities carried out by individuals, families, groups or small enterprises. Their main motivation is generation of self-employment and income.

This group is usually ignored by both National and Local Governments in their planning programmes despite the important role they play in bridging the gap between the urban poor and the formal sector.

2.2.1.7 External Support Agencies

External Support Agencies (ESAs) include bilateral and multilateral agencies like the World Bank, United States Agency for International Development (USAID), Swedish International Development Agency (SIDA), United Nations Centre for Human

Settlements (UN-HABITAT) Department for International Development (DFID), United Nations Environment Programme (UNEP) among others.

Their main motivation is to enhance urban management capacities of recipient countries.

2.2.2 Infrastructure Financing Options

Adequate financing is a prerequisite for sustainable infrastructure systems. Financing of infrastructure is viewed from two perspectives – financing the initial physical capital investment and financing the operation and maintenance of services. Apart from financing options that discussed here below, infrastructure can also be fully or partially provided through self-help and in-kind contributions.

Governments, donors and the private sector are the major funding sources for infrastructure services and facilities. Government and internally generated private funding are usually drawn from the same domestic sources. Donor resources or externally generated private sector funding come from outside the country (Fox, 1995).

2.2.2.1 Financing Initial Infrastructure Investment

2.2.2.1 a) Government Funding

Own source revenues and borrowed funds are the main financing sources for central governments. Apart from these two sources, local governments also benefit from grants, donations and intergovernmental transfers from the central government. Own source of revenue for local governments include the following: -

- Rates – land rates on property owned by individuals, companies or the government including parastatals.
    - Rates on buildings (developed property)
- Fees and charges, the key ones being

- Premises licenses
- Occupational licenses
- Services or facilities – ambulances, survey fees etc.
- Goods or documents supplied

- Commercial activities including returns from own investments and rental income
- Return on investment

Own source revenue includes taxes, charges for the sale of goods and services, fees and miscellaneous revenues such as the sale of assets and interest earnings. In Britain for instance, taxation revenue mainly comes from motor fuel taxes, vehicle and license duties, and Value Added Tax on purchase of motor vehicles (O'Flaherty, 1975). It also includes net profit from government owned companies, depreciation accounts and repayment of debt owed to the government. These revenues are either deposited in the government's general fund where or in an earmarked account. An example of an earmarked fund is fuel levy fund where he deposits can be used only for highway maintenance and construction.

Borrowing by the national and local government to finance infrastructure can be from the conventional bond market or from the banking sector, individual savers or pension accounts and other accounts controlled by the government. The choice between using own-source revenues and borrowed funds is determined by the timing for payment of services borrowing being using appropriate when payment for the service is over a long period (Fox, 1995)

Infrastructure development banks are another source of borrowing by local government. Initial establishment of infrastructure banks requires funding by either central government through bond issues or through a group of local authorities as in the case in Brazil (Fox, 1995). The Kenya Local Government Loans Authority established under the Local Government Loans Act Cap 210 is an example of an infrastructure bank.

Resources held by an infrastructure bank are loaned as a source of funds for the initial works of infrastructure projects. The borrowing organization must repay the loans resulting in a revolving fund that is then used to lend to others. For infrastructure banks to be sustainable, interest rates on borrowers must be imposed at prevailing market rates. Guidelines for creditworthiness of borrowing organizations must also be established and mechanisms for enforcing repayments be clearly spelt out.

2.2.2.1 b) **Donor Financing**

Donor funds provide access to resources from outside the domestic economy. Funds are either granted or loaned. Donors include bilateral and multilateral agencies like the World Bank and its affiliates; the Public-Private Infrastructure Advisory facility (PPIAF), African Development Bank, Swedish International Development Agency (SIDA), United States Agency for international Development (USAID), the European Economic Commission (EEC) among others.

Though credited with having greater stimulative effect than domestic funds, donor funds are sometimes associated with distortions. This occurs especially when the wrong technology is imposed or unnecessary features are introduced to the physical

facility. Donors sometimes also insist on rigid standards, which in some cases fail to consider local service delivery conditions (Fox, 1995).

2.2.2.1 c) Private – Equity Financing

This source of funding could come from the resources of parastatals or private sector companies. Private equity financing occurs when the private sector has ownership or partnership interest in the infrastructure. This can involve some form of build-operate-transfer (BOT) arrangement in which the private sector builds and then operates the facility for some period, after which the facility is transferred to the government. It is important to have a carefully specified agreement negotiated between the private entity and government.

A number of advantages are associated with private equity financing. Private equity financing provides access to resources, which would otherwise be unavailable. It also serves as a funding substitute in situations where the public sector is unable to provide adequate resources. Private equity finance can also be used when the public sector wants to lower the risks in making the wrong infrastructure investments. Finally the private sector is usually associated with innovations and this could result in reduced construction costs and gains in efficiency in service delivery (Fox, 1995).

The disadvantage of using private equity finance occurs mainly when the private sector chooses projects and the government is to enter into some form of cost sharing. This may result in the governments' resources being diverted from more productive uses.

facility. Donors sometimes also insist on rigid standards, which in some cases fail to consider local service delivery conditions (Fox, 1995).

2.2.2.1 c) Private – Equity Financing

This source of funding could come from the resources of parastatals or private sector companies. Private equity financing occurs when the private sector has ownership or partnership interest in the infrastructure. This can involve some form of build-operate-transfer (BOT) arrangement in which the private sector builds and then operates the facility for some period, after which the facility is transferred to the government. It is important to have a carefully specified agreement negotiated between the private entity and government.

A number of advantages are associated with private equity financing. Private equity financing provides access to resources, which would otherwise be unavailable. It also serves as a funding substitute in situations where the public sector is unable to provide adequate resources. Private equity finance can also be used when the public sector wants to lower the risks in making the wrong infrastructure investments. Finally the private sector is usually associated with innovations and this could result in reduced construction costs and gains in efficiency in service delivery (Fox, 1995).

The disadvantage of using private equity finance occurs mainly when the private sector chooses projects and the government is to enter into some form of cost sharing. This may result in the governments' resources being diverted from more productive uses.

2.2.2.2 Financing Operations and Maintenance

Sources for financing operations and maintenance (O & M) include user fees, own source revenue, general fund contributions from the government, or intergovernmental transfers from central to local governments. Transfers from national to local governments are usually inadequate to meet needs while intergovernmental transfers are unpredictable and are usually the first victim of tight national budgets.

User fees are the best choice for funding O & M. The following advantages are associated with user fees: -

- When designed effectively, user charges tie the amount the consumers pay to the amount they use.
- User charges are relatively easy to access and collect especially in situations where consumers must pay the fee prior to or at the same time as receiving the service. Services can be terminated if charges are not paid.
- When users are charged for services or facilities, it gives consumers greater choice in the amount of services they wish to consume and some ability to affect the quality of the service by varying the amount they use.
- User charges are flexible and can be adjusted as costs change over time.
- When applied effectively, user charges encourage fiscal discipline among service providers and service users.

User charges are however also associated with some disadvantages, which include:

- User charges are often difficult to levy for services essential for public welfare.
- Some infrastructure like roads provide both private and public goods, hence sometimes it is difficult to levy user charges for their use.
- Levying too many charges in cities may create political risks.
- Financing by user charges may exclude the poor from accessing essential infrastructure services (Rondinelli, 1990).

2.2.3 Financing Urban Physical Infrastructure in Kenya

2.2.3.1 Legal Basis for Revenue and Resource Mobilization

In Kenya local authorities derive legal right to raise income from various Acts of Parliament. These rights are however subject to approval by the Ministry of Local Government (Smoke, 1994).

These Acts of Parliament include: -

- The Local Government Act, Cap 265
- The Valuation for Rating Act, Cap 266
- The Local Authorities Transfer Fund Act No. 8 of 1998
- The Road Maintenance Levy Fund Act no. 9 of 1993
- The Kenya Roads Board Act, 1999
- The Local Government Loans Act, Cap 270
- The Finance Act 2000
- The Physical planning Act, Cap 286.

2.2.3.2 Major Sources of Local Authority Revenue

The principal sources of general revenue in Kenya LAs are land rates, property rates, business and trade license fees, charges for services, agricultural cesses and intergovernmental grants (World Bank, 1992). Revenue finance is raised to meet the

LAs recurrent expenditures while capital finances are raised to carry out capital works, such as roads, water and sewerage expansion, housing and street lighting among others.

Property tax, which includes land rates on property owned by individuals, companies or the Government and rates on buildings, constitute a major component of total revenue collection in Kenyan cities. In Nairobi, rates form over 60 per cent of the total revenue of the City Council (UH – Habitat, 1999).

Urban services that generate revenue include water supplies and sewerage, Housing Development (site and service schemes and plot sales), refuse removal and disposal, cess pit emptying, public rental housing, education and health services.
LAs derive a lot of income from institutions involved in trade and supply of goods and services in their jurisdiction. Some of these include slaughterhouses, market and food vendor charges, non-motorized taxes, street vehicle parking, entertainment taxes, stadia charges, bus park charges, library and game reserve fees.

In Nairobi, taxes on goods and services (fees and licenses) are lumped together with other miscellaneous charges in a group called 'Administration and General Charges'. Levies are charged on the following: -

- Premises licenses e.g. licenses to traders
- Occupational licenses e.g. licenses issued to Jua Kali artisans
- Services for facilities provided e.g. ambulance fees, land use related fees – survey fees, beacon certificate, plan approval fees, subdivision fees among others.

- Goods or documents supplied, for example plot transfer fees and application forms.

Investment in commercial activities is another source of revenue for some LAs. Municipal Council of Mombasa for example, has invested in commercial buildings, shopping centres, as well as a rest house. Municipal Council of Mombasa and City Council of Nairobi had, until recently, invested in the Kenya Bus Company which is involved in public transport in the two cities.

Borrowing from both local and external agencies provides the other source of LA revenue especially for financing projects aimed at improving service delivery. The law also allows local authorities to issue stocks and bonds to raise revenue. This however is restricted to NCC. (The last stocks matured in 1993 and no new stocks have been issued recently).

Local sources in providing loans for capital development in LAs includes the local Government Loans Authority (LGLA), the National Housing Corporation (NHC) and Housing Finance Company of Kenya HFCK). Overdraft facilities from national banks such as Kenya Commercial Bank (KCB) and National Bank of Kenya Limited marks the other source of local funds. External sources of funds includes both bilateral and multilateral donors. The include the WB, USAID, SIDA among others.

Central Government allocations is another category of LA revenue source. These allocations generally take three different forms: -

- Allocations from the Central Government to the municipality through the Ministry of Local Government (LG) and other sector ministries, whose activities also include development and provision of urban services and amenities.

- Allocations from the Central Government to LGLA, which in the past has provided loans to LAs for project development.
- Allocations made in the form of grants through the Ministry of Local Government.

The allocations arise from sharing of revenue and taxes and also in the form of grants. Beginning from the 1998/99 fiscal year, LAs were to get 20 per cent of the Road Maintenance Levy and a 5 per cent share of the Central Government's annual income tax collection. During 2002/03, KShs. 3.0 billion was disbursed to the 174 Local Authorities (now 175) in Kenya through the LATF mechanism to facilitate improvement of local service delivery (GoK, 2003).

Table 2.2: Central Government Transfer through LATF to LAs 1990/00 – 2002/03 (KShs. Million)

	1999	2000/01	2001/02	2002/03
NCC	89.50	485.32	607.06	607.06
Municipal Councils	208.54	511.13	816.81	816.81
County Councils	556.85	1,060.21	1,256.23	1,256.23
Town Councils	145.11	250.23	319.90	319.90
Total	**1,000.00**	**2,306.90**	**3,000.00**	**3,000.00**

Source: (GoK, 2003)

Table 2.3: Expenditure by LAs, 1998-99-2002/03 (KShs. Million)

	NCC	Other Municipal Council	Sub Total	Town and County Councils	Total
1998/99	3,368.46	4,115.85	7,484.31	2,373.67	9,857.98
1999/00	4,201.14	3,066.58	7,267.72	2,516.36	9,784.08
2000/01	4,047.91	3,369.67	7,417.58	2,648.33	10,665.91
2001/02*	4,919.41	4,112.88	9,032.29	3,326.37	12,358.66
2002/03**	4,243.47	4,532.41	8,775.88	3,428.36	12,204.24

Source: (GoK, 2003)

***Provisional**

****Estimates**

N.B There are currently 175No. LAs in Kenya comprising 1 City, 45 Municipal Councils, 62 Town Councils and 67 County Councils, (GoK, 2004).

2.2.3.3. Sources of Financing Urban Physical Infrastructure in Kenya

Various sources have been used to finance urban physical infrastructure in Kenya. These include: -

- Own sources funds from the various sources discussed above
- Borrowing from other external and internal sources. Internal sources have mainly been from the LGLA, NHC, HFCK and the national banks. External sources include both bilateral and multilateral groups who include the WB, the European Union, KFW, AFD, JICA, SIDA, ADB, DANIDA, Arab Bank for Economic Development in Africa (BADEA), OPEC among others.
- The Road Maintenance Fuel Levy Fund (RMFLF)
- The local Authority Transfer Fund (LATF)
- Grants both from Central Government and Development Partners
- Through stock issues. NCC has been the only LA that has managed to use this option.

2.2.4 Infrastructure Management Options

For a long time the public sector has dominated the provision and management of infrastructure. This has been so because of a number of reasons – infrastructure's economic and political importance; a belief that problems with the supply technology required a highly activist response by governments; and the general faith that governments' could succeed where markets appeared to fail. (World Bank, 1994). In practice, publicly provided infrastructure services have often delivered poor quality and inadequate coverage (Rondinelli, 1990; World Bank 1994; Gidman; Et al 1995; World Bank 2002).

In order to deliver infrastructure services that respond to user's demands a management capacity that is often beyond the reach of the public sector is required.

Organized arrangements involving the entire actors-public sector, NGOs and CBOs, formal private sector, the informal private sector and service users are desirable in order to ameliorate some of the associated problems – operation inefficiencies, inadequate maintenance, excessive dependence on fiscal resources, lack of responsiveness to users needs limited benefits to the poor and insufficient environmental responsibility (World Bank, 1994)

Some of these management arrangements include: -

a) **Devolution** – this is a type of administrative decentralization. It refers to the transfer of authority and service delivery from the Central to Local Government (Rondinelli, 1990; Fox; 1995; Mitullah; 2001; Amaya, 2001). Fox (1995) notes that devolution works well for delivering some services and not others. Devolution is most effective when economies of scale are limited, local choice is strongly desired, different tastes for services exist, benefits from service delivery mostly accrue to local residents and where there is a strong existence of local government (Fox, 1995).

b) **Privatization** – this is a gradual process of disassociating state-owned enterprises or state-provided services from government control and subsidies and replacing them with market

driven entities. In the context of municipal services, privatization generally implies reducing local government activity within a given sector by: -

- Involving participation from the private sector, or
- Reducing government ownership, through divestiture of enterprises to unregulated private ownership; and commercialization of local government Agencies.

Rondinelli (1990) notes private sector has lower production costs and greater capacity to obtain and maintain capital equipment. The private sector can offer consumers greater choice and provide services more efficiently.

He continues to argue that private sector organizations make decisions more efficiently and expeditiously. They also can cut costs, increase competitiveness and encourage increased productivity. They also can cut costs, increase competitiveness and encourage increased productivity.

Some of the basic modes of privatization include: -

i) **Concessions:** a contractual arrangement whereby a private operator is selected and awarded a license to provide specific services over a discrete period of time in return for negotiated fee. The concession agreement sets out the rights and obligations of the service provider, who generally retains ownership of the principal assets. This method is well suited to enterprises which provide services that are economically and socially important and need significant improvement; are large and usually enjoy a monopoly position, are politically and/or practically difficult to sell and are in need of investment capital; for example trucks and bins.

   BOT, BOO and affermage are examples of concessions

ii) **Management Contract:** A private organization may agree to take over the responsibility for managing a service to specified standards using the staff, equipment, vehicles and buildings of the urban authority set out in the contract.

iii) **Commercialization:** A process in which the city authority forms a wholly owned subsidiary. Shares of the new company are restricted and consumers' representatives, the local government

Rondinelli (1990) notes private sector has lower production costs and greater capacity to obtain and maintain capital equipment. The private sector can offer consumers greater choice and provide services more efficiently.

He continues to argue that private sector organizations make decisions more efficiently and expeditiously. They also can cut costs, increase competitiveness and encourage increased productivity. They also can cut costs, increase competitiveness and encourage increased productivity.

Some of the basic modes of privatization include: -

i) **Concessions:** a contractual arrangement whereby a private operator is selected and awarded a license to provide specific services over a discrete period of time in return for negotiated fee. The concession agreement sets out the rights and obligations of the service provider, who generally retains ownership of the principal assets. This method is well suited to enterprises which provide services that are economically and socially important and need significant improvement; are large and usually enjoy a monopoly position, are politically and/or practically difficult to sell and are in need of investment capital; for example trucks and bins.

BOT, BOO and affermage are examples of concessions

ii) **Management Contract:** A private organization may agree to take over the responsibility for managing a service to specified standards using the staff, equipment, vehicles and buildings of the urban authority set out in the contract.

iii) **Commercialization:** A process in which the city authority forms a wholly owned subsidiary. Shares of the new company are restricted and consumers' representatives, the local government

and other stakeholders make up the board of directors. The ownership of assets, regulation of tariffs and quality control remain at all times vested in the municipal authority. This is especially suitable for managing water supplies.

iv) **Franchise**:a process in which the city authority awards, through competition, a finite-term, zonal monopoly to a private firm for the delivery of service. The private firm pays a license fee to cover the governments' costs of monitoring and recovers earned revenue through direct charges to households and the establishment served. The city authority provides control over the tariff charged to the consumer. This method is suitable for solid waste management.

v) **Private Enterprise/Entrepreneurship**: a mode whereby a city authority freely allows qualified private firm to compete for service delivery. Individual households and establishments make private arrangements with individual firms who compete for business. Under such arrangements, city authorities license, monitor and sanction the private firms. Private firms bill their customers directly. In deciding whether to privatize a specific aspect of its service, an urban authority needs to weigh the risks against the economic benefits of private sector efficiency. Some of the risks include political manipulation, changing environmental regulations, government tariff regulations, currency devaluation, inflation and unclear tax systems.

Table 2.4.shows some of the main institutional options for provision of infrastructure.

Table 2.4 **The main institutional options for provision of infrastructure**

Function	Option A					Option B		Option C	Option D
	Government department	Public enterprise: Traditional	Public enterprise: Corporatized and commercial	Public enterprise: With service contract	Public enterprise: With management contract	Leasing contract	Concession contract	Private (including cooperative) ownership and operation	User or community provision (self-help)
Ownership of assets	Public		Public (majority)			Public (majority)		Private (majority)	Private or in common
Sectoral investment planning, coordination, policy making, regulation	Internal to government	By parent ministry	Parent ministry or separate public authority			Public authority negotiated with private operator		None or public authority	None or public authority
Capital financing (fixed assets)	Government Budget	Subsidies and public loans	Mainly market-based financing			Public	Private operator	Private	Private
Current financing (working capital)	Government budget	Mainly subsidies	Mainly internal revenues			Private operator		Private (government may pay for public service obligations)	Private
Operation and maintenance	Government	Public enterprise		Private operator for specific services	Private operator	Private operator		Private	Private
Collection of tariff revenues	Government	Government or public enterprise	Public enterprise			Private operator		Private	Private
Other characteristics: Managerial authority	Government		Public enterprise		Private operator	Private operator		Private	Private
Bearer of commercial risk	Government		Public enterprise		Mainly public	Private operator		Private	Private
Basis of private party compensation	Not applicable			Fixed fee based on services rendered	Based on services and results	Based on results, net of fee paid by operator for use of existing assets.		Privately determined	Privately determined
Typical Duration	No limit			Fewer than 5 years	About 3-5 years	5-10 years	10-30 years	No limit	No limit

Key: Option A - Public Ownership and Public Operation

Option B - Public Ownership and Private Operation

Option C - Private Ownership and Private Operation

Option D - Community and User Provision

Source: Adapted from World Development Report – 1994

b) **Cooperatives :** These are self governing, voluntary organizations working in partnership with public authorities. They serve the interest of their members.

2.3 Experiences of 'Good Practice' Infrastructure Provision and Management

A few selected examples from various parts of the world are presented to show cases of successful infrastructure provision and management options that have been applied.

2.3.1 Experiences from the West

2.3.1.1 Contracting of Private Companies in Santiago, Chile

A company called the Metropolitan Company for Sanitary Works (EMOS) in the city of Santiago contracts with the private sector for two different kinds of activities: those related to investment and others dealing with maintenance, quality control and general services.

Feasibility studies, design, construction and supervision of works are some of the contracts related to investment. They also include rehabilitation and replacement of facilities. The private sector accounts for about 95 per cent of total investment budget of the company in this area. O & M services relate to maintenance of water treatment. Works and water supply and sewerage networks; water sampling and quality testing, meter reading and replacement, billing, information management, publicity, office cleaning and transportation.

Frequent tasks include leak repairs, repairs to valves and fire hydrants, blockages in sewers and house connections. The contracts also include replacement of pipes that have outlived their usefulness as well as earthworks and road repairs. Contracted

companies are supposed to work 24 hours of the day and 365 days of the year. Contracts are renewed every 2 to 3 years through s system of public and private tendering. The contracts have operated successfully from 1981 generating a great deal of efficiency in service delivery.

The experience of EMOS shows that participation of private sector companies in quantifiable activities and of frequent occurrence provides optimum results. The management flexibility of the private sector is something that can be counted on to ensure public demand satisfaction by avoiding distortions likely to be created by lack of competition (Gidman, 1995).

2.3.1.2 **Solid Waste Management/Environmental Sanitation**

Public-Private Management – El Salvador.

The Municipality of San Salvador, nine municipalities of the Metropolitan Area, members of the private sector, Non – Governmental Organizations (NGOs), community groups and a University developed and implemented an Integrated Solid Waste Management Programme in order to solve critical environmental pollution problems caused by inadequate solid waste management in the Metropolitan Area of San Salvador. The program brought to the country innovative procedures in different steps of the solid waste management: street cleaning, selective collection, separation, compost, recycling, appropriate closing of Marionas' open air dumping site and construction and operation of a new landfill.

Process of association between the public and private partners who include micro enterprises, cooperatives, electricity companies and a high-tech Canadian company were created. The municipality, NGOs, the University and CBOs developed publicity in order to improve collective habits.

Besides the improvement of the environmental quality, the experience allowed to overcome and ameliorate the obsolete institutional, technical, legal and financial mechanisms in terms of solid waste management.

The initiative was among those recognized as a 'Best Practice' by the UNCHS/Habitat in year 2000 (http://best practices.org/).

2.3.2. Experience from Africa

2.3.2.1. Cote d' Ivoire's Experience with a Concession for Water Supply

Concessions (or franchises) as we have already seen are one way to introduce private provision in infrastructure and to stimulate competition for the market. An excellent example of a private company providing public services in Africa is Cote d' Ivoires' SODECI. This is an Ivorian company owned by local interests (52 per cent); Saur; a French water distributor (46 per cent) and the reminder 2 per cent by a government investment fund.

Formed about 40 years ago SODECI now provides water throughout Cote d' Ivoire at rates comparable to state companies in neighbouring countries, but at excellent quality and with very high repayment rates from private consumers (World Bank, 2000).

The 1994 World Development Report notes that since the early 1970s full cost recovery has been the rule, and water sales have fully covered capital and operation and maintenance costs. About 10 years prior to 1994, unaccounted-for water never exceeded 15 per cent and collection from private consumers has never fallen below 98 per cent. There are only four staff per thousand connections, which is a reflection of best practice standards.

SODECI retains part of the rates collected to cover its operation costs, depreciate its assets, extend and rehabilitate distribution networks and pay dividends to shareholders. SODECI's bonds are one of the blue chips on Abidjan's financial market. The company has been paying taxes since its inception as well as dividends to shareholders. Services provided are very close to those of industrialized countries (World Bank, 1994).

2.3.2.2.1 The South African Government's Grant Funded Municipal Infrastructure Programme

Launched in 1996, the South African Municipal Infrastructure Programme (MIP) is one of the largest and most ambitious in the world. Its mission is to ensure that all communities have access to at least a basic level of service.

The aim of programme is to promote five key objectives: -

- Upgrading the living environment,
- Promoting social equity,
- Integrating former apartheid cities and towns,
- Enhancing economic opportunity, and
- Fostering partnership to leverage inputs.

The programme is a partnership between the state, provinces and the municipalities in order to ensure community-driven delivery of services. The programme sought to ensure community participation and structured a constructive interface between communities, municipalities, provincial governments and urban authorities. Communities submit project proposals to their municipality for approval, assistance

and support. The municipality prepares business plans for the projects and submits them to the provincial cabinet for approval, possible additional funding and mobilization of grant funds. Funds for projects that meet certain set criteria are channeled from the nations government to the municipalities who monitor project implementation. 40 per cent of MIP funds had been allocated to water supply, 22 per cent to roads, 17 per cent to sanitation, 6 per cent to storm water drainage, 5 per cent to community facilities and 2 per cent to refuse collection as of March 2000.

Impressive impacts have been reported on the grounds. Improvements to water supply systems have promoted economic activity and diminished the incidence of water-borne diseases. New and upgraded roads have enhanced the development of micro-enterprises and created jobs. Extensive community involvement has been critical to successful project implementation. Communities define priorities, develop plans and elect committees to pay for services increased as the quality of services improved.

By March, 2000, the MIP had implemented 1496 projects for a total expenditure of over US$ 350 million. The MIP funds have provided water supply to 9.3 million rural and urban residents, sanitation to 5.1 million, storm water drainage to 1.7 million, access roads to 3.8 million, community lighting to 1.7 million and solid waste disposal to 0.9 million. MIP was recognized in 1998 as a 'Best Practice" under UNCHS/Habitat Best Practices in Local Leadership Programme (World Bank, 2000)

2.3.3 Experience from Kenya

2.3.3.1. City Garbage Recyclers, Nairobi

The City Garbage Recyclers (CGR) self help group was formed in 1995 by the residents of Maringo Estate in Nairobi to address the problem of poorly disposed waste in the area. The uncollected mountains of domestic waste had become a breeding ground for armful insects and rodents. Other than being an environmental disaster disease outbreak was a constant threat from the garbage. CGR was recognized by the government through formal registration. Its mission is to build the capacity of the community for environmental conservation through waste recycling.

Tones of domestic waste from households of Eastlands area in Nairobi are collected and separated manually into organic and inorganic categories. The organic waste decomposes to make organic fertilizer. Inorganic wastes are sold as raw materials for recycled materials such as polythene bags, plastic containers, metals, glasses and paper. The remaining 25 per cent of the wastes which includes dirty cartons, sisal, paper, thread and clothing are used to make cheap mattresses, as well as energy saving briquettes. The organic fertilizer is sold to local farmers to replenish nutrients to depleted soils. The briquettes are used as an alternative to wood fuel and charcoal and thus saving our natural forests.

Over 300 people living in Eastlands have benefited through the creation of employment opportunities, conservation of natural forests, prevention of air and water borne diseases as well as an improved physical environment. This initiative if replicated in other urban areas/estates will contribute to poverty eradication, reduce unemployment as well as save the City Council of Nairobi its meagre resources.

CGR case has shown that community involvement in waste – management is a sustainable way of keeping cities like Nairobi clean and environmentally friendly. CGR was voted as one of the 'Best Practices' in year 2000 under the UNCHS/Habitat Best Practices Programme (http.//www/bestpractices.org/)

2.3.3.2 Partnership between the Council of Nairobi and the Nairobi Central Business District Association (NCBDA)

NCBDA was formed in 1997 to agitate for better services from the City Council of Nairobi. Through partnership with the NCC the lobby group has successfully rehabilitated a number of public toilets in the Central Business District of the capital city. Among the hitherto unusable but now very pleasant public toilets that have been rehabilitated include one along Accra road, another one on Haile Selassie Avenue near the Wakulima market and one on Koinange Street. To sustain the operations of the toilets, users are charged a small user fee. NCBDA has also placed refuse bins in various parts of the CBD to assist the NCC in its solid management efforts.

2.4 Policy Framework and implications in Kenya

Guidelines and policies related to urban infrastructure provision and management in Kenya are contained in various Acts of Parliament, Sessional Papers and National Development Plans. Some of the Acts of Parliament with a bearing an infrastructure includes.

2.4.1. The Local Government Act – Chapter 265

The Local Government Act is the principal law governing the activities of local authorities in Kenya since independence. Local authorities operated under the Local Government Regulations (1963) until 1977 when these regulations were promulgated

into a fully fledged Local Government Act (LGA) with retrospective effect from 30th April 1963. The main stated purpose of the Act is to provide for the establishment of activities for local government that largely impact on the type and quality of services rendered by local authorities. It also defines the relationship between local government and the central government (Wamwangi, 2003).

Some of the section of the Act pertinent to infrastructure include: -

a) Section 168-176 contains the power to undertake sewerage works and provisions related to the same.

Section 168 specifically states that every Municipal Council, Town Council or an Urban Council, may establish and maintain sewerage works within or without its area.Section 176(a) gives powers to every municipal council, town council or an urban area to generally regulate sewerage and drainage while section 176 (e) gives power to fix charges for the use of Local Authorities' drains, sewers and sewerage works.

b) Section 177 deals with powers vested on Local Authorities in relation to provision of housing.

Section 177 (a) allows a council to lay out building plots or otherwise subdivide any land acquired or appropriated by it, whether within or without its area, for the purpose of housing schemes for the inhabitants of the area.

Section 178-180 deals with powers related to water

Section 178(1)) permits Councils to undertake the supply of, and establish, acquire and maintain works for the supply of water within its area, and with the consent of any other local authority within the area of that local authority.

Section 178 (2) gives guidelines on how Councils can make by-laws with regard to water under regulations provided in the Water Act Cap 372, it states that: - '*without prejudice to its power to make by-laws under the Act; a Municipal Council, Town Council or an Urban or Area Council, may make by-laws under this Act in respect of and matter upon which, and to the extent of which, a water undertaker may make regulations under the Water Act'*.

c) Section 181 (1) gives provision for local authorities to undertake the supply of, establish, acquire and maintain works for the supply of electricity, light, heat or power with its area or with the consent of any Local Authority subject to the Electric Power Act.

d) Section 182 gives Councils control of all public streets in their area and also vests the Local Authority in trust to keep and maintain the same for use and benefit of the public.

Section 184, 186,192, 193 and 194 provides further provisions related to road functions.

2.4.2. The Physical Planning Act, (PPA No. 6 of 1996), Cap 286

The Physical Planning Act, 1996 is an Act of parliament to provide for the preparation and implementation of physical development plans and for connected purposes. The act and other relevant regulations were published under various legal notices in the Kenya Gazette Supplement No. 53 of 2nd October 1998. Consequently the Physical Panning Act, 1996 (Cap 286) became operational in 1998 despite its presidential assent on 24th October 1996.

Section 29 of the Act defines the powers bestowed on local Authorities. Under the provision of the Act, each local authority shall have the power;

a) To publish or control the use of development of land and buildings in the interests
of proper and orderly development of its area,

b) To control or prohibit the sub division of land or existing plots into smaller areas,

c) To consider and approve all development applications and grant all development permissions,

d) To ensure the proper execution and implementation of approved physical development plans,

e) To formulate by-laws to regulate zoning in respect of use and density of development and

f) To reserve and maintain all the land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical development plan.

Section 30 states that no person shall carry out development within the area of a local authority without development permission granted by the local authority.

The Act also recommends that local authorities facilitate the establishment of liaison committees as a way of conflict resolution. It also mandates local authorities to facilitate involvement of the community and other stakeholders in the planning process by encouraging participation.

2.4.3 The Public Health Act Chapter 242

The Public Health Act, Cap 242 commenced on 6th September, 1921. This Act of Parliament makes provision for securing and maintaining health.

Section 116 confers the duty and maintenance of cleanliness and prevention of nuisances to local authorities. Such nuisances are described in section 118 of the Act and includes among others: -

- Any street, road or part thereof so constructed as in the opinion of the Medical Officer of Health (MOH) to be offensive or injurious or dangerous to health.
- Any source of water supply which in the opinion of the MOH is polluted or otherwise liable to render it dangerous to health.
- Any dwelling or premises, which is so overcrowded as to be dangerous to health.

2.4.4 The Water Act-Chapter 372 and New Act, 2002

The Water Act has a commencement date of fifth May 1952. It has been amended several times since then, the latest being in 2002.

This is an Act of Parliament to make better provision for the conservation, control, apportionment and use of the water resources in Kenya, and for purposes incidental thereto and connected therewith.

Since 19 (1) calls for the establishment of the Water Resources Authority to exercise and perform such duties as may be imposed upon it by the Act. The composition of the Authority shall include among others one person appointed by ministers from amongst persons nominated by the City Council of Nairobi.

Under the Water Act, Cap 372 the functions of policy, regulation and provision were lumped in the Ministry of Water. Under this Act, local authorities have been providing water services under powers delegated from the Water Minister.

Conflict of interest has been witnessed in this case as water services have been operated at part of a wider range of local authority activities and businesses. There has been only minimal plough tack into maintenance and expansion.

The new institutions, proposed under the New Water Act 2002, to bring new life into the water sector are; -

- Water Resources Management authority – to spearhead restoration of degraded water catchments and depleted ground aquifers.
- Water Services regulatory Board – to license, regulate and supervise service boards, thus ensuring access and expansion, quality, standards and service affordability.
- Water Trust Fund –to be a financing instrument for expanding services particularly to the poor.
- Water Services Boards – the institutions are expected to hold the license and legal responsibility for water provision in their areas of jurisdiction.

- Water Appeals Boards – to act as arbitrator of disputes that may arise from time to time between the regulator, the water services boards, service providers and service consumers.

The Ministry's role will revert to water policy formulation and direction (Stower, 2003). The Water Act 2002 requires Councils to privatize water management.

2.4.5. The Kenya Roads Board Act, 1999

This is an Act of parliament to provide for the establishment; powers and functions of the Kenya Roads Board and for connected purposes.

Section 6 (I) defines the object and the purpose of the Board as that of overseeing the road network in Kenya, to coordinate its development, rehabilitation and maintenance and to act as principal adviser to Government on all maters related thereto.

The Board shall: -

a) Coordinate the implementation of all policies related to the development, rehabilitation and maintenance of all road networks;

b) Coordinate the development, rehabilitation and maintenance of the road network with a view to achieving efficiency, cost effectiveness and safety;

c) Administer the funds derived from the fuel levy and any other funds that may accrue from it;

d) Determine the allocation of financial resources from the fund or any other source available to the board required by road agencies for the development, rehabilitation and maintenance of the road network to

ensure that the allocation of funds is pegged to specific categories of roads;

e) Monitor the operations of road agencies ;

f) Recommend to the government appropriate levels of road user charges, fines, penalties, levies e.t.c.

2.4.6. The Environmental Management and Coordination Act (EMCA), (Act No. 8 of 1999)

This Environmental law passed by the Kenya parliament in 1999 is the principal legislation on matters of the environment. It was adopted by Parliament in December 1999 and received presidential assent on 6th January 2000. Its overall objective is to provide an appropriate legal and institutional framework for the management of the environment and to meet the requirement of sustainable use of natural resources.

The EMCA has for the first time in Kenya's legislative history provided that everyone in Kenya is entitled to a clean and health environment and has s duty to safeguard and enhance the environment, (Section 3 (1)). The right to a clean and healthy environment means that every person is entitled to have access to and enjoy the various elements of the environment for recreational, educational, health, spiritual and cultural purposes.

In addition to giving rights, the Act also confers duties. At least four duties are identified. The first is to refrain from activities that are injurious to the environment or any component of it. The second is to perform specific tasks on a regular basis to ensure that all survive, especially the human species. The fourth duty is to police,

supervise, monitor and evaluate the performance of individuals and all agencies on which the first three or any other duties are imposed (ILEG, 2003).

Section 3 (c) requires that any ongoing activity be subjected to an environmental audit while section 3 (a) compels persons responsible for environmental degradation to restore the degraded environment as far as practicable to its immediate condition prior to the damage and 3 (e) to provide compensation for any victim for pollution and the cost of beneficial uses lost as a result of an act of pollution and other losses that are connected with or incidental to the foregoing.

2.4.7 The Local Authorities Transfer Fund Act (LATF), No. 8 of 1998

This is an Act of Parliament for the establishment of a Local Authorities Transfer Fund (LATF), to provide for the sources, purposes and the administration of the fund and for matters incidental thereto.

The object and purpose of the fund shall be to facilitate the disbursement of all the funds specified under section 5 to local authorities to supplement financing of the services they are required to provide under the Local Government Act, Cap 265. The funds are specifically to be used to improve service delivery to the public; to improve financial management and accounting and to reduce local debts.

Section 5 (1) sets the initial capital of the fund at 5 per cent of all tax collected under the Income Tax Act. LATF is a 'block grant' available to all 175 local authorities in Kenya. LATF monies are to be combined with local own source revenues to implement local priorities as contained in the approved council budget. LATF mandates that each local budget must meet certain criteria for release of LATF funding.

a) Council budgets should (1) not spend more than 60 per cent of total expenditures on personnel and (2) allocate a minimum amount to the capital budget (equal to the equivalent of 50 per cent of the LATF service delivery amount).

b) Councils must confirm that statutory obligations are being paid on a current basis from 1st July 2000.

2.4.8 The Building Code

The building code gives guidelines with regard to development of building within the jurisdiction of a local authority.

In Kenya, the building code encompasses: -

a) The Local and Government (adaptive By-Laws) order of 1968 or Grade I By-Laws and

b) The Local Government (adaptive By-Laws – Grade II By Laws) order of 1968.

These are made under the provision conferred by section 210 of the Local Government Act. They deal with minimum specifications such as spaces about building, building lines, individual plot accesses, minimum plot sizes and plot coverages.

2.4.9. The Local Government Loans Act, Chapter 270

This is an Act of Parliament to facilitate the borrowing by Local Government Authorities of money for capital development, to establish a Local Government Loans Authority and a Fund for that purpose and for purposes connected therewith. It was established in 1953. Its main purpose therefore is to lend funds to local Authorities (LAs) for infrastructural development programme and projects.

2.4.10 Thee Traffic Act – Chapter 403

This Act came into force on 1st January 1954. It is an Act of Parliament that consolidates the law relating to traffic on the roads.

2.5 Institutional and Management Systems in Kenya

Several government and non-government agencies are involved in the provision and management of infrastructure in urban areas. These include:

2.5.1. Government Agencies

2.5.1.1. Ministry of Local Government

As per the Presidential Circular No. 1 of 1998, the following are the policy mandate of the Ministry of Local Government: -

- Articulation of sound Local Government Policies
- Ensuring local authority's compliance with the Local Government Act, Cap 265
- Facilitating local authority's compliance with the various legislation e.g. LGA, Cap 265; Valuation for Rating Act Cap 267; Rating Act, Cap 266; PPA, Cap 286 among others
- Regulating the borrowing and lending by LAs
- Supervising the management of pension funds for LA employees
- Facilitating human resources development for Ministry and LA personnel
- Promoting urban development strategies that are consistent with natural development policies

The overall goal of the ministry of Local Authorities is to promote orderly development, growth and management of LAs into viable, efficient and effective institutions of local governance, service provision and economic growth. The Ministry is therefore responsible for the development and management of urban infrastructure policies. This is performed by the Urban Development Department (U.D.D) of the Ministry.

2.5.1.2. Ministry of Lands

This Ministry has responsibility for implementing Government urban land policies and the preparation of national, regional, district and urban physical development plans. All these activities influence land use and hence urban infrastructure.

2.5.1.3. Ministry of Transport

The Ministry is responsible for the registration, licensing and regulation of all vehicles and laws pertaining to their use. It is directly involved in transport operations through the Kenya Railways.

Telkom, the parastatal responsible for telecommunication falls under this Ministry.

2.5.1.4. Ministry of Energy

The overall policy objective of the Ministry of Energy is to explore and exploit energy resources while developing them in a sustainable manner and most technically efficient manner with a view to achieving self-sufficiency in energy supply to meet increasing demand.

The Ministry of Energy is charged with the responsibility of formulating the National Energy Policy and the coordination of energy related institutions. These include,

among others, the Kenya power and Lighting Company, the Kenya Electricity Generating Company and the Energy Regulatory Board.

2.5.1.5. Ministry of Roads

The Ministry has responsibility for the planning, design, construction and maintenance of the national road network through the Kenya Roads Board.

2.5.1.6. Ministry of Water Resources

This has responsibility for all policy mattes related to water resources development and utilization. They include: -

- Planning, assessment, conservation, protection and management of water resources,
- Administration of the Water Act,
- Control of water catchment areas
- Water development and management of water supplies
- Water quality and pollution control
- Training for the water sector
- Coordination and regulation of water sector actors.

2.5.1.7 Ministry of Environment and Natural Resources

The ministry has responsibility for all policy matters relating to the environment. The National Environment Management Authority (NEMA) responsible for overseeing the implementation of the Environmental Management and coordination Act, falls under the ministry.

2.5.1.8 Office of the President (OP)

The Kenya police who are responsible for the enforcement of traffic regulation fall under the OP. The El-Nino Roads Programme also falls under the OP.

2.5.1.9 Ministry of Finance

The ministry guarantees all loans borrowed by local authorities for capital development through the Local Government Loans Authority established under the provisions of the Local Government Loans Act, Cap 270 of the laws of Kenya.

2.5.1.10. City Council of Nairobi (N.C.C.)

The City Engineer's Department of N.C.C. is responsible for construction and maintenance of the city's road network, street lighting and traffic management.

The Transport Unit of the City Engineer's Department is responsible for transportation planning, traffic management, street lighting, road safety and parking. The City Inspectorate Department is responsible for enforcement of parking regulations while the City Treasurer's Department collects parking revenue.

Other departments of N.C.C. responsible for infrastructure include the City Planning Department which is charged with the responsibility of the overall urban planning of the city, the Department of Environment which is responsible for solid waste management and the Housing Development Department which is responsible for the management of site and service schemes in the city.

2.5.1.11. Other Local Authorities

Other local Authorities have similar responsibilities to those of Nairobi. This is especially so for Mombasa, Kisumu, Nakuru, Eldoret, Thika, Nyeri and Kitale.

2.5.2. Private Sector

These include bodies in various sectors of infrastructure. In these may include bus and matatu owners for example, Kenya Bus Service, refuse handlers like Bins Limited; and Contractors.

2.5.3 Non Governmental Organizations

These includes organizations like the Nairobi Central Business District Association (NCBDA) who are active in the solid waste management and sanitation sector.

2.5.4 The Informal Sector

These includes for example small scale contractors responsible for construction and maintenance of works like storm water drainage and scavengers who collect, sort and dispose of solid waste.

2.5.5 External Support Agencies (ESAs)

These include both bilateral and multilateral agencies. They are mainly involved in funding infrastructure development. They include among others, the World Bank and its affiliates; USAID, AFD, GTZ, JICA, DFID, SIDA, UN-HABITAT and EEC.

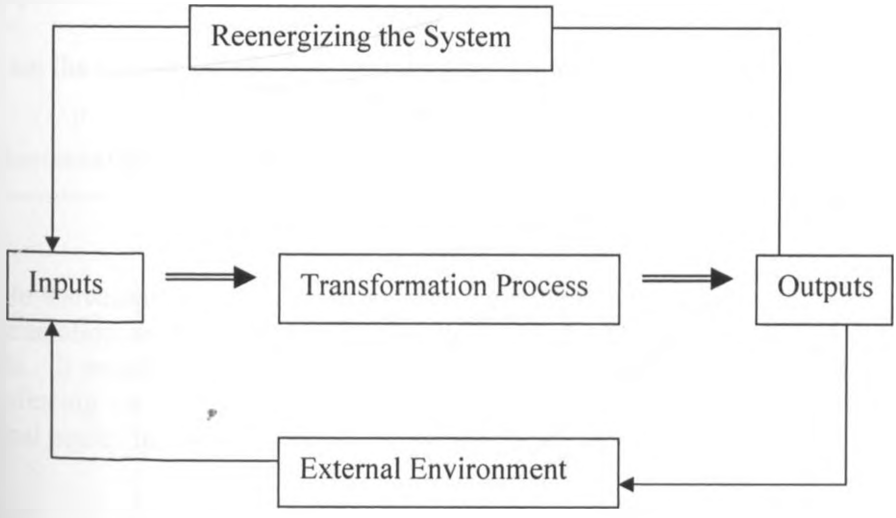
2.6. Conceptual Framework for Urban Infrastructure Provision and Management

From the literature reviewed on urban infrastructure provision and management it has emerged that the task is wide and complex. An understanding of the inputs and the transformation processes required to produce the desired outputs is essential. Aligula (1999) gives an insight into the urban water infrastructure services delivery and management process. Schubeler (1996) presents a model for solid waste management in low income countries. Koontz and Weihrich (1994) helps in understanding the input – outputs open-system model (figure 2.1) which is further reinforced by Rasmussen (1987).

Aligula observes that there is general lack of a strategic orientation in the urban water service delivery system. This is caused by number of factors which include an inappropriate legal framework, complex and uncoordinated planning legislation; lack of political accountability by LAs, uncoordinated institutional framework, multiple planning standards with inadequate legal backing, among others. He recommends reforms in the sector to be guided by among others, increased application of public – private partnerships, corporatization of the local government processes, introduction of open and transparent processes and mechanisms and enhanced stakeholder participation.

The open system model of management notes that an organization or an enterprise does not exist in a vacuum but includes interactions between the organization and its external environment. The external environment includes political, economic, socio-cultural, legal, technological and educational aspects. All these have a bearing in the transformation process and the final outputs.

Fig: 2.1: Input – Output Model



Source: (Koontz and Weihrich, 1994)

In conceptualizing the stakeholders it is necessary to do an analysis to answer questions such as:

- Who depends on the project?
- Who are interested in the outcome of the project?
- Who will influence the project?
- Who will be affected by the project?
- Who will work against the project?

The conceptual framework envisioned below is modeled to answer the following questions:

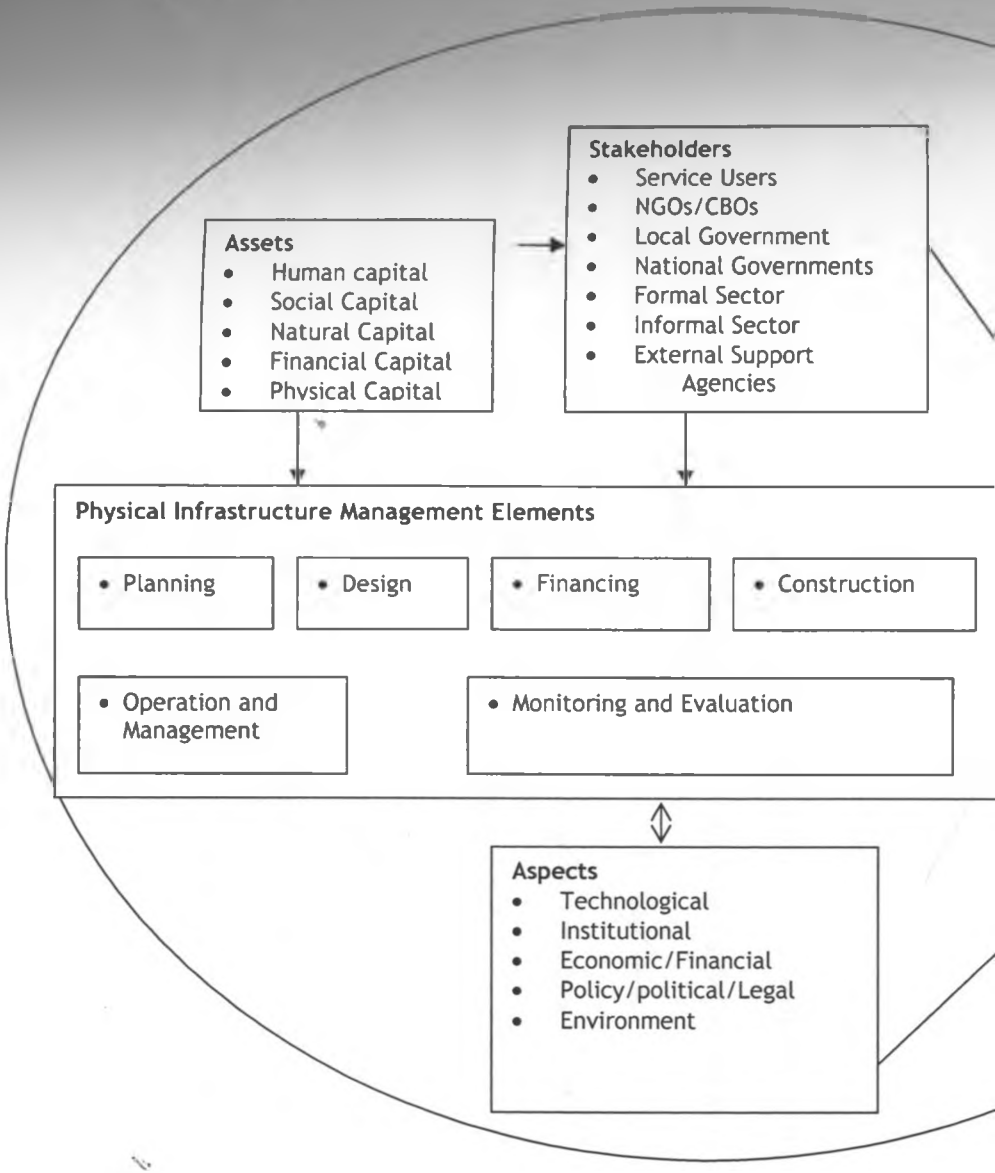
- What is involved in the management of urban road infrastructure?
- Who are the actors in the management of urban road infrastructure?
- What assets are available to these actors to be used to manage urban road infrastructure?
- What are the strategies available to transform the inputs in the form of assets into infrastructure services?
- What aspects are likely to influence or affect the transformation process?
- Which are the desired outputs for sustainable urban infrastructure services?

Box 2.1: Sustainable Development

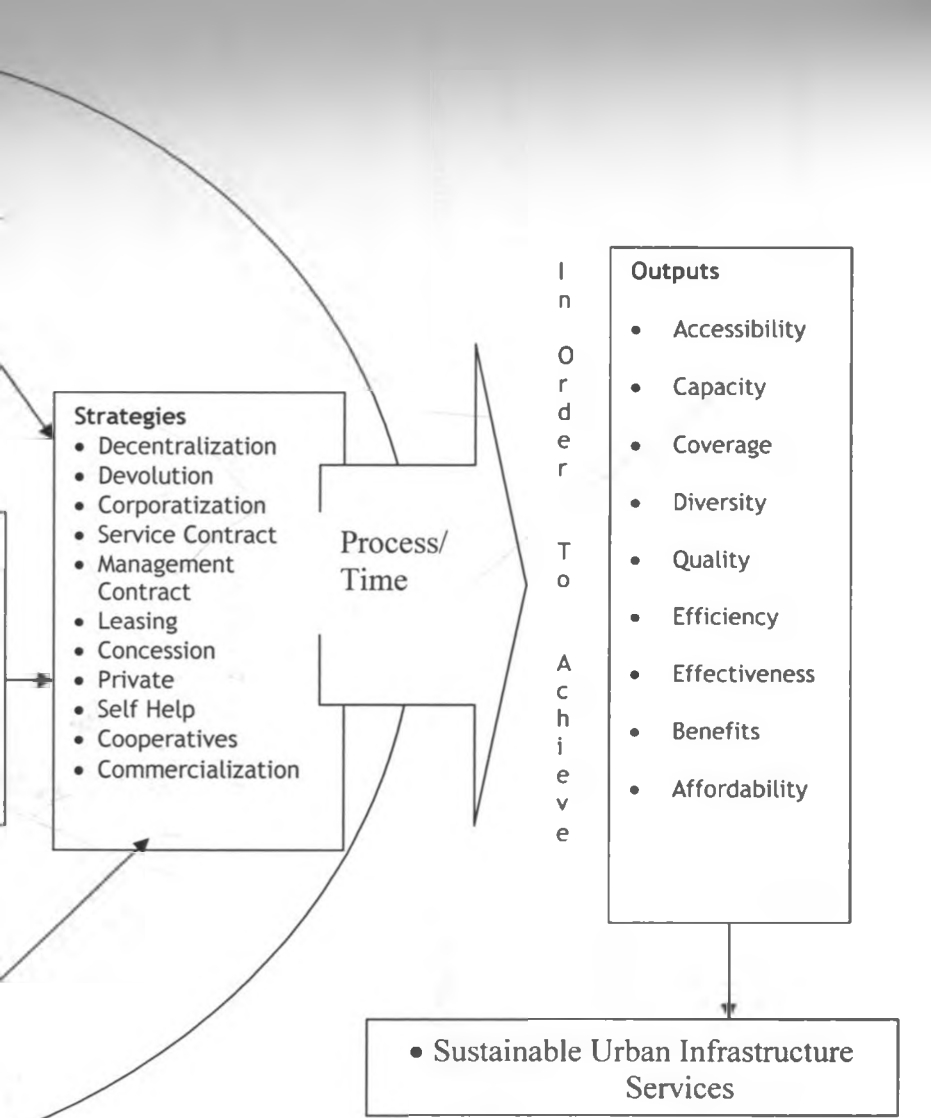
Sustainable Development is defined as the development that meets the needs of the present generation without comprising the ability of the future generation to meet their own needs. It entails the integration of economic, social and environmental objectives, while conferring on society the obligation to uphold both intra-generational and inter-generational equity in pursuit of development needs.

Source: (UNEP 2002)

Fig 2.2: Conceptual Framework for Management of Urban Road Infrastructure



Source: (Author's Construct, 2008)


Strategies
• Decentralization
• Devolution
• Corporatization
• Service Contract
• Management Contract
• Leasing
• Concession
• Private
• Self Help
• Cooperatives
• Commercialization
Process/ Time
In Order To Achieve
Outputs
• Accessibility
• Capacity
• Coverage
• Diversity
• Quality
• Efficiency
• Effectiveness
• Benefits
• Affordability
• Sustainable Urban Infrastructure Services

CHAPTER THREE: BACKGROUND INFORMATION ON THE STUDY AREA

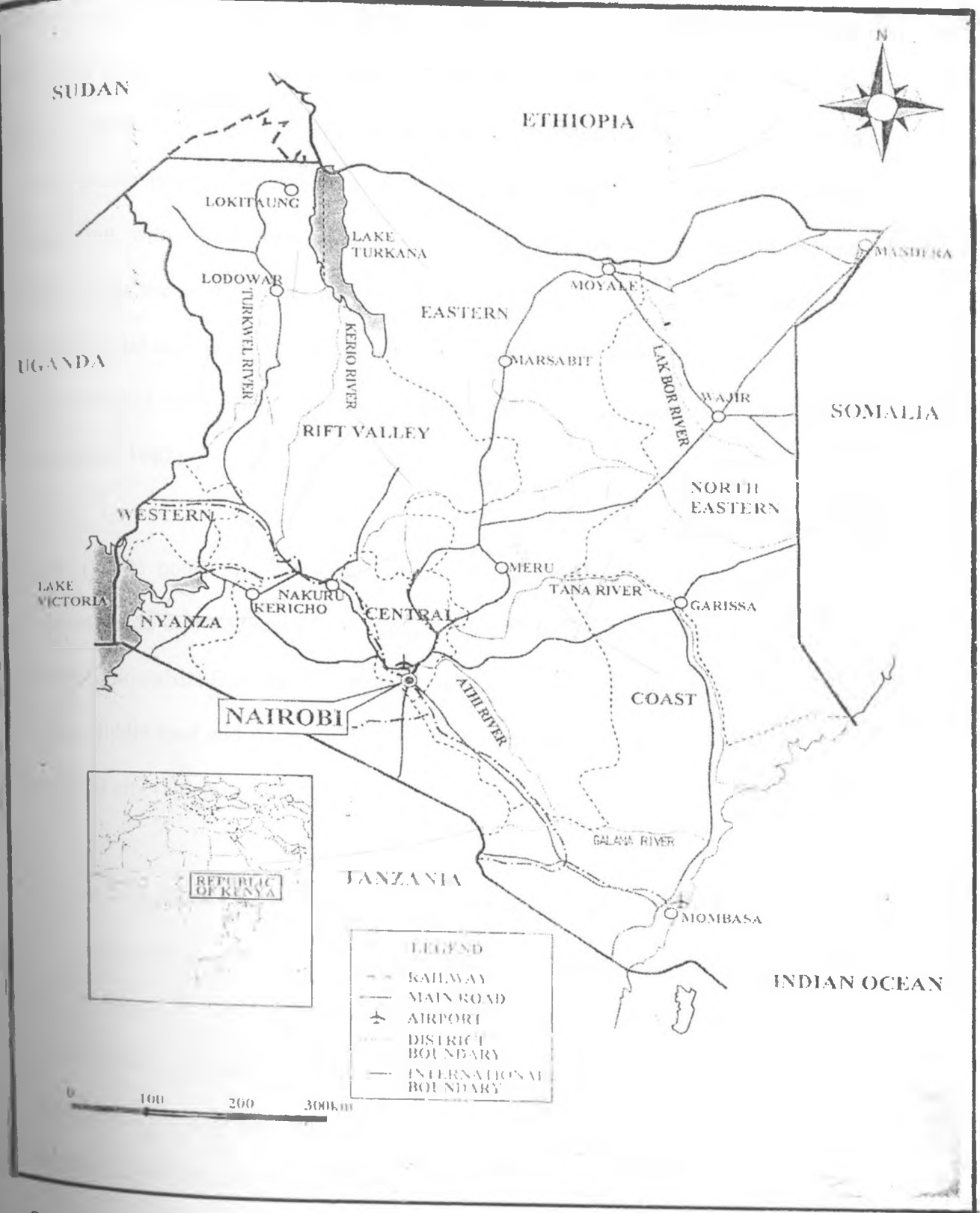
3.1 Historical Development of Nairobi

The city of Nairobi, located at an altitude of 1674 m and on latitude 01^0 17 S and longitude 36^0 50 E, is an example of an urban area in a developing country. Its location, state and condition is determined largely by its political and economic history (Ondiege, 1981; Ismail, 1982; Shihembetsa 1989).

Ndegwa (2002) notes that the strategic importance of Nairobi was first realized by the Maasai who used to water their animals from the river 'Enkare Nairobi', meaning 'the stream of the cool waters'. In 1898 the British government who had colonized Kenya decided to establish a railway depot for the Kenya – Uganda railway at the site. Situated roughly midway between Mombasa and Port Florence (now Kisumu) and at an altitude of 1500 feet above sea level the site ensures a comparatively salubrious climate; there was ample ground for all requirements and excellent sites for quarters of officers and subordinates. The site also had a fairly good supply of water. In July 1899 the railway company moved its headquarters from Mombasa to Nairobi. In the same year the Ukamba Province – which included Nairobi transferred the provincial headquarters from its earlier location of Machakos to the new railway town (Ndegwa, 2002).

Thus Nairobi earliest history is that of a railway town. It was planned to be a railway town for Europeans with a mixed European and Asian trading post. It was however deliberately located near a densely populated rural African area with a view of accessing cheap labour (Ismail, 1982).

Map 3.1: Nairobi in the Regional Setting



Source: (GoK, 2003)

Nairobi was granted the status of township in 1903. In 1906 the original railway depot and camp had mushroomed to a town of 11,000 people. In 1908, Nairobi became the official capital of the Kenya protectorate and was granted Municipality status in 1919. In 1927 a settler plan for Nairobi was sponsored which emphasized residential zoning strategy but with racial segregation. The planning of residential and commercial functions plus the laying out of roads was done to benefit the upper class. The upper class residential and commercial areas were laid out in the best areas available in Nairobi. Roads were laid out in such a way as to separate different races and classes from each other (Ismail, 1982)

Ndegwa (2002) notes that the settler's town of the 1920's and 1930's acquired an international role in the advent of the Second World War. It became the headquarters of the British colonialists East Africa command and the base of East African troops active in Ethiopia, Middle East and Asia. After the war, Nairobi had acquired a new status as an international city (Ndegwa, 2002)

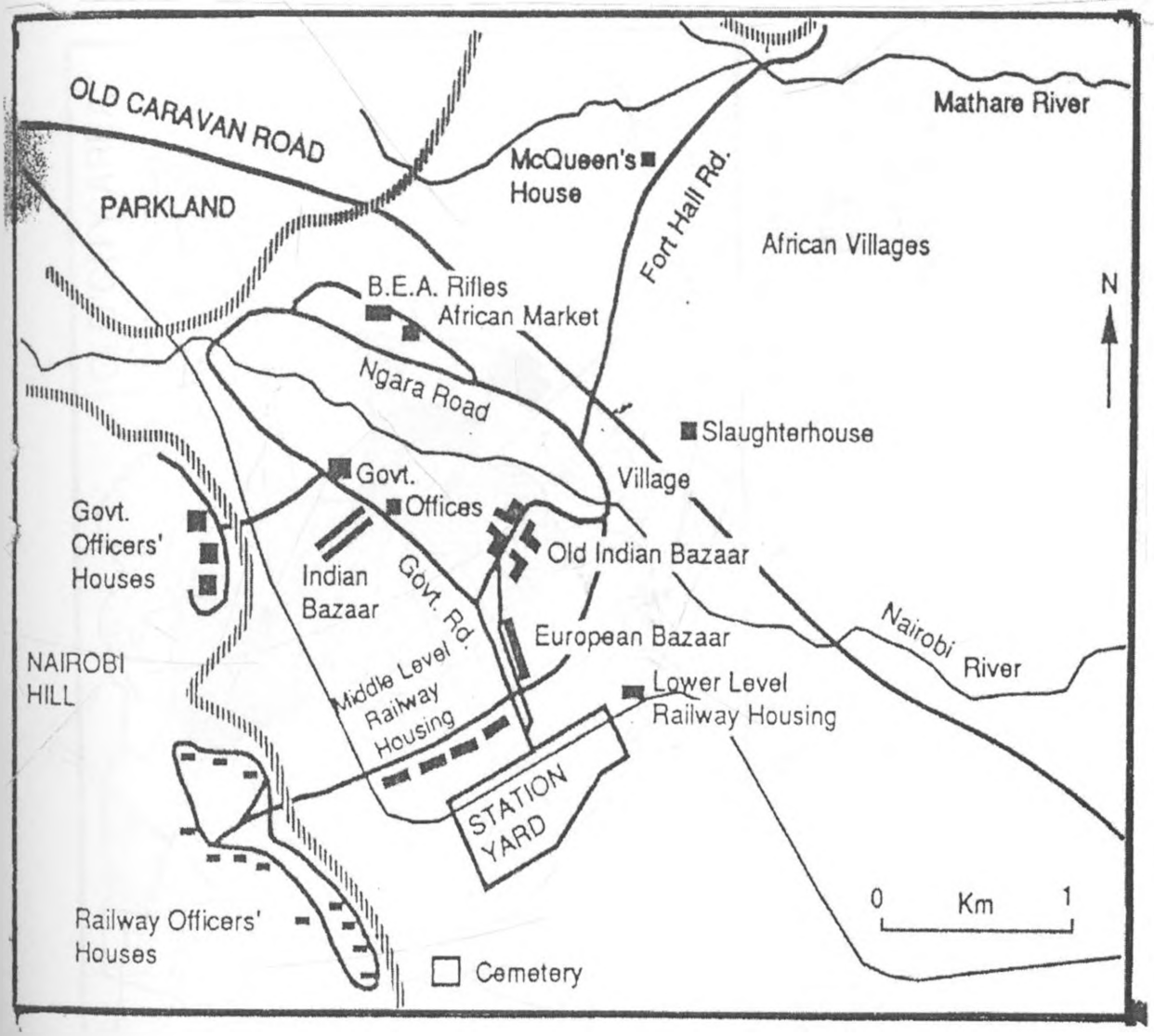
A master plan of Nairobi as a "colonial capital" was prepared in 1948. It was conceived as a key plan to the general physical, economic and social development of Nairobi over the next 25 years. It contained proposals for zoning of residential, industrial and other use. The Garden City planning strategy of dividing residential areas into neighbourhood units was applied. The present layout of both the industrial Area and the road network is attributed to the 1948 master plan.

At independence, Nairobi was not only the capital of the nation but also its most modernized, most urbanized and most industrialized centre. City boundaries were expanded in 1963 from the initial 90 square kilometers to the current 690 square kilometers. This was to provide adequate land for future expansion for both residential and commercial use and to absorb peri- urban settlements. By 1967 the City of Nairobi had started experiencing problems, which included water shortages, inadequate road system and acute shortage of housing.

In 1970, the Nairobi Urban Study Group (NUSG) was formed to carry out necessary studies and to formulate a strategy for the future growth of Nairobi. This culminated in the Nairobi Metropolitan Growth Strategy (NMGS). The NMGS was funded by the NCC, the Kenya Government and the United Nations. The NUSG recommended among others, the intensification of low cost housing construction; the recognition of the need to initiate site and service projects, improvement and upgrading of existing slum settlements and provision of basic infrastructure services in these areas including piped water, sewerage and roads with minimum acceptable standards, including murram roads (NCC, 1973).

Despite the noble recommendations the NUSG perpetuated the segregation by class policies of other earlier plans. The NMGS expired in the year 2000. The process of enacting the Nairobi Metropolitan Growth and Management Strategy to the year 2030 has already started. The expiry of the 1973 NMGS justifies the carrying out of this research whose results could be a useful input into the new envisaged plan.

Map 3.2: Nairobi 1903

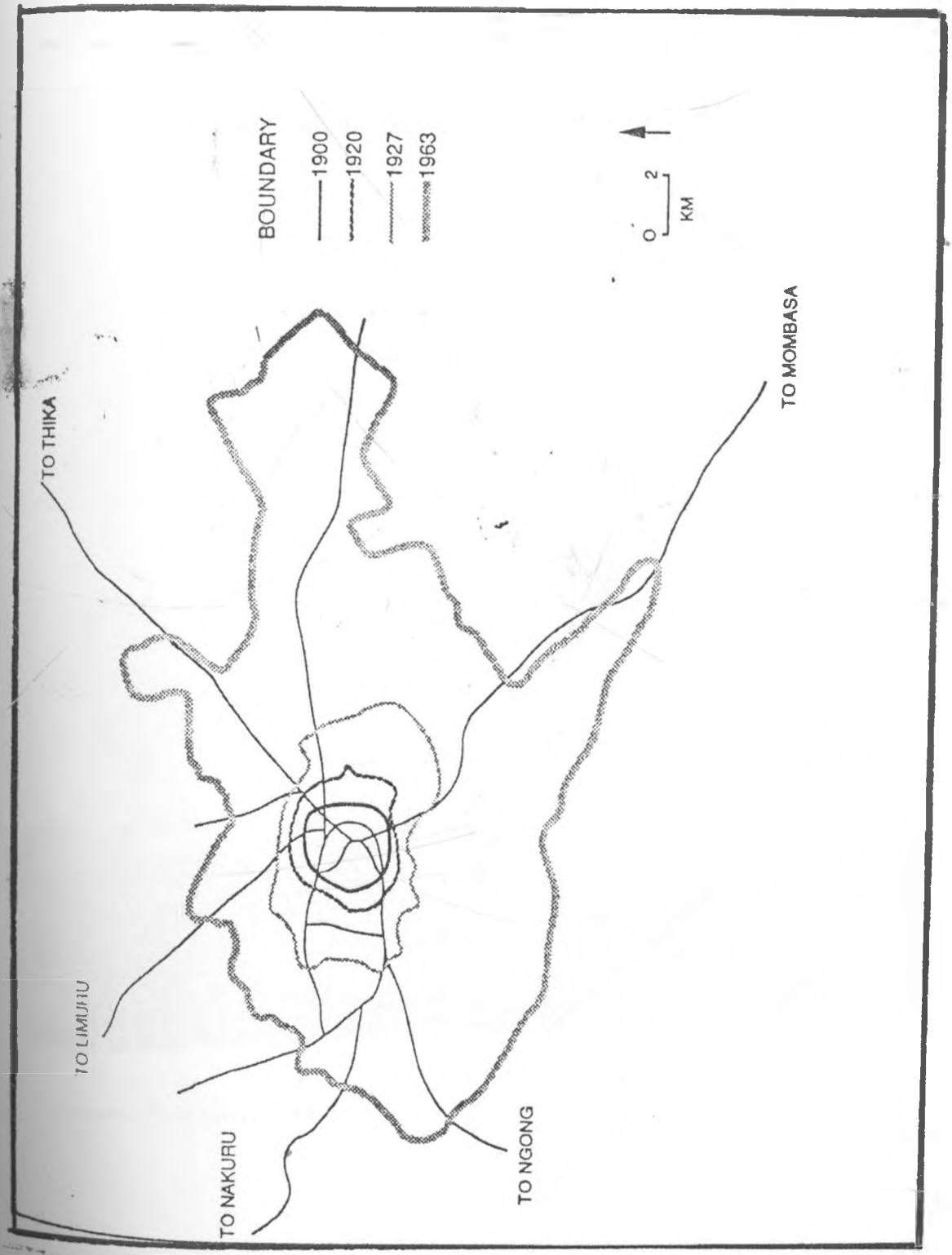


Source: (Malombe, 1990)

Map 3.3: Land Use in Nairobi Municipality, 1939

Source: (Kingoriah 1980, 224)

Map 3.4: Nairobi Boundary Changes Between 1900 and 1963



Source: (Malombe, 1990)

Plate 3.1: Nairobi Central Business District 2008

Source: (Field Survey, 2008)

3.2 Development of Dandora Site and Service Scheme

3.2.1 Urban Housing Strategies from 1960s to date

Different approaches have been adopted the world over from the 1960s to date in the provision of urban housing. The 1960s witnessed mostly public housing programmes being undertaken by the local and national governments. At independence in 1963, the Kenya Government was the main house provider in Nairobi. It provided especially low income housing with over subsidized rental housing schemes while demolishing informally built settlements (Mitullah, 1995).

The shortcomings of the public housing approach were that only very few governments had adequate resources to match the increasing housing needs; rising cost of public housing meant that public housing always missed the target population and the few housing finance institutions available then could hardly cope with the demand for housing loan (UNHCS, 2001).

Here in Kenya, most of the houses are now in deplorable conditions as the local authorities hardly maintain them due to lack of funds. They also occupy prime land in most urban centres and huge sums of money (as loans) are still due to the National Housing Corporation (NHC). Examples of these estates include Kaloleni, Kariokor flats and shauri Moyo in Nairobi.

The 1970s witnessed the site and service approach where sites were made available with basic amenities in place. These included infrastructural services like water, roads and sewers and 'starter' units consisting of one room/water closet/bathroom etc. The

advantage to this approach was that available public funds could be stretched to benefit many more households, it allowed for greater flexibility in building and construction could be phased according to capacity of thee beneficiary.

The disadvantages of this approach were that it presupposed that there would be abundant supply of public land mostly through private land acquisition and also presupposed availability of technical advice to project beneficiaries. Many households exhausted their savings/earnings before completion and thus ran into debts they could not repay. Examples of sites developed under this approach included Dandora, Mathare Valley North and Kayole in Nairobi; Miritini and Mikindani in Mombasa and Migosi in Kisumu. Others include Racetrack in Nakuru, Kiawara in Nyeri and Kipkaren in Eldoret (Rasmussen, 1987; Kiamba,1989; UNHCS 2001).

The late 1970s saw the beginning of upgrading schemes. Most governments started to invest the slum and squatter upgrading mainly with funds from the urban lending program of the World Bank (UNHCS, 2001). The approach made significant positive impact in basic services and general living conditions in many of the areas where it was applied. It was also a recognition of the necessity to ensure security of tenure for residents of these settlements. In Kenya settlements upgrading has been carried out in Mombasa (Chaani and Mikindani), Kisumu (Manyatta), Eldoret, Kitale, Nakuru, Nyeri and Thika. Mathare 4 A in Nairobi is a more recent example.

In the 1980s and 1990s the enabling approach was adopted by most governments. The thrust of the approach was to utilize the full potential and resources of all actors – NGOs, CBOs, LAs and the private sector, in shelter production and improvement process so that people would be given the opportunity to improve their housing conditions according to

needs and priorities that they themselves define. Governments were to act merely as facilitators or enablers,. (UNHCS, 2001).

The enabling approach continues to date. However, from the year 2000 the main campaign internationally has been the security of land tenure (SOT). SOT is seen as a prerequisite to socio-economic development.

Current initiatives in Nairobi include slum upgrading in Kibera, a GOK/UNHABITAT Citywide Slum Upgrading Initiative co-funded by the Cities Alliance.

3.2.2 Historical Background of Site and Service Schemes in Kenya

Site and Services experience in Kenya dates as far back as 1923 when the first site and services projects in Nairobi was declared an official African location to accommodate the migrant population in Nairobi. In 1954 Kariobangi in Nairobi was suggested as site and services project to solve the problem of illegal squatting. It was ten years later in 1964 however, when the Kariobangi project was implemented. After 1964, migration to urban areas continued to increase rapidly (Kruijff, 1980).

By the early 1970s traffic congestion in Nairobi and the need for planning for housing and other amenities were starting to show concern. As a result technical officers of NCC were asked to give an outline of the future problem of NCC administration at a World Bank and International Monetary Fund (I.M.F) meeting held in Nairobi in 1973. This culminated in the formation of the Nairobi Urban Study Group (NUSG) with the full support of the then World Bank President, Mr. Robert MacNamara. One of the outcomes of the NUSG was the recommendation for intensification of low cost housing construction, mainly through site and services projects.

Acceptance of the site and services concept in Kenya was noted in the Development Plan 1970 – 74 thus:

"These schemes will be a significant part of the housing programme in urban areas. If no alternatives are available, the lowest income families will build the temporary houses they need anyway, as witnessed by the existence of large and expanding illegal squatter areas near the urban centres. It will be the responsibility of the local authorities and N.H.C to ensure that this activity is channeled into proper self-help schemes on serviced sites, lest the task of removing them or providing them with services later on becoming a grave problem" (GoK, 1970).

The 1984 – 1988 Development Plan re-emphasized the role of site and services schemes, as part of government's policy on urban low cost housing thus:

"Site and services projects will be continued. They are those in which residential plots or land are provided with basic services like water, sanitation, roads, surface drainage, street lighting and allocated to eligible applicants so that they can gradually develop the houses with permanent materials over a period of time using self-help efforts. Materials loan and technical assistance are offered to plot allottees (GoK, 1984)."

Site and service schemes are to be found in many different urban areas all over the country. They differ in the size of the Schemes, from a low of 30 plots to a high of 6,000 plots (Malombe, 1990).

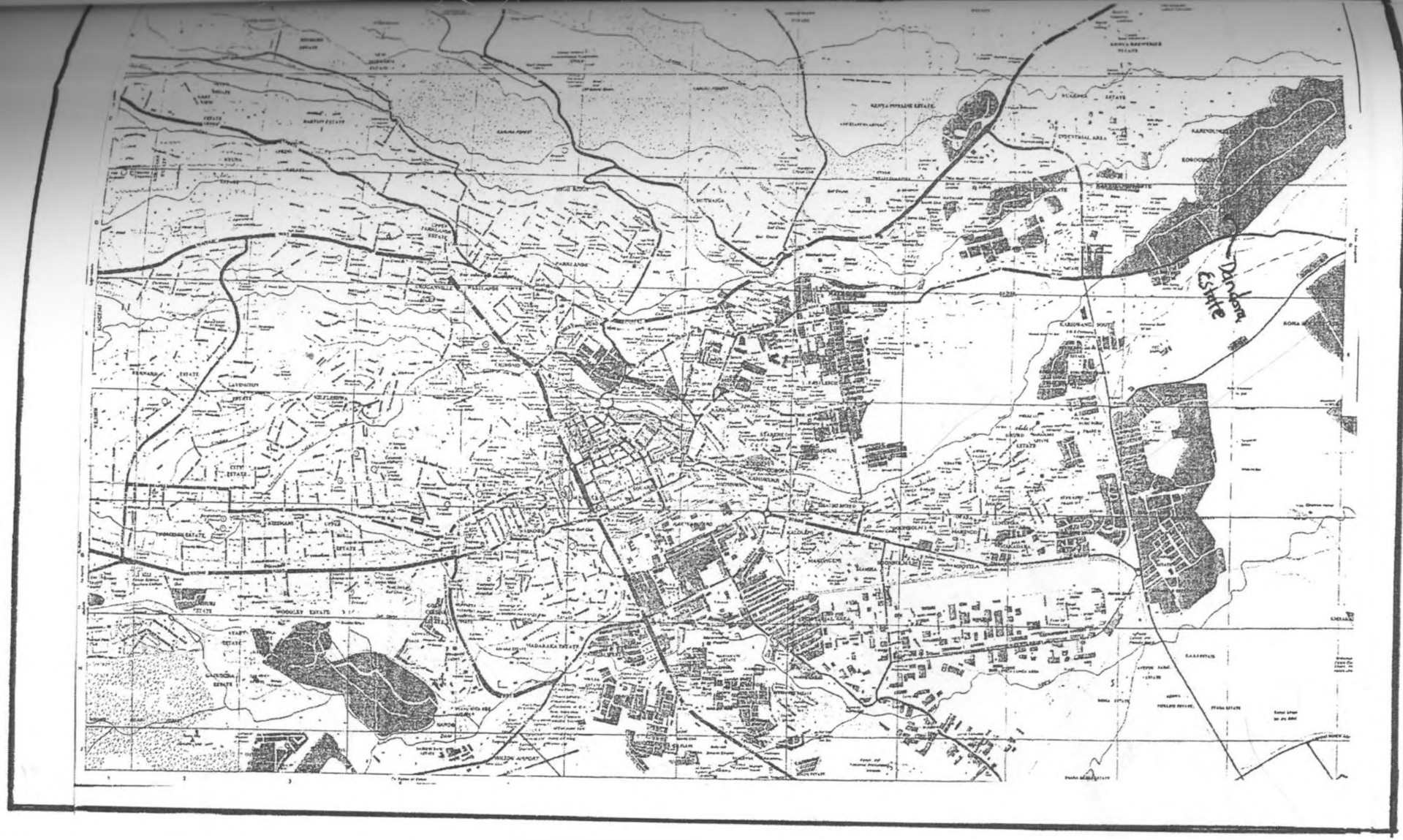
3.2.3 Location of Dandora

Dandora site and service scheme is situated about 12 Kilometers North East of Nairobi City Centre. It straddles a ridge which is bounded on the North and East sides by the Nairobi River, flowing in an easterly direction within a deep natural valley.

Along the southern boundary is the New Komarock road and a seasonally dry watercourse located in a shallow wide profiled valley. This stream joins with Nairobi River in the eastern corner of the site.

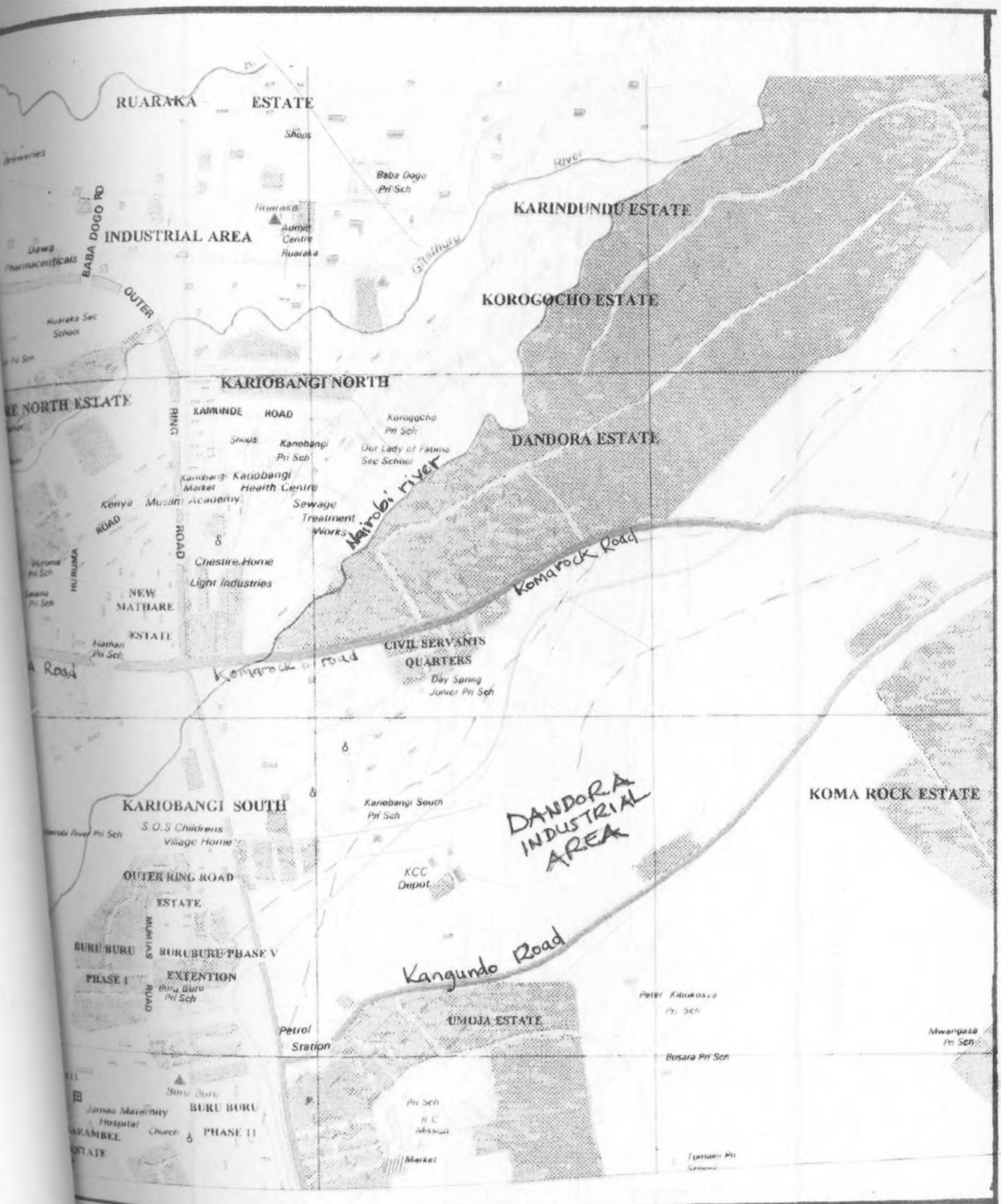
To the North of Dandora lies Korogocho Estate and Kariobangi North Estate while to the South is Kariobangi South Civil Servants Estate and Dandora Industrial Area. To the West lies Kariobangi Light Industries.

Dandora is linked to the Nairobi City Centre through Juja Road, Outering through Thika Road, Outering through Mumias – South and then Jogoo Road, Outering through Jogoo road and Outering through Mombasa Road. It is also linked to the City Centre through rail.



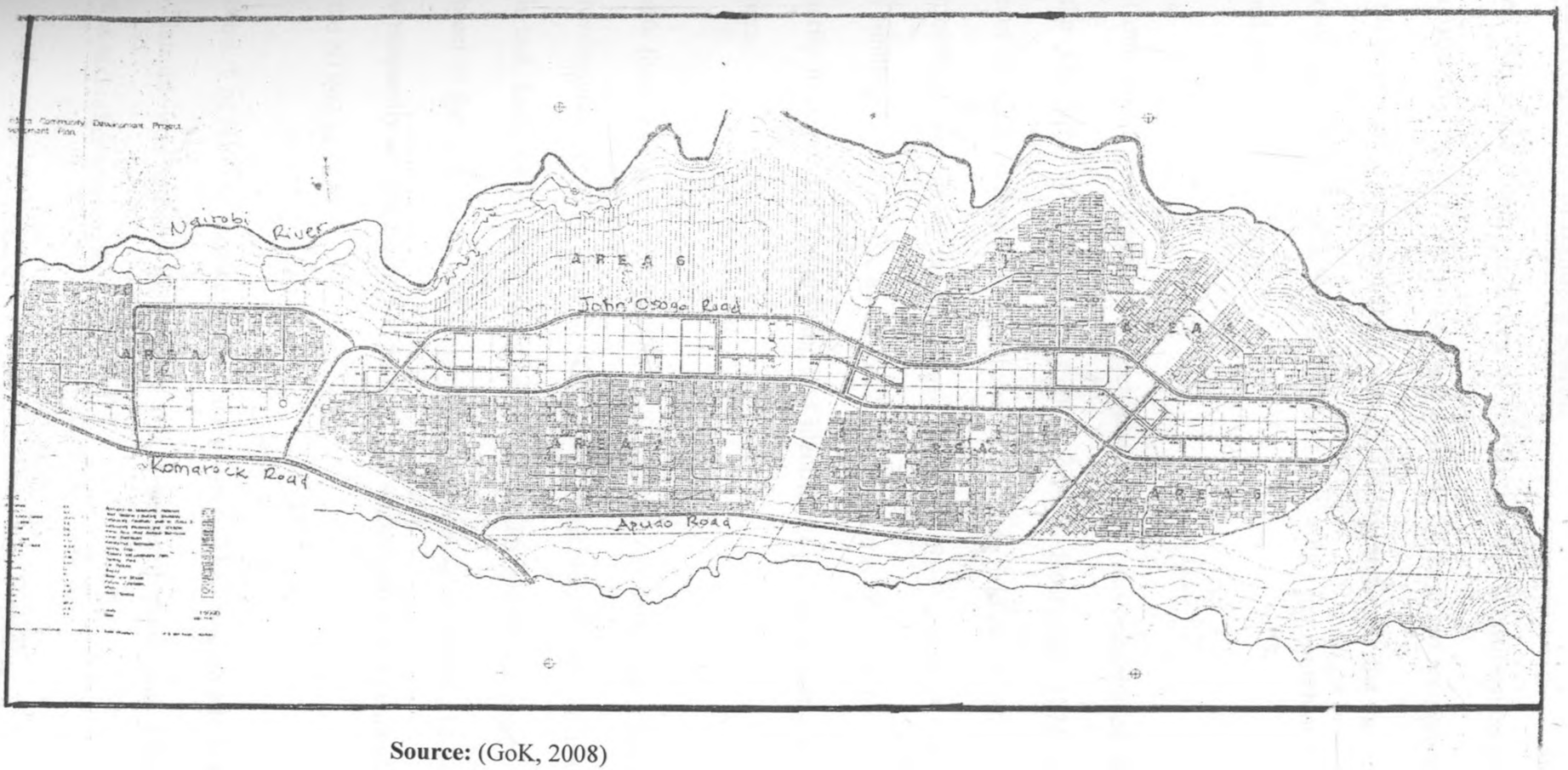
Source: (GoK, 2008)

Map 3.6 Location of Dandora – Neighbourhood Level



GoK, 2008)

Map 3.7 Dandora Scheme Layout



Source: (GoK, 2008)

3.2.4 Historical Perspectives of Dandora Scheme

As stated earlier, one of the recommendations of NUSG was the intensification of low cost housing construction through site and service schemes. The group recommended, inter alia, that there was an urgent need for about 20,000 housing units for the low – income households earning between KShs. 200/= and KShs. 800/= per month at a price they would afford, (Shihembetsa, 1989).

The Dandora Community Development Project Department was established by a resolution of the Ordinary Monthly Meeting held on 3rd December 1974 on a recommendation of the General Purposes and Finance Committee held on 27th November 1974. The commencement date of the department was 28th February 1975. It was established with funding from the GoK and a loan/credit from the World Bank. It was established primarily to respond to the growing and identified need for housing for the low-income earners.

An in – house task force was formed within the NCC to work out details of a housing project for the low-income groups in Nairobi. The World Bank was willing to finance the project. This task force submitted a project proposal for the Dandora Community Development Project to the GoK. The GoK submitted this proposal to the World Bank for financing. Consequently an agreement was reached and signed about five years since the setting up of the NUSG in 1970.

It was the responsibility of NCC to provide land for the project. The Dandora site in the eastern part of Nairobi was chosen to develop 6,000 serviced plots and related community facilities and other services.

The Dandora project was to be the first in a series of urban housing projects in Nairobi and other urban centres in the country. It was conceived as a pilot project for the government and local authorities to evaluate the role and potential of such projects for other urban areas in Kenya.

Though site and services schemes had been known in Nairobi since 1920, they were traditionally small – scale and the plots were big with low plot coverage. The Dandora project was the first large – scale site and service scheme to be financed by the World Bank in Kenya, and it differed from earlier projects in that plot sizes were reduced, community facilities and other community development aspects were included, and allocation procedures were changed to assure fair plot allocation (Rasmussen, 1987).

Rasmussen (1987) notes that the Dandora Community Development Project represented a break with past planning practices in Kenya. The GoK had previously – led by non – other than the founding father President Mzee Jomo Kenyatta – vigorously fought the implementation of low standard housing, as expressed in a report of the president's remarks he made in a speech he gave in 1972:

> President Kenyatta warned at the weekend he will sack any of his Ministers who continue to treat Kenyans as the colonialists did by building them 'native –type' houses not suitable for human habitation. He said all those charged with the responsibility of building houses for wananchi, especially in towns, must ensure that the houses built are suitable for a family to live in.

3.2.5 Goals and Objectives of the Dandora Project

The Dandora Project had the following goals and objectives:

a. To provide access to land and security of tenure on a long-term basis primarily for residential use, with supporting community facilities including schools and clinics.

b. To control speculation and profit making at the expense of the low-income groups.

c. To stimulate employment opportunities and industrial activities in the organization of local residents associations and for credit, purchasing, equipment, training of special skills, management, legal assistance and marketing outlets.

d. To develop a framework within which residents can develop their own associations to administer the development of housing units and utility networks.

e. To provide communication and utility channels which will stimulate transport routes, and investment in residential, industrial and commercial activities both within and near new communities (Malombe, 1990)

3.2.6 Functions of the Dandora Community Development Department

a. To prepare and service 6,000 residential plots of 100 to 160 sq. meters with individual water and sewerage connections, access roads, security/street lighting and refuse collection services in the Dandora Project site.

b. To construct the following wet cores and demonstration houses for the serviced plots:

   i. Option A: 3870 plots with wet cores (toilet and shower) on plots of 100, 120 and 140 sq. meters.

   ii. Option B: 1800 plots with wet cores and kitchen and store on plots of size 100, 120 and 140 sq. meters.

   iii. Option C: 300 plots with wet cores, kitchen, store and one room on 160 sq. meters plot and 30 demonstration houses to illustrate housing consolidation for option A and B plots. The option C plots were to be sold at market prices.

c. To operate and administer a materials loan fund amounting to KShs. 30 million to enable plot tenants for option A and B to borrow appropriate amounts for building materials required to expand such plots to have two rooms through self-help or contracting.

d. To construct community facilities including six primary schools, two health centres, two multi-purpose community centers with day-care facilities, one sports complex and 400 market stalls

e. To construct trunk access roads to the project site.

f. To ensure impartiality in the selection of prospective plot tenants, who must meet at least the following eligibility requirements:

   i) Total income at the time of application of the tenant and such members of his family as will live with him on his plot is between KShs. 280/= and KShs. 500/= per month for option A plots and KShs. 450/= and KShs. 650/= per month for option B plots.

ii) Prospective tenant to have resided in Nairobi for not less than two years and does not own any residential property in Nairobi

iii) The tenant's family does at the time of application and will upon allocation of the plot reside with the tenant.

iv) Prospective tenants will pay City Council of Nairobi the appropriate fees for sewerage and water connection and a deposit of KShs. 400/= within sixty (60) days of notification that they have been allocated a plot (Ismail, 1982, Rasmussen, 1987 , Shihembetsa, 1989, Malombe, 1990)

The Dandora Project was therefore intended to benefit low-income earners through allocation of the type A and B plots, which accounted for 95per cent of the total plots. Type C plots were to cross-subsidize the total cost of preparing Type A and B plots (NCC, 1976)

3.2.7 Organization of the Dandora Community Development Department (DCDD)

The Dandora Community Development Department, which was later to change to the Housing Development Department (HDD) in February 1978 was originally set up with four divisions: a Managers Division, a Technical Division, a Financial Division and a Community Development Division. According to the agreement with the World Bank, the duties of the various divisions were:

a) Manager's Division

In charge of the overall activities of DCDD and was to ensure that other sections conducted their specified tasks. It consisted of the Project Manager, Deputy Project Manager and Project Attorney

b) Technical Division

- Supervision of detailed planning, engineering and preparation of tender documents for site infrastructure, wet cores and community facilities.
- Providing technical staff with specific building skills on site to allow allottees to perform technical tasks.
- Ensuring proper supervision of construction
- Illustrating the techniques of housing construction by erecting demonstration units in the site.

c) Finance Division

- Keeping all project accounts involving expenditures related to the project
- Developing an accounting and management system acceptable to World Bank.
- Preparation of quarterly financial reports and annual project accounts to be audited by an independent auditor.
- Operating and administering the material loans fund.

d) Community Development Division

- Publicize the project
- Solicit and process applications for the residential plots
- Orient and train allottees prior to the occupation of the plots.
- Work with families during the construction phase and

- Assist residents in developing the institutions and programmes to enable them to create a genuine community.

3.2.8 Financing of the Dandora Project

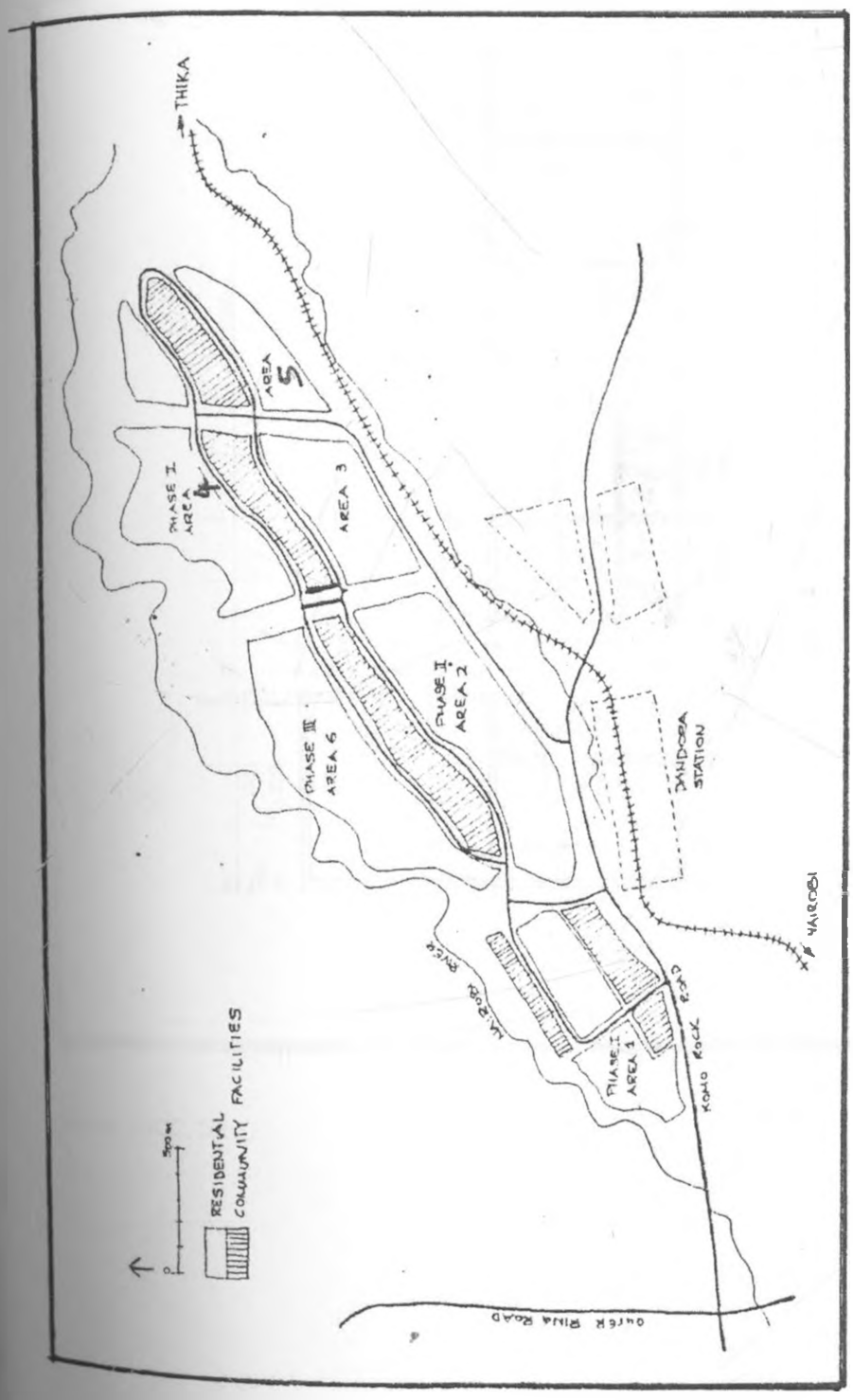
Financing of the Dandora Project was a joint venture between the World Bank (WB) and the Kenya Government. The project was projected to cost approximately KShs. 200 million or approximately US$ 30 million (1975 figures) of which the Kenya government was to contribute US $ 14 million and the WB US$ 16 million; US$ 8 million being a loan through the International Bank for Reconstruction and Development (IBRD) and US$ 10 million being a credit through International Development Association (IDA).

While Type C owners paid in full for the purchase of the plots, owners of Type A and B plots were to repay for their plots on a monthly basis for a period of 30 and 20 years respectively at an annual interest rate of 8.5per cent initially (NCC, 1976).

3.2.9 Implementation of the Dandora Project

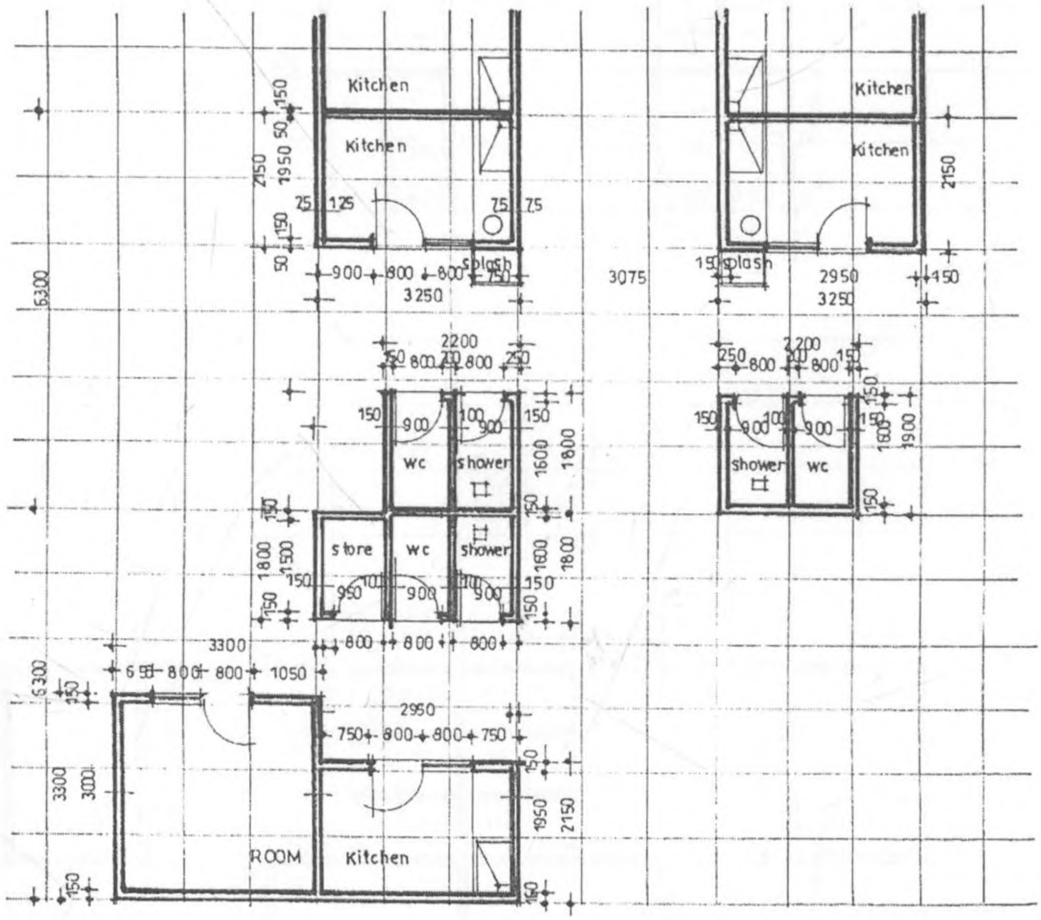
The DCDP was implemented in three phases. It started in 1975 and was substantially complete in 1984. The phases were Phase I, which consists of Residential Area I; phase II, which consists of residential area II, III, IV and V and the central spine of community facilities; and Phase III, which consists of residential area VI. Fig 3.1 shows the Dandora Project layout.

Fig 3.1: Dandora Project Layout



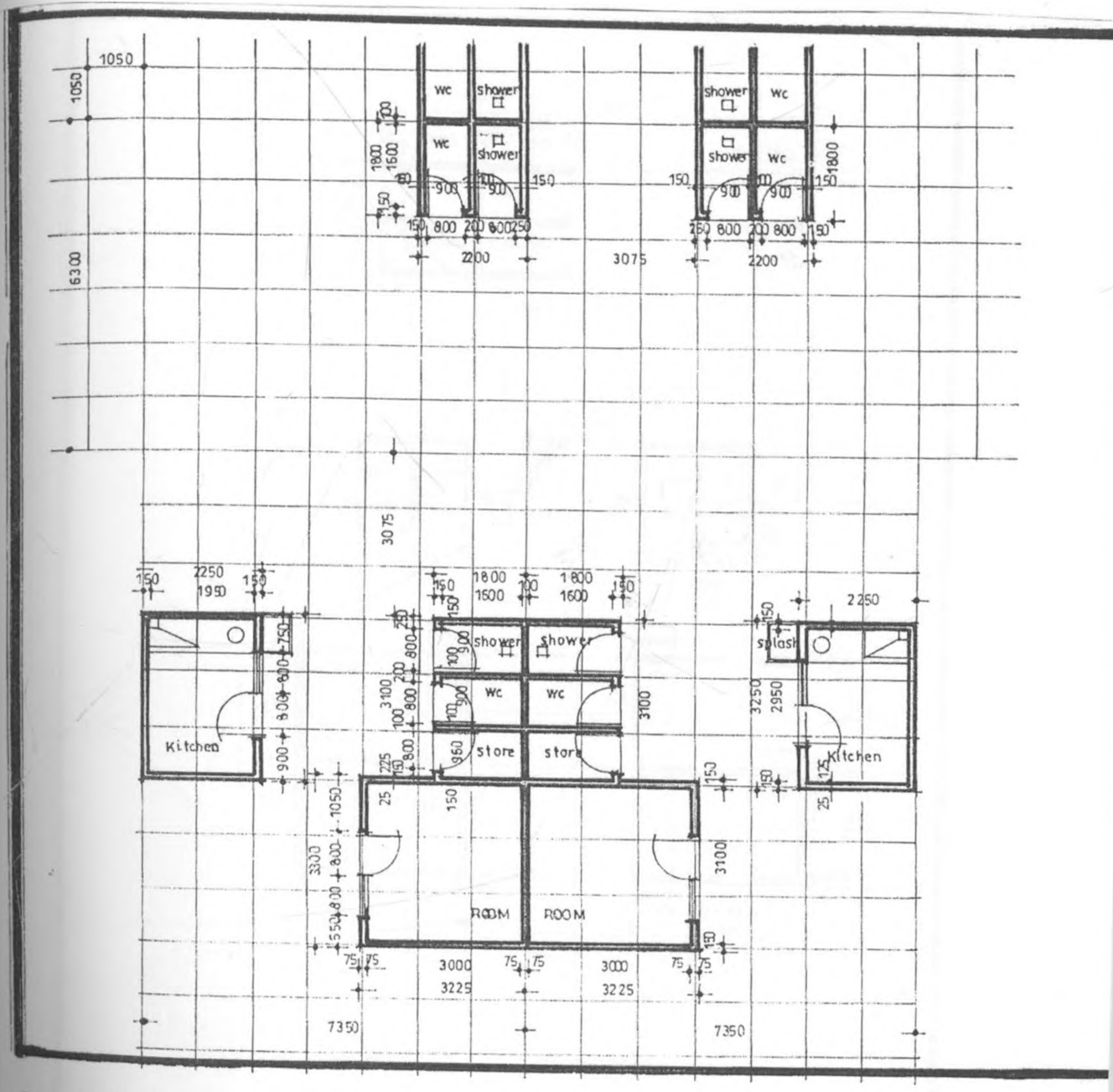
Source: (Shihembetsa, 1989)

Fig. 3.2: Dandora Wetcore Layout 1



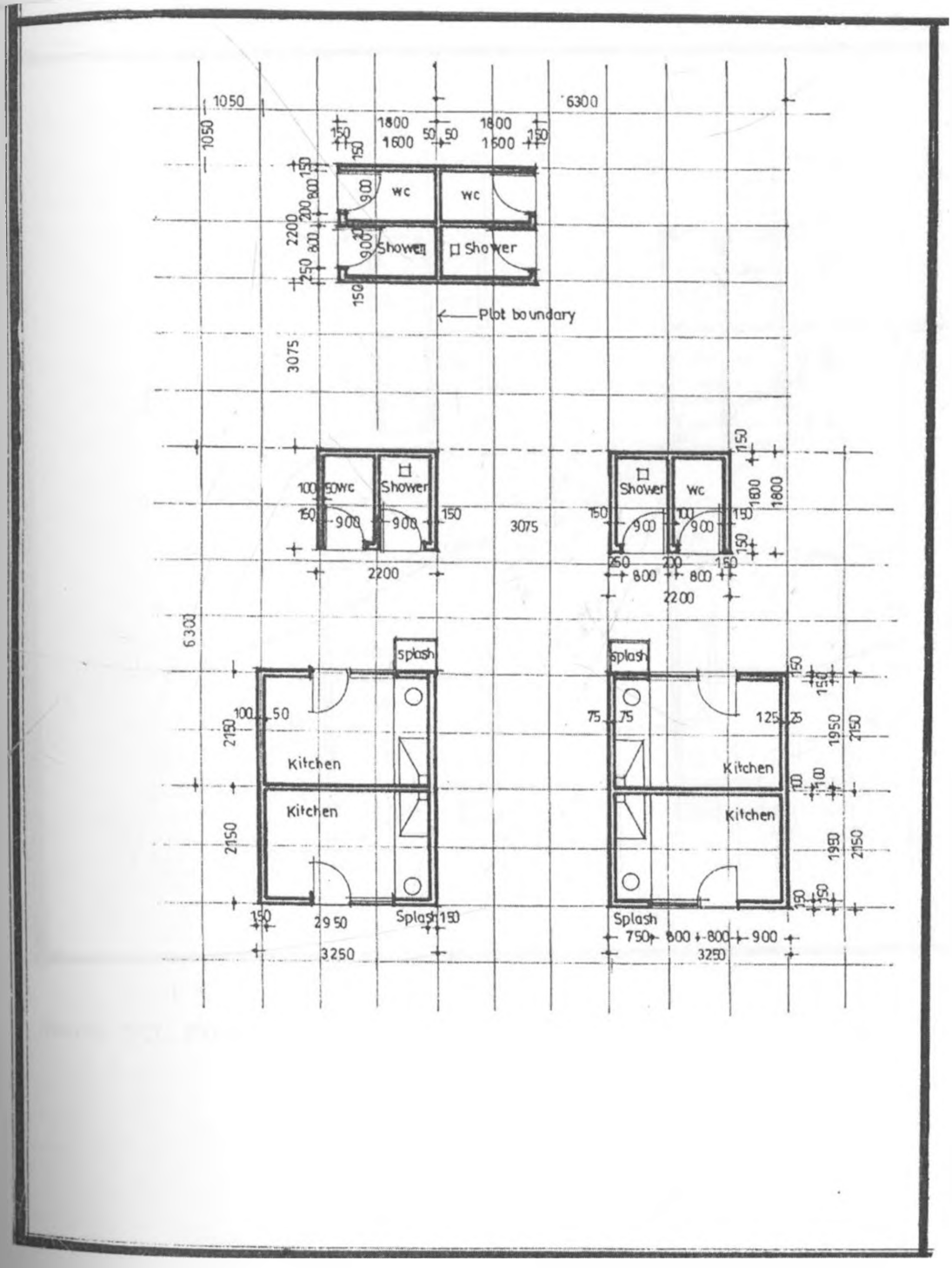
Source: (NCC, 2003)

Fig. 3.3 Dandora Wetcore Layout 2



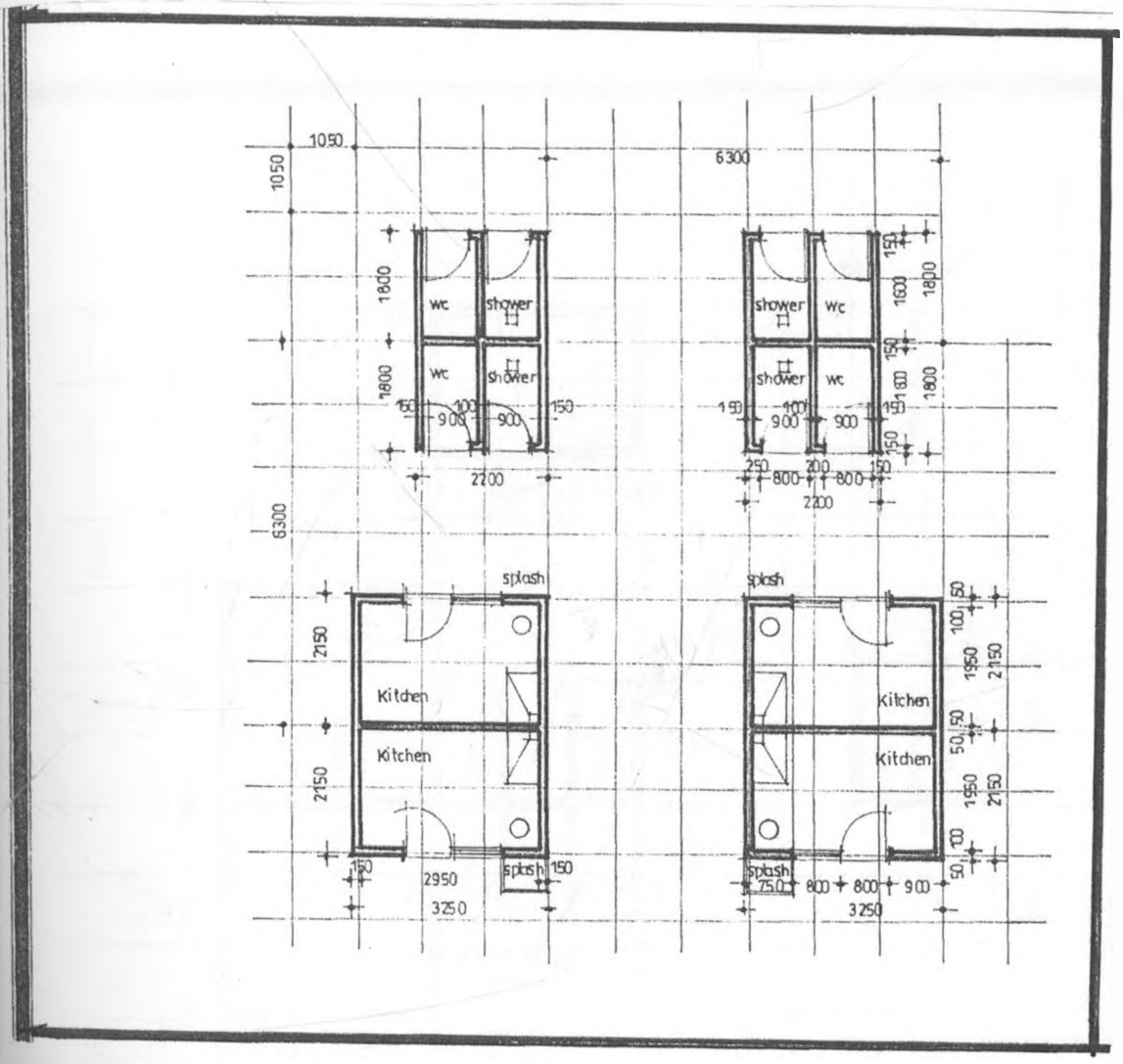
Source: (NCC, 2003)

Fig. 3.4: Dandora Wet Core Layout 3



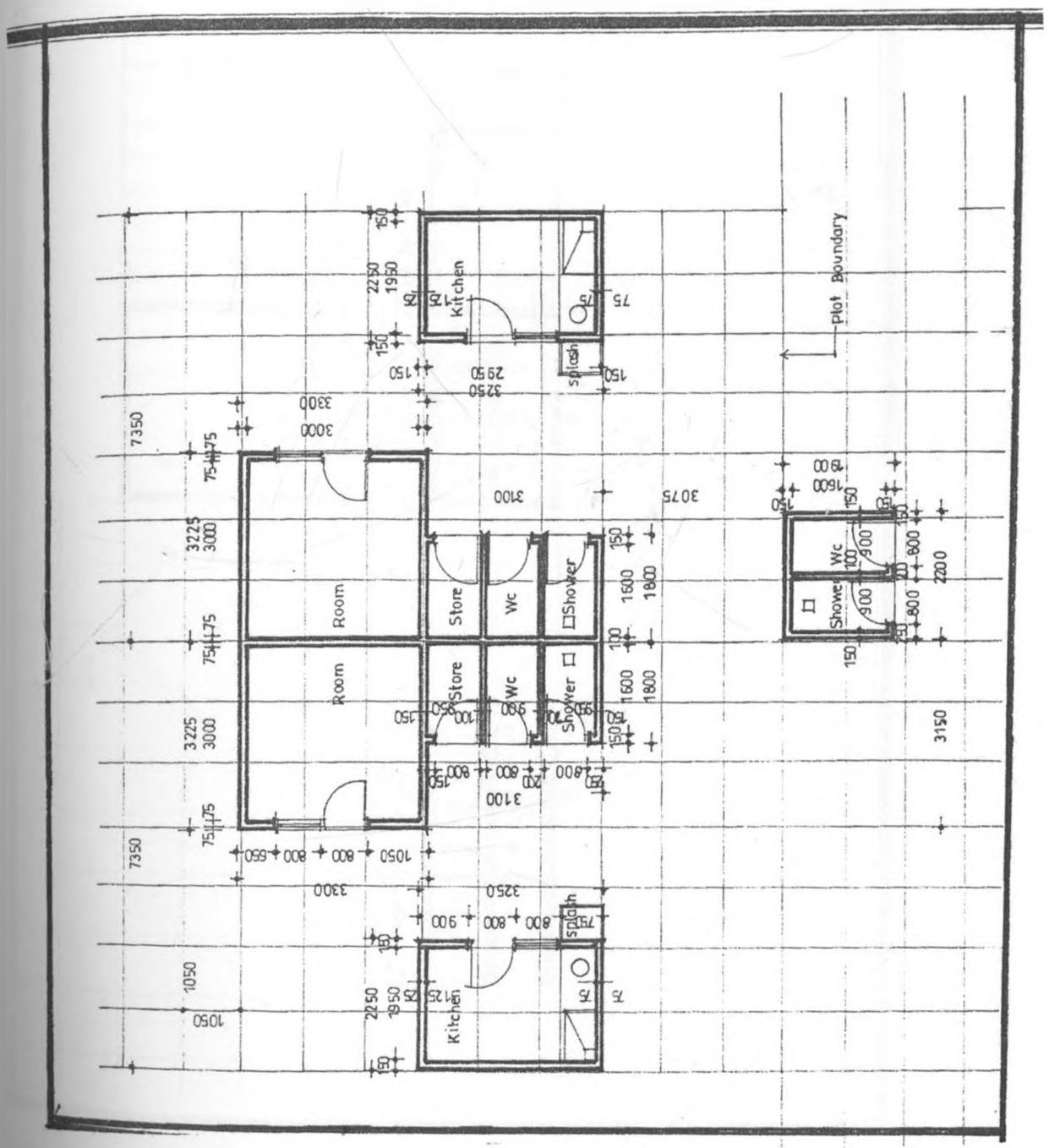
Source: (NCC, 2003)

Fig. 3.5: Dandora Wetcore Layout 4



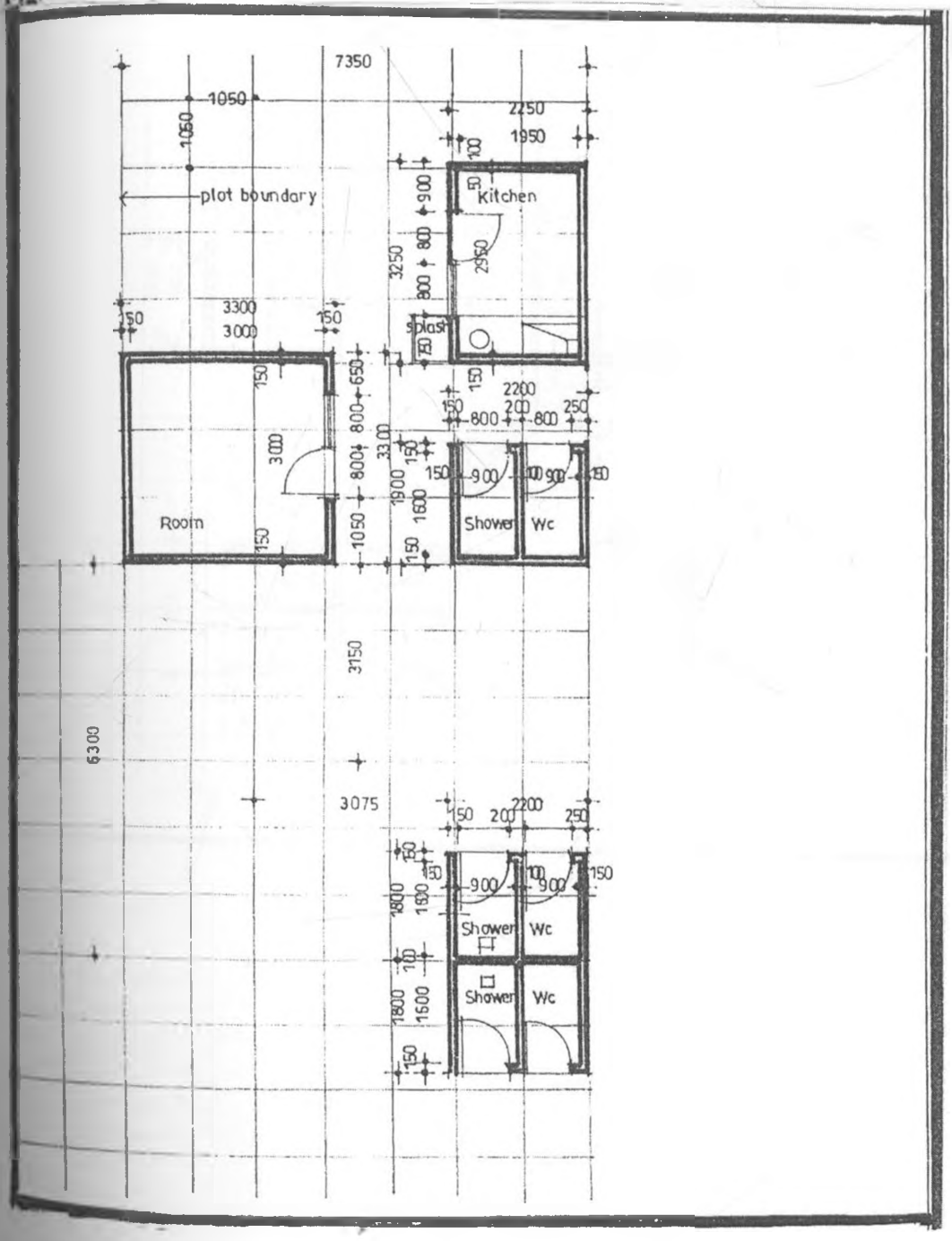
Source: (NCC, 2003)

Fig. 3.6 Dandora Wetcore Layout 5



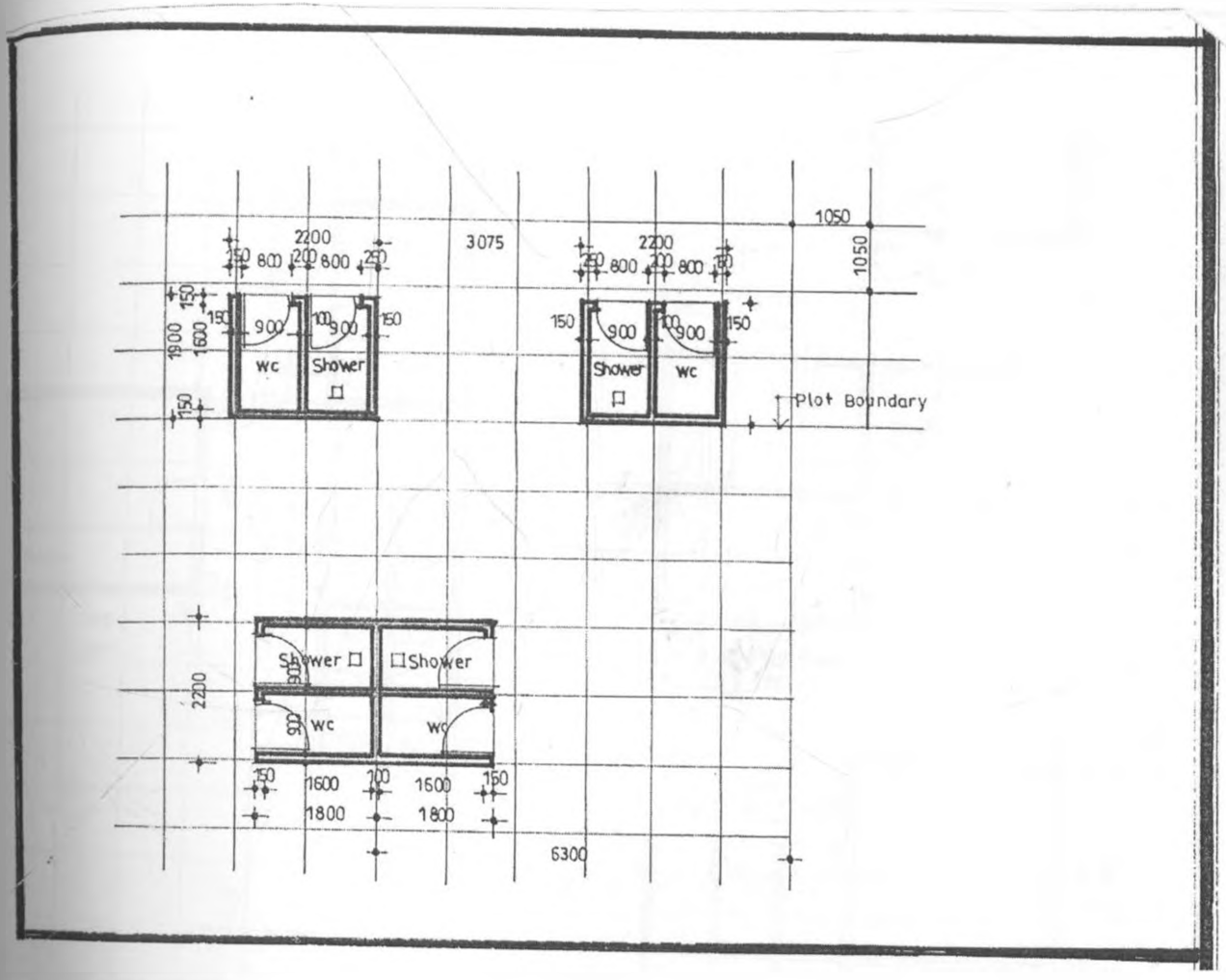
Source: (NCC, 2003)

Fig. 3.7 Dandora Wetcore Layout 6



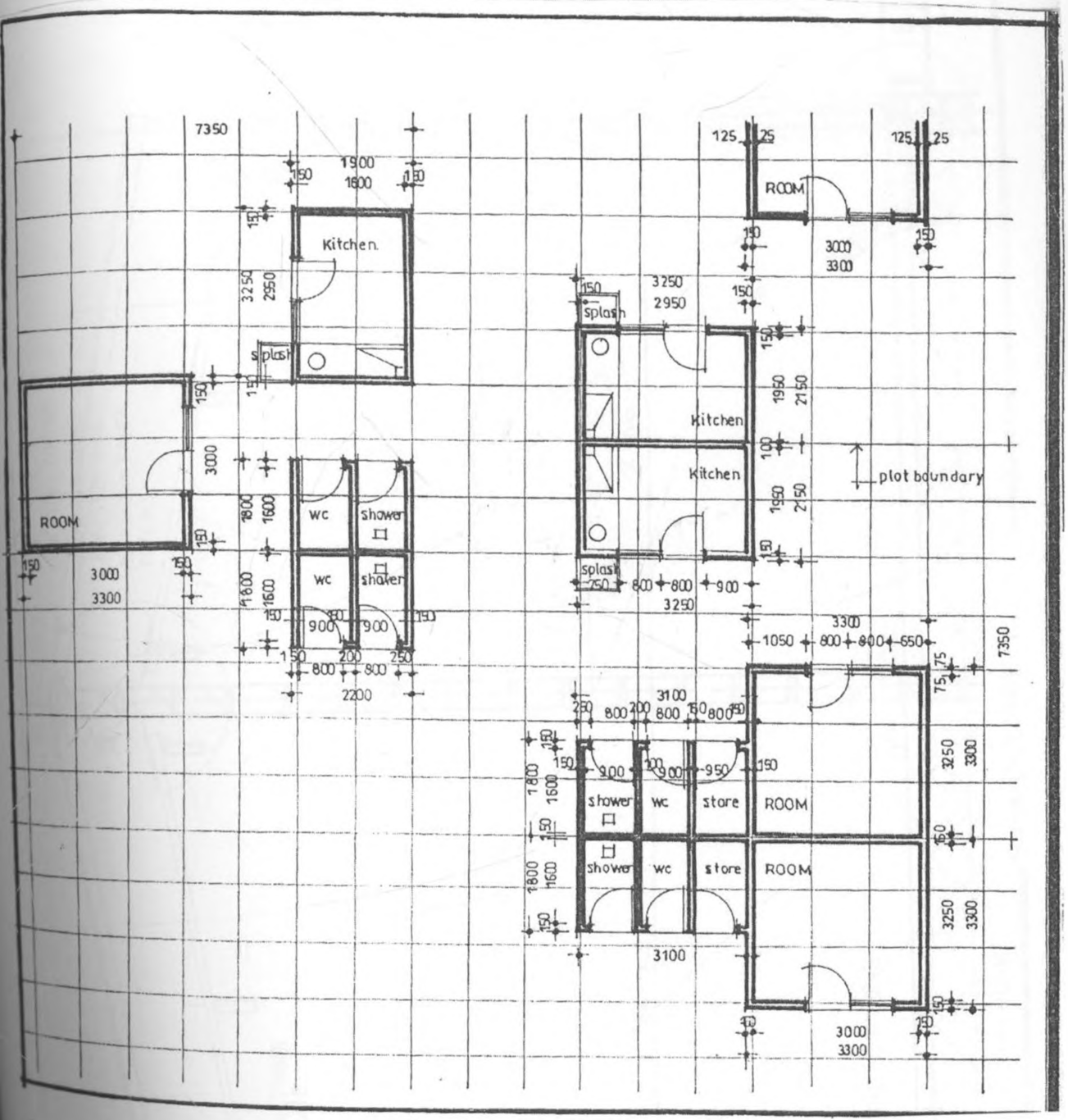
Source: (NCC, 2003)

Fig. 3.8: Dandora Wetcore Layout 7



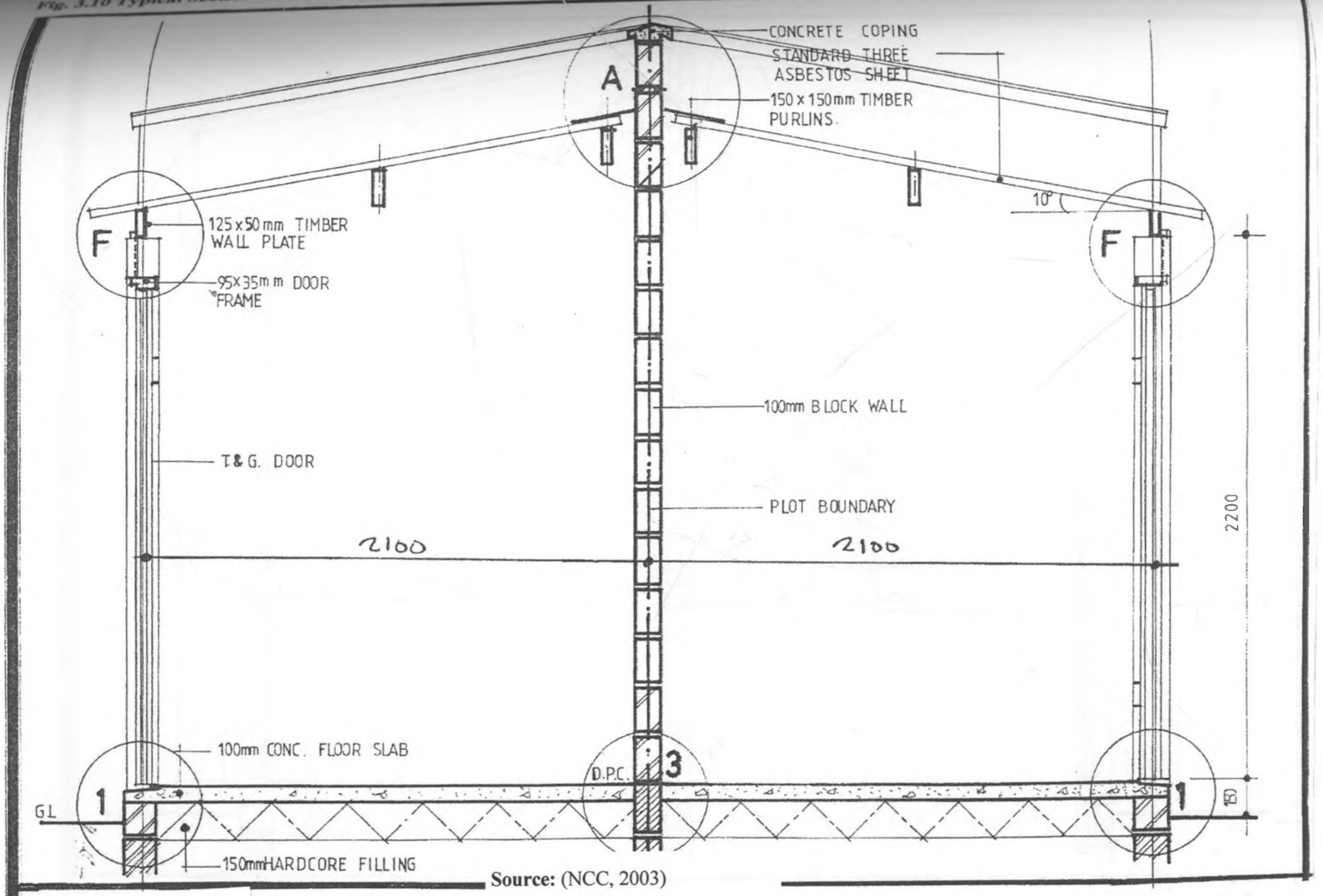
Source: (NCC, 2003)

Fig. 3.9 Dandora Wetcore Layout 8



Source: (NCC, 2003)

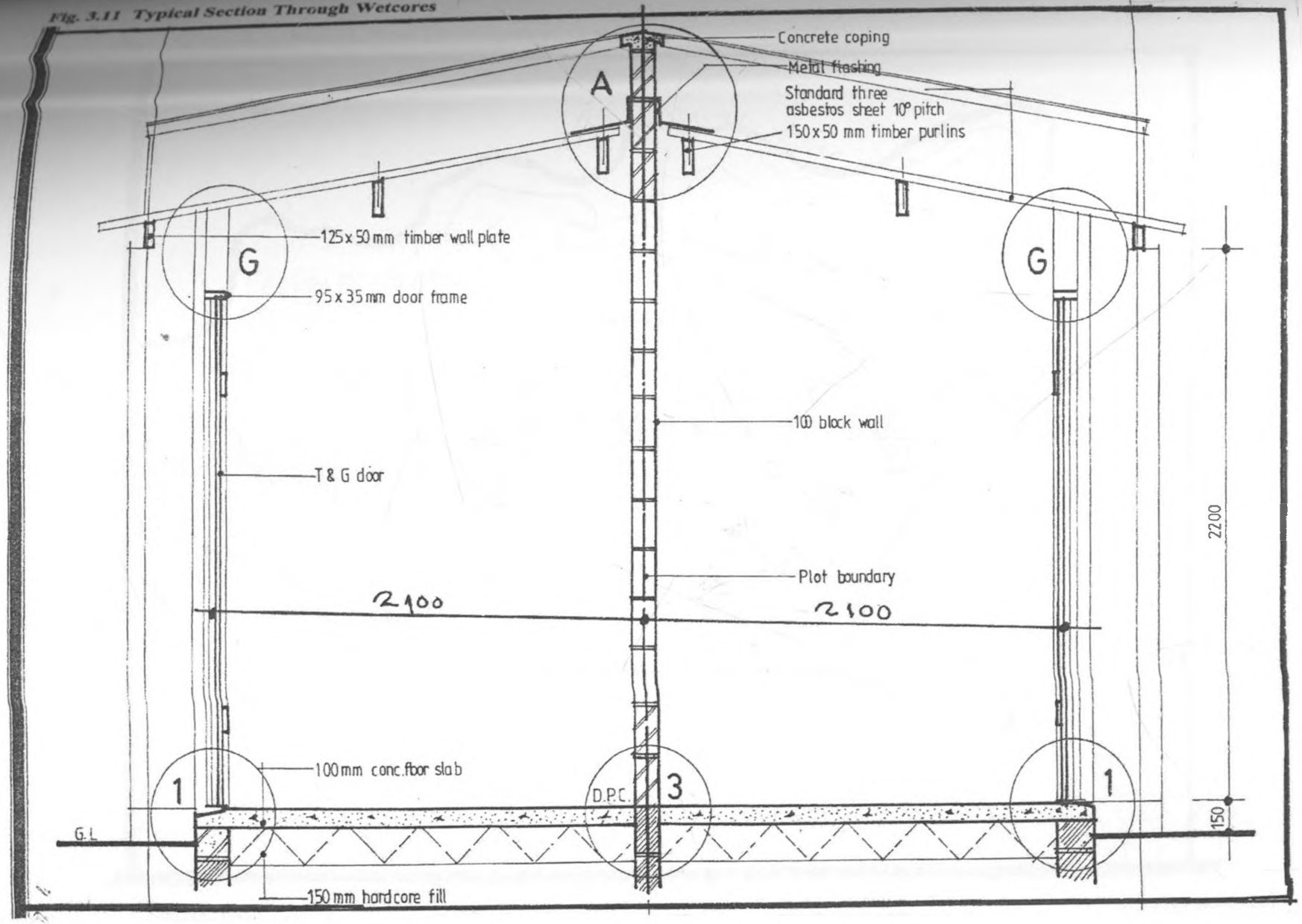
Fig. 3.10 Typical Section Through Kitchen



Source: (NCC, 2003)

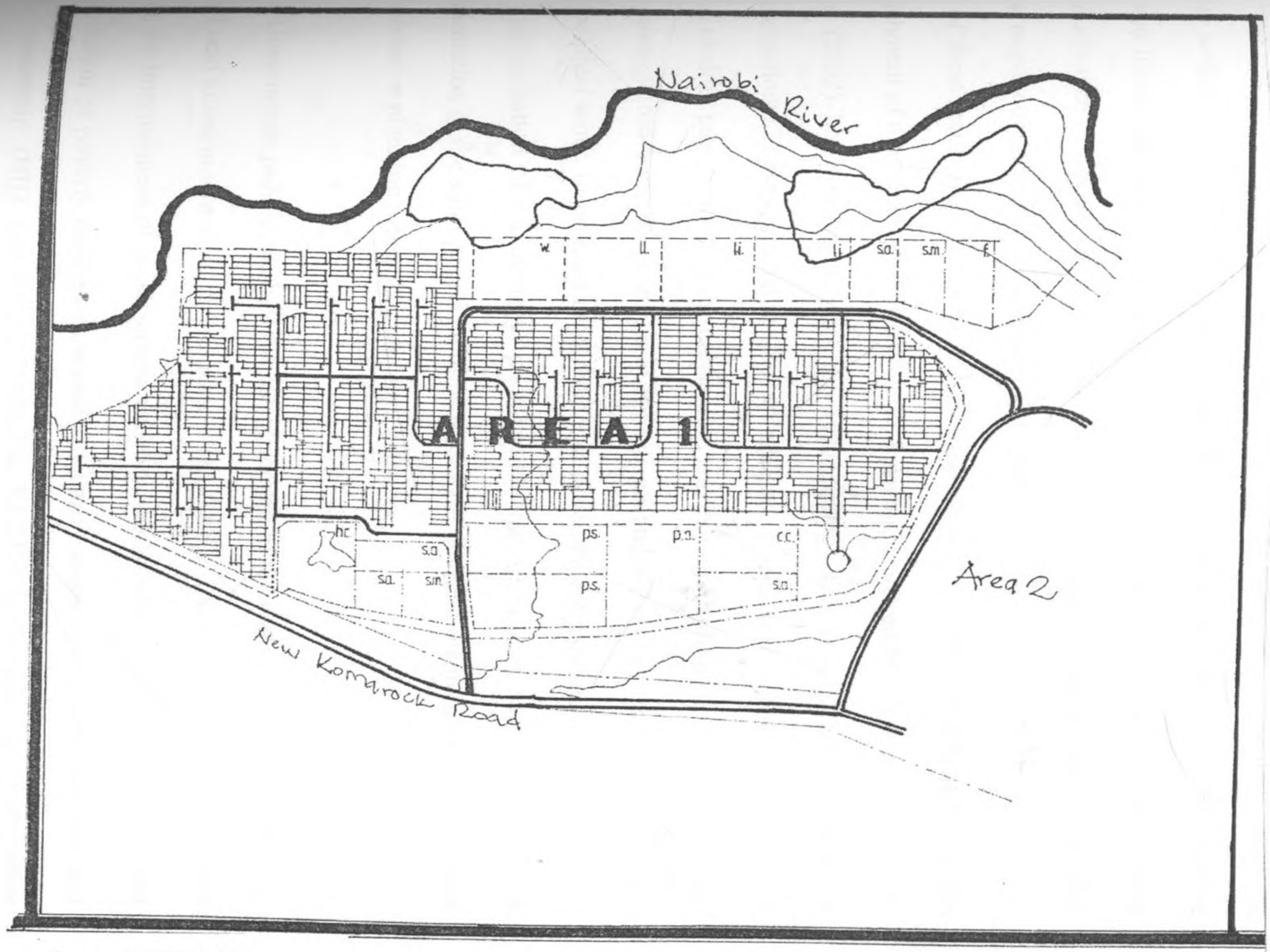
Source: NCC

Fig. 3.11 Typical Section Through Wetcores



Source: (NCC, 2003)

Fig. 3.12 Dandora Phase 1, Area 1 Development Plan



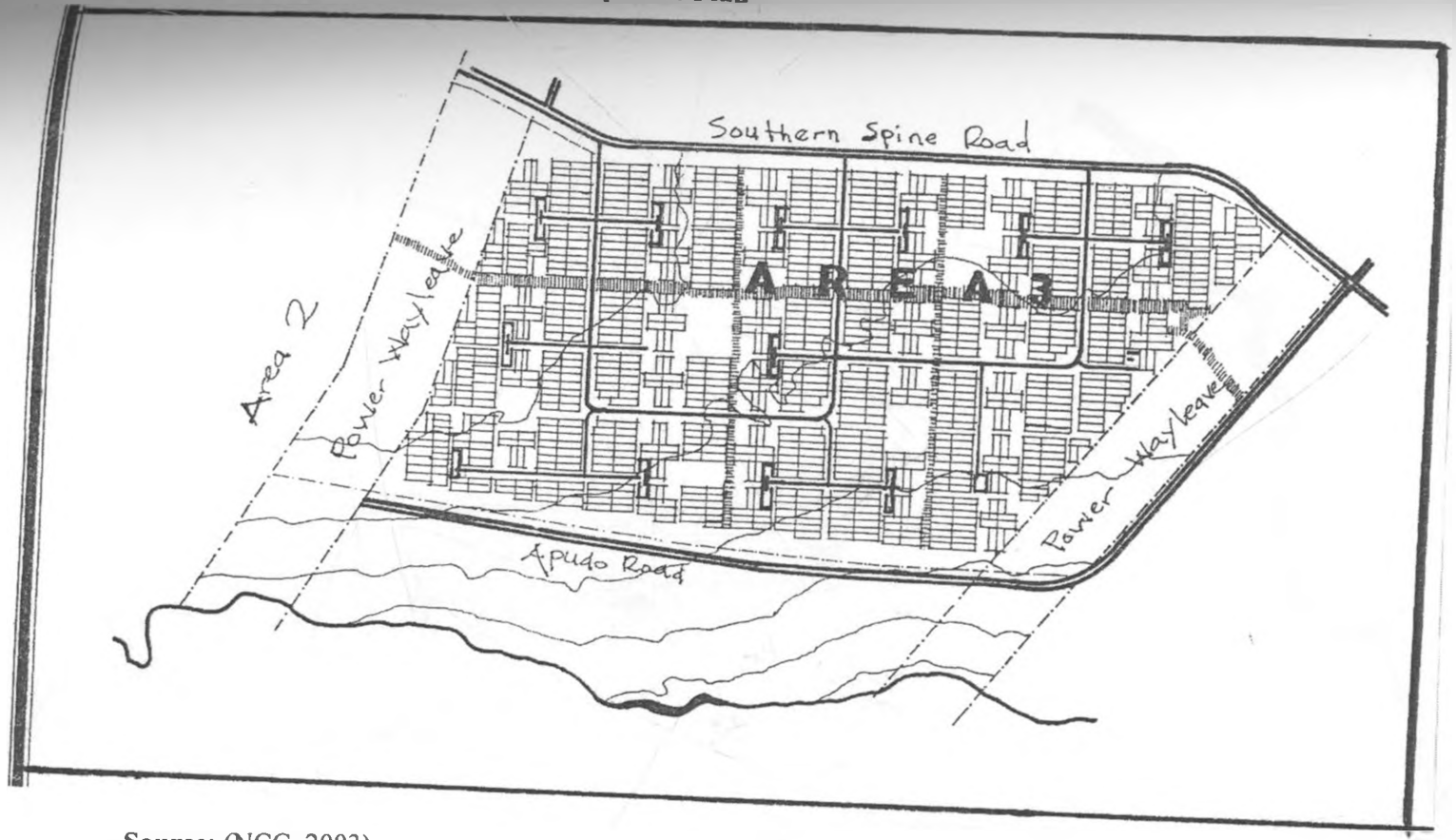
Source: (NCC, 2003)

proportion of the city's total resources invested in private housing and the reallocation of public housing investment towards lower income groups, improvement of existing squatter settlements and the yearly provision of sufficient serviced sites to accommodate the lower income groups. It also recommended the establishment of public land reserves well in advance of development needs for low and moderate income housing, industrial estates, major commercial area, transport and other public services (NCC, 1973)

Some of these recommendations, for instance the expansion of the city boundary and the establishment of other industrial areas like Ruaraka and Dandora have been implemented. Amaya (2002) however argues that the 1973 strategy faced many constraints in its implementation. These included the lack of adequate financial resources; lack of citizen and stakeholder participation in the preparation and implementation and hence ownership of the strategy; too much involvement of consultants and technical officers and sidelining of the political wing; inadequate involvement of development partners in the preparation and implementation of the strategy; poor institutional framework for preparation and implementation of the strategy and inordinate stress of physical planning approach and on comprehensive planning rather than strategic planning.

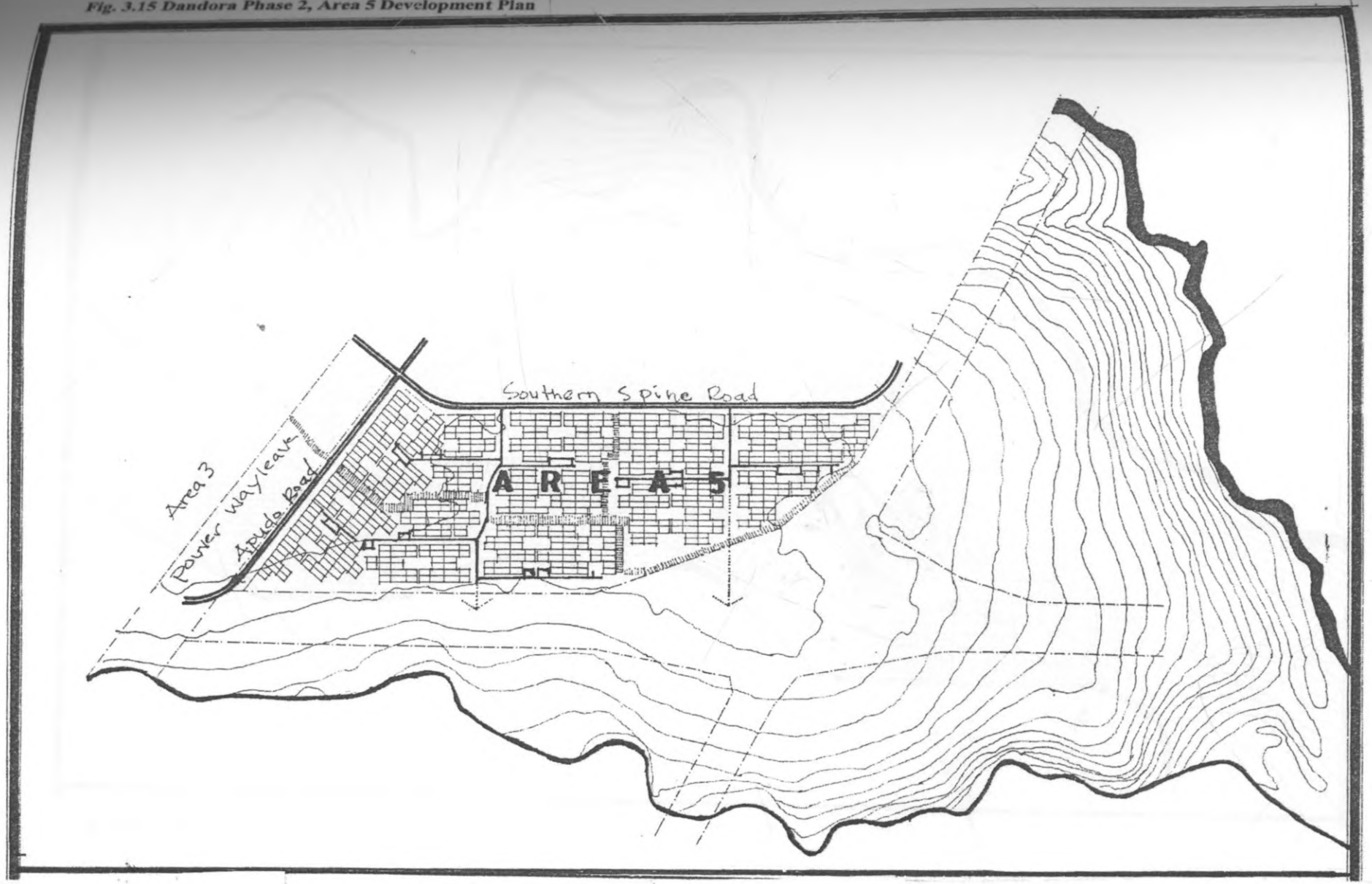
Recent Government policies include the establishment of the Kenya Roads Board and the Kenya Local Government Reform Programme (KLGRP). The objectives of the KLGRP include the improvement of local service delivery, the enhancement of governance and the alleviation of poverty through increased efficiency, accountability, transparency and citizen ownership (HID and DAG, 1997).The KLGRP is focusing on four major components namely; rationalizing the central – local financial relations, improving local authority financial management and revenue mobilization, strengthening participatory

Fig. 3.14 Dandora Phase 2, Area 3 Development Plan



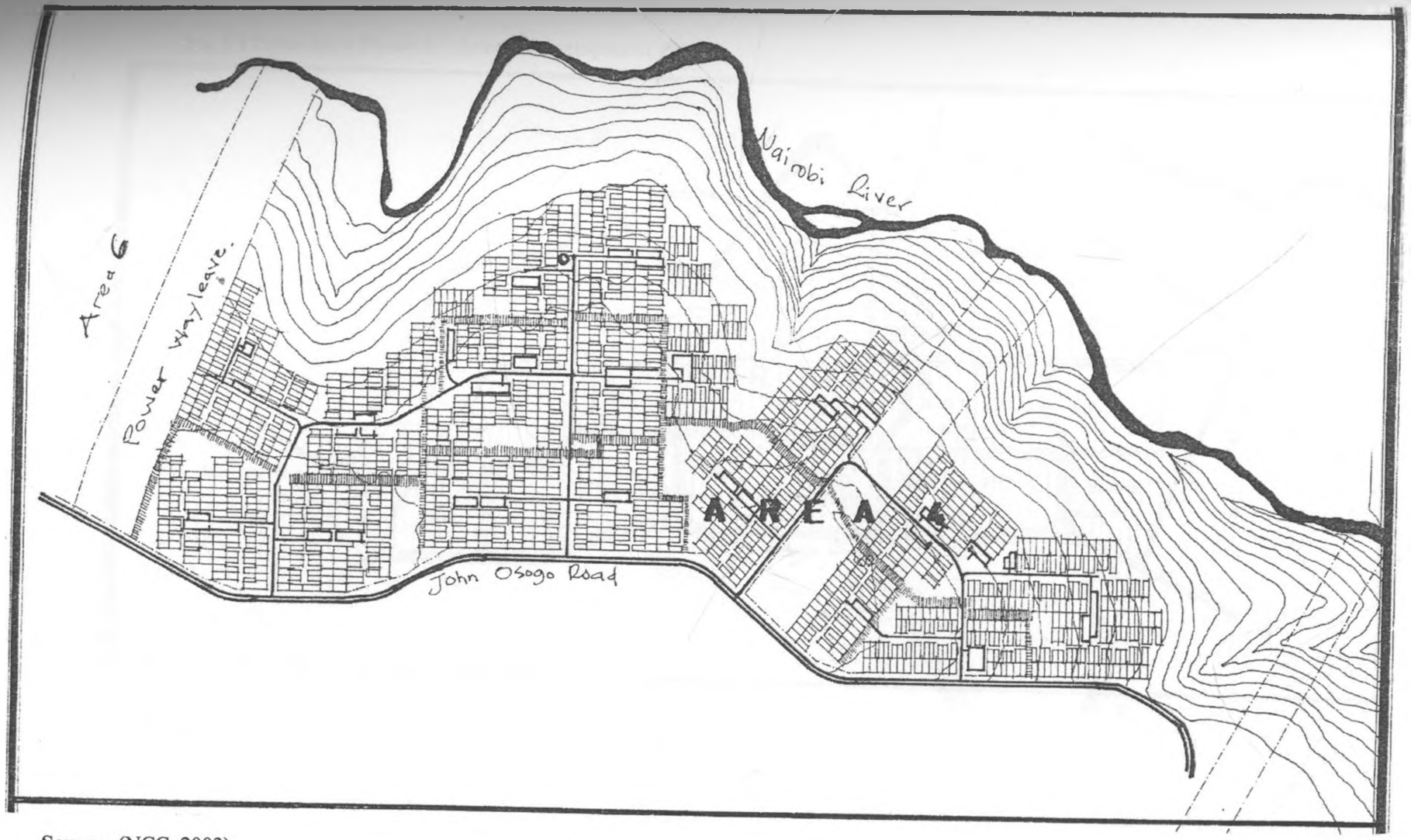
Source: (NCC, 2003)

Fig. 3.15 Dandora Phase 2, Area 5 Development Plan



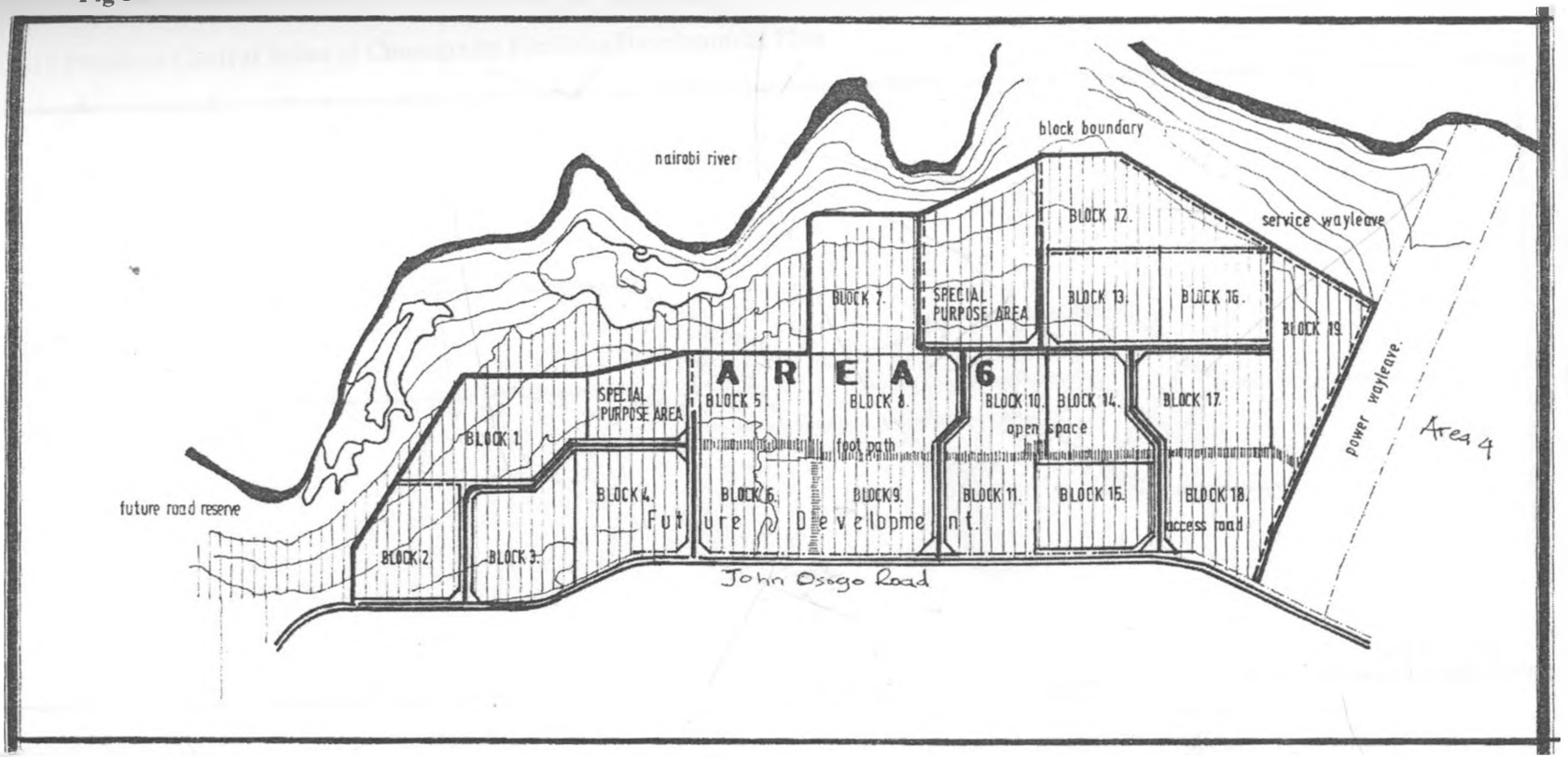
Source: (NCC, 2003)

Fig 3.16 Dandora Phase 2, Area 4 Development Plan



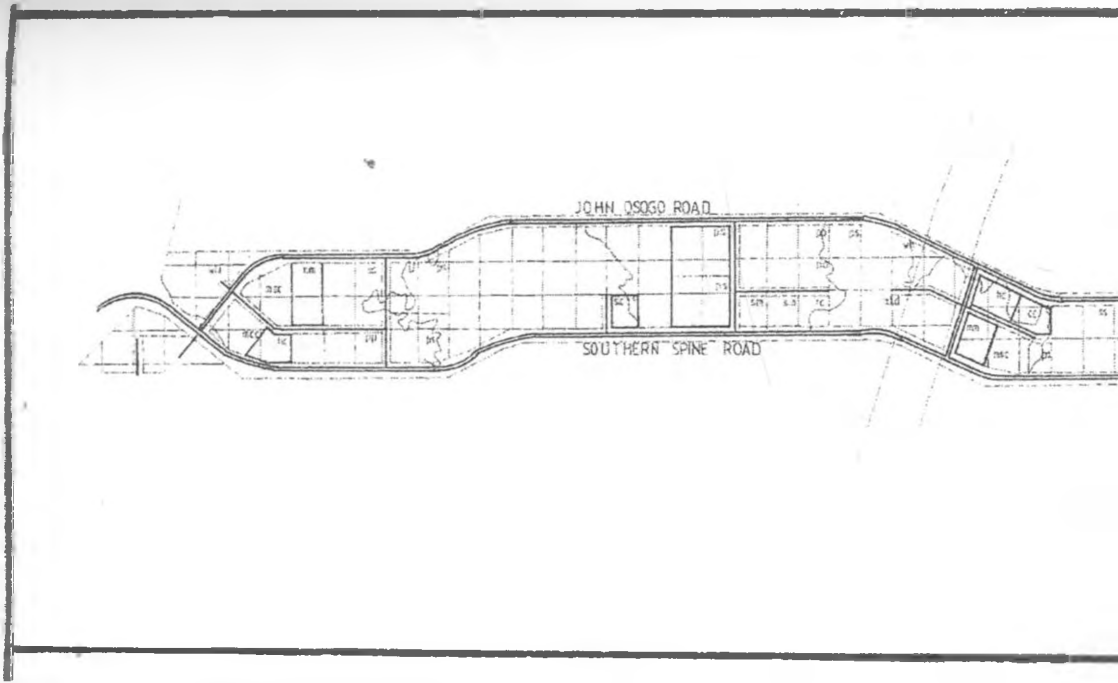
Source: (NCC, 2003)

Fig 3.17 Dandora Phase 3 – Area 6 Development Plan



Source: (NCC, 2003)

Fig. 3.18 Dandora Central Spine of Community Facilities Development Plan



Source: (NCC, 2003)

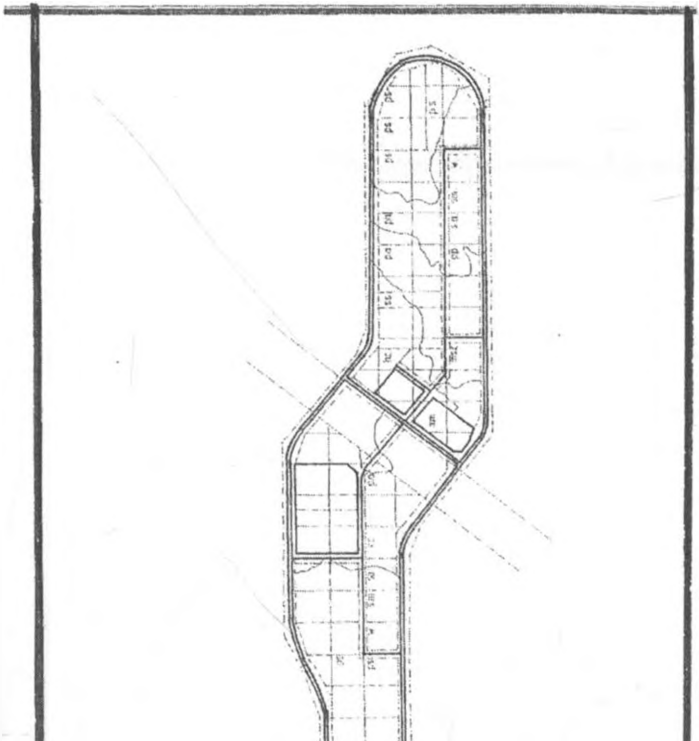
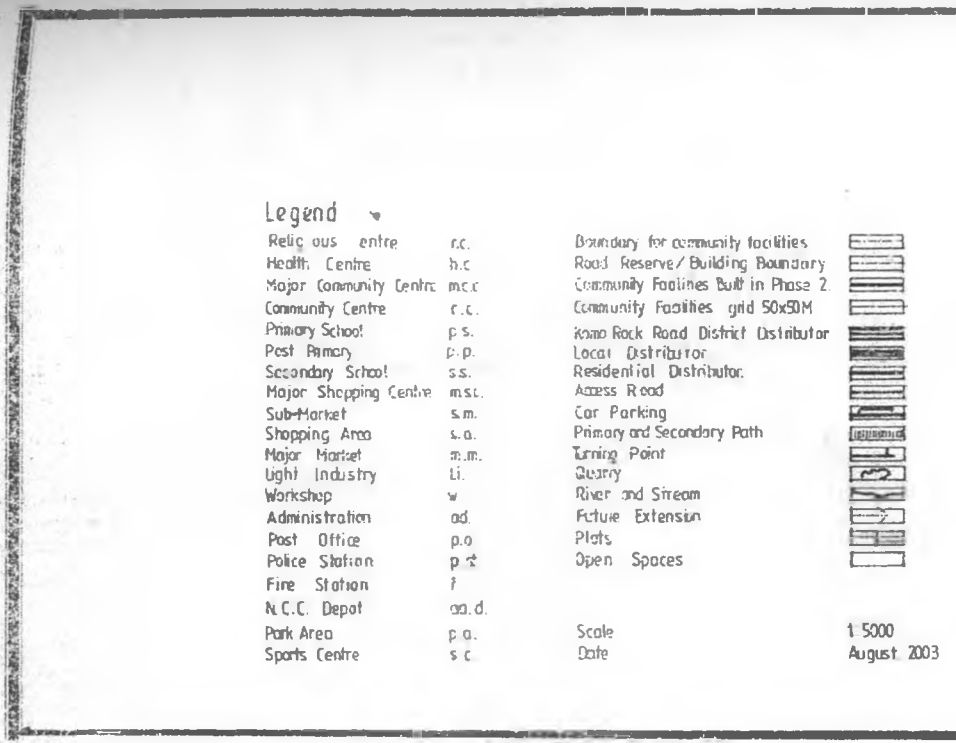
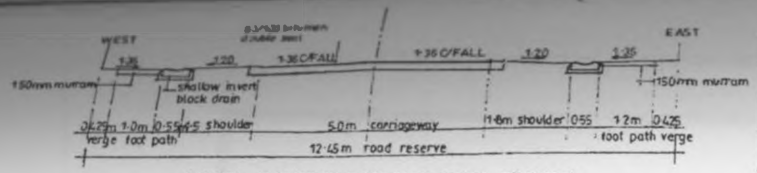


Fig. 3.19 Legend



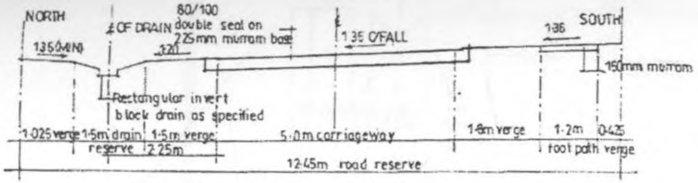
Source: (NCC, 2003)

Source: (NCC, 2003)



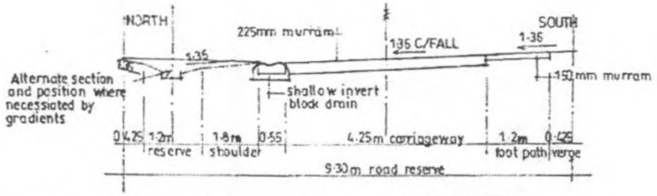
TYPICAL SECTION OF 5·0M CARRIAGEWAY IN(CAMBER)

SCALE 1:100



TYPICAL SECTION OF 5·0M CARRIAGEWAY

SCALE 1:100

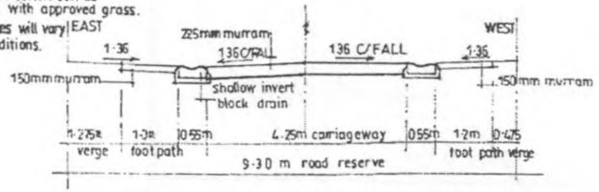


TYPICAL SECTION OF 4·25M CARRIAGEWAY

SCALE 1:100

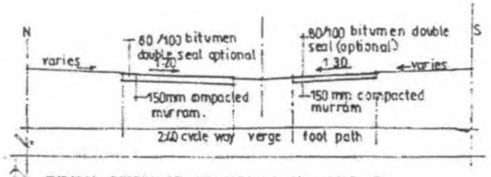
NOTES

1. Murram base on black cotton soil. Fill on normal soil formation.
2. All verges to be provided with 150mm top soil or mixture of red/black cotton soil as specified and grassed with approved grass.
3. Grain sections and sizes will vary depending on size conditions.



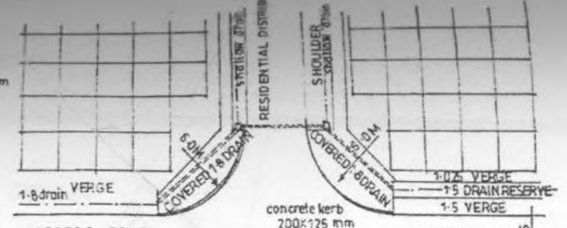
TYPICAL SECTION OF 4.25M CARRIAGEWAY IN (CAMBER)

SCALE 1:100



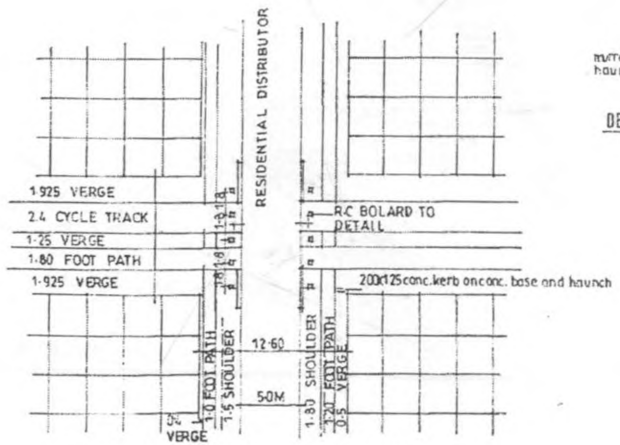
TYPICAL SECTION OF CYCLE TRACK AND FOOTPATH

SCALE 1:100



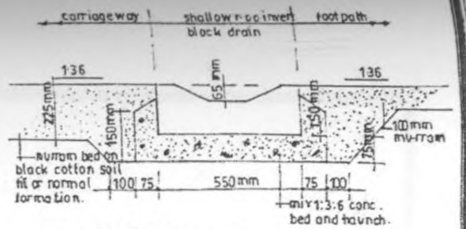
TYPICAL JUNCTION TYPE 'A'

SCALE 1:400



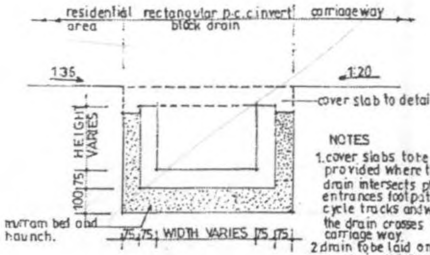
DETAIL OF CROSSING OF FOOTPATH CYCLE TRACK AND ROAD

SCALE 1:400



DETAIL OF SHALLOW INVERT BLOCK DRAIN AND ROAD EDGE

SCALE 1:20

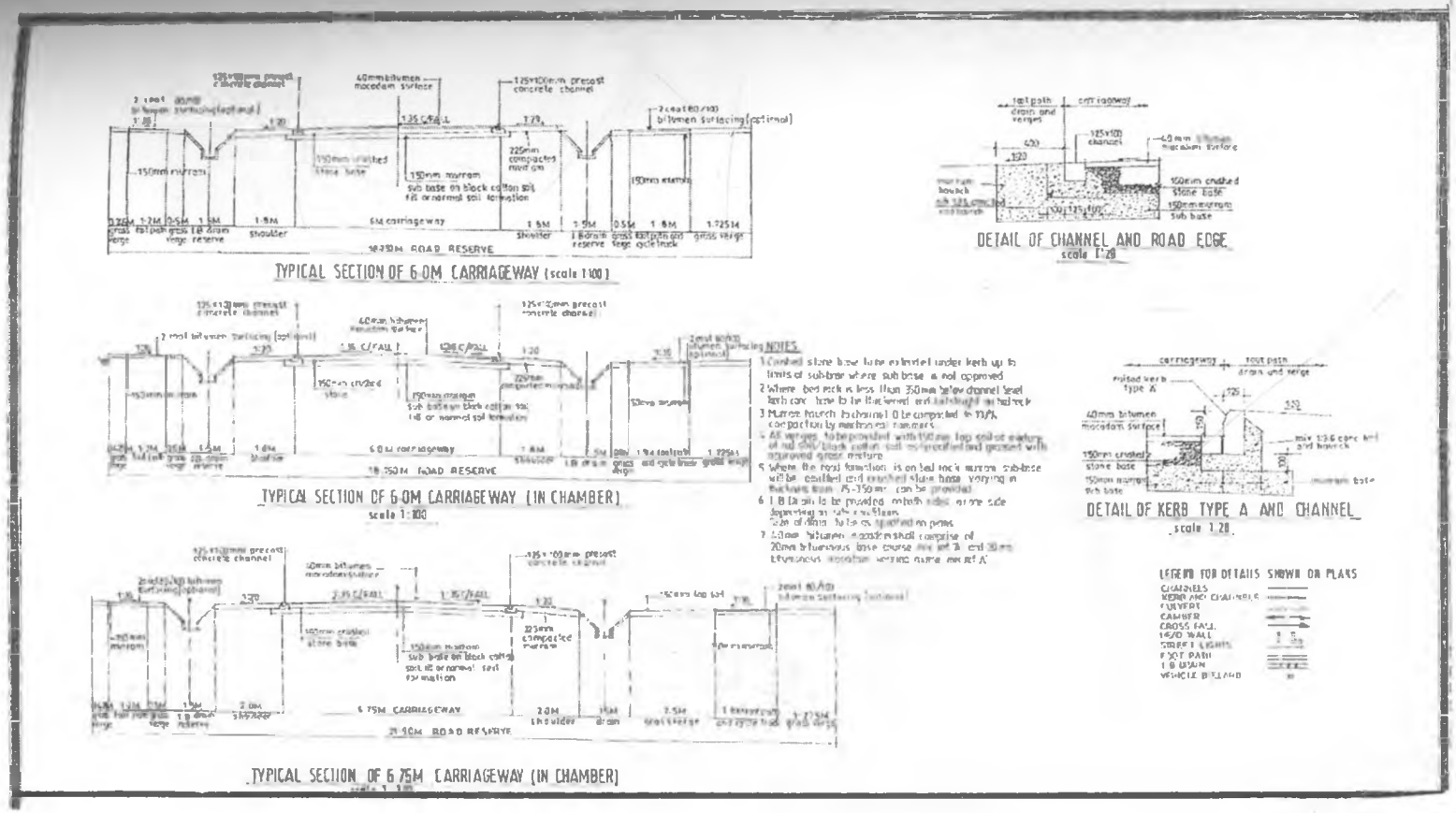


DETAIL OF RECTANGULAR INVERT BLOCK DRAIN

SCALE 1:20

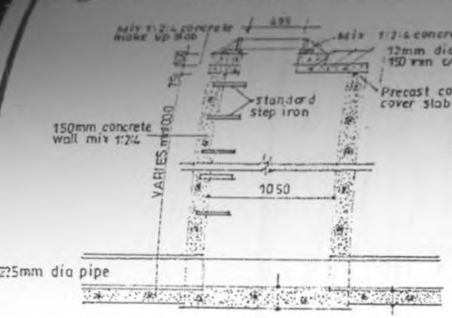
Source: (NCC, 2003)

Fig. 3.22 Typical Road Cross-sections

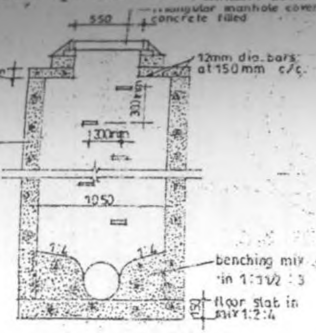


Source: (NCC, 2003)

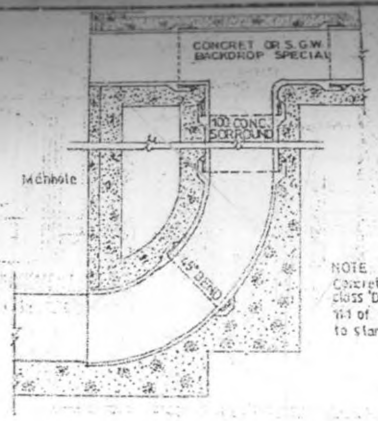
Fig. 3.23 Standard Manhole and Trench and Pipe Details



SECTION C-C



SECTION D-D



END ENTRANCE BACKDROP
SCALE 1:30

NOTE
Concrete beds and sorroundings class 'D' in accordance with table 11-1 of the specification. manhole to standard details.

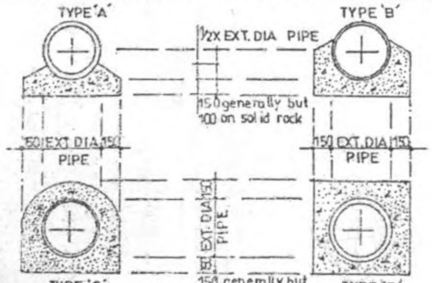
INTERNAL NOMINAL PIPE DIAMETER	PIPE THICKNESS	HAUNCH TYPE TYPE 'A' 100mm	TYPE 'A' 150mm	TYPE 'B' 100mm	TYPE 'B' 150mm	TYPE 'C' 100mm	TYPE 'C' 150mm	TYPE 'D' 100mm	TYPE 'D' 150mm
150mm	25mm	0.0642	0.094	0.0845	0.1107	0.1705	0.1967	0.1980	0.2242
225mm	28mm	0.0783	0.1078	0.1262	0.1557	0.2154	0.2449	0.2542	0.2819
300mm	30mm	0.0938	0.1277	0.1557	0.1905	0.2616	0.2964	0.3099	0.3446
375mm	34mm	0.1079	0.1470	0.1864	0.2254	0.3093	0.3483	0.3701	0.4091
450mm	37mm	0.1253	0.1688	0.2207	0.2643	0.3621	0.4057	0.4380	0.4815
525mm	43mm	0.1433	0.1916	0.2563	0.3045	0.4157	0.4650	0.5049	0.5532
600mm	50mm	0.1619	0.2146	0.2942	0.3470	0.4729	0.5257	0.5841	0.6368
675mm	53mm	0.1804	0.2374	0.3309	0.3879	0.5268	0.5838	0.6557	0.7137
750mm	56mm	0.1986	0.2599	0.3681	0.4293	0.5820	0.6433	0.7321	0.7934
900mm	62mm	0.2377	0.3075	0.4461	0.5159	0.6970	0.7668	0.8917	0.9615
1050mm	68mm	0.2809	0.3604	0.4943	0.5738	0.8177	0.8972	1.0630	1.1425
1200mm	75mm	0.3289	0.4159	0.6227	0.7097	0.9443	1.013	1.2456	1.3329

CONCRETE QUANTITIES IN BEDS AND SORROUNDINGS FOR G-G CONCRETE PIPES (CU.m PER LIN.m)

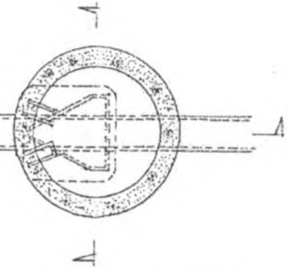
DEPTH TO TOP OF PIPE	PIPE DIAMETER 150	225	300	375	450	525	600	675	750	<750
<1.25m in roads <1.0m elsewhere	TYPE 'C'									AS SPECIFIED BY ENGINEER
<4.0m	TYPE 'A' concrete bed may be deleted at the descretion of the eng.							TYPE 'B'		
>4.0m	TYPE B									
>6.0m or in heading	TYPE 'C' OR 'D' AS DIRECTED									

TYBE OF BED AND HAUNCH TO BE USED

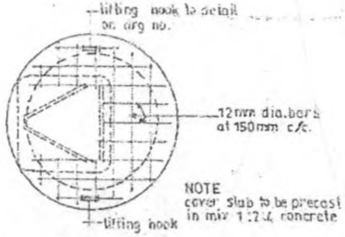
All haunches are class 'D' concrete as specified in table 11-1 of the speafication over excavation to be made good in concrete class 'E'.



CONCRETE PIPE BEDS AND HAUNCHES

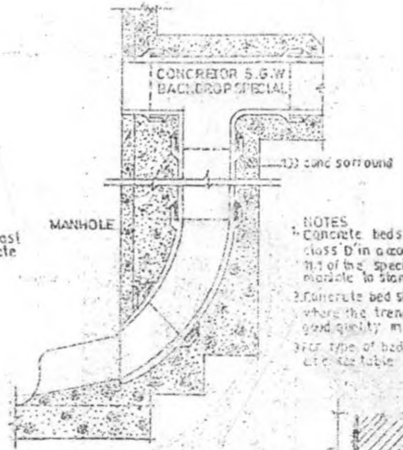


RING MANHOLE DEPTH 1000mm AND UP TO 3000 mm
SCALE 1:40



TOP SLAB REINFORCEMENT DETAIL
SCALE 1:40

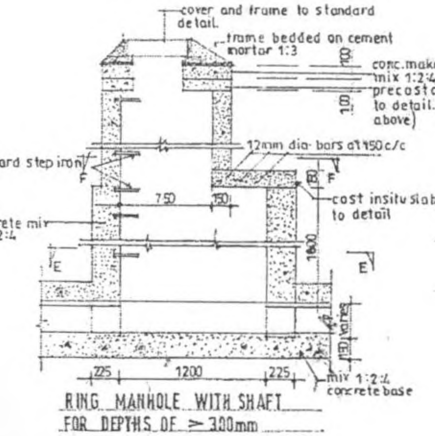
NOTE
1. Manhole cover to be triangular Heavy duty concrete filled cover to detail on drawing no.
2. Standard step irons to comply with B.S.S. 497
3. Cast insitu manholes to be cast using steel moulds.



SIDE ENTRANCE BACKDROP
SCALE 1:30

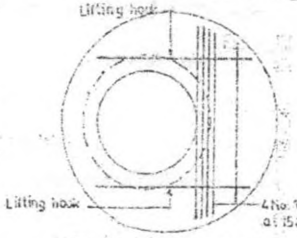
NOTES
1. Concrete beds and sorrounds class 'D' in accordance with table 11-1 of the specification. manhole to standard details
2. Concrete bed shall be 100mm in areas where the trench bottom is in rock or good quality murrum
3. For type of bedding and sorround see table

NOTE
All dimensions in millimetres

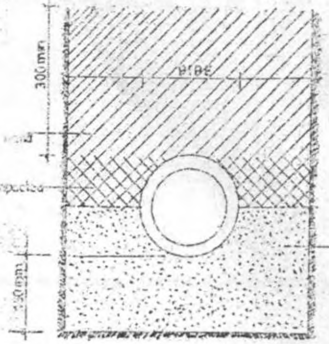


RING MANHOLE WITH SHAFT FOR DEPTHS OF > 3000mm

SECTION E-E
SCALE 1:40

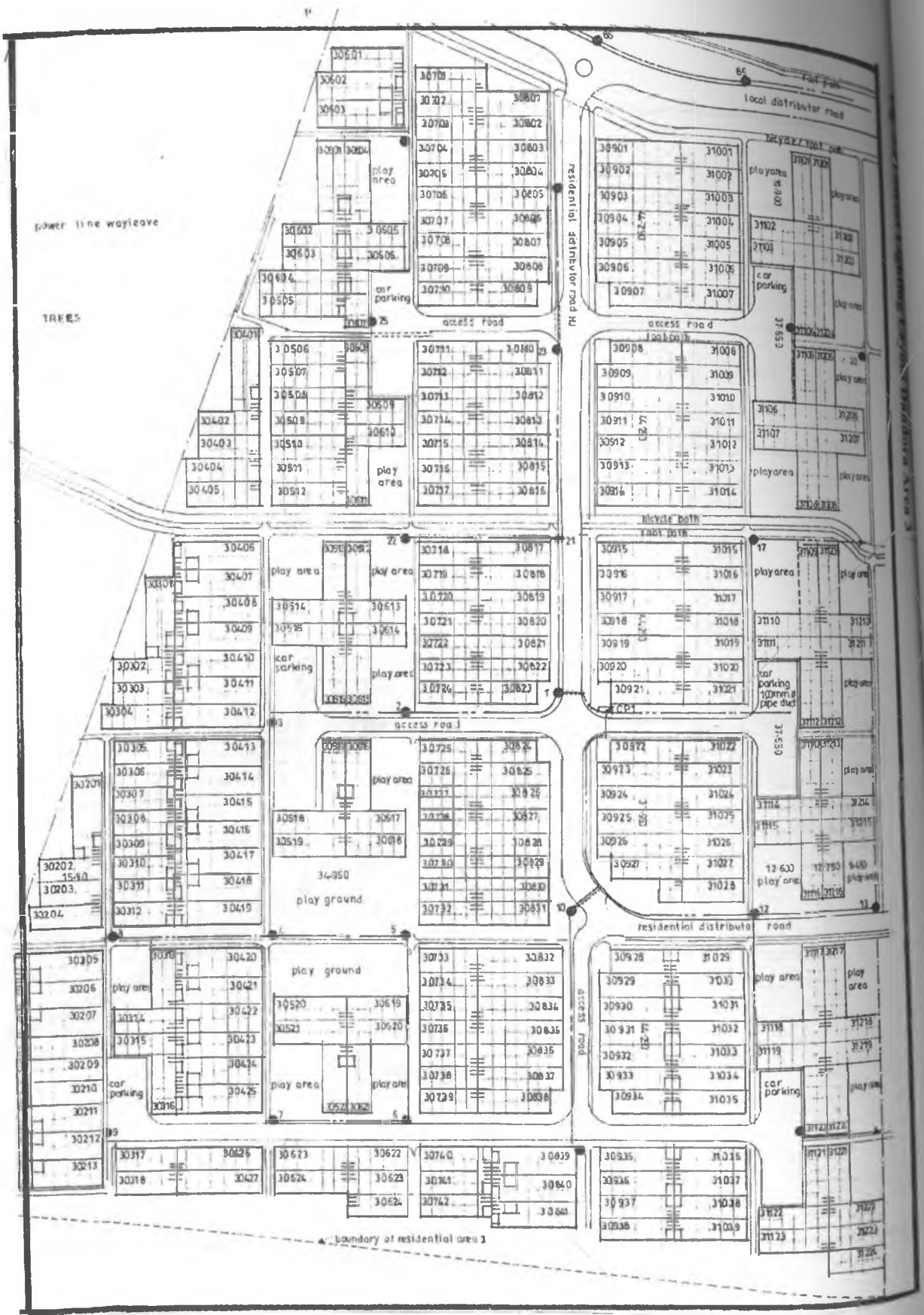


SLAB REINFORCEMENT DETAIL SECTION F-F

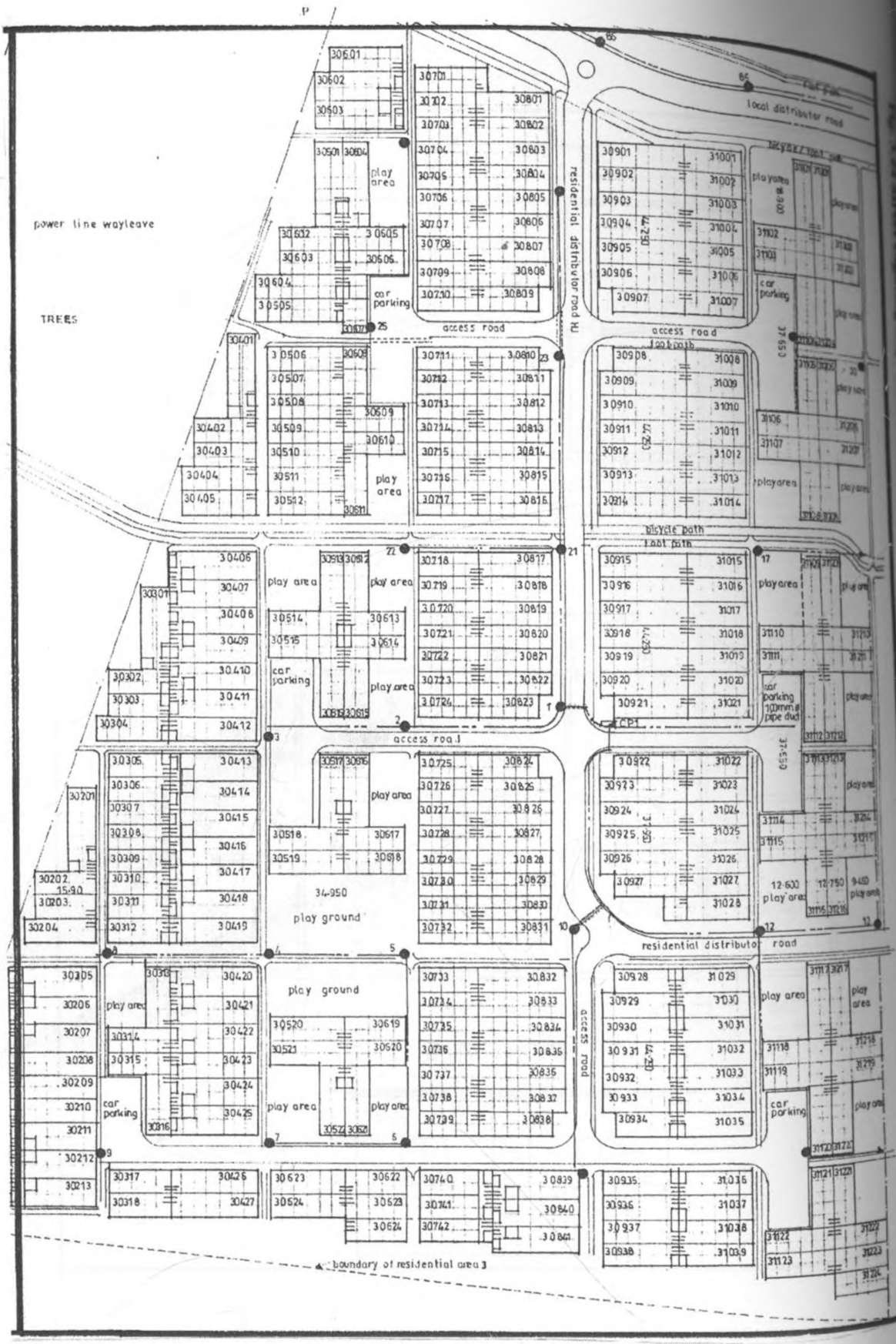


GRANULAR BEDDING FOR RUBBER RING-JOINTED PIPES
SCALE 1:10

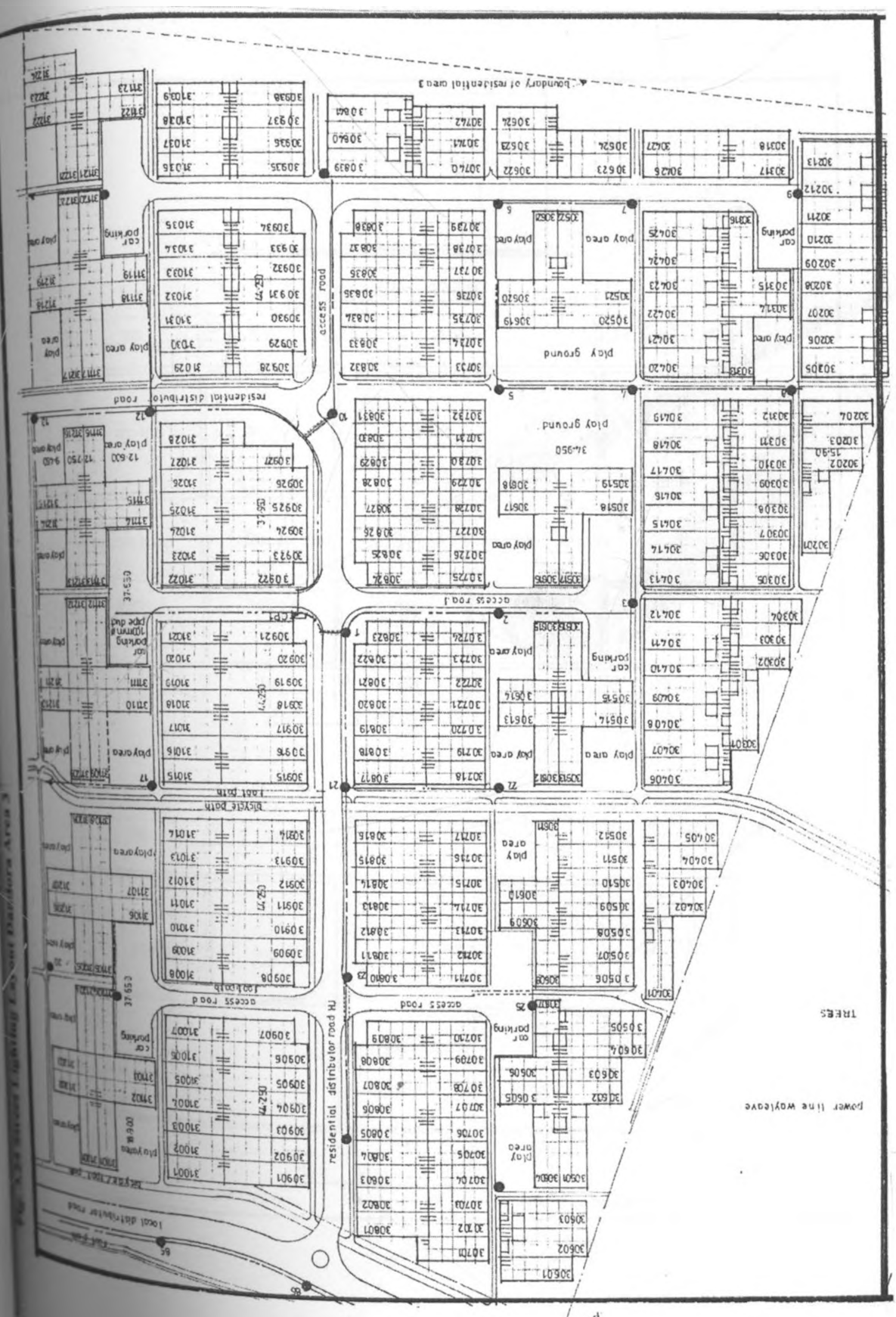
Source: (NCC, 2003)



Source: (NCC, 2003)

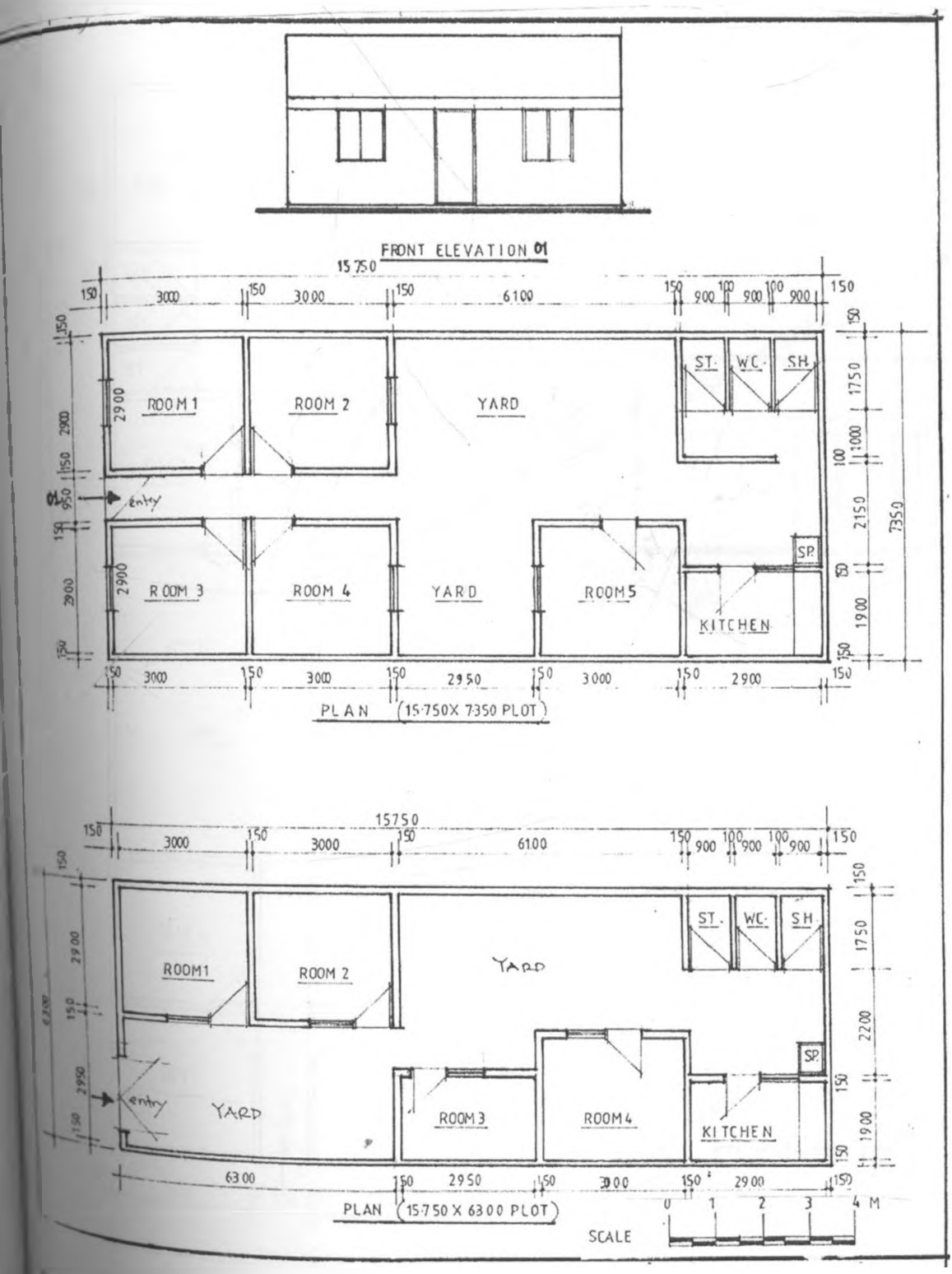


Source: (NCC, 2003)



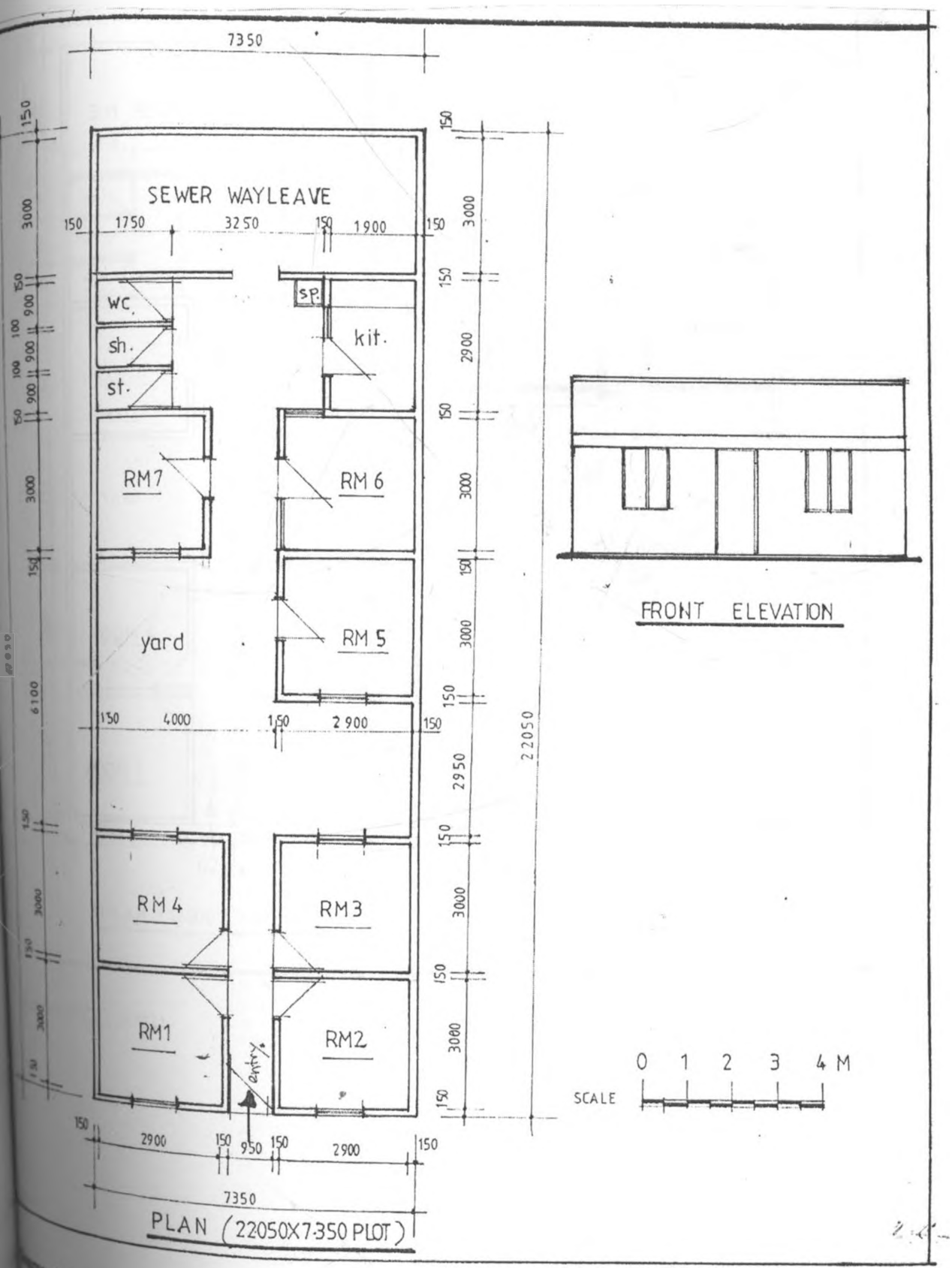
Source: (NCC, 2003)

Fig. 3.25: Dandora Type Plan (I)



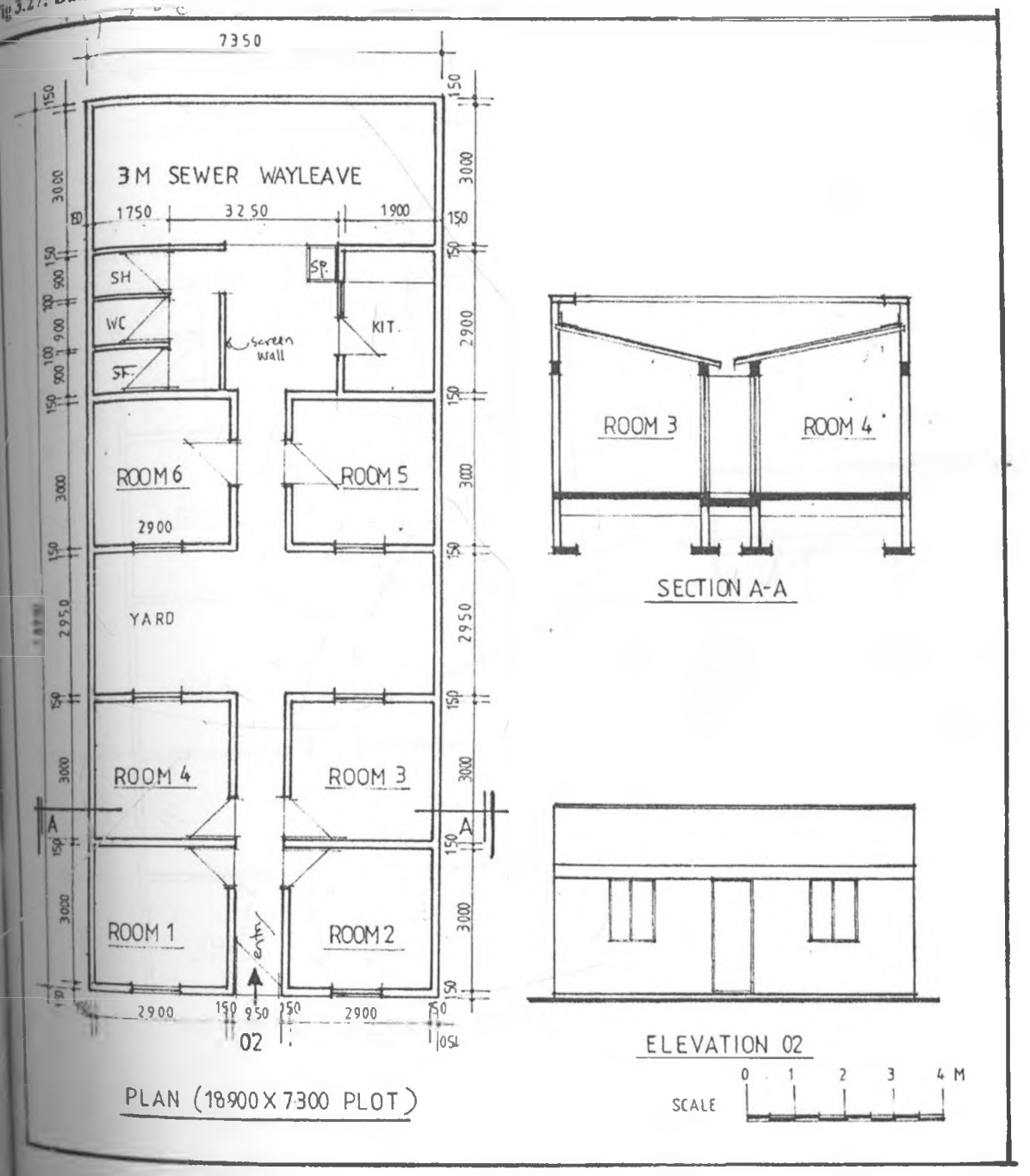
Source: (NCC, 2003)

Fig. 3.26 Dandora Type Plan (ii)



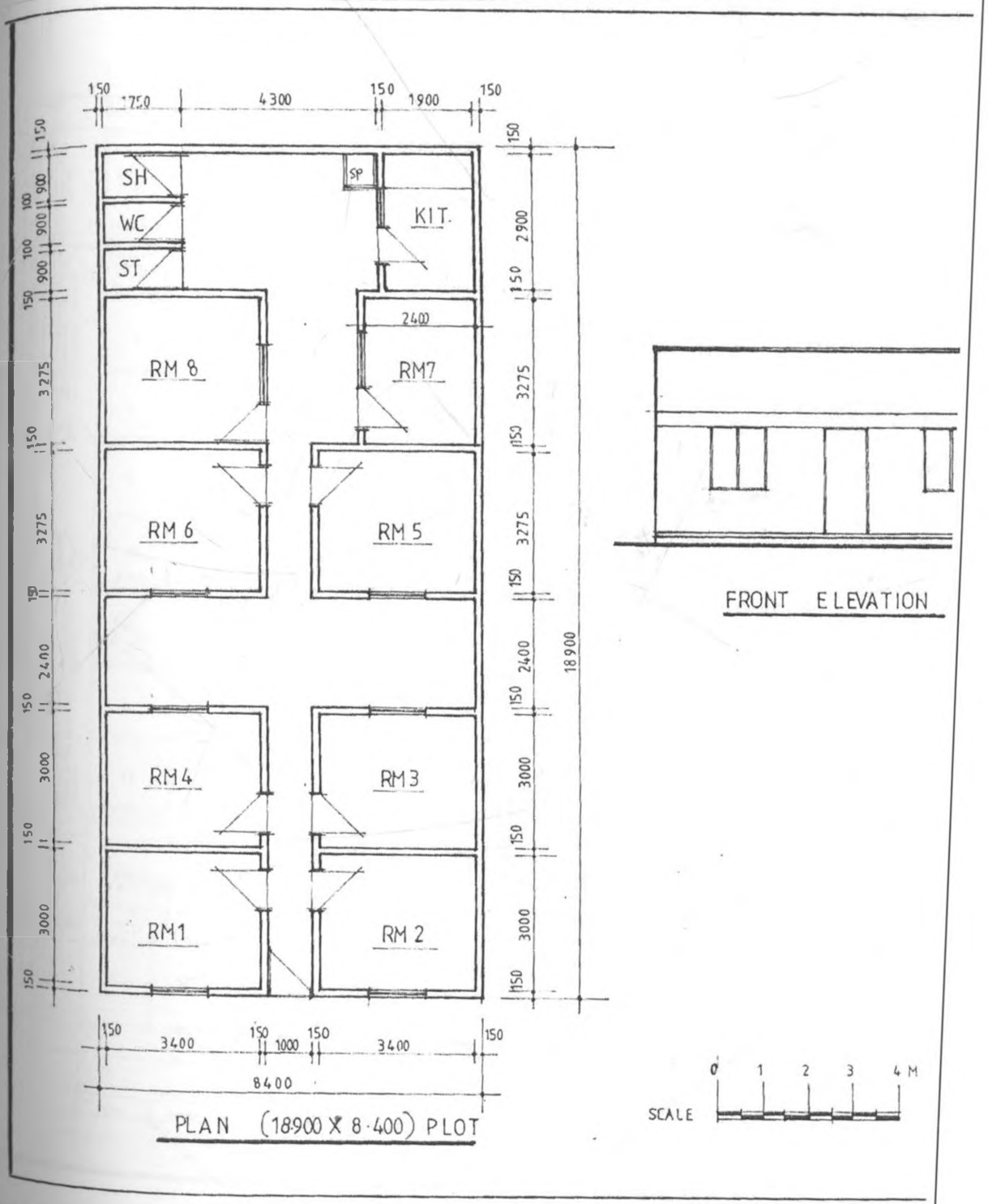
Source: (NCC, 2003)

Fig 3.27: Dandora Type Plan (iii)



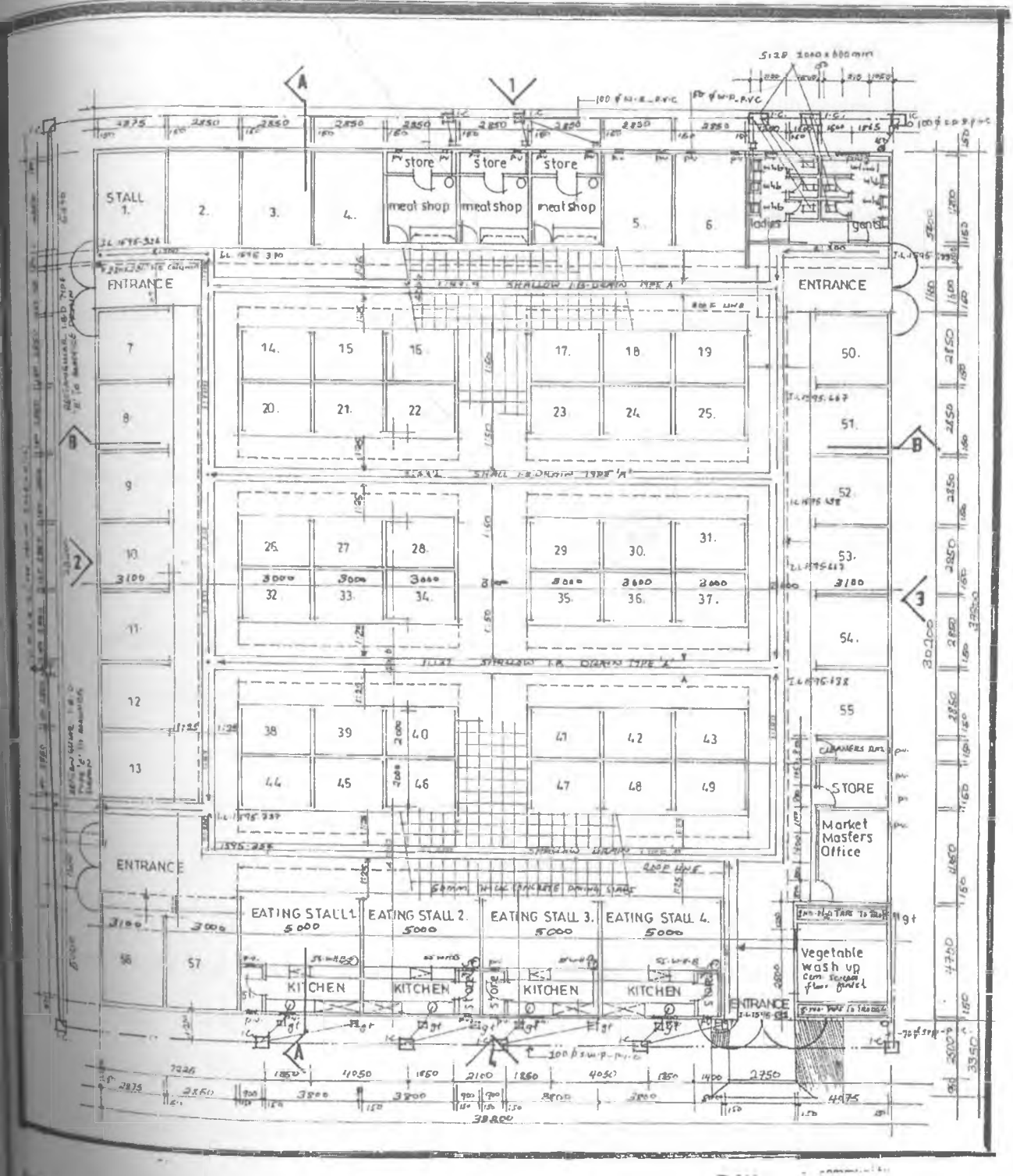
Source: (NCC, 2003)

Fig. 3.28 Dandora Type Plan (iv)



Source: (NCC, 2003)

Fig 3.29: Market No. 4 Layout



Source: (NCC, 2003)

Construction work for Phase I started in October 1975 and was completed in November 1976. This consisted of 1029 serviced residential plots comprising 690 Type A plots, 264 Type B plots, 54 Type C plots and 21 demonstration plots. It also included 3 day care plots, 13 commercial plots, 1 primary school, 1 health centre, 1 community centre, 2 markets, 1 workshop cluster and associated on-site and off –site infrastructure: sewerage water reticulation, roads, storm water drainage, street lighting and temporary stabilization ponds. Consolidation works in phase 1 i.e completion of individual housing units, started in February 1977 after the allottees were issued with house type plans.

Construction work for phase II which was defined as the areas which could not be served by the temporary sewerage treatment works constructed in Phase I, started in May 1978 and was completed in September 1981. This phase had 4962 serviced residential plots, 5 primary schools, 4 markets, 1 multipurpose hall, 1 health centre with maternity wing, 1 sports complex and on – site infrastructure.

There were delays in the implementation of Phase II due to disagreements between various NCC departments with regard to the planning and building standards used in Phase I which was based on Grade II bylaws. This caused considerable delay in the approval of plans. Phase II Residential Areas II and III were started in May 1978 and completed in June 1980. Residential areas II and III comprised of 1741 and 969 plots respectively. Consolidation work in area II began in December 1979. Residential Area IV and V were completed in September 1981 and December 1980 respectively. The comprised of 1625 and 600 plots respectively with associated on- site infrastructure.

Phase 3 of Dandora comprised Residential Area 6, having a total of 1000 market sale plots to be developed in 19 blocks measuring 1.5 hectares to 2.0 hectares. Infrastructure developed included both on-site and off-site infrastructure. Dandora area 6, part of urban II project, was completed in 1984.

With the closure of urban projects due to financial withdrawal by the WB on 31st December 1982, the project cost for Phase I and II stood at approximately KShs. 252 million as shown in Table 3.1. There was a shortfall from the total project cost as per the appraisal report due to some factors. These included the desired improvement in design of community facilities especially schools and health centres and an overall 3 year delay in project implementation. The shortfall was met by the GoK. The total cost of Dandora Area 6 market sale plots preparation as on 31st December 1983 was approximately KShs. 12 million (Table 3.2)

Table 3.1: Overall Project cost for Phase I & II as on 31.12.1982.

Area/Component	Cost (KShs.)	Total Cost
PHASE I		
Civil & Building Component	10,169,852.85	
Primary School	1,263,529.00	
Health Centre	1,062,000.00	12,495,381.85
PHASE II		
Consultancy		6,241,329.65
Area 2 & 3		
Civic & Building Components		44,987,952.35
Area 4 & 5		
Civic & Building Components		41,012,820.25
Primary Schools in Areas 2-5	8,242,493.00	
Health Centre with maternity wing	2,741,177.50	10,983,670.50
Off-site trunk Infrastructure		75,096,624.00
Project Administration		35,492,764.65
Materials Loans		23,855,310.00
Miscellaneous		2,446,330.00
Total cost		**252,612,193.85**

Source: (Author's Construct from various NCC Annual Reports, 2008)

NB: Included in the Building component are the costs of Six (6) markets, social centres and sports complex constructed under area 4 & 5 contracts.

Table 3.2: Total Project Cost for Phase 3 as on 31.12.1985

Component	**Cost KShs.**
Consultancy Services	1,425,169.45
Spine Road	3,220,982.35
Site Preparation	7,566,471.65
Total Cost	**12,212,623.45**

Source: (NCC, 1990)

Table 3.3: ACTORS IN DANDORA PROJECT IMPLEMENTATION

Classification	Institution	Agency	Role
External Support agencies (ESAs)	World Bank (WB)	IBRD IDA	• Provision of part of the project finance • Project evaluation and monitoring
	United Nations	United Nations Industrial Development Organization (UNIDO)	• Preparation of the evaluation report on potentials for economic employment within DCDP
		UNICEF	• Financing local and overseas training for staff members of DCDP • Financing of Day Care and Women Training Centre at former Khan House. • Provision of grants to Neighbourhood communities to improve the environment through better health habits.
	European Economic Commission (EEC)		• Funding of Workshop Cluster in Dandora Phase I. This included 40 small workshop units, basic workshop equipment & machinery; initial stock of raw materials and remuneration of workshop management for the first 12 months
National Government	GoK	Ministry of Finance & Planning National Housing Corporation(NHC)	• Negotiations for project with WB • Provision of part of the project finance • Guarantee for loan agreement with IBRD
		Local Government Loans Authority (LGLA)	• Guarantee of credit agreement with IDA
		Ministry of Local Government	• Loan agreement with NCC project monitoring
		Ministry of Lands & Settlements	• Provision of land for the project loan disbursement to NCC
Local Government	City Council of Nairobi (NCC)	DCDPD	• Vetting of allottees • Implementing the Dandora project • Design of schools, health centres and workshop clusters • Loan disbursement to allottees
		City Engineers Department	• Approval of drawings (Town Planning Section) • Maintenance of Dandora office buildings and grounds
		Town Clerks	• Preparation of lease agreement with plot allottees
		Social Services & Housing Dept.	• Running of Khan House Day Care Centre & Women's Training Centre
		City Treasurer's Dept.	• Project Finance Monitoring
		Public Health Dept.	• Approval of drawings
		Water & Sewerage Dept.	• Design of Water reticulation • Design of part of sewer reticulation

Classification	Institution	Agency	Role
Private Sector	Consultants	Mutiso Menezes International	Lead Consultant
		I.B Patel, Mangat & partners	Engineering design
		Armstrong & Duncan	Quantity Survey Work
		VIAK (EA)Ltd	Trunk sewer design
		Carl Bro Kenya Ltd	Dandora Area 6 Engineering Consultancy
		Kamwere & Associates	Engineering Survey
		Senga, Ndeti & Associates	Evaluation and monitoring study
		Coopers Lybrand & Associates Ltd in conjunction with University of Birmingham	Housing Operations Study
		Waweru & Associates	Study of Low Cost Housing and squatter Upgrading in Kenya. DCDPD formed part of the project definition team
	Contractors	• S.S Mehta and sons	• Civil Engineering works for Dandora Phase I
		• Patrickson & Coxon	• Sub contractors for building works for Phase I
		• Gurbaksh Electrical Service	• Street Lighting for Phase I
		• M/S Ahmed Khan (1973)	• Trunk sewer and temporary stabilization ponds for Phase I
		• M/S Lalji Bhimji Sanghani	• Trunk sewer for Phase II
		• Mowlew Construction Company Ltd	• Treatment Works
		• Twiga Construction Ltd	• Civil & Building works for Phase II • Northern Spine Road
		• M/S. Shiv Construction Co.Ltd	• Water reticulation construction
Non-Governmental Organization	NCCK		• Designing management structure of DCDP • Designing of allocation procedures
	Kenya Catholic Secretariat		• Operation of a demonstration garden • Organizing a communication workshop for staff members
Non formal private sector		Building group	• Pooling of finances, planning construction on each members plot & carrying it out
		Hawkers	• Hawking of food and other items
		Craftsmen & Masons	• Consolidation works
		Allottee	• Plot owners and consolidation works

Source: (Author's Construct from various NCC Annual Reports, 2008)

It is clear from table 3.3 above that different actors had to partner together for successful implementation of a project of Dandora's magnitude. The actors include external support agencies, the National Government through different ministries and departments, the Local Government, the commercial private sector, third sector organizations, the non-formal private sector and the project beneficiaries themselves.

Each of these played their different roles by applying the various forms of assets available to them. External support agencies provided both financial and human capital; the National Government provided both human and natural capital(in terms of land), the Local Government provided both human and social capital while the commercial private sector used both human, natural and financial capital to produce physical capital in terms of roads and other physical infrastructure. The NGOs applied human and financial capital to enhance social capital among the project beneficiaries. The non-formal private sector engaged human, social and financial capital to produce physical capital.

In agreement with the conceptual framework outlined in fig 2.2 and as we have already seen in this chapter, the Dandora Project in implementation was affected by many external factors ranging from financial aspects, the number of institutions involved and also policy, political and legal aspects.

It has been argued and rightly so that successful project implementation requires the involvement of all stakeholders in all the phases of the project – from conceptualization, design to monitoring and evaluation.

Box 3.1: **What is partnership?**

Partnership implies

- An active and deliberate process, even if partners are active in not doing something.
- A process of working together in mutually-interdependent fashion, often with shared responsibilities.
  Most successful partnerships are those in which each partner drives something beneficial, and gains access to something that it does not have from the other partner or partners in the relationship.
- A common agenda and goal, even the interests, benefits and powers of the partners differ.
- A relationship in which accountability and transparency are crucial.

Source: (UNCHS – Habitat, 1993)

3.2.10 Land use patterns and Characteristics

Dandora is zoned broadly for pure residence. Apart from residential land use, others found in the area include commercial – shopping centres, market stalls (market A to F,) two petrol stations (Total and BP), supermarkets, open air markets and kiosks; educational institutions which include Council of Nairobi primary schools – Dandora Primary School, James Gichuru, Wangu, Tom Mboya, Ronald Ngala and Ushirika, other primary schools run by other institutions like Dandora Holy Cross Catholic /church and P.C.E.A. Dandora Church and also by private individuals; Nursery schools; one secondary school – Dandora Secondary School and Vocational Training Schools.

Public purposes land use includes institutions like the NCC Housing Development Department situated in Dandora Phase 1, Kinyago Police Post; and religious institutions – Holy Cross Church, P.C.E.A. Dandora Church,

Believers Centre Church, Deliverance Church, Anglican Church of Kenya, Baptist Church, Legio Maria, Tabernacle Church, Masjid Ridwan Mosque, Seventh Day Adventist Church and Gospel Revival Center, among others.

Recreation is provided by the two NCC Community Centres, playing fields in the various schools and also in the spaces within the estate.

Health facilities include two NCC Health Centres and other health centres run by religious institutions and private individuals.

Light manufacturing, especially of metal household goods like doors and windows is carried out within the NCC owned workshop cluster and other privately owned premises scattered all over the estate but predominantly along the central spine. Transportation which takes approximately 20per cent of the usable land area (Kruijff, 1989) is provided through a network of roads, the main ones being the New Komarock road, the Northern Spine (John Osogo) road, the Southern Spine road and the Southern Access (Apudo) road.

Urban agriculture activities noted include the growing of maize, sugarcane, and bananas and rearing of domestic animals that include goats, sheep, cows and pigs.

Way leaves for public utilities like water, sewers, storm water drainage, telephones and electricity are provided.

3.3 Existing Situation

3.3.1 Population

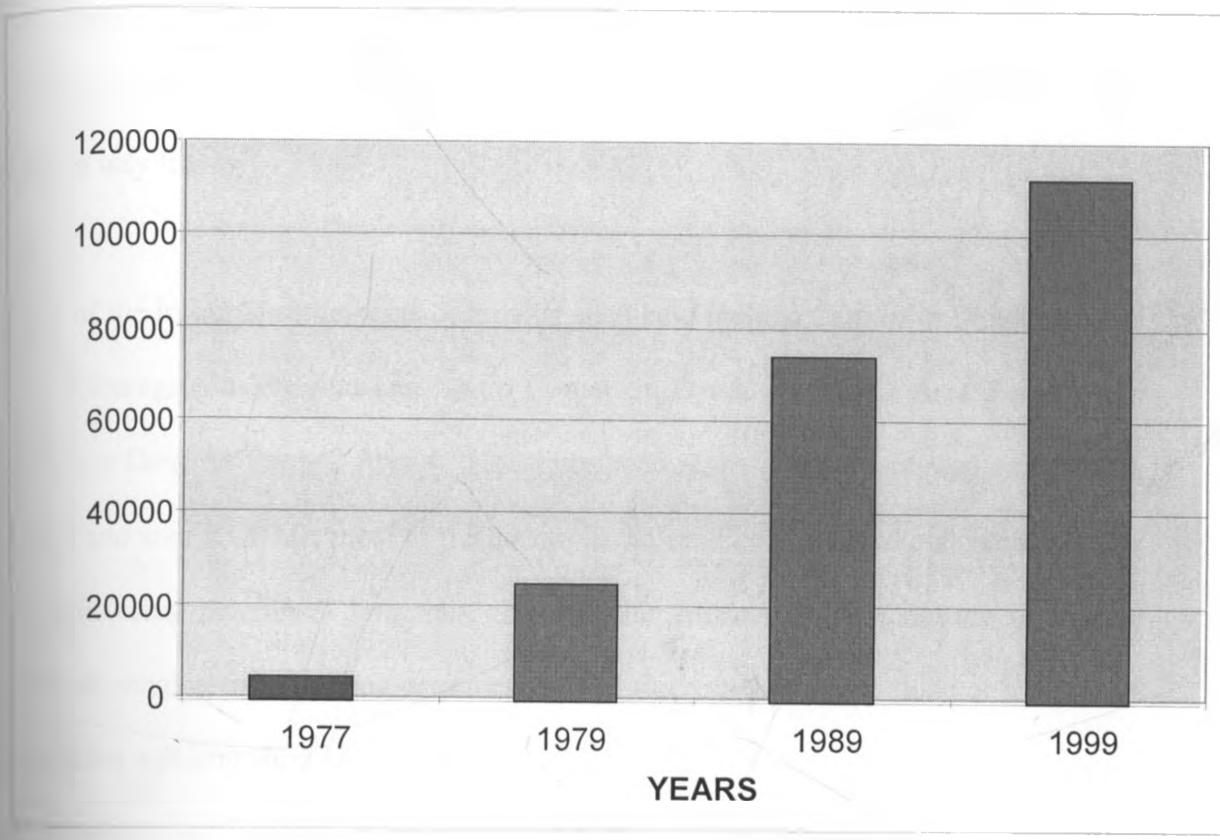
The population of Dandora has increased progressively from 6,000 people in 1977 (NCC) to 22,672 people in 1979, 71,838 people in 1989 and 110,164 in 1999 (GoK, 1979, 1989, 1999). This represents an increase of 139 per cent p.a between 1977 and 1979, an increase of 21.7 per cent p.a between 1979 and 1989 and an increase of 5.30 percent p.a between the intercensal years of 1989 and 1999

Table 3.4: ***Population of Kenya, Nairobi and Dandora by sex, number of Households, area and density of Persons (per Sq. Km)***

Year	Area	Male	Female	Total	Households	Area in Sq. KM	Density
1969	Kenya	5,482,381	5,460,324	10,942,705		582,547	19
	Nairobi	303,819	206,067	509,286		693	734
1970	Kenya	7,607,113	7,719,948	15,327,061	2,956,369	564,162	27
	Nairobi	479,448	348,327	827,775	200,474	684	1,210
	Dandora	12,523	10,149	22,672	6,253	4	5,668
1989	Kenya	10,628,368	10,815,268	21,443,636	4,352,751	581,787	37
	Nairobi	752,597	517,973	1,324,570	382,863	693	1,911
	Dandora	39,397	32,441	71,838	24,638	4	17,960
1999	Kenya	14,205,589	14,481,018	28,686,607	6,371,370	581,677	49
	Nairobi	1,153,828	989,426	2,143,254	649,426	696	3,079
	Dandora	57,353	52,811	110,164	36,691	4	33,579

Source: (GoK, 1969, 1979, 1989, 1999)

Fig 3.30: Population Growth in Dandora



Source: (GoK, 1979, 1989, 1999)

It is clear from Table 3.4 that density of people per km^2 in Dandora has progressively increased over the years, from 5,668 people per km^2 in 1979 to 33,579 people per km^2 in 1999. This increase both in population and in density implies greater demand and strain on the available physical infrastructure.

3.3.2 Housing

Plot consolidation in the original serviced plots has substantially taken place. Houses of different typologies have been built ranging from single storey to multiple-storey buildings, a big deviation from the originally issued type plans as seen earlier in 3.2.9.

House types range from single rooms to flats. There is also an emergence of housing structures on land originally planned for other land uses like light industries, power way leaves, road reserves, public car parks, foot paths, open spaces, shopping centres and riparian way leaves.

Some of the informal settlements occupying such land include Canaan in Dandora Phase I, Ex-Kibarage, Ex-Muoroto and 'sharp Corner' in Dandora Phase 2 Area 5 and Gitari Marigu in Dandora Phase 2 Area 4. Houses on road reserves are found predominantly in Area 2 and area 3. While most of the houses in the originally planned and serviced plots are built using permanent materials, those in the informal settlements are of diverse materials ranging from earthen or cement-screed floor; mud, natural stone or iron sheets for walling and iron sheets for roofing.

3.3.3 Other Buildings

Apart from residential housing other buildings include a police post, various church buildings, schools, community centres, workshops, petrol stations, shopping centres, markets and health centres (see 3.3.5)

3.3.4 Infrastructure

3.3.4.1 Roads

Most of the access roads are highly dilapidated. Some of the problems observed include presence of potholes, cracking of the road service; rutting; edge damage; obstructions mainly from kiosks, soil heaps and construction debris; high vegetation on the shoulders, depressions, missing road furniture and stripping/fretting of the road surface.

3.3.4.2 Street Lighting

Street lights where existing were either not functional, damaged or dirty (worn out paint work or rusty street lighting poles) in most of the areas. Obstruction by informal business (kiosks) was also noted.

3.3.4.3 Footpaths and Non Motorized Traffic paths

Obstruction by informal businesses (kiosks), poor physical condition (potholes) and dumping on the footpaths and NMT route was noted. Encroachment by residential buildings has resulted in reduction of the widths of the footpaths in some areas.

3.3.4.4 Water and Sanitation

Water and sewerage services are still being provided by the NCC. Blocking of sewerage system was the main problem noted.

3.3.4.5 Storm Water Management

Problem identified included

Culverts – Silting, blockage by debris, damaged ditch lining, obstruction by kiosks and overgrowth of vegetation.

3.3.4.6 Solid Waste Management

Solid Waste Management services in the area are provided by the NCC and the private sector- formal and informal. Accumulation of garbage heaps was noted indicating irregularity and inadequacy of the service.

The official dumping site in Nairobi is located in Dandora. Currently dumping has overflowed into Dandora area 6 residential plots, not only making the plots undevelopable but also contributing to high potential health risk to the residents in the vicinity.

3.3.5 Community Services

The main community establishments in Dandora include the Housing Development Department (HDD) of the NCC, a police post, various religious institutions, educational institutions, health institutions, social and cultural welfare institutions, markets and shopping centres.

Plate 3.2 Dandora Health Centre

Source: (Field Survey, 2008)

PLATE 3.3 **James Gichuru Primary School located in the Central Spine, Dandora Phase 2 Area 2 (Note: The dumping of solid waste in the foreground)**

Source: (Field Survey, 2008)

PLATE 3.4: **Ushirika Primary School located in the Central Spine, Dandora Phase 2 Area 5 (Note: The goats lying on the road – evidence of urban agriculture)**

Source: (Field Survey, 2008)

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the case study done in Dandora. It is based on primary data gathered by the use of semi-structured questionnaire administered to residents of the area and also on data gathered by the researcher through observation and interviews. The data includes demographic structures, housing characteristics, socio-economic characteristics, conditions of infrastructure and community structure among others.

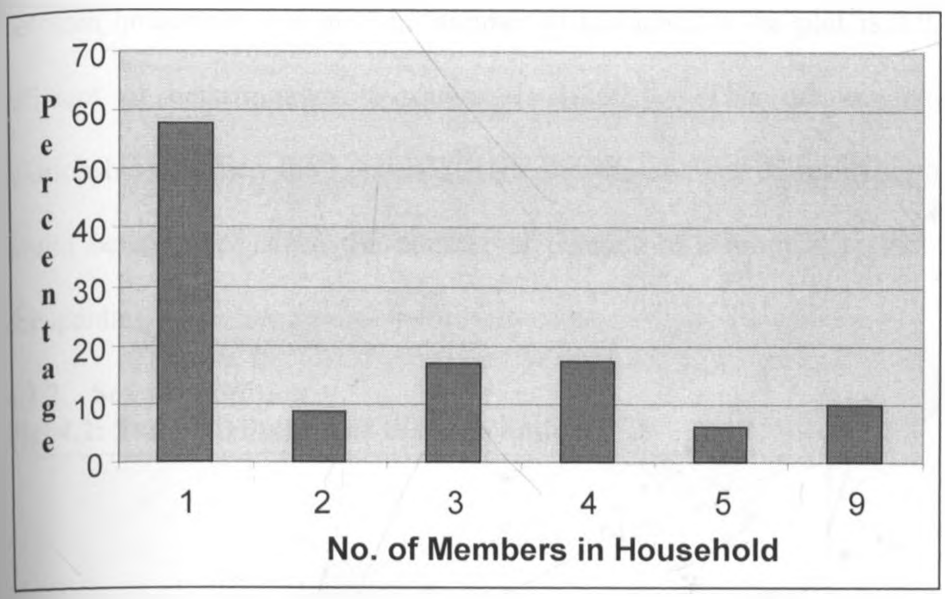
4.2 Household characteristics

This section presents the household characteristics in terms of size, age, sex distribution, marital status, level of education and period of stay in both Dandora and Nairobi.

4.2.1 Household Size

This shows the number of members in a particular household. It is a way of indicating the level of overcrowding in the housing units.

Fig 4.1 Household Size



Source: (Field Survey, 2008)

According to the survey results, a cumulative 84.4 percent of the households had between 1 to 3 members with the majority representing 56.7 percent being single member households. The results are consistent with the single room housing that is predominant in the area (see results on housing in 4.3). 14.4 per cent of the households had either 4 or 5 members which is in the medium room density range while 1.7 per cent had 9 members, indicative of high density housing.

Table 4.1 Household Size – Number of Residents in Plot Correlation

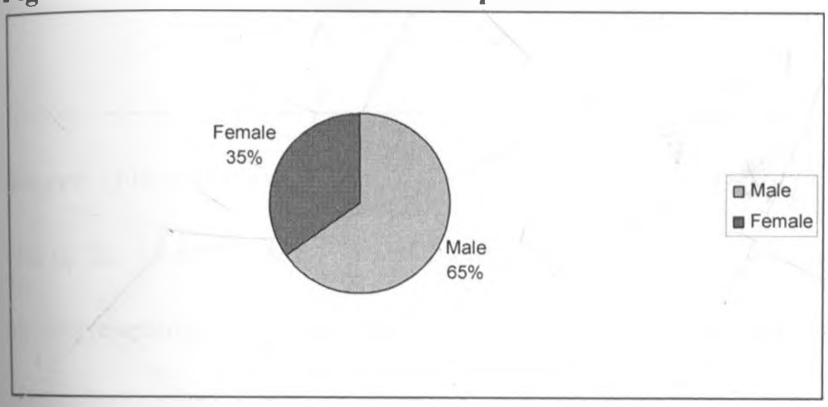
		Household size	No. of Residents in plot
Household Size	Pearson Correlation	1.000	0.037
	Sig. (2 Tailed)	-	0.738
	N	96	86
No. of Residents in plot	Pearson Correlation	0.37	1.000
	Sig. (2 Tailed)	0.738	-
	N	**86**	**89**

Source: (Field Survey, 2008)

From the Pearson Product-moment correlation above, the co-efficient of correlation between household size and the number of residents in the plot is 0.037 while the co-efficient of determination (r-square) is 1.369^{-03}. This denotes negligible positive relationship between the household size and the number of residents in the plot. This would be expected since the number of persons in a room is at the discretion of the occupants.

4.2.2 Sex distribution

Fig. 4.2: Sex Distribution of the Respondents

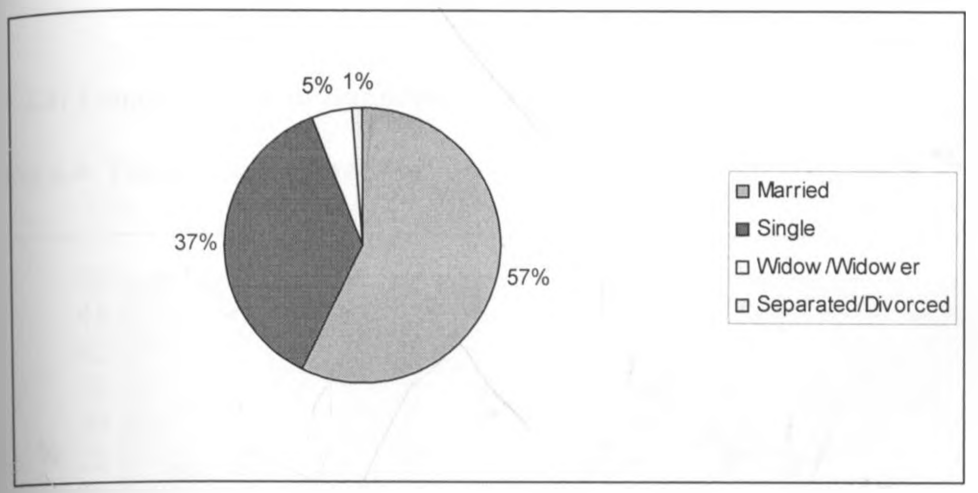


Source: (Field Survey, 2008)

The results indicate that the population of males is higher to that of females, with 64.6 per cent being male and females 35.4 per cent. The results have a significant positive relationship with general sex distribution in both Dandora and Nairobi as seen in various census reports (Table 3.4)

4.2.3 Marital Status

Fig 4.3: Marital Status of the Respondents



Source: (Field Survey, 2008)

Out of the 94 respondents, 53 of them representing 56.4 per cent were married while 35 no. representing 37.2 per cent were single. 1.1 per cent and 5.3 per cent of the respondents were widows/widowers and separated/divorced respectively. The results imply a fairly cohesive community, an important attribute to consider if the management option to be adopted will entail an element of community participation. Community participation for sustainability of projects as illustrated in the conceptual framework in figure 2.2.

There is no relationship between the sex distribution of the respondents and the marital status of the respondents.

Table 4.2: Sex Distribution – Marital Status Correlation

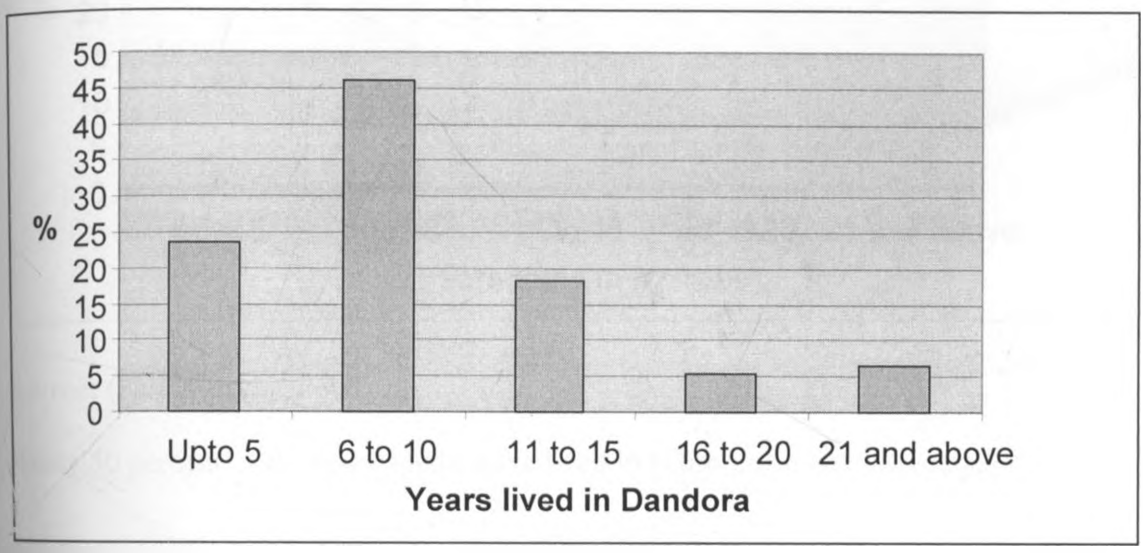
		Sex of the Respondents	Marital Status
Sex of the respondents	R	1.000	-0.004
	N	96	96
Marital Status	R	-0.004	1.000
	N	96	140

Source: (Field Survey, 2008)

A sex distribution – marital status correlation yields a coefficient of correlation (r) of -0.004 signifying no relationship between the two variables.

4.2.4: Length of Stay in Dandora

Fig 4.4: Years lived in Dandora

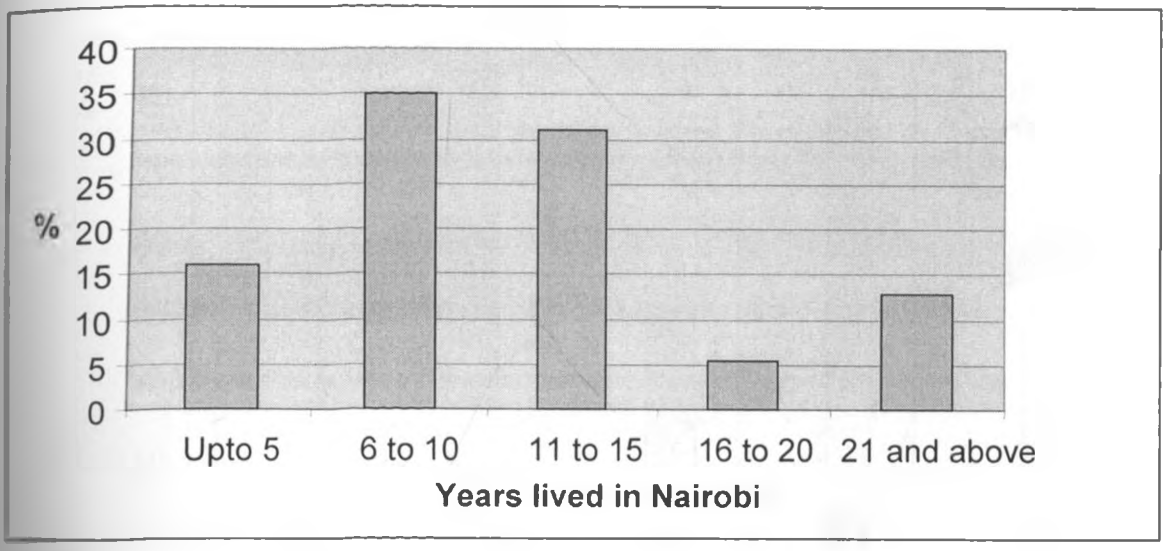


Source: (Field Survey, 2008)

It is evident from figure 4.4 that about 24 per cent of the respondents have lived in Dandora for up to 5 years while about 6.5 per cent (almost two-thirds) have lived in Dandora for a period long enough to appreciate the nature and magnitude of infrastructure problems in the area. It is significant to note that 6 out of the 93 respondents, representing 6.5 per cent, have stayed in the area for about 20 years. Noting that roads and related infrastructure in the last phase of Dandora were completed about 20 years ago, this group provides valuable institutional memory about the way infrastructure has deteriorated over the years.

4.2.5 Length of Stay in Nairobi

Fig 4.5 Years lived in Nairobi



Source: (Field Survey, 2008)

Nearly 50 percent of the respondents have lived in Nairobi for over 10 years.

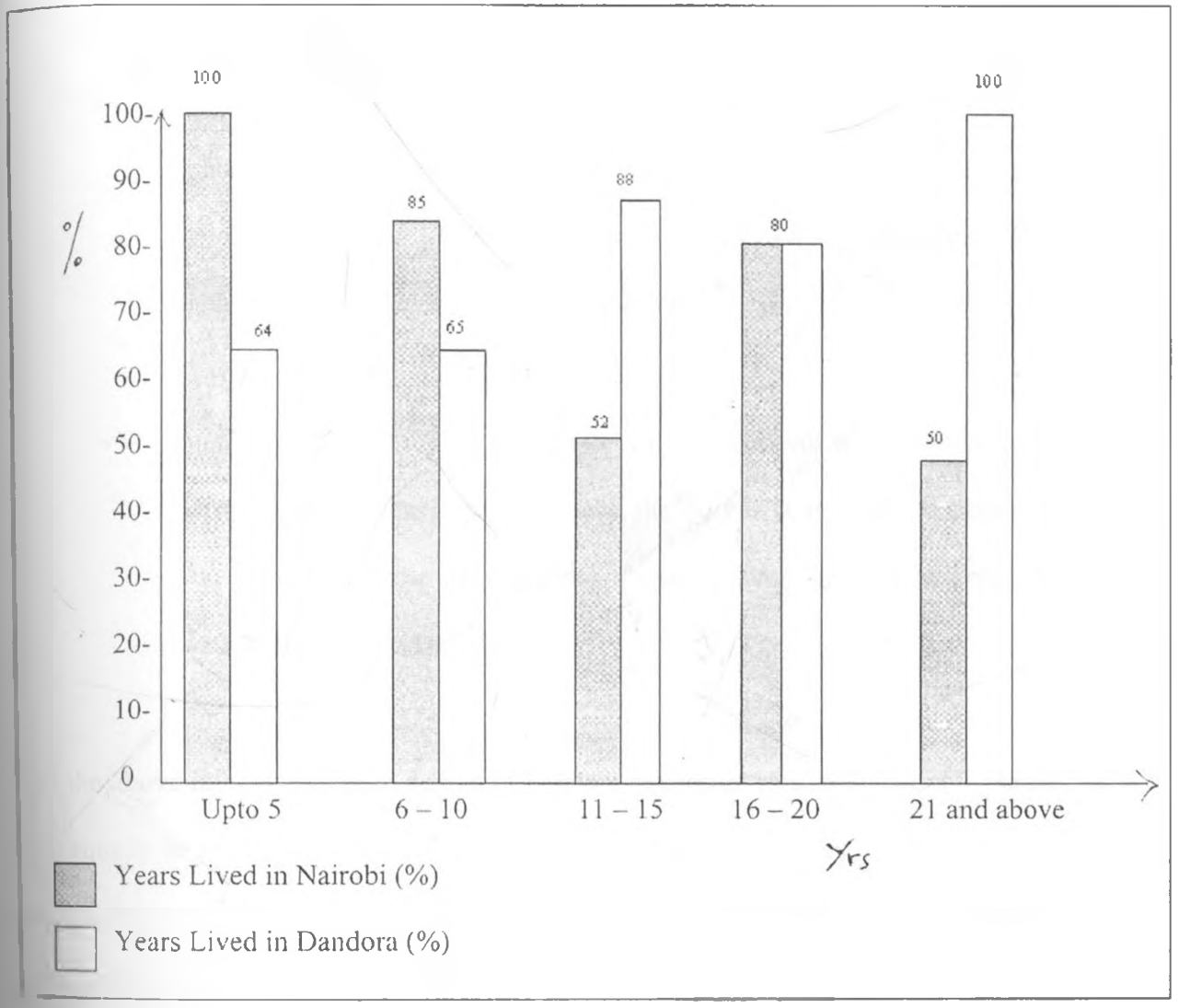
Table 4.3: Length of Stay in Dandora – Length of Stay in Nairobi cross Tabulation

Years lived in Dandora Cohorts (Yrs)

	Upto 5	6 -10	11 - 15	16 - 20	21 and over	Total
Upto 5	14	0	0	0	0	14
6 – 10	5	28	0	0	0	33
11 – 15	2	12	15	0	0	29
16 – 20	0	0	1	4	0	5
21 and above	1	3	1	1	6	12
Total	**22**	**43**	**17**	**5**	**6**	**93**

Source: (Field Survey, 2008)

Figure 4.6: Years Lived in Nairobi Versus Years Lived in Dandora



Source: (Field Survey, 2008)

From the cross tabulation of years lived in Dandora and years lived in Nairobi, a few inferences can be made:

i) 28 out of 33 respondents lived in Nairobi for between 6 and 10 years. This represents about 85 per cent.

ii) Respondents who have lived in Dandora for between 6 and 10 years is 28 out of 43 respondents, representing about 65 per cent.

iii) From (i) and (ii) it can be inferred that those respondents who have lived in Nairobi for between 6 and 10 years have lived mostly in Dandora.

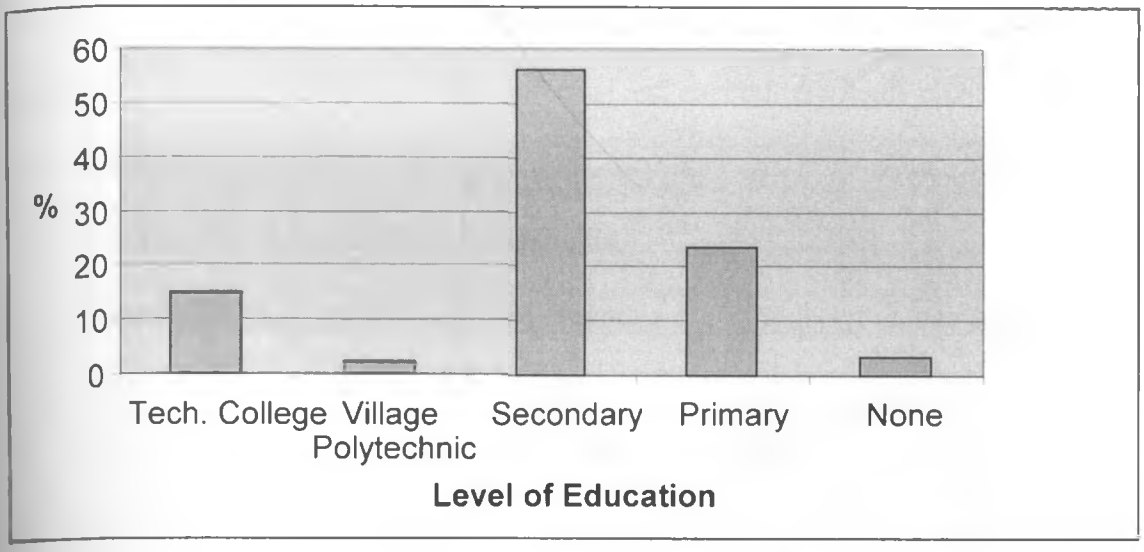
iv) 15 out of 29 respondents representing slightly over 50 per cent have lived in Nairobi for between 11 and 15 years. Within the same period the table indicates 15 out of 17, about 88 per cent have lived in Dandora. This implies that the respondents who have lived in Nairobi for between 11 – 15 years have lived all their life in Dandora.

v) Equally significant to note is that out of the 80 per cent who have stayed in Nairobi for between 16-20 years and the 50 per cent of the respondents who have stayed for 21 years and above in Nairobi, have respectively lived all their life in Dandora.

From the above inferences a high degree of permanency in the stay in Dandora is noted. It can equally be concluded that the respondents regard Dandora as their "home". A high understanding of the problems of infrastructure in the area can therefore be inferred by their extended stay in the same. Their experiences will therefore become handy while exploring methods of sustainable management solutions to the road infrastructure problems being experienced in Dandora.

4.2.6 Level of Education of the Respondents

Fig 4.7: Level of Education of the Respondents



Source: (Field Survey, 2008)

56.4 per cent of the respondents have acquired secondary education while 23.4 per cent and 14.9 per cent have at least primary level and technical level of education respectively. Only 3.2 per cent of the respondents lacked any kind of formal training.

As seen from the conceptual framework in Fig. 2.2, education, which is a form of human capital, is an important asset among service users in the overall management of infrastructure in a sustainable manner.

4.3 Socio-economic Characteristics

This section analyzes the socio- economic profile of the residents of Dandora estate. As seen earlier in the input – output model in chapter 2 (Fig 2.1), the external environment in an open system has a bearing on the transformation process of inputs into outputs. Socio-

economic aspects form part of this external environment (see conceptual framework, Fig 2.2)

An investigation of the income and expenditure patterns of the respondents, including the type of employment, whether formal or informal and expenditure items is carried out.

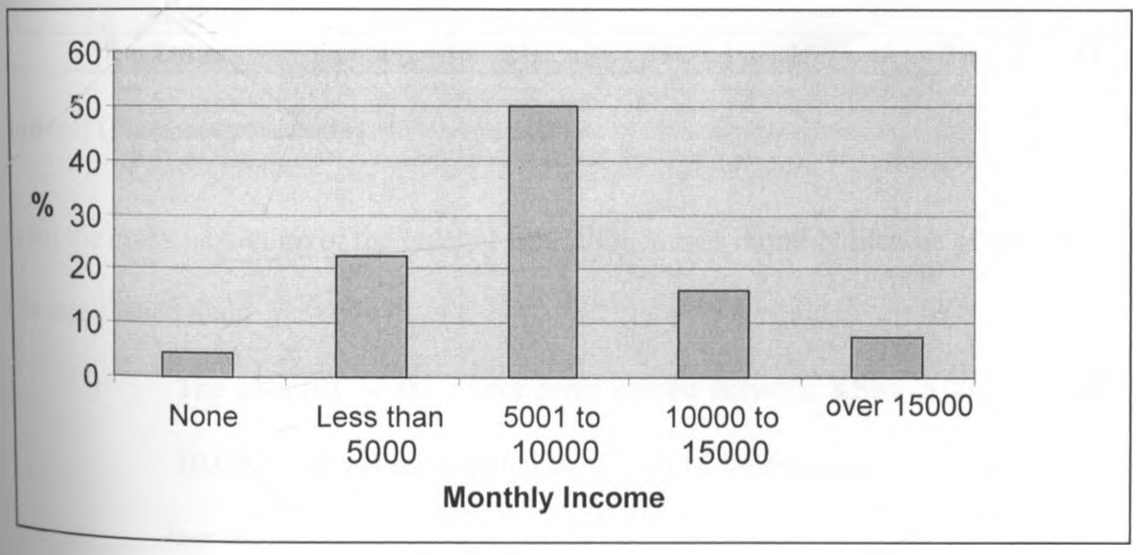
4.3.1 Income

Table 4.4: Monthly Income of the Households

Income (KShs.)	Frequency	per cent
None	4	4.3
Upto 5,000	21	22.3
5,001 – 10,000	47	50.0
10,001 – 15,000	15	16.0
Over 15,000	7	7.4
Total	**94**	**100**

Source: (Field Survey, 2008)

Fig 4.8: Monthly Incomes of Households



Source: (Field Survey, 2008)

The results revealed that out of the 94 valid cases only 4.3 per cent did not have a month income. 22.3 per cent earned less than KShs. 5,000 per month while 50 per cent of the

households are in the income bracket of KShs. 5,001 – 10,000. Only a small percentage of the households earned more than 15,000 per month.

Affordability is a key ingredient of sustainable urban infrastructure services. A clear understanding of the income levels of residents is therefore necessary when considering infrastructure management options that may involve cost sharing with the beneficiaries.

Table 4.5: Level of Education – Monthly Income in KShs. Cross –tabulation

		Monthly Income (KShs)					
		None	**Less than 5,000**	**5,001 – 10,000**	**10,001 – 15, 000**	**Over 15,000**	**Total**
Level of Education	None	-	1	1	-	1	3
	Primary	2	7	10	1	2	22
	Secondary	2	12	30	5	4	53
	Village Polytechnic	-	1	-	1	-	2
	Technical College	-	-	6	8	-	14
	Total	**4**	**21**	**47**	**15**	**7**	**94**

Source: (Field Survey, 2008)

From the cross tabulation of the level of Education versus monthly income of households, it is established that:

i) The majority of the respondents earned between KShs. 5,001 and KShs. 10,000. This is represented by 47 out of 94 respondents equivalent to 50 per cent

ii) The majority of the respondents earning KShs. 5,001 – KShs. 10,000 have at least secondary level of education (30 out of 47 respondents representing 63.8 per cent)

iii) The majority of those earning over KShs. 15,000 (4 out of 7 equivalent to 57.1 percent) have secondary level of education

iv) Those with technical education earned over KShs. 5,000 with the majority, 57.1 percent, earning between KShs. 10,001 and KShs. 15,000

The results give positive correlation between level of education and level of income. This is in agreement with established trend where those with education and technical skills are able to get gainful employment or even self –employment.

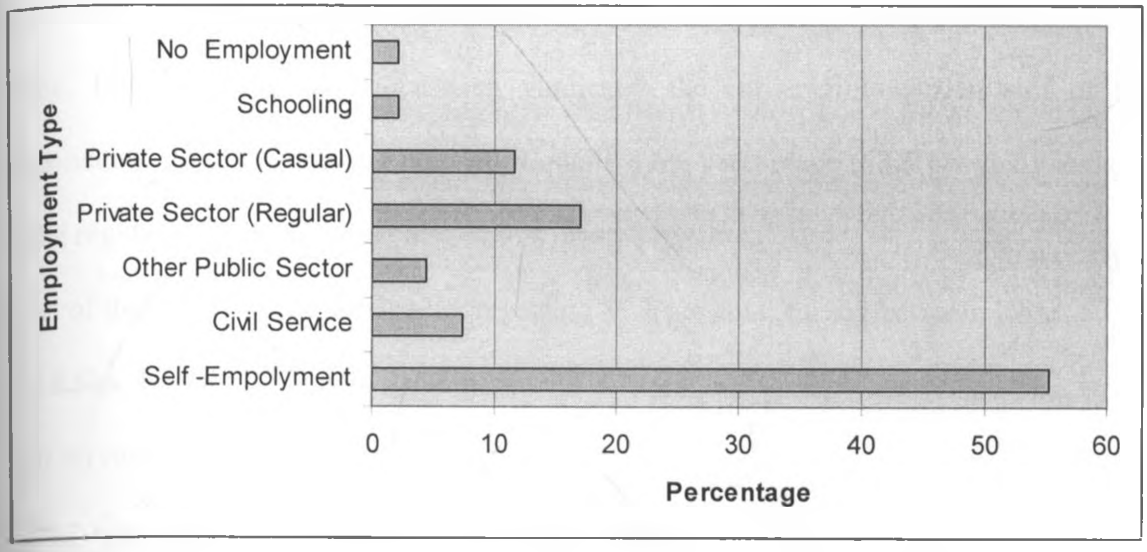
4.3.2 Employment/schooling

Table 4.6: Employment Type/Schooling

Type	Frequency	per cent
Self Employed	52	55.3
Civil Service	7	7.4
Other Public Sector	4	4.4
Private Sector (Regular)	16	17.0
Private Sector (Casual)	11	11.7
Schooling	2	2.1
No Employment	2	2.1
Total	**94**	**100.0**

Source: (Field Survey, 2008)

Fig 4.9: Type of Employment/schooling



Source: (Field Survey, 2008)

Slightly more than half of the respondents were in self –employment. A few others were employed in the private sector while others were in the public sector including the civil service. Only a small percentage were either not employed or were schooling.

Table 4.7: Employment/Schooling – Monthly Income Cross – Tabulation

		Monthly Income (KShs)					
		None	**Less than 5,000**	**5,001 – 10,000**	**10,001 – 15, 000**	**Over 15,000**	**Total**
Employment/ schooling	Self Employment	-	15	26	6	5	52
	Civil service	-	-	2	4	1	7
	Other public sector	-	-	3	-	1	4
	Private Sector (Regular)	-	1	10	5	-	16
	Private sector (Casual)	-	5	6	-	-	11
	Schooling	2	-	-	-	-	2
	No Employment	2	-	-	-	-	2
	Total	**4**	**21**	**47**	**15**	**7**	**94**

Source: (Field Survey, 2008)

A cross tabulation of employment/schooling versus monthly income of thee households establishes that the majority of those in self employment earn between KShs. 5,001 and KShs. 10,000. The cross tabulation vindicates the earlier finding that half of the respondents are in this income bracket. Equally a big percentage (62.5 per cent) of those in the regular private sector are also in this income bracket.

6 out of those in the civil service, representing 85.7 per cent, earned between KShs. 5,000 and KShs. 15,000. This is in agreement with salaries paid to low cadre employees in the civil service in Kenya.

4.3.3 Work/School Location

Table 4.8 Location of Work/or school

Distance of Location	Frequency	per cent
Home	43	32.6
1 – 2 Km	39	29.5
2 – 4 Km	9	6.8
4 -6 Km	11	8.3
Over 6 Km	29	22.8
Total	**131**	**100.0**

Source: (Field Survey, 2008)

43 family members representing 32.6 per cent of the 131 valid cases worked at home. Another 39 members, representing 29.5 per cent, worked or schooled at a location between 1 and 2 Km from home. 6.8 per cent and 8.3 per cent worked or schooled between 2 -4 Km and 4 – 6 Km respectively while 22.8 per cent worked or schooled beyond 6 Km from home.

The results are in agreement with earlier findings - significant number of the family members are in self-employment and also the abundance of schools within easy reach in the estate

4.3.4 Monthly Expenditure

4.3.4.1 Monthly Expenditure on Rent

Table 4.9: Monthly Expenditure on Rent

Rent (KShs)	Frequency	per cent
0 – 1500	29	36.3
1501 – 3000	39	48.8
3001 – 4000	11	13.8
Above 4001	1	1.3
Total	**80**	**100.0**

Source: (Field Survey, 2008)

From the results it is clear that the majority of the residents (85.1 per cent) spent between KShs. 0 and KShs. 3,000 on rent with 36.3 per cent spending between zero and KShs. 1,500 and the other 48.8 per cent spending between KShs. 1,501 and KShs. 3,000. Only 11 out of 80 valid cases spent between KShs. 3,001 and KShs. 4,500 while a negligible percentage (1.3per cent) expended over KShs. 4,001 on rent. The results are consistent with the income levels of the respondents and type of housing provided in the area as will be seen later in 4.4.

It is generally assumed that rent should take about 25 per cent of one's income. Thus, for those earning upto KShs. 5,000, the maximum they would be expected to spend on rent is KShs, 1,250 while those in the KShs. 5,001 – KShs. 10,000 income brackets would be expected to spend between KShs. 1,250 and KShs. 2,500 on rent.

Those earning between KShs. 10,001 and KShs. 15,000 would be expected to spend between KShs. 2,500 and KShs. 3,750 on rent while the last category earning over KShs. 15,000 would be expected to pay from KShs. 3,750 upwards on rent.

Table 4.10: Rent per Unit per Month – Monthly Income in KShs. Cross Tabulation

		Monthly Income in (KShs.)					
		None	**Less than 5,000**	**5,001 – 10,000**	**10,001 - 15,000**	**Over 15,000**	**Total**
Rent per Month (KShs.)	Up to 1,500	-	13	16	-	-	29
	1,501 – 3,000	1	5	25	5	3	39
	3,001 – 4000	-	-	-	9	2	11
	Over 4,001	-	-	-	-	1	1
	Total	**1**	**18**	**41**	**14**	**6**	**80**

Source: (Field Survey, 2008)

A cross tabulation of rent per month and the monthly income to a large extent validates the assumption of rent paid in relation to income. For instance 13 out of 18 of those earning less than KShs. 5,000, representing about 72 per cent paid up to a maximum of KShs. 1,500 in rent. Equally significant to note is that 9 out of 14 of those who earned between KShs. 10,001 and KShs. 15,000, representing 64 per cent, paid between KShs. 3,001 and KShs. 4000 in rent which is within the assumed 25 per cent payable as rent. Out of 39 people who paid between KShs. 1,501 to KShs. 3,000 for rent, one person has no monthly income. This can be explained by earlier findings that, apart from employment, there are other sources of family income which include charity. 25 out of 41 people earning between 5,001 – 10,000 (about 61 per cent) paid between KShs. 1,501 to KShs. 3,000 monthly as rent. Against this within the expected range of rent payable by that category of income earners.

Table 4.11: Perception of Rent status

	Frequency	per cent
Very High	26	31.0
High	40	47.6
Moderate	18	21.4
Total	**84**	**100.0**

Source: (Field Survey, 2008)

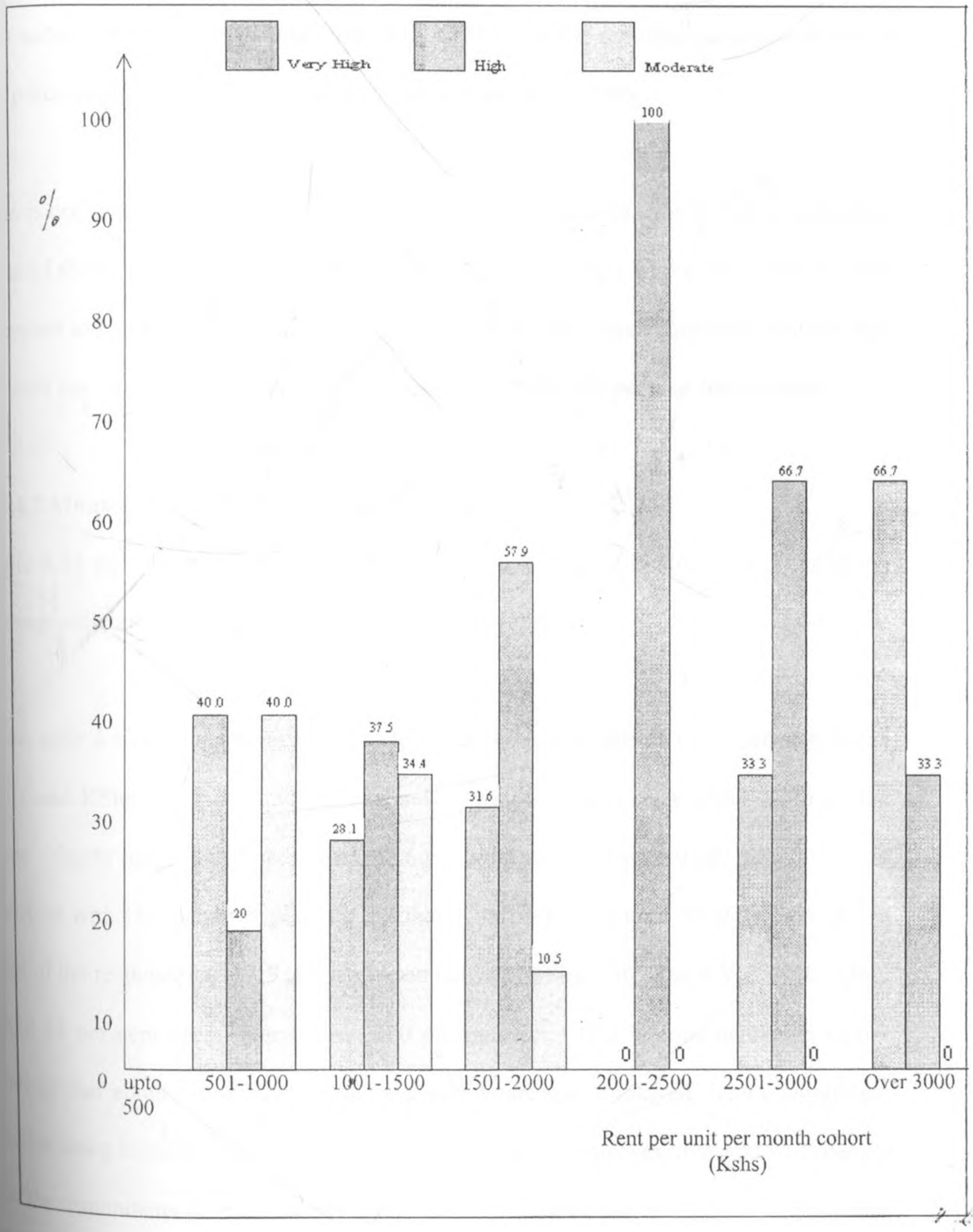
31per cent of the respondents perceived the rent paid per month as very high, while 47.6 per cent considered it to be very high. The remainder 21.4 per cent regarded the rent as moderate.

Table 4.12: Rent per Unit per Month – Consideration of Rent Status Cross – Tabulation

		Consideration of Rent Status			
		Very High	**High**	**Moderate**	**Total**
Rent per Unit per Month	(KShs.) upto 500	0	0	0	0
	501 – 1000	2	1	2	5
	1001 – 1500	9	12	11	32
	1501 – 2000	12	22	11	38
	2001 – 2500	0	1	0	1
	2501 – 3000	1	2	0	3
	Over 3000	2	1	0	3
	Total	**26**	**39**	**17**	**82**

Source: (Field Survey, 2008)

Fig. 4.10 **Consideration of Rent Status Versus Rent Paid Per Unit Per Month**



Source: (Field Survey, 2008)

From table 4.12 and Fig 4.10 it is evident that the percentage of those who perceive rent paid per unit per month as either very high, high or moderate is less than 50 per cent for rent cohorts 0 – 500, 501 – 1000 and 1001 – 1500. As the rent increases upwards so is the percentage of those who consider rent to be high or very high.

This is consistent with the kind of housing provided in the area. As it will be seen later most of the housing provided in the area is of single room type where the maximum rent expected to be charged is KShs. 1,500 per room. Personal enquiry revealed that the rent per unit per month in the study area is dependent on the unit type, size and location.

4.3.4.2 Monthly Expenditure on other Items/Services.

Table 4.13 shows the monthly expenditure on food, transport, health, water, electricity, garbage collection, recreation and education and training.

From table 4.13 it is clear that about 64 per cent of the respondents spent between KShs. 1501 and KShs. 3500 on food while about 15 per cent spent over KShs. 5000 on the same. Nearly half of the respondents (48.6 per cent) spent between 0 and KShs. 1500 on transport with 18.1 per cent spending less than KSh. 500 per month. Slightly more than a third of the respondents (37.5 per cent) used between KShs. 1501 and KShs. 2000. Only about 14 per cent spent over KShs. 2000 on transport. This is consistent with earlier findings that about 50 per cent of the respondents are self-employed, with a significant number being home-based or working within 1 to 2 Km. However, it would be expected that the respondents do occasionally travel longer distances, say to CBD, to access other goods and services not found within Dandora.

A majority of the respondents (about 77 per cent) spent between 0 and KShs. 500 on health with another 15 per cent spending between KShs. 501 and KShs. 1000. Less than 10 per cent of the respondents spent beyond KShs. 1000 on healthcare per month.
It can be deduced from the above results that the majority of the residents use the medical facilities provided by the two NCC health centers where cost-sharing charges are quite low.

Most of the respondents indicated that they paid for water through their house rent. Of the few who had individual meters, about 44 per cent spent upto KShs. 500 per month on water while another 25 per cent spent between KShs. 501 and KShs. 1000. An additional 25 per cent spent between KShs. 1000 and KShs. 2000 on the same.

As with water, electricity charges were in most cases compounded with the house rent. Consequently, only a few had individual meter connections. Out of those with individual meter connections, about 71 per cent paid upto a maximum of KShs. 1000 on electricity per month.

Table 4.13: Monthly Expenditure on Food, Transport, Health, Water, Electricity, Garbage collection and Recreation

Expenditure (KShs.)	Food		Transport		Health		Water		Electricity		Garbage Collection		Recreation		Education & Training	
	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent
Up to 500	0	0	13	18.1	60	76.9	7	43.7	8	38.1	79	100.0	16	34.0	3	37.5
501-1000	0	0	14	19.4	12	15.4	4	25.0	7	33.3	0	0	17	36.2	0	0
1001-1500	4	4.4	8	11.1	2	2.6	1	6.3	2	9.5	0	0	6	12.8	1	12.5
1501-2000	12	13.2	27	37.5	3	3.8	3	18.7	3	14.3	0	0	6	12.8	3	37.5
2001-2500	10	11.0	5	6.9	0	0	0	0	0	0	0	0	1	2.1	0	0
2501-3000	26	28.5	3	4.2	0	0	1	6.3	0	0	0	0	1	2.1	0	0
3001-3500	10	11.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3501-4000	7	7.7	1	1.4	1	1.3	0	0	0	0	0	0	0	0	0	0
4001-4500	3	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4501-5000	5	5.5	0	0	0	0	0	0	1	4.8	0	0	0	0	0	0
Over 5000	14	15.4	1	1.4	0	0	0	0	0	0	0	0	0	0	1	12.5
Total	**91**	**100**	**72**	**100.0**	**78**	**100.0**	**16**	**100.0**	**21**	**100**	**79**	**100**	**47**	**100**	**8**	**100**

Source: (Field Survey, 2008)

Table 4.14: Monthly Expenditure of Garbage Collection

Expenditure	Frequency	per cent
Less than 100	70	88.6
101 – 150	6	7.6
151 – 200	2	2.5
Above 200	1	1.3
Total	**79**	**100.0**

Source: (Field Survey, 2008)

An overwhelming majority of the valid cases (70 out of 79), representing 88.6 per cent, spent less than KShs. 100 on garbage collection services while 7.6 per cent spent be between KShs. 101 and KShs. 150. Only about 4 per cent spent beyond KShs. 150 on garbage collection services. The result reveals the presence of private sector participation in the study area. The comparatively low charges are an indication of the location of the official dumping site within the area, significantly reducing transport costs for the service providers.

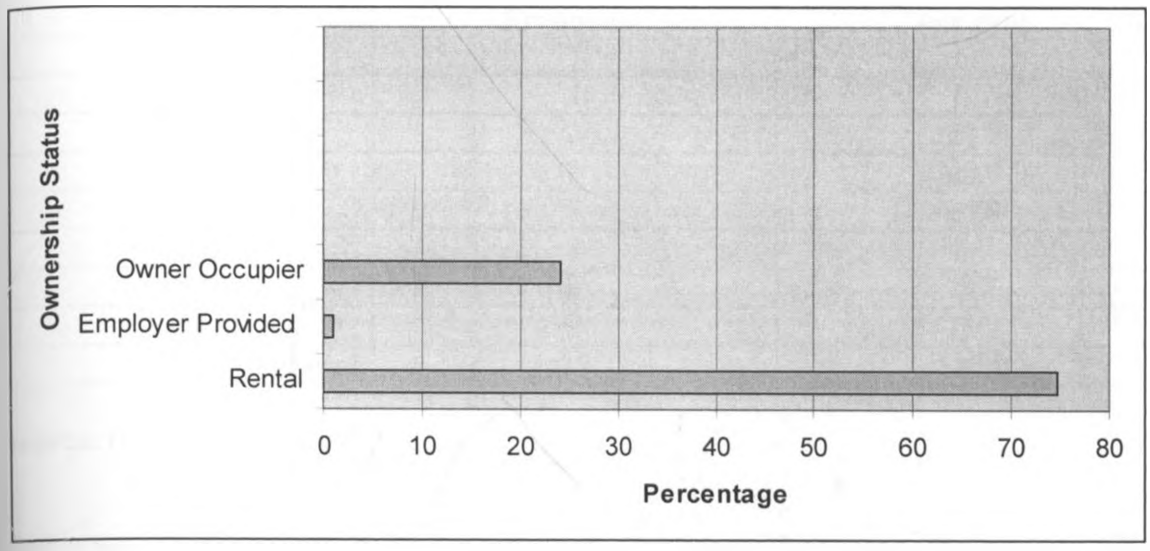
Others areas of expenditure included recreation where about 96 per cent spent between 0 and KShs. 2000 on the same and in education and training where slightly more than a third of the few who expended in this area spent up to KShs. 500 and between KShs. 1501 and KShs. 2000 on this service.

4.4 Housing

This section will analyze housing in terms of ownership, tenure status, year of acquisition, rent per unit per month, type of house and usage, facilities available in the house or nearby and materials used for housing.

4.4.1 Ownership

Fig 4.11: Housing Ownership in Dandora



Source: (Field Survey, 2008)

The results indicate that most of the respondents (74.4per cent) have rented houses while 24.4 per cent and 1.1 per cent are owner occupied and employer provided respectively. All the owner occupied houses are on leasehold tenure.

The results are consistent with socio-economic dynamics in the society. With time, the original allottees have been able to add more rooms to the originally provided starter units and rented out the extra rooms to other people. Some have also sold their plots, with the new owners developing them either for personal occupation or for rental purposes.

4.4.2 Year of Acquisition

Table 4.15: Year of Acquisition

Year	Frequency	per cent
1977	1	6.7
1979	1	6.7
1980	3	20.0
1982	3	20.0
1988	3	20.0
1989	1	6.7
1993	1	6.7
1996	2	13.2
Total	**15**	**100.0**

Source: (Field Survey, 2008)

The above results reveal that the respondents acquired their housing in different years, the earliest being in 1977 and the latest in 1996. The results are consistent with earlier results on ownership status and also the phasing of the entire project as discussed in chapter 3; phase 1 having been ready for occupation in February 1977 and phase 2, Area 2 in December 1979. Area 4 was completed for occupation in September 1981 while Area 5 was ready in December 1980.

Consolidation works is a continuous process and continues to date explaining further the different years of acquisition.

4.4.3 Means of Acquisition

60 per cent of the valid cases acquired their housing through original allotment by NCC while 13.3 per cent and 26.7 per cent acquired it through purchase and inheritance respectively.

When questioned on whom they had rented from in the case of rentals, all of them (100 per cent) indicated that it was from the owners.

Table 4.16: Years of Acquisition – Means of acquisition Cross – tabulation

		Means of Acquisition			
		Original allotment by NCC	**Purchase**	**Inherited**	**Total**
Year of Acquisition	1977	1			1
	1979	1			1
	1980	1		2	3
	1982	2		1	3
	1988	3			3
	1989			1	1
	1993		1		1
	1996	1	1		2
	Total	**9**	**2**	**4**	**15**

Source: (Field Survey, 2008)

A cross tabulation of year of occupation with means of acquisition shows that:

i) Slightly more than half of the respondents (8 out of 15, equivalent to 53.3 per cent) acquired their housing between 1977 and 1982.

ii) 5 out of the 8 who acquired their housing between 1977 and 1982 (62.5 per cent) secured the acquisition through original allotment by NCC

iii) 55.6 per cent of those who acquired their housing through original allotment by NCC did so between 1977 and 1982,

iv) Those who acquired their housing purchase (2 out of 15) did so much later after completion of the Dandora Project

v) The 26.7 per cent acquired their housing through inheritance did so over a period of time.

The results are consistent with the phased implementation of the Dandora Project which was started in 1975 and was substantially complete by 1984 as indicated earlier in chapter 1. A high proportion of those who acquired their housing through allotment by the NCC

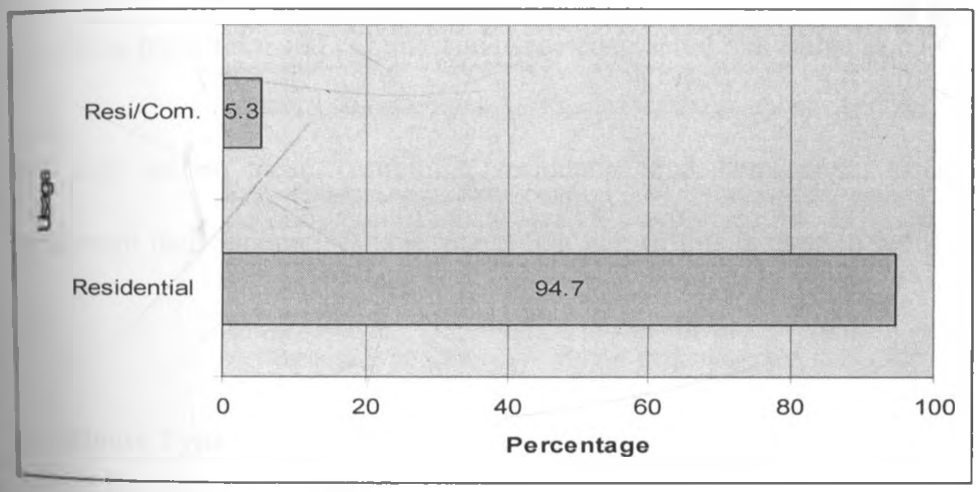
therefore did so during this period. Those who allocated houses were not to sell their units for a period of five years after allotment.

This explains observation in (iv) above

One of the eligibility requirements of the prospective plot tenants was at the tenant's family was at the time of application and would upon allocation of the plot reside with the tenant (See 3.2.7 (f) in chapter 3). This coupled with our socio – cultural dynamics, explains the inheritance aspects of housing acquisition.

4.4.4. Housing Usage

Fig 4.12: Usage of the Housing Units



Source: (Field Survey, 2008)

A majority of the housing units (94.7 per cent) were used for residential purposes while 5.3 per cent were used for residential cum commercial purposes. The results above depict the general residential – user zoning of the area. A few have combined residential and commercial uses to supplement their income and to reduce the expenditure that would otherwise have been incurred in renting separate premises.

Table 4.17: Consideration of rent status – Usage of Housing Units cross-tabulation

	Usage		
Consideration of rent status	**Residential**	**Residential cum Commercial**	**Total**
Very High	25	1	26
High	36	3	39
Moderate	18	-	18
Total	**79**	**4**	**83**

Source: (Field Survey, 2008)

The results of the cross-tabulation above indicate that a high proportion of those using their units for residential purposes only considered rent paid to be high and very high compared to those combining residential and commercial usage. Only a third of those combining residential and commercial usage considered rent status to be very high.

As noted earlier those combining residential and commercial usage are able to supplement their income. It is assumed that part of this is used to reduce the burden on rent.

4.4.5 House Type

Table 4.18: Type of House

Type	Frequency	per cent
Flat	1	1.4
Single Rooms	70	98.6
Total	**71**	**100.0**

Source: (Field Survey, 2008)

The results indicate that the housing units are predominantly single room dwellings. This is consistent with the original design of the project and the low income nature of the settlement.

Table 4.19: Housing ownership – Type of House Cross Tabulation

Housing Ownership		Type of House		Total
		Flats	Singles	
	Owner Occupier	-	16	16
	Rental	1	54	55
	Total	**1**	**70**	**71**

Source: (Field Survey, 2008)

The results above indicate that a significant number of single room dwellings are rented out (77.5per cent) while the remainder 22.5 per cent are owner-occupied.

4.4.6 No. of rooms in Plot

Table 4.20: No. of Rooms in Plot

No. of Rooms	frequency	per cent
1 – 4	4	4.3
5 – 8	66	70.2
9 -12	9	9.6
13 -16	4	4.3
17 – 20	3	3.2
21 -24	4	4.3
25 – 28	1	1.0
29 -32	2	2.1
33 – 36	1	1.0
Total	**94**	**100.0**

Source: (Field Survey, 2008)

The above results reveal that only 4.3 per cent of the plots had between 1 and 4 rooms. 66 of the 94 valid cases, representing 70.2 per cent had between 5 and 8 rooms in the plot while another 9.6 and 4.3 per cent respectively had between 9 to 12 rooms and 13 -16 rooms respectively. A cumulative 11.6 per cent had between 17 and 36 rooms.

The number of rooms per plot is indicative of the varying plot sizes and the different levels of development, some of them illegal. Whereas originally single storey buildings

were envisaged as depicted by the type plans in figure 3.25 – 3.28, a number of multi-storey buildings have been put up in the area.

The demand for housing brought about by the increasing population of the area has given rise to these illegal multi storey buildings. NCC on the other hand has not only failed to follow planning guidelines but has also been unable to manage and to control the emerging developments. The result is an increase in strain on the available infrastructure which has not been upgraded to absorb the resultant increase in population (See the different house typologies below).

The results also validate the low income qualification requirements of the plot tenants. A majority of them could afford to build only single storey rooms

Plate 4.1: A scene in Phase 1

Source: (Field Survey, 2008)

Note the many single storey houses with rusty iron sheets roofing in the foreground and the other multi storey buildings are varying heights in the background

Plate 4.2: Different Levels of Plot Development in Area 2, Phase II

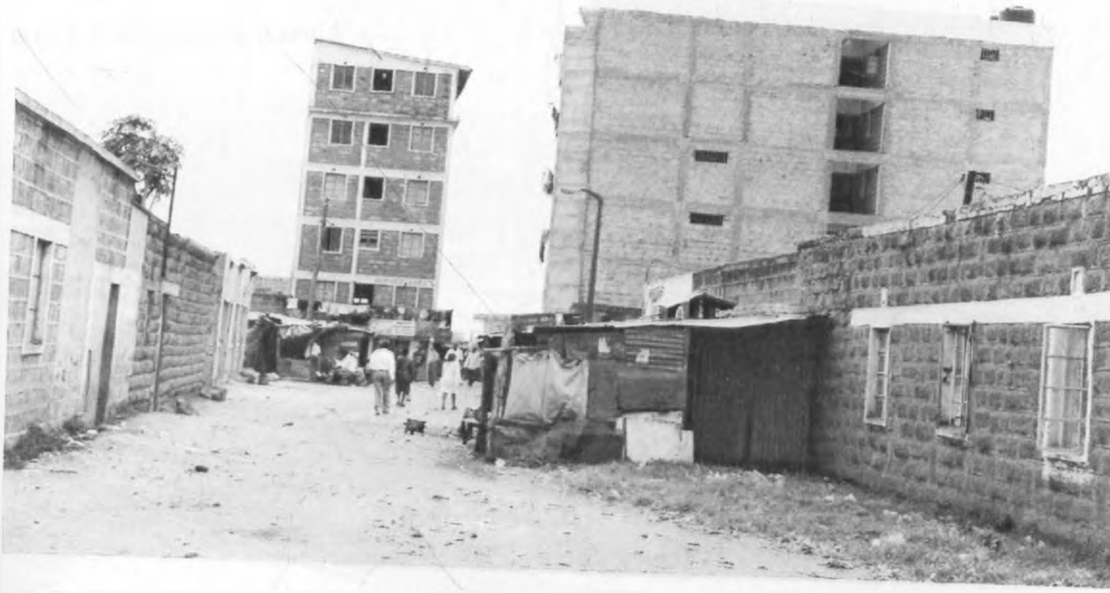
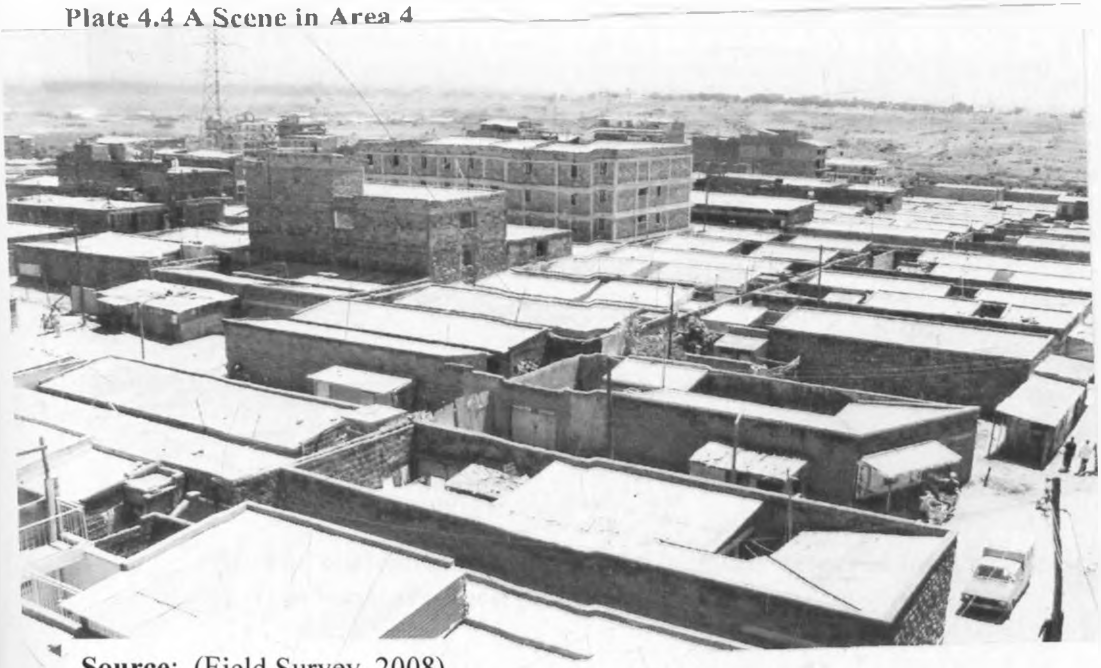


Plate 4.3 Squatter Settlements under the Powerline between Area 3 and 5, Pha

Source: (Field Survey, 2008

Plate 4.4 A Scene in Area 4



Source: (Field Survey, 2008)

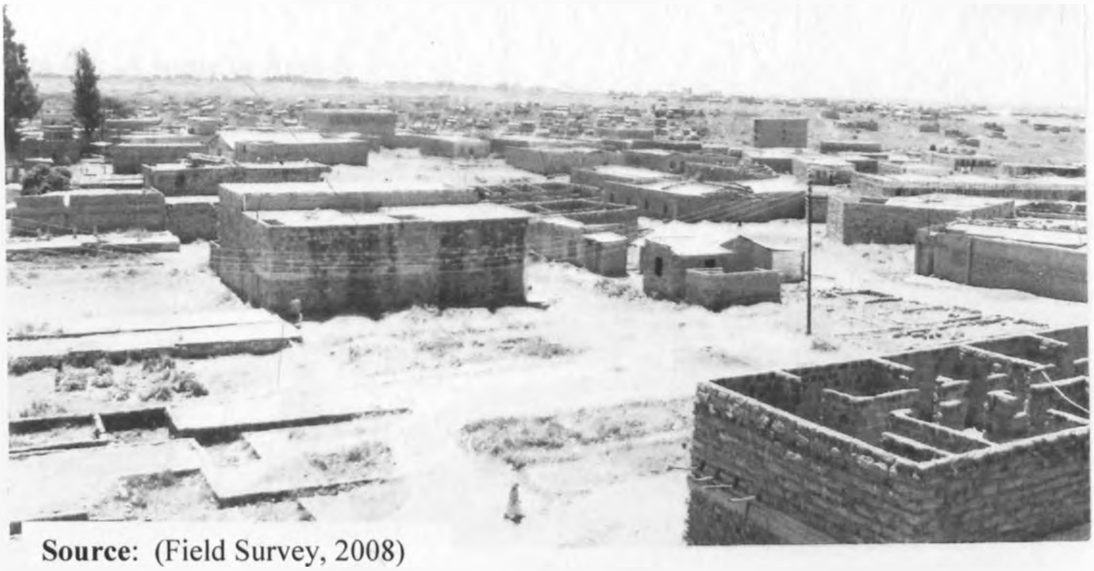
Note the different sizes of the plots and levels of development

Plate 4.5 A Scene in Area 5

Note the many multi-storey buildings in the background (Area 4)

Source: (Field Survey, 2008)

Plate 4.6: Ex-Muoroto Settlement



Source: (Field Survey, 2008)

NB: The settlement is built on land formerly reserved for a road reserve and riparian wayleave/flood plain

Plate 4.7 An Illegal Eight Storey Building along Komarock Road below Area 2

Source: (Field Survey, 2008)
The building is on a road reserve

Plate 4.8: A scene in Area 5

Source: (Field Survey, 2008)
(NB: The Structures on the left foreground are in 'sharp corner' resettlement-built on formally proposed industrial plot)

4.4.7 No. of rooms occupied by respondent (excluding kitchen, stores, toilets and baths)

Table 4.21: No. of rooms Occupied by Respondent (excluding kitchen, stores, toilets and baths)

No. of rooms Occupied	Frequency	per cent
1	50	59.5
2	24	28.6
3	9	10.7
Total	**84**	**100.0**

Source: (Field Survey, 2008)

Almost 60 per cent of the respondents occupied one single room while 28.6 per cent occupied two rooms. 9 out of the 84 valid cases, representing 10.7 per cent, occupied three rooms while a small percentage (1.2 per cent) occupied four rooms.

The results are consistent with the type of housing in the area and also the income levels of the respondents. It also agrees with predominantly one to three members' household size as discussed earlier.

Table 4.22: No. of rooms in plot-rooms occupied by respondent (Less Kitchen, toilet, bath, store) Cross tabulation

		Rooms occupied (less Kitchen, Toilets, Bath and Store)				
No. of rooms in plot		**1**	**2**	**3**	**4**	**Total**
	1-4	3	1	0	0	**4**
	5-8	36	18	5	1	**60**
	9-12	6	1	0	0	**7**
	13-16	1	0	2	0	**3**
	17-20	0	2	1	0	**3**
	21-24	3	1	0	0	**4**
	25-28	1	0	0	0	**1**
	29-32	0	1	1	0	**2**
	Total	**50**	**24**	**9**	**1**	**84**

Source: (Field Survey, 2008)

The following observations can be made from the cross tabulation of numbers of rooms in the plot with the number of rooms occupied by the respondent (excluding Kitchen, toilet, bath, store):

i) It is only in plots with five to eight rooms where respondents occupied all the categories of rooms in terms of number.

ii) 36 out of 50 respondents, representing 72 per cent, who occupied single room dwellings, were in plots with 5-8 rooms.

iii) Equally, 18 out of the 24 respondents, representing 75 per cent, who occupied two rooms, were found in plots with 5-8 rooms.

iv) Slightly more than half (55.6 per cent) of the respondents occupying three rooms were also in plots with 5-8 rooms, while the only respondent occupying four rooms was also in this category of plot.

v) Majority of the respondents (about 71 per cent) occupied rooms in plots with 5—8 rooms while a small percentage (about 8.3 per cent) occupied rooms in plots with 9-12 rooms.

Again the results are in agreement with earlier findings on income levels of occupants, household size and sizes of plots. The results are also consistent with the findings that since the scheme was meant for low income earners, a majority of them could only afford to build single storey room dwellings in accordance with the type plans given to them. The type plans had rooms ranging from 4 to 8 depending on the size of the plot. (See Fig 3.25 to 3.28)

4.4.8 Facilities available to Respondent

4.4.8.1 Kitchen

Table 4.23: Type of Kitchen facility

Type	Frequency	per cent
Independent	3	3.8
No. fixed Place	77	96.2
Total	**80**	**100.0**

Source: (Field Survey, 2008)

An overwhelming majority of the respondents had no fixed place for cooking purposes. Only 3.8 per cent of those interviewed had an independent kitchen facility. It was observed that even where a kitchen had provided as a starter unit, most were currently being used as a dwelling units.

Table 4.24: Rooms Occupied by Respondent – Type of Kitchen Cross- tabulation

		Kitchen Type		
Rooms occupied by respondent (less kitchen toilets, stores and bath)		**Independent**	**No Fixed Place**	**Total**
	1		39	39
	2		21	21
	3	2	5	7
	4	1		1
	Total	**3**	**65**	**68**

Source: (Field Survey, 2008)

It is clear from the cross – tabulation in table 4.32 that 60 per cent of the respondents (39 out of 65) having no fixed place for their cooking purposes occupied single rooms dwellings. Another 32.3 per cent (21 out of 65) with no fixed kitchen occupied two room dwellings.

Independent kitchens were available only to those occupying 3 or 4 rooms. It can be inferred that those who are able to rent 3 to 4 rooms are equally able to afford the extra room in form of a kitchen.

4.4.8.2 Water, Electricity, Telephone, Garage/Carport

Table 4.25 Status of Water, Electricity, Telephone and availability of Garage/Carport

Facility	Status	Frequency	per cent	Total per cent
Water Connection	Piped to house	4	4.2	
	Pipe in Compound	91	95.8	100.0
Electricity	Connected	74	87.0	
	Not Connected	11	13.0	100.0
Telephone type	Landline	4	4.3	
	Mobile	36	38.7	
	None	53	57.0	100.00
Telephone Connection	Connected	37	90.2	
	Not Connected	4	9.8	100.0
Garage/carpet	Available	8	11.1	
	Not available	64	88.9	100.0

Source: (Field Survey, 2008)

Only 4.2 per cent of the respondents had water connected to their individual housing units. An overwhelming 95.8 per cent accessed water from a pipe stand in the compound. This is in line with the original design of the settlement as all the plots were provided with water within the plot. Both cases are within WHO standards of access to safe water.

87 per cent of the respondents had access to electricity with only 13 per cent not being connected. This is a good indicator of electricity coverage in the settlement (WB, 1994).

Only 4.3 per cent of the respondents had landlines as their means of telecommunications. 38.7 per cent had mobile phones while 57.0 per cent did not have any telephones at all, implying great reliance on public telephone booths.

Enquiries on connection status revealed that 90.2 per cent who had telephones were connected as opposed to 9.8 per cent who were not connected.

Only about 11 percent of the respondents had a garage/carport within the compound. This implied that most of the residents rely on the communal parking spaces provided in the settlement, hence the need for proper management of the same.

4.4.8.3 Toilets

All 96 valid cases indicated that they had communal water borne toilets facilities within the plot. This is consistent with the project design as all the plots were provided with wet cores. It is also a very good indicator of access to sanitation by the respondents (Habitat, 1997)

4.4.9 Materials Used for Housing

4.4.9.1 Floor

Table 4.26: Floor materials

Type	Frequency	per cent
Earthen	2	2.1
Cement Screed	94	97.9
Total	**96**	**100.0**

Source: (Field Survey, 2008)

A majority of the houses (about 98 per cent) had cement screed floors while a negligible 2 per cent had earthen floors. This latter group portrays the evolving nature of site and services low income housing.

4.4.9.2 Wall

All valid cases, representing 100 per cent, had quarry stone blocks as the walling material.

4.4.9.3 Roof

Corrugated iron sheets were the dominant roofing materials for all the valid cases.

4.5 Access to Social Infrastructure

This section analyses access to social infrastructure like schools, dispensaries/hospitals, social halls/community centres, shops/shopping centres and markets.

Table 4.27: Distance to schools, dispensaries/hospitals, social halls/community centres, shops/shopping centres and markets.

Distance (M)	School		Hospital/Dispensary		Social Hall/Community Centre		Shop/Shopping Centre		Market	
	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent	Freq	per cent
0- 250	61	64.9	44	46.8	47	50.5	54	58.0	51	55.7
251-500	19	20.2	16	17.0	26	28.0	15	16.1	17	18.5
501-750	4	4.3	3	3.2	7	7.5	5	5.4	8	8.7
751-1000	10	10.6	21	22.3	6	6.5	18	19.4	15	16.3
1001-1500	0	0	1	1.1	4	4.3	0	0	0	0
1501-2000	0	0	9	9.6	2	2.2	1	1.1	1	1.1
Beyond 2000	0	0	0	0	1	1.1	0	0	0	0
Total	**94**	**100**	**94**	**100.0**	**93**	**100.0**	**93**	**100.0**	**92**	**100.0**

Source: (Field Survey, 2008)

The results in the table above shows that social infrastructure services are very close to the residents, with the majority having access to all the facilities at a maximum of only one kilometer. The results strongly agree with the project design concept where community services are concentrated on a central spine for almost the whole length of the settlement.

Residents are however likely to travel longer distances to access these facilities if the routes i.e roads, footbaths and bicycle path are not functioning properly.

4.6 Community Organization

This section is concerned with the respondents awareness of third sector organizations - NGOs and CBOs in the area, the community's cooperative efforts, security arrangements as well as their perception of their living environment. The conceptual framework in fig 2.2 notes that social capital is an important asset for sustainable management of infrastructure services.

4.6.1 Awareness of NGOs/CBOs in the Area

Only 6 out of 92 respondents were aware of the presence of any NGO/CBO in their area. This represents only 6.5 per cent with other 93.5 per cent being unaware. The only two CBOs mentioned by the respondents were the Shalom Youth Project and the Dandora Residents Association (DRA). The main activities of these CBOs were participation in garbage collection in the neighbourhood, making arrangement for improvement of security and fighting for the residents' rights.

4.6.2 Neighbourhood Cooperation

Enquiries on whether the respondents held any meetings in their neighbourhood resulted in only 3.3 per cent in the affirmative while the remainder 96.7 per cent indicated they did not meet. The negligible number that did hold meeting did so to discuss security matters. Only 1.4 per cent of the respondents indicated that neighbours did infact cooperate in community efforts. Lack of cooperation was cited as the reason for this dismal performance.

4.6.3 Security

Table 4.28: Security Rating in the Area

Rating	Frequency	per cent
Good	0	0
Fair	25	26.6
Poor	69	73.4
Total	**94**	**100.0**

Source: (Field Survey, 2008)

There was nobody who rated security in the area as good. Those who regard it as fair comprised 26.6 per cent while the remainder 73.4 per cent regarded it as poor. The majority thus regard security in the area to be poor. The respondents cited robbery with violence and public harassment as reasons to why their security is poor.

The insecurity could also be attributed to lack of street lighting or malfunctioning of the street lights where they are provided (Field Observation, 2008).

4.6.4 Respondents Perception of their Living Environment

This section intended to establish how the respondents viewed their living environment.

Table 4.29: Respondents Perception of their Living Environment

Perception	Frequency	per cent
Good	1	1.1
Fair	74	84.1
Poor	13	14.8
Total	**88**	**100.0**

Source: (Field Survey, 2008)

Only 1 out of 88 respondents considered the living environment as good. A majority of the respondents perceived the living environment as fair. This category was equivalent to 84.1 per cent while 14.8 per cent thought the living environment was poor. The presence of the Dandora dumping site in this neighbourhood could be a major contributing factor to the respondents' perception of their living environment.

4.7 Infrastructure

In this section, analysis of the problems of physical infrastructure in the study area carried out. The physical infrastructure problems analyzed include those related to roads, street lighting, storm water drainage, car parks, footpaths and bicycle paths, sanitation and solid waste management.

4.7.1 Roads

Problems associated with roads in the study area are as shown in table 4.30

Table 4.30: Problems Experienced with roads

Perception	Frequency	per cent
Potholes	68	71.7
Lack of Cleanliness	21	22.1
None	6	6.3
Total	**95**	**100.0**

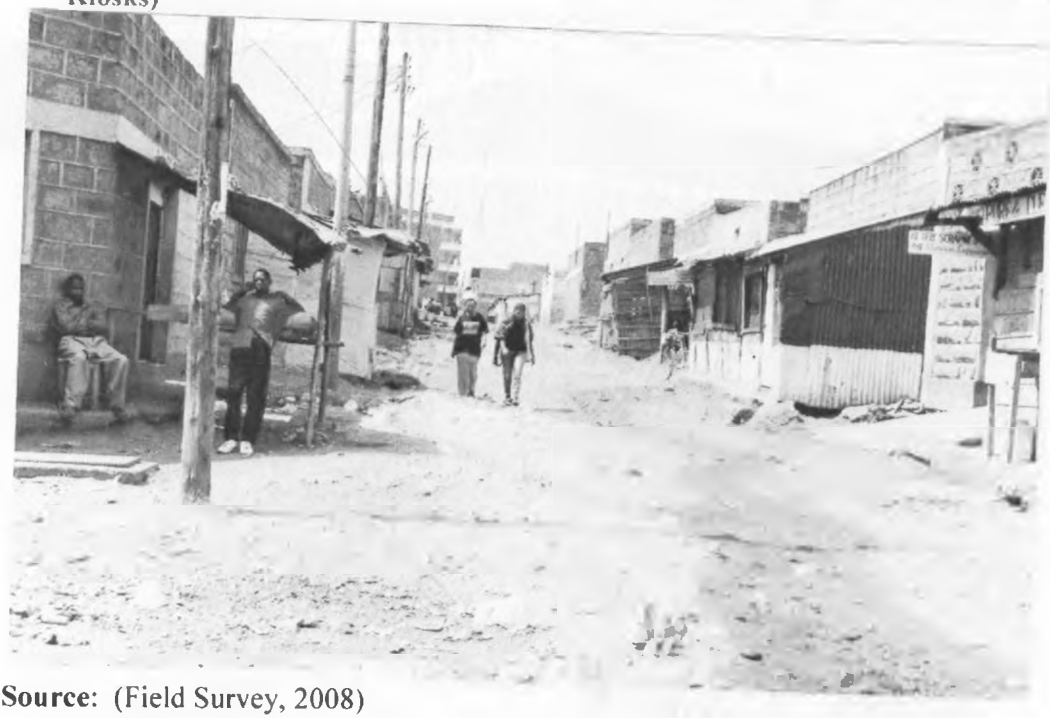
Source: (Field Survey, 2008)

From the open-ended question on problems experienced with roads in the study area, 71.6 per cent of the respondents were concerned with potholes while 22.1 per cent were concerned with the lack of cleanliness of the same 6.3 per cent of the respondents indicated they had no problem with the roads. Given the technical nature of the question and the fact that the respondents were not given a choice of the problems to choose from, only two problems were identified. The researcher, however observed the following problems in addition to those identified by the respondents: cracking of the road surface, rutting; edge damage; obstructions mainly from kiosks, soil heaps and debris; high vegetation on the shoulders; depressions; missing road furniture and stripping/fretting of road surface.

Plate 4.9 A Road in Area 2

Source: (Field Survey, 2008)

Plate 4.10 **Access Road in Area 4 – Badly Worn Out (Note Encroachment on Road Reserve by Kiosks)**



Source: (Field Survey, 2008)

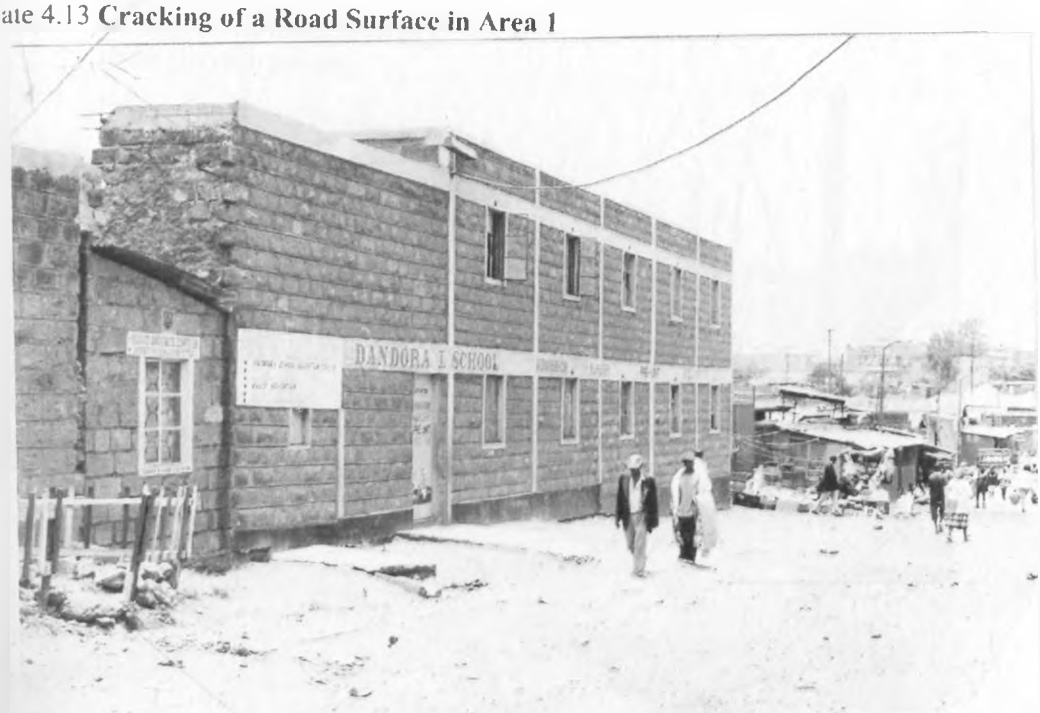
Plate 4.11: Remains of Northern Spine Road in Area 6
Carriageway completely worn out: Note also the heavy dumping.

Source: (Field Survey, 2008)

Plate 4.12 **A Road in Area 5**
(Note the dumping on the road and the stalled water)

Source: (Field Survey, 2008)

Plate 4.13 **Cracking of a Road Surface in Area 1**

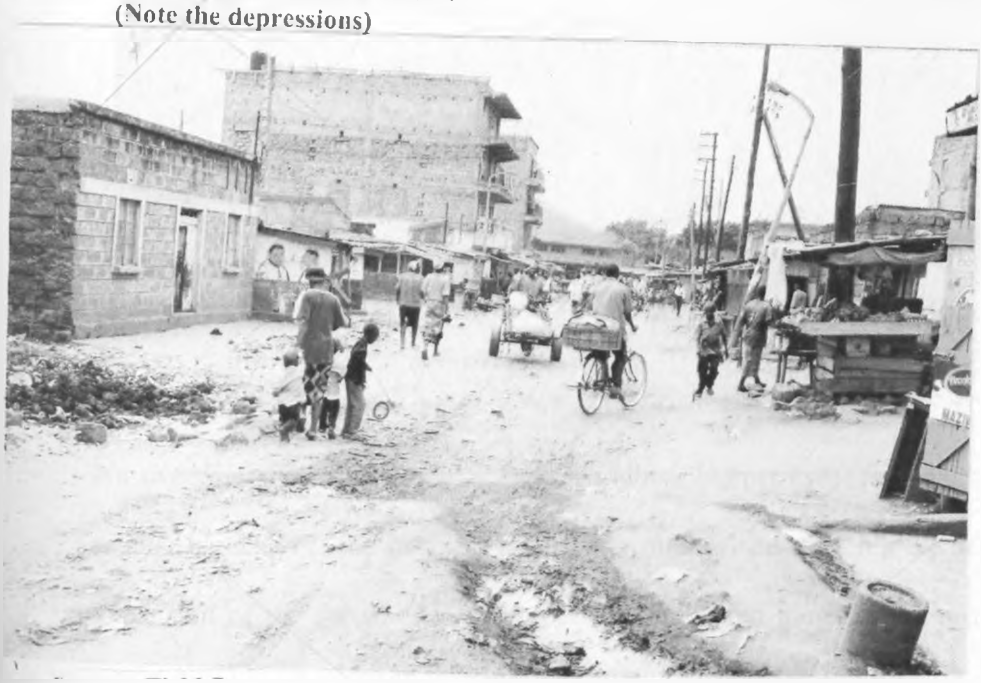


Source: (Field Survey, 2008)

Plate 4.14 **Illegal Constructions on a Road Reserve (Southern Access Road)**

Source: (Field Survey, 2008)

Plate 4.15 **A Dilapidated Road in Area 4 (Note the depressions)**



Source: (Field Survey, 2008)

4.7.2 Street lighting

According to observations and enquiries made by the researcher, street lighting, which form part of the road furniture, were either not functioning, damaged, missing or dirty (worn out paint work or rusty street lighting poles). An obstruction by informal business operations (kiosks) was also noted.

Plate 4.16 Damaged Street Lighting Pole
Note the kiosks built on the access road in the background

Source: (Field Survey, 2008)

4.7.3 Storm Water drainage

An overwhelming majority of the respondents (94.8per cent) lamented about regular blockage of the storm water drains, while 3.1 per cent felt the need for expansion of the drains. Only 2.1 per cent indicated they had no problems with storm water drainage. Other problems identified by the researcher included: -

i) Culverts – Silting, blockage by debris, headwall damage

ii) Drains – Silting, blockage by debris, damaged ditch lining, obstruction by kiosks, overgrowth of vegetation.

4.7.4 Parking Facilities

19.8 per cent of the respondents reported no problems with car parks as the originally provided car parks were still existing. However, 31.2 per cent of the respondents complained that their car parks had been grabbed for residential development while 49 per cent of the respondents reported that they had no access to any car parks. Personal enquiries by the researcher revealed the NCC had indeed created 'infill' plots from designated car parks and allocated the same to developers. This indicates poor planning and lack of good corporate governance on the part of NCC.

4.7.5 Footpaths and Bicycle paths

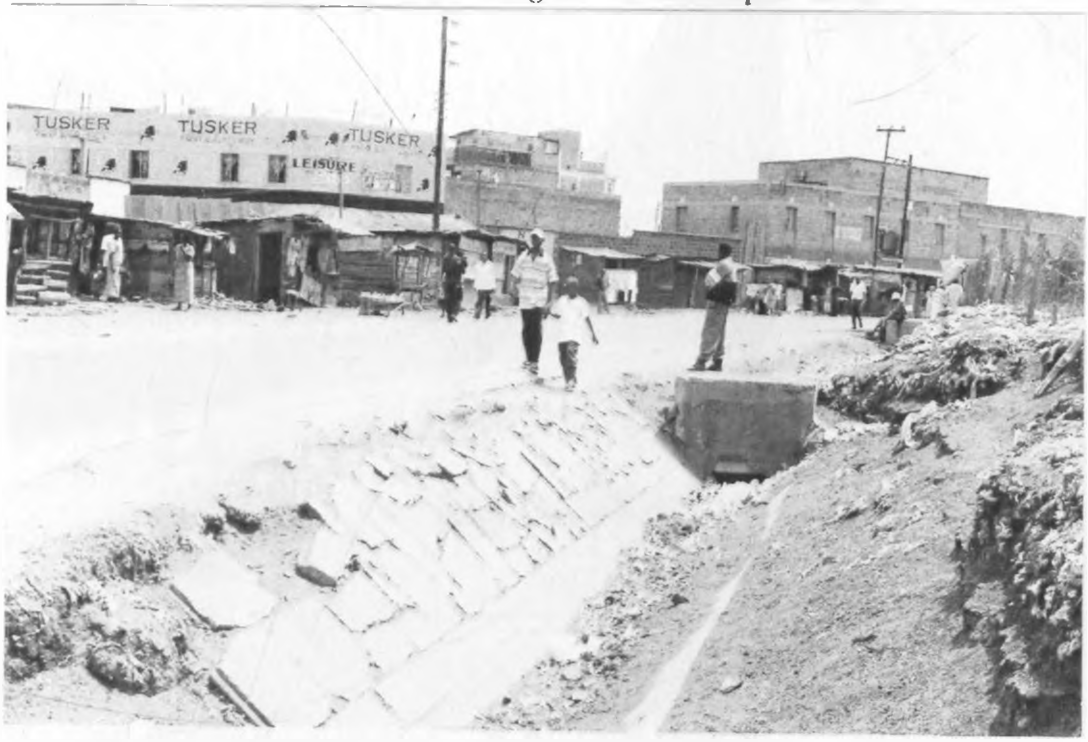
Table 4.31: Problems Experienced with Footpaths and bicycle paths

Nature of Problem	Frequency	per cent
In bad condition	14	14.6
Grabbed by kiosk owners	21	21.9
Great Insecurity	43	44.8
A lot of dumping	14	14.6
None	4	4.2
Total	**96**	**100.0**

Source: (Field Survey, 2008)

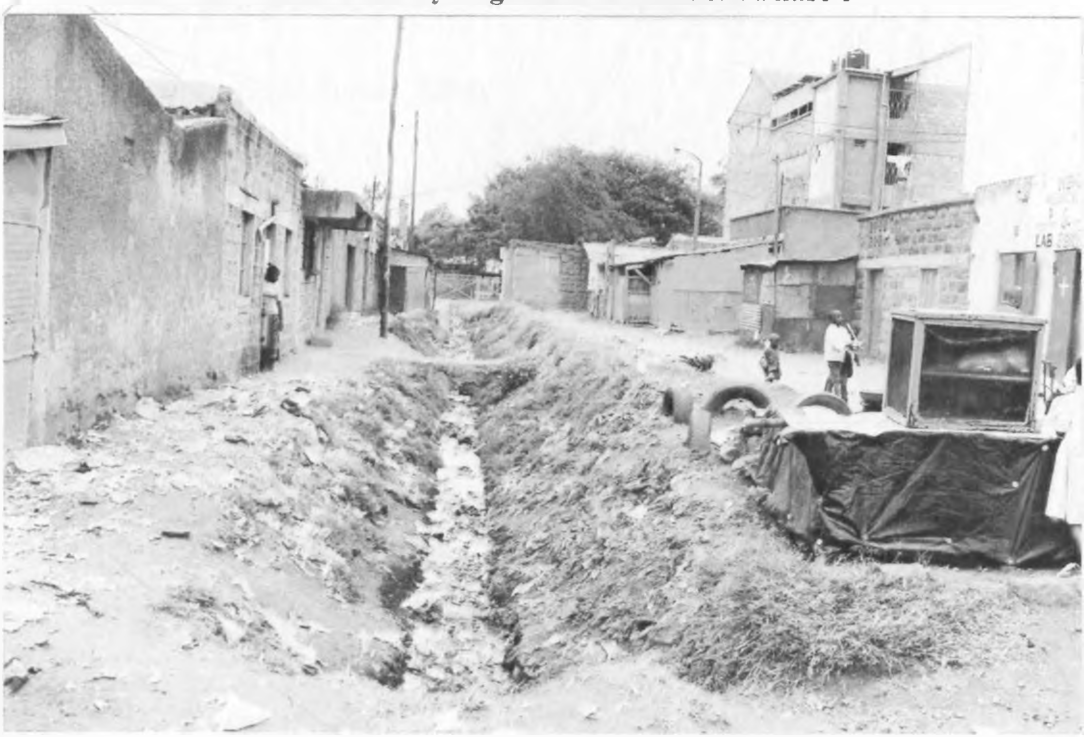
The results indicate that the main problem associated with footpaths and bicycle paths is insecurity thus rendering them unusable by most of the respondents. Other problems cited include obstruction by informal traders (kiosks, poor physical condition (potholes) and dumping on the same. Only a small percentage of the respondents (4.2 per cent) indicated that they had no problem with the facilities as provided.

Plate 4.17 **Silting in a Storm Water Drain Along the Northern Spine Road.**



Source: (Field Survey, 2008)

Plate 4.18 **Storm Water Drain Covered by Vegetation in Dandora Phase I**



Source: (Field Survey, 2008)

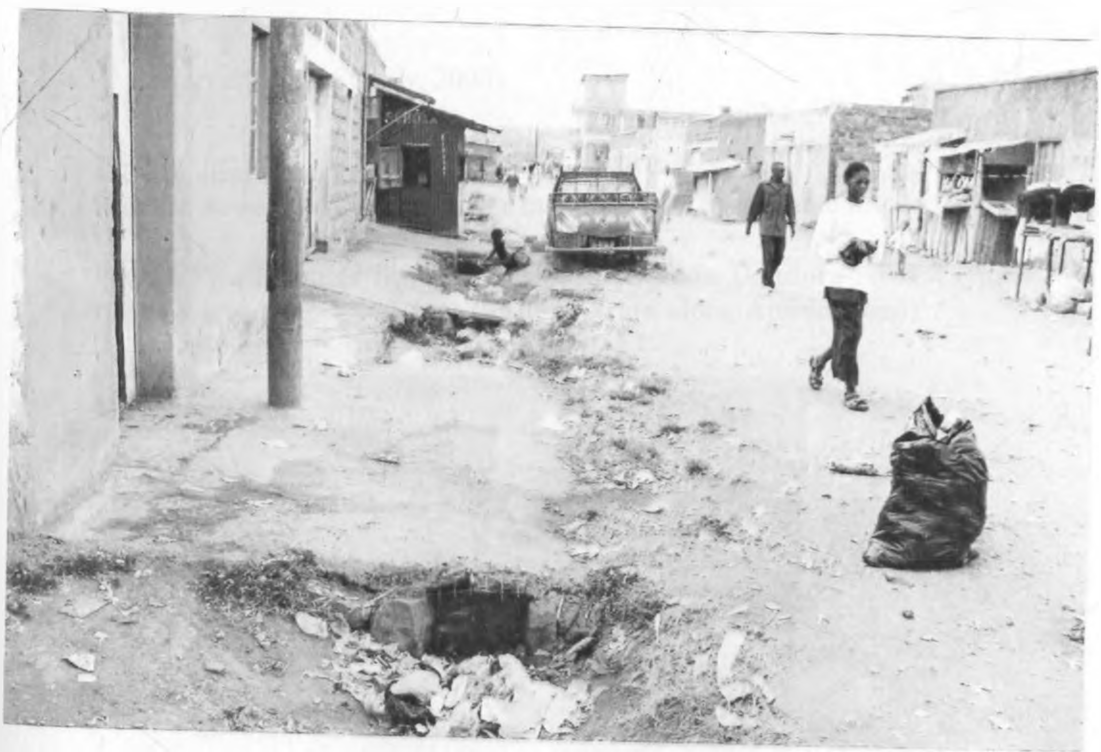
Plate 4.19: Obstruction of Storm Water Drain by a Kiosk (Note also the silting)

Source: (Field Survey, 2008)

Plate 4.20: Structures Built Over Storm Water Drainage Along Northern Spin Road Making Cleaning of the Drain Difficult

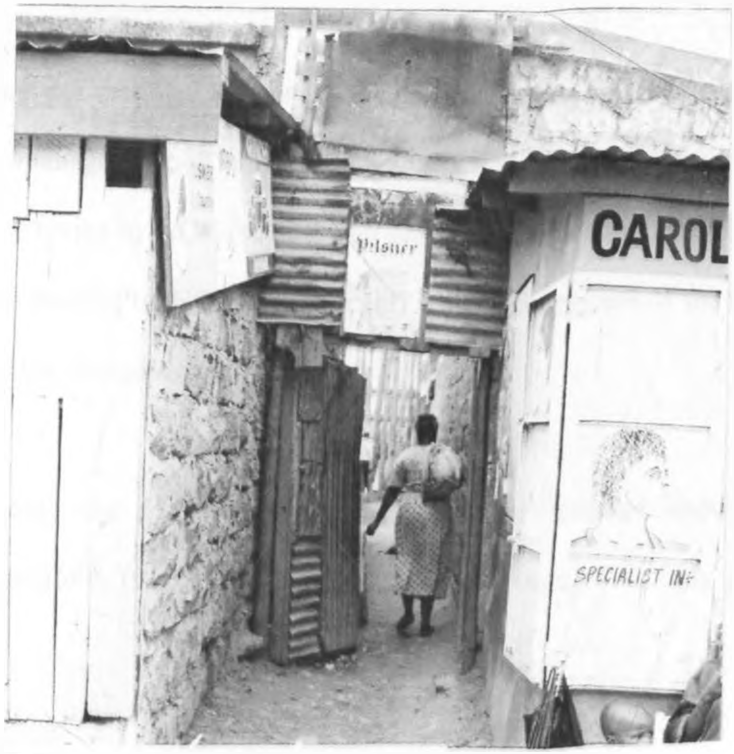
Source: Field Survey

Plate 4.21 **Access Ramps Over Open Channels in Area 5 (not done professionally and may lead to blockage)**



Source: (Field Survey, 2008)

Plate 4.22: Obstruction and Encroachment of Public Footpath (N.B . The Footpath was originally 3 metres Wide)



Source: (Field Survey, 2008)

4.7.6 Sanitation

Blocked Sewerage System was the main problem cited by the respondents

Plate 4.23: **Structure Built on top of a Sewer in Dandora Area 2 (Note the raw sewer discharge into the open drain along Apudo Road)**

Source: (Field Survey, 2008)

4.7.7 Solid Waste Management

The survey found out that 88.3 per cent of the respondents relied on private collectors for solid waste management. This is a problem because they have to pay charges in addition to those levied by NCC for the same service. Another problem cited was the irregularity of collection by NCC (7.4 per cent) while 4.3 per cent of the respondents complained of high charges levied.

Enquiries on high the respondents disposed of their garbage showed that an overwhelming majority (95.7 per cent) used polythene bags while only 4.3 per cent used dust bins.

4.8 Improvement of Infrastructure

This section sought to know from the respondents what authorities they thought were better placed to undertake measures to improve management of infrastructure in Dandora. It also aimed to establish what the respondents desired most to be improved to make Dandora a better place to live in.

4.8.1 Authorities for improvement of management of infrastructure in Dandora

While responding to what they considered the best way to improve management of infrastructure in this settlement, all the respondents, representing 100 per cent, preferred a combination of efforts by the NCC, the Central Government, the community and NGOs. This was so for all the different physical infrastructure categories.

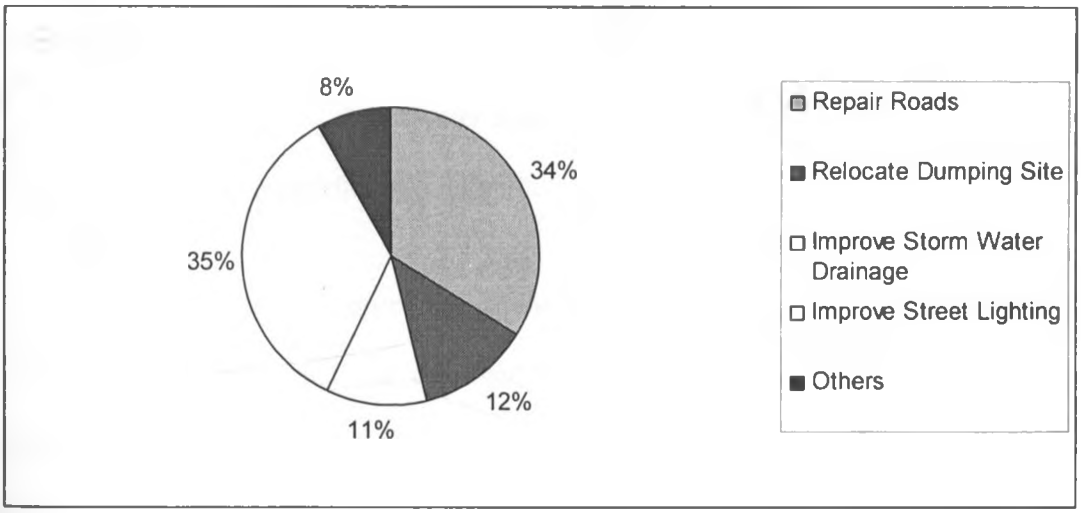
4.8.2 What the respondents would most like to be improved in Dandora to make it a better place to live in

Table 4.32: What the respondents wanted to be improved

Recommendation	Frequency	per cent
Repair roads	31	33.7
Improve Security	3	3.3
Relocate dumping site	7	7.6
Improve storm water drainage system	10	10.9
Improve water supply	3	3.3
Introduce NCC waste collection	4	4.3
Improve Street lighting	33	35.9
Lower House Rent	1	1.1
Total	**92**	**100.0**

Source: (Field Survey, 2008)

Fig 4.13: What Respondents wanted to be improved in Dandora



Source: (Field Survey, 2008)

Table 4.32 and Fig 4.13 above illustrate the various concerns of the respondents. On a priority basis the respondents desired improved street lighting (35.9 per cent), followed closely by repairing of roads (33.7 per cent) and then improvement of storm water drainage (10.9 per cent). Other desires were the relocation of the dumping site, introduction of waste collection by NCC and improvement of water supply and security in that order.

In the city of Nairobi, three categories of groups are involved in the management of roads, storm water drainage and street lighting. They include the City Council of Nairobi which manages adopted and non-adopted streets/roads, storm water drains, street lights, traffic lights and general traffic management; the Ministry of Roads and Public Works which manages the classified road network and private individuals and firms who manage private roads under their jurisdiction (NCC, 2008).

The management of roads and associated infrastructure in site and service schemes is currently undertaken by the City Council of Nairobi. The City Engineer attributes the unsatisfactory road conditions in site and service schemes to inadequate allocation of funds for road maintenance which leads to inadequate personnel and equipment for carrying out the works and weaknesses in the existing laws that governs the provision and maintenance of roads, storm water drainage and street lighting. Bad habits and lack of concern by the beneficiaries is another contributing factor.

The NCC funding for roads operations and maintenance comes from various sources. They include the General Fund, the Road Maintenance Fuel Levy Funds and from LATF. Enquiries showed that allocations are not only inadequate but also unreliable (NCC, 2008).

Funding of roads maintenance from General Fund competes with other services like education, health, staff emoluments, garbage collection among others and in most cases suffers from inadequate funding since the revenue available is not adequate for all the services offered by NCC. Plot owners in Dandora are charged KShs. 20 per month for road maintenance in the estate. Although this money goes to the General Fund, little if any at all is ploughed back for the intended use. The levy is also highly

inadequate. The same scenario happens with funds from the Fuel Levy Funds. Although a lot of Fuel Levy Fund is collected in Nairobi, little is used on Nairobi roads (NCC, 2008).

The KRB Act mandates the Kenya Roads Board to administer the funds derived from the Fuel Levy. It also determines the allocation of financial resources to the road agencies. Though managing the highest proportion of roads in the city, the KRB act does not include NCC ass one of its agencies. This is a big anomaly that also contributes significantly to the apparent disproportionate allocation of funds from the KRB and subsequent deterioration of roads in the city including in site and service schemes.

Allocation of LATF monies and their release are based on certain conditions and therefore unreliable for planning purposes. Some of the conditions include:

- Sixty per cent (60per cent) is released if council submits required budget and meets current statutory creditor obligations,
- Forty per cent (40per cent) is released if council submits the following documents:
    - ◊ Statement of Actual Revenues and Expenditures
    - ◊ Statement of Debtors and Creditors & Debt Repayment Plan
    - ◊ Abstract of accounts
    - ◊ Revenue Enhancement Plan,
    - ◊ Local Authority Service Delivery Action Plan (LASDAP)

In addition as we saw earlier in chapter 2, council budget should not spend more than 60 per cent of total expenditure on personnel (KLGRP). The City Council of Nairobi rarely meets the above conditions and the funds are always delayed. Embargo on employment has contributed to the inadequate level of staffing in the City Engineer's

Department. Personnel leaving the service through retirement, resignation or natural attrition are not replaced leading to a severe shortage of staff (NCC, 2008).

According to the City Engineer (2008) the above factors significantly contribute to the poor conditions of infrastructure in the City of Nairobi including Dandora site and service scheme.

CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSIONS

5.1. A Synthesis of the Research Findings

This study has established that Dandora Site Service Scheme in the Eastlands of Nairobi has not been spared by the effects of rapid urbanization. Like many urban settings in Kenya. Dandora has witnessed phenomenal growth in its population, from a small population of 6000 people in 1977 to approximately 110,000 in 1999.

This rapid rise in population has resulted in a number of problems. They include the proliferation of informal settlements like Gitari Marigu, Ex-Muoroto, Canaan, Sharp Corner and others within the formal Dandora settlement; insecurity; environmental degradation; deteriorating health standards; shortage of conventional housing; increase in land speculation; overcrowding, poverty depicted by the emerging shanties, increase in street families; unemployment, weak social relations and deteriorating infrastructure.

The study has established that the population in Dandora has increased due to a number of factors which includes natural increase through birth, in – migration from other parts of Nairobi and from other parts of the country and through the proliferation of informal settlements, normally associated with overcrowding. The increased population has consequently put a lot of strain on the physical infrastructure in Dandora.

The study has established that physical infrastructure and especially those of concern to this study - roads, footpaths and bicycle paths, parkings, storm water drainage and

street lighting are in a state of disrepair. Problems identified with roads included presence of potholes, cracking of road surface, rutting; edge damage; obstructions mainly from kiosks, soil heaps and construction debris; high vegetation on the shoulders; depressions; missing road furniture and stripping/fretting of the road surface.

Streetlights were either not functioning; damaged; missing or had worn out paint work on the lighting poles. A high degree of obstruction by informal business operations was another contributing factor. Footpaths and bicycle paths suffered from insecurity mainly caused by non-existent street lighting; obstruction by informal business and also dumping. Car parks had been encroached on by informal businesses or their use converted to residential use through the creation of infill plots by NCC.

Storm water drains were found to be prone to regular blockages. Other problems established included silting, blockage by debris, headwall damage, damaged ditch lining, obstruction by kiosks, overgrowth of vegetation and interference by plot developers.

The study has established that for sustainable management of infrastructure services, all stakeholders must be involved in the whole process – from project conceptualization, through design, financing and planning to implementation, operation and maintenance, monitoring and evaluation. The study has identified the stakeholders to include the service users, third sector organizations which include NGOs, CBOs, and Faith Based Organizations (FBOs) and also external support agencies.

The study notes that provision and management of infrastructure is a process that takes time and resources. These resources are in the form of different types of assets including human capital, social capital, natural capital, financial capital and physical capital. The study has shown that none of the actors may have all these asses. The actors can however employ these assets in a synergistic manner by partnering together to achieve sustainable infrastructure services.

The study has established the involvement of all the classes of stakeholders from the initial stages of the Dandora project up to project implementation phase. External support agencies contributed most of the project funding while the Kenya Government contributed financially and also provided land. The local Government through NCC did part of the design work and vetting of allottees. Most of the design work o the project was done by consultants in the private sector as was the construction which was carried out by private contractors. NGOs were involved in designing structures and also in empowerment of the allottees while the non-formal private sector was involved in a range of activities including consolidation works.

During this period (according to key informants who have been in Dandora since the inception to date) coordination of all stakeholders was evident. In addition, according to the same sources, adherence to the project's objectives was strict during the same period. It is due to this fact primarily that phase 1 of the project retains most of its original character. Little of this coordination and involvement by the various stakeholders is evident today.

It has been established through the study that various aspects bear on the successful and sustainable management of urban infrastructure services. These include

technology, institutions involved; economic and financial considerations; policy and legal matters and the political establishment.

The study has established that NCC, which is the main institution currently charged with the responsibility of maintenance of roads, street lighting and storm water drainage in Dandora is lacking adequate people both in terms of skills and number. Equally lacking are adequate tools and equipment for maintenance of the same. NCC has failed in controlling illegal developments despite its legal mandate though various statutes like the LGA, PPA and EMCA. This is evident in the many unapproved high rise buildings and informal establishments (kiosks), most of which are unlicensed and unapproved. Other institutions which have contributed to this scenario include the national government through the provincial administration. The latter contribute significantly to the increase of informal settlements and kiosks.

A very low presence of NGOs and CBOs in Dandora has been noted. This is one aspect of the Dandora project objectives which has not been achieved and may be a contributor to the lack of empowerment of the Dandora people. The study has established that adequate financing is a prerequisite for sustainable infrastructure systems. However, according to the City Engineer, sources of finance for management of infrastructure in Nairobi are few and the amounts allocated to infrastructure inadequate and unpredictable. The result is that little or no maintenance at all is carried out on urban infrastructure leading to the deplorable conditions.

Aspects of other infrastructure like water, housing, solid waste management and sanitation affect the performance of roads, street lighting, storm water drainage, footpaths and bicycle paths. It has been established in this study that all these aspects

operate under different laws and policies and in most cases different institutions, often not harmonized. This results in uncoordinated management of urban road infrastructure.

Political interference and lack of political will are other aspects which have been identified to bear on infrastructure management. The allocation of car parks in Dandora to private developers has been cited as one such form of political interference by the City Councilors. The restructuring of LGLA has been one of the strategies identified by the GoK to improve funding of infrastructure development. This has however remained on the wishful thinking list since 1986, a clear lack of political will.

This study has established the need to improve the management of physical infrastructure in Dandora through a multi-stakeholder approach.

5.2 Recommendations

From the foregoing observations on the existing situation with regard to management of infrastructure in Dandora a few recommendations are suggested aimed at improving the same.

5.2.1. Capacity Building and Awareness Creation

This study recommends the lifting of the embargo on employment by LAs, particularly for the technical cadre. This will enable the NCC to recruit more engineers and technicians to supplement the current number which is not adequate to provide all the required services to the increasing Nairobi population in an effective and efficient manner. The MOLG and NCC should then embark on a comprehensive

policy on capacity building to enable LAs to improve on service provision. Capacity building can be through retraining by attending tailor made courses or through further education locally and abroad.

The study also recommends creation of public awareness to the service users to act as watchdogs on the road physical infrastructure in their neighbourhood. They should particularly be made aware of the provisions of section3 (1) of EMCA which provides that everyone in Kenya is entitled to a clean and health environment and has a duty to safeguard and enhance the same. It is recommended that awareness creation be carried out by relevant, NGOs, FBOs and CBOs with the support of ESAs, Local and National Governments through specialized agencies like NEMA and KRB and also the private sector.

5.2.2 Institutional Aspects

Bearing in mind that infrastructure provision and management requires different forms of assets which may not be available in total to any one stakeholder, this study recommends the involvement of all stakeholders in a partnership approach in management of the same. This will enable the stakeholders to take advantage of their respective comparative advantages and help in building effective synergies aimed at overall improvement in infrastructure management.

Involvement of other stakeholders in all the stages of infrastructure provision and management will be crucial in an attempt to create ownership. To improve institutional framework, an overhaul of the current system that bestows the responsibility of management of most of the physical infrastructure on LAs is recommended to allow full participation by all other stakeholders. Liaison

committees should then be created in order to improve collaboration and coordination among the LAs, various relevant government ministries and agencies, CBOs, FBOs, NGOs and the private sector, both formal and informal.

5.2.3. Financial Aspects

It is recommended that the MOLG speeds up the implementation of the KLGRP to cover all the urban LAs in Kenya. If implemented according to the outlined principles, KLGRP will result in LAs improving on financial management and revenue mobilization which would then be channeled to improving road infrastructure management.

This study recommends an increase in RMFL transfers from the current 20 pr cent to 50 percent and also recommends that 50 per cent of this transfer be granted to Nairobi which generates the bulk of this money.

The study also recommends an increase of LATF capital from the current 5 per cent of total income tax collected to 20 per cent and that the allocation of Nairobi be pro rata to the amount of income tax collected within the jurisdiction of Nairobi.

The study recommends implementation of the long overdue restructuring of LGLA to enable LAs access affordable capital for road infrastructure provision and management.

It is also recommended by this study that the KShs. 20 levied to Dandora plot owners towards road maintenance be increased by 50 per cent to KShs. 40 per cent month. This money should be banked in an earmarked account specifically for improvement

of maintenance of Dandora roads. The account should be operated by the liaison committee proposed in 5.2.2.

5.2.4. Fiscal and Economic Aspects

This study recommends a deliberate increase in budgetary allocation by the Ministry of Finance to KRB to be used specifically for maintenance of roads and related infrastructure.

The study recommends an upward revision in land rates for all main roads frontagers who have changed their land use. It was an observation of this study that a majority of such frontagers have converted their premises into commercial enterprises thus earning the owners additional incomes with no benefit to NCC at all.

5.2.5. Legal Aspects

It is recommended that KRB Act be amended to include NCC as a road agency. This would enhance the latter's bargaining power in allocation of funds to be used for provision and management of roads.

Equally the LGA should be reviewed to reflect recent changes like the enactment of EMCA, the New Water Act, the PPA and other recent legislation. The review should also remove the excess powers bestowed on the Minister for Local Government which has to date interfered with the smooth running of many LAs, NCC included.

5.2.6 Policy Aspects

It is recommended that any policy formulation geared towards improvement of road physical infrastructure should always involve all the stakeholders at all stages. Failure of such strategies like the NMGS of 1973 would then be avoided.

5.2.7. Political Aspects

It is recommended that all political leaders be trained on the tenets of good governance i.e. transparency, accountability, openness, impartiality, inclusiveness, gender equity, efficiency and effectiveness in services delivery to the residents of our urban areas.

5.2.8. Strategy

It is recommended that maintenance of roads, storm water drainage and street lighting in urban site and service schemes be privatized to bring competition and hence reduce costs of operating and maintaining the services. The strategy has worked in other developing countries like Chile and Indonesia.

5.3 Conclusions

Physical infrastructure is important to the proper functioning of any urban authority. This study has noted that efficiently run road infrastructure has positive links to economic growth and in ensuring poverty reduction. Infrastructure also has important links to the environment. There is therefore need to ensure that physical infrastructure in our urban LAs is efficiently managed.

The study has noted however that there are many factors in the external environment that hinder the provision of urban infrastructure services in a sustainable manner.

The study has established that Dandora's road physical infrastructure is in a state of disrepair courtesy of some of these factors. The study has recommended the harnessing of the different assets possessed by the various stakeholders in order to overcome the above factors. It is hoped that the recommendations herein will contribute to improvement in management of road physical infrastructure in urban site and service schemes.

5.4 Area of Further Research

This study looked into a site and service scheme developed by the public sector. Noting that there are many site and service schemes developed by the private sector, further research is recommended in this segment of development.

This study also recommends further research on the use of LATF and RMFL funds since the inception of the same in Kenya and whether the same have any impact on service delivery in our urban areas, particularly on road infrastructure.

The study also recommends further research to establish whether Dandora is due for urban renewal.

BIBLIOGRAPHY

Abuodha S. O. (1997) - **The Private Finance Initiative** in Kenya Engineer, July/August

Aligula, E. M. (1999) - Improve the performance of Urban Water Infrastructure Services Delivery and Management in Kenya. A case study of Nairobi City, Kisumu and Eldoret Towns, Shaker Verlag 1999.

Alreck, P.L. and R.B. Settle, (1995) - The Survey Research Handbook. Irwin/McGraw-Hill

Amaya, J. A. (2001) - **Governance Issues in the Planning and Development of the City of Nairobi.** Paper presented at Consultative Workshop on Metropolitan Development and Management Strategy for Nairobi 5-6 December 2001, Nairobi – Kenya.

Amoako K. Y. (2000) - **Implementing the Habitat Agenda.** Statement issued at official opening o Regional Africa Ministerial Conference on HABITAT. Addis Ababa – Ethiopia, 6th November 2000.

Bubba, Ndinda and D. Lamba (1991) - Urban Management in Kenya, Environment and Urbanisation Vol. 3 No. 1 April 1991.

Chana T. S. (1979) - Development Site and Planning Experience fro the Dandora Community Development Project, HRDU, Nairobi 1979.

City Commission of Nairobi (1990) - Annual Report for 1990 Housing Development Department.

City Commission of Nairobi (1989) - Annual Report for 1989. Housing Development Department.

City Commission of Nairobi (1988) - Annual Report for 1988. Housing Development Department.

City Commission of Nairobi (1987) - Annual Report for 1987. Housing Development Department.

City Commission of Nairobi (1986) - Annual Report for 1986. Housing Development Department.

City Commission of Nairobi (1986) - Annual Report for 1985. Housing Development Department.

City Commission of - Annual Report for 1984. Housing Development

Nairobi (1984) Department.

City Commission of Nairobi (1983) - Annual Report for 1983. Housing Development Department.

City Commission of Nairobi (1982) - Annual Report for 1982. Housing Development Department.

City Commission of Nairobi (1981) - Annual Report for 1981. Housing Development Department.

City Commission of Nairobi (1980) - Annual Report for 1980. Housing Development Department.

City Commission of Nairobi (1979) - Annual Report for 1979. Housing Development Department.

City Commission of Nairobi (1978) - Annual Report for 1978. Housing Development Department.

City Commission of Nairobi (1977) - Annual Report for 1977. Dandora Community Development Project Department.

City Commission of Nairobi (1976) - Annual Report for 1976. Dandora Community Development Project Department.

City Commission of Nairobi (1975) - Annual Report for 1975. Dandora Community Development Project Department.

City Commission of Nairobi (1975) - Annual Report for 1975. Dandora Community Development Project, Mutiso Menezes International.

City Commission of Nairobi (1974) - Communal and Social Facilities, Dandora Community Development Project.

City Commission of Nairobi (1973) - Nairobi Metropolitan Growth Strategy, Volume One, Nairobi Urban Study Group.

City Commission of Nairobi (1973) - Nairobi Metropolitan Growth Strategy, Volume Two, Nairobi Urban Study Group.

Daily Nation, (2003) - **Water Services to go Private.** Statement by Permanent Secretary, Ministry of Water Resources – Kenya in address at the 3rd World Water Forum, Kyoto – Japan. Daily Nation, March 21st, 2003.

Daily Nation, (2003) - **Shocking Wastage in Nairobi.** Community in Daily Nation, March 21st, 2003.

Fox W.F. (1994) - Strategic Options for Urban Infrastructure Management. UNDP/UNCHS/World Bank Urban Management Programme World Bank, Washington

D.C.

Gidman, P., J. Blore, J. Lorentzen, and P. Schuttenbelt, (1995) - Public-Private Partnerships in Urban Infrastructure Services, UNDP/UNCHS/World Bank, Nairobi, Kenya.

Gilbert A. and J. Gugler, (1981) - Cities, Poverty and Development, Urbanisation in the Third World, Oxford University Press, New York.

Government of Kenya (2003) - Economic Survey, 2003, Central Bureau of Statistics – Government Printer, Nairobi, Kenya.

Government of Kenya (2003) - Road Maintenance Manual Part I. Ministry if Roads and Public Works.

Government of Kenya (2003) - Road Maintenance Manual Part II. Ministry if Roads and Public Works.

Government of Kenya (2003) - Road Maintenance Manual Part III. Ministry if Roads and Public Works.

Government of Kenya (2002) - National Development Plan, 2002-2008, Government Printer, Nairobi, Kenya.

Government of Kenya (2002) - The New Water Act, 2002, Government Printer, Nairobi, Kenya.

Government of Kenya (2001) - Poverty Reduction Strategy Paper, 2001-2004, Government Printer, Nairobi, Kenya.

Government of Kenya (1999) - The Environmental Management and Coordination Act, 1999, Government Printer, Nairobi, Kenya.

Government of Kenya (1999) - The Kenya Roads Board Act, 1999, Government Printer, Nairobi, Kenya.

Government of Kenya (1998) - The Local Authorities Transfer Fund Act, 1998, Government Printer, Nairobi, Kenya.

Government of Kenya (1998) - Public Investment Programme 1999/2000-2001/2002 Ministry of Finance and planning, Nairobi, Kenya.

Government of Kenya (1997) - National Development Plan, 1997-2001, Government Printer, Nairobi, Kenya.

Government of Kenya (1997) - Session Paper No.2 of 1996 on **Industrial Transformation to the year 2020**, Government printer, Nairobi, Kenya.

Government of Kenya (1996) - The Physical Planning Act, 1996, Government Printer, Nairobi, Kenya.

Government of Kenya (1994) Session Paper No. 1 of 1994 on **Recovery and Sustainable Development to the year 2010.** Government Printer, Nairobi, Kenya.

Government of Kenya (1994) - Development Plan, 1994-1996, Government Printer, Nairobi – Kenya.

Government of Kenya (1993) - The Road Maintenance Levy Fund Act of 1993, Government Printer, Nairobi, Kenya.

Government of Kenya (1993) - The Traffic Act, Cap 403 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1990) - The Housing Act, Chapter 117 of the Laws Kenya, Government, Printer, Nairobi, Kenya.

Government of Kenya (1986) - Sessional Paper No. 1 of 1986 on **Economic Management for Renewed Growth.** Government printer, Nairobi, Kenya.

Government of Kenya (1986) - The Rating Act, Cap, 267 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1986) - The Public Health Act, Cap 242 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1986) - The Local Government Act, Cap 265 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1984) - The Local Government Loans Act, Cap 270 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1984) - The Valuation for Rating Act, Cap 266 of the laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1984) - Development Plan 1984 – 1988, Government Printer, Nairobi, Kenya.

Government of Kenya (1979) - The Transport Licensing Act, Cap 404 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1978) - Human Settlements in Kenya. A strategy for Urban and Rural Development, Ministry of Lands and Settlement, Nairobi, Kenya.

Government of Kenya - Development Plan, 1970-1974, Government

(1974) Printer, Nairobi, Kenya.

Government of Kenya (1972) - The Water Act, Cap 372 of the Laws of Kenya, Government Printer, Nairobi, Kenya.

Government of Kenya (1970) - Development Plan, 1970-1974, Government Printer, Nairobi, Kenya.

Government of Kenya (1968) - Building Code, Government Printer, Nairobi, Kenya.

Housing Research and Development Unit (HRDU), University of Nairobi (1980) - Case Studies of Site and Service Schemes in Kenya, HRDU (1980), Nairobi, Kenya.

Housing Research and Development Unit (HRDU), University of Nairobi (1978) - Finance for Housing Infrastructure HRDU (1978), Nairobi, Kenya.

Institution of Highways and Transportation with the Department of Transport (1987) - Roads and Traffic in Urban Areas, Laygon Place, London.

Ismail, Z. (1982) - **Introduction to Nairobi and Its Urbanisation Process** in UN-Follow-Up Workshop on Housing, HRDU, Nairobi, Kenya, 12-29, January 1982.

Japanese International Cooperation Agency (JICA), (1998) - The Study of Solid Waste Management in Nairobi City in the Republic of Kenya, March 1998.

Kiamba, J.M (1992) - **Constraints to Urban Growth and Spatial Planning**. Proceedings of Africa Research Network for Urban Management (ARNUM) Workshop. Urban Management in Kenya, Joyce M. Malombe Ed. 1992.

Kiamba, J.M (1989) - **The Private Housing Finance System and issues in Kenya.** In Report and Proceedings Workshop on Housing, January 23rd-February 4th 1989, Nairobi, Kenya.

Kingoriah, G.K. (1980) - **Policy Impacts on Urban Land Use Patterns in Nairobi, Kenya: 1899 -1979**. Unpublished Ph.D Dissertation, Indiana State university, Terre Haute, Indiana, U.S.A., 1980.

Kohout, F. J. (1974) - Statistics for Social Scientists. John Wiley & Sons,

Inc. 1974.

Koontz H, and H. Weihrich, (1994) - Management, A Global Perspective, McGraw Hill, Inc. 1994.

Lazaro, T.R. (1990) - Urban Hydrology, Technomic Publishing Company, Inc. Pennsylvania, U.S.A.

D. Lee Smith and P. Memon (1988) - Institutional Development for Delivery of Low Income Housing. An evaluation of Dandora Community Development Project in Nairobi. Mazingira Institute. Monograph No. 1 September 1988.

Mabogunje, A. (1999) - Governance and Democratization in West Africa. Dele Olowu Ed. 1999.

Mabogunje, A. (1993) - **Infrastructure: The Crux of Modern urban Development.** In the Urban Age, Volume One Number three, Spring 1993. Page 3-6.

Malombe M. J. (1990) - The impact of Site and Service Projects on Urban Housing Markets. The Case of Dandora, Nairobi, Ph.D Thesis, University of Western Ontario, Canada.

Mbogua, P. (1992) - Municipal Finance and Administration. Proceedings of Africa Research Network for Urban Management (ARNUM) Workshop. In Urban Management in Kenya, Joyce M. Malombe Ed. Nairobi, Kenya, 1992.

Mitullah, W. (2001) - **Local Governance and Citizen Participation; An Overview.** Paper presented at Seventh Training Course on Local –Regional Development Planning and Management 20th October – 24th November.2001.Nairobi, Kenya.

Mugenda, M. O. and A. G. Mugenda, (1999) - Research Methods. Acts Press Nairobi, Kenya

Nachmias D, and C. F. Nachmias,. (1996) - Research Methods in the Social sciences. Arnold, London.

Ndegwa, E. (2002) - **The idea of Strategic Development and Management Plan and its Relevance to the City of Nairobi.** Paper Presented at Workshop on Strategic Urban planning and Management. 10-11 December 2002, Nairobi, Kenya.

Obudho, R. A and P. Juma, - The Role of Urbanisation and Sub-Urbanisation

(2002) Process in Urban Land Management. Olima W. and Kreibich V. Ed. (2002).

O'Flaherty, C. A. (1974) - Highways. Highways and Traffic, Edward Arnold Publishers, London.

Rakodi C. and Devas Nick (Eds) (1993) - Managing Fast Growing Cities. New Approaches to Urban Planning and Management in the Developing World. Longman, Harlow, England (1993).

Rasmussen, S. (1987) - Implementing and Institutions. A Case Study of the Housing Development Department in Nairobi. Unpublished Masters Thesis. Aalborg Universitets Centre, Danmark.

Republic of South Africa (1995) - Guidelines for the Provision of Engineering Services and Amenities in residential Township Development. Department of Housing, Pretoria, South Africa.

Rondenelli, D. A. (1990) - Decentralizing Urban Development Programs: A Framework for Analyzing Policy. USAID, Washington D.C.

Saturday Nation, (2003) - **World Water day – Current Issues and Challenges: Agenda 21**, March 22nd 2003.

Schubeler, P. (1996) - Participation and Partnership in Urban Infrastructure Management, NDP/UNCHS/World Bank, Washington DC.

Shihembetsa, L. U. (1989) - **Urban Development and Dwelling Environments Brief Notes on Dandora** in Report and Proceedings. Workshop on Housing 23rd January – February 4th 1989, Nairobi, Kenya.

Smoke, P. J. (1994) - Local Government Finance in Developing Countries. The Case of Kenya, Oxford University Press.

Syagga P. M. and E.M Aligula (1999) - Provision of Urban Infrastructure Services. In Management and Agency in the Urban Real Property Market in Kenya, Aachen Shaker.

Tomlinson, R. (2001) - Urban Development Planning. Lessons for the Economic Reconstruction of South Africa's Cities. Witwaters Rand university Press, Johannesburg, South Africa.

UNCHS (Habitat) (1999) - Financing Cities for Sustainable Development with

Specific reference to East Africa. UNCHS (Habitat), Nairobi, Kenya.

UNCHS (Habitat) (1998) - UNCHS Best Practices 1998, http:www.bestpractices.org/accessed on 8/4/03.

UNCHS (Habitat) (1997) - Human Settlements Basic Statistics, UNCHS (Habitat), Nairobi, Kenya.

UNCHS (Habitat) (1996) - An Urbanizing World: Global Report on Human Settlements 1996, Oxford University Press, Oxford.

UNCHS (Habitat) (1994) - Population, Urbanisation and Quality of life, UNCHS (Habitat), Nairobi, Kenya.

UNCHS (Habitat) (1993) - Public/Private Partnerships in Enabling Shelter Strategies. UNCHS (Habitat), Nairobi, Kenya.

UNCHS (Habitat) (1992) - Training Manual on Urban Local Government Finance for English Speaking East and South African Countries, Nairobi, Kenya.

UNCHS (Habitat) (1991) - Human Settlements Development through Community Participation, UNCHS (Habitat), Nairobi, Kenya.

UNCHS (Habitat) (1989) - Methods for the Allocation of investments in Infrastructure within Integrated Development planning. An overview for Development Planners and Administrators, Nairobi, Kenya.

UNDP, (1996) - Sector Review on Capacity Building for Metropolitan Governance of Nairobi, Kenya.

UNEP, (2002) - Africa Environment Outlook, Past. Present and future Perspectives, UNEP, Nairobi, Kenya.

Weissman, S. (1992) - **Road Maintenance and Economic Growth: An Agenda for Reform.** In Kenya Engineer, September/October 1992.

World Bank, (2002) - Building Institutions for Markets, World Development Report 2002, World Bank, Washington D.C.

Wokabi, M. S. (2000) - Partnerships in Urban Environmental Management: An Approach to Solving Environmental Problems in Nakuru, Kenya. In Environment and Urbanisation Vol. 12No. 2 October 2000.

World Bank, (2000) - Can Africa Claim the 21st Century? The World

Bank; Washington D.C.

World Bank, (2000) - Partnership for Development 2000. World Bank, Washington D.C.

World Bank, (1994) - World Development Report 1994. Infrastructure for Development, Oxford university Press.

World Bank, (1992) - Kenya Local Government Finance Study. World Bank, Nairobi, Kenya.

APPENDICES

APPENDIX I: DATA MATRIX

Data Type	Data Needs	Source of Data	Method of Data Collection	Method of Data Analysis	Method of Data Presentation	Remarks
Project Area	Base Maps	Survey of Kenya	Retrieval	Qualitative	Maps	
History of Nairobi/Dandora	Literature Review	Library, NCC, Key Informants	Reading, Oral Interview	Qualitative	Text and Maps	
Regional setting analysis	Maps	Survey of Kenya	Retrieval	Qualitative	Text and Maps	
Physical Environment	Gradient Terrain Slopes Soils Height Rivers	• Geological maps from survey Office • Library • NCC	Retrieval	Qualitative	Text and Maps	
Settlement Pattern	• Pattern • Land Use	• Library • NCC • Field survey	• Retrieval • Observation	Qualitative	Maps and text Tables	
Population	• Sex • Age • Household size • Household Structure • Population density	• Field Survey • Population census Report	• Questionnaire • Retrieval	Qualitative	Tables and text	
Plot Details	• Size • Coverage • Plot Ratio • Building Line • Owner • Tenure	• NCC • Field Survey	• Retrieval • Questionnaire	Qualitative	• Tables • Text • Plans • Sketched	
Housing	• Type • Occupancy Rate • Physical Condition • No. of Rooms • Type of House • Materials of Housing • Services of House	• Field Survey	• Questionnaire	• Statistics • Qualitative	• Photography • Plans • Text	

Data Type	Data Needs	Source of Data	Method of Data Collection	Method of Data Analysis	Method of Data Presentation	Remarks
Other Buildings	• Type • Activity • Height	Field Survey	Observation	Qualitative	• Text • Photography	
INFRASTRUCTURE 1. Roads	• Network • Linkages • Distribution • Capacity • Physical Condition • Footpaths • Street Lighting • Car Parks • Storm Water Drainage • Public Transport Facilities • Cost • Other Problems	• Maps • Field Survey	• Retrieval • Observation • Questionnaire	Qualitative	• Text • Maps • Photography	
2. Water	• Access • Quantity • Quality • Reliability • Cost • Other Problems • Distribution Network	• Field Survey • NCC • Maps	• Retrieval • Questionnaire • Scheduled interview	• Statistics • Qualitative	• Charts • Tables • Maps	
3. Sanitation	• Access • Type • Quality • Cost • Other Problems • Distribution network	• Field Survey • Maps • NCC	• Retrieval • Questionnaire • Observation • Interview	• Qualitative • Statistics	• Charts • Tables • Maps • Photography	

Data Type	Data Needs	Source of Data	Method of Data Collection	Method of Data Analysis	Method of Data Presentation	Remarks
4. Solid Waste Disposal	• Access • Method • Cost • Other Problems	• Field Survey • NCC	• Questionnaire • Interview • Observation	• Qualitative • Statistics	• Text • Charts • Tables • Photography	
5. Electricity	• Coverage • Reliability • Cost • Distribution network • Other Problems	• Field Survey • Maps	• Questionnaire • Retrieval • Observation	• Statistics • Qualitative	• Text • Charts • Tables • Photography	
Telephone	• Type • Reliability • Cost • Distribution network • Other Problem	• Field Survey • Telkom	• Questionnaire • Retrieval	• Statistics	• Text • Tables • Charts • Photography	
COMMUNITY SERVICES 1. Education	• Level • Distribution • Ownership	• Field Survey • NCC	• Observation • Retrieval • Interview	• Qualitative	• Text • Tables • Photography • Map	
2. Health	• Level • Distribution • Ownership • Number	• Field Survey • NCC	• Observation • Retrieval • Interview	• Qualitative • Quantitative	• Text • Tables • Photography • Map	
3. Social Halls/Community Centre	• Distribution • Ownership • Number	• Field Survey • NCC	• Observation • Retrieval • Interview	• Qualitative • Quantitative	• Text • Tables • Photography • Map	
4. Religious Organization	• Type • Number	• Field Survey	• Observation • Interview	• Qualitative • Quantitative	• Text • Photography • Map	

Data Type	Data Needs	Source of Data	Method of Data Collection	Method of Data Analysis	Method of Data Presentation	Remarks
COMMUNITY ORGANIZATION/ STRUCTURE/ CAPACITY	• Organization structure • Culture • Religion • NGOs • CBOs • Membership <u>Institutions</u> • Local Government • Private Sector • Non-formal Private sector • ESA's	• Field Survey • Literature review	• Observation • Retrieval • Interview	• Qualitative • Statistics	• Text • Photography • Charts and • Tables	
PRODUCTION AND ECONOMIC SYSTEM 1. Markets	• Number • Type • Access	• Field Survey • NCC	• Observation • Retrieval	• Qualitative • Statistics	• Text • Photography	
2. Industry	• Type • Ownership	• Field Survey	• Observation • Retrieval	• Qualitative • Statistics	• Text • Photography	
3. Employment	• Nature • Salary • Expenditure pattern	• Field Survey	• Questionnaire	• Statistics	• Text	
4. Security	• Effectiveness • Efficiency	• Field Survey	• Questionnaire • Observation	• Qualitative	• Text	

APPENDIX II

UNIVERSITY OF NAIROBI

DEPARTMENT OF ARCHITECTURE AND BUILDING SCIENCE
SCHOOL OF THE BUILT ENVIRONMENT
P.O. BOX 30197
NAIROBI

RESEARCH PROJECT: **"TOWARDS IMPROVING PROVISION AND MANAGEMENT OF ROAD INFRASTRUCTURE IN URBAN SITE AND SERVICE SCHEMES: CASE STUDY OF DANDORA – NAIROBI".**

RESEARCHER: MUNGAI J.M
(MUM II – URBAN MANAGEMENT)

DECLARATION: This study is for academic purposes only and any information provided will not be used for any other purposes.

QUESTIONNAIRE NO: ----------DATE OF INTERVIEW: ----------

INTERVIEW _____

RESPONDENT (OPTIONAL)_____

AGE OF RESPONDENT:_____

SEX OF RESPONDENT:_____

NO. OF RESIDENTS IN PLOT:_____

LOCATION:_____PHASE:_____ AREA:_____

HOUSE/PLOT NO.:_____

Q1. DEMOGRAPHY AND EDUCATION

SERIAL No.	HOUSEHOLD MEMBER	AGE	MARITAL STATUS	LEVEL OF EDUCATION	EDUCATION SOURCE	SEX

KEY

Kinship

1. Head
2. Spouse
3. Son
4. Daughter
5. Others (Specify)

Sex

1. Male
2. Female

Marital Status

1. Married
2. Single
3. Widow/widower
4. Separated/Divorced

Level of Education

1. None
2. Primary
3. Secondary
4. Village Polytechnic
5. Technical College
6. University
7. Others (Specify)

Source of Education

1. Private
2. Community Based Organization
3. Government
4. Non Governmental Organization
5. Others (Specify)

Q2. HOUSING

a) Ownership
   1. Owner Occupier
   2. Employer Provided
   3. Rental
   4. Squatter
   5. Others (Specify)

b) If owner occupier, is it?
   1. Freehold tenure
   2. Leasehold tenure
   3. Others (Specify)

c) Year of acquisition (indicate year)_____

d) Means of acquisition
1. Original allotment by NCC
2. Purchase 3. Lease 4. Sub-lease
5. Inherited
6. Others (Specify
7. No Information

e) If rental, it is rented from
1. Owner(s)
2. NCC
3. Sub-tenant
4. Others (Specify)

f) Rent per unit month (indicate).....

g) What do you consider about the rent (or mortgage) payment of this dwelling unit relative to your income?

1. Very High 2. High
3. Moderate 4. Low 5. Very low

h) Uses (functions)

1. Residential 2. Commercial
3. Residential cum Commercial 4. Others (Specify)

i) Type of house
1. Bungalow 2. Flats
3. Condominiums 4. Single Rooms
5. Maisonnettes 6. Others (Specify)

j) No. of rooms in plot _____

k) Rooms occupied by respondent (excluding kitchen, stores, toilets and baths)_____

l) Facilities available to respondent

- Kitchen

1. Independent Kitchen 2. Shared Kitchen 3.Verandah
4. Open Yard 5. No fixed place

- Toilets
    1. Communal water borne toilet within plot
    2. Private family latrine (pit)
    3. Ventilated pit latrine
    4. No fixed place
    5. No Information

- If toilet is not located within the dwelling. How far is it? (State distance)_____

- Water

1. Piped to the house/building
2. Pipe stand in the compound
3. Pipe stand (water kiosk) outside the house/building
4. River
5. Well
6. Borehole
7. Other (Specify)

- If water is from a water kiosk, how far is it from the dwelling? (state distance)_____
- Electricity

Indicate whether 1. Connected 2. not connected

- Telephone

1. Landline: If landline (i) Connected
(ii) not connected

2. Mobile: If mobile (i) Connected
(ii) not connected

3. None

m) Materials of the house

Component	Material
Floor Wall Roof	

Options:

Floor type	Wall type	Roof type
1. Earthen	1. Mud and wattle	1. Thatch
2. Cement Screed	2. Wood	2. Corrugated iron sheets
3. Wooden	3. Mud bricks	3. Asbestos
4. Tiles	4. Cement blocks	4. Tiles
5. Others (state)	5. quarry stone blocks	5. Reinforced concrete
	6. others (specify)	6. others (state)

n) Do you have a garage/carport? 1. No 2. Yes

o) How long have you lived in Dandora?.....

p) How long have you lived in Nairobi?.....

Q3. ECONOMIC DATA

Basic data on occupation, employment, income etc for all family members currently employed in gainful employment excluding married sons and daughters.

Family Members	Occupation (specify each job)	Location of work and/or school	Time taken from home to work /school	Employment /school	Transport costs per day (both ways)	Means of transport to work/school	Monthly income in KShs.	Additional family income	Period receiving wages /services
1. Head 2. Spouse 3. Son 4. Daughter 5. Others		1. Home 2. =1-2km 3.=2-4km 4.=4-6km 5.=over 6km		1. Self (i) Formal (ii) Informal 2. Civil services 3. other public sector 4. private sector (regular) 5. private sector (casual) 6. Schooling 7. No employment		1. N/A 2. Walking 3. Bicycle 4. Own Personal vehicle 5. bus/matatu 6. Train	0)N/A 1)1-5,000 2) 5,001 - 10,000 3) 10,001-15,000 4) over 15,000	1) Business 2) Rental income 3)Charity 4) Other (specify)	1) Daily 2) Weekly 3) Monthly 4) Other (specify)

Q4. EXPENDITURE PATTERN

(Collect information for all relevant areas)

Area of expenditure	Expenditure KShs.	
	Average Monthly	Last Month
House Rent		
Food		
Transport		
Education and/or skill training		
Health/treatment		
Water		
Electricity		
Telephone		
Garbage Collection		
Vehicle repairs		
Recreation		
Religious Activities		
Neighbourhood association		
Other (specify)		

Q.5 INFRASTRUCTURE

What problems do you experience with:

a) Roads?
b) Street lighting?
c) Strom Water Drainage?
d) Car parking in your neighbourhood?
e) Footpaths and bicycle paths?
f) Public transport facilities?
g) Water Supply?
h) Sanitation?
i) Electricity supply?
j) Solid Waste (garbage) disposal?
k) How do you dispose your garbage?
l) Telephone?

Q.6 AVAILABILITY OF SOCIAL INFRASTRUCTURE

Service	Appr. Distance from house/building.
1. School	
2. Dispensary/Hospital	
3. Social Hall/Community	
4. Shops/Shopping Centre	
5. Market	

Q.7 COMMUNITY ORGANIZATION/STRUCTURE

a) Are you aware of any NGO/CBO in your area? 1. YES NO

b) If yes, are you a member? 1. YES NO

c) What is the name of the group?

.....

d) What is its main activity?

.....

e) Do you have meetings in your neighbourhood? 1. YES 2. NO
State functions if
YES.....

f) Do your neighbours co-operate on any communal effort?
Please
explain.....

Q.8 How do you rate the security in this area?

1. Good 2. Fair 3. Poor
If poor,
why.....
.....

Q.9 How do you consider your living environment?

1) Good 2) Fair 3) Poor

Q.10 Which do you consider the best way to improve management of Infrastructure in this settlement?

a) Water and Sanitation

1. Through the City Council of Nairobi
2. Through the Government
3. Through the community and NGOs
4. Through a combination of the above
5. Through individual efforts
6. Others (specify).....
7. No information

a) Roads and storm water drainage, car parks and footpaths

1. Through the City Council of Nairobi
2. Through the Government
3. Through the community and NGOs
4. Through a combination of the above
5. Through individual efforts
6. Others (specify).....
7. No information

c) Street Lighting

1. Through the City Council of Nairobi
2. Through the Government
3. Through the community and NGOs
4. Through a combination of the above
5. Through individual efforts
6. Others (specify).....
7. No information

d) Solid Water Collection

1. Through the City Council of Nairobi
2. Through the Government
3. Through the community and NGOs
4. Through a combination of the above
5. Through individual efforts
6. Others (specify).....
7. No information

e) Public Transport

1. Through the City Council of Nairobi
2. Through the Government
3. Through the community and NGOs
4. Through a combination of the above
5. Through individual efforts
6. Others (specify).....
7. No information

Q.11 What infrastructure aspect would you most like improved so that Dandora becomes a better place in which to live?

.....

Q.12 Any other comments?

.....

Q.13 Any other observations by interviewer?

.....

FOR INTERVIEWER

FILL IN ITEMS BELOW IMMEDIATELY AFTER LEAVING RESPONDENT

A. Total length of interview..... minutes

B. Cooperativeness of the respondent
- Very Cooperative 1
- Somewhat cooperative 2
- Not cooperative 3

C. Respondent's understanding of questions
- Good understanding 1
- Fair understanding 2
- Poor understanding 3

SIGNATURE OF INTERVIEWER.....

APPENDIX III

MANAGEMENT OF URBAN ROAD INFRASTRUCTURE
CITY ENGINEER – CITY COUNCIL OF NAIROBI

This is to inform you that the data that is collected through this questionnaire is for purely academic purposes and shall be treated with utmost confidentiality.

INSTITUTIONAL STRUCTURE

1. What agencies/group are involved in the management of roads, storm water drainage and street lighting in the city?

Agencies/Group	Responsibility
1.	
2.	
3.	
4.	

2. a) What activities does your department undertake in the management of the above services especially in site and services scheme:

.....

.....

b) What do you consider to be your core areas?

.....

c) What personnel do you require in terms of skills and quality?

	Skills	Personnel	
		Required	Actual
1.			
2.			
3.			
4.			

ORGANIZATION STRUCTURE

3. a) How is your department organized? (provide organogram if available)

b) What do your consider to be its weaknesses?

c) How can they in your opinion be rectified?

APPENDIX III

MANAGEMENT OF URBAN ROAD INFRASTRUCTURE
CITY ENGINEER – CITY COUNCIL OF NAIROBI

This is to inform you that the data that is collected through this questionnaire is for purely academic purposes and shall be treated with utmost confidentiality.

INSTITUTIONAL STRUCTURE

1. What agencies/group are involved in the management of roads, storm water drainage and street lighting in the city?

Agencies/Group	Responsibility
1.	
2.	
3.	
4.	

2. a) What activities does your department undertake in the management of the above services especially in site and services scheme:

.....
.....

b) What do you consider to be your core areas?

.....

c) What personnel do you require in terms of skills and quality?

Skills		Personnel	
		Required	Actual
1.			
2.			
3.			
4.			

ORGANIZATION STRUCTURE

3. a) How is your department organized? (provide organogram if available)

b) What do your consider to be its weaknesses?

c) How can they in your opinion be rectified?

4. EFFECTIVENESS AND EFFICIENCY

How do you determine the efficiency and effectiveness of your department?

(a) Measures of Efficiency	Source of data
1.	
2.	

(b) Measures of Effectiveness	Source of data
1.	
2.	

5. What are the sources and levels of financing for operations and maintenance?

Source	Level of Financing	
	Projected	Actual

6. What problems do you encounter in financing maintenance of roads, storm water drainage and street lighting?

.....

7. What was your budget provision for the above services in the last three financial years?

Year	Budget	
	Projected	Actual allocated by NCC
1. 2001 /2002		
2. 2002 / 2003		
3. 2003 / 2004		

8. LEGAL FRAMEWORK

In your opinion, what weaknesses are there in the existing laws that govern the provision and maintenance of roads, storm water drainage and street lighting?

.....

9. TECHNOLOGY

Do you have the right and adequate equipment to effectively carry out the above services? Explain

.....

10. What role can other stakeholders play in the maintenance of roads and related infrastructure especially in the site and service schemes to complement the efforts of the City Council of Nairobi?

.....