



MIXED URBAN DEVELOPMENT

NAIROBI

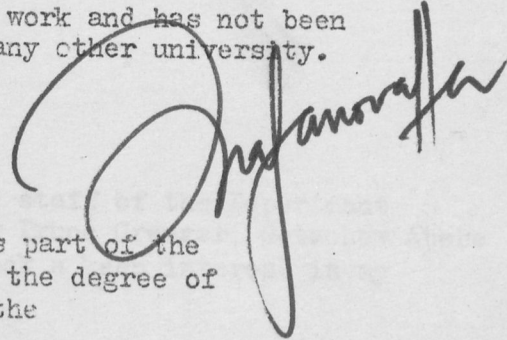
M. ARCH THESIS PROJECT

IQBAL JANOWALA 76/77

DECLARATION:

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

Author:- Iqbal Janowala



This thesis is submitted as part of the University Examination for the degree of Master of Architecture of the University of Nairobi.

Chairman of the Department of Architecture.
University of Nairobi.

ACKNOWLEDGEMENT:-

I would like to thank the staff of the Department of Architecture specially Eruce Creager, Getachew Abebe and Hubert Murray who took a keen interest in my project.

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APPENDIX:-

Abstract

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ABSTRACT:

This thesis project deals with a sector of Nairobi central area which demonstrates its response to the deteriorating conditions prevailing in the city. The central area is becoming decadent due to its present socio-economic conditions. My response to this situation is to introduce a development which integrates work place, recreation and dwelling units. Where streets are safe to walk and squares are meeting places, where spaces for the purpose of resting, playing, watching, sleeping will retain vitality as time advances. My site is bounded on one edge by Government Road and by Kimathi Street on the other. At this moment it exhibits the highest form of commercial activity in Nairobi with secretarial colleges, dispensaries, hair dressing saloons, professional offices and restaurants. The proposed development considers:-

- 1) Redevelopment
- 2) Retention

Use the concept of mixed use development which caters for various activities which are now spread around the city and beyond to give a comprehensive solution which allows commercial, office, recreation, education and living activities to form an integral part of the whole development, internal as well as external.

To control the flow of traffic and discourage vehicle into the C.A. so that certain parts of the city could become pedestrian and virtually segregated from the noise and pollution of vehicles. Certain streets therefore can be time zoned so that vehicular traffic is restricted between 8.00 a.m. to 7.00 p.m. but at other times allowed,

To upgrade the status of the man in the street who sells maize cobs, newspapers, lottery tickets or curios etc. so that he feels encouraged to do his little business which actually brings life to our dead streets. To the majority of pedestrian to give them a sense of direction, identity (streetscape) with protection against sun, rain etc.

To enhance some of our values and preserve those traditional ways of living which have been subjugated by technological advances which have crept into our way of living and impoverished it.

Proposed development - areas:-

Ground floor:- Rentable space - 10,000 sq.m. (approx) including toilet and storage.

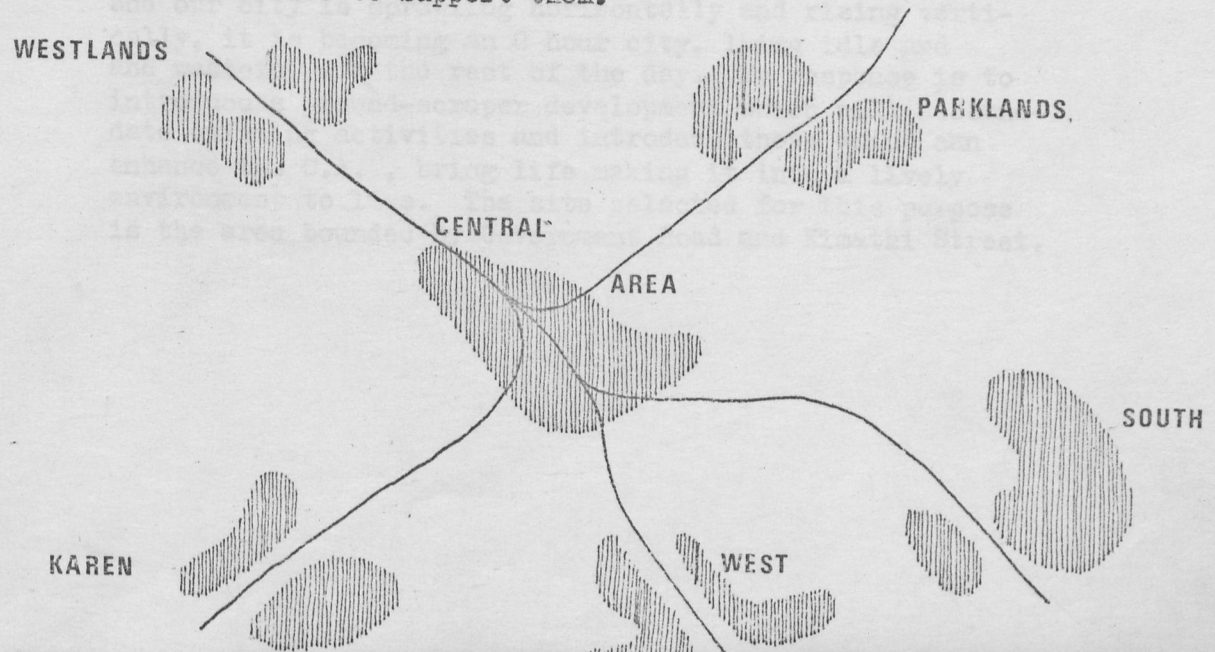
First floor:- Rentable space - 10,000 sq.m. (approx) (including toilet)

	Units
Residence:- Type A (120 sq.m. - 136 sq. m.)	- 22
Type B (180 m ²)	- 16
Type C (45 M ²)	- 32
Type D (80 m ² - 90m ²)	- 37

Office Rentable Space - 10,000 sq. m. (including toilets)

INTRODUCTION:

Towns and villages came into existence when man as a social animal found it obligatory to live in the form of communities and neighbourhoods. Various towns sprang up as a result of its suitability as a trading post, harbour, market place or religious institutions. These small towns have eventually prospered as life became more complex and sophisticated into cities and metropolis. Nairobi as a town started in its unique way because of its mid-way position of the proposed railway line during colonial days. Also Nairobi's altitude and its tropical upland climate was suitable and easily acclimatized by the early settlers before independence. As a result of increased trade the city developed along that area of Government Road to the Nairobi River. After independence the city developed in terms of buildings, roads, infra-structure at a rate unprecedent before. These made habitants living in the city migrate to surrounding countryside which offered plenty of open spaces and countryside environment. After ten years suburbs known as South, West, Westlands, Eastlands, Parklands, Karen etc. became predominately residential supported by shopping centres etc. Suburbs have cost a fortune as new roads, sewers, telephone, electrical and water had to be built in the infrastructure to support them.



Advances in transportation technology enabled man to be mobile and therefore live in the countryside and use vehicles to their place of work. For those who have no access to vehicles a public bus service is available which provides services to all residential areas around the city. This given situation has patternized our way of life. The most prevalent pattern is that one which starts at 8.00 a.m. when everyone rushes to their place of work. During lunchtime some are able to reach home for lunch, others either have lunch in the C.A. or sacrifice it to meet their friends as this is the only time available to meet new people. After 5.00 p.m. people return home or end up in places of recreation while others return at night to enjoy whatever forms of recreation the city can offer.

Most of us undergo a similar pattern as a result of planning policies which have determined land use etc. The result is pathetic. We are using more energy than conserving it, we are losing social contact and intimacy, more congestion of vehicles, noise, pollution, streets have become unsafe and our city is sprawling horizontally and rising vertically, it is becoming an 8 hour city, lying idle and wasteful for the rest of the day. My response is to introduce a ground-scraper development which will accommodate existing activities and introduce those which can enhance the C.A., bring life making it into a lively environment to live. The site selected for this purpose is the area bounded by Government Road and Kimathi Street.

IDENTIFICATION OF DESIGN PARAMETERS:-

To introduce vertical integration of various activities ranging from commercial, offices, recreation, education and residential. Some of these activities exist while others will add to the concept of mixed use.

To give flexibility at certain levels thus ensuring that the proposal can accommodate change as socio-economic conditions change or demand rises.

To give the man of the informal sector a better environment to work, giving him an opportunity to encourage himself and others to earn his living besides adding life to the street.

To restrict vehicular traffic at certain times during the day resulting in less congestion, noise and pollution.

To introduce spaces from private/semi-private/semi-public/public spaces at all levels of social interaction.

To provide courtyards which are public performing a range of activities around it.

To expose, wherever possible, as much of vertical circulation as awareness, orientation add life to people moving at all levels.

Horizontal circulation in concept as a street performing as a street in the air (externally and internally).

STATEMENT OF DESIGN

OBJECTIVE:

To achieve an urban environment where streets are alive with people playing, resting, eating etc, all which gives a character and identity to our streets.

To restrict vehicular movement to an extent that transportation serves its useful purpose and not abusing it causing chaos, noise and pollution.

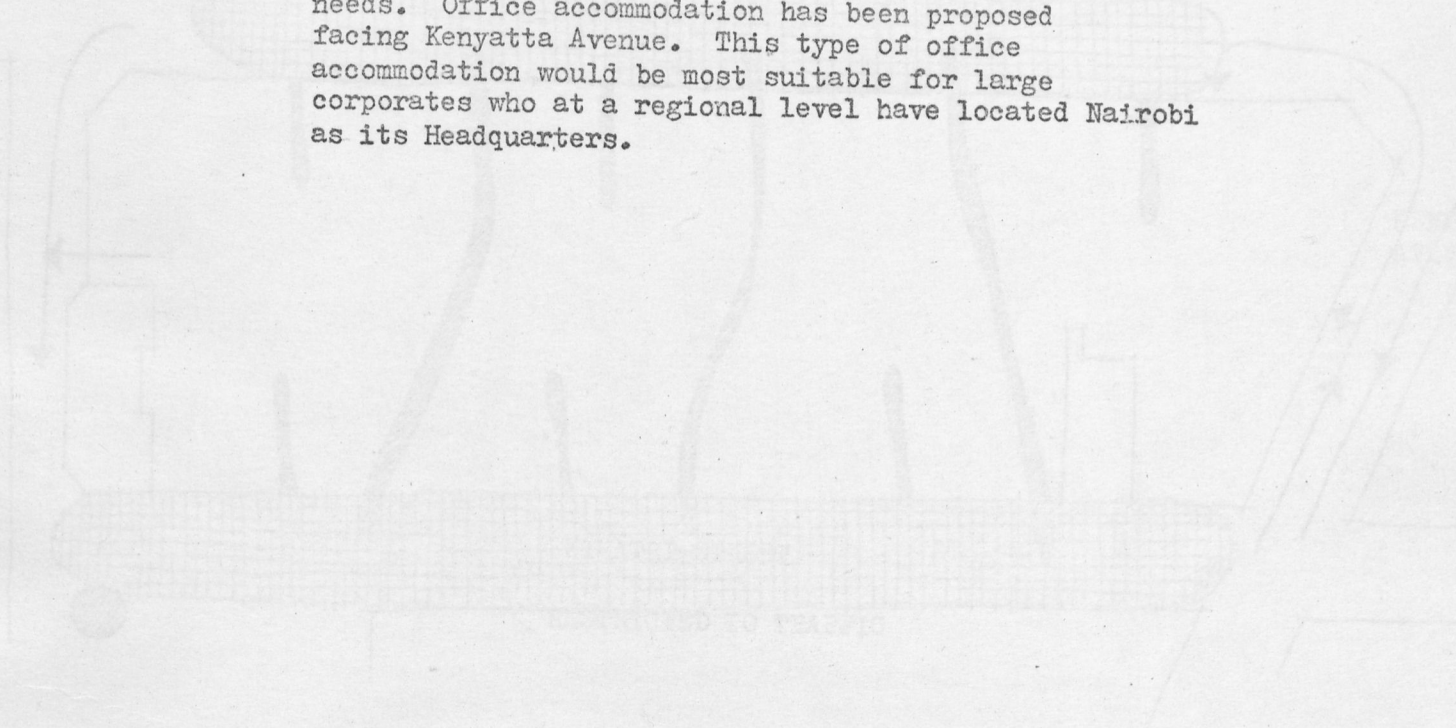
To arrive at a solution which demonstrates a range of different and various activities at all levels, each one having its own character yet vertically integrated like an organism each one dependent on another i.e. work and dwelling integrated and never segregated.

STATEMENT OF DESIGN
CONCEPT

The present Kimathi Street which connects Kenyatta Avenue and Tubman Road will be restricted to vehicles (certain times during the day) which will form the spine of the proposed development. The development will consider the ground floor to be utilized entirely for commercial purpose. The aim is to introduce as much flexibility to accommodate various shop sizes, from that of a kiosk to large shops, to small scale industries. To enhance the ground floor, various informal activities taking place will be accommodated in the spine to give character to the commercial area and street. Parking in the basement is mainly for residents and offices and will compensate for street parking which have been removed. One floor of accommodation above ground floor to be catered for recreation, education and professional services. The ground floor and commercial area above takes into account change and therefore maximizes on flexibility. By locating wet areas at appropriate position, a system can be devised to give accommodation of a range of areas for different functions. A system of horizontal circulation will be used at the ground floor which will be public leading to public courtyards and semi private courtyards leading to private areas. While on the floors above horizontal circulation will be of both types, internal as well as external. Internal circulation will make streets more intimate and private while external circulation will expose one to the urban environment around him. Residential floor above is to be treated as a ground floor with private intimate streets leading to residential units. The user will be given a plot with attached services and he can accommodate his house to satisfy his own style and needs. While at this moment emphasis must be put on flexibility on two levels of commercial,

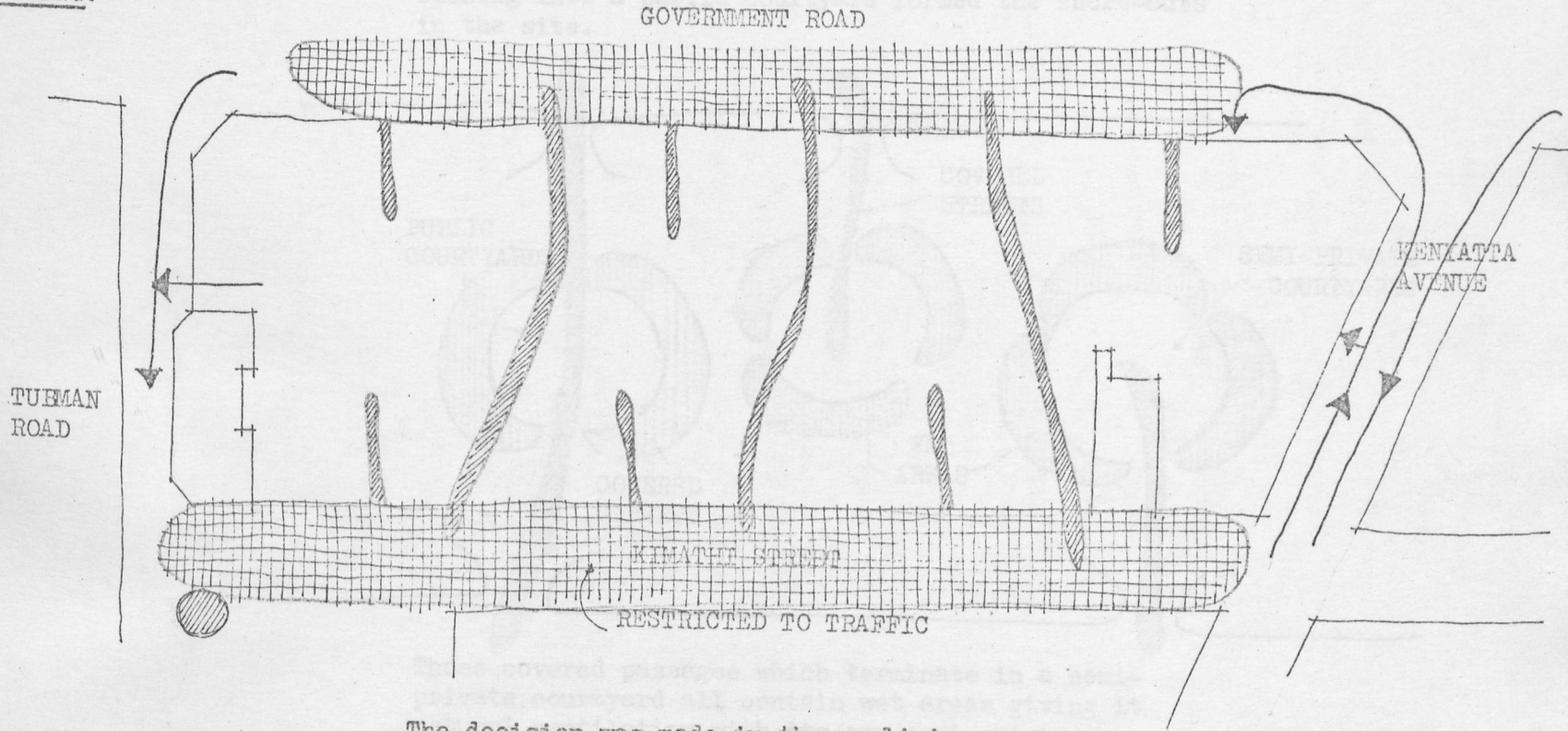
DESCRIPTION OF PROPOSED
BUILDING

at the residential level this is achieved within the household unit, in order to create a balance between needs. Office accommodation has been proposed facing Kenyatta Avenue. This type of office accommodation would be most suitable for large corporates who at a regional level have located Nairobi as its Headquarters.



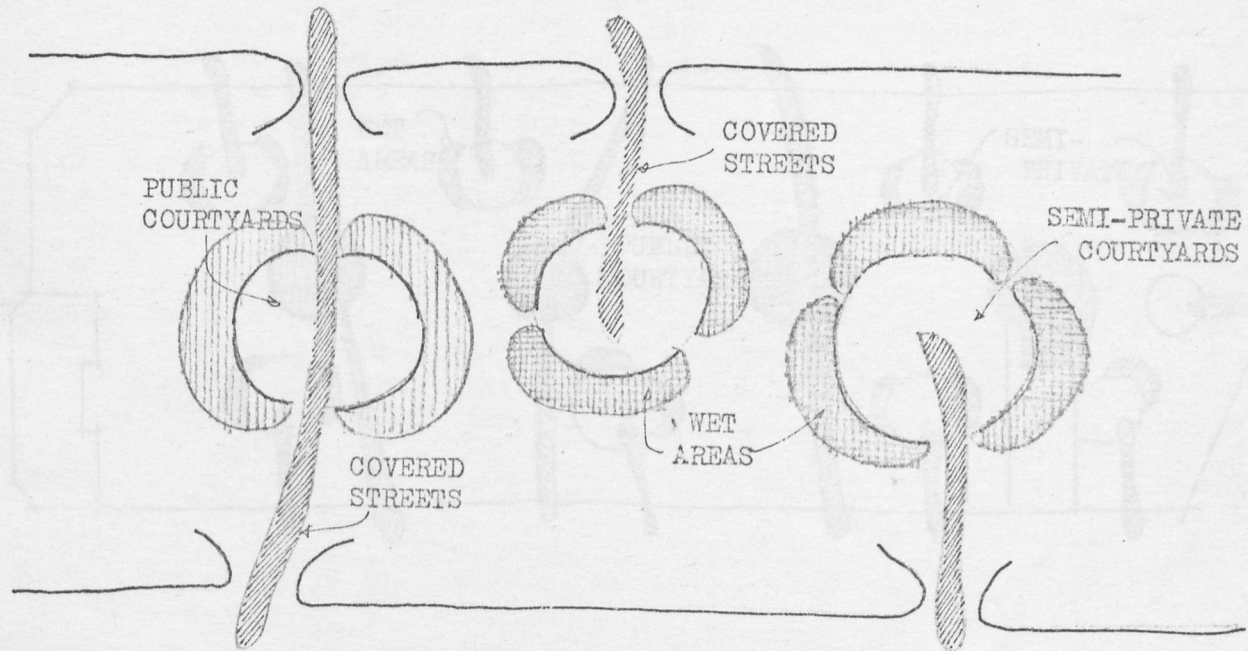
The decision was made in the preliminary stage to provide two levels above ground level and the area surrounded by the access and library. At this stage entry into the site for vehicles was proposed from the north side which will give a large stage it was decided that entry from Government Road and into the building would be made and if Government Road would be made and the main access would be from the north side, this formed the basis of locating the central streets with various activities, usually provided in almost all of the general street and

ELABORATION OF CONCEPTUAL
THINKING:



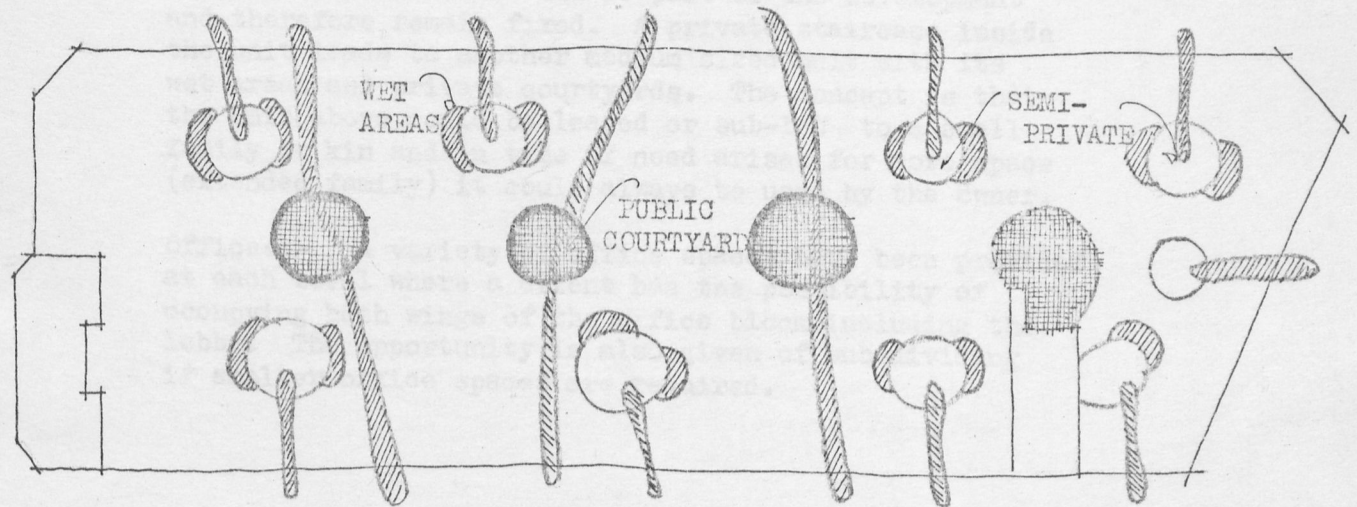
The decision was made in the preliminary stage to restrict traffic into Kimathi Street and the area surrounded by the mosque and library. At this stage entry into the site for vehicles was proposed from Kenyatta Avenue while exit from Tubman road. At a later stage it was decided that entry from Government Road and exit from Tubman Road would be liable even if Government Road became pedestrianized. Taking into account existing short-cuts in the site, this formed the basis of locating the covered streets with various activities, usually perceived on either side of the covered street and

opening into a public courtyard formed the short-cuts in the site.



Those covered passages which terminate in a semi-private courtyard all contain wet areas giving it natural ventilation with its own semi-private environment. With these circulation pattern defined and located they form the bases where all commercial activity is formed around these streets. All wet areas on the ground are located around the semi-private areas which are also entry points for service to shops. These wet areas continue being stacked up on one more floor above with wet areas located conveniently, flexibility is possible as demand changes. I expect all commercial activity to be at ground level while first floor to cater for recreation, educational facilities etc. There is also the possibility if

these functions inter-changing at different levels.



Horizontally circulation is partially exposed to urban environment with internal and external circulation on the first floor, while ramps are introduced for vertical circulation up to the second floor, being totally public.

Private staircase from basement lead directly to the residential level which has a totally internal environment of streets which open into dwelling units and social amenities.

Residential-dwelling unit, each unit has its own private courtyard (serves also the purpose of ventilation and lighting) and the arrangement of its space can be

flexible to suit the owner's requirements. At this moment it should be noted that wet areas will remain fixed as the services will be part of the development and therefore remain fixed. A private staircase inside the unit leads to another medium sized unit with its wet areas and private courtyards. The concept is that the unit above could be leased or sub-let to a small family or kin and in time if need arises for more space (extended family) it could always be used by the owner.

Offices:- A variety of office spaces have been provided at each level where a client has the possibility of occupying both wings of the office block including the lobby. The opportunity is also given of sub-dividing if smaller office spaces are required.

CENTRAL AREA STUDY:-
REPORT BY URBAN STUDY
GROUP:-

As Nairobi city expanded internationally with global recognition (some major conferences have been held) the Nairobi City Council hired a group of specialist (Nairobi Urban Study Group) to deal with urban problems facing the city. The report in short concludes numerous surveys and data, problems identified, objectives determined, giving solutions and suggesting 5 major development areas in the central areas. The surveys shown are those of:

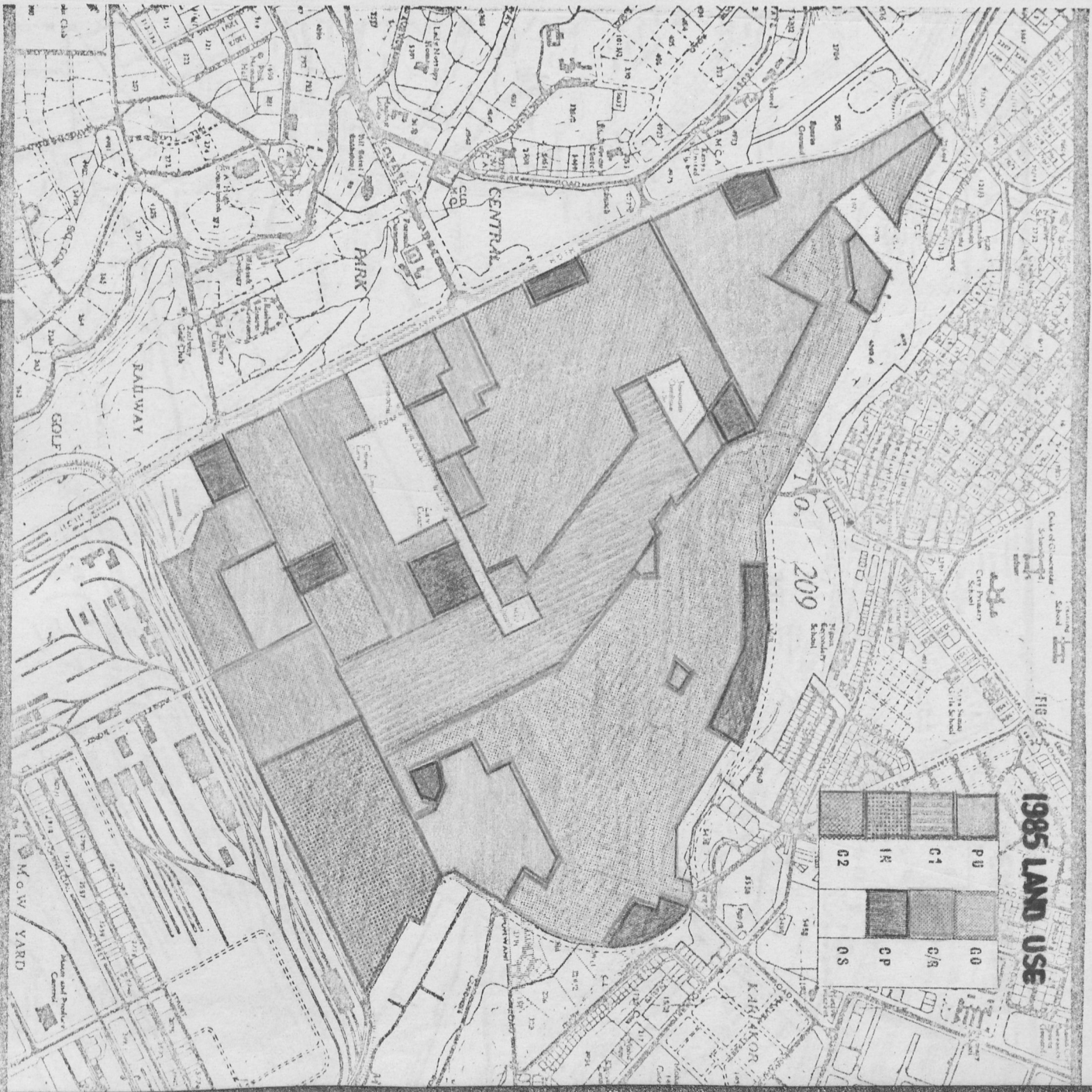
- 1) Land-use
- 2) Employment
- 3) Parking
- 4) Residential density
- 5) Vehicular/Pedestrian Routes.

The site is located in grid 12 and the surveys gave me an indication of various factors (mentioned above) within the site and its adjacent areas. This gave me an overall cross-section of a range of determining factors at a macro-level. Therefore certain decisions were made at this level which was used then to my particular site.

Parking:- Concentration of parking is heavy in grid cells 17, 23, 24 which indicate high density development with sufficient basement parking. A medium concentration of cars in cells 7, 13, 11, 5, 9, 16, 22, 28, 31 which suggest open areas is used for parking and commercial business is vehicle orientated as development is not very dense.



FIG. 2
GRID CELL MATRIX



1985 LAND USE

PU	GO
C1	C/A
IR	CP
G2	OS

FIG. 2

209

CENTRAL

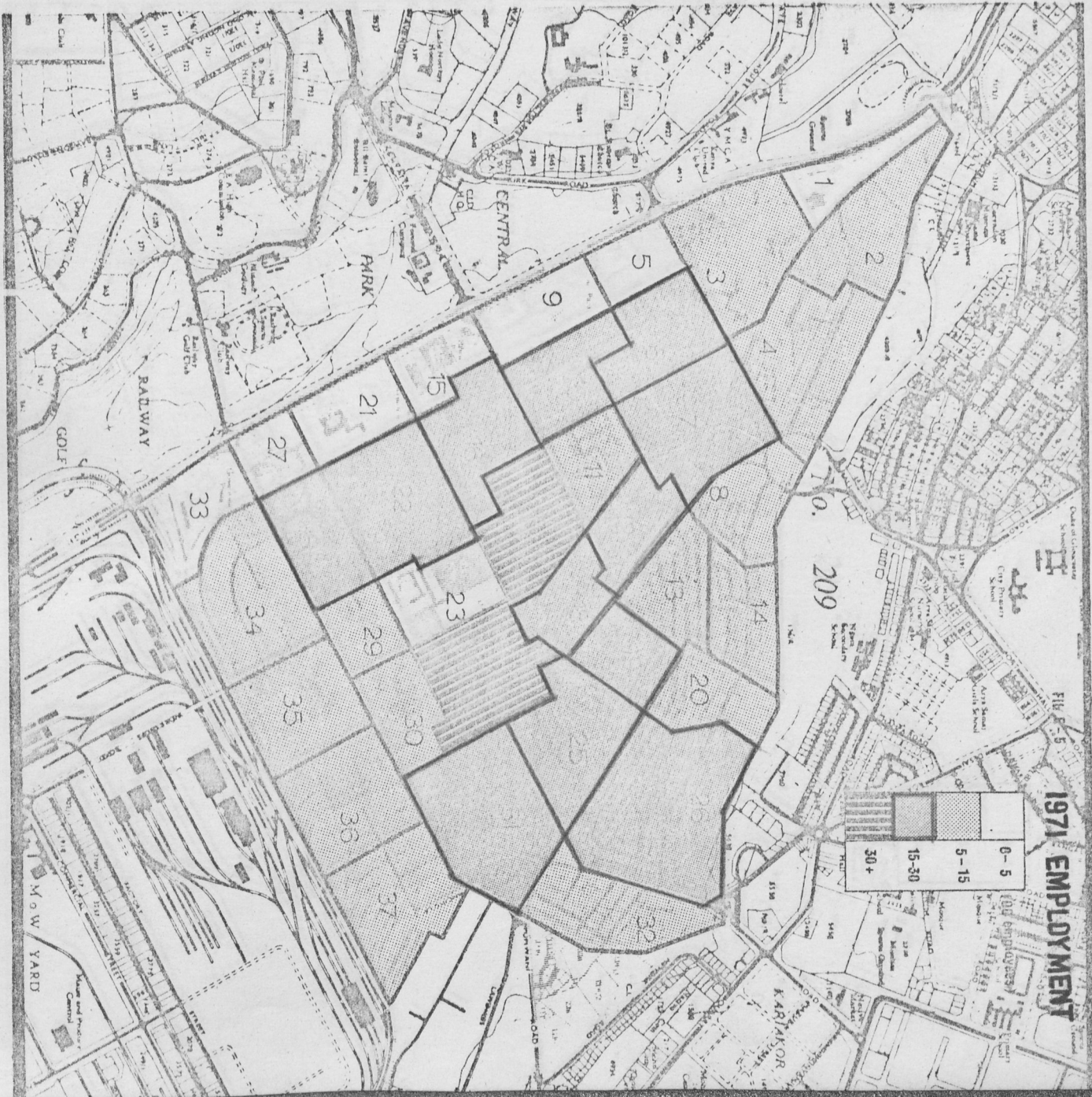
PARK

RAILWAY

GOLF

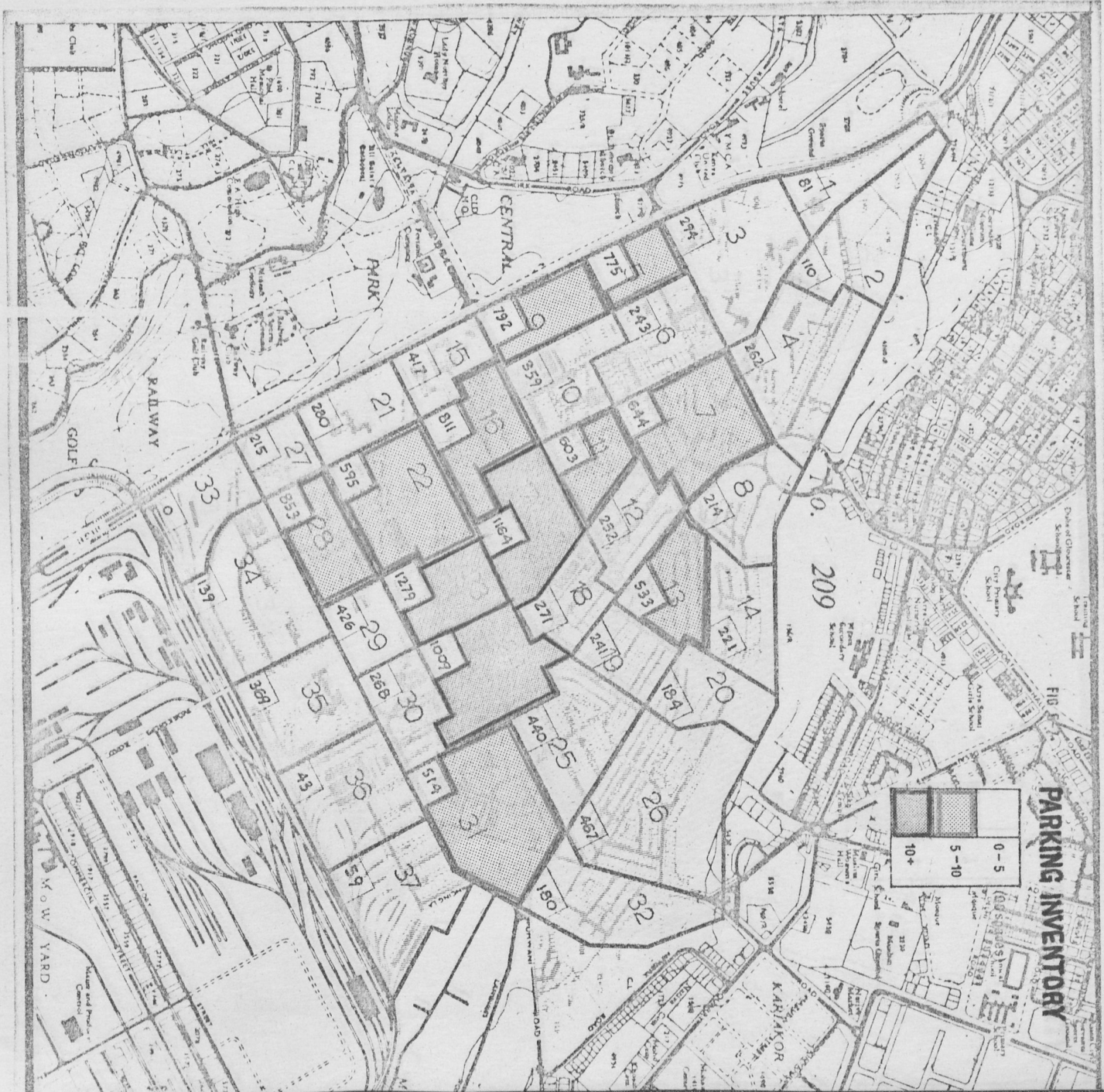
MOW YARD

KAMAKOIA



0-5
5-15
15-30
30+

FIG. 5
1971 EMPLOYMENT



PARKING INVENTORY

0-5
5-10
10+

PARKING INVENTORY

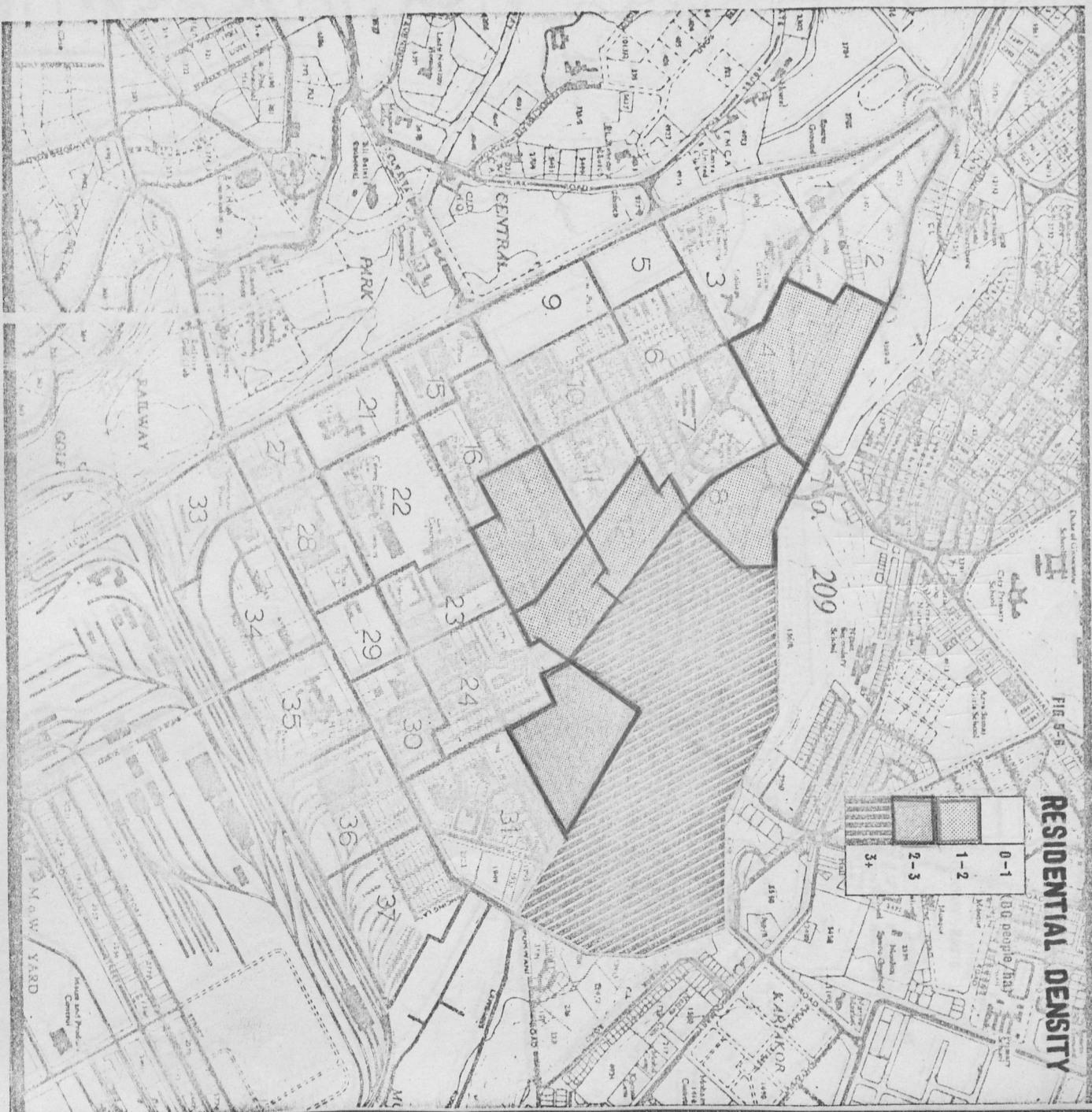


FIG. 9-8
RESIDENTIAL DENSITY

0-1	1-2	2-3	3+
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100 people/ha



1985 PEDESTRIAN SYSTEM

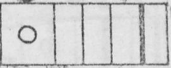


FIG. 1

209

CENTRAL

PARK

RAILWAY

MOW YARD

KARAKOR

SECONDRARY ROUTE

POSSIBLE TERMINATION POINT



1985 TRANSPORTATION



209

Rt. No.

CENTRAL

PARK

RAILWAY

GOLF

MOW YARD

KARMAKOR

DISTRIBUTOR ROAD

BOZOVAN JUNCTION STATION

HIS 8

State of Oklahoma

City of Norman

City of Moore

City of Broken Arrow

City of Muskogee

City of Okmulgee

Transportation:* It was proposed to define the C.A. by a peripheral Road which carries regional traffic. This Peripheral Road was to be made up of the Uhuru Highway, Haile Selassie Avenue and the proposed Ring Road. Introduction of suitable spots for multi-storey parking on the Peripheral Road would also ease congestion in the city and any place in the city would be a maximum of a ten minute walk. Inter-connecting secondary routes will connect one part of the city to the other while densely populated streets would be pedestrianized.

Employment:- Grid cells 17, 24 have the highest number of employees suggesting dense development while employment is average in grid 6, 7, 10, 16, 22, 28, 12, 18, 19, 25, 26 and 31 suggesting a very linear form of development. The rest of the grid cells have very few numbers in terms of employment.

Land use:- As shown in the survey the most predominant activity in the C.A. is commercial. All trade regarding sales of vehicles concentrated in grid cells 6, 7, and 10. Textiles, a major retail activity in cells 7, 8, 12, 13, 14, 18, 19, and 20. General retail activity in cells 6, 7, 13, 14, 25, 26. Retail is second largest in cells 11, 12, 13, 14. Important retail trade activity located in the north-west sector of the C.A.

The central area is distinctly developed in two differing patterns. The area from Government Road to the River has single-storeyed commercial buildings with occasionally

offices or residences above. The area south of Government Road has developed into prestigious shops, high-rise office buildings and tourist hotels.

Basic objectives laid by N.U.S.G.:-

To integrate the two parts by reorganizing vehicular traffic and introducing pedestrian streets linked with a system of open spaces.

The C.A. should be encouraged to enhance its international, national, Governmental, commercial, educational and social importance.

The C.A. should provide for social interaction and a range of economic group participation with differing images as a basis of identification, character, texture etc.

Residential population should increase in the form of medium and high density housing, youth, student's hostels.

Five major areas in the C.A. were proposed as future development areas. I differ from this view as my proposal would be to restrict development to ground-scraper type of building with occasional high rise development for offices. In this way we may virtually make no use of high-rise automated elevators and giving the C.A. a low profile skyline which would give the city its own identity and character differing in its own unique way from other cities of the world.

EVALUATION:-

The informal sector (shoe-shine boys, ticket and magazine sellers, maize, vegetable, curious hand-made baskets) have been provided with an opportunity and space to conduct business in the vehicle restricted streets. The pedestrian can use streets without the fear of vehicles, giving life to our streets and form to urban areas. This has been my personal observation that the people contributing to the informal sector have been neglected in terms of social and economical environment. By providing a sound environment for their service they will be secured of their self-employment, relieving the city of its unemployment problem. This has been one very positive contribution of my thesis.

The differentiation of public streets/public spaces/semi-private street/semi-private spaces/private spaces has been fairly resolved. Each space and street related to the kind of function it serves. This gives an individual freedom to choose a level of social interaction that he prefers.

The ground floor and one floor above can inter-change activities, the residential floor remains fixed although services can be introduced by individuals to serve the residential population.

The gradient of horizontal and vertical circulation (private, semi-private public) has justified itself for the functions related to it.

JEEVANJEE FIELDS

MOLTAR DADDAH STREET

MUNDI

BIASHARA STREET

MBWU

TUBMAN ROAD

STREET

KIGAU ROAD

MOSQUE

LIBRARY

BANTA STREET

PROPOSED DEVELOPMENT

KIMATHI STREET

GOVERNMENT ROAD

KENYATTA

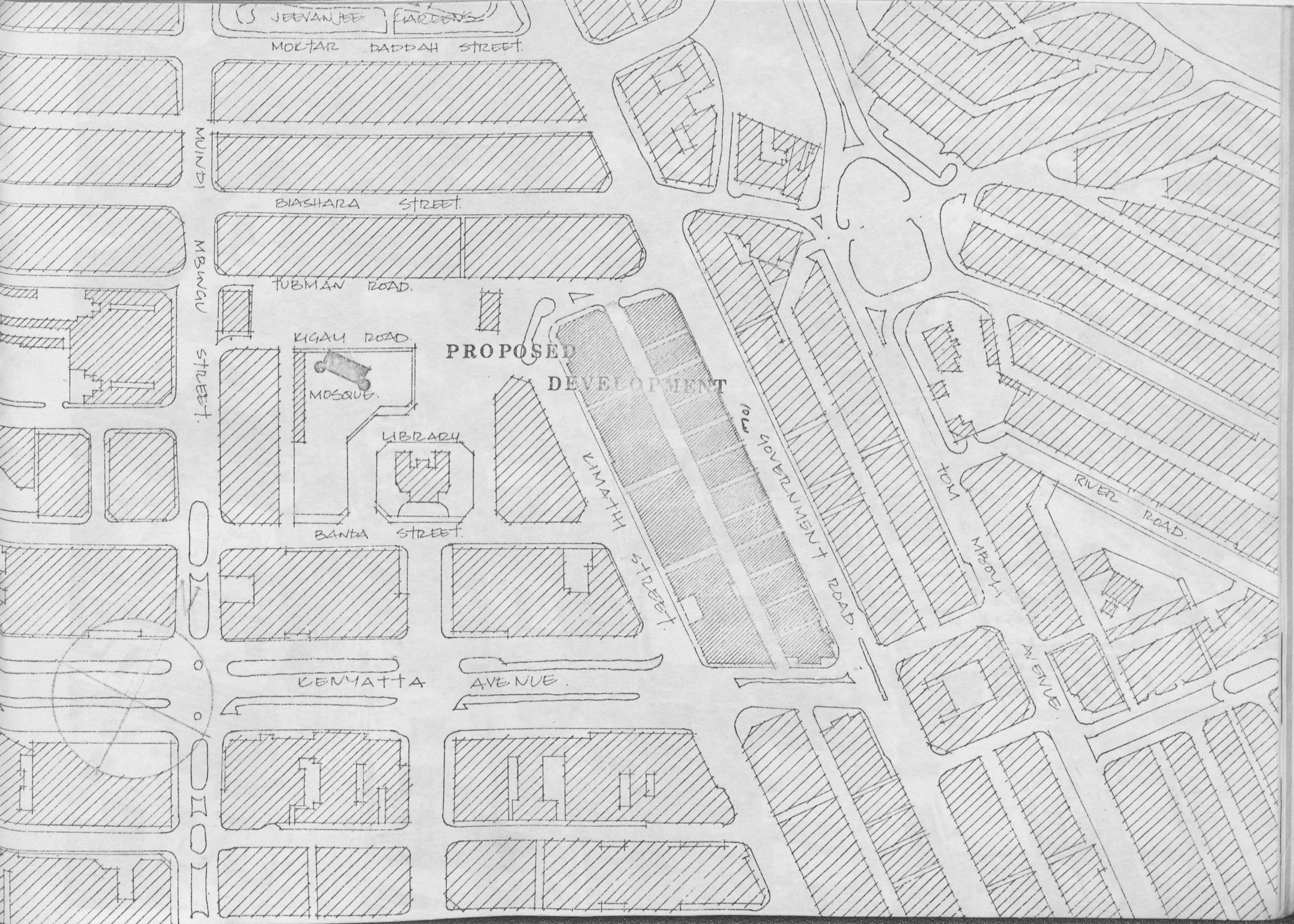
AVENUE

AVENUE

RIVER ROAD

MIBOYA

TOM





SITE:

The proposed site lies in the heart of the commercial activity in grid cell 12 of the central area of Nairobi. Ground edge conditions are defined by a road network which engulfs the site on one side by Government Road and Kimathi Street on the opposite edge. Existing buildings are on level ground surrounded by a few trees mainly on Kimathi street. Most of the ground floor activities range from retail clothing, hardware, pharmacy, jewellery, grocery etc, in fact a very mixed type of activities. Some buildings have a floor above whose activities again in a unique way are of mixed types. These activities range from restaurants, offices, educational institutions, message and hair dressing saloons. Existing bank which has colonial characteristics and a huge hardware shop are two prominent developments on the site which will be retained. The site has an existing service lane in the middle dividing the site along its longer edge. The most interesting condition exists between two buildings where a small lane forms a short-cut through the existing buildings lined up on the edges and filtering in the lane are activities of the sellers in the street (newspaper, magazines, curios etc).

Photographs to give visual descriptions



VIEW OF EXISTING BANK



AFYA LANE

SHORT-CUT FROM KIMATHI STREET



SHORT-CUT FROM GOVT. ROAD



STREET SELLING (Curios etc)



DEACON'S

STORE

STREET VIEW - KINATHI STREET



STREETSCAPE KIMATHI STREET

ENVIRONMENT:-

Air temperature:- The dry bulb temperature (DBT) in the shade decreases with altitude.

Altitude 1800m

Day-time mean (maxima) -- (24° - 30°c)

Night-time mean (minima) -- (10° - 13°c)

Some locations it may fall below 4°c -- ground frost

Humidity:- RH varies between 45% - 99% and vapour pressure -- 800-1600 N/M²

Precipitation:- Varies, critical are heavy concentrated showers, peaks at 80 MM/HR.

Sky-Conditions:- Normally clear or partly overcast, about 40% during monsoon rains-sky is overcast, clouds are heavy and low.

Solar-Radiation:- Strong and direct during the clear periods, ultra-violet radiation is specially stronger.

Winds:- Predominantly north-east and south-easterlies, but may be reflected by local topography, wind velocity varies from 5 - 15 M/S.

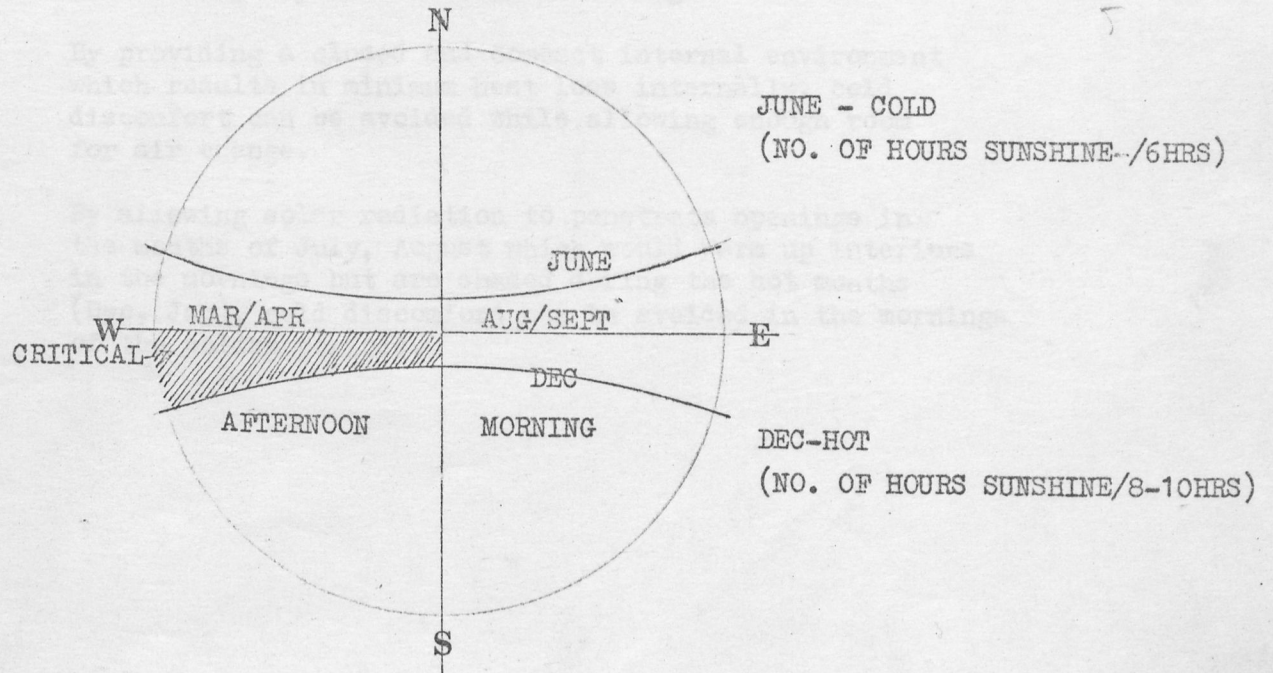
Special characteristics:- Heavy dew at night, strong radiation loss at night, during dry season leads to radiation fog, thunder-storms with a fair proportion of electrical discharges, air to ground, hail may also occur.

Human comfort:- Nairobi climate is the most favourable in Kenya with regard to human comfort. Extremes of temperature do not occur, rarely rising above the upper

limits of the comfort zone, sometimes drops below the lower limits-strong sunshine-heat gains.

Warmest months (Dec - March):- Hot at mid-day, but relatively low in humidity, with steady breezes that prevail, quiet comfortable at least in the shade.
Cool months (May - Sept), can be very chilly, much due to increased cloudiness, reduced radiation, drop in air temperature ($2^{\circ}\text{C} - 5^{\circ}\text{C}$). Cold-humid discomfort may be felt in the morning, hot-humid discomfort rarely occurs as high humidities are experienced with low temperatures. Nights are cool throughout the year.

Indoor comfort:- Due to radiation, over-heating can be experienced during the day while nights can be very cold. Heavy structures of high thermal capacity have a time-lag of 8 hours (300 MM thick stone or brick wall) would retain most of the heat during the day and emit (20.00 - 21.00) when it is most needed.



Ventilation:- While air movement is not important for human comfort, air temperature rarely exceeds upper limit of comfort, cooling of body not needed. Air change is necessary for cooling interiors as a result of internal heat gain (cooking, human activity ect) and therefore the rate of air change is important rather than rate of air movement.

Critical:- Cool months (July, August) can be very chilly much due to increased cloudiness, reduced radiation, drop in air temperature ($2^{\circ}\text{c} - 5^{\circ}\text{c}$). Cold humid discomfort may be felt in the mornings and generally at night all the year around.

Action:- Solar radiation which heats up the building fabric can be used to store some of the heat gained, to be re-emitted during the night. Concrete as a building material can be most efficiently used as it has a high thermal capacity. An R.C. frame structure with concrete blocks (infull) is ideal for retaining heat during day and emitting it at night.

By providing a closed and compact internal environment which results in minimum heat loss internally, cold discomfort can be avoided while allowing enough room for air change.

By allowing solar radiation to penetrate openings in the months of July, August which would warm up interiors in the mornings but are shaded during the hot months (Dec, Jan), cold discomfort can be avoided in the mornings of the colder periods.

Critical:- Rate of air change is important rather than rate of air movement.

Action:- By providing courtyards at every level of the proposed development air change is most frequent from one end of the interior of the other end.

Critical:- During hot-months solar radiation can cause hot discomfort in the building while cold months can cause cold discomfort.

Action:- Sun-shading has been designed to cut out most of the sun during the hot months (Dec, Jan) but allow solar radiation during the cold months (July, August).

STRUCTURE:-

Since the proposed development has a whole range of elements, a planning module of 1.2 is used (width size of toilet, corridor, staircase, cupboard, door etc) from which the structural grid will be organized as multiplies of 1.2m (while in length remain almost constant).

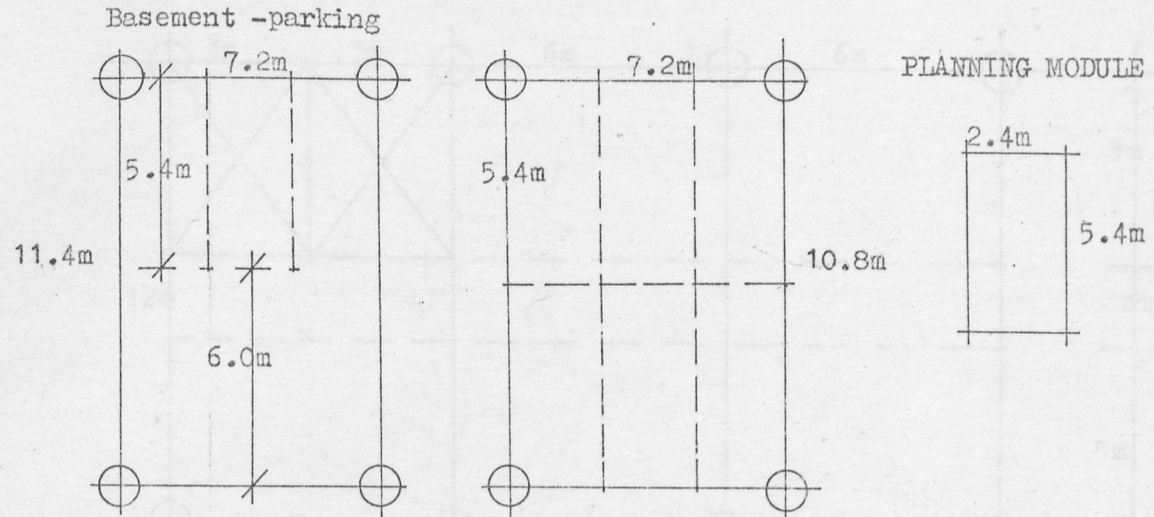
The fabric of the building is of 12 concrete (high thermal capacity) with concrete blocks as infull wall for partitioning.

Foundation of the structure can be at two different levels below ground level. The podium foundation can rest at a certain depth from ground (on the red soil) while that of the office tower can go deep down on rock because of extra loading.

All horizontal loads (winds etc) can be counterbalanced by R. C. Walls carrying lifts, staircase etc.

Expansion joints to be introduced every 45m to counter seismic forces.

STRUCTURES:-



Structural grid of 7.2m x 11.4m allows a maximum of 3 car park with a 6m lane for turning and access.

Structural grid of 7.2m x 10.8m allows two rows of 3 car park, facing each other.

Ground floor - shopping:-

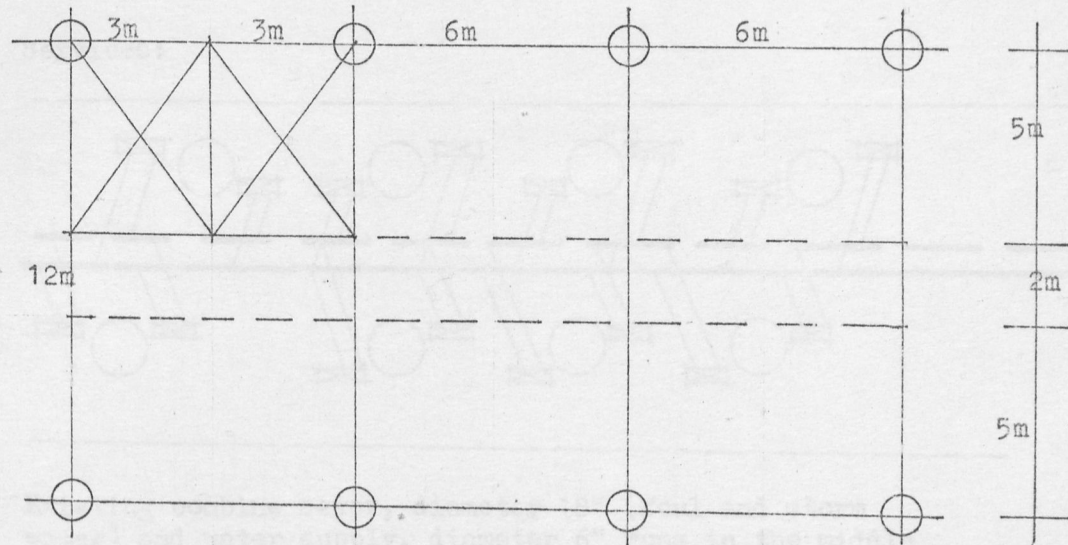
Most shops on the periphery therefore could have a minimum frontage of 7.2m while the depth can vary without obstructing the structural grid.

Internal shops will then have a frontage of 5.4m or 6m depth can again vary as required.

First floor: Commercial

This floor will accommodate colleges, recreation, clubs, professional suites, structural grid of 7.2m x 11.4m and 7.2m x 10.8m can offer a variety of areas for different functions.

Office tower:-



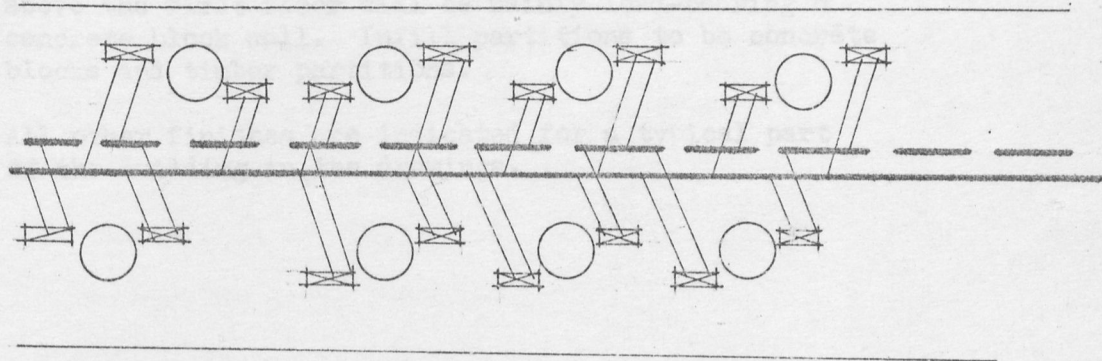
Structural system of 6m x 12m can accommodate the smallest office (3mx5m) on either with a corridor 2m wide. A range of office spaces can be fitted from that of 3m x 5m office to poor type areas of 6m x 12m or even 12m x 12m.

Residential:- Residential floor is treated in similar ways to a ground floor with load-bearing walls supporting a concrete slab.

Basically two structural system used in the residential floor, dwelling units of three bedrooms with a frontage of 7.2m with a one bedroom unit above it. Dwelling units of four bedrooms with a frontage of 6m with a one bedroom unit above it.

Loading bearing walls at 7.2m and 6m support a flat roof system in the residential floors.

Services:



Existing combine sewer, diameter 18" (foul and storm water) and water supply, diameter 6" runs in the middle of the site along the longitudinal edge.

All wet areas are grouped around the courtyards on the periphery of the development. One common ducts carries all service pipes vertically from the basement to the first floor. This duct also carries electrical and telephone conducts which spreads horizontally at every floor.

Similar ducts in the office tower vertically carries all service pipes and is connected to the existing sewer, water supply, electrical and telephone conducts.

Two levels of residential areas have their wet areas stacked on each other for every dwelling unit. Common vertical pipes feed each dwelling unit and then horizontally (1:40 fall) open into the vertical ducts below the roof of the first floor.

External/internal finishes:-

A general R.C. frame will form the main fabric of the building up to the first floor. The residential area above the first floor will be mainly load-bearing c concrete block wall. Infill partitions to be concrete blocks and timber partitions.

All other finishes are indicated for a typical part of the building in the drawings.

REFERENCE:-

Image of city: Kevin Lynch (M. I. T. Press)

Man in the Street - Shadrach Woods

Townscaps - Gordon Cullen

Towns and Buildings - Rasmussen

Habitat - Moshe Safdie

Architecture for the poor - Hassan Fathy

Community and privacy - Christopher Alexander