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STRUCTURAL DESIGN.

↳ Kabuye, Emmanuel

'Nakawa Market Kampala' ↙

University of NAIROBI Library



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

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This thesis is in part fulfilment of the examination for the
degree of B. Arch U.O.N.

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

The present market situation in Uganda is a sad one. They have been some of the worst hit economic, social institutions by the political, social, economic situation in the country. They have been badly affected by inflation, lack of transport, fluctuation in commodity supply and commodity prices, and the general lawlessness making marketing business a risky venture. The proposed market i.e. "NAKAWA MARKET PROJECT" situated 3km from Kampala city centre is to be the biggest and for the present the only modern market in Kampala. In addition to serving about 20,000 people within the nearest walking distance, it is also to serve an estimated 15% of people closer to other markets = 5000 people who will be attracted by better provisions and quality of commodities, and social atmosphere the new market is intended to offer.

The market is also intended to set new standards for markets in Kampala, create new initiative for modernisation and improvement of market conditions in the country.

It is a basically food market but it also include shops, a bank, postoffice and recreational facilities like bars, restaurants and night-clubs.

Presently there is a small shanty market, which serves this area. It is characterised by the same problems in present day markets in Uganda, i.e. lack of proper stalls, storage facilities, very unhealthy condition in drinking, eating and selling areas. The structures are normally a few poles with mabati roofs. It is to be scraped and the new market raised in its place instead.

The market is financed by Kampala City Council and with the present change of Government, conditions should improve drastically.

Problems encountered during my investigations.

Even after being cleared by the National Research Council, I still found the people I interviewed very guarded. I was warned also of the dangers of taking photographs without a security officer by the "National Research Council." Having failed to get such an officer, the possibility of photographs and sketches was out.

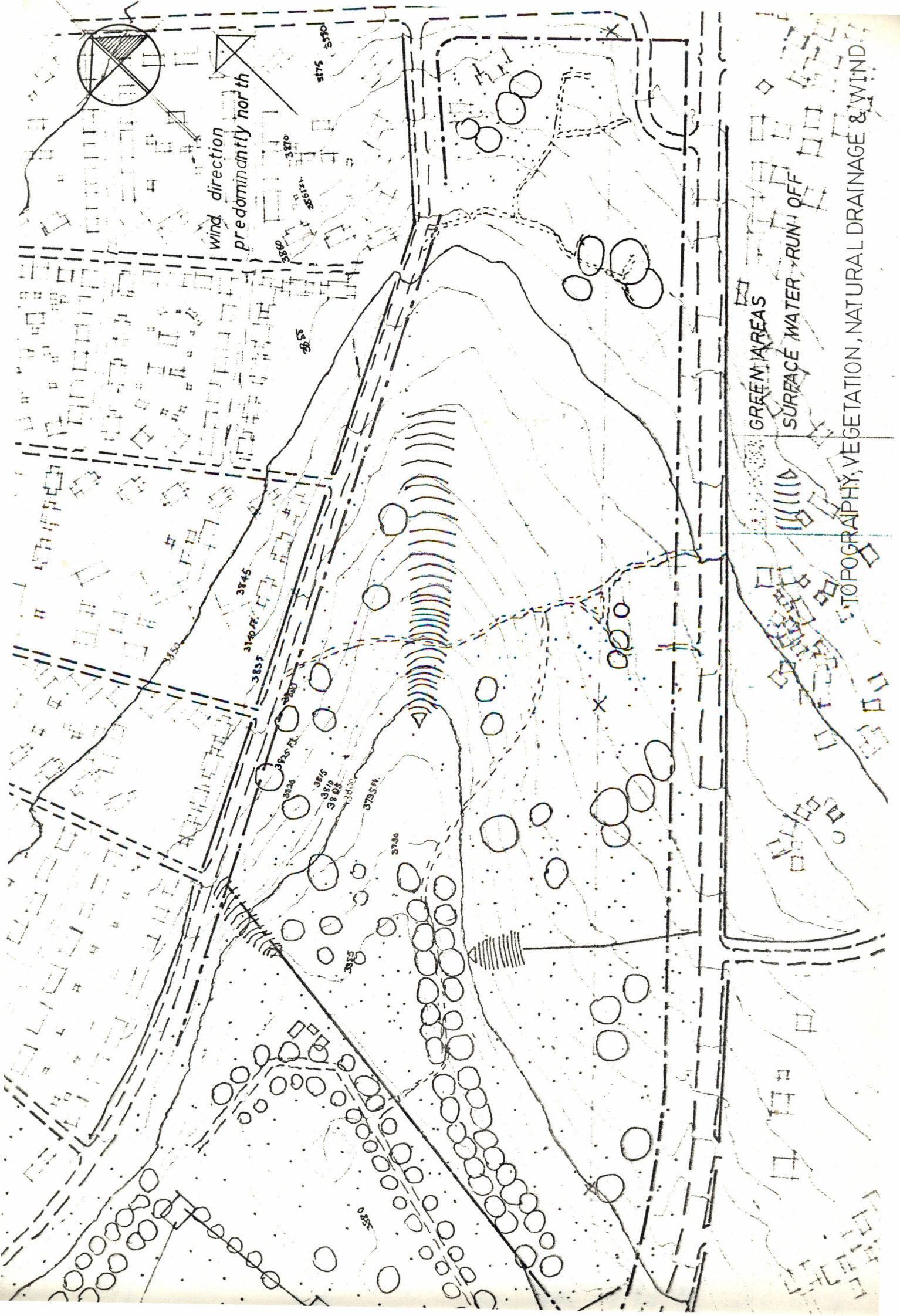
THE SITE

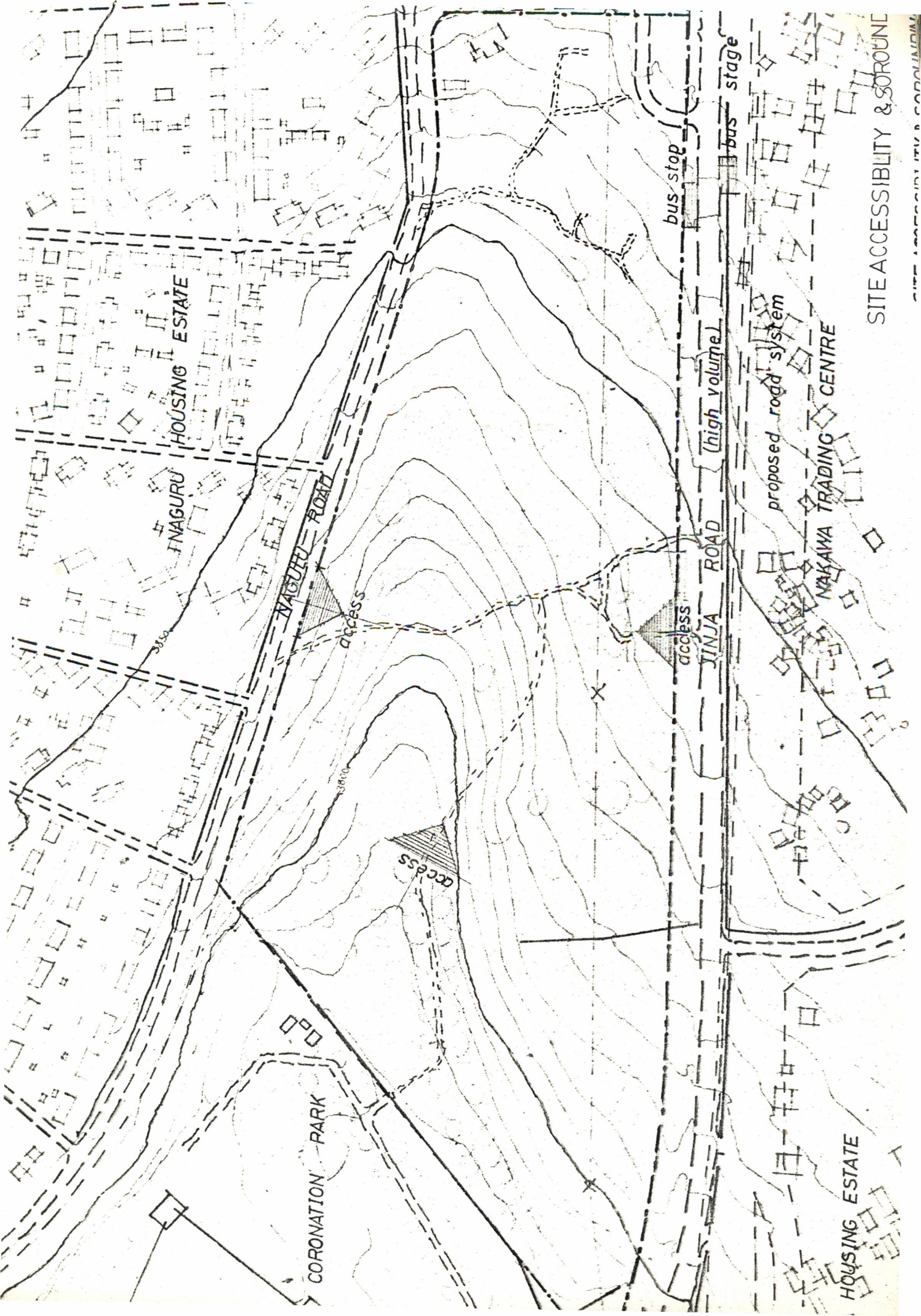
The site is located in Nakawa town, a small trading centre in the educational residential area, three kilometres from Kampala City Centre.

It covers an area of about 11.22 hectares part of which I develop for the market, the remaining part being used for residential, commercial and recreational activities. It is bounded by Jinja Road, Naguru Road and the coronation park down the valley.

The site is well drained with vegetable soil to 300mm over lying red soil mixed with stones. It is endowed with many trees most of them Mango trees varying between 5-20m diameter. It over-looks an interesting parkdown the valley which could enhance the social activities to take place in the market.

Access to the site is possible from Jinja Road, Naguru Road and by foot-path through coronation park. Two bus stops exist that can be used by the patrons of the market. Water mains, public suage system, telephones and three phase electricity power lines are available within reach of the site.





HOUSING ESTATE

INAGURU

NAGURU ROAD

access

access

bus stop

(high volume)

JINJA ROAD

bus stage

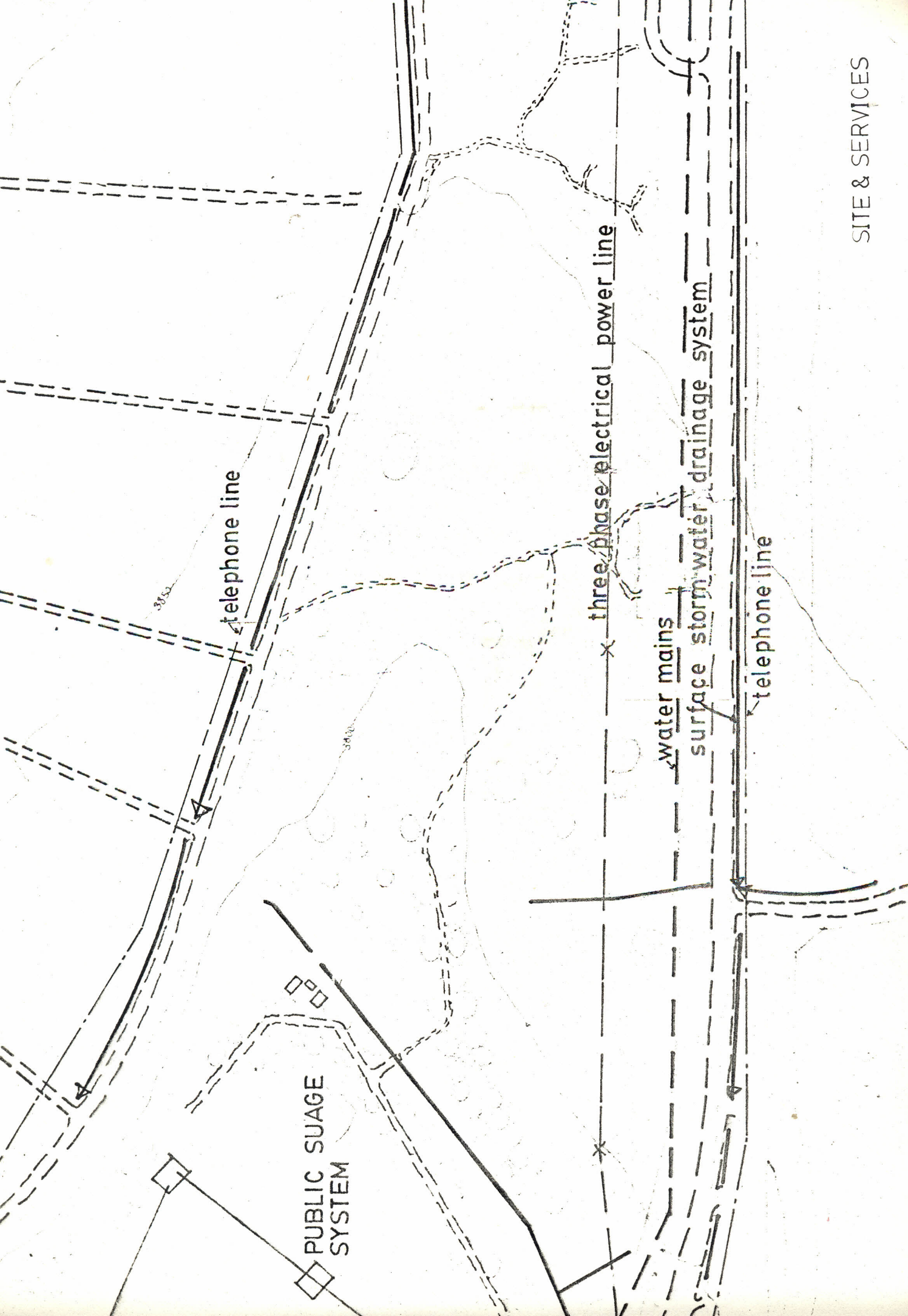
proposed road system

NAKAWA TRADING CENTRE

CORONATION PARK

HOUSING ESTATE

SITE ACCESSIBILITY & SURROUNDINGS



telephone line

three phase electrical power line

water mains

surface stormwater drainage system

telephone line

PUBLIC SEWAGE SYSTEM

The market tradition in Uganda like in all other cultures is an old one.

Markets in rural areas still operate on specific days of the week on rotational basis. The sellers therefore have to move from one site of the market day to the next selling their merchandise. These normally include clothing materials, food stuffs and house-hold effects.

Market days however are days of great social significance, many people of the area also take their merchandise. These include beer, cooked and raw food stuffs, cows, goats and chicken are sold live and slaughtered. There is a lot of eating and drinking beside the commercial activities. For many a young man, the market day is a day of meeting; friend men and women.

Because of urbunisation however day to day food markets have had to evolve to cater for the many urban dwellers and workers who have to depend entirely on food stuffs sold in such markets.

Presently such markets are faced with lack of proper stalls, and storage facilities, much of the food supplied rots, as a result, they suffer from high costs of food products and great price fluctuation due to high transport costs and constant fluctuation in food supply. These markets are also a health hazard, they are infested with hoards of flies, there are no proper rubbish disposal systems, the toilets if any are blocked and long out of use, the eating and drinking places are filthy and the market structures normally put up by tenants are weak and usually collapse with the first rains.

A revolution in the market construction and administration to ensure stable structure, cleanliness in all parts of the market, constant supply of food stuffs and more stable prices is necessary. The new market is also intended to reinstate beside the commercial activities the social activities characteristic of the traditional markets.

Proposed response and design concept.

Nakawa is an educational residential area with a small trading centre in the area. Most of the shops, restaurants, workshops and drinking places are temporary buildings made of mud and wattle.

Nakawa Market Project is intended to revive the spirit of the people in the area by creation of an exciting commercial, social institution.

The market is also to set new standards for other markets in Uganda by providing efficient servicing, systems, by its cleanliness, by providing storage facilities enabling the stocking of larger amounts of commodities and help reduce fluctuation in prices due to fluctuation in commodities' supply.

It is hoped that because of the superior quality of commodities, the variety and superior shopping, social atmosphere the market will serve a big percentage of Kampala area and neighbourhood in addition to serving about 20,000 people who live within its immediate neighbourhood as compared to other neighbouring markets.

The market will also provide recreational facilities. The shops restaurants, nightclub, and bars will operate even beyond market closing hours so that the market remains alive long after closing hours.

No expansion is provided for, but it is hoped that as population expands with time, also other markets will be coming up, expanding and improving, their services so that a smaller area of Kampala will have to depend on Nakawa Market.

Building Form

The market is built on three levels with a small balcony under the large roof. The first level and the basement part of the second level is servicing, and storage areas, while the rest of the project are shops and stalls.

The design makes it possible to have access to all major floors from ground level. The building is designed to "sit comfortably" into the site while the big roof stands out to transform the market into a land mark in the area. It also enable customers within the market to orient themselves relative to it.

Design Determinants

Site Slope The site slope at about 1:10 hence need for stepped building. It enabled me to provide direct access to all major floor on ground level.

Need for ventilation: The food products need maximum ventilation to avoid rotting hence all stalls are half the floor to floor high to allow un entrapped air flow.

Separation of servicing from customer traffic

In order to achieve this I had to service from the basement and bring the goods up using lifts into service areas enclosed by stalls.

Servicing Market.

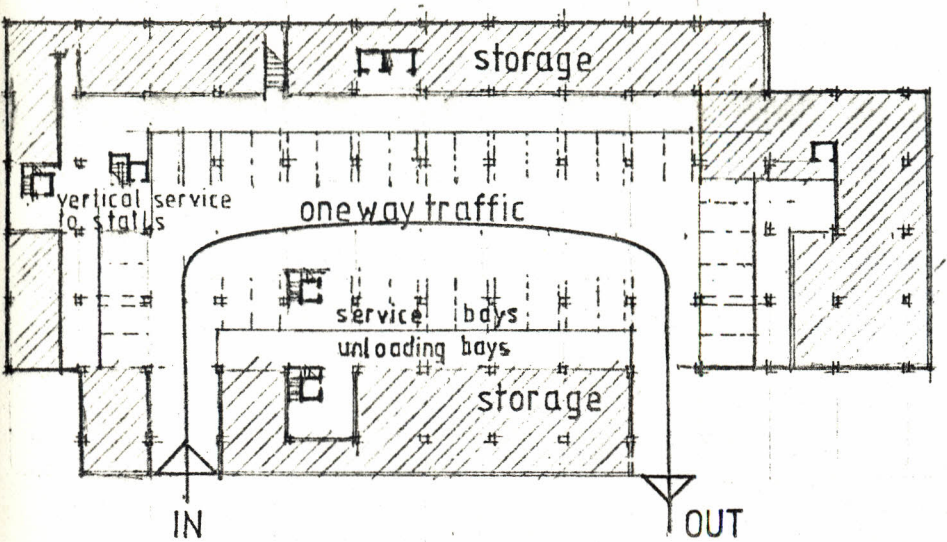
The servicing takes place in the basement on the first level and in the basement part of the second level.

The design is intended to ensure that there is no mixing of servicing with customers traffic. The goods are delivered by vans and pickups in the basement. They are unloaded onto the unloading bays, weighed and either stored in the stores that are adjacent or put into lifts and carried to the stalls.

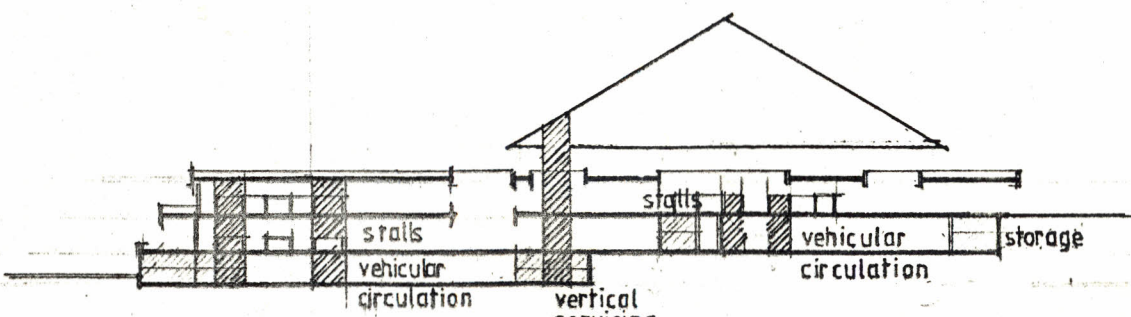
The stalls are designed to radiate from general service space. Here vegetables are washed in the troughs, cut and taken into shelves in the stalls.

chutes are provided in every unit for disposal of rubbish to basement into rubbish stores accessible to the city council workers, for removal of rubbish and disposal.

Fowel water pipes run between double beams and down the columns.



Level one plan to show servicing in basement.



Lifts head into stalls.

Section to show vertical movement of goods from basement.

Customer Traffic

Four main entrances are provided one on each side, two on each floor. Ample space has been left out-side these entrances to accommodate the coming and out going customers and to provide space for hawkers.

More space inside the entrance has also been allowed for the same purpose.

Two shopping routes are used inside the market. The main circulation routes 5m wide. These lead to the different departments and always end at points of exists or into stairs to other floors.

Secondary routes are (3m) wide. These are for circulation within the same department. Stair cases have been placed near all entrances enabling one to reach any floor immediately one is inside building. It is also possible to enter market through shops and restaurants.

Orientation

The big roof visible from all points of circulation is intended to help customers orient themselves relative to it like Hilton and Kenyatta Conference Centre in Nairobi. Use of few major routes enables one to locate oneself relative to these routes.

The stalls are half floor to floor height allowing general feeling of unity, it also ensures that advertisement for different departments can be seen from all points within market, the division of available commodities on different floors improve orientation.

Level one and half basement on level two -
servicing and storage closed to customers.

Second level foods stuffs.

Level three greens, fruits and animal products.

Level four supermarket, special shops, workshops, bank and postoffice.

Parking

In estimating of required parking spaces the following were considered:-

- i) For about 20,000 people Nakawa Market is nearest. 15% of these are the rich = 3000 people.
Of these two thirds were assumed to have cars = 2,000 people.
- ii) About 6,000 people in areas further away we also expected, these were the rich who could afford the extra costs of transport.
Two thirds of these were taken to have cars.
Hence total number of cars expected = 6000.

Shopping is done normally once every two days, hence cars expected = 3000 per day.
Of these about 80% come during pick hours.
= 2400 cars during pick hours.

Pick hours are 10 a.m. - 12 noon and 5 - 6.30 p.m.
Hence parking spaces required = $\frac{2400}{7} = 340$

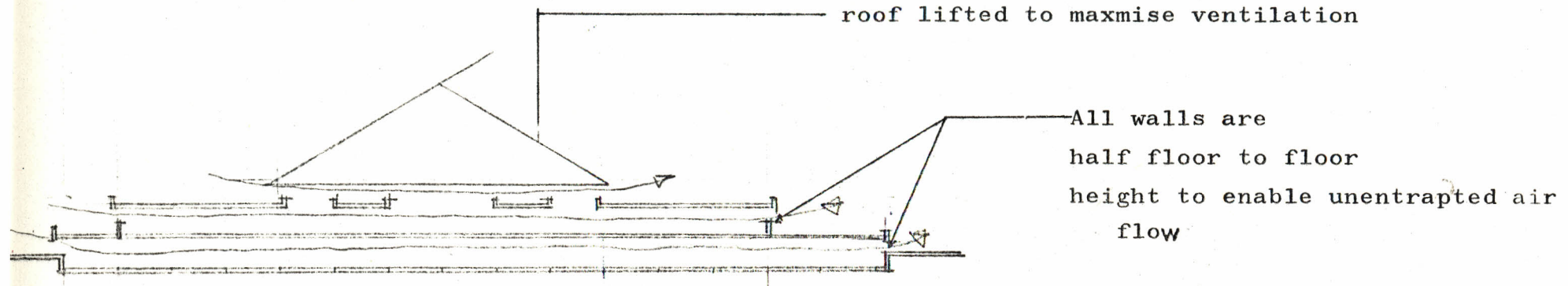
add about 20% = 400 cars.

Public parking spaces provided 395
on area 12,500m².

Private parking for workers 37 spaces on area of 1,100m²

Total parking spaces 432 spaces.

Total area for parking = 13,600m².

Enviromental conditions

The enviromental analysis showed that all conditions were with in confort zone throughout the year. But ventilation is needed if the vegetables and fruits are to be kept in fresh conditions to allow unentrapped air floor the walls are only half the floor to floor height.

Stalls have been designed out of decorative grill wherever possible to farther enhance free air circulation.

Thermal ComfortSTATISTICS USED FOR INVESTIGATIONS ARE FOR YEARS 1931 - 54 SUPPLIED BY WEST AFRICAN MET. STATIONS

Month	Temperatures				Humidity	
	Max °C	Min °C	9.am °C	12.noon °C	9.am %	3.pm.
January	28.4	18.1	20.6	26.7	83	53
February	28.3	18.1	20.4	26.4	84	55
March	27.5	18.0	20.4	25.8	91	60
April	26.1	17.6	19.9	24.4	92	69
May	28.4	17.5	19.7	23.8	92	71
June	25.2	17.2	19.3	23.4	91	68
July	25.1	16.5	18.3	23.3	89	66
August	25.6	16.4	18.6	23.4	92	66
September	26.6	16.9	19.2	24.2	93	65
October	27.2	16.9	20.0	24.7	91	63
November	27.2	17.3	20.1	25.3	86	61
December	27.2	17.4	20.1	25.3	87	60

Confort Zone Chart

J - January
F - February
M - March
A - April
MY - May
JU - June
JL - July
AU - August
S - September
O - October
N - November
D - December.

In the chart the maximum temperature of each month is plotted against the humidity of the same month at 3 p.m.

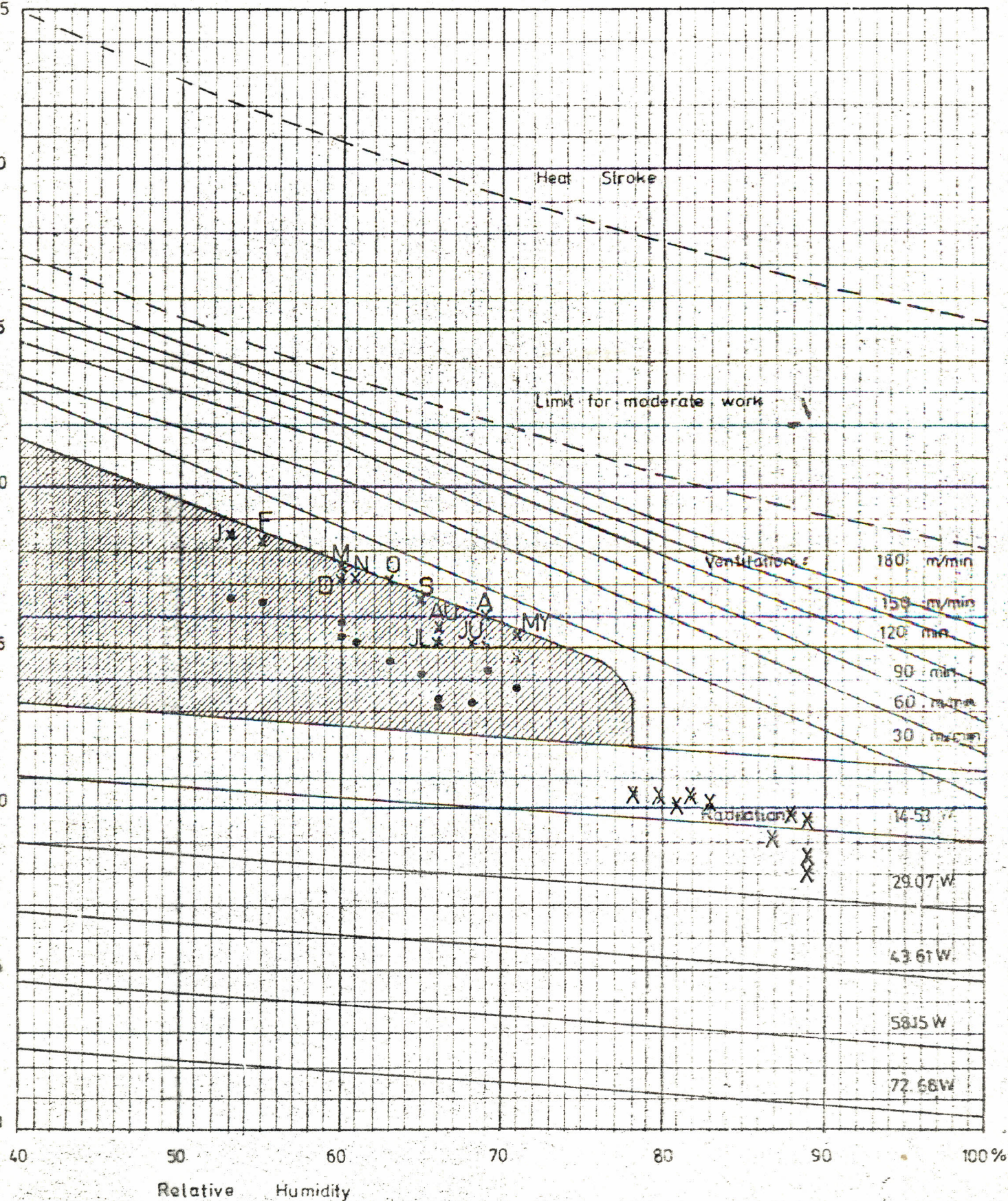
We know that the humidity at max temp will be lower than the 3 p.m. humidity therefore the star (x) is always above the most uncomfortable point on the confort chart for the given month.

The black dots give the 3 p.m. temp plotted against the 3 p.m. humidity and is always below the most uncomfortable point. It follows that the most uncomfortable zone is always in the confort zone therefore ventilation is not vital for human confort.

The other stars around "Radiation" are plotted for the respective values at 9 a.m. and show that for all the month some radiation should be allowed in for human confort.

In my market however, ventilation is still necessary to keep vegetable fresh.

Temperature



COMFORT ZONE for men in warm climate (slightly clothed)

acc. to V. Olgay / P. Dequeker

E.M. / Nov. 1975

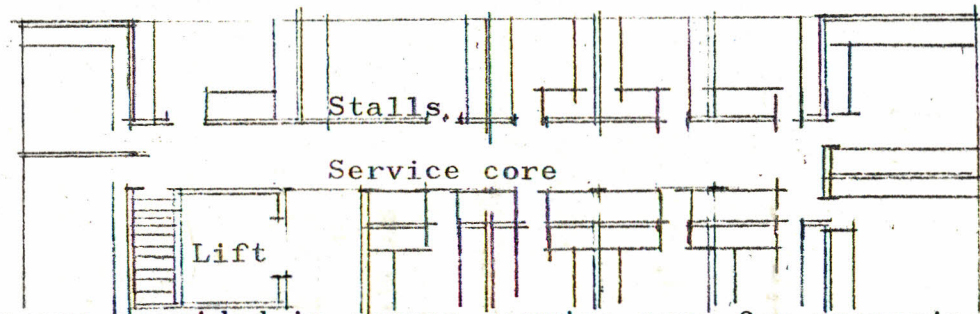
Stalls Design

Stall sizes are determined by:

- products to be sold
- need to provide variety
- number of people to be accommodated.

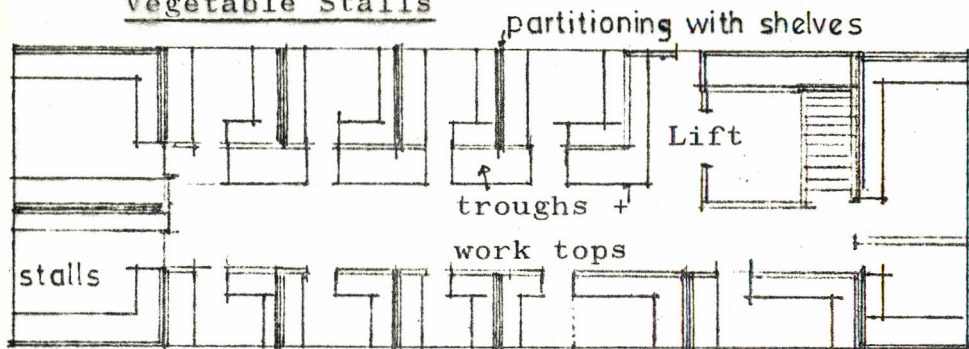
The smallest stall is designed to accommodate at least two people since one person has to close when one goes to look for merchandise, but it should also be possible to operate such stalls single-handed.

All the stalls are designed around service cores. The products arriving in service core by lift are prepared and then put into the individual stalls.



Concrete troughs and work tops are provided in common service core for preparing goods to be sold.

Vegetable Stalls



buying to take place inside stall people like examining vegetables they have to buy.

In city market where people have been allowed to buy from shopping streets, sellers keep bringing the goods farther and farther into the shopping street to reach customers, adjustability is achieved by using the shelving for partitioning these can be rearrange to increase or reduce size of stalls.

Meat & Fish stalls.

Here the examination is less and therefore the counters have just been set back 500mm from the shopping street to avoid customers buying from shopping street.

Bulky stuff like banana and potatoes, partitioning is done by use of hollow decorating grills.

Development Areas

Plot coverage - 75%

Plot Ratio -

Actual plot area used for development including green areas	-	48,000m ²
Basement service area, cold and dry storage	-	11,340m ²
Stalls total including circulation	-	9,977
Shopping Area total	-	1521
Recreational facilities	-	320
Offices	-	149
Post Office	-	100
Workshops and Special shops	-	162
Toilet facilities and changing room	-	320
Total floor area of development	-	25,819m ²
Total parking area	-	13,600m ²
Total developed area	-	<u>26,863</u>

UNIVERSITY OF NAIROBI - DEPARTMENT OF ARCHITECTURE

INTERNAL FINISHES SCHEDULE

	FLOOR	SKIRTINGS	WALLS	CEILING	FRAMES	LIGHTING	REMARKS
ulation es	Paving slab of ^{crushed} brick coarse & fine aggregate & cement				Steel		Vertical sliding steel grills to enclose market during closing
ns & t ls	Same	-	Steel shelving	smooth plaster white paint	-	Natural lighting day time - tangestan bulb at night with diffusing cover	Since the walls halfway ceiling for all stalls ceiling is always the s
ice s for stalls	Grano	Granoli thic	Granolithic up to 1.6m decorative grills above	Same	-	Natural lighting - tangestan bulb for night lighting	
/fish l	Granoli thic	same	Granolithic to 1.6m facing brick screed above	same	Steel	Same	

Structural System

A structural grid of 9 x 9m. has been used to enable maximum flexibility.

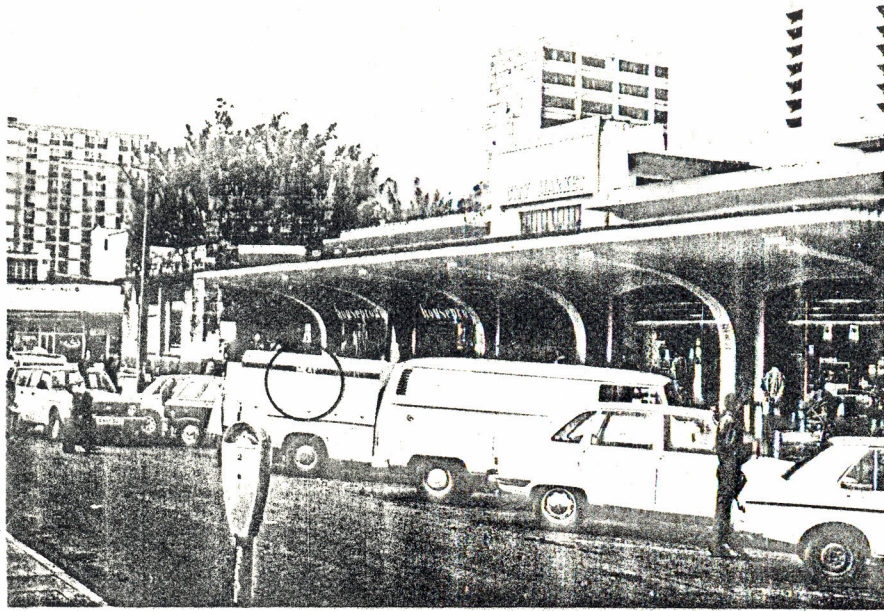
The main structure is of reinforced concrete double beams supported on U shaped columns. These enable the passage of fowel water pipe between the double beam and through the U shape down the basement.

Movement joints are provided at 54m intervals.

The "big" roof has its own structure composed of concrete columns and steel trussed. These are combined work as the pined arch hence ensuring that the base of the columns don't have to occupy a lot of useful space.

Maxpan construction is used for all suspended floors and roof slabs.

Case study of City Market in Photographs.



Due to easier access from public parking area. Many suppliers prefer servicing from here than from service yards.

This is also due to fear of congestion in service area due to its small size.

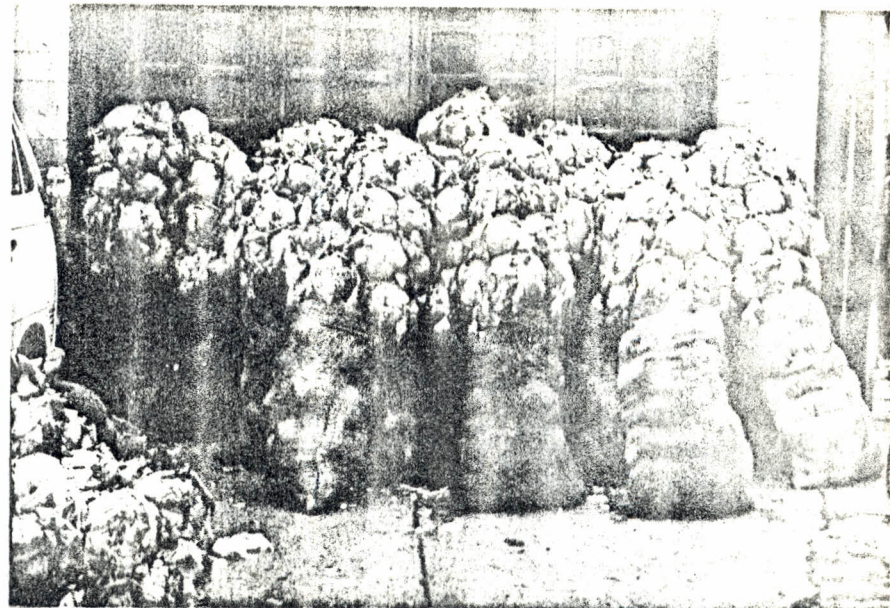


For the same reasons deliveries are being made at public entrances of market.

Due to lack of proper storage facilities soda cases for canteen are kept in service yard.

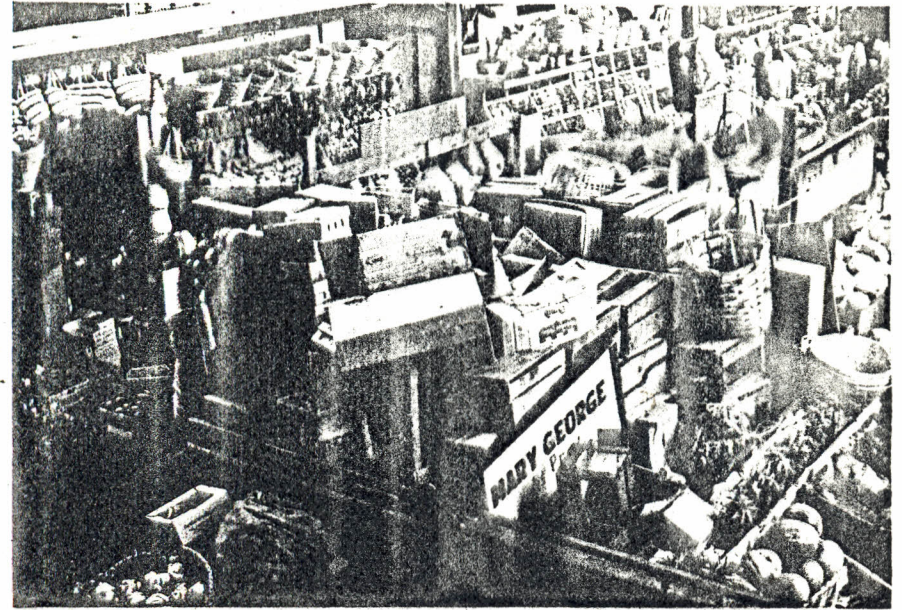


Cabbage sacks heaped up in service yard due to lack of proper storage facilities.

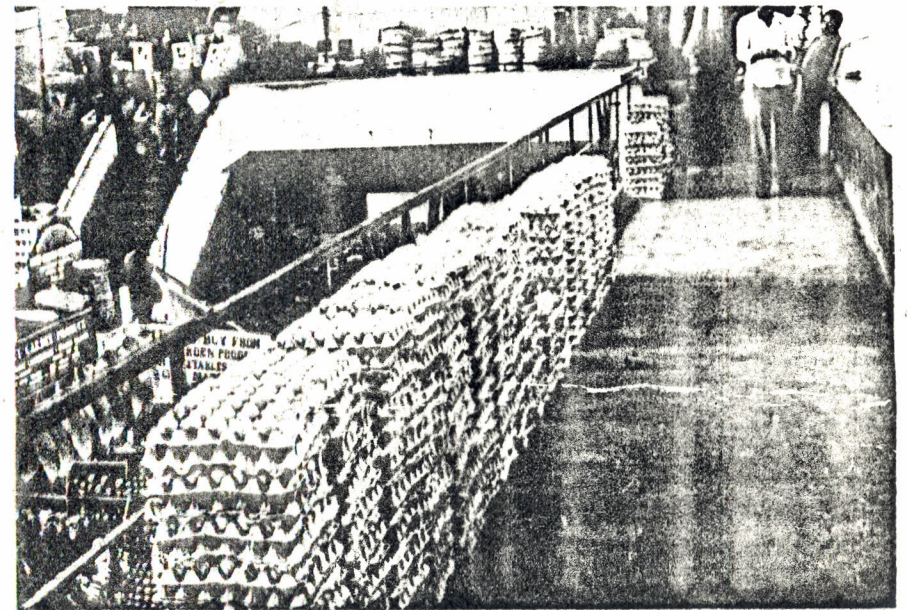


Lack of proper storage in market.

Boxes litter the tops of stalls giving terrible site.



Lack of storage. Here egg-trays are being stored along circulation route.



Servicing along customer route.



Here the route is more than adequate to accommodate both goods and shoppers. But, the unloading is done on the same route. Vegetables are also cut along the same route causing litter all over the place.

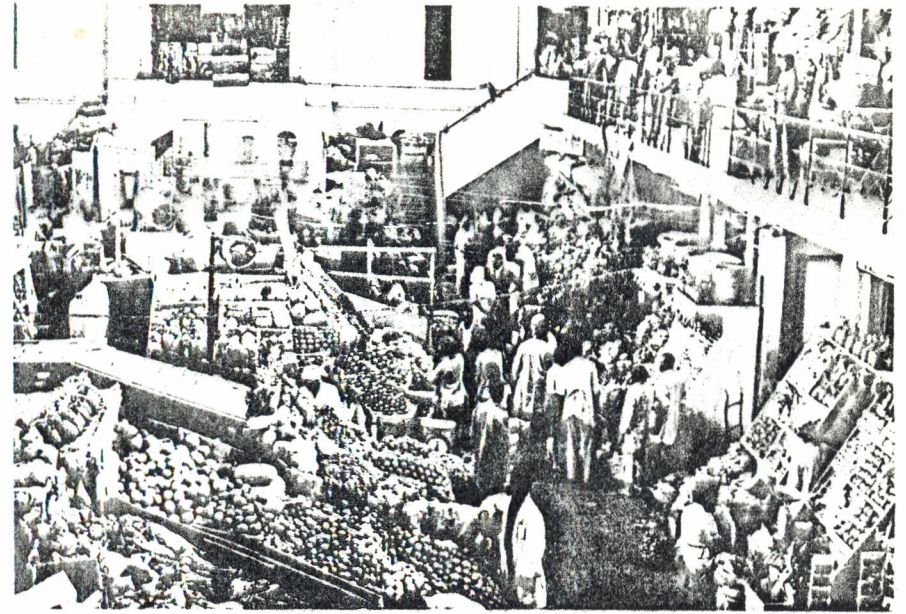
Storage of goods is also done along customers route.

Not efficient system.



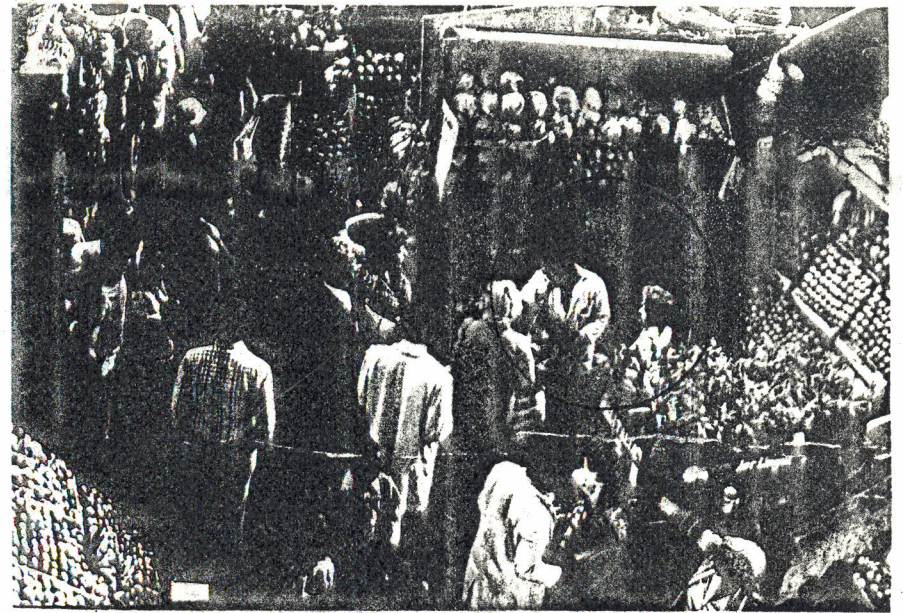
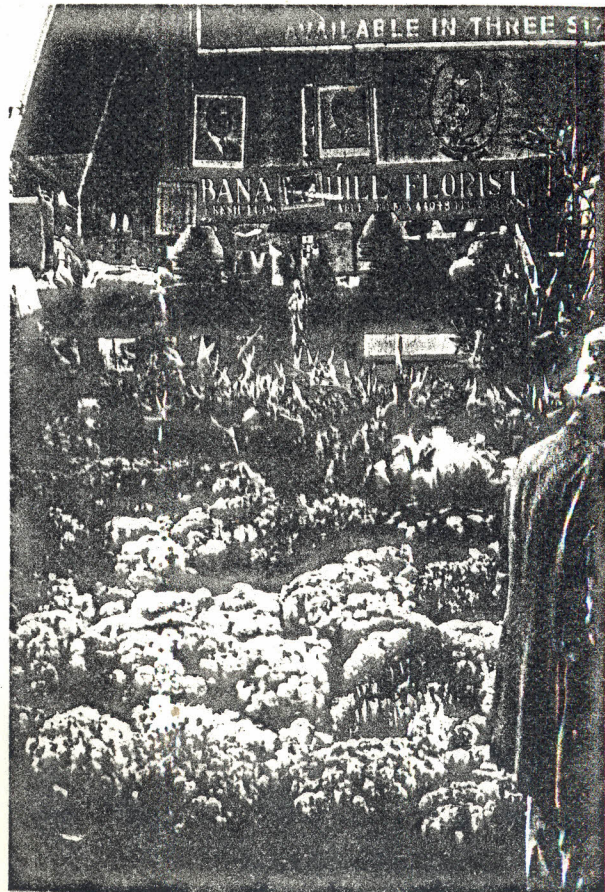
Here fish is displayed and prepared along the circulation routes - terribly unhealthy situation.

Here the goods are displayed along the customers route. The sellers keep on bringing them closer and closer to the customers reducing the circulation route terribly and causing congestion.



Better design for stall here the customer is encouraged to enter the stall reducing the congestion along major circulation route.

This stall encourages customers buying from within. But it is not large enough to accommodate all customers.



Flowers can be an interesting feature at the main entrance but better display is necessary for successful effect.