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LAND SUBDIVISION AND PRICING POLICY FOR MOGADISHU, SOMALIA

JUNE 1984

OFFICE OF HOUSING
AND URBAN PROGRAMS
AGENCY FOR
INTERNATIONAL DEVELOPMENT

Prepared by
PADCO
PLANNING AND DEVELOPMENT
COLLABORATIVE INTERNATIONAL

LAND SUBDIVISION AND PRICING POLICY FOR MOGADISHU, SOMALIA

Prepared for

Office of Housing and Urban Programs
Agency for International Development
Washington, DC

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PREFACE

At the request of the Mayor of Mogadishu and the East Africa Regional Housing and Urban Development Office (EA/RHUDO) in Nairobi, a second PADCO mission to Somalia took place April 10 to May 2, 1984. Robert Olsen, Architect/Planner, was asked to review the urban land development process in Mogadishu and make recommendations concerning land design standards and land pricing policy.

Because of the rapid growth of Mogadishu and the active land distribution program of the Municipality, the decisions made now concerning the land program will have a tremendous impact on the development of Mogadishu.

It is estimated that 200,000 new plots will be needed in Mogadishu by the year 2000. If the standards and programs recommended in this report are adopted to meet this need (instead of continuing with present practices) the land required could be reduced by more than 21,000 hectares and the cost of providing services reduced by more than So.Sh.7,000,000,000.

Under the proposed program infrastructure provision would be self-financing, thus permitting the Municipality to service all new development as well as the presently unserviced areas of the city.

The entire recommended program could be financed with a revolving fund of So.Sh.261 million (U.S.$15 million) under the assumptions discussed in the report.

The choice is between consuming great quantities of land to inefficiently provide unserviced plots or instituting an economical use of land to provide serviced plots at a minimal cost to the Municipality.

Once the layout and form of a city have been established, it will usually not change for generations, so the decisions being made today will affect the quality of life of residents for many years.

The consultant wishes to thank the Mayor of Mogadishu and his staff for their consideration and assistance during the mission. Many hours were spent in providing information, setting up appointments, translating and attending meetings. Special thanks is given to Mr. Abdi Yusuf Dualeh and Mr. Hassan Mohammed Sabrie for the extra time and effort they gave to facilitate the work of the mission. Mr. David Benson of the EA/RHUDO and the staff of the USAID mission in Mogadishu provided guidance and assistance.

PADCO appreciates the opportunity to work with the Municipality and to be involved in an active program with the potential of improving the living conditions of over a million residents of Mogadishu.

EXECUTIVE SUMMARY

A. DEFICIENCIES OF THE PRESENT LAND DISTRIBUTION PROGRAM

The Municipality is to be commended that its land distribution program has kept pace with the population increases in Mogadishu, thus avoiding the many problems of squatter settlements. Still, a number of serious problems with the program have been identified.

1. Urban sprawl and very low density (6-14 plots per hectare) have resulted from the present land use standards. Most available land is now distant from the city center and its services which creates problems and high transportation costs for residents.

2. Design standards result in excessive space for circulation with minimal space for public facilities and open space.

3. No infrastructure or services are provided to new neighborhoods. Water must be purchased at inflated prices from vendors, which creates hardship for low-income families.

4. Inefficiencies in the administrative systems result in many problems and disputes over land ownership. The resolution of these disputes puts an unnecessary burden on the already over-extended staff of the Land Offices.

5. The very low official price for land provides insufficient income for the Municipality thus limiting the services which can be provided.

6. Land speculation is encouraged by the low land prices since enormous profits can be realized when land is resold, as well as by the present land registration procedures, which allow individuals to acquire more than one plot.

B. OBJECTIVES OF A RECOMMENDED DISTRIBUTION PROGRAM

There is general agreement that the present system is in need of modification to resolve the above problems. The following are objectives for a new land distribution program:

1. Adopt land design standards which result in an economic use of urban land while providing adequate space for public facilities and minimizing the cost of services.

2. Provide basic infrastructure and services to all new neighborhoods at the time of development as well as to existing unserviced areas.

3. Create a self-financing system for the provision of infrastructure where the full costs are recovered from the beneficiaries.

4. Establish a more realistic land pricing policy so that the Municipality captures some of the value increase resulting from development. Profits from the sale of valuable land can be used to reduce the costs of plots for low-income families.

5. Improve the efficiency of the Land Office operation so that higher levels of service can be provided while maintaining the required level of activity.

6. Discourage land speculation through improved administrative procedures for land registration and improved pricing policy.

C. RECOMMENDATIONS

To achieve the objectives outlined above, the Municipality and the Land Office need to establish a comprehensive program of land subdivision, servicing and distribution. Some benefits can result from modifications to the various elements of the system; but to derive full benefits, modifications to all the elements of the process should be coordinated. The recommended activities to develop an improved land distribution program are:

1. Reorganize the Land Office with expanded responsibilities and capacity to manage a more comprehensive land distribution program.

2. Modify legislation and administrative procedures to make the system function more efficiently and discourage land speculation.

3. Develop an intermediate range program for land distribution activities and concept plans to guide these activities.

4. Adopt more efficient land use standards with a hierarchy of plot sizes and circulation ways, which will increase the land devoted to residential use and the residential density. All new neighborhoods should be planned using these standards.

5. Institute coordinated planning and implementation procedures so that basic services and infrastructure are provided at the time of development.

6. Develop a land pricing policy and land sale procedures for a self-financing program to provide infrastructure and affordable plots to lower-income families.

7. Reorganize the land titling and plot registration procedures to reduce problems and disputes over land ownership.

D. BENEFITS FROM A NEW LAND PROGRAM

Because of the magnitude of the land distribution program which will be needed to accommodate the anticipated future growth in Mogadishu, the benefits — both short- and long-term — to be derived from improvements to program procedures are indeed substantial. Implementing recommended changes now will favorably affect the present and future residents of Mogadishu in the following ways:

1. Conservation of urban land. By the turn of the century, the urban land used to house the increased population in the city could be reduced by as much as 21,000 hectares if the land design standards recommended in the report are used. This area is about five times larger than the built-up area of the existing city between the 21 October Road and the ocean.

2. Greatly reduced cost of serving new neighborhoods. The per hectare cost of serving urban land is basically constant regardless of the density; therefore as the utilization of land increases with lower densities, so does the cost of providing infrastructure. At a cost of So.Sh.343,000 per hectare to service urban land to a medium standard, the savings to be realized from adopting new standards could be as much as So.Sh.7.3 billion over the next 20 years.

3. Improved quality of life for as many as one million new residents of Mogadishu who could have access to plots with basic services.

4. A self-financing program of land development and provision of infrastructure to permit the Municipality to service all new areas of the city, while protecting limited public funds.

5. A more efficiently operating land distribution system with fewer problems and disputes and reduced land speculation.

E. STEPS TO IMPLEMENT NEW PROGRAM

Some steps could be implemented in the immediate future to place the program operation on a firm base with other improvements and modifications to be phased in over a period of time. Important steps to be initiated at the present time are:

1. The first step is the formulation and adoption by the Mayor's Committee on Lands and the Municipal Council of a policy on land development and distribution containing the following elements, as documented in the report:

    - Land design standards
    - Land pricing policy
    - Reorganization plan for the Land Office
    - Revised land regulations and procedures

2. Once the legislative mandate is in place, a medium range program and financial plan for the Land Office should be developed.

3. The reorganization of the Land Office should be started with the recruitment of new staff, or outside technical assistance for specific tasks, and staff training where appropriate.

4. Formalize agreements to define obligations and responsibilities of other agencies involved in the provision of services in Mogadishu.

5. Complete plans and detailed studies for site design and infrastructure for a first phase of the program.

CHAPTER I
INTRODUCTION

With the rapid growth of Mogadishu, the demand for land has increased tremendously during recent years. The Municipality has been successful in meeting much of this demand through an active subdivision and distribution program. All indications are that the expansion of the city will continue at a rapid rate for many years to come. In the Urban Development Assessment of Mogadishu prepared by PADCO in 1983, it was estimated that as many as 200,000 new plots would be needed by the year 2000. With expansion of this magnitude, it is important that new developments are economical in both the use of land and of limited municipal funds.

Several illustrations are given in Table I.1 to show how plot sizes and land use standards will influence the commitment of land and resources needed to meet this demand over the next 16 years.

TABLE I.1
LAND NEEDS AND COSTS FOR PROJECTED EXPANSION OF MOGADISHU

Land Use Standards	Average Plot Size (m^2)	Land use (percent of Total)			Plots/ Hectare	Land Required for 200,000 Plots (Hectares)	Reduction in Land Required from Example 1 (Hectares)	Cost of Services[1] (So.Sh. Millions)	Reduction in Cost of Services from Example 1 (So.Sh. Millions)
		Circulation	Services & Open Space	Residential					
Example 1 - Current Standards	600	52	8	40	6.67	30,000	--	10,290	--
Example 2 - Current Standards	300	52	8	40	13.33	15,000	15,000	5,145	5,145
Example 3 - Proposed Standards	300	25	15	60	20.00	10,000	20,000	3,430	6,860
Example 4 - Proposed Standards	300	20	10	70	23.33	8,570	21,430	2,940	7,350

[1]Assumes servicing areas to a medium standard with a cost of So.Sh.343,000 per hectare.
Source: PADCO Analysis

Using the standards of Example 1 would require over 21,000 hectares more than would be required for Example 4. At a cost of So.Sh.343,000 per hectare to service residential land to a medium standard, Example 1 would require an additional So.Sh.7,350 million over Example 4 to provide infrastructure to the same number of residents.

While the average plot size is the same for the last three examples, changes in the percentages of land used for circulation for Examples 3 and 9 has reduced the

required land by 5,000 to 6,500 hectares. It should be noted that the percentage of land for services and open space has been increased in the last two examples.

Examples 3 and 4 indicate the generally accepted range of land use distribution for residential areas with 60-70 percent of land devoted to residential, 20-25 percent for circulation, and 10-15 percent for public facilities and open space. The rationale for these standards is discussed in the following section.

Inexpensive land has been one of the contributing factors to the rapid growth of Mogadishu in relation to secondary cities. Increasing the cost of settling in Mogadishu to reflect more closely the actual costs of developing and servicing urban land could encourage growth in other urban centers.

The land program of the Municipality should continue at an active pace, but it is important that immediate steps be taken to improve the efficiency of neighborhood plans and to increase the revenues from the process so that services can be provided to the residents of the expanding areas of Mogadishu.

CHAPTER II
RATIONALE FOR RECOMMENDED LAND USE STANDARDS

As can be seen from the above example, land use standards influence significantly the amount of land utilized for new development and the cost of urban services. The objective of land use standards should be the efficient use of urban land while meeting the needs of residents at minimum cost. Land consumption and costs are most directly affected by the density of a neighborhood; therefore, the goal of the recommended standards is to increase residential density of new areas by maximizing residential land use and by decreasing the average plot size. Recommended standards for plot sizes, circulation, public facilities, and open space are:

A. RESIDENTIAL LAND USE AND PLOT SIZES

The generally accepted standard for residential land use in most developments varies between 55 and 70 percent depending on site conditions and the income level being served. In no case should the percentage of land devoted to residential use drop below 50 percent of the site.

1. Plot size

Since the plot size has such a significant influence on density and cost of servicing residential development, careful consideration should be given to determine the minimum size plot acceptable to the residents of Mogadishu. This must be investigated from both technical and cultural considerations.

a. Technical

Since most of the lower-income neighborhoods will be served by on-site pit latrines or septic systems, adequate space must be provided to permit absorption of waste water and to avoid contamination of water supplies. The minimum size usually recommended by sanitation experts is approximately 200m^2 depending on the type of soil and local conditions.

Discussions with officials and field surveys indicate that the soil in Mogadishu is generally sandy with excellent absorption capacity thus creating good conditions for pit latrines and soak-aways. There is no chance of latrines polluting the city's potable water sources since municipal wells are not close to residential areas and are over 200 meters deep. If all private wells are as deep (25 meters) as one visited in a developing area, there is also little danger of contamination.

In light of the favorable conditions in Mogadishu, a minimum plot size of 150m^2 is recommended based on technical considerations.

b. **Cultural**

The question of culturally acceptable plot size is more difficult to resolve. Most people would like a large plot, but often cannot afford the costs of one. Decisions should be based not only on desire but on financial considerations as well.

The Department of Lands has sold plots of $144m^2$ (12mX12m) and $169m^2$ (13mX13m) in the past. Field visits to areas with both sizes of plots indicate that most smaller plots have been occupied by lower-income families, judging from the type of structures. Two different plots of $144m^2$ were each occupied by 10 people who are members of extended families. Structures were located on the sides of the plot with a partially covered central court for household activities and cooking (Figure II.1). One $169m^2$ plot visited was occupied by 18 people in three related families. There are six rooms on three sides of a central courtyard with covered cooking area and a pit latrine (Figure II.1).

These neighborhoods illustrate that the smaller plots are acceptable and do provide shelter and needed facilities for a large number of low-income people in Mogadishu. Therefore, a minimum plot size of $150m^2$ is recommended. Possible layouts for $150m^2$ plots are illustrated in Figure II.1.

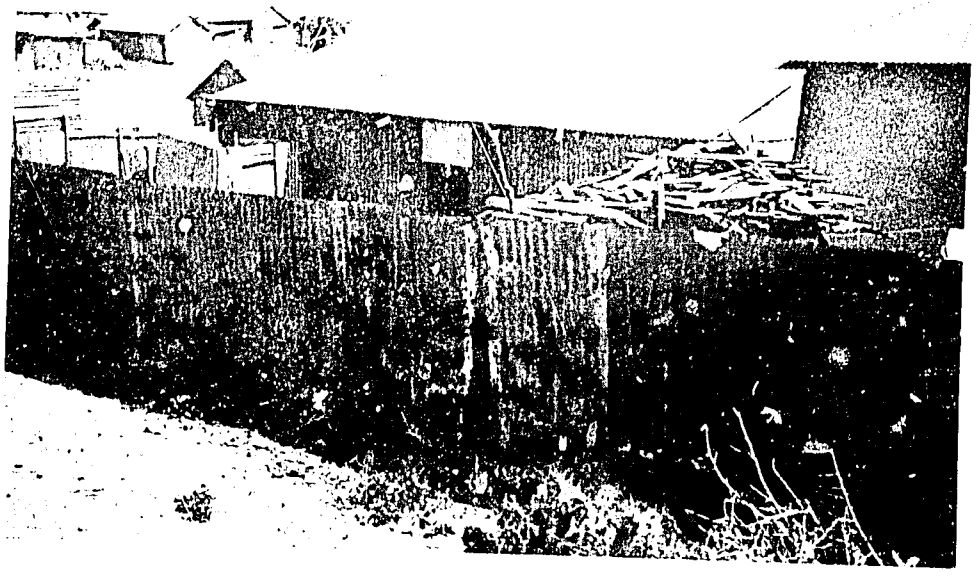
2. **Plot proportion**

The shape and proportion of a plot also influences the cost of infrastructure. The narrow dimension of a plot should always be oriented to the street. The ratio of length to width should be approximately 2:1. For example, the desirable dimensions of a $200m^2$ plot would be 10 meters by 20 meters with the 10 meter side facing to the street.

Table II.1 shows recommended plot sizes and dimensions based on the above criteria. The size of plots should be determined by the income level of the group to be served. As a general rule, the larger plots should be located on the main circulation streets with the smaller plots on the interior of neighborhoods.

B. CIRCULATION LAND USE

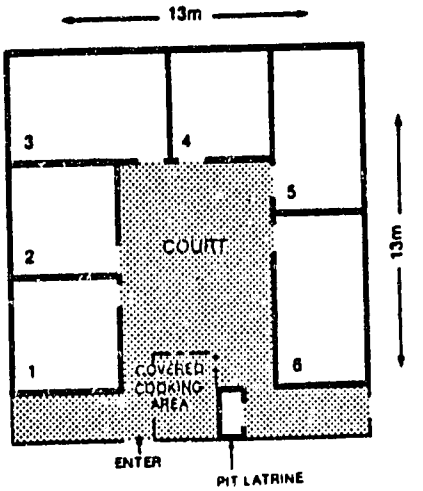
The amount of land devoted to circulation in a site should not exceed 25 percent. As shown by the examples in the introduction, as circulation space increases there is less space for residential use and public facilities and costs increase. In order to maintain a level below 25 percent it is necessary to evaluate the needs of residents and establish a hierarchy of circulation ways, ranging from major inter-city highways to pedestrian ways in low-income residential neighborhoods, which are appropriate to these needs. Recommended standards for a circulation system are presented in Table II.1.



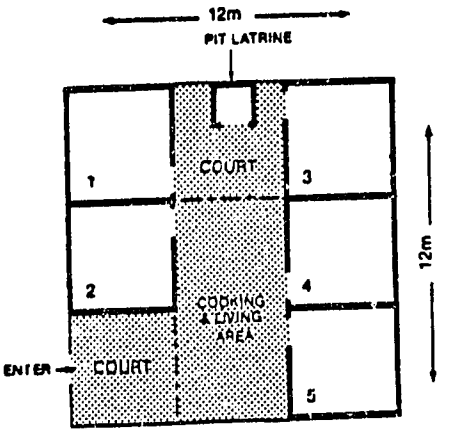
A high percentage of 144 and 169m² plots are occupied by generally lower-income households. Construction usually occupies 1/2 to 2/3 of the plot, with a cooking area and pit latrine located in the courtyard. The excessive width of street rights of way which are undeveloped and used mostly for pedestrian circulation is evident in these neighborhoods.

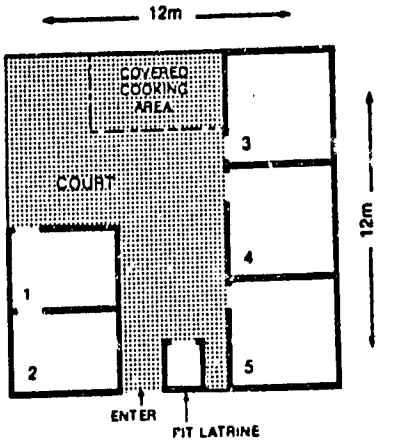
FIGURE II.1
LAYOUT OF SMALL PLOTS

EXISTING PLOTS
Plot Size: 169m²

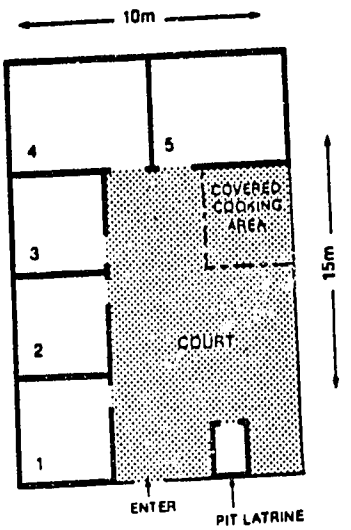


Plot Size: 144m²





PROPOSED PLOTS
Plot Size: 150m²



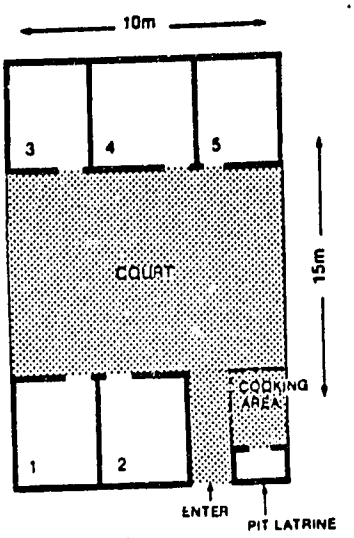


TABLE II.1
RECOMMENDED LAND USE STANDARDS

SITE UTILIZATION

Use	Percent of total site
Residential	60 to 70
Circulation	20 to 25
Public Facilities and Open Space	10 to 15

RECOMMENDED PLOT SIZES

Nominal Size	Dimensions	Ratio (Length/Width)	Target Population[1]
150	10.0 x 15	1.50	Low-Income
200	10.0 x 20	2.00	Low-Income
300	12.5 x 24	1.92	Middle-Income
450	15.0 x 30	2.00	Middle-Income
600	17.5 x 34	1.94	Upper-Income
900	22.5 x 40	1.77	Upper-Income

CIRCULATION STANDARDS

Designation	Right of Way (meters)	Carraige Way (meters)
Inter- & Intra-City Arterial	30-60	varies
Collector	20	8
Primary Residential	15	6
Secondary Residential	10	6
Tertiary Residential	8	4
Pedestrian/Emergency Access	6	3
Pedestrian	4	2

[1]See Chapter IV for discussion on land pricing policy and cost recovery.

Source: PADCO Analysis

The recommended standards will function well for Mogadishu since streets can be designed to meet actual demand. Collectors and primary residential streets wil provide convenient access into the city's arterial circulation system as well as access for buses and public transport. Since there is limited traffic on interior residential streets, narrower rights of way are adequate for access of residents and service emergency vehicles. Tertiary streets and pedestrian ways would normally be used with smaller plots intended for low-income families.

The circulation area can also be reduced by the use of culs-de-sac or dead-end streets and by making city blocks 100 to 140 meters long, thus minimizing cross streets.

C. PUBLIC FACILITIES AND OPEN SPACE

The area of a site devoted to public facilities and open space should usually be between 10 and 15 percent. As the density increases the public areas should also increase due to the additional residents to be served. The allocation of space among various ministries and uses is one of the most difficult elements of land use planning. A program and standards will need to be worked out with the agencies involved in providing services.

Space should be provided for the following facilities: education at both the primary and secondary levels, recreation and open space, commercial and markets and other public uses such as health centers, post office and police station. The largest areas are needed for education and recreation facilities.

An example of social infrastructure standards used in India is shown in Figure II.2. A hierarchy of services based on the type and size of area being served as well as per capita space standards for the district level have been established. Use of these standards would result in 10 to 15 percent of a site being used for public facilities depending on the density. It appears that these standards would generally be applicable to Mogadishu, but they should not be adopted without thorough evaluation and modification to meet the conditions and needs of the city.

D. SUMMARY

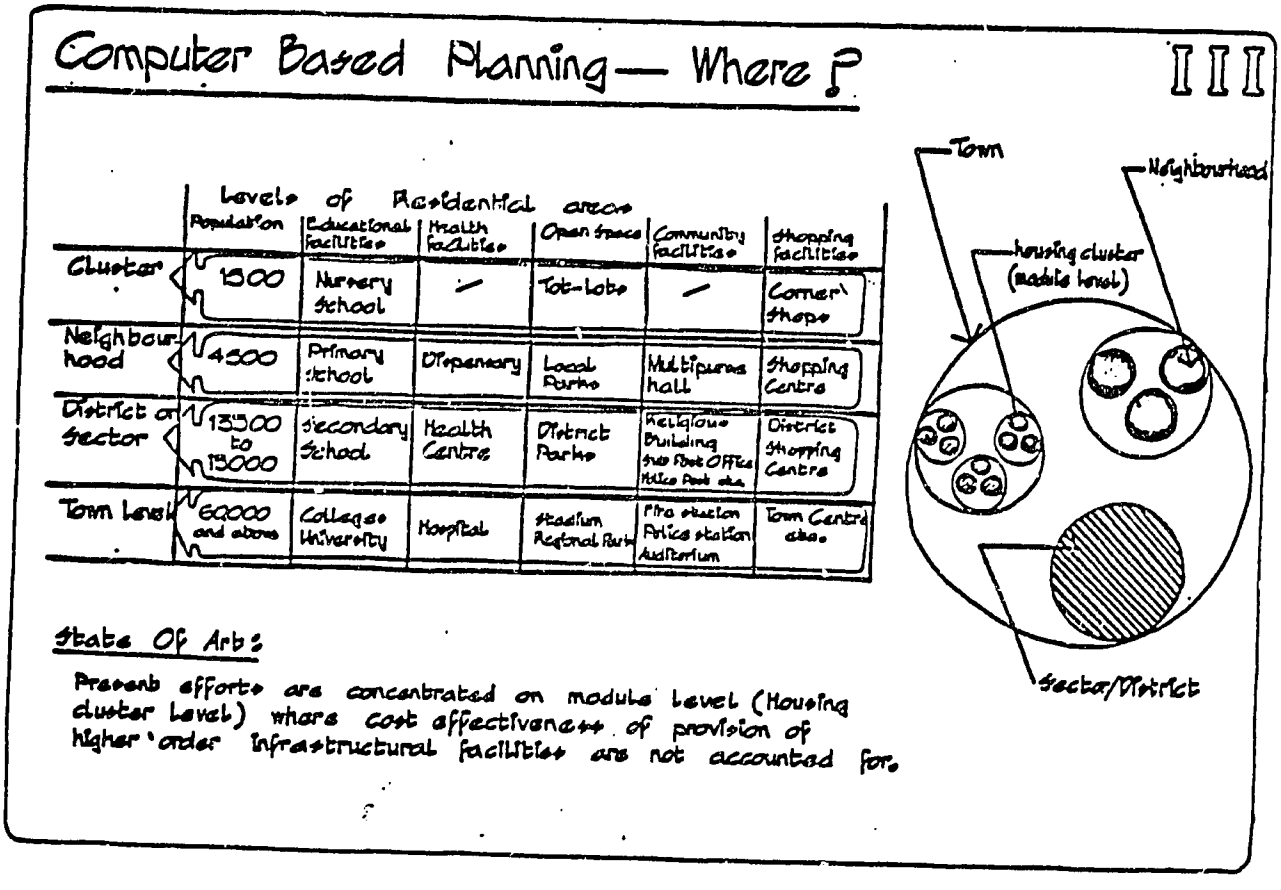
Five site plans, Figures II.3 through II.7, with the same layout but different standards, have been developed to illustrate the effect of plot size and street width on density. With 200m^2 plots (Figure II.4), 10.81 hectares are used for 378 plots or 35 plots per hectare. For 600m^2 plots (Figure II.7), the most common plot size in Mogadishu, 19.09 hectares are used for 224 plots resulting in a density of 12.8 plots per hectare. Plots of 900m^2 (Figure II.8) result in a density of only 7.7 plots per hectare with 160 plots on 20.75 hectares.

Circulation standards have been changed from a basic level of 6 and 10 meter wide streets for Figure II.3 to a high level of 15 and 20 meter wide streets for Figure

II.7. The percentage of land for circulation has increased from 18.38 to 24.04 percent and the actual amount of space devoted to circulation has more than doubled, from 19,900m^2 to 51,213m^2. Since a hierarchy of streets is recommended, the percentage of circulation would be between these figures for new plans. With the present standards as much as 50 percent of the site is used for circulation.

Concept Plan A (Annex I) illustrates the land use concepts outlined in this section and is recommended as a model to be used in the planning of new areas. Table AI.1 gives a summary of the plot types which vary from 150m^2 to 600m^2 with an average plot size of 292m^2. There are 1,868 plots on 85 hectares resulting in a density of 22 plots per hectare. The circulation hierarchy varies from 4-meter-wide pedestrian ways to 20-meter-wide collectors. The land use is within the recommended limits with 64.05 percent for residential, 23.08 percent for circulation, and 12.88 percent for public facilities and open space.

FIGURE II.2
SOCIAL INFRASTRUCTURE STANDARDS FOR INDIA



Per capita social facility space requirement for 15000 population

	Facility	Total in hects.	Per capita (sq. mts.)
1.	Primary School	2.25 (3 nos.)	1.50
2.	Secondary School	1.50 (one)	1.00
3.	Health centre	0.33 (one)	0.22
4.	Post and telegraph office	0.9	0.06
5.	Police station	0.9	0.06
6.	Community/religious buildings	0.99	0.66
7.	Recreational open space	4.50	3.00
8.	Commercial/shopping	1.50	1.00
	Total		7.50

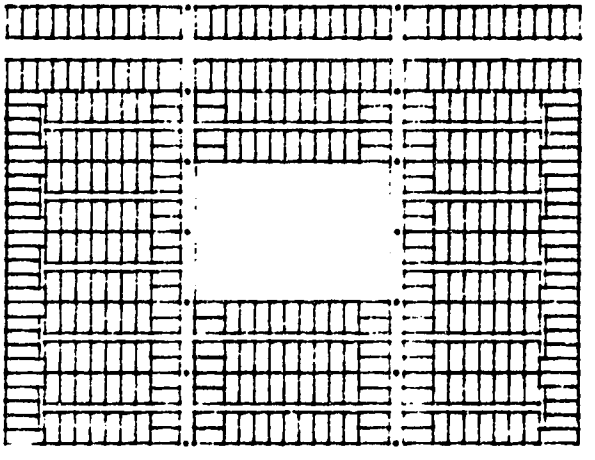
Source: HUDCO. Sector Model. New Delhi. 1983. pp.20 and 27.

FIGURE IL3
SITE PLAN - PLOT SIZE 200M^2

LAND USE LIST01

PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
192.61	40	10.58	7704	
200.00	314	83.07	62800	
236.80	20	5.29	4736	
300.00	4	1.06	1200	
TOTAL	378	100.00	76440	
				% 70.58

TOTAL RESIDENTIAL=	76440
	% 70.58
EDUCATIONAL	
SCH1	11960
TOTAL EDUCATIONAL	11960
	% 11.04
TOTAL CIRCULATION=	19900
	% 18.38
TOTAL AREA	108300



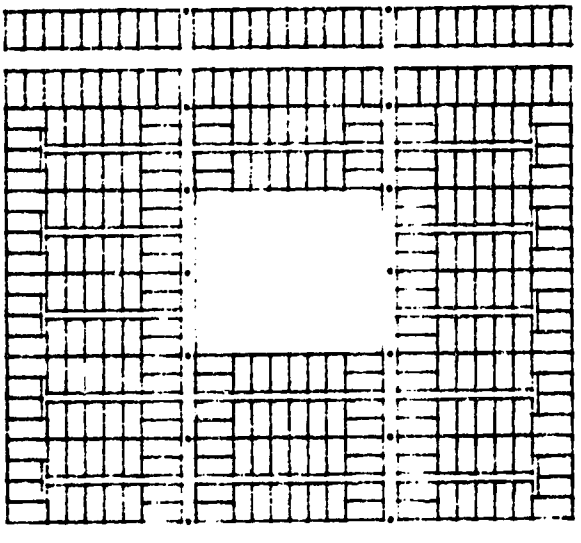
INFRASTRUCTURE COST LIST01

SPEC	UNIT COST	TOTAL QUANTIT	TOTAL COST
PAV-PREM 1	500.00	0	0
PAV-SPRY 2	300.00	0	0
GRAVEL. 3	100.00	2250	225000
SIDEWALK 4	200.00	0	0
..... 5	0.00	0	0
..... 6	0.00	0	0
..... 7	0.00	0	0
..... 8	0.00	0	0
..... 9	0.00	0	0
.....10	0.00	0	0
.....11	0.00	0	0
LANDSCAP12	15.00	16730	250950
TOTAL ROAD & DRAIN COST=			475950
4"PIPE..13	1050.00	0	0
2"PIPE..14	466.00	0	0
1"PIPE..15	186.00	0	0
CONN1/2"16	115.00	0	0
4"W/FOUN17	1250.00	367	458125
2"W/FOUN18	666.00	0	0
..... 19	0 00	0	0
....20	0.00	0	0
....21	0.00	0	0
..... 22	0.00	0	0
TOTAL WATER SUPPLY COST=			458125
ELE-MAIN23	300.00	368	110400
ELE-SEC.24	150.00	0	0
ELE-TER.25	100.00	0	0
SEW-ELEC26	2400.00	0	0
2SEW-ELE27	1150 00	0	0
.....28	0.00	0	0
.....29	0.00	0	0
.....30	0.00	0	0
.....31	0.00	0	0
.....32	0 00	0	0
TOTAL SEWER COST		=	110400
TOT.INFRASTRUCTURE COST=			1044475
COST PER GROSS M2		=	9.64

FIGURE II.4
SITE PLAN - PLOT SIZE 300M²

LAND USE LIST02

PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
300 00	232	78.38	69600	
315.33	40	13.51	12613	
354.00	20	6.76	7080	
360.00	4	1.35	1440	
TOTAL	296	100.00	90733	
			% 72.66	
TOTAL RESIDENTIAL=			90733	
			% 72 66	
EDUCATIONAL				
SCH1			13500	
TOTAL EDUCATIONAL			13500	
			% 10.81	
TOTAL CIRCULATION=			20642	
			% 16 53	
TOTAL AREA =			124875	



INFRASTRUCTURE COST LIST02

SPEC	UNIT COST	TOTAL QUANTIT	TOTAL COST
PAV-PREM 1	500.00	0	0
PAV-SPRY 2	300.00	2166	649800
GRAVEL.. 3	100.00	3807	380700
SIDEWALK 4	200.00	0	0
..... 5	0.00	0	0
..... 6	0.00	0	0
..... 7	0.00	0	0
..... 8	0.00	0	0
..... 9	0.00	0	0
.....10	0.00	0	0
.....11	0.00	0	0
LANDSCAP12	15.00	14238	213570
TOTAL ROAD & DRAIN COST=			1244070
4"PIPE..13	1050.00	362	379575
2"PIPE..14	466.00	635	295677
1"PIPE. 15	186.00	0	0
CONN1/2"16	115.00	0	0
4"W/FOUN17	1250.00	0	0
2"W/FOUN18	666.00	0	0
.....19	0.00	0	0
.....20	0.00	0	0
.....21	0.00	0	0
.....22	0.00	0	0
TOTAL WATER SUPPLY COST=			675252
ELE-MAIN23	300.00	363	108900
ELE-SEC.24	150.00	0	0
ELE-TER.25	100.00	635	63450
SEW-ELEC26	2400.00	0	0
2SEW-ELE27	1150.00	0	0
.....28	0.00	0	0
.....29	0.00	0	0
.....30	0.00	0	0
.....31	0.00	0	0
....32	0.00	0	0
TOTAL SEWER COST		=	172350
TOT.INFRASTRUCTURE COST=			2091672
COST PER GROSS M2		=	16.75

FIGURE IL5
SITE PLAN - PLOT SIZE 400M^2

LAND USE LIST03

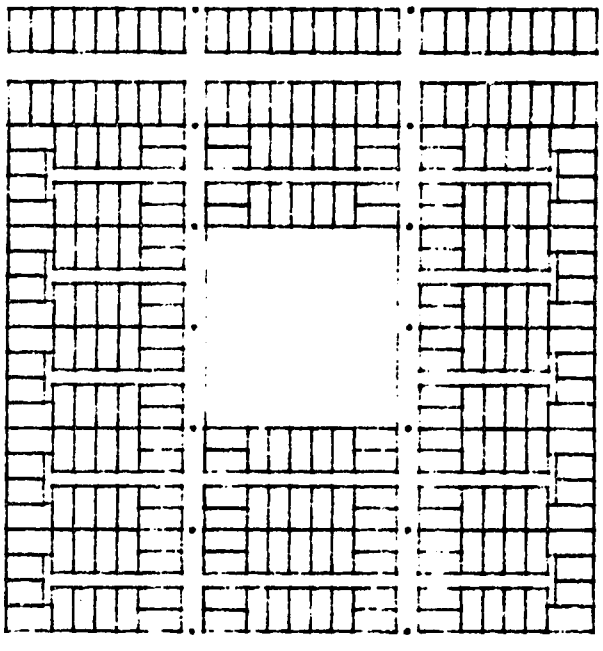
PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
396.45	40	15.15	15858	
399.00	200	75.76	79800	
441.00	4	1.52	1764	
498.00	20	7.58	9960	
TOTAL	264	100.00	107382	
				% 67.95

TOTAL RESIDENTIAL= 107382
% 67.95

EDUCATIONAL
SCH1 16929
TOTAL EDUCATIONAL 16929
% 10.71

TOTAL CIRCULATION= 33725
% 21.34

TOTAL AREA = 158036



INFRASTRUCTURE COST LIST03

SPEC	UNIT COST	TOTAL QUANTIT	TOTAL COST
PAV-PREM 1	500.00	2982	1491000
PAV-SPRY 2	300.00	4872	1461600
GRAVEL.. 3	100.00	7859	785940
SIDEWALK 4	200.00	0	0
..... 5	0.00	0	0
..... 6	0.00	0	0
..... 7	0.00	0	0
..... 8	0.00	0	0
..... 9	0.00	0	0
.....10	0.00	0	0
.....11	0.00	0	0
LANDSCAP12	15.00	16822	252330
TOTAL ROAD & DRAIN COST=			3990870
4"PIPE..13	1050.00	0	0
2"PIPE..14	466.00	812	378392
1"PIPE..15	186.00	1264	235067
CONN1/2"16	115.00	0	0
4"W/FOUN17	1250.00	368	459688
2"W/FOUN18	666.00	0	0
.....19	0.00	0	0
.....20	0.00	0	0
.....21	0.00	0	0
.....22	0.00	0	0
TOTAL WATER SUPPLY COST=			1073146
ELE-MAIN23	300.00	369	110775
ELE-SEC 24	150.00	812	121800
ELE-TER.25	100.00	1265	126530
SEW-ELEC26	2400.00	0	0
2SEW-ELE27	1150.00	0	0
.....28	0.00	0	0
.....29	0.00	0	0
.....30	0.00	0	0
.....31	0.00	0	0
.....32	0.00	0	0
TOTAL SEWER COST		=	359105
TOT.INFRASTRUCTURE COST=			5423121
COST PER GROSS M2		=	34.32

FIGURE IL6
SITE PLAN - PLOT SIZE 600M2

LAND USE LIST04

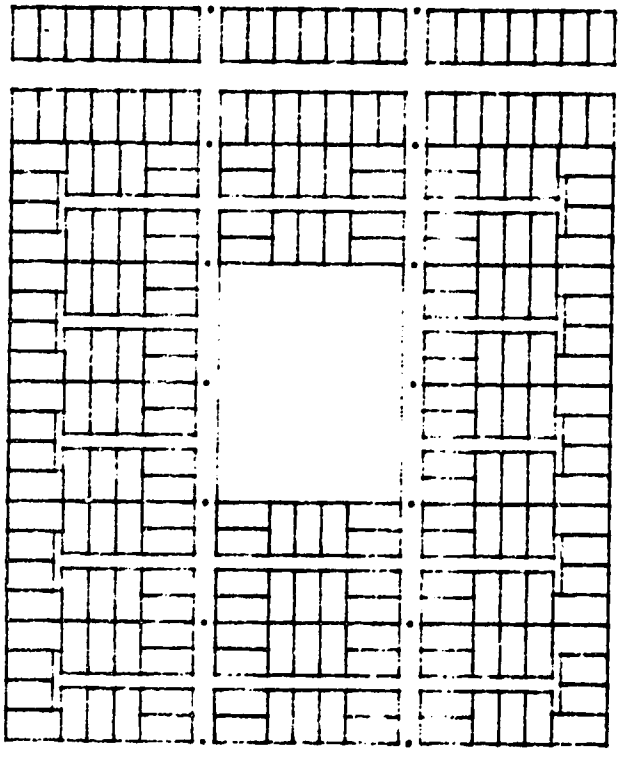
PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
586.30	40	17.86	23452	
595.00	160	71.43	95200	
629.00	4	1.79	2516	
712.00	20	8.93	14240	
TOTAL	224	100.00	135408	
				% 70.91

TOTAL RESIDENTIAL= 135408
% 70.91

EDUCATIONAL
SCH1 19110
TOTAL EDUCATIONAL 19110
% 10.01

TOTAL CIRCULATION= 36443
% 19.08

TOTAL AREA = 190961



INFRASTRUCTURE COST LIST04

SPEC	UNIT COST	TOTAL QUANTIT	TOTAL COST
PAV-PREM 1	500.00	6460	3230000
PAV-SPRY 2	300.00	10197	3059100
GRAVEL.. 3	100.00	0	0
SIDEWALK 4	200.00	4154	830800
..... 5	0.00	0	0
..... 6	0.00	0	0
..... 7	0.00	0	0
..... 8	0.00	0	0
..... 9	0.00	0	0
.....10	0.00	0	0
.....11	0.00	0	0
LANDSCAP12	15.00	14697	220455
TOTAL ROAD & DRAIN COST=			7340355
4"PIPE..13	1050.00	378	396900
2"PIPE..14	466.00	956	445496
1"PIPE..15	186.00	1255	233430
CONN1/2"16	115.00	0	0
4"W/FOUN17	1250.00	0	0
2"W/FOUN18	666.00	0	0
.....19	0.00	0	0
.....20	0.00	0	0
.....21	0.00	0	0
.....22	0.00	0	0
TOTAL WATER SUPPLY COST=			1075826
ELE-MAIN23	300.00	0	0
ELE-SEC.24	150.00	0	0
ELE-TER.25	100.00	0	0
SEW-ELEC26	2400.00	380	910800
2SEW-ELE27	1150.00	2213	2544375
.....28	0.00	0	0
.....29	0.00	0	0
.....30	0.00	0	0
.....31	0.00	0	0
.....32	0.00	0	0
TOTAL SEWER COST		=	3455175
TOT.INFRASTRUCTURE COST=			11871356
COST PER GROSS M2		=	62.17

FIGURE II.7
SITE PLAN - PLOT SIZE 900M²

LAND USE LIST05

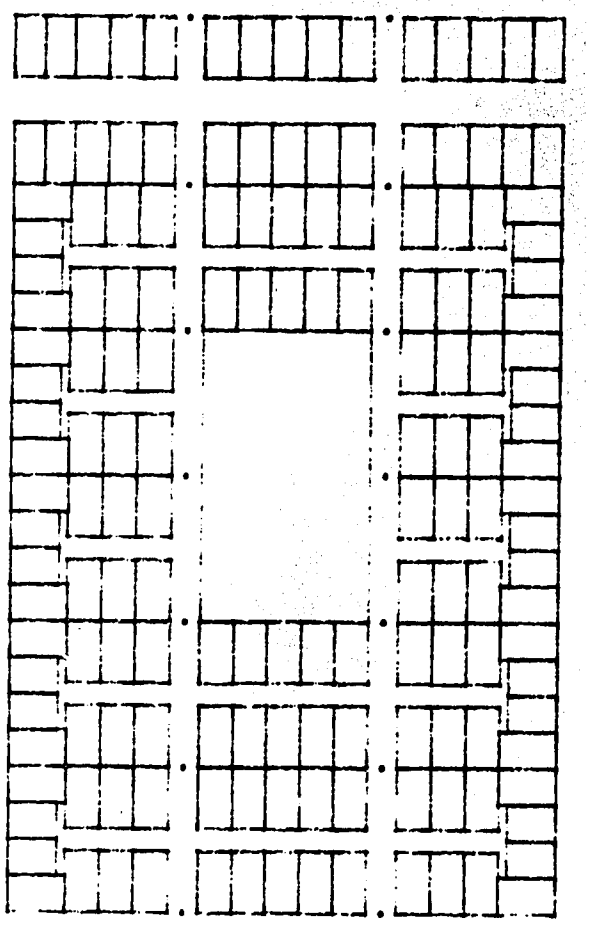
PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
759.05	20	12.50	15181	
800.00	8	5.00	6400	
832.00	4	2.50	3328	
900.00	88	55 00	79200	
901.55	20	12.50	18031	
913.60	20	12.50	18272	
TOTAL	160	100.00	140412	
				% 65.92

TOTAL RESIDENTIAL= 140412
% 65.92

EDUCATIONAL
SCH1 21375
TOTAL EDUCATIONAL 21375
% 10.04

TOTAL CIRCULATION= 51213
% 24.04

TOTAL AREA = 213000



INFRASTRUCTURE COST LIST05

SPEC	UNIT COST	TOTAL QUANTIT	TOTAL COST
PAV-PREM 1	500.00	18712	9356000
PAV-SPRY 2	300.00	0	0
GRAVEL.. 3	100.00	0	0
SIDEWALK 4	200.00	9408	1881680
..... 5	0.00	0	0
..... 6	0.00	0	0
..... 7	0.00	0	0
..... 8	0.00	0	0
..... 9	0.00	0	0
.....10	0.00	0	0
..... 11	0.00	0	0
LANDSCAP12	15.00	21574	323610

TOTAL ROAD & DRAIN COST= 11561290

4"PIPE..13	1050.00	1505	1580355
2"PIPE..14	466.00	0	0
1"PIPE..15	186.00	1046	194463
CONN1/2"16	115.00	0	0
4"W/FOUN17	1250.00	0	0.
2"W/FOUN18	666.00	0	0
.....19	0.00	0	0
.....20	0.00	0	0
..... 21	0.00	0	0
.....22	0.00	0	0

TOTAL WATER SUPPLY COST= 1774818

ELE-MAIN23	300.00	0	0
ELE-SEC.24	150.00	0	0
ELE-TER.25	100.00	0	0
SEW-ELEC26	2400.00	1507	3615840
2SEW-ELE27	1150.00	1047	1204050
.....28	0.00	0	0
.....29	0.00	0	0
.....30	0.00	0	0
.....31	0.00	0	0
.....32	0.00	0	0

TOTAL SEWER COST = 4819890

TOT.INFRASTRUCTURE COST=18155998

COST PER GROSS M2 = 85.24

CHAPTER III
RATIONALE FOR RECOMMENDED INFRASTRUCTURE STANDARDS

While the land distribution program of the Municipality has been able to keep pace with most of the demand for new plots in Mogadishu, one of the problems has been that few or no services have been provided to the new areas. The limited number of families surveyed on field visits indicated that their main concern was the lack of water and electricity. Some of these families pay So.Sh.30 per day for water from vendors, which certainly must be a financial burden for many low-income families.

Infrastructure standards cannot be considered independently of cost and affordability considerations. Costs of providing basic services are discussed at the end of this chapter and land pricing policy and cost recovery mechanisms in the next chapter. The objective of the program is to have self-financing infrastructure expansion into the new areas.

It will become increasingly important to provide basic services to new areas as they become more distant from the center of Mogadishu, as well as providing services to the recently developed neighborhoods. Since the cost of infrastructure should be recovered from beneficiaries, basic standards for services have been recommended for developing areas of the city.

A. POTABLE WATER

The goal of the program should be access to potable water for all residents through a system of conveniently located public fountains with expansion and upgrading of the system to individual house connections over time.

Main supply lines should be installed on collectors (20 meters) and primary residential streets (15 meters). Public fountains should be spaced at 500 to 800 meters along supply lines. It is important that the main lines be sized to handle possible expansion to adjacent areas and to meet the projected potential demand for individual connections (Figure III.1).

Connections to plots fronting on collector and primary streets would be at the option and expense of individual owners. Supply lines for secondary and tertiary streets would be installed on request and at the expense of the residents being served.

B. CIRCULATION AND STREETS

Collector streets connecting to major arteries should be graded and provided with a surface layer of gravel or coral for an 8-meter-wide carriage way. Primary residential streets should also be graded and provided with a gravel or coral base 6 meters in width (Figure III.2). All remaining streets should be graded to provide a minimum carriage way as shown in Table II.2.

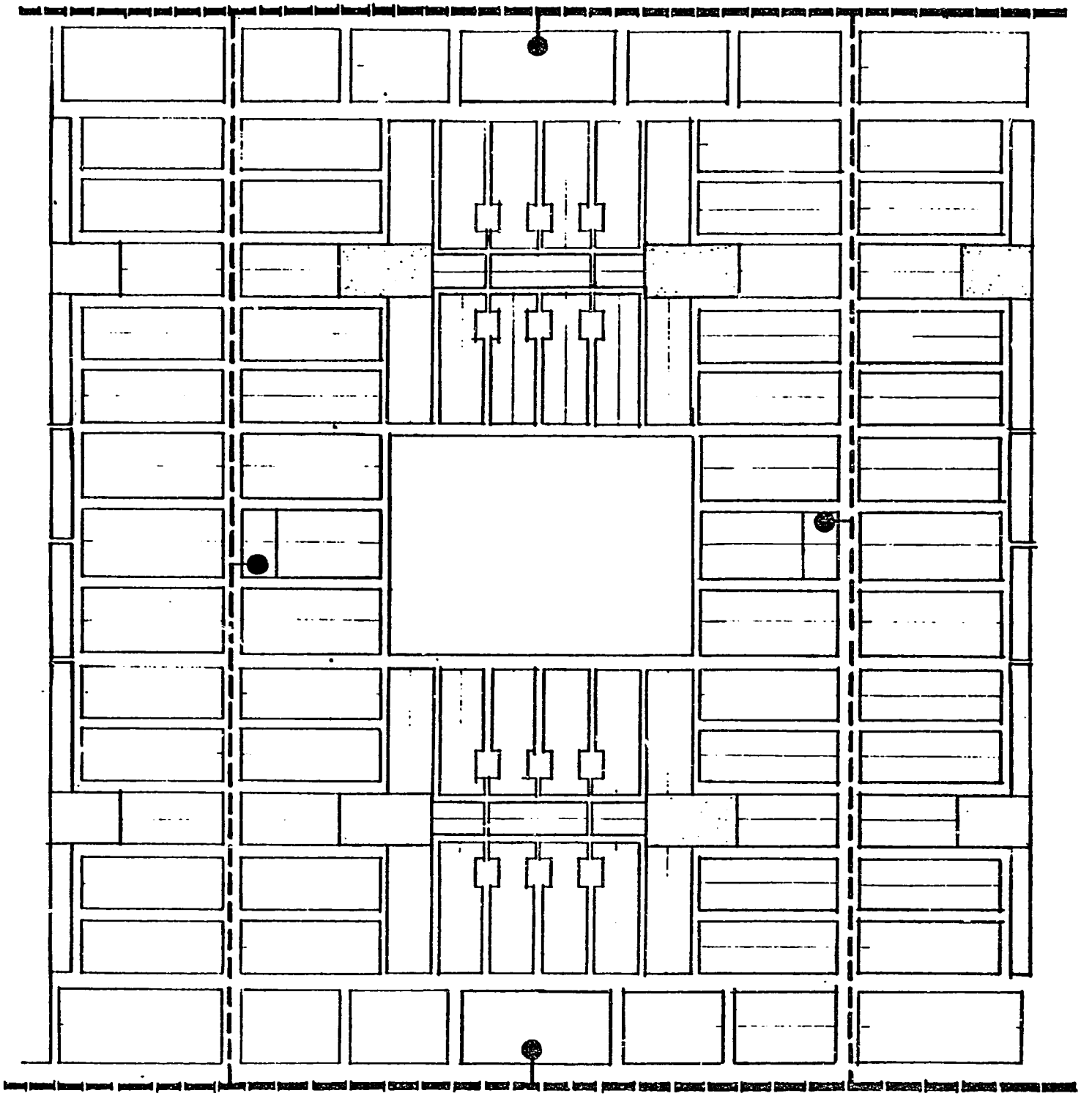


FIGURE III.1
WATER SUPPLY
SCALE 1/5000 26 APRIL 1984

4" SUPPLY LINE
2" SUPPLY LINE
PUBLIC FOUNTAIN

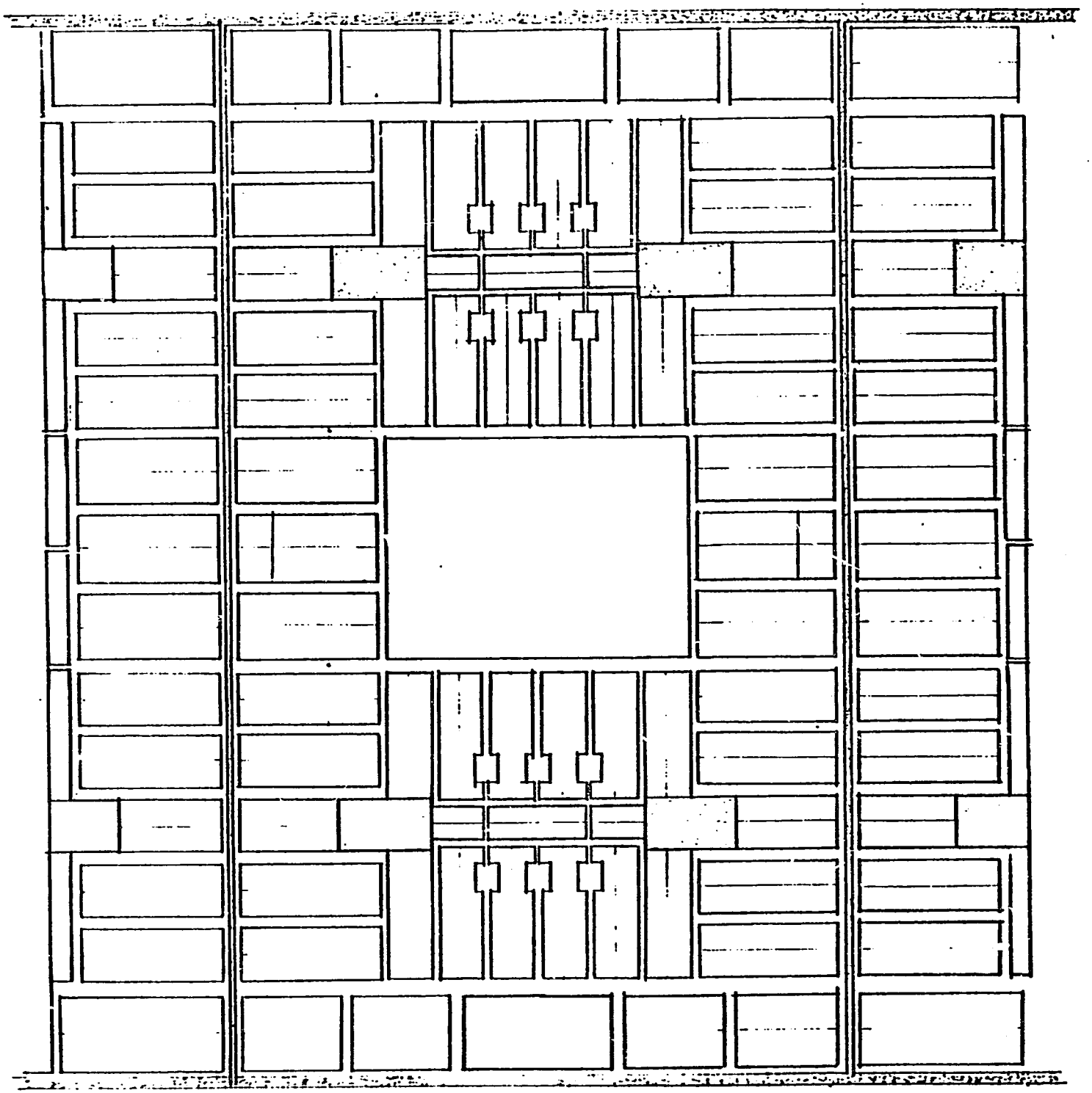


FIGURE III.2
CIRCULATION
SCALE 1/5000 26 APRIL 1984

GRAVEL-8m
GRAVEL-6m

There would be no provisions made for storm drainage in the initial phase. A field survey following the first heavy rain of the season indicated there were few drainage problems in the new areas which are sparsely settled since most rain water was absorbed directly into the sandy soil. Problems of puddles and flooding increased as the areas became more developed. Since the new areas will likely develop drainage problems in the future, planners should be aware of the topography of sites and avoid placing houses or public structures in low areas subject to future flooding.

C. ELECTRICITY

Main supply lines on utility poles should be provided on collector (20 meters) and primary residential streets (15 meters). Street lights connected to utility poles would be installed at a spacing of approximately 100 meters on both types of streets (Figure III.3).

Electrical connections to plots on streets with supply lines would be at the option and expense of individual owners. Likewise, the installation of lines on secondary and tertiary streets would be on request and at the expense of residents being served.

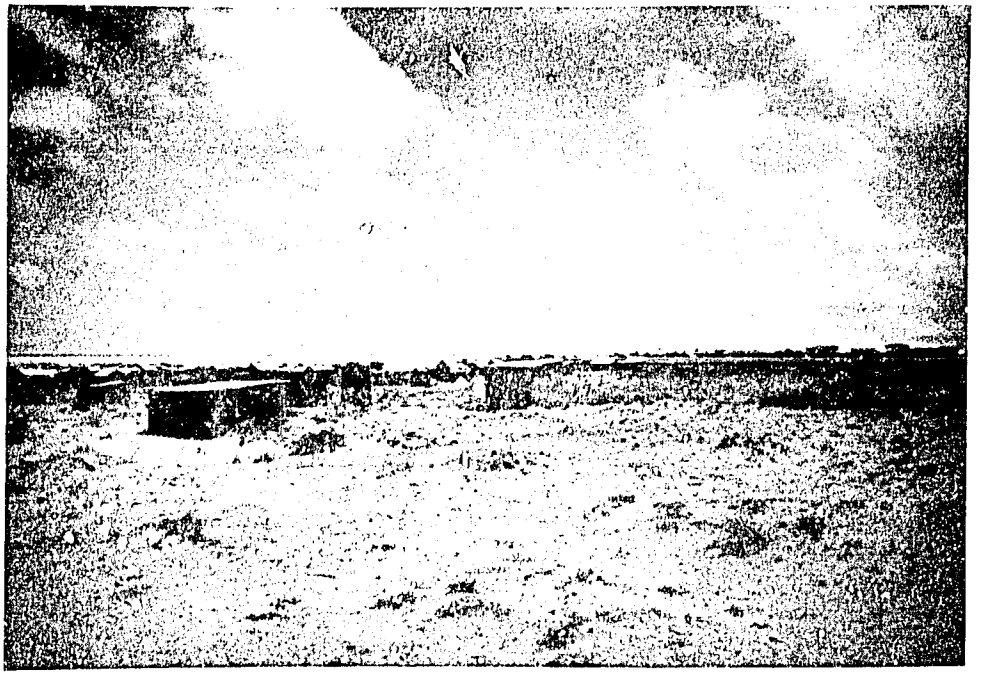
D. SANITATION

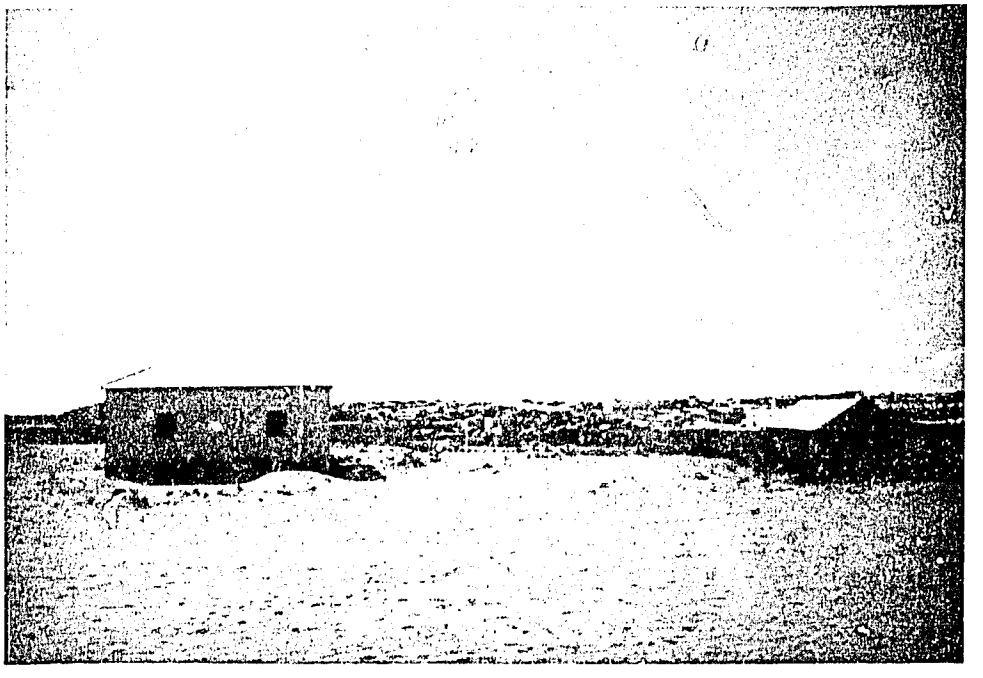
On-site sanitation facilities in the form of pit latrines or septic systems with soakaways should be used in new areas. As discussed earlier, the existing natural conditions are excellent for the use of this type of system and should provide a long-term solution for sanitation in residential areas.

E. INFRASTRUCTURE COSTS

Figures II.4 to II.8 give examples of infrastructure costs at five different levels of service. The lowest level of service (grading of streets with gravel and water and electrical lines on the collector street) would cost So.Sh.9.64 per gross m^2 or So.Sh.14.83 per net m^2 of residential land. The highest standard (paved streets with sidewalks as well as individual connections to water, sewer and electricity for all plots) would cost So.Sh.85.04 per gross m^2 or So.Sh.130.83 per net m^2 of residential land. The cost estimate of the infrastructure standards recommended above for Concept Plan A is So.Sh.15.11 per gross m^2. Unit costs used to calculate development costs are shown in Table III.1.

The administrative cost of the Land Office should also be recovered from the proceeds of the sale of plots. At So.Sh.1.20 per gross m^2, this cost is relatively minor compared to the cost of services. This calculation was based on an annual budget by 1985 of So.Sh.2,732,000 for the Land Office and the yearly volume of 7,500 plots with an average size of $300m^2$ (Table III.2).





There is an impressive amount of construction activity in the recently-developed neighborhoods at the periphery of the city, even though no services have been provided. Initial construction is a traditional structure out of local material or a one- or two-room house of corrugated metal.

Cost estimates are based on the best data available from several sources including both public agencies and private firms involved in construction. Because of the erratic pricing of construction materials in Mogadishu resulting from imports and exchange rates, the cost estimates should be used as a general indication of an order of magnitude and not as definitive costs. Inflation in construction costs is estimated to be between 20 and 25 percent per year.

TABLE III.1
UNIT COSTS

Material	Unit	Cost (So.Sh.)
Roads		
Pre-mixed Bituminous Paving with Curbs	m^2	500
Sprayed Bituminous Paving with Curbs	m^2	300'
Gravel or Coral Surface	m^2	100
Sidewalk Concrete	m^2	200
Grading	m^2	15
Water		
4" Pipe (Including Fittings)	lm	1,050
2" Pipe (Including Fittings)	lm	466
1" Pipe (Including Fittings)	lm	186
½" Pipe (Including Fittings)	lm	115
Public Fountain	Unit	100,000
Electricity		
Main Line w/Lights @ 100m	lm	300
Secondary Line w/Lights @ 100m	lm	150
Tertiary Line	lm	100
Sewer		
Main Line	lm	[illegible],100
Secondary Line	lm	[illegible],000

Source: PADCO Analysis

TABLE III.2
COSTS OF OPERATIONS FOR LAND OFFICE

SALARIES		ANNUAL COSTS (So.Sh.)
56 Permanent - 8 Temporary	So.Sh.77,681/Month	932,172
Office Supplies	So.Sh.2,500/Month	30,000
Reproduction		18,000
Auto Park, Gas, & Oil	So.Sh.1,500/Day x 318 Days	477,000
Subtotal		1,457,172
20% Contingencies		291,434
Subtotal		1,748,606
Projected 25% Increase By End 1984		437,151
Subtotal		2,185,757
Projected 25% Increase By End 1985		546,439
Total		2,732,196
Administrative Costs Per Gross m^2*		So.Sh.1.20

*Assumes 7,500 new plots per year with total area of 2,250,000m^2.

SOURCE: PADCO Analysis

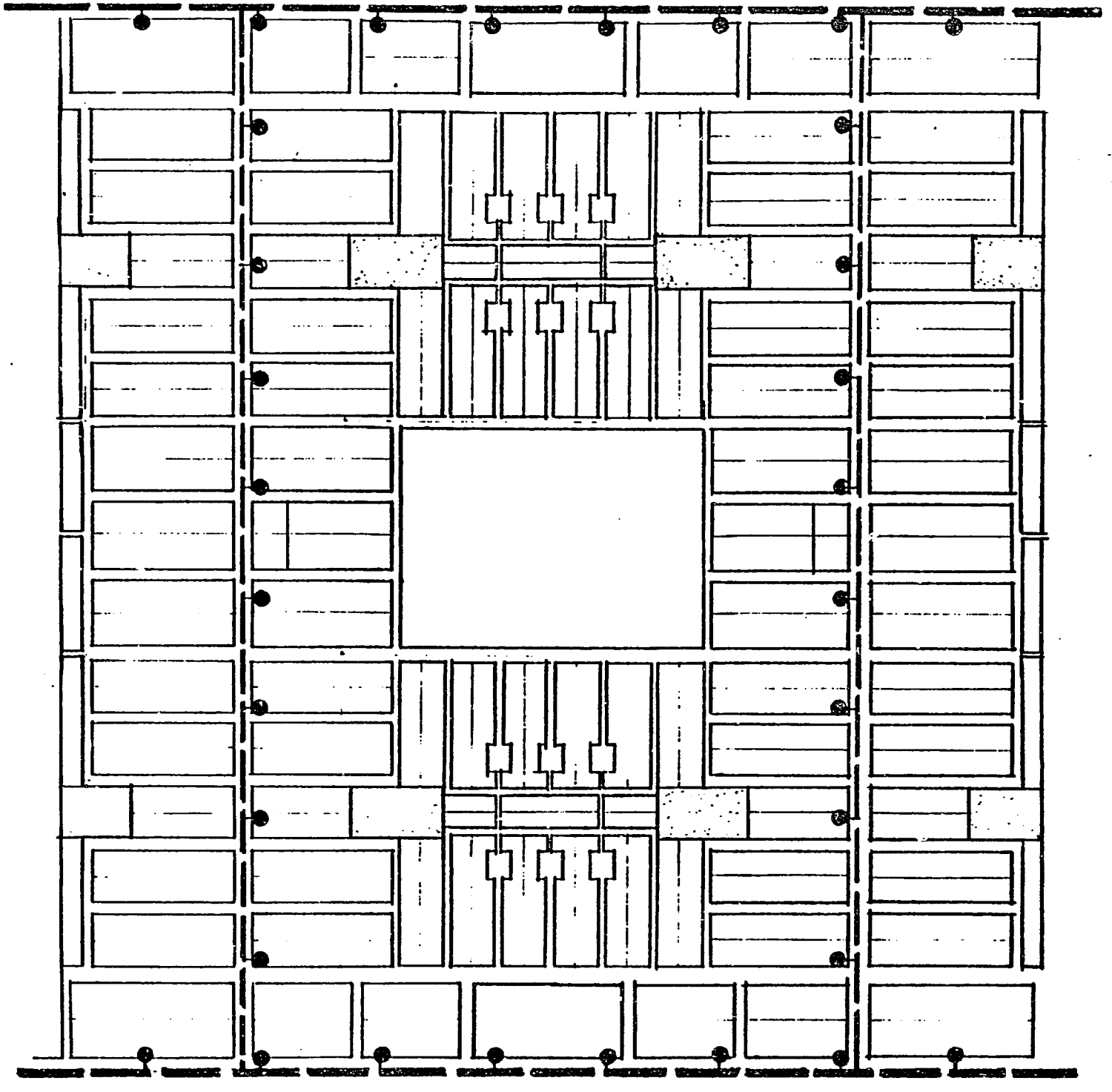


FIGURE. III·3
ELECTRICITY
SCALE 1/5000 26 APRIL 1984

MAIN DISTRIBUTION LINE
LOCAL LINE
STREET LIGHT

CHAPTER IV
RECOMMENDED LAND PRICING AND COST RECOVERY POLICY

It is clear that the present pricing policy of So.Sh.3 per square meter of land, regardless of its location or size, is inadequate. A new land pricing policy is needed to meet a number of objectives, including:

- To provide land at reasonable costs and in an equitable manner to meet the needs of residents of Mogadishu, particularly the needs of low-income families
- To provide basic public services to the new areas of the city as they are developed
- To recover the full administrative and development costs of new land from beneficiaries so as to permit the Municipality to continue to provide services
- To increase the revenues from the sale of public lands in central locations thus permitting cross subsidies for low-income residents.

There seems to be no relationship between the So.Sh.3 per square meter being charged by the Land Office and the cost of land on the private market. Individuals involved in the private sale of land indicate the following prices at the present time:

Private Market Land Prices

- **City center**
  Plot on main road — So.Sh.1,000 to So.Sh.2,000/m^2
  Interior plot — So.Sh.600 to So.Sh.1,250/m^2
- **Developing villages**
  Plot on main road — So.Sh.400 to So.Sh.875/m^2
  Interior plot — So.Sh.250 to So.Sh.500/m^2
- **New areas**
  Plots without services — So.Sh.33 to So.Sh.125/m^2

Apparently some people are realizing large profits by buying land at the official price and selling at the much higher private value. If a 600m^2 plot was purchased at So.Sh.3 per m^2 and sold for So.Sh.1,000 per m^2, the seller would realize a profit of So.Sh.598,200. To create a more equitable system, the official pricing policy for land needs to be brought more in line with the private system.

A draft proposal of a land pricing policy prepared by the land committee of the Municipality has been reviewed. The following comments and observations are in relation to that proposal.

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A. LAND PRICING ZONES

The zoning of the city into three areas with different prices is an important first step in recognizing the crucial factor of location on the value of land. The zones should definitely be included as part of a new policy. The limits of the zones will need careful review to be certain that the areas are relatively similar in character and levels of service. It is difficult to make suggestions with a limited exposure to the city, but consideration should be given to including beach front property for three to five kilometers each direction from the center of the city into Zone A. Also the expansion of the area of Zone B to include more of the city inside of the 21 October road should be studied.

B. LAND PRICING AND COST RECOVERY

Using Concept Plan A as an example, there are alternatives for land pricing which will recover the development and administrative costs for the Municipality. The most direct way is to assume that all costs will be passed directly to the beneficiaries at a fixed price per square meter. For Concept Plan A, the price would be calculated as follows:

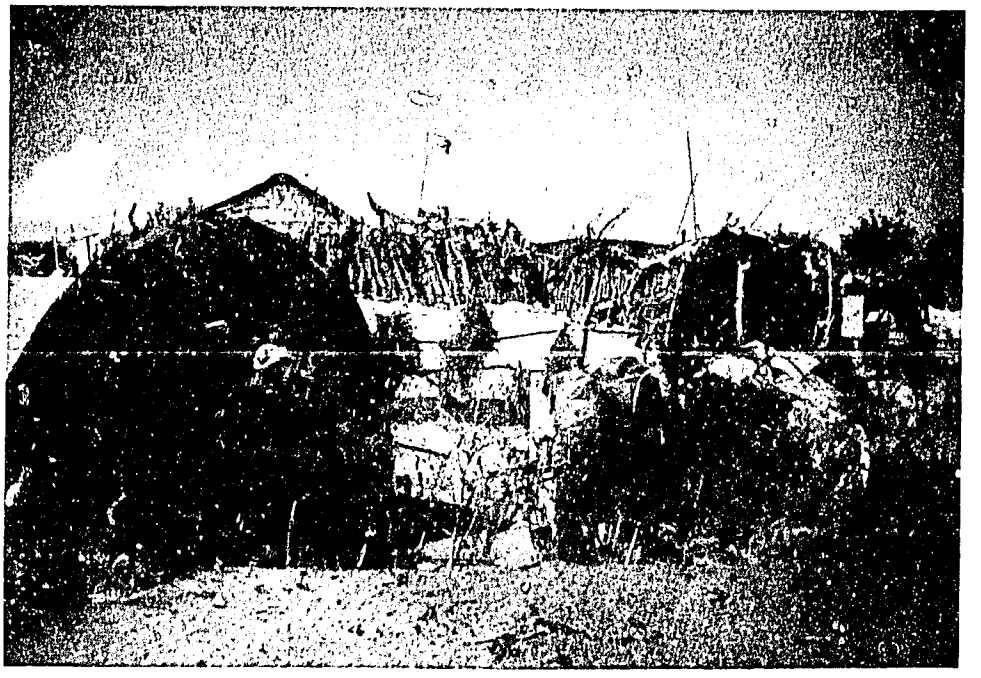
Cost per gross m^2	So.Sh.15.11
Administrative costs per gross m^2	So.Sh.1.20
Total cost per gross m^2	So.Sh.16.31
Residential land	64.05% of site
Cost per net residential m^2	So.Sh.25.46 (use So.Sh.25.50)

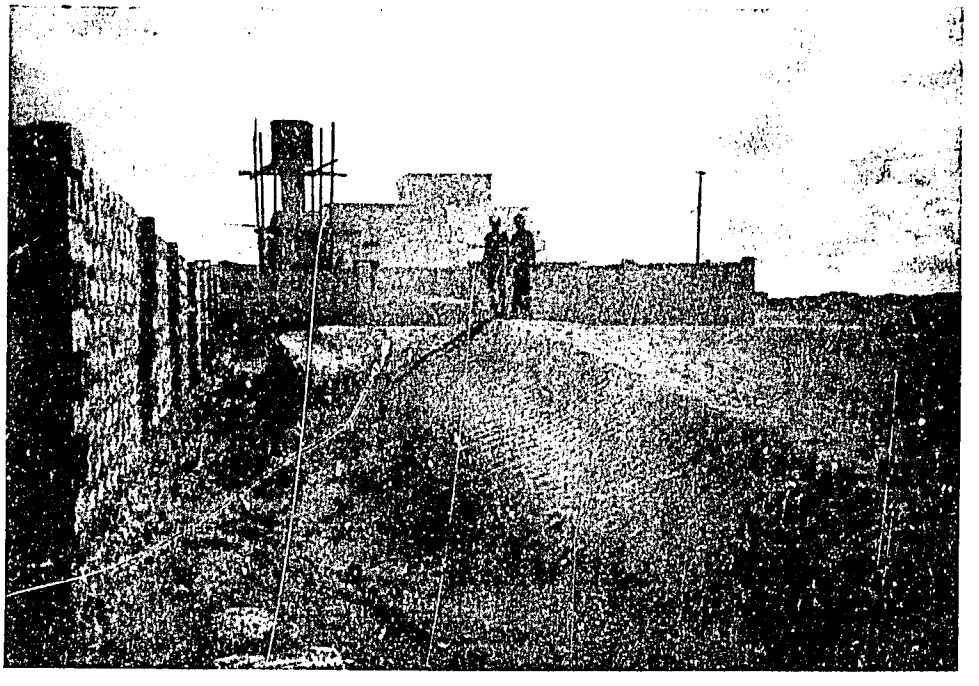
A second concept is differential land pricing, where a higher price would be charged for plots on major streets with increased levels of service, thus reducing the cost of interior plots. Three groups of plots have been established:

1. Interior plots under $250m^2$
2. Interior plots over $250m^2$
3. Plots facing collectors and primary residential streets

Starting with a base price of So.Sh.25.50, Table IV.1 shows the prices, So.Sh.35.10 and So.Sh.30.53, which would have to be charged for the plots facing major streets in order to reduce the cost of the smallest plots (under $250m^2$) to So.Sh.15.00 and So.Sh.20.00 per m^2 respectively. It is assumed that the middle group of plots would be sold at actual cost of So.Sh.25.5 per m^2.

Table IV.2 gives some examples of the monthly incomes needed by households to purchase plots under the financial terms discussed in the next section. It is assumed that families would put 30 percent down with a 5-year repayment period at 14 percent interest. The maximum of 15 percent of income for land purchase has been used.





Many families build traditional structures until they have the resources to build a more permanent house, while other families build substantial and expensive houses. A pricing policy should take into account the financial capacity of target groups. Drifting sand creates circulation and maintenance problems in some of the newer neighborhoods of Mogadishu.

TABLE IV.1

DIFFERENTIAL LAND PRICING FOR CONCEPT PLAN A

	GROUP 1 (Plots Below 250m^2)	GROUP 2 (Interior Plots)	GROUP 3 (Plots on Main Streets)	TOTALS
Number of Plots	788	736	344	1,868
Area (m^2)	138,882	254,080	151,952	544,914
Cost/m^2 (So.Sh.)	15.00	25.50	35.10	25.50
Cost Recovered (So.Sh.)	2,083,230	6,479,040	5,333,037	13,895,307
Cost/m^2 (So.Sh.)	20.00	25.50	30.53	25.50
Cost Recovered (So.Sh.)	2,777,640	6,479,040	6,638,627	13,895,307

Source: PADCO Analysis

TABLE IV.2
MONTHLY PAYMENTS AND INCOMES
(So.Sh.)

	Plot Size (m^2) 150	200	300	450	600
Option 1					
Cost for Infrastructure	25.50	25.50	25.50	25.50	25.50
Monthly Payment	97.28	129.71	194.57	291.85	389.14
Monthly Income	650	900	1,300	2,000	2,600
Option 2					
Cost for Infrastructure	15.00	15.00	25.50	35.00	35.00
Monthly Payment	57.23	76.30	194.57	400.58	534.11
Monthly Income	400	500	1,300	2,700	3,600
Option 3					
Cost for Infrastructure	10.00	15.00	25.50	35.00	45.00
Monthly Payment	38.15	76.30	194.57	400.58	686.71
Monthly Income	250	500	1,300	2,700	4,600

Source: PADCO Analysis

If the cost of infrastructure for the smallest plots is subsidized by the sale of larger plots and reduced to So.Sh.15 and So.Sh.10 per square meter, these plots would be affordable to families with monthly incomes of So.Sh.400 and So.Sh.250 respectively.

In light of the above cost data, it is evident that the prices proposed by the Land Committee of So.Sh.7, 10, and 15 will not provide adequate revenues to cover

development costs as well as the administrative costs of the Land Office. A differential pricing policy which considers locational criteria within each Zone could make official land prices closer to those of the market. Using the pricing groups discussed above in each zone, it is possible to develop a multi-level pricing policy, presented in Table IV.3.

TABLE IV.3

LAND PRICING POLICY
(Cost So.Sh./m^2)

	GROUP 1 (Plots Below 250m^2)	GROUP 2 (Interior Plots)	GROUP 3 (Plots on Main Streets)
Zone A	100	500	1,000
Zone B	50	250	500
Zone C	15	25	35

While these recommendations are a radical change from the present So.Sh.3 per m^2, the prices of Zones A and B are still no more than 50 percent of the current private market prices. Inexpensive plots would continue to be available to low-income families in the new areas. The cost of a 150m^2 plot at So.Sh.15.00 per m^2 would be only So.Sh.450 more than the cost of a plot of 600m^2 at the current price.

It should be kept in mind that the proposed prices for Zone 3 cover only the cost of infrastructure and include nothing for the value of the land. It is felt that people will be willing to pay higher prices if they realize basic services are provided.

C. FINANCING THE LAND DEVELOPMENT PROGRAM

The overall program (assuming a start-up in 1985) would require total capital investment in 1984 constant shillings of So.Sh.261 million (US$15 million) to be provided in five annual installments:

1985 — So.Sh.87 million (US$5 million)

1986 — So.Sh.43 million (US$2.5 million)

1987 — So.Sh.43 million (US$2.5 million)

1988 — So.Sh.43 million (US$2.5 million)

1999 — So.Sh.43 million (US$2.5 million)

This level of funding would have to carry an interest rate of 10 percent annually with a grace period for 10 years on principal followed by a 20-year repayment

period of interest and principal. It is likely that this interest rate could be achieved through the blending of soft loans or grants and market rate funds, if an international donor could be attracted to support the project. The donor would also have to be prepared to support a significant level of technical assistance to make the program run effectively during the early years while Somali capacity is built up. This has not been included in the capital costs of the program.

This level of capital financing will produce 210,000 serviced plots between 1985 and 2000 at the standards recommended in this report under the following assumptions:

- Each plot is sold with 30 percent down payment and the remainder financed at 14 percent interest for five years
- The construction period is no more than one year for each annual program
- All inflation increments are recovered through higher prices for future plots, therefore keeping cost at 1984 levels in constant shillings
- All collections due are received (which is unlikely and some form of reserve for bad debts would need to be established)
- All funds recovered are reinvested in the program and not diverted into other uses

If these assumptions can be achieved the program would be able to continue to produce 15,000 serviced plots a year at an annual surplus of So.Sh.11 million beyond the year 2000 even while fully paying off the initial capital investment.

The key reason for this high performance is the financial leverage achieved between obtaining financing for 30 years and onlending in five-year increments, plus the interest rate differential between borrowing at 10 percent and onlending at 14 percent.

While all of these numbers are of necessity very hypothetical at present, it is clear that a very successful program could be developed so long as the Government was prepared to enforce onlending terms with which to produce the needed leverage and to ensure nearly full cost recovery. Several factors could make the program even more attractive. Obviously, if the borrowing terms were made better than 10 percent for 30 years this would result in significant reductions in costs. In addition, some of the other special case situations for land sales at full market rates discussed in the following sections of this report would also produce additional revenues which might increase the levels of cross-subsidy already assumed in the analysis. This could further reduce the costs to low-income purchasers of serviced plots.

The general financial program plan is summarized in Tables IV.4 and IV.5.

TABLE IV.4

HYPOTHETICAL MORTGAGE RECOVERY CASH FLOW 1985-1995
(In Millions of Constant 1984 Shillings)

PROGRAM ELEMENTS					MORTAGE PAYMENTS 14% FOR 5 YEARS										
Year	Total Units	Total Annual Cost	30 percent Down	Mortgage Financed	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1986	10,000	77.8	23.3	54.5	-	15.9	15.9	15.9	15.9	15.9	-	-	-	-	-
1987	11,000	85.6	25.7	59.9	-	-	17.5	17.5	17.5	17.5	17.5	-	-	-	-
1988	12,000	93.5	28.0	65.5	-	-	-	19.1	19.1	19.1	19.1	19.1	-	-	-
1989	13,000	101.1	30.3	70.8	-	-	-	-	20.6	20.6	20.6	20.6	20.6	-	-
1990	14,000	108.9	32.7	76.2	-	-	-	-	-	22.2	22.2	22.2	22.2	22.2	-
1991	15,000	116.7	35.0	81.7	-	-	-	-	-	-	23.8	23.8	23.8	23.8	23.8
1992	15,000	116.7	35.0	81.7	-	-	-	-	-	-	-	23.8	23.8	23.8	23.8
1993	15,000	116.7	35.0	81.7	-	-	-	-	-	-	-	-	23.8	23.8	23.8
1994	15,000	116.7	35.0	81.7	-	-	-	-	-	-	-	-	-	23.8	23.8
1995	15,000	116.7	35.0	81.7	-	-	-	-	-	-	-	-	-	-	23.8
1996-2000	75,000	583.5	175.0	408.5	-	-	-	-	-	-	-	-	-	-	-
TOTALS	210,000	1633.9	490.0	1143.9		15.9	33.4	52.5	73.1	95.3	103.2	109.5	114.2	117.4	119.0

Source: PADCO Analysis

TABLE IV.5

SUMMARY OF HYPOTHETICAL LAND DEVELOPMENT PROGRAM CASH FLOW 1985-2000
(In Millions of Constant 1984 Shillings)

PROGRAM ELEMENT	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
INCOME											
Downpayments	23.3	25.7	28.0	30.3	32.7	35.0	35.0	35.0	35.0	35.0	35.0
Mortgage Payments	-	15.9	33.4	52.5	73.1	95.3	103.2	109.5	114.2	117.4	119.0
TOTAL ANNUAL INCOME	23.3	41.6	61.4	82.8	105.8	130.3	138.2	144.5	149.2	152.4	154.0
EXPENDITURES											
Capital Costs	77.8	85.6	93.5	101.1	108.9	116.7	116.7	116.7	116.7	116.7	116.7
Debt Service	8.7	13.05	17.4	21.75	26.1	26.1	26.1	26.1	26.1	26.1	26.1
TOTAL ANNUAL COSTS	86.5	98.65	110.9	122.85	135.0	142.8	142.8	142.8	142.8	142.8	142.8
ANNUAL SURPLUS OR (DEFICIT)	<63.2>	<57.05>	<49.5>	<40.05>	<29.20>	<12.5>	<4.6>	1.70	6.4	9.60	11.2

Source: PADCO Analysis

D. INDUSTRIAL, COMMERCIAL, AND PROJECT LAND

The proposed set price of So.Sh.15 per m^2 is too low. Industrial land should be sold at the same price as the residential land in the same zone and group. Care should be taken not to overprice industrial land since this can discourage industrial development and job creation. Land for industrial development and special projects should be evaluated and the price set on a case-by-case basis.

Commercial land, because of its income-generating potential, should cost more than normal residential land. The higher price for plots facing major streets already reflects this potential for most areas. Land with commercial potential in the downtown and neighborhood centers should be designated as special value land and sold at full market value through an auction or bidding procedure.

E. SPECIAL VALUE LAND

There are still some undeveloped areas of Mogadishu with particularly high market value because of their location and should be given special status under the pricing policy. The most obvious of these areas is the beach front land to the east of the city which will be a prime site for high-income development once the slaughterhouse has been relocated. Other land in the downtown area or along major arterials still owned by the government should be identified for special treatment.

This land should be sold at auction at the full fair market value to generate the maximum income for the Municipality. The revenues should not go into the general operating budget but be used to provide additional facilities to new lower-income neighborhoods or to subsidize costs to make possible the purchase of plots by the lowest-income families.

F. PLOT DISTRIBUTION

The land policy should clearly state that each family is entitled to only one plot. While this will be difficult to control until improved registration and record-keeping procedures are instituted, some initial steps could be taken, including:

1. Keeping a register of persons receiving plots by name and identity card number, thus facilitating the checking of new applications.

2. Requiring applicants to sign a document stating that they or other members of their immediate family have not been allocated any other plots by the Land Office. The penalty for violations would be immediate confiscation of new property without compensation.

G. TRANSFER OF LAND FROM TEMPORARY TO PERMANENT STATUS

One of the problems with setting an official price for land that approaches the private price would be the hardship caused to low-income families seeking to change the registration of their temporary plot, since, under the present practice, they would be required to pay for the land again. It is suggested that these regulations be modified to permit the transfer by paying the fees proposed by the Lands Committee and 2 percent of the value of the land as outlined below.

Land registration fees
So.Sh.500 — publishing
So.Sh.2,000 — control and check design
So.Sh.500 — land title
2% of cost of land — final registration

For plots in Category C and Group 1 in Categories A and B this should create no problems; in fact, the set fees would in most cases be more than the percentage payment on the value of the land. The suggested registration fees are reasonable for larger, more expansive plots, but seem high in relationship to smaller plots.

Once the new policy of full cost recovery is in effect, land registration fees should be included in the base price. Then when the payments are completed, the title would automatically be changed from temporary to permanent.

H. LAND RESALE

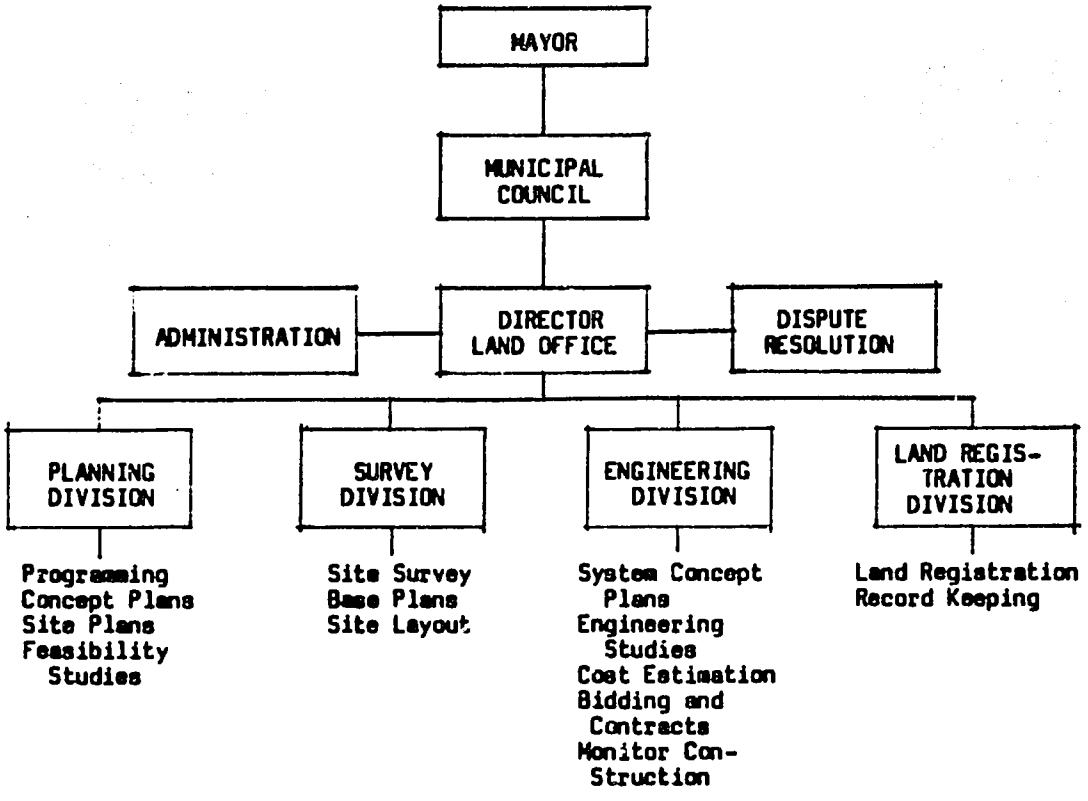
The proposal by the committee for the Land Office to appraise each property that is sold and to collect 5 percent of the sale price could provide a substantial increase in revenues, but raises some serious questions. Would the Land Office, which at present is understaffed, be able to handle the increased workload in a timely manner? If not, these additional steps could become a bottleneck in the process. What criteria would be used by Land Office personnel to set the property value? It would seem that either an arbitrary price would be set or that considerable work would be required to evaluate the property and to identify comparable sales.

With an official pricing policy close to the market price, it may be more efficient to base the 5 percent charge on the official price or the recorded selling price, whichever is greater. This could still provide substantial revenue, but reduce the additional workload of the Land Office.

CHAPTER V
INSTITUTIONAL RECOMMENDATIONS

A detailed study of the organization of the Land Office was not made as a part of this mission, but would be needed if a reorganization to meet new demands is to be done. As has been indicated in earlier sections, the proposed changes will require additional activities from the existing staff as well as the recruitment of new staff with technical skills not presently available. Figure V.1 presents a proposed organization chart for the land office with a list of functions for each of the divisions which are briefly discussed below.

FIGURE V.1
PROPOSED LAND OFFICE ORGANIZATION



A. PLANNING DIVISION

The Planning Division would have the responsibility of preparing concept plans for the expanding areas of Mogadishu which could give organization direction to the planning activities. The preparation of these plans should be given a high priority. If necessary, technical assistance and training should be provided to carry out the first plans and to establish procedures which can be followed in the future.

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More detailed site plans would then be prepared for both site layout and implementation. The existing staff has extensive and valuable experience in land development and with training should be able to manage the increased work demands.

A third area where skills could be increased is in project evaluation and feasibility analysis. Project should be evaluated at various stages of the design process using cost data supplied by the engineering division.

B. SURVEYING AND SITE LAYOUT

It is very important that the survey capacity of the Land Office be improved as quickly as possible or that arrangements be made with another organization to temporarily assist with this work. Site surveys and base plans are needed for detailed site design. As mentioned earlier at least the major elements of a plan should be laid out with survey equipment. The present field staff, because of their extensive experience, could do most of the survey work if they had some training and basic instruments.

C. ENGINEERING DIVISION

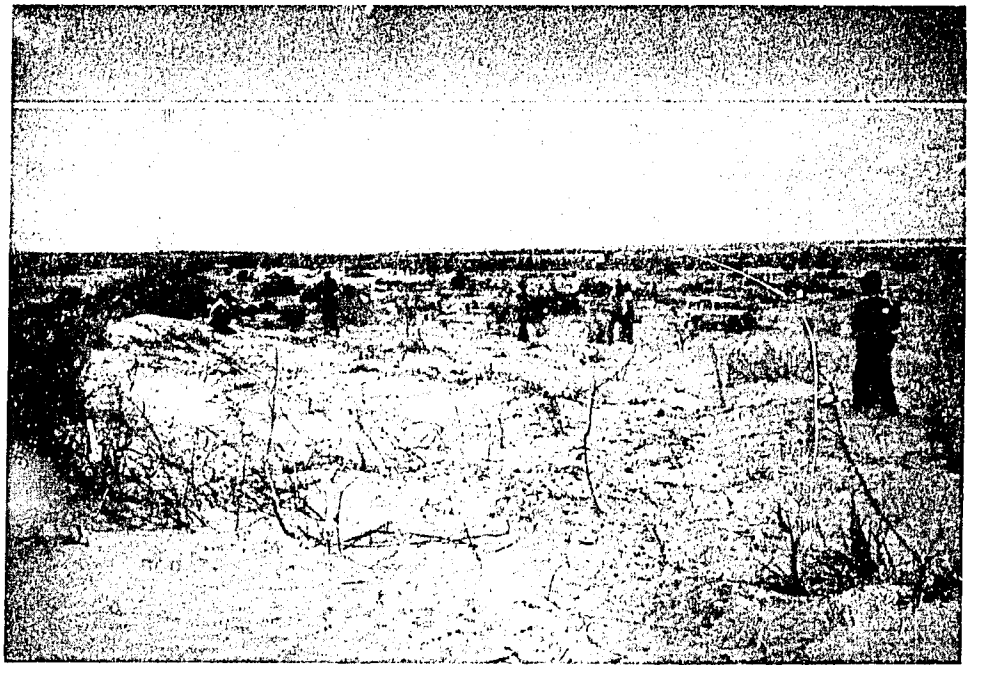
This division would carry out new functions for the Land Office to implement the infrastructure provision program. They would be responsible for the planning and design of circulation, water and electric systems as well as for bidding and contracting activities and the monitoring and coordination of construction. A person with cost estimation experience should be on the division staff to monitor costs during the design process.

D. LAND REGISTRATION DIVISION

This existing division would continue with the responsibilities it has at present. Technical assistance should be provided to upgrade the systems and procedures to permit better control of land distribution activities by the Land Office.

E. OFFICE ORGANIZATION

Working at the Land Office indicated that it is difficult to accomplish technical work because of the almost constant interruption of visitors with questions and problems for the staff. Since the Land Office is a public institution, it cannot isolate itself from the public; but, by establishing set visiting hours and scheduling responsibilities for working with visitors, it should be possible to create adequate blocks of work time for the technical staff while providing good service to the public.



Land currently being subdivided is unoccupied and distant from the center of the city. Layout of new areas is done with measuring tapes and visual alignment of metal poles. Plots are marked with wood pegs. When a plot has been assigned, the owner has the responsibility of installing concrete markers at the corners.

CHAPTER VI
IMMEDIATE ACTIONS

Since the Municipality has an active and ongoing land distribution program, it will be necessary to implement procedural and policy changes without substantially reducing the level of activity of the Land Office. Procedural changes will likely require a higher level of activity by the Land Office staff to develop the same amount of land annually as was done in the past. This chapter will outline possible future activities for the Municipality and Land Office and a program for the immediate future.

A. PROPOSED FUTURE ACTIVITIES

1. Site Design

There are a number of steps which could be taken by the Municipality to establish a land design policy which would improve the efficiency of future land development activities and reduce the costs of servicing these lands. Following are some of the activities which will need to be accomplished to implement the new land distribution program.

- **Land design policy**
  The critical element in establishing a more efficient use of urban land and the basis of a differential land pricing policy is the adoption by the Municipality of a set of land use standards with a hierarchy of plot sizes and street widths similar to those outlined in Chapter II. These standards should be carefully reviewed by the land policy committee and the Land Office to assure that they are applicable to the various situations in Mogadishu and that they can be defended to the City Council. It is important that the cost and land utilization implications of design standards be evaluated and understood.

- **Land development program**
  Once the land design standards have been approved, the Land Office should formulate a program and map out future activities. An illustrative program is outlined in section VI.B. which follows.

- **Site plan preparation**
  Based on an overall concept plan for the expansion areas of the city, site plans could then be prepared for the areas to be implemented during each year of the program. Since there would be various sizes of plots and circulation ways, more detailed plans that those presently done would be needed. Before approval, site plans should be evaluated to be certain they meet design standards and program objectives. A survey of new sites and plans at a scale of 1/2000 showing any special features and at least spot elevations should be completed before undertaking the final site design.

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- **Site layout**
  Because plans will be less uniform than the present plans, at least the main roads and boundaries should be laid out using survey equipment to assure the accuracy of the work. It would be desirable to survey all plots, but it is not likely that the capacity to do so could be developed with sufficient speed to avoid delays in the land program. The surveyed boundaries and streets would serve as a guide and check for the layout of plots within these boundaries.

- **Sites and Services Demonstration Project**
  It is recommended that at least one sites and services project of 15 to 20 hectares be implemented in the near future to illustrate the new standards, to test the market for smaller serviced plots, and to provide experience for the Land Office with this type of project. Funding for a demonstration project of modest scale could likely be obtained from international donors. A schematic plan for a Sites and Services Project is presented in Annex II.

2. **Provision of Infrastructure**
   Since one of the objectives of a new land pricing policy is to provide basic services to new areas of the city, the design and installation of these services will need to be coordinated and occur concurrently with the design of site layouts. Some of the tasks to be undertaken by the Land Office include:

   - **Coordination of activities**
     Several ministries, agencies and international donors will be involved in the provision of the various services thus requiring coordination and programming of these activities by the Municipality. The Engineering Division of the Land Office should be responsible for and take the lead in both project design and monitoring of construction. Meetings held on a regular schedule with the involved agencies will facilitate the exchange of information and the resolution of problems.

   - **Systems design**
     The design of systems should be done as part of the site design including an overall schematic plan as well as detailed plans and specifications for the implementation of each phase. Based on a concept plan for the whole area, the systems for each phase can meet immediate needs but also to function as part of the larger future system.

   - **Construction scheduling**
     Another area needing coordination will be during the implementation phase. Once a site has been surveyed, scheduling of construction activities for the water and electrical systems and roads can minimize conflicts and problems and facilitate completion of the work in a timely manner.

3. Land Pricing Policy

In order to accomplish the above activities, a program to recover the cost of urban development will be needed. Chapter IV outlines the principal elements of a land pricing policy to make this possible and to resolve many of the problems of the present system. As with the recommended site design standards, the pricing recommendations should be carefully reviewed by the land committee for applicability to Mogadishu and political acceptability. After review and modification, if necessary, the City Council should adopt a land pricing policy and set the effective date.

It is extremely important that money recovered from beneficiaries be kept in the program to finance future activities and not go to the treasury or general operating fund. If the latter were to happen, the land distribution program would soon be decapitalized and unable to continue operation.

B. PROGRAM OF FUTURE ACTIVITIES

A realistic program of activities for the Land Office should be established based on the growth and needs of Mogadishu. Also a program should reflect the capacity of the Land Office to handle the increased work load. Between 1975 and 1983 the Land Office distributed an estimated 157,000 plots or an average of almost 17,500 plots per year. Population projections for Mogadishu have been done which can provide some help in formulating a program. The Urban Development Assessment by PADCO gives projected populations for the city through 1990 for both high- and low-growth scenarios. The projected population change and the approximate number of new plots needed to accommodate this change are shown in Table VI.1.

TABLE VI.1

PROJECTED POPULATION GROWTH OF MOGADISHU

YEAR	HIGH (000s)	INCREASE (000s)	# PLOTS*	LOW (000s)	INCREASE (000s)	# PLOTS*
1983	884			795		
1984	955	71	8,875	843	48	6,000
1985	1,031	76	9,500	894	51	6,375
1986	1,114	83	10,375	947	53	6,625
1987	1,203	89	11,125	1,004	57	7,125
1988	1,299	96	12,000	1,064	60	7,500
1989	1,403	104	13,000	1,128	64	8,000
1990	1,516	113	14,125	1,196	68	8,500

*Assuming 8 persons/plot.

Source: Urban Development Assessment of Mogadishu, Somalia, PADCO, Washington, D.C., October 1983

Annual population increases are projected to be between 71,000 and 113,000 for the high-growth scenario and 48,000 to 68,000 for the low-growth scenario. Assuming an average of 8 persons per plot, it would be necessary to provide between 9,000 and 14,000 new plots on an annual basis to satisfy needs for the high-growth projection and 6,000 to 8,500 new plots annually for slower growth.

1. **New Development**

Two programs have been developed (Tables VI.2 and VI.3) based on the growth scenarios to illustrate how the work of the Land Office could be structured. The total number of plots needed each year have been divided into three groups reflecting the divisions proposed in Chapter IV. It is assumed that Groups 1 and 2 will each have 40 percent of the plots with the remaining 20 percent of the plots in Group 3. Fortunately demand is lowest in the early years thus giving some time to develop and institute new procedures. The production and demand should be monitored each year and goals adjusted to reflect the actual situation.

TABLE VI.2

PROGRAM 1986-1990 - HIGH GROWTH PROJECTION

YEAR	NEW PLOTS								UPGRADING EXISTING AREAS NO. PLOTS	TOTAL PLOTS
	GROUP 1 (AVERAGE SIZE 175m2)		GROUP 2 (AVERAGE SIZE 350m2)		GROUP 3 (AVERAGE SIZE 450m2)		SUBTOTAL			
	# PLOTS	AREA (HA)	# PLOTS	AREA (HA)	# PLOTS	AREA (HA)	# PLOTS	AREA (HA)		
1985	3,600	96.9	3,600	193.9	1,800	124.6	9,000	415.3	12,000	21,000
1986	4,000	107.7	4,000	215.4	2,000	138.5	10,000	461.5	14,000	24,000
1987	4,400	118.5	4,400	236.9	2,200	152.3	11,000	507.7	16,000	27,000
1988	4,800	129.2	4,800	258.5	2,400	166.2	12,000	553.9	18,000	30,000
1989	5,200	140.0	5,200	280.0	2,600	180.0	13,000	600.0	20,000	33,000
1990	5,600	150.8	5,600	301.5	2,800	193.8	14,000	646.1	20,000	34,000
TOTAL	27,600	743.1	27,600	1486.1	13,800	955.4	69,000	3184.6	100,000	169,000

Source: PADCO Analysis

TABLE VI.3

PROGRAM 1986-1990 - LOW GROWTH PROJECTION

YEAR	NEW PLOTS								UPGRADING EXISTING AREAS NO. PLOTS	TOTAL PLOTS
	GROUP 1 (AVERAGE SIZE 175m^2)		GROUP 2 (AVERAGE SIZE 350m^2)		GROUP 3 (AVERAGE SIZE 450m^2)		SUBTOTAL			
	# PLOTS	AREA (HA)	# PLOTS	AREA (HA)	# PLOTS	AREA (HA)	# PLOTS	AREA (HA)		
1985	2,400	64.6	2,400	129.2	1,200	83.1	6,000	276.9	5,000	11,000
1986	2,600	70.0	2,600	140.0	1,300	90.0	6,500	300.0	5,500	12,000
1987	2,800	75.4	2,800	150.8	1,400	96.9	7,000	323.1	6,000	13,000
1988	3,000	76.9	3,000	161.5	1,500	103.8	7,500	342.2	6,500	14,000
1989	3,200	86.2	3,200	172.3	1,600	110.8	8,000	369.3	7,000	15,000
1990	3,400	91.5	3,400	183.1	1,700	117.7	8,500	392.3	7,000	15,500
TOTAL	7,400	464.6	17,400	936.9	8,700	602.3	43,500	2003.8	37,000	80,500

Source: PADCO Analysis

The number of hectares required to meet the annual objectives and the total program have also been calculated assuming 65 percent of a site is residential land use. Between 2,000 and 3,000 hectares would be used by 1990 depending on the rate of growth. These figures can be used to identify the areas where new development will occur during the planning period and to prepare concept plans for these areas.

2. **Upgrading Existing Areas**

Annual targets for upgrading and servicing of existing areas have also been included as part of the work program. The Municipality will have to decide how the capacity and resources will be divided between new development and improving occupied areas. There are is no firm data on the number of unserviced plots in Mogadishu, so in order to establish some parameters for projecting activities it is assumed that of the 157,000 plots developed since 1975 approximately 2/3 or 100,000 plots are unserviced. In the high-growth program (Table VI.2) services would be provided to all areas by 1990, requiring that between 12,000 and 20,000 plots be serviced annually. In Table VI.3 these needs would be met by the year 2000 and would require the servicing of between 5,000 and 7,000 plots annually during the program period.

Since the plots in the existing areas have already been distributed, it will not be possible to recover the cost of servicing through the sale of land. Therefore other means of cost recovery should be established for neighborhood improvement activities.

This program should be self-financing, as it is for new areas with beneficiaries paying for the new services. This can be accomplished through the establishment of a betterment tax which would be assessed to all residents or property owners of the improved neighborhood. Upgrading would not be automatic but would have to be requested by at least a majority of the residents of a neighborhood who agree to the repayment of costs.

3. **Recommended Program**

It is recommended that a program similar to the one based on the low-growth projection be developed by the Land Office for the following reasons:

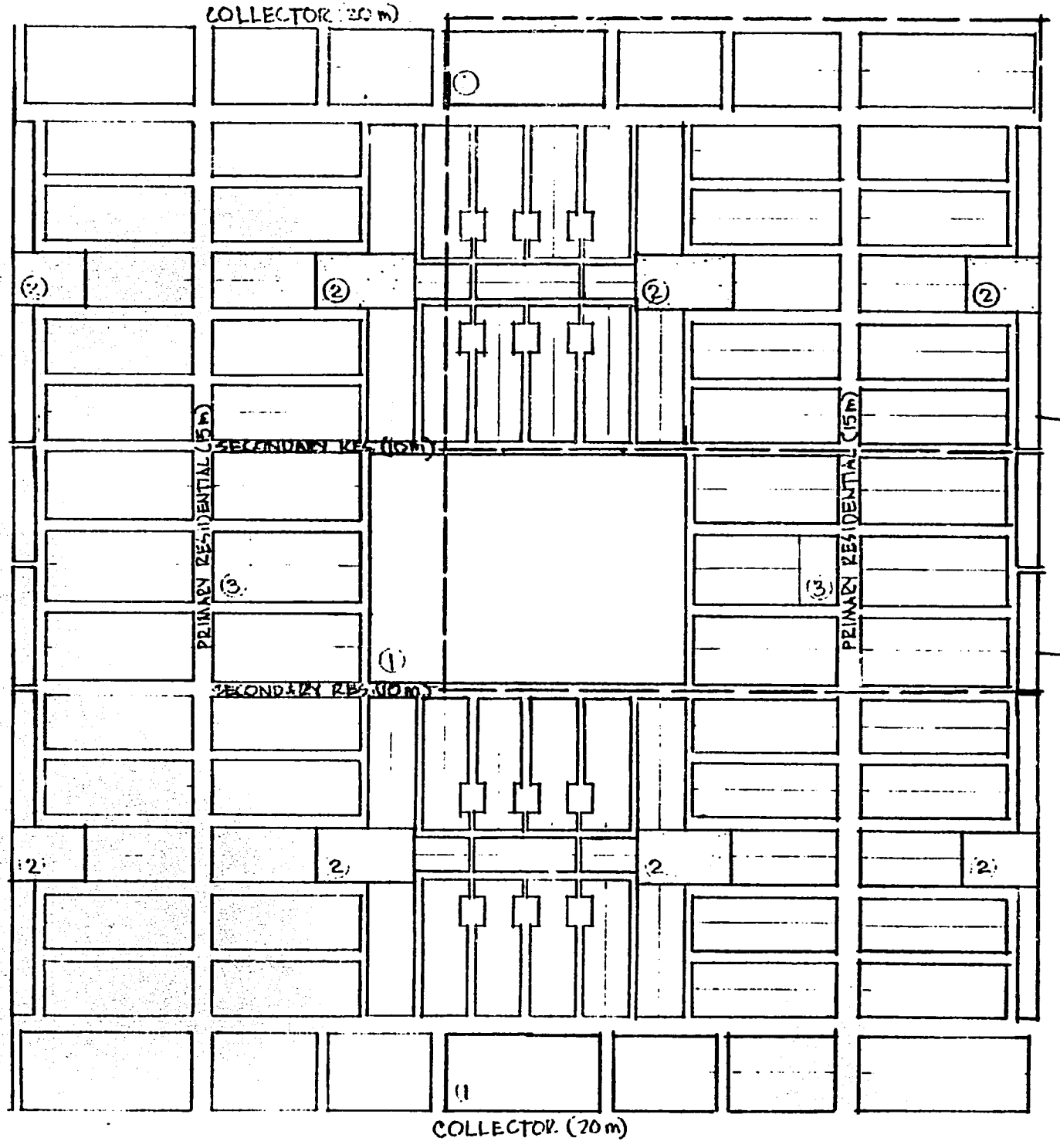
- While figures are not available, it is clear from field visits that there are many unoccupied plots located in existing neighborhoods. It is not known if these plots are being held for land speculation or if the owners plan to occupy them in the future, but they do create a reserve that can accommodate some of the future land needs for Mogadishu.

- With new procedures and programs to implement, it is not likely that the Land Office would have the capacity to carry out a large program, at least in the initial years. Therefore, the program should begin at a reduced level and be expanded over time as conditions and demand dictate and as the capacity of the staff increases.

- Since the financing of development and the cost recovery techniques will be new activities for the Land Office, it would be advisable to begin with a more modest program so as not to create financial problems for the Municipality.

ANNEX I

CONCEPT PLAN A



PLAN A1.1
CONCEPT PLAN A
SCALE 1/5000 26 APRIL 1984

① PUBLIC UTILITY
② PARK
③ RELIGIOUS

SEE PLAN A1.2

SEE PLAN A1.3

TABLE AI.1
CONCEPT PLAN A -- LAND USE

Plots

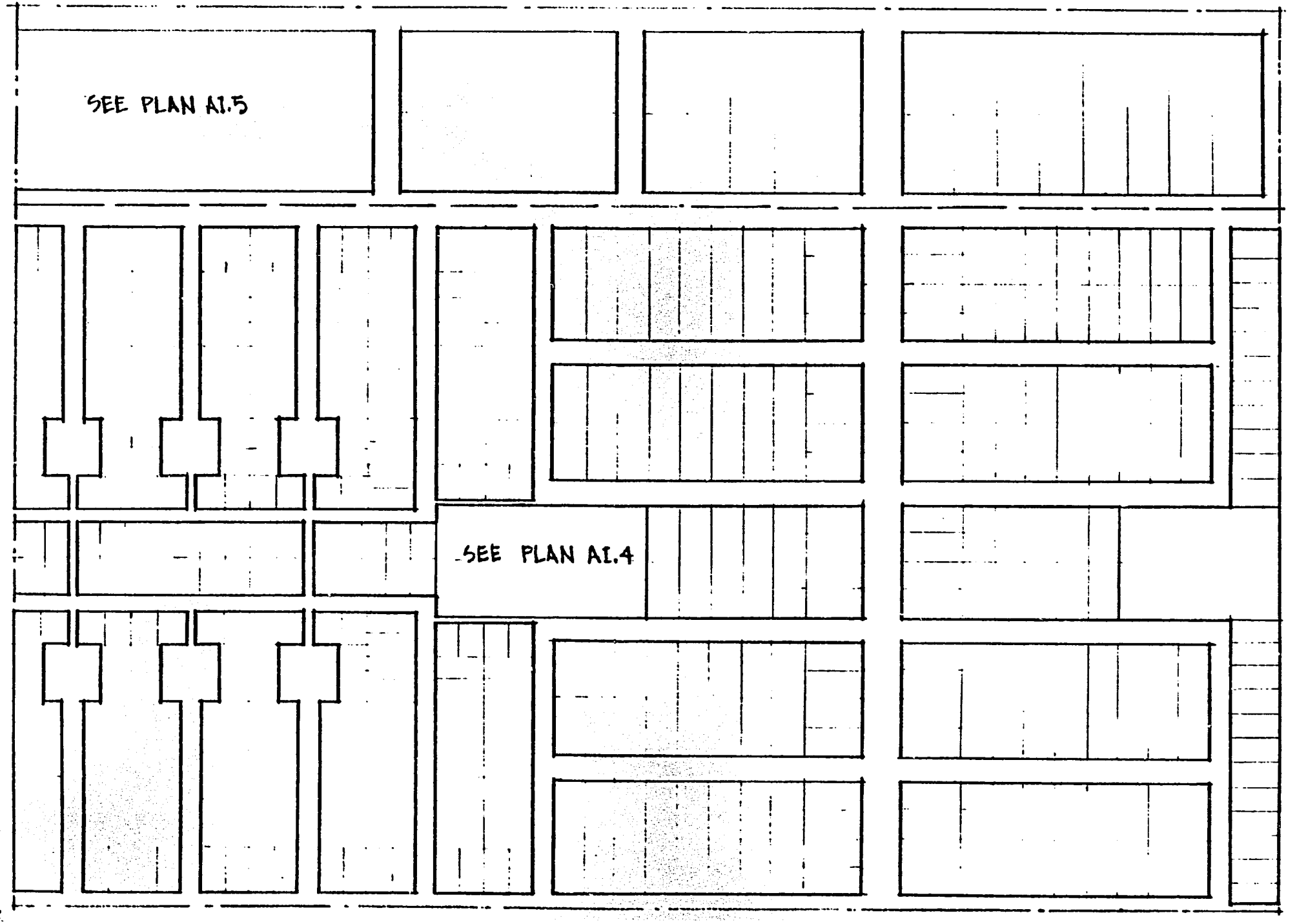
Plot Size (m^2)	Number	% of Total
150	204	10.92
200	584	31.26
300	752	40.26
450	184	9.85
600	144	7.71
Totals	1,868	100.00

Average Plot Size -- 291.7m^2

Plots/Hectare -- 21.96

Land Use		Area(m^2)	% of Total
Residential		544,914	64.05
Circulation		196,314	23.08
Public Utility		109,536	12.88
Parks	29,822		
School	56,000		
Public Ser. & Market	20,944		
Religious	3,600		
Total		850,764	100.00

PLAN A1.2 CONCEPT PLAN A SCALE 1/2000 26 APRIL 1984



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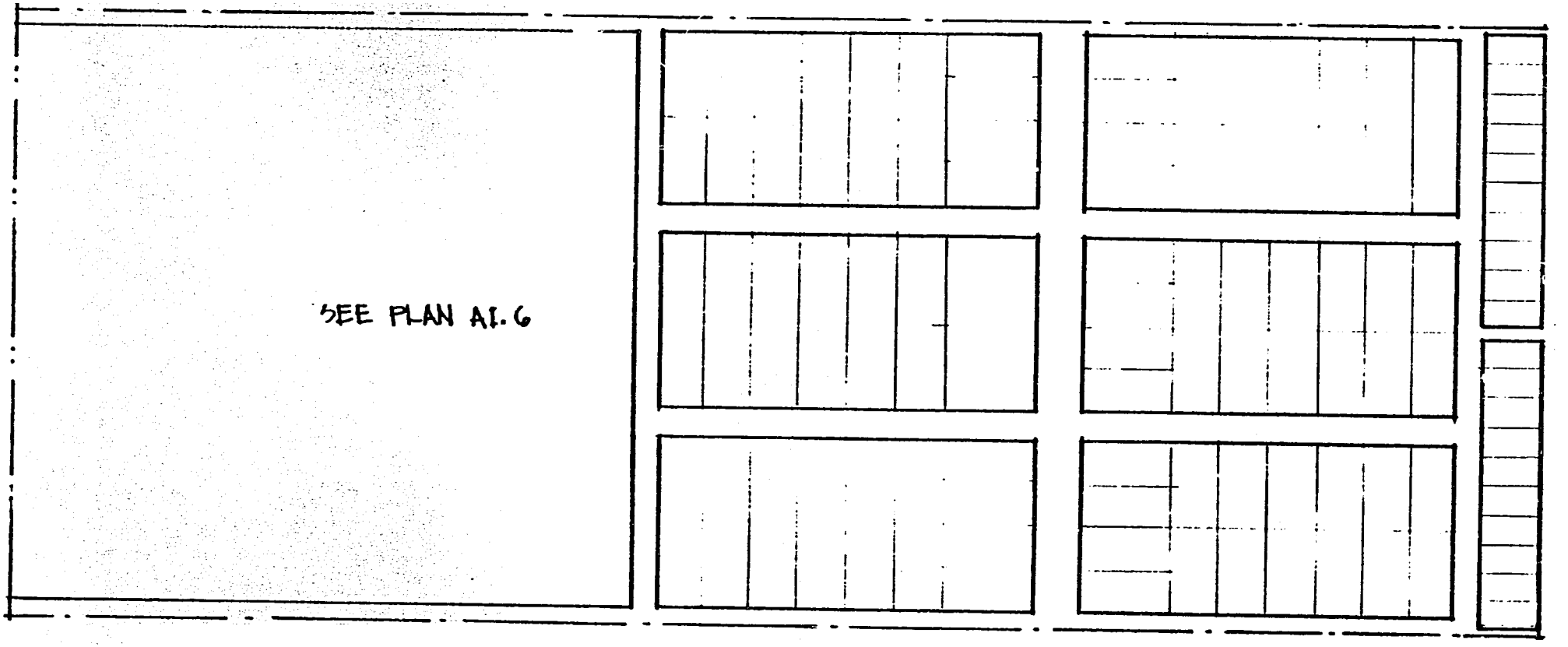
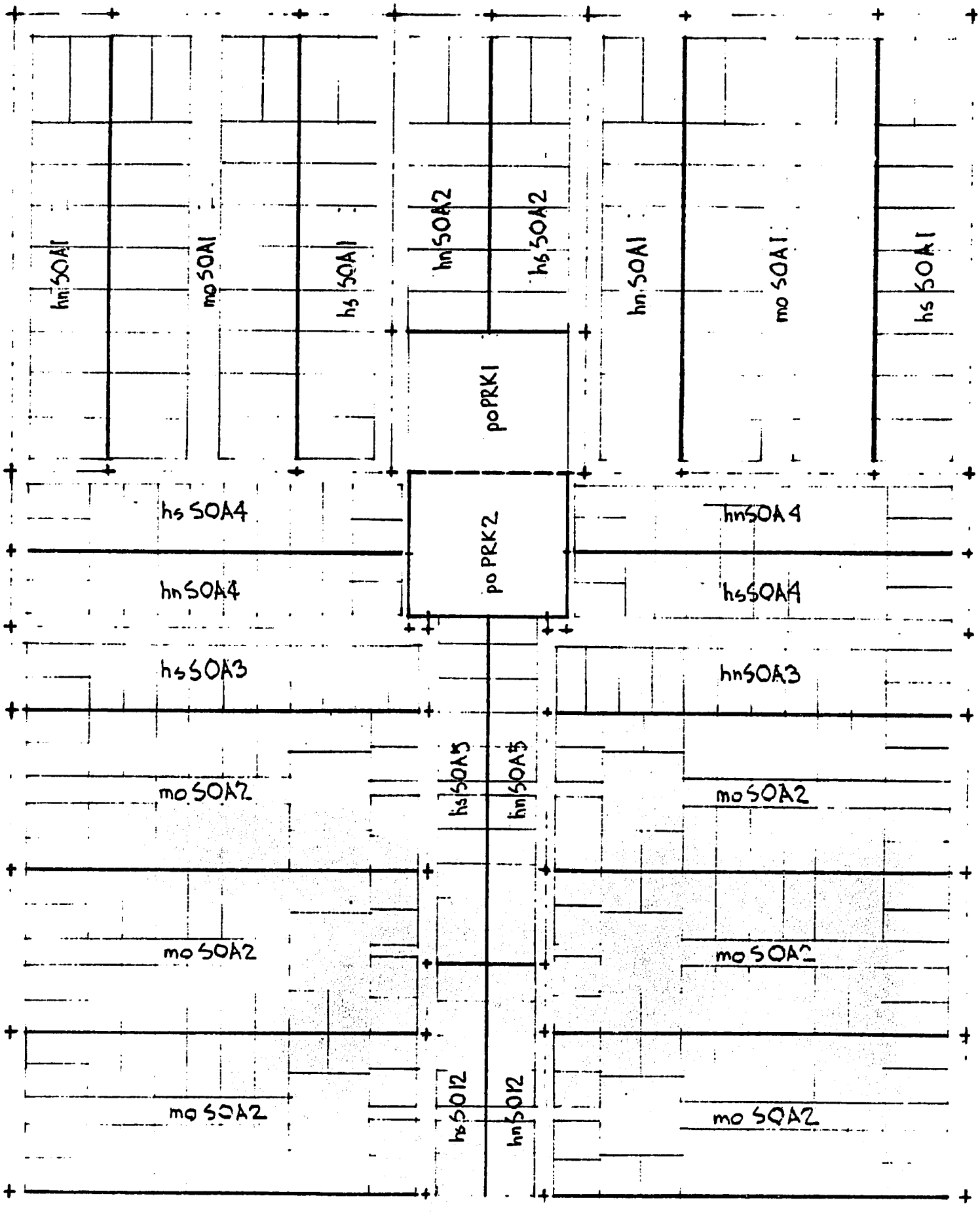
PLAN A1.3

CONCEPT PLAN A

SCALE 1/2000 26 APRIL 1987

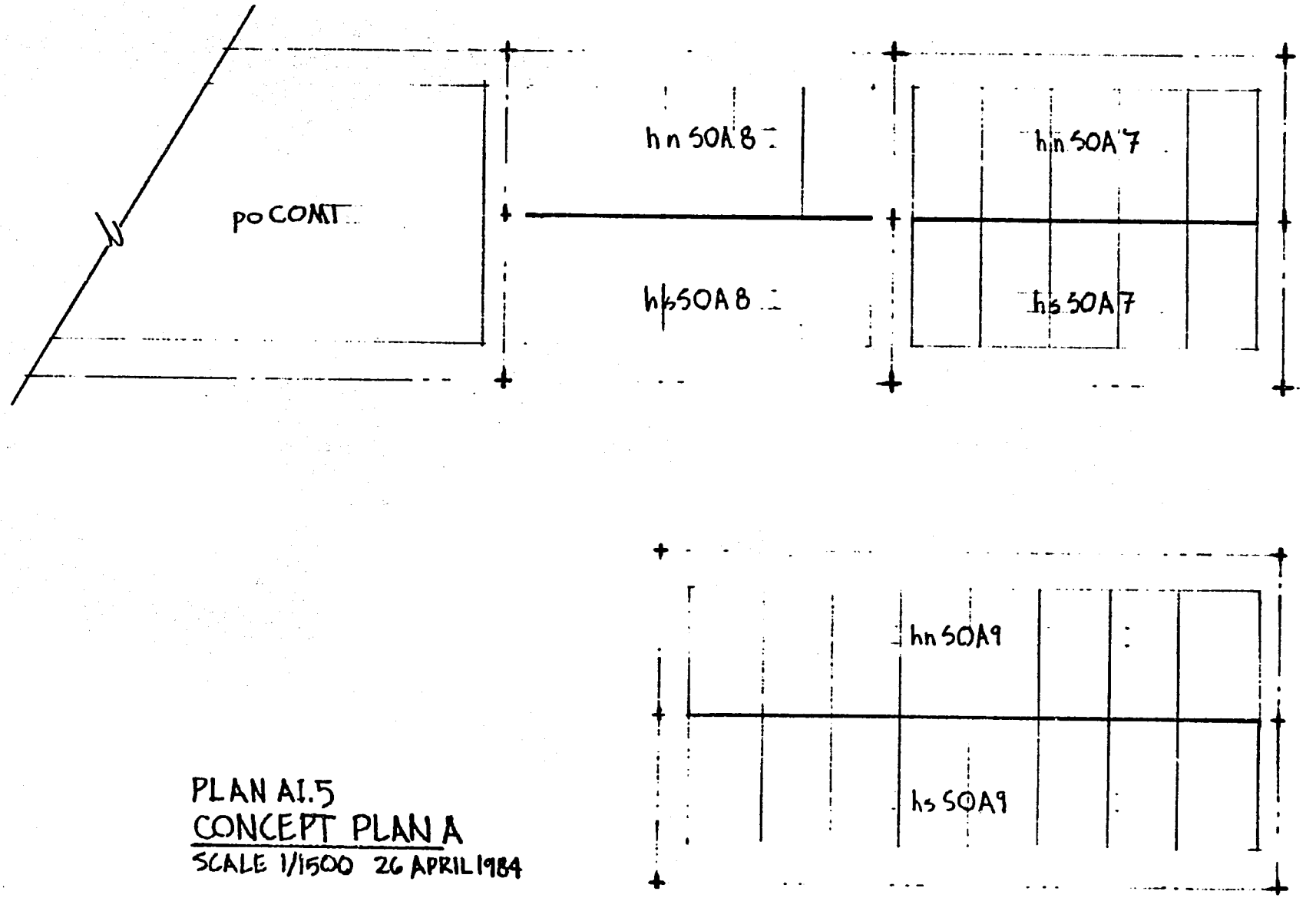




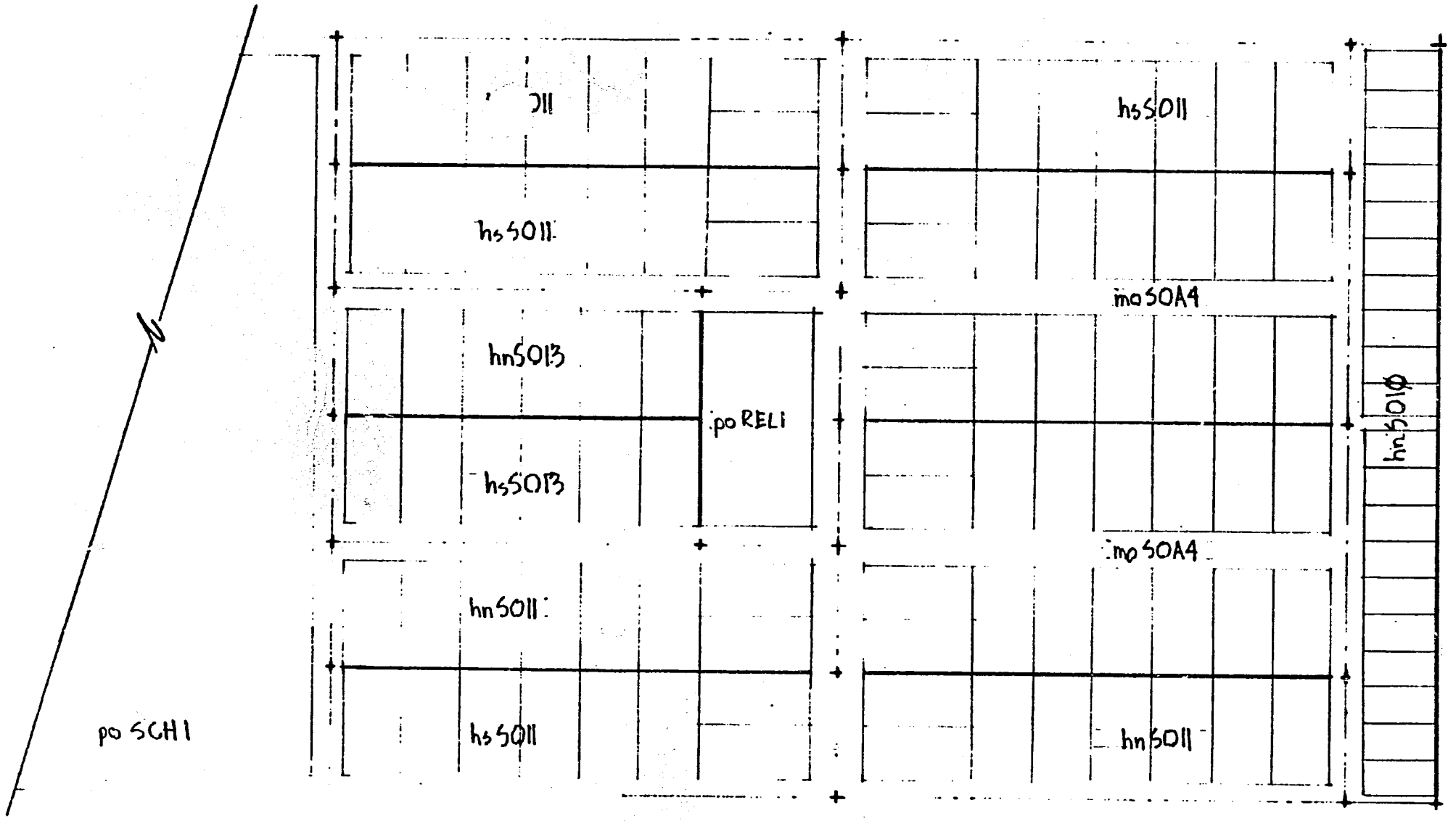
PLAN A1.4

CONCEPT PLAN A

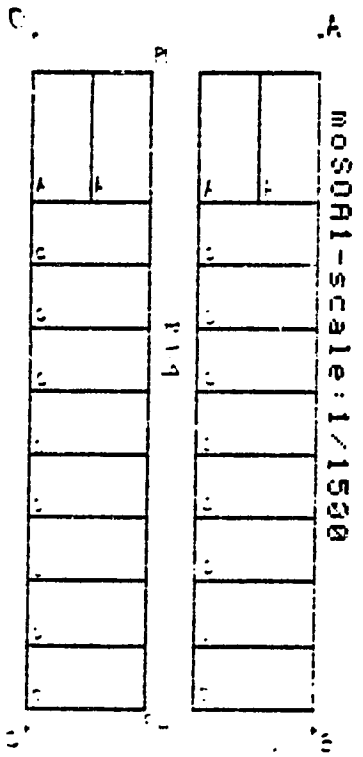
SCALE 1/1500 26 APRIL 1989



PLAN A1.5
CONCEPT PLAN A
SCALE 1/1500 26 APRIL 1984



PLAN A1.6
CONCEPT PLAN A
SCALE 1/1500 26 APRIL 1984

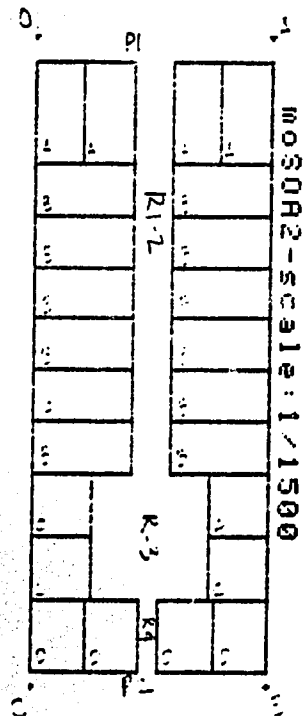


Module name:moSOA1
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[12.00]	[25.00]	4	300.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	12.50	[24.00]	[14]	300.00
D	[24.00]	12.00	2 [	300.00]
		[12.50]		

PRIMARY ROADS(r.o.w)
P1= 15.00 P2= 8.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.50 CO= 136.50
OA=[58.00] BC=[58.00]
ANGLE OCB=[90.000]

Module area =[7917.00]
Circulation area=[1917.00]
% Circulation =[24.21]

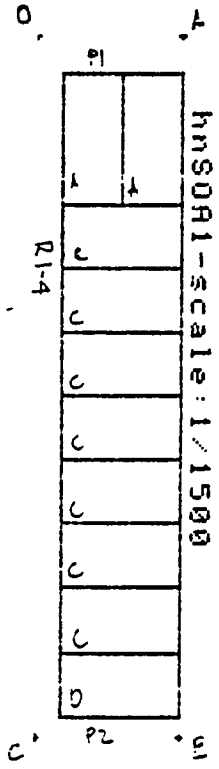


Module name:moSOA2
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[10.00]	[20.00]	4	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	10.00	[20.00]	12	200.00
C	12.68	[11.83]	[4]	150.00
D	[11.00]	13.00	4 [	150.04]
		[13.64]		

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 6.00
SECONDARY ROADS
R1= 8.00 R2=[8.00]
R3= 24.34 R4= 4.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 127.00 CO= 127.00
OA=[48.00] BC=[48.00]
ANGLE OCB=[90.000]

Module area =[6096.00]
Circulation area=[1695.80]
% Circulation =[27.82]

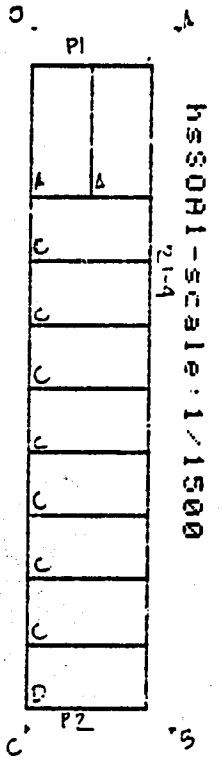


Module name:hnSOA1
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[12.00]	[25.00]	2	300.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	12.50	[24.00]	[7]	300.00
D	[24.00]	12.00	1 [	300.00]
		[12.50]		

PRIMARY ROADS(r.o.w)
P1= 15.00 P2= 8.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.50 CD= 136.50
DA=[29.00] BC=[29.00]
ANGLE DCB=[90.000]

Module area =[3958.50]
Circulation area=[958.50]
% Circulation =[24.21]

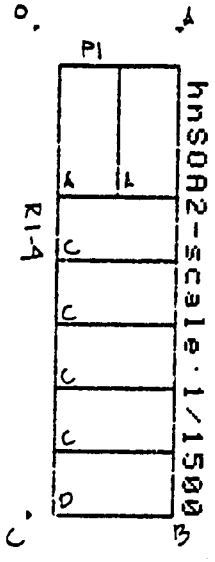


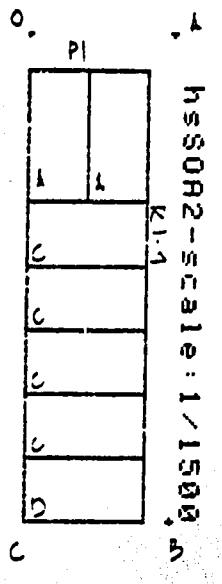
Module name:hsSOA1
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[12.00]	[25.00]	2	300.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	12.50	[24.00]	[7]	300.00
D	[24.00]	12.00	1 [	300.00]
		[12.50]		

PRIMARY ROADS(r.o.w)
P1= 15.00 P2= 8.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.50 CD= 136.50
DA=[29.00] BC=[29.00]
ANGLE DCB=[90.000]

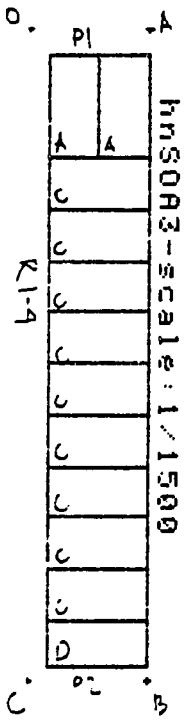
Module area =[3958.50]
Circulation area=[958.50]
% Circulation =[24.21]



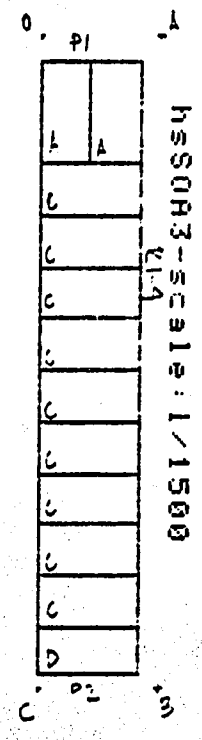



```
Module name hnSOA2
PLOT TYPES:
Plt.Width  Length Number  Area
A  [12.00][25.00]   2     300.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    12.50 [24.00][  4]   300.00
D  [24.00] 12.00     1 [  300.00]
           [12.50]
PRIMARY ROADS(r.o.w)
  P1=  15.00   P2=   0.00
SECONDARY ROADS
  R1=  10.00   R2=[  0.00]
  R3=  10.00   R4=  10.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB=  95.00   CO=  95.00
  OA=[ 29.00]  BC=[ 29.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 2755.00]
 Circulation area=[  655.00]
 % Circulation    =[   23.78]
--------------------------------
```

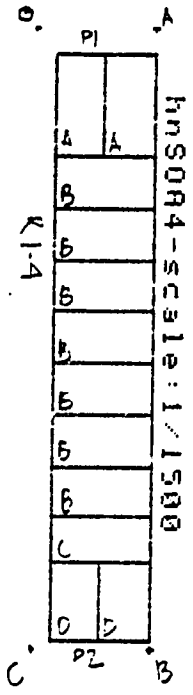
```
Module name:hsSOA2
PLOT TYPES:
Plt.Width  Length Number  Area
A  [12.00][25.00]   2     300.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    12.50 [24.00][  4]   300.00
D  [24.00] 12.00     1 [  300.00]
           [12.50]
PRIMARY ROADS(r.o.w)
  P1=  15.00   P2=   0.00
SECONDARY ROADS
  R1=  10.00   R2=[  0.00]
  R3=  10.00   R4=  10.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB=  95.00   CO=  95.00
  OA=[ 29.00]  BC=[ 29.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 2755.00]
 Circulation area=[  655.00]
 % Circulation    =[   23.78]
--------------------------------
```

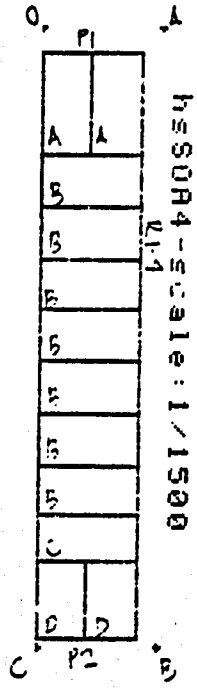



```
Module name:hnSOA3
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   2     200.00
A1 [ 0.00][ 0 00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [20.00][  9]   200.00
D  [20.00]  9.00     1 [  180.00]
           [ 9.00]
PRIMARY ROADS(r.o.w)
  P1=  10.00   P2=   6.00
SECONDARY ROADS
  R1=   8.00   R2=[  0.00]
  R3=   8.00   R4=   8.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB= 127.00   CO= 127.00
  OA=[ 24.00]  BC=[ 24.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 3048.00]
 Circulation area=[  668.00]
 % Circulation    =[   21.92]
--------------------------------
```



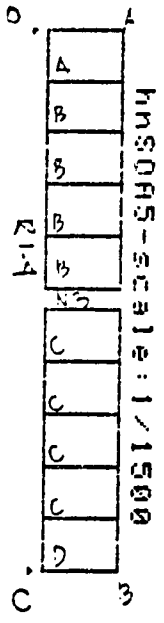

```
Module name:hsSOA3
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   2     200.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [20.00][  9]   200.00
D  [20.00]  9.00     1 [  180.00]
           [ 9.00]
PRIMARY ROADS(r.o.w)
  P1=  10.00   P2=   6.00
SECONDARY ROADS
  R1=   8.00   R2=[  0.00]
  R3=   8.00   R4=   8.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB= 127.00   CO= 127.00
  OA=[ 24.00]  BC=[ 24.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 3048.00]
 Circulation area=[  668.00]
 % Circulation    =[   21.92]
--------------------------------
```

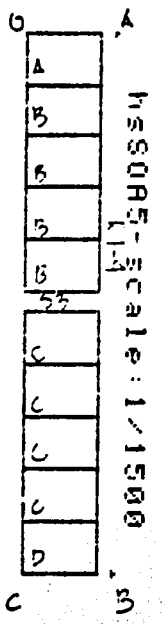





```
Module name:hnSOA4
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   2     200.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    10.00 [20.00]   7     200.00
C     9.00 [20.00][  1]    180.00
D  [10.00]  9.00     2 [  150.00]
           [15.00]
PRIMARY ROADS(r.o.w)
  P1=  10.00   P2=    4.00
SECONDARY ROADS
  R1=    8.00   R2=[  8.00]
  R3=    8.00   R4=    8.00
TERTIARY ROADS
  N1=    0.00   S1=    0.00
  N2=    0.00   S2=    0.00
  N3=    0.00   S3=    0.00
  N4=    0.00   S4=    0.00
  N5=    0.00   S5=    0.00
MODULE DIMENSIONS:
  AB= 121.00   CO= 121.00
  OA=[ 24.00]  BC=[ 24.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 2904.00]
 Circulation area=[  624.00]
 % Circulation    =[   21.49]
--------------------------------
```

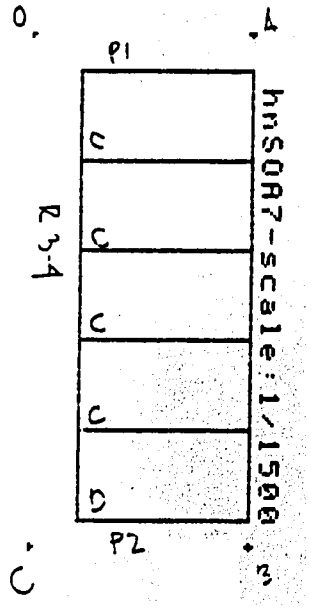
```
Module name:hsSOA4
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   2     200.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    10.00 [20.00]   7     200.00
C     9.00 [20.00][  1]    180.00
D  [10.00]  9.00     2 [  150.00]
           [15.00]
PRIMARY ROADS(r.o.w)
  P1=  10.00   P2=    4.00
SECONDARY ROADS
  R1=    8.00   R2=[  8.00]
  R3=    8.00   R4=    8.00
TERTIARY ROADS
  N1=    0.00   S1=    0.00
  N2=    0.00   S2=    0.00
  N3=    0.00   S3=    0.00
  N4=    0.00   S4=    0.00
  N5=    0.00   S5=    0.00
MODULE DIMENSIONS:
  AB= 121.00   CO= 121.00
  OA=[ 24.00]  BC=[ 24.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 2904.00]
 Circulation area=[  624.00]
 % Circulation    =[   21.49]
--------------------------------
```

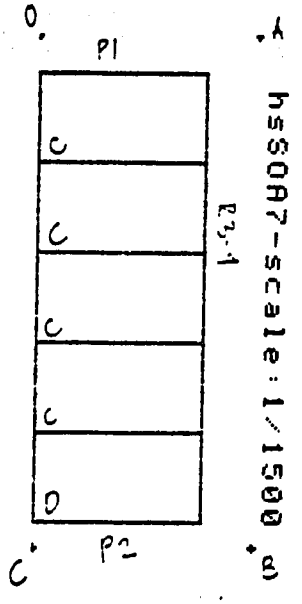





```
Module name:hnSOA5
PLOT TYPES:
Plt.Width  Length Number  Area
A  [15.00][10.00]   1     150.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    10.00 [15.00]   4     150.00
C    10.25 [15.00][  4]   153.75
D  [15.00]  9.00     1 [  150.00]
           [10.00]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    0.00
SECONDARY ROADS
  R1=    6.00    R2=[  6.00]
  R3=    6.00    R4=    6.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    4.00    S3=    4.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 105.00    CO= 105.00
  OA=[ 18.00]  BC=[ 18.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 1890.00]
 Circulation area=[  375.00]
 % Circulation    =[   19.84]
--------------------------------
```

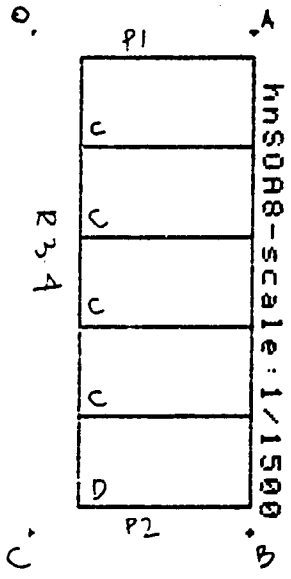
```
Module name:hsSOA5
PLOT TYPES:
Plt.Width  Length Number  Area
A  [15.00][10.00]   1     150.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    10.00 [15.00]   4     150.00
C    10.25 [15.00][  4]   153.75
D  [15.00]  9.00     1 [  150.00]
           [10.00]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    0.00
SECONDARY ROADS
  R1=    6.00    R2=[  6.00]
  R3=    6.00    R4=    6.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    4.00    S3=    4.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 105.00    CO= 105.00
  OA=[ 18.00]  BC=[ 18.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 1890.00]
 Circulation area=[  375.00]
 % Circulation    =[   19.84]
--------------------------------
```

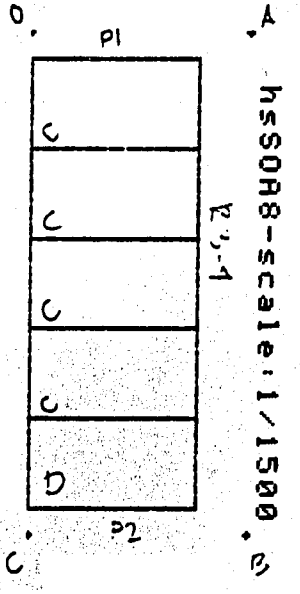





```
Module name:hnSOA7
PLOT TYPES:
Plt.Width  Length Number   Area
A  [ 0.00][ 0.00]   0       0.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    17.50 [34.00][  4]   595.00
D  [34.00] 17.00     1 [  595.00]
           [17.50]
PRIMARY ROADS(r.o.w)
  P1=  15.00    P2=  10.00
SECONDARY ROADS
  R1=    0.00    R2=[  0.00]
  R3=   20.00    R4=  20.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 100.00    CD= 100.00
  OA=[ 44.00]   BC=[ 44.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 4400 00]
 Circulation area=[ 1425.00]
 % Circulation    =[   32.39]
--------------------------------
```

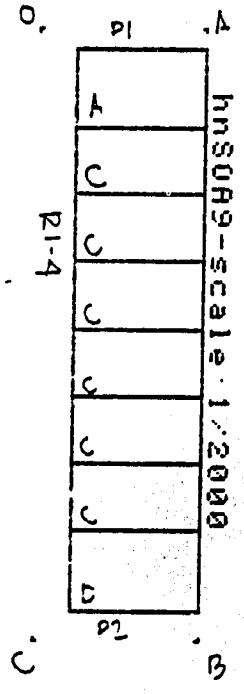
```
Module name:hsSOA7
PLOT TYPES:
Plt.Width  Length Number   Area
A  [ 0.00][ 0.00]   0       0.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    17.50 [34.00][  4]   595.00
D  [34.00] 17.00     1 [  595.00]
           [17.50]
PRIMARY ROADS(r.o.w)
  P1=  15.00    P2=  10.00
SECONDARY ROADS
  R1=    0.00    R2=[  0.00]
  R3=   20.00    R4=  20.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 100.00    CD= 100.00
  OA=[ 44.00]   BC=[ 44.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 4400.00]
 Circulation area=[ 1425.00]
 % Circulation    =[   32.39]
--------------------------------
```






```
Module name:hnSOA8
PLOT TYPES:
Plt.Width  Length Number  Area
A  [ 0.00][ 0.00]   0       0.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    0.00 [ 0.00]   0       0.00
C   17.50 [34.00][  4]   595.00
D  [34.00] 17.00    1 [  595.00]
           [17.50]
PRIMARY ROADS(r.o.w)
  P1=  10.00   P2=  10.00
SECONDARY ROADS
  R1=   0.00   R2=[  0.00]
  R3=  20.00   R4=  20.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB=  97.50   CD=  97.50
  OA=[ 44.00]  BC=[ 44.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 4290.00]
 Circulation area=[ 1315.00]
 % Circulation    =[   30.65]
--------------------------------
```

```
Module name:hsSOA8
PLOT TYPES:
Plt.Width  Length Number  Area
A  [ 0.00][ 0.00]   0       0.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    0.00 [ 0.00]   0       0.00
C   17.50 [34.00][  4]   595.00
D  [34.00] 17.00    1 [  595.00]
           [17.50]
PRIMARY ROADS(r.o.w)
  P1=  10.00   P2=  10.00
SECONDARY ROADS
  R1=   0.00   R2=[  0.00]
  R3=  20.00   R4=  20.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB=  97.50   CD=  97.50
  OA=[ 44.00]  BC=[ 44.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 4290.00]
 Circulation area=[ 1315.00]
 % Circulation    =[   30.65]
--------------------------------
```

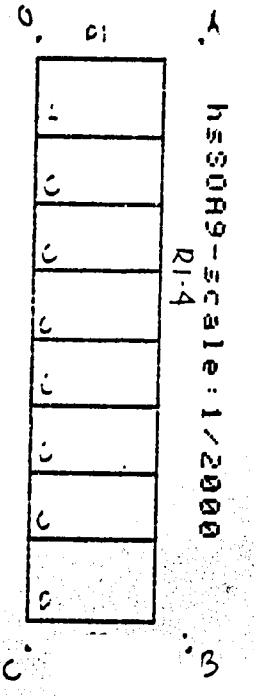


Module name:hnSOA9
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[34.00]	[20.50]	1	697.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	17.50	[34.00]	[6]	595.00
D	[34.00]	17.00 [20.50]	1 [	697.00]

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 15.00
SECONDARY ROADS
R1= 20.00 R2=[0.00]
R3= 20.00 R4= 20.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 158.50 CO= 158.50
OA=[44.00] BC=[44.00]
ANGLE OCB=[90.000]

Module area =[6974.00]
Circulation area=[2010.00]
% Circulation =[28.82]

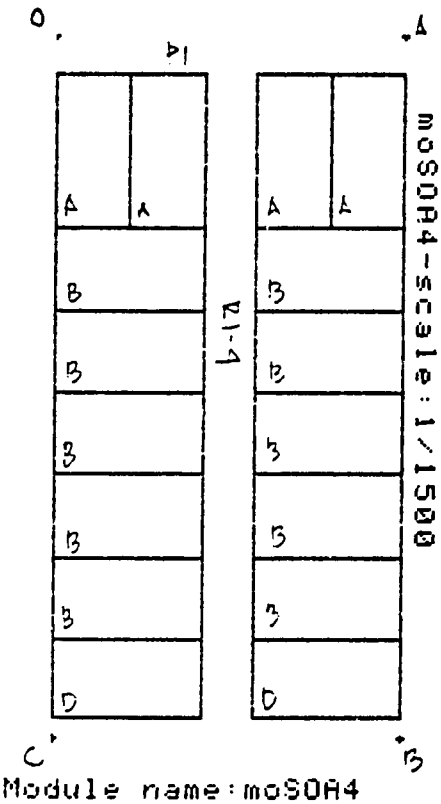


Module name:hsSOA9
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[34.00]	[20.50]	1	697.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	17.50	[34.00]	[6]	595.00
D	[34.00]	17.00 [20.50]	1 [	697.00]

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 15.00
SECONDARY ROADS
R1= 20.00 R2=[0.00]
R3= 20.00 R4= 20.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 158.50 CO= 158.50
OA=[44.00] BC=[44.00]
ANGLE OCB=[90.000]

Module area =[6974.00]
Circulation area=[2010.00]
% Circulation =[28.82]

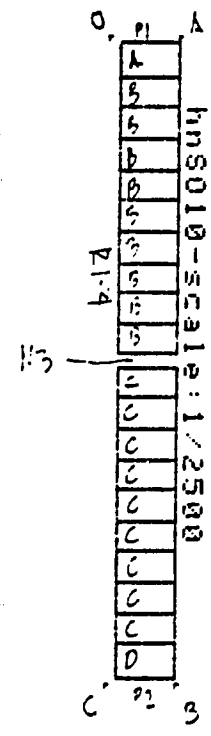


Module name:moSOA4
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[15.00]	[30.00]	4	450.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	16.00	[30.00]	10	480.00
C	15.00	[30.00]	[0]	450.00
D	[30.00]	14.00	2	[450.00]
		[15.00]		

PRIMARY ROADS(r.o.w)
P1= 15.00 P2= 8.00
SECONDARY ROADS
R1= 10.00 R2=[10.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.50 CO= 136.50
OA=[70.00] BC=[70.00]
ANGLE OCB=[90.000]

Module area =[9555.00]
Circulation area=[2055.00]
% Circulation =[21.51]

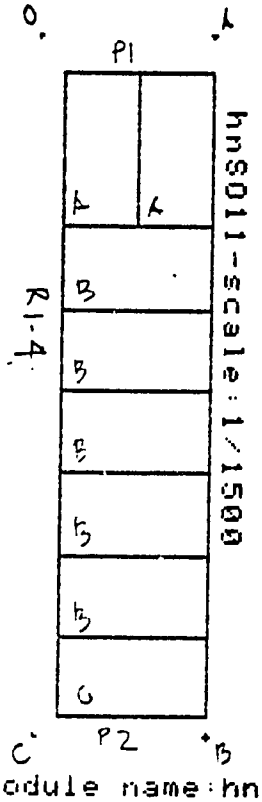


Module name:hnSO10
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[20.00]	[11.00]	1	220.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	10.00	[20.00]	9	200.00
C	10.00	[20.00]	[9]	200.00
D	[20.00]	7.00	1	[220.00]
		[11.00]		

PRIMARY ROADS(r.o.w)
P1= 4.00 P2= 4.00
SECONDARY ROADS
R1= 8.00 R2=[8.00]
R3= 8.00 R4= 8.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 4.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 210.00 CO= 210.00
OA=[24.00] BC=[24.00]
ANGLE OCB=[90.000]

Module area =[5040.00]
Circulation area=[1000.00]
% Circulation =[19.84]

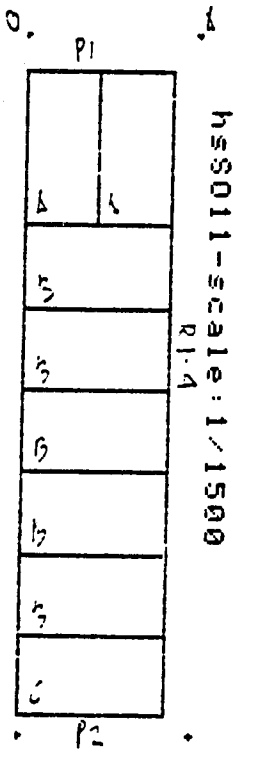


Module name:hnS011
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[15.00]	[30.00]	2	450.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	16.00	[30.00]	5	480.00
C	15.00	[30.00]	[0]	450.00
D	[30.00]	14.00	1	[450.00]
		[15.00]		

PRIMARY ROADS(r.o.w)
P1= 15.00 P2= 8.00
SECONDARY ROADS
R1= 10.00 R2=[10.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.50 CO= 136.50
OA=[35.00] BC=[35.00]
ANGLE OCB=[90.000]

Module area =[4777.50]
Circulation area=[1027.50]
% Circulation =[21.51]

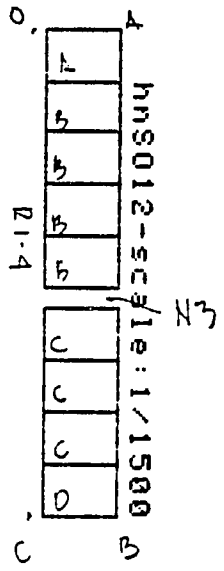


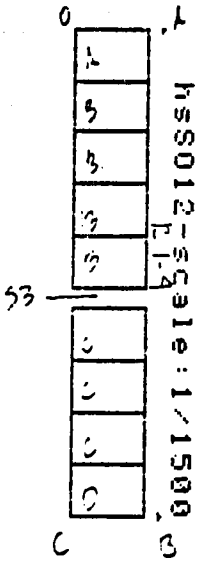
Module name:hsS011
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[15.00]	[30.00]	2	450.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	16.00	[30.00]	5	480.00
C	15.00	[30.00]	[0]	450.00
D	[30.00]	14.00	1	[450.00]
		[15.00]		

PRIMARY ROADS(r.o.w)
P1= 15.00 P2= 8.00
SECONDARY ROADS
R1= 10.00 R2=[10.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.50 CO= 136.50
OA=[35.00] BC=[35.00]
ANGLE OCB=[90.000]

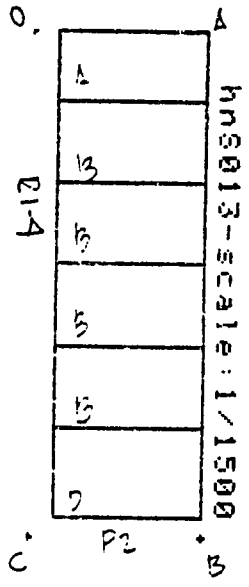
Module area =[4777.50]
Circulation area=[1027.50]
% Circulation =[21.51]

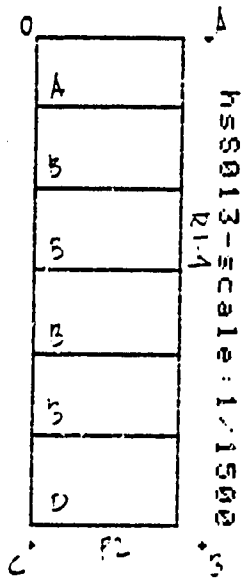





```
Module name:hnS012
PLOT TYPES:
Plt.Width  Length Number  Area
A  [15.00][10.00]   1     150.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    10.00 [15.00]   4     150.00
C    10.25 [15.00][  3]   153.75
D  [15.00]  9.00     1 [  153.75]
           [10.25]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    0.00
SECONDARY ROADS
  R1=    6.00    R2=[   6.00]
  R3=    6.00    R4=    6.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    4.00    S3=    4.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB=   95.00    CO=   95.00
  OA=[ 18.00]  BC=[ 18.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area       =[ 1710.00]
 Circulation area=[  345.00]
 % Circulation    =[   20.18]
--------------------------------
```

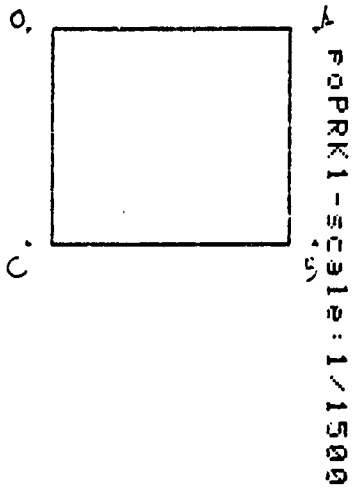
```
Module name:hsS012
PLOT TYPES:
Plt.Width  Length Number  Area
A  [15.00][10.00]   1     150.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    10.00 [15.00]   4     150.00
C    10.25 [15.00][  3]   153.75
D  [15.00]  9.00     1 [  153.75]
           [10.25]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    0.00
SECONDARY ROADS
  R1=    6.00    R2=[   6.00]
  R3=    6.00    R4=    6.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    4.00    S3=    4.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB=   95.00    CO=   95.00
  OA=[ 18.00]  BC=[ 18.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area       =[ 1710.00]
 Circulation area=[  345.00]
 % Circulation    =[   20.18]
--------------------------------
```

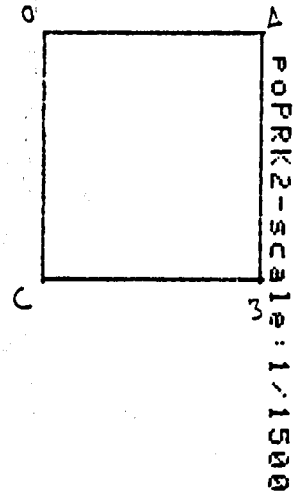





```
Module name:hnS013
PLOT TYPES:
Plt.Width  Length Number  Area
A  [30.00][13.33]   1     400.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    16.00 [30.00]   4     480.00
C    15.00 [30.00][  0]    450.00
D  [30.00] 14.00     1 [  530.01]
           [17.67]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    8.00
SECONDARY ROADS
  R1=   10.00    R2=[ 10.00]
  R3=   10.00    R4=   10.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0 00    S5=    0.00
MODULE DIMENSIONS:
  AB=   99.00    CD=   99.00
  OA=[ 35.00]   BC=[ 35.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area       =[ 3465.00]
 Circulation area=[   614.99]
 % Circulation     =[    17.75]
--------------------------------
```

```
Module name:hsS013
PLOT TYPES:
Plt.Width  Length Number  Area
A  [30.00][13.33]   1     400.00
A1 [ 0.00][ 0.00][  0][     0.00]
B    16.00 [30.00]   4     480.00
C    15.00 [30.00][  0]    450.00
D  [30.00] 14.00     1 [  530.01]
           [17.67]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    8.00
SECONDARY ROADS
  R1=   10.00    R2=[ 10.00]
  R3=   10.00    R4=   10.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB=   99.00    CD=   99.00
  OA=[ 35.00]   BC=[ 35.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area       =[ 3465.00]
 Circulation area=[   614.99]
 % Circulation     =[    17.75]
--------------------------------
```



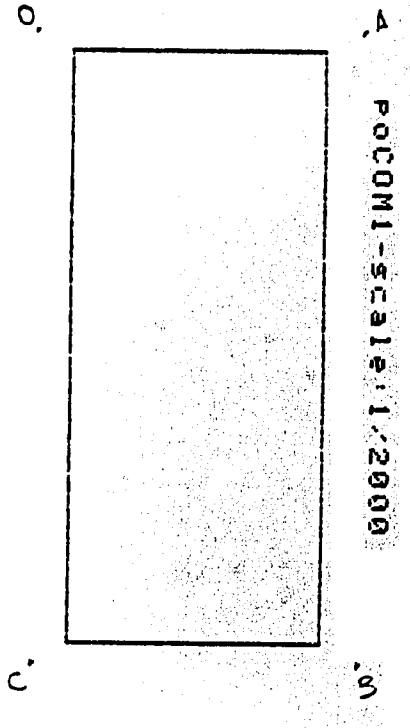



```
Module name:PoPRK1
  P1=    0.00    OA=   58.00
  P2    10.00    AB=   41.50
  P3     0.00    BC=   58.00
  P4    10.00    CD=   41.50

  [oa= 48.00]  [ab= 41.50]
  [bc= 48.00]  [co= 41.50]
--------------------------------
 Module area       =[ 2407.00]
 Circulation area=[  415.00]
 % Circulation     =[   17.24]
 PoPRK1 area       =[ 1992.00]
--------------------------------
```

```
Module name:PoPRK2
  P1=    0.00    OA=   44.00
  P2=    0.00    AB=   48.00
  P3=    0.00    BC=   44.00
  P4=    0.00    CD=   48.00

  [oa= 44.00]  [ab= 48.00]
  [bc= 44.00]  [co= 48.00]
--------------------------------
 Module area       =[ 2112.00]
 Circulation area=[    0.00]
 % Circulation     =[    0.00]
 PoPRK2 area       =[ 2112.00]
--------------------------------
```

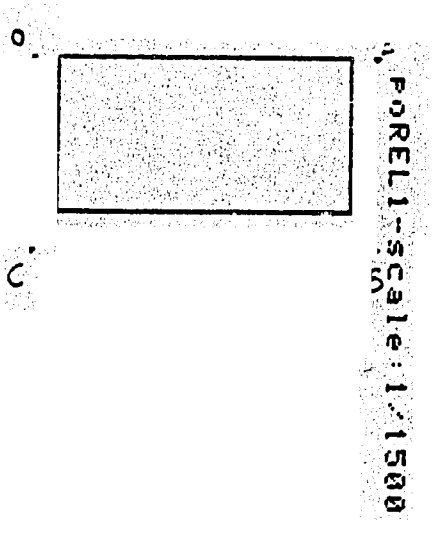


Module name:poCOM1

P1=	10.00	OA=	88.00
P2=	20.00	AB=	164.00
P3=	10.00	BC=	88.00
P4=	20.00	CO=	164.00

[oa= 68.00] [ab=154.00]
[bc= 68.00] [co=154.00]

Module area =[14432.00]
Circulation area=[3960.00]
% Circulation =[27.44]
poCOM1 area =[10472.00]

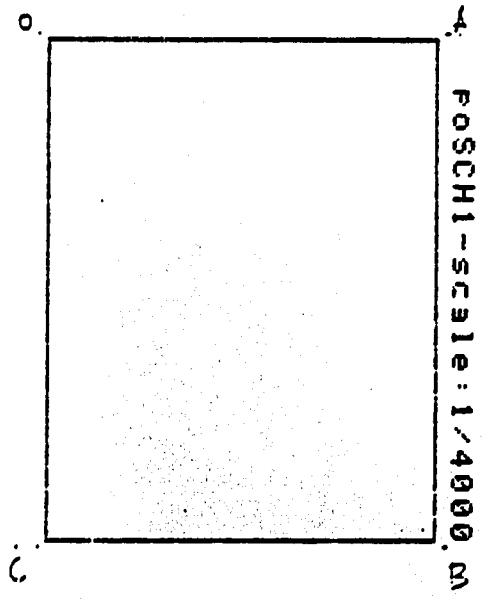


Module name:poREL1

P1=	0.00	OA=	70.00
P2=	10.00	AB=	37.50
P3=	15.00	BC=	70.00
P4=	10.00	CO=	37.50

[oa= 60.00] [ab= 30.00]
[bc= 60.00] [co= 30.00]

Module area =[2625.00]
Circulation area=[825.00]
% Circulation =[31.43]
poREL1 area =[1800.00]

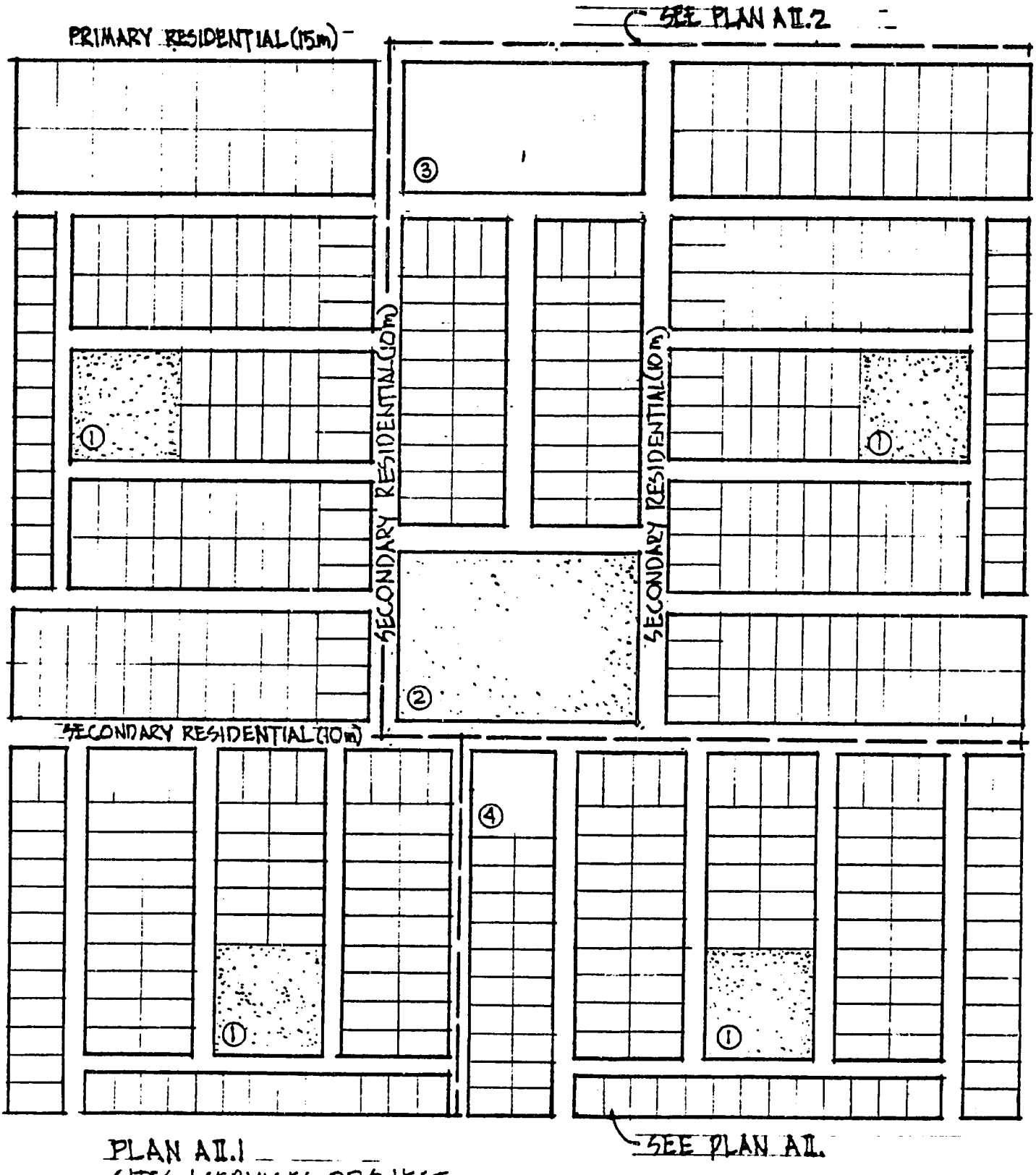



```
Module name:POSCH1
  P1=    6.00    OA= 210.00
  P2=   10.00    AB= 256.00
  P3=    6.00    BC= 210.00
  P4=   10.00    CO= 256.00

  [oa=200.00]  [ab=250.00]
  [bc=200.00]  [co=250.00]
-----------------------------------
 Module area       =[53760.00]
 Circulation area=[ 3760.00]
 % Circulation     =[     6.99]
 POSCH1 area       =[50000.00]
-----------------------------------
```

ANNEX II

SITES & SERVICES PLAN



PLAN AII.1
SITES & SERVICES PROJECT
SCALE 1/2000 28 APRIL 1984

① PARK
② SPORTS FIELD
③ MARKET
④ RELIGIOUS

TABLE AII.1

SITES AND SERVICES PROJECT

Plots

Plot Size (m^2)	Number	% of Total
150	64	13.73
200	362	77.68
300	40	8.59
Totals	466	100.00

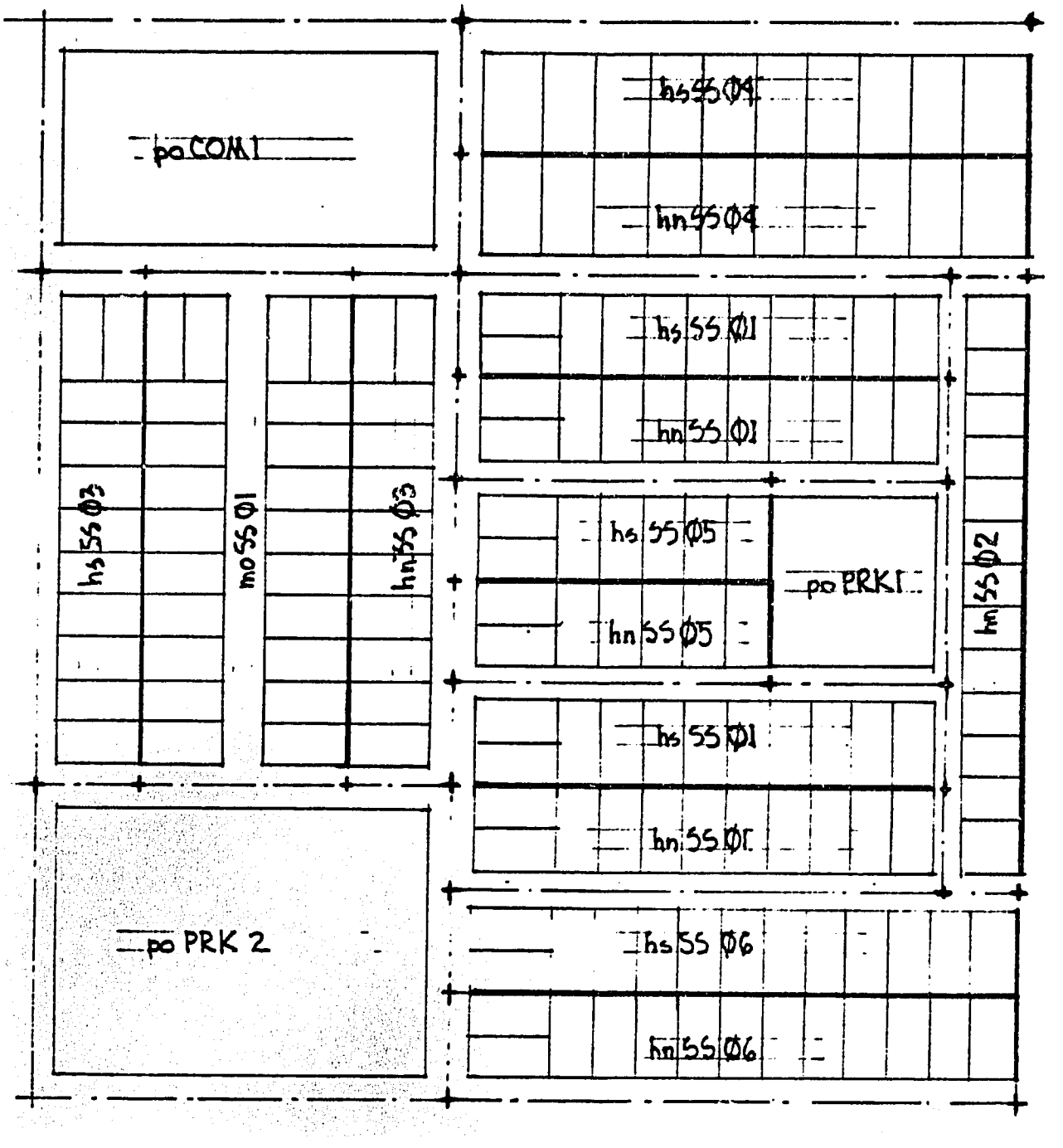
Average Plot Size -- 203.12m^2

Plots/Hectare -- 32.18

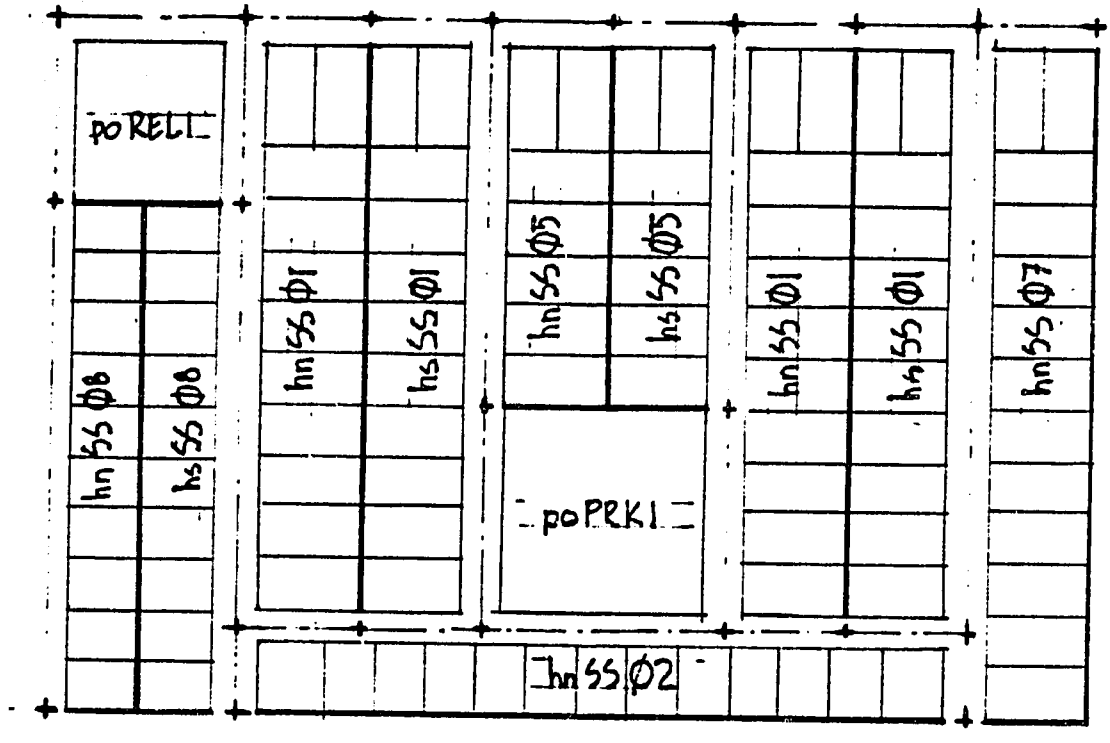
Land Use		Area(m^2)	% of Total
Residential		94,656	65.37
Circulation		32,908	22.73
Public Utility		17,230	11.90
Parks	6,400		
Sports Field	5,670		
Market	4,230		
Religious	930		
Total		144,794	100.00

Preliminary Cost Estimate

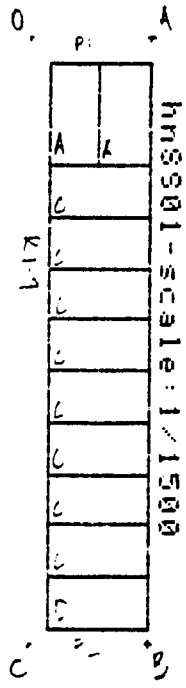
Infrastructure Costs	SH1,589,735
20% Contingencies and Inflation	317,947
15% Survey and Studies	286,152
Total	2,193,834
Per Gross m^2	SH15.15
Per Net Residential m^2	SH23.18



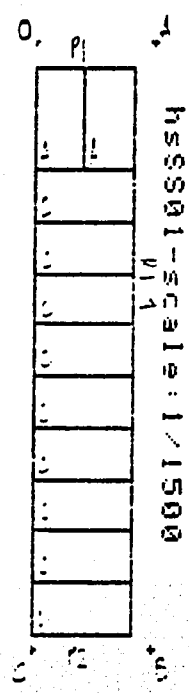
PLAN AII.2
SITES & SERVICES PROJECT
SCALE 1/1500 28 APRIL 1984



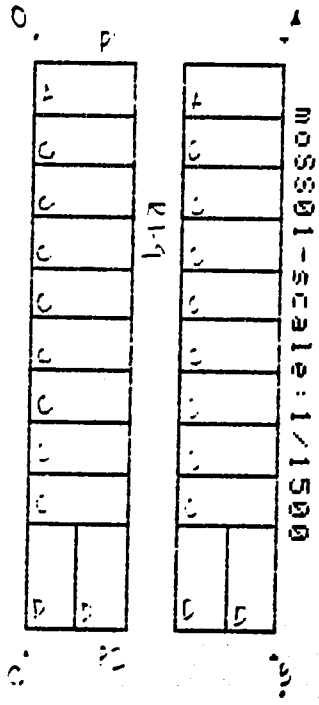
PLAN AII.3
SITES & SERVICES PROJECT
SCALE 1/1500 28 APRIL 1984




```
Module name:hnSS01
PLOT TYPES
Plt.Width  Length Number  Area
A  [10 00][20.00]   2     200.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [20.00][  8]   200.00
D  [20.00]  9.00     1 [  200.00]
           [10.00]
PRIMARY ROADS(r.o.w)
  P1=  10.00    P2=    6.00
SECONDARY ROADS
  R1=    8.00    R2=[  0.00]
  R3=    8.00    R4=    8.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 118.00    CD= 118.00
  DA=[ 24.00]  BC=[ 24.00]
  ANGLE DCB=[ 90.000]
-----------------------------------
 Module area       =[ 2832.00]
 Circulation area=[  632.00]
 % Circulation    =[   22.32]
-----------------------------------
```




```
Module name:hsSS01
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   8     200.00
A1 [ 0.00][ 0.00][  6][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [20.00][  8]   200.00
D  [20.00]  9.00     1 [  200.00]
           [10.00]
PRIMARY ROADS(r.o.w)
  P1=  10.00    P2=    6.00
SECONDARY ROADS
  R1=    8.00    R2=[  0.00]
  R3=    8.00    R4=    8.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 118.00    CD= 118.00
  DA=[ 24.00]  BC=[ 24.00]
  ANGLE DCB=[ 90.000]
-----------------------------------
 Module area       =[ 2832.00]
 Circulation area=[  632.00]
 % Circulation    =[   22.32]
-----------------------------------
```

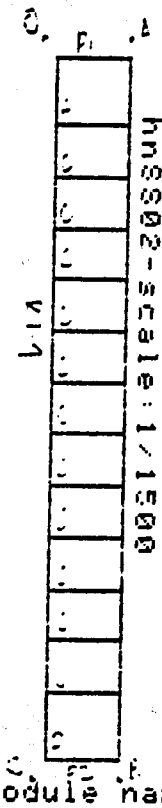


Module name:moSS01
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[20.00]	[10.00]	2	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[20.00]	[16]	200.00
D	[10.00]	19.00	4	[200.00]
		[20.00]		

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 10.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 120.00 CD= 120.00
OA=[50.00] BC=[50.00]
ANGLE OCB=[90.000]

Module area =[6000.00]
Circulation area=[1600.00]
% Circulation =[26.67]

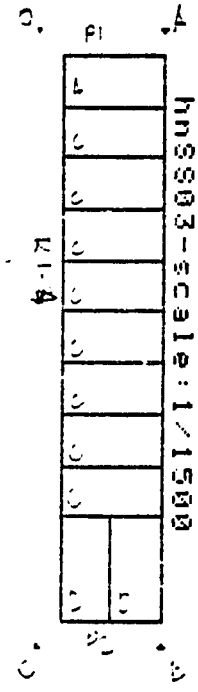


Module name:hnSS02
PLOT TYPES:

	Plt.Width	Length	Number	Area
A	[15.00]	[13.00]	1	195.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[15.00]	[11]	150.00
D	[15.00]	9.00	1	[195.00]
		[13.00]		

PRIMARY ROADS(r.o.w)
P1= 8.00 P2= 8.00
SECONDARY ROADS
R1= 6.00 R2=[0.00]
R3= 6.00 R4= 6.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 144.00 CD= 144.00
OA=[18.00] BC=[18.00]
ANGLE OCB=[90.000]

Module area =[2592.00]
Circulation area=[552.00]
% Circulation =[21.30]

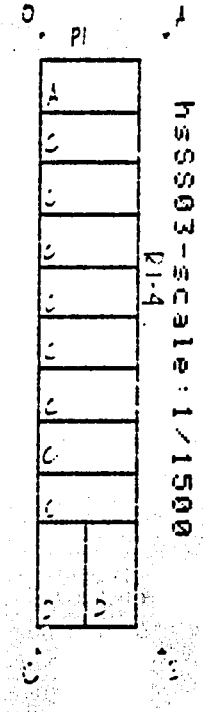


Module name:hnSS03
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[20.00]	[10.00]	1	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[20.00]	[8]	200.00
D	[10.00]	19.00 [20.00]	2	[200.00]

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 10.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 120.00 CO= 120.00
OA=[25.00] BC=[25.00]
ANGLE OCB=[90.000]

Module area =[3000.00]
Circulation area=[800.00]
% Circulation =[26.67]

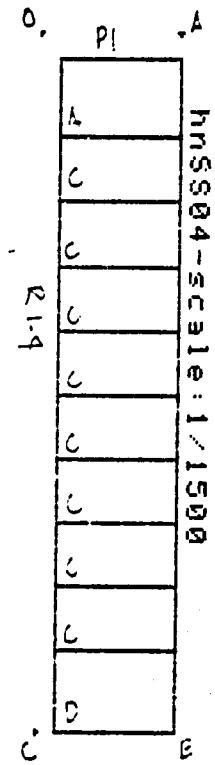


Module name:hsSS03
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[20.00]	[10.00]	1	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[20.00]	[8]	200.00
D	[10.00]	19.00 [20.00]	2	[200.00]

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 10.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 120.00 CO= 120.00
OA=[25.00] BC=[25.00]
ANGLE OCB=[90.000]

Module area =[3000.00]
Circulation area=[800.00]
% Circulation =[26.67]

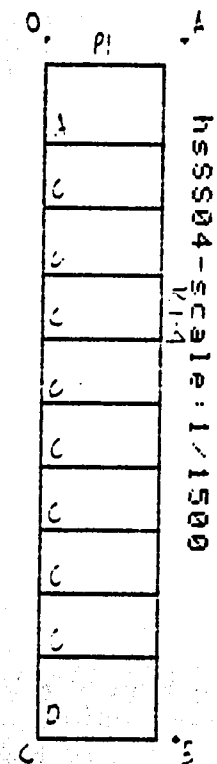


Module name:hnSS04
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[24.00]	[15.50]	1	372.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	12.50	[24.00]	[8]	300.00
D	[24.00]	12.00 [15.50]	1	[372.00]

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 0.00
SECONDARY ROADS
R1= 8.00 R2=[0.00]
R3= 8.00 R4= 8.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.00 CD= 136.00
DA=[28.00] BC=[28.00]
ANGLE DCB=[90.000]

Module area =[3808.00]
Circulation area=[664.00]
% Circulation =[17.44]

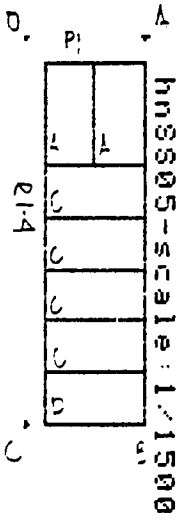


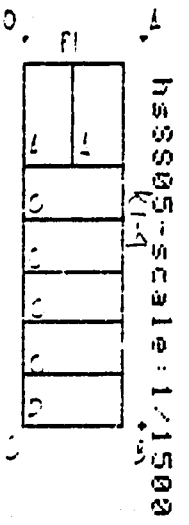
Module name:hsSS04
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[24.00]	[15.50]	1	372.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	12.50	[24.00]	[8]	300.00
D	[24.00]	12.00 [15.50]	1	[372.00]

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 0.00
SECONDARY ROADS
R1= 8.00 R2=[0.00]
R3= 8.00 R4= 8.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.00 CD= 136.00
DA=[28.00] BC=[28.00]
ANGLE DCB=[90.000]

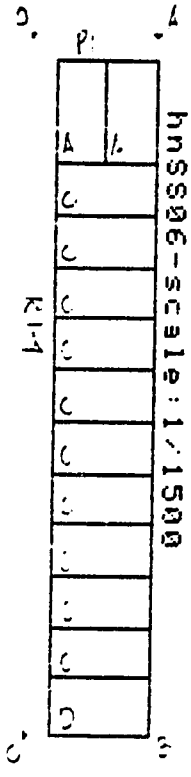
Module area =[3808.00]
Circulation area=[664.00]
% Circulation =[17.44]






```
Module name:hnSS05
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   2     200.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [20.00][  4]   200.00
D  [20.00]  9.00     1 [  200.00]
           [10.00]
PRIMARY ROADS(r.c.w)
  P1=  10.00   P2=   0.00
SECONDARY ROADS
  R1=   8.00   R2=[  0.00]
  R3=   8.00   R4=   8.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB=  75.00   CO=  75.00
  OA=[ 24.00]  BC=[ 24.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 1800.00]
 Circulation area=[  400.00]
 % Circulation    =[   22.22]
--------------------------------
```

```
Module name:hsSS05
PLOT TYPES:
Plt.Width  Length Number  Area
A  [10.00][20.00]   2     200.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [20.00][  4]   200.00
D  [20.00]  9.00     1 [  200.00]
           [10.00]
PRIMARY ROADS(r.c.w)
  P1=  10.00   P2=   0.00
SECONDARY ROADS
  R1=   8.00   R2=[  0.00]
  R3=   8.00   R4=   8.00
TERTIARY ROADS
  N1=   0.00   S1=   0.00
  N2=   0.00   S2=   0.00
  N3=   0.00   S3=   0.00
  N4=   0.00   S4=   0.00
  N5=   0.00   S5=   0.00
MODULE DIMENSIONS:
  AB=  75.00   CO=  75.00
  OA=[ 24.00]  BC=[ 24.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area      =[ 1800.00]
 Circulation area=[  400.00]
 % Circulation    =[   22.22]
--------------------------------
```

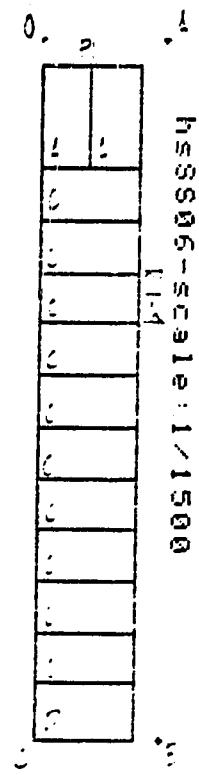


Module name:hnSS06
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[10.00]	[20.00]	2	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[20.00]	[10]	200.00
D	[20.00]	9.00	1 [	220.00]
		[11.00]		

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 0.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.00 CD= 136.00
DA=[25.00] BC=[25.00]
ANGLE DCB=[90.000]

Module area =[3400.00]
Circulation area=[780.00]
% Circulation =[22.94]

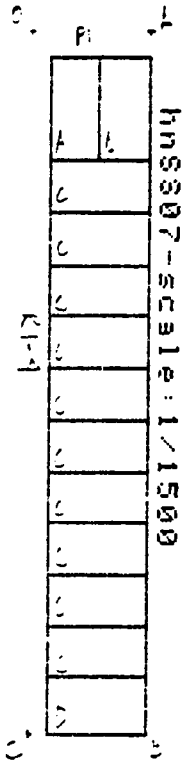


Module name:hsSS06
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[10.00]	[20.00]	2	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[20.00]	[10]	200.00
D	[20.00]	9.00	1 [	220.00]
		[11.00]		

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 0.00
SECONDARY ROADS
R1= 10.00 R2=[0.00]
R3= 10.00 R4= 10.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.00 CD= 136.00
DA=[25.00] BC=[25.00]
ANGLE DCB=[90.000]

Module area =[3400.00]
Circulation area=[780.00]
% Circulation =[22.94]

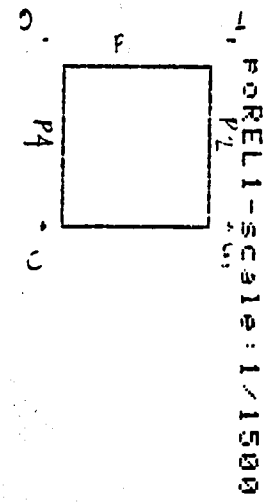


Module name:hnSS07
PLOT TYPES:

Plt.	Width	Length	Number	Area
A	[10.00]	[20.00]	2	200.00
A1	[0.00]	[0.00]	[0]	[0.00]
B	0.00	[0.00]	0	0.00
C	10.00	[20.00]	[10]	200.00
D	[20.00]	9.00	1	[220.00]
		[11.00]		

PRIMARY ROADS(r.o.w)
P1= 10.00 P2= 0.00
SECONDARY ROADS
R1= 8.00 R2=[0.00]
R3= 8.00 R4= 8.00
TERTIARY ROADS
N1= 0.00 S1= 0.00
N2= 0.00 S2= 0.00
N3= 0.00 S3= 0.00
N4= 0.00 S4= 0.00
N5= 0.00 S5= 0.00
MODULE DIMENSIONS:
AB= 136.00 CO= 136.00
OA=[24.00] BC=[24.00]
ANGLE OCB=[90.000]

Module area =[3264.00]
Circulation area=[644.00]
% Circulation =[19.73]

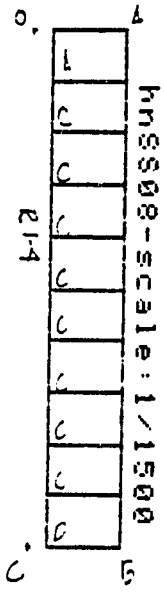


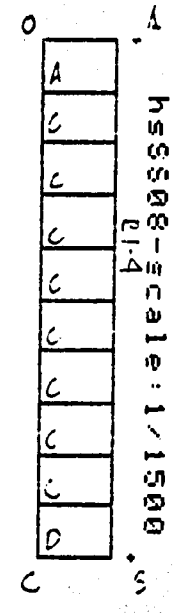
Module name:poREL1

P1=	10.00	OA=	38.00
P2=	8.00	AB=	36.00
P3=	0.00	BC=	38.00
P4=	8.00	CO=	36.00

[oa= 30.00] [ab= 31.00]
[bc= 30.00] [co= 31.00]

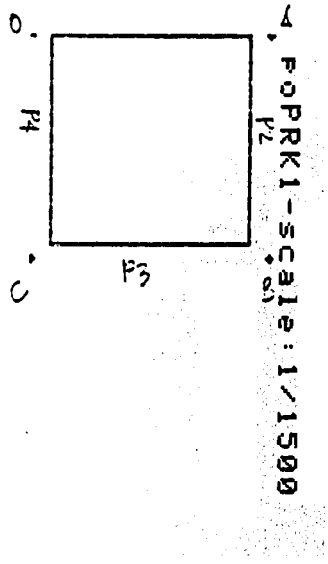
Module area =[1368.00]
Circulation area=[438.00]
% Circulation =[32.02]
poREL1 area =[930.00]

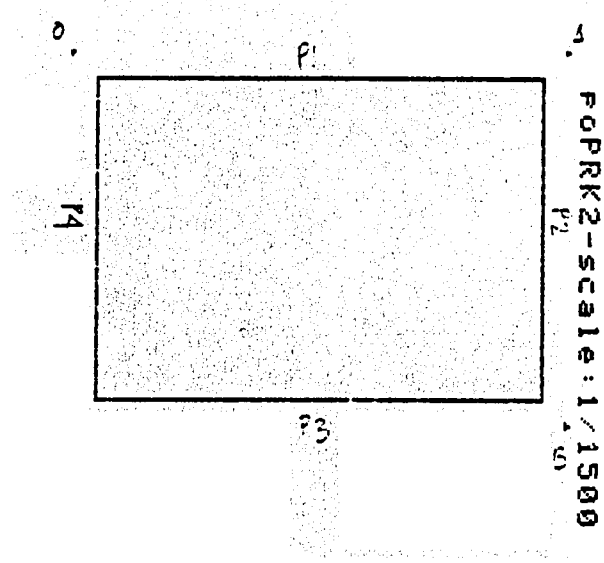





```
Module name:hnSS08
PLOT TYPES:
Plt.Width  Length Number  Area
A  [15.00][10.00]   1     150.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [15.00][  8]   150.00
D  [15.00]  9.00     1 [  150.00]
           [10.00]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    0.00
SECONDARY ROADS
  R1=    8.00    R2=[  0.00]
  R3=    8.00    R4=    8.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 100.00    CO= 100.00
  OA=[ 19.00]   BC=[ 19.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area       =[ 1900.00]
 Circulation area=[  400.00]
 % Circulation     =[   21.05]
--------------------------------
```

```
Module name:hsSS08
PLOT TYPES:
Plt.Width  Length Number  Area
A  [15.00][10.00]   1     150.00
A1 [ 0.00][ 0.00][  0][     0.00]
B     0.00 [ 0.00]   0       0.00
C    10.00 [15.00][  8]   150.00
D  [15.00]  9.00     1 [  150.00]
           [10.00]
PRIMARY ROADS(r.o.w)
  P1=    0.00    P2=    0.00
SECONDARY ROADS
  R1=    8.00    R2=[  0.00]
  R3=    8.00    R4=    8.00
TERTIARY ROADS
  N1=    0.00    S1=    0.00
  N2=    0.00    S2=    0.00
  N3=    0.00    S3=    0.00
  N4=    0.00    S4=    0.00
  N5=    0.00    S5=    0.00
MODULE DIMENSIONS:
  AB= 100.00    CO= 100.00
  OA=[ 19.00]   BC=[ 19.00]
  ANGLE OCB=[ 90.000]
--------------------------------
 Module area       =[ 1900.00]
 Circulation area=[  400.00]
 % Circulation     =[   21.05]
--------------------------------
```



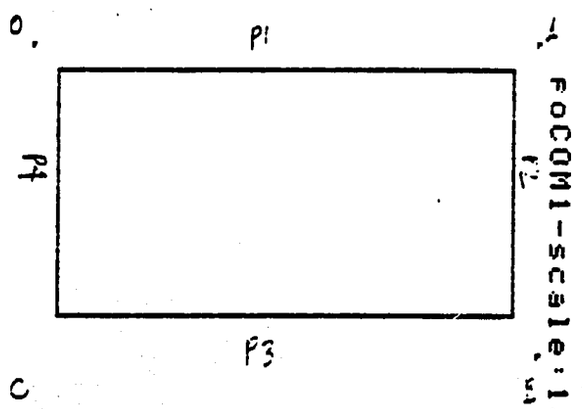



```
Module name:poPRK1
  P1=    0.00    OA=   48.00
  P2=    8.00    AB=   43.00
  P3=    6.00    BC=   48.00
  P4=    8.00    CO=   43.00

  [oa= 40.00]  [ab= 40.00]
  [bc= 40.00]  [co= 40.00]
--------------------------------
 Module area       =[ 2064.00]
 Circulation area=[  464.00]
 % Circulation     =[   22.48]
 poPRK1 area       =[ 1600.00]
--------------------------------
```

```
Module name:poPRK2
  P1=   10.00    OA= 100.00
  P2=   10.00    AB=  73.00
  P3=   10.00    BC= 100.00
  P4=   10.00    CO=  73.00

  [oa= 90.00]  [ab= 63.00]
  [bc= 90.00]  [co= 63.00]
--------------------------------
 Module area       =[ 7300.00]
 Circulation area=[ 1630.00]
 % Circulation     =[   22.33]
 poPRK2 area       =[ 5670.00]
--------------------------------
```




```
Module name:PoCOM1
  P1=  10.00    OA= 100.00
  P2=  10.00    AB=  59.50
  P3=  15.00    BC= 100.00
  P4=  10.00    CO=  59.50

  [oa= 90.00]  [ab= 47.00]
  [bc= 90.00]  [co= 47.00]
--------------------------------
 Module area      =[ 5950.00]
 Circulation area=[ 1720.00]
 % Circulation    =[   28.91]
 PoCOM1 area      =[ 4230.00]
--------------------------------
```