BIBLIOGRAPHIC DATA SHEET	1. CONTROL NUMBER	2. SUBJECT CLASSIFICATION (695)
	PN-AAJ-278	I.D00-0000-G176

3. TITLE AND SUBTITLE (200)

Zimbabwe shelter sector assessment; technical appendices

4. PERSONAL AUTHORS (100)

Wright, James; Oakley, David; Baker, Lee

5. CORPORATE AUTHORS (101)

PADCO, Inc.

6. DOCUMENT DATE (110)	7. NUMBER OF PAGES (120)	8. ARC NUMBER (170)
1981	179p.	ZI3Ø1.54Ø96891 .W951a

9. REFERENCE ORGANIZATION (150)

PADCO

10. SUPPLEMENTARY NOTES (500)

(Main report,104p.:PN-AAJ-277)

11. ABSTRACT (950)

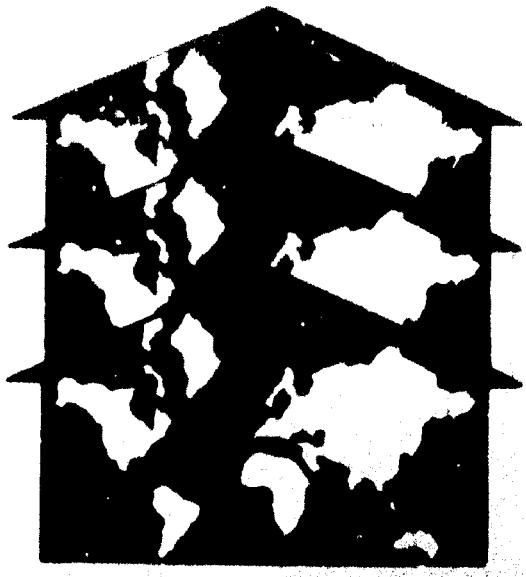
12. DESCRIPTORS (920)		13. PROJECT NUMBER (150)
Zimbabwe	Housing	
Assessments	Sector analysis	
Civil engineering		14. CONTRACT NO.(140) DS/H
Small scale industries		15. CONTRACT TYPE (140)
		16. TYPE OF DOCUMENT (160)

AID 590-1 (10-79)

ZIMBABWE SHELTER SECTOR ASSESSMENT

TECHNICAL APPENDICES

JANUARY 1981



AGENCY FOR INTERNATIONAL DEVELOPMENT

OFFICE OF HOUSING

ZIMBABWE
SHELTER SECTOR ASSESSMENT

Technical Appendices

JANUARY 1981

OFFICE OF HOUSING
AGENCY FOR INTERNATIONAL DEVELOPMENT

WASHINGTON, D.C.

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ANNEX 1 (1)

SOCIAL CRITERIA FOR DWELLING DESIGN

As mentioned in the Conclusions and Recommendations chapter, there exists a need to develop, in addition to the presently incorporated income and unit cost criteria used in family affordability calculations, a complementary social specification which would take into consideration household preference for different housing types and the cultural sensitivities required in dwelling unit and site layout design. The present annex briefly discusses some of the major points in defining a social specification. The expressed thoughts are presented in the Zimbabwe context existing as of August 1980.

A. SOCIAL ACCEPTABILITY OF DESIGN

Field surveys/site visits are essential elements from the point of view of achieving and contributing to progressive design improvement. This form of monitoring and evaluation is a necessary component of a mass housing program. These program components should be developed and incorporated into the building design review process which leads to periodic modification of the dwelling design statement.

B. SOCIAL REQUIREMENTS: HOUSE DESIGN AND SITE LAYOUT

The social requirements associated with house design and site layout can be defined in at least three ways:

(1) The expressed preferences of potential project beneficiaries and/or discussions with families presently occupying spontaneous settlements or government constructed higher density housing schemes.

(2) The building and planning standards of central and local government housing agencies.

(3) Discussions with administrative and technical professionals as to "what people should have" in the way of housing.

C. SOCIAL NEEDS SPECIFICATION FOR THE LOW INCOME URBAN HOUSEHOLD

A first attempt to define the social requirements for plot development of higher density housing was undertaken in August 1980. It was envisaged that this exercise would stimulate local designers to seek improved and more socially acceptable designs. Improved designs stem from a knowledge of the user's

needs and their response to types of housing solution provided. Constant updating is required of the social specification. The following requirements were identified as appropriate for higher density design:

(1) A shelter and services opportunity for a household of six people.

(2) Affordability of the proposed housing solution for those households with less than the median income.

(3) Provision of floor space equivalent to the area of "three rooms."

(4) A dry roof cover for the entire floor area.

(5) Potential for housing solution completion and expansion.

(6) Space for individual household cultivation.

(7) A fence to enclose the plot so as to provide security and protection for the household garden.

ANNEX 1 (11)

RECOMMENDED PLANNING STANDARDS FOR HIGH DENSITY LOW INCOME HOUSING AREAS

The following standards and guidelines are used by the Housing Development Services Branch as an aid to the planning of low income housing areas. The use of these standards will contribute towards the creation of a satisfactory community environment in these areas.

1.0 RESIDENTIAL STANDS

In low cost housing developments, two sizes of stands are normally used:

10 x 20 m (200 m²) and 12,5 x 25 m (312,5m²)

In order to ensure a satisfactory living environment it is necessary to adhere to specific minimum space standards for both the house and the surrounding open space. The standards which are used are:

Minimum Floor Space Ration (house area) = 7,0 m² per person

Minimum Total Living Space Ratio (house area plus garden and/or public open space) = 35 m² per person

Where there is insufficient garden space for each residential stand then it is essential that extra space be allocated within the residential development for public open space. Hence, for typical low cost housing development the following development controls apply:

STAND SIZE	MAXIMUM PERMITTED STAND COVERAGE	% OF RESIDENTIAL LAY-OUT AREA REQUIRED FOR PUBLIC OPEN SPACE
200 m²	28%	29%
312,5 m²	20%	10%

2.0 OPEN SPACE

The previous section detailed the area that should be allocated as public open space according to the type of residential development. In any layout a minimum of 10% of the total development area should be reserved as public open space. This will include space for park-land, golf courses, river line preservation zones etc., and will ensure adequate public land for both passive and active recreation.

3.0 SCHOOLS

In addition, land must be reserved for schools within each residential area on sites acceptable to the Ministry of Education. Schools must be provided according to the following standards:

1 x primary school per 500 houses.

1 x secondary school per 5 primary schools

School sites should be on fairly level ground and easily accessible

2/...

from the surrounding residential area. Minimum areas required are given below, but where possible more generous allocations should be made:

1 x primary school between 3,5 ha and 4 ha

1 x secondary school between 8,0 ha and 9,0

4.0 MEDICAL FACILITIES

The most important medical facility that must be provided in a residential development is the primary care clinic, which will treat patients for most common ailments. The following standard should be adhered to:

1 primary care clinic per 40 - 50 000 population

site size = 0,4 - 0,5 ha

Larger medical facilities such as hospitals will only be required for population concentrations of over 100 000 people.

5.0 SWIMMING POOLS

This is a public amenity which is well used by people during the hot months, and provision should be made for a site to accommodate a 33 m pool to serve a population of 30 - 40 000.

6.0 CHURCHES

There is usually a steady demand for church sites and these should be provided within the layout. Stand size area approx 1 600 m².

7.0 CORNER STALLS

In any residential layout consideration should be given to the provision of corner stalls for the sale of bread and milk type commodities to the housewife. Such stalls should be within a few minutes walking distance of the home, and should be provided according to the following guidelines:

Stalls should serve an area of maximum radius of 400 m

Site area = 600 m² approximately

Provision must be made for water and sewer connection to the site.

8.0 SHOPPING CENTRES

The major shopping activity will, however, be at the local shopping centre. Each residential zone should have as its focal point a local shopping centre within 800 m walking distance. Space for shopping centres should be provided as follows:

1 shopping centre serving an area of maximum radius of 800 m

Site area 0,25 - 0,5 ha per 1 000 population served.

A shopping centre should act as a focus for community facilities and activities and should accommodate the following components:

hall, day-care centre, petrol station, public toilets, beer garden and adequate parking facilities.

The following standards give guidelines for the provision of these facilities:

8.1 Small Shops:

100 m² shop floor space (excluding the rear yard) per 1 000 population served.

8.2 Supermarkets:

55 m² shop floor space (excluding the rear yard) per 1 000 population served.

8.3 Market:

80 m² market area per 1 000 population served.

8.4 Service Industry:

2 x 30 m² stands
2 x 60 m² stands
1 x 400 m² stands
} per 4 000 population served.

8.5 Community Hall:

building size approximately 1 000 m²

8.6 Day-care Centre and Playground:

site area approximately 1 500 m²

8.7 Bus Station:

site area 30 x 80 m

8.8 Petrol Station:

site area 45 x 50 m

8.9 Public Toilets:

site area 8 x 15 m
These should be located close to the bus station and the market.

8.10 Beer Garden:

site area approximately 2 500 m²
Care should be taken to ensure that a beer garden is not sited close to schools, clinics or houses as it is often a source of noise and disturbance.

8.11 Parking:

1 bay per 3 m shop frontage
1 bay per 20 hall seats
1 bay per 12 m market stall frontage
1 bay per 40 m² beerhall area
1 bay per 30 m² office floor space

9.0 MISCELLANEOUS

In planning any development consideration must be given to other

land uses that may be required:

eg. police station, post office, and telephone exchange, municipal offices, sewage treatment works, cemeteries and power line servitudes.

Detailed requirements should be obtained from the appropriate authorities.

10.0 ROADS

The following standards should be adhered to when planning the alignment of various classes of roads:

District distributor:	25 or 30 m road reserve 200 m minimum radius of curvature
Local distributor:	15,18 or 20 m road reserve 150 m minimum radius
Stand access road:	10 or 12,5 m road reserve 50 m minimum radius
Maximum gradient:	1 : 15
Cul-de-sac turning circle: (10 m and 12,5 m roads)	20 m x 14 m

11.0 SEWERAGE

To ensure satisfactory flows through sewer pipes the following minimum standards apply:

PIPE DIAMETER	MINIMUM GRADIENT
100 mm	1 : 100
150 mm	1 : 150
225 mm	1 : 250

The minimum depth permitted for sewer pipes crossing public land is 750 mm, measured from ground level to the top of the pipe.

Note: When designing stand layouts single rows of houses should be avoided. The use of back-to-back (i.e double row) stands significantly reduces the overall costs for sewer and water services.

12.0 CONCLUSION

These standards are designed to ensure that in the planning and development of a residential area adequate provision is made for the facilities and amenities that should be available to every urban community even if the sites themselves are only developed at a later stage. In general they represent flexible guidelines rather than rigid criteria and as such can be varied as circumstances permit. However, it should be borne in mind that they represent minimum rather than idealistic criteria and should not be reduced at any time. Our aim must be to plan for the long-term well-being of the community.

ANNEX 1 (iii)

GUIDELINES FOR CIVIL ENGINEERING DESIGN CRITERIA APPLICABLE TO LOW COST HOUSING PROJECTS

August 1980

INTRODUCTION

The following guidelines have been prepared to assist Consulting Engineers and Municipalities in formulating realistic design philosophies for low-cost housing projects.

The guidelines are intended as an outline for requirements but are not intended to stifle design innovations. Engineers are required at all times to remember that we are not looking for elaborate solutions but rather the least costly solution to meet adequately the needs of the situation. Adequately does not imply comfortably.

These guidelines are to be read in conjunction with the latest Conditions of Contract and Specifications published by the Housing Development division of the Ministry of Local Government and Housing. They were prepared predominantly for use in granitic sandveld areas and may be reduced in areas of more stable soil conditions.

ROADWORKS

1. Road reserve sizes will be dictated by the layout but generally will be as follows:

   i) District Distributor - 25 or 30 metre reserve. Minimum radius of curvature 200 metre.

   ii) Local Distributor - 15 or 18 or 20 metre reserve. Minimum radius of curvature 150 metre.

   iii) Stand Access Roads - 10 or 12,5 metre reserve. Minimum radius of curvature 50 metre or as dictated by layout.

2. The detailed specification outlines construction requirements for each road subject obviously to local conditions.

3. Bus routes normally on the 25 or 30 metre road will require more durable surfacing treatment and the following is recommended:

   i) Prime MC30 Bitumen.

   ii) Tack Coat 180/200 Bitument.

   iii) 15 mm Stone.

   iv) One coat Bitumen slurry seal.

4. As Vankie tar products are no longer available substitute:

   i) MC30 for Vankie Tar Prime.

   ii) 180/200 Bitumen for MT55A.

5. Road Junctions as follows:

i) All junctions to be kerbed over length ,5IR

ii) Radius of kerb to be:

a) 7 metre for access roads.

b) 12 metre for Local Distributor roads.

c) 15 metre for District Distributor roads.

d) The radius of curvature is dictated by the minor road in the junction.

iii) The kerbing on minor roads is to be placed so that the minimum width of the surfaced road at the junction is 8,5 metres for the 10 metre road and 5 metres for the 12,5 metre road. Surface widening occurring over 7,5 metres and 10 metres respectively.

6. Gravel roads are to be constructed where the economics of development preclude surfacing. They are to be constructed to the same standard as shown for surfaced roads provided:

i) For shaped earth roads delete gravel and surfacing layer.

ii) Gravel Roads:- place one layer of gravel only to the thickness specified for Sub-base.

iii) Unsurfaced stabilised roads are not permitted. If no suitable sub-base gravel exists higher P.I. gravel may be tested to achieve a suitable running course quality.

7. Long sections to be provided for all roads larger than and including 18 metre road reserves. Minor road long sections will not be required as these roads may be formed to reasonable standards without long sections.

STORMWATER DRAINAGE

---

1. Minor drainage works relating to shopping complexes and market places designed for a two year flood.

2. Drainage for local suburbs up to 3 000 housing units designed for a five year flood.

3. Box culverts and stormwater drainage for major link roads within the urban complex designed for a ten year flood.

4. All stormwater drainage to be catered for in open channels.

5. Culverts to be used in all intersections involving 25 and 30 metre road reserves.

6. All other intersections wherever possible to allow for splash drains. The point of changeover from splash drain to culvert will be when the anticipated flow through the splash drain exceeds ,25 m^3 per second.

7. Where the size of the side drain on the standard road cross section is too small to take the anticipated flow of water trapezoidal drains

may be located below the line of machine cut to supplement their capacity. These are to be kept as shallow as possible.

8. Standard side drains are to be bolstered when the velocity of flow exceeds 1,5 metres per second and lined when the velocity of flow exceeds 2,0 metres per second.

9. Major outfalls drains spilling into vlei areas are required to be grader cut and bolstered if necessary.

10. The use of major lined water channels will only be considered under special circumstances.

WATER RETICULATION

---

1. The following water supply provisions must be made:

DESCRIPTION	DAILY CONSUMPTION
a) High Density Areas 20 Plots per Ha	650 Litres/Stand
b) Medium Density Areas 12 Plots per Ha	750 Litres/Stand
c) School Hostels only (not day schools)	100 Litres/Head
d) Hospitals	150 Litres/Head

Day activities will have no specific water supply provision. Major town centre development or industrial complexes will be dealt with individually.

2. Residual Head at house connection to be ten metres.

3. Peak flow of 3 x Average Daily Consumption.

4. Wherever possible all services are to be located on the back stand boundary.

5. Double house connections are to be used i.e. one pipe connection to serve two houses.

6. Minimum pipe size to be 50 mm.

7. 50 mm Pipe to serve 40 housing units if ringed and 25 housing units if herring bone design is indicated.

8. Wherever possible bearing in mind economy all pipe networks are to be ringed.

9. Gate valves are to be provided to isolate blocks of 200 houses.

10. Fire hydrants are to be provided as follows:

i) one to each shopping complex.

ii) one to each school

iii) one to each clinic or hospital site.

Hydrants should be located on 75 mm piping or larger but not additional water usage to be allowed for.

In the event of fire, hydrants will be required to operate to the detriment or inconvenience of other users of the water reticulation system.

13. Depth of pipe to be as specified.

SEWAGE RETICULATION

1. Hydraulic load in sewage reticulation systems calculated as follows:
   ADWF = ,85 x daily water consumption (as detailed previously)
   Peak flow to be 5,25 ADWF with the pipe flowing full until ADWF exceeds 2 000 m³/day.

   Peak factor to be reduced for larger flows and to be as follows:-

ADWF (1 000 m³/day)	DESIGN FACTOR
2 to 6	4,5
6 to 20	3,75
20 to 200	3,00
200 or more	2,70

2. All services to be mid block wherever possible.

3. Double house connections are permissible when economics dictate this course of action.

4. Minimum size of pipe permissible between manholes is 150 mm. 100 mm pipe to be used to serve the last four to six houses in a sewer run. This 100 mm pipe must be provided with a rodding way and connect into a manhole. i.e. No manhole required at the head of every sewer run but rather at the end of a rodding way and start of 150 mm sewer run.

5. Sewer cover at the start of a rodding way may be 450 mm. Cover for 150 mm sewer may be 600 mm. Cover under roadways to be 900 mm. Sewer runs are to be kept as shallow as possible.

6. Permissible minimum gradients to be as follows:

PIPE SIZE	GRADIENT
100 mm	1 : 100
150 mm	1 : 150
225 mm	1 : 200
300 mm	1 : 300

7. Permissible minimum velocity is ,6 metres per second in 150 mm sewer at a peak flow of 3 x ADWF.

8. Manholes are to be spaced as follows:

PIPE	MANHOLE SPACING
150 mm	90 metres
225 mm or larger diameter	120 metre

SEWAGE TREATMENT WORKS

1. Maturation ponds are the first choice for sewage treatment works.

3/...

2. When the anticipated cost of treatment works approaches $100 000 serious consideration must be given to the use of aerated lagoon systems.

3. Maturation ponds are to be designed according to the C.S.I.R. report "AT 34 by Meiring, Drews, van Eck and Stander.

4. New pond systems are to have screens and grit channels. Anaerobic pretreatment ponds are to be used when works can be located 300 metres from the nearest dwelling.

5. When considering the upgrading of existing pond systems the use of anaerobic pretreatment must be evaluated before the extension of the pond system.

6. Provision must be made for the irrigation of effluent from the treatment works by either the disposal of effluent to commercial farmers or the irrigation of wood-lot areas.

7. All treatment works will be designed in accordance with guidelines laid down by the Ministry of Water Development.
"Guidelines for the disposal of sewage and sewage effluent during wet weather". Ref. C/5/20

8. All treatment works are to consider the ultimate development envisaged in the area and construction is to be phased. Phase 1 to cater for immediate requirements plus development envisaged over the following two years.

ANNEX I (iv)

ZIMBABWE CABINET

MINISTRY	MINISTER
Prime Minister, and Minister of Defence:	Mr Robert Mugabe
Deputy Prime Minister and Minister of Foreign Affairs:	Mr Simon Muzenda
Minister of Home Affairs:	Mr Joshua Nkomo
Minister of Manpower Planning and Development:	Mr Edgar Tekere
Minister of Finance:	Mr Enos Nkala
Minister of Justice and Constitutional Affairs:	Mr Simbi Mubako
Minister of the Public Service:	Mr Richard Hove
Minister of Labour and Social Services:	Mr Kumbirai Kangai
Minister of Local Government, Housing, and District Administration:	Dr Eddison Zvobgo
Minister of Lands, Resettlement, and Rural Development:	Dr Sydney Sekeramayi
Minister of Commerce and Industry:	Mr David Smith
Minister of Agriculture:	Mr Denis Norman
Minister of Information and Tourism:	Dr Nathan Shamuyarira
Minister of Natural Resources and Water Development:	Mr Joseph Msika
Minister of Education and Culture:	Mr Dzingai Mutumbuka
Minister of Health:	Mr Herbert Ushewokunze
Minister of Public Works:	Mr Clement Muchachi
Minister of Roads and Road Traffic, Posts and Telecommunications:	Mr George Silundika
Minister of Mines and Energy Resources:	Mr Maurice Nyagumbo
Minister of Youth, Sports and Recreation:	Mrs Teurai Ropa Nhongo
Minister of State in the Prime Minister's Office:	Mr Emmerson Munangagwa
Minister of Transport and Power:	Mr Enmount Kadungure
Minister of Economic Planning and Development:	Dr Bernard Chidzero

2/....

DEPUTY MINISTERS

Deputy Minister of Foreign Affairs:	Dr Witness Mangwende
Deputy Minister of Home Affairs:	Mr Tarisai Ziyambi
Deputy Minister of Finance:	Dr Oliver Munyaradzi
Deputy Minister of Labour and Social Services:	Mr Robson Manyika
Deputy Minister of Local Government, Housing, and District Administration:	Adv. Godfrey Chidyausiku
Deputy Minister of Lands, Resettlement, and Rural Development:	Mr Mervin Mahachi
Deputy Minister of Commerce and Industry:	Mr Moses Mvenge
Deputy Minister of Agriculture:	Dr Simba Makoni
Deputy Minister of Education and Culture:	Mrs Victoria Chitepo
Deputy Minister of Health:	Dr Simon Mazorodze
Deputy Minister of Roads and Road Traffic, Posts and Telecommunications:	Dr Naomi Nhiwatiwa
Deputy Minister of Mines and Energy Resources:	Mr Jean Ntuta
Deputy Minister of Youth, Sports, and Recreation:	Mr Cephas Msipa

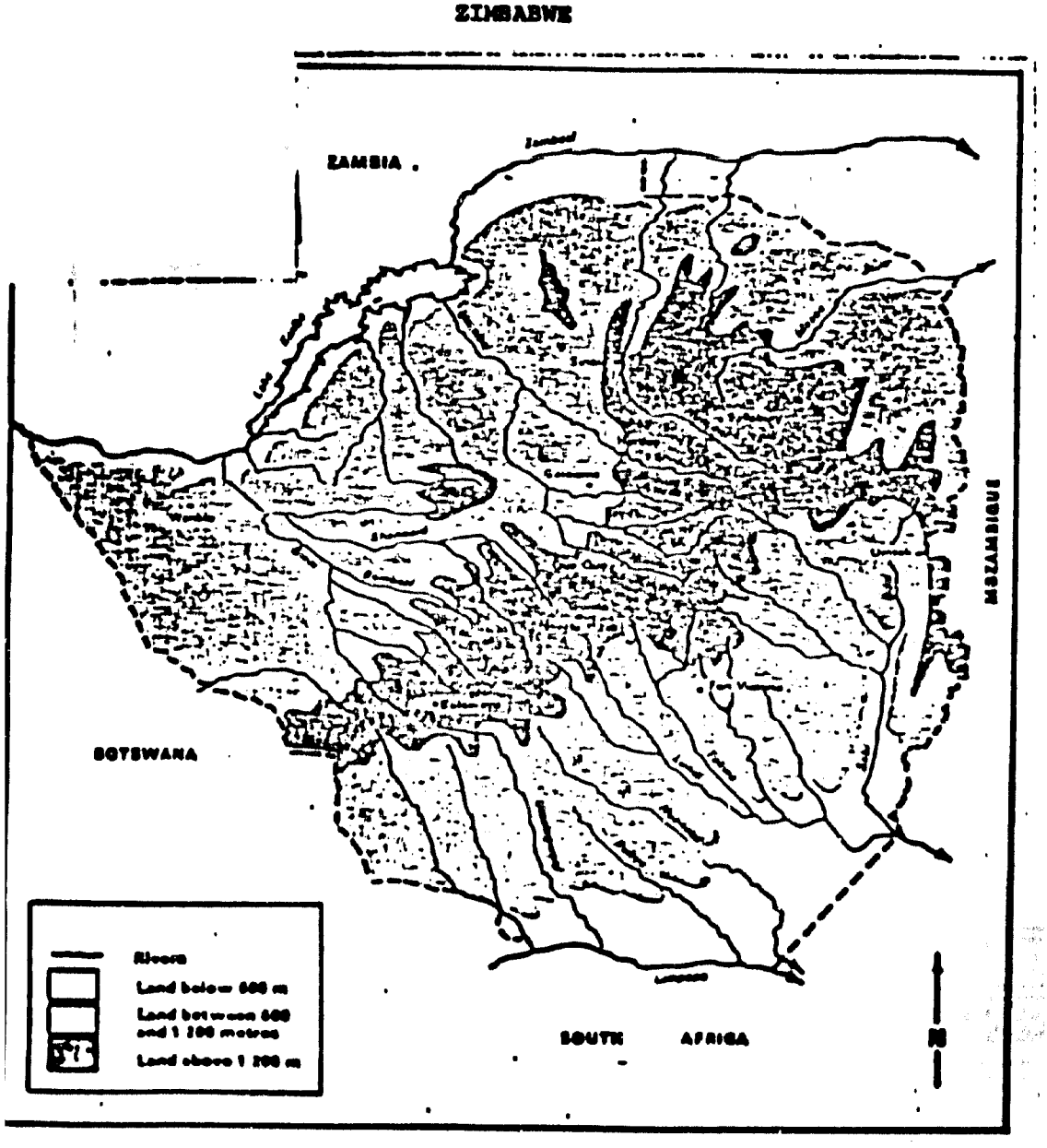
Department of Information,
P.O. Box 8150,
Causeway.

Tel: 703891

6th June, 1980

RM/CM

ANNEX 1 (v)a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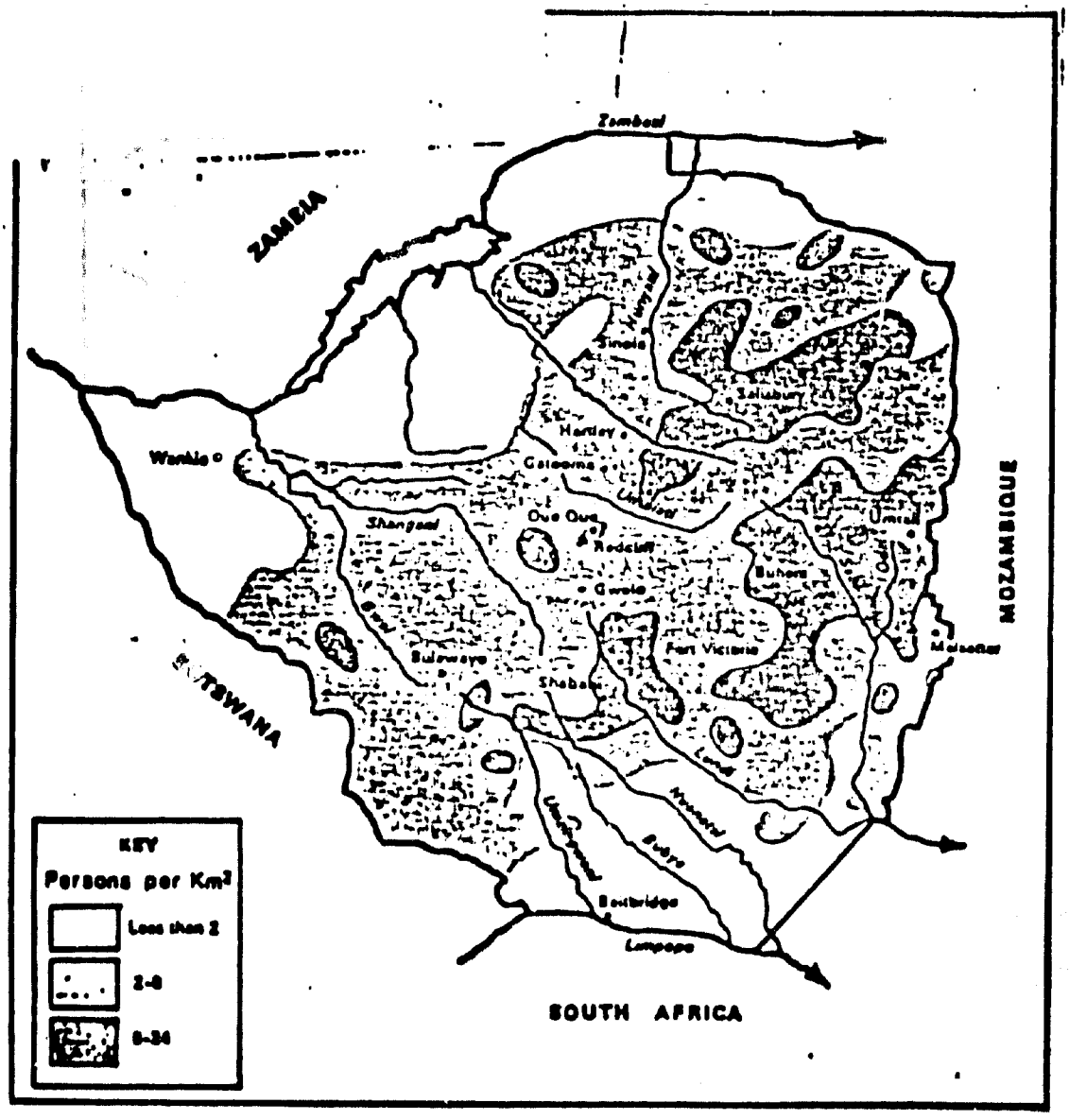
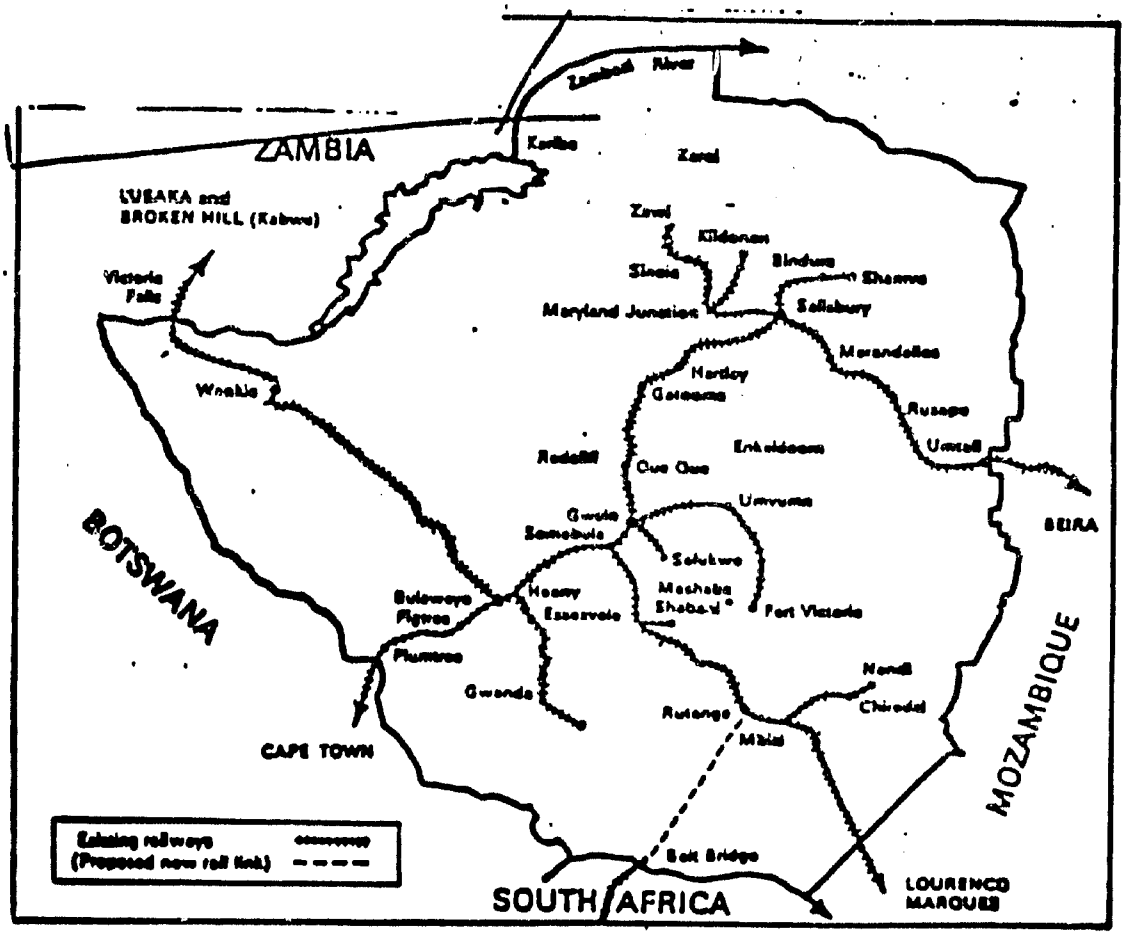
ZAMBIA
MOZAMBIQUE
BOTSWANA
SOUTH AFRICA
Rivers
Land below 600 m
Land between 600 and 1 200 metres
Land above 1 200 m
N

The Distribution of Zimbabwe's Population



The Towns and Railways of Zimbabwe



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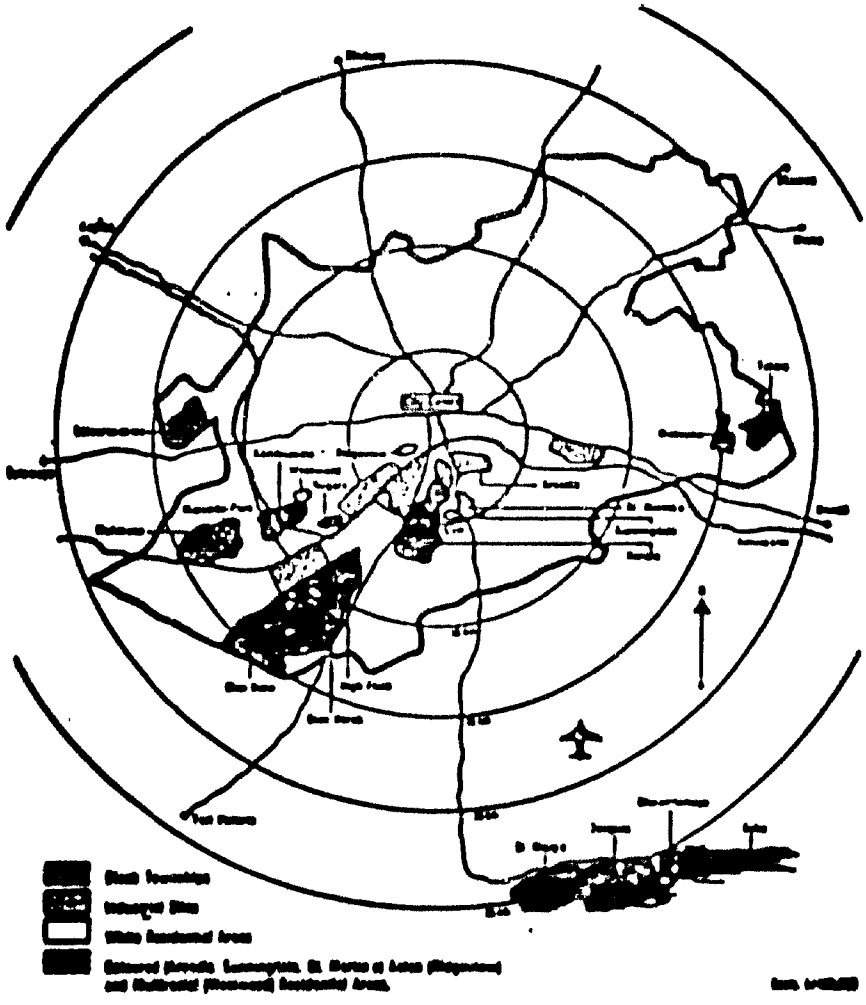


ANNEX 1 (vi)

ASSISTANCE TO SMALL SCALE INDUSTRIES

Three separate entities are involved in the field of assistance to small scale enterprises. All of them come under the direction of the Ministry of Commerce and Industry. Their activities are coordinated through the Small Enterprise Assistance Agencies Liaison (SEAL), which is a committee in the Ministry.

1. Development Finance Corporation (DFC)

This is a fully owned subsidiary of the Industrial Development Bank of Zimbabwe. Its purpose is to make loans to businessmen who cannot get credit through normal commercial channels. It has been active in urban areas with rather small scale enterprises such as small repair shops and bakeries. It is also active in rural areas where traditionally businessmen could not have full tenure to land so they could not offer normal collateral for commercial loans. It loans on commercial terms, currently 8.5 percent for three to five years. At present, there is an emphasis on rural lending because about 5,000 small businesses have been affected by the war. However, it can operate in urban areas and it would be an appropriate organization to coordinate with to bring financial assistance to SSE's on AID project sites.

2. Small Industries Advisory Service (SIAS)

This is an agency within the Ministry of Commerce and Industry which offers technical assistance and training to small industries. It too is pressing to decentralize its operations outside of Salisbury and Bulawayo. However, it would be an appropriate organization to coordinate with to bring assistance to AID project sites. There is frequent collaboration between the SIAS and lending by the DFC.

3. Institute of Business Development (IBD)

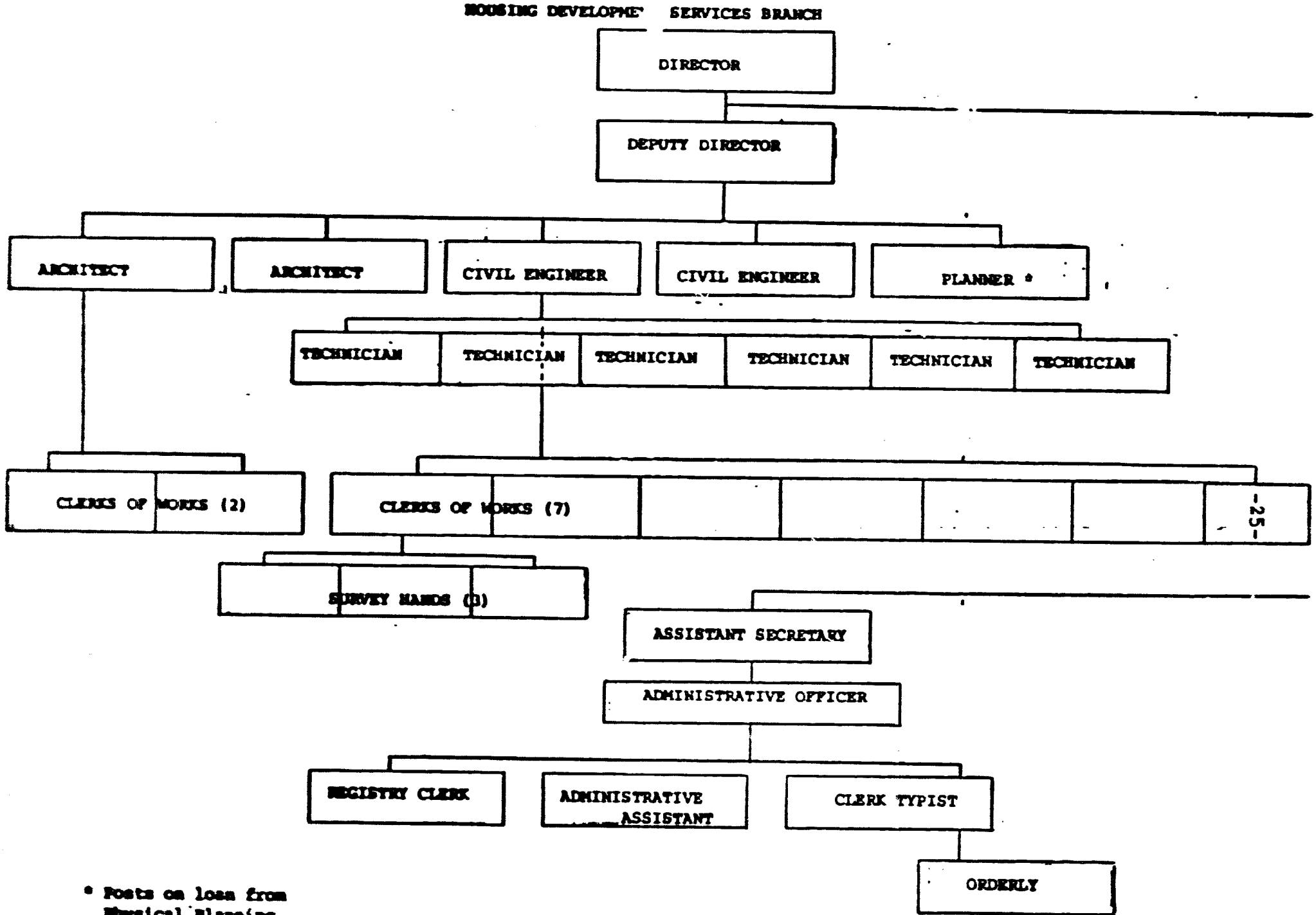
This organization has been sponsored in the past by the Ministry of Commerce and Industry, but the Chamber of Commerce of Zimbabwe has been the real driving force. It has now been taken over by the Chamber of Commerce in order to be able to raise funds from domestic and international private sector sources. The Government will continue to contribute Z$50,000 per year for the next three years.

The IBD provides training and technical assistance for small commercial enterprises. It concentrates on commercial

enterprises as opposed to industrial enterprises which are served by the SIAS. In the past, it has focused on activities in Salisbury, largely because of limits in funding. It is now planning to expand its operations to have a total of 18 small business consultants and 20 training officers. It also works in collaboration with financing from the DFC.

ANNEX 2

ORGANIZATION CHARTS FOR THE MINISTRY OF LOCAL GOVERNMENT AND HOUSING (MLGH), THE HOUSING SERVICES DEVELOPMENT BRANCH (HDSB) AND THE DEPARTMENT OF PHYSICAL PLANNING


HOUSING DEVELOPME' SERVICES BRANCH
DIRECTOR
DEPUTY DIRECTOR
ARCHITECT
ARCHITECT
CIVIL ENGINEER
CIVIL ENGINEER
PLANNER *
TECHNICIAN
TECHNICIAN
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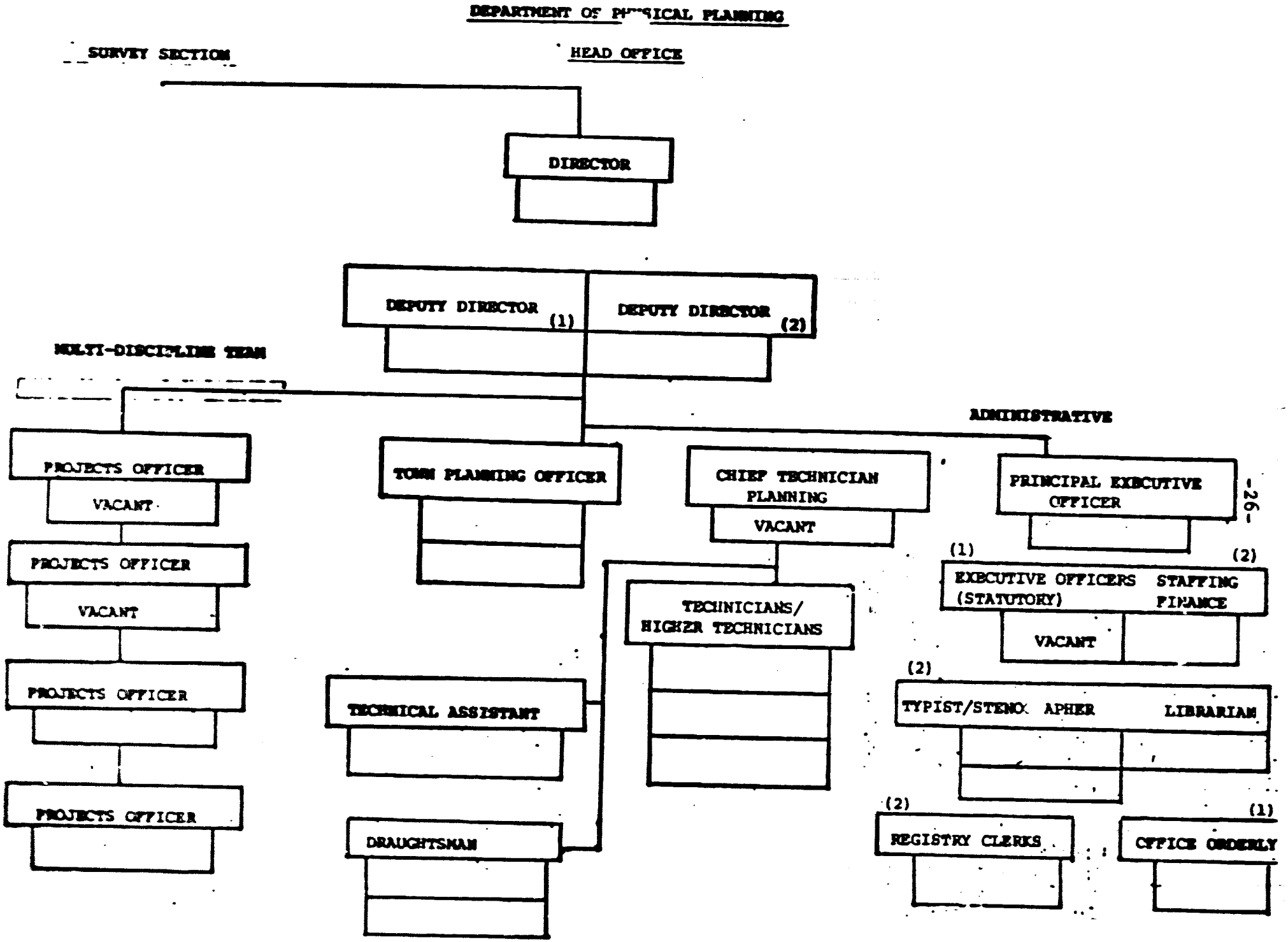
CLERKS OF WORKS (7)
SURVEY HANDS (3)
ASSISTANT SECRETARY
ADMINISTRATIVE OFFICER
REGISTRY CLERK
ADMINISTRATIVE ASSISTANT
CLERK TYPIST
ORDERLY
* Posts on loan from Physical Planning


DEPARTMENT OF PHYSICAL PLANNING
SURVEY SECTION
HEAD OFFICE
DIRECTOR
DEPUTY DIRECTOR (1)
DEPUTY DIRECTOR (2)
MULTI-DISCIPLINE TEAM
ADMINISTRATIVE
PROJECTS OFFICER
VACANT
PROJECTS OFFICER
VACANT
PROJECTS OFFICER
PROJECTS OFFICER
TOWN PLANNING OFFICER
CHIEF TECHNICIAN PLANNING
VACANT
TECHNICIANS/ HIGHER TECHNICIANS
TECHNICAL ASSISTANT
DRAUGHTSMAN
PRINCIPAL EXECUTIVE OFFICER
(1)
(2)
EXECUTIVE OFFICERS (STATUTORY)
STAFFING
FINANCE
VACANT
(2)
TYPIST/STENOGRAPHER
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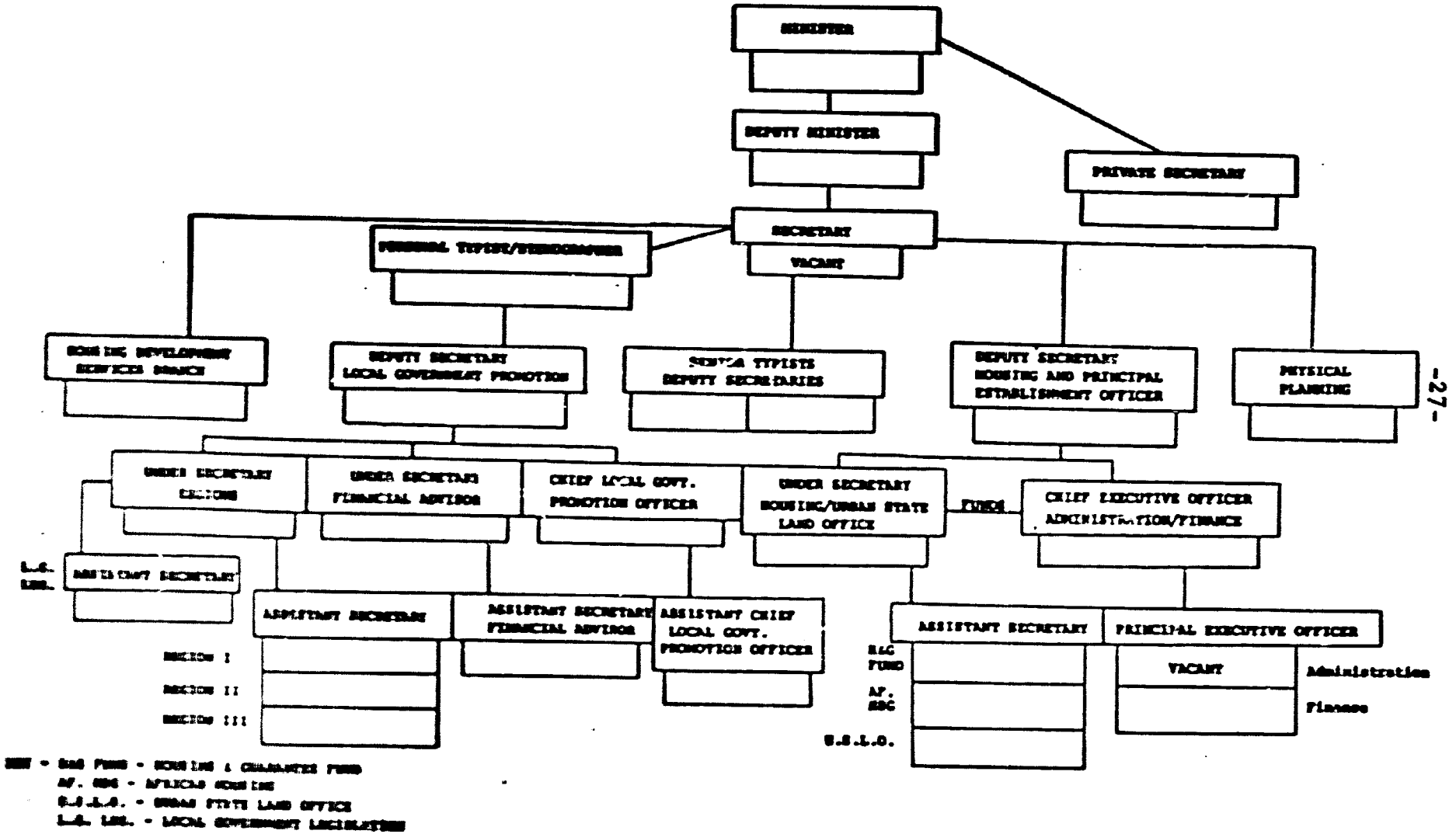
OFFICE ORDERLY

LOCAL GOVERNMENT AND HOUSING 1980 ESTABLISHMENT CHART
(including Physical Planning and Housing Development Services Branch)



ANNEX 5

HOUSING PLAN OF GOZ

ZIMBABWE GOVERNMENT

MEMORANDUM BY THE MINISTRY OF LOCAL GOVERNMENT AND HOUSING May 1980

Five Year Plan : Low Cost Housing Construction Programme 1980/85

1. The present backlog of low-cost housing is 37 000 units. This is in reality the number of names of heads of families, placed on a register kept for the purpose in each urban area, application having been made for housing. In each case the applicant has satisfied the registering authority that he is employed in the urban area.

2. The concern of the Ministry of Local Government and Housing is with several factors. Combined they have been employed to determine both a policy and a plan to get on top of the backlog and to cope with urban growth. These factors are -

(1) Housing must be of a standard which is durable, i.e., will last for some 40-50 years at least.

(2) Housing must be of a cost which the different income groups can afford to occupy.

(3) Services which include reticulated fresh (treated) water supplies, a reticulated sewerage system and good standard roads must be provided.

(4) Each house must be capable of being sold to the occupant, if only on a basis of lease with option to purchase - resulting in freehold tenure.

(5) The present backlog (which is small by world standards) must be capable of being satisfied within the first 5 years of a building construction plan.

(6) Estimated growth of industrial and commercial development in the urban areas must be catered for, year by year, together with an allowance for the usual drift from rural to urban areas.

(7) The first essential is to provide housing which gives adequate shelter from cold in winter and rain in summer, and provides an electric fuel supply to whatever income group occupies each building standard adopted.

3.(1) The attached memorandum discusses the various factors outlined above, and sets out a plan of the financial implications to achieve a full programme, assuming that the necessary financial resources

2/...

are available. These are given in paragraph 19 as -

Year 1	R 72 923 130
Year 2	121 512 146
Year 3	147 308 303
Year 4	181 916 540
Year 5	214 305 898
Total	R 737 966 017 (US$1.2 billion)

Allowance has been made for escalating building costs.

(2) The plan is capable of easy adjustment, should the necessary finance not be available. For example in Year 1 (1980/81), the present programme envisages some £42 m. Thus a further £30m would be required from July, 1980 to June 1981 for the more ambitious 5-year plan. If, however, the £30m is not available, the plan must be cut across the board by 42%, or 11 500 units less than the 27 400 referred to in paragraph 13 of the attached memorandum. The £42m available in 1980/81 will be allocated to local authorities.

4. The 5 year plan in the attached paper must be regarded, therefore, as a policy which is designed to be flexible and at the same time to make the best use of the financial resources available to the public sector. To be effective, it should be adopted as a directive to the local authorities which are to implement the plan.

Ministry of Local Government and Housing

May 1980

ZIMBABWE GOVERNMENT

MEMORANDUM BY THE MINISTRY OF LOCAL GOVERNMENT AND HOUSING.

ESTIMATE OF LOW-COST HOUSING NEED - 1980-1985.

TABLE 1.

	Housing Need Criteria	Income Groups		
		$800 - $1100	$1100 - $1600	$1600-$2200
1.	Percentage of wage earners in each group (a) *	50	20	12
2.	Wage earners apportioned as percentage of demand for public housing (b)*	61	24,5	14,5
3.	Monthly rent paying capacity @ 22½ per cent. of wage	$15 - $20	$21 - $30	$31 - $50
4.	Monthly payment for services (supplementary charge) $/unit Land/Roads cost - $/unit (c)*	8,00 2,50	8,00 2,50	8,00 2,50
5.	Money available for house repayments-$/unit per month (3-4)	4.50 - 10,50	10,50 - 19,50	19,50 - 40,00
6.	Cost of house based on repayments capacity - cost amortised @ 8 per cent.over 25 years - $ per unit	580 - 1360	1360 - 2525	2525 - 5245
7.	Type of house related to payment capacity	Ultra low-cost - 2 rooms.	"Standard" Core,1-2 rooms	"Standard" house, 2-3 bedrooms
8.	Cost of house assumed for estimating purposes - $ (d) *	800	1 600	2 800
9.	Cost of services - $/unit : (i) external trunk services $ (ii) internal services (e)* -$	 500 500	 500 500	 500 500
10.	Total development cost per unit - $ (f)*	1 800	2 600	3 800
11.	Professional fees @ 7 per cent. - $	120	180	270
12.	Total cost per unit - $	1 920	2 780	4 070

* See Notes

13. To satisfy the existing national 'official' backlog of 37 000 low-cost housing units and to achieve the goals of the Five Year Development Programme calls for the building of 167 000 houses over the next five years. It is proposed that the development programme should be phased on an incremental basis over the five year period as follos (This should be related to the present rate of construction of about 15 000 units per annum):

Year 1	27 400 units
Year 2	30 400 units
Year 3	33 400 units
Year 4	36 400 units
Year 5	39 400 units
Total	167 000 units for five year period

TABLE 2

COST ESTIMATE OF FIVE YEAR DEVELOPMENT PROGRAMME

14.

	HOUSE TYPE			TOTALS
	Ultra low-cost, 2 room (61%)	Standard Core 1-2 room (24,5%)	Standard 2-3 bedroom 14,5%	
Year 1 - units	16 714	6 713	3 973	27 400
Unit Cost $	1 920	2 780	4 070	
Costs, Year 1, $	32 090 880	18 662 140	16 170 110	66 923 130
Year 2 - units	18 544	7 448	4 408	30 400
(g) Unit Cost + 15%	2 208	3 197	4 680	
Costs, Year 2 - $	40 945 150	23 811 256	20 629 440	85 385 846
Year 3 - units	20 374	8 183	4 843	33 400
Unit cost + 15%	2 539	3 677	5 382	
Costs - Year 3 $	51 729 586	30 088 891	26 065 026	107 883 503
Year 4 - units	22 204	8 918	5 278	36 400
Unit cost + 15%	2 919	4 229	6 189	
Costs, Year 4-$	64 813 476	37 714 222	32 665 542	135 193 240
Year 5 -Units	24 034	9 653	5 713	39 400
Unit Cost + 15%	3 357	4 863	7 117	
Costs, Year 5 $	80 682 138	46 942 539	40 659 421	168 284 098
TOTAL COST $	270 261 230	157 210 048	136 189 539	563 669 817
PERCENTAGE OF TOTAL COST	48%	28%	24%	167 [illegible]

15. NOTES ON ESTIMATES

(a) The percentage of wage earners in each category is calculated on this basis of the present distribution of income of employees (excluding agricultural, mining and domestic workers). See Appendix I which illustrates wage distribution related to affordable housing.

(b) The Estimated demand for public housing excludes-

(i) highest 3% of wage earners who can borrow from building societies for houses costing $6000 and over;

(ii) lowest 15% of wage earners who would be housed as lodgers or in accommodation provided by employers, etc.

(c) Service charge is based on a relatively high figure as this varies around the country between $5,50 to $8,50; it includes repayment for the cost of the installation of sewerage and water reticulation. It can be anticipated that in the near future service charges will increase as wages are increased. Land/Road costs are added separately on the basis of current practice by the Ministry of Local Government and Housing where capital costs are amortized at 8% over 15 years. This cost varies from place to place depending on the cost of acquisition of land.

(d) The cost of the house structure is calculated on the basis of an estimated 'national average' allowing for impending increases in wages and thus labour costs.

(e) The cost of services takes into account the cost of sewage disposal works and water storage/purification works.

(f) Cost estimates do not include administrative/overhead charges levied on housing development projects by some local authorities.

(g) Unit costs are increased on the basis of a 15% per annum rate of escalation.

16. ADDITIONAL COSTS

Loans for upgrading and extending core houses

Funds are required to provide loan facilities for owners of ultra low-cost houses and standard construction core houses in order to facilitate the upgrading of the ultra low-cost houses and the provision of additional rooms for both types of house. Extensions carried out by small contractors are costing roughly $1000 per room whilst the same extensions undertaken as part of the initial mass housing contract cost about $400 per room. It is assumed that owners of standard core houses would wish to provide three additional rooms whilst the owners of ultra low-cost houses would wish to upgrade these houses and provide at least two additional rooms. The following are suggested figures for loans to assist in this process:

Standard core houses - $ 1 500
Ultra low-cost houses - $ 1 200.

/-4- ....

17. It is proposed that such funds should be made available from Year 2 as follows (based on core and ultra low-cost houses built the previous year).

TABLE 3

	Ultra Low Cost House $	Standard Core Houses $
Year 2	20 056 800	10 069 500
Year 3	22 252 800	11 172 000
Year 4	24 448 800	12 274 500
Year 5	26 644 800	13 377 000
Total	93 403 200	46 893 000

Total for loans for upgrading and extensions : $140 296 200.

18. Electrification of existing housing stock

It is estimated that about 100 000 houses urgently required electrification. This is mainly because of the high cost of fuel and the reduced availability of firewood. The cost is estimated at about $300 per house, a total cost of $30 000 000. This should spread over the five year period at $6 million per year.

SUMMARY OF FINANCIAL REQUIREMENT FOR LOW-COST HOUSING, 1980/85.

19. Based on Tables 1, 2 and 3, the following are the minimum annual financial requirements to implement the Five Year Development Programme proposed in these estimates.

Year 1	$ 72 923 130
Year 2	121 512 146
Year 3	147 308 303
Year 4	181 916 540
Year 5	214 305 898
Total	$ 737 966 017

Say, $737,966 million

20. Aided Self-help Programme

The Ministry of Local Government and Housing is currently examining the creation of an aided self-help programme to encourage a maximum input by lower income people. This will involve technical aid, credit facilities, the provision of basic building materials and equipment and a skilled labour input. It is intended to establish a pilot project in the near future although cost estimates for this are not included here. However, it is not anticipated that such an aided self-help programme will have a significant impact on the development programme within the five year period.

Ministry of Local Government and Housing.
16th May, 1980.

ANNEX 4

AFFORDABILITY ANALYSIS FOR HDSB DWELLING TYPES

ANNEX 4

AFFORDABILITY ANALYSIS FOR HDSB DWELLING TYPES
AUGUST 1980

ITEM	HDSB DWELLING TYPE		
	ULTRA LOW COST (2 Rooms)	"STANDARD" CORE (1-2 Rooms)	"STANDARD" HOUSE (2-3 Bedrooms)
Dwelling Unit Area (m^2)	20.7	24.0	41.9
Unit Cost of Dwelling Unit (Z$/$m^2$)	36.2	65.0	65.0
Total Cost of Dwelling Unit (Z$)	750	1,560	2,724
Site Development Costs for Storm Drains and Roads (Z$)	400	400	400
Total Site Development Costs (Z$)	700	700	700
Total Amortized Development Costs (Z$)[1]	1,293	2,037	3,182
Total Development Costs (Z$)	1,514	2,333	3,489
Professional Fees (7% of Total Development Costs) (Z$)[2]	106	163	244
Total Amortized Development Costs (Including Professional Fees)(Z$)	1,314	2,201	3,426
Total Development Costs (Including Professional Fees)(Z$)	1,620	2,496	3,733
Total Amortized Monthly Payment (Z$)	10.14	16.99	26.45
Total Monthly Payment (Including Supplementary Charges)(Z$)[3]	17.14	23.99	33.45
Corresponding Monthly Income (Z$)[4]	62.33	87.24	121.64
Income Percentile (%)[5]	36	55	77

NOTES:

[1] Housing Services Development Branch present practice dictates the amortization of costs relating to the core unit, site development of storm drains and roads, land, connection fees and professional fees.

[2] Included in Capital Cost Recovered from Beneficiaries.

(continued next page)

NOTES (continued)

[3] Presently the Salisbury City Council collects a monthly series of charges to cover the administrative costs of low income housing scheme programs; capital costs and maintenance for public lighting, sewerage, water supply, electricity and refuse collection; and the maintenance costs for storm drains and roads. Preliminary estimates for these charges for the housing scheme under consideration totaled US$26.91 (Z$16.82). Water and electricity charges are not included in affordability calculations. The remaining monthly supplementary charge of US$17.20 (Z$10.75) is decreased to US$11.20 (Z$7.00) based on likely reductions anticipated from HSDR and Salisbury City Council negotiations.

[4] The income percentile to which a particular unit type is affordable is based on the updated June 1980 wage distribution for the black population of Salisbury and the assumption that 27.5 percent of the wage income is spent on the monthly amortization payment and supplementary charge (recently revised upward from 22.5 percent August 22, 1980).

[5] Based on Salisbury's black employees cumulative wage distribution presented in Figure ___.

SOURCE: PADCO Elaboration of HDSB-provided information.

ANNEX 5

GRADE "B" BUILDING SOCIETY SPECIFICATIONS

ANNEX 5

CENTRAL AFRICA BUILDING SOCIETY

GRADE 'D' MINIMUM SPECIFICATION FOR SINGLE STOREY BUILDINGS

1. PREAMBLE

(a) It is a requirement of this specification that the following features are embodied in the design :-
  (i) Permanent floor coverings to all living rooms of vinyl, wood parquet or other approved material.
  (ii) Internal wall faces to be plastered.
  (iii) Complete house to be ceiled with an approved material.
  (iv) Bathroom to be provided with built-in bath, wash-hand basin and water closet pedestal.
  (v) Kitchen to be provided with stainless steel sink and built-in cupboard units with a minimum capacity of $0,8m^3$ excluding any pantry.
  (vi) Electrical power points in each living room and kitchen. Electrical lighting points in each compartment.
  (vii) An approved domestic hot water system.

(b) It is intended that this specification will permit the use of proprietary methods of building construction and pre-fabricated designs provided that :
  (i) In the Society's opinion, they are not inferior to this specification.
  (ii) They conform to the definition of urban immovable property in terms of the Building Societies Act, and
  (iii) Have received the approval of the Local Authorities.

2. DEFINITIONS

(a) "APPROVED" means "approved by the Society"
(b) "SOCIETY" means "the Central Africa Building Society".

3. METRICATION

This specification has been prepared in accordance with the following publications :-

(i) METRIC DIMENSIONS OF MATERIALS AND COMPONENTS
Compiled by and obtainable from :
The Rhodesian Institute of Architects,
P.O. Box 3592, Salisbury,
and
The Institute of Rhodesian Quantity Surveyors,
P.O. Box 2124,
Salisbury.

(ii) BASIC GUIDE TO THE METRIC SYSTEM IN RHODESIA
Issued by the Metrication Council and obtainable from the Government Printer, Salisbury.

(iii) INTRODUCTION TO CONCRETE
Issued by the Portland Cement Institute Central Africa,
P.O. Box 2234,
Bulawayo
and

The Colonnade,
Umtali Road,
Salisbury.

All contractors are recommended to obtain copies of the above publications.

4. NOTES

(a) This specification gives minimum requirements, but clients may make reasonable variations therefrom with the prior consent in writing of the Society.
(b) All work is to comply with Government or Local Authority by-laws, and with plans submitted to the Society and approved by the relevant authority. The work is to be to the satisfaction of the Society's representatives who shall have the right to open up any concealed work which has not been approved. The cost of opening up and making good is to be borne by the contractor.
(c) Where the provisions of this specification conflict with Government or Local Authority by-laws, then the latter must be complied with provided that they are not inferior to the Society's requirements.
(d) All materials must be of an acceptable quality, free from defects and are to be approved by the Society's representative.
(e) The use of second-hand materials will not be permitted for any work of a permanent nature except as authorised by the Society's representative.
(f) No variation from the approved plans may be undertaken without the approval of the Society and the Government or Local Authority concerned.
(g) Before any payment can be made by the Society a Builder's Waiver of Lien is to be completed and signed by the contractor and the approved plans submitted for scrutiny.

5. INSPECTIONS

Not less than twenty-four hours notice is to be given to the Society when inspections are required and these are to be as follows :
(a) when the excavated trenches are ready to be concreted and level pegs are in position;
(b) when the hardcore is laid before any concrete slab is poured;
(c) when the roof structure is in position before the roof covering or ceilings are fixed;
(d) when the structure is completely finished, but before the applicant takes occupation.

The inspections quoted above are the minimum requirement and in its discretion the Society will undertake others, including inspections arising from a request for funds by the borrower.

6. SPECIAL FOUNDATIONS

Where in unstable ground or in special circumstances the trenches and foundations may be required to be altered to suit particular conditions, the foundations are to be designed and supervised by an approved practising structural engineer, and on completion, the structural engineer will be required to sign the form of certificate attached hereto.

7. EXCAVATOR

(a) SITE
The site is to be cleared of all rubbish and vegetation and roughly levelled; It is to be examined for termite workings and, if any are found, treatment is to be carried out in accordance with the Standards Association of Central Africa Specification CAS CA 7.

(b) TRENCHES
These are to be excavated under all walls until a solid bottom is obtained, but in any event to a minimum of 460 mm below ground level. Bottoms must be level, stepped WHERE NECESSARY (to be avoided if possible) and well rammed. The minimum width of trenches is to be 610 mm under 230 mm walls and 460 mm under 115 mm walls.

8. CONCRETOR AND BRICKLAYER

MATERIALS

(a) CEMENT
(i) All cement to comply with the Standards Association of Central Africa Specification CAS A46.
(ii) Portland cement 15, normal portland cement and portland blastfurnace cement may be used in all concrete and mortar work except that the use of portland blastfurnace cement for plastering and floor screeds is not permitted.
(iii) All cement is to be stored under cover to prevent deterioration and used in order received.

(b) SAND (FINE AGGREGATE)
(i) Fine aggregate for concrete is to comply with the Standards Association of Central Africa Specification CAS A34.
(ii) "Sand" for concrete is to be clean sound river and/or pit sand and/or crusher sand. Sand for mortar or plaster is to be clean sound river and/or pit sand. All materials are to be free from deleterious substances and are to be protected from contamination on site.
(iii) Sand containing a high proportion of clay is not acceptable.

(c) STONE
(i) Stone for concrete is to comply with the Standards Association of Central Africa Specification CAS A34.
(ii) Stone for concrete is to be clean, free from clay and other deleterious substances.
(iii) Stone for foundations, floors, steps, lintels and reinforced concrete shall be 20 mm.

(d) "READY-MIXED" CONCRETE
Ready-mixed concrete may be used provided that it complies with the strength requirements of this specification and is produced in accordance with the South African Bureau of Standards Specification SABS 878.

(e) REINFORCEMENT
All reinforcing steel is to be clean and free from grease, millscale, rust, etc.

(f) BRICKS AND BLOCKS
(i) Burnt clay building bricks and blocks to comply with the Standards Association of Central Africa Specification CAS A35.

(ii) Precast concrete blocks to comply with the Standards Association of Central Africa Specification CAS A9.

(iii) Cement bricks to comply with the Standards Association of Central Africa Specification CAS A41.

(iv) "Only concrete blocks and cement bricks produced by a manufacturer licenced to use the certification mark of the Standards Association of Central Africa will be permitted".

(g) LIME

Lime for mortar is to comply with the Standards Association of Central Africa Specification CAS A15.

9. CONCRETE MIXING AND PLACING

(a) Aggregates for concrete are to be measured only in standard 30 litre gauge boxes, e.g., the term 4 parts or 5 parts refers to 4 x 30 litres or 5 x 30 litres. No other form of container for the measurement of aggregate will be permitted. The measurements of a standard 30 litre gauge box are as follows:-
300 x 300 x 330 mm deep.
Cement for concrete is to be measured only by the sack or half sack. If half sack measures are used, the number of measures of aggregate must be reduced to half the number specified for the mix.

(b) The grades of concrete referred to in this specification are the characteristic compressive cube strengths in megapascals (MPa) at 28 days' maturity. The characteristic strength of concrete is that 28 day cube strength below which not more than 5% of the test results are permitted to fall. Unless otherwise approved mixing is to be carried out in a mechanical batch-mixer capable of producing a uniform mix. The minimum mixing time is 2 minutes. Concrete is to be placed in position within 45 minutes of mixing and thoroughly compacted into position. The concrete is to be free from honeycombing. The concrete is to be kept damp, or otherwise cured, for a minimum period of 4 days.

10. FOUNDATIONS (GRADE 10 CONCRETE)

Foundations are to be of concrete composed of :

Cement	1 sack
Sand	4 parts
Stone 20 mm	5 parts

Foundation concrete is to be reinforced to the approval of the Society when necessary. Foundation concrete is to be not less than 230 mm thick. The foundation concrete is to be the same width as the trenches, stepped and levelled as required, the steps to be of an even height not exceeding two brick courses or one block course with overlaps of not less than the width of the foundation. Foundation concrete of chimneys is to be in proportion to that of the walls.

11. FOUNDATION WALLS

(a) Foundation walls are to be of brick, solid block or stone laid in cement mortar, or of Grade 10 concrete.
(b) Foundation walls under 115 mm brick or 150 mm block external walls shall be 230 mm thick.

12. PLINTH

External wall faces below damp course level are to be :-
(a) Plastered brick or concrete, painted two coats bituminous paint, or
(b) Face brickwork, or
(c) An approved proprietary finish.

13. FILLING UNDER SOLID FLOORS

(a) Good quality non-expansive materials are to be used for filling. These materials shall be free from top soil, grass and all other fibrous or organic matter. All filling is to be adequately watered and well rammed down in layers not exceeding 150 mm. On no account may materials be used which contain black cotton soil or expansive clay.
(b) Immediately under the concrete slab, a minimum thickness of 75 mm of hardcore is to be provided. The hardcore may be composed of well burnt broken brick, clinker ash, crushed stone or other approved non-expansive material. The hardcore is to be well rammed and adequately watered immediately before pouring any concrete.
(c) With prior approval of the Society, where the sub-soil and filling consist of non-expansive materials, hardcore may be omitted and a membrane of 0,15 mm polythene sheet laid on a carefully prepared smooth surface in accordance with Standards Association of Central Africa Specification CAS 16.

14. GROUND FLOOR SLAB (GRADE 15 CONCRETE)

The ground floor slab is to be 90 mm minimum thickness constructed as independent slabs between the walls and of concrete composed of :-

Cement	1 Sack
Sand	3 Parts
Stone 20 mm	4 Parts

Floor slabs exceeding 12 m^2 in area shall be reinforced with one layer of weldmesh Ref. 125 placed 10 mm below top of slab.

15. AIR BRICKS OR PERMAVENTS

These are to be provided in accordance with local authority requirements, but care must be taken to ensure that air bricks do not impair the strength of the structure.

16. DAMP PROOF COURSE

(a) All damp proof courses are to comply with the Standards Association of Central Africa Specification CAS A25 Parts 1 to 3.
(b) HORIZONTAL
This is to be approved bituminous felt, of not less than 3 250g/m^2 or polythene sheet having a thickness of at least

0,46 mm and is to be laid on a smooth surface under all walls to the full width of the walls. At ends, angles and intermediate junctions the damp course must overlap for the full thickness of the walls. The damp proof course is to be at a minimum height of 175 mm above ground level.

(c) VERTICAL

In all walls between changes of floor level, or walls of which the internal face is exposed below the horizontal damp proof course or below ground level, a vertical damp proofing of bituminous felt of not less than 3 250 g/m² or polythene sheet having a thickness of at least 0,25 mm is to be provided to the satisfaction of the Society's representative. Vertical damp proofing in walls is to be protected with 115 mm brickwork.

17. BRICKWORK AND BLOCKWORK

(a) All brickwork is to be properly bonded, built plumb and true. All brickwork is to rise uniformly, no part exceeding 1,5m above another; all walls are to be raked back, block bonding and toothing is not allowed. Concrete blocks and cement bricks are to be laid dry and where hollow burnt clay and concrete blocks are used mortar "shell bedding" is permitted. Where required by the Society's representative, brick reinforcement is to be built in as directed. Where walls are not plastered, joints are to be pointed (weatherstruck, flush or recessed). All external walls are to have beam filling carried up hard to the underside of roof covering, except in cases of enclosed eaves.

(b) External and internal walls are to be 115mm nominal thickness in solid brick or hollow clay block or 150mm hollow concrete block.

(c) External walls for houses with cement tile roofs shall be 230mm solid brickwork unless the roof load is supported independently of the walls.

(d) With prior approval of the Society, precast concrete wall units may be used provided that the structure so formed is of a permanent and immovable nature.

18. MORTARS

Mortar is to be composed of 1 part cement to 6 parts sand, measured by loose volume. This is equivalent to 1 sack cement to 0,27m³ sand. Mortar is to be mixed in small quantities and used within 45 minutes without retempering. Where a plasticiser is to be used, the manufacturer's written instructions must be strictly followed. Plasticisers, or the addition of building lime, are recommended particularly when cement bricks or concrete blocks are to be used.

19. CHIMNEYS AND FIREPLACES

The minimum size of the flue is to be 230 x 230 mm corbelled as necessary. All brickwork around chimneys is to be not less than 230 mm thick and the inside of the flue is to be parged and coved as work progresses. The height of the chimneys is to be not less

than the level of the nearest ridge, and must be properly weathered. Where bends are put in they are to be as slow as possible. Fireplaces are to be constructed of approved materials and openings are to be properly formed, gathered and throated, and provided with a suitable hearth. Proprietary fireplaces and flues may be used in accordance with the manufacturer's written instructions.

20. EXTERNAL WINDOW CILLS

External cills are to be of quarry tiles, face brick on edge, cement concrete or other approved material. All cills are to have an adequate slope and are to project not less than 25mm beyond face of wall.

21. LINTELS

(a) Brick reinforcement may be used subject to the following:-

(i) The bricks in lintels are to be specially selected for hardness and in 230mm walls the lowest course of the brick lintel must be headers. All courses must be thoroughly grouted.

(ii) The mortar in lintels is to be composed of 1 part cement to 4 parts sand by loose volume.

(iii) The height of lintels and the numbers of rows of brick reinforcement of the appropriate width is to be as set out below and the length of the lintel and reinforcement is to be not less than 700mm greater than the span of the opening.

Span	Number of Brick Courses	Number of Rows Reinforcement
Up to 1510 mm	3	2
*1 510 mm to 2 000 mm	4	3
*2 000 mm up to 2 490 mm	5	4

*Brick lintels may only be used for spans in excess of 1 510 mm with special permission of the Society.

(iv) Adequate temporary centering is to be provided.

(b) Concrete lintels are to be Grade 20 concrete composed of :-

Cement	1 sack
Sand	3 Parts
Stone	3 Parts

Mild steel reinforcement of not less than the number and diameter of bars, as set out below, is to be used as bottom steel with 20 mm concrete cover :-

Span	Reinforcement per 115 mm width of lintel
Up to 1 020 mm	1 No. 6mm diameter
Exceeding 1 020 mm and not exceeding 1 510 mm	1 No. 12mm diameter
Exceeding 1 510 mm and not exceeding 2 000 mm	1 No. 16mm diameter
Exceeding 2 000 mm and not exceeding 2 490 mm	2 No. 12mm diameter

Lintels are to bear not less than 230mm on either side of openings and are to be not less than two courses deep up to 1 510mm span and three courses deep over openings exceeding 1 510mm and not exceeding 2 490 mm span. The concrete and

reinforcement in lintels of spans in excess of 2 490mm, specially shaped lintels, cantilever lintels and hood slabs are to be designed by an approved structural engineer.

(c) Proprietary precast lintels of approved manufacture may be used in accordance with the manufacturer's printed instructions, including size and bearing.

22. STEPS

(a) Steps are to be of :-
(i) brickwork or
(ii) Grade 10 concrete composed of :-

Cement	1 part
Sand	4 Parts
Stone	5 Parts

Steps are to be built on approved foundations with granolithic or other approved finish. Treads with granolithic finish are to be reeded.

(b) All risers in each flight are to be the same height. Risers shall not exceed 180 mm and treads shall not be less than 230 mm. It is recommended that two risers plus one tread should equal between 530mm and 610mm.

23. ROOF AND SURFACE WATER DRAINAGE

If the roof is not fitted with rainwater gutters, an apron is to be provided under all eaves of 75 mm thick concrete extending not less than 300 mm beyond a line dropped vertically from the edge of the roof overhang and with a slope away from the building of not less than 1 in 8. Adequate provision is to be made to direct surface water well away from the building.

24. REINFORCED CONCRETE STRUCTURES

All reinforced concrete is to be completed in accordance with plans submitted by and to the specification of an approved practising structural engineer. All shuttering is to be approved and substantial and all joints are to be close enough to prevent leakage of concrete. Before commencing concreting, shuttering is to be cleaned. No shuttering is to be struck for at least 14 days or as specified by the structural engineer. On completion, a structural engineer's certificate is to be submitted certifying that the work has been carried out in accordance with his design and to his satisfaction.

CARPENTRY AND JOINERY

25. NAILING

All nails to be of adequate length. All exposed panel pin heads in joinery work to be punched. Screw fixings to be pelleted.

26. TIMBER

(a) All timber is to be carefully selected, free from sap, large loose or dead knots, shakes, wany edges, twisted grains, etc., and is to be thoroughly seasoned.

(b) All woodwork built into brickwork, stonework and concrete is to be treated with an approved protective solution.

27. ROOFING GENERALLY

(a) Wall plates on 230mm walls are to be not less than 38 x 76mm in long lengths, half lapped, bedded level on walls and fastened with 1mm hoop iron or 4mm galvanized wire ties built into walls not less than 460mm below the wall plates and spaced at not more than 1 800mm centres. Wall plates are not to be provided on 115 or 150mm walls, but the top course of bricks or blocks is to be carefully levelled to a true line and a roof tie provided and secured to every rafter. For roof coverings specified under Clause 28 (a)(i) to (vi), the ties are to be carried up and secured to the roof timbers.

(b) Trusses are to be properly framed of 38 x 114mm or 38 x 152mm timber and strongly nailed with 100mm nails clinched. Bolts of adequate size with bulldog connectors may be used. Unstrutted lengths of timbers are not to exceed 2 000mm in the case of rafters and in other roof timbers are not to exceed 3 000mm. Trusses are to be well secured to the wall plate and are to be fixed plumb and parallel to each other.

(c) No roof timbers are to be built into a chimney stack but are to be properly trimmed around the stack.

(d) For rafters of 38 x 115mm, hips and valleys are to be 38 x 152mm. For rafters of 38 x 152mm, hips and valleys are to be 38 x 228mm. All hips and valleys are to be properly framed.

(e) No butt joints are allowed in fascias or barge boards; these must be splayed. An extra wrot plaster batten is to be fixed on the rafters immediately above the external face of the walls where these are plastered to enable the plaster to be finished neatly at the top of the wall.

(f) All eaves must project a minimum of 400mm beyond external face of wall and all exposed woodwork at the eaves must be wrot.

(g) Construction of projecting verges exceeding 460mm or eaves exceeding 750mm must be to the Society's satisfaction.

(h) Engineered trusses from an approved manufacturer may be used subject to the Society's approval.

(i) Roof coverings are to project 50mm into gutters.

28. ROOF COVERINGS

(a) The following table gives minimum sizes, centres and pitches unless some alternative method of protection and weather proofing is approved by the Society :-

	Type of Roof	Truss Centres Not more than	Maximum spacing of Purlins or Battens	Minimum Pitch
(i)	Corrugated Iron	1 800 mm	50 x 76 mm @ 1 219 mm	7½°
(ii)	Corrugated Asbestos-Cement "Andurite" or "Trafford Tiles"	1 800 mm	50 x 76 mm @ 1 375 mm	10°

	Type of Roof	Truss Centres Not more than	Maximum spacing of Purlins or Battens	Minimum Pitch
(iii)	Ditto - in single sheets	1 800 mm	50 x 76 mm @ 1 375 mm	7½°
(iv)	Corrugated Asbestos-Cement "Standard"	1 800 mm	50 x 76 mm @ 915 mm	10°
(v)	0,6 mm Inverted Box Rib Sheets	1 800 mm	50 x 76 mm @ 2 133 mm	5°
	0,4mm Inverted Box Rib Sheets	1 800 mm	50 x 76 mm @ 1 219 mm	5°
(vi)	0,8 mm Longspan Aluminium	1 800 mm	50 x 76 mm @ 1 200 mm	5°
(vii)	Asbestos-Cement Pressed Slates	1 000 mm	38 x 38 mm @ 250 mm	17½°
(viii)	Asbestos-Cement Honeycomb Tiles	1 000 mm	38 x 38 mm @ 185 mm	25°
(ix)	Interlocking Tiles - (Conventional Size)	762 mm	38 x 38 mm @ 305 mm	26½°
	(Major Size)	762 mm	38 x 38 mm @ 336 mm	26½°
	(Major Size)	762 mm	38 x 38 mm @ 305 mm	17½°

(b) CORRUGATED GALVANISED IRON

This is to be 0,6 mm and to have not less than 230mm end lap and 1½ corrugation side lap. It is to be fixed with 63mm drive screws with one lead and one galvanised washer per screw. Ridging and hips are to be 460mm wide of 0,6mm galvanised iron and dressed into corrugations.

(c) CORRUGATED ASBESTOS-CEMENT

This is to be of approved manufacture and sheets are to be fixed in accordance with the manufacturer's printed instructions.

(d) INVERTED BOX RIB SHEETS

These are to be fixed in accordance with the manufacturer's printed instructions. Where insulating tiles or other insulating application is used these are to be used in accordance with the manufacturer's printed instructions and supporting timbers are to be designed to carry the additional loading. A suitable mastic sealer to be used in side laps. Verandah bolts to be used at 710mm centres in case of 24 GA metal being used and 610mm when thinner gauge metal is used.

(e) LONG SPAN ALUMINIUM SHEETS

These are to be fixed in accordance with the manufacturer's printed instructions.

(f) ASBESTOS-CEMENT PRESSED SLATES AND HONEYCOMB TILES

These are to be of approved manufacture and are to be fixed in accordance with the manufacturer's printed instructions.

(g) INTERLOCKING TILES

These are to be of approved manufacture. A tilting fillet is to be used at eaves. Half round hips and ridges are to be bedded in 1 : 5 cement-sand mortar pointed and tinted to match tiles. Interlocking tiles designed for pitches below 26½° are

to be fixed in accordance with the manufacturer's printed instructions and roof truss members increased in size and connections bolted or engineer designed trusses used to the satisfaction of the Society's representative.

29. FLOORS

(a) Wood blocks are to be of approved quality and bedded in bitumen or other approved adhesive on properly screeded concrete slab which must be thoroughly dry. When bitumen is used the floor must be primed with a priming coat. All wood blocks are to be sanded on completion.

(b) Proprietary floor coverings are to be laid in accordance with the manufacturer's printed instructions.

30. CEILINGS AND CEILING HEIGHTS

(a) The minimum height of a level ceiling is to be 2 439mm measured between the finished floor level and the underside of the ceiling. Where ceilings are sloping, the average height over two-thirds of the floor area must be not less than 2 439mm with a minimum of 1 700mm against the walls.

(b) (i) Ceilings are to be of approved sheets, fixed on brandering of not less than 38 x 38mm. The brandering should be spaced at not more than 450 x 600mm or at closer centres to suit the sheet being used. Where open joints are used brandering must be 38 x 57mm.

(ii) Plaster ceilings are to be of approved plaster board on brandering of not less than 38 x 38mm at not more than 400mm centres one way and at all heading joints. Joints are to be open, covered with suitable scrim and the whole plastered to a minimum thickness of 5mm.

(c) Where the truss centres are more than 900mm apart either the size of the ceiling brandering is to be increased or additional ceiling joists of not less than 38 x 114mm are to be placed between ties of trusses at not more than 900mm centres. Cornices are to be of wood, or similar material as ceiling, neatly joined, mitred or scribed and fixed in long lengths. At least one trap door is to be provided in the ceiling and is to be not less than 600 x 600mm with the opening trimmed and properly framed.

31. SKIRTINGS (OPTIONAL)

These are to be of approved materials and sizes, securely fixed in long lengths and neatly jointed.

32. QUADRANTS, ARCHITRAVES, ETC. (OPTIONAL)

These are to be close fitted and neatly mitred or scribed at joints.

33. DOOR FRAMES

Wooden door frames are to be not less than 38 x 76mm with 12 x 25mm stops, planted on. Jamb linings may be solid rebated of not less than 44mm thickness or may be skeleton framed of 38mm framing with minimum 12mm stop of suitable width planted on. Pressed steel frames to be of approved manufacture. All frames are to be plumbed, solidly bedded and tied to brickwork.

34. DOORS

Doors are to be of approved manufacture. Where doors are exposed to the weather, they shall be of exterior quality and provided with a weather board or water bar as necessary. Main doors are to be not less than 815 x 2 030 x 44mm. Pantry and bathroom doors may be not less than 760 x 1 980 x 44mm. Pressed steel doors and frames of not less than 760 x 1980mm may be used in outbuildings.

35. WINDOWS AND FRAMES

Window frames are to be of metal of approved manufacture.

36. IRONMONGERY

All doors are to be fitted with approved locks and furniture. Casement stays and fasteners may be of wrought iron, brass or bronze. Hinges are to be 100mm butts for 44mm doors or 75mm for lighter doors, casements and fanlights.

37. CUPBOARDS, FITMENTS, ETC.

These are to be of approved materials and construction.
Built-in cupboard units of minimum 0,8 cubic metres capacity are to be provided in the kitchen.

PLASTERING AND WALL TILE

38. MATERIALS

(a) SAND AND STONE
Sand and stone is to be as specified under "MATERIALS" Clause 8(b) and (c).

(b) CEMENT
Cement is to be Portland Cement 15 or Normal Portland Cement. (The use of Portland Blast Furnace Cement for plastering or screeds is prohibited).

(c) LIME
Lime is to comply with the Standards Association of Central Africa Specification CAS A15 for hydrated lime. Hydrated lime should be matured with water for 24 hours before use so as to develop satisfactory plasticity.

(d) PROPRIETARY PLASTERS
Proprietary plasters are to be of approved manufacture and used in accordance with the manufacturer's printed instructions.

39. WALL PLASTER

NOTE: All internal wall faces are to be plastered.
(a) All surfaces are to be cleaned and dampened with water before plastering to ensure even suction. Concrete block walls and some cement brick walls may not need to be dampened but if this is necessary, water is to be applied sparingly.
(i) Internal (Optional)
Internal rendering is to be composed of 1 sack cement to 0,20m³ sand, finished with a fine wood float.
(If all materials are batched by loose volume, then the mix is 1 part cement to 4½ parts sand).

(ii) Internal
Internal plaster is to be composed of 1 sack cement to 0,30m³ sand.
(If all materials are batched by loose volume, then the mix is 1 part cement to 7 parts sand).
Alternatively a lime-cement mortar may be used composed of :-

Cement	1 sack
Lime	2 sacks
Sand	0,30m³

(If all materials are batched by loose volume, then the mix is 1 part cement and 2 parts lime to 7 parts sand).

(b) OUTBUILDINGS
The external plaster is to be as for the dwelling house, but internal walls may be bagged. Internal walls of W.C. and Shower cubicles must be cement plastered and steel trowelled to a smooth finish.

40. CEMENT FLOOR TOPPINGS

All concrete floor surfaces are to be chipped, roughened and thoroughly washed clean. Floors are to be soaked with water for 24 hours and slurried with a grout of neat cement immediately before the topping is laid.

(a) Granolithic is to be a minimum thickness of 25mm, and steel trowelled to a smooth finish. The mix is to consist of :-

Cement	1 sack
Sand	0,05m³
Stone - 10mm + 5mm	0,08m³

(If all materials are batched by loose volume, then the mix is 1 part cement to 1 part sand and 1.3/4 parts stone).

(b) For cement/sand toppings, the mix is to consist of 1 sack cement to 0,10m³ sand.
(If all materials are batched by loose volume, then the mix is 1 part cement to 2 parts sand).

41. SCREEDS

These are to be 20mm minimum thickness, composed of 1 sack cement to 0,10m³ sand.
(If all materials are batched by loose volume, then the mix is 1 part cement to 2 parts sand).
The screed is to be wood floated or steel trowelled, as appropriate, to receive the floor finish.

42. WALL TILING (OPTIONAL)

Tiles are to be of approved quality, even in colour, gauged for size before fixing and set in 1 : 4 cement-sand mortar or with an approved adhesive. All joints are to be neatly flush pointed in white or tinted cement and cleaned down on completion.

PLUMBER

43. GUTTERS AND DOWNPIPES (OPTIONAL)

(a) Gutters are to be of adequate size and downpipes are to be of not less than 75mm diameter, both constructed of either minimum 0,6mm galvanised iron properly rivetted and soldered at joints, or asbestos-cement of approved manufacture.

(b) Gutters are to be fixed at eaves and downpipes are to be securely fixed at suitable positions clear of the walls and extended to within 150mm of finished ground level. Approved gutter brackets and holderbats to downpipes are to be provided and securely fixed to the structure. Clips with wood blocks are not permitted. All gutters are to have an adequate fall towards the outlets.

44. SOAKERS AND FLASHINGS

These to be of minimum 0,6mm galvanised iron, tucked, wedged and pointed into brick joints. All raking flashings are to be stepped; cement fillets are not acceptable.

45. BATH

Baths are to be enamelled cast iron or other approved material complete with hot and cold taps, trap, wastepipe and overflow. Open sides or ends of bath are to be built-in with 75mm plastered brickwork. Access is to be provided to wastepipes.

46. WASH-HAND BASIN

Wash-hand basins are to be of glazed earthenware, cast iron or other approved material complete with hot and cold taps, trap and waste-pipe.

47. SINK

Sinks are to be of stainless steel complete with trap and wastepipe.

48. WATER CLOSET

Cisterns and pans are to be of approved make.

49. DRAINS, WASTE PIPES AND VENT PIPES

These are to be in accordance with Local Authority requirements.

50. SEPTIC TANK AND SOAKAWAY

These are to be of approved design of adequate size and in accordance with Local Authority requirements.

WATER SUPPLY

51. Water supply pipes are to be provided in accordance with Local Authority requirements. Supply pipes chased into walls are to be not less than medium duty galvanised mild steel. Hot water heater capacity is to be not less than 90 litres. At least one stand-pipe is to be erected in a suitable position. Stop cocks are to be fitted in the following positions :-

(a) entry into each building;
(b) to isolate all cisterns and hot water heaters;
(c) to the down services from hot water heaters.

GLAZIER

GLAZING

52. All glass is to be of approved manufacture and is to be back puttied, sprigged and front puttied or glazing beads are to be used. For steel doors or windows, special putty manufactured for the purpose must be used. Glass thicknesses are to comply with the manufacturer's recommendation.

PAINTER

MATERIALS

53. All Paints, Distemper, P.V.A.'s etc., are to be of approved manufacture used according to the manufacturer's printed instructions.

WOODWORK

54. Knot, prime, stop and paint with at least two coats of alkali synthetic, all internal and external woodwork including doors, windows, skirtings, picture rails, exposed ends of rafters, fascias and barge boards. Inside woodwork may be stained and twice varnished. Wrot hardwoods may be oiled, varnished or treated with a special sealer. Fascias, barge boards and wooden door frames are to be primed before fitting.

IRONWORK

55. All surfaces of steel windows, doors, gutters and other ironwork are to be suitably primed and painted with at least two coats of approved paint. All galvanised iron and coated cast iron is to be adequately treated before being painted.

CEILINGS

56. Sheet or plaster ceilings are to receive at least two coats of ceiling white.

WALLS

57. (a) Internal walls are to receive at least two coats of Distemper.
(b) External walls to house and outbuildings may be limewashed. Where external walls are fairfaced brickwork, they must be adequately water-proofed.

ELECTRICAL INSTALLATION

58. All work is to be carried out strictly in accordance with the relevant Supply Authority Regulations.

CLEARING OF SITE

59. On completion of work, the site is to be cleared of all surplus building materials and left tidy.

OWNER'S AND BUILDER'S UNDERTAKING

60. It is understood and agreed that the Society, as mortgagees, shall be entitled to reject any work or material which, in its opinion, does not conform with this specification. The Society shall, however, be under no liability for not rejecting any work or material not conforming with the specification which is intended solely as a safeguard for the protection of the mortgagee. I/We agree to carry out the work to not less than the minimum specification stipulated herein in connection with the buildings to be erected at

_____

SIGNED : _____
Builder/Contractor

Date : _____ _____
Owner

March 1977.

ANNEX 6

RELEVANT ENVIRONMENTAL LAWS

RHODESIA

ACT

To provide for the planning of the optimum development and utilization of the water resources of Rhodesia and the establishment of water development advisory councils; for the establishment, jurisdiction and composition of the Water Court and for the powers and procedure thereof; for applications for rights to the use of public water and for the control thereof by the State in certain circumstances; for the declaration of public water shortage areas and the consequences thereof; for the control of underground water; for the acquisition of servitudes in respect of water and matters ancillary thereto; for the prevention and control of water pollution; for the approval of combined irrigation schemes; for the safety of dams; to amend the Interpretation Act [*Chapter 1*], the Natural Resources Act [*Chapter 150*] and the Sabi-Limpopo Authority Act [*Chapter 156*]; to repeal the Water Act [*Chapter 160*] and the Water Amendment Act, 1975; to amend the Mines and Minerals Act [*Chapter 165*], the Urban Councils Act [*Chapter 214*], the Rhodesia Railways Act [*Chapter 261*] and the Roads Act [*Chapter 263*]; and to provide for matters incidental to or connected with the foregoing.

Printed by the Government Printer

ACT

(EXTRACT)

PART IX

WATER POLLUTION CONTROL

PART XII

GENERAL

PRELIMINARY

2. (1) In this Act - Interpretation

"local authority" means -

(a) a municipal council, town council or rural council;

or

(b) a local board, provincial authority or African council declared in terms of subsection (2) to be a local authority;

"Minister" means the Minister of Water Development or such other Minister to whom the President may from time to time assign the administration of this Act;

"pollution", in relation to a public stream or private wate , public water or underground water, means -

(a) such contamination or other alteration of the biological, chemical or physical properties of the public stream or water, including changes in colour, odour, taste, temperature or turbidity; or

(b) such discharge of any gasebus, liquid, solid or other substance into the public stream or water,

as will or is likely to create a nuisance or render the public stream or private water, public water or under ground water, as the case my be, detrimental, harmful or injurious to the health, safety or welfare of the public or any section thereof or to any consumer or user of the water or to any birds, fish or other aquatic life, livestock or wild animals;

"private water" means all water, other than public water and underground water, which -

(a) rises naturally on any land; or

(b) drains or falls naturally on to any land;

so long as it remains on the surface of the land and does not visibly join a public stream;

"public stream" means a watercourse of natural origin wherein water flows, whether or not-

(a) such watercourse or any portion thereof is dry during any period of the year; or

(b) the conformation of such watercourse has been changed by artificial means;

"public water" means all water found on or below the bed of a public stream, including marshes, springs, swamps or vleis forming the source of or found on the course of the public stream;

"Secretary" means the Secretary for Water Development appointed in terms of subsection (1) of section four.

"underground water" means all water which is-

(a) beneath the surface of the ground; and

(b) not visible on the land concerned;

and includes water in boreholes and wells;

"Water Court" means the Water Court established by subsection (1) of section twenty-two;

PART IX

Water Pollution Control

Pollution of water as offence.

101. (1) Subject to the provisions of subsection (2), a person who causes, permits or allows-

(a) any organic or inorganic matter, including water containing such matter, to be discharged or disposed of into a public stream or into any private water, public water or underground water, whether directly or through drainage or seepage, so as to cause pollution of the public stream, private water, public water or underground water, as the case may be; or

(b) any effluent or waste water which has been produced by or resulted from the use of water for any purpose to be discharged or disposed of into a public stream or into any private water, public water or underground water, whether directly or through drainage or seepage;

shall be guilty of an offence.

(2) The provisions of subsection (1) shall not apply to a person who-

(a) causes, permits or allows effluent or waste water which conforms with such requirements relating to standards of quality as may be prescribed for the purpose of this paragraph to be discharged or disposed of into a public stream or into any private water, public water or underground water; or

(b) is the holder of a permit issued to him in terms of subsection (3) and complies with the conditions attaching to such permit; or

(c) discharges or disposes of any matter, effluent or waste water into any waters in accordance with the provisions of the Inland Waters Shipping Act [Chapter 258] or the regulations made thereunder.

(3) The Minister, after consultation with the Minister of Health, may, notwithstanding anything contained in regulations prescribing requirements referred to in paragraph (a) of subsection (2)-

(a) issue, subject to such conditions as he thinks fit, permits granting exemption from compliance with the provisions of that paragraph; and

(b) amend or withdraw any permit referred to in paragraph (a) or amend any conditions subject to which it was issued.

(4) A person who is aggrieved by a decision of the Minister in terms of subsection (3) may appeal against such decision to the Water Court.

(5) In a prosecution for an offence in terms of subsection (1), it shall not be a defence for the accused to prove that he did not act knowingly or wilfully;

Provided that, if the accused proves that he took due care and all reasonable precautions to prevent the discharge or disposal referred to in that subsection, such fact shall be taken into account in the assessment of the sentence passed on him.

Secretary may require persons to take certain steps to control or prevent pollution.

102. (1) If, in the opinion of the Secretary, the activities of any person may lead to, or are giving rise to, the commission of an offence in terms of subsection (1) of section one hundred and one, the Secretary may by notice in writing require such person to take such steps, including all or any of the following-

(a) the installation of devices to test and monitor the quality and quantity of gases, liquids or solids-

(i) in any public stream, private water, public water or underground water; or

(ii) in any effluent or waste water;

or

(b) the sinking of boreholes and wells to test and monitor the quality and quantity of any underground water; or

(c) the provision of facilities for the taking of samples by the Secretary; or

(d) the testing or monitoring of any effluent or waste water, private water, public water or underground water and the submission to the Secretary of the results of such testing and monitoring; or

(e) the taking of reasonable measures for the control or prevention of pollution; or

(f) the construction or installation of works or devices for the control or prevention of pollution;

as the Secretary may specify.

(2) Subject to the provisions of subsection (3), a person who, without reasonable excuse, the onus of proof whereof lies on him, fails to comply with a requirement made in terms of subsection (1) shall be guilty of an offence.

(3) A person who is aggrieved by a requirement made in terms of subsection (1) may appeal against such requirement to the Water Court.

Duties of local authorities in relation to pollution

103. (1) A local authority shall-

(a) if it has reason to believe that an offence in terms of subsection (1) of section one hundred and one has been or is likely to be committed within the area under its jurisdiction, forthwith report the matter to the Secretary; and

(b) subject to the provisions of subsection (2), be responsible for controlling or preventing the pollution of any public stream or private water, public water or underground water within the area under its jurisdiction.

(2) The Minister may in writing, subject to such conditions as he thinks fit to impose-

(a) exempt wholly or in part a local authority from compliance with the provisions of paragraph (b) of subsection (1); and

(b) amend or withdraw an exemption referred to in paragraph (a).

Secretary may delegate certain powers to local authorities.

104. The Secretary may, after consultation with the local authority concerned and the Secretary for Local Government and Housing and after considering the financial resources available to such local authority-

(a) delegate in writing to such local authority the powers conferred on him by subsection (1) of section one hundred and two, subject to such conditions as he thinks fit to impose; and

(b) amend or withdraw in writing the powers delegated to such local authority in terms of paragraph (a).

Powers of Water Court on appeal.

105. On an appeal in terms of subsection (4) of section one hundred and one or subsection (3) of section one hundred and two, the Water Court may-

(a) confirm the decision of the Minister or the requirement of the Secretary or of the local authority concerned, as the case may be, or, if it considers that such decision or requirement should be varied or set aside, require the Minister or the Secretary or such local authority to vary or set aside his or its decision or requirement; and

(b) make such order in relation to costs or otherwise as it thinks fit.

PART XII

General

Offences and penalties

134. (2) A person who is guilty of an offence in terms of Part IX or XI shall be liable, subject to the provisions of subsection (3)-

(a) in the case of a first conviction, to a fine not exceeding five hundred dollars or to imprisonment for a period not exceeding six months or to both such fine and such imprisonment; or

(b) in the case of a second or subsequent conviction to a fine not exceeding two thousand five hundred dollars or to imprisonment for a period not exceeding one year or to both such fine and such imprisonment.

(3) Any person who-

(a) has been convicted of an offence in terms of subsection (1) or of Part IX or XI; and

(b) persists, after a conviction referred to in paragraph (a), in the course of conduct which constituted the offence concerned;

shall be guilty of a continuing offence and liable-

(i) in the case of a conviction of an offence referred to in subsection (1), to a fine not exceeding two hundred dollars; or

(ii) in the case of a conviction of an offence referred to in subsection (2), to a fine not exceeding five hundred dollars;

for every day or part thereof during which he so persists.

Rhodesia Government Notice No. 687 of 1977.

[ACT 41/76

Water (Effluent and Waste Water Standards) Regulations, 1977

IT is hereby notified that the Minister of Water Development has, in terms of section 135 of the Water Act, 1976, made the following regulations: —

Title

1. These regulations may be cited as the Water (Effluent and Waste Water Standards) Regulations, 1977.

Interpretation

2. In these regulations—

"heavy metal" means a metal having a specific gravity greater than 5,0;

"Zone I catchment area" means a Zone I catchment area specified in the First Schedule;

"Zone II catchment area" means a Zone II catchment area specified in the First Schedule.

Prescribed standards of quality for effluent and waste water

3. The standards of quality, prescribed for the purposes of paragraph (a) of subsection (2) of section 101 of the Act, to which effluent or waste water which has been produced by, or results from, the use of water for any purpose, and which is discharged or disposed of into a public stream, private water, public water or underground water, whether directly or through drainage or seepage, shall conform, shall be as set out in the Second Schedule.

Sampling procedure

4. The following requirements shall be complied with in respect of any sample which may be taken or required to be taken of effluent or waste water for the purposes of Part IX of the Act—

(a) a composite sample for the purpose of analysis for all tests, other than those for temperature, pH and dissolved oxygen, shall be taken by combining individual samples so that a minimum of five samples of equal volume of not less than five hundred millilitres each

of the effluent or waste water shall be taken, at the point of discharge, at approximately equal intervals of time over a minimum period of approximately four hours within any twenty-four-hour period;

(b) temperature, pH and dissolved oxygen readings shall be taken on individual samples at the time of sampling, and all samples shall comply with the standards specified in respect of temperature, pH and dissolved oxygen in the First Schedule;

(c) where full laboratory facilities do not exist on the site for the determination of dissolved oxygen, the oxygen in the sample may be fixed at the time of sampling by adding the sulphuric acid, the permanganate, the oxalate, the manganous sulphate and the alkaline iodide only:

Provided that—

(i) the stopper of the sample container shall be replaced and the solution shall be well mixed;

(ii) the remaining steps shall be carried out later in the laboratory.

Repeals

5. The Water Pollution Control (Waste and Effluent Water Standards) Regulations, 1971, published in Rhodesia Government Notice No. 699 of 1971, are repealed.

R.G.N. No. 687 of 1977

FIRST SCHEDULE *(Section 2)*

ZONES I AND II CATCHMENT AREAS

1. *Zone I catchment areas*	*Locality*
The river catchment area of—	
(a) the Gairezi River and its tributaries .	Inyanga district
(b) the Pungwe River and its tributaries .	Inyanga district
(c) the Hondi River and its tributaries .	Inyanga district
(d) the Nyamkwarara River and its tributaries	Inyanga district
(e) the Inyangombe River and its tributaries to its confluence with the Nyajezi River	Inyanga and Makoni districts
(f) the Nyajezi River and its tributaries to its confluence with the Inyangombe River	Inyanga district
(g) the Odzi River and its tributaries to its confluence with the Odzani River . .	Inyanga district
(h) the Odzani River and its tributaries to its confluence with the Odzi River . .	Inyanga district
(i) the Masonwe River and its tributaries .	Umtali district
(j) the Umvumvumvu River and its tributaries to its confluence with the Nyamberwa River	Melsetter district
(k) the Nyamberwa River and its tributaries to its confluence with the Umvumvumvu River	Melsetter district
(l) the Nyanyadzi River and its tributaries to its confluence with the Biriwiri River	Melsetter district
(m) the Biriwiri River and its tributaries to its confluence with the Nyanyadzi River	Melsetter district
(n) the Lusitu River and its tributaries .	Melsetter district
(o) the Buni River and its tributaries .	Chipinga district

2. *Zone II catchment areas*

All river catchment areas other than those specified under Zone I.

SECOND SCHEDULE (*Section 5*)

PRESCRIBED STANDARDS OF EFFLUENT OR WASTE WATER

1. The water shall not contain any colour or have any odour or taste capable of causing pollution.

2. The water shall not contain any radioactive substances capable of causing pollution.

3. The pH of the water shall be, where discharged or disposed of—
   (a) in a Zone I catchment area, between 6,0 and 7,5;
   (b) in a Zone II catchment area, between 6,0 and 9,0.

4. The temperature of the water at the point of discharge shall not exceed—
   (a) in a Zone I catchment area, 25 °C;
   (b) in a Zone II catchment area, 35 °C.

5. The water shall contain dissolved oxygen to the extent of at least, where discharged or disposed of—
   (a) in a Zone I catchment area, 75 *per centum* saturation;
   (b) in a Zone II catchment area, 60 *per centum* saturation.

6. The chemical oxygen demand of the water, after applying chloride correction, shall not exceed, where discharged or disposed of—
   (a) in a Zone I catchment area, 30 milligrams per litre;
   (b) in a Zone II catchment area, 60 milligrams per litre.

7. The oxygen absorbed by the water shall not exceed, where discharged or disposed of—
   (a) in a Zone I catchment area, 5 milligrams per litre;
   (b) in a Zone II catchment area, 10 milligrams per litre.

8. The total undissolved solids content of the water at the point of discharge shall not be greater than—
   (a) in a Zone I catchment area, 10 milligrams per litre;
   (b) in a Zone II catchment area, 25 milligrams per litre.

9. The total dissolved solids content of the water at the point of discharge shall not—
   (a) in a Zone I catchment area, increase the total dissolved solids content of the receiving water by more than 100 *per centum* and the total dissolved solids content of the effluent shall not exceed 100 milligrams per litre;
   (b) in a Zone II catchment area, exceed 500 milligrams per litre.

10. The water shall not contain soap, oil or grease in quantities greater than, where discharged or disposed of—
   (a) in a Zone I catchment area, nil;
   (b) in a Zone II catchment area, 2,5 milligrams per litre.

11. The maximum permissible concentrations of chemical constituents permissible in the water which is discharged or disposed of in a Zone I or Zone II catchment area shall be as specified in the following table:

TABLE

MAXIMUM PERMISSIBLE CONCENTRATIONS OF CERTAIN CHEMICAL CONSTITUENTS

Constituent	Maximum concentration in milligrams per litre	
	Zone I catchment area	Zone II catchment area
Ammonia free and saline (as N)	0.5	0.5
Arsenic (as As)	0.05	0.05
Barium (as Ba)	0.1	0.5
Boron (as B)	0.5	0.5
Cadmium (as Cd)	0.01	0.01
Chlorides (as Cl)	50	100
Chlorine residual (as free chlorine)	Nil	0.1
Chromium (as Cr)	0.01	0.05
Copper (as Cu)	0.05	0.5
Cyanides and related compounds (as CN)	0.2	0.2
Detergents (as manoxol -OT)	0.2	1.0
Fluoride (as F)	1.0	1.0
Iron (as Fe)	0.5	0.5
Lead (as Pb)	0.05	0.05
Manganese (as Mn)	0.1	0.1
Mercury (as Hg)	0.5	0.5
Nickel (as Ni)	0.001	0.001
Nitrogen total (as N)	10.0	10.0
Phenolic compounds (as phenol)	0.01	0.1
Phosphate total (as P)	1.0	1.0
Sulphate (as SO_4)	50	200
Sulphides (as S)	0.05	0.2
Zinc (as Zn)	0.5	1.0
Total heavy metals	1.0	2.0

12. The water shall not contain any detectable quantities of pesticides, herbicides or insecticides, nor shall it contain any other substances not referred to elsewhere in these standards, in concentrations which are poisonous or injurious to human, animal, vegetable or aquatic life.

Rhodesia Government Notice No. 1101 of 1974.

[CAP. 167

Public Health (Effluent) (Amendment) Regulations, 1974 (No. 1)

IT is hereby notified that the Minister of Health has, in terms of section 112 of the Public Health Act [*Chapter 167*], made the following regulations:—

1. These regulations may be cited as the Public Health (Effluent) (Amendment) Regulations, 1974 (No. 1).

2. The Schedule to the Public Health (Effluent) Regulations, 1972, published in Rhodesia Government Notice No. 638 of 1972, is amended by the deletion of "E. Coli (type 1) not exceeding 10 per 100 millilitres", wherever it occurs, and the substitution of "E. Coli (type 1) not exceeding 1 000 per 100 millilitres".

Supplement to the Rhodesia Government Gazette dated the 29th November, 1974. Printed by the Government Printer, Salisbury.

1977

Rhodesia Government Notice No. 638 of 1972.

[CAP. 167

Public Health (Effluent) Regulations, 1972

IT is hereby notified that the Minister of Health has, in terms of section 112 of the Public Health Act [*Chapter 167*], made the following regulations: —

1. These regulations may be cited as the Public Health (Effluent) Regulations, 1972.

2. In these regulations—

"approval" means written approval by a health authority given in terms of these regulations;

"council" means any municipal council, town council or rural council;

"effluent liquid" means any liquid discharged from sewage-treatment works or oxidation ponds;

"health authority" means—

(a) in the case of an application for approval in respect of land within the jurisdiction of a council, the council; and

(b) in the case of an application for approval in respect of land outside the jurisdiction of a council, the chief health officer;

"oxidation ponds" include aerated oxidation ponds, passover channels and their variations;

"sewage" means any liquid containing waste matter of excremental, domestic or industrial origin;

"sewage-treatment works" means any works, installation, process or method used for the treatment of sewage, but does not include oxidation ponds.

3. No person may—

(a) discharge any effluent liquid on to; or

(b) use any effluent liquid for the irrigation of;

any land without having first applied for and received the approval of the appropriate health authority.

4. (1) Any person requiring the approval mentioned in section 3 shall apply to the health authority and give full details of his proposed use or discharge of the effluent liquid, and any other information reasonably required by the health authority.

(2) In considering an application made in terms of sub-section (1), the health authority shall take into account, *inter alia*, the quantity and nature of the effluent liquid in relation to the area and type of land on to which it is to be discharged, or where it is to be used.

(3) The approval mentioned in section 3 may be made subject to all or any of the following conditions—

(a) that a reticulation system is provided for the effluent liquid entirely separate from any system for the reticulation of potable water;

(b) that all piping, equipment and installation for use in the storage and reticulation of the effluent liquid, above or below ground, are distinctively and indelibly marked so as to be immediately distinguishable from any system for the reticulation of potable water;

(c) that all pipe connexions are below the ground;

(d) that adequate warning notices are erected in appropriate languages indicating that effluent liquid is being used; and

(e) any other conditions deemed necessary by the health authority to protect the health of the public.

(4) In giving the approval mentioned in section 3, the health authority shall prescribe standards of purity which shall not be lower, but may be higher, than those specified in the Schedule for the effluent liquid.

(5) Notwithstanding the provisions of sub-section (4), the appropriate health authority may, for a stated period and for good and sufficient reason, grant exemption in writing from compliance with the standards of purity specified in the Schedule:

Provided that if a council grants such an exemption it shall notify the Chief Health Officer in writing immediately of its reasons for doing so and shall provide details of any lower standards it may lay down.

(6) A health authority may, by notice in writing—

(a) revoke its approval or any conditions to which the approval was subject; or

(b) amend or add to any conditions to which the approval was subject; or

(c) withdraw any exemption granted in terms of subsection (5).

5. Where any effluent liquid from sewage-treatment works or oxidation ponds which are the property of a council is to be used for the irrigation of land, the council shall comply with the standards of purity prescribed in terms of section 4.

6. No person may use any effluent liquid for the irrigation of any land on which salad crops, vegetable crops, berry fruits or any crops intended for human consumption in an uncooked state, are growing.

7. No person may use, for the irrigation of any land within 200 metres of an occupied dwelling or 50 metres of any public road by sprinklers, any effluent liquid unless such liquid complies with the minimum standards prescribed in the Schedule for use in relation to public amenities.

8. (1) No person may, without having first applied for and received approval, use—

(a) any digested sludge for agricultural purposes; or

(b) any raw or undigested sludge for any composting process:

Provided that no approval shall be granted for the use of digested sludge for agricultural purposes without at least a fifty *per centum* reduction in volatile matter in the digestion process.

(2) The health authority may make approval granted in terms of subsection (1) subject to any conditions it deems necessary to protect the public health.

9. No person may use any raw or undigested sludge or sewage for agricultural purposes.

10. The Public Health (Effluent) Regulations, 1970, published in Rhodesia Government Notice No. 662 of 1970 and the Public Health (Effluent) (Amendment) Regulations, 1971 (No. 1) published in Rhodesia Government Notice No. 133 of 1971 are repealed.

Type of crops or crop	Minimum standards of purity of effluent	Method of irrigation	Other requirements
C. (a) As in A; and (b) Pastures for dairy stock; and (c) Cut flowers grown for sale.	(1) Biochemical oxygen demand not exceeding 10 parts per million; and (2) Stability as measured by the methylene blue test not less than 21 days; and (3) E. Coli (type I) not exceeding 10 per 100 millilitres.	Surface or sprinkler	As for A (c) and (d)
D. Public amenities, e.g. sports fields, public parks, golf courses, etc., but not swimming pool surrounds.	(1) Biochemical oxygen demand not exceeding 10 parts per million; and (2) Stability as measured by the methylene blue test not less than 21 days; and (3) E. Coli (type I) not exceeding 10 per 100 millilitres; and (4) Residual chlorine not less than 0.3 parts per million after 30 minutes' contact in samples taken at the sewage-treatment works.	Surface or sprinkler	—

2. EFFLUENT FROM OXIDATION PONDS.

Type of crops or crop	Minimum standards of purity of effluent	Method of irrigation	Other requirements
A. (a) Grain crops; and (b) Crops grown for industrial processing, such as oil-seeds, fibre, etc., which are not for direct human consumption, but excluding crops grown for dehydration, canning or preserving; and (c) Crops grown solely for seed-production for sale to registered seed merchants but not human consumption; and	The effluent shall at no time contain less dissolved oxygen than 1.0 milligram per litre in a sample taken from the outlet of the pond or from the surface of the pond as near the outlet as possible, and in any case not deeper than 25 millimetres below the surface; the determination of the oxygen content shall be carried out by means of a dissolved oxygen meter or by the Winkler test, the oxygen being "fixed" on site by the addition	Surface only	

Type of crops or crop	Minimum standards of purity of effluent	Method of irrigation	Other requirements
(a) Nursery production, excluding cut flowers grown for sale; and (b) Fodder crops for harvesting; and (f) Pastures for slaughter stock; and	of the manganese sulphate or manganese chloride followed by the alkaline potassium iodide and the determination completed in the laboratory.		No grazing to be permitted within 24 hours of application of effluent, and drinking troughs of potable water to be provided for stock. No fruit windfalls to be knocked.
(d) Deciduous and citrus orchards, walnut trees, plantations and tree crops.			
B. As in A (a), (b), (c), (d), (e) and (f).	As for B.	Surface or Sprinkler	As for A.
C. (a) As in A; and (b) Pastures for dairy stock; and (c) Cut flowers grown for sale.	(1) The effluent shall at no time contain less dissolved oxygen than 1.0 milligram per litre in a sample taken at any time of the day or night from the outlet of the pond or from the surface of the pond as near the outlet as possible, and in any case not deeper than 25 millimetres below the surface: the determination of the oxygen content shall be carried out by means of a dissolved oxygen meter or by the Winkler test, the oxygen being "fixed" on site by the addition of the manganese sulphate or manganese chloride followed by the alkaline potassium and the determination completed in the laboratory; and (2) E. Coli (type I) not exceeding 10 per 100 millilitres.	Surface or sprinkler	As for A (f) and (g)