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9. ABSTRACT

This Shelter Sector Assessment is an overview of the total Mauritian housing sector which describes the components of the shelter sector and the dimensions of the shelter problem. The major areas presented are an overview and dimensions of the shelter problem, characteristics of the population, programs and institutions, shelter delivery systems, and prospects and analyses. Numerous tables, maps, and figures show populations, construction rates, distributions, budgets, and other pertinent data. The chapter on prospects and analyses undertakes an in-depth analysis of existing programs, institutions and the construction sector. This analysis leads to a series of recommendations by the team as to how present programs and institutions can be revised and adapted to better meet the shelter needs of the total population. Particular attention is given to cyclone Gervaise victims and to low income families in general. The findings and recommendations of the team are summarized under three main headings: reducing construction standards; increasing institutional capacity; and increasing construction sector efficiency. Some of the recommendations are to: reduce standards in the present program from completed units being built to core units which are still cyclone proof; reduce infrastructure standards and increase densities such that projects can become economically feasible; design comprehensive projects to combine core units with completed middle income houses; and channel housing improvement to low income families in general. This assessment attempts to describe the existing shelter sector in Mauritius and to identify and analyze possible shelter packages which would contribute to the resolution of shelter problems in general. The options recommended are considered realistic in order to maximize the use of available human and financial resources, both formal and informal, in meeting existing and

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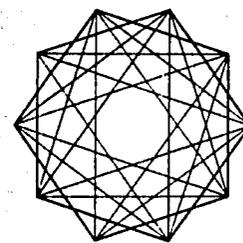
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PADCO

AID/otr-C-1627

**PLANNING AND
DEVELOPMENT
COLLABORATIVE
INTERNATIONAL**

**MAURITIUS SHELTER SECTOR
ASSESSMENT**



PADCO

**AN INTERNATIONAL COLLABORATIVE FORMED TO
PROVIDE GOVERNMENTS AND PRIVATE CLIENTS IN
AFRICA, ASIA, LATIN AMERICA AND THE NEAR EAST
WITH INTEGRATED RESEARCH, PLANNING AND MANAGEMENT
SERVICES FOR URBAN AND RURAL DEVELOPMENT**

Prepared for DS/H under Contract
No. AID/otr-C-1627, Work Order 2

MAURITIUS SHELTER SECTOR
ASSESSMENT -- 1 of 3

MAIN REPORT

**MAURITIUS SHELTER
SECTOR ASSESSMENT**

Prepared for:

**Office of Housing
Agency for International Development
Washington, D.C.**

Prepared by:

**PADCO, Inc.
1834 Jefferson Place, N.W.
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JUNE 1978

PLANNING AND DEVELOPMENT COLLABORATIVE INTERNATIONAL

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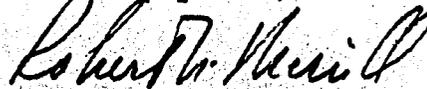
Mr. Peter M. Kimm
Director
Office of Housing, AID
Department of State
Washington, D.C. 20523

Dear Mr. Kimm:

PADCO is pleased to submit its report on the Mauritius Shelter Sector Assessment in accordance with contract AID/otr-C-1627, Work Order No. 2. Also submitted is a separate reference document for use by the Office of Housing in preparation for a Shelter Sector Strategy paper. The report and reference document were written by Ms. Marilyn Dawson, Mr. Ernest Slingsby, and Mr. Robert Merrill. They are based on a mission to Mauritius from February 20 through March 12, 1978. The report follows the SER/H Guidelines for Preparing a Shelter Sector Assessment as amended by the RHUDO, Nairobi and Ms. Nolan.

A great deal of data on the Mauritian shelter sector has been assembled and analyzed in this SSA. Based on this analysis, several options for shelter programs have been recommended. It is therefore hoped that this SSA will not only be used as a reference document on the Mauritian shelter sector but also as a basis for program development to assist in alleviating low-income shelter problems.

Sincerely yours,



Robert N. Merrill
Vice President

RNM/cls

P A D C O

AN INTERNATIONAL COLLABORATIVE FORMED TO PROVIDE GOVERNMENTS AND PRIVATE CLIENTS IN AFRICA, ASIA, LATIN AMERICA AND THE NEAR EAST WITH INTEGRATED RESEARCH, PLANNING AND MANAGEMENT SERVICES FOR URBAN AND RURAL DEVELOPMENT.

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REFERENCE DOCUMENT FOR MAURITIUS'
SHELTER SECTOR STRATEGY PAPER
BOUND SEPARATELY

BACKGROUND DATA

AREA

2,000 square kilometers

1,100 square kilometers of arable land

POPULATION DENSITY (1977)

155 per square kilometer

327 per square kilometer of arable land

POPULATION AND VITAL STATISTICS

Population in 1977: 909,169

Urban population: 44 percent

Population growth rate: 1.1 percent, ¶ 2.9 percent urban

Natural rate of increase between 1970 and 1976: 1.3 percent

Life expectancy at birth in 1975: 65.5 years

Infant mortality: 40.0 deaths per 1,000 live births

Birth rate: 25.6 percent

NUTRITION

Daily intake: 2,192 calories

ECONOMIC INDICATORS †

Income distribution in 1975: highest quintile 55.0 percent,
lowest quintile 5.0

* Information is from Central Statistical Office except where otherwise indicated.

¶ Population growth is less than the rate of natural increase because of emigration.

† World Bank.

Gross national product per capita in 1976: US\$ 680
Median family expenditure per month: US\$ 89 (1975); US\$ 103 (1978)
Average family expenditure: US\$ 138 (1975)
Debt service ratio, 1976:
Public debt, including guaranteed, 1.0
Non-guaranteed private debt, 0.3
Total outstanding and disbursed, 1.3

DISTRIBUTION OF SUGAR LAND OWNERSHIP ^Ω

80 percent owned by top 10 percent of owners
2 percent owned by bottom 10 percent of owners

HOUSING

Average number of persons per household, 5.3
Habitable rooms per house: urban 3.29, rural 3.10
Persons per room: urban 1.66, rural 1.78
Persons per house: urban 5.42, rural 5.65
Housing stock in 1972, 123,290: 7,337 in straw huts (5.95 percent), 26,068 not on foundation (21.14 percent), and 89,887 on foundation (72.91 percent)

ABBREVIATIONS

CEB Central Electricity Board
CHA Central Housing Authority
CWA Central Water Authority
DWC Development Works Corporation
EDF European Development Fund
MEPD Ministry of Economic Planning and Development
MF Ministry of Finance
MHC Mauritius Housing Corporation
MOH Ministry of Housing, Lands and Town and Country Planning
SILWF Sugar Industry Labor Welfare Fund

^Ω World Bank.

CONVERSIONS

1 Rupee = SDR 0.129638 (Before January 1976 the rupee was pegged to the pound sterling)

Rate of Exchange: Annual Averages per US\$

<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978 (Jan-March)</u>
5.44	5.70	6.03	6.75	6.34	6.20

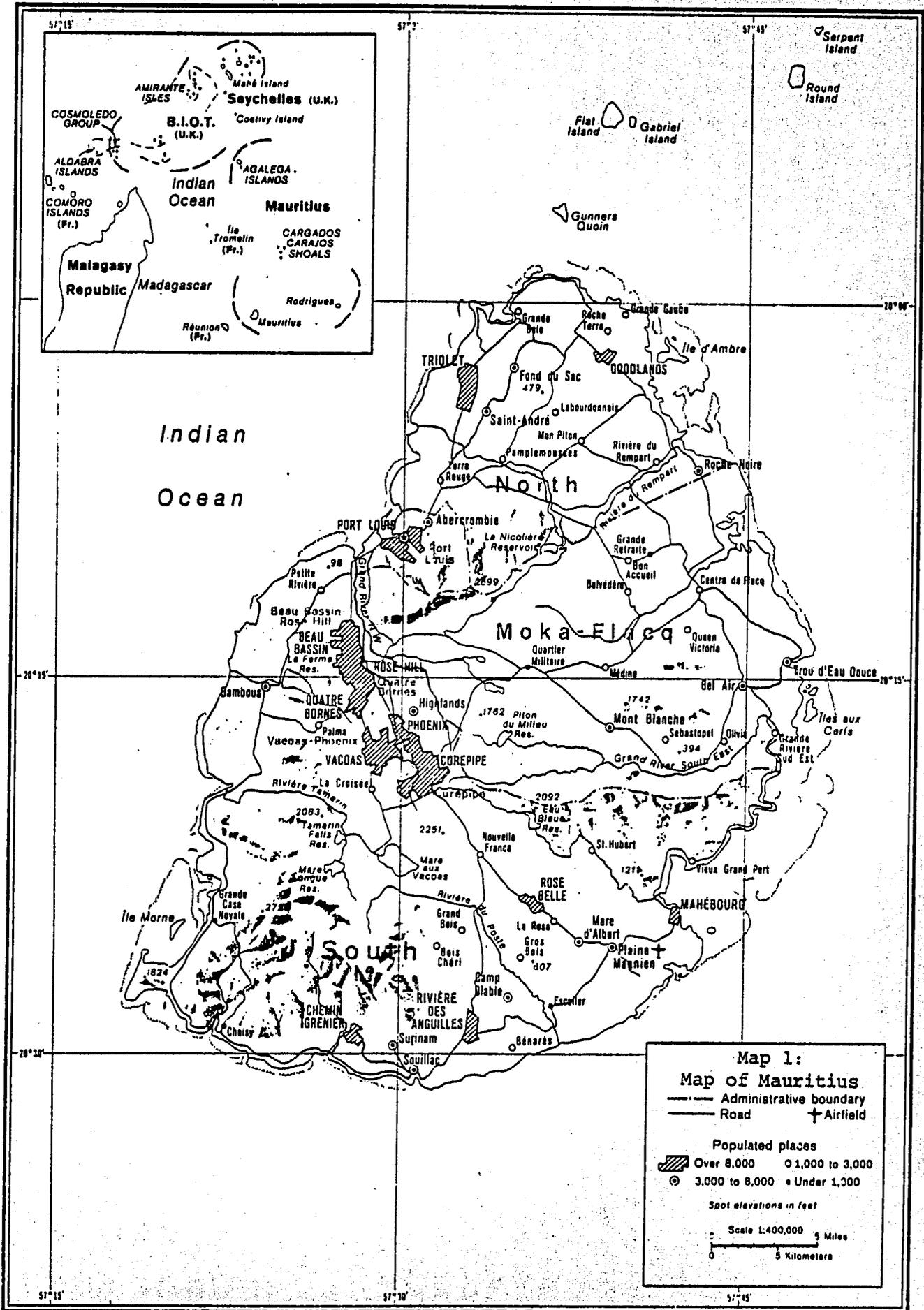
Fiscal year July 1 to June 30

1 arpent = 1.043 acres

1 perch = 454 square feet

1 tois = 45.4 square feet

1 kilogram = 2.205 pounds



SUMMARY OF RECOMMENDATIONS

This Shelter Sector Assessment is an overview of the total Mauritian housing sector which describes the components of the shelter sector and the dimensions of the shelter problem. The last chapter, Prospects and Analyses, undertakes an in-depth analysis of existing programs, institutions and the construction sector. This analysis leads to a series of recommendations by the SSA team as to how present programs and institutions can be revised and adapted to better meet the shelter needs of the total population. At the request of the Mauritian Government, particular attention has been given to cyclone Gervaise victims and to low-income (defined as below-median income) families in general.

The findings and recommendations of the team are summarized under three main headings: (A) reducing construction standards; (B) increasing institutional capacity; and (C) increasing construction sector efficiency.

A. Reducing Construction Standards

The most outstanding factor of present public housing activity is the extremely high standard (far above what is necessary for cyclone resistance) at which units are being built under the Gervaise reconstruction program. High standards mean high costs and high subsidies, since the units are being allocated mostly to low-income families who lost their homes in Gervaise. While some subsidy may be justified because of the emergency/welfare nature of the program, the gap between the present high-standard/high-subsidy program and a low-subsidy program could be significantly narrowed by designing units at reduced construction standards. Less costly units would still be far better than the Gervaise victims' previous housing conditions and would free capital to meet the housing needs of a larger population.

In the opinion of the SSA team, thinking and subsequent planning in terms of lower-cost standards are necessary since the government presently cannot afford the capital subsidies involved in meeting the housing demand at present standards and terms. Further, if a large segment of the population comes to expect highly-subsidized, high-standard housing provided by the government through a series of unreplicable

projects, the government will suffer from considerable pressure to accomplish the impossible.

It should be stressed, however, that lower construction standards do not mean lower living standards for either the Gervaise victims or low-income families in general. ^{1/} Most of the houses destroyed in Gervaise were either of temporary materials or were not on foundation. In addition, services such as water and electricity were often unavailable. As will be seen in Chapter I, these conditions also exist for substantial portions of the present housing stock. Thus, construction of new cyclone-proof homes designed to be expanded by the occupants within planned and serviced estates should be a significant benefit to both Gervaise victims and other low-income families in need of housing.

Based on the analysis in Chapter V (see Tables 49 and 50), an expandable core house with two rooms, a sanitary core, and firmly fixed concrete tile roof could be afforded by those families with an equivalent median expenditure (defined as median income) of Rs 750 per month. This package is based on a 25 percent subsidy or down payment, or some combination of the two. If land costs were fully subsidized and 12 percent of income were available for housing, families down to the 30th percentile on an updated 1978 expenditure distribution curve could afford the foregoing package. According to estimates of net effective demand shown in Table 51, this type of unit at economic terms could meet approximately 50 percent of the total net housing requirements.

If standards were reduced to serviced plots only, these could be afforded (at ten percent for 30 years, 25 percent subsidy, and no land cost) by families down to the 15th percentile. In addition, fully 95 percent of net housing requirements could be met. The subsidy element can be met through cross-subsidization by charging more for higher cost housing (see below).

Table 51 also shows the percent of net housing requirements which could be met at various economic terms by present standard MHC and CHA units. It is evident from the table and

^{1/} According to data gathered on eligible Gervaise victims, 90 percent declared they had incomes below the median family income in 1975. Thus, there is a substantial overlap between the victims of Gervaise and the lower-income population (see Chapter II).

from the existing waiting list at MHC (5,559 applications) that a substantial effective demand exists for middle-income units at market rates (12 percent for 20 years). It is therefore felt that core housing of the type described in Chapter V and called for in the 1975-1980 Development Plan could be combined in projects with higher-standard, complete units which would be sold at market rates. The SSA team estimates these rates to be considerably above cost. Profit from the sales of the latter would be used to cross-subsidize or lower the costs of the core houses. In this manner not only can middle-income, effective housing demand be met, but it can be capitalized upon to reduce costs to low-income families. In addition, the documented capacity of low-income households to expand and improve their shelter can also be mobilized.

According to investigations of house building processes in the informal sector, many low-income families are expanding their shelter, usually at very high standards. One of the major constraints to this informal construction process was the lack of funds and inability to get loans to continue construction. If loans were available, people said they would pay up to 34 percent of their income on repayments. Since most of the owner-built housing observed had stopped at the ceiling or roof stage, roof loans from the MHC would be one way to stimulate this process. These loans might also be combined with a recognition of the *cycle* system by encouraging monthly deposits of unused funds in the MHC. However, since the monthly *cycle* amount is interest free, the feasibility of formalizing the *cycle* system should be further investigated.

The following recommendations are made:

1. Reduce standards in the present program from completed units being built to core units which are still cyclone proof.
2. Reduce infrastructure standards (roads to footpaths, less pavement, unlined drainage) and increase densities such that projects can become economically feasible.
3. Design comprehensive projects in order to combine core units with completed middle-income houses such that profits from the latter can reduce costs on the former.
4. Channel housing improvement and/or roof loans to low-income families in general, to mobilize their existing physical, financial, and organizational resources for house expansion.

B. Increasing Institutional Capacity

An analysis of existing institutions and recommendations for increasing their capacity to undertake an expanded and more comprehensive housing program are contained in Chapter V Section B. Without repeating the analysis, the recommendations can be summarized as follows:

1. Ministry of Housing

Create, as soon as possible, a Housing Division within the Ministry of Housing to be responsible for:

- a. Policy and program formulation for the remaining years of the Second and the complete Third Five-Year Plan.
- b. Coordination and monitoring of all publicly-sponsored housing programs and their related infrastructure.
- c. Special project planning and design such as the integrated projects recommended above in order to demonstrate the feasibility of lower construction and infrastructure standards, more efficient project layouts, etc.

2. Central Housing Authority

- a. Formulate low-standard design briefs geared to the affordability of lower-income families for execution by the CHA.
- b. Strengthen the CHA's collections and estate management functions in order to achieve debt recuperation at economic rates.
- c. Consolidate the seven divisions of the CHA under two deputy directors, one for administration and management and the other for technical direction.
- d. Phase out CHA's direct labor force as these can be absorbed by the Development Works Corporation (DWC) or the labor force in general.

3. Mauritius Housing Corporation

- a. Allow expanded funding of the MHC through increased domestic or international commercial loans; issuance of mortgage bonds; utilization of pension funds; or an employer's tax earmarked for low-income units.
- b. Increase savings deposits in the MHC by allowing exceptional savings scheme savers to deposit varying amounts each month and allowing loans to be used for completion (e.g. roofs) and/or purchase of existing housing.
- c. Utilize MHC's efficiency in any new housing program by channeling housing improvement loans through it and perhaps allowing it to collect payments of project occupants where salary deduction is feasible.
- d. Utilize MHC's experience in financing and executing middle- and upper-income housing to execute those portions of integrated projects.

4. New Housing Finance Institutions

- a. Explore the use of the Post Office Savings Bank as a depository and lender for home improvement and completion loans for lower-income families in rural areas.
- b. Investigate the feasibility of expanding loans from the Mauritius Cooperative Central Bank to housing cooperatives formed for new low-income projects.

5. Land and Land Institutions

- a. Due to the shortage of skilled staff and funds, do not create new institutions for land banking and development.
- b. Begin purchasing larger tracts of land where construction can be phased as off-site services become available.

- c. Consider land statutes similar to those existing in Singapore where land values are frozen as of a particular date, thus discouraging if not eliminating speculation.

C. Increasing Construction Sector Efficiency

Based on the discussions of housing stock (Chapter I Section E), the construction sector (Chapter IV Section C), and their subsequent analysis in Chapter V, the following recommendations are made as techniques by which the construction sector could become more effective in responding to the housing needs of various income groups.

1. Labor Productivity

A primary gap in the construction sector is labor productivity. Training programs at the supervisory level should therefore be developed. These programs should stress labor management, cost control, and basic construction technology. Assistance should be given to existing training institutions and to organizations such as the Development Works Corporation which provide on-the-job training. The DWC should be encouraged to turn over its trainees more rapidly to the industry as a whole and to train supervisory personnel.

In addition, policies which encourage productivity should be developed. Some policies might include: providing incentives to both public and private employees through bonuses, providing better job security for all types of labor, developing employment opportunities for redundant labor such as self-employment, providing tax incentives to employers to provide on-the-job training for both current employees and unemployed labor, and encouraging employment opportunities through small-scale industries.

2. Balanced Importation

A more balanced importation policy should be developed which supports employment policies and the promotion of indigenous production of building materials. Investments in technologies which are heavily capital intensive to reduce labor costs act counter to policies of encouraging greater employment and do nothing to reduce the large import component of construction. As a case in point, if cement importation

trends continue, opportunities for developing other indigenous materials and the use of alternative construction systems which are more cost effective than concrete construction may not be sought.

3. Informal Sector

Since the informal sector constructs a large portion of the housing in Mauritius, it should be encouraged to improve both the quality and quantity of its output. Informal sector programs might include: providing building materials loans to home owners; improving methods of small contractor financing for purchase of equipment and building materials; providing technical and managerial training to skilled craftsmen in order to upgrade their abilities to operate businesses; and encouraging smaller contractors to compete in public sector housing projects. The latter might be particularly valuable in projects being executed in many small locations throughout the country.

4. Indigenous Building Materials

Smaller-scale, environmentally-sound production of indigenous building materials should be initiated. As mentioned in Chapter V, some prime prospects for local manufacture are: cement in small-scale facilities having capacities of 80,000 to 200,000 tons; lime products such as sand-lime bricks; treated timber products which are resistant to weathering, insects and fire; resin-bonded roofing materials; interlocking metal roofing systems; and small-scale concrete precast panel floor and roof systems.

5. Building Codes

Building codes which increase costs without substantially improving the performance of buildings should be modified. For instance, room height restrictions requiring heights in excess of eight feet merely increase costs without adding to environmental comfort. However the *raison d'être* for such a code was to ensure proper ventilation which is a function of window size and placement. Furthermore, codes which restrict construction to particular technologies or building materials do not necessarily ensure structurally sound housing. They merely restrict the number of options which can be used to

meet that goal. Finally, building codes should not impede the capacity of home owners to seek financial assistance to improve their housing.

The development of performance standards is a method of ensuring that building construction meets required structural and environmental standards without restricting the use of alternative technologies or building materials. An environmental performance standard would, for instance, require that all habitable rooms have adequate ventilation or that all building construction be capable of resisting cyclone-force winds without endangering the lives of the building occupants.

Conclusions

The burden of the following SSA is not only to describe the existing shelter sector in Mauritius but also to proceed beyond this description to an identification and analysis of possible shelter packages which would contribute to the resolution of shelter problems in general. The options recommended are considered realistic in order to maximize the use of available human and financial resources, both formal and informal, in meeting existing and future housing needs.

Chapter I

OVERVIEW AND DIMENSIONS OF THE SHELTER PROBLEM

A. Geographic and Climatic Conditions

Mauritius is an island of volcanic origin 38 miles long and 29 miles wide covering an area of 720 square miles. It is located about 500 miles east of Madagascar. Its dependency, Rodrigues Island, is about 40 square miles in area. Smaller islands of St. Brandon, Tromelin and the Agalega group are also dependencies. From the north a plain rises from sea level to form a central plateau which varies in altitude from 900 to 2,400 feet above sea level. It then drops sharply to the south and western coasts.

The mean summer temperature ranges from 81°F in Port Louis which is ten feet above sea level to 72°F in Curepipe which is 1,800 feet above sea level. Average winter temperatures range from 72°F in Port Louis to 63°F in Curepipe. The principal climatic factors affecting housing are the violent cyclones to which the island is subject. The last two, Gervaise in 1975 and Carol in 1960, destroyed nearly 27,000 houses and led to large-scale governmental construction programs which are described in Chapter III.

B. Overview of Government Structure

Mauritius is an independent state in the British Commonwealth with a parliamentary form of government. The Legislative Assembly is a 70-seat unicameral body of which 62 members are elected by universal suffrage, including two from Rodrigues. Eight are appointed from among the unsuccessful candidates by the Electoral Supervisory Commission in order to assure at least minimum representation of all ethnic groups. The Council of Ministers is responsible for the direction of the government. It consists of a Prime Minister who is the leader of the majority party in the legislature and 20 other ministers. Elections are scheduled every five years, but after independence the then-ruling coalition agreed to postpone the 1972 election until 1976. The next election is scheduled for 1981.

Mauritius is divided into five municipal councils and three district council areas. The district councils encompass all rural areas and are further divided into 98 village councils. Local government functions are carried out by municipal and town councils in the urban areas and by district and village councils in rural areas. The municipal councils have an elected chairman, a mayor, a deputy mayor and from 25 to 30 members. Each village council has 12 members.

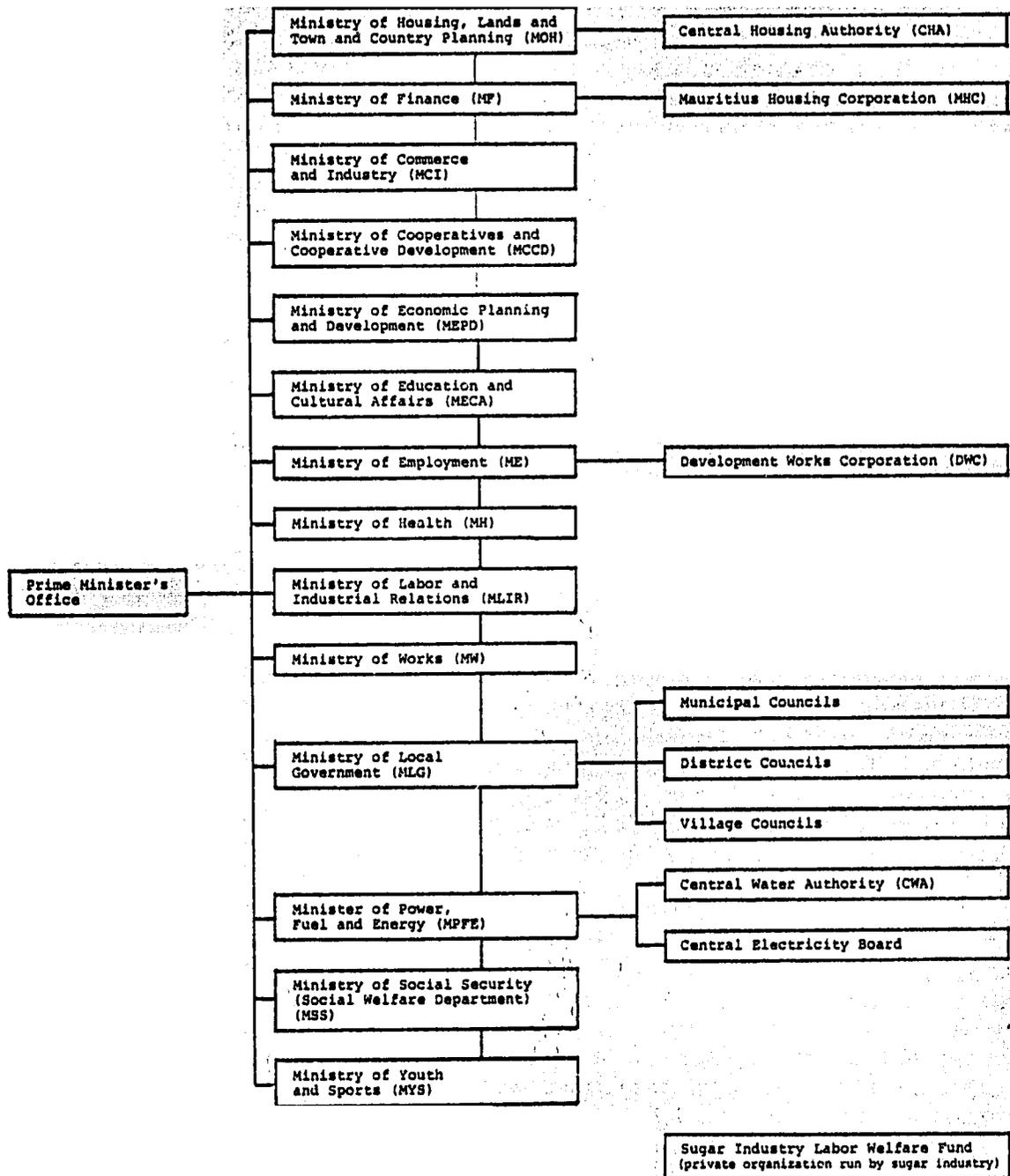
The local governments share the responsibility with the central government for maintaining public property. All main roads are the responsibility of the Ministry of Works while the municipal authorities maintain urban secondary roads. Local authorities may construct and maintain public buildings. All have health inspectors, some have preprimary education facilities, and several conduct technical and commercial courses. However, police and special mobile forces are under the direction of the Prime Minister's office and fire services are administered by the Ministry of Local Government.

The municipal authorities, unlike the councils in the rural areas, have the power to tax property. They also issue development permits which enforce local zoning regulations and are a prerequisite to obtaining building permits. By law, both urban and rural authorities are allowed to borrow from the government at low interest rates for residential construction, and up to ten years ago they did build and administer housing schemes. In 1969, with the growth of the Central Housing Authority, local authorities discontinued implementing new schemes.

National land use planning is undertaken by the Planning Department in the Ministry of Housing, Lands and Town and Country Planning. Local planning is through municipal authorities in urban areas and through a planning committee with representatives of the three ministries concerned with physical planning in the district council areas. Two parastatals are charged with shelter construction and finance. The Mauritius Housing Corporation is a parastatal under the Ministry of Finance and the Central Housing Authority is under the direction of the Ministry of Housing, Lands and Town and Country Planning. A full description of their activities is contained in Chapter III.

The organization chart on the following page (Table 1) shows the various ministries and agencies relevant to the shelter sector.

TABLE 1
Organization Chart of Relevant Ministries



C. Overview of the Economy

Sugar constitutes about 85 percent of Mauritius' exports; exports account for 60 percent of the gross domestic product. This dependency on the world price of sugar is evident from the recent economic history of Mauritius. In the 1960s, when world sugar prices were stable, the Mauritian economy had a real annual growth rate of less than one percent. When sugar prices began to increase rapidly in 1971, the economy underwent a period of rapid growth of somewhat over eight percent per year between 1970 and 1976. However, nearly simultaneously with the end of the sugar price boom in 1975, Mauritius was struck by cyclone Gervaise which destroyed roughly a third of the sugar crop. As a result of these two occurrences, sugar earnings fell sharply in 1976 and Mauritius sustained a trade deficit of Rs 563 million. The country has consequently entered a phase of slower growth than in the first half of the 1970s -- requiring more credit restraint and an efficient use of resources.

Mauritius had a balance of payments surplus until 1976, but in 1976 ran a deficit of Rs 250 million. Due to worsening terms of trade, foreign exchange reserves have also been declining -- although this trend is reversing as domestic consumption decreases. According to Ministry of Finance and World Bank projections, the debt service ratio should remain below eight percent up to 1985.

The government plans to seek partial funding for the development plan from external sources and is a good candidate for credit. About one-sixth of planned investment (Rs 1,865 million at 1974 prices) was to be from foreign sources and another sixth from direct budgetary savings. Since the budgetary savings will fall short of what was expected, an additional amount will be sought from foreign sources.

Since the mid 1960s, about 45 percent of the recurrent expenditure has been for social programs. Public savings capacity consequently has been restricted by the government's use of the budget as a mechanism for the redistribution of income. However, about 21 percent of the capital budget is presently being spent on housing and the shelter-related sectors of water and sewerage with ten percent on housing alone.

Intended government capital expenditure on housing over the plan period 1975-1980 is about Rs 330 million (see Table 2). It is planned for the Central Housing Authority to provide 10,000 low-cost houses. The Mauritius Housing Corporation is to construct an unspecified number of core houses and 1,000 middle-income residential units in urban and semiurban areas;

and the Sugar Industry Labor Welfare Fund Committee is to construct about 1,000 units for sugar industry workers. In addition, MHC should provide mortgage loans to individuals for the construction of another 2,000 units. The SILWFC will also provide mortgage loans on soft terms.

TABLE 2
Housing Program 1975-1980
(Rs million)

Project	Project Value
Mauritius Housing Corporation	105
Central Housing Authority	200
Sugar Industry Labor Welfare Fund Committee	<u>25</u>
Total	330

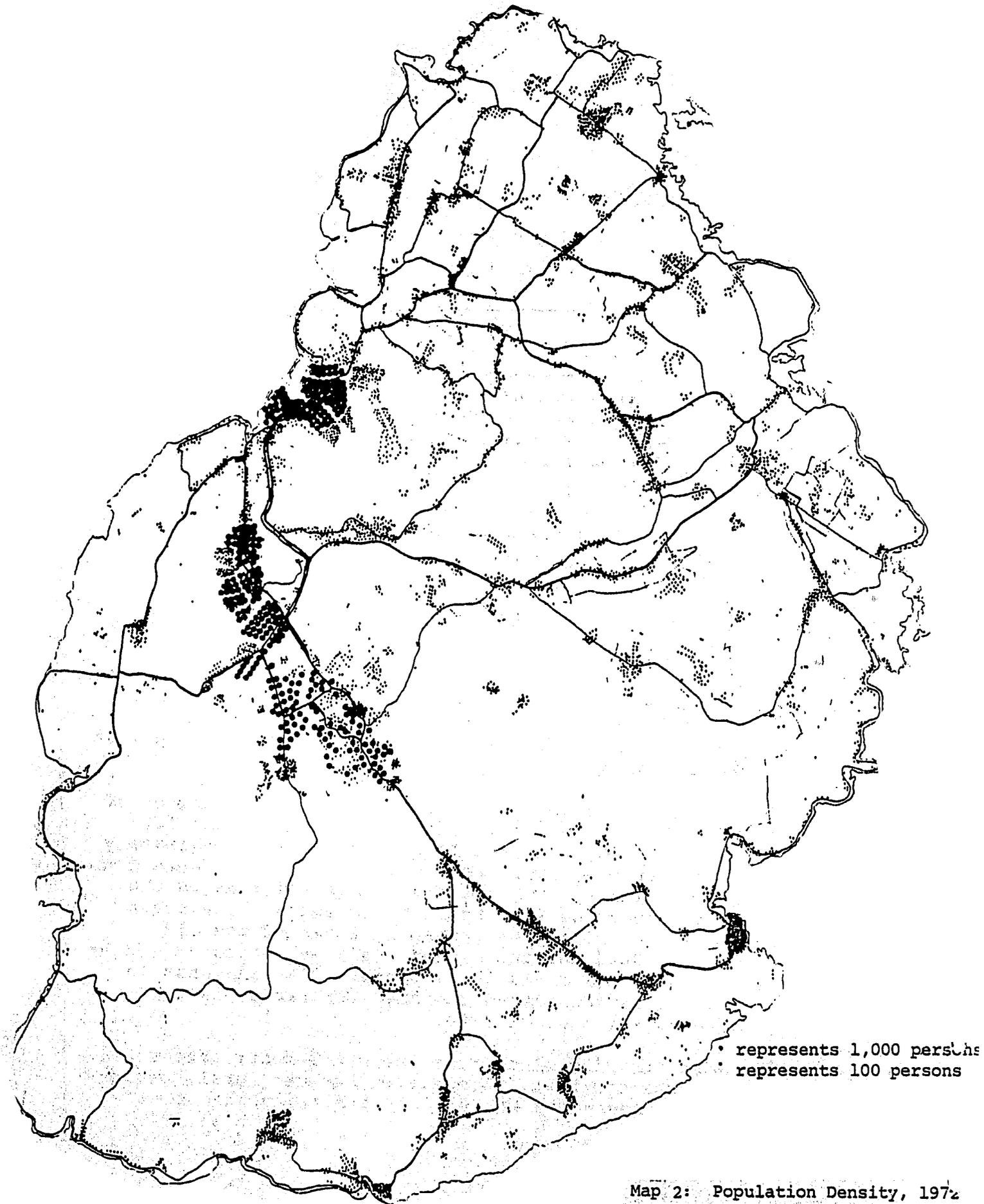
SOURCE: Five-Year Development Plan, 1975-1980.

D. Human Settlement Patterns

Mauritius is one of the most densely populated countries in the world with 1,200 persons per square mile (see Map 2 on next page). No locality is more than 25 miles from a town center. Rural areas remain distinguishable because most of their populations are engaged in agriculture.

In 1972 the five municipalities contained 44 percent of the population (see Table 3). Built-up areas account for about five percent of the land area, including approximately 420 villages scattered about the island. As can be seen from the population density map, the most urbanized area is the linear strip connecting Port Louis to Curepipe. The urban corridor developed along the transport links of the old Plaines Wilhems Road and the Midland Railway (which no longer operates). The corridor is 20 kilometers long and ends in Curepipe, which is considered the most desirable place to live because of its cool climate.

The most striking element of the settlements pattern in Mauritius is the contrast in densities between rural, peripheral urban and inner-city areas. Large-sized plots, some



Map 2: Population Density, 1972
SOURCE: MATIM, 1972.

TABLE 3
Population in Municipal
and Village Council Areas, 1972

Administrative Division and Size	Number of Municipalities or Areas	Both Sexes	Male	Female
Municipal Areas				
100,000 or more	1	133,996	66,431	67,565
50,000 - 99,999	3	183,044	90,294	92,750
20,000 - 49,999	<u>1</u>	<u>47,638</u>	<u>23,740</u>	<u>23,898</u>
Subtotal	5	364,678	180,465	184,213
Village Council Areas				
20,000 or more				
10,000 - 19,999	8	100,087	50,470	49,617
5,000 - 9,999	18	115,514	58,228	57,286
3,000 - 4,999	19	72,415	36,535	35,880
2,000 - 2,999	23	57,860	29,535	28,325
1,000 - 1,999	21	31,961	16,260	15,701
500 - 999	7	5,983	3,021	2,962
200 - 499	<u>2</u>	<u>728</u>	<u>370</u>	<u>358</u>
Subtotal	98	384,548	194,419	190,129
Population not in Municipalities or Village Council Areas		<u>76,973</u>	<u>38,696</u>	<u>38,277</u>
Total Population		826,199	413,580	412,619

SOURCE: Central Statistical Office.

containing very small houses, are found throughout both the rural and peripheral urban areas. Many low-income areas are also characterized by low densities. Although geographical expansion of villages is usually constrained by surrounding sugar fields or by the ocean, densities do not appear to be high. Only in the inner-city areas of Port Louis are high densities found (see Photos 1 and 2).

In order to control the country's future physical development, a National Physical Development Plan is being prepared for the government by a French team of architects and engineers. 2/ The Plan remains confidential and includes studies on most sectors.

Tables 4 and 5 show the major urban centers with their population projections. The fact that urban population figures did not change substantially between 1962 and 1972 disguised shifting patterns of emigration and internal migration.

In the 1971-1976 five-year period, net emigration averaged 3,430 persons per year or about four percent of the total population. This emigration affected the composition of the urban population. Of the 34,400 emigrants between 1962 and 1972, the latest period for which statistics are available, 28,500 came from the five municipal council areas. On the other hand, 23,400 of the 28,000 internal migrants settled in the four municipal council areas of Plaines Wilhems.

While it would seem that the housing stock freed by the emigrants would be available to the newcomers, this in fact is not the case because the migrants from rural areas tend to be from the lower-income groups whereas the emigrants are from the middle- and upper-income groups. There is therefore a shortage of low-income housing in the urban areas.

The team spoke to the few squatter families on the outskirts of Port Louis. These families are among those with the most severe housing problems. All had tried to rent one or two rooms in conventional dwelling units in the Rs 50 to 150 per month price range and said that larger units costing three times that much were more readily available. There were also rumors of low-income tenants being evicted in favor of tenants who were able to pay higher rents.

2/ Mission d'Aménagement du Territoire à L'île Maurice (MATIM).



Photo 1

High density urban housing in Port Louis, Mauritius.

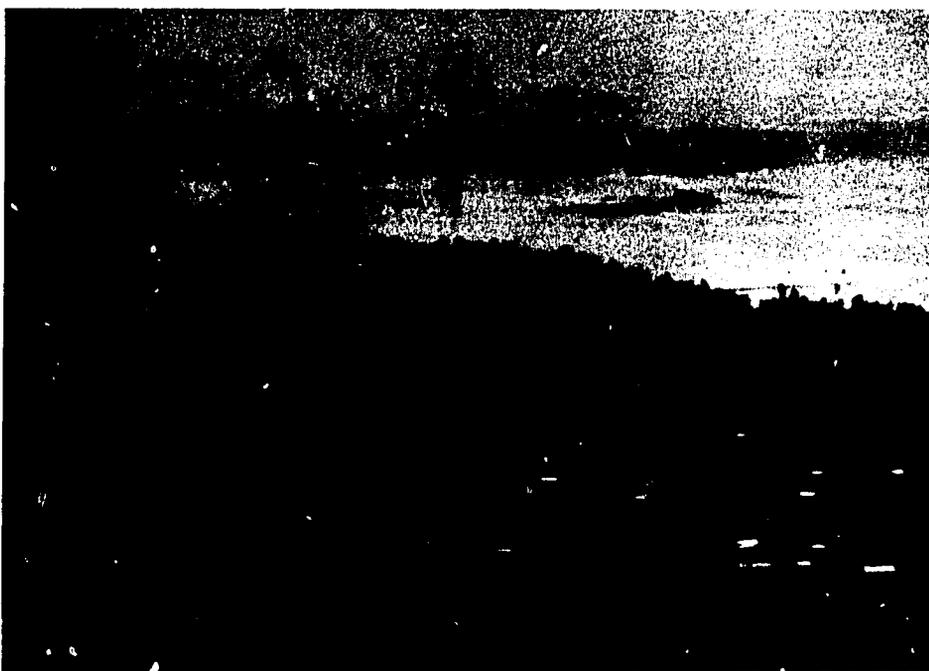


Photo 2

Low density housing near Pointe aux Saïles.

TABLE 4

Population of Major Urban Centers,
1972 and 1977

Urban Center	1972	1977
Port Louis	133,966	141,022
Beau Bassin-Rose Hill	80,318	83,270
Quatre Bornes	50,770	53,465
Vacoas-Phoenix	47,638	50,987
Curepipe	51,956	54,156

SOURCES: 1972 Housing and Population Census of Mauritius, Volume V; and Biannual Digest of Statistics, June 1977. Central Statistical Office. Estimates for 1977 are based on final 1972 census data.

TABLE 5

Population of Major
Market Towns, 1972

Town	1972
Triplet	11,852
Goodlands	11,235
Centre de Flacq	2,282
Rose Belle	8,690
Mahebourg	15,463
Riviere des Anguilles	4,945
Quartier Militaire	2,138
Souillac	3,361
Tamarin	1,388

NOTE: 1977 estimates are not available.

SOURCE: 1972 Housing and Population Census of Mauritius, Volume V. Central Statistical Office.

The major cause of internal migration is job opportunities. New jobs in the secondary and tertiary sectors have been concentrated in Port Louis, thus accounting for the growth in the surrounding villages of Terre Rouge, Pailles, and Petite Riviere. The tourism industry makes Grand Baie and Tamarin attractive. According to the census, the population in the sugar estate areas has not increased but the tea growing areas such as the village council areas of Union Park, Grand Bois and Bois Cher have shown a relatively high growth rate.

Major population increases have also occurred on the outskirts of municipal council and village areas but near to employment centers such as in Plaines Wilhems. In the case of Port Louis, the construction of commercial structures has decreased the amount of residential land available. The lack of suitable sites for residential expansion in the central city has also been responsible for migration to the outskirts.

The last census showed no signs of migration to the rural areas. While it is not quantifiable, it is possible that some has occurred since then. Programs such as the World Bank-sponsored rural development program under the Rural Division of the Ministry of Planning and Development have improved infrastructure and made the rural areas more attractive places in which to live. Rural areas have the additional advantage of being free of property taxes.

Particularly in the rural areas, it is common to see houses for various income groups in close proximity. In the past, those with high-income jobs in the city would buy land and build in urban areas in order to take advantage of urban amenities. Many now prefer to reside in more rural areas and commute to work. This change seems to be occurring because of the rising cost of city living on one hand and the improvement in rural services on the other.

E. Housing Stock

The following sections of the SSA discuss the conditions of the existing housing stock, estimate the need to replace existing housing, project the growth of the housing stock, and show current household living conditions. From these existing housing conditions, total housing needs are projected to indicate the future needs for housing construction by income group.

In the 1972 Housing Census of Mauritius, the Central Statistics Office enumerated 123,290 places of habitation of which 73 percent were described as being on foundation (see Table 6). The remaining 27 percent of the housing stock was classified either as straw huts or not on foundation. ^{3/}

TABLE 6
Housing Stock by Type of Construction
and Year of Completion, All Districts

Year	Total	Straw Huts		Not on Foundation		On Foundation	
		#	%	#	%	#	%
Before 1960	39,491	2,442	6.18	5,207	13.19	31,842	80.63
1960-1969	68,719	3,970	5.78	17,323	25.21	47,426	69.01
1970	4,306	244	5.67	1,142	26.52	2,920	67.81
1971	3,254	213	6.55	967	29.72	2,074	63.74
1972 (Jan-May)	1,429	92	6.44	407	28.48	930	65.08
Year Not Stated	6,091	376	6.17	1,020	16.75	4,695	77.08
Total	123,290	7,337	5.95	26,066	21.14	89,887	72.91

SOURCE: Housing and Population Census of Mauritius, 1972.

The census classifications do not fully indicate the permanence of construction. As of 1972 only 37 percent of all housing in all three classification groups was constructed of other materials. Nevertheless the census figures do show an increase in construction using concrete and block (see Table 7). Prior to 1960, only 15 percent of the permanent housing stock used concrete roofing. However by 1972, one-third of the on foundation housing stock used it. Since 1972 the switch away from other types of roofing to concrete has become even more significant. Although actual housing statistics are not available, the increased usage of concrete construction is indicated by the increased consumption of cement, while consumption of other building materials has decreased or remained static.

^{3/} The census defines straw huts as buildings with thatched roofs and walls made of wood, iron or tin sheets, or vegetable materials. There is some confusion in the definition because on foundation and not on foundation include sizable amounts of residential structures which utilize thatch and metal sheets for walls and roofs.

TABLE 7
Residential Buildings, Permanent
Construction by Type of Building
Material and Year of Completion

Year	Type of Walls	Total	Type of Roof			
			Concrete Slab	Shingles	Metal	Others
Before 1960	Concrete Block	11,092	4,754	453	5,718	167
	Others	20,751	21	2,855	17,754	120
1960-1969	Concrete Block	27,943	20,270	93	7,419	161
	Others	19,483	143	161	19,105	68
1970	Concrete Block	2,332	1,880	7	435	10
	Others	588	11	7	564	6
1971	Concrete Block	1,668	1,171	1	488	8
	Others	406	-	3	402	1
1972	Concrete Block	711	502	1	206	2
	Others	219	-	1	216	2
Year Not Stated	Concrete Block	1,778	872	59	810	37
	Others	2,917	2	539	1,225	3
Subtotal	Concrete Block	45,524	29,449	614	15,076	385
Subtotal	Others	44,363	177	3,574	40,266	345
Total		89,887	29,626	4,188	55,342	739

SOURCE: Housing and Population Census of Mauritius, 1972.

The census further elaborates housing into structural conditions defined as: sound, deteriorating and dilapidated. The general condition of most 1972 housing appears to be fair⁴ good. Only 20 percent of the total housing was found to need either major repairs or be uninhabitable. Of that group, only two percent was so structurally unsound as to be in need of immediate replacement. There seem to be some anomalies in this data, however, since CHA estimates of total housing completely destroyed by cyclone Gervaise amounted to about eight percent of the estimated 1975 housing stock.

Since the structural condition of housing is dynamic -- because portions of the housing stock continually become uninhabitable due to poor maintenance, poor construction or change in living patterns -- the housing stock requires continual replenishment. To avoid the devastating effects of natural disasters, the rate of replacement of housing stock should be gradual and continuous. This rate of replacement of existing housing stock is therefore an important component of estimates of the requirements for new housing stock.

Table 8 shows a method of deriving a gradual rate of replacement of housing stock. Based on census data, it is assumed that 100 percent of structurally unsound housing (Condition III) will need replacement over a ten-year period, while an estimated 60 percent of housing which is severely deteriorated (Condition II) will need replacement. Furthermore, it was assumed that a portion of structurally sound housing will deteriorate and will also require replacement. As a result, the required rate of replacement of existing housing is 1.5 percent per year over ten years.

Prior to 1972, the census indicates a fairly constant housing construction rate of about 3,300 units per year. Since 1972, statistics on housing construction rates are not available. Nevertheless, it is possible to estimate the rate of permanent construction, i.e. construction using cement-

4/ Condition I (sound) housing is described as having no visible defects or defects that minor maintenance could rectify; Condition II (deteriorating) housing is described as needing repairs greater than would be provided during regular maintenance but still in habitable condition; and Condition III (dilapidated) housing is that which endangers the lives or health of its occupants and should be replaced.

TABLE 8
HOUSING requiring Replacement, 1972

	Total	Straw Huts				Not on Foundation				On Foundation			
		Total	Condition*			Total	Condition*			Total	Condition*		
			I	II	III		I	II	III		I	II	III
All Districts	123,290	7,337	3,121	3,583	631	26,066	16,769	8,483	794	89,887	79,819	9,468	546
Needing Replacement** (%)	14.8	42.2	10.0	60.0	100.0	22.5	5.0	60.0	100.0	10.3	5.0	60.0	100.0
Replacement need spread over 10 years (%)	1.5	4.2	1.0	6.0	10.0	2.3	0.5	6.0	10.0	1.0	0.5	6.0	10.0

NOTES: * Condition definitions: I, structurally sound but may need minor repair; II, deteriorating and need major repairs but still habitable; and III, dilapidated, structurally unsound, and should be replaced.
 ** Replacement needs were calculated by using the following assumptions: all of the Condition III stock, 60 percent of the Condition II stock, 10 percent of the straw hut Condition I, and five percent of other Condition I units will require replacement. Thus, an average of total required replacement needs equals 14.8 percent of the existing housing stock. If that replacement need is spread over ten years, it results in an annual replacement need of 1.48 (say 1.5 percent) of the existing housing stock. These replacement rates assume that the condition of the housing remains dynamic, so some of the housing stock through neglect or poor construction will always require replacement. Therefore, to renew the existing stock deficient housing should be replaced gradually over a long period to eliminate the sudden demolition of a large number of housing units caused by a natural disaster.

SOURCE: Housing and Population Census of Mauritius, 1972 and PADCO analysis.

based products, 5/ in both formal and informal sectors, from the percentage of gross domestic fixed capital formation due to residential construction, annual cement consumption in Mauritius, and estimates of worker productivity. 6/ As estimated in Table 9, the annual percentage increase to the permanent housing stock has increased from 2.6 percent in 1972 to an estimated 6.6 percent in 1978. This estimated increase is due in part to the increased construction of the cyclone Gervaise program and is evidenced by the increase in cement consumption from 0.08 tons per capita in 1970 to 0.28 tons per capita in 1978. 7/

Although all construction in both urban and rural areas requires both development and building permits, the issuance of building permits has not kept pace with the rate of construction. In 1970 when 4,306 housing units were constructed only 1,525 building permits were issued; in 1974 when an estimated 3,803 units were completed only 2,918 permits were granted. 8/ Even though there may be considerable delay between issuance of a building permit and actual construction completion, the excess of construction completion over building permits indicates a large amount of housing construction has not been recorded -- a large portion of which is being constructed by the informal sector.

5/ The 1972 census indicated the rate of cement consumption for housing has been increasing. As a result, consumption of other building materials, i.e., corrugated metal sheets, timber and asbestos-cement, have decreased or remained static. Thus, due to the heavy reliance on cement for construction in all sectors, cement-based construction can be used as an indicator of total housing construction activity.

6/ Details of these calculations are further developed in the construction section, Chapter IV Section C.

7/ Bi-Annual Digest of Statistics, 1970-1978.

8/ Central Statistical Office. Bi-Annual Digest of Statistics, 1970 and 1974. Housing developed by both the Central Housing Authority and the Mauritius Housing Corporation does not require building permits and is excluded from compliance with building codes.

TABLE 9

Estimated Rate of Housing Construction, 1960-1978

(1) Year	(2) Annual Additions to Housing Stock	(3) Cumulative Additions to Housing Stock	(4) Cumulative Adjusted for Permanent Construction <u>2/</u>	(5) Annual Increase (%)	(6) Building Permits Issued
Before 1960 <u>3/</u>		39,491			
1960-1969 <u>3/</u>	3,247	108,210	79,268		
1970 <u>3/</u>	4,306	112,516	82,188		1,525
1971 <u>3/</u>	3,254	115,770	84,264		1,685
1972 <u>3/</u>	3,429	119,199 <u>1/</u>	86,494	2.65	2,006
1973	3,629	122,828	90,123	4.20	2,623
1974	3,803	126,631	93,926	4.22	2,918
1975	4,772	131,403	98,698	5.08	3,775
1976	5,572	136,975	104,270	5.65	4,141
1977	6,160	143,135	110,430	5.91	
1978	7,251	150,386	117,681	6.57	

NOTES: 1/ Housing for which date of completion is unknown were deleted.
2/ Follows 1972 Housing and Population Census definition "On Foundation" which in 1972 accounted for 73 percent of the total housing stock. 3/ 1972 Housing and Population Census.

SOURCE: Figures through 1972 from Housing and Population Census of Mauritius, 1972. Column 2, annual additions before 1973, figures are from the census. 1973-1978 figures are PADCO estimates from gross fixed capital formation due to residential construction, annual imports of cement, and estimated construction worker productivity. Since 1972, column 2 additions have represented only permanent construction (concrete based) and were added in total to column 4.

1. Household Characteristics

An average dwelling in mainland Mauritius has about 3.3 habitable rooms and contains about 5.5 persons. Housing units tend to be small and not too overcrowded (see Photos 3 and 4); almost 60 percent of all housing units contain less than four habitable rooms. A fairly large proportion of these units (46 percent) house from two to five occupants, while about 36 percent house between six and nine persons (see Table 10). The variation among urban and rural house densities is small. Urban districts average about 5.42 persons per house compared to 5.65 persons per house in rural districts (see Table 11).

Slightly smaller rural house sizes (averaging 3.29 rooms in urban districts and 3.16 rooms in rural districts) combined with the larger household sizes in rural areas account for somewhat higher rural room occupancy rates: 1.78 compared to 1.48 in Plaines Wilhem. In spite of the fact that about 35 percent of all housing units have one or two rooms, there does not seem to be serious overcrowding in Mauritius. ^{9/} The housing problem seems to be one of improving the quality of the existing housing stock and providing accommodation for new households rather than one of providing new housing to relieve severe overcrowding.

The genesis of nuclear family formation is shown in Table 12 by the number of single-person households ^{10/} and the relatively low percentage of households containing more than one nuclear family (10.6 percent). These figures indicate a preference for single nuclear family households, a break from traditional multiple family living styles.

^{9/} Overcrowding in tropical areas is often described as more than two adults and one small child per habitable room. If living rooms are not used as sleeping rooms during the night, there may be greater *de facto* room densities than shown above, but that is unlikely.

^{10/} A household is defined as: 1) a person who makes provision for his own food or other essentials for living; 2) a group of two or more persons, related or not, who make provision for food and other essentials for living communally; or 3) a group of persons who share at least one meal a day and live together in the same housing unit.



Photo 3
Typical low-income housing near La Brasserie.



Photo 4
Rural housing on Black River Road.

TABLE 10

Housing Units by Number of Habitable
Rooms and Occupants Per Dwelling

Number of Occupants per Dwelling	Total Dwellings		Number of Rooms per Dwelling (Percentages)										
	Number	Percent	1	2	3	4	5	6	7	8	9	10+	Not Stated
1	10,430	7.2	54.4	24.2	9.4	7.6	2.1	1.1	0.5	0.2	0.1	0.1	0.4
2	14,510	10.1	26.1	29.7	19.0	16.5	4.2	2.3	1.1	0.4	0.2	0.2	0.2
3	16,143	11.2	18.7	28.0	21.2	20.3	6.2	3.4	1.1	0.5	0.3	0.3	0.2
4	17,591	12.2	13.6	26.5	21.9	23.0	7.5	4.6	1.5	0.7	0.3	0.4	0.1
5	18,044	12.5	10.8	24.5	23.9	23.9	8.1	5.2	2.0	0.8	0.4	0.4	0.1
6	16,975	11.8	7.6	21.5	25.7	26.4	9.2	5.9	2.0	0.8	0.4	0.3	0.1
7	14,752	10.2	4.7	17.0	35.1	24.5	8.7	5.9	2.1	1.0	0.4	0.4	0.1
8	12,429	8.6	3.5	16.3	27.3	29.0	11.5	7.9	2.3	1.3	0.5	0.4	0.1
9	8,323	5.8	2.2	13.3	26.4	28.9	13.5	9.7	3.2	1.6	0.7	0.5	0.1
10+	14,852	10.3	1.2	8.0	19.6	26.3	15.7	15.2	6.6	3.6	1.8	1.8	0.1
	144,049	100.0	13.6	21.7	22.3	23.1	8.7	6.1	2.3	1.1	0.5	0.5	0.1

NOTES: Average number of persons per dwelling is 5.49; average number of rooms per dwelling is 3.31
SOURCE: Housing and Population Census of Mauritius.

TABLE 11
Housing Densities
(averages)

District	Persons Per House	Rooms Per House	Persons Per Room
All Districts	5.49	3.31	1.74
Urban Districts*	5.42	3.29	1.66
Rural Districts	5.65	3.16	1.78
Port Louis	5.13	2.97	1.73
Pamplemousse	5.79	3.26	1.78
Plaines Wilhem	5.33	3.61	1.48
Riviere du Rempart	6.07	3.31	1.83
Flacq	5.89	3.25	1.81
Grand Port	5.54	3.19	1.74
Savanne	5.46	3.23	1.69
Moka	5.68	3.14	1.81
Black River	5.27	2.92	1.80

NOTE: *Defined as the two districts of Port Louis and Plaines Wilhem which contain the five municipal councils and the greatest population concentration.

SOURCE: Housing and Population Census of Mauritius, 1972.

TABLE 12
Household and Family Formation in Mauritius

District	Total Population	Number of Households	Persons per Household	Percent of Single Person Households	Family Nuclei per Household*	Percent of Households with More Than One Family**
Port Louis	133,996	26,437	5.07	13.52	1.11	9.43
Pamplemousse	68,948	12,299	5.61	9.50	1.14	11.72
Riviere du Rempart	66,995	11,747	5.70	8.60	1.14	11.88
Flacq	89,050	15,831	5.63	9.48	1.14	12.20
Grand Port	80,719	15,155	5.33	11.20	1.13	11.17
Savanne	53,011	10,007	5.30	10.87	1.13	10.99
Plaines Wilhem	258,699	49,879	5.19	10.65	1.11	9.61
Moka	48,610	8,767	5.54	9.06	1.15	12.63
Black River	26,171	5,110	5.12	11.43	1.10	9.15
All Districts	826,166	155,232	5.39	10.48	1.13	10.97
Average			5.32	10.78	1.12	10.64

NOTES: *Family nuclei are defined as either married couples with or without never-married children or single parents with never-married children. **Excluding single person households.

SOURCE: Housing and Population Census of Mauritius, 1972.

F. Housing Need

The trends in building rates, preferences for building types, and household composition can be translated into projections of total housing needs to give a perspective of the demands which will be placed on the housing sector. Projections of housing needs shown on Table 13 are based on population growth rates after 1975 of 1.1 percent ^{11/} and a constant 6.5 percent per annum rate of increase of the housing stock. ^{12/}

Table 13 also compares the differences in housing needs resulting from different assumptions about changes in household sizes. If household sizes decrease (as shown by the A category of housing needs), the demand represented by the increased number of smaller nuclear family households increases at a greater rate (5.5 percent per annum) than if household sizes remain constant (3.8 percent per annum). However, if the estimated construction rate of 6.5 percent can be maintained, the net unsatisfied housing requirements will continue to diminish even though the number of total households continues to increase. However, if the construction rate drops below five percent and household size decreases, the trend reverses and net housing requirements increase.

To maintain current construction rates, per capita consumption of key materials such as cement will have to continue at current high levels. However, changes in standards and a drop in the building rate to five percent per annum would reduce the consumption of imported materials and would continue to meet projected housing needs as shown in Table 13 columns 11 and 12.

To further illustrate the composition of housing needs in Mauritius, Table 14 shows a breakdown of housing needs by income group. The income distribution shown has resulted from updating the 1975 Household Budget Survey to 1978. ^{13/} Population and household size estimates were based on estimates used in Table 13.

^{11/} World Bank Statistics.

^{12/} Based on Census Data and 1978 estimates of additions to housing stock (see Table 9).

^{13/} As the percentage distribution of incomes was used in the derivation of housing needs and not the incomes themselves, incomes were not adjusted for future inflation and therefore were presented at 1978 levels. The actual distribution was assumed to remain constant throughout the period shown.

TABLE 13

Housing Need Projections in Mauritius, 1972-1986

(1)	(2)	(3)		(4)		(5)	(6)	(7)	(8)	Change in Net Housing Need by Reduced Building Rate 5/								
		Household Size		Total Housing Needs						Annual Additions to Housing Stock (%)	Net Housing Needs		A		B		C	
		A	B	A 3/	B 4/						A	B	Building Rate (%)	Net Housing Needs	Building Rate (%)	Net Housing Needs	Building Rate (%)	Net Housing Needs
1972	826 1/	155	5.3	20,208			2.6		16,028									
1974	857	161	5.3	21,060			4.2		13,937									
1976	893 2/	168	5.3	21,507			5.7		10,310									
1978	912	172	5.3	21,458			6.6		7,918									
1980	932	186	5.0	5.3	23,048	21,918	6.5	9,603	8,474	5.2	11,264	4.9	11,968	4.5	12,907			
1982	953	194	4.9	5.3	24,330	22,758	6.5	9,080	7,590	5.2	12,130	4.9	12,834	4.5	13,772			
1984	974	203	4.8	5.3	25,704	23,655	6.5	8,407	6,359	5.2	11,875	4.9	12,665	4.5	13,737			
1986	995	212	4.7	5.3	27,179	24,615	6.5	7,561	4,997	5.2	11,485	4.9	12,390	4.5	13,598			

NOTES: 1/ Population growth based on Bi-Annual Digest of Statistics (1.9 percent per annum). 2/ Population growth based on World Bank estimates (1.1 percent per annum). 3/ Housing needs if household sizes become smaller while population growth remains constant, building rates remain constant, and replacement rates remain constant at 1.5 percent of the existing stock per annum. 4/ Housing needs if household sizes remain constant at 5.3 persons per household, population growth remains constant, building rates remain constant, and the rate of replacement remains constant. 5/ Change in net or unsatisfied housing needs if household sizes reduce in size and if building rates change while population growth remains constant and the rate of required replacement remains fixed at 1.5 percent per annum.

SOURCE: PADCO analysis.

TABLE 14

Housing Need Projections in Mauritius by Income Group, 1978-1982

Year	Population ('000) <u>1/</u>	Household size <u>2/</u>	Income Group	Monthly Income (Rs)	Percent of Household Need <u>3/</u>	Estimated Number of Households in Income Group	Total Housing unit Needs of Income Group	Total Housing Needs as a Proportion of Total Households
1978	912	5.3	1	2,000+	6.4	11,013	1,373	12%
			2	1,501-2,000	6.6	11,357	1,416	
			3	1,001-1,500	10.2	17,552	2,188	
			4	751-1,000	15.5	26,671	3,325	
			5	501- 750	25.4	43,707	5,450	
			6	301- 500	22.3	38,372	4,785	
			7	151- 300	10.1	17,380	2,167	
			8	Up to 150	3.5	6,023	751	
			Totals			172,075	21,458	
1980	932	5.0	1	2,000+	6.4	11,930	1,494	14%
			2	1,501-2,000	6.6	12,302	1,541	
			3	1,001-1,500	10.2	19,013	2,381	
			4	751-1,000	15.5	28,892	3,619	
			5	501- 750	25.4	47,355	5,930	
			6	301- 500	22.3	41,567	5,206	
			7	151- 300	10.1	18,826	2,358	
			8	Up to 150	3.5	6,524	817	
			Totals			186,409	23,349	
1982	953	4.9	1	2,000+	6.4	12,447	1,577	13%
			2	1,501-2,000	6.6	12,836	1,627	
			3	1,001-1,500	10.2	19,838	2,514	
			4	751-1,000	15.5	30,146	3,820	
			5	501- 750	25.4	49,400	6,260	
			6	301- 500	22.3	43,371	5,495	
			7	151- 300	10.1	19,644	2,489	
			8	Up to 150	3.5	6,807	862	
			Totals			194,489	24,644	

SOURCES: 1/ Table 9. 2/ Table 9 household size estimate A. 3/ Table 24, 1978 income distributions were used.

As indicated by the 1978 income distribution, the greatest housing needs (61 percent) are found among households having incomes less than Rs 750 per month. Of that group, the largest proportion (48 percent) is from households earning between Rs 300 to 750 per month. However, housing needs for households having incomes above Rs 1,000 are also substantial (23 percent). At the lowest end of the income distribution, needs are somewhat less as only 14 percent of total housing needs result from households having incomes of Rs 300 or less per month.

These studies of total housing needs and housing needs by income group show that while housing policy should address all segments of the population, emphasis should be given to those sectors where the greatest needs are demonstrated, i.e., below the 50th percentile. The analysis also demonstrates the need for a long-term approach of gradually replenishing and increasing the housing stock to meet increased housing needs due to population growth and changes in living patterns. Table 13 also shows that the housing sector's reliance on imported materials can be reduced through a lower building rate and changes in building standards.

Chapter II

CHARACTERISTICS OF THE POPULATION

A. Income Distribution

The analysis in Chapter I indicates a need for housing among all income groups. The following description of the national income distribution and social and cultural characteristics of the population provides a frame of reference in which to consider the future project alternatives recommended in the final chapter of this report.

Housing need in Mauritius is most acute among those whose homes were damaged beyond repair by cyclone Gervaise in 1975. Of the 13,074 families who registered with the CHA to participate in the rehousing program, 90 percent had incomes below the 1975 median of Rs 550 a month. Similarly, the majority of those indicating an interest in public housing by responding to a MHC survey had incomes below the 1975 median (see Table 15) and were unable to afford to participate on economic terms in the programs described in Chapter III.

In the design of housing projects it is important to adjust the standards to the income and payment capacity of the population to be served. However, as is illustrated by comparing the excess of family expenditure over declared income (see Table 16), family expenditure is often a more accurate indicator of actual income than declared income, especially among low-income families. Tables 16 and 17 are based on a 1975 Family Budget Survey conducted by the Central Statistical Office of 2,247 households earning up to Rs 2,000 per month.

As can be seen from Table 16, average expenditure per family is consistently higher than the median income of each category and among the lower-income brackets even exceeds the upper limit of the category. This trend can be clearly seen in Figure 1 where the cross-hatched area is the difference between average expenditure per family and the median incomes of the respective categories. The substantial excess of expenditure over income could be a result of a combination of two factors: 1) understatement of income to the enumerator; and 2) a dissavings, especially among low-income families. Since the expenditure data show a positive savings.

TABLE 15
Interest in Public Housing
as Indicated by Response to Mauritius Housing Corporation Survey, 1975
(By Locational Preference and Income Group)

Area Preference	Income Group (Rs per month)								Total
	500 & Below		501 to 1,000		1,001 to 1,500		1,500 and Above		
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Rose Hill	145	19.5	272	37.0	184	25.0	132	18.5	733
Port Louis	235	44.0	188	35.0	67	12.0	47	9.0	537
Beau Bassin	50	25.8	67	34.5	43	22.2	34	17.5	194
Curepipe	68	40.2	60	35.5	37	21.9	4	2.4	169
Quatre Bornes	27	21.1	43	33.6	32	25.0	26	20.3	128
Totals	525		630		363		243		1,872

SOURCE: Mauritius Housing Corporation, 1975.

TABLE 16
Income and Expenditure Distribution
and Median Income, 1975

Income/ Expenditure Group (Rs.)	Income		Expenditure		Average Expenditure per Family (Rs.)
	Percent	Cumulative Percent	Percent	Cumulative Percent	
Under 150	5.2	5.2	4.2	4.2	178
151-300	12.5	17.7	14.7	18.9	327
301-500	27.2	44.9	26.3	45.2	496
501-750	24.6	69.5	23.5	68.7	727
751-1,000	10.9	80.4	11.6	80.3	1,032
1,001-1,500	9.9	90.3	11.0	91.3	1,361
1,501-2,000	5.0	95.3	4.1	95.4	1,937
Over 2,001	4.7	100.0	4.6	100.0	3,226
Average		753		860	860
Median		552		551	

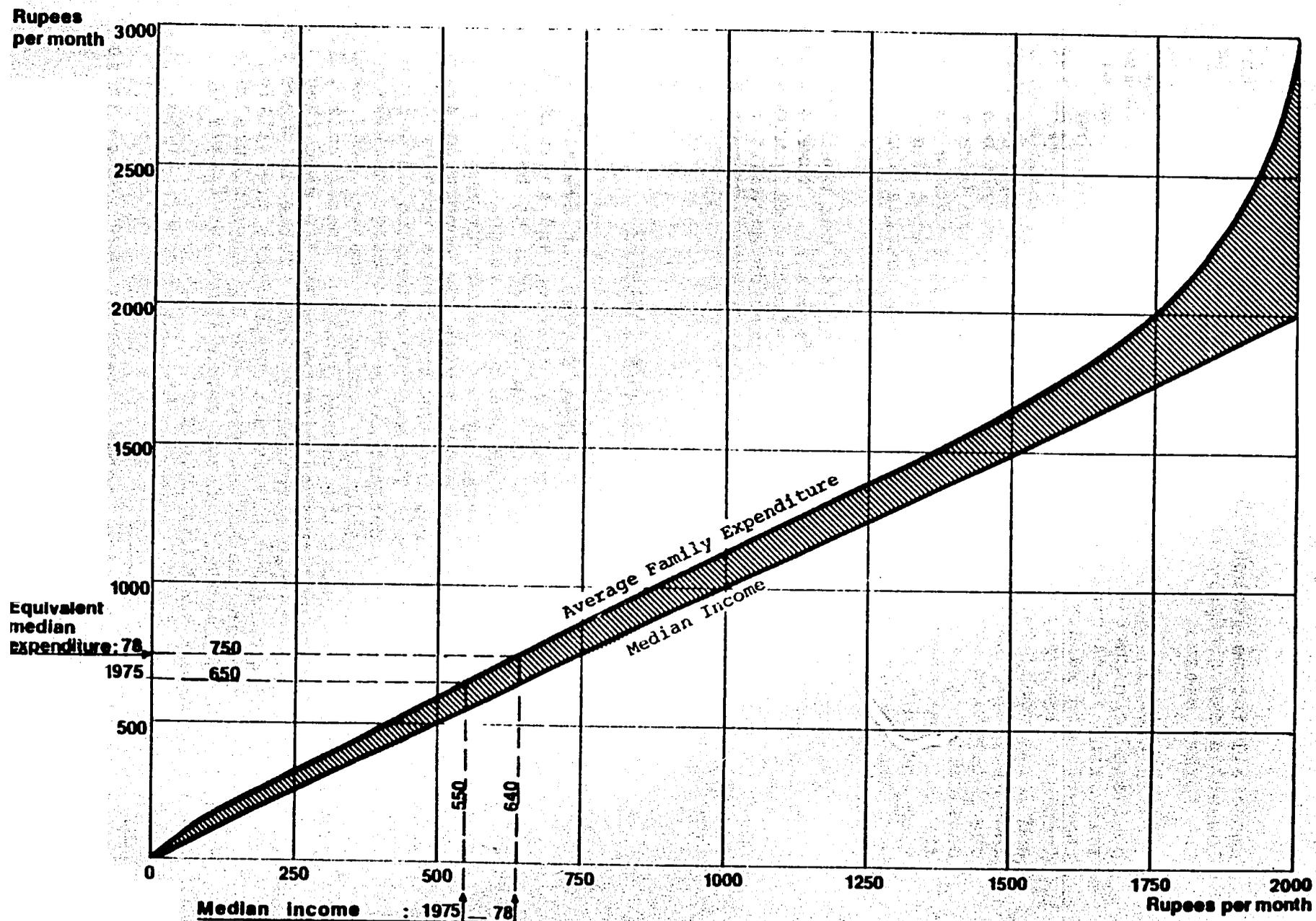
SOURCE: 1975 Family Budget Survey, Central Statistical Office.

TABLE 17
Income and Expenditure Distribution
and Median Income, 1978

Income/ Expenditure Group (Rs.)	Income		Expenditure	
	Percent	Cumulative Percent	Percent	Cumulative Percent
Under 150	3.5	3.5	2.8	2.8
151-300	10.1	13.6	11.2	14.0
301-500	22.3	35.9	22.4	36.4
501-750	25.4	61.3	24.5	60.9
751-1,000	15.5	76.8	15.6	76.5
1,001-1,500	10.2	87.0	11.2	87.7
1,501-2,000	6.6	93.6	6.4	94.1
Over 2,001	6.4	100.0	5.9	100.0
Average		858		998
Median		640		639

SOURCE: Estimated from 1975 Family Budget Survey,
Central Statistical Office.

Figure 1
AVERAGE FAMILY EXPENDITURE AND MEDIAN INCOME 1975 AND 1978



among all income groups (although admittedly small among the lowest income groups), it seems the discrepancy is more from the former reason.

In updating the 1975 income distribution to 1978, the published consumer price index was used. Usually the wholesale price index composed of less price-controlled items or the wage and salary index are better bases for updating incomes. However, due to Mauritius' small manufacturing base and large-scale imports of factory goods, no wholesale price index exists. Further, although wage data are kept for various categories, no wage and salary index has as yet been developed. However, the team was assured by the Director of the CSO that wages and salaries kept adequate pace with inflation and that the consumer price index was a good base for updating incomes. This was done with the results shown in Figure 2.

Strictly speaking, the income of Rs 640 per month should be taken as the median (Table 17 and Figure 1). However, since it seems expenditure more accurately reflects real income and hence paying capacity, the equivalent median expenditure of Rs 750 shown in Figure 2 was felt to be a more accurate reflection of median income. 14/

B. Housing Expenditure Patterns

According to the Family Budget Survey, an overall range of 12 percent of income is spent on housing and related expenses with a range from 15 percent in the under Rs 150 group to 11 percent for those in the Rs 300 to 500 range. In the Mauritian context, the percentage of income currently being spent on housing cannot be equated with the amount consumers would be willing to spend, because rents have traditionally been unrealistically low. The Mauritius Housing Corporation Study in 1975 found 20 percent to be the average maximum percentage of income available for housing. However, the exact percentage varies among the income groups. Specifically, 80 percent of the respondents earning below Rs 500 said they could not afford to pay more than Rs 200. Table 18 shows the amount of rent paid and the amount respondents are willing to pay by district in the MHC survey. On the expenditure side, Table 19 shows the 1975 average expenditure per family by income range and commodity group.

14/ In Figure 2 the income update to 1978, since it is proportionate to 1975 throughout the scale, is equivalent to a rightward move along the income axis.

Figure 2
 1975 — 1978 FAMILY EXPENDITURE CURVES

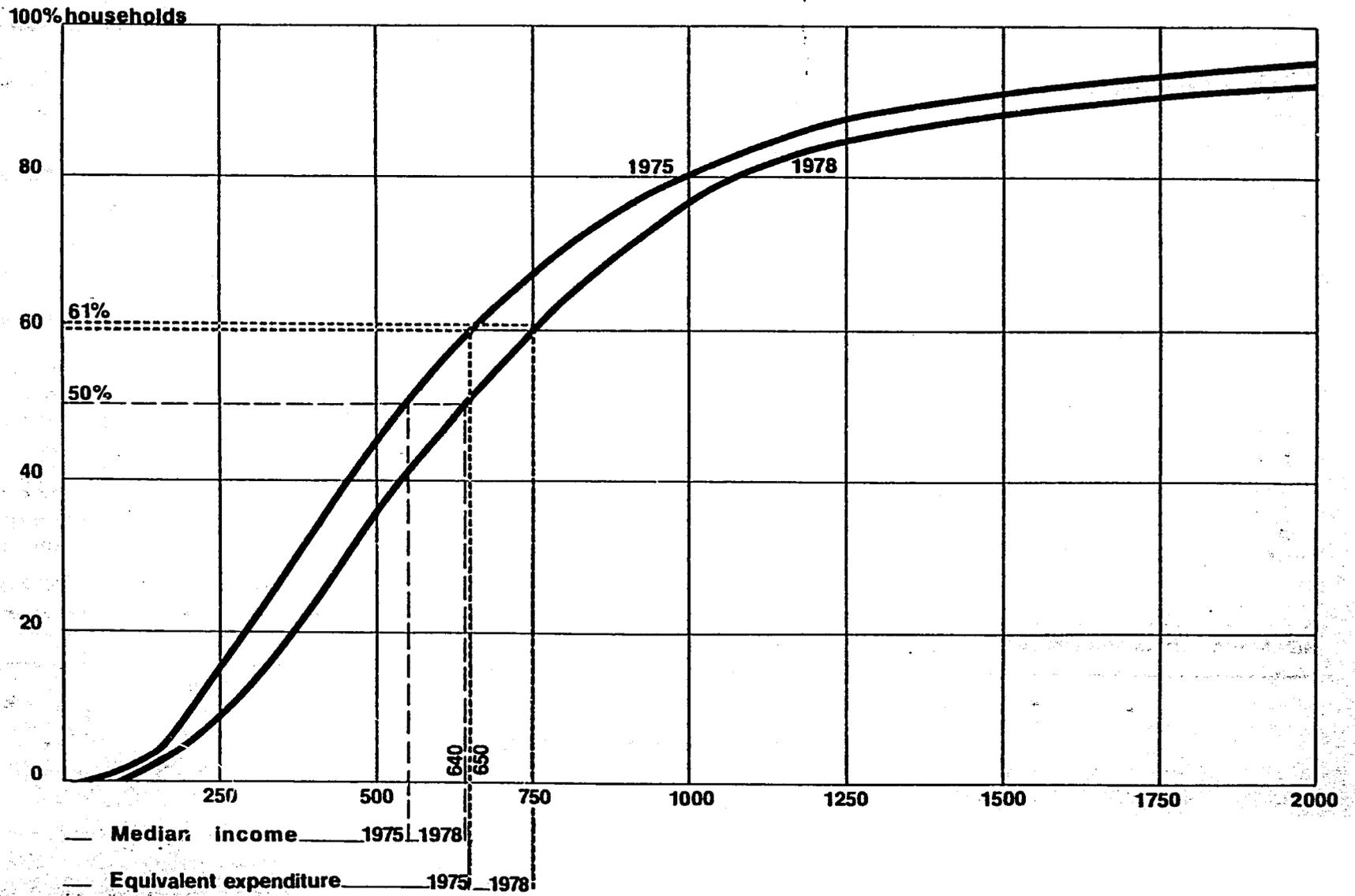


TABLE 18

Actual and Affordable Rent Payments
by Income Group

	Rose Hill	Beau Bassin	Quatre Barnes	Port Louis	Vacoas-Phoenix	Curepipe
Rent Now Paying Each Month						
No rent	18.1%	15.5%	19.5%	13.2%	38.6%	29.0%
Below Rs 100	41.2	49.5	46.8	69.3	47.2	53.8
Rs 101 - 150	15.8	17.6	14.1	9.9	11.4	8.3
Rs 151 - 200	12.4	8.2	5.5	4.7	--	5.5
Rs 201 - 250	5.3	3.6	6.3	0.9	--	1.2
Rs 251 - 300	2.9	1.5	3.1	0.6	1.4	1.2
Rs 301 - 400	2.2	1.5	--	0.4	--	0.6
Rs 401 - 500	0.7	--	--	--	--	--
Above Rs 500	--	--	--	--	--	--
Decline to state	1.4	1.6	4.7	1.0	1.4	0.6
Rent Can Afford to Pay Each Month						
Below Rs 100	21.0%	21.6%	20.2%	43.4%	24.2%	47.3%
Rs 101 - 150	16.2	25.3	12.5	25.0	15.7	16.0
Rs 151 - 200	15.7	10.8	11.7	6.9	18.6	6.5
Rs 201 - 250	12.4	12.9	10.9	5.0	12.9	6.5
Rs 251 - 300	12.3	10.8	14.1	7.1	10.0	10.7
Rs 301 - 400	13.4	10.4	14.1	3.0	8.6	7.1
Rs 401 - 500	3.5	4.1	4.7	3.4	4.3	1.2
Above Rs 500	2.2	0.5	5.5	1.9	1.4	--
Decline to state	3.3	3.6	6.3	4.3	4.3	4.7

TABLE 19
Average Expenditure per Family
by Income Ranges and Commodity Group, 1975
(percent of total average expenditures)

Commodity	Income Ranges (Rs per month)								
	All Income Ranges	Under 150	151-300	301-500	501-750	751-1,000	1,001-1,500	1,501-2,000	Over 2,000
Total average expenditure per family	860.1	177.9	327.0	495.9	727.4	1,031.8	1,360.5	1,937.5	3,225.8
Food, beverage, and tobacco	39.1	57.3	56.2	51.6	44.7	39.3	36.5	30.0	23.5
Fuel and light	3.2	4.6	4.4	3.9	3.5	3.3	3.1	2.7	2.1
Housing, household appliances and utilities*	12.1	15.0	11.1	10.8	11.3	12.2	11.5	13.9	13.7
Rent for housing and water charges	8.0	11.7	9.0	8.9	8.6	8.1	7.3	6.9	7.4
Clothing, bedding, footwear and headwear	9.7	8.8	7.7	8.7	9.5	10.4	10.9	10.9	8.1
Miscellaneous items**	19.2	11.7	12.6	16.8	17.8	17.4	20.3	21.9	23.8
Average non-consumption expenditure	16.7	2.5	8.0	8.2	13.2	17.4	17.7	20.7	27.6

NOTES: *Includes house repairs and upkeep, furniture and furnishings, household services, etc.
**Includes medical care, personal care, education and reading, transport and communication, recreation and amusement, animal food, etc.

SOURCE: Central Statistical Office.

C. Employment Opportunities and Prospects

Employment prospects for the low-income population are encouraging. D.F. Wilson ^{15/} estimated that 46 percent of the job opportunities created in the period 1972-1982 would require an educational level no higher than the Primary School Leaving Certificate. These will probably include the below median income population who are most in need of housing.

The entire labor force in Mauritius is in the cash economy. As of the 1972 census, 83 percent of the male population aged 15 and over participated in the labor force as compared to 20 percent of the females. Table 20 shows the distribution of employment by industrial group and occupation. The percentage of male participation is expected to decrease by two percent in 1980 as attendance at educational institutions increases among the 15 to 19 age group. Female participation is expected to increase by two percent with slight increases in all age groups except age 60 and over.

Of the workers in the export processing zone, 80 percent are female because of the exacting nature of the work. As a large proportion of the new jobs created are in this sector, the government has expressed concern that males, who would normally be the family breadwinners, are not benefiting sufficiently from increasing employment opportunities. Yet with an overall unemployment rate of about ten percent, less than five percent of heads of households were unemployed in 1975 (see Table 21).

Official unemployment figures overestimate the extent of unemployment. According to the Ministry of Employment, anyone who wants a job can find one. For example, some of those registered as agricultural laborers are not willing to work in the sugar fields. While the salary paid is competitive, the work is tiring and carries very low status. Since the young are reluctant to do this type of work, the average age of the sugar industry labor force has been noticeably increasing over the last ten years. Mechanization is being investigated. Moreover, some tea growing activities have been abandoned as a result of the lack of labor.

The figures regarding unemployment in the construction industry are also misleading. Private contractors hire labor for 11 months and ten days, the maximum time allowable before benefits are paid. After being laid off for 15 days, the

^{15/} Manpower and Development in Mauritius. Unpublished, 1974.

TABLE 2C
Employment by Major Industrial Group and
Major Occupational Group, March-June 1977

Major Industrial Group*	Major Occupational Group**							Total
	Profes- sional Technical, and Related	Adminis- trative and Managerial	Clerical and Related	Sales	Service	Agricultural, Animal Husbandry, Forestry, and Fishermen	Production and Related, Trans- port Equipment Operators	
Agricultural, hunting, forestry and fishing	143	190	514	4	776	49,245	10,260	61,132
Mining and quarrying	-	5	-	-	-	-	138	143
Manufacturing	551	529	1,446	296	524	348	27,098	30,792
Electricity, gas and water	118	9	559	2	303	-	3,079	4,070
Construction	88	38	345	3	119	4	6,532	7,129
Wholesale, retail trade, restaurants and hotels	254	422	1,515	1,236	2,269	162	1,652	7,510
Transport, storage and communication	106	83	3,142	3	736	6	6,039	10,115
Financing, insurance, real estate and business services	428	189	1,715	118	549	227	260	3,486
Community, social and personal services***	15,145	378	6,357	329	9,192	4,940	18,162	54,503
Activities not else- where classified	16	5	253	-	251	4	13,909	14,438
Total	16,849	1,848	15,846	1,991	14,719	54,936	87,129	193,318

NOTES: *Major industrial groups of the International Standard Industrial Classification of All Economic Activities, Revised Edition 1971. **Major occupational groups of the International Standard Classification of Occupations, Revised Edition 1968. ***Includes development workers but excludes figures for Central Housing Authority, now included under construction.

SOURCE: Central Statistical Office

TABLE 21
 Distribution of Unemployed
 Persons by Geographical District, 1978

Employment Office	Districts Served	Combined Total Population	Number Registered Unemployed	Percent Unemployed
Port Louis	Port Louis	141,022	2,539	0.2
Mapou	Pamplemousses Riviere du Rampart	147,558	3,180	0.2
Rose Belle	Black River Grand Port Savanne	171,354	2,076	0.1
Carepipe/ Rose Hill	Plains Wilhelms	272,176	5,333	0.2
Quartier Militaire	Flacq Moka	<u>149,651</u>	<u>2,470</u>	<u>0.2</u>
Totals		881,761	15,598	0.9

SOURCE: Ministry of Employment

workers are invited back for another 11 months and ten days, after which they appear on the unemployment register again. This security factor contributes to making the Development Works Corporation an employer of first, rather than last, resort.

D. Geographical Distribution of Employment

It is important that future plans for residential and industrial development be closely coordinated. A recent study of businesses with ten or more employees shows that 70 percent of all nonagricultural jobs are concentrated in urban zones. Forty-four percent of all secondary employment and 39 percent of all tertiary employment is in Port Louis, and one-half of all employment created between 1952 and 1972 was located there. The distribution of agricultural employment is unbalanced also. Fifty-four percent of all primary sector jobs are in the three geographical districts of Flacq (21 percent), Savanne (17 percent), and Grand Port (16 percent). While Pamplemousses and Riviere du Rempart have high agricultural potential, they contain only eight and 12 percent of agricultural employment, respectively (see Table 22). The problem of job distribution is exacerbated by a weak public transportation system, with limited stops between main cities.

TABLE 22
Distribution of Employment by
District and Sector, 1972
(jobs in thousands)

District	Primary Sector	Secondary Sector	Tertiary Sector	All Sectors (%)	Population aged 15-59 (%)
Port Louis*	1.2	21.9	36.7	27.8	16.8
Pamplemousses	5.7	2.9	4.6	23.2	32.5
Riviere du Rempart	8.6	2.7	3.7	6.1	8.2
Black River	6.4	0.8	1.9	7.0	7.8
Plaines Wilhems*	7.7	13.0	29.4	4.2	3.0
Moka	3.6	1.1	5.6	4.8	5.8
Flacq	14.8	3.5	4.5	10.6	10.2
Grand Port	11.0	1.9	4.9	8.2	9.4
Savanne	<u>11.9</u>	<u>1.8</u>	<u>3.7</u>	<u>8.1</u>	<u>6.2</u>
Total	70.8	49.6	95.0	100.0	100.0

NOTE: *Urban zones.

SOURCE: Cahier No. 6, Mission d'Amenagement du Territoire a l'Ile

Export processing zone (EPZ) industries also have had difficulty recruiting female labor and some new ones are locating in currently nonindustrial areas where they think more labor may be available. Others are providing transportation for their workers, and at least one planned housing estate is adjacent to a new industrial estate.

E. Social and Cultural Characteristics

1. Life Style

Information about the social and cultural characteristics of the population most interested in public housing is available from a MHC survey conducted in 1975. 16/ Of the 4,126 respondents, 58 percent of those earning less than Rs 500 a month were manual workers -- laborers, attendants, porters, or caretakers -- which required little or no skill or training. Skilled laborers such as masons, carpenters and tailors made up 32 percent of this group. The average head of household was 36 years of age and the average number of household members was 4.9, slightly lower than for other income groups. Probable family size in five years' time ranks the lowest of all income groups at 4.7. The national average in the 1972 census was 5.3 persons per household. 17/

The survey suggests that there are many broken families within this group relating to both actual and probable family sizes. For similar reasons, the second lowest probable family size was in the lower-middle-income group, Rs 500 to 1,000. Thirty-seven percent of the respondents in this group were skilled technicians, mechanics and machine operators; 36 percent were semi-professional workers -- typists, clerks, and cashiers; and 18 percent were manual workers with more than one salary per household.

The lower-income families are, for the most part, currently sharing their homes with other family groups and will probably split into nuclear family groups in the future. As mentioned in Chapter I, there is a strong trend toward nuclear family living. Traditionally, newlyweds lived with either the husband's or the wife's parents for the first few years of married life. Now all who can afford to seek their own accommodations.

16/ Market Survey of Families interested in Public Housing by Mauritius Housing Corporation. Unpublished, March 1975.

17/ 1972 Housing and Population Census of Mauritius.

Skilled workers and semi-professionals make up the middle-income group (Rs 1,001 to 1,500). The average of 5.1 family members ranks as the highest family size of all income groups, and the probable family size of 5.2 is also the largest. Nuclear family groups are strong with both parents being present.

The existence of the upper-middle-income group (Rs 1,500 and above) in the survey was surprising, as it had been expected that in Mauritius as elsewhere this group would be able to finance housing through conventional programs such as the MHC mortgage scheme. The current high price of land is seen as responsible for the interest in public housing. This group presently has the lowest family size but the average expected family size of 5.1 is the second highest, as they will probably assume responsibility for older parents and other relatives.

The lower the income, the less popular apartment living becomes. While more than half of those earning above Rs 1,001 said that they would definitely like to live in an apartment, 64 percent of the lowest-income group said that they would not prefer this type of living arrangement, because it would not be a personal home, would be too crowded, and would not have a garden. While house size is not of paramount importance, this group recorded the strongest positive response for one-bedroom units regardless of family size.

It is important for all individual units to have space for a garden. Not only can it be used for growing vegetables but it can also add a touch of individuality. Application by the owner/tenant of exterior finishings can also lend individuality while decreasing construction costs.

In all income groups, location preference is based on nearness to work, transportation, and parents, and current area of residence. In fact, occasionally, if the parents' plot is big enough, it will be split so that a young couple can build a separate unit. Climate is a factor that is considered important only by high-income groups.

Of the 13,074 units destroyed by Gervaise, as measured by those who registered for assistance with the CHA, 30 percent were located in the Plaines Wilhems District, 19 percent in the Port Louis District, and 11 percent in Grand Port. Given the desire of the population to reside in the areas where they have always lived, housing projects in these areas are being planned by the CHA. A complete list of the Gervaise victims by income group and location is given in Table 23; 90 percent of the victims earned below the median income in 1975.

TABLE 23

Distribution of Gervaise Victims
by Locality, Family Size, and Family Income*

Locality	Family Size			Income Group* (Rs per month)						Total
	1-4	5-8	Over 9	Under 200	201-400	401-600	601-800	801-1,000	Over 1,000	
Port Louis District	134	1,949	447	993	1,018	381	87	31	20	2,530
Moka District	271	454	98	160	388	209	55	5	6	823
Black River District	159	341	83	193	277	93	16	2	1	583
Flacq District	162	486	244	269	577	233	43	9	10	1,141
Pamplemousse District	163	626	212	220	497	205	58	11	10	1,001
Riviere de Rampart District	190	540	154	207	434	183	40	13	7	884
Grand Port District	122	1,067	276	368	720	297	66	5	9	1,465
Savanne District	102	473	106	184	316	146	32	1	2	681
Plaines Wilhems District	868	2,607	489	1,267	1,652	766	170	48	64	3,966
TOTAL				3,861	5,879	2,513	567	125	129	13,074
Cumulative Percents				30	75	94	98	99		

NOTE: *Family income is defined as the income of the applicant for assistance and his wife.

SOURCE: Calculated by SSA team from data furnished by CHA.

2. Community Development

Mauritius has been undergoing a period of rapid social change due to the trend away from extended family living, a high level of literacy, and exposure to different standards of living through travel and the media. A new middle class has been created consisting of the smaller sugar cane planters, salaried workers, and middle management. The population is quite willing to save and work to achieve its new aspirations.

Thus, community development activities have been very well received. Most programs are presently concentrated in the rural areas. The World Bank is assisting in a rural development program in 29 village council areas. Village halls, children's parks, volleyball pitches and public benches are being built. The Ministry of Agriculture has an extension service and the Sugar Industry Labor Welfare Fund is also active in rural areas. The Ministry of Youth and Sports sponsors a program in personality development and youth group development throughout the island.

The experience of a private, nonprofit agency, Institut. Pour le Developpement et le Progres (IDP), could also be further tapped for national community development efforts. Courses in leadership and group animation, civics, economic and community development, cooperatives and credit unions, adult education, trade-unionism, social work and nutrition are offered on weekends to volunteer workers by a variety of social organizations throughout the country. Over 1,000 persons have participated in 25 basic courses and 90 persons have graduated from the four advanced courses that have been offered.

IDP is an organization of social action as well as education. It has assisted in the establishment of 15 credit unions, and four staff members are residing in communities where they aid in the development of over 12 neighborhoods. Its 1978 budget is Rs 60,000 and most of the staff are volunteers.

In terms of providing new housing within integrated and stable community structures, several suggestions can be made. Efforts to locate families near previous areas of residence should continue. Also, experience has shown that hire-purchase tenants take better care of their homes. Even in areas where there was not a strong sense of community, people met by the team expressed interest in organizing for specific purposes such as improving the water supply and obtaining better access to other community services. Lack of initiative and leadership seemed to be major constraints. In a survey taken in the CHA

and EDF housing estates of Barkly, La Cure and Malherbes, all residents said that they would like to have a community center, although the preferred structure of the organization varied. 18/

It would be helpful to have social service personnel on the new housing estates to ease adjustment problems of the new occupants. For example, a social worker could be put in charge of rent collections so that he or she could be in regular contact with the residents, be aware of their problems, and encourage participation in community programs. At present 10,000 monthly payments due to the CHA are collected by 18 nonresident housing assistants with some payments made by mail.

3. Public Health and Nutrition

Health and nutritional services, the responsibility of the Ministry of Health, are spread uniformly throughout the island and appear to be effective. As of 1976 there were a total of 2,860 hospital beds or one per 316 persons; infant mortality was low with 40.4 per thousand live births compared with 70.5 per thousand live births in 1967; average caloric intake has increased from 2,148 in 1962 to 2,179 in 1970 (average adult caloric intake adjusted for temperature is estimated at 2,192). 19/ The Central Statistical Office, however, estimates that there are slight protein deficiencies. In 1970, protein intake equaled 33 grams of reference protein per person per day, the equivalent of about 78.2 percent of daily requirements as set by the FAO, compared to 75.4 percent of daily protein requirements in 1962. Diseases related to nutritional problems generally accounted for only 16 percent of the total notifiable diseases in 1976. 20/ Attendance figures of hospitals and dispensaries indicate that the entire population of Mauritius averaged 1.83 visits to various health facilities during 1976. (The ministry indicates that there may be some inaccuracies in those figures due to social customs of meeting friends at clinics and to double counting. However, the services provided are generally uniform for all segments of the population and entirely free to the recipient.)

18/ Cuy Delforge, La vie sociale dans les cites CHA et EDC des Plaines Wilhems. Institut pour le Developpement et le Progres, Port Louis Rogers & Co. Ltd. circa 1972.

19/ Central Statistics Office.

20/ Unpublished data from the Ministry of Health.

4. Education

Primary education is free and almost universal. In 1975, 92 percent of the primary school age population attended school. In 1976 the pupil/teacher ratio in primary schools was 26. Recently, secondary school education was also fully subsidized. Thus, in 1976 there was a total of 66,920 secondary school pupils in 126 schools which had a student/teacher ratio of 32. Fifty-five percent of the secondary school pupils and 51 percent of the primary pupils are male.

The University of Mauritius which has three schools -- administration, agriculture, and industrial technology -- graduated almost 300 students during the 1976/77 year. Technical school training which develops craftsman-level skills is provided by the Industrial Trade Training Center formally and through a combination of site experience and classroom training efforts by the Development Works Corporation. The Industrial Trade Training Centre provides training which leads to the U.K. city and guilds examination or its equivalent.

Chapter III

PROGRAMS AND INSTITUTIONS

A. Introduction

There are essentially two types of publicly-sponsored housing programs in Mauritius: 1) the public housing program for Gervaise reconstruction being executed by the Central Housing Authority and the Ministry of Housing; and 2) the semipublic program mostly for middle-income families being executed by the Mauritius Housing Corporation.

The programs being offered by the CHA are intended to benefit the low-income population; they are highly subsidized with standards far above the occupants' previous dwelling units (see photos 5 and 6). Only 552 units had been completed as of January 1978 for 13,074 families of cyclone Gervaise. MHC the Ministry of Finance. The demand for loans and housing in the middle- and upper-income groups exceeds the resources of the MHC. It is therefore suggested that it be allowed to broaden its range of funding options. Since a large portion of housing construction takes place in the informal sector, this activity could be encouraged through improvement loans from the MHC.

At present there is no central policymaking body for housing in Mauritius. A Housing Division within the Ministry of Housing, Lands and Town and Country Planning could be responsible for policy and program formulation; coordination and monitoring of all aspects of publicly-sponsored housing; and for the planning and design of special projects.

B. Programs

1. Up to 1975

Large-scale public housing activity in Mauritius began in 1960 after cyclone Carol. Fifteen thousand families were counted eligible for assistance and a program of nearly 14,000 units was undertaken by the newly established Central Housing Authority (see Table 24). The program was accomplished mainly by hiring private contractors.

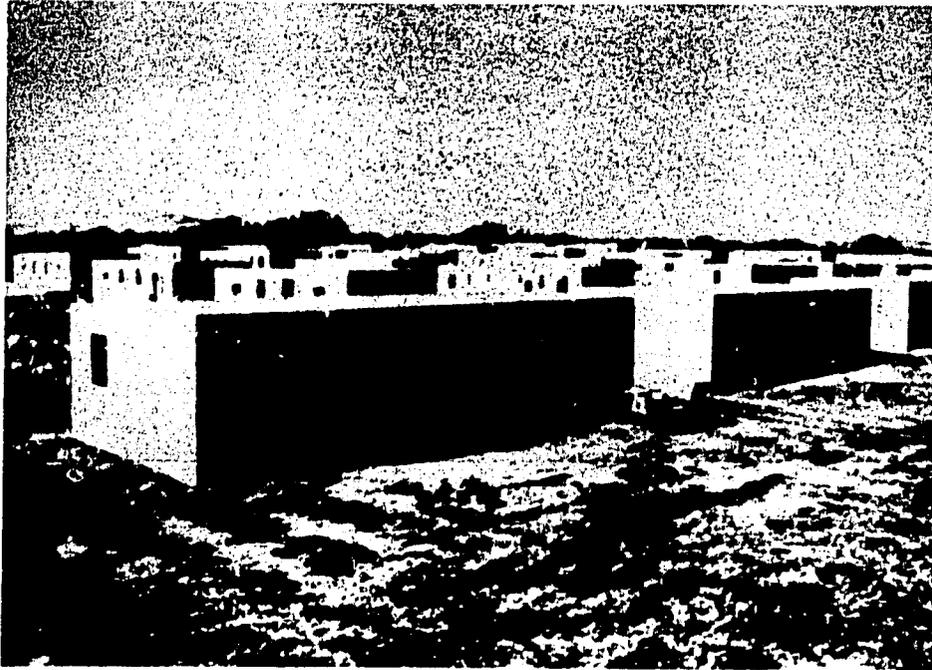


Photo 5

Gervaise Program: Type F housing, Pointe aux Sables.



Photo 6

Gervaise Program: Type J housing, La Brasserie.

TABLE 24

Central Housing Authority
Housing Program Up to 1975

Contractor	Units
Longtill Ltd.	6,046
Engineering Design Company	2,835
Houses on private sites	
Low Cost Housing Ltd.	2,131
Patels Construction	2,172
Tea Village Housing	
Longtill Ltd.	500
Engineering Design Company	25
Low Cost Housing Ltd.	24
Total	13,733

SOURCE: Central Housing Authority.

Most of these houses were a standard four-room plan of 420 square feet costing Rs 4,500 per unit when contracted for in 1962. In addition, 495 units were divided in half to create 990 substandard units which were originally rented for Rs 7 per month (now Rs 12 or 15). The four-room units were sold on terms of 6.5 percent for 25 years based on 55 percent of the unit cost, 45 percent being government grant. This resulted in a payment of Rs 25.5. Those in Tea Village Housing paid Rs 17.50.

2. Present Programs

General Housing Scheme

Between the post-Carol program and the present Gervaise construction program, a small program entitled the General Housing Scheme was undertaken by CHA beginning in 1972. The program entailed five types of houses to be built on privately owned plots (see Table 25).

Although there were 3,000 applicants by January 1973, only a total of 275 houses were built, 210 by CHA and 65 by the Development Works Corporation (DWC). The program was stopped by government because of the high cost of the houses which were felt to be more in the Mauritius Housing Corporation's market. At the end of 1977 the last six houses were to be handed over to the owners.

TABLE 25
General Housing
Scheme Program

Type	Area (sq. ft.)	Units
A	351	26
B	497	69
C	663	51
D	945	24
E	1,372	37
Total		210

SOURCE: Central Housing
Authority.

The Gervaise Program

The reconstruction for the victims of the 1975 cyclone Gervaise began in early 1976. Program progress to date is summarized in Table 26. The types and costs of housing in the foregoing program can be further broken down as shown in Tables 27 and 28.

The Mauritius Housing Corporation

About 2,000 cyclone Gervaise victims were referred by the government for loans on special terms. About 320 loans have been processed and 297 houses had been started as of January 30, 1978. MHC also has built four housing estates totaling 286 units; a 500 low-cost unit project is planned for Roches Brunes in Rose Hill.

C. Program Finance

1. MHC Finance

The financial terms and program of the MHC are described in Chapter IV. The institution is essentially self-financing with a spread of 1.3 percent between its average borrowing and lending rates. Table 35A in the appendix shows that

TABLE 26
Gervaise Housing Program Statistics, January 1978

Project	Target	Completed	Under Construction
Emergency Rehousing Scheme			
Central Housing Authority	345	284	22
Emergency Housing Program			
Central Housing Authority	150	25	101
Lontill Ltd.	162	-	74
Building and Engineering Ltd.	250	-	12
Mauritius Building Ltd.	<u>99</u>	<u>-</u>	<u>99</u>
Subtotal	661	25	286
Low Cost Housing Program			
Longtill Ltd.	5,000	131	317
Central Housing Authority	2,000	-	213
Mauritius Housing Corporation	2,000	64	233
Sugar Industry Labor Welfare Fund	<u>600</u>	<u>48</u>	<u>68</u>
Subtotal	9,600	243	831
Total	10,606	552	1,139

SOURCE: Ministry of Housing, Lands and Town and Country Planning.

TABLE 27
Gervaise Program by Housing Type

Project	Two Story (570 sq. ft.)	Single Story (488 sq. ft.)
Emergency Housing Program		
Three contractors	511	
Central Housing Authority		150
Low Cost Housing Program		
Longtill Ltd.	3,000	2,000
Central Housing Authority		2,000

SOURCE: PADCO analysis from Ministry of Housing sources.

TABLE 28
Gervaise Program by Unit Costs

Project	Type	Unit Cost
Emergency Housing Program		
Longtill Ltd.	Two Story J	32,696
Building & Engineering Ltd.	Two Story J	31,928
Mauritius	Two Story J	31,289
Central Housing Authority	Single Story H	26,635
Low Cost Housing Program		
Longtill Ltd.	Two Story J	30,140*
	Single Story F	22,863*
Central Housing Authority	Single Story F	27,000**

NOTES: *As of June 1976. Should be increased by about 20 percent for March 1978 prices; i.e. Rs 36,000 and 27,500 respectively. ** As of June 1977.

SOURCE: PADCO analysis from Central Housing Authority sources.

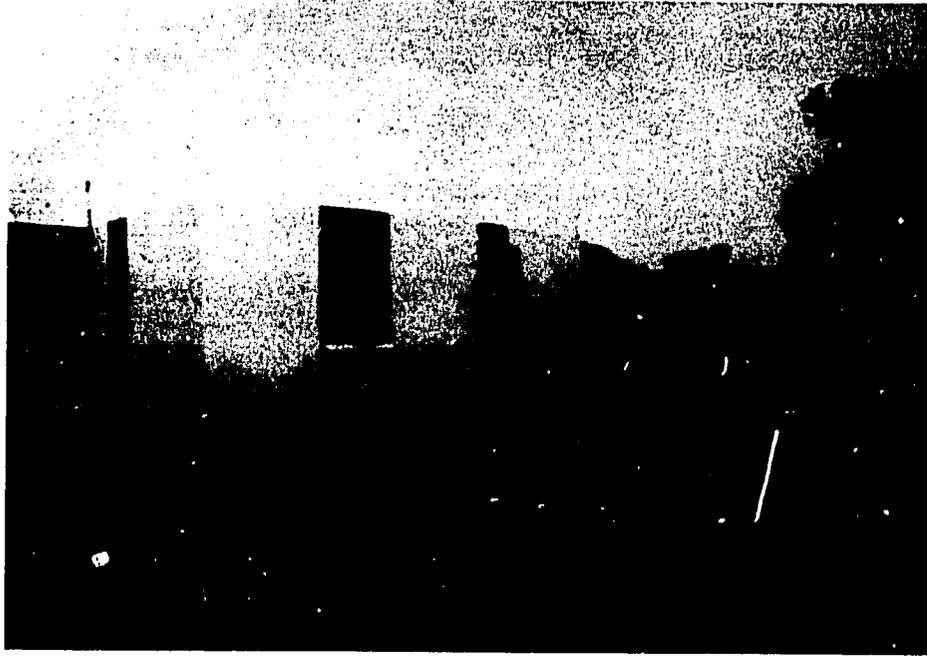


Photo 7
SILWF housing on Black River Road.

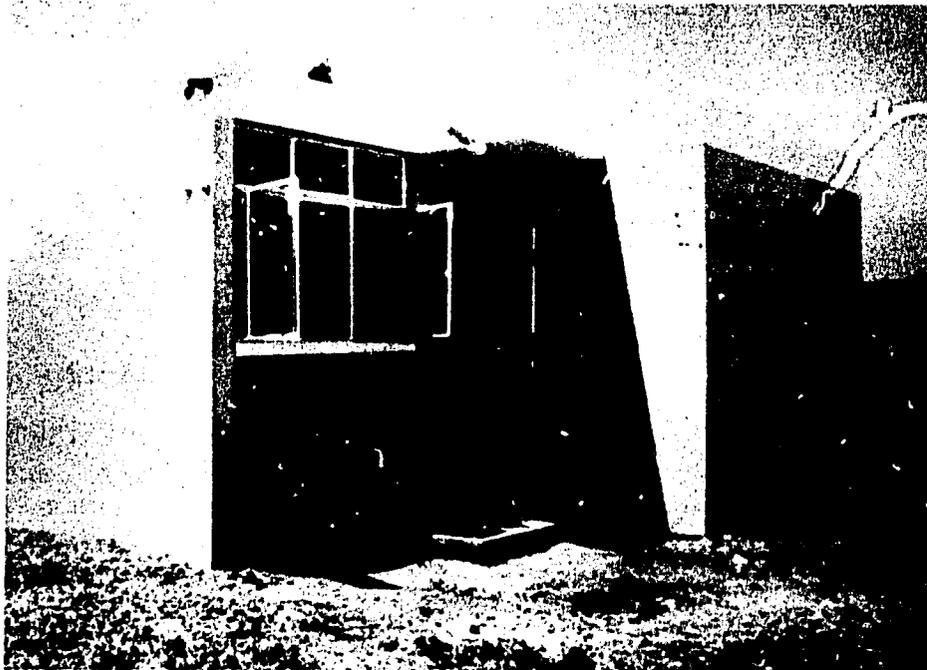


Photo 8
MHC low-income housing, Roche Bois.

although exactly half of its financing is from government, the effective rate is still 6.2 percent. Only the first loan and two recent loans for the Harbor View project have been on soft terms of 2.5 percent.

Since July 1977, the MHC has been receiving an average of 103 loan applications per month for an average amount of Rs 54,370. In addition, the corporation presently has a firm commitment of Rs 34.8 million: Rs 10.4 million in housing loan deposit accounts and Rs 24.4 million representing loan offers made (Rs 9.1 million) to Gervaise victims. As of February 1978, the Board had approved 274 loan applications for Rs 13.2 million (Rs 1.3 million for Gervaise loans) and must consider another 895 applications (620 Gervaise) representing Rs 31 million.

Although its uncommitted reserves were in excess of Rs 11 million as of June 30, 1977, the size of its outstanding commitment and the lack of any immediate prospect for additional government or external loans is forcing it to apply stricter criteria in granting loans in order not to overcommit its resources. Thus, not only has the rate of deed signature, i.e., loan commitment, been slowed; the following criteria will be applied in considering any new loan applications:

1. Members of the Exceptional Savings Scheme, whereby Rs 35 are saved each month, will have priority.
2. Priority will be given to applications for loans on units under 1,000 square feet (1,500 square feet for more than one story).
3. Loans should be limited to construction debts or completion of buildings, excluding improvements or enlargements to existing dwellings.
4. Applications for housing purchases will be discouraged.

In order to revolve funds more rapidly, loan repayment periods are being reduced to as much as individual clients can bear, i.e., 10 or 15 years versus the usual standard of 20 years.

Since up to February 1978 government had only released Rs 15 million (Rs 5 million for Gervaise and Rs 10 million for ordinary loans) compared to a budget provision of Rs 39 million for FY 1978, the corporation made a request to

government that it be allowed to borrow from commercial banks without restrictions from the Bank of Mauritius. Further, it has also suggested that it be allowed to raise funds by borrowing from the Sugar Industry Pension Fund and/or the National Pension Scheme, by public debentures, or by borrowing on the international market.

2. Gervaise Program Finance

The EDF Program

The EDF program is based on an exceptional aid grant from the European Development Fund composed of three million European units of account (about US\$ 3.6 million) or some Rs 22 million. The program is meant for the poorest of the Gervaise victims. Although these were taken to be those applicants earning under Rs 150 in 1975, the CHA is now finding, when total household income is counted, that most earn substantially more, some even up to Rs 1,000 per month.^{21/}

Since the financing is on grant terms, it was agreed with the government that the units would be passed on at not more than Rs 15 per month. They will actually be allocated at Rs 10 per month to cover maintenance costs. Costs of land and infrastructure are not included. A nominal land rent is to be charged at Rs 1 per plot per month.

Low-Cost Housing Program

The general low-cost housing program of 9,600 units for Gervaise victims is being financed 25 percent by a government grant and 75 percent through a government loan at 2.5 percent for 40 years. Based on a 1976 tender price of Rs 22,863 plus CHA overhead (7.5 percent) and physical contingencies of 10 percent, the Type F ^{22/} house costs about Rs 26,000. Thus, with Rs 6,500 as a grant, amortizing the remaining Rs 19,500 over 40 years at 2.5 percent gives a monthly payment of Rs

^{21/} See Table 23 for family income distribution of Gervaise victim families.

^{22/} See Appendix IX, Figures 9A and 10A for plans of Type F and J units.

69.75 to buy the unit. For those families earning less than Rs 300 per month, units will be rented at Rs 25 per month.

The addition of a second story on 3,000 of the units, which will add about Rs 10,000, is not included in the total cost. The same is true for project infrastructure and land costs (the same charge of Rs 1 per plot per month being levied on the latter). The total cost of the program as estimated by the Ministry of Economic Planning and Development in March 1977 is shown in Table 29.

TABLE 29
Low-Cost Housing Program

	Number	Rs Million	US\$
CHA	7,000	182	27.5
SILWF	600	16	2.4
MHC	2,000	62	9.5
Land	-	30	4.5
Infrastructure	-	25	3.8
Contingencies	-	15	2.3
Totals	9,600	330	50.0

SOURCE: Ministry of Economic Planning and Development

In addition to the Rs 22 million provided by EDF, the League of Arab States has provided Rs 15 million, and it is likely that the EDF will provide another Rs 23 million under its Indicative Aid Figure. The Government of Mauritius has earmarked Rs 30 million in addition to the Rs 2.5 million in the Prime Minister's Cyclone Gervaise House Reconstruction Fund. Also, the SILWF is expected to finance 600 houses from its own funds of Rs 15.6 million. Totaling the above resources gives an estimated shortfall of Rs 222 million (US\$ 35.8 million at present exchange rates) for which the government will be looking for foreign funds on concessionary terms.

As can be seen from the foregoing, the subsidies in the Gervaise program are pervasive: capital subsidies of 100 percent of the land and infrastructure costs and 25 percent of house construction costs (46 percent for maisonettes costing Rs 36,000); interest subsidies of 9.5 percent on the total capital cost (assuming a market rate of 12 percent); and land revenue of at least 12 percent per year. An order of

magnitude of the total subsidy involved in the CHA program can be approximated as shown in Table 30, based on land, infrastructure, and construction costs as documented for the La Caverne site in Vacoas (which will ultimately have 650 maisonettes).

TABLE 30
Central Housing Authority Program Subsidy Element

Item	Cost
Land cost (25 acres)	Rs 84,000/acre
Land development cost	Rs 76,000/acre
3,000 maisonettes (Type J)	Rs 36,000 each
4,000 bungalows (Type F)	Rs 27,500 each
Market rate of interest	12 percent
Total program capital subsidy (not including land which remains with government)	Rs 81.5 million
Annual interest revenue loss	Rs 20.6 million
Annual revenue loss on land, 12 percent per year	Rs 5.2 million
Total annual revenue loss	Rs 25.8 million

SOURCE: PADCO analysis.

Although the total capital subsidy is over twice as much as the FY 1978 government budget provision for the MHC, a justifiable case can be made for some degree of subsidy. Since it is for Gervaise victims whose houses were completely destroyed (or destroyed beyond repair), the program is of an emergency/welfare nature. However, it is the standards -- and therefore the degree of subsidy -- which seem incompatible with the victims' former dwellings. If standards of the reconstruction program were more in keeping with the victims' former dwellings, capital subsidies could be substantially reduced if not eliminated at the present payment of Rs 70 per month.

Assuming the present payment of Rs 70 per month is fixed, it is interesting to observe the behavior of land costs at present construction standards and what the monthly payment would be at more economic terms with zero land costs.

It can be seen from Table 31 that at present standards and payments of Rs 70 per month an impossible situation results, i.e., land costs become negative to offset the high construction standards and fit the fixed monthly payment of Rs 70. This phenomenon can also be expressed another way:

the negative land cost figures in Table 31 are those square meter costs of raw land, without construction, which could be afforded at Rs 70 per month at varying terms.

TABLE 31
Land Subsidies and Monthly Payments
For Types F and J at Varying Terms

Terms	Land Subsidy (Rs per square meter) at Rs 70 per month		Monthly Payment (Rs) at Zero Land Cost	
	Type F	Type J	Type F	Type J
	2½% 40 years, 25% grant	- 56	-106	99
5½% 30 years, 25% grant	-110	-207	170	170
9% 30 years, 25% grant	-132	-250	241	241
12% 30 years, 25% grant	-143	-271	300	303
12% 30 years, no grant	-155	-292	400	404
12% 20 years, no grant	-157	-297	440	440

SOURCE: PADCO analysis.

When land costs are held at zero, i.e., fully subsidized as under the present program, only payments on present terms (case one) come near to the publicly-announced Rs 70 per month. ^{23/} Payments for the Type F house at 5.5 percent for 30 years could probably be afforded by those at or below the equivalent median expenditure of Rs 750. However, those at terms approaching market rates could not. At full market rates, terms for the Type J unit equal more than half of the 1978 equivalent median expenditure.

D. Institutions

Delivery of shelter services to low-income families in developing countries is accomplished through various institutions, both formal and informal. Although most formal public housing institutions are mandated to serve low-income families, costly land acquisition, elaborate design solutions, lengthy

^{23/} They are slightly above Rs 70 per month because cost increases since 1976 have been included in the formula.

project preparation, and high construction standards most often prevent them from offering affordable housing to those truly in need of such services. Thus, as has been widely described in the literature, low-income families assemble land, materials, labor, and finance outside the formal sector to provide themselves accommodation. The result of this *ad hoc* process is often more cost effective, i.e., higher standards for less investment, than the efforts of governmental housing institutions.

In this section a discussion of the findings of informal sector interviews is followed by a description and analysis of the three formal sector institutions most involved in the housing sector in Mauritius.

1. Informal Sector

Since evidence of an informal construction process is abundant throughout Mauritius, several families were interviewed in depth in order to document the processes, resources, and constraints of shelter construction in the informal sector. The complete interviews are in Appendix VIII.

Respondent households were identified by obvious signs of construction in progress and materials stored in the yards. Many of the respondents live in population centers which are not within the boundaries of municipal council areas and two live in Port Louis (see Map 3). The respondents selected for case studies were located in Bambous Virieux (two cases), a very poor fishing village on the southeastern coast; Bois Pignolet (two cases) and Pamplémousses (one case) in the north interior; Baie du Tombea (one case) on the northeastern coast and Pointe aux Sables (two cases) near the coast just south of Port Louis.

While the nine complete case studies do not constitute a statistically significant sample, it is believed that they give an accurate picture of the informal sector dwelling construction process in Mauritius. The results are consistent with numerous casual conversations and observations made by the team.

Building Plans

Home owners' friends with drafting skills are often asked to draw the building plans. Building permits are issued by either the City Engineer of Municipalities or the Ministry

of Works. While there are health inspectors on the issuing boards, several respondents thought that the permits were issued by health inspectors. A common complaint is that when privately-drawn plans are submitted, the health inspectors may insist that the plans are lacking in some respect and must be redrawn by themselves (at a fee of Rs 45 to 90). It is possible that the original plans do not meet the building code standards which are unrealistically high.

Construction Implementation

Labor is usually provided by the men of the household with assistance from friends and relatives (see Photos 9 and 10). Friends and relatives do not charge for their work, but reciprocation is understood. When masons are hired, they usually work evenings and weekends under the supervision of the owner. If there is no man in the household, somebody known to the home owner -- a neighbor, friend, or relative -- is hired to be the contractor for the entire job.

Although statistics are not available on informal construction (employment statistics are kept only on establishments larger than ten employees), a sizable amount of informal construction is performed by formal sector employees after working hours and during periods of formal sector work shortages. As a result, much of the new informal construction takes the appearance and technology of construction executed by larger contractors. Reinforced concrete frames, concrete slab roofs, concrete window mullions, non-load-bearing block walls, metal framed doors and windows, and standard appearing plans and building heights typify modern construction in both formal and informal sectors. Daily labor rates also follow formal sector rates closely in informal construction.

With this form of self-help, building costs could be considerably below those in the formal sector and more in reach of the target population. However, this is not presently the case. In the informal sector, it was found that higher rates are charged for materials. Also, the labor component at a generally comparable daily rate ranges from 30 to 40 percent of the cost of construction in the informal sector, compared to 30 percent for the formal sector. A more detailed discussion of building costs and components in the formal sector is contained in Chapter IV Section C.



Photo 9
Addition to SILWF housing, Black River Road.



Photo 10
Self-help construction near La Caverne site.

Finance

Building materials are usually assembled gradually over a period of one or more years before the start of construction as finances permit. Piles of concrete blocks can be seen in front of many houses where construction had not yet begun. Given the rate of inflation and the increasing cost of building materials, this is a financially prudent system. Interest rates on savings deposited in commercial banks are lower than the rate of increase in the cost of building materials. While interest paid on savings deposit accounts varies from 6.75 percent short term to 11 percent long term, building materials costs have increased 14 percent per annum between 1968 and 1978.

A traditional system of rotating savings is also a common and financially effective method of financing construction over time. The respondents were asked about their personal savings habits and those of their friends. The *cycle* system was found to be quite common in both urban and rural areas. Formed into groups of 12 friends, relatives or coworkers, each member contributes a specified sum to a common pool which is given in total to a different member each month. Many respondents used their receipts to improve their dwelling units on a yearly basis. If a participant receives the money at a time when there is no special need for it, it can be deposited in a bank. Among those who have bank accounts, occasional large deposits seem to be preferred to numerous smaller ones. In case of financial emergencies, it is possible for the group members to exchange turns. This feature is preferable to standard banking systems which might not provide loans for such emergencies.

The commercial financial institutions have not traditionally tapped the savings potential of the rural population. When they have, the results have been encouraging. A mobile unit of the Bank of Baroda started operations in 1965 and now covers 30 villages a week. Table 32 shows the accounts and deposits.

TABLE 32

Bank of Baroda Savings
Experience in Rural Mauritius

Year (December 31)	Number of Accounts	Deposit Amount (Rs. million)
1973	3,800	2.2
1974	4,263	4.3
1975	4,672	6.6
1976 (March)	4,800	7.0

SOURCE: Bank of Baroda

Respondents were aware of housing finance schemes available through the Mauritius Housing Corporation, the Central Housing Authority, and commercial bank lending. A few had commercial bank loans and others had tried unsuccessfully to obtain them. Many members of the target group had attempted to participate in public programs but were frustrated by what seemed to be incomprehensible red tape. MHC officials explained that the misunderstandings often stemmed from the need to provide documents concerning the right of occupancy to the property.

The last resort is private *notaires* or moneylenders who charge interest rates two percent above those of commercial lenders.

In cases where building had stopped but the work was not completed, the universal reason was lack of funds and inability to get a loan to continue. If loans were available, people said they would be able to spend up to 34 percent of their incomes on repayments. Among the respondents the average amount of income available for housing loan repayments was 21 percent. It should be noted that more than the specified percentage of stated income may be available, because in some cases total stated expenditure is higher than total stated income. While the family budget survey found food to be the greatest expenditure, when families are in the process of building, construction becomes the primary expense.

2. Formal Sector Institutions

The Ministry of Housing, Lands, and Town and Country Planning

Until the latter part of 1976, the ministry had not been involved in the direct implementation or management of public housing schemes. However, when the EDF agreement to build 661 houses for the poorest victims of cyclone Gervaise was signed, it was decided to appoint a person in the ministry to coordinate and manage this program. In addition, in 1976 a housing adviser was assigned with funds from ODM to assist in the formulation of housing policy, plans and programs.

As can be seen in Table 33, in the organization of the Ministry there is at present no formal Housing Division. However, under the Principal Assistant Secretary and his administrative officers, the staff and activities of the three line divisions closely relate to housing development. These are described on the following pages.

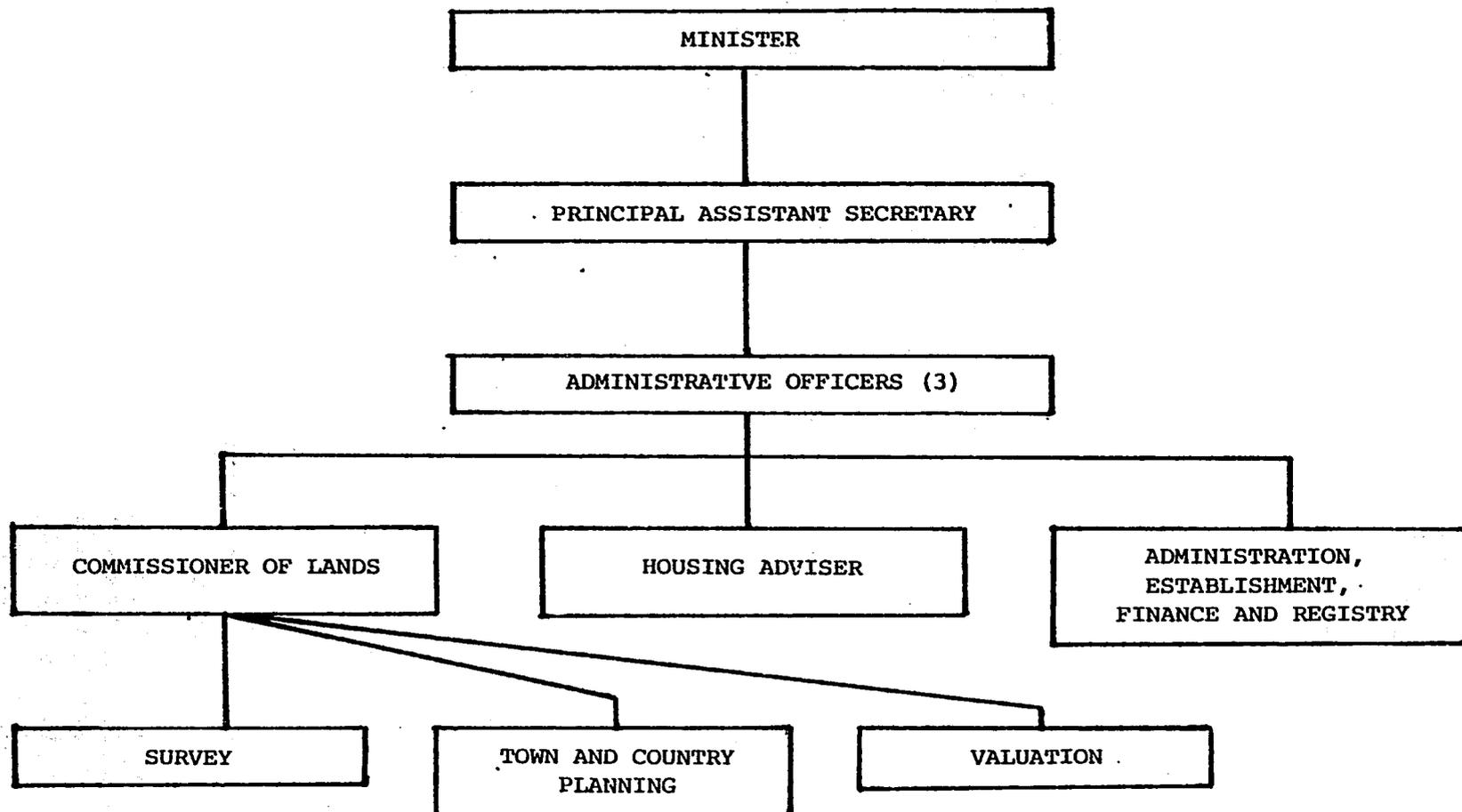
Valuation. Land is a crucial and scarce factor in the housing program. The Valuation Division, nominally under the Commissioner of Lands, is responsible for the location, valuation and acquisition of all sites. The following description of the acquisition process shows why land is a constraint to any program and also the relationships between the various divisions involved in acquisition.

Since the Valuation Division is responsible for assessing all purchases of land for public purposes, its staff has a good idea of prevailing market values and where sites might be available for projects. It suggests prospective housing sites to the Town Planning Division which in turn assesses their suitability from locational and development perspectives. A committee composed of representatives from Town Planning, Survey, Valuation and the CHA then select the most suitable sites. These are referred to the Survey Division which obtains the deed plans, locates any new buildings or improvements, surveys the boundaries if necessary, and calculates the total area. After the Valuation Division carries out the official valuation and recommends a price, negotiations are held with the owner(s): if no agreement can be reached, compulsory purchase is begun.

Only in a few cases has compulsory purchase actually been required, and these were due more to unclear titles than to disagreement over the price. The compensation paid is not only based on fair market value for the land and its

TABLE 33

Organization Chart: Ministry of Housing,
Lands, and Town and Country Planning



improvements but also on any losses or damages the owner has suffered due to severance. Depending on whether the owner is willing to sell, whether survey is required, and whether the acquisition must go to compulsory purchase, the process can take from two or three weeks to six months. Most acquisition, however, takes two or three months.

In order to undertake the foregoing tasks in acquiring all land for public purposes, the Valuation Division is quite well staffed at the upper levels, but requires additional staff at the lower levels as shown in Table 34.

Recruitment is underway for senior valuation and valuation assistants. The most promising are sent to England for training to obtain their diploma in valuation surveying (and hopefully to become a Fellow of the Royal Institute of Chartered Surveyors, FRICS).

Survey. As can be seen from the foregoing description of the land acquisition process, proper surveying is an essential step in acquiring and subsequently developing land, especially for housing projects. Since the Survey Division is responsible for surveying all new government projects, its staff is spread thinly.

The Survey Division is headed by a Chief Surveyor (acting and a Deputy Chief Surveyor (unfilled)). It is divided into two subdivisions, Mapping and Land, each headed by an Assistant Chief Surveyor. The Mapping Subdivision, composed of the cartographic, photo, plans and records, and photogrammetry sections, is adequately staffed with only one or two vacant posts. However, as can be seen in Table 35 the Land Subdivision is grossly understaffed.

Perhaps one of the major reasons for the critical lack of surveyors at the lower levels is lower salary scales among all grades (especially the lower ones) than comparative grades in both the Valuation and Town and Country Planning Divisions. In addition, qualified surveyors can earn more in the private sector.

Given the lack of surveyors, the existing ones are understandably employed on urgent projects throughout the country, e.g., the New North Road, the New Airport, etc. Thus, construction on several housing projects has begun without topographical maps, which has led to delays and extra construction costs (see Photo 11). In addition, no plot surveys can be undertaken (only the site boundaries are surveyed when the land is originally acquired). This means individual plots are conveyed without deed plans. Perhaps in the future whole projects may be completed with only the boundaries beacons. This will cause substantial problems in future registration and transfer of titles.

TABLE 34
Valuation Division Staffing Levels

Position	Authorized	Filled
Principal government valuer	1	1
Senior government valuer	1	1
Chief valuation assistant	1	1
Government valuer	11	9
Trainee government valuer	2	1
Senior valuation assistants	16	10
Valuation assistants	<u>84</u>	<u>38</u>
Total	116	61

SOURCE: Valuation Division.

TABLE 35
Land Subdivision Staffing Levels

Position	Authorized	Filled
Assistant chief surveyor	1	1
Principal surveyors	4	4
Senior surveyors	8	4
Surveyors	22	3
Surveying assistant/trainee surveyors	<u>32</u>	<u>20</u>
Totals		

SOURCE: Land Subdivision.



Photo 11

Absence of a topographical map increased construction costs of the Type J housing units at La Caverne.

Town and Country Planning. In a 1972 report by the Town and Country Planning Division on its structure, the following were listed as its responsibilities.

To advise the minister on problems concerning the use and development of land, both urban and rural; in particular, to advise on the planning aspects of the development of government land and selection of sites for government projects.

To prepare outline plans on behalf of the Town and Country Planning Board.

To advise local authorities on the merits of applications for development permits and to liaise with local authorities in the preparation of detailed plans.

To select sites and prepare planned layouts in connection with the Emergency Housing Program.

To prepare housing policies.

In the interest of better fulfilling these responsibilities, a proposal has been made to change the present structure of four general planning sections under the Chief Town and Country Planning Officer into four specialist divisions dealing with housing, strategic planning, local planning, and development control.

Due to the high priority being given to housing by the government, the case is made that "...The Planning Division is the best equipped to receive and feed a housing cell which can draw upon the supportive services of the Division."

Although the Town and Country Planning Division has been heavily involved in the selection and planning of sites ^{24/} under the present housing program, it is felt that the formulation and implementation of housing policy is too important to be left to a "cell" in the Town and Country Planning Division. As mentioned earlier, a "temporary unit" reporting directly to the PAS and the minister has been created within the ministry to implement the EDF housing program. Presently, however, this unit has only a Project Manager (a Town and

^{24/} Many of the layouts reviewed were of quite high standards with road frontage to every house, lined drainage, etc.

Country Planning Officer, TPCO, from the TCP Division), a clerical officer, and a typist. Given the scale of present and possible future housing programs, it is strongly felt that a separate housing division should be created within the ministry. As can be seen from the organization chart, a sole housing adviser handles housing policy and program formulation in the Ministry of Housing.

The Central Housing Authority

The CHA, a part of the Ministry of Housing, has traditionally been the agency dealing with housing in the public sector. Two months after the agency's creation in 1960, cyclone Carol struck the country. Thus, instead of serving low-income housing needs in general, the CHA undertook the post-Carol reconstruction program. After finishing this program, it took over the remaining units of the General Housing Scheme from the DWC in 1975. Since the DWC was using direct labor under the Travail Pour Toutes (TPT), a make-work program designed by the government to combat unemployment, the CHA was also obliged to hire casual laborers. Consequently, out of a 1977 staff of 1,282, about 250 are still casual workers in the CHA's direct labor program.

Presently, the CHA is the principal agency in charge of the execution of the Gervaise program. It has contracted out 5,000 units to a large, private contractor, Longtill Ltd., leaving 2,000 units for its staff. In addition, it is to build 345 units under the Emergency Rehousing Scheme and 150 units under the EDF program. Although the latter two programs were begun in 1976, they were still not completed as of January 31, 1978. In addition, only about ten percent of CHA's portion of the low-cost housing program is presently under construction.

While these low production figures are partially a result of a lack of sufficient (and large) sites, a great deal of the problem is also because of the low productivity of its direct labor and lack of adequate construction supervision. Due to the make work aspects of the direct labor program, labor absenteeism on site is extremely high. On one site visited, absenteeism varied from 12 to 53 percent among skilled laborers, with the highest rates usually occurring on Mondays. In addition, although the CHA is currently in charge of construction supervision for both the low-cost housing and the EDF programs, it only has 52 out of a total 138 authorized supervision posts. Most of these are the lower positions of assistant inspectors and foremen.

In order to increase its efficiency, the CHA has recently undergone a restructuring but not a major reorganization. In place of five divisions reporting to the director (the deputy director post is vacant), there are now seven, with two reporting to a chief engineer. While the government has agreed to most of CHA's staff proposals, qualified staff are still lacking in the following areas (in addition to construction supervision):

Finance and Accounting. Only one chief accountant and one assistant accountant exist for 11 authorized accounting posts. Thus, balance sheets and operating statements are complete only up to the 1974/75 year with general statements showing revenues and expenditure for major items through 1975/76 and 1976/77.

Engineering and Survey. The authority has only one engineer out of five authorized and no quantity or land surveyors out of six authorized. Thus, while it is attempting to recruit engineers from the U.K. or India, it presently has no design or high level supervision capacity. Surveyors will probably be hired from the private sector on a individual basis.

In addition to its direct labor and present staffing problems, another cause of CHA inefficiency is its method of financing. The CHA is dependent upon government budget subventions and concessionary loans for its operations. Its projects are also heavily subsidized. Since there is no strict loan repayment schedule to the government, project payments collections are lax. This is evidenced by the fact that, in spite of low monthly payments, arrears carried forward as of December 1977 amounted to Rs 581,286 for purchasers and Rs 343,305 for tenants.

Further, due to the near grant terms of its funding and the heavy subsidies on rent and purchase terms, units do not have to be designed to meet the paying capacity of low-income families on economic terms. In other words, with heavy subsidies, high standard units, and inefficient land use they can still be afforded by low-income families. Thus, major errors in the planning and design process, which would show up if units were conveyed at economic rates, are hidden in the heavy subsidies.

Mauritius Housing Corporation

The MHC is a self-sufficient organization, borrowing and lending money for mostly middle- and upper-income housing.

As a parastatal of the Ministry of Finance, it is more of a housing bank than a corporation. Its average borrowing rate as of January 30, 1977 was 6.99 percent and its average lending rate at the same time was 8.23 percent, i.e., an effective spread of 1.24 percent versus 1.42 percent on June 30, 1976 (see Appendix IX, Table 35A for sources and terms of funds).

Since an increase in the Central Bank rate from seven to nine percent on January 11, 1978, MHC's Board has approved an increase in its rates on February 1, 1978 as shown in Table 36.

TABLE 36
MHC Interest Rate

	Old Rates	New Rates	Maximum Square Feet
Above Rs 50,000	10.0%	12.0%	-
Below Rs 50,000	8.5%	10.5%	1,000*
Special loans	6.0%	6.0%	800

NOTE: *1,500 sq. ft. for multistory dwellings.

SOURCE: Mauritius Housing Corporation.

Repayment is usually over 20 years, but discounts are being considered to accelerate repayments. If it is felt a borrower can repay in a shorter amount of time, shorter terms are stipulated. Priority is also given to savers at the MHC, especially young couples enrolled in the Exceptional Savings Scheme.

The net mortgage assets of the MHC represented 4,093 mortgage loans as of June 30, 1977 with an average outstanding loan of Rs 23,377 (Rs 19,000 in June 1976). Since payments are deducted from salaries at source, arrears are negligible, representing only .09 percent of MHC net mortgage assets at June 30, 1977.

The corporation has built several housing estates as shown in Table 37.

As of February 1978, 297 units have also been started under the Gervaise program and plans are underway to build 500 low-cost units at Roches Brunes in Rose Hill. In conjunction with the Ministry of Housing, consideration is being given to a large-scale development on 140 acres at La Tour owned by the

TABLE 37

Housing Estate Construction

Location	Units
Harbor View, Port Louis	202
Floreal	25
Vacoas	47
Vuillemin	12

SOURCE: Mauritius Housing Corporation.

Development Bank of Mauritius (DBM). The site is in an excellent location across from DBM's new industrial estate about two miles from downtown Port Louis. It is estimated that over Rs 300 million will be required for the project. MHC has a five-year Development Plan from 1978 to 1982 (see Appendix IX, Table 36A) comprising 1,878 units (including 60 commercial and 68 other) on 19 projects. Three projects totaling 188 units have already been started.

As a largely commercial operation, the MHC has to be, and is, operationally efficient. It has a total of 90 staff and does its own project design, supervision, and management. Out of 13 new posts approved by its Board, four have been filled; vacancies still existing for one building inspector and five assistant building inspectors.

Up to now the corporation has mainly served middle- and upper-income groups. With the tightening of credit and its entry into the Gervaise program, however, it is undertaking units in the 500 square foot range, models of which have proved popular among loan recipients. Although it is attached to the Ministry of Finance -- due to its experience in designing and managing projects, especially payments collection -- a major role should be given to it in any new housing program.

Sugar Industry Labour Welfare Fund

The SILWF supplies houses to sugar laborers and to some dockers who have their own plots or are on tracts of land provided free by sugar estates. The laborers must have worked at least three years on sugar estates to qualify. Terms are zero percent for 40 years including the cost of infrastructure, no maximum income, and maximum age of 65. Since its beginning in 1960, SILWF has completed about 3,500 houses, about 1,187 of which are on sugar estates.

Chapter IV
SHELTER DELIVERY SYSTEMS

A. Land

There are essentially two types of land in Mauritius: Crown (public) land and privately-owned land. Exact figures as to the percentage of each type were unavailable, but according to the MOH most land is privately held. Public or Crown lands comprise a small amount of total land holdings. As a result, Crown land was found to be insufficient for the Gervaise reconstruction program.

As is typical of the British land tenure system, all Crown land is conveyed on leaseholds, usually for 99 years. Annual ground rents for such leaseholds can vary from Rs 324 per acre (Gervaise program) up to Rs 14,000 per acre (industrial sites).

As mentioned in Chapter I, squatting as it is commonly defined, i.e., illegal possession of public or private land, is virtually unknown in Mauritius. Houses in all of the villages visited were on platted land. Even if families have no official title, after 20 years of occupation they have full rights to the land. Moreover, if they have to be removed before that time, adequate compensation must be paid.

Although agricultural land is characterized by large holdings, most privately owned nonagricultural land is predominantly in small holdings of less than 30 arpents. In urban areas this maximum is reduced to three arpents.

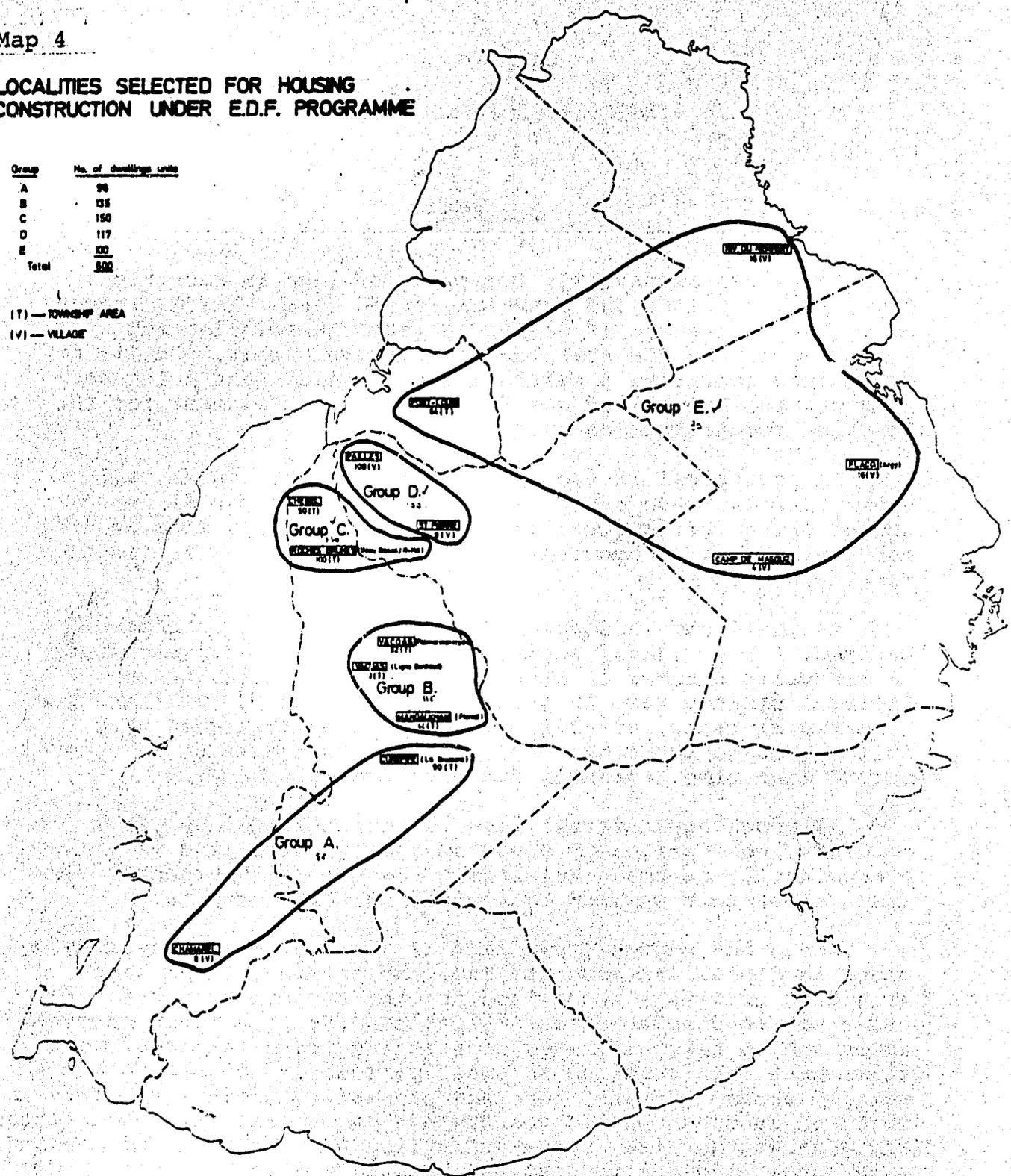
Since not enough Crown land is available for construction under the total Gervaise program, the government has been acquiring privately owned land for the various projects. In order not to displace the families too far from their original homes and to take advantage of existing urban services, most sites have been acquired in small parcels in and around settled areas. In addition, the necessity to preserve agricultural land has placed constraints on overall land acquisition. Map 4 shows the size (number of units) and locations of housing sites under the EDF program and exemplifies the dispersion of even a small program throughout the island.

Map 4

LOCALITIES SELECTED FOR HOUSING CONSTRUCTION UNDER E.D.F. PROGRAMME

Group	No. of dwellings units
A	96
B	135
C	150
D	117
E	100
Total	500

(T) — TOWNSHIP AREA
(V) — VILLAGE



MINISTRY OF HOUSING LANDS & TOWN & COUNTRY PLANNING
Town & Country Planning Division
Chief Town & Country Planning Officer: GUY DANJOUX-ARIBA-FREPI.
Scale 1:100,000
Drawing No. TCA/18/77

The procedure of acquiring many small, scattered sites, however, has led to substantial construction difficulties and the near impossibility of programming labor and equipment in an economic fashion. Consequently, the government has recently begun acquiring larger sites on agriculturally unsuitable land. The acquisition process described in Chapter II can be long and involved, especially if the land has not been surveyed and the owner is not willing to sell. As mentioned previously, surveying remains a substantial bottleneck in the land acquisition process. In addition, because of the lack of an overall housing program, sites are not being acquired in any strategic fashion, but rather as they are referred to the committee by owners or the Valuation Division. Another difficulty arises in that the Land Identification and Acquisition Committee, although originally appointed at a high level, is now composed of middle-level officials who often do not have the power to make final decisions on large-scale acquisitions.

The foregoing problems of land acquisition have made programming of Gervaise construction difficult. Up to March 1975, land sufficient for only 52 percent (about 3,650 units) of the total 7,000 unit program had been provided to CHA and private contractors.

As will be seen in the next section, there has also been great difficulty in servicing the larger tracts now being acquired, especially with water. A ministerial committee has been appointed to look into this problem and an overall infrastructure coordinator has been appointed in the Ministry of Housing. However, several major sites (e.g., Beau Vallon and Pointe aux Sables) will probably not have water in 1978; about 175 units are presently standing empty without water.

As in most countries with a limited amount of land, the commodity itself has become the object of intensive speculation in Mauritius. In order to get an idea of the extent and location of this process, the team documented increases in land costs in several parts of the country.

As can be seen from Table 38, increases of 50 to 100 percent are common in the urban areas sampled with the largest increases occurring in central Port Louis. Prices of Rs 250,000 to 500,000 per arpent (about US\$ 38,000 to 76,000 per acre) are most common in urban areas. Thus, land prices are forcing the acquisition of large tracts outside urban areas. However, in addition to the lack of urban services, political issues are a factor. A shift of 500 families from certain areas in Port Louis to outside the city results at times in a decisive shift from one constituency to another.

TABLE 38

Land Values: Estimated Increases and Current Values

Location	Rs per arpent	Square meters	Percent Change
Port Louis			
1967	200,000	47.38	
1978	1,500,000-2,000,000	355.00-473.82	650.0
Plante Verte/Roche Bois			
1968	100,000		
1978	500,000		400.0
Northern End of Harbor			
1967	25,000-30,000	5.92-7.11	
1973-1974	125,000	29.61	316.4
1978	250,000	59.23	100.0
Quatre Bourne			
1967-1968	40,000-50,000	9.48-11.85	
1970	25,000-100,000	17.77-23.69	87.5-100.0
1973	200,000	47.38	33.3-100.0
1975	350,000-400,000	82.92-94.76	75.0-100.0
1978	600,000-800,000	142.15-189.53	50.0-100.0
Floreal			
1969	20,000-25,000	4.73-5.92	
1971	50,000	11.85	100.0
1973	75,000	17.77	50.0
1975	150,000	35.54	100.0
1978	250,000-300,000	59.23-71.07	66.7-100.0
Village Residential Land Before 1973			
	50,000-75,000		

SOURCE: PADCO analysis based on data from the Ministry of Housing, Lands and Towns and Country Planning.

In order to begin to resolve the land supply problem and control speculation, a Central Land Institution has been recommended. Such an institution would intervene in the private land market, buying up large tracts of land in order to create a land bank. It would also do a certain amount of physical planning in relation to housing development.

Due to a general lack of funds, however, land banking is a difficult process. In addition, the creation of a new land authority would require a great deal of skilled staff which are already scarce in the country. In order to lend greater emphasis to the government's determination to acquire enough land for a national housing program and at the same time begin to control speculation, it might be more effective to make more extensive use of the existing Land Acquisition Act of 1973. In this manner larger tracts of land could be purchased and future projects phased as off-site infrastructure becomes available. In addition, there has been a suggestion for an undeveloped urban land tax to encourage private development. The recommendation of the housing adviser to inventory undeveloped urban land of more than three arpents in order to obtain the basis for such legislation should be pursued. Investigation might also be made of those areas of the world (e.g., Colombia) where self-valuation has been introduced whereby land valued high by the owner is taxed heavily and that valued too low is purchased.

B. Public Utilities and Infrastructure

The public utilities infrastructure system on the Island of Mauritius is generally well developed and, with temporary exceptions, functions well. Urban areas with their sizable population concentrations are the best served. Where infrastructural services have not been extended to rural areas, the government, in collaboration with the various agencies involved, has developed plans for extension of those services. On the Island of Rodrigues, partly because of lower population concentrations, infrastructural services are less well developed than on Mauritius. The following sections and Appendix VI describe the various agencies involved in provision of infrastructure and public utility services, the current extent of those services, and constraints on their operations.

1. Water Supply

The Central Water Authority (CWA), a parastatal of the Ministry of Power, Fuel and Energy, is responsible for

providing and maintaining the water supply system in Mauritius. All water supplies rely on ground water sources found near the surface and on streams. After treatment, the supply is stored in small reservoirs where it is held for consumption. The distribution system is built extensively throughout the island. However, the system is antiquated and frequently in need of repairs. Unofficial estimates indicate that up to 60 percent of the water supplied to the system at treatment centers is lost through leakage before it reaches users.

Over 27 percent of the 1972 population had piped water supplies at their houses -- representing a total of 39,248 individual house connections; 72 percent of those connections were located in two urban districts. They provided house supply to 35 percent of the consumers and provided up to 96 percent of the population with pipe-borne water supply within 100 meters of their houses.

The water supply system is heavily subsidized. Recent CWA estimates show that the differences between economic rate structures and their current revenues results in a shortfall of almost 50 percent. The deficit is made up by government budgetary allocations. 25/

To illustrate the subsidies involved in water supply, after the government revised tariffs to a lower rate, CWA experienced a deficit of Rs 14.3 million representing 55 percent of its total expenditures in 1974/75. As a result, the combined revenue from all categories of customers accounted for only 45 percent of its combined operational expenditure. Revenues from the sale of potable water covered slightly more, about 48.5 percent of expenditures for the supply. The average cost of supplying one cubic meter of potable water supply was Rs 0.62 while the average selling price per cubic meter was

25/ While the CWA is not allowed to change economic tariffs, much of its capital budget results from government loans lent at economic terms.

26/ Central Water Authority. Annual Report and Accounts, 1974-1975. CWA paper No. 16 of 1976.

2. Sanitary Waste Disposal

The Ministry of Works is largely responsible for the provision and maintenance of sewerage systems. The inspectorate divisions of the municipal councils provide night soil collection services in areas without sewers. Otherwise, in new estate developments the agency developing the estate provides initial sanitary waste disposal systems such as septic tanks. Thirty-four percent of all housing units in Mauritius are connected to some form of sewerage system. In urban areas over 55 percent of the population is served by sewerage connections, representing about 26 percent of the total 1972 population.

In 1972, 96 percent of the total population was served by either connections to a water-borne sewerage system or a pit latrine system. Over 55 percent of the urban populations of Port Louis and Plaines Wilhems were served by water-borne sewerage, and an additional 40 percent were served by pit latrines. However, a small proportion (two percent) of the urban population still relies on municipal collection of night soil.

The present sewerage rates are based on the value of properties connected. Due to the increases in land costs this is not a good indicator of sewage load. Furthermore, an estimated 50 percent of the dry weather loading is due to surface water infiltration, which during heavy rains or cyclones results in system overloading and unsanitary conditions in some areas. As a result, inclusion of additional loading on the existing system has been suspended.

A small number of housing estates developed by the CHA have individual sewerage systems: 11 have individual treatment plants, six are connected to main sewerage systems, and the remaining 61 have pit latrine systems.

3. Solid Waste Disposal

Public cleansing and solid waste disposal is performed by the city engineer's department of the five municipal council areas. Areas outside of the municipal councils are the responsibility of the Ministry of Works. In Port Louis about 76 percent of the solid waste collected was household refuse; the remainder was divided almost equally among commercial and industrial uses. The Port Louis system relies on about 280 scavengers and a transport system consisting of three lorries, 38 trailers, 50 wheeled carts, and two small lorries. Night soil resulting from about 300 users is collected by special lorries.

4. Road and Transportation Networks

In municipal council areas the city engineering departments construct and maintain road and street networks. Rural roads and urban streets outside the municipal areas are developed and maintained by the Ministry of Works. Recently, however, the Development Works Corporation has also been actively engaged in constructing rural roads. In Port Louis, capital expenditure on the street network accounted for 30 percent of the capital budget. The city engineering department maintains a current road network of 200 kilometers. The other four municipal council areas also provide road networks within their areas of jurisdiction.

The condition of the road network is good, because of good road design and controlled axle loadings. However, in urban areas the density of transport has increased, making many of the major urban trunk roads inadequate. There is no publicly-owned transport system as all buses and taxis, the only modes of public transport, are privately owned.

5. Electricity

The Central Electricity Board, a parastatal of the Ministry of Power, Fuel and Energy, is responsible for production and supply of electricity in Mauritius. In 1976, about 20 percent of the power generated came from hydroelectric plants, the remaining 80 percent was supplied by thermal power stations. ^{27/} About 41 percent of CEB's clients were domestic in 1976, representing 119,158 consumers. With the current IBRD-financed rural electrification program, domestic service is expected to be provided throughout the island. Connection charges are included in the tariff structure if the consumer is less than 125 feet from a transmission line. Tariff structures are uniform throughout the consumer class. Domestic rate structures are presented in Appendix IX, Table 37A.

At present, although demand at normal loads is about 67 percent of capacity, the CEB is turning down no new customers. During periods of drought when hydro capacity is low, load

^{27/} The CEB also purchases power supplies from the sugar estates during sugar production season.

shedding is often necessary at hours of peak demand. By 1982 CEB expects that it will need a third thermal station to meet demand.

6. Constraints in the Public Utilities/Infrastructure System

The major, and most obvious, constraint in the infrastructure system is the lack of coordination between the various agencies charged with providing the services and the various agencies which utilize the services. An outstanding example has been the development of housing estates which are outside the current water distribution system and are in areas which are not immediately programmed for service. As a result, the CWA has difficulty serving those areas and has to modify its development programs to meet the demands of the occupants. Moreover, since methods of payment for off-site infrastructural services are not clearly defined, budgetary allocations for provision of those services may not be made.

Much of the water supply system itself is antiquated and needs replacement. As a result, service in many areas is limited and service pressures are low, causing a complete lack of service in some cases. The heavy subsidies present in the tariff system allow consumption patterns which are far in excess of supply projections, resulting in abuses of the system and waste of as much as 60 percent of the water supplied. The current practice in CHA housing estates of running water lines along adjoining property boundaries or through boundaries also makes metering the system difficult.

The problems of the sanitary sewerage system are linked directly to the problems in water supply. Water leaks from the water distribution system flow into the sewerage system, resulting in flows over the capacity of the sewerage system. In some areas, this has resulted in environmental problems. Individual sewerage systems for housing estates outside the reach of the trunk sewers are often not well designed. As a result, building costs rise; due to the large number of absorption pits in relatively small areas, saturation may occur, resulting in environmental hazards, particularly during heavy rains. Servicing individual systems is often infrequent because of lack of equipment and lack of knowledge on the part of occupants concerning needs for servicing.

The primary constraints faced by the Central Electricity Board in servicing new areas and maintaining the current system are the rising costs of fuel and increasing demands

which are reaching capacity. This results in overloading the system, particularly during dry seasons when hydroelectric production is down.

The lack of defined jurisdiction over road networks in urban fringe areas acts as a constraint to providing access to housing in those areas. The problem becomes most acute in areas directly adjacent to municipal council areas. As a result, the responsibility for the supply of access roads, their ownership, and maintenance is not clear. Also, the availability of public transportation facilities to new housing estates is frequently a problem for residents.

Construction constraints, particularly labor, are experienced by all of the agencies involved in providing infrastructure. The lack of labor to dig trenches for water lines, to provide holes for poles, and to perform the manual labor aspects of road construction all result in delays in extending infrastructural services to new areas.

C. Construction Sector

1. Formal and Informal Construction Technology

Several ministries are concerned with construction policy and development. The Ministry of Works registers contractors, the Ministry of Labor and Employment sets policy concerning conditions of employment, and the Ministry of Finance, Commerce and Industry controls import policy and the development of locally produced building materials. The Tender Board is also located in the Ministry of Finance, and prices are regulated by the Ministry of Prices and Consumer Protection.

Residential construction has been an important contributor to Mauritius' economy, regularly accounting for 25 percent of total gross domestic fixed capital formation and 41 percent of the portion due to construction. ^{28/} Construction provides about eight percent of total formal sector employment, and public sector construction agencies have regularly been called upon to provide employment for unemployed people in Mauritius.

^{28/} See Appendix IX, Table 38A for construction's share of gross domestic fixed capital formation between 1965 and 1976.

In order to gain an overview of construction in Mauritius, this section describes construction standards and materials in both the formal and informal sectors. Subsequent sections elaborate the roles of technology, labor, contractors, and building materials.

Formal Sector Construction Technology

High standards of construction are common in the formal sector. As a result, construction costs tend to be high. Reductions in construction standards, however, would not result in buildings with poor structural qualities. Much of the demand for very high standards of construction is from the fear of damage resulting from cyclones, particularly after cyclone Gervaise. The same standards of construction are demanded regardless of the type of building or its design. This overdesign is partly a result of the absence of developed performance criteria for different types of materials and building functions which would enable cost savings to be achieved without sacrificing structural stability.

Formal construction has traditionally relied on either stone, concrete block or timber wall construction and fairly steeply pitched roofs of either wooden shingles, metal, or asbestos-cement roofing sheets. Recent conventional construction patterns have shifted entirely away from either stone or timber walling and rely almost completely on concrete block, non-load-bearing walls. Regardless of structural loading or income group, most new housing units now use concrete frame construction, even though there is no seismic problem in Mauritius. The main problem, wind loads, could be resolved through load-bearing wall systems which are less costly to construct. Because of fear of cyclone damage, constructors of conventionally built houses have switched from pitched roofs to concrete slab roofs, a feature which raises costs substantially.

Due to rising construction costs, imported prefabricated concrete systems have been introduced. Their initial costs, however, have been discouraging. Unit costs for various types of prefabricated construction have been more or less equal to unit costs of conventional construction. However, the systems have not been tested long enough to see if economies in scale or construction time can be achieved.

Informal Sector Construction Technology

Informal construction comprises three types of construction technology: 1) modern construction similar to formal sector construction in both materials usage and technology; 2) wood framed construction; and 3) construction from salvage materials.

As the 1972 Housing and Population Census of Mauritius indicated, wood frame construction continues even though it is not the preferred mode of construction. ^{29/} As a result, much existing timber housing is in very poor condition and is viewed as temporary construction. Metal sheets are used for both walling and roofing materials. Usage of metal sheeting is probably the result of the lack of timber in Mauritius. However, much of the older wood-framed housing did use wood siding and is still in fairly good condition. A third type of informal construction consists of salvage materials, such as rusty metal roofing sheets, thatch, and other salvage materials, and appears to be temporary in nature.

The primary cost savings in informal construction appears to be in contractor overheads and from the phasing of construction which it allows. There may be some savings in labor costs, particularly unskilled labor costs, since self-help techniques are employed. Labor cost savings may range to as much as 15 percent of total construction costs. Table 39 illustrates the building efficiencies of eight informal sector construction programs which were studied during February and March 1978. Since the level of finish equals formal sector built housing, it is doubtful that any savings on materials are achieved. Material costs may even be higher due to the small quantity of materials required by individual, somewhat isolated, houses. Single home owners are forced to buy materials on the open market where they may not be sold at controlled prices.

The primary differences between the formal and informal sector technologies appear to be in the efficiency of design and in the quality of construction. Much concrete-frame construction is heavily over-designed, resulting in inefficient usage of materials. Furthermore, many of the concrete frame

^{29/} During the first three years of this decade wood-framed housing averaged about 60 percent of the new additions to the housing stock.

TABLE 39

Component Costs of Informal Sector Construction

Case	Date Constructed	Total Size (m ²)	Total Cost (Rs)	Unit Cost (Rs/m ³)	Total Labor Cost (Rs.)	Percent	Total Materials (Rs.)	Percent
1*	1976	30.11	3,000	99.63	1,200	40	NA	
2	1966-1972	410.40	12,000	29.24	NA		NA	
3**	1977	18.60	7,270	391.13	3,024	42		
4	1977-1978	44.20	25,000	565.13	7,000	28	18,000	72
5	NA	37.17	31,000	833.90	7,000	23	14,000	45
6	1977	60.20	13,000	215.86	-		13,000	100
7	1975	214.13	15,000		4,000	27	11,000	73
8	1968	37.20	20,000	538.00	NA		NA	

NOTES: *Excludes doors and windows. **Minus roof.

SOURCE: PADCO surveys February and March 1978.

structures viewed were very poorly constructed, concrete was not well vibrated, reinforcement was not thoroughly covered, and form-work not always well constructed.

2. Building Cost Components

Building costs are usually broken down into about 50 to 60 percent materials, 30 to 40 percent labor, and about ten percent profits. This breakdown does not give a complete picture of costs. The labor component, which is about 30 percent of private sector construction and 40 percent of public sector construction, contains a factor of 15 to 20 percent overheads in addition to labor wages. At least ten percent of material costs are contractor overheads for handling and procuring the materials. A more complete breakdown of construction costs is presented in Table 40. Labor costs, due to a labor force which is roughly 50 percent employed by the public sector, averages about 35 percent. When 15 percent for contractor overhead is subtracted from labor, the costs of labor wages are 30 percent. Similarly, when overheads are removed from material costs the result is 50 percent. Contractor profits -- usually taken to be ten percent of composite labor, materials, and overhead costs -- when combined with overheads account for about 18 percent of total building costs.

TABLE 40
Proportionate Building Cost Components

	Sector		Average Percent (1.00)	Percent Overhead	Sub- Total	Overhead	Total	Final Percent of Total
	Public (.50)	Private (.50)						
Labor	40%	30%	35%	15%	29.75	4.46	29.75	30.5
Materials			55%	10%	49.50	4.95	49.50	50.8
Overhead						9.41	9.41	18.7
Profit							8.87	
Total							97.53	100.0

SOURCE: PADCO analysis.

Total building costs are: labor 30.5 percent; building materials 50.8 percent; and profit and overhead 18.7 percent. As the imported component of building materials is 74 percent, the total import component of building costs is 38 percent. In self-contracted construction, where contractor overhead and profit are eliminated, building materials costs probably range between 60 and 70 percent of total costs. However, there should be savings in total costs.

Roofing tends to be one of the highest cost subsystems of Mauritian housing, ranging between 18 and 26 percent of total building costs. The other two main subsystems of single-story construction, substructure and walls contribute about 16 percent of total building costs. Doors and windows and internal and external plastering and painting result in about 30 percent of the total.

The areas where costs can be reduced most easily are in the use of alternative, lower-cost roofing systems and in the reduction of the standards of the internal and external finishing. Concrete roofing, which has an import component of about 60 percent, contributes heavily to increasing the cost of single-story housing. The difference in cost between a concrete roof and a cyclone-proof roofing system of alternative materials can be as much as 50 percent.

Some of the alternative roofing system options which could be substituted for concrete roofing in single story housing include: lightweight precast roofing tiles, metal roofing systems, composite roofing materials made of locally available roofing materials and, perhaps, treated timber products. Roofing problems in areas subject to cyclone-force winds are further discussed in Appendix VII.

3. Building Materials

All building materials used in Mauritius are imported with the exception of sand, aggregate and about 20 percent of the timber. The primary materials used in residential construction -- cement, reinforcing steel, glass and metal doors, windows and frames -- represent 64 percent of total building construction costs and have imported components averaging 74 percent by value. Table 41 gives the estimated imported values of several key building materials. Details about building material imports are presented in Appendix IV.

TABLE 41

Estimated Imported Value of Key Building Materials

	Unit	Value (Rs)	Sale Price	Estimated Imported Value %
Cement	Ton	344.88	434.00	78.7 <u>1/</u>
Concrete Blocks	Block	-	2.15	55.0
Reinforcement	Ton	1974.73	2653.00	74.0 <u>2/</u>
Nails	Ton	2503.27	3433.00	73.0
Galvanized Iron Roofing	Ton	3067.24	3954.48	78.0
Average Imported Value				74.3%

NOTES: 1/ Weighted average. 2/ 87% including direct imports.

SOURCE: Data from Ministry of Prices and Consumer Protection and Annual Report of the Customs and Excise Bureau.

While building materials processing accounts for about 20 percent of the total number of large employers (firms having more than ten employees) and about ten percent of total employment in large establishments, much of the supply of key building materials is dominated by a few firms. Materials such as cement, concrete blocks and steel reinforcement account for about 60 percent of total building costs and are supplied by only a few firms. There is one supplier of cement, four major suppliers of blocks, and four producers of steel reinforcement. The suppliers of the latter two materials control 70 percent of their respective markets. 30/

As a result of the importance of these materials to construction costs, their prices are regulated by the Ministry of Prices and Consumer Protection which regularly inspects both manufacturing operations and retail outlets. While the ministry has several inspectors and prices are regularly published, there is a black market for key materials such as cement. Unofficial estimates indicate that the prices vary on the black market from ten to 20 percent above controlled prices.

To gain an idea of the trends in the increases of building materials costs, a building materials cost index was constructed of three key imported materials which account for 64 percent of total construction costs: cement, iron and steel products, and glass (see Table 42). Unit CIF (cost, insurance, freight) import values and retail sales price composites were multiplied times the percentage each represents of total building costs. These weighted unit costs were summed to form a current index of imported materials costs. To account for inflation, the current index was deflated by the consumer price index. Then the index was multiplied by the estimated building materials component of total building costs (50.8 percent). The result shows trends in building materials prices over the ten-year period 1968 to 1977:

The annual growth rate of building materials costs is 13.8 percent. Individually, the unit sales prices of cement have shown a growth rate of 41.7 percent over the period, while iron and steel have only increased 13.5 percent since 1968.

Since cement plays such an important role in construction in Mauritius -- over 40 percent of total costs are for

30/ Unpublished data from the Ministry of Prices and Consumer Protection

TABLE 42

Selected Materials Index, 1968-1978

	Cement (42%)				Glass (1.3%)		Steel Goods (17%)		Consumer Price Index	Materials Index Current (50.8%)
	CIF Unit Value (Rs/ton)	Weighted Index	Unit Sales Price (Rs/ton)	Weighted Index	CIF Value (Rs/ton)	Weighted Cost Index (Rs/ton)	CIF Unit Value (Rs/ton)	Weighted Cost Index (Rs/ton)		
1968	108.79	17.88	127	8.93	4,348	56.52	816.90	135.03	100.0	110.93
1969	110.38	21.97	132	10.86	5,005	65.07	894.23	147.82	102.3	136.79
1970	109.23	27.00	131	11.55	5,762	74.91	1,170.33	193.46	101.5	153.61
1971	110.71	33.18	119	11.84	6,632	86.22	1,092.02	180.51	100.3	152.39
1972	108.02	39.01	125	7.35	7,635	99.26	1,031.82	170.56	105.4	175.51
1973	138.51	46.04	175	15.44	8,789	114.26	1,309.09	216.39	113.5	241.43
1974	190.07	57.87	262	29.71	10,543	137.06	2,353.09	388.97	129.1	285.76
1975	290.14	96.27	368	32.46	8,115	105.50	2,486.21	410.97	114.7	296.94
1976	322.32	102.88	424	42.74	11,855	154.12	2,150.75	355.52	113.5	293.28
1977	344.88	114.43	434	38.28	16,759	217.87	2,386.93	394.56	109.5	355.94
1978	370.81*	120.05	480	48.00	17,771	231.03	2,536.10	419.22	---	---

NOTE: *Projected unit price.

SOURCE: PADCO analysis.

materials which utilize cement -- the supply of cement can be used as an indicator of the performance of the construction sector. Since 1961, imports of cement grew at about 6.7 percent per year. However, since 1970 the supply of cement has increased by 17.4 percent per year, almost triple the 1961 to 1978 growth rate. Since population has increased annually at about four percent from 1961 to 1970 and slowed to 1.1 percent per annum since 1975, 31/ this increase of cement supply has resulted in a per capita consumption of cement of 0.33 tons, an increase of 260 percent over 1961's per capita consumption (see Table 43). 32/

This increase in the supply of cement has resulted in an increased growth in annual new additions to the housing stock of 6.5 percent. But not all of the supply of cement has resulted in housing stock additions. An estimated 17.5 percent is not consumed directly but is stored in the form of blocks. 33 The estimated increase in savings has somewhat followed the increases in the consumer price index and the increases in both the supply and cost of cement. Storage in the form of blocks is evident throughout the island, mostly on residential plots.

4. Construction Labor

Private and public construction employment of an estimated 16,129 workers in 1977 provided work for about eight percent of the total labor force. 34/ Construction employment in the

31/ Recent World Bank estimates.

32/ By comparison, cement consumption in Asia is 0.041 tons per capita; in Latin America 0.1008 tons per capita; in Europe 0.42 tons per capita; and in Ghana 0.059 tons per capita.

33/ Cement storage was based on average construction worker consumption of cement which was estimated at 0.77 bags per day or 9.6 tons per year. This productivity or consumption pattern on the part of the entire construction force results in an absorption capacity of cement which equals between 74 and 94 percent of the total cement supply in any one year.

34/ There is some confusion in the pre-1976 census employment figures because force-account construction labor in the public sector was not separated from total public sector employment until after 1976 when the CHA labor force was separated from the central government labor force and added to total construction employment. A similar difficulty exists with the Development Works Corporation because total employment in the corporation is not separated into construction and nonconstruction workers.

TABLE 43
Cement Consumption in Mauritius, 1961-1978

Year	Cement (000 tons)	Percent Change	Value (Rs. Million)	Popula- tion (000)	Per Capita Consump- tion	Percent Change	Proportion Wasted or Stored (%)
1961	91.8		9.1	692.4			
1962	95.2	3.7	8.8	69.4	0.14		
1963	80.4	-15.6	7.4	713.4	0.11	-21.4	
1964	103.1	28.2	9.1	733.6	0.14	27.3	
1965	95.4	-7.5	8.9	751.4	0.13	-7.1	
1966	79.7	-16.5	7.5	762.9	0.10	-23.1	
1967	87.9	10.3	8.1	772.3	0.11	10.0	
1968	67.1	-23.6	7.3	788.9	0.09	-18.2	
1969	76.1	13.4	8.4	801.2	0.09		
1970	65.0	-14.6	7.1	813.4	0.08	-11.1	
1971	82.2	26.5	9.1	824.8	0.10	25.0	22
1972	93.5	13.8	10.1	834.5	0.11	10.0	
1973	131.4	40.5	18.2	843.4	0.16	45.5	6
1974	151.0	14.9	28.7	855.8	0.18	12.5	13
1975	193.7	28.3	56.2	867.2	0.22	22.2	18
1976	220.9	14.0	71.2	880.8	0.25	13.6	26
1977	245.3	11.0	84.6	881.1	0.28	12.0	20
1978	300.0	22.3	NA	891.5*	0.33	21.4	

Annual Growth Rate 6.70%

Average Increases:	Cement Imports	Per Capita Consumption
1973-1978	21.8%	15.1%
1970-1978	17.4%	16.2%
1962-1978	8.8%	6.51%

NOTE: *Island of Mauritius only.

SOURCE: Biannual Digest of Statistics and PADCO analysis.

private sector was growing at about 12 percent from 1966 to 1971 when private sector employment boomed, increasing annually at about 20 percent. Public sector employment, which in 1977 accounted for over 50 percent of total construction employment, has been increasing at about 13 percent annually since 1974.

Construction wages, however, have increased more rapidly than employment. Since 1968 the composite wage index (see Table 44) has grown annually at a rate of 17 percent. Skilled labor wage increases have followed the composite wage index, averaging an annual growth rate of 18 percent. Wages of unskilled labor have increased more rapidly (about 19 percent), keeping pace with the unweighted labor index at current prices.

About 50 percent of the construction force is unskilled labor. Masons and carpenters comprise almost equal shares of the remaining 50 percent of skilled labor. If current labor trends continue, private sector construction employment will increase to about 10,354 in 1980, an increase of 45 percent over the estimated 1978 private sector employment. Total employment in formal sector construction could therefore increase by almost 70 percent by 1980 to over 27,000 workers.

Construction firms, however, experience shortages of skilled labor and supervisory staff. Labor productivity has therefore suffered, resulting in rising labor components of total building costs. As previously mentioned, to account for this reduction in productivity and increase in costs, many of the larger contractors have been turning to more capital-intensive technologies. Since none of these technologies have been in existence in Mauritius for very long, their impact on either construction costs or productivity cannot yet be assessed. However, it appears unlikely that they will be capable of providing low-cost housing within the reach of low-income groups or that they will have a large impact on total construction sector employment.

A rough assessment can be made of the productivity of construction workers by comparing gross supplies of building materials, in this case cement, with the capacity of construction workers to utilize those materials in construction. 35/

35/ Unit productivity was measured as the amount of concrete which various contractors stated their labor crews had been utilizing per day. Average daily productivity was then taken to be about 0.13 cubic yards of concrete per private sector worker and about 0.09 cubic yards per public sector worker. These factors assume that about 30 percent of a worker's time is nonproductive.

TABLE 44
Labor Wage Index, 1967-1978

	Average Skilled Labor Wages Current Prices (.50)	Average Unskilled Labor Wages Current Prices (.50)	Average Labor Wages Current Prices	Consumer Price Index	Labor Index Weighted 30.5% of Building Costs	Labor Index Weighted For Unit Construction
1967	3.82	2.90	6.84	100.0	2.09	41.95
1968	3.94	2.90	6.92	102.3	2.06	41.35
1969	4.02	2.90	7.31	101.5	2.20	44.16
1970	4.42	2.90	7.34	100.3	2.23	44.76
1971	4.44	3.10	7.08	105.4	2.05	41.15
1972	3.98	4.46	9.22	113.5	2.48	49.78
1973	4.76	5.70	12.11	113.5	2.86	57.40
1974	6.42	7.29	17.35	129.1	4.61	92.53
1975	10.06	8.85	23.67	114.7	6.29	126.25
1976	14.82	11.45	27.82	113.5	7.48	150.12
1977	16.38	14.55	30.93	109.2	8.64	173.40
1978	18.34	14.64	32.98			
Average Annual Growth Rate		19.24	19.24		16.91	16.91

SOURCE: PADCO analysis.

TABLE 45

Employment in Formal Construction, 1966-1986

	Construction Employment Private Sector*	Development Works Corporation (Public)	Total	Gross Supply of Cement Per Worker (Tons)	Per Worker Cement Consumption Weighted For Productivity (Tons)***	Consumption as a Proportion of Supply (%)	
						All Sectors	Private Sector
1966	2,442						
1967	2,445						
1968	2,040						
1969	-						
1970	1,779						
1971	2,058	3,206	5,264	15.62	10.05	66	78
1972	2,523	6,153	8,676	10.78	9.70	90	113
1973	3,994	6,165	10,159	12.93	10.06	78	94
1974	4,580	6,221	10,801	13.98	10.17	73	87
1975	6,229	6,880	13,109	14.78	10.34	70	82
1976	6,188	7,234	13,422	16.46	10.29	63	74
1977	7,129	9,000**	16,129	15.21	10.23	67	80
1978	7,122	9,303	16,228	18.49	10.32	56	66
Annual Growth Rates	12.5%	13.4%	15.3%				
Projected							
1980	7,584	10,026	19,017				
1981							
1982	8,507	11,473	21,805				
1983							
1984	9,430	12,920	24,593				
1985							
1986	10,430	14,367	27,382				

NOTES: *Excluding relief workers but including CHA after 1976. **Excluding relief workers. ***Weighted average of productivity based on contractor estimates of average cement consumption per worker per day (0.77 bags) times average working year (316 man days). Informal estimates by DWC rate its workers as 70 percent as efficient as private sector workers.

SOURCE: Biannual Digest of Statistics and PADCO analysis.

Productivity, when measured against supply, has been dropping. Since 1972 it has dropped over 60 percent. This drop is largely due to the number of unskilled workers which the public sector has been absorbing. Consumption of cement as a proportion of supply in the private sector has remained more or less constant at about 80 percent. Table 45 illustrates these various construction employment patterns.

5. Construction Management

Private Sector

Since formal registration of contractors is not required for execution of government contracts, there is a gap in the total picture of construction management. However, the Ministry of Works registers contractors for its construction programs in four classes according to their financial standing, their permanent staff, and previous work experience. As indicated by Table 46, the ministry has currently registered 37 contractors for both civil and building works. However, only four of these private firms are engaged in civil engineering works such as road and bridge construction. In addition to these private contractors, the Development Works Corporation also engages in civil works.

TABLE 46

Contractors Registered with the Ministry of Works

Contractor Class	Number of Contractors	Estimate of Approximate Capacity (Rs million)	Capital Resource (Rs million)	Remarks
Group I	10	20-150	2.0 (min)	Complete technical staff
Group II	11	10- 50	0.5-3.0	Some technical staff
Group III	9	1.0 (max)	1.0 (max)	Foremen only
Group IV	7	0.150 (max)	NA	NA

SOURCE: Unpublished Data. Ministry of Works.

The larger contractors have fully developed managerial and technical staffs and are capable of handling complex construction projects. Many of the contractors in this grade

were affiliated with foreign firms, although all of the contractors currently operating in Mauritius have incorporated locally and have their main offices in Mauritius. At the other end of the scale are very small contractors lacking technical and managerial skills. These firms are frequently run by master craftsmen who have gone into business for themselves. More details of contractor capacities are presented in Appendix V.

The Development Works Corporation (DWC)

In terms of sheer numbers alone, the DWC is the largest contractor in Mauritius. Although it employs over 50 percent of the current construction labor force and executes both civil engineering and building works, it is a parastatal of the Ministry of Employment and not of the Ministry of Works. The corporation was established in 1968 in conjunction with a USAID relief program. As a nonprofit corporation, it was established to provide employment for both unemployed and unemployable workers by providing on-site training for relief and construction workers. Currently the DWC has about 14,000 employees of which 9,000 are engaged in construction. About 50 percent of its construction force is engaged in road construction. Since 1972, its construction crew has grown from 3,200 to its present level of 9,000.

As part of a World Bank Rural Development loan, the DWC has embarked on formal training of construction workers to complement its on-site training. It currently has two training centers which have trained about 750 masons and carpenters who have been absorbed by the DWC. As the DWC has begun to fill its current manpower needs, it is turning its training efforts toward providing skilled labor for public and private sector contractors.

While the DWC was originally mandated to provide initial on-site training for unemployed and/or unskilled workers and then turn those workers over to the construction industry, most of its employees have been reluctant to leave the security provided by employment in the corporation. In spite of wages which are 20 percent lower than construction industry levels (as much as 50 percent lower than skilled wages), the corporation has a staff which is at least 30 percent redundant. The result is labor costs of about 42 percent of total building costs (compared to 30 percent in the private sector). Deficits caused by redundant labor and delays in construction programs are met by the government's budget.

The DWC's management hopes to nudge some of this excess staff into the private sector by setting up small-scale production centers which will eventually be turned over to employees. It is also intensifying its training programs and extending training periods from 24 to 36 weeks in order to develop skilled craftsmen and foremen more readily usable by the construction industry.

6. Constraints in Construction

The primary constraints in construction and building materials are the shortages of skilled labor, the low productivity of labor, the high import component of building materials, high construction standards (both in formal and informal construction practices), and capacity problems.

While there is an abundance of unskilled labor whose productivity is low, there is a shortage of skilled labor. Furthermore, the mechanisms for training skilled labor are insufficient. The labor problem has been further exacerbated by full employment policies which have had negative effects on labor productivity. Public employment programs have been initiated without providing incentives for increased productivity. As a result, public sector builders have been forced to maintain surplus construction crews -- which has caused increasingly higher labor components in construction costs. In addition, the lack of supervisory personnel has resulted in inefficient labor management and a lack of capacity to motivate construction crews.

The shortage of skilled labor also hampers informal construction. While individual finance may contribute to construction delays, many of the home owners interviewed seemed to have engaged skilled labor for periods much longer than would normally be warranted for construction of their houses, even though they were paying construction wages equal to those in the formal sector. In fact, some of the daily rates quoted by house owners were actually at the higher end of construction wage scales. As a result, some of the gains in the self-help, self-contracting method of home building may be lost.

The high import components of building construction and frequent shortages in supply result in increasing construction costs and delays in implementation. The high import component of building materials ties building costs and construction timetables very closely to international supplies and prices. As a result, labor (which is dropping in productivity) is the largest domestic component of the industry.

While the effect on short-term building projects may not be great, building material costs have been increasing at 14 percent per annum and total construction costs have been keeping pace. The increase in building costs has not been matched by an increase in finance availability; in fact the opposite has been the case. As a result, semi-completed house shells are common throughout the island.

While there are no statistical data to support the thesis, the high import component and the small number of importers probably make procurement of building materials by low-income families buying in small quantities more difficult. The lack of local production also results in missed employment opportunities as small-scale manufacturers of building materials are not common. As was seen above, most building materials processing is dominated by a few large firms.

While it may be a temporary problem, the current lack of credit has caused suppliers to demand full payment, in some cases advance payment, prior to supplying building materials. Smaller builders who do not have the capital resources of larger contractors and government have difficulties in meeting those terms.

The fear of cyclones and the resulting high building standards are constraints to both informal and formal construction processes. The current practice of building entirely out of concrete and concrete block results in higher costs and hinders the development of alternative construction technologies which are also cyclone-proof. The lack of performance standard which would define acceptable construction solutions for resolving wind loading results in structures which are over designed and highly import consumptive. This reliance on a single technology/building material mix constrains the development of local technologies and the safe substitution of less expensive construction techniques. It also results in inefficient usage of imported materials in private residential construction where professional design services are not often used. A case for the use of alternative roofing systems to resist severe wind loading is presented in Appendix VII.

Building codes established in 1925 also have the effect of slowing down construction and increasing costs. While the codes have been important in reducing overcrowding and protecting public health and welfare, they result in higher costs without achieving much in the way of actually improving public health. It is probably for these reasons that the development programs of both the CHA and MHC have been excluded from compliance with these codes.

D. Finance

Total government capital expenditure on the housing sector was Rs 20.1 million in FY 1975/76. It is projected to increase to Rs 63.7 million during FY 1977/78. ^{36/} The primary channels of government funds to the housing sector have been through long-term loans to the MHC and the CHA and direct grants to the CHA. The primary nongovernment sources of housing finance have been through mortgage loans granted by MHC, the insurance companies, and pension funds. Informal sector housing finance has traditionally been through household savings -- an estimated 63 percent of household savings has been reinvested in residential construction -- and *notaires* whose interest rates can be as much as two percent above other mortgage lenders and private lenders.

1. Public Sector Housing Finance

Total government participation in the housing sector, including residential water and sewerage systems, is estimated to equal about 21 percent of the capital budget for FY 1977/78. About 79 percent of this amount is in loans to the MHC, CHA, and CWA. Capital expenditure on housing alone has ranged two to ten percent of the capital budget from 1971/72 to 1977/78. Budgetary subsidies and grants are projected to range up to 15 percent of the total capital expended on housing in the FY 1977/78 budget. Since 1971, government capital expenditure in the housing sector has been increasing, most recently due to large expenditures on cyclone reconstruction programs (see Table 47).

2. Private Formal Sector Housing Finance

Other than household savings, the only sources of housing finance have been mortgage loans granted by the Mauritius Housing Corporation, the insurance companies, and the pension funds. Other commercial banks have not entered into the housing sector except as the depositories of household savings. The funds of the three main sources providing mortgage financing are limited. As a result, there has been a major shortage

^{36/} Capital Budgets with Memorandum. Government Printer. Port Louis, Mauritius, various issues.

TABLE 47

Budgeted Capital Expenditures for Housing,
Water Supplies and Sewerage, 1971/72-1977/78

(Rs millions)

	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77 (Estimated Expenditure)	1977/78 (Estimated New Provision)
<u>Housing</u>							
Loans to MHC		2.0			13.0	15.8	35.0
Loans to CHA		.3	1.0	1.5	5.1	11.9	19.0
Grants to CHA		0.3	2.2	.2	2.0	2.2	2.7
Subsidies to MHC							4.0
Subsidies to CHA						2.8	3.0
Subtotal Housing	0.1	2.6	3.2	1.7	20.1	32.7	63.7
<u>Water Supplies</u>							
Loans to CWA	.7	1.9	6.0	7.5	6.4	11.9	50.0
Capital works	4.0	8.8					
Subtotal Water Supplies	4.7	10.7	6.0	7.5	6.4	11.9	50.0
<u>Sewerage</u>							
Loans for house service connection				0.2		0.2	0.1
Capital works	9.1	17.8	8.1	7.4	6.7	12.2	17.7
Subtotal Sewerage	9.1	17.8	8.1	7.6	6.7	12.4	17.8
Total Housing, Water Supplies and Sewerage	13.9	31.1	20.5	16.8	33.2	57.0	131.5
Total Capital Expendi- ture	100.8	127.4	244.9	259.0	423.4	490.0	634.5 <u>1/</u>

NOTES: 1/ Minus reserve and international subscriptions.

SOURCE: Mauritius capital budgets with memorandums. Government Printer. Port Louis. Various issues.

in lending to the housing sector. The following is a brief discussion of the formal sector sources of housing finance.

Mauritius Housing Corporation

The MHC provides mortgage financing for housing loans at current interest rates ranging from six to 12 percent, depending on the size of the loan and the size of structure built. Its assets are almost entirely in housing loans which as of June 1977 had an effective interest rate of 8.3 percent. MHC's primary sources of funds are savings deposits, government loans (roughly a third of its total liabilities), loans from other private sector sources, and foreign loans. It also has the authority to borrow on foreign markets.

Prior to January 1978, MHC and other commercial banks paid six percent on ordinary 12-month savings deposits. However, to encourage younger savers to save with MHC and thereby later qualify for mortgage loans, it established the Exceptional Savings Scheme whereby monthly deposits saved over a fixed period (usually four years) would earn between eight and 12 percent, depending on the size of the monthly deposits. At the end of the period, the saver would qualify for a mortgage loan if other conditions were met, i.e., the depositor must be a landowner, have the capacity for repayment, and be able to contribute ten percent of the building costs. In early years the scheme was very popular; by 1973, 800 savers had registered. By September 1974, however, that number had dropped to 430.

Following the increase in discount rates from seven to nine percent in January 1978, the interest paid on savings deposited over 12 months increased to 7.5 percent. MHC also raised interest rates on its mortgage loans to 12 percent for loans in excess of Rs 50,000 and 10.5 percent for loans less than Rs. 50,000. For housing which does not exceed 800 square feet, MHC offers concessionary rates of six percent.

Due to the limited number of financial sources which are currently available for housing finance -- i.e., government loans, loans from other local financial intermediaries, and foreign sources -- MHC cannot provide mortgages for all of its applicants, recently more than 100 per month. In early 1978, MHC had to place restrictions on the number of loans approved.

Sugar Industry Pension Fund

Several industries as well as the government sector provide pension plans for their employees. The largest and best established is the sugar industry fund with total assets in 1974 of Rs 93.3 million. It has been a major source of mortgage financing, investing most of its assets in the housing sector. It has also served as a source of funds for other intermediaries such as the MHC.

Life Insurance Companies

The third major source of formal sector housing finance has been the ten insurance companies selling life insurance. These funds before expenses totaled Rs 107 million in 1973. Most of their funds have been channeled into government securities, mortgages, and loans to policyholders.

Household Savings

The bulk of housing finance has resulted from household budget savings which account for 25 percent of all formal sector savings. Since an estimated nine out of ten households have bank accounts, household savings deposits are roughly equal to 64 percent of total estimated household savings. The remainder is probably hoarded or saved in kind through accumulation of goods such as construction materials. The latter have been a better hedge against inflation than bank accounts, since average construction sector prices have been increasing at a greater rate than inflation and interest rates.

Nevertheless, household savings deposits have been growing in large part due to increases in incomes. Much of this savings has been from upper-income households. As shown by the 1975 income distribution, the upper five percent of households received 69 percent of income while the lower 40 percent received 14 percent of income. As a result, upper-income surplus earnings generated most of household savings.

Two other sources of private sector finance are the informal cycle system and private lenders. The latter borrow at higher rates of interest and tend to lend at least two percent higher than commercial mortgage loans.

3. Constraints in Housing Finance

Until January 1978 the general interest rate structure was quite low. Furthermore, as a result of inflation interest rates have become negative (see Table 48). Although the discount rate was raised from seven to nine percent, 12-month savings deposit rates of 7.5 percent are still less than recent inflation rates. Negative interest rates did not deter savings during the recent sugar boom. Although savings increased due to excess liquidity in the private sector, recent drops in international sugar prices may reduce that liquidity and perhaps decrease savings deposits.

TABLE 48
Real Interest Rates on Deposits

	Deposit Rate (12 months)	Rate of Inflation	Real Interest Rate (Rs)
1971	5.25	0.3	4.90
1972	5.50	5.4	0.10
1973	5.50	13.5	-8.00
1974	5.50	29.1	-23.60
1975	5.75	14.7	-8.90
1976	5.75	10.0	-4.25
1977	6.00	9.2	-3.20
1978	7.50		

SOURCE: Biannual Digest of Statistics and Bank of Mauritius.

On the lending side, present interest rates also provide little incentive for financial institutions to extend long-term loan arrangements. On short-term deposits which constitute most deposits, banks pay about 7.5 percent for which they can lend at 11.5 percent. However, on long-term deposits of three years or more, the interest rate is 11 percent, while the maximum lending rate is 12 percent.

Current housing finance programs are also limited in scope. Pension plans and insurance funds provide mortgage facilities mainly to participants within their own groups. Similarly, the MHC's Exceptional Savings Scheme is limited in that it accepts only fixed deposits aimed at specific loan sizes while many savers may be able to deposit more. To qualify under the scheme borrowers must be owners of land and other securities, a limitation which excludes many

potential borrowers. Further, although the bonus and interest paid on contributions toward a mortgage loan are between eight and 12 percent, the maximum a saver can withdraw at the end of four years is only Rs 2,000. This hardly compensates him in a time of high inflation.

With the exception of cyclone reconstruction programs, all housing finance policies have been mainly directed toward new construction -- not the purchase of existing dwellings or renovation and improvement of existing dwellings. This particular policy has limited improvements of existing structures and prevents tenants from purchasing dwellings they now occupy. The policy probably limits improvements on rental stock also, although the degree of this limitation is not

Chapter V
PROSPECTS AND ANALYSES

A. Reducing Construction Standards

The outstanding feature of public sector shelter activities is the present construction standard to which units are being built for low-income families. The previous chapter described the costs of the extremely high standards of construction and infrastructure for rehousing victims of cyclone Gervaise. Since the Gervaise program is of an emergency/welfare nature, some subsidies (perhaps for land since land will remain state-owned) may be justified. However, while a degree of subsidy may be justifiable, it is questionable whether present standards with their deeper subsidies are necessary.

Of the 1972 housing stock, 20 percent needed major repairs or was uninhabitable, and two percent were so structurally unsound they needed immediate replacement. In 1975, Gervaise destroyed about eight percent of the total stock. Most of these units were in the straw hut or the not on foundation categories of the 1972 Housing and Population Census. Thus, it is evident that present construction standards of concrete blocks, reinforced columns, reinforced ring beams, and concrete slab roof are far above those of the victims' former dwellings.

The government has a legitimate concern that any new housing constructed for cyclone victims should be cyclone-proof. However, there are many degrees of standards below the present ones which are cyclone-proof and entail less subsidy. Using present costs and a mathematical formula which relates land, infrastructure, building and connection costs, built area, persons per household, persons per hectare, and units per hectare to monthly payments at varying terms, the SSA team investigated how standards might be reduced and the effect of subsequent reductions on monthly payments. Since land costs could be a likely target for subsidy, monthly payments were calculated with and without land costs.

Table 49 is based on the semi-detached Type F house presently being built, showing the economic effects of present standards and repayment terms. If monthly payments of Rs 70 are used to amortize the current program, a negative balance arises equal to a negative land cost of Rs -54 per square meter. The current program under current terms can

TABLE 49

Type F Semi-Detached Reduced
Standards and Subsidies

Case	Monthly Payment* (Rs)		Land (Rs/m ²)	Infrastruc- ture costs (Rs/m ²)	Building Costs (Rs/m ²)	Connec- tion Cost (Rs)	Built Area (m ²)	Persons per Household	Density	
	A	B							Persons per Hectare	Units per Hectare
#1		99	0	101	571	400	46	5.3	206	39
#2	174		59	101	571	400	6	5.3	206	39
#3	435		59	101	571	400	46	5.3	206	39
#4	580		59	101	571	400	46	5.3	206	39
#5	482	341	59	101	571	400	46	5.3	206	39
#6	410	270	59	66	571	400	26	5.3	206	39
#7	390	250	59	66	485	400	26	5.3	206	39
#8	345	230	59	66	485	400	26	5.3	254	48
#9	310	215	59	66	485	400	26	5.3	306	58
#10	290	195	59	66	400	400	26	5.3	306	58
#11	275	180	59	66	334	400	26	5.3	306	58

NOTES: *A = with land costs; B = without land costs. Case #1: Current Gervaise Program, 2.5%, 40 years, 25% grant. Case #2: Gervaise Program, land costs included: Rs 250,000 per arpent. Case #3: Gervaise Program at economic terms: 12%, 20 years, 25% grant. Case #4: Gervaise Program at economic terms: 12%, 20 years, no grant. Case #5: Core House (2 rooms and sanitary core): 12%, 20 years, no grant. Case #6: Reduce infrastructure standards 35%. Case #7: Reduce building costs 15% (remove interior doors and finishings). Case #8: Reduce plot sizes, increase residential land use to 75%, increase density. Case #9: Reduce plot sizes to 130 square meters. Case #10: Reduce building costs to shell (30% reduction). Case #11: Change roof to precast concrete tiles.

SOURCE: PADCO analysis.

only be financed through increased monthly payments of Rs 99 or through increased subsidies amounting to 47 percent of the capital costs not including land. When a prevailing land cost is included, payments increase by 75 percent. As terms become more economic, payments increase rapidly to Rs 580 per month. At economic terms (presently MHC terms), incomes over Rs 2,000 per month (representing the upper 6th percentile of household incomes) are required to purchase the house.

Case 5 reduces standards to a core house a little over half the size of the Type F unit, with two rooms and a sanitary core. Even at these reduced standards and without land cost payments, economic terms are nearly half of the estimated 1978 median monthly income of Rs 750 (see Chapter II). Infrastructure standards were therefore reduced by substituting more footpaths for roads and replacing bituminous road surfacing with compacted gravel (Case 6); building costs were also reduced slightly (Case 7). Even after reducing plot sizes and increasing residential land uses and densities (Cases 8 and 9), payments are still not below 25 percent of the 1978 median income.

Only after reducing building costs to a shell house -- i.e., without plastering, removing the fixtures (except toilet) and changing the concrete slab roof to firmly fixed concrete tiles -- do monthly payments without land costs fall within 25 percent of the Rs 750 estimated median expenditure. With land costs included, payments are nearly Rs 100 per month higher.

Table 49 thus allows one to ascertain what standards of construction, infrastructure, and densities are relevant on fully economic terms to begin to reach below the median expenditure of Rs 750 month and thus become affordable by the Gervaise victims on economic terms. Once the nature of the relevant standards was determined, the terms, including down payments or cross-subsidies, were varied to ascertain corresponding income ranges assuming 15 to 20 percent of income for housing. Although the 1975 Family Budget Survey found an average of 12 percent of income was being spent on housing among low-income groups, informal interviews among families building or adding to their own houses indicated that families were often spending or willing to spend at least 20 percent of income, especially if they could get a loan. This 15 to 20 percent of income is a conservative estimate.

It can be seen from Table 50 that a Type F core house without land costs, with a 25 percent cross-subsidy (or down payment), and terms of ten percent for 25 years can be

TABLE 50

Type F Single Story Semi-Detached House:
Core House, Concrete Tile Roof, 25% Cross-Subsidy

Terms	Monthly Payments (Rs)		Income Range (Rs)		
			(% of Income Spent on Housing)		
	With Land	Without Land	20%	20%	15%
12%, 25 years	196.51	128.85	983	644	860
12%, 30 years	192.22	126.03	961	630	840
11%, 25 years	182.89	119.91	915	600	800
11%, 30 years	177.66	116.48	890	565	777
10%, 25 years	169.64	111.22	850	556	741
10%, 30 years	163.85	107.43	820	537	716
9%, 20 years	167.96	110.12	840	550	734
9%, 25 years	156.57	102.66	785	512	685
9%, 30 years	150.23	98.50	751	492	656
8%, 25 years	144.07	94.46	720	472	630
8%, 30 years	136.98	89.81	685	449	598
7%, 25 years	131.94	86.51	660	433	577
7%, 10 years	124.10	81.39	620	407	543

NOTES: Land Rs 59.32 per square meter. Infrastructure Rs 65.65 per square meter. Building costs Rs 333.74 per square meter. Connection costs Rs 400. Built Area 26.2 square meters. Persons per household 5.3. Persons per hectare 305.77. Units per hectare 57.69.

SOURCE: PADCO analysis.

afforded by families earning less than Rs 750 per month using 15 percent of their income. If 20 percent of income is available for housing, families with incomes of Rs 750 could afford terms of nine percent for 30 years with land costs included in the package. Given the small amount spent on food by many low-income families, especially in the rural areas, and the large amount of income in kind, it is evident that payments up to Rs 100 per month could be afforded by families earning well below Rs 750 per month, e.g., down to about the 36th percentile or Rs 500 per month.

In order to approximate the potential effective demand for units of the current program and those at reduced standards, Tables 49 and 50 were integrated with estimates of gross and net effective demand for the country as a whole (based on figures shown in Table 13). Gross effective demand for housing is the total demand for housing at unit costs and economic terms which a particular income group can afford, whereas net effective demand is the unsatisfied effective demand which a particular income group exhibits after supply has been subtracted. The results, which also give a perspective on the effectiveness of the current program, are presented in Table 51.

At high standards (MHC type) and market terms, the net effective demand for housing from income groups above the 90th percentile is quite small, six percent of total net housing requirements. Even at the 50th percentile of incomes, CHA Type J maisonnettes at economic terms have only a very small effective demand of 11 percent of the total net housing requirements. If income (Rs 650) instead of expenditure (Rs 750) is used as monthly income for the 50th percentile, the CHA Type F single-story, semi-detached house is able to supply only about eight percent of the net housing requirements at economic terms. Even if a 25 percent cross-subsidy is achieved (with zero land costs), only about 15 percent of the net housing needs can be supplied. 37/

37/ The percentile income groups used to calculate effective demand shown in Table 51 are cumulative income groups. Thus, the 50th percentile income group represents a group whose minimum 1978 incomes (expenditures) are Rs 750 and above. To serve the 50th percentile income group, programs should be designed so that the total effective demand for those programs is roughly equal to 50 percent of all households needing housing. Similarly, a program to serve incomes at the 20th percentile should be affordable by all households above the 20th percentile, i.e., the upper 80 percent of all households.

TABLE 51
Housing Requirements and Effective Demand - 1978

(1) Net Housing Needs (House- holds) <u>1/</u>	(2) Income Group Per- centile	(3) Percent Spent on Housing	(4) Monthly Income (Rs)	(5) Type	(6)-(10) Housing Standards					(11)-(12) Terms Interest Period		(13) Percent Cross Sub- sidy	(14) Net Effective Demand (House- holds)	(15) (14) ÷ (1) × 100 Percent Net Housing Requirements Met	
					(6) Super Struc- ture (Rs/m ²)	(7) Built Area (m ²)	(8) Plot size (m ²)	(9) Land cost (Rs/m ²)	(10) Infra- struc- ture (Rs/m ²)	(11) (%)	(12) (years)				
7,918	92	(20)	2,000	MHC	771	60	60	90	147	12	20	-	457	6	
	80	(15)	1,060	MHC	771	60	60	90	147	12	20	-	454	6	
	50	(13)	750 <u>2/</u>	MHC	771	60	60	90	147	12	20	-	696	9	
					CHA/J	658	52.3	60	90	101	12	20	-	917	12
					CHA/F	560	45.5	160	90	101	12	20	-	750	10
	50	(13)	750		CHA/F	560	45.5	160	0	101	12	20	-	1,010	13
	50	(13)	650 <u>3/</u>		CHA/F	560	45.5	160	90	101	12	20	-	651	8
	50	(13)	650		CHA/F	560	45.5	160	90	101	12	20	25	868	11
	50	(13)	650		CHA/F	560	45.5	160	0	101	12	20	25	1,168	15
	50	(13)	750 <u>2/</u>		B	440	26	100	90	65.65	12	20	0	1,558	20
	50	(13)	750		B	440	26	100	90	65.65	12	20	25	2,077	26
	50	(13)	750		B	440	26	100	0	65.65	12	20	25	3,115	39
	50	(13)	650 <u>3/</u>		B	440	26	100	0	65.65	12	20	25	2,700	34
	50	(13)	750		C	338	26	100	0	65.65	12	20	25	3,653	46
	50	(13)	650 <u>3/</u>		C	338	26	100	0	65.65	12	20	25	3,166	40
	40	(13)	525 <u>2/</u>		C	338	26	100	0	65.65	12	20	25	3,069	39
	40	(13)	525 <u>2/</u>		C	338	26	100	0	65.65	9	25	25	4,027	51
	40	(13)	525		C	338	26	100	0	65.65	9	30	25	4,198	53
	30	(12)	450 <u>2/</u>		C	338	26	100	0	65.65	9	30	25	3,875	49
	30	(12)	450		C	338	26	60	0	65.65	8	30	25	5,126	65
	20	(11)	375 <u>2/</u>		C	338	26	60	0	65.65	8	30	25	4,475	57
	20	(11)	375		C	338	26	60	0	65.65	7	30	25	4,940	62
	20	(11)	375		C	338	26	60	0	65.65	7	30	35	5,700	72
	20	(11)	375		D <u>4/</u>	338	20	60	0	65.65	7	30	35	6,780	86
	20	(11)	375		E <u>5/</u>	0	0	90	0	65.65	7.5	30	0	7,592	96
	14	(10)	300		E	0	0	70	0	65.65	7.5	30	0	7,543	95
	14	(10)	300		E	0	0	70	0	65.65	10	20	0	5,464	69
	14	(10)	300		E	0	0	70	0	65.65	10	20	30	7,805	97
	14	(10)	300		E	0	0	70	0	65.65	10	30	-	6,005	76
	14	(10)	300		E	0	0	70	0	65.65	10	30	25	7,506	95

NOTES: 1/ Based on 1978 population of 912,000 and household population of 172,000, for which there is a total housing need in households at the beginning of the year of 21,507 and an annual building rate of 6.57 percent. 2/ Based on 1978 equivalent median expenditure. 3/ Based on 1978 income estimates. 4/ Consists of sanitary core plus one small room to provide shelter suitable for expansion by self-help construction. 5/ Low income serviced land.

SOURCE: PADCO analysis.

When standards are reduced to Type C and land costs are fully subsidized, the net effective demand generated begins to approach 50 percent of the total net housing requirements at economic terms. ^{38/} At the 40th percentile of incomes, a group which includes 4,671 households, net effective demand exceeds 50 percent of the housing requirements when repayment terms are reduced to nine percent over 30 years. At the 20th percentile of incomes (expenditure of about Rs 375 per month), housing programs can begin to meet the net effective demand represented by this group only by reducing core houses in size to one room plus bathroom, reducing repayment terms to seven percent over 30 years, and increasing the total cross-subsidy to 35 percent.

Removing the Type D core house creates a sites and services option which can meet up to 96 percent of net housing requirements and be afforded without cross-subsidy by the 20th percentile income group. At terms affordable by families at the 14th percentile (Rs 300 per month), using only ten percent of income for housing, 95 percent of net requirements can be met. Thus, sites and services have the greatest potential for meeting low-income housing requirements in Mauritius. Before attempting such schemes on a large scale, however, they should be incorporated with conventional and core housing projects to test their acceptability by the people and the government.

B. Increasing Institutional Capacity

1. The Ministry Housing

The outstanding characteristic in the description of shelter sector institutions in Chapter III is the lack of a housing division in the Ministry of Housing. Although the CHA has traditionally handled public housing activities, these have been of an implementation nature. It has never been involved in overall policy and program formulation. In fact, due to a lack of action in this area, housing policy and program formulation, at least as stated in the Plan, have occurred in the Ministry of Economic Planning and Development.

^{38/} A Type C house is a core house consisting of two rooms and a sanitary core; self-help construction is relied upon to finish the interior and reduce costs. The house design can be easily expanded by adding two more rooms.

Given the priority of housing in the Second Plan, housing policies and programs can no longer be subject to *ad hoc* formulation. The lack of policy and coordination in the housing sector has been recognized at the Cabinet level as witnessed by the proposal to form an Urban Planning Coordinating Committee chaired by the Minister of Finance. In addition, a proposal for creating a Housing Division within MOH was put forward last year. A Housing Division need not be very large to begin with, but could be built around the present housing adviser and the EDF project manager. It is recommended that such a division would have the principal responsibilities outlined in the following paragraphs.

Policy and Program Formulation

Presently the only *de facto* housing policy in Mauritius is cyclone reconstruction programs. In general there are no comprehensive policies or programs for various income groups and/or sectors of society. The MHC has recently developed a building program through 1981 for its clients; the SILWF serves sugar laborers (and some dockers) on an *ad hoc* basis, and the CHA has no long-term program whatsoever. Although there is a program of targets and types of units for Gervaise reconstruction, there is no comprehensive housing policy and program for the country as a whole or for low-income groups in general.

Policy formulation and program determination by types of units for the effective demand categories, institutions, and locations should be the first priority of the nascent division. This exercise should be attempted for the remainder of the Second Plan in order to gain experience for detailed inputs into the Third Plan beginning in 1981. The housing policy adviser could take the lead in this exercise along with a counterpart economist and sociologist.

Program Coordination and Monitoring

Chapter IV documents the lack of coordination between the Ministry of Housing and other ministries and/or parastatals supplying infrastructure to project sites. This lack of coordination and forward planning is especially acute in the supply of water. Although a ministerial coordinating committee has been appointed to attempt to resolve some of these problems, off-site infrastructure coordination for future projects must be one of the principal responsibilities of a new housing division. This has been recognized by officials

in the ministry with the recent assignment of all infrastructure coordination responsibilities for the Gervaise program to the present EDF project manager.

Internal coordination among the divisions within the ministry is also required. In this sense, the new housing division must coordinate land acquisition, valuation, survey, and site planning. These functions can either be done by the respective divisions, as presently, or by relevant personnel assigned to the new housing division. Since each one official would retain his/her scheme of service in his/her original division, secondment to the new housing division would be more efficient for undertaking new operations.

Due to the critical lack of personnel in some categories, active steps must be taken to build up the ministry's staff, especially in survey. If salary categories in the Survey Division were revised comparable to valuers and town planners, more surveyors might be attracted to and remain within the ministry. In addition to the lack of surveyors, there is also a need for additional architect/planners and valuation assistants in the ministry.

Monitoring the physical and financial progress of the housing program would be another important responsibility of the new division. Although this is sometimes taken to mean actual on-site construction supervision, the new division should instead build up capacity in an overall program monitoring sense and allow implementing bodies more familiar with construction, such as the CHA, to carry out actual on-site construction supervision. Division officials would be better off to obtain feedback needed to expedite the program and to evaluate it for future changes from a monitoring exercise.

Special Project Design

Since the standards referred to in the previous section would be radically lower than prevailing standards and could have problems with initial acceptability, the new division might have to build up a design capacity (or hire consultants) to demonstrate new shelter concepts. Such concepts would not only be physical (core houses, sites and services, etc.) but would also be financial (integrated project design with neighborhoods of middle- and high-income housing or large serviced plots sold to cross-subsidize low-income units such that the project as a whole is economically viable). Enhanced social integration would also be achieved, not necessarily in the

neighborhoods but in the schools, commercial areas, community centers, etc. Since integrated projects of this nature are one of the few ways to introduce lower standards while simultaneously using effective demand among middle-income groups to benefit low-income groups, it is strongly recommended that such projects be attempted by the new division.

2. The CHA and the MHC

The CHA and MHC are considered together in this section because it is felt that one of the ways for the CHA to become an efficient organization is to make it financially responsible. As maintained in Chapter III, utilization of government grants for construction and reliance on heavily subsidized terms does not make an efficient agency. Without the financial constraint of loans which have to be repaid, many public housing agencies continue to subsidize their own mistakes. To operate at economic terms, design standards and costs must be continually monitored and often reduced, so that the final product can be afforded by the target population.

If the CHA is to continue to design and manage projects, consideration could be given to channeling funds for the CHA through the MHC at near economic rates. If funds were channeled through the MHC, which has long experience in designing projects at market rate terms, MHC technicians would formulate design briefs with CHA staff based on the physical and financial feasibility of each project for the selected target population. ^{39/} Using this procedure would mean that CHA could increase construction efficiency, lower its overheads, and collect all payments due.

This client role could also be played by the new housing unit recommended for the ministry. However, technical assistance and, most likely, design consultants would have to assist the new unit in formulating design briefs for the CHA to execute. In either case, technical assistance would also be required to build up CHA collection and overall estate management functions so that full debt recuperation could be effected.

^{39/} MHC should obtain a certain fee or percent of project costs to cover its overhead for this service.

Another alternative would be for the CHA to become solely a project developer based on design briefs from the MOH. In this case, however, the collections and estate management functions would have to be transferred to either the MHC or the MOH. This would be difficult since neither institution is presently equipped to handle these functions. MHC collections are mostly through salary deductions which would not fully apply in cases of projects for low-income families who are self-employed. In addition, new positions and schemes of service, presently attached to the CHA, would have to be created for these functions.

In either case, the organization of CHA could be streamlined. Instead of having seven divisions reporting to the director, it might have two deputy directors, one in charge of administration (including finance) and housing management, and the other in charge of technical direction (including tendering, construction supervision, stores, and transport). This would lighten the load of the director while consolidating related functions.

While additional accounting, engineering, and construction supervision staff may all be required, the overall staffing of the CHA should be reviewed by the MOH. Its present administrative and professional staff (72) seems quite large for such a small program -- roughly 800 units per year -- creating a high overhead rate of 7.5 percent of capital investment. The area where the most inefficiency arises is the casual labor contingent under the TPT program. Since unemployment is still a problem (about ten percent in 1976), it would be politically difficult to dismiss this contingent at once. Investigations at DWC also ascertained that it was saturated with workers under the program. Thus, while cancellation of the direct labor program is necessary to CHA's efficiency, it will have to be undertaken gradually.

3. Increasing Housing Finance Capacity

While the financial sources currently used by the MHC are limited (i.e., government loans, loans from other domestic intermediaries and foreign sources), there are sources of housing finance which have not been fully exploited. For example, there is likely to be considerable savings volume in rural areas not presently served by banking facilities. Furthermore, low-income and informal sector markets in urban areas have not been fully served. The potential exists to include these savers in programs designed to meet their savings and housing needs.

Existing programs such as MHC's savings program could be expanded to include home improvement loans and assistance to renters for purchase of their present dwellings. The latter, through condominium laws, could serve as a vehicle for improving areas which are now in poor condition. Renters would be encouraged to purchase their current housing and to receive loans to improve the condition of these structures.

To this end, there are several financial intermediaries in addition to the MHC which now are not in the housing sector but which could be encouraged to enter it. The Post Office Savings Bank which deals mainly with low-income earners has the largest number of branch offices. Although it now limits savings deposits to a fixed amount, it could be encouraged to lessen its restrictions and to enter the housing market through savings for home improvement loans. The Mauritius Cooperative Central Bank which is owned by over 400 cooperatives had total assets of Rs 15 million as of 1974. While it does provide some credit for housing, it represents a potential source of housing finance which has not been fully explored. Although some of the pension funds have provided housing finance, the National Pension Fund represents a major source of finance which up to now has not been available.

Two other sources of housing finance are available which have not been used. The first is an employers' tax, which would provide funds for housing through a one or two percent tax on the salaries paid by companies with over ten employees. This tax would form a fund which could be channeled through the MHC to provide mortgage loans either to employees of the companies taxed or to the general public. While the tax could be somewhat inflationary as its costs are usually passed on to consumers through increased prices, it would provide a large source of funds for housing finance. This tax system has been used successfully in Brazil, Tanzania, and Togo.

The issuance of mortgage bonds represents another source of housing finance. The MHC could issue bonds on the open market at competitive interest rates to finance the development of housing projects.

4. New Institutions

Two new institutions, a Central Land Institution and a Land Development Institution have been recommended to deal with land problems. The first would intervene in the land market to bank land; the second would plan and develop the land.

It can be seen from the foregoing that this assessment of the Mauritian shelter sector concentrates on building up existing institutions, not creating new ones. According to the observations of the SSA team, skilled personnel are not available to staff and manage such institutions -- nor are the funds available that would be required to build up land reserves to levels which could begin to control speculation. These constraints make establishment of new institutions difficult.

Instead, larger tracts will probably have to be located as near as possible to trunk services and centers of employment. Projects can then be phased as off-site infrastructure becomes available. In this manner government can begin to capture the unearned increment in neighboring land values caused in great part by its own investment.

Since Mauritius is a small island where well located, nonagricultural land is scarce and expensive, land statutes such as those existing in Singapore or Hong Kong might be considered. In Singapore, for example, land prices were frozen as of values prevailing in 1973. Thus, there is no incentive to speculate. If the official assessment is below the 1973 value, that price is paid; if it is above it, the 1973 value is the maximum that can be paid.

C. Construction Sector and Building Materials

1. Construction Sector Trends

To gain a perspective of future trends in building costs, a least-squares regression formula was used to review historic trends and then project those trends to 1986. Since 1968, the total building cost index has shown an annual growth rate of over 15 percent. The materials index and labor index (both deflated by the consumer price index) had growth rates of 14 percent and 17 percent respectively (see Table 52). If current cost trends persist, total building costs will increase by about 16 percent per year over the period, labor costs by about 21 percent, and material costs by about 15 percent.

To put these price increases in perspective with other construction industry trends, growths of the building materials supply, the construction labor force, and new additions to housing stock were projected from growth trends observed between 1968 and 1978. The annual growth rates of cement -- the primary building material -- and labor have been about 15 percent, far outpacing the growth rate of new

TABLE 52.

Building Price Index Based on
Consumer Price Index, 1968-1978

	Materials Index		Labor (Wage)		Overhead and Profit		Total Building Cost Index	Consumer Price Index
	Current	Weighted 50.8%	Current	Weighted 30.5%	Current	Weighted 18.70%		
1968	218.36	110.93	138.88	42.36	65.30	12.21	165.50	100.0
1969	275.47	136.79	146.71	44.16	77.17	14.11	195.06	102.3
1970	306.92	153.61	147.31	44.76	83.03	15.30	212.48	101.5
1971	311.75	152.39	142.10	41.15	82.96	15.47	209.01	100.3
1972	316.18	175.51	185.05	49.78	91.62	16.26	241.55	105.4
1973	392.13	241.43	243.05	57.40	116.11	19.13	317.96	113.5
1974	613.61	285.76	348.21	92.53	175.82	25.47	403.79	129.1
1975	645.20	296.94	475.06	126.25	204.78	33.39	456.58	114.7
1976	655.26	293.28	558.35	150.12	221.85	36.55	479.95	113.5
1977	765.14	355.94	620.77	173.40	253.34	43.38	572.72	109.2
1978	818.30	418.12	661.91	185.16		46.28	654.02	
Rate	14.7%	13.8%	16.92%	16.91%		15.4%	15.34%	
1980	998.92	475.83		263.18		61.74	870.09	Change
1982	1,314.15	616.24		374.08		82.27	1,157.55	33%
1984	1,728.86	798.08		531.70		109.63	1,539.97	33%
1986	2,274.44	1,033.57		755.73		146.10	2,048.97	33%

SOURCE: PADCO analysis.

additions to the housing stock which is estimated at 8.5 percent. The growth of the labor force in part is because of national employment programs which have aimed at full employment. The slower projected growth rate of housing may be a result of the emphasis given to construction in other sectors, even though residential construction's contribution to gross domestic fixed capital formation has remained constant at about 40 percent. Lower labor productivity in housing could also partially account for the slower projected growth rate the housing stock.

To compare growth in new additions to housing stock with growth in labor force and building materials supply, the growth in housing stock was increased by a factor equivalent to residential construction's proportion of gross domestic fixed capital formation (57 percent of total building construction). Estimates of labor force requirements were based on person-day requirements for the Type F house. ^{40/} By comparing the housing stock demand for labor (Table 53, column 5) with the projected labor capacity (column 6), the size of the labor gap in current housing programs becomes apparent. In 1977, the demand generated for labor by various building programs was almost 20 percent greater than the supply of labor. This gap was due more to low productivity and absenteeism than to the actual scarcity of labor.

Based on the growth trends presented in Table 53, it appears that there will continue to be gaps in the labor supply, especially if productivity and absenteeism remain the problems they are now. These gaps, however, may be partially filled by informal sector construction which may add as much as 13 percent to the total labor force.

As indicated by comparison of cement supply per worker (column 8), importation rates of cement supply could decrease somewhat. During the years 1975 to 1978, construction demand for cement was about 84 percent of the supply. However, when projected demand for cement (1980 through 1986) is measured against the projected supply of cement (assuming supply continues to grow at current importation rates), construction demand for cement drops to 65 percent of projected cement supply.

^{40/} Average daily labor wages were divided into the estimated labor component of the costs of the Type F house to derive an estimate of labor requirements. The projected labor capacity was based on a person-year of 250 days and an estimate of productivity of 50 percent. The latter was derived from absenteeism rates which can range from 25 percent to 70 percent of the labor force, depending on the day of the week.

TABLE 53
Projected Building Materials Supply, Labor Supply and Growth in Housing Stock, 1975-1986

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Growth in Cement Supply (000 tons)	Growth in Construction Labor	Growth in New Additions to the Housing Stock <u>1/</u>	Growth in new Additions to Housing Stock Adjusted by GDFCF <u>2/</u>	Demand for Labor From Housing Stock Adjusted by GDFCF (000 man-days) <u>3/</u>	Projected Labor Capacity Adjusted for Productivity (000 man-days) <u>4/</u>	Cement Supply per Worker (tons)	Projected Cement Consumption per Worker Weighted for Productivity (tons)	Demand for Cement Generated by Adjusted Housing Stock Growth <u>5/</u> (000 tons)	Cement Demand as Percent of Supply
1975	194	13,109	4,772	8,372	1,850	1,639	14.78	10.34	159	82
1976	221	13,422	5,572	9,775	2,160	1,678	16.47	10.29	186	84
1977	245	16,129	6,160	10,807	2,388	2,016	15.21	10.23	205	84
1978	300	16,228	7,251	12,777	2,824	2,209	18.49	10.32	243	81
Annual Growth Rate	15.9%	15.3%	8.5% <u>6/</u>							
1980	347	19,017	7,433	13,097	2,894	2,615	18.25	10.50	249	72
1981	466	21,805	8,750	15,418	3,407	2,998	21.37	10.63	293	63
1982	540	24,593	10,302	18,153	4,012	3,382	21.96	10.76	345	64
1983	626	27,382	12,128	21,371	4,723	3,765	22.86	10.88	406	65

NOTES: 1/ Includes permanent construction only. 2/ To calculate (4), adjusted growth in new additions to housing stock, only the building portion of GDFCF was used of which residential construction is 57%. The entire building portion of GDFCF is expressed in equivalent housing units. 3/ House unit was estimated to require 221 man-days of construction time. The labor requirement was derived from estimates of the labor component of the Type F house which was divided by average daily wages. 4/ Labor capacity (6) was found by multiplying the labor force times an average worker year (250 days), adjusted by estimates of productivity which were based on absenteeism rates of construction labor which are estimated to account for 30 to 70 percent of public construction time. 5/ The demand for cement generated by adjusted housing stock (9) was based on estimates of Type F house cement requirements (approximately 11 tons) which was weighted 15 percent for wastage and further increased 30 percent to account for more cement intensive uses. 6/ Note that while new additions to housing stock increased by 8.5 percent, total housing stock increased by 6.6 percent.

SOURCE: PADCO analysis.

If the building rates mentioned 41/ in Chapter I, Table 9, remain at about 6.6 percent, there will be more severe gaps in labor supply, since such a rate would create a much greater demand for labor than the projected labor capacity shown in Table 53, column 6. If the total building rate drops to, say, five percent, the labor capacity conditions shown in Table 53 will be sufficient. 42/ It can be seen from comparing columns 5 and 6 (demand for labor and labor capacity, respectively) that labor productivity will have to increase in order to maintain current construction trends.

It appears that more emphasis should be given to management of labor to increase productivity instead of to heavy investment in building systems. The heavy investment in precast-concrete building technologies may not have as great an impact on low-income housing needs as it is projected to have, mainly because of the cost and relative inflexibility of the systems themselves. Current estimated costs of the precast systems are equal to conventional construction which has been shown to be beyond the affordability of large segments of the population. These systems may well provide portions of middle- and upper-income housing needs, however.

2. Public Sector Construction

Best estimates of public contributions to housing stock are presently about 1,000 units per year or 16 percent of the projected 1977 housing stock. If this percentage contribution is to continue, the total number of units which the public sector annually builds would have to increase by about five percent per annum or to 1,300 housing units by 1980.

41/ The building rates quoted in Chapter I are total annual increases to the existing housing stock. Thus, a total building rate of 6.6 percent when used to project housing needs is multiplied by the existing housing stock. The projection equals an estimate of new additions to the housing stock in that year. The growth rates shown in Table 53, however, are the average rates at which the new additions to housing stock have been growing. These rates were used to project new additions to housing stock through 1986.

42/ As shown in Table 13 of Chapter I, building rates of five percent or over will cause the gap between total housing needs and net housing needs to decrease. Building rates less than five percent cause the gap between the two to increase.

This rate of completion of housing units seems within the capabilities of the public sector agencies if the other constraints, i.e., land, infrastructure, etc., can be overcome. These projections are shown in Table 54.

TABLE 54

Projected Public Sector Contribution
to New Additions to Housing Stock, 1977-1986

Year	New Additions (Building Rate of 5% per annum)	Public Sector Contributions (16% per annum)	Percent Change for Public Sector
1977	6,160	1,000	---
1978	7,251	1,144	14.4
1979	7,810	1,249	9.2
1980	8,201	1,312	5.0
1981	8,611	1,377	5.0
1982	9,041	1,446	5.0
1983	9,494	1,519	5.1
1984	9,968	1,594	4.9
1985	10,466	1,675	5.1
1986	10,990	1,758	5.0

SOURCE: PADCO analysis.

Since the public sector's share of residential construction is likely to remain about 16 percent, consideration might be given to greater use of smaller formal and informal contractors.

Assistance to small contractors can originate in public sector organizations such as the Ministry of Housing and its parastatals or the Development Works Corporation.

The ministry can assist by encouraging them to bid on housing projects which are small and geographically dispersed and by providing access to building materials. In conjunction with the Development Works Corporation, it also can provide technical training as a component of its projects. This can be accomplished either by directly providing training to contractors who participate in the construction of its projects or by providing incentives for private sector contractors to hire workers trained by the DWC.

Similarly, the larger building contractors should be offered incentives to hire skilled labor and to provide training. This training could be performed in conjunction with the DWC and could, with the DWC, become part of pilot schemes

to test labor's, responsiveness to training and the effectiveness of the approach. The result could be higher caliber labor skills and more private sector employment opportunities.

3. Indigenous Building Materials

The use of indigenous materials can result in substantial savings in construction costs. Currently, from 74 to 80 percent of the value of building materials used in housing construction are imported. The only primary indigenous materials ^{43/} used now are sand, aggregate, lime (although portions of the lime supply are still imported), about 20 percent of the timber supply, and pressed bagasse ^{44/} boards mainly used for furniture and interior partitioning. Sand and aggregate supplies are adequate for projected building needs. The Forestry Unit of the Ministry of Agriculture projects that the forest reserves will grow to the point where they may be able to meet about 50 percent of the timber requirements of Mauritius. This assumption, however, is probably based on current consumption patterns which do not rely heavily on timber.

Based on the analysis and constraints highlighted in Chapter IV, Section C, the following are a series of possible materials which could be manufactured in Mauritius. With the exception of cement, no feasibility studies have yet been conducted, but the following have proven successful in other geographical areas.

Cement

Mauritius contains all of the major raw materials require for cement production. The only material it lacks is gypsum. As recently as 1973, a UNIDO expert studied cement production in Mauritius and found that small-scale production of about 80,000 to 200,000 tons annually would be economically viable. The primary restraints to developing cement production have been problems in siting and environmental concerns.

^{43/} Indigenous building materials are defined as products whose raw materials costs are more than 60 percent domestic.

^{44/} Bagasse is the fibrous residue in sugar production from sugar cane

Lime

In addition to its use in cement manufacture, lime production could be increased. Since there are sufficient quantities of lime and sand, sand-lime bricks could be manufactured. The fuel requirements are much lower than for either cement manufacture or for fired-clay brick production (roughly half of fired-clay brick manufacture), and local fuel resources such as noneconomic timber or bagasse can be used. Sand-lime bricks are handsome in appearance and do not require plaster and paint for weather proofing. Furthermore, a Belgian cement manufacturing process using lime, flyash or sand has been developed which may have applications in Mauritius, if portland cement manufacture proves unfeasible. The manufacture of sand-lime bricks could substantially reduce the 50 percent import component of conventional concrete block walling.

Timber

Although forest reserves are small, a good use for this growing resource might well be in the development of timber treatment plants for preserving timber against rot, insect damage, and making it fire resistant. A plant with a capacity of about a half million cubic feet can be installed for an initial capital investment of less than US\$ 100,000 (1977 costs).

Roofing Systems

USAID recently sponsored development of various alternative roofing systems which are manufactured from indigenous materials. The products have been laboratory tested in the U.S. and in tropical conditions in Jamaica and the Philippines. Two of the products in particular may have applications in Mauritius: resin-bonded bagasse fiber roofing composites and phenolic-bonded unfired-clay products. The existing manufacturer of bagasse boards may have the capacity to add these products to his existing production line.

Interlocking metal roofing systems also have applications in Mauritius, particularly on top floors and single-story buildings. The systems have been designed to resist cyclone-strength winds without damage and are longer lived than conventional metal roofing systems. Small-scale, unreinforced precast concrete panel manufacture for roofing systems at smaller-sized, lightly-reinforced concrete panels should be encouraged as an intermediate step between large-sized,

relatively inflexible precast concrete systems and conventional techniques. Capital investment in smaller-sized precasting is much lower and is much more labor intensive. Manufacturing operations can be set up at several locations throughout the island to diversify supply and employment opportunities. See Appendix VII for a detailed discussion of cyclone-resistant roofing systems.

While feasibility studies have not been conducted in Mauritius for these various building materials, it is possible to project the impact which these materials might have on total costs based on experiences gained elsewhere. The resin-bonded bagasse roofing sheets which have been developed in the Philippines and Jamaica have been demonstrated to be highly competitive with conventional roofing materials in those countries. Cost savings have been as much as 50 percent over products already on the market. Furthermore, these materials have been designed to withstand the hurricane-force winds to which both Jamaica and the Philippines are subject.

Small unreinforced precast concrete roofing tiles require simple manufacturing processes and could reduce costs of roofing by as much as 40 percent. Such a roofing system would provide a viable alternative to corrugated metal sheets which are subject to rust and to asbestos-cement which cracks.