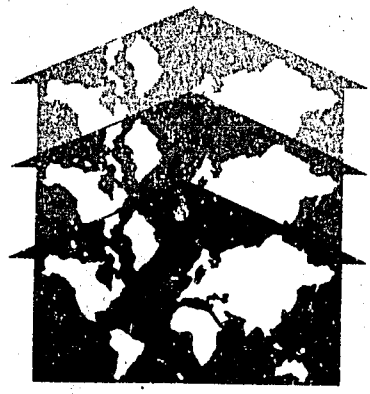
HOUSING COSTS IN BARBADOS

AUGUST 1984



OFFICE OF HOUSING AND URBAN PROGRAMS
AGENCY FOR INTERNATIONAL DEVELOPMENT

Prepared by
PADCO
PLANNING AND DEVELOPMENT COLLABORATIVE INTERNATIONAL

HOUSING COSTS IN BARBADOS

Prepared for

BARBADOS MISSION

and

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

Prepared by

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FOREWORD

This report is one of several studies being prepared as part of the development of a National Housing Plan for Barbados. The Plan is under the direction of the Ministry of Housing and Lands (MOHL) with financial assistance from USAID. The objectives of the study as outlined in the terms of reference are to:

- provide a summary description of recent trends in building and land costs
- identify the major components of housing costs, and the labour, material and import content for each component of four different house types
- compare the relative cost for a modest wall (masonry) house and timber house of similar size and amenities
- suggest ways to improve the efficiency and reduce cost of housing construction and subdivision development

The field work for the report was done by Robert Olsen between July 30 and August 15, 1984. Assistance in data collection and development of the report was provided by Allan Jones, Chief Housing Planner, and Robert Dubinsky, Resident Housing Advisor, as well as other staff members of the Ministry of Housing and Lands. Colin Cooper and Andy Clark of Colin S. Cooper Associates Ltd., Bridgetown, Barbados, served as cost consultants for the study. They provided cost estimates for the four house types as well as advice and guidance for the preparation of the report.

There were many other people both in the public and private sectors that gave of their time and resources to provide information and insights into the residential construction industry in Barbados. Without their generous assistance, this report would not have been possible. A list of persons interviewed during the field visit follows.

PERSONS INTERVIEWED

Chris Andrew	Rush & Tompkins International BV
Lemuel A. Blades	Land Development & Building Ltd.
C. Lionel Barrow	Property Developments Limited
Vibert Best	Ministry of Housing & Lands
B. Bjerkhamn	Bjerkhamn Associates Limited
Levi Blades	Customs
Luther Bourne	Town and Country Planning
C. David Bynoe	Manning Wilkinson & Challenor Ltd.
Paul Chappell	Ideal Homes Ltd.
Andy Clark	Colin S. Cooper Associates
Dennis Clark	Barbados Mortgage & Finance Corporation
Brian Claxton	Structural Engineer
Colin S. Cooper	Colin S. Cooper Associates
Robert Dubinsky	Ministry of Housing & Lands
Clement S. Durant	Plantations Training Company Limited
Ronald Fitt	Ministry of Housing & Lands
Norman Flag	Flag Construction
Stanford Gittens	Ideal Homes, Ltd.
Elias Haloute	Bartrin Construction Ltd.
Eric Holman	Rush & Tompkins International BV
Allan Jones	Ministry of Housing & Lands
Albert J. Joseph	Realty Sales & Services Ltd.
John A. Marshall	Marshall Trading Limited
David Sealy	National Housing Corporation
J.D. Springer	Mannings Pinehomes

SUMMARY AND RECOMMENDATIONS

1. Incremental building has been the accepted method of construction in Barbados for many years for a large segment of the population. Renovation and additions, rather than new construction, are the principal means of improving the housing stock and the living conditions of a majority of households.

2. Because of the high level of maintenance and improvement, the number of dilapidated units is small (0.9 percent in 1980). Even though timber units comprise approximately 60 percent of the housing stock, 67 percent of the units are more than 20 years old.

3. Four housing types (3 masonry and 1 timber) ranging in size from 1,700 ft^2 for an upper-middle-income family to a basic 600 ft2 house for a lower-income household were selected for the cost study. The construction costs vary from $72 to $54 per ft^2 (a difference of over 33 percent).

4. A comparison of a wall (masonry) and timber house, which are the same size and have similar amenities, shows that the timber house is 3.1 percent more expensive.

5. The components that contribute most to the construction cost of a house are the substructure (footings, foundations, and floor--21 to 26 percent), the roof (12 to 14 percent), the finishes, and the infrastructure installations. Because of different levels of finishes, they account for 25 percent of the cost for the most expensive house but only 13 percent of the small wall structure. Plumbing and electrical installations account for 16.5 percent of the largest house but 27 percent for the small house.

6. Reductions in construction costs will result from savings in a number of elements rather than from major reductions in one or two components. Costs can be reduced by improving the general construction environment through assuring a consistant level of construction activity, reducing administrative delays, improving the efficiency in the use of materials and manpower, and increasing availability of mortgage funds.

7. The biggest reductions in cost can be realized with the substructure by minimizing the contact with the ground and thereby reducing the cost increases resulting from poor soil conditions common in Barbados. Costs can also be reduced by providing minimal finishes.

8. There is sufficient land in approved subdivisions to meet the needs of middle- and upper-income families to the year 2000; the problem is the lack of smaller plots that are affordable to the lower-income population.

9. Land costs have increased more rapidly (annual average of 24.5 percent) than any other component of housing cost between 1978 and 1983. The relatively standard price for residential land on the periphery of urban areas is $.75 to $1.00 per ft^2.

10. Serviced sites sell for $3.50 to $4.50 per ft^2. The most expensive components of site development are roads and drainage which account for almost 70 percent of cost. Water and electrical services account for just over 22 percent of site development cost.

11. The cost of a serviced site can be reduced by modification to the land use and infrastructure standards. A review of subdivision design standards and practices is recommended to encourage the design of smaller lots that meet the needs of, and are affordable, to low-income households.

12. Barbados enjoys a very high level of services throughout much of the island. Over 85 percent of units have piped water connections and access to electricity. In light of higher costs for infrastructure, it may be necessary to modify infrastructure standards so that low-income households can purchase a building lot.

13. The cost of imported materials accounts for between 58 to 80 percent of total material costs. The timber house has the highest percentage of imported materials. Imports could be reduced through increased use of the limited indigenous and locally manufactured materials.

14. The foreign exchange component is less than the cost of imported materials since duties, taxes and dealers' markup are paid in local currency. Foreign exchange is needed for 35 to 48 percent of material costs.

15. It is recommended that the Government not be involved in housing construction activities; the main thrust of Government intervention should be to facilitate the provision of land and basic urban services at affordable prices.

16. Government programs should be designed to serve the low-income segments of the population. It is recommended that minimal standard sites and services projects be developed with options for building material loans or starter homes available to project beneficiaries.

17. There are several proposals to introduce systems-building techniques to Barbados. It is recommended that the Government provide support and assistance but not become involved in construction or subsidizing of proposals. Promoters should compete in the open market to achieve success by providing an improved and less expensive product.

CHAPTER I

INTRODUCTION

A. HOUSING IN BARBADOS

An interesting tradition exists in Barbados in the development of the chattel or portable wood house. With the emancipation of the slaves, housing was no longer provided, but instead rental plots were made available on which houses could be built. Since the land tenure was not permanent, small wood house were built which could be disassembled when necessary and moved from site to site. An incremental approach to building developed at the same time. The initial phase was a one room house with a gable roof. As time and money permitted, other rooms were added to the rear of the first room so that the structure became a 2-, 3-, or even sometimes a 4-gable house. Incremental building is the most important method used by Barbadians to upgrade their housing and is still employed today, with the latest manifestation being the addition of a wall structure to the rear of the house for an indoor bathroom and kitchen.

The most reliable figures on the housing stock in Barbados are found in the 1970 and 1980 census data. In 1980 there were a reported 67,133 housing units, an increase of 8,565 units over the 1970 figure of 58,596. This is an approximate net annual increase of 1.45 percent. The number of units is heavily concentrated along the southeast to west coasts, with four parishes accounting for over 60 percent of all units. The greatest concentration of housing stock in 1980 was found in St. Michael Parish with 27,970 units or 41.6 percent of the total.

It is estimated that timber units comprise approximately 60 percent of the housing stock with approximately 67 percent of the units being more than 20 years old in 1980. Even with the high percentage of older timber structures, the level of dilapidated structures was low at 0.9 percent in 1980. The level of service to the housing stock is high. Over 95 percent of the units have piped water service, while over 90 percent have access to electricity.

As indicated above, the census data shows that between 1970 and 1980 there were 8,500 dwelling units added to the housing stock in Barbados. It is estimated that an additional 3,500 units were constructed to replace existing units which dropped out of the stock during this same period for an average of 1,200 units a year. One source of information on housing activity comes from the Barbados Water Authority's statistics on water connections for the start of residential construction (Table I.1). The peak year of construction activity occurred in 1981 with connections to 790 units. Activity decreased the next two years to a low of 558 units started in 1983. The Parish of Christ Church, with 1,156 connections, accounts for over one-third of the connections, while over 80 percent are concentrated in the four already urbanized parishes of Christ Church, St. Michael, St. Philip, and St. James.

TABLE I.1

WATER CONNECTIONS FOR THE START OF RESIDENTIAL CONSTRUCTION

PERIOD	ST. LUCY	ST. PETER	ST. JAMES	ST. ANDREW	ST. THOMAS	ST. GEORGE	ST. JOHN	ST. JOSEPH	ST. PHILIP	ST. MICHAEL	CHRIST CHURCH	TOTAL
1979	9	7	70	0	36	37	0	3	79	132	241	614
1980	10	18	67	1	41	25	2	6	110	139	255	674
1981	19	15	70	2	72	59	10	10	165	151	217	790
1982	10	28	82	0	33	18	3	3	92	119	183	571
1983	14	23	62	2	29	31	4	3	93	92	205	558
MAR 84	3	13	27	1	10	7	2	1	35	31	55	185
TOTAL	65	104	378	6	221	177	21	26	574	664	1156	3392
ANNUAL AVERAGE	12.34	19.8	7.20	1.1	42.1	33.7	4.0	4.9	109.3	126.5	220.2	646.1

Source: Barbados Water Authority

TABLE I.2

ANNUAL PERCENTAGE CHANGE IN SELECTED PRICES

Year	Imported Construction Material	Construction Labour	Composite Indices			
			Land[a]	Materials Labour	Total Development Costs[b]	All Retail Prices
1978-79	23.2	5.1	26.0	16.3	18.7	16.8
1980-81[c]	19.1	0.0	26.0	12.0	15.5	12.3
1981-82	14.5	14.6	23.0	14.5	16.7	6.9
1982-83	2.1	2.1	23.0	2.1	7.6	5.4
4-year average 1978-83	14.7	5.4	24.5	11.2	14.6	10.3

[a] Based on three-year average in land valuation.

b Includes construction materials, labour and land, weighted for their shares of total cost.

[c] The base for the Retail Price Index was changed in 1980, thus, precluding calculation of changes for 1979-1980.

Sources: Prepared by the Urban Institute from the following:

Construction materials and labour: unpublished figures compiled by the Statistical Service for computation of the Retail Price Index; all retail prices; Central Bank of Barbados, Economic and Financial Statistics, various issues, Table II; land unpublished data compiled by the valuation office as part of reappraisals of land for property taxation.

An interesting tradition exists in Barbados in the development of the chattel or portable wood house.

An incremental approach to residential construction is common. The initial phase is a one-room house with a gable roof. As time and money permit, other rooms are added to the rear of the first room so that the structure becomes a 2- or 3-gable house.

The number of connections is lower than estimated housing starts since some new houses, particularly those built in the informal sector, do not have water connections. Another indication of housing activity, which is closer to the actual situation is the number of new electrical connections. The data, available only since the second half of 1981, shows 1,233 connections in 1982 and 1,014 connections in 1983.

The low percentage of dilapidated structures indicates a high level of maintenance and renovation of the existing housing stock. With new construction contributing only minimally to the total stock, renovation is the principal means of improving the living conditions of the majority of the population. Since much of the renovation activity takes place in the informal sector, there are no statistics to quantify the degree of activity but indications are that it is a very active sector. One of the large building materials suppliers indicated that approximately 60 percent of their retail trade was with individual owners and small craftsmen for residential renovation. A tour of residential neighborhoods in Bridgetown shows a high percentage of units with renovations or additions in various stages of completion.

During the 1970s, inflation occurred in all the areas of the building industry. Table I.2 shows the annual percentage increase in the cost of construction labour, imported construction material, and land. The annual increase for development costs has been higher for all years than for retail prices. The biggest changes have occurred in the price of land and imported construction material. During the last 12 to 18 months, prices have stabilized as indicated by the modest change of only 2.1 percent for material and labour in 1982-83.

B. STRUCTURE AND METHODOLOGY OF THE STUDY

The first part of the study identifies the physical and administrative elements contributing to the costs of a new house. Four house types ranging in size from 600 ft^2 to 1,700 ft^2 were selected for the study. The plans for the three-wall (masonry) houses were obtained from local developers. The floor plan for the timber house is the same as the smallest wall house. Cost estimates for each of the units were prepared by chartered quantity surveyors to identify the relative importance of the physical elements of the house. All costs are in Barbadian dollars.

The import component of each element has been identified and the foreign exchange expenditure for each house type estimated. An estimation has also been made of the effect of importing materials for new residential construction on the overall level of foreign imports.

Land and infrastructure costs are identified based on a site being currently developed by the National Housing Corporation. There is a discussion of land use and infrastructure standards, and those factors which most directly influence the cost of residential development. Finally, other costs such as administrative and legal fees are identified.

The second part of the study outlines some options which can help to reduce or at least stabilize construction costs. The suggestions relate to the general construction environment, the physical components of the structure, the land and infrastructure, and the administrative requirements. Where possible the potential savings have been identified.

The third section identifies some program options for consideration by the Ministry of Housing and Lands (MOHL) as well as criteria for the review of systems building proposals.

CHAPTER II

COMPONENTS OF HOUSING COST

A. CONSTRUCTION COSTS

During recent years rapid inflation in the cost of residential construction in Barbados has occurred. The average annual change in the cost of construction labour and materials between 1978 and 1983 was 11.2 percent. The greatest change during this period was an increase of 16.3 percent in 1978-79. Inflation has slowed during the last 18 to 24 months as shown by the modest increase of 2.1 percent during 1980-81. A better understanding of construction costs can identify those elements which contribute most to inflation of prices, and thereby permit identification of possibilities for cost reduction.

As a country dependent on imports for many of its goods and materials, the balance of payments situation is of concern to the Government of Barbados. In order to influence the economy and protect its reserves, the Government has controlled interest rates on loans and deposits. The policies have tended to decrease the availability of mortgage funds, and thereby the level of construction activity. In this chapter, that portion of materials which is usually imported has been identified as well as the possible effect of Government policies on imports.

1. Housing Types

Four housing types were selected for the cost study, ranging in size from 1,700 ft^2 for an upper middle-income family to a basic house of 600 ft^2 for a lower-income family. The houses selected use traditional construction methods and are available in the private market. The small house was also priced for both wall (masonry) and timber construction in order to compare the two types of houses. The following is a brief description of the selected house types.

- House A is the largest of the four houses with a total area including covered carport and patio of 1,730 ft^2. It is intended to serve an upper-middle-income population that makes $50,000 to $70,000 a year. The structure is traditional 8-inch wall construction with a high level of finishes. See Figures II.1-II.3 for plans, elevations, and an outline specification.
- House B is considered a middle-income house and is intended for families earning $30,000 to $35,000 per year. The area of the structure, including carport and patio, is 1,107 ft^2. The structure is 6-inch concrete block with wood frame interior partitions. Finishes are less expensive than those used for House A. See Figures II.4-II.6 for more detail on finishes, plans, and elevations.

- House C is the smallest of the houses with an area of 600 ft^2 including a covered patio and is intended for a lower-income family earning $14,000 to $17,000 annually. It represents the most basic house which is presently available in the private market. Figures II.7-II.9 provide more detail on the basic finishes as well as elevations and plans.
- House D is the same size as House C but is timber construction. See Figures II.10-II.11 for more details.

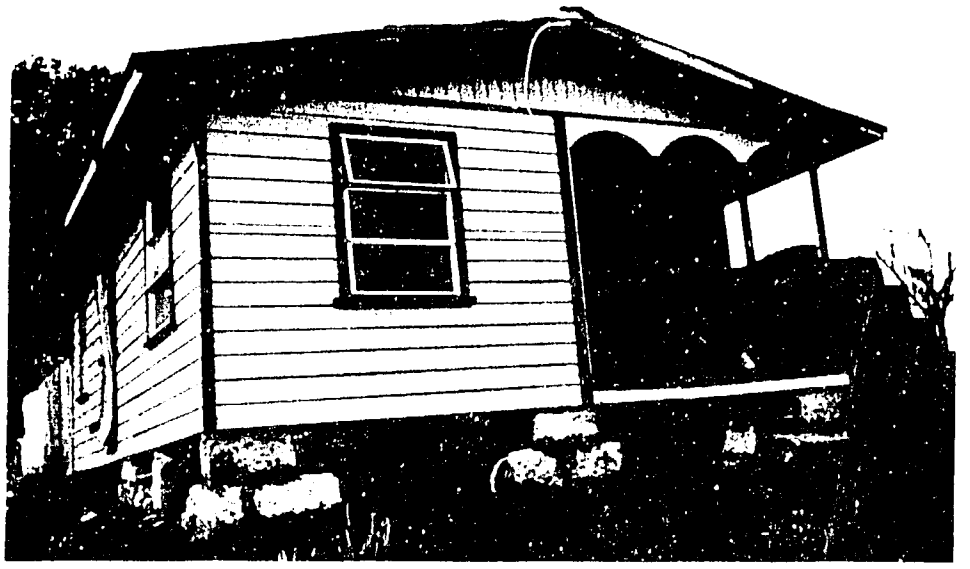
2. **Building Components**

Quantity take-offs and cost estimates were done for the four housing types by Colin S. Cooper Associates Ltd., chartered quantity surveyors of Bridgetown. The results are presented in Table II.1 for 15 main elements of the houses showing both the labour and material content for each element. Contractor profit and overhead of 15 percent have been added to set the final sale price of the house types in a range from $144,000 for House A to $37,500 for House C. The percentage of overhead charged on a project can vary depending on the situation and the contractor.

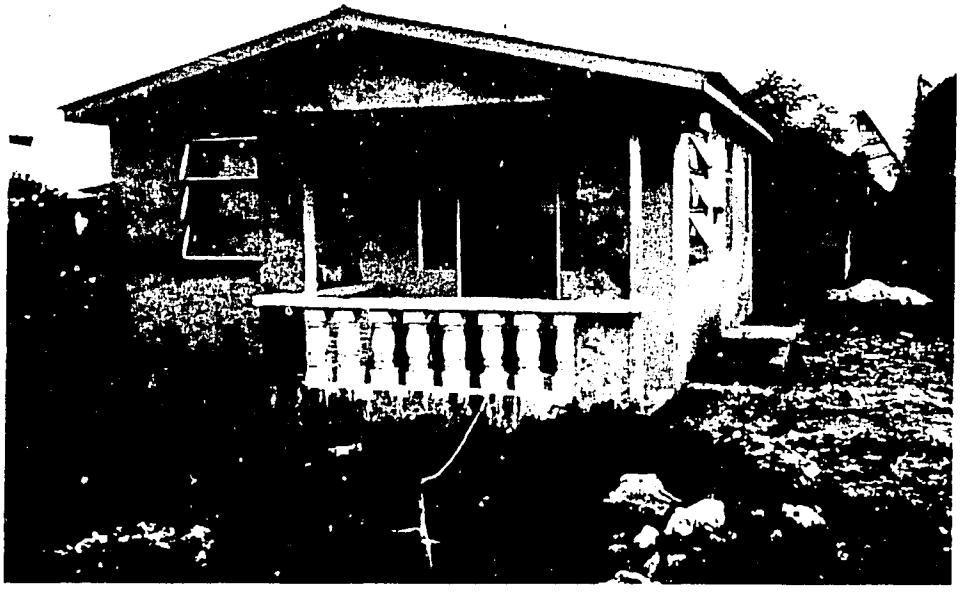
Because of the different levels of finish and types of materials specified, there are considerable differences in the construction costs per square foot. The square foot cost of House A is 33.2 percent higher than the cost of House C.

House A - $72.32
House B - $62.82
House C - $54.29
House D - $55.99

It is generally considered that a timber house is the least expensive type of structure, but the standard price from lumber companies includes only the wood structure, usually on a temporary rock foundation with few amenities. A comparison of the costs of Houses C (wall construction), and D (timber construction) which are the same size and have similar amenities, shows that the timber house is 3.1 percent more expensive than the wall house. The estimate for House D includes a permanent foundation and wall enclosure for the bathroom as well as plumbing installation and drainage system. The study assumes that the timber house is custom-built at current retail prices.



Several companies manufacture and market prefabricated timber houses which are constructed at a central location and then disassembled into panels for movement to a new site. There the houses are reassembled on foundations provided by the purchaser.



Many families have custom built timber or wall houses, often furnishing much of the labor themselves. These modest houses are similar to House Types C and D.

FIGURE II.1
PLAN HOUSE A AREA 1,730 ft2

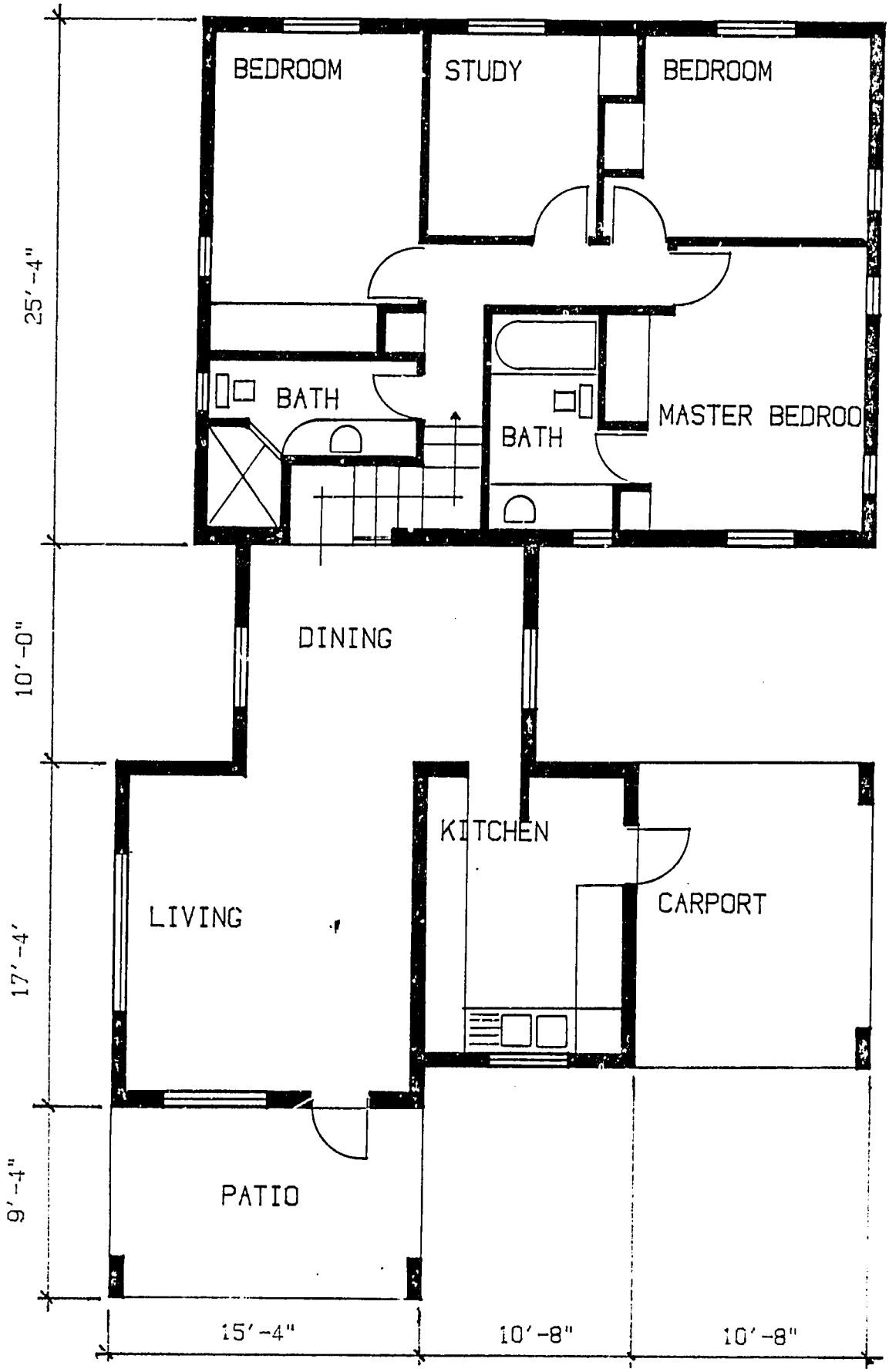
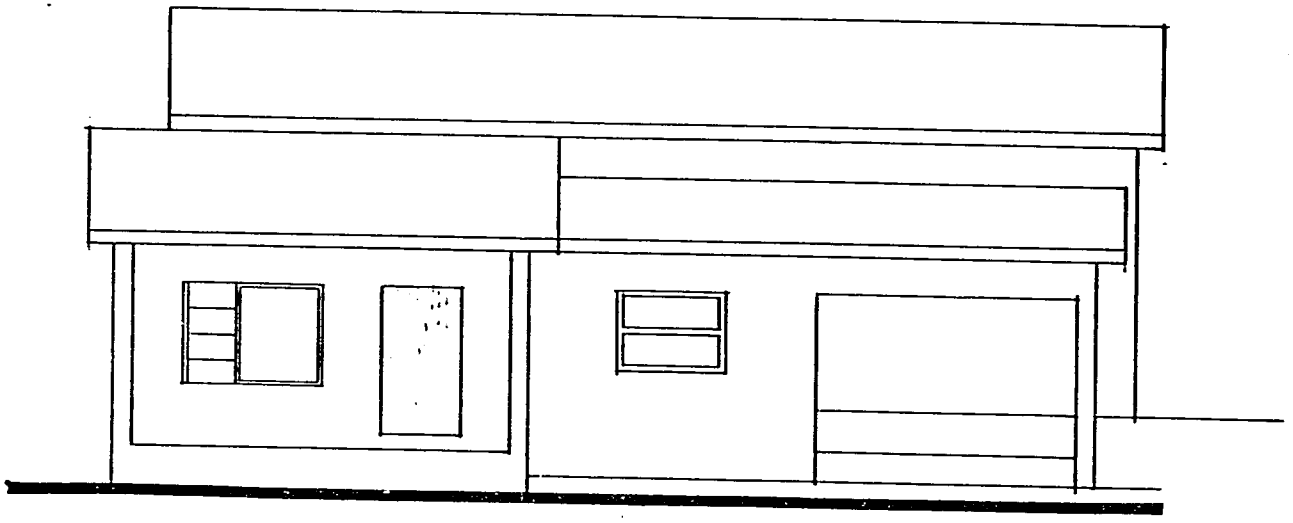
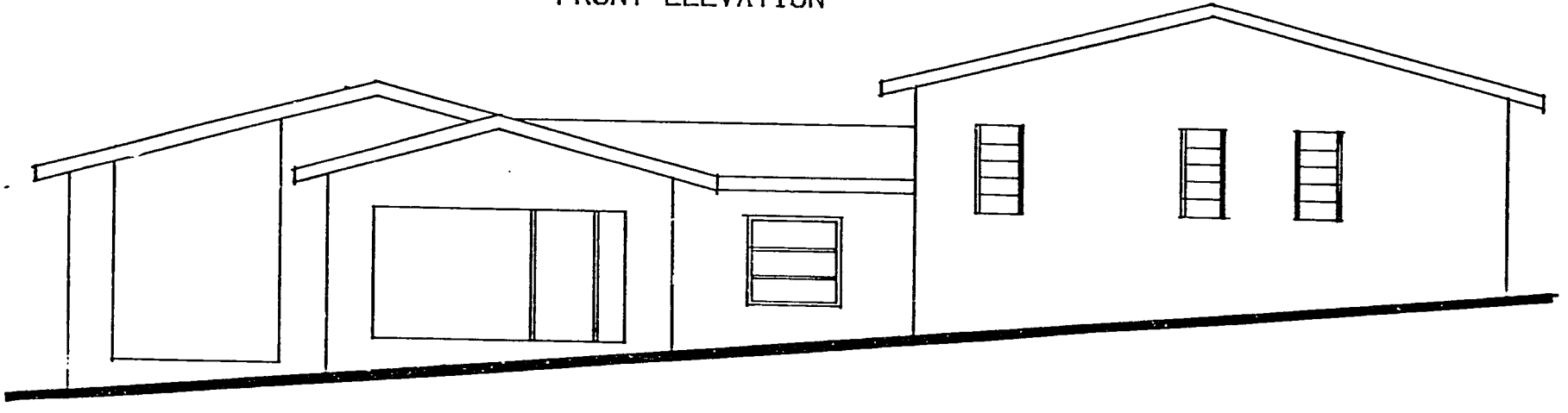


FIGURE II.2
ELEVATIONS HOUSE A



FRONT ELEVATION



SIDE ELEVATION

FIGURE II.3

TYPE OF CONSTRUCTION

HOUSE A

FOUNDATION	6" deep reinforced concrete footing 8" concrete block filled solid with concrete Reinforcing bars at 4 ft. centers
FLOOR	Reinforced concrete on hard-core filled base
WALLS	Exterior - 8" concrete block with ½" steel reinforcement tied into 8" reinforced ring beam Interior - 4" concrete block
ROOF	Treated pitch pine rafters with Decramastic tiles
WINDOWS	Bronze aluminum awning type Metal louver with tinted glass
DOORS	Exterior - solid core - front door paneled Interior - hollow core Frames - metal except wood for front door
FINISHES	Floor - living & dining - carpet kitchen, bathrooms - ceramic tiles patio - clay tiles other rooms - vinyl asbestos tiles Walls - cement plaster inside and out exterior - 1.5mm textured finish interior - 1mm textured finish bathrooms - ceramic tiles to 5 feet Ceiling - painted gypsum board
EXTERIOR WORKS	Paved driveway from road to carport
SANITATION	Grease trap and suck well

FIGURE II.4
PLAN HOUSE B
AREA 1,107 ft2

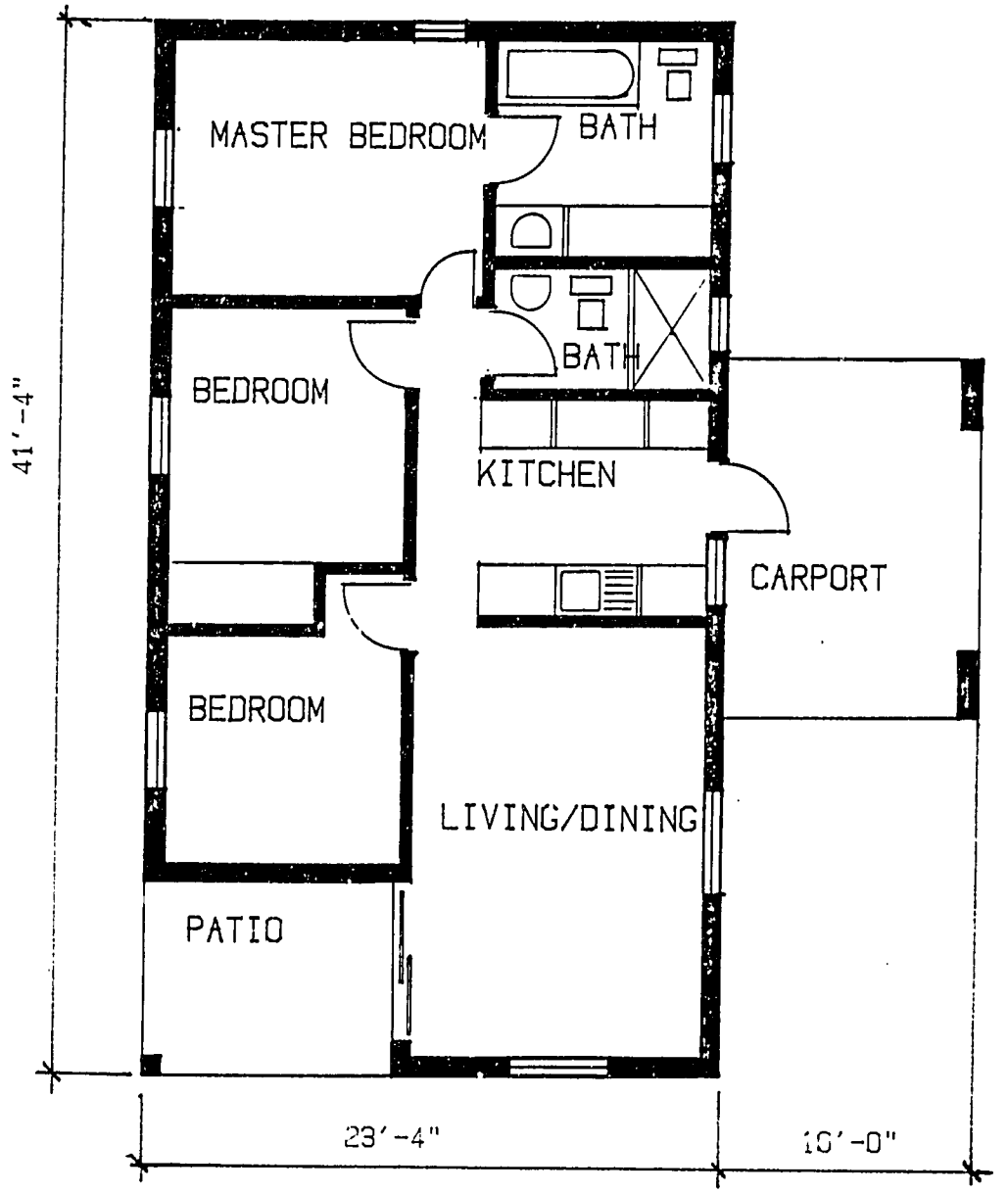
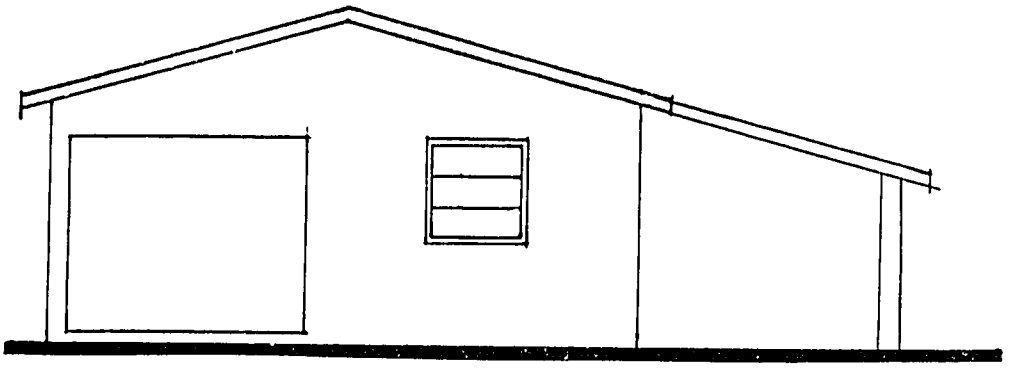
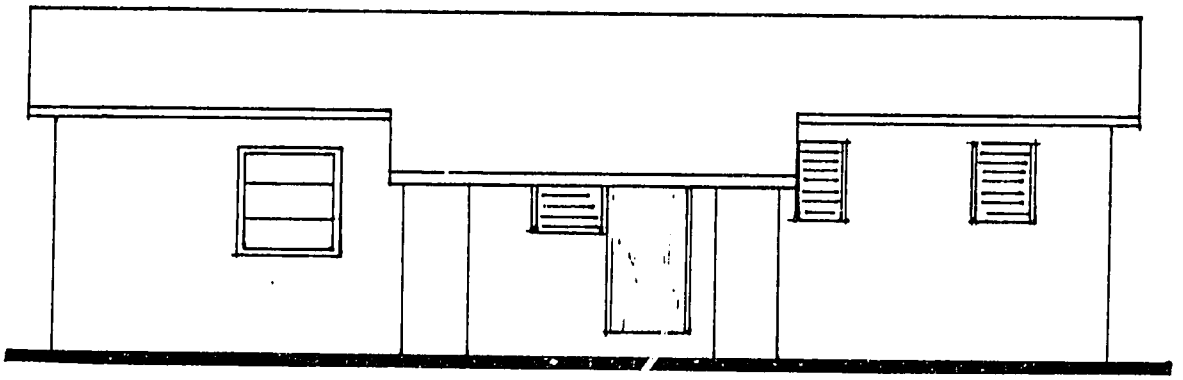


FIGURE II.5
ELEVATIONS HOUSE B



FRONT ELEVATION



SIDE ELEVATION

FIGURE II.6

TYPE OF CONSTRUCTION

HOUSE B

FOUNDATION	6" deep reinforced footing 8" concrete block filled solid with concrete Reinforcing bars at 4 ft. centers
FLOOR	Reinforced concrete on hard-core filled base
WALLS	Exterior - 6" concrete block with ½" steel reinforcement tied into 6" reinforced ring beam Interior - framed partitions with gypsum wallboard
ROOF	Treated pitch pine rafters covered with grooved plywood and asphalt shingles
WINDOWS	Aluminum awning type
DOORS	Exterior - solid core-front door sliding glass Interior - hollow core Frames - metal
FINISHES	Floor - All rooms - vinyl asbestos tile Patio - clay tiles Walls - block-cement plaster inside and out exterior - 1.5mm textured finish interior - 1mm textured finish bathrooms - ceramic tile to 5 feet Ceiling - stain and varnish on exposed structure
EXTERIOR WORKS	Paved driveway from road to carport
SANITATION	Grease trap and suck well

FIGURE II.7
PLAN HOUSE C
AREA 600 FT2

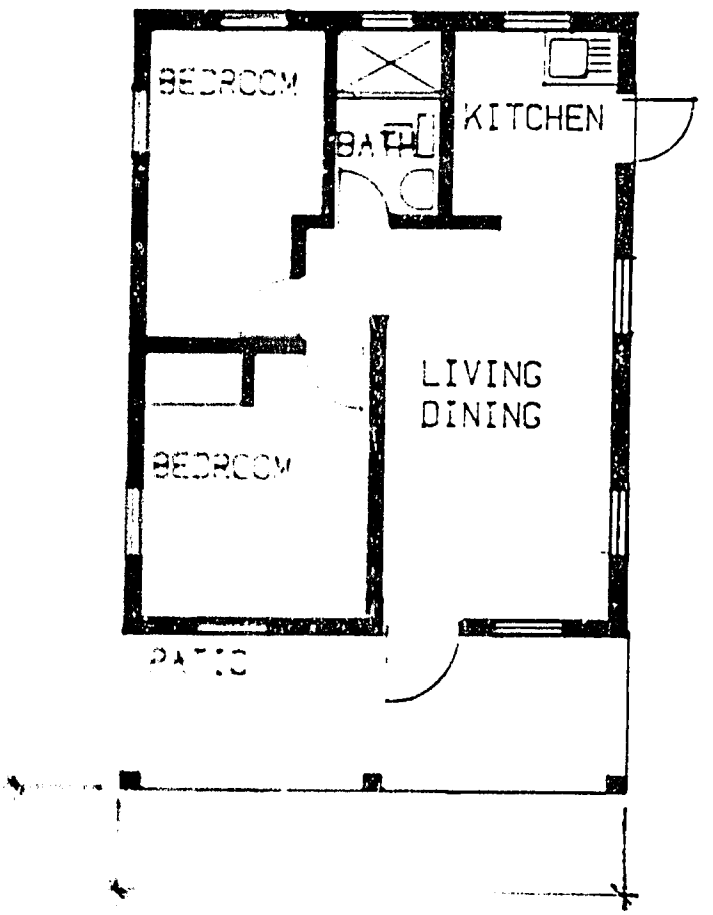
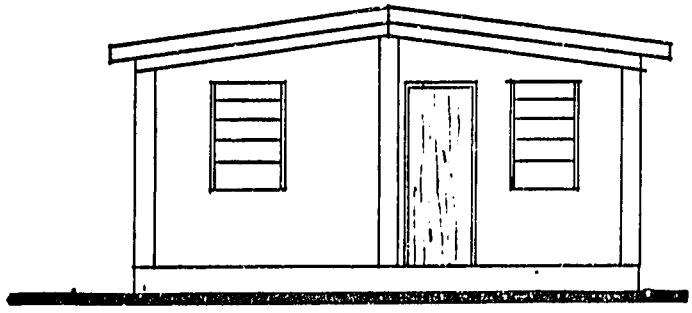
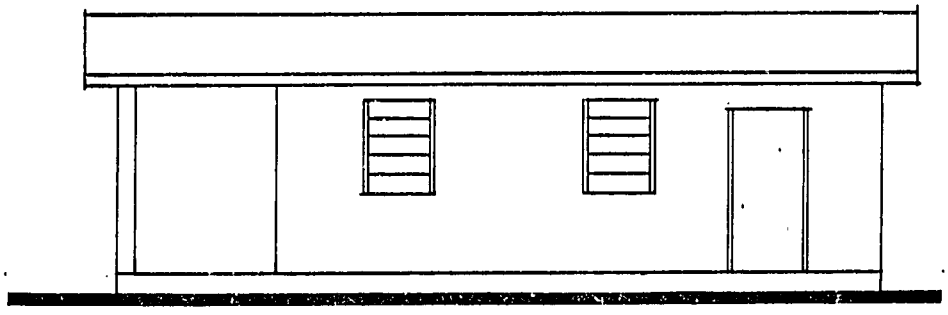


FIGURE II.8
ELEVATIONS HOUSE C



FRONT ELEVATION



SIDE ELEVATION

FIGURE II.9

TYPE OF CONSTRUCTION

HOUSE C

FOUNDATION	24" X 24" concrete pads with 12" X 16" concrete block piers; 10" X 12" reinforced concrete beam
FLOOR	Reinforced concrete structural slab
WALLS	Exterior - 6" concrete block with ½" steel reinforcement tied into 6" reinforced ring beam Interior - 4" concrete block
ROOF	Treated pitch pine rafters and battens covered with galvanized roofing sheets
WINDOWS	Metal-louver type
DOORS	Exterior - solid core Interior - hollow core Frames - treated wood
FINISHES	Floor - smooth finish concrete Walls - trowel on plastic finish - inside and out Ceiling - hardboard
SANITATION	Grease trap and suck well

FIGURE II.10
PLAN HOUSE D

AREA 600 ft2

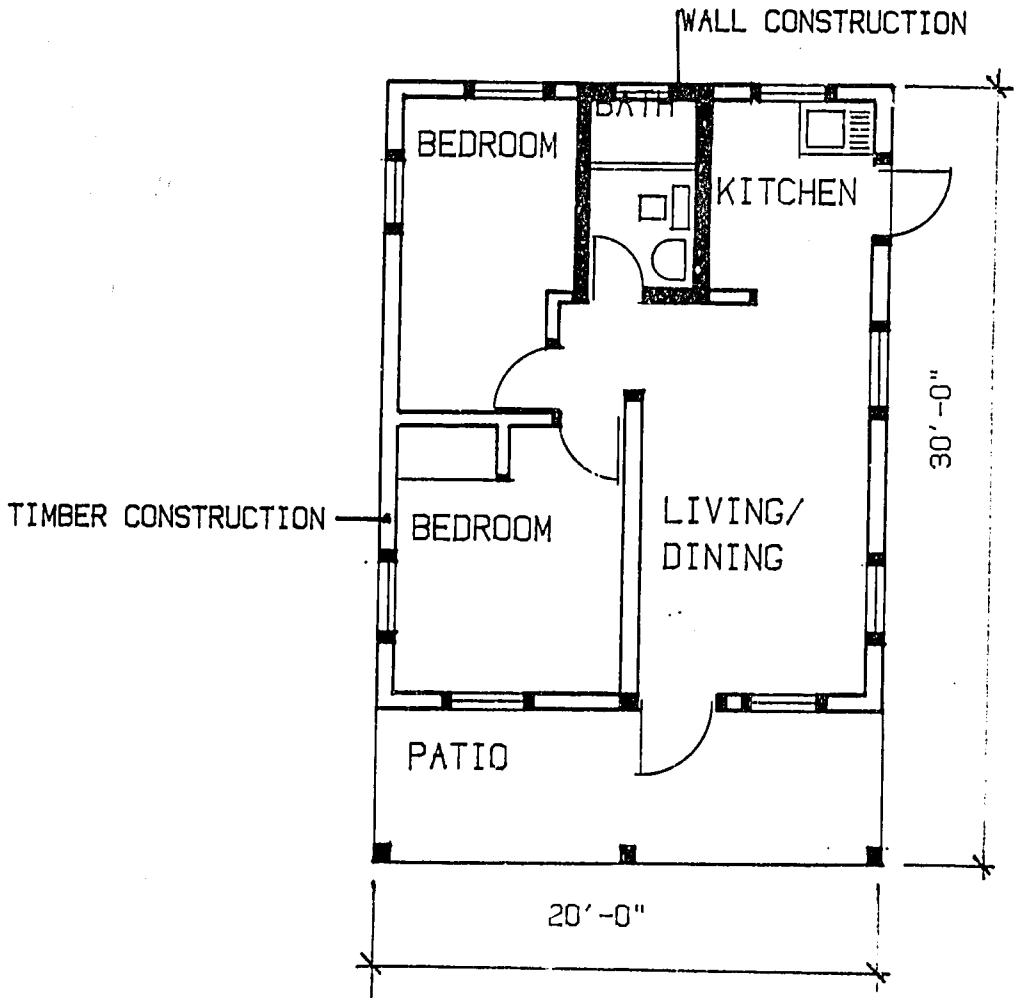


FIGURE IL11

TYPE OF CONSTRUCTION

HOUSE D

FOUNDATION	24"x24" concrete pad with 12"x16" concrete block piers;
FLOOR	Treated wood joist with plywood sheets
WALLS	Exterior - treated pine framing with wood siding Interior - treated pine framing with plywood paneling in living/dining - hardboard other rooms
ROOF	Treated pine rafters and battens covered with galvanized roofing sheets
WINDOWS	Metal louver type
DOORS	Exterior - solid core Interior - hollow core Frames - wood
FINISHES	Floor - none Walls - paint Ceiling - hardboard
SANITATION	Grease trap and suck well

TABLE II.1

COST OF BUILDING ELEMENTS
(Barbadian $)
1984

	HOUSE A				HOUSE B			
	LABOUR	MATERIAL	TOTAL	% TOTAL	LABOUR	MATERIAL	TOTAL	% TOTAL
SUBSTRUCTURE	12,145	15,647	27,792	22.2	7,210	10,624	17,834	25.7
STRUCTURE	1,942	6,709	8,651	6.9	1,780	3,398	5,178	7.5
ROOF	5,211	10,669	15,880	12.7	3,478	6,166	9,644	13.9
WALLS/PARTITIONS	1,070	1,938	3,008	2.4	540	1,682	2,222	3.2
WINDOWS	950	4,560	5,510	4.4	585	1,141	1,726	2.5
DOORS	560	1,640	2,200	1.8	280	1,515	1,795	2.6
FLOOR FINISHES	1,629	6,311	7,940	6.3	611	2,076	2,687	3.9
WALL FINISHES	4,121	10,623	14,744	11.8	1,494	4,210	5,704	8.2
CEILING FINISHES	3,848	4,436	8,284	6.6	333	591	924	1.3
FITTINGS/SUNDRIES	2,230	6,245	8,475	6.8	1,770	2,429	4,199	6.1
PLUMBING INSTALL.	1,800	6,055	7,855	6.3	1,500	3,865	5,365	7.7
ELECTRICAL INSTALL.	2,400	7,600	10,000	8.0	1,800	5,700	7,500	10.8
DRAINAGE SYSTEM	1,550	1,250	2,800	2.2	1,350	1,250	2,600	3.8
EXTERNAL WORKS	480	1,500	1,980	1.6	480	1,500	1,980	2.8
SUBTOTAL	39,936	85,183	125,119	100.0	23,211	46,147	69,358	100.0
COST/FT^2	23.08	49.24	72.32		21.02	41.80	62.82	
OVERHEAD/PROFIT			18,768				10,404	
TOTAL			143,887				79,762	
COST/FT^2			83.17				72.25	

TABLE II.1 (Continued)

COST OF BUILDING ELEMENTS
(Barbadian $)

	HOUSE C				HOUSE D			
	LABOUR	MATERIAL	TOTAL	% TOTAL	LABOUR	MATERIAL	TOTAL	% TOTAL
SUBSTRUCTURE	2,464	5,209	7,673	23.6	2,252	4,993	7,245	21.6
STRUCTURE	1,181	2,590	3,771	11.6	1,469	2,986	4,455	13.3
ROOF	1,534	2,496	4,030	12.4	1,960	2,233	4,193	12.5
WALLS/PARTITIONS	90	636	726	2.2	208	330	538	1.6
WINDOWS	736	851	1,587	4.9	736	851	1,587	4.7
DOORS	260	1,010	1,270	3.9	260	1,010	1,270	3.8
FLOOR FINISHES	22	58	80	0.2	127	529	656	2.0
WALL FINISHES	542	1,794	2,336	7.2	877	1,315	2,192	6.5
CEILING FINISHES	851	1,054	1,905	5.8	902	1,362	2,264	6.7
FITTINGS/SUNDRIES	100	300	400	1.2	100	300	400	1.2
PLUMBING INSTALL.	1,500	1,595	3,095	9.5	1,500	1,595	3,095	9.2
ELECTRICAL INSTALL.	660	2,640	3,300	10.1	660	2,640	3,300	9.8
DRAINAGE SYSTEM	1,350	1,050	2,400	7.4	1,350	1,050	2,400	7.1
EXTERNAL WORKS	0	0	0	0	0	0	0	0.0
SUBTOTAL	11,178	21,225	32,493	100.0	12,401	21,194	33,595	100.0
COST/FT^2	18.82	35.47	54.29		20.67	35.32	55.99	
OVERHEAD/PROFIT			4,886				5,039	
TOTAL			37,379				38,634	
COST/FT^2			62.43				64.39	

Source: Colin S. Cooper Associates, Ltd.

Prefabricated timber houses sold by lumber companies could cost approximately 10 percent less ($2,000) for the basic structure because of increased efficiency and reduced material costs resulting from direct importation of lumber. This would make the cost of the timber structure less than the cost of the masonry unit.

The one element of the structure that is clearly a major cost factor is the substructure which accounts for between 21 and 26 percent of total cost. The substructure consists of the footings and the foundation walls up to and including the floor structure. The estimates are based on the assumption of ideal site conditions with a uniform foundation depth of 2 feet 6 inches in soil and a 6-inch deep footings in base rock. In actual situations, site conditions vary considerably and may require foundations as deep as 10 to 12 feet thus adding substantially to the estimated cost. Because of the uncertainty associated with the soil conditions in Barbados, the substructure is a major concern to builders. Some builders are using construction techniques such as the piers on House C which minimize cost increases resulting from difficult site conditions.

The next most important single element is the roof structure which accounts for 13 to 14 percent of the total cost. The structure (load-bearing walls from the floor level to the ring beam or roof line) accounts for only 7 to about 13 percent of the total cost. The first three components in Table II.1 which make up the basic structure of the house account for about half (41.8 to 51.1 percent) of the total cost.

There is more variation in other elements between the more and less expensive houses. Finishes account for almost 25 percent of costs for House A but just over 13 percent for House C. This variation results largely from the type of finishes used. For House A, the block walls are rendered inside and out with 1-1.5mm textured finish and painted. The wall finishes, at $19.25 per square yard, account for almost 12 percent of the costs. The walls of House C are constructed with fairfaced block and finished with textured paint. At $6.75 a square yard, wall finishes account for about 7 percent of the cost.

The combined cost of structure and finishes should be evaluated for cost reduction. While the roof structure for House B is the most expensive (13.9 percent of costs) of the house types, the cost of the ceiling finish is minimal with the combined cost accounting for just over 15 percent of the costs. The roof and ceiling finishes are 18 to 19 percent of costs for the other houses.

While the plumbing and electrical installations are more extensive in the higher-priced houses, they account for a lower percentage of total costs. These installations account for 16.5 percent of the cost of House A, but 27 percent for House C.

The greatest concern is for reducing costs of the smallest houses to create improved housing opportunities for low-income families. Since these

houses are already at a very basic level, there are fewer options for further reductions. Cost reduction options will be discussed in the next chapter, but elements that appear to have potential are the structural elements, particularly the substructure, and further reduction in the level of finishes. While accounting for over one fourth of costs, it is unlikely that the plumbing and electrical installations can be substantially reduced because of basic technical requirements.

3. **Import Content**

As mentioned earlier, because of dependence on imports in Barbados, there is concern about keeping imports down to maintain a favorable balance of payments. In this section, the import and foreign exchange components of the housing types as well as the relationship between construction material imports and other imports will be reviewed. An order of magnitude estimate of possible reduction in imports resulting from decreased construction activity will be made.

a. **Import components**

It is traditionally assumed that 50 to 60 percent of the cost of a house is in imported materials. There are two areas to be considered:

- **Cost of imported materials**
  The analysis of the four house types found that imported materials account for between 58 percent (House C) and 80 percent (House D) of total material costs (Table II.2).
- **Foreign exchange component**
  This figure is less than the cost of the materials since duties, taxes and dealers' markup are paid in local currency. It is assumed for this study that these items account for 40 percent of the cost of imported materials.

Based on these assumptions, the foreign exchange component is between 35 and 48 percent of material costs and 20 to 28 percent of total construction costs.

The import content of wall houses has been reduced since cement has become, as of a few months ago, a locally-produced material. While there are imported elements, including energy, used in the manufacture of cement, it has been considered a local material for the estimates. The estimates also take into account the value added by local labour and assembly from imported materials and parts of items such as windows.

TABLE II.2

IMPORT CONTENT
(Barbadian $)

	HOUSE - CONSTRUCTION MATERIALS			HOUSE - CONSTRUCTION MATERIALS			HOUSE - CONSTRUCTION MATERIALS			HOUSE - CONSTRUCTION MATERIALS		
	TOTAL	IMPORTED	% OF IMPORTED	TOTAL	IMPORTED	% IMPORTED	TOTAL	IMPORTED	% OF IMPORTED	TOTAL	IMPORTED	% OF IMPORTED
SUBSTRUCTURE	15,647	2,918	5.6	10,624	1,623	5.5	5,209	709	5.8	4,993	2,665	15.7
STRUCTURE	6,709	1,488	2.8	3,398	889	3.0	2,590	1,162	9.5	2,986	2,986	17.6
ROOF	10,669	10,669	20.4	6,166	6,166	20.7	2,496	2,496	20.4	2,233	2,233	13.1
WALLS/PARTITIONS	1,938	542	1.0	1,682	1,001	3.4	636	125	1.0	330	330	1.9
WINDOWS	4,560	2,360	4.5	1,141	684	2.3	851	851	6.9	851	851	5.0
DOORS	1,640	680	1.3	1,515	909	3.0	1,010	490	4.0	1,010	490	2.9
FLOOR FINISHES	6,311	6,311	12.1	2,076	2,076	7.0	58	85	0.7	529	529	3.1
WALL FINISHES	10,623	2,280	4.7	4,210	2,029	6.8	1,794	350	2.9	1,315	615	3.6
CEILING FINISHES	4,436	4,436	8.5	591	591	2.0	1,054	1,054	8.6	1,362	1,362	8.0
FITTINGS/SUNDRIES	6,245	6,245	12.0	2,429	2,429	8.1	300	300	2.4	300	300	1.8
PLUMBING INSTALL.	6,055	6,055	11.6	3,865	3,865	13.0	1,595	1,595	13.0	1,595	1,595	9.4
ELECTRICAL INSTALL.	7,600	7,600	14.5	5,700	5,700	19.1	2,640	2,640	21.5	2,640	2,640	15.5
DRAINAGE SYSTEM	1,250	450	0.9	1,250	850	2.8	1,050	400	3.3	1,050	400	2.4
EXTERNAL WORKS	1,500	200	0.4	1,500	1,000	3.3	0	0	0.0	0	0	0.0
TOTAL	85,183	52,234	100.0	46,147	29,812	100.0	21,225	12,172	100.0	21,194	16,996	100.0
FOREIGN EXCHANGE COM		31,340			17,887			7,354			10,198	
% OF MATERIAL COST		36.8			38.8			34.8			48.1	
% OF TOTAL COST		21.8			22.4			19.6			30.4	

Source: Colin S. Cooper Associates, Ltd.

House C has the lowest foreign exchange component at 34.8 percent ($7,354) while House D has the highest at 48.1 percent ($10,198). So the timber house is not only slightly more expensive than a comparable wall house, but also has a higher foreign exchange component since the major structural material is imported. There are several components of the structure with noticeably larger imported elements. For the wall houses, the roof structure has the highest import cost at just over 20 percent of the total. The next components are the plumbing and electrical installations, accounting for 11 to 21 percent of imports. For House A, the floor finishes and fittings/sundries each account for 12 percent of imports.

For the timber house, the main structural elements (floor, walls, and roof) make up over 45 percent of import costs. These are followed by the plumbing and electrical installations at 9.4 and 15.5 percent, respectively.

While 36.8 percent of material costs for House A would be purchased with foreign exchange, the actual amount of $31,340 is over four times greater than House C. Therefore, it would be possible to house four lower-income families with less outlay of hard currency than to house one upper middle-income family.

b. **Imported materials for residential construction**

The costs for materials used in the above estimates include tariffs, taxes and duties. These charges are paid in local currency and do not generate foreign exchange losses. Tariff regulations are complicated and vary substantially for different products as well as for the same product, depending on its origin and the state in which it is being imported. Tariffs on construction materials range from 10 to 45 percent. In addition to the tariff, there are other charges levied on imported materials:

- A consumption tax is charged on the C.I.F. (cost, insurance, and freight) value plus the tariff paid on the item. For most construction materials, the consumption tax is 5 percent.
- A stamp duty, recently increased from two percent to 5 percent, is charged on the C.I.F. value of all imported products.

Therefore, the minimum import charge for consumption tax and stamp duty is 10 percent. If a conservative estimate of 10 to 15 percent for the tariff is used, the cost of imported materials is increased by at least 20 to 25 percent. The following is an approximation of the tariff and taxes paid on each house type:

House A - $10,447 to $13,059
House B - $ 5,963 to $ 7,453
House C - $ 2,451 to $ 3,064
House D - $ 3,399 to $ 4,249

For the wall houses, this represents 7.5 to 10.7 percent of construction costs; while, for the timber house, the import charges represent 10.1 to 12.6 percent.

Table II.3 presents imports by selected categories from 1957 to 1983. On the average, construction materials have been 8.47 percent of imports but have fluctuated from a high of 10.7 percent of all imports in 1960 to a low of 5.86 percent in 1983. The last figure would indicate that efforts to protect foreign exchange reserves have been effective in the reduction of construction materials imports. The relationship of construction materials to consumer goods has averaged 19.6 percent over the period, with a high of 24.6 percent in 1960 and a low of 14.6 percent in 1975. From the highest level in 1981, the value of construction materials imports decreased by 8.1 and 16.2 percent in 1982 and 1983, respectively. The value of consumer goods and total imports decreased in 1982 but increased to record levels in 1983. Thus, the economic controls have been particularly effective in holding down the importation of construction materials.

As mentioned earlier, the Government, as part of a program to protect foreign currency reserves, has adjusted the rates of interest allowed on mortgages and long-term deposits. One of the effects has been to limit the availability of residential mortgage funds, and thereby new housing starts. There is insufficient data to determine exactly the effect of this policy but, by using some assumptions, it is possible to establish an approximation of the reduction in imports. Discussions with those involved in construction indicate it is reasonable to assume that at least 50 percent of imported materials are used in non-residential projects. Since construction materials imports have on the average represented 8.4 percent of total imports, residential construction would account for 4.2 percent.

Not all of these materials would be used for new residential construction since some would be used in the very active home improvement and renovation market. Because much of this activity takes place in the informal sector, it is difficult to determine the magnitude of the activity. Those involved in the supply of building materials felt that this market used between 25 and 30 percent of the imported materials. Government policy has had little effect on this segment of the industry since home improvement loans up to a $5,000 limit are not regulated and, also, because much renovation activity is self-financed.

TABLE II.3

RETAINED IMPORTS BY CATEGORIES (1957-1983)
(Current Barbadian $ 000)

PERIOD	TOTAL GOODS	CONSUMER GOODS	CONSTRUCTION MATERIALS IMPORTS	% OF TOTAL	% OF CONSUMER GOODS
1957	64,310	27,885	6,096	9.5	21.9
1958	68,792	30,270	6,130	8.9	20.2
1959	67,949	31,381	7,142	10.5	22.7
1960	77,404	33,535	8,250	10.7	24.6
1961	74,073	33,939	6,561	8.9	19.3
1962	75,889	36,689	5,696	7.5	15.5
1963	82,588	38,866	6,966	8.4	17.9
1964	93,712	45,938	6,983	7.4	15.2
1965	99,613	50,009	7,722	7.7	15.4
1966	111,206	53,132	9,488	8.5	17.9
1967	116,032	53,955	8,928	7.7	16.5
1968	147,443	64,955	12,688	8.6	19.5
1969	177,655	74,756	16,153	9.1	21.6
1970	217,965	97,454	20,419	9.4	20.9
1971	216,522	100,278	19,472	9.0	19.4
1972	249,075	119,040	21,769	8.7	18.3
1973	308,602	133,938	32,107	10.4	24.0
1974	368,919	156,120	33,192	9.0	21.3
1975	397,532	160,652	23,543	5.9	14.6
1976	439,200	182,132	33,394	7.6	18.3
1977	503,161	204,231	35,977	7.1	17.6
1978	553,982	228,058	41,196	7.4	18.1
1979	779,503	279,805	56,409	7.2	20.2
1980	931,013	342,200	80,274	8.6	23.4
1981	1,057,032	372,743	85,100	8.0	22.8
1982	962,614	321,654	78,266	8.1	24.3
1983	1,139,560	353,902	65,621	5.8	18.5

Source: Annual Statistical Digest, Central Bank of Barbados, 1983

If it is assumed that 30 percent of materials are used for renovation, then new residential construction would account for approximately 3 percent of total imports. If the lack of mortgage funds reduces new residential construction by 50 to 75 percent, a reduction in imports of 1.5 to 2.3 percent would result.

Obviously, construction materials are not the only component of imports used by the construction industry. Equipment and fuel for transport as well as other imported commodities are used by the industry. Thus, the reduction in imports from a slow-down in construction activity would be greater than indicated above, but still about 3 percent maximum.

4. Labour Content

Labour costs have not increased as rapidly as material costs since 1978, but they have contributed to the recent inflation in the sector. The average annual change in labour costs between 1978 and 1983 was 5.4 percent with the greatest increase of 14.6 percent occurring in 1981-82.

Table II.1 shows the labour component of each of the elements of the houses. The total labour for the construction of the house represents between 31 and 34 percent of the cost. If the contractor's profit and overhead are added to the labour component, it then accounts for 40 to 43 percent of the cost.

The highest labour cost for a single component is for the substructure (21 to 31 percent). The labour component for the structural elements (components 1-3) is between 46 and 53 percent of the total labour costs. Because of the higher level of finishes in House A, almost 25 percent of labour costs is devoted to these areas. For the smallest house, labour costs for the plumbing and electrical installations and drainage are over 30 percent of the total.

B. ELEMENTS OF COST RELATING TO THE BUILDING SITE

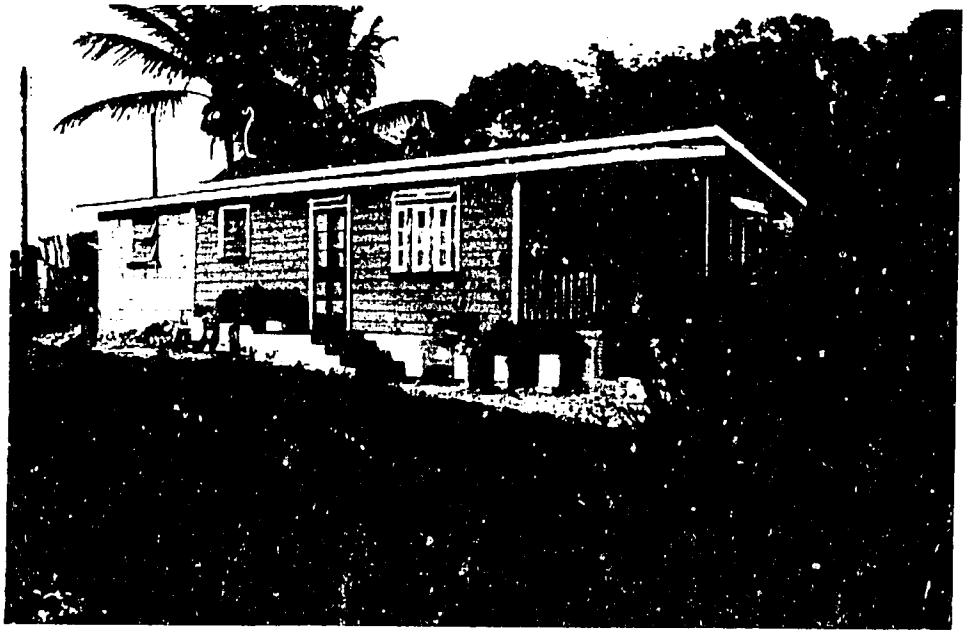
The inflation of the 1970s not only increased the costs of housing construction but the cost of land and its associated development costs as well. This section will analyze the elements contributing to the cost of a serviced lot and their relationship to housing construction costs for each of the subject housing types.

1. Land

a. Existing situation

A study by a consultant to the MOHL on the availability of land for housing provides a detailed look at the existing land situation in Barbados. The following observations on factors influencing land costs are summarized from the study. Because of the small size of the island, land is a limited commodity in Barbados and is in demand for many competing uses. The Government has established controls to protect both prime agricultural land and catchment areas for the nation's water system from further development.

Location is also an important factor in determining the cost of land. Sites in and near urban centers are usually more valuable because they provide for convenient access to sources of employment and services. Location is particularly important for lower-income families because of their limited transportation options. In 1980, approximately 62 percent of the population of Barbados lived in a band along the west to southeast coast between Speightstown and St. Philip Parish. As population continues to concentrate into this area, land close to urban centers suitable for residential development will be in greater demand and likely to become more expensive.



Much of the activity in the home improvement and renovation market takes place in the informal sector. The addition of a wall structure at the rear of a timber house is very common for an indoor bathroom and kitchen.

The ministry study concludes that there is at present an adequate supply of land approved for residential development to meet the needs of middle- and upper-income families for the immediate future. It is estimated that approximately 700 hectares of vacant subdivided land--only some of it with services--is distributed around the island. A survey of 124 private subdivisions approved between 1965 and 1977 found that only 14 percent of the lots had been developed and of these only 34 percent had been sold. The survey also found that 52 percent of the lots are 800 m^2 or larger thus putting the majority of lots beyond the reach of lower-income families. Many low-income families living on rented lots have been given the right to purchase the lot which they currently rent under the provisions of the Tenantries Freehold Purchase Act of 1980. A possible resource which could meet some of the needs for other low-income households is an estimated 44 hectares of smaller parcels of undeveloped land within the Bridgetown urban area.

It is estimated in the Physical Development Plan (amended 1983) that land will be needed to accommodate 8,970 new households in the presently urbanized areas by the year 2000. If an average lot size of 300 m^2 (3,160 ft^2) and residential land use of 70 percent are assumed, approximately 580 hectares would be used to meet the projected need which is about 83 percent of the 700 hectares of approved subdivision land. Therefore, the problem is not one of land availability but one of proper location and affordability for the lower-income population.

b. **Land design standards**

The final purchase price of a lot in a residential subdivision is strongly influenced by the land design standards. Density of development is the main determinant with lower densities resulting in higher costs per lot. The elements of site design which determine the density are the percentage of land devoted to residential use and the lot size.

An analysis of several site plans by both public and private developers indicates that the percentage of land devoted to residential use is usually very high (Table II.4). At 70 to 80 percent residential land use, these sites are considerably above the normally accepted norms of 55 to 65 percent. This efficient use of land results primarily from minimal but adequate circulation standards (Table II.5) and the provision of limited amounts of public and open space. Most roads in residential neighborhoods are Classification 4 with a right-of-way of 7.92m. The amount of open space in future developments should increase since Town and Country Planning has adopted new minimum standards for open space in residential projects.

TABLE II.4

LAND USE OF SELECTED PROJECTS

Type of Project	Residential Area m^2	%	Circulation Area m^2	%	Open Space Area m^2	%	Total Area m^2
Private Projects							
#1	17,557	81.9	3,890	18.1	0	0	21,447
#2	46,856	76.2	9,928	16.2	4,676	7.6	61,460
#3	24,825	70.5	7,018	19.9	3,391	9.6	35,234
#4	78,166	84.0	14,924	16.0	0	0	93,090
Public Projects							
#1	15,975	73.0	3,681	16.8	2,234	10.2	21,890
#2	46,724	80.7	11,151	19.3	0	0	57,875

Source: PADCO Analysis

TABLE II.5

ROAD STANDARDS

Road Classification	Road Reserve	Building Line
1 Special	21 ft. (6.3m)	50 ft. (15.0m)
1	21 ft. (6.3m)	32 ft. (9.6m)
2&3	17 ft. (5.1m)	32 ft. (9.6m)
4	13 ft. (3.9m)	19 ft. (5.7m)

Note: All distances from center line of road

Source: Town & Country Planning

In spite of the high percentage of residential land, the density of many developments is low because of the large lot sizes. As mentioned earlier, in a survey of private subdivisions it was found that 52 percent of all lots were 800 m^2 (8,600 ft^2) or larger. In most cases, the smallest plots are 300 m^2 (3,200 ft^2) to 325 m^2 (3,500 ft^2). Whereas the official minimum size plot is 223 m^2 (2,400 ft^2), developers indicated that in the past site plans with lots this small were not approved by Town and Country Planning.

While standards must be adapted to each situation, other countries with traditions similar to Barbados have determined that lots of 150 m^2 (1,600 ft^2) to 200 m^2 (2,150 ft^2) are adequate and affordable for lower-income households. The main reason for reducing lot sizes is to reduce costs, thus providing greater land ownership opportunities to low-income families.

c. **Cost**

Obviously, land prices vary depending on location and the potential uses. The relatively standard price for undeveloped residential land on the periphery of urban areas is $.75 to $1.00 per ft^2. Since lots cannot be sold in an unserviced state, it is necessary to also consider the cost of servicing.

2. **Infrastructure**

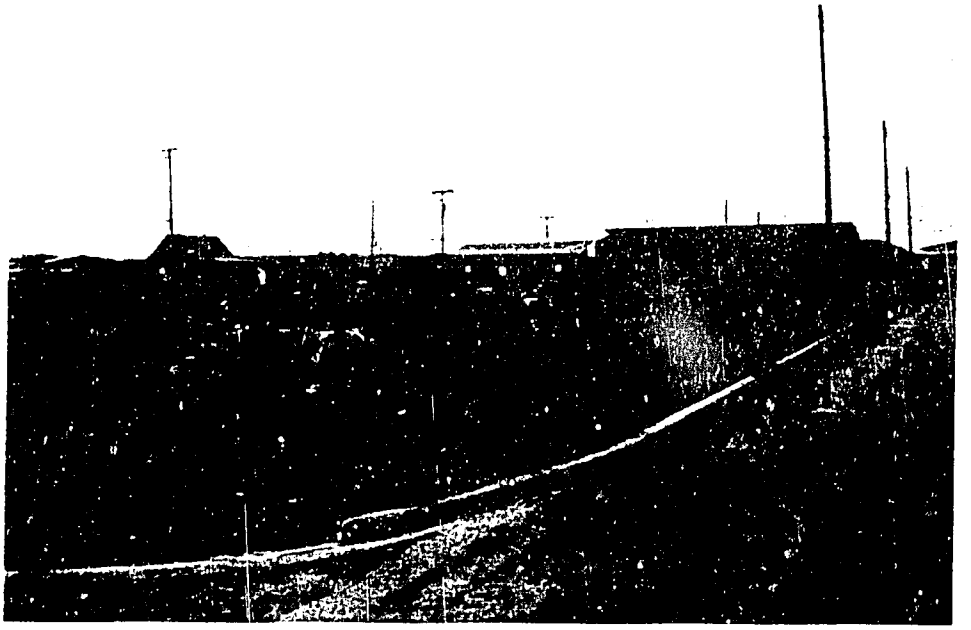
The other element which influences most directly the final cost of a plot is the level of infrastructure and services. Barbados has traditionally maintained—and has been able to afford—a high level of services in urban areas compared to some other Caribbean countries. This has resulted in part from a policy requiring the cost to be passed on by the developer to the purchaser, thus avoiding the pitfall of highly-subsidized provision of urban services. In difficult economic times, it is particularly important to have full-cost recovery from residential developments.

Table II.6 presents the various elements traditionally provided for new developments as well as the estimated costs of providing these services for a 2.19 hectare development planned by the National Housing Corporation. The main elements contributing to the costs of site development include:

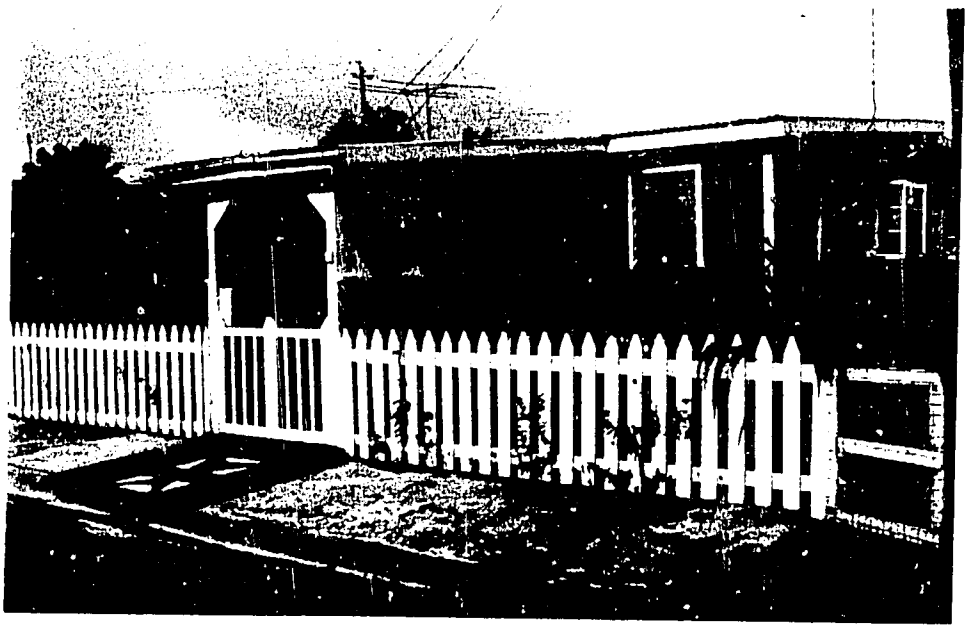
a. **Water**

The design and installation of extensions of the water system into new developments is done by the Barbados Water Authority and charged to the developer. The charge is based on actual labour and material costs plus a 60 percent surcharge. Supply lines are provided on one side of the carriageway to permit individual connections to all lots. The provision of water costs $.36 per net (salable) ft^2 and accounts for 16.3 percent of the projected development costs.

In rural areas, some houses are not provided with services; while in urban areas, most households enjoy a high level of infrastructure.



Before lots can be sold, developers are required to complete installation of paved streets with curbs and drainage as well as water and electrical lines.



By adding fences and sidewalks, residents often improve their properties.

b. **Electricity**
As with the water system, the electrical service is designed by the Electric Authority, approved by the Chief Town Planner and installed at the expense of the developer. The initial installation consists of only appropriately-located utility poles. The wires are strung and connections made at the request of residents. For the subject development, the cost is $.14 per net ft^2 and accounts for 6.1 percent of total costs.

c. **Roads and drainage**
The design and construction of the road system is the responsibility of the developer, but must be designed to meet the standards of, and be approved by, the Ministry of Transport and Works. The standard for residential streets requires a 7.92m (26 ft) right-of-way with a 4.9m (16 ft) paved carriageway. Concrete curbs and a storm drainage system must also be provided. As can be seen from Table II.6, at $1.55 per net ft^2, this is by far the most expensive element of site development, accounting for almost 70 percent of the total cost.

d. **Other**
The estimated cost of design and surveying accounts for 8 percent of the cost at $.18 per net ft^2.

e. **Connections**
The charge for water connections varies depending on site conditions, but is most often $200. Electrical connections cost $25 with additional cost and meter rental being recovered through user charges.

3. **Costs**
The total cost for land development of the site discussed above is $2.23 per net ft^2. According to several developers interviewed, this is about the minimum for the provision of infrastructure in today's market. Therefore, with the cost of land and developers overhead and profit included, the price of a developed lot is between $3.50 and $4.00 per ft^2 for areas close to Bridgetown with more distance areas going for $3.00-3.50. In some cases the price can be as high as $4.50 to $5.00 per ft^2. Smaller plots usually sale for a higher price per ft^2 than larger plots. The following plot sizes and land costs were assumed for the house types:

House A - 8,000 ft^2 x $3.50 = $28,000
House B - 5,000 ft^2 x $4.00 = $20,000
House C - 3,000 ft^2 x $4.00 = $12,000
House D - 3,000 ft^2 x $4.00 = $12,000

As shown in Table II.7, the lot costs are a significant part of the total cost of a house, particularly for the smaller house where the lot accounts for almost 23 percent of the cost of Houses C and D. If land costs on the smallest lots were reduced to $3.50, it would reduce the price by $1,500 and the overall cost by about 3 percent for Houses C and D.

TABLE II.6

DEVELOPMENT COSTS GALL HILL PROJECT

	Estimated Cost(B$)	% of Total	Cost/Net FT^2(B$)
WATER SUPPLY Supply line on one side of carriage way on all streets	$ 62,400	16.3	$ .36
ELECTRIC SUPPLY Utility poles at locations specified by Electrical Authority	23,475	6.1	.14
ROADS & DRAINAGE Paved carriage way concrete curb & gutter with drainage to suck wells (includes engineering 10%)	266,200	69.6	1.55
SURVEYING	20,500	5.4	.12
PLANNING	10,000	2.6	.06
TOTAL	$382,575	100.0	$2.23

Source: PADCO analysis

TABLE II.7

SUMMARY OF HOUSING COSTS

	HOUSE A		HOUSE B		HOUSE C		HOUSE D	
	Cost	%	Cost	%	Cost	%	Cost	%
Labour	39,936	22.2	23,211	22.2	11,290	21.6	12,401	23.5
Materials	85,183	47.5	46,147	44.1	21,283	40.7	21,194	40.2
Overhead & Profit	18,768	10.4	10,404	9.9	4,886	9.4	5,039	9.6
Total Construction Costs	143,887	80.1	79,762	76.2	37,459	71.7	38,634	73.3
Land $	8,000	4.5	5,000	4.8	3,000	5.7	3,000	5.7
Infrastructure	20,000	11.1	15,000	14.3	9,000	17.2	9,000	17.1
Total Site Costs	28,000	15.6	20,000	19.1	12,000	22.9	12,000	22.8
Other Permits & Inspections	1,350	0.8	850	0.8	450	0.9	450	0.9
Mortgage Origination & Legal Fees	6,280	3.5	4,124	3.9	2,360	4.5	1,585	3.0
Total Other Costs	7,630	4.3	4,974	4.7	2,810	5.4	2,035	3.9
Grand Total	179,517	100.0	104,736	100.0	52,269	100.0	52,669	100.0

Source: PADCO Analysis

C. OTHER COSTS

The purchaser of a house usually pays other costs associated with administrative and legal procedures. These are fees related to government permits and approvals and the mortgage and land title process.

1. **Town and Country Planning Approvals**
   Any new construction or major additions require Town and Country Planning approval. But as is the case in many countries, much construction activity takes place in the informal sector without the approval or involvement of official bodies. If a purchaser is interested in a mortgage from a financial institution, approvals will be required from Town and Country Planning.

   Town and Country charges consist of a $50 application fee, $50 for monitoring construction, and $50 for a certificate of compliance. Applicants are required to submit site and building plans with the application. It is assumed that plan preparation will cost $1,200 for House A, $700 for House B and $300 for the smaller houses.

2. **Mortgage Application and Legal Fees**
   Fees associated with a mortgage application were calculated based on the regulations of the Barbados Mortgage and Finance Cooperation. It is assumed that 80 percent financing would be provided except for House A which would receive the maximum loan of $100,000. Charges vary and may be higher with other lending institutions. These charges account for between 2.9 and 4.5 percent of the total housing costs.

   One of the problems most frequently noted with the residential construction industry is the excessive length of time required for legal work. A title search and preparation of documents should at maximum take no more than 3 to 4 weeks but can take as long as 6 months. For private developers and builders, this can add significantly to carrying charges on construction financing.

3. **Summaries**
   The individual elements which contribute the most to the cost of a new house are:

   Material Cost - 40 to 48 percent
   Labour Cost - 22 to 24 percent
   Infrastructure Costs - 11 to 17 percent

   The other elements of cost are 10 percent or less of the total. The construction costs comprised of the labour, materials, overhead and profit are around three-fourths of the cost. Since these are the elements that contribute most heavily to the cost of a house, they offer the most promise for possible cost reduction or control.

CHAPTER III

POTENTIALS FOR COST REDUCTION

In the previous chapter, elements which contribute to the cost of housing have been established and their relative importance identified. This chapter will explore options for reducing costs, or at least reducing the rate of increase. As indicated earlier, costs in the construction industry have been stable over the last 12 to 18 months but, because of inflationary trends prior to this, the purchasing power of households has been decreased and the market must adjust to the new situation. This chapter will review modifications to designs and building practices by developers to maintain the affordability of their units as well as administrative and policy issues which influence the production of more economical housing.

A. GENERAL CONSIDERATIONS

Some of the problems that can influence the costs of construction relate to the general practices and efficiencies of the overall system and not to the actual construction elements. Savings resulting from improvements to the overall environment are difficult to quantify and control but can be substantial. The following are problem areas which have been identified by individuals involved in the housing sector:

1. **Inconsistent Level of Construction Activity**

   In recent years, there have been substantial fluctuations in the level of construction activity in Barbados. The industry has gone from a very active period during the 1970s and early 1980s to a much reduced level of activity at present. During the active period, there was a shortage of skilled workers, materials suppliers were achieving record sales volumes and costs were increasing. These conditions have now changed with resulting unemployment and decreased business activity. One building materials firm indicated that business is down 12 percent from the peak in 1981; while, in another case, the labour force of a company building timber houses has been reduced from over 40 employees in 1980 to six employees today.

   The expansion and contraction of production capacity creates inefficiencies within the system and thereby higher costs. During boom times, large capital investments in equipment are made which will be difficult to support during slow periods. It is also difficult to maintain a staff of skilled craftsmen and workers during slow periods.

   A consistent supply of building materials, labour, and mortgage funds is needed to maintain a regular level of construction activity. It is felt that there are generally few problems with the supply of labour and materials. but that the problem in Barbados at present is the almost total lack of funds for residential mortgages, thus requiring most new residential construction to be financed through sources other than mortgage lenders.

2. **Administrative Delays**
There is the potential for unreasonable administrative delays at several points in the construction process. In the past, there were some problems with approval of subdivision plans by Town and Country Planning which on occasion would take as long as 6 months. Procedures have been improved so that review and approval of applications now usually takes less than two months.

The main complaint is with the mortgage application process and the often unreasonable delays associated with the required legal work. Delays of up to six months have occurred from the date of completion of the house until settlement. This can increase substantially the carrying costs on the construction financing for the developer. The Government, through the Ministry of Housing and Lands, is in a good position to review the situation and establish procedures and guidelines to alleviate problems in this area.

3. **Inefficiencies in the Construction Industry**
In recent studies of the construction industry, it was found that there is a limited number of large- and medium-sized firms involved in residential work. Much of the residential construction is done by small builders who complete 3 or 4 houses a year, or do renovations and additions. While there are many excellent craftsmen and builders in Barbados, interviews and field surveys indicated that some small- and medium-size builders have limited management experience and use inefficient building practices. Poor planning and design results in cutting and wasting of standard-sized building materials and inefficient use of manpower resources. Inaccurate work creates additional expense to complete the job.

This is a difficult problem to resolve inasmuch as a large number of individuals working in the informal sector are involved. The Government is providing better training for young people moving into the building trades which will improve the efficiency over the next several years. Training courses in construction management and organization could help to improve the efficiency of those presently working in the sector.

4. **Lack of Mortgage Financing**
As mentioned earlier, one of the contributing factors to the fluctuation of construction activity has been the erratic supply of mortgage financing. During the last two to three years, funds for residential mortgages have been very limited, particularly for low- and moderate-income households.

B. BUILDING MATERIALS AND COMPONENTS

In the preceding chapter, those elements of the structure which contribute most heavily to costs were found to be the substructure, the roof, and finishes. The water and electrical installations are also important cost elements, but provide limited opportunities for cost reduction, short of elimination of the service. In this section, suggestions for cost reduction will be reviewed along with some of the cost-saving measures being implemented by private builders. There are economies that can be realized through improved building design and use of materials, but they are not going to be large in scale. Reduced building costs will result from the accumulation of many small reductions to different elements of the total structure.

1. Substructure

The substructure accounts for almost one quarter of the construction cost of the house, assuming ideal site conditions. Because of the unpredictable nature of the soil and coral formation, foundation problems and additional expenses are often encountered. Traditionally, the entire area of the house is excavated to a solid base. The footings are excavated into the coral and the foundation walls built up to the floor level. The interior is then filled with compacted marl to receive the reinforced slab. This is a very labour intensive process and can be extremely expensive if unfavorable site conditions are encountered.

A modified substructure is being used by some builders that is based on the concept of keeping the points of contact with the site to a minimum and disturbing the ground as little as possible. Spot footings and piers are located at the corners and at appropriate intervals along the walls to support a grade beam and structural slab. Thus, excavation is greatly reduced and need for compacted fill avoided. The substructure for Houses A and B was estimated based on traditional construction and cost just over \$16 per ft^2. For House C, spot footings with grade beam and structural slab costs approximately 20 percent less at \$12.79 per ft^2. The savings would be even higher for difficult site conditions.

If the traditional methods for the foundation are used, a simple slab on grade would be adequate, thereby saving the cost of reinforcing steel. Another option is to avoid a concrete slab altogether by installing locally manufactured tiles on sand placed directly on the compacted marl fill.

2. Roof

The roof structure has less flexibility and options for cost reduction. A galvanized corrugated metal roof on wood rafters and purlins is the most commonly used material for low-cost construction, and is one of the least expensive materials at \$47.43 per square yard. Unfortunately, it is not particularly well-suited to tropical climates since, if left exposed on the inside, an undesirable living environment results from the heat radiated by the metal roof. If a hardboard ceiling is installed to provide the needed insulation, the cost is increased to \$65.18 a square yard.

Grooved plywood sheets and asphalt shingles on wood rafters at $59.20 per square yard are more expensive than corrugated metal, but require no ceiling and little or no finishing. The composite cost of $65.20 per square yard makes a plywood roof very competitive with corrugated metal.

Another proposal by a local developer for a basic house for low-income families is to build the roof structure with precast concrete joists and slabs that would give an environmentally acceptable solution and, again, not require a ceiling or interior finishes.

3. **Finishes**

The level of finishes has a direct influence on the cost of a structure. As was noted earlier, the finishes on House A are 25 percent of the cost, but are 13 percent for House C. The square foot cost for finishes for House A and House C are $17.90 and $7.20, respectively. This is a 60 percent reduction in unit cost for House C but, because it is at such basic levels, it would be difficult to make further reductions. Some of the basic finishes being offered by private builders include:

- smooth finished concrete floors
- unrendered fair-faced block with or without paint
- no ceiling with exposed rafters and grooved plywood deck
- basic sink unit with no kitchen cabinets
- space in bedrooms for closets and cupboards but without doors or fixtures

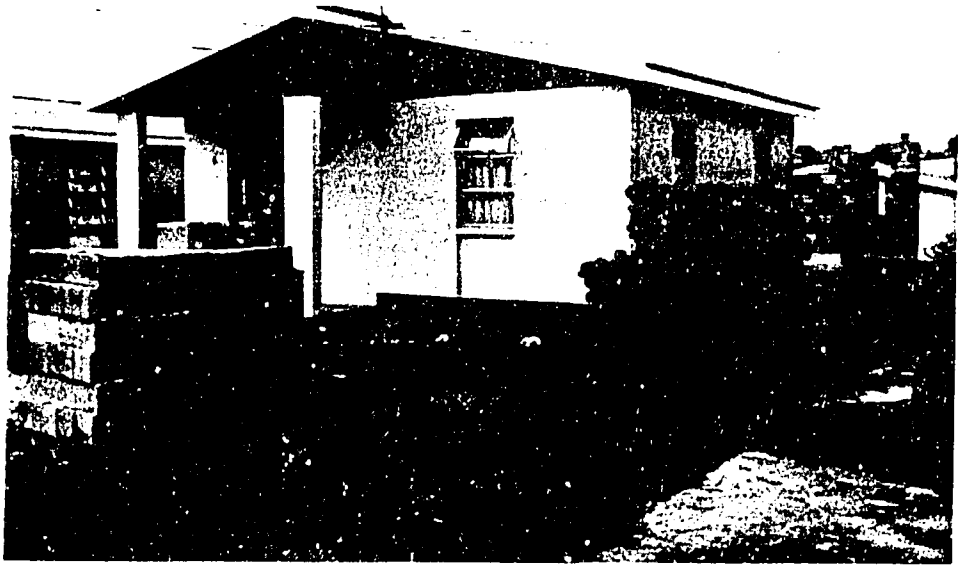
A basically unfinished house gives the owner the opportunity to move in immediately and to complete the finishes as money is available. Field observation shows that Barbadians will modify and individualize their houses to satisfy their taste, often removing or changing finish materials.

4. **House Size**

The larger builders, over the last two years, have reduced the sizes of houses they are building to keep the units affordable to lower- and middle-income families. The most basic models are between 500 and 600 ft^2. The smaller the house, the more carefully it must be planned to make maximum use of the available space.

5. **Simple Designs**

The more complicated the design the higher the cost. The involved plan of House A with its many corners and indentations is a contributing factor to its higher costs. The design of low-cost housing should be kept as simple and straight forward as possible. Figure III.1 shows an example of a small (500 ft^2 including the covered patio) but efficiently designed structure with a minimum of corners and complications.



Field observation shows that Barbadians will individualize and modify their houses to satisfy their taste.

6. **Shared Structural Elements**
   One of the few examples of party wall construction in Barbados are the blocks of public housing units built by the NHC. The Ministry of Housing could sponsor some small projects to test the marketability of duplexes and row houses. The savings on building materials would be minimal, but the bigger savings could result from reduced lot sizes and lower land costs.

C. LAND

It was found from the cost study that the service site can account for as much as 20 to 23 percent of the cost of a house. Since increased land and development costs have placed the price of a lot beyond the reach of most of the lower-income population, it is important that ways be found to reduce the overall cost. These costs are primarily determined by the density and the level of services. If costs are to be reduced, it will be by the manipulation of these elements.

1. **Density**
   Since circulation and open space standards are basic and provide for a high percentage of residential land, the way to increase density is by decreasing lot sizes. A variety of lot sizes is needed to meet the needs of different income groups, but the traditionally accepted minimum of 280-325 ft^2 (3,000-3,500 ft^2) is not affordable to lower-income households and is often larger than required to meet a family's needs.

   To illustrate the effect of lot size on density and costs, a 5.79 hectare section of a site plan prepared by the National Housing Corporation for the Husbands Heights Development was analyzed using a computerized land design model[1]. Over 80 percent of the site is devoted to residential use with the remaining space (19.3 percent) used for circulation (Figure III.2). There are 103 lots with an average size of 453.6 m^2 (4880 m^2) and a density of 17.79 lots per hectare. Using the costs outlined in Chapter II, the total infrastructure and land costs for the site would be $1,634,432 or $15,868 per lot.

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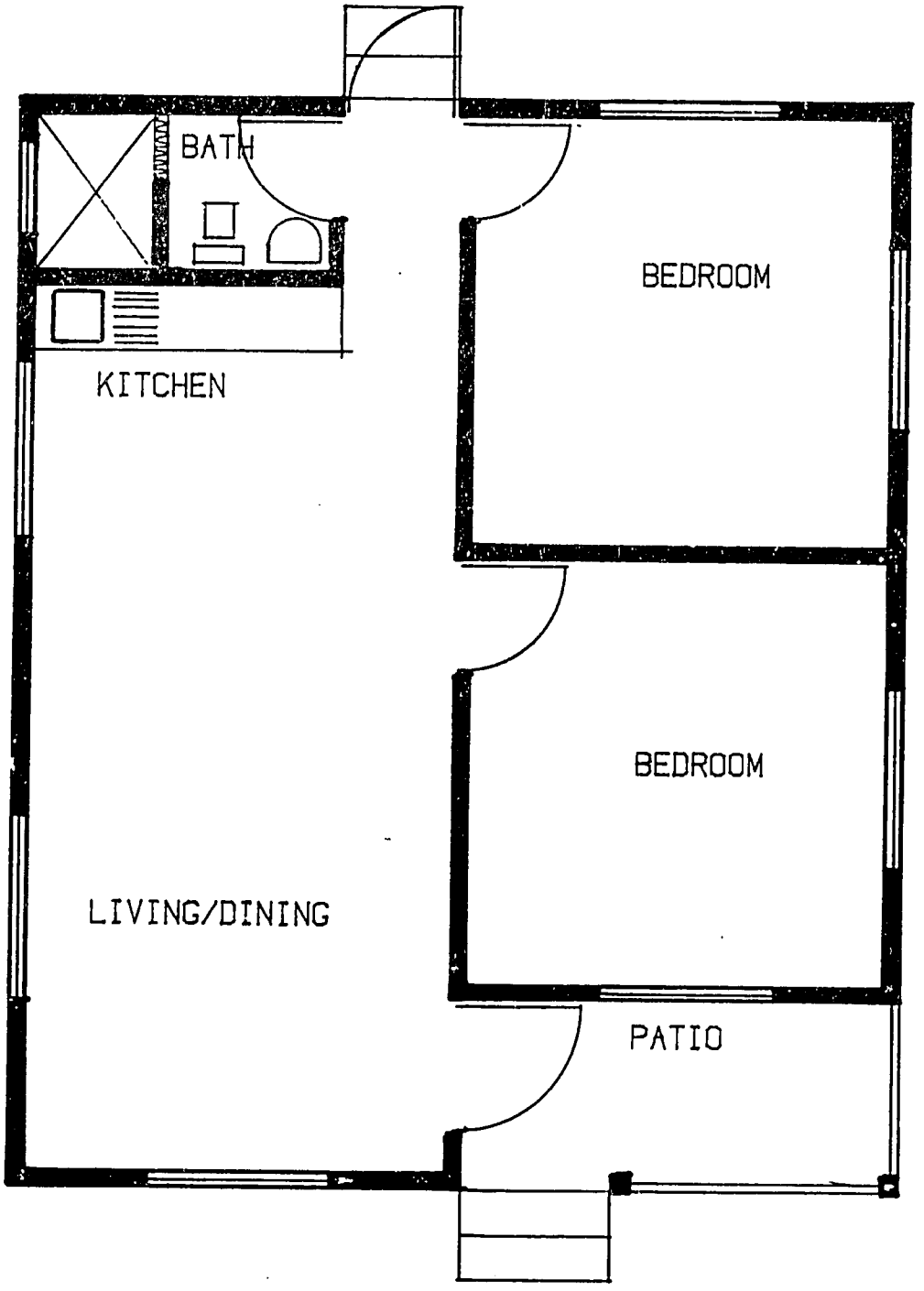
[1]The PADCO/Bertaud Model, using a micro-computer, has been developed to analyze the design and affordability of low-income housing programs. The Moduling System component of the Model allows planners to design or evaluate site plans in less time than required by traditional methods. Based on a concept plan, data is fed into the computer which evaluates the information and draws a plan of a module of the plan. Different modules can be combined into a full site plan and drawn to scale by the computer. The computer also calculates and prints a table of basic land use data, including the number and sizes of plots and the area and percentage of each type of land use.

FIGURE III.1
HOUSE PLAN



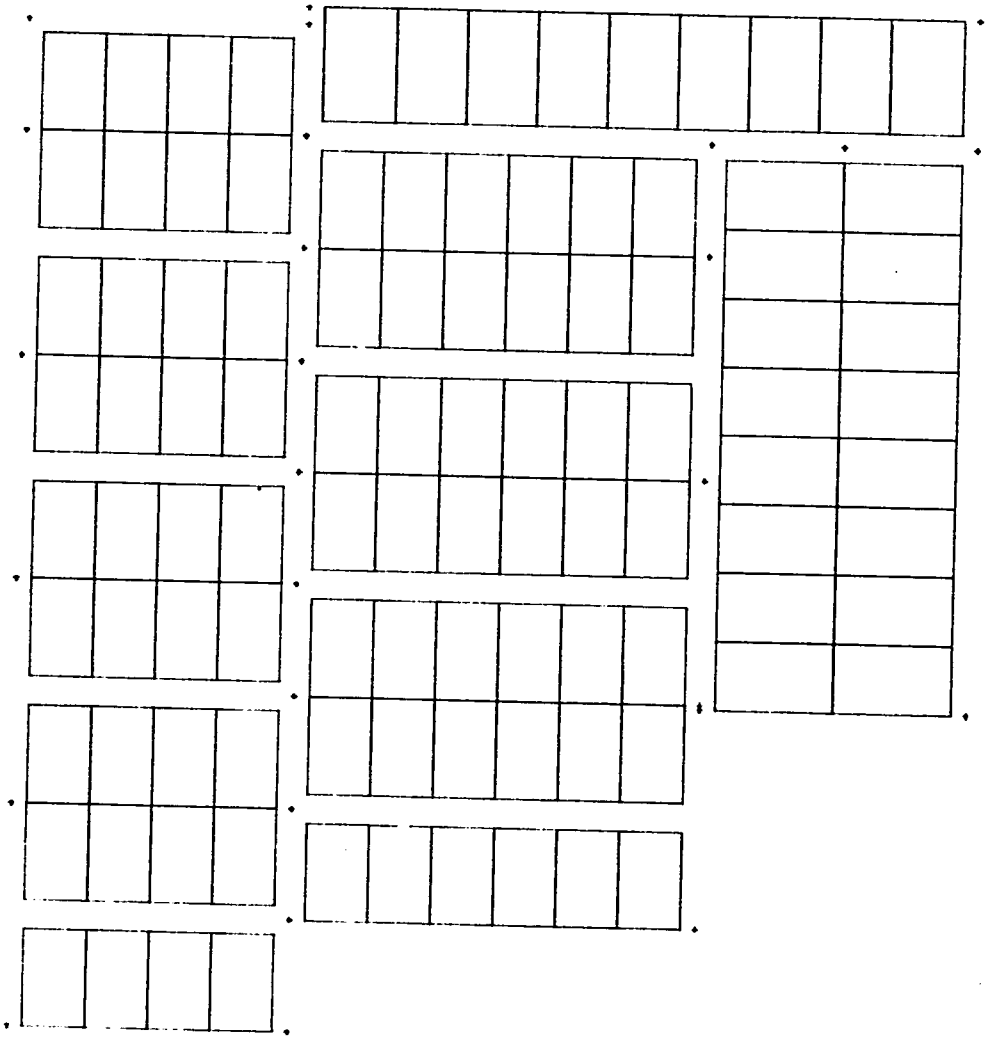


FIGURE III.2

SITE PLAN
HUSBAND HEIGHTS

SCALE 1/2000

LAND USE LISTH1

PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
419.58	78	75.73	32727	
558.15	23	22.33	12837	
579.80	1	.97	580	
579.81	1	.97	580	
TOTAL	103	100.00	46724	
				% 80.73

TOTAL RESIDENTIAL= 46724
% 80.73

TOTAL CIRCULATION= 11151
% 19.27

TOTAL AREA = 57875

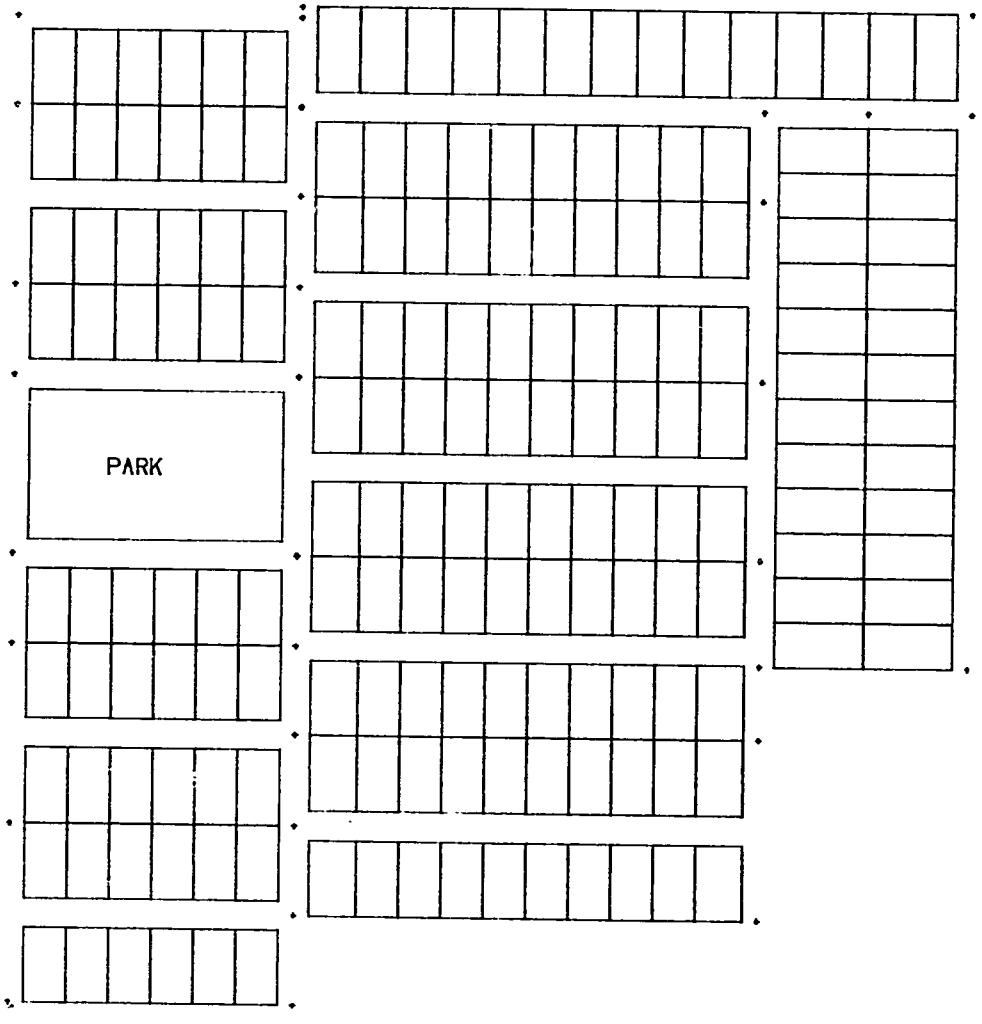


FIGURE III.3

REVISED SITE PLAN
HUSBAND HEIGHTS
SCALE 1/2000

LAND USE LISTH2

PLOT AREA	PLOT NUMBER	%OF PLOTS	TOTAL AREA	%
220.00	126	69.23	27720	
242.00	18	9.89	4356	
254.38	2	1.10	509	
276.00	36	19.78	9936	
TOTAL	182	100.00	42521	
				% 73.24

TOTAL RESIDENTIAL=	42521	
		% 73.24
PARKS AND PLAYGROUNDS		
PRK1	2640	
TOTAL PARKS	2640	
		% 4.55
TOTAL CIRCULATION=	12894	
		% 22.21
TOTAL AREA =	58055	

DF, IM38, OE,

The section of the site was redesigned with lot sizes reduced to 220 and 242 m^2 (2,367 and 2,600 ft^2. The area of the site devoted to residential use decreased to just over 73 percent and the circulation space increased (as is always the case when lot sizes are reduced) to 22.2 percent (Figure III.3). Also, a small park using 4.6 percent of the site was added. In spite of the decrease in residential land, the number of lots increased to 182 and the density to 31.38 lots per hectare. The cost of development per hectare increases only slightly with increases in density, but the cost per lot is reduced since there are many more households to share the costs. Assuming the infrastructure costs increase proportionally to the increase in circulation space, the total costs for the site would be $1,786,153 or $9,814 per lot. This is a 38.2 percent reduction from the cost of the larger lots. The following activities are recommended in order to reduce site costs:

a. **Review subdivision design standards and practices**
The Ministry of Housing, in cooperation with the NHC and Town and Country Planning, should take another look at design standards as they relate to lot sizes and to actual need and affordability. At least, the present minimum of 223 m^2 (2,400 ft^2) should become the accepted norm for any sites and services projects sponsored by the Government. Other countries with traditions similar to those in Barbados have, in light of economic realities, developed lots of 150 to 200 m^2 (1,600 to 2,150 ft^2) and found them to be very satisfactory as well as affordable to a larger number of households. The set-back and lot coverage standards should also be reviewed since it may be necessary to make some adjustments to these standards for smaller lots.

The proportion and orientation of the lot are also factors influencing cost. The normally accepted standard is to have the depth of the lot approximately twice the width or a ratio of length to width of 2:1. Thus, the desired size of a 200 m^2 lot would be 10 meters by 20 meters. The short dimension of the lot should always be oriented toward the street, since this reduces the length of road and infrastructure lines needed to service the lot.

With serviced lots selling at $4.00 per ft^2, any reduction in lot size has a very direct effect on the cost. If lot size is reduced from 3,000 ft^2 to 2,000 ft^2, the savings would be $4,000 or 7.6 percent of the total cost of Houses C and D.

b. **Develop house plans adaptable to smaller lots**
With less space available, a house must be carefully designed to assure efficient utilization of the lot and satisfaction of occupants' needs. Plans should provide for future expansion of living space. On smaller lots, it is often advantageous to use party walls connecting two or more houses.

2. Infrastructure

Barbados enjoys a very high level of services throughout much of the island, and particularly in urban areas. It is understandable that there is reluctance to compromise on established standards but, in light of higher costs for land and infrastructure, it will be necessary to reduce standards, and thereby costs, if lower-income households are to own land without large Government subsidies. The following activities are recommended:

a. Develop road and drainage standards appropriate for sites and services projects

Since by far the most expensive element of site development is the road and drainage system, it offers the greatest opportunity for cost reduction. In sites and services or special projects targeted for low-income families, a simplified road design without concrete curbs and gutter and a minimal surface drainage system would reduce costs. A detailed study of development costs was not conducted so it is not possible to indicate the magnitude of potential savings.

Another option for reducing road costs is to serve some lots in a development with pedestrian-ways rather than full vehicular streets. Automobile ownership is usually not high in lower-income neighborhoods, thus requiring less direct vehicular access. Rights-of-way for pedestrian paths of 20 ft (6.12 m) will permit access of emergency vehicles. A 6-foot wide paved path with surface drainage is adequate for pedestrian use, and would result in a substantial savings on development costs. Where possible, pedestrian-ways should be planned in conjunction with parks and open spaces.

b. Reduce installation costs of the water system

Presently, the design and installation of the water distribution system for a development is done exclusively by the Barbados Water Authority. The developer is charged actual cost of labour and materials plus a 60 percent fee. These costs are, of course, passed on to the consumer. There are complaints that because the Water Authority is a monopoly, it is charging excessively high costs for installation. In some cases, the final cost charged to the developer was as much as 150 to 200 percent over the original estimate.

Opening up the system to permit involvement of the private sector would in many situations reduce the cost of the water system. The review and approval of the engineering design and the installation should remain with the Water Authority, but a developer should have the right to do the installation or to contract it out through a competitive bidding process. To assure that high quality work is done, the Water Authority could establish a list of pre-qualified contractors.

There are strong pressures within the Government to maintain the present high development standards, as well as larger lot sizes. In light of increased land and servicing costs, it is clear that either the density of developments must be increased or the cost of infrastructure reduced, or a combination of the two, if housing opportunities are going to be available to low-income households in the future.

D. OTHER AREAS FOR COST REDUCTION

1. Legal Fees

The most significant other costs are for legal fees required for the title and mortgage application. This is compounded by the additional carrying charges incurred because of delays in the legal process. As mentioned earlier, the Government could take the lead in reviewing the process and establishing procedures and guidelines for acceptable practices as well as a system of sanctions for delinquent lawyers.

For sites and services and other officially sponsored projects, the title search and legal work should be for all lots at the same time, thereby reducing the cost and time required through economies of scale.

2. Duties and Taxes

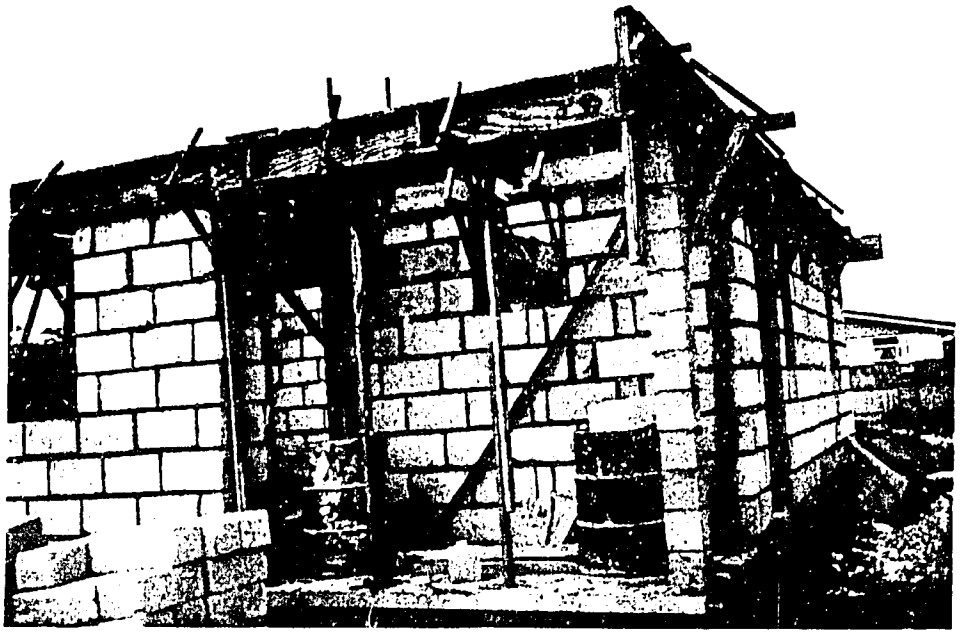
Again, for officially sponsored projects designed for low-income households, it would be possible to give an exemption from the consumption tax and stamp duty. This would reduce the cost of imported materials by approximately 10 percent; and it would provide a savings of approximately $700 on House C and $1,000 on House D. There would also be some reduction in the cost of materials for infrastructure.

E. REDUCTION OF IMPORTED CONSTRUCTION MATERIALS

The way to reduce construction material imports is to substitute locally-available materials for those presently purchased abroad. The only structural material indigenous to Barbados is cut coral stone blocks which were used traditionally for permanent residential construction, but have not been popular in recent years. Two builders interviewed for this study are using coral stone for some of their houses. New equipment at the quarries has improved the quality and uniformity of blocks making them easier to use.

The foreign exchange costs of materials can be reduced by manufacturing or assembling items in Barbados from imported ingredients or components. Cement is an example of this kind of import substitution. While cement is locally produced, some of the components and energy used in production are imported. Other examples of locally-manufactured products include fired brick, floor tiles, PCV pipe and some types of windows and doors. The lower the initial capital investment and energy requirements, the more effective the material will be as an import substitute.

Research could be conducted on the use of by-products of the sugar industry for building materials. Roofing panels and blocks, or wall panels for interior partitions, are possible uses that might be considered.



Some builders are using coral stone for low- and moderate-cost housing construction.

CHAPTER IV

HOUSING PROGRAMS

There are a number of programs being discussed within the Government, as well as initiatives by several private firms, to introduce prefabricated housing systems on the island. This chapter will review several programs that could be instituted to assist lower-income families to improve their housing conditions and the potential savings which could result from these programs. The objective of any of the programs should be to achieve as close to full-cost recovery as possible so that programs can be continued to serve the maximum number of households.

A. GOVERNMENT SPONSORED PROGRAMS

Government programs should be designed to serve the low-income segments of the population inasmuch as the needs of the middle- and upper-income households can be satisfied by the private sector. Also, the Government should do those things that individuals cannot do for themselves. The conclusion of this report is in agreement with an earlier report[22] that recommended that the Government not be involved in housing construction activities. The main thrust of Government intervention should be to facilitate the provision of land and basic urban services at an affordable price with minimum subsidization. Programs should build on the long-standing tradition of self-help construction over time. The following types of programs are recommended:

1. **Sites and Services Project**

   There is an adequate supply of larger lots in approved and, in many cases, developed subdivisions to meet the demands of middle- and upper-income families. The shortage that the Government could help to alleviate is for smaller, less expensive lots.

   A good site plan for a sites and services project should meet the needs of the intended beneficiaries in an efficient and economical manner so that the lots are affordable without Government subsidy. Residential land use should be maximized (65 to 75 percent) with circulation requiring not more than 15 to 20 percent of the site. Public facilities and open space generally use 5 to 15 percent of a site.

   Most lots should be the presently accepted minimum size (223 m^2 -2,400 ft^2), or smaller, and about twice as deep as they are wide. Larger plots should be located in the more desirable location, such as along main streets, and can be sold at higher prices.

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[2]A Review of the Residential Building Industry of Barbados. Abeles, Schwartz, Itaekel and Silverblatt, Inc. New York, 1982.

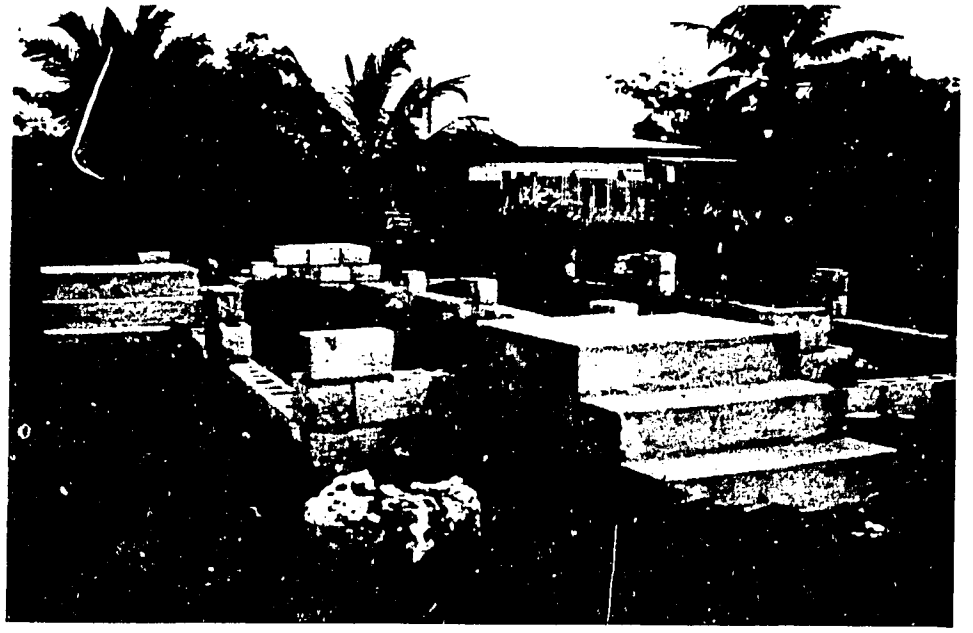
Serviced sites could meet the needs of those households that own a chattel house but, for some reason, do not want to or cannot purchase the lot on which it located; as well as providing a relocation option for households living on very small lots in the older sections of Bridgetown. Acquiring a serviced lot would also permit families with savings or sources of private finance to start construction on a house.

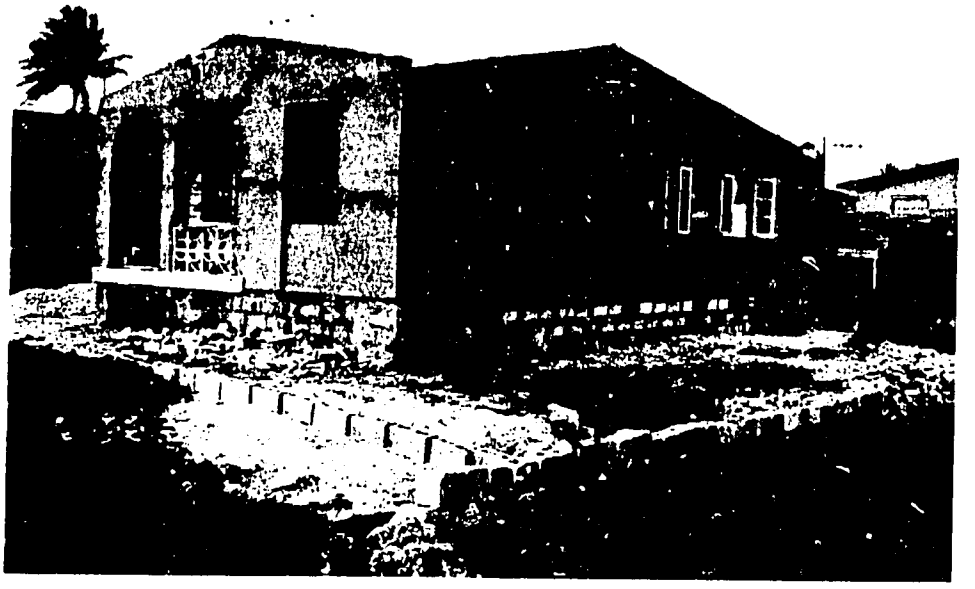
2. **Sites and Services Project with Loans for Self-help Construction**
For a household with limited financial resources, it is difficult to purchase a lot while paying rent and at the same time save money to build a house. It is important that a family occupy the lot as soon as possible to avoid double payments. If a construction loan is provided with the purchase of a lot, the family can begin house construction immediately.

If the owner acts as his own contractor and provides—or gets family and friends to provide—some of the labour, he can reduce the cost of the house. Using House C as an example, the savings on overhead and profit would be $4,900. Assuming that labour costs are reduced 10 to 20 percent, there would be an additional savings of $1,100 to $2,200 for a total savings of $6,000 to $7,100.

Instead of a straight construction loan, an option would be to provide a combination of building materials and cash to pay for labour. A local private building materials supplier could be contracted to deliver a predetermined quantity of materials on presentation of a voucher from the owner. The supplier would then be paid for the delivered materials with project funds. Because of volume purchases, it should be possible to save a minimum of 5 to 10 percent on material costs. For House C, this would be between $1,000 and $2,000, thus giving a potential total savings of between $7,000 and $8,600. This is a reduction of between 18 and 22 percent of the construction costs. It is important that the procedures and regulations of a building materials program be kept as uncomplicated as possible so that savings on material costs are not offset by increased administrative costs.

3. **Sites and Services with Starter Home**
Incremental building has been the accepted method of construction in Barbados for many years for a large segment of the population. A field visit to the residential neighborhoods of Bridgetown shows that it is still a viable option for many households. Yet in spite of this long standing tradition, the Government has never accepted incremental building as an official policy, nor sponsored a core house or starter home project. One of the main advantages of a starter home is that the family can move in immediately after purchase and thus avoid the problem of double payments. Additions and improvements can be done over time as funds are available.





Incremental building has been the accepted method of construction in Barbados for many years for a large segment of the population.

To avoid further involvement of the Government in housing construction, it is recommended that proposals from private developers or builders be solicited for projects on lands owned by or available to the Government. MOHL would establish the program and criteria to be followed. The selected developer would then be responsible for the installation of infrastructure and the construction and marketing of the starter homes.

It is felt that a starter home program, if properly designed and implemented, would be well accepted in Barbados. This could be confirmed by conducting a market study by building models of starter homes in several locations on the island which would be open to the public. Visitors would fill out a questionnaire on their reaction to the starter home concept and on their housing needs. Successful starter-home programs have been developed in the island nations of Jamaica and Mauritius. In other countries that have done a market study, the concept has been well-received and the information obtained useful in fine tuning the program to beneficiaries' needs. A market study would also provide an excellent opportunity to test the acceptability of other concepts such as smaller lots and the use of party walls.

A one bedroom starter home of approximately 320 ft^2 would probably be most acceptable. To serve lower-income families, a core house of 160 ft^2 with one multi-purpose room and sanitary core could be considered. This has been successful in other countries. A core house should be a basic shell with few or no finishes. There would be less opportunity for cost reduction than in the example above since over half of the house would be built by a contractor. If an owner is his own contractor for an addition that would enlarge a 320 ft^2 house to 600 ft^2, he has the potential to save between $2,500 and $3,000 on labour, overhead and profit.

Since each of the above solutions would serve a different target group, all three could be combined into one comprehensive program that would give families several options from which to choose. The important objective should be to provide acceptable and affordable solutions for low-income households lacking shelter opportunities at the present time.

B. SYSTEMS BUILDING PROPOSALS

At the present time, there are several proposals to introduce new systems building techniques to the island. The proposals include:

- systems using precast concrete panels for walls
- a system of precast two-room modules
- systems using either metal and wire frames or expanded polystyrene panels which are covered with concrete

While these are new technologies to the island, there is a housing systems industry of long standing in the lumber companies' timber houses. As indicated earlier, savings of the magnitude of 10 percent are possible with system-built structures. This results from a more efficient production process and use of materials and

manpower. Also, lumber companies pay less for materials since they can be imported in bulk at reduced prices without the normal retail markup. The timber houses of Barbados illustrate the main advantages of prefabricated building which are efficient production techniques and economies of scale resulting in a less expensive product produced in less time.

The introduction of systems building could help to overcome the problems of inefficiency, wastage and substandard workmanship that are present in the construction industry. But there are potential problems that must be anticipated. Prefabricated housing has not been widely accepted in developing countries; one reason is that it does not fit into the traditional incremental construction process used by the vast majority of low-income families to provide their own shelter. Prefabricated housing often has the problem of being too expensive for the poor but not acceptable for aesthetic reasons to the middle-and upper-class families who could afford it. Also, there should be concern over thesize of the market in Barbados and its capacity to support capital intensive systems. The following points should be considered when evaluating systems building proposals:

- What is the import component of the system and in what form do materials come into the country? A system whose components were imported into the country basically complete would not have a positive impact on the local economy in that imports would be increased while creating few new jobs. A system that uses local materials and requires assembly or fabrication in country would be the most desirable.
- How versatile is the system? Can it be readily adapted to new forms or demands? Given the Barbadians tradition of home improvement and additions, it is important that the system be easily expandable and accept additions and modifications.
- How capital intensive is the system? What are the start-up costs to get the system operating? The higher the start-up costs the larger the production that will be required to amortize the initial investment. A study of the local market, and what percentage a system can realistically hope to capture, will help to determine the feasibility of the system. Obviously, several individuals feel there is a good market for systems building in Barbados but, if all enter the market, it may be divided so that none of the ventures is viable.
- Are there other markets outside of Barbados to be exploited to increase the production levels? The export of components which use local materials and labour could have a positive impact on the economy.

- Is the product from the system less expensive than conventionally built housing? Is there a savings from reduced construction time? If the product is not more efficient and less expensive, one would have to question it being introduced. The amount of cost reduction will be limited since most systems deal only with the structural walls which account for only about 10 percent of the total construction cost. Therefore, a 10 to 20 percent reduction in the cost of the walls would result in a 1 to 2 percent savings on the cost of the house.

It is recommended that the concept of systems building in Barbados be supported by the Government, and that improvements and innovations in the construction industry be encouraged. Government should become involved in areas where it can best serve and not in actual construction or subsidizing of schemes. As with other programs, the role of Government could be to facilitate the provision of land and basic urban services. For new innovations, assistance could be provided in expediting agency review and approvals as well as employing various systems in MOHL-sponsored demonstration projects. It is felt that support should not take the form of large subsidies to a particular system, but that promoters should be encouraged to compete in the open market to achieve success by providing an improved and less expensive product.