HOUSE CONSTRUCTION IN JAMAICA:

A National Overview

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CHAPTER I

CONSTRUCTION IN THE NATIONAL ECONOMY

A. CONSTRUCTION AND MACROECONOMIC INDICATORS

In Jamaica the two most important causes of inflation tend to be import prices of building materials and the commercial bank loan rate. Given the level of dependence of construction on imports and bank credit, inflation has had a negative effect on the construction industry.

- As a percentage of Gross Domestic Product, Construction and Physical Installation between the years 1962 to 1980 ranged between 14.7% and 5.2% whether constant or current prices are used as a basis for the calculation.[1] (See Table 1:1.)

- In magnitude, and at current prices, the construction sector's contribution to GDP steadily rose from 1972 to 1975. Since 1975 it has been falling, although there has been an upturn in 1981.

- At constant prices there has been a marked decline in building production and construction between 1972 and 1980. In general, over the last ten years there has been a rising monetary expenditure but a falling real contribution to GDP.

- Between 1972 and 1980, the average rate of decline for the sector was 29% and for GDP as a whole 27.8%. Thus, while need was rising, supply fell short.

B. THE ECONOMIC STRUCTURE OF CONSTRUCTION

For the last decade Jamaica's construction activities have fallen into a general pattern as follows:

- New work comprises 75% of all work. Little is spent on refurbishment or maintenance.

- The private sector accounts for a high percentage of new work. Over 50% of this relates to the construction of new dwellings, incorporating modern conventional materials of block, reinforced concrete and roof sheets.

- Infrastructure investment is irregular and at times draws plant and labor skills away from the general run of work, i.e. to hotel areas, to a new power project or major residential development on reclaimed land.

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1 Persaud, W.H. Inflation and Housing in the 1980's. Department of Economics, University of the West Indies, Kingston, October 1981.

TABLE 1.1

CONSTRUCTION AND INSTALLATION
IN GDP 1972 - 1980 CONSTANT PRICES

1972	1973	1974	1975	1976	1977	1978	1979	1980	
347.4	279.3	260.2	248.7	168.5	133.5	138.3	137.2	95.6	Construction and Installation
14.7	12.1	11.6	11.2	8.3	6.7	7.0	7.0	5.2	Percent
2,360.1	2,299.4	2,251.5	2,229.6	2,026.1	1,987.3	1,982.0	1,953.4	1,848.0	Total GDP

SOURCE: Social and Economic Survey, Jamaica. Various Years.

- Foreign exchange difficulties affect the regularity of the flow of imported fittings, fixtures and other construction materials.

- Shortages of skilled labor, materials, supervisors and management staff are delaying recovery in the housing sector.

- Building activity in local renewable materials is not mentioned in the statistics.

- The internal structure of the industry in unrecognized; diagnosis of ills lacks precision.

A development profile of the construction industry in Jamaica has yet to be constructed but its structure can be identified (Figure 1:1). Indicators would include:

- The share of construction in the national accounts — a share which rises as the economy expand.

- The percentage of locally produced building materials.

- The adoption and spread of relevant modern technology (many technological adoptions are exciting rather than developmental and only have a staying power of a few years, i.e. many housing systems).

- The composition of the labor force, i.e. the percentage of skilled employees in relation to the whole is an indicator of industrial health (Table 1:2).

- The degree of relevant mechanization. Some mechanization is exciting rather than relevant and not economical in the mid and long term.

In practice, the indicators listed above are highly correlated and may be represented by the first listed — the share of the monetary sector represented by construction output.

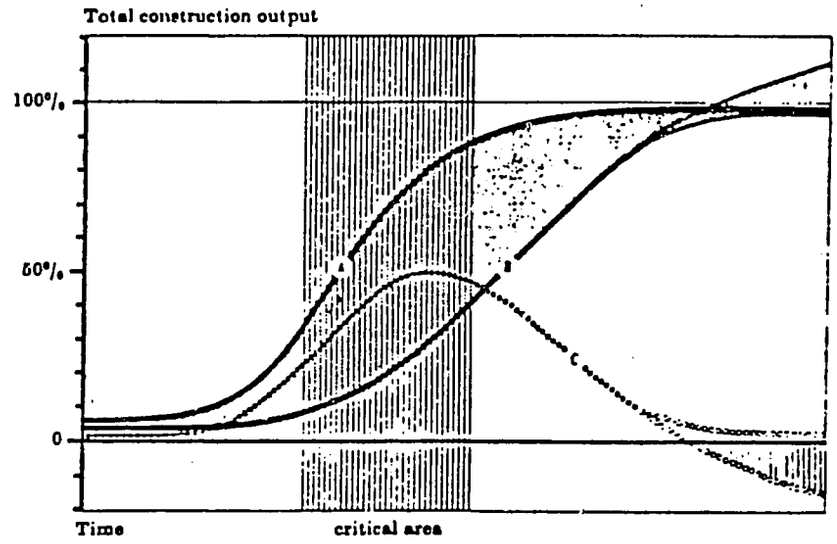
The construction of a development profile (See Figure 1:1) of Jamaica's construction industry would probably show it to be in the critical (i.e. shaded) area and to the left of the shading (i.e. there is a long time to go before the industry absorbs a large relative share and absolute share of the the national purse and the local supply of modern factors of production overcomes the significance of imports — perhaps 30-50 years). At the moment, construction has to complete with other sectors of the economy for scarce foreign exchange. Its allocation — or share — will, under current conditions, limit its growth and so capability to meet, for example, any Government housing and settlements program that is proposed (Table 1:3, see particularly the last column which gives a construction environment profile applicable to Jamaica).

C. EMPLOYMENT IN THE CONSTRUCTION INDUSTRY

Accurate statistics for the construction industry and for its use of labor are hard to come by in any country. This is because of the multi-faceted activity of the construction as it spreads horizontally through many sectors of the economy. The situation is aggravated by seasonal fluctuations, under-employment, self-help constructors and strikes.

FIGURE I:1

A DEVELOPMENT PROFILE FOR
THE CONSTRUCTION INDUSTRY



KEY:

A -- Output of construction in the monetary sector.

B -- Local supply of modern factors of production

C -- Imports

NOTE: The critical area indicates a time span of between 30 and 50 years into which Jamaica is perhaps one-third of the way.

TABLE 1.2

EMPLOYMENT LEVELS BY INDUSTRY

ANNUAL AVERAGE 1975 - 1980

Category	1975		1976		1977		1978		1979		1980	
Total Classifiable Labor Force	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
	682.2	100	685.9	100	689.9	100	708.5	100	689.0	100	720.4	100
Agric., Forestry, Fishing	226.8	33.2	243.9	35.6	244.0	35.4	257.0	36.3	232.0	33.7	263.5	36.6
Mining, Quarrying, Refining	7.4	1.1	7.8	1.1	7.4	1.1	6.0	0.8	7.6	1.1	7.8	1.1
Manufacture	74.0	10.8	75.6	11.0	76.2	11.0	79.0	11.2	73.8	10.7	76.7	10.6
Construction and Installation	44.6	6.5	38.0	5.5	33.0	4.0	32.9	4.6	31.9	4.6	25.4	3.5
Transport, Communication Public Utilities	31.6	4.6	31.5	4.6	29.6	4.3	29.3	4.1	29.3	4.3	34.3	4.8
Commerce	81.7	12.0	80.7	11.8	88.4	12.8	93.2	13.2	89.9	13.0	91.2	12.7
Public Administration	98.4	14.4	106.4	15.5	111.3	16.1	108.0	15.4	110.1	16.0	108.7	15.1
Other Services	114.5	16.8	98.5	14.4	96.0	13.9	98.0	13.8	108.4	15.7	108.1	15.0
Not Specified	3.2	0.5	3.5	0.5	4.0	0.6	4.4	0.6	5.9	0.8	4.6	0.6

SOURCE: Social and Economic Survey, Jamaica; various issues.

TABLE 1:3

THE MAIN DIFFERENCES IN CONSTRUCTION ENVIRONMENT
BETWEEN THE DEVELOPED AND LESS DEVELOPED COUNTRIES

Resources and Needs	Industrially Developed Countries	Less Developed Countries	
		Those with High Foreign Exchange Earning such as Oil-Producing Countries	Those with Low Foreign Exchange Earning; i.e., Jamaica
(1) MONEY:			
1.1 Capital available for construction	Abundant.	Abundant.	Scarce.
1.2 Average family income	High.	Moderate.	Low.
1.3 Effective interest rate	Low.	Moderate.	High.
1.4 Public construction expenditure vs. private sector	Low.	High.	Very High.
(2) MACHINERY:			
2.1 Construction technology	Capital intensive.	Labor intensive moving toward mechanization.	Labor intensive.
2.2 Modern construction equipment and machinery	Plentiful.	Available, but shortage of services and operators.	Scarce.
2.3 Ratio of average cost of renting construction equipment to average labor wage	Low.	Moderate-High.	High.
(3) MATERIAL:			
3.1 Modern construction material	Plentiful.	Imported types available but shortage of skilled manpower constrains their use.	Scarce.
3.2 Quality of available construction material	Good.	Poor.	Poor.
3.3 Ratio of average cost of material per average labor wage	Moderate.	High.	High.
(4) MANPOWER, EMPLOYMENT, WAGES:			
4.1 Indigenous skilled manpower	Plentiful.	Scarce.	Scarce.
4.2 Foreign skilled manpower	--	Available.	Available.
4.3 Indigenous unskilled manpower	Scarce.	Plentiful, but due to high demand, they are in short supply.	Plentiful.
4.4 Unemployment	Small among skilled. Moderate among unskilled.	Negligible among skilled. Moderate among unskilled.	Small among skilled. High among unskilled.
4.5 Wages	High.	Very high for skilled. Moderate for unskilled.	Moderate for skilled. Low for unskilled.
(5) PROBLEMS AND NEEDS:			
5.1 Population growth	Low.	High.	High.
5.2 Rate of urbanization	Slow and steady with local shifts.	Very high.	Moderate.
5.3 Urban housing shortage	Moderate.	Very high.	High.
5.4 Rural housing shortage	None.	Moderate.	High.
5.5 Level of competition of residential housing with key development projects in using available resources.	Not competitive.	Not competitive for money, but highly competitive for manpower, machinery and material.	Highly competitive for all resources except manpower.

SOURCE: Rayani, Raza, Criteria for Seismic Design of Unreinforced Masonry and Adobe Low-Cost Housing in L. J. Goodman, et al., Editors, Low-Cost Housing Technology. Pergamon Press, 1979.

Taking the above into account, study of general trends and figures in numerous countries[1] leads one to expect employment in Jamaica in construction to be about 5% of the paid work force. Employment in associated building materials and components, construction materials distribution and transport probably adds another 3% to 4%. These figures give a certain expectancy and viewpoint when examining any particular set of statistics that is available for Jamaica (See Table 1:4).

Labor relations between labor and employers are conducted informally through a labor agreement which is made each year or as necessary. Two unions, the Bustamante Trade Union and the National Worker's Union represent the majority of construction workers in Jamaica.

The Joint Industrial Council has members from both unions and employers and the Trades Union Congress. The JIC is responsible for the terms of the Labor-Management agreements. These have worked satisfactorily until recent years when strikes and violence have plagued construction sites. An anomaly may be that the JIC sets day rates, but in practice trades sub-contract work by task, not by day rate.

Labor costs have been rising rapidly and the listing below gives the increases over recent years.[2]

1 April	1971	15%
1 January	1973	26%
1 April	1975	82.7%
1 April	1977	waived
1 April	1978	33.33%
1 April	1980	33.33%

These rises appear high, yet are well below the 1981 rises in the Consumer Price Index. The worker is less well paid now than early in the decade.[3]

D. SUMMARY

There is a need to develop a new set of indicators to reveal performance of the construction industry. These should distinguish between civil construction and housing and between different levels of technology measured on a scale of four from International Modern to traditional timber, nog and wattle. Current indicators covering

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1 Turin, D.A. Construction Industry, UNIDO, UN, New York. 1969.

2 Goldson, B. L. Analysis of Increased Housing Costs Over the 70's and Its Implications for the 80's, Kingston, 1981.

TABLE 1:4

GROSS DOMESTIC PRODUCT AND CONSTRUCTION LABOR FORCE

a	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total	2,068	2,260	2,258	2,265	2,244	2,026	1,987	1,982	1,953	1,848
Construction	269	259	230	213	214	168	133	138	137	96
b										
Construction Labor Force 1,000	55	50	51	50.6	45	39.6	32.2	32.9	31.9	25.4

SOURCE: Government Economic and Social Survey.

the industry at macro level show an upturn in activity after nearly a decade of decline. If GOJ development aims in general are to be achieved, it is probable that construction will have to grow at a faster rate than GDP.

There is a need to develop a development profile of the industry so that discussion, policy formulation and decision to act are related to this quite as much as to the perceived historic inheritance. This profile should plot expenditure in construction against the local supply of the modern factors of building production and imports. The pattern so revealed will guide investment in the industry and in construction materials enterprises and enable a planned development policy to be pursued. It will also enable a comparative economic and financial analysis to be made of the blandishments of semi-industrialized housing companies. While they may appear to offer something immediate, it may be at the cost of the development of the industry as a whole.

Labor opportunities vary greatly between sub-sectors for the construction industry; between housing and road maintenance, between small contractors and large, and between block and steel and semi-industrialized. In all, some 5% of those in work are in construction and perhaps 3% more in material production and hoarding. Labor efficiency is low on block and steel sites, and is lowered further where welfare-employed, day labor is utilized to flood the site.

CHAPTER II

THE CONSTRUCTION PROCESS

Construction is a complex affair; not because of its technical complexity (although in Jamaica because of earthquake, cyclone, flood, expensive clay and termite risks such complexity is to be found), but because of the number of participants involved and the conflicts that arise from the differing requirements and attitudes.

A. THE MAIN PARTICIPANTS

Clients, financiers and target users are the main participants of the housing process. They must be in focus for a building project to be projected. Five stages can be said to characterize the process:

- Initiation
- Design
- Preparation for construction
- The organization of construction
- The execution of building work[1]

These stages are present whether the project is a squatter's shack on the edge of Kingston or a new housing scheme of the Ministry of Construction.

When the GOJ declares its interest in lowering the costs of house building, it is to this sequence of events that it must turn, every element of which will demand policy attention.

Diversity of Interest

Reducing costs continues to be an over-riding interest of the initiator of a scheme and of its occupants-to-be. Predicting building costs is inherently difficult for costs arise in part through the character of the building organization adopted and the various interests of the actors involved. In Jamaica the same block and steel house erected in the same work period by differing contract methods will vary in price.

• Erected by skilled blocklayer for own occupation	100% base
• Erected by one-man contractor for a family	115% (estimate)

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1 Oakley, D. The Phenomenon of Architecture, Pergamon Press, Oxford, UK, 1970.

- Erected as 1 of 10 in a small contract — 125% (estimate)
- Erected as 1 of 100 in a large contract — 140% (estimate)

Wide range though this is (and the percentages need a study untaken for checking), it is not the whole range. All the foregoing contracts displayed assumed the purchase of materials on the open market at hardware store prices. If the contractors, however, have management and labor only contracts and are supplied with materials through the government warehouse and stores, then the whole range drops to something like 85%, 100% 110%, 125% respectively. Should neither government stores or commercial outlets be able to supply, the contractor may have to purchase on the black market at prices up to twice the commercial rate.[1]

Costs, form of contract and source of building materials supply are closely mixed. It is here that study must focus to arrive at the most cost effective "supply/contracting/supervision" system of delivery.

It will not be in everybody's interest to lower base costs by exposing where the excess money flows.

Price differentials are brought about not only by method of contract, but by profit expectancy, overhead, overpricing and by contractors insurance against the unknown, i.e. labor strikes, security costs, and wage rises.

Conflict Management

We need only to expose this building commissioning and contract process in order to recognize that it is one demanding conflict management. Failure to recognize this lies at the heart of the management difficulties experienced with the process in Jamaica. That conflicts arise is known. That they are inherent to the process and escalated by the local environment is not perhaps openly accepted. It is only through the open resolution of conflict the energies of the main participants can be channelled to a common end.[2]

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1 Supply shortages, and the need to complete quickly for early occupation, puts the individual owner-occupier at a disadvantage in negotiation on the black market and for craft assistance task rates. The 115% for "Erected by one-man contractor for a family" in the listing above represents an average about which there may be wild extremes.

2 The Masterbuilders Association has played a signigicant role in providing assessors for disputes surrounding claims for extra payment.

B. CONTRACTURAL RELATIONSHIPS BETWEEN PARTIES

A building is normally sold before it is made, i.e. the commissioner is on line with his money before work commences. This characteristic of housing, the sale up-front, is at the root of the complicated and elaborate written documents and drawings through which the design team communicates to the constructing team. According to custom in Jamaica, all the characteristics of the final product must be fully described, itemized (and costed in principle) to enable the contractor in competitive bidding to offer a firm price. Contractors are generally linked to bills of quantity.

The tendency in Jamaica is to practice competitive tendering rather than joint-venture or negotiated forms. Thus, the contribution that the constructor (i.e. a systems builder) could make to design is neglected. At the same time, his technologically-based solutions, designed in isolation from the client, are hawked around as being ready-made solutions on a "take it or leave it" basis. The Government to date has failed to define, as client, what is wanted in social and technical terms. This is a central policy need (Figure 2:1).

Risk Management

The avoidance of risk, or rather the attempt to avoid risk and conflict to control prices, lies at the heart of present contractual procedures. Unfortunately, neither risk, conflict nor price is under control. This is a particular embarrassment to the GOJ.

The attempt to eliminate risks in commissioning construction often leads to the greatest risk of all — rigidity of administration, which in the construction executive arm of the MOC(H) is a present inheritance.[1]

Not every job is best done on a lump sum fluctuating price contract. The Ministry of Construction (Works and Housing) has used lump sum contracts, lump sum subject to escalation in labor and materials, cost plus contracts and cost plus fixed fee contracts (See Chapter IV, Table 4:4).

Contractor Selection

The larger the contract, the more formal the pre-qualification procedure and the more environmental factors influence the assembly of the bid list and the final selection. Formally pre-qualification has been determined by the size of the contractor, his ability to do the work, financial standing and the number of years of relevant experience. An improved pre-qualification form has recently been prepared[2] but is somewhat naive in asking contractors to declare the reason why they failed to perform well on previous construction contracts.

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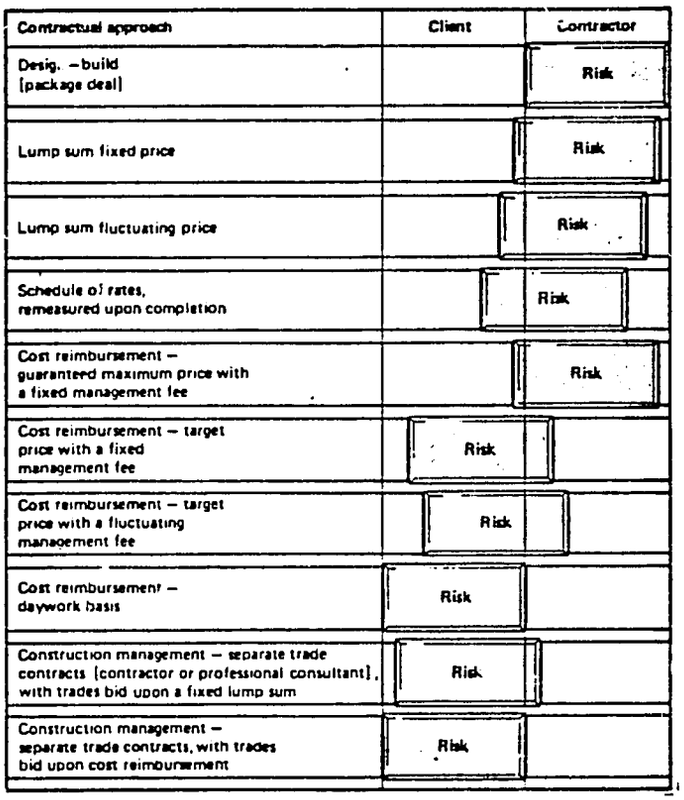
1 Flanagan, Roger, Change the System in Building, London, 20.3. 1981.

2 Senold, F. J. Organization and Operations of Sites and Services Division, MOC(H), GOJ, Kingston, September 1981.

FIGURE 2:1



Degrees of business risk for client and contractor in relation to particular forms of contracts.

SOURCE: Flanagan, Roger in Change the System, Building, London, 20.3.1981.

Bonding of contractors is a method of ensuring a penalty to those who fail to carry out the work according to the contract. Performance bonds may range from 10% to 20% of contract value. Retention sums of 10% of value of work are not unusual and normally some relief is given to contractors on practical completion by the release of 50% or so of the monies withheld at each stage payment. In some instances, both bonds and retention sums have been required of a contractor. There should be no such requirement for both bond and retention.[1] The outstanding retention money is held for what is called "the maintenance period" during which period the contractor is called upon to repair defects.

The system is breaking down as a control. A high proportion of current projects stand 15% to 25% incomplete in Jamaica. One presumes that in some cases it is because of bankruptcy of finance or management. In other cases it appears that a profit has been made at the 85% stage and there is little profit in completing work. So completion is not undertaken, despite retention or bonding. Defaulting on bonding has led to bonds now being hard to get.

Even if bonding was a complete success in achieving discipline, it is a job overhead that increases bid costs. Exploration of other ways to ensure compliance (and completion) is required.

C. THE STAGES OF THE CONSTRUCTION PROCESS

While a fair amount of attention is given to improving site behavior and efficiency, rather less has been given to the pre-contract stage when professional management of quality is crucial. Quality of pre-contract decision making leads to quality on the site — this is a further major policy theme.

D. THE ROLE OF GOVERNMENT IN CONSTRUCTION

This is a varied one:

- The Government acts as a legislative authority.
- The Government acts as a client.
- The Government acts as a constructor through direct labor contracts.
- The Government sets up organs for finance, saving and borrowing for construction.
- The Government sets up building materials factories.

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1 Watson, J. G., The Development of the Domestic Construction Industry in Jamaica, World Bank/UNDP, Kingston, 1979.

- The Government sets up production units for timber and pre-cast concrete components.

- The Government operates design organizations.

Since Government has acted as a client for housing and construction in Jamaica for decades without promoting technical and organizational development in the industry as a whole, it indicates that being and acting as a major client is not in itself sufficient. A definite policy is required to use the public sector as a pioneer in the production of desired changes in the structure and attitudes of the industry as a whole. The issuing of detailed technical terms of reference is essential. PRODEM and a revised building code (Annex II) have significant contributions to make to this task.

E. SUMMARY

Construction is a complex activity because it demands the cooperation of many people, professions, business and government among whom are to be found a wide diversity of interests. Some are trying to make a profit, others offer service, while the client agency is trying to achieve quality at low cost. All this remains true even if the diversity of GOJ organizations now involved in housing was reduced in number. The central problem is structural to the building process.

It is, thus, important to expose the relationships and the decision making patterns for it is these activities that need to be more effectively managed if construction efficiency is to be improved. There is little point in gaining the efficiency of "one member" of the team if teamplay is still ragged.

There are identifiable relationships between contract size and type and the cost of a standard dwelling. More information on this is required if the median is to be found.

Risk and conflict management need to be accepted as part of the activity of construction and people trained to appraise and adjudge. Improvements are required in the pre-qualification of contractors, and in the use of bonds and retention monies. These no longer achieve their declared objectives of ensuring completion on time and specified quality.

In these matters and more, GOJ has the opportunity to achieve improvement since it is so involved in the construction process, especially the domestic construction process; it is legislator, client, contractor, financier, materials manufacturer, component maker, and building designer. The potential clout of this influence is not being exploited. A definite policy is required to use the public sector as a pioneer to achieving changes in attitude and in the structure of the industry. PRODEM offers a medium through which many of the needed disciplines can be issued and operated, but policy formulation must come first.

CHAPTER III

THE OUTPUT OF CONSTRUCTION

A. CATEGORIES AND ANALYSIS

There are several ways the construction industry can be disaggregated for analysis. Common are:

- New work and maintenance, and repairs
- Housing, non-residential building and other construction works (bridges, dams, etc.)
- Public sector and private sector
- Modern and traditional

Breaking down into categories is important for the development of policy. There cannot be a policy for construction but rather a number of interlocked policies for elements and sectors of the field. A decision needs to be taken as to what categories are useful for Jamaica and in which context. This enables statisticians, designers, quantity surveyors and others to refine their tools within publicly agreed categories.

While this report to this point has considered construction output in a global manner, this is not effective beyond a certain point. Different categories of construction consume different inputs, follow different patterns of financing, grow at different rates, use different technologies and are sometimes handled by different professions and contractors.

Therefore, a separate analysis is required. Here, this will be limited to housing construction with an emphasis on the categories modern and tradition.

- **New Work and Maintenance and Repairs**

  While new work occupies a very small part of the housing stock of Jamaica, it receives most of the policy attention. If the housing stock as a whole is reviewed, however, then maintenance and repair figure high in the priorities, especially in the light of hurricane and earthquake risks. Poorly maintained buildings are at a greatly enhanced risk in the face of such hazards.

- **Housing, Non-Residential and Other**

  Whatever is determined for housing will have ramifications for other Government building types. Unity of purpose between departments of housing concern and general building design is important, most particularly in the fields of planning, control, standards, building legislation and contract management.

Public Sector and Private Sector

In Jamaica housing, the public sector provides the lead and the environment in which the private sector operates. The private sector is a dependent sector. This places the Government in a strong position when seeking to give a lead. It also places the Government in an exposed position should it fail to give a lead, for the private sector does not know what to do and how to plan and prepare.

Modern and Traditional:

- Traditional Buildings: Those of timber frame and nog, wattle and daub, timber frame and boarding, earth buildings.

- Conventional Modern: Buildings of clay block, brick, concrete block and reinforced steel, reinforced concrete and imported corrugated sheets.

- Neo-Conventional Building: This is based upon the international development of new materials and material uses. It is represented by advanced reinforced concrete technology, pre-stressed concrete, steel frame structures, mass production of building components, prefabricated wall systems, patent cladding systems for roofs, constructional systems for whole houses.

- Industrialized Building or Rationalized Building (Sometimes known as International Modern): This technique of building production makes use of knowledge gained in the three other forms of building production, yet puts this knowledge into a new framework that results in a new technique of building production. The importance of the industralized building process lies not so much in the idea of industrialization as of rationalization. The essence of the idea is to so pre-plan building initiation, design, production programming, manufacture and erection that the majority of building problems are solved before anyone starts to turn the earth upon any particular site. This concept, rather than industrialization per se, is obviously of great relevance for the GOJ and particularly for the Government Housing Authorities.

These four types of building operation can be distinguished; yet, each may have an influence one upon the other. Each type of operation has its role to play in a national program. All four are capable of improvement and of working the one with the other given appropriate policy lead.

Systems Building (A Form of Industrialized Heresy in Jamaica)

This heading is used at this point (although not used in the categorization above) because it is in use in Jamaica to describe on- or off-site, model house production to specifications prepared by the manufacturers. A production variety has been established outside of any design or user specification of Government. This type of building operation can be likened to the "car sales" market. You have to purchase from what is made and from what you can afford. Government has abdicated here from its role as major housing client, designer and specifier and taken on the role of procurer.

Credit must be given to Jamaica's system builders for seeing a market niche and entering at risk. The processes now, however, have become dominated by commercial considerations, rather than GOJ as client and user necessities. It will only be by bonding together all of its client acting bodies (the Ministry of Construction, Ministry of Local Government, National Housing Trust, Urban Development Corporation, Sugar Industry Housing, etc.) and speaking through a Chief Technical Officer that Government could exert a social control over, and set design standards for, the systems industry. There are signs that the systems operators would welcome this. It would help define more clearly the commercial market and lower their risk. It could also open up the market so as to cater for lower income groups.

B. THE RATIONALE OF RATIONALIZATION

The roots of technical policy, when GOJ considers a rationalization of house design and production, lie in the desire for efficiency and cost reduction.

- To reduce site labor (not reliable, not available in certain localities, too expensive, or a shortage of craft skills).
- To economize in materials (if they are scarce, substitutes made in factories become economic, alternatively the scarce materials are processed in factories, where controlled processes allow for less materials being used to meet specified performance standards). Frequently, the demands of transport set the design parameters.
- To make use of resources not at present fully used (skilled or even unskilled labor away from the building site and tools, equipment and factories now no longer required for their original purpose).
- To speed up building by making the most efficient use of all available resources, i.e. using dry construction which allows faster building and early occupation.
- To permit the better organization of building production (through the use of standard components; by dimensional coordination between building components and elements; by closer integration of building initiation, design, finance and erection; by the use of improved costing, purchasing and store-keeping methods).

C. THE GOVERNMENT'S TASK

Technical policy, to ensure rational production in housing, will need to cover an appropriate pattern of commission, budgeting, acquisition and preparation of sites, design and contract forms adopted for projects. Building rationalization for housing cannot proceed without the consolidation of house building programs to shared standards and specifications, continuity of operations, a reasonable scale of operation and Government guidance and support. The one essential, if the private sector is to contribute effectively, is the existence in Government of a clear policy direction, set of programs, and budgetary plan leading to a continuity of commissioning of work. A developmental perspective is required within which five year plans and one year budgets can be devised.

On the design side, the functional and performance standards, dimensional standards, manufacturing tolerances and site tolerances all need to be defined. Then the development of preferred dimensions, the establishment of performance specifications for elements such as wall and roofs made of certain materials, and the design of component ranges may then follow, under either governmental or commercial sponsorship.

D. SUMMARY

The need to disaggregate the industry for analysis and policy making purposes is clear. How to disaggregate is less clear but it is recommended that levels of technology adopted be the only theme: internatinal modern construction; national-based modern construction, i.e. conventional block and steel; and traditional construction of timber frame and locally found material. The output of these sub-sectors is distinctive. Some overlapping occurs. There is competition for scarce resources between the sub-sectors. If this is to be brought to a minimum, the GOJ construction policy must have objectives to this end and set up the management ability in MOC(H) to provide the leadership.

CHAPTER IV

THE COST OF CONSTRUCTION

The cost of a house type will vary over a wide range in accordance with the form of contract; size of job in terms of numbers of similar dwellings built; whether materials are bought from Government stores, the commercial market or the black market.

A. THE DISTRIBUTION OF COSTS

Table 4:1 gives the rise, over ten years, of the cost of building materials. This cost rise has been accompanied by material shortages. Each contractor will price his Bills of Quantities to include some cover for having to buy above commercial rates, i.e. on the black market.[1]

Table 4:2 gives the 1981 cost breakdown of the same type house built by two different methods of contract. The 20% difference will in part be attributable to the lower overheads of the small contractors and part due to his lower profit expectancy (See also Table 4:3).

Table 4:4 gives a distribution of costs by infrastructure element, and by house element, for National Housing Trust financed schemes over recent years. The interest in these figures of distribution lies primarily for the design professions. If these represent true costs (rather than prices), then it indicates where design revision is most likely to result in savings. Infrastructure sewerage, roads and drainage look promising areas to seek reductions. In building structure reductions might be sought in substructure and walls. Conversely, a saving made in water installation (although not to be encouraged) would have little impact on the overall cost.

B. THE COST OF BLOCK AND STEEL

Since it is not possible to review cost savings on every type of contract, a focus will be made upon a common type. That of the contract with Bills of Quantities for lower middle income and middle income housing schemes where the Contractor offers his services as a manager of the building process and supplier of the complete building. The house type in this example is of concrete block, reinforced pockets, with an in-situ belt beam and with a highweight sheet roof on timber sub-structure. Locally this type of construction is known as "block and steel" (Figure 4:1).

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1 Although these rises look dramatic, they are part of general price increases and to some extent, wages rose in parallel but with some drag in the wage rise.

TABLE 4:1

OVERALL INCREASES IN HOUSE CONSTRUCTION COSTS
(Weighted)

April 1970	-	March 1971	2.5%	
April 1971	-	March 1972	8.9%	
April 1972	-	March 1973	19.2%	
April 1973	-	March 1974	18.0%	
April 1974	-	March 1975	13.2%	
April 1975	-	March 1976	32.6%	
April 1976	-	March 1977	2.1%	
April 1977	-	March 1978	22.9%	
April 1978	-	March 1979	55.9%	
April 1979	-	March 1980	17.5%	
April 1980	-	March 1981	27.0%	including wage award
April 1981	-	March 1982	6.2%	(estimated)(z)

NOTE: New wage award due July, 1982.

A summary of the increases for the decade to 1980 would be as follows:

1.	Construction materials	485%
2.	Construction labor	256%
3.	Overall construction costs (1 and 2 above)	441%
4.	Consumer Price Index	425%

SOURCE: Goldson, B. L., 'Trends in Housing Costs' in Housing and and Finance Jamaica, Summer, Kingston, 1981.

NOTE: (z) = others have estimated this to be higher: See Table IV:5.

TABLE 4:2

COMPARATIVE ANALYSIS OF DETAILED ESTIMATES
FOR TYPE 807 UNIT -- MINISTRY OF CONSTRUCTION (HOUSING) 1981

Elements	1	2	
	Small Contractors	Medium Size Contractors	Difference using QS Section as Norm
	$	$	$
Preliminaries	1,856	1,760	-
Labor	3,280	3,706	+ 426
Materials	8,230	11,314	+ 3,016
Electrical Installation	1,014	1,350	+ 336
Provisional Sum for Additional Substructure Work	1,600	1,500	- 100
	15,980	19,630	3,678
Overheads & Profits	1,439(10%)	3,926(20%)	+ 2,286
	17,419	23,556	5,964
Contingency to Cover costs of Materials, etc.	1,875	1,000	- 875
	19,294	24,556	5,089
Provisional Sum for Absorption Pit	1,000	1,000	
	20,294	25,556	
	say 20,300		

Small contractors here undertake up to ten houses; medium size undertake between 50 and 200. In making the comparison, the Ministry has assumed the small contractors obtain most of their materials from Ministry stores and the medium contractors buy on the commercial market. Labor rates are as agreed in early 1981 and JIC scale. The main points of difference being in materials costs and the overheads and profits line item. The 10% and 20% shown indicate the experience of the Ministry and of Messrs. Goldson, Barrett, Johnson, Quantity Surveyors of Kingston.

TABLE 4.3

DISTRIBUTION OF COSTS FOR MINISTRY OF CONSTRUCTION HOUSE TYPE 807 IN 1981

Construction is of Block and Steel, Medium Si
Contractors (50-200 Houses) Adopting 20%
Overhead and Profits are Assumed

	ELEMENT	Total Cost of Element	% of Total Per Unit	% Labor of Element	% Mats of Element
		$			
1.	Preliminaries	2,250.35	9.07	--	--
2.	Substructure	972.77	3.92	32.8%	67.2%
2(a	Substructure (Prov.) (if a sloping site)	1,600.00	6.45	--	--
3.	Walls	3,150.37	12.70	30.5%	69.5%
4.	Roofing	4,199.48	16.93	13.0%	87.0%
5.	Doors & Windows	2,754.77	11.10	10.3%	89.7%
6.	Finishes	4,554.30	18.36	39.5%	60.5%
7.	Fitments	204.06	.82	35.3%	64.7%
8.	Plumbing & San. Fittings	1,623.72	6.55	16.6%	83.4%
9.	Electrical Inst. (Prov.)	1,620.00	6.53	--	--
10.	Drainage	379.24	1.53	54.6%	45.4%
11.	Contingencies	1,500.00	6.04	--	--
	TOTAL	$ 24,809.00	100.00		

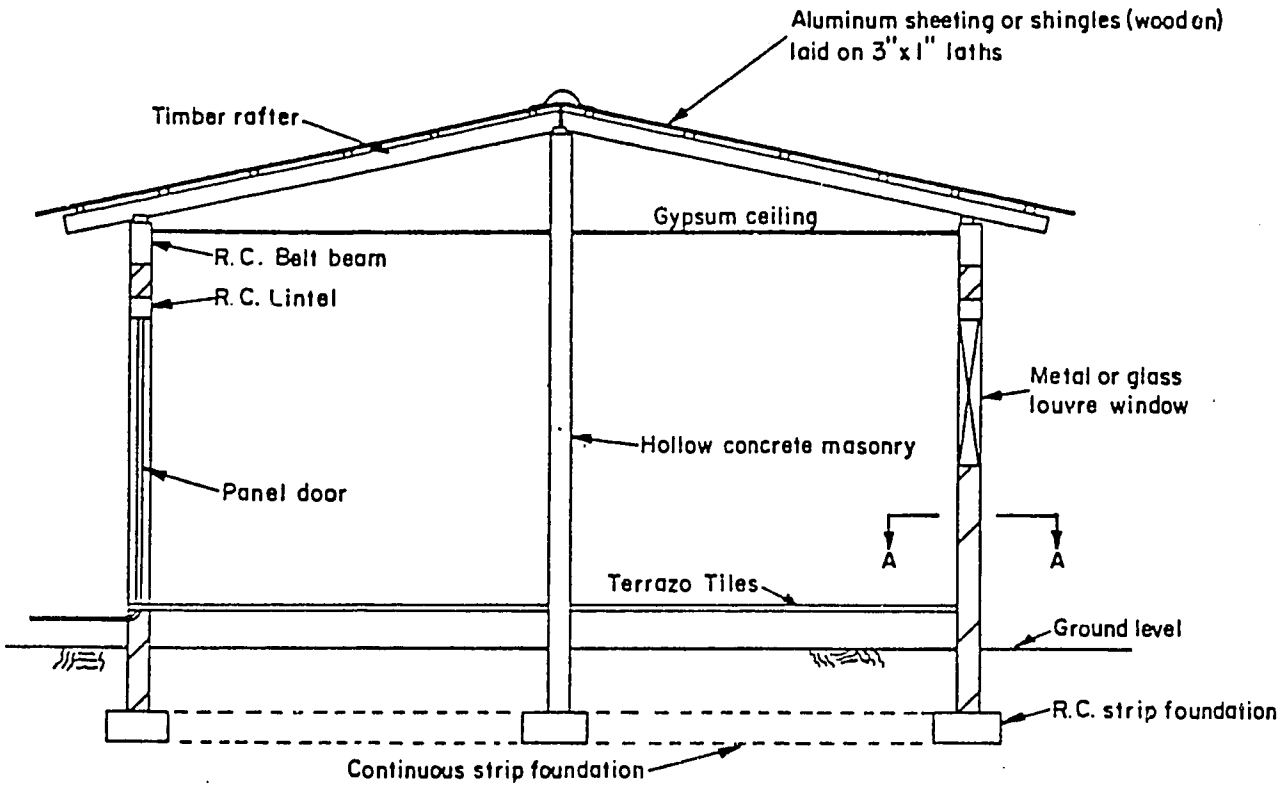
TABLE 4:4

DISAGGREGATION OF INFRASTRUCTURE AND BUILDING COSTS:
BLOCK AND STEEL HOUSE

	% of Total	Materials	Labor	Equipment	Materials		Labor	
					Local	Imported	Skilled	Unskilled
	100	%	%		%	%	%	%
Infrastructure								
Earthworks	16	40	40	20	40	--	32	8
Roads	18	40	49	20	32	8	30	10
Drainage	17	60	30	10	45	15	11	19
Water	14	60	30	10	18	42	8	22
Sewerage	24	60	30	10	18	42	8	22
Footpaths	10	50	40	10	40	10	12	28
	100	52	36	12	31	21	17	19
Building								
Substructure	13	60	40		45	15	12	28
Walls	36	60	40		48	12	12	28
Water installation	5	70	30		14	56	21	20
Electrical installation	7	70	30		7	63	24	9
Roof	22	60	40		18	42	20	6
Sanitary appliances	7	70	30		14	56	21	9
Doors and windows	10	70	30		28	42	21	9
	100	63	37					

SOURCE: National Housing Trust, 1981.

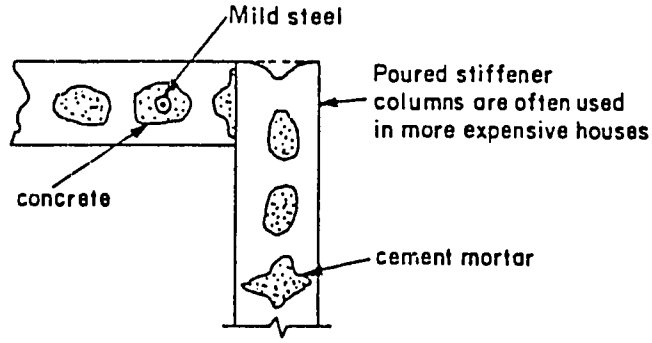
FIGURE 4 :1



Hollow Concrete Masonry Construction: Block and Steel

The most common construction method in Jamaica.

SOURCE: Adams, A. B.



PART SECTION A-A

Commissioning of Layout and House Type

Costs start escalating when there is a serious mismatch between the development costs of the site and the target group's ability to pay. Steeply sloping sites, access, and control of surface water run-off quickly raise site development costs. A steep slope site for a small house increases construction cost by about one-seventh over a flat site (Table 4:3).

House design is influenced by market trends — "what will sell", affordability and by "the image" of what is modern. There is in Jamaica a large mismatch for the low, middle income groups between what they can afford and what they would like to have (Figure 4:2). This gap can be closed by lowering costs on one side and client education on the other. The meeting point for the poorest classes may be the allocation of an undeveloped building plot located in surveyed land that offers ease of upgrading and access reservations.

Infrastructure Design

High standards add on costs to the house price and increase the mortgage. These costs stem in part by standards being pushed up by local authorities under their planning powers; and partly by the developer's desire to stay in the market. Table 4:4 indicates that there is a need to examine roads, drainage and sewerage provision for savings through new standards and economical re-design.

House Design

Designs tend to be conventional in appearance and construction. Among the reasons for this is the low learning capacity of unskilled labor, the tastes of the purchasers and the fact that a contractor can be expected to price high for the unusual in order to cover in his estimate for unknowns.

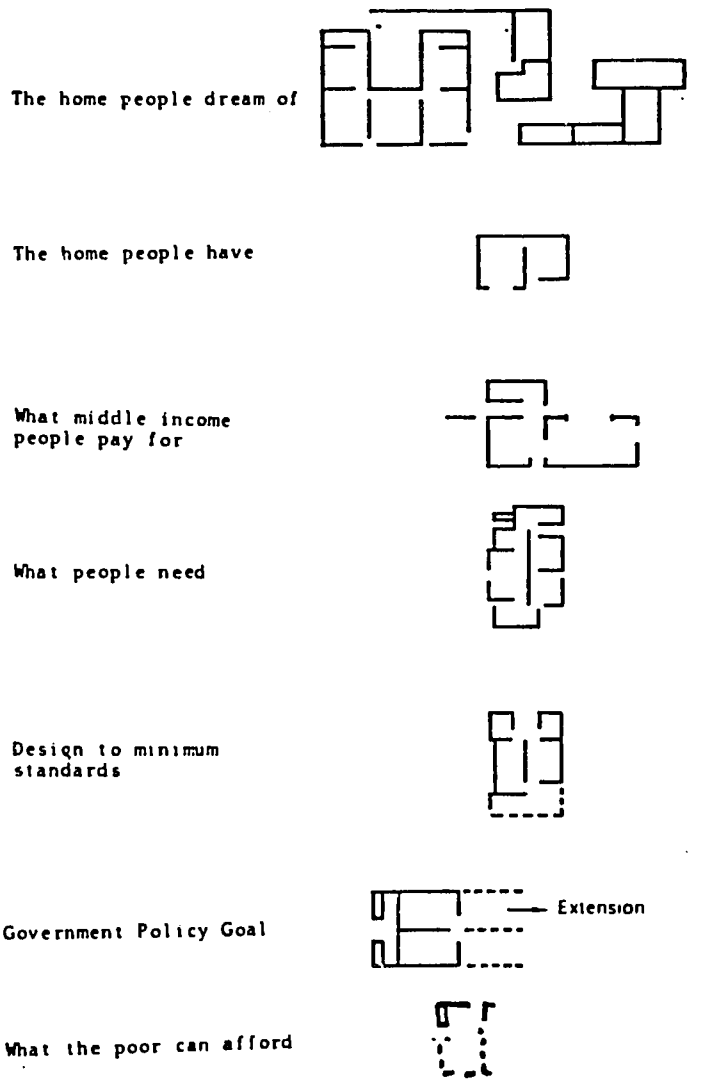
House walls of block are normally rendered both sides and topped with an in-situ reinforced concrete wall beam. This latter forming part of the earthquake and hurricane resistant "cage". From 30% to 40% of the cost of the finished wall lies in the wall or belt beam and the rendering costs. The importance of this wall construction as "control" in Jamaica's house building economy can hardly be over-emphasized. This piece of construction sets the price range for all alternatives, i.e. the systems built walls are priced to just below the cost of the "control". Savings on the wall would bring other forms of construction down in a domino effect. A "U" block belt beam would save costs.

One cost distribution (Table 4:3) shows finishes costing more than block walls. Attention is further drawn to the need to save on rendering costs. A recent Hellshire Hills NHT basic house is built of unrendered block walls.

Planning Approval

The very convoluted approval system is described in Chapter VI. Here it is stressed that the longer this system delays a construction start — anything between 12 and 18 months has been quoted for extreme cases — then the more the contract costs and the more the purchasers will pay. Building material costs will

FIGURE 4:2



Perceptions of "the house" shape, desires and policies. The mismatch between what the poor can afford and "the dream" is very great in Jamaica; this leads to popular impatience with GOJ small delivery sites and services schemes. Payment is expected bu GOJ for something which by no means meets aspirations.

rise as will as probably will the cost of borrowing money. The approval system requires attention if overall costs are to be reduced.

Building Code Approval

Costs here can be attributed to delays in the approval system and to the inflexibility of the ancient code. The environmental requirement that schemes of over 50 houses should have a sewerage treatment plant is ineffective and some times even detrimental[1], for in a high proportion of cases the skills and funds to operate the sewerage plants are not commonly available.

Form of Contract

Risks and costs vary with contract type (See Chapter II Figure 2:1). Choice should be governed in part by the economy of the contract method.

Scale of Contract

Small contractors carry few overheads and can produce houses at lower costs than medium to large contractors. A study is required that relates unit costs to contractor size and method of contract (Table 4:2). This may show, for example, that it is most economical to use contractors in the 10 - 30 houses range since their balance of "controlled" costs proves most economical despite the greater management supervision required on-site by financing or commissioning authority.[2] However, if a large contractor paying higher rates works near a site employing small contractors, their labor rates are likely to rise also.

Cost of Money

If the contractor has no funds to acquire materials other than those paid for by stages of the job (less retention monies), then work is likely to proceed in fits and starts — and, therefore, cost more.

Setting Up by Contractor of Site Control and Store

This is paid for in Bills of Quantities under the heading Preliminaries, but many of the costs involved can stray into other items as the contractor tries to recover them.

- Security store or fence for materials
- Cost of security guard/storesman

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1 Pumps cease to work and become unrepairable. This leads to pollution.

2 See Summary Section, this Chapter.

- Cost of protection to be paid to a local person

- In spite of foregoing, material losses through pilferage.

Costs in the Bill of Quantities

Contracts are usually awarded to the lowest bidders. The distribution of costs throughout the Bill does not necessarily reflect actual costs for each element such as foundations, walls, finishes, etc. Because the contractor is paid in stages, it is in his interest to load the early stages and underprice perhaps the finishing trades and realize his profit early. The finishing off stages thus become unattractive since they often require most skill, yet on the the method of cost distribution practices, also show the least profit.

Cost per area of blockwork and foot of excavation are seemingly rooted in agreement and myth. There is a real requirement that such work be re-measured and costed by work study methods in order to get back to "the real cost", which is now unknown.

Work in 90% of cases is sub-contracted to task workers who will undertake to build all the walls of a house for a fixed sum. Some over-pricing may be expected in such an arrangement. Tradition being strong, this may be difficult to uncover. Measurement of blocklayers through work study would reassert true output figures. Currently it is said that a first class blocklayer lays 225 in a day and a second class blocklayer lays 125 in a day.

The provisional sum for the absorption pit — still much used for schemes of less than 50 houses — traditionally hides many on-costs. The contractor of whatever level will sublet the digging and stone-lining to a sub-contractor who may then sublet to other sub-contractors, for example, in five pit groupings. The man who digs and lines the pit may get only 25% to 35% of the declared cost. Again, tradition protects this procedure.

Costs of scaffolding and formwork for concrete can be very variable in Bills of Quantities submissions. Whether or not a contractor is awarded a job may show up in the price he gives against this item; all other rates being much the same as for other contractors. The other "costs" thus appear as "costs" by contractor agreement. Scaffolding and formwork is a true variable nevertheless. If a contractor has it standing idle, or close to the site, then his costs are lower than a contractor who has to purchase anew.

Variation Orders on Bills of Quantities

Variation orders are orders for agreed increases in payment authorized on behalf of the client paymaster usually by an architect and quantity surveyor, sometimes by a contracts manager engineer. Variation orders can stem from:

- Unforeseen costs of site development and house location (i.e. slopes unsurveyed, poor bearing ground, need to re-channel a water flow, removal or rock, etc.).

- Professional error in under-qualifying the labor materials. This then shows up as an extra to be paid for when construction is underway.

- Parish Councils giving only a general approval for a scheme and then upping their requirements on a sliding scale once work starts. This particularly impacts road sub-base work and water supply. If these new demands of the Council are not met, there is no chance of the Parish taking over or of water supply connection being made. This then produces a variation in original price and an extra charge to the eventual house purchaser.

Fluctuations

Agreeing fluctuation rates within the framework of contracts that allow for fluctuations to be an extra cost, chargeable to the client, has been a costly and time-consuming business for professionals. Agreement on fluctuations is facilitated if tied to an index of cost rises rather than to the cost rises themselves. Indices have often been used to give expression to the historic degree of rise. It is now proposed in Jamaica to use a set of indices to facilitate contract settlements.[1]

Fluctuations could be minimized by more bulk ordering and warehousing of materials. To buy ahead, even if high interest charges are payable on borrowed money, is often cheaper than letting the year go by and paying for 50% to 60% of materials (especially imported materials) at the year's inflation rate (Table 4:5)

Access to Materials

Costs displayed in Bills of Quantities materials make up to 62% to 70% of the cost of an average middle income house. By world standards this is a high proportion. Reasons for the high figure could be looked for in the difficulty of obtaining importing licenses on time, irregular supply of materials, the costs of foreign exchange, and the fact that hidden labor costs lie in the material costs. Delays in material acquisition may lead to high costs and cash flow problems for the contractor. Contractors may attempt to buy themselves out of this situation by purchasing on the black market. This is, of course, in itself a cost raising activity. Knowing in advance of the strong possibility that such measures will be required leads all contractors to price up to cover the eventuality.

Labor Costs

Labor in Jamaica is of three kinds:

- Skilled

- Unskilled

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1 Stoppi, M., Chairman, Report of Committee on Price Fluctuation Formula Methods.

TABLE 4:5

EFFECT OF VARIATIONS, FLUCTUATIONS AND LABOR RATE INCREASES ON AGREED CONTRACT SUM: A 1980 EXAMPLE IN KINGSTON

Description	J$	¢
Contract Sum: Infrastructure and Dwellings	1,522,048.22	
Adjustment of Prime Cost and Provisional (Net Additions)	127,923.90	
	1,649,972.12	
Variations (Net Additions)	8,338.25	
	1,658,310.37	
Fluctuations (Additions)	456,986.12	
ESTIMATED FINAL BUILDING AND INFRASTRUCTURE COST	$ 2,115,296.49	
PLUS: ESTIMATE FOR EXPECTED BACK-DATED LABOR AWARD	$ 111,500.00	

SOURCE: Adapted from Berkeley & Spence, Chartered Quantity Surveyors; Kingston.

- Welfare labor nominated by parish officials and others to join "the job" at a daily rate. This labor is in addition to the unskilled labor which is truly required to assist the skilled.

The cost of labor types — skilled and unskilled — can be shown directly in the Bills of Quantities but added to the first cost worked through will almost certainly be an addition to help pay for the forced addition or "welfare" labor. Flooding a job with unneeded labor is a short term policy overwhelming a major long term perhaps the provision by Government and Government inspired measures of economical housing for all. This conflict of policy demands resolution.

Transport

Transport costs are rising propelled by the rising cost of fuel. Economies in the approach to using trucks are always possible. Weight, size, shape, nesting characteristics and liability to damage in handling will all effect the cost of moving materials and components. The distance to be travelled can be reduced as a cost if return loads (non-building industry goods) can be arranged. It is the combination of bulk, nesting character, liability to damage times the distance that raises cost as the manufacturers, off-site, of pre-cast units, know too well. In the design of pre-cast units, ease and economy of transport are sometimes neglected leading to breakages, despite attention being given to design for structural stability during transport.

Completion on Time

Failure to complete on time is subject to penalties. However, those penalities are hard to implement due to the complexities of the local environment. Therefore, in practice the Commissioner of Building Work has little effective control of delivery date.

Failure to complete at all (currently not uncommon in Jamaica) is also difficult to control. Due to "transfer-costing" in the Bill of Quantities from the finishing stage of a job to the earthworks and foundations, etc., a contractor may at the 80% stage have little profit incentive to complete. Completion by another contractor or by direct labor adds expenses which may at times be considerable.

Quality Control and Supervision

Achievement of specification quality is not easy. Supervision by the Director of Construction, Ministry of Housing, is made difficult in any event because of the grave shortage of competent staff. This is an expression not so much of their non-availability[1] as of the low pay scales in Government compared with Statutory Bodies and the private sector. Knowing of the poor supervision

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1 Although there is in 1981 some evidence of an aboslute shortage.

situation, designers tend to over-design to compensate by specifying increased steel and prefab concrete sections. Failure to staff up to supervise work thus leads to an escalation of costs.

Retention and the Maintenance Period

Retention of a proportion of construction stage payments is a method of trying to ensure that what is handed over is of sound quality. It is also offered as a technique of ensuring that repairs required during the six months or one year maintenance period are undertaken. However, this control is proving ineffective in Jamaica (See "Transport" and "Completion on Time" in the foregoing).

Parish Take-Over of Completed Housing Schemes

Parishes are reluctant to take over housing schemes as they are not equipped financially and technically to do so. Delays in taking over could be avoided by budgeting maintenance support as a true cost element of the scheme.

C. THE MANAGEMENT OF BLOCK AND STEEL CONTRACTS

Figure 4:2 shows a comparison of costs for two forms of contract. In the first column, the contractor signs to provide management and labor using materials supplied through Government stores. Such contractors do not price a Bill of Quantities. They accept the offer to build ten houses and agree to the Ministry of Construction rates shown in a priced bill. This reduces their management task, but it still is possible to lose money on such contracts. Few such contractors will keep accounts and will have no idea of any stage payments, including the last, or whether they are making a profit. Therefore, while from the Ministry's point of view a saving is being achieved, when compared to the middle to large size contractor, the small contractor is not being developed into a businessman. He has to be, if he is to contribute to lower costs overall.

The middle and large contractor prices his Bill of Quantities to get the work within the market he and his competitors know very well. If they are to contribute, as managers, to lower costs, then they have to move beyond product at erection management to process and project management for economy of effort. This needs knowledge and skill. Block and steel construction exerts no process discipline on-site as do the systems. The incentive here is achieving competiveness through cash flow control and achieving a low cost product.

D. THE COST OF SYSTEMS BUILDING

In Jamaica, surprisingly, systems building is not as expensive as conventional modern building in block and steel. This tends to reinforce the general impression that the costs of block and steel homes are not true costs but "prices" that include hidden extras from the pervasive environment of Jamaica's construction activity.

System Types

Building systems in Jamaica can be classified as modern non-conventional. They are semi-industrialized and fall into one of three categories:

- Heavy and dry
- Wet and heavy
- Light and Dry.

Heavy and Dry

The principal component (load-bearing parcels) are cast of reinforced concrete generally to be self-finished. The panels are generally of a size and weight to make them unsuitable for long-distance transport. The panels probably receive their greatest loading when being lifted for transport and are designed for this loading. Large panels are, therefore, over-designed for performance in place. A central casting plant is required off-site and heavy lifting devices must be available on-site. Layouts can be determined by crane trackways where cranes have to be used. A limitation of the method is that buildings can be erected only within a limited distance of the main casting shop.

- **Ashtrom:** A highly mechanized, plant-based, pre-cast system using large panels from 3" - 7-1/2" thick according to position and loading[1] (Figure 4:3).
- **Sandino:** A pre-cast system using grooved columns and pre-cast panels 12" x 24". Transport is not too difficult; both panel and column being handled by two men. Roof is of wooden trusses, pre-cast or timber rafters (Figure 4:4).
- **Mamecodi:** A pre-cast panel system.
- **Stresscon:** Highly mechanized production unit. Concrete slabs, which can be designed to meet architect or engineer specifications, are pre-cast and pre-stressed.
- **West Indies Home Contractors:** A pre-cast system using large ribbed panels.

It is inhereint in the use of panel systems that when assembled on-site they are weak in shear and tension and so exposed to high winds and earthquake damage. Shear walls can be cast on-site to overcome this, as with the Sandino system. Exposed rods from the panel ends can be welded on-site as with the Stresscon system. A common problem with structure of this type is water-proofing at panel joints, especially on the roof.

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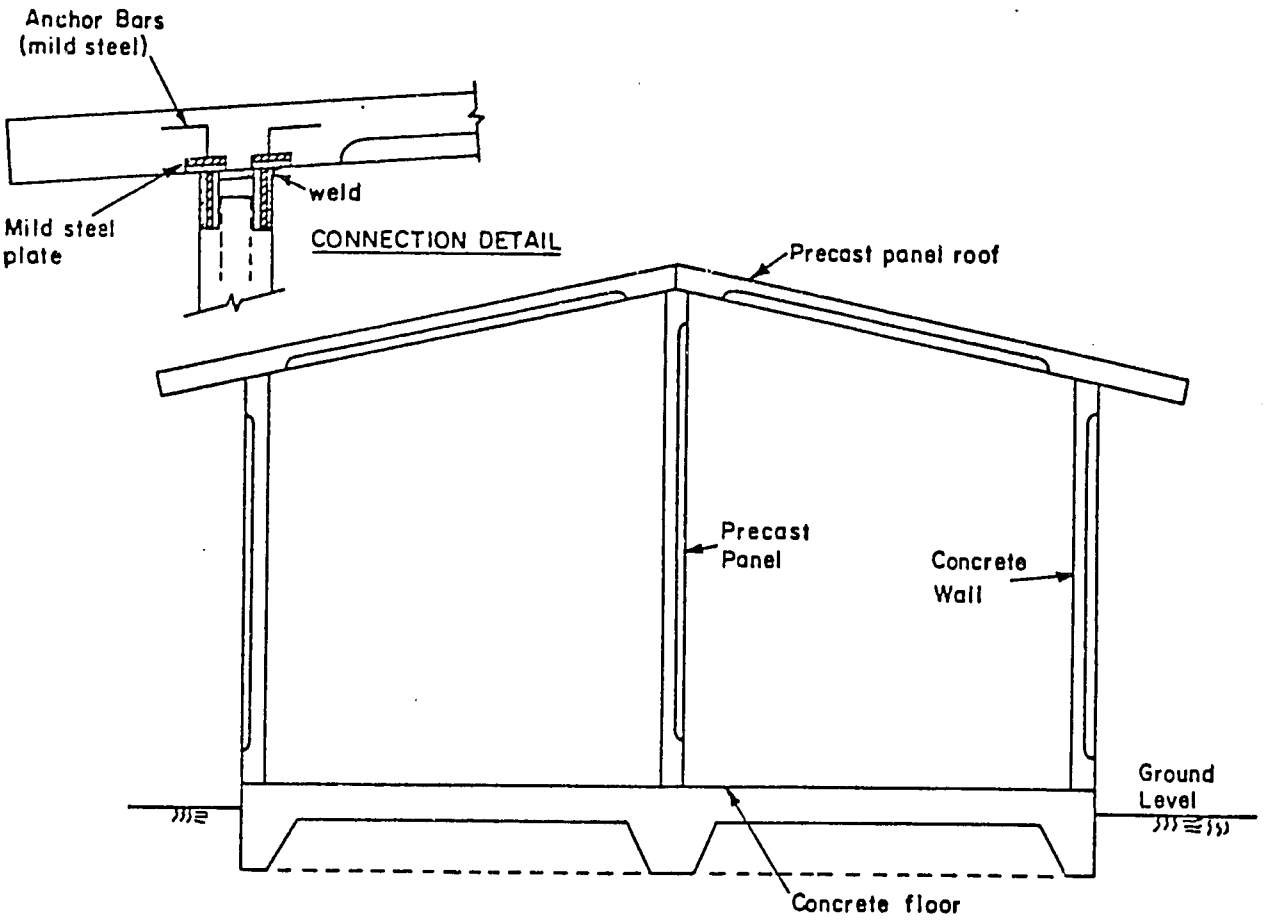
1 Descriptions of systems is given in Datacon Associates, Technical and Economic Evaluation of Building Systems, for the Ministry of Construction, Kingston, May 1980.

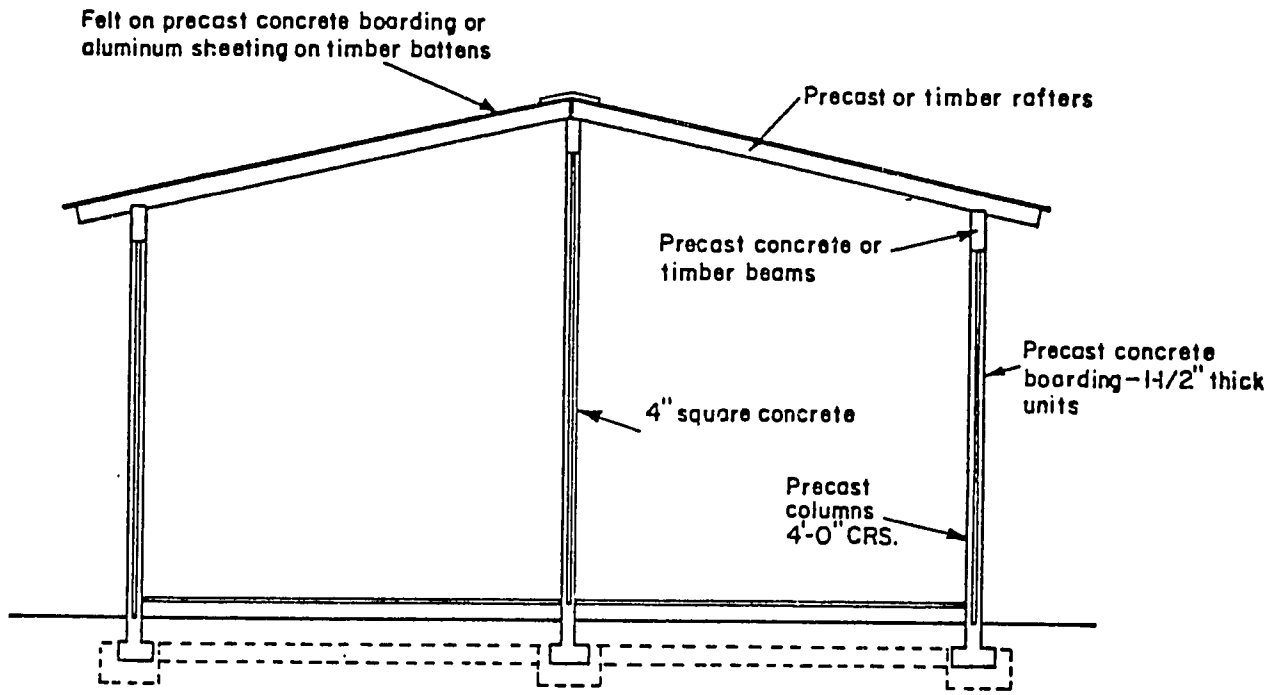
FIGURE 4:3



Heavy and Dry:
Large Panel Precast Concrete System Yastrom Type

SOURCE: Adam, A.D.

FIGURE 4:4



Medium Heavy and Dry:
Precast Concrete System -- Sandino 'Principle' and ARH House of MOC(H)

SOURCE: Adams, A. D.

Wet and Heavy

Here the building is not prefabricated but the site operations are mechanized. A load-bearing, in-situ concrete structure is typical, using standard formwork. It is the least flexible of systems from an architect's standpoint.

- **Marley and Plant:** A typical version of the type using on-site pouring between moulds and skilled labor.

- **Aerocon:** A wired steel cage is produced on-site and concrete is sprayed on. It is light version of the type.

The wet and heavy systems require considerable number of units on one site if it is to be worthwhile moving the plant to the construction site.

Light and Dry

In this approach, most componets are made in factories or workshops and on-site work is kept to a minimum. A framed system is the most common using steel, timber or aluminum. Other components are kept as light as possible; lightweight concrete, timber panels, aluminum sheeting, bagasse panels and tiles, chipboard, fibre board, plaster board, plaster. Joints and their weather-proofing can be a problem. The method allows great flexibility in design and is readily combined with a module and preferred dimensional coordination approach to design.

- **A.R.H. Type House:** A wooden frame shell structure of treated lumber with simple trusses in timber and aluminum sheet roof covering. The shell is made at the Government Housing Workshop and delivered to site for erection under supervision (Figure 4:5). Occupier then completes with own materials. These structures are not highly wind resistant, unless well anchored into foundations, cross-braced in all planes, and built with stiffened, strapped joints.

- **Experimental Houses:** Houses of aluminum frame, aluminum sheet or chipboard walling or using plaster-bonded natural materials. Many have been demonstrated in Jamaica but production runs have never been large. This is an area for a Building Research Institute program.

The Build-up of Cost of Systems

The recent comparative study of costs of systems in Jamaica[1] is illuminating. Helpful though the systems contractors were, they were unlikely to reveal to anyone their true unit costs. The final price is made up of:

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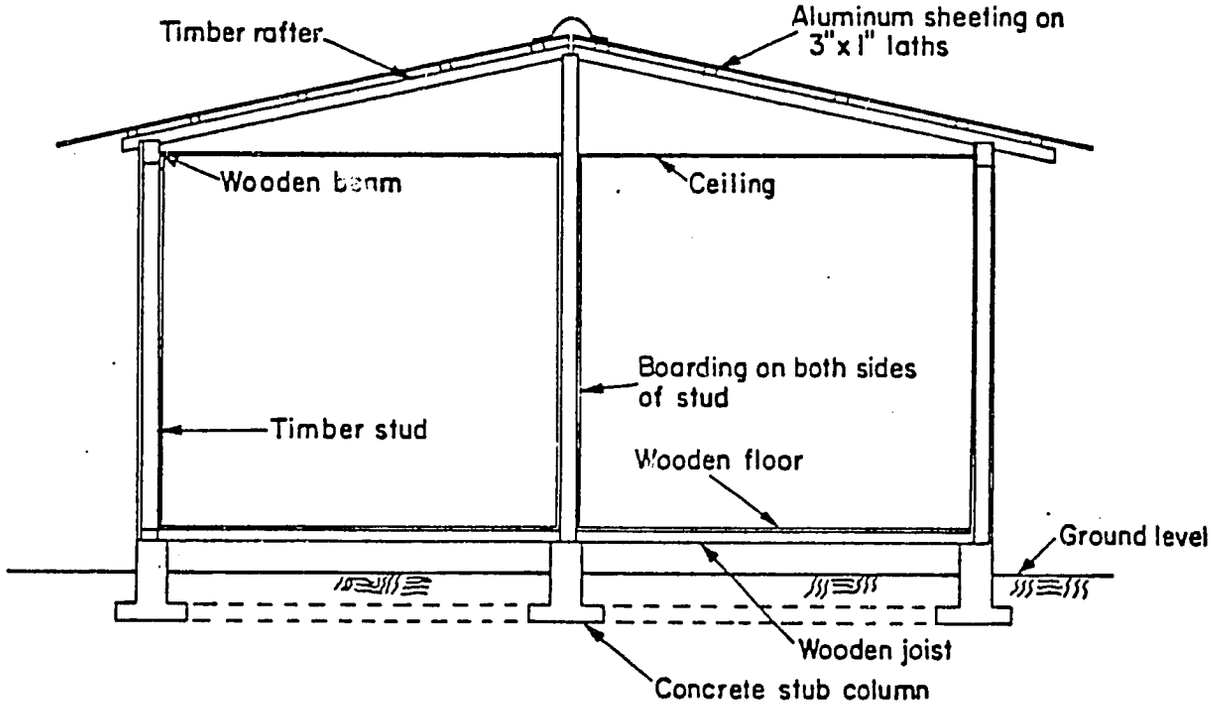
1 Datacon Associates, Technical and Economic Evaluation of Building Systems, for Ministry of Construction, Kingston, May 1980.

FIGURE 4:5



LIGHT AND DRY:
TIMBER SYSTEM -- STUD AND LAPPED BOARDED WALLS

These houses are usually elevated on piers or sleeper walls at least 2 ft. to 3 ft. above ground and provided with a flooring of timber joists and boarding.

SOURCE: Adams, A. D.

- Materials
- Equipment
- Proportion for breakages/pilferage
- Labor
- Transport
- Fabrication and installation.

The price at which the systems contractor/developer is willing to sell contains his:

- Overhead-management in head office and at a distance; on-site
- Cost of borrowing working capital
- Royalties to the originator of the system (in some cases)
- Profit

When there is talk of costs in Jamaica the subject is in truth prices. Nowhere is this more true than for the products of the systems. Final price is set not only by the items listed above, but by the market. The competition — the price of the standard block and steel middle income house — is high priced so it follows that all other alternatives will be priced just below it (Table 4:6). There is no need to offer at a cost-plus price. The market can be captured by just under-pricing the market leader, block and steel.

Commentary on Systems

The systems have been generated by developers appraisal and by commercial forces, not by GOJ client requirement. They do not lend themselves to house extension except in the light or dry systems. The advantage of the system is as studies of the cost structure of systems build contracts have concluded that **the savings come from the improvement in management and work processes** rather than from the systems themselves. The secret is not in the formwork, the pre-casting, or the spraying, but in the work organization needed to carry through the operations.

Dwellings built of concrete block are cheaper than other concrete-based systems, except in Jamaica.

System Building and the Non-Flat Site

The systems tend to be limited to flat and gently sloping sites since foundation preparation for steeply sloping sites is expensive; on-site labor-intensive work is what the systems contractor is trying to avoid.

TABLE 4:6

COMPARATIVE STRUCTURE COSTS
OF SYSTEMS-BUILT HOUSE OF 630 SQ. FT.

Data is as given to Messrs Datacon Associates by Systems Builders in early 1980
(Does not include overhead/profit margin.)

	SYSTEM	CONSTRUCTED UNIT J$
1.	Heavy and Dry	
	Ashtrom	13,175
	Sandino	12,386
	Mamecodi	12,846
	Stresscon	N/A
	West Indies Home	N/A
2.	Wet and Heavy	
	Marley and Plant	13,896
	Aerocon (medium heavy)	13,017
3.	Light and Dry	
	A.R.H. Type House	15,345
4.	Conventional (For Comparison)	
	Block and Steel	15,785
	Improved Block & Steel	15,078

Systems and the Building Code

Much of the construction seen in the systems is not even mentioned in the Kingston and St. Andrew Building Regulations. The industry has sailed past the legal fort and the need for the building code to "catch up" is now pressing. This is especially so in the specification or requirements against hurricane and earthquake forces. There is a lack of uniformity in the treatment of these problems by engineers and systems builders.[1]

E. COST DISTORTIONS

Investment in Jamaica housing is lumpy and distortions arise in the costs due to the following:

- Some contractors write off or abandon work mid-contract.
- Some contractors price low to re-enter the market after a slump.
- When tourism construction expands or a large dam is constructed, scarce skills migrate to the opportunities leaving the housing scene even weaker.

Unless some manpower and materials use planning accompanies the implementation of the proposed housing of the Law of the Sea Administration, then the construction of hundreds of high standard large houses for the international staff could cause supply problems and foreign exchange problems for the remaining house building sector. Costs will again rise. The upper-middle income Hellshire Hills development could have a similar effect.

F. SUMMARY

The structure of building cost in Jamaica needs to be reviewed in depth. This could be an early task of any government-sponsored research program. The essence of the task is to refine the technique of isolating areas of high cost and setting out a method of control for each. These methods then need prosecuting through a design, costing and building implementation management system. The solutions will not be obvious. For example, it would be overly hasty to conclude from a review of Table 4:2 that in the future the Ministry of Construction should only contract for houses in groups of ten or under. To do so might have two effects:

- Increase the number of houses that remain unfinished (due to poor cash flow control of smaller contractors).

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1 Adams, A.D. Low Cost Housing and Extreme-Wind-Related Problems in Jamiaca, in NBS No. 56, U.S. Department of Commerce/National Bureau of Standards, Washington, DC, October 1974.

- Overload the Ministry supervision staff; for smaller contractors require closer supervision and often considerable technical guidance.

The need here is to get behind the rising costs to examine the reasons why they are the way they are. This necessitates as a first stage an elemental analysis of the distribution of costs over a building roof, floor, window, etc. This distribution, however, may not reflect the true distribution which can only be found through work study and measurement on building sites.

The cost of block and steel sets the price levels throughout the residential construction world of Jamaicaa. It is here alternatives have to be found if costs overall are to be brought down. Factors to study include:

- The commissioning of designs
- Planning approval
- Building code approval
- Form of contract
- Scale and size of contractor
- Cost of money to contractors
- Site control and storage
- Costs as given in the Bill of Quantity
- Variation orders
- Fluctuations
- Access to materials
- Labor costs
- Transport
- Completion (or not) on time
- Quality control and supervision
- Relation and the maintenance period
- Parish take-over (or not) of the completed scheme.

Since costs are influenced by methods of site assembly, there is also a need for a comparative study between well managed block and steel and the systems approaches.

Various costs distortions are to be noticed due to the dominance at times of major project activity. Future possibilities here include "oil towns" if oil is discovered in commercial quantity, the establishment of a Seabed Authority with offices and high class housing, and the Hellshire Hills high income housing scheduled for 1985.

Obtaining a grip on housing costs may be best obtained by using PRODEM and the Building Research Institute as joint managers of an experimental building site in which social response management techniques, work study improved project, and process and product management are undertaken.

CHAPTER V

BUILDING MATERIALS AND CONSTRUCTION ASSEMBLIES

The preceding Chapter IV showed that it was to management, for pre-planning, purchasing, work study and the organization of labor for construction effectiveness that one should look for savings in the cost of domestic construction.

The popular diagnosis of why houses cost a lot is that it is all due to the rise in cost of materials (Tables 5:1 and 5:2). However, basic materials cost are but one of many factors leading to increase. The manners of assembly, ordering, warehousing, issuing, and ensuring of flow and quality of materials are equally significant.

If housing costs are to lower relative to income, then every cost reduction technique will have to be employed without delay. Over the long term, imported materials will have to be replaced by locally produced substitutes or alternatives.

A. THE MACRO VIEW

The Ministry of Mining and Energy administers or oversees the activity of bauxite mining, the processing of bauxite into aluminum, the mining of gypsum (currently ceased), silica sand, quarrying (said not to be enough nor widely enough distributed), the production of cement and industrial lime, marble, prospecting for metals, and gravel. Cement production should be able to match local demand soon and then develop an export market.

Cement Production Sales:

The production of cement during the first half of 1981 increased by 7,413 tons or 10.4% while sales declined by 2,355 tons or 3.14%. The increase in production is related to improvements to plant and equipment being undertaken by the Jamaica National Investment Company (JNIC). Negotiations for a loan of US$60 million from the Inter-American Development Bank were expected to be concluded shortly in order to expand the existing plant capacity with the construction of a modern 430,000 tons per year dry process cement plant. The total expansion program is now expected to cost US$90 million, involving the conversion of oil to coal fired kilns. On completion, total plant capacity will be increased to 630,000 tons per year.

A survey of major users of cement carried out by the National Planning Agency in June 1981 suggests that likely demand for cement for the 12-month

TABLE 5:1

INCREASES OF COSTS OF BUILDING MATERIALS
(Point to Point)

Year	April	1970	to	March	1971	4.2%
"	"	1971	to	"	1972	2.7%
"	"	1972	to	"	1973	18.4%
"	"	1973	to	"	1974	33.3%
"	"	1974	to	"	1975	18.8%
"	"	1975	to	"	1976	6.7%
"	"	1976	to	"	1977	4.6%
"	"	1977	to	"	1978	43.4%
"	"	1978	to	"	1979	66.7%
"	"	1979	to	"	1980	25.7%
"	"	1980	to	"	1981	25.3%
"	"	1981	to	"	1982	8.8% estimated

SOURCE: Goldson, B. L. 'Trends in Housing Costs' in Housing and Finance Jamaica, Summer, Kingston 1981.

TABLE 5:2

EXAMPLES OF MATERIAL INCREASES

	Jan. '78	Dec. '80	Increase
Cement Delivered	$ 2.30 per bag	$ 8.50	270
6" Blocks	$ 23.00 per 100	$ 70.00	204
½" Steel	$400.00 per ton	$1,162.00	191
Toilets	$ 81.00 ea.	$ 275.00	240

NOTE: (i) New cement price as imported by Masterbuilders is $12.20 per bag, giving an increase of 430% Since January 1978.
(ii) Yet for big orders where Masterbuilders' credit is good, cement could be bought at the factory for J$ 6.85 even in Nov. 1981.

SOURCES: B. L. Goldson, Competitive Surveyor;
A member of Masterbuilder's Association.

period July 1981 to June 1982 will be at least 200,000 tons, or some 58,000 tons more than the 1980 production[1] (Table 5:3).

The production of components from these base materials is inhibited greatly by the cost of fuel. If hydro-electric power were to be extended, then this position may change.

Timber is not generally available in commercial quality but there are local supply areas. The woods are often hard to work. Curing is indifferent and warping is common. Investment is now taking place in forestry and improvement in the sector is expected.

B. PRODUCT AND COMPONENT PRODUCTION

These industries are few, for they are caught by the limited size of the market and the lack of sufficient Governmental financial support to develop export industries. Trinidad and Puerto Rico suggest themselves as possible export markets for building components. Lack of standardization, i.e. unnecessary variety in wall types, doors and windows, roof spans, etc. means that small craft-based manufacturers cannot enter the field with confidence being unsure of a "bread and butter" demand from GOJ.

Steel Production and Sales:

Steel is produced in Jamaica in small quantities; in the main in the form of reinforcing bars.

Production of steel between January and May 1981 increased by 1,025 tons or 27.2% although sales for the period declined by 1,356 tons or 32%. The latter is attributed to delivery problems. During the first quarter, production at the steel factory continued to suffer from inadequate supplies of local scrap as well as continued restrictions in its capacity to import needed raw materials. As a result, production during the first quarter lagged behind that in the comparable period of 1980. With the receipt of import licenses in April 1981, the factory was able to operate on double shift during the second quarter of 1981, resulting in a total of 3,128 tons of steel being produced between April and May compared with 1,465 tons during the corresponding period of 1980.

It is envisaged that total 1981 production will be approximately 13,000 tons, an increase of 39% over 1980 and 1979 level of 14,709 tons[2] (Table 5:4).

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1 National Planning Agency, Economic and Social Survey, Jamaica, 1981.

2 Ibid.

TABLE 5:3

CEMENT PRODUCTION AND SALES
(in Tons)

	Jan. - June 1980	Jan. - June 1981
Production	71,008	78,421
Sales	76,342	73,987

SOURCE: Caribbean Cement Company.

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TABLE 5:4

STEEL PRODUCTION AND SALES
(in Tons)

	Jan. - June 1980	Jan. - June 1981
Production	3,765	4,790
Sales	4,242	2,886

SOURCE: Caribbean Steel Company.

Bagasse boards and other products were manufactured until recently. The plant changed hands and then had industrial problems and closed. Marketing issues may have contributed to the closure. The bagasse boards were claimed to have a wider utility in building than they have.[1] Failure then led to lack of confidence in the trade. The Government Stores have large quantities of 5/8" board in stock which is used for ceiling lining.

Agricultural quality clay drains are made and used in the smaller housing contracts. On larger contracts the builders turn to asbestos and plastic pipes, both made locally from imported raw material.

Fibreglass sinks and shower bases are made locally from imported raw materials. No cost savings on imported items are reported. Taps, wastes, washers, etc. still have to be imported to complete the items for installation.

C. IMPORTATION OF MATERIAL

Substantial quantities of building materials are imported into Jamaica. Imports of wood, lumber and wood products are traditionally high.

Other materials including bricks, tiles, iron, steel prefabricated components, sanitary ware, plumbing and lighting fixtures account for a large volume and large amounts of foreign exchange.

Importation of construction materials increased by US$11.9 million or 27% in the period January to June 1981 compared with the first half of 1980. Indications are that there was greater availability of most raw materials during the first half of 1981 than in the corresponding period of 1980. For example, importation of wood, lumber and manufactures of wood increased by 65.6%. However, there was continued national shortage of certain items needed for completion of housing projects such as sanitary plumbing, lighting fixtures and fittings (Table 5:5).

As a result of a recent joint agreement between Jamaica and Puerto Rico, an opportunity has developed for joint-venture building product manufacture between the two countries. Parts from one country could be built into composite components in the other.

D. SPECIAL PROBLEMS OF SMALL INDUSTRIES

Small industries and their problems is the subject of another in the series.[2] Some of the key points made therein:

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1 Another explanation is that the bagasse material was advertised as a "substitute". This word did not appeal to the middle class house purchaser.

2 Laquian, Aprodocio A. Small Scale Enterprise and Informal Sector Employment, USAID/PADCO, Kingston and Washington, DC, 1981 - 1982.

TABLE 5:5

IMPORTS OF CONSTRUCTION MATERIALS

($'000)

	Jan.-June 1980	Jan.-June 1981
Wood, Lumber and Manufacturers of Wood	8,823	14,612
Non-Metallic Mineral (Cement, Tiles, Bricks)	1,717	4,623
Iron and Steel	18,702	20,870
Sanitary Plumbing Lighting Fixtures and Fittings	1,169	244
Other	13,501	15,439
TOTAL	43,912	55,788

SOURCE: Trade Data, Department of Statistics.

- Raw material shortages
- Foreign exchange licensing difficulties
- Foreign exchange difficulties
- High cost of raw materials because they can only be afforded in small amounts.

Production Technology

Some components industries are one or two men using craft techniques. Others are still small in manpower but use machines. Spare parts for the machine and their costs are a problem since they have to be bought retail. Bookkeeping by small business, except in the Kingston urban area, is unusual. Without considerable support such small industries cannot develop.[1, 2, 3]

E. MATERIALS HANDLING

Losses from poor handling onto trucks, off trucks, and in stocking on construction sites is reported to be high. Concrete block breakage are reported to be particularly high, especially where day labor is used.

There is a very obvious savings to be made in improvement of materials handling. Knowing that breakage will be high means that the medium and large contracts will price up for materials costs 10% or 15% instead of " a norm" of 5%. A related issue is pilferage. Pricing to cover breakages and pilferage can add 15% to 25% onto material prices. The true figure of "add-on" can only be discovered by deep inquiry of contractors over a period of time.

F. INDIGENOUS MATERIALS DEVELOPMENT

A very long agenda can be developed of indigenous materials development potential. The first step in the search to establish priorities for technical and/or investment study would be to assemble and analyze all past proposals, or attempts to

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1 Laquian, Aprodocio A. Small Scale Enterprise and Informal Sector Employment, USAID/PADCO, Kingston and Washington, DC, 1981 - 1982.

2 Fisscha, Y. and Omar Davis. The Small Scale Manufacturing Enterprise in Jamaica, Draft, 1981.

3 Ayob, A.M. Made in Jamaica, John Hopkins University Press for the World Bank, 1979.

develop such industries, and establish the reasons for the success or failure.[1, 2, 3, 4] with this done, it becomes possible to go down the agenda with some insight into what might or might not be a "runner" Jamaica-wide or Carib-wide in harness with Trinidad and Puerto Rico. This listing can then be checked against larger policy intent.

Materials development can take place in three distinct contexts:

- Within framework of indigenous traditional construction
- Of the conventional modern, i.e. block and steel
- Within a rationalized building process set forward by the GOJ.

A Review:

- Earth and Soils: These are easy-to-use, but difficult to use as well. The desirable properties are dependent upon the construction methods to be employed and local climate conditions. Among possible methods are:
  - Wattle and Daub (Figure 5:1)
  - COB: The building of walls with loosely formed balls and earth.
  - Poured Adobe: A construction technique; concrete in which earth is poured between formwork.
  - Adobe Brick: The bricks are moulded from a plastic clay-based mixture and made to size in moulds. They can be reinforced in the mix with straw, bagasse or other fibre.
  - Rammed Earth: Similar to cast adobe but a stiffer mix that has to be rammed between formwork.
  - Nog (Figure 5:2)

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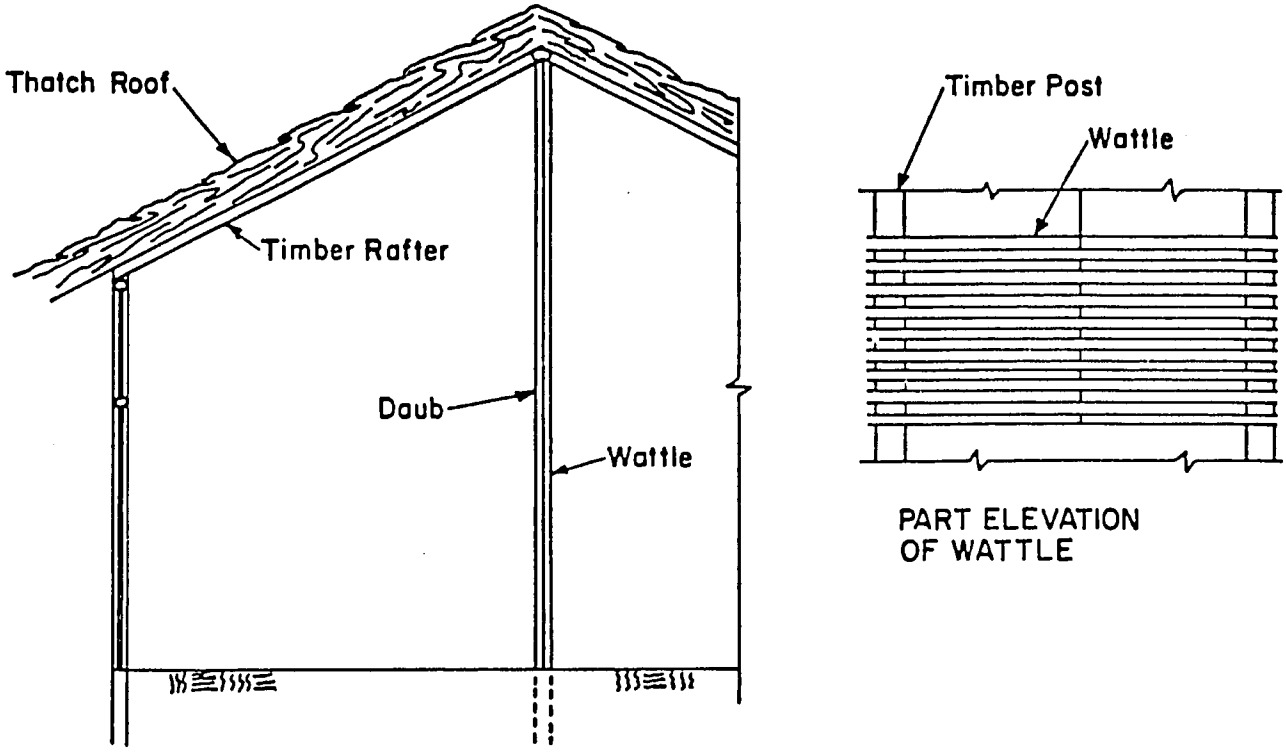
1 An early task in the Building Research Institute program.

2 The USAID sponsored plastic roof covering study needs re-examination.

3 The bagasse products component needs special study.

4 Deitz, A.G. "Material" in Low Cost Housing Technology, Editor Goodman, L.T. etal, Pergamon Press, 1979.

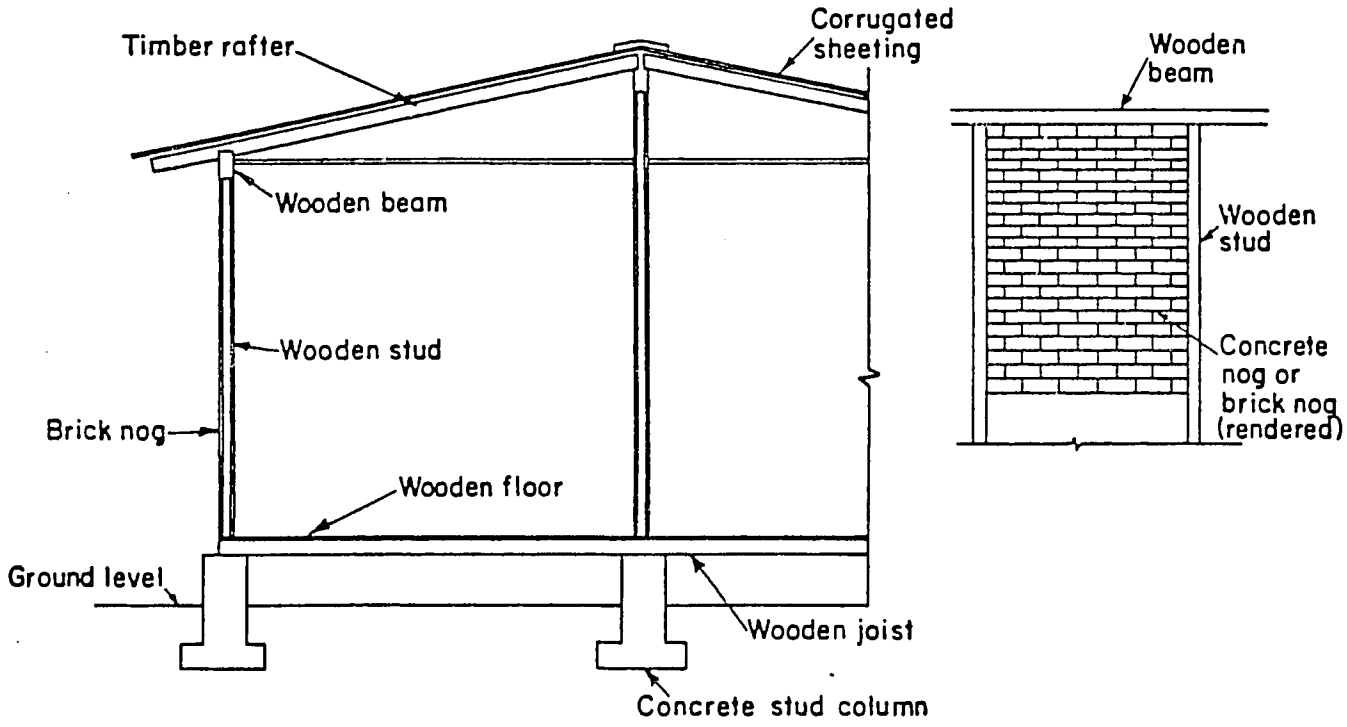
FIGURE 5:1



WATTLE AND DAUB

SOURCE: Adams, A. B.

FIGURE 5:2



Brick Nog and Concrete Nog

SOURCE: Adams, A. D.

Soils in Jamaica are known and classified[1] but for building use characteristics of types need re-describing; their constituents, moisture content, plasticity, shrinkage limit, liquid limit, plasticity index, optimum moisture content, absorption, strength, pressure of soluble salts and weathering characteristics.

According to soil, there are different mediums that can be used to stabilize:

- Portland cement
- Lime and lime admixtures
- Emulsified asphalt
- Other chemical stabilizers.

Surface coatings of earth walls are formed out of the interaction of soil experience and scientific testing. Science is required but the practice is an art.

- **Wood:** Knowledge of Jamaica's commercial timbers is part science and public, and part practice and known to the carpenters and joiners of particular locations in the island. Since no timber is available in large quantity, the further development of indigenous wood working will be on a very localized, small-industry base, i.e. elm, Spanish wood, mahoe, etc.

  The key success lies in selection of the wood for specific use, its storage and curing (the weak link in the process in Jamaica), treatment against insect attack (unless a naturally resistant hardwood), and appropriate design use. Only an advisory service could spread this philosophy and integrate it into localized knowledge — from which there would be much to learn. The key to the effective use of wood is to utilize its advantage and get around its limitations. This commences with organizing its study through:

  — Classification

  — Growth pattern study

  — Structural properties (related to growth)

  — Moisture retention

  — Shrinkage effects

  — Strength characteristics.

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1 Weir, Collin C. Caribbean Soils, Heinemann Educational, 1980.

Timbers for commercial use must, therefore, take into consideration diagonal grain, knots, and splits such as checks (caused by shrinkage and drying) and shakes (splits which occur naturally in the tree). Engineering timbers (required for hurricane and earthquake resistant structures) are graded on this basis, plus allowance for dimension, duration of load (i.e. impact or long-term) plus factor of safety.[1]

Factors Affecting Performance of Wood: The basic factors are:

- Climate: moisture, heat, light, erosion or weathering
- Biological: wood destroying fungi, wood discoloring moulds, wood destroying insects.[2]

All these factors can be handled in practice by various combinations of selection, curing treatments, structural choice and detail design.

The information to allow for better judgment by wood workers in local timber needs codifying and offered in the form of checklists and decision trees. This is an identifiable task for the Building Research Institute program. A search through old publications (50 to 30 years old) will probably show that much of the necessary study has already been done (Figure 5:3).

Development and Use of Preservatives

The techniques are well established for the urban centers. Kingston has its wolumanizing plants. The challenge lies in the local centers using locally cut woods. Among the options are:

- Brushing out of cut ends with creosote assembly is practiced. This can be a good answer where there is no aesthic objection to the black or brown appearance.
- Water soluable salts such as zinc cholride or sodium flouride. Borax is also ful.
- Solvent-soluble preservatives such as pentachlorophenol.

Chemical treatments against fire damage are possible, but probably too expensive for local development given the small size of the market.

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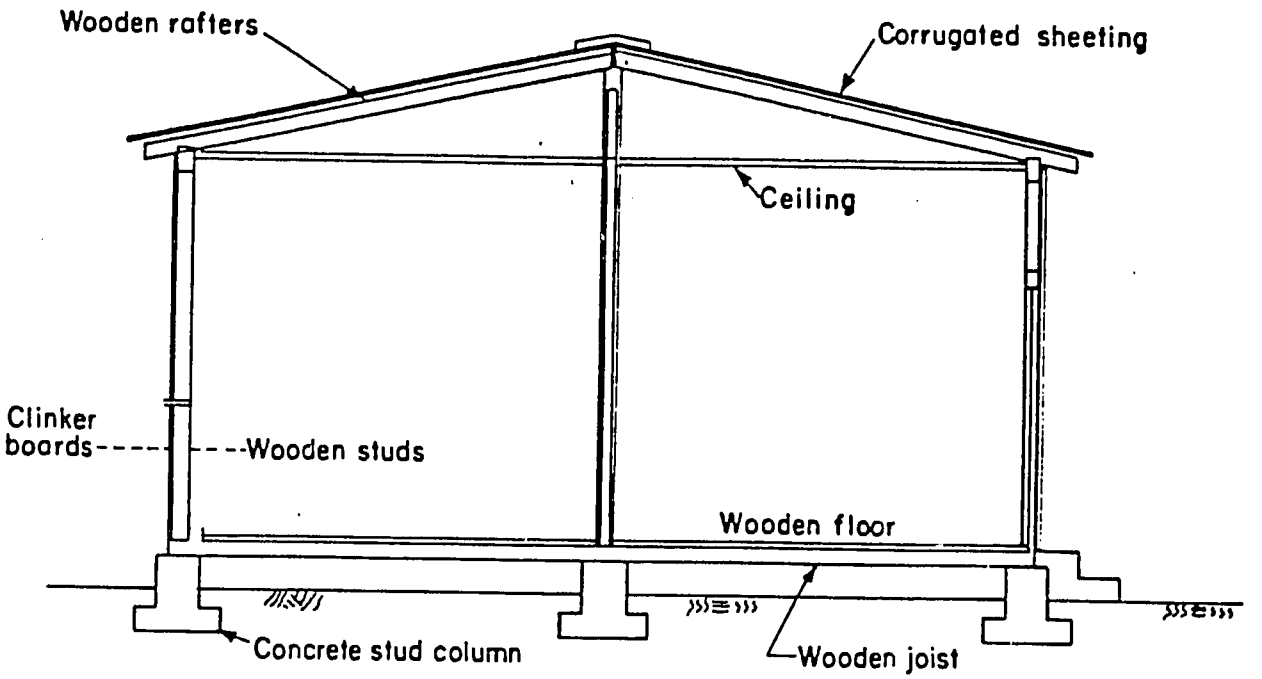
1 Dietz, A.G. "Material" in Low Cost Housing Technology, Editor Goodman, L.T. et al, Pergamon Press, 1979.

2 Overseas Division, Timber in Tropical Building, OBN, Building Research Status, UK, October 1972.

FIGURE 5:3



Timber Stud and Boarding

A Low Cost Housing
Construction in Jamaica

SOURCE: Adams, A. D.

Adhesively-Bound Wood Products

Possibilities here include plywood, particle board and hardboard. The market for plywood is small,[1] but for particle board and hardboard may be sufficient if designs employ them for ceiling and partition linings.

Bamboo

Bamboo is a material of which dwellings of great delicacy of design and structural soundness can be built. The technology is well developed around the world and unites science and the traditional skills of many people. The re-launching of this material in Jamaica, however, would require a sale and promotion campaign of religious intensity. For low income people it has the stigma of low status, middle income families would not accept it for fear of being thought of as country people. Only the international set, using the hotels of the north coast, find some delight in its use.

Plastics

Plastics industries are high technology industries. In Jamaica there are already factories making drain pipes and other products. Experiments have been made with using plastics as a cement in bagasse boarding and roofing sheeting. There is probably utility in plastics development of building products in Jamaica. Where sheeting and boarding is being considered commercially, it must be remembered that low cost on-site will come from producing a cheaper roof assembly or wall assembly, not from merely producing a cheaper material. Producing a lower cost roofing covering is not enough. Certainly not so, if the secondary roofing structure requires close spacing and frequent fixing.

There would be a market for plastic fixing blocks for hinges and electric outlets. These would be attached to inner linings of formwork and eliminate the need to break up cast concrete work.

Concrete

Concrete is a material made on-site. It is a very variable product. Its performance in place is highly determined by the quality, sizing and cleanliness of the aggregates, sand, water and cement and the appropriateness of the mix.

Concrete made in the pre-stressing or pre-cast yard can be produced to an average higher quality since supervision and production conditions come closer to factory conditions.

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1 US$9 million investment by the private sector has just led to the opening of a plywood factory in Guyana. There is an arrangement to export US$2 million worth of plywood each year to Barbados. Government provided duty-free import of materials for construction and production plant. The factory makes a standard size sheet 1.20 meters by 2.70 meters, but will also make other sizes to order.

The focus of attention in a trade upgrading operation would be the concrete produced by the smaller contractors and by the owner-builders in the traditional sector. An extension service would be needed to find various ways of reaching its widely-spread audience.

A second attention area is that of the production yard of hollow concrete blocks. Blocks are of very variable strength, quality and of surface finish. If walls are to be built of unrendered block, then a block with a dense finish will be required.

Cement Asbestos

For Jamaican conditions of high winds and rough building tolerances in roof structures, asbestos roofing sheets do not appear to be an obvious choice for the mass market.

Clay Products

Agricultural and sewer drain pipes are made in Jamaica. Hollow clay blocks are made on a small scale. Fuel costs can form a heavy item in clay product manufacture, but where this can be kept under control to produce a product range that will compete with plastic pipes laid or hollow concrete block laid, then there is a case for their further development in scale of manufacture.

Mortar Mixes

The mortar used in joints and rendering is generally too strong for its purpose. In joints this can lead to water penetration due to excessive joint shrinkage. The use of the over-strong mortar (with flush instead of struck joints) leads to the widely-spread opinion that block walls have to be rendered for water resistance. If mortar mix is suitable for the task, and joints are well filled and struck, then this is not necessary (except for conditions of maximum exposure on seashore or mountain top).

Money could, thus, be saved by using appropriate mortars with better quality surface finish blocks for since walls could be left unrendered. A cement slurry or cement-based paint will provide an improved performance. The success of this specification will depend upon improving the appropriateness of mortar mixes and the quality of blocklaying craftsmanship.

A lower cost mortar cement containing a ready-mix of lime, pozzolanas and portland cement could be marketed for about half the cost of portland cement.[1] It would need to have a specific tone of grey to distinguish it from portland cement. It would be naturally easy to wash and enable improved joint filling to be readily learned.

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1 Already done in Sri Lanka.

Aluminum

Extracted aluminum products are already made in Jamaica. If a major production plant is established, the aluminum slotted angle structure would have a definite utility in Jamaica. Elaborate structures, meeting hurricane and earthquake specifications, are possible in aluminum angles and tube. Aluminum sheeting can be designed to be non-structural or give resistance to shear forces.

Savings Lead to Lower Costs

An impression grows from a materials overview that without making any investment in new material manufacture there are considerable savings to be made:

- In improvment of materials handling and storage
- In reducing pilferage
- In selection for task and in seeing materials in an assembly context rather than as a separately costed item, i.e. element reduction(roofs, walls in place) is much more important than lowering the cost of any one material.

Masonry Cement Manufacture

Considerable savings seem possible by moving towards a better consistency concrete block with a smooth face, built into walls with a pre-bagged lime-cement mortar. Savings may be more easily realized than in the elusive search for a new low-cost material. Upgrading of the skills of mortarlayers would be necessary.

Building Assemblies Development

The popular debate in Jamaica on the cost of building material and the need for substitute materials of indigenous origin has revolved around a partial statement of the problem. It is the cost of material in place and within the context of specific constructional assemblies that the GOJ and the user/purchaser eventually pay for. There can be no useful talk of new or upgraded materials unless attention is also given to the constructional assemblies. This then leads naturally to the rationalization of design for domestic construction. This can be approached by first recognizing the four distinctive ways of building.

Ways of Building

Four different attitudes to building design can be recognized:

- **The "On-Off" Approach:** The building is singular; the client, professionals and builder relate only for the period of the commission.
- **The Component Approach:** The objective is to combine the advantages available from a limited number of components, which through standardization of dimensions and coordination of plan and section

dimensions, can be used in a variety of combinations to produce a range of designs for housing, schools or health buildings. This was explored in a modest way in Jamaica over two decades ago.

- The Model Approach: In this a whole building is standardized and becomes a repeat. This appraoch is much practiced in Jamaica (it has become the norm), both when building in conventional modern materials of block and steel and in closed systems. The production process for each systems model tends to be incompatible with each other model. No manufacturer seeks to unify his dimensions or components with any other. Successive Government in their role of major client have failed to organize the production system by specifying their technical needs.

- The Process Approach: A continuous development of dimensional relationships, specification of technical requirements, development of standard details are linked to the evolution of house types built by a limited range of techniques. These are encouraged to be developed to meet social and economic specifications. This is a possible appraoch for Jamaica and is encouraged by the scale of the need. The opportunity to implement comes with the establishment (now to be implemented) of the Project Planning, Design and Monitoring Company under the control of the Ministry of Construction.

The Rationalization of Domestic Building

The essential components of the idea of rationalization of the building process are:

- Continuity of building production: This also imples a steady flow of demand by GOJ.

- Standardization of Size: Dimensions in design, of components, of manufacturing.

- The Integration of Differing Stages of the whole building process: Initiation, design, programming, execution.

- A High Degree of Work Organization: Complete site organization and the transfer, where appropriate, of operations to off-site factories.

- Mechanization of Operations: To replace labor on-site.

- The Use of Research and Development: Continuous experimentation in material use and structural techniques.

All that this needs is to be set in the context of the idea of "the growing house" in Jamaica for the lower income group. The initially provided houses must be expandable

(See Chapter IV, Figure 4:2). Design for extension offers a special challenge given the need for hurricane and earthquake resistance and, therefore, structural continuity.[1]

Gradually, the type of construction industry policy that is required begins to emerge (developed in Chapters VII and VIII).

G. SUMMARY

There is some truth in the popular view that it is the cost of materials that has led to high residential costs in Jamaica. This is not the whole truth, however. Many factors are influential, including the way materials are assembled and the overall capacity of construction management. The special problems of a relatively small market for building materials means that GOJ has to give a lead in the use of a local material or it has no chance of success. Small industries offering fittings and components need considerable help to survive.

Indigenous materials can be developed in three distinct contexts:

- Within the framework of indigenous traditional construction.
- In the context of conventional modern construction: block and steel.
- Within the rationalized building process set in motion by the GOJ.

Within the three contexts, materials can be examined for relevance technically and in the three commercial settings. The chief materials of interest are: earth, wood, bamboo, plastics, concrete, cement, asbestos, clay product, mortar mixes and aluminum. These will best prosper in the third option above and in a context which includes Government offering a forward look as to how its houses of the future will be constructed. This should form part of policy statements. Once made, individuals and firms can make self-assessment of the part they could play in the new market.

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1 This aspect has been forgotten by the systems builders in pre-cast concrete. See particularly, the housing areas of the Portmore area.

CHAPTER VI

BUILDING LEGISLATION

There are numerous interlocking and overlapping Acts that bear upon the planning, siting and design of construction work in Jamaica. Although the administration of these Acts can be time-consuming, and some are outmoded in structure, it is doubtful if any have constrained either GOJ or private citizens from undertaking construction of the kind and nature they intended. For large-scale developments waivers are obtained[1] from planning advice. Industrialized building proceeds outside the confines of the ancient Kingston and St. Andrew Building Act.

A. KINGSTON AND ST. ANDREW BUILDING ACT, 1883 With Revisions Mainly to Schedules in 1957 and 1969.

This Act is now so outmoded that it is difficult to administer and more notice is taken of a draft replacement Act, prepared in the early 1970's and recently revived administratively as a working draft for a new enactment planned for 1982 to 1983. The form of this new Act is not yet finalized and points governing its revision are made in Annex II. The main items are that the Act should cover all classes of building, offer guidance as well as control, and be easy to administer in a "checklist" format. The present draft does not meet these requirements.

B. THE TOWN AND COUNTY PLANNING ACT, 1958

This reflects the problems and concerns of the UK Planning Acts of the period. Essentially, it is an Act to control development and focuses on procedure, not guidance and good practice. Conditions for obtaining approval are given and the medium of the declaration of a development area is used to bring the Act into force for specific geographic areas. The Parish Councils are the planning agencies through which an application to develop is made. In practice, these applications then pass to the Government Town Planning Department in Kingston, whose advice is taken in about 96% of the cases. Delays ensue due to administrative delays in the parishes, shortages of staff in Government Town Planner's office, applicants failure to supply sufficient detail (often GOJ is itself guilty of this)[2] and postal delays. The consultation period required by the Government Town Planner is at least two months — the consultation process is

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1 As appears to be the case with Portmore.

2 A new form has been prepared which guides potential subdividers more clearly than the existing form. This should help to reduce delays caused by incomplete information.

thorough.[1] Despite attempts to shorten the period by bringing interested specialists together to comment on the larger proposals, it is difficult to reduce this time. An applicant can thus expect to wiat a minimum of 3-1/2 to 4 months between applying to a parish and receiving a reply. The Act makes provision for the Minister to over-rule the decision of the Parish Councils in planning matters.

The Government Town Planner has issued a Manual for Development in provisional form. The manual offers the guidance to developers that the Act lacks. This manual is currently under revision and in relation to low income multiple housing is an improvement upon the 1973 Provisional edition. In preparing this revision, there is a need to cross-relate to the committee preparing the new draft Building Act.

The Town and County Planning Act is to be revised and a list of proposed amendments has been issued. It is difficult to appreciate the nature of the new Act for the proposed revisions have not yet been incorporated into one changed draft that can be read as a whole. This seems a necessity if the Drafting Committee is to appraise the work as a whole. The paramouncy of this Act over all others dealing with development is an intention in the minds of the drafters.[2]

In the new consolidated Act the approval of a subdivision will not have to go to the Minister for ratification. The double approval system (T and CP and Subdivision Approval) will cease, therefore, administrative time will be saved.

A later report[3] (undated) recommends that the local improvement Act be repealed and its terms be incorporated in the new Town and County Planning Act. This appears to have been accepted by GOJ in principle, but the incorporated draft has not yet been prepared. It is necessary to commission some one person to take all of the existing recommendations and prepare a consolidated draft that clearly reflects a list of principles. These latter still need clarification. The proposal that the new Building Act also be incorporated into the Town and County Planning Act is not a useful one. The enactments would be delayed indefinitely since incorporation would be extremely difficult and result in a document very difficult to administer.

C. LOCAL IMPROVEMENTS COMMUNITY ACT, 1977

This provides for the legal basis for upgrading activity in settlements. It specifically asks that local authorities (the parishes) be consulted prior to scheme authorization.

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1 Samuels, Blossom. The Physical Planning Mechanism, October 1981.

2 September 1977 draft is still current.

3 August 1978 draft.

D. THE KINGSTON IMPROVEMENT ACT , 1890 revised in 1956

This reflects the Victorian concern for "improvements" which occupied their minds as does "upgrading" ours today. It should be absorbed into the revised Town and County Planning Act.

E. LAND ACQUISITION ACT, 1947 revised in 1955, 1968 and 3rd schedule in 1969.

This provides the GOJ with compulsory purchase powers and lays out the manner of compensation using bonds.

F. HOUSING ACT, 1969

This covers the preparation and approval of schemes, emergency housing, slum clearance and improvements, acquistion of land, compensation of schemes and consequential powers, approval of schemes by housing associations. The Act is not parish-oriented and parishes are not defined as having to be consulted. The Minister is, in effect, the housing authority for the island. Powers are given the Minister to insist that once schemes are physically completed to his satisfaction, a parish take over the scheme for maintenance. However, there is not provision for the parish to obtain funds to carry out the maintenance.

G. NATIONAL HOUSING TRUST ACT, 1979

Raises funds from levies on employers and employees.

H. THE URBAN DEVELOPMENT CORPORATION ACT, 1968

This is an enabling Act to set up a major urban projects corporation with extensive powers. The corporation reports to the Ministry of Finance and not the Ministry of Construction. This is not likely to change.

I. THE KINGSTON AND ST. ANDREW CORPORATION ACT, 1931 With Many Revisions Up to 1973

Much of the Act deals with election procedures for the councils. Under the Act, Kingston is empowered to raise rates to pay for improvements.

J. THE PARISH COUNCILS ACT, 1901 With Revisions up to 1977

Much of the Act deals with election of members to Parish Councils. Powers are delt with briefly and include (subject to approval by the Minister) the ability to lease land, acquire land, prepare local schemes, dispose of lands and to limit the size of a town or village. There are also powers to make regulations. In practice, the powers of Parish Councils are weaker than even the Act suggests.

Commentary

The multiplicity of Acts bearing upon development reflects a history of an attempt to bring land development and housing under centralized control, to establish standards, and to perfect instruments through which GOJ could give a lead. There is now an awareness that consolidation of laws is a necessity. There is also a considerable body of experience on how to thread a way through the jungle of laws and regulations. Their major negative impact is the causation of cost over-runs caused by approval delays at the the project initiation stages. These delays may be more readily tackled by instituting new procedures of review than through changing the laws. Satisfaction of the laws is tending to replace the over-riding intents, which presumably was to get improvements, housing and developments done.

A side effect of the nationwide laws has been an erosion of the powers of Parish Councils. They are not seen as partners in the development process, rather, cast as "victims" having to assent. This is now hindering development and the maintenance of developed areas. It will prove a definite handicap to getting the working cooperation of parishes in the execution of a National Settlements Strategy (Annex VI).

K. SUMMARY

Increased costs have been attributed to delays in the plan approval process and to the character of the Town Planning Act and the Local Improvement Act. It is intended to combine these two Acts, but the principles which will guide this amalgamation are not yet established and redrafting and implementation will be a lengthy process (at least two years without acceleration and technical guidance). There is a suggestion that the new Building Act be amalgamated with the Planning Act. This would result in an unweildy document, difficult to use and revise. The two Acts for Planning and Building inter-relate, but are not clearly "of a kind".

The Building Code in draft has been prepared in Committee and is now in the form of an "almost last draft". It still needs further work, for in its present form it will be difficult to administer and technically only of use to qualified engineers. A building code needs to be a public document offering guidance to all who build — not just a minority.

Delays in planning approval are not all attributal to the Planning Department. Many applications are incomplete or have to be returned. Parishes may hold applications for weeks before processing and forwarding to the Government Town Planner. On receipt of recommended approval, the Parish may again hold the application for some weeks prior to informing the applicant.

Building application in Kingston and St. Andrew appears, on the whole, to be reasonably quickly approved.

CHAPTER VII

FRAMEWORK OF POLICY FOR THE HOUSE CONSTRUCTION INDUSTRY

A. CONSTRUCTION IN THE NATIONAL ECONOMY

Technological Level and Policy Choice

There are technological choices to be made and policy implications to follow at the level of national economic development planning.

In Jamaica the value added by construction (1979) accounts for only 8% of GDP. However, the total value of new construction work can represent anything between 35% to 50% of national gross domestic capital formation. To the extent that economic growth is related to the level and efficiency of capital formation, there is a direct link to the capacity of the construction industry.[1] If the industry fails to grow at a faster pace than GDP, it may become a serious constraint to the achievement of a sustained capital investment program.

The concept of construction capacity is somewhat difficult to measure and define. If capacity is defined as "the limit imposed on output by the availability of a critical resource", then the critical resources are different in the varying construction technologies. It is, therefore, necessary to disaggregate the construction industry into a matrix which relates different levels of technology to the different supply sectors of the industry[2] (Table 7:1). While there can be some migration of skills and materials between the sectors, there is also a high degree of inflexibility.

- **International Modern Sector**

  This is characterized by such structures as the new bridge of steel girder on the coast road east of Port Antonio and (for example) the Intercontinental Hotel, Kingston. This sector is largely constrained by the availability of foreign exchange to pay for material, fittings and plant; by the cost of international construction management; and by the assessment made of political stability.

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1 The MOC thus, has a responsibility to plan and advise on how to remove operational and supply bottlenecks.

2 Turin, D.A. The Role of Construction in Development Strategies, IDR, Washington, DC, No. 3, 1974.

TABLE 7:1

INDICATIVE DISTRIBUTION OF CONSTRUCTION OUTPUT IN JAMAICA 1971-81

(a) By Technological Level and
(b) By Sector of Industry (After Turin)

CONSTRUCTION INDUSTRY		(a) LEVEL OF TECHNOLOGY																TOTAL
		Very High				High				Medium				Low				
Type of Work	Civil Engineering	6	3	-	-	5	7	-	-	-	3	1	-	-	-	1	2	28
	Repairs and Maintenance	1	1	-	-	1	1	-	-	-	-	2	-	-	-	-	4	10
	Buildings and Housing	2	3	-	-	2	12	1	-	-	5	15	-	-	-	13	4	57
	Repairs and Maintenance	1	1	-	-	-	1	-	-	-	-	1	-	-	-	-	1	5
TOTALS		18				30				27				25				100%
Sector of Industry	International Modern	8	-	-	-	2				-				-				10
	Neo-Conventional or Semi-Industrialized		5				23				6				-			34
	Conventional Modern -- Block and Steel							2				24				10		36
	Traditional -- Timber, Nog, Wattle				-				-				-				20	20
SECTOR OF INDUSTRY		IM	SI	CM	T	IM	SI	CM	T	IM	SI	SM	T	IM	SI	CM	T	100%

The Table illustrates imaginatively the diversity of the industry. The various sectors in (b) compete for resources as do those in (a). Expansion in some sectors can depress activity in others. The different sectors need different kinds of policy attention.

Semi-Industrialized Sector

This sector is a national Jamaican version of a neo-conventional building scene common to most of Europe, or Puerto Rico. It comprises the larger local contractors on the island and those manufacturers of building products using modern technologies of production and assembly, i.e. plastic drainage pipes, fibreglass wash basins. This sector is limited by the shortage of local management skills, supervision skills, and indigenous technician skill. There appears to be no absolute shortage of professionals in design and costing, but the public sector working at this level of building has created a relative shortage for Government implementation because of low pay scales (2 to 2-1/2 times the salary is available in the private sector). Shortage of foreign exchange also impacts this sector since so little fittings and fixtures are made locally and most reinforcing steel is imported, as is plant spare parts. Adequate working capital is available probably to only one-third of the building contractors in this group. The shortage of capital works its way back into the contractual performance of the group and influences the way they cost and run jobs.

Conventional Modern Sector

This is characterized by block and steel construction and pre-cast assemblies. While some of the larger contractors in the Semi-industralized sector also operate in this sector at times, this form of construction is most to be associated with the smaller Jamaican contractors and craft manufacturers operating at the edge of the economy. These contractors suffer even more than the semi-industrialized group from shortage of managment, technical skills and cost prediction ability. They compete at a disadvantage for scarce resources, having to pay more on the open market for materials and spare parts than does the larger contractor. Although such contractors are helped by having access to materials through the Government warehouse, they otherwise receive little direct encouragement from Government.

Traditional Sector

This, for social status reasons perhaps, has dropped below the horizon of what Government notices. However, it has various strengths that could be revived so that it plays a part in providing houses on a local region basis for the disadvantaged. It is also a potential source of employment rooted in local areas. With some 30% to 35% of Jamaican households unable to buy the products of the semi-industralized and modern conventional sectors, however tightly designed and ingeniously financed, attention has to be given to this sector. Small business advice, purchasing management, achieving hurricane and earthquake resistance, siting to avoid flood, and credit lines all form worthy topics of advice. The form in which this advice is offered will need close attention. A suitable extension service appears as the prime lack of this sector, followed by poor mobilization of human resources and in both rural and urban areas, the lack of (plus difficulty of obtaining) clear title to a house lot by the low income families who form the client/users of its products.

Housing construction activity, being so fragmented, offers a wide range of technical answers at various levels of cost to the same problem. There is no need to go for the high tech, systems-build approach to achieve mass production at low cost. The semi-industrialized sector appears competitive in cost in Jamaica because the conventional modern block and steel sector is weak in management skill and labor control (one large-to-medium sized firm is an exception), as is the traditional sector. A construction policy needs to attend to the weak points in each of the sectors and give some policy leads as to the extent Government, in its capacity as housing client, intends to use each sector.

Construction in the National Development Plan

In shaping policy for construction, a first task is to accept the fragmentation of the industry. Policy relates to this acceptance and the need to develop all four sectors from the International to the Traditional. While the standardization of sizes and tolerances will help in this, a balance has to be struck between such central guidance and the need to foster the use of local regional skills and materials, particularly in conventional and traditional building.

The themes of significance are:

- The improvement of the reliability of national products, e.g. the concrete block.

- The placing of large contractors on the same buisness footing as other producers, and so due to credit support are able to apply for long term industrial loans.

- The placing of small contractors (after appraisal) on the same footing as small business enterprises and due for the range of support services. The lack of assets and high mobility tend to exclude them at present from the services of the national banks. A cash flow advisory service could be developed using a "national bank" branch manager network as the medium. Such managers could offer monthly counseling meetings to small contractors first in groups and then individually.

- The effective use by GOJ of its power as the largest client in the construction industry. This power is bing dissipated at present in a series of ad hoc decisions which instead of giving an effective lead to an articulated policy, tend to suggest that despite the rhetoric of change, it is "business as ususal". This could be fatal, since policy is what you decide to do, not what you say you will do.

- Devise ways of being a more demanding and innovative client. In Jamaica, it is to the private sector that one looks for a close watch on contracting costs and for technical innovation. Yet, the GOJ could give a lead since its residential program is potentially large by:

  — Working to strengthen the management and business capabilities of medium and small contracting organizations through training offers.

- Establishing suitable training schemes.

- Encouraging cost reducing innovations by specifically requesting technical experiments in 5% of every unit in a scheme. The extra costs (for example 10% to 15%) of each experimental house to be borne either by spreading over the whole scheme or by a direct "development vote" to the contractor from a research and development fund. These experiments should be reviewed prior to implementation by the Council of the new Building Research Institute.

- Looking to the more distant parishes from Kingston and improving the network of human and material resources applicable to building and linking with the human settlements development program. Themes:

  * Local branches of a national building information extension service, based on the Building Research Institute but using cast and other institutions to inform small contractors, hardware and lumber merchants, controllers of Government building material stores, local sawmills, local block factories, local quarries, etc.

  * To establish local informative seminars on improved block and steel, traditional building techniques, hurrican and cyclone resistance, measures against flood damage, etc.

  * The development of a "common technical services" approach to strenghening the technical ability of Parish Councils, i.e. common services units could be cased at the three county levels (Annex VI).

- Facilitate the payment of contractors by revising contract documentation, insisting upon the network or bar chart control of expenditure and work done and revising the retention scheme.[1] Larger projects should be monitored by the use of aerial photography on a monthly basis.

- Expedite the revision and approval of the new Town Planning Act and Building Act but as separate but related documents. In each case, committee work has reached the stage where technical drafts need to be produced that absorb all the accreditations that these revised drafts have collected. The production of these revised drafts is now urgent. If necessary, technical assistance should be sought. The outside

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1 This might be replaced by a league table approach. Contractors could be grouped in, for example, four leagues in accord with capacity and capability. If they fail to perform to the standards of their league, they drop to the league below — and then out the contracts league system all together. Relegated firms would find themselves listed as "10 house men" instead of 250. Improved firms would move up from 50 house capability to 250.

draftsman has the advantage of clearer sight (plus, in Jamaica, access to files of informed discussion on reform and redrafting).

Freed from the tangle of policy, ad hoc decisions, delayed decision, under-capitalization, poor access to documentation, lack of understanding of how the different sectors of the industry compete among themselves for scarce resources, etc., then the construction industry could help give a lead to Jamaica's economic rebirth and provide increased employment (meaning here truly needed employment, not welfare jobs) at relatively low levels of capital cost.

Transition Plan, 1982 - 1983

The foregoing need to all commence in FY 1982 - 1983 if the industry is to be turned around in the next four to five years. Meanwhile, there is the challenge of an immediate increase in output being required now. Three things should be focused upon:

- The use of the systems builders to an increased extent in 1982 - 1983 (but dropping away from their use in current form in later years). The case for using them now is that their project management, building process management and probably product erection management is currently more effective than most present block and steel contracts, therefore, costs per unit are relatively lower.

- Immediately determine to improve quality of construction management in public and private sectors with special reference to block and steel contracts. Undertake key and subordinate appointments in PRODEM and establish training.

- Adopt in contract management reform a "Center of Excellence" approach similar to what the organization PRODEM will do for design and planning. One or two organizations[1] should be strengthened in contract management capability (NHC for management and NHT for supervision of contracts, for example, following the line of building on strength) and then encouraged to take on contract management (for a fee) on behalf of the weaker-staffed housing implementation organizations. These organizations should then gradually be weaned of their contract management role and their implementing department closed down.

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1 This approach has already been followed by GOJ in relation to low income upgrading projects and Sites and Services implementation, the implementation work is now under the management of Sugar Industry Housing Limited. This suggests a "Center of Excellence" for "social" housing contract management and for middle income housing implementation, i.e. at NHC.

B. THE CONSTRUCTION PROCESS

The prime moves in initiating a building project are concerned with turning a perceived need into an effective demand. The program and projects are then designed to met the demand drawing in finance and construction industry to produce "the product" which is to be bought and sold.

The importance of effective identification of target groups, and of reorganizing executive bodies of Jamaica so they may effectively undertake their essential business as outlined in a memorandum.[1] This reorganization when carried through will enable certain contractual improvements to be made in the relationships of GOJ implementing agencies and building contractors. Institutional reform is a necessary step in the reform of the managment of construction.

When redefining target groups and their ability to pay, it is necessary to look beyond mere affordability. There are economic, custom-bound, psychological factors that bear upon the kind of solutions that are possible for certain groups (Figure 4:2 and Tables 7:2 and 7:3). Widening the possible is only viable if accompanied by massive popular education program (c.f. the non-acceptance to date of Sites and Services approaches). A varied pattern of dwelling types acceptable and of materials use (status of materials) crosses Jamaican society according to class.

Meeting the need of the lower class[2] is compounded by low income and under-employment (Table 7:2). Their problems are primarily economic and, while these are solved, they cannot afford to enter even the developed plot end of the housing market. They could enter a "layout only" scheme, however, which was designed with upgrading in mind.

C. EMPLOYMENT

The conventional modern and traditional sectors are relatively labor intensive, compared to the international modern and semi-industralized sectors. They could play a useful and sustained role in Government policy for sustained employment generation. The emphasis here would be on supervisory and technican grades, on craft skill and on the development of a pool of unskilled but experienced labor. For all sectors except the tradional sector registration of grade, skill and most particularly of the unskilled is important. Some experience is required if material is not to be wasted and costs brought under control. Only registered labor would be employed on sites under this scheme, except for infrastructure contracts, and then only on site clearance, brushing, grading and ditching work.

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1 Merrill, R. Draft Housing Policy Principles for Jamaica, PADCO, November 1981.

2 The terminology of class is used in the social science literature. All classes are equally valuable.

TABLE 7:2

SOCIAL STATUS GROUPINGS IN JAMAICA

Upper and Middle Class	1.	Capitalists: The owners and managers of large and medium scale private companies and farms employing a large labor force on a regular basis (0.5% of population)
	2.	Administrative Class: Public sector officials, the professions, politicians, etc. who administer key institutions and services (0.5%)
Lower Middle Class	3.	Independent Property Owners: Shopkeepers, small businessmen, middle farmers and landlords living on rental of dwellings (5.0%)
	4.	White Collar Workers: Professionals, technicians, white-collar workers and high-wage and skilled workers (18%)
Lower Class	5.	Own-Account Worker: Small farmers, higglers, petty-traders, small contractors (28%)
	6.	Working Class: Low wage manual (23%)
	7.	The Unemployed: Aspirants in the main to the working class but indefinitely or long-term out of work (25%).

SOURCE: Stone, Carl, Democracy and Clientelism in Jamaica, Transaction Books, New Brunswick, USA and London, 1980.

TABLE 7:3

1979 AVERAGE WEEKLY INCOME

BY CLASS GROUPINGS

Average Weekly Income	Small Farmers	Lower Working Class	Working Class	Lower Middle Class	Middle Class	Capitalists
Less Than $30	84%	67%	5%	0%	0%	0%
$30 - $49	12	27	45	3	0	0
$50 - $69	4	6	20	18	0	0
$70 - $99			19	29	11	0
$100 - $149			5	44	28	0
$150 - $199			4	3	22	0
$200 - $499			2	3	24	14
$500 or more					15	86
	100%	100%	100%	100%	100%	100%

SOURCE: Stone, Carl, Democracy and Clientelism in Jamaica, Transction Books, New Brunswick USA and London, UK, 1980.

Nothing is more damaging to the development of an efficient construction industry than the use of it as a "cheap way" of absorbing the unskilled on a local basis. This practice has sent management distortions, bills of quantity distortions, cost cover-ups and cost-escalation like cancers through the contracting system.

Labor needs a fresh deal in construction, otherwise, it cannot reform itself. Day work should be kept to an absolute minimum since productivity is minimal. Day work should be redesigned as task or to support task work (as in blocklaying) work and labor-only, sub-contracts let out to a labor-only task work leader for a fixed sum. He should then recruit his task force and hire his day labor.

This will reduce the number of people who have to be dealt with on a site directly by the main contractor or Government building operations manager. These small measures, for such they are, will be difficult to implement but offer the potential for improved efficiency and lower costs, plus a rise in a morale of the industry which is badly needed.

While construction activity offers employment and the block and steel sector perhaps most of all, it can neither accept large pools of unskilled or penetrate the unemployment problem to any great extent (Table 7:4). The unemployment problem is an expression of the dependency of Jamaica's economy on that of the international community. To the extent that it can be tackled locally, it is a matter for construction skill training, small local business encouragement, and craft manufacture encouragement. Most needed, however, is a GOJ policy that embodies social concern, welfare employment and community stabilization.[1]

Since the volume of work has fallen over the decade until 1981 (See Chapter I, Table 1:2), unemployment is high in construction. Those with skills to offer have in part left the island leaving a skill gap that can only be closed by on-the-job training. On-the-job training is made difficult while one part of Government sees construction work as a welfare employer spreading "income". While this path of social assistance is followed, skill levels will remain low; productivity will be low and labor expensive for the contractor. Inevitably, the costs incurred by contractors using welfare employees are passed back to the client body who in turn pass them on in raised dwelling/building purchase prices or raised rents.

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1 This could take the form of a national upgrading and squatter layout program in which the entrepreneural skills of the informal sector were allied to the reaching of national objectives. In such an operation people can be paid for real work. This approach would be of particular application to Western Kingston. Essentially, it treats the poor families as an informal "private sector" that stimulates and helps as do other levels of the private sector.

TABLE 7:4

RELATIVE SIZE OF LABOR FORCE SUBSECTORS

Services	%
Government	16
Commerce	13
Transport, Communications and Utilities	4
Other Services	14
	47%
Production of Goods	
Construction	5
Mining and Refining	1
Manufacturing	11
Agriculture	36
	53%

SOURCE: Stone, Carl, Democracy and Clientelism in Jamaica, Transaction Books, New Brunswick USA and London, UK, 1980.

D. THE COST OF CONSTRUCTION

The survey of costs portrayed in Chapter IV provides the agenda for a cost reduction program that needs to be devised by PRODEM in cooperation with the Building Research Institute's Board of Management:

- Layout and House Type Selection
- Infrastructure Design
- Planning Approach
- Building Code Approval
- Form of Contract
- Scale of Contract
- Cost of Money (to contractors)
- Site Control and Storage
- Costs in the Bill of Quantities
- Variation Orders
- Price Fluctuations
- Access to Materials
- Labor Costs
- Transport
- Completion on Time
- Quality Control
- Retention Monies
- Parish Take-Over of Completed Schemes.

These, and may sub-topics, if investigated could lead to a wide range of changes in administrative, technical, professional, contractual and craft practices which together could lower costs of block and steel construction. With this lowered, a fall in the cost of semi-industrialized systems building can be expected to follow.

It will be necessary to devise techniques that make for design-cost team work between architects, engineers and quantity surveyors. A common base could be the element breakdown (See Chapter IV, Figure 4:4). This feeds information back to the

designer in a form he can make use of at the drawing board. Knowing that a high element of cost is found in sewerage or walls makes it worthwhile to focus upon them at the design stage.

E. RESEARCH AND DEVELOPMENT

Every policy-making center needs it research, development and information unit if it is to remain relevant to the issues. Facts and practices worldwide need dissemination and procedures of management evolved and necessary technical weightings published to place in the scales against immediate political necessities.

The NHT has established a life style that incorporates research and documentation handling in its development of policy and strategy. Within the Ministry of Construction (Housing), there have been periods when development work and research have provided the base for decision. A new phase of this is now proposed through the medium of the acceptance of a Project Paper which outlines the formal establishment of a **Building/Construction Research Institute** (Annex III).

This project has been long in gestation, but is also well articulated. The main activities are outlined and grouped into two phases. Modes as the proposal appears, it is still somewhat ambitious in its current form. The Project Paper, however, does form an admirable plateau from which to launch a workable development and advisory activity.

The project would gain in credibility if renamed the Housing Research and Development Center. The focus of direct activity would then be the housing user and his needs (the target groups), policy formulation, rationalization of building design and production, selection of local standards (or international) and, most importantly, the dissemination of information at various levels, i.e. for professions, technicians, craftsmen, owner-builders, etc.

The second task of the Center would be (in this conception) to serve as a Research Program Management Center for two basic continuing research studies:

- The cost of construction, its analysis and reduction
- Indigenous building material development.

The cost study program could be under a seven-man steering committee reporting to the Director of Housing Research and Development. This group would be representative of Government, developer, contractor, professional and user interests. The work of the program would be allocated to any number of persons and institutes, i.e. not an "in-house" study.

A similar approach would be adopted for the indigenous building material program. The important thing is to have a coherent program, this the Director of Housing Research with his seven-man committee could ensure. The work is then best undertaken (through research and development funding) at the institutes and statutory bodies where skills and resources are most to be found. The Center itself would then only develop its own physical plant or testing facilities where these were not to be found already on the island, i.e. in roads laboratories or geological institutes.

The emphasis in this approach is on developing a research and information program rather than an Institute. The Institute could then be small, but prestigious; intellect-based and information-oriented. This standpoint, if accepted, now becomes the tool through which to re-examine the Project Paper and to illumine the particular priorities listed under Phase 1 and 2, all of which when understood in the context outline above are very right.[1, 2]

Building activity rests upon chemical and physical science, but in practice is for from being a scientific activity. Only about 20% to 25% of a research station's activity is likely to be "science". This may be best contracted out to other institutions.

In order to ensure that the research and development program approach receives due consideration, a review with proposals, should be demanded of the Chief Technical Officer of PRODEM within six months of taking office. Technical assistance might be requested for this assistance.

In reaching for a key to dimensional coordination, it is probably wise not to choose a theory but accept the dimensions of the standard concrete block as "a module" for plan and section. A second stage would be to establish some preferred manufacturing dimensions for components (and for systems builders, based upon multipliers of the block module). The proposed Building Research Institute could study and recommend sizing and tolerences to local manufacturers so that what they make fits the module and the preferred dimensions (i.e. height from floor to belt beam, span of roof members). Variety in house design remains possible within the limits set by the modular and dimensionally coordinated framework. The aim is simplicity and the reduction of needless technical variety.

F. SUMMARY

There is a need to identify the pattern of construction output by sub-sectors and by levels of technology. Construction policy will then be related to this matrix for each sub-sector has its specific needs. There can be no "one policy" for the whole of construction.

Construction needs a specific place in national development planning. Not just in the plan document, but in action and in planned distributed investment in materials producing, contract management, training, etc.

Important to the process of the operation is the GOJ taking on the responsibility of being an informed and demanding client. Extensive services to industry, professions and public are needed. This might be channeled through the information services of the

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1 Daldy, A. F. and R. Sperling. Setting Up A Building Research Station, Build International, Vol. 3, No. 7/8, July/August 1970.

2 Burian, F. J. and E. Q. Canela. Low Cost Housing Information Exchange in Low Cost Housing Technology, Ed. Goodman, L.J. et al, Pergammon Press, 1979.

Building Research Institute. Meanwhile, transition plans are required covering the next few years. A policy for effective employment needs to accompany construction policy. This must make a clear separation between real employment in construction and welfare day work. Welfare work, if continued, should be charged to a "social overhead" account and not to house cost.

The target groups as defined for designers set cost frameworks and so designers have an interest in definition. Affordability is not the only criteria because even if affordable, people will not buy what they do not like, especially if it is in the wrong place.

The Research and Development Institute seems a key to technical success. At present much is expected of it and perhaps not the right things, or even what is possible. A modest practical Institute would have relevance as a center for administration, uniting and advising on the reseach of other bodies in Jamaica. Its own role should be essentially that of integration, policy formulation and information services.

CHAPTER VIII

IMMEDIATE ACTION

The first step is to establish a workable framework and technique of decision (Annex I).

A. TAKING DECISIONS

Problems need to be sorted out and related to the levels of decision where action has to be taken. A possible categorization is:

- A macro-level national problem
- An MOC(H) issue
- An MOC(H) and other housing agencies issue
- Long or short term in character
- Within current institutional capacities to handle
- Short of resources and expertise and, therefore, requiring finance and/or technical assistance.

Macro-level problems include the lack of effective demand for housing by a large proportion of the population (Table 7:1) because of poverty and the scarcity of wage employment, raw materials shortages, machine shortages, foreign exchange shortages, use of unskilled labor to flood construction jobs and investment in small business (i.e. small contractors and craft level building materials industries). These matters are beyond the MOC(H) and are for GOJ cabinet level decision. Some items, such as the development of small businesses, are already the topic of GOJ financial and technical decision (November 1981).

However, MOC(H) can sharpen the statement of housing and construction problems. (These have been treated at a theoretical level for some decades now.) The elements of problems could be separated out and allocated to organizations and persons for action. Decision trees can be formed (Annex I). The MOC(H) can relate production necessities to effective demand, specify targets, specify component needs, set standards, design the flow of housing mark to obtain continuity of employment in the residential construction industry.

The MOC(H) could intervene in the matter of import licensing for building materials, upgrade the allocation and speed the process. It could also ensure through cooperative planning that utilities and social facilities arrive on housing schemes in a timely fashion. The duties of ensuring that this happens have to be allocated to some person with superintending authority in contract management. Transport difficulties and costs could be reduced if a plan of transport use was prepared and a strategy and practice followed. Again, someone has to be made responsible.

Where tasks are within present institutional capabilities, they can be allocated now. Required technical assistance and training should be arranged. For a lack of decisions followed through, a great opportunity could be lost.

It seems unlikely that technical policy of such magnitude and diversity can be carried through without the appoinment of a Chief Technical Officer in the MOC(H). He should have a policy and programming role and work executively through the Director of Construction and Maintenance and the Director of PRODEM.

B. THE OPPORTUNITY IN JAMAICA

The GOJ, and particularly the MOC(H), has a policy opportunity at this time which is seldom to be found:

- A decision has been taken to give a lead to the house construction industry
- There is public expectancy
- A design unit that could start on a simplified rationalization approach to house provision has been authorized (PRODEM)
- There is a preparedness to exploit local materials
- There are construction groups skilled in off-site and on-site production
- There is in the NHE and in NHT construction management expertise that is complementary (one group on the client monitoring side; the other on client management representation) and which, if augmented, could form a "center of excellence" for construction management of middle income homes to parallel the Sugar Industry Housing Limited responsibility for low income shelter and site development.

C. RESPONDING TO THE OPPORTUNITY

- Establish and announce that the major policy is to adopt the process approach (Chapter V) to building design and make use of the component approach in a supportive way. "One off" building approaches and "the model approach" — typified by the 1981 products of the systems builders, will not form part of the mid to long term future (Chapter IV).
- Government will give a lead through PRODEM (later to be supported by the Housing Research and Development activity of the Building Research Institute) in selecting preferred dimensions for plan, section and component sizes (windows, doors, wash basins, etc.). (The objective here is not to undertake a theoretical study for the "best" but to base recommended sizes and tolerances on blocks, windows, doors, etc. already on the market, or which could be readily obtained to the preferred dimensions.)
- PRODEM to issue outline house plan forms showing means of extension. These are to relate to planning and structure grids.

- Sizes to be published to allow importers and small scale industries to offer products that "fit". This they are more able to do once the market is defined.

- Issue support programs for small scale building component industries, i.e. timber doors, louvres, purlins, bamboo mat ceiling panels, gypsum panels, etc. This program would offer credit and advice. It could form part of the already announced program supported by AID.

- Portray the type of contracting industry that it is intended to promote, i.e. a composite of the semi-industrialized and conventional modern (See Chapter VII) which offers a framework within which traditional builders can also work. Characteristics of this industry can be portrayed by describing the two types of construction it might undertake in seven to ten years time. Examples might be:

  Composite "Block and Steel" and "Light and Dry

  In this approach a core unit containing WC, bathroom and kitchen wall will be developed in, for example, three versions of size, finish and cost to meet middle income, lower middle income and low income needs of quality and affordability. This unit will be of block and steel (using U-blocks for belt course) and also form the hurricane refuge within the dwelling and the base of earthquake resistance.

  Added to this core will be a lightweight frame structure, expressive of the preferred dimension systems, and made of timber (nog), light aluminum or other light metal structure. To this structure, which defines the rooms, will be added (in accord to income level affordability) particle board linings, plastic boarded bagasse panels, etc. The the light framed roof structure will be fixed sheet roofing developed in Jamaica of plastic-bonded material. Foundations will be on pre-cast concrete short columns connected with pre-cast concrete ground beams, stiffly connected to the short columns and to the disaster resistant core of block and steel.

  Composite Structure Using "Wet and Heavy" Cores (WC, Bathroom, Kitchen Wall) and "Unrendered Block and Steel Walls" (or earth blocks; or systems alternative — if cost is lower. In the new context, this may not readily prove to be the case); concrete slab roof or framed and sheeted (i.e. the same as in the above option).

  This option will also be designed to the same dimensions as the option above with hurricane and earthquake resistant core and in three income level variations of structural design and finish.

It will be seen that by enunciating such a policy, and giving an illustration of the two types of composite constructions that will be developed, the MOC(H) takes the lead at a technical as well as a client level. All kinds of block and steel systems builders, innovative aluminum frame builders and components manufacturers of all sizes can then relate to the orchestrated program. Variety and development can follow, but within some technical rules, standards of performance and set of preferred dimensions. In such a setting cost study, cost comparison and cost control can be forcibly developed to a commanding role in the building process.

D. THE TECHNICAL TRANSITION PERIOD, 1981 - 1985

The transition period that leads on towards achieving the new "design-and-build" setting will be one of great activity as the new pattern is created by institutional reform and direction. Each year will be marked by success in achieving some elements of the whole. The early years will be marked also by the necessity to implement current designs by current methods, including systems build in the form they now are. This is inevitable because of current weaknesses in block and steel management capability in the public and private sector. The patterns would be something as follows:

FY 1981 - 1982

- Appoint a Chief Technical Officer MOC(H)
- Establishment of PRODEM and preparation with Director of brief to develop a process approach to domestic construction "design-and-build"
- Upgrading of construction management ability in public sector "center of excellence" for construction management
- Using the most effectively managed units of production (by current standards).

FY 1982 - 1983

- Issuing to public and industry the set of preferred dimensions and design drawings for the two modes of composite structural designs for dwellings
- Moving about 20% to 30% of the year's construction program under the "center of excellence" and using the prototype composite structure designs
- Moving a further 25% of current conventional house building contracts under the management of the "centers of excellence"
- Completing programs conceived under the former method
- Incorporating knowledge fed in by the Building Research Institute into the design and costing process of PRODEM.

FY 1983 - 1984

- Issue of a second generation of house designs developed from experience of building the first generation. Great changes are neither envisaged nor desired, but rather refinement of dimensions and detail
- Encouragement of small industries to feed materials and components into program.
- Continued use of advice from Building Research Institute
- Refinement of design specifications of care for prototype to enable systems builders to offer alternative detail design and bids

- Encouragement of small and large businesses to make prefabricated (i.e. pre-welded) plumbing lines to build into house service cores.

FY 1984 - 1985

- Planned growth towards the master-minding of the house construction operation for all income groups

- The objective is not for GOJ to build everything, but to set a lead so that the private sector finds it to its technical as well as financial advantage to follow the lead.

E. THE OUTPUT OF CONSTRUCTION

Construction management interweaves three themes:

- It contributes to the successful management of the project

- The management of the business and process of construction (i.e. the flow and time of the work)

- The management of the erection of a structure that meets the technical specification of the agreed cost.

Project Management

It is at the time of commencement of construction implementation that construction management interweaves with general project management. But this is too late. Pre-contract work impinges greatly on construction implementation. In Jamaica client or design based changes made after construction commences have led to extra time being required and to higher costs.[1] There is need to:

- Ensure design and design communication deficiencies are put right prior to going out for bids

- Rule out client-side design amendments after the contract is signed; or at least keep to an essential minimum (i.e. where connected with building stability)

- Improve the accuracy of cost prediction. At times of inflation and where imported products form a large component of the cost, this is difficult but necessary. This is a combined effort of architect and quantity surveyor. Architects in design work should link design activity to the cost element information (See Chapter IV, Table 4:4) and focus on cost reduction at high cost areas. Quantity surveyors need to develop inflation indices giving high,

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1 Sites and Services Project - New/Old Harbour 1980 - 1981.

medium and low projected figures linking last cost (the estimate) to start and completion dates. This will help bring home to project management teams (in MOC(H), NHT, etc.) that delay in commencement of construction is a heavy on-cost on the scheme.

The difficulty of estimating last cost is accepted, but it can be improved. At present, there is a large difference (running up to 100% increase) between the estimate of a dwelling cost which launches a scheme, the tender price when received and the settlemt cost at construction completion. This means at least two project re-calculations and almost certain removal of the original target group from the market for the scheme.

Design the construction contract for staged hand-over of dwellings for occupation. At present, it is the general rule for a contractor building hundreds, even thousands, of dwellings to plan for hand-over of all at the end of the construction period. This puts the GOJ in its client capacity at a position of disadvantage once delays ensue, or worse, if the contractor walks off the job failing to complete.

Within the framework of, for example, a two year contract for infrastructure and dwellings it would be more cost effective to plan for hand-overs in three or four stages so that GOJ has something in hand that is occupyable at an early date and not 2,400 partially completed units at some later date.

It may cost more to plan services in such a manner that phased occupancy is possible, but the marketing load is phased and the average time of construction per unit is lowered, so balancing savings are possible.

Construction Process Management

This is a joint responsibility of the agent acting for the building owner (the Directorate of Construction MOC(H) or NHC) and the building contractor. Relationships and responsibilities are described in the contract document to which both are parties (Annex V).

- **Process Management for the Client**

Government in Jamaica frequently acts as building client and thus, is directly concerned with building process management. The role is not well assumed. It is not at the forefront of the minds of all superintending staff. Training, handbooks of procedure, and pre-stage and post-stage status reporting needs institutionalizing. This, in order to manage contract time and construction status, needs to be linked to a network diamgram which tracks the construction period on site. This diagram should be proposed initially by the contractor and form part of his tender bid. It will reveal the relationship of critical activities to the whole and show those stages which have a time float and, therefore, do not impact process management so forcibly.

No first stage payment to a contractor should be authorized until his network diagram has been agreed. Contract management is then linked to the critical path of the site work. Extras are then linked only with the critical path components. Where small contractors are used, then a bar diagram should replace the critical path diagram. All contractor claims for delay then must be linked to the chart.

While contractors will be initially reluctant (have been reluctant since NHC and the MOC(H) recently introduced the network management discipline) they will experience in the operation a benefit from the network. It is "the secret" of the "low cost" of systems building.

The standard form of contract currently in use does not govern the bonding of contractors effectively.[1] Since government is the major employer of contractors, especially for housing, it has the possibility of exerting discipline. Over-runs in constsruction time, poor quality work, failure to complete extensive works required in the maintenance period could all earn penalty points. Since contractors are grouped in capacity to construct 250 houses, 50, 10 or 1 - 5, penalty points should drive them down and off the contractor lists. Once off the list, there should be no reinstatement for three years and then a start again from the bottom category of 1 - 5 houses.

Process Management by the Contractor

Although the foregoing emphasized the management role of GOJ housing agencies, the prime responsibility for managing the process of construction is that of the contractor. He tends to be cast as "the devil" who has to be watched. Seen from the contractor's viewpoint (especially the larger contractors), the devils are elsewhere; lurking in the jungle of beauracracy that stops him from odering his affairs logically and from planning his work.

F. TRAINING

For an expanded program MOC(H) and its associated agencies would have a large training need. This needs to be the subject of survey and study. This work would need to relate to an MOC(H) Training Officer whose appointment is now needed. Training needs stem from five sources (all are to be found in MOC(H)).

- The need for changes in the ways things are done and so establishment changes
- Inability to fill with qualified people, either the existing or revised establishment

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1 JIC Construction Contract Standard Form (private edition with Quantities).

- The changing nature of jobs: new techniques, new machines, new methods
- Imbalances in staff: a missing level of middle management or field supervisor
- Misunderstandings about functions that lead to low job performance in skill trades and technicians.

Training has four phases: All are of equal importance.

- Preparatory, identification, planning
- Pre-training readiness, institutional readiness, organizational readiness, training unit readiness
- The training sequence
- Post-training monitoring, evaluation and followup.

Discussion of training issues in the MOC(PW) has proceeded much further than in MOC(H). An Education Committee has been established and training monitoring is well established. An apprenticeship scheme for tradesmen is operated. A Training Officer is actively being sought to fill an established post. MOC(H) should take advantage of this activity in its midst; join in and work to identify in detail training needs and means of their satisfaction.

G. TECHNICAL ASSISTANCE

Within a framework devised by the MOC(H) as advised by GOJ and AID agencies, the following technical assistance for the technical guidance and construction management of GOJ sponsored housing construction is proposed:

- Advisor on the construction industry profile and to identify indicators: one economist/planner with construction background to cooperate with MOC(H), MOF and Department of Economics UWI at Mona. Time: six weeks.
- Advisor on the detailed development of a construction industry management policy and to identify the key institutional instruments through which to achieve objectives: one architect/engineer planner and manager with policy level experience. Time: six weeks.
- The development of a preferred dimension approach to building design to form the basis of a lower cost housing program: One architect with modular and preferred dimension background and training experience. Time: three months.
- Quantity surveyor with work-study background (from U.K., Australia or the Carib Region) Time: 18 months to 2 years.
- Advisor on building material analysis and marketing, scales of producing, etc.; link to development of Building Research Institute. Time: six weeks.

- Advisor to assist in the preparation of a functional draft Planning Act which incorporates new principles and covers the concerns of the existing Planning Act and the Improvement Act: One legal Town Planner. Time: six weeks.

- Draftsman Advisor to assist in preparing a draft Building Code using the Committee's work to date. The code to be prepared for ease of understanding and administration. A brief Act with "Deemed to Satisfy" clauses: One code writer/administrator. Time: six - eight week).

- Construction Management for the identification of needs and the training of trainers of many levels and the design of courses using local agencies in the public and private sector (i.e. Management schools, UCWI, Mona, CAST): Construction trainer. Time: three months.

- Technical trainer for the identification of needs and the training of trainers for technicians and craft skills. The preparation of a program built upon current training operations. Time: three months.

- Building Research Advisor to focus efforts on practical advisory services and the establishing of a Jamaica context for research. This is an articulation task. There are inspired counterparts available: Research Architect/Engineer/Administrator used to making the most of a modest scale of resources. Time: three months).

A first stage towards organizing this Technical Assistance would be to develop the Terms of Reference with the Director of PRODEM when appointed. Some of these tasks may merge into being composite activities related to a fewer number of advisors. It would be more efficient, and less confusing to the MOC(H) as client, if the advisors had a team briefing prior to commencing work. The most effective way of managing the expertise would be to appoint through one sub-contractor reporting to AID.

H. SUMMARY

There is a public commitment to act in housing policy and a public expectancy. There is an opportunity to make an improvement since all is in such disarrary.

A commitment should be made to the process form of construction development.

Using PRODEM, backed by the Building Research Institute, this approach should be prosecuted. It would be a mistake for the Institute to conceive itself as a research body in the scientific sense. The problems to be solved lie in material use, contract procedures, cost control and management.

Government should portray the future by issuing imaginative specifications of two composite dwelling types:

- Composite block and steel cores and light and dry construction

- Composite construction using wet and heavy concrete cores plus unrendered block and steel walls.

These two structural types could each be designed to be available in versions suited to three income levels; completeness, size and used material varying with each income level. Building Code revision must cross reference. During the development of this approach, which should link to the discipline of preferred dimensions, transition policies will be required and need careful tailoring.

Construction Management needs much upgrading in its three aspects:

- Contribution to project management
- Building process management
- Quality of product management.

There is a need to define the training need in MOC(H) and allied bodies. Requirements:

- Definitions, job specifications and schemes of service from senior officers
- Training commitment by the Ministry - willingness to give time off with pay to trainees and to budget for training experience
- Undertaking of analyses of current and new jobs
- The meshing of organizational plans for change (and particularly of transition periods) with training strategies
- Formulation of detailed training needs
- Ministry collaboration with trainers. This means appointing an officer to have such a responsibility.
- Acceptance of the four-phase approach to programming of training:
  - Preparatory
  - Pre-training readiness
  - Training
  - Post-training followup.

HOUSE CONSTRUCTION IN JAMAICA

ANNEXES I -- VI

ANNEX I

TAKING DECISIONS

Levels of decision are found in every nation. They present problems of allocation of responsibility in the decision itself, and in the taking of action. In Jamaica, however, this naturally found complexity is further compounded in housing by the multiplicity of agencies responsible. This makes for difficulty in shaping policy and in coordinating implementation.

It is tempting to suppose that the reason housing policy is so unformulated is because the MOC(H) is so administratively weak in relation to its own family of agencies (NHT and NHC for example) and those outside the family (such as the UDC and the Hellshire New Town Development Corporation under the Ministry of Finance). The weakness comes from not shaping up the pattern of decision[1]. This will be required of the Ministry whatever councils of cooperation are established between the agencies. Bringing people together is just as likely to bring out their differences as it is to bring out common ground. Coming together is not enough.

Each organization exists in an environment. Each organization has control of a limited number of program elements in its own activities. For performance in the world they rely on the activities of other organizations who they can influence to a greater or lesser extent. There is a third set of organizations whose activities cannot be influenced by housing agencies, yet are crucial — financing bodies, public utilities, etc., — whose behavior pattern has to be appreciated by the agencies in order to get "into their good books". It seems important in housing decision for each agency to list what actions it can control, those actions it seeks to influence, and those it can only appreciate and seek to curry favor.

The MOC(H) could then seek to match these pathways of decision and ensure that through its committee life decisions are possible, and that there is no vacuum of leadership at the top (i.e. the decision on size and character of programs are made, as are those on technical standards to be adopted).

If such a framework of decision were adopted, then it would not be possible for an announcement of the Hellshire Hills development of 4,000 middle income houses to be made outside of the context of the housing of the poorer people of Kingston. The housing problem of the established city cannot be solved by avoiding the heartland of the problem. In fact, the problem can be made worse because technical expertise, skilled workers and finance will be drained off for Hellshire Hills at the expense of a balanced program. There is this real danger.

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1 It is compounded by the lack of a Chief Technical Officer.

Therefore, policy may depend not only on the making, but on shaping up the patterns of decision through which it is implemented. Policy is not what you say but what, through your actions, you bring about.

Decisions of quality have to be worked on well before they reach being an agenda item. It is dangerous to put an item on the public or Ministry agenda <u>until</u> a policy answer is in sight and the expertise and resources to be used have been identified.

Following this approach, a policy item appearing on an MOC(H) agenda would have been discussed informally with every associated organization; those directly influenciable and those in the environment affecting the decision. After this informal survey, a paper of recommendation would be prepared for the Inter-Ministerial Committee or Inter-Agency Committee. This would set out briefly:

- the issue
- the analysis
- the policy orientation
- the action options
- the people and organizations consulted
- the policy choices reviewed
- the one recommended and the reasons why. This item should go before Committee "starred".

This means that there is no discussion on the recommendation, only a vote "yes" or "no". Members of the Committee have the paper two weeks before the meeting. Should they have objections to the acceptance of the recommendations (and the action that follows), then they must put them cogently in writing and request "unstarring". These reasons are then put before the Committee who by a show of hands agree to the "unstarring" or not. Once the discipline of the method is established, "unstarring" hardly ever takes place if pre-meeting consultation has been undertaken properly. This method, if followed through, leads to group decision on a flow of issues and action recommendations. It could transform housing decision in Jamaica.

ANNEX II

BUILDING LEGISLATION

THE BUILDING CODE

In Jamaica each Parish administers its own code. The code for Kingston and St. Andrew does not cover the whole of the urban area. In format it belongs to the early part of this century. Although certain amendments and additions were made in the 1950's, the document is now truly historic and offers a poor guide to good practice. It relates poorly to the task of checking plan proposals and has proven time-consuming to administer. These and other inadequacies have been known to GOJ and the local professions for many years. A Standing Review Committee has been established, and recently re-animated, with the task of recommending a new draft code. Membership is wide but could be usefully extended to include someone close to people undertaking rural-type housing of traditional renewable materials.

TERMS OF REFERENCE OF THE COMMITTEE

As published, the Terms of Reference are:

- Purpose: To review the present draft regulations.
- Objective: to advise on:
  - a. safety standards
  - b. time frame for preparation of new code and its implementation
  - c. social implications.

The Committee has set up sub-committees to report on selected topics:

- a. Safety Standards
- b. Social Aspects of Housing
- c. Organization of the Document
- d. Legal and Institutional Framework
- e. Implementation

In addition, Committee members have prepared advisory papers to inform the Committee of special issues. One by the representative from the Office of Disaster Preparedness and Emergency Relief (ODIPERC) draws attention to the role that can be played by a relevant code to mitigate the effect of natural hazards of flood, hurricane and earthquake. It points out that the code's task of ensuring public safety within

dwellings should be extended in disaster-prone Jamaica to include community safety after a natural hazard has struck. This implies special code provision to govern location and construction of health and hospital buildings, power plants, fire stations, etc. Vulnerability studies are required to establish communities, buildings and areas most at risk, and risk zones mapped. Such measures would structure not only the design of buildings, but property insurance rates and influence the house mortgage market. Vulnerability to loss from earthquake, flood and hurricane does not currently influence the location of new housing schemes; yet the multiple failures that can be anticipated could make some sites dangerous for occupants. Portmore, near Kingston, would be a place to evacuate should a hurricane warning be received. No warning, however, is to be expected of an earthquake.

As the Committee has determined, building control is properly concerned with the protection of human life and particularly with the occupants of buildings. This control is exercised by determining, enacting, zoning and then enforcing certain minimum building standards below which no person is permitted to build. It is assumed that anyone adopting lower standards in the areas controlled would endanger the health or safety of others. It is important to stress this. A code is for public use and is of public concern. It should not be a private document for engineers to read. Such minimum standards cover:

- Accommodation: room sizes, dwelling sizes, ventilation and light, etc.
- Construction: seen from the standpoint of structural safety. (Special consideration being given to zoning of risks and design and construction of hazard prone structures.)
- Drainage and sanitation.
- Fire: its spread and means of escape from it.

AMENITY

Where it is thought desirable to regulate the appearance of buildings or to regulate some other aspect of amenity such as "space about buildings", these should be dealt with under planning controls. In those parts of Jamaica where there is as yet no effective planning and development control administration, it may be necessary to insert a section in the Building Code to regulate such matters as plot coverage and zoning by use or structural type.

BASIC PRINCIPLES OF BUILDING CONTROL

Building Control is effected by determining, enacting and then enforcing certain minimum standards. The instruments employed are "a code": the means of administering it, and the means of checking that the buildings built within the provenance of the code have, in fact, been built "within the law" (The latter is hardly practiced, even in Kingston).

It is a principle of law that regulations should only be introduced where they can be enforced. As implied above in the previous paragraph, the enforcement of a building code is in two stages:

- **In an Office of the Administration:** The drawings are checked by qualified staff such as a City Engineer, City Architect, Medical Officer of Health. For large buildings the Chief Fire Officer is also consulted.

- **On Building Sites:** Here Building Inspectors ensure that the buildings really have been constructed in accordance with the drawings submitted and passed by the Administration as satisfying the provisions of the code.

The emphasis of controls and codes will vary according to circumstances. In Jamaica, the combination of natural hazards — even if of fairly low frequency — plus the fact of much owner-builder activity in traditional materials and in low-skill construction in modern materials **makes for a special circumstance which will structure any relevant code.**

We have noted that it is not good in principle to enact building law which cannot be enforced. It is also unwise to enact building law which is inappropriate in the situation that is to be controlled. It is thus important to define the situation that is to be controlled. This is being emphatically re-stated at this point because although the Committee on Building and Construction Codes has structured its activities very well, it had as its starting point the present Kingston regulations. It also is in need of a statement of principles to guide the drafters of sections of the new code. Such principles stem from looking at the kind of building that takes place in Jamaica — rather than about the former code; or rather, the still active Kingston and St. Andrew Building Act. What has to be regulated is the project process, i.e.:

- Approval in principle
- Issues of permits
- The licensisng of contractors
- Safety precautions of work in progress
- The issue of certificates of occupancy
- Permissible areas and heights
- Fire ratings and various planning issues relating to the siting of buildings on lots
- Minimum room standards, means of escape and precautions to be taken on constructions if a hurricane warning is received.

All of these items are covered in detail in the revised draft. Some items, however, could be simplified for inspection purposes; some items could go in annexes or schedules, where as supporting documents to the Act, they can be more easily changed as conditions change than if they remain solidified into the main text.

The heartland of the revised regulations lies in the sections on Structural Requirements and Materials. These suffer from not relating to the building scene of Jamaica, i.e.:

- International Modern
- Semi-Industrialization
- Conventional Modern: block and steel
- Traditional: timber, log, etc.

The draft in its current form is a monument to the effort of the Committee and its Sub-Committees. It covers everything (almost) but not in a useable form.

The buildings to be found in Kingston or Montego Bay are not all "of a kind". They can however, be roughly grouped into "three kinds":

a. By Professional Builders, etc.: Economy can only be achieved in this class of work if designers are permitted to make use of new techniques within a framework of "design loads" and "Codes of Practice". Enforcement of this type of code is administratively not too difficult either in the office or on site.

b. By Small Builders and Untrained "Plan Drawers": These people do not design in the true sense of that word so it is no use trying to control them through concepts of "design loads" and "Codes of Practice". They require specific guidance as to is good practice: what will be accepted by the code. They need this spelled out in terms of wall thicknesses, beam depths, etc. (Yet, to control professionally qualified architects and engineers in this way is very inefficient and raises the cost of commercial and "official" building.)

c. By Small Builders or Residents Using Short-Life but Renewable Materials: The vast majority; perhaps 40% of all domestic building. Here control must be basic, limited to essentials. Those whose efforts are to be controlled do not understand why: enforcement in the office will be weak, on-site almost non-existent. It is no use taking on a control task which it is impossible to execute. Control of this kind of building is left for discussion in a later section.

COMBINED CODES

While keeping their different aims and objectives distinct, it is possible to combine codes (a) and (b) within the body of one single document. Ideally, this combined code should be written so that it can be used as a designer's handbook. It should be organized so **that it is easy to use while checking designs.**

The main objectives of a combined code would be to permit greater freedom in the use of new materials and methods **to those professionally qualified to exercise this freedom**, while at the same time setting safe and certain **standards for untrained or half-trained designers and builders to follow.**

The achievement of these aims is facilitated if requirements governing construction are arranged into groups. Each group relates to a particular function to be formed by the building, i.e. such as its ability to withstand certain specified dead and live loads (e.g., wind loads).

The requirements governing any particular function generally take the form of **performance standards** which specify to what degree the building as a whole, or a particular part (such as walls or roof) must be capable of performing the function. However, **they do not make it obligatory to adopt any specified form of construction, thickness of material, etc.** (This would be a sharp change from the format of the present Kingston Regulations.)

DESIGNING THE CODES

An example of the new type of code is being proposed herein. Loadbearing walls must be designed so as to be capable of taking various loads and stresses (see Table A-II:1). The functional by-law does not state, for example, that hollow concrete block walls shall be of a certain thickness; or that the reinforcing bars that may be required to stiffen them shall be of any particular size. Nor is there any limitation of the materials to be used in wall construction. There is complete freedom of choice to use any material or construction providing that it can be shown to meet the required standards set out in the functional requirement clauses of the code. Designers who wish to do so are, therefore, able to design for a particular purpose with resulting economy and efficiency and still remain within the framework of the approved code.

"DEEMED-TO-SATISFY" CLAUSE

Many designers, particularly those who have not had the benefit of a technical training, will not want to depart from the use of conventional materials in conventional ways. The performance standards we have been discussing are, therefore, supplemented by further by-laws. These specify the customary method of construction that are **deemed-to-satisfy** the performance standards required. If a designer or builder complies with American or British Standard, Code of Practice or other approved specification which is deemed to satisfy a particular by-law, the he has met his requirements. He is, however, as we have seen, quite at liberty to adopt any other material or method provided he can show that it satisfies the relevant functional requirement. There is, therefore, a clear distinction between the by-laws proper, which **must be complied with** and the deemed-to-satisfy clauses which **may be followed** if desired. These latter go to form the handbook of good standard practice. They assist in improving the performance of buildings designed by the less skilled by offering the designer guidance at the design stage.

ADMINISTRATION OF THE COMBINED CODE

Such a building code requires to be administered by people qualified by training and experience. The main object of this form of by-law is stultified if those administering them, or working to them, have regard solely to the specifications laid down in the deemed-to-satisfy clauses. The fact that a material or method is not

TABLE A-II:1

AN EXAMPLE OF THE USE OF 'CHECK-LIST' REGULATIONS
AND OF 'DEEMED-TO-SATISFY' CLAUSES

WALLS, General	5.03	(1)	All walls shall be sufficiently strong to carry the expected loads on them without collapse or undue deformation and all external walls shall be weatherproof;
	5.04	(2)	Smooth interior surfaces shall be provided to all rooms, corridors and passages;
		(3)	All walls shall be adequately connected to the parts of the building on which they abut.
WALLS, Masonry, etc.	5.04	(1)	External walls and other load bearing walls not more than 10 ft. in height above floor level shall be constructed of either -- (a) masonry set in mortar, and not less than 1 ft. 0 in. thick; OR (b) blocks of concrete or cement/fine aggregate set in mortar and not less than 6 in. thick; OR (c) burnt clay bricks set in mortar and not less than 8½ in. thick; OR (d) framed wooden construction to comply with Regulation 5.04; OR (e) concrete panel set between reinforced concrete posts.
		(2)	External walls and other load bearing walls two storeys high shall have the upper storey constructed to comply with Regulation 5.04 (1): the lower storey shall be constructed of either -- (a) masonry set in mortar and not less than 1 ft 6 in. thick; OR (b) blocks of concrete or cement/fine aggregate and not less than 8½ in. thick; OR (c) burnt clay bricks set in mortar and not less than 8½ in. thick; OR (d) framed wooden construction to comply with Regulation 5.05.
		(3)	Internal single-storey walls which carry no load other than their own weight shall be constructed of either -- (a) masonry set in mortar and not less than 6 in. thick; OR (b) blocks of concrete, lightweight concrete or cement/fine aggregate set in mortar and not less than 2 in. thick; OR (c) burnt clay bricks, set in mortar and not less than 2-3/4 in. thick; OR (d) framed wooden construction to comply with Regulation 5.05.
		(4)	(a) Every wall shall be supported at right angles to the wall by means of intersecting walls, piers or buttresses; (b) the distances between such lateral supports for walls constructed of masonry, blocks, bricks, or unreinforced concrete shall not exceed -- (i) load bearing solid walls -- 20 times the wall thickness, (ii) non-load bearing walls -- 36 times the wall thickness. For the purpose of this paragraph the wall thickness shall be taken to be the thickness of the wall excluding any surface finish or rendering. (c) The distance between lateral supports for walls constructed of reinforced concrete shall be as decided by the Buildings Authority. Provided that the Buildings Authority may accept walls of other construction and may impose conditions for their use.

TABLE A-II:1 (Continued)

MASONRY, BRICK AND BLOCK WALLS SHALL BE DEEMED TO SATISFY REGULATION 5.03(3) IF:

(1) A ring beam is constructed on top of all external walls, in which case --

(a) the wall plates are fixed to the ring bram by rag bolts not further apart than 5 ft.: the bolts are ½ in. dia., extend not less than 4 inches into the ring beam and are secured by a nut and 1½ inch dia. washer on top of the wall plate.

(b) each ring beam is at least 6 in. deep, covers the full width of the wall and is suitably reinforced;

(c) a ring beam is constructed of either --

(i) cast in situ concrete to mix C reinforced with at least two bars each 3/8 inch dia. set 1½ inch from each side of the beam, OR

(ii) precast U shape sections, the sides and base of the U being not less than 3/4 inch nor more than 1½ inch thick. These sections are cast using either the same mix as the wall blocks or concrete to mix C but with coarse aggregate which passes a 3/8 inch sieve: the inside of the U is filled with similar concrete and is reinforced with two bars each ½ inch dia. set one in each of the internal corners of the U;

(d) each ring beam is anchored to the foundation with ½ inch diameter bars embedded in the walls: One such anchor bar is fixed at each corner of the building and others so that there is at least one bar in every 6 ft. length of external wall.

mentioned in the code by no means suggest that it could not be used in shown to satisfy the performance standards. The professionally qualified architect and engineer is, therefore, given complete freedom to design to the limit of his ingenuity and ability and is thus able to offer a more efficient design service than the untrained person. The freeing of a restrictive building code also provides a stimulus to experiment in the building material industry since the possibility now exists of inventors and manufacturers being able to get approval for new construction techniques; whereas under the former code they might not have been able to receive a hearing (although a waiver might be obtained).

A CODE FOR DWELLINGS BUILT OF SHORT-LIVED MATERIALS

One "official" view, and one supported by many practicing engineers, is that dwellings of renewable materials (i.e. traditional structure) and dwellings of non-engineered design built of modern materials should not be permitted in urban areas. However desirable a policy this may be for the year 2000, it is quite unrealistic for the next two decades. Unemployment and under-employment mean that much of the urban population cannot afford dwellings built to the most minimum of officially approved standards. Guidance has, therefore, to be given to provide the highest possible protection to human life within the no-income, low-income household community.

Guidance is quite as important, even more important, at low-income levels, than contol. The code itself should be seen as a teaching tool (Table A-II:1), but will also need explanation through "hand-outs" at hardware and lumber outlets, radio chats, newspaper supplements, and "on-site" demonstrations (at agricultural shows such as Denbigh and at showgrounds on such occasions as National Heroes Day).

A code to govern short-life traditional structures may require two main sections. One section governing their erection within traditional-type village and town environments; one section governing their erection in urban sub-divisions.

The urban version will be dominated by the themes of safety, health, and exit from the housing area at time of hazard and disaster. An outline code is given in Table A-II:2. The improvement of dwellings of short-life materials in earthquake and hurricane resistance is not pursued by regulation, but through demonstration and education.[1]

An evolutionary approach to the achieving of higher dwelling and community standards for the low-income groups has been argued for in a paper placed before a UN Conference on Codes and Regulations[2]. This approach offers the most for the least expense and draws the community into providing for its own improvements[3].

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1 Developed from Tropical Building Legislation Note 4, Building Research Station, Garston, ENGLAND, 1963.

2 Knight, Gloria, Building Codes and Regulations in Developing Countries, in Building Codes and Regulations, etc., SWEDEN, UN, 1980.

3 Oakley, David et al, Transition Housing for Victims of Disaster, PADCO/OFDA/USAID, Washington, D.C., April 1981.

TABLE A-11:2

EXAMPLE OF FORMAT OF REGULATIONS TO GOVERN
THE ERECTION OF DWELLINGS OF RENEWABLE MATERIALS

1. These regulations shall be known as the Regulations for Semi-Permanent Dwellings built of Recovered and Renewable Materials. They will apply only in those areas declared under the Law (Act. _____) or otherwise (i.e., as marked on development plans or as zoning plans.) Compliance with these regulations will be deemed to satisfy, in notified areas, the requirements of the Building Act.

2. Each house shall consist of at least one habitable room in addition to kitchen, ablution and privy accommodation for the exclusive use of the occupants of the house: this accommodation may be provided in one or more buildings.

3. The area of a habitable room shall be at least 80 sq. ft.

4. The height of the walls of a habitable room, kitchen, ablution room or privy accommodation shall be at least 6 ft. 6 in. The average height of a havitable room shall be at least 8 ft. 0 in.

5. Each habitable room shall be provided with a door or door opening, at least 2 ft. 6 in. wide by 6 ft. 6 in. high.

6. In addition to the door opening each habitable room shall have natural ventilation to the open air. For this purpose the area which is open or which can be opened shall be at least 4 sq. ft.; no part of this area shall be taken into account if it is less than 6 ft 0 in. from the nearest part of the door opening.

7. The floor of every habitable room, kitchen, ablution room or privy accommodation shall be at least 6 in. higher than the level of the surrounding ground.

8. (a) There shall be distance of at least 10 ft. between the eaves of any two buildings: provided that for the purposes of this part of Regulation 8 a wall or fence of which no exposed part is constructed of combustible materials shall not be deemed to be a building.

   (b) No part of a building other than a wall or fence shall be less than 5 ft. from a side boundary of the plot on which this building stands.

   (c) (a wording similar to 8(b) may be needed for the back boundary of the plot).

9. There shall be a distance of at least 10 ft. between a habitable room or kitchen and room containing privy accommodation other than waterborne sanitation.

10. The distance between a well and any pit latrine, pit or other excavation or container from which untreated or, in the opinion of the medical officer of health, inadequately treated sewage can enter the soil, shall be decided for each Housing Area by the medical officer of health (or other appointed officer).

11. Nothing in these Regulations shall prevent any person from constructing a building which complies with all the requirements of the Main Building Regulations in an area in which semi-permanent housing may be constructed.

NOTE: (1) Earthquake and hurricane resistance would be worked for through education, demonstration, and skill training -- not by regulation.

(2) The dimensions given in the above example are given as an example. There has not been time to appraise their suitability for Jamaican condition.

ACHIEVING EARTHQUAKE AND HURRICANE RESISTANCE

To design and construct to be "proof" against such forces is very expensive. The design has to be taken as to what degree of resistance shall be sought. This is made by having knowledge of the natural forces and how they are modified or amplified by siting, location and ground conditions. Numerical values have to be attached to all influencing factors.

Within this framework design load criteria are then set:

a. For buildings that must function past a disaster, i.e. hospitals, fire stations, police buildings

b. Other public buildings

c. Commercial buildings and housing built of modern materials to architected and engineered designs

d. Plan-drawer's housing

e. Traditional structures.

In all types it is important not to set the design figure for earthquake and hurricane loading higher than is necessary to achieve the objective. To do so leads to an ignoring in practice of the regulations that appear since it becomes too expensive to follow them. The value of the forces selected must be seen to be cost-effective or commitment to enforce will erode.

There is a tendency in these matters to swing between two poles, to either set design forces too high, (for example, a current proposal[1] which adopts the California Earthquake Code for four storey buildings and applies it in Jamaica to single storey buildings) or to set standards too low and not enforce any design figure for hazard live loading.

Hurricane "design wind" speeds again need to be selective. The 125 mph at 33 feet (based on a 50-year return period three record gust) recommended by the Jamaica Institution of Engineers may be right for buildings in categories (a) and (b) above, but too high a figure for low buildings in category (c). For example, the adoption of 110 mph for category (c) would ensure a high degree of protection for all but the most extreme event — and not raise costs unduly. No figure is worth stating for buildings in categories (d) and (e) for designer/builders of these categories do not design from such principles. Here the emphasis should be on good construction, selection of timber and concrete sizes and fixing at junctions. The themes to emphasize in technical guidance are **anchorage, bracing and continuity.**

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1 Jamaica Institution of Engineers, A Building Code for Jamaica, Part I, Structural Requirements, Kingston (undated). Within its limits an excellent draft, but ignores economic impact of such a high standard code and the costs of administration.

SUPERVISION OF CONSTRUCTION

Codes are of little consequence unless administered effectively. Specification has to be followed by inspection on site: inspection has to be of high quality under responsible supervision. It is by pressure on a site supervisor that quality and code adherence is achieved. If codes are to have meaning, then both contractors and inspecting supervisors will need further training. Examples of course content are given in Tables A-II:3 and A-II:4. The Jamaica College of Arts, Science and Technology could work as it has before in joint venture with the Ministry of Construction and technical assistance teams as may be necessary.

TABLE A-11:3

TRAINING PROGRAM FOR CONSTRUCTION SUPERVISORS

Duration of the Course: 8 Weeks

Background of the Participants: Engineers, Resident Agents, Chief Inspectors & Officers of Similar Grades

An Outline of the Course Content:

	SUBJECT	OBJECTIVE	OUTLINE OF SYLLABUS	DURATION
UNIT 1	Techniques	To provide a foundation course in basic technical subjects designed as a refresher course.	Site investigation techniques, surveying and levelling, quantity surveying and estimating, structures, reinforced concrete design, engineering materials, water supply, drainage and sewerage.	10 Lectures. 5 Personal Study. 1 Week.
UNIT 2	Management	To provide an orientation course in site management techniques.	Site organization, office procedure, levels of responsibility, personnel management, materials purchases procedure, stores, management.	10 Lectures. 5 Personal Study. 1 Week.
UNIT 3	Planning	To provide an orientation course in planning and programming techniques.	Construction planning, networks and bar charts, resources planning, progress control, recording and documentation.	16 Lectures. 5 Personal Study. 1½ Weeks.
UNIT 4	Financial	To provide an orientation course in financial planning and contract systems.	Financial planning, cost control, contract procedure.	10 Lectures 5 Personal Study. 1 Week.
UNIT 5	Evaluation	To test the extent of the additional knowledge gained and the relevance of this knowledge in the application to a typical project.	A critical analysis and a report on a work site familiar to the participant. This report will be presented to the group at the end of the course.	3½ Weeks.

TABLE A-11:4

TRAINING PROGRAM FOR CONSTRUCTION OVERSEAS

Duration of the Course: 8 Weeks
Background of the Participants: Inspectors of Works, Sub-Inspectors of Works, Construction Superintendents, Asst. Construction Superintendents and Supervising Overseers and Officers of Similar Grades

An Outline of the Course Content

	SUBJECT	OBJECTIVE	OUTLINE OF SYLLABUS	DURATION
UNIT 1	Techniques	To provide a foundation course in basic technical subjects designed as a refresher course.	Site investigation techniques, surveying and levelling, quantity surveying and estimating, structures, reinforced concrete design, engineering materials, water supply, drainage and sewerage. Earthquake and hurricane resistance: supervision of casting and detailing.	14 Lectures. 7 Personal Study. 1½ Weeks.
UNIT 2	Management	To provide an orientation course in site management techniques.	Site organization, office, procedure, levels of responsibility, personnel management, materials purchase procedure, stores management.	10 Lectures. 5 Personal Study. 1 Week.
UNIT 3	Planning	To provide an orientation course in planning and programming technique.	Construction planning, networks and bar charts, resources planning, progress control, recording and documentation.	16 Lectures. 5 Personal. 1½ Weeks.
UNIT 4	Financial	To provide an orientation course in financial planning and contract system.	Financial planning, cost control, contract procedure.	10 Lectures. 5 Personal Study. 1 Week.
UNIT 5	Evaluation	To test the extent of the additional knowledge gained and the relevance of this knowledge in the appliance to a typical project.	A critical analysis and a report on work site familiar to the participant.	3 Weeks.

TABLE A-11:3

TRAINING PROGRAM FOR CONSTRUCTION SUPERVISORS

Duration of the Course: 8 Weeks

Background of the Participants: Engineers, Resident Agents, Chief Inspectors & Officers of Similar Grades

An Outline of the Course Content:

	SUBJECT	OBJECTIVE	OUTLINE OF SYLLABUS	DURATION
UNIT 1	Techniques	To provide a foundation course in basic technical subjects designed as a refresher course.	Site investigation techniques, surveying and levelling, quantity surveying and estimating, structures, reinforced concrete design, engineering materials, water supply, drainage and sewerage.	10 Lectures. 5 Personal Study. 1 Week.
UNIT 2	Management	To provide an orientation course in site management techniques.	Site organization, office procedure, levels of responsibility, personnel management, materials purchases procedure, stores, management.	10 Lectures. 5 Personal Study. 1 Week.
UNIT 3	Planning	To provide an orientation course in planning and programming techniques.	Construction planning, networks and bar charts, resources planning, progress control, recording and documentation.	16 Lectures. 5 Personal Study. 1½ Weeks.
UNIT 4	Financial	To provide an orientation course in financial planning and contract systems.	Financial planning, cost control, contract procedure.	10 Lectures 5 Personal Study. 1 Week.
UNIT 5	Evaluation	To test the extent of the additional knowledge gained and the relevance of this knowledge in the application to a typical project.	A critical analysis and a report on a work site familiar to the participant. This report will be presented to the group at the end of the course.	3½ Weeks.

ANNEX III

NOTE ON BUILDING/CONSTRUCTION RESEARCH INSTITUTE

The Project as Prepared by NHT and Adopted by MOC(H)

DEVELOPMENT OBJECTIVE

The Government of Jamaica has as a major overall objective the curtailment of rapidly rising housing construction costs in order to increase the accessibility of lower income groups to adequate shelter and services, as well as to revitalize the building industry and promote jobs and investments in this sector. At the same time, it hopes to reduce the substantial importation of building materials and components by the increased utilization of indigenous materials of appropriate quality.

The Government intends to achieve these overall objectives through the eventual establishment of a fully operational Building and Construction Institute and the integration of the multiplicity of units involved in research and support activities in this sector.

IMMEDIATE OBJECTIVES

This project will be executed in two distinct phases of one year in the first instance, and two years in the second. The immediate objectives for Phase I are as follows:

Phase I

To establish a core institutional framework to commence preparatory arrangements for the eventual establishment of a fully operational Building and Construction Institute. Within this framework, the core group will:

- Prepare elaborated guidelines for the organizational and functional arrangements of the BCI during the initial years.
- Prepare proposals for the phased recruitment of additional professional, technical and administrative personnel, as well as for additional equipment along with the financial implications.
- Establish and consolidate channels of communication, coordinating procedures and means of collaboration among existing agencies related to the building sector, bearing in mid the evolving institutional framework for the BCI.
- Initiate a program for high priority work on research and development, information and longer term training.
- Formulate proposals for attracting additional assistance to the BCI from international and bilateral sources, or for specific sub-project activities which may attract funding from specialized agencies or donor countries.

- Revise and update the proposed Building Regulations Draft of 1974.
- Undertake preliminary identification of investment protential and job generating projects with a view to revitalizing the building and construction industry.
- Initiate arrangements for the testing of certain indigenous materials abroad as a stop-gap measure until the capabilities of local facilities are expanded and improved.

Phase II

The second phase of the project will bring about the establishment of a more autonomous and expanded departmentalized organization which will coordinate and perform specific functions within the following four basic areas:

- Research and Development (R&D)
- Information
- Training
- Investment Identification (within R&D)

Specifically, Phase II will achieve the following:

- The establishment of a distinct Research and Development Division to incorporate relevant research facilities and personnel from existing agencies.
- The establishment of an Information Division (with responsibility for organized training activities during the initial years).
- The establishment of a Training Unit (during the second year) in collaboration with the Jamaica College of Arts, Science and Technology and other suitable training institutions.
- The establishment of a Project Identification Unit to determine the commercial viability in respect of indigenous materials.
- Improved level of local expertise in building and construction related areas.

ANNEX IV

MINISTRY OF CONSTRUCTION (H) WORKSHOP AND STORES

These were set up, some thirty years ago on funds provided by the U.K. Government after the 1951 hurricane. It was envisaged as a timber prefabrication operation. A railway line from the dockside runs into the workshop site. This enable timber to be purchased in bulk from overseas and to be delivered direct to the yard where a large storage area was provided. A treatment plant adjoins the stockyard. Machine shops run the length of the site with a rail line running from the treatment area connecting the sheds. Units for the owner-occupied scheme, the indigent housing scheme and the farm housing scheme have all been produced here, together with a range of components and frames. From early days, precasting of poles, panels, foundation blocks, etc. has also taken place on the site.

Today, timber is no longer bought in bulk directly for the workshop and the stockyard is empty, the treatment plant is unused, the Government-purchasing scheme[1] seems unable to supply lumber either in the amounts required or at the time required, therefore, the workshop buys treated lumber from commercial importers. (Where these importers are buying from the Government's warehouse, a circular and expensive purchasing system will develop.) Timber and cement shortages are said to be the operational bottleneck in 1981. However, even when materials are available, production cannot be at optimum for the greater proportion of the machines are as old as the plant itself and require maintenance, spare parts and/or replacement. Assuming that all this were done, then about 500 timber prefabricated small houses a year could be produced, plus about 800 of the ARH composite precast concrete and timber houses. These figures could be raised 15 - 20% if overtime were worked.

The workshop is fast approaching the status of an historic site. Policy and management level decisions are desperately required. Among the options:

- Use site only as a store for a much expanded building operation; set up new timber plant elsewhere.
- Revitalize the bulk purchase operation of untreated lumber, open up timber dip plant and refit timber prefab sheds for greater production runs. Move precasting operations to another site.
- Together with above, tailor the operation to the Kingston region rather than nationally, developing smaller but good operations based on Montego Bay and Port Antonio,[2] to serve the other areas of the Island. Import lumber direct into Montego Bay and Port Antonio. (This would form part of the wide economic development proposal for the Island.)

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1 Now run by Jamaica Community Trading Company Ltd.

2 A first shipment into Montego Bay arrived in early November 1981.

The name "workshop" has hidden from the Ministry that it owns a factory, which is only an asset when worked on commercial lines using every purchasing, manufacturing and marketing advantage. Currently, it is a run-down facility which can still make things. However, it is no longer a production operation as it once was. The setting up of a new plant elsewhere will make the need for management and production policy even more acute. A listing of repairs and replacements needs for the machines of the present workshop is now in preparation for the Director of Construction, MOC(H).

ANNEX V

JIC CONSTRUCTION CONTRACT STANDARD FORM
(Private edition with quantities 1976)

This is modeled upon U.K. precedent and used as a "draft" a document prepared for U.K. conditions. As such it presents "an ideal" rather than a useful basis for day-by-day domestic house building in Jamaica.

The current form has relevance when determining the relationships between client and one of the few large housing contractors (about five). Assuming some contractor education and training is pursued, then this form of contract could be made to work for an additional 10 to 12 medium sized contractors.

For smaller sized contractors (the great majority), a revised document is required. This revised form should be organized in two sections[1]:

- General Conditions: These should cover all standard procurement conditions and regulations accepted or promulgated by Government that apply to whatever sized GOJ contracts.

- Special Conditions: In present practice these are attached to the back of the present Standard Form. However, more use should be made of these and be re-drafted for each specific project. They should clearly set out the GOJ directions regarding the contract and expectations of the duties of the contractor. The approved construction drawings, specifications, bill of quantities and accepted rates should become part of the specific contract special conditions. Since it is very common in Jamaica for changes to be made in the original scope, time period, or costs during the contract period, the contract has to specify a simple process by which modification can be agreed.

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1 Senold, F.J. Organization and Operations of Sites and Services Division, MOC(H), Jamaica, Kingston, September 1981.

ANNEX VI

THE USE OF PARISH COUNCILS AS IMPLEMENTING AGENCIES FOR HOUSING AND NATIONAL SETTLEMENTS POLICY

The present position can be briefly summarized. It is correct to think of using the Parish Councils as development agencies, but if used in the present form they will collapse.

No settlement policy can be implemented without some local agencies, for cooperation between the local, regional and national representives will be essential for success. There is no regional government (the counties exist only in name and in one post — the County Road Engineer — who has only advisory functions to the parishes in "his" county). The location of local representation is thus in the parishes, or in a grouping of parishes (county or other level).

The parishes have very limited powers in law and even less in practice. They tend to be given responsibilities without being given the joy of being a development partner. Development takes place in their areas, initiated by central government (often without consultation, i.e. Portmore in St. Catherine); then they are expected to deliver services, maintain and clear solid waste. Yet, they are given no revenues and can raise almost nothing in their own right. The parishes have works departments, ones possible for the maintenance of parish roads. Funds for this work are granted from central government and are disbursed to politically effect on a very localized basis, i.e. a mile of road is worked on by 40 stewarts from either side of the mile.

The parishes are not the only form of decentralized management. The Ministry of Agriculture and the Ministry of Construction (both in Housing and Public Works) have a network of parish offices. These offices do not liaise locally, except in a very light manner. They exist to execute central policy.

LOCAL INVOLVEMENT IN LOCAL GOVERNMENT

History has led to the parish Councils being a location of political debate — little related in any functional way to development performance or maintenance of public services. If they can be by-passed or over-ruled by central government, then in the interest of getting things done, they often are[1]. The UDC has experimented with the use of Parish Councils as development partners, but it adopts a strong paternal role; overseeing specially set up bank accounts and avoiding the Council's political representation (i.e. it relates directly to implementing technical and administrative officers). The Major of one council has refused funding on such conditions.

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1 For political reasons they are used to administer the annual Christmas season clearance work on banks and roads after the rains.

Despite the grave administrative difficulties, housing implementation and a national settlement policy will only work if local voice is joined with national. The parishes, weak though they are, have to be strengthened. A new view of them would have to be taken by the GOJ and by the Ministry of Local Government in particular. At present, the Ministry of Local Government grows in size and fuctions at the expense of the Parish Councils, e.g., in becoming responsible for the National Water Authority it took responsibility for water supplies in St. Catherine away from the Parish Council.

STRENGTHENING THE PARISHES

There are too many of these to each be the subject of an administrative upgrading exercise. However, they could be given a new "charter" and role and then given the means to carry it out. Two main steps would need to be taken:

- Land and property taxation which now goes to central government should be ceded to the parishes. They could raise and alter as needed. The local population would take a great interest in how the money collected was spent, thus making the local council more accountable to its electorate[1].

- Provide a pool of expertise to the parishes. This would need to be MOLG, MOC(H) and (PW) serviced but should be regionally operated at county level or similar. From the county pool financial, administrative, technical, research, statistical, legal and project preparation support should be available[2]. Training should be seen as an integral part of the county level operation.

Recruitment to the County Support Units would not be easy but must be encouraged if local partnership is to develop and Kingston cease to be the magnet it now is. Further development of the Ministry of Local Government in Kingston is not the answer; it is part of the problem (of over-centralization).

The Ministry of Construction and the Ministry of Local Government staff should be encouraged to see and to know that service in a county unit is a step up in promotion. Those officers who have not had county experience would lose points at promotion time. Those with county experience could be given early retirement (each two years of county service, taking one year off the retirement age on full retirement pay). A salary supplement for "away from home" could be paid. There are arguments against doing this, but the argument for it is that the Parish Councils and the County Support Units have to work if a settlement policy is to operate. The UDC could back-up the county system by offering project preparation and management services.

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1 Mill, G.E. et al, Report on the Reform of Local Government in Jamaica, 1974.

2 Where project preparation for overseas funding is involved, the UDC could be called in on a "fee basis" to strengthen capability further.

THE KSAC

This body is a special case of the parish syndrome. While its officers are better paid than in other parishes, and Kingston is a draw for staff, it is inadequately organized and staffed to be true partner in development or maintenance. It is also under-financed and constantly has to appeal to GOJ for special funds (i.e. every year when the rains come to enable roads to be patched). On the other hand, it has not the facilities to really prepare a road maintenance program.[1]

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1 National Planning Agency. Urban Growth and Management Study, November 1978.

FIGURE A-VI:1

POSSIBLE ORGANIZATIONS TO GOVERN DEVELOPMENT PROJECTS
WITHIN THE PARISH FRAMEWORK