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MUTUAL AID HOUSING FOR SAN JUAN

by

PHILIP LAWRENCE MANSON GOLDBERG

B. Arch., Cornell University, 1968

ABSTRACT OF THESIS

Submitted in partial fulfillment of the requirements  
for the degree of Master of Architecture in  
Environmental Design in the Graduate School of  
Syracuse University, June, 1970

Approved \_\_\_\_\_

Date \_\_\_\_\_

GILBERT BOND

25% COTTON

## ABSTRACT OF THESIS

The problem of housing the poor in developing societies is studied in terms of future needs in order to propose a policy program of use to planners. A housing deficit that is increasing due to its present construction rates is defined in terms of limited undeveloped land near employment, increasing population, and rising living standards. San Juan's squatter settlements are selected as a model of unusually vivified social climate coupled with extreme physical deterioration. Here, savings institutions and governmental agencies have failed to lower financing costs sufficiently for industry to provide the poorest people with adequate shelter they can afford. It is demonstrated that public housing has not solved the housing problem in a social context because designers and commissioners do not understand the life style and physical needs of tenants.

A policy program for mutual aid construction is presented. In this approach, rural families organize teams to build their dwellings and buy construction materials through new savings organizations. The chief prerequisite for mutual aid in a specific situation is that the ratio of

material to labor costs be high.

Current technological developments including a structural system costing only \$45 per square meter, should make mutual aid more practical in urban areas by shortening construction time.

Pride in home ownership, training in construction skills, and naturally evolved neighborhoods prove the thesis that mutual aid is the most promising solution for housing the poor in developing societies. Financial burden on the public is minimized, and the Government can control municipal expansion by retaining land ownership.

In high density areas, a basic, multi-story frame can be finished by inhabitants owning units in a condominium arrangement. A design of this type, La Puntilla, is presented as a prototype.

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## PREFACE

This paper was prepared for 6 hours credit in the new Environmental Design program at Syracuse University. The writer is more accustomed to presenting his work graphically, and had time allowed, a specific design would have been presented for the housing outlined in this program.

To acquire familiarity with the subject, the writer traveled to San Juan in April, 1970, where he obtained the aid of many persons at the University of Puerto Rico. Others at Cornell University and in the Syracuse area shared their time with the writer in his pursuit of information. He wishes to acknowledge particularly the counsel rendered by Syracuse University Professors W. Crane and P. Malo, and also his Academic Advisor, R. Reimann of the School of Landscape Architecture, New York State College of Forestry.

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## I INTRODUCTION

Perhaps the gravest threat facing the world today is its own teeming population. In developing areas the provision of sufficient housing appears hopeless for poor people who have neither economic nor political power to enter the housing market on an equal basis with other classes. Direct economic ties with the United States have made Puerto Rico a senior member among developing societies, and because of the island's proximity and the availability of information, it has been chosen for study as a paradigm. This investigation, however, should be of value to students of every developing area of the world, as many problems described are universal.

The enormous housing need so evident in Puerto Rico must be examined in terms of limited land resources, booming demographic and economic growth, and the inadequacy of existing structures for dealing with these problems. Standards of living are rising along with progress in education, communication, transportation, and industry. Emigration to the United States has reversed and can no longer be expected to ease the effective population explosion on the island.

Requirements for shelter must be considered in view of constraints preventing fulfillment through cherished processes of democracy and private enterprise. Sociological implications, financial considerations, and governmental disparities all play significant roles in determining what types of housing are really most appropriate for various family types.

A chapter on current housing efforts identifies shortcomings of past and present approaches to the problems described. Issues discussed include the failure of industry to diminish the housing need despite obvious technological progress, the dilemma of public housing, and the difficulties encountered when usual aid techniques are employed in the urban context. Emphasis is placed upon squatter settlements where the fight for decent shelter is most dramatic.

A thesis is proposed in the form of a viable housing program combining the best features of many approaches studied. This program is intended to aid policy makers in solving the above problems of developing societies. It is therefore presented in terms of the major areas of policy making within the field of housing: design, financing, and implementation. It is hoped that the suggestions presented here will inspire further research in this vital field.

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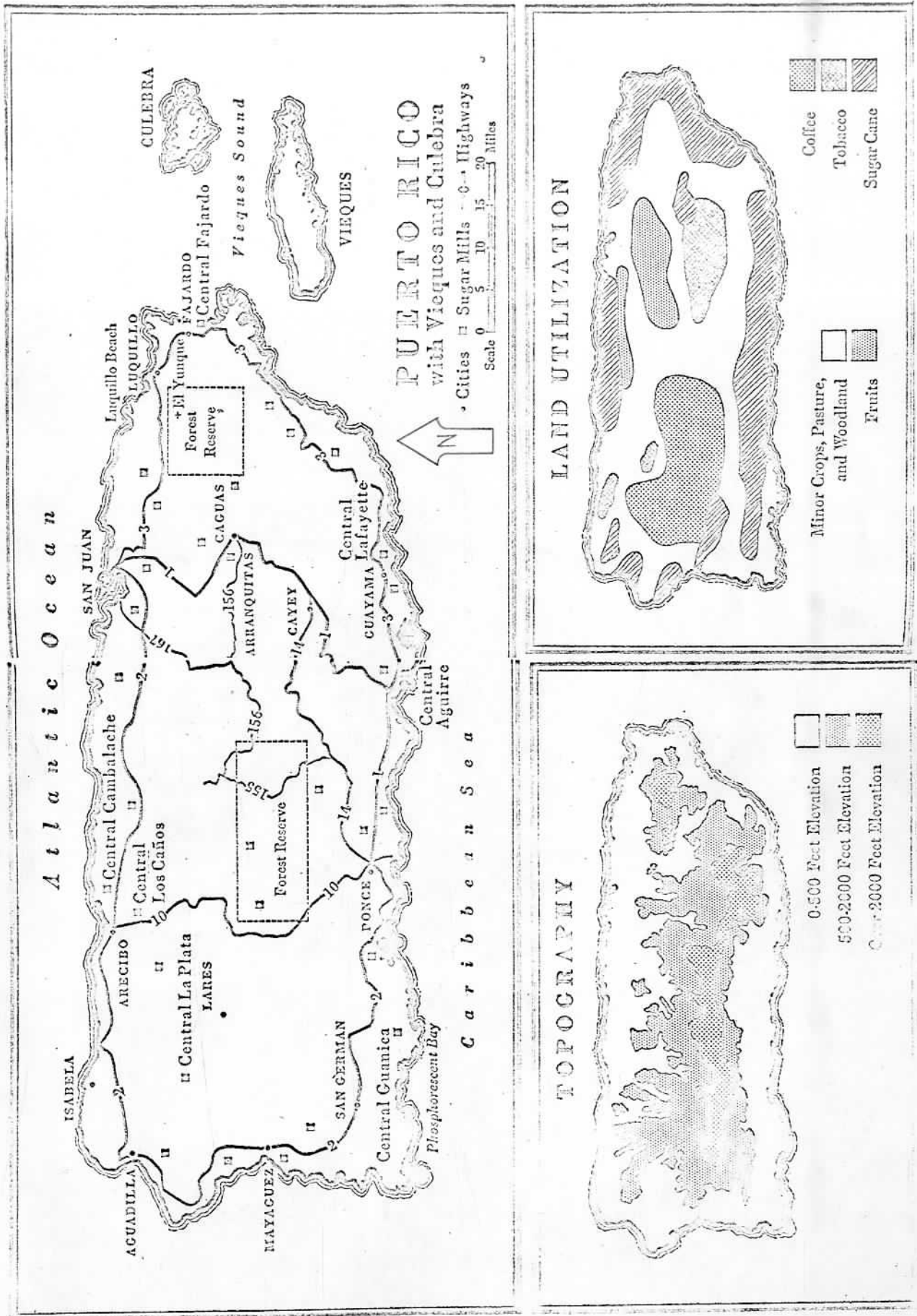
25% COTTON

## II PROJECTED HOUSING REQUIREMENTS

### Land Resources

The island of Puerto Rico lies 1,600 km. southeast of Miami Beach. About 160 km. long and 48 km. wide, the topography features a central mountain ridge which impedes development. About 80% of the island is too steep for traditional construction. The northern region is dominated by tropical rainforests; the South remains savanna. Major ports and cities are located along the coasts and include San Juan, the capital. See Fig. 1. The rainy season lasts from May through October, leaving 50 to 100 cm. of rain in San Juan. Here, the climate is ideal. Temperatures range from 21 to 32 degrees centigrade throughout the year. Winter breezes from the Northeast are steady, at 15 to 25 km. per hour. There are about 5 days per year without sunshine. Warm ocean currents arrive from the Southeast.

Broadleaf evergreen hardwoods tower over lush vegetation. Soils support bananas, cacao, coffee, pineapples, sugar cane, and tobacco. The most densely populated of predominantly agricultural countries, Puerto Rico's agricultural



<sup>a</sup>Source: R. Pico, The Geog. Regs. of P.R. (U. of P.R.)



regions average 2.5 persons per acre. Subsurface conditions in the cities can support tall structures, but there are occasional earthquakes and hurricanes.<sup>1</sup>

There is much undeveloped land, but because most transportation on the island is by private automobile, urban dwellers unable to afford this mode of travel must remain near the large city centers.

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Demographic Growth

Packed within this natural paradise, are 2.7 million people, rendering the area 30 times as densely populated as the average South American country. Though birth rate is declining, absolute numbers still increase. See Table 1. The number of households grows even faster as average family size is decreasing: The number of persons per dwelling was 5.1 in 1950, and 4.9 in 1960. More dwellings would be needed even for a constant population: The number of households increased 58% from 1950 to 1970, while the population grew 50.1%. The hope of greater employment opportunities in the cities encourages migration from rural areas so that the urban population is increasing faster

<sup>1</sup>E. Espenshade, Jr., (ed.), Goode's World Atlas (Chicago: Rand McNally & Co., 1964), p 170.

TABLE 1  
POPULATION GROWTH<sup>a</sup>

	1930-40	1940-50	1950-60	1960-70	1970-80 <sup>b</sup>
Fuerto Rico	53.1%	62.4	21.0	50.1	49.8
San Juan	21.1	18.3	6.3	4.4	2.3

<sup>a</sup>Source: Bureau of Economics & Statistics, P.R. Planning Board.

<sup>b</sup>Estimate

TABLE 2  
DILAPIDATED HOUSING UNITS<sup>a</sup>

	1950	1960	1970	1980 <sup>b</sup>
San Juan S.M.S.A.	21.2%	14.1	10.3	8.7
San Juan City	49.1	45.0	34.8	24.9

<sup>a</sup>Source: P.R. Urban Renewal and Housing Admin., Community Renewal Program (San Juan: Housing & Home Finance Agency, 1964), p 14.

<sup>b</sup>Estimate

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than the rural. The rapid population growth in San Juan (one of the highest rates in the world) is partially responsible for the poor employment and economic conditions there.<sup>2</sup> See Fig. 2.

San Juan is a non-nucleated city of great extremes in living conditions, ranging from crowded squatter settlements along the north coast to expensive penthouse apartments overlooking restored areas of Old San Juan, where density is 44 persons per acre.<sup>3</sup>

Most Puerto Ricans love the climate and life style of their homeland, but are attracted to the United States where they can earn better wages to support their large families.<sup>4</sup> When they have saved enough money to return to the island they often do, only to be forced to go to the mainland again when funds are dissipated. Because Puerto Ricans are U.S. citizens by birth, and air fare between San Juan and New York City is relatively inexpensive, many travel between the two cities continually.<sup>5</sup> Paradoxically, in New York so many have settled in one area, East Harlem,

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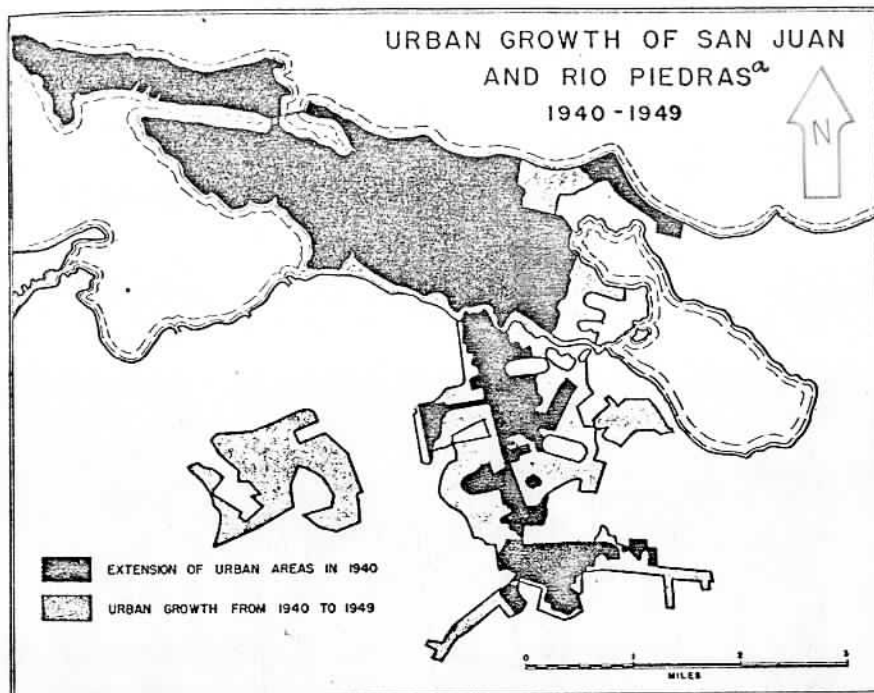
<sup>2</sup>B. Hanson, Transformation -- The Story of Modern Puerto Rico (N.Y.: Simon & Schuster, 1959), p 353.

<sup>3</sup>T. Caplow and S. Stryker, The Urban Ambience (N.Y.: The Bodleyhead Press, 1964), p 22.

<sup>4</sup>C. Abrams, Forbidden Neighbors (N.Y.: Harper & Bros., 1955), p 56.

<sup>5</sup>S. Friedlander, Labor Migration and Economic Growth (Cambridge: M.I.T. Press, 1965), p 81.

FIGURE 2



<sup>a</sup>Source: R. Pico, The Geographic Regions of Puerto Rico (Rio Piedras: Univ. of Puerto Rico Press, 1950), p 18.

FIGURE 3

SLUM TYPES<sup>a</sup>

		SLUMS	
		Hope	Despair
CLASSES	Escalator	A	B
	Non-Escalator	C	D

<sup>a</sup>Source: C. Stokes, "A Theory of Slums", Land Economics, (Aug., 1962), p 189.

that they have recreated a density problem they moved to avoid. Perhaps, for this reason the trend is now reversing: In 1966, 7,000 more Puerto Ricans migrated from the United States to Puerto Rico than the opposite direction.<sup>6</sup>

In September, 1967, delegates from many Roman Catholic countries met in Caracas to discuss a formerly forbidden subject -- birth control. It became evident that control of growth must be part of overall economic planning: The Gross National Product (G.N.P.) for Latin America was increasing 4.4% per year, but because the population grew 2.3% during the same period, the actual per capita growth was reduced to 1.9%.<sup>7</sup>

#### Rising Standards

In addition to conditions created by growing population coupled with limited land resources, the housing predicament is intensified by a rising standard of living. This is manifested in the considerable amount of urban renewal taking place in San Juan, where new buildings surpass previous standards of spaciousness and durability. At the root of much destruction lies the belief in slum clearance for its own sake. The agency Corporacion de Renovacion Urbana y

<sup>6</sup>A. Harvacs, "Exodus to States Reverses Direction", The San Juan Star (Feb. 23, 1970), p. 8.

<sup>7</sup>E. Rolles, "Birth Control Meeting to Begin in Caracas Today", The New York Times (Sept. 10, 1967), p. 20.

Vivienda (C.R.U.V.) made this clear by stating in 1964 that slum clearance is their first concern.<sup>8</sup> Indeed, many of the reasons commonly presented to defend urban renewal are not applicable here: Competition between the central city and the suburbs is negligible; there is little need to entice leaders back to the inner city.

The urban situation is of greatest concern because there is more crowding and lack of sanitary facilities. See Table 2. From 1950 to 1960, the number of occupied dwellings in Puerto Rico increased 12.3%. But the increase for the San Juan Standard Metropolitan Statistical Area (S.M.S.A.) was 34.9%. See Fig. 4. Elaborate statistical techniques have been applied to "windshield" surveys to designate 1,493 acres for clearance in San Juan.<sup>9</sup>

In Latin America, there are 1.5 million more inadequate units every year. If nothing is done to alter the present rate of renewal, there will be 150 million slum units instead of the present 100 million by the year 2000. In Puerto Rico, 300,000 new units are needed by 1980, while San Juan alone will need 43,000. See Table 3. A third of this housing demand is due to demolition and 7% represents increasing vacancies, though the ratio of new to demolished construction is increasing.<sup>10</sup> From 1960 to 1980 the Commonwealth Government is expected to complete demolition of 24,000

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<sup>8</sup> Puerto Rico Urban Renewal and Housing Administration, Community Renewal Program (San Juan: Housing & Home Finance Agency, 1964), p. 8.

<sup>9</sup> Ibid et passim.

<sup>10</sup> Ibid., p. 16. See also T. Caplow and S. Stryker,

FIG. 4 -- San Juan, P.R.  
STANDARD METROPOLITAN STATISTICAL AREA



----- MUNICIPIO LINE  
===== CITY LIMITS



TABLE 3

HOUSING CHARACTERISTICS<sup>a</sup>San Juan P.R.A.<sup>b</sup>

	Owner occup., land owned	Owner occup., land rented or rent free	Renter occup.
Of all units, no. valued under \$1000	7.7 <sup>c</sup>	39.5	14.1
Of units valued under \$1000, no. sound <sup>c</sup>	30.8	22.2	52.0
Of units valued under \$1000, no. overcrowded	46.6	51.8	31.1
Of units overcrowded, no. sound <sup>d</sup>	56.3	28.4	44.3
Of units in- habited by fams. with under \$500 annual income, no. overcrowded	16.7	32.9	24.8

<sup>a</sup>Source: U.S. Bureau of the Census, U.S. Census of Housing: 1960 (Washington: U.S. Govt. Printing Office, 1963), vol. II, part 7, p 202 -- 3-21.

<sup>b</sup>1960 Census definition. See Fig. 4.

<sup>c</sup>1960 Census definition.

<sup>d</sup>Overcrowded units are those with greater than 1.5 persons per room.



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 San Juan City
 

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	Owner occup., land owned	Owner occup., land rented or rent free	renter occup.
Of all units, no. valued under \$1000	2.36	26.7	14.2
Of units valued under \$1000, no. sound	26.3	13.5	51.4
Of units valued under \$1000, no. overcrowded	44.8	90.8	31.1
Of units overcrowded, no. sound	64.3	21.6	45.6
Of units in- habited by fams. with under \$500 annual income, no. overcrowded	7.8	28.4	24.9

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units in San Juan, displacing 29,000 families. It is easier to acquire slums in San Juan than on the mainland because fewer vested interests need be opposed. The Government's goal is to reduce inadequate housing to 11% of the total by 1960, when urban density will be 100 persons per acre. Residential land use is increasing in relation to other uses. But slums are growing as rapidly as public housing.<sup>11</sup> Squatter settlements are growing even faster.

In man's universal quest for decent housing, squatters represent a special case. The squatter population of Latin American cities is growing 19% each year -- much faster than the population as a whole. While studying a particular settlement (barrida) in Lima, one researcher noted that most of these people migrated from the countryside but first settled in city slums, in hopes of earning a better living for their large families.<sup>12</sup> As rents rose, they found they were hardly better off than previously, so families organized to invade publicly owned land and construct shacks according to a predetermined plan. These families were more stable than those of the slums; the average family had spent 9 years in the barrida at the time of the study (1957). Squatters were usually better educated than families remaining in rural environments, and most squatter families were relatively young. See Table 4. Their economy was closely tied to the central city where most were employed.<sup>13</sup>

op. cit., p 41.

<sup>11</sup>ibid., p 228.

<sup>12</sup>W. Haeghe, "Squatter Settlements", Scientific American (Oct., 1957), p 21.

TABLE 4  
DISPOSITION OF SAN JUAN FAMILIES<sup>a</sup>

	Squatter Settlement	Public Housing
Nuclear family	47%	38
Extended family	20	20
Female-headed family	21	35

<sup>a</sup>Source: H. Safa, "The Female-Based Household in Public Housing: A Case Study in Puerto Rico", Human Organization, (Summer, 1965), p 135.

TABLE 5  
UNEMPLOYMENT<sup>a</sup>

	1960	1970	1980 <sup>b</sup>
United States	5%	4	4
San Juan S.M.S.A.	9	7	4
San Juan City	16	14	10

<sup>a</sup>Source: A. Carnoy, Democracia Si!, (N.Y.: Vantage Press, 1962), p 216.

<sup>b</sup>Estimate

Public sympathy, aversion to excessive police violence, and lack of alternative housing compelled government authorities to allow squatters to remain. (Though squatter shacks are built in a few hours, it may take a year of "red tape" to destroy them.) In time, masonry replaced original wood and straw dwellings. About 30% of the families had some retail or service business within the barracks. Though the settlers included professionals, employment remained the major problem. Most needed inexpensive transportation to the city center.

In squatter settlements, utilities, police protection, and health facilities are usually minimal. In certain cases, squatters have organized to collect their own taxes to provide these amenities. Some settlements are quite patriotic, with autonomous mayors and town councils.

There are 3 predominant types of squatter families: (1) abandoned women with children, (2) unemployed, uneducated men, (3) workers with some skills. Though there is some fear of outsiders' disdain for the settlement, there are few families who want to leave.<sup>14</sup> They are loyal to homes they helped build, and feel they were being abused in the slum. These people have been found to possess substantial initiative for self-help and community organization, and respond to public encouragement to ameliorate their

<sup>13</sup>J. Turner and L. Peattie, "Suburban Shantytowns", The New York Times (Feb. 13, 1966), sec. VI, p 22.

<sup>14</sup>J. Gross, "As the Slum Goes, So Goes the Alliance", The New York Times (June 23, 1963), sec. VI, p 12.

homes.<sup>15</sup> They have done far more to improve their living conditions than any governmental agency, with very little expense to the rest of the community.

In April, 1970, 200 San Juan squatter families picketed the governor until he promised them parcelas (land) titles and utilities in 6 months. Their 2 year old settlement, San Isidro, is named to commemorate the original sheet-out between residents and police trying to evict them.<sup>16</sup>

Of the many squatter settlements in San Juan, perhaps the best known is La Perla (ironically, the Pearl), housing 800 families. See Plate 1. Began in the 1930's, it lies between the old city wall and the ocean along the northern coast of Old San Juan. See Plates 2 and 3. The lowest units are built on piles above the water and are frequently inundated. Other settlements are located on steep land avoided by commercial developers.

In La Perla, the mean annual income per family is \$1,500, or 50% of the city average. Some families earn only \$50 per year. Only 13% of the families have automobiles. About 20% of the families are female-headed. The median age of residents is 18 years, and in 1960, 20% were nonwhite.

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<sup>15</sup>W. Mangin, op. cit., p 28.

<sup>16</sup>J. McDonough, "Squatters Happy with Parcelas Promise", The San Juan Star (April 7, 1970), p 6. For other examples of a similar nature, see L. Varela, "Police Halt IncurSION By 188 Squatters", The San Juan Star (March 13, 1970), p 6; and "V.I. Judge Orders Halt to Home Destruction", The San Juan Star (March 13, 1970), p 12.

PLATE 1  
ENTRANCE TO LA PERLA

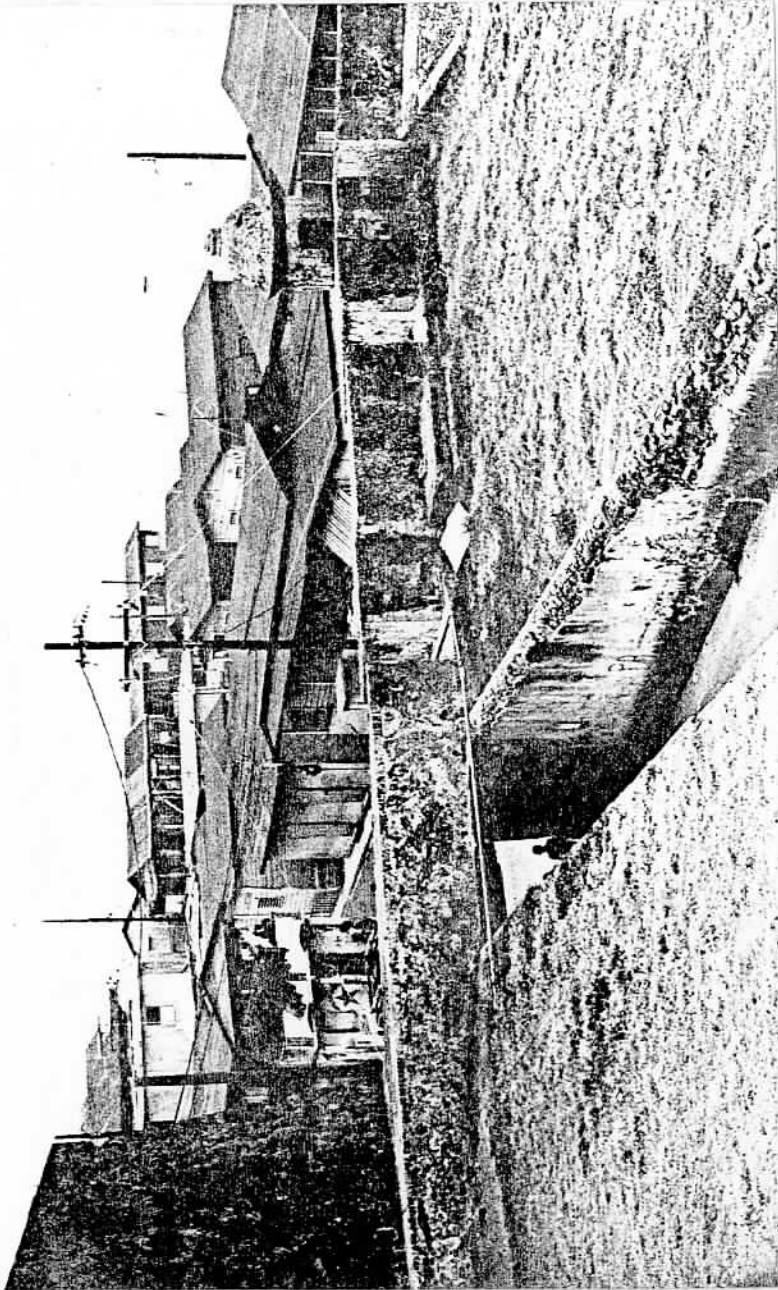


PLATE 2

VIEW OF LA PERLA SHOWING OLD CITY WALL

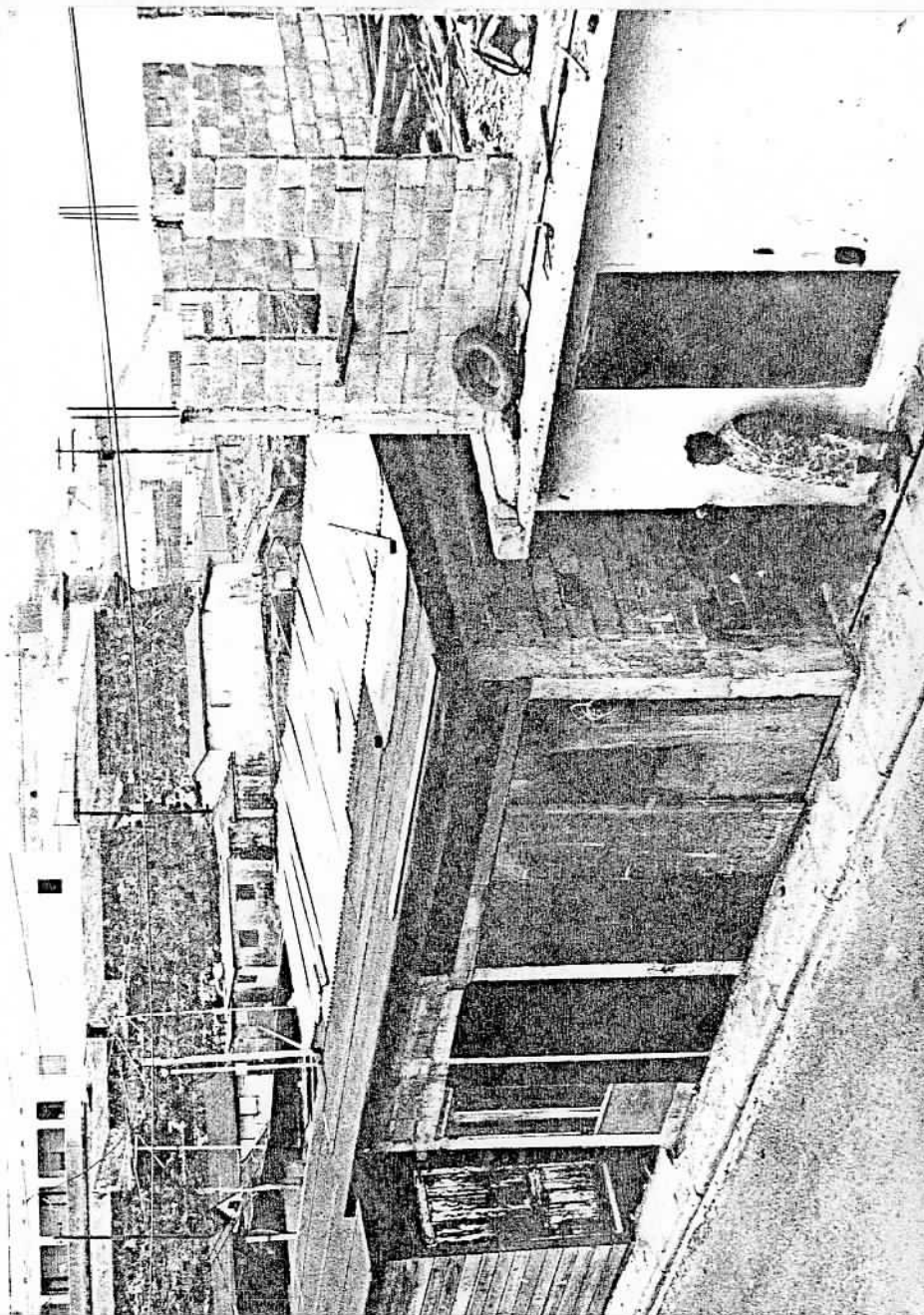
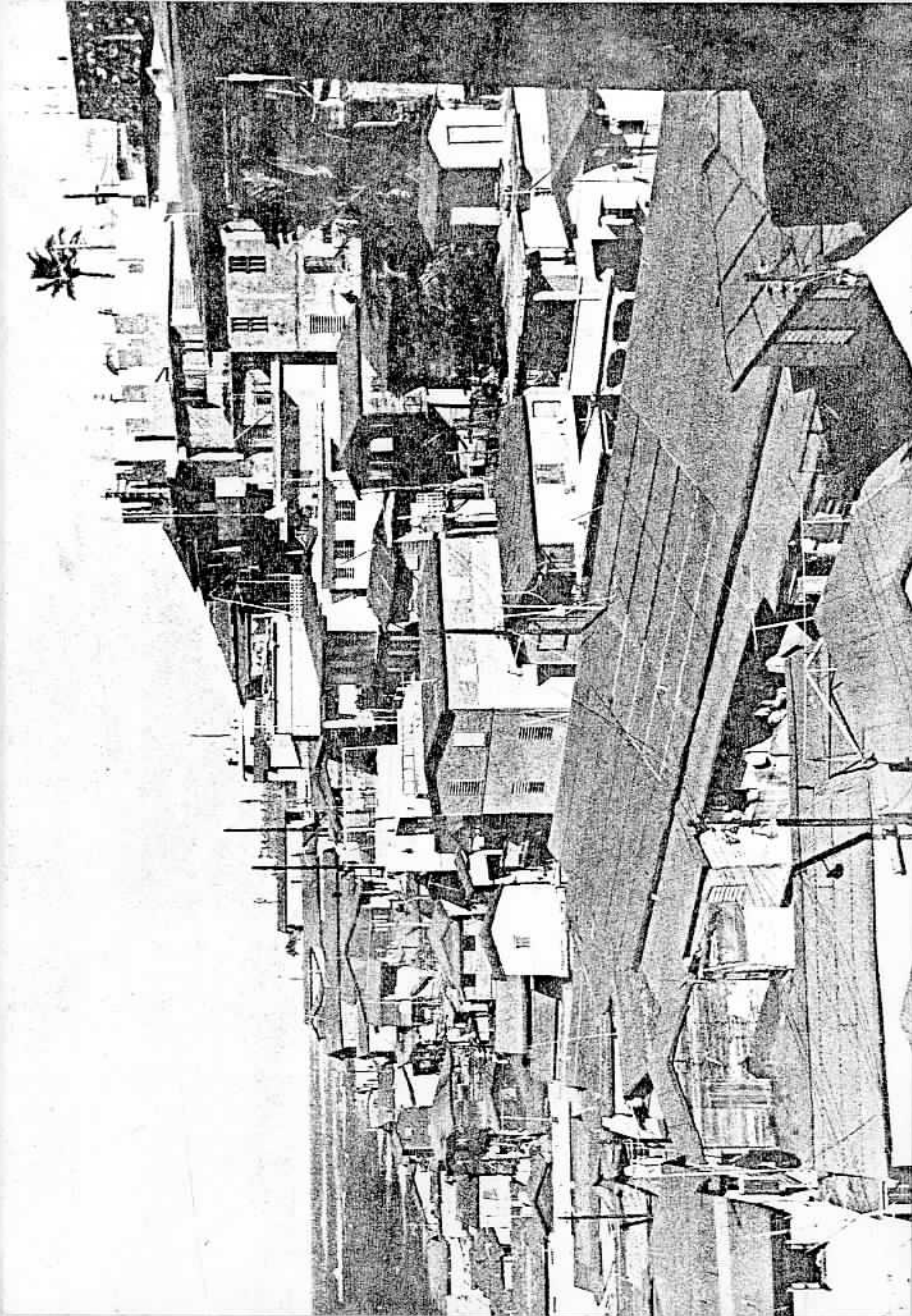


PLATE 3

VIEW OF LA PERLA SHOWING THE OCEAN



25% COTTON



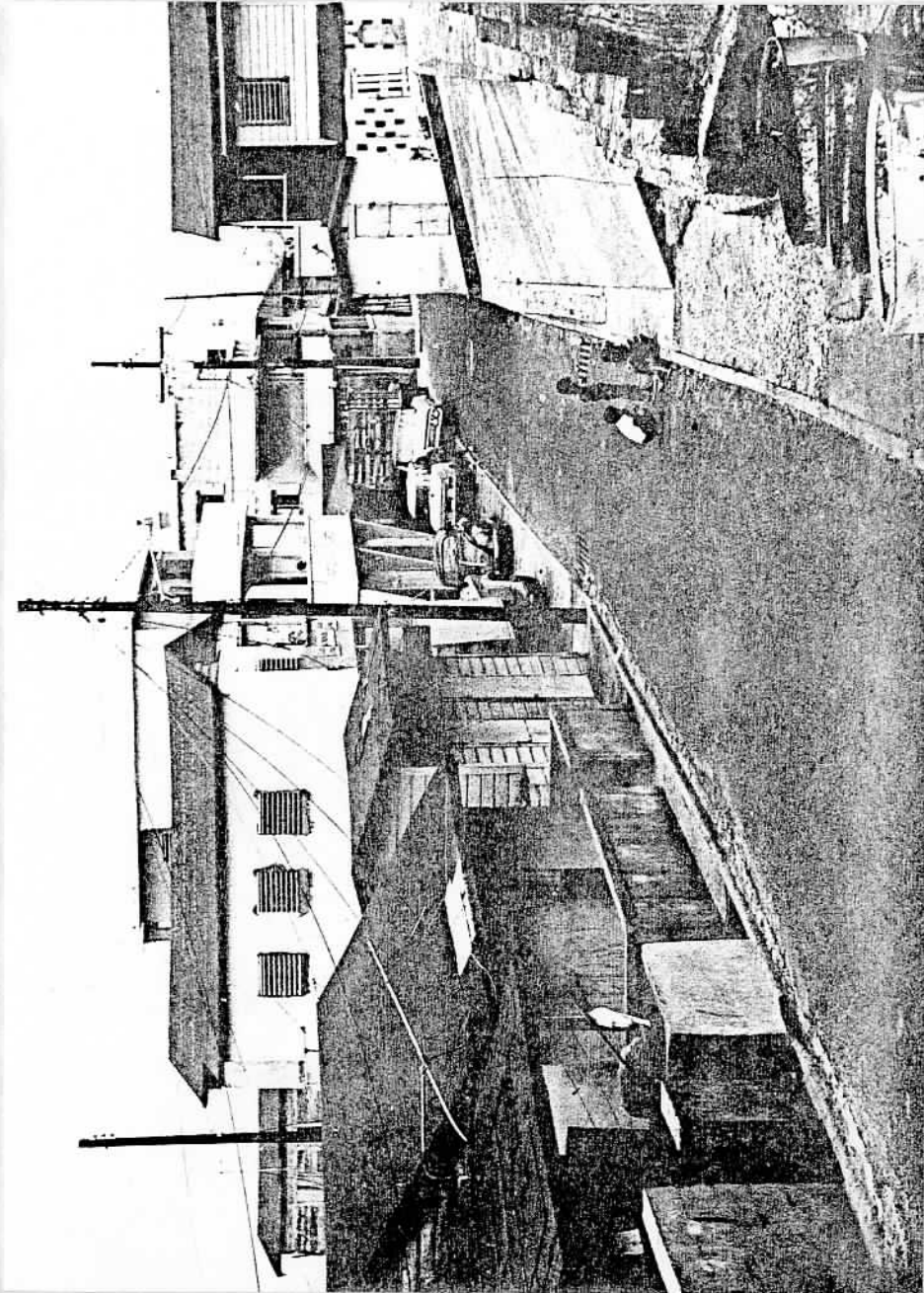
The average value of houses is \$700, and 73% of the dwellings are owner-occupied. Average rent for the remainder is \$15 per month. Due to poor sanitation, disease is more prevalent than in the rest of the city. Only 19% of the units had enclosed sewers in 1960.<sup>17</sup> See Plate 4.

Though it is difficult to secure detailed information concerning the range of undeveloped land in San Juan, dependence upon the automobile, a relatively expensive medium of travel, has necessitated overcrowding of lower class people near employment centers. See Table 3.

The U.S. Census of Housing portrays rapid demographic growth and urban renewal demonstrates the desire on the part of the Commonwealth Government to improve living standards for the poor. These factors combine with the survey of deteriorated housing noted in Table 3 to indicate that intelligent policies designed to satisfy the projected housing requirements are long overdue.

<sup>17</sup>J. Green, loc. cit.

PLATE 4  
STREET IN LA PERLA



### III SIGNIFICANT HOUSING CONSTRAINTS

#### Sociological Implications

If Puerto Rico is the bridge between North and South America, then a conflict prevails between supposed South American lethargy and United States imperialism. Certainly, Puerto Rico is a land in transition, with a highly stratified society becoming more anglicized, and class structure approaching U.S. norms. A study of insular urban sites with greater than 2,500 population reveals that 60% of the residents are directly from rural areas.<sup>1</sup> A larger middle class is induced by increased economic opportunity due to industrialization. A new 3 class system based upon wealth itself is gradually replacing the family as the basic social order.<sup>2</sup>

M. Tumin made a detailed study of the changing relation of class to other social indicators, and found that residential location was the most significant of variables examined.<sup>3</sup> That land ownership remains a prime indicator of prestige, may explain its great attraction when it offers

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<sup>1</sup>International Federation for Housing and Planning, Human Environment and Civilization (Paris: By the Federation, 1962) p 333.

<sup>2</sup>E. Hanson, Puerto Rico: Ally for Progress (Princeton: D. Nostrand Co., Inc., 1962) p 210.

<sup>3</sup>M. Tumin, Social Class and Social Change in

less economy and security than renting. Another significant indicator, education, is replacing residence as a prime subcultural determiner. San Juan suburbs have higher education indices than the central city, where only 30% of the population was literate in 1961.<sup>4</sup> But the central city has a greater proportion of young people, perhaps seeking education and the companionship of other youths.<sup>5</sup> The great influx of new ideas effected by increased literacy should create an optimistic outlook.<sup>6</sup> Indeed, because education is altering class distinctions, most people studied by Tunin indicated that for them life was improving.<sup>7</sup>

In his classic study of Boston's West End, H. Gans found that the lower class residents were not frustrated seekers of middle class values.<sup>8</sup> Though commonly thought of as a slum, he found the area was not; it contained a distinct working class subculture. When an area is not significantly harmful to residents it is not a slum regardless of physical conditions. With all members sharing similar housing, residence ceased to be an element of prestige. The common

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Puerto Rico (Princeton: Princeton Univ. Press, 1961), p 6.

<sup>4</sup>Ibid., p 50.

<sup>5</sup>G. Lewis, Puerto Rico (N.Y.: N.R. Press, 1963), p 254.

<sup>6</sup>A. Hollingshead and L. Regier, "Attitudes Toward Slums and Public Housing in Puerto Rico" in The Urban Condition, ed. L. Duhl (N.Y.: Basic Books, Inc., 1963), p 229.

<sup>7</sup>Tunin, op. cit., p 453.

<sup>8</sup>H. Gans, The Urban Villagers (N.Y.: The Free Press of Glencoe, 1962) p x.

silence of these people attested to their alienation from ethnocentric, upper class planners who held political power. Status established in regard to the peer group was quite independent of the concepts of social workers and other missionaries from the outside world. There are actualities of fulfillment of basic human needs available to members of these subcultures that must not be obliterated: adventure, aggressiveness, belonging without sacrificing individuality, sexual satisfaction, and meaningful loyalties.<sup>9</sup> Successful planning must allow the promulgation of these needs. The lowest classes require considerable mobility if parents are to raise their children out of poverty.

M. Fried and P. Gleicher found that slum residents achieved much satisfaction from a strong sense of identity with local places, which provided a varied framework for social and personal integration; kinship ties encouraged people to remain in the area.<sup>10</sup>

Concrete evidence substantiates the theory that a large city environment may, in some cases, be harmful: Some writers feel industrialization has been too rapid in Puerto Rico.<sup>11</sup> Industrialization promotes a loss of isolation and traditions, a rise in standard of living, and increased political autonomy for specific urbanized areas. When

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<sup>9</sup>Ibid., p 267.

<sup>10</sup>M. Fried and P. Gleicher, "Some Sources of Residential Satisfaction in an Urban Slum", Journal of the American Institute of Planners (Nov., 1961) p 305.

<sup>11</sup>International Federation for Housing and Planning, op. cit., p 287.

constituents feel they have some value to society they are more eager to improve it.<sup>12</sup> But anonymity of the individual and particularly anomic, accompanying any rapid change can lead to social stagnation.<sup>13</sup> Recent in-migrants are vulnerable when they have no prospect for adequate employment or education.<sup>14</sup>

Relocation poses many serious demands of its own, the chief one being the achievement of social integration. Residential location has meaning not only in terms of real estate value but also in terms of occupation, educational level, income class, nationality group, cultural attributes, and religious preferences.

E. Caplow and S. Stryker found in 1964 that of urban squatters wishing to move, the most common reason given was dissatisfaction with the physical condition of their housing.<sup>15</sup> We know that a physical neighborhood is not necessarily a social one; the homogeneity -- heterogeneity argument finds fuel in the knowledge that neighborhood solidarity is directly related to social homogeneity and inversely to duration of habitation.<sup>16</sup> The International

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<sup>12</sup>Tumin, op. cit., p 464.

<sup>13</sup>International Federation for Housing and Planning, op. cit., loc. cit.

<sup>14</sup>"U.S. Said to Ignore Urban Aid Abroad", The New York Times (Feb. 15, 1961) p 7.

<sup>15</sup>Caplow, Stryker, op. cit., p 202.

<sup>16</sup>I. Rosow, "The Social Effects of the Physical Environment", Journal of the American Institute of Planners (May, 1961) p 131.

Federation for Housing and Planning found that 5,000 to 8,000 persons constitute the ideally sized community.<sup>17</sup> People fear being thrust into a group of socially disinherited persons. A brief study of even the earliest Spanish villages discloses that they centered about a plaza, indicating much more community life than is common in the United States.

O. Lewis has written a fascinating treatise concerning the life style of an extended family in a typical Puerto Rican squatter settlement.<sup>18</sup> His thesis is that there exists a subculture of poverty, not necessarily related to monetary wealth, with the ability to maintain itself through generations. Changes in the sociological composition of the population are not as great as may be supposed by observing construction or financial statistics alone.

Slum formation depends upon the integration rate of migrants as well as the rate of in-migration. Therefore, slum formation depends upon barriers to escalation and a distinction between income and "ability" classes. C. Stokes has abstracted his studies of a poor community in Guayaquil, Ecuador, as shown in Fig. 3.

This community contained 500,000 people, many of whom were in-migrants from rural areas. Box "A" represents a temporary slum inhabited by strangers who see no insur-

<sup>17</sup>International Federation for Housing and Planning, op. cit., p 290.

<sup>18</sup>O. Lewis, La Vida (N.Y.: Random House Inc., 1966).

mountable barrier to rising in social position. This type of slum formation is basic to city growth whenever rural immigration is an issue, and is actually a sign of economic health, though good social planning can make it unnecessary.<sup>19</sup> Rapid change in home ownership indicates a type "A" slum which will self-eliminate with time. When availability of jobs quickens assimilation of in-migrants, this elimination is accelerated.

Different cultures set characteristic priorities in the satisfaction of needs. As indicated by their allocation of limited resources, the lowest classes in Puerto Rico consider food foremost, then shelter, transportation to work, and utilities. Place in the life cycle affects this ordering. Privacy is not esteemed as highly as within middle and upper class societies. The lower classes are often intent upon being seen by their peer group, as evidenced by their great interest in clothing fashion. Locale may be more important than ownership, and that in turn of greater desirability than fashion or modernity. We may learn from the experience of the Commonwealth Government when it supplied houses to low income people who in turn sold them to families slightly wealthier so they could buy food.<sup>20</sup> We can evaluate housing by the quality of its response to the family life situation and consider attributes thus experienced; past public housing designs have merely compounded social

<sup>19</sup>C. Stokes, "A Theory of Slums", Land Economics (Aug., 1962) p 189.

<sup>20</sup>J. Crane, "Workers' Housing in Puerto Rico" Unpublished paper, University of Puerto Rico, 1942, p 36.



problems.<sup>21</sup> People frequently see the home as an extension of the self: Home ownership can determine role, status, and life style. A major change in housing condition can induce an accompanying transformation in a person's self-concept.<sup>22</sup>

A study was made of female-headed households in Puerto Rico in 1965.<sup>23</sup> In many cases low wages obstructed the males' normal economic function in the families. Welfare and public housing provide an ideal environment for the female-headed household, and such families are increasing faster than the population as a whole. Female-headed families usually expect public housing to be their permanent home.<sup>24</sup>

If asked to describe the ideal home, lower class persons will answer that they desire a single house on a large lot in a quiet neighborhood with paved streets and sidewalks. It should be near schools, stores, churches, health facilities, public transportation, and playgrounds. The house should be of concrete, with glazed tile floors, several bedrooms, porches, substantial closets, and complete utilities. There should be a wall around the lot for

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<sup>21</sup>J. Turner, "A New View of the Housing Deficit" in Housing Policy for a Developing Latin Economy by Social Sciences Research Center (Rio Piedras: Univ. of Puerto Rico, 1966) p 35.

<sup>22</sup>K. Back, Slums, Projects, and People (Durham: Duke Univ. Press, 1962), p 3.

<sup>23</sup>H. Saha, "The Female-based Household in Public Housing: A Case Study in Puerto Rico", Human Organization (Summer, 1965) p 136.

<sup>24</sup>Ibid., p 138.

privacy.<sup>25</sup>

The surprising similarity of this response to one characteristic of the middle class reveals the marked discrepancy between the idealized values lower class people feel are necessary for acceptance by the rest of society and norms truly held. The growing influence of television upon the lower classes promotes the emergence of a life style conflicting with that already cultivated. Nevertheless, the desire for different physical surroundings is outweighed by the need to preserve and improve the social environment.

In this light, we need a new definition of housing deficit. Otherwise, public housing becomes very expensive in being designed according to a false set of values.<sup>26</sup> The parade ground park for people preferring intimate outdoor spaces for pig roasts, remains a glorified testimony to this truth, as do essential features added amateurly by tenants. As yet there is but meager evidence that desirable social patterns result from better physical planning.<sup>27</sup>

Architects are accused of being overconcerned with aesthetics and ignoring the people who must use their buildings. No planning at all is often better than bad

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<sup>25</sup>B. Elliott, Financing Latin American Housing (N.Y.: F. A. Praeger, 1956), p 193.

<sup>26</sup>Turner, op. cit., p 54.

<sup>27</sup>J. Jacobs, The Death and Life of Great American Cities (N.Y.: Random House, Inc., 1961), p 110.

planning. The designer has a social responsibility to learn as much as possible about people forced to be his clients.<sup>28</sup> "Operation Breakthrough", a program for providing low-cost housing in the United States, is presently testing market acceptability of various designs for houses in the \$5,000 to \$7,000 range.<sup>29</sup> Eventually, there may be an ecumenic architecture with local variation for climate.

Much has been made of the need to raise standards of living among the poor in developing countries to curtail the spread of Communism and promote Democracy.<sup>30</sup> Cuba's swing toward the Soviet Union has emphasized to leaders of small Latin American countries the vulnerability of rural migrants to violent political doctrines. Whether or not home ownership is a capitalist act, it is widely held that owners work harder to maintain their property and pay off mortgages. If hope is a social force, continued charity will develop a race of beggars.<sup>31</sup>

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<sup>28</sup>C. Doxiadis, Architecture in Transition (N.Y.: Oxford Univ. Press, 1963) p 29.

<sup>29</sup>"Low-cost Housing Tests Consumer Preferences", Progressive Architecture (April, 1970) p 29.

<sup>30</sup>A. Carnoy, Democracia Si! (N.Y.: Vantage Press, 1962) p 137.

<sup>31</sup>Gross, loc. cit.

### Financial Considerations

Housing is the most underdeveloped market in the world today.<sup>32</sup> Public housing demonstrates the Government's acceptance of responsibility for providing shelter. But the means for implementation are varied and fraught with problems, when rapid growth and social change are involved.

In the San Juan metropolitan area, there are 36,000 families earning less than \$2,000 per year, the minimum necessary to obtain government aid in financing a home. Houses had to be worth at least \$9,000 to be financed by the Federal Housing Administration (F.H.A.) in 1963.<sup>33</sup> By 1975, Puerto Rican per capita income should equal the U.S. figure for 1950! It is estimated that in 1980, 8% of all families will earn less than \$2,000, and decent private houses will cost at least \$21,000; the minimum income needed to buy a decent home will be \$10,500. Rent supplements are available to families earning less than \$2,000, but little is done to help families with incomes between \$2,000 and \$4,000.<sup>34</sup>

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<sup>32</sup>W. Hanco, "Housing and Urban Development Act of 1969", Journal of Housing (Jan., 1970), p 22.

<sup>33</sup>Puerto Rico Urban Renewal and Housing Administration, op. cit., p 15.

<sup>34</sup>G. Lewis, op. cit., p 243.

Available financing methods are of 2 overlapping types: public and private. (A hybrid variation requires government guarantees on private loans.<sup>35</sup>) Developing nations have set 4 interrelated goals in this regard: (1) Increase quantity, (2) Increase quality, (3) Reallocate population within existing stock, (4) Guarantee low rents to tenants. This last area is where most variation in approach occurs.<sup>36</sup>

To eliminate slums we must attack their cause -- poverty. Increasing real income can be accomplished through greater employment or higher wages; the greatest hope for the lower classes lies in preparing people for more jobs. Even a cursory study of the 1960 Housing Census reveals that living conditions generally improve with higher rent, as rent is directly correlated with income.<sup>37</sup> Merely augmenting stock will prove perfunctory until we can assure that new housing will not become like the physical slums extant.

In 1968, the Puerto Rican economy grew 10.7%, with housing 8.0% of G.N.P. Housing costs are rising 7.2% and labor costs 4% per year, but this is partly offset by greater per capita productivity: \$1,400 in 1960, \$2,500 in 1970, and \$5,100 (estimate) in 1980. Material costs are about constant, but land is appreciating rapidly. In 1963, land amounted to 34% of the total cost of an average home,

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<sup>35</sup>J. Belaguer, "A Good House", Vital Speeches (March 15, 1959) p 327.

<sup>36</sup>A. Nevitt (ed.), The Economic Problems of Housing (N.Y.: MacMillan, 1967), p 254.

<sup>37</sup>United States Bureau of the Census, United States Census of Housing: 1960 (Washington: U.S. Govt. Printing Off., 1963) II-7, 202-5.

while the comparable U.S. figure was only 16%. This soaring expense of land has encouraged much speculation.<sup>38</sup>

The expense of financing can surpass 43% of the total cost of conventional housing. This sector could be decreased by developing a "rotating credit" system, with investors helping each other pay debts quickly so that interest on only the final segment of a relatively large loan must be paid. This cooperative self-financing scheme could save 30% of the overall expense of housing.<sup>39</sup> If interest were reduced there would be more funds remaining for construction.

Taxes cannot provide initial capital, though they can induce "big business" to build low-cost housing. Though San Juan presently exempts the first \$15,000 of assessed valuation on houses from the property tax, rates could be modified to control land speculation.<sup>40</sup> Land adjacent to concentrated housing could be taxed to support new developments.<sup>41</sup> Generally, deteriorated units are most profitable to owners, and though landlords will try to perpetuate them, they must be made unprofitable if they are to be improved. The city pays for the profits class offer owners through excessive crime control, fire fighting, and

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<sup>38</sup>R. O'Neill and M. Huntoon, Jr., "An Open Letter", House and Home (Feb., 1970), p 51.

<sup>39</sup>P. Malo, "Notes Towards a Proposal for Lower Cost Housing", Syracuse: Typescript, April, 1970.

<sup>40</sup>Puerto Rico Urban Renewal and Housing Administration, op. cit., p 5.

<sup>41</sup>Ibid., p 16.

sanitation work.

Parents find saving difficult because of the expense of rearing children; 40% of the population is under 15 years old.<sup>42</sup> Because Puerto Ricans have traditionally minimized personal frugality, few savings institutions exist. In many cases, inflation has effaced what savings there were. In "frozen asset" investment, families would gather building materials and store them until they had enough to supplement their houses.<sup>43</sup> The people are slowly mobilizing savings: In 1962, local savings were only 52% of total fixed investment, and in 1963, 63%. Commercial bank deposits are similarly increasing: \$270 million in 1950, \$562 million in 1960, and \$1,280 million in 1970.<sup>44</sup>

In "seed loan" negotiations, U.S. banks lend money to the Inter-American Development Bank to back high risk mortgages.<sup>45</sup> Self-help schemes are featured in about 30% of all such loans, which totalled over \$600 million through 1965.<sup>46</sup> The Puerto Rican Constitution's limitation of government debts discouraged mortgages until amended in 1962.<sup>47</sup>

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<sup>42</sup>The Chase Manhattan Bank, Housing in Latin America (N.Y.: By the Bank, 1962).

<sup>43</sup>E. Hanson, Puerto Rico -- Land of Wonders (N.Y.: A. Knopf, 1966), p 295.

<sup>44</sup>Puerto Rico Urban Renewal and Housing Administration, op. cit., p 31.

<sup>45</sup>Carnoy, op. cit., p 246.

<sup>46</sup>J. Vaughn, "Housing and Urban Development in Latin America" in Dept. of State Bulletin (Washington: U.S. Govt. Printing Off., July 12, 1965) p 66.

<sup>47</sup>Carnoy, op. cit., p 154.

Puerto Rican bond issues are now floated in the United States at 3.5% interest.<sup>48</sup>

United Nations research has tried to determine the relationship between rapid urbanization and capital shortages in the housing sector.<sup>49</sup> Part of the problem is caused by the need for quick capital to boost short-term industrial investments.<sup>50</sup> Investors prefer rapid turnover, so mortgage rates are high.<sup>51</sup>

In 1952, R. Rockefeller claimed that 18 million more Latin American families could be housed if only reasonable financing were available. He founded a new company to provide this: The International Basic Economy Corporation (I.B.E.C.) insures housing loans made by South American branches.<sup>52</sup> At one time, the U.S. Congress considered establishing an International Home Loan Bank, similar to the successful institution in Brazil, where the need for decent housing is even more intense. The National Housing Bank of Brazil was founded in 1964 to facilitate the construction of homes and related utilities. It has separate programs for low income and extremely poor families. Financing is available not only for materials but also for

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<sup>48</sup>C. Abrams, Housing in the Modern World (London: Faber & Faber, 1964) p 161.

<sup>49</sup>Economic and Social Council, Finance for Housing and Community Facilities in Developing Countries (N.Y.: The United Nations, 1966) p 14.

<sup>50</sup>Ibid., p 18.

<sup>51</sup>"Housing Will Never Be the Same Again", The San Juan Star (March 10, 1970) p 30.

<sup>52</sup>P. Shabecoff, "Spurs Are Sought in Latin Housing", The New York Times (Oct. 21, 1962) sec. III, p 1.



supplying working capital to manufacturers of construction components. Interest rates on loans vary with income, but range from 4% to 10% per year according to a dynamic price index. The bank avoids aggravating existing disparities among regional economies.<sup>53</sup> About 330,000 homes were so financed through 1968.

"Big business" is getting increasingly involved in housing. With the greater efficiency offered by the factory system of building, the larger manufacturer of housing components has an advantage over the smaller builder, if markets are large and identifiable. Automotive and aircraft unions have wisely realized that while mass production methods have eliminated some jobs they have created far more. Industries have rehabilitated structures to be managed by non-profit agencies; a combination successful in obtaining advantageous mortgages.<sup>54</sup> In other cases, governmental agencies have prevented businesses from making reasonable profits, by requiring higher standards than low-income tenants could support.<sup>55</sup>

Construction most familiar to architects and planners in the United States is of a relatively high standard, and expensive, even when programs call for low-cost housing. Upper class planners apparently experience difficulty imagining anyone living under conditions much different from

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<sup>53</sup>"National Housing Bank -- Retrospective Study", Conjuntura Económica (May, 1969), p 18.

<sup>54</sup>B. Ahlers, "Church Land Offered to Squatters", The San Juan Star (Feb. 23, 1970), p 6.

<sup>55</sup>"Homebuilding's Happy Future", Business Week

their own.

A developing society should not always try to quickly acquire the standards of others when the sacrifices made to reach that stage of development are unknown. Most governments prefer to wait until they can build housing of high standards before attempting any construction at all, though moderate standards might be satisfactory in tropical areas and far more economical. Moderate standards are more likely to be met by mass production techniques. With construction of high standards, fewer families can afford private housing, or less housing can be supplied for a given amount of money. There may be political opposition by the middle classes when seeing lower classes housed better than themselves at public expense. Zero standards are maintained in squatter settlements where codes are unenforced. If people are satisfied with the social aspects of their location, and zero standards prevail, they will have little incentive to move, for if real incomes rise faster than building costs, people will improve their own housing.

Public housing of high standards has been built for the middle classes in the belief that "filtering down" would eventually benefit the lower classes. A given amount of subsidy will help the poor to some extent when given to the middle classes if the subsidy required by them (the difference

GILBERT BOND  
(May 6, 1967), p 84.

25% COTTON

between income available for rent and actual rent) is less per family, so that a given amount will displace the most families. But it would be better to design housing for the lower classes according to their specific needs, and avoid the instability within residential occupation patterns, resulting in antagonism between new and old groups in a given area. It is probably better to build housing of moderate standards than to subdivide existing housing so as to overcrowd it. An insistence on high quality beyond the point where it is warranted may produce more low quality conditions than necessary.<sup>56</sup>

The great problem of relocating displaced persons through urban renewal has encouraged speculative housing on the urban fringe where the poor have a difficult time traveling to work. Where zero construction standards are not allowed, at least the poor live closer to the city center.

#### Governmental Disparities

Is it undemocratic to expect Government to do more than benefit the land speculator, finance company, or

<sup>56</sup> A. Downs, "Housing the Urban Poor: The Economics of Various Strategies", The American Economic Review (Sept., 1959), p 646.

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25% COTTON

building contractor? In providing housing, the Commonwealth Government decides what portion of gross domestic capital shall be allocated to fixed capital formation, specifically the housing sector. Investment should be greatest where social marginal productivity is highest. Per capita output may be the best measure of economic activity in a developing nation: Per capita G.N.P. in Puerto Rico is \$3,020.<sup>57</sup> For the United States in 1965, gross domestic investment was 17.3% of G.N.P. In Puerto Rico the portion of G.N.P. represented by gross domestic investment was 8% in 1940, 14.7% in 1950, and 20.4% in 1960.<sup>58</sup>

A family of 4 receives \$900 a year in welfare payments.<sup>59</sup> If 20% of this goes to rent, they then have \$15 a month for rent. The Government must decide who will be directly subsidized. Should it subsidize tenants, rent would rise to meet the increase. In rent supplement plans, there is little incentive for landlords to maintain sound properties. Yet, Government hesitates to lose control over its investments as it must through present P.H.A. legislation.

Political conflict arises between the U.S. State Department trying to improve our image in Latin America,

<sup>57</sup>P. Wendt, The Determination of Housing Policies in a Developing Economy (Berkeley: University of California, 1966), p 7.

tion, op. cit., p 11.

<sup>58</sup>Puerto Rico Urban Renewal and Housing Administration, Thriving Economy Fuels Puerto Rico Building Boom, The New York Times (March 23, 1969), sec. VIII, p 1.

and the U.S. Treasury, which finds the resulting outflow of money damaging to our economy.<sup>60</sup> With greater centralization, the Federal Government could stimulate local governing bodies in line with overall policies.<sup>61</sup>

There are presently 2 major political parties in Puerto Rico: The Statehood Republican Party, related to the Federal Republican Party, would build new houses within present slums; the Popular Democratic Party upholds the existing Commonwealth status for the island, and would eliminate slums. Indeed, the latter party is the more popular.<sup>62</sup>

"Operation Bootstrap" is a program started by Governor H. Maria (Popular Democratic) in 1965, intended to inspire Puerto Rico to help itself. The Planning Board is responsible for setting priorities and is the heart of the movement. The Commonwealth employs its Development Bank as a fiscal agent to control housing financing. Another important arm of "Operation Bootstrap", is the Economic Development Administration (Fomento Cooperativo), begun by U.S. Ambassador R. Tugwell. This body catalyzes private industrial interests with government funds. C.R.U.V. administers transitional public housing projects like "Buenos Aires" with units renting at \$7 per month.<sup>63</sup>

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<sup>60</sup> Elliott, op. cit., p 193.

<sup>61</sup> H. Franklin, "A New Look at Subsidized Housing". Lecture, Syracuse, N.Y., April 9, 1970.

<sup>62</sup> Office of the Commonwealth of Puerto Rico, The Commonwealth of Puerto Rico (Washington: By the Commonwealth, 1962) p 17.

<sup>63</sup> R. Corrada, "The Place of Self-Help and

Eventually these apartments will be cooperatively owned by inhabitants. There are a total of 15 housing programs intended to suit families of various needs and incomes but underfunding has limited their effectiveness. New Housing and Urban Development (H.U.D.) proposals include leasing existing housing for the poor to promote the private sector, and strengthening tenant management. The H.U.D. Act of 1965 included a rent supplement section considered a great improvement, and the 1969 Act establishes new mortgage ceilings and requires a new unit built for every one demolished. (In 1949, a unit had to be destroyed for each one built!<sup>64</sup>) Bonds are now offered for 8% interest.<sup>65</sup> A 2 bedroom apartment can be mortgaged for as much as \$15,525.<sup>66</sup> The Secretary of H.U.D. can assure that construction unions impose no constraints on the use of modern technology. New depreciation clauses should encourage investment in low income housing, despite the high risk factor. Maximum rent for low income units is fixed at 25% of family income.

"Operation Breakthrough" has also affected the housing scene: So far, 22 proposals have been selected for the first of 3 mandatory phases: (1) detailed design, (2) prototype construction, (3) volume implementation. A winner for San Juan consists of stacked concrete "boxes"

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Mutual Aid in the Total Housing Program", in Proceedings of the 1960 World Planning and Housing Congress (San Juan: By the Congress, 1961) p 9.

<sup>64</sup>L. Roberts and R. Stefani, Patterns of Living in Puerto Rican Families (Rio Piedras: Univ. of P.R., 1949) p228.

<sup>65</sup>B. Abrams and G. Ortiz, "Ferre Approves Bill Raising Bond Interest", The San Juan Star (Feb. 20, 1970) p 1.

costing \$100 per square meter.<sup>67</sup> The intent of this program is to spur private industries in order to reduce government costs. H.U.D. must cover initial expenses to make the endeavor profitable to the industries involved. Were the Government to build housing alone, many people would fear such "socialized housing".

The Government is gradually providing more aid to families buying houses rather than investing solely in public housing. Home ownership encourages greater social, political, and economic stability. Priority is ideally given to relocating families, as many are victims of extensive Model Cities clearance programs. Very large families have great difficulty finding new housing.<sup>68</sup>

The United States loaned a billion dollars to Latin America for housing from 1961 through 1965 as part of President J. Kennedy's "Alliance for Progress" pact.<sup>69</sup> Investment in housing was \$250 million in 1960, \$550 million in 1970, and \$1,010 million (estimate) for 1980. In the 1962-3 fiscal year, Federally financed (Title III) housing in Puerto Rico cost \$21.9 million, while \$4.7 million was spent on urban renewal. In 1964, the Commonwealth spent \$3.3 million on housing and C.R.U.V. spent \$5.9 million.<sup>70</sup> For 1970, the housing allocation is \$11.6 million, or 2.1% of the Commonwealth budget.<sup>71</sup>

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<sup>65</sup> Senno, op. cit., p 20.

<sup>67</sup> B. Roney, and S. Stephens, "Operation Breakthrough: Operation P/R", Progressive Architecture (April, 1970) p 126.

<sup>68</sup> Office of the Commonwealth of Puerto Rico, op.

President R. Nixon's current plans to curb inflation will undoubtedly increase taxes and unemployment -- a situation Puerto Rico doesn't need. See Table 5. Yet, easy money would not aid the lowest classes, unless suitable financing agencies were available.<sup>72</sup>

Constraints limiting efforts to solve the housing problem in San Juan are common to most developing societies: Urbanization, prompted by industrialization exceeds the city's ability to expand efficiently. New wealth for those able to find employment and greater educational opportunities have modified former class distinctions. Slums inhabited by these in-migrants have been shown to be socially vivified though physically deteriorated. Relocation attempts that ignore social aspects have failed to produce satisfying neighborhoods despite excessively high construction standards. Planning more cognizant of lower class values is desperately needed.

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cit., p 35.

<sup>69</sup>Carnoy, op. cit., p 217.

<sup>70</sup>Puerto Rico Urban Renewal and Housing Administration, op. cit., p 8.

<sup>71</sup>G. Ortiz believes this figure should be raised to 5% -- See "Home Ownership Encouraged", The San Juan Star (Feb. 10, 1970), p 6.

<sup>72</sup>J. Villanil, "A Financial Policy for Puerto Rico", The San Juan Star (Feb. 1, 1970), p 19.

25% COTTON



Public initiative must begin the cycle of financial rehabilitation in San Juan. A traditional dearth of savings and lending institutions and unfavorable tax and welfare structures have left the lowest classes insufficient funds to acquire decent housing. Conflicts with governmental agencies and labor unions have hindered attempts by private industry to supply low-cost housing profitably.

Should slums be cleared or rehabilitated? Further research could develop a test for social concordance which, if present, would suggest that the community be strengthened through physical improvement. Relocation problems are of such severity that neighborhoods should be preserved whenever possible. Home ownership relieves many problems characteristic of slums and should be a major goal of housing policies.

#### IV CURRENT HOUSING EFFORTS

##### Technological Developments

In House, Form and Culture, A. Rapoport argues that site, climate, and available technology merely define possibilities for specific design solutions -- forms buildings take depend upon life style and cultural preferences:

Look for what culture or physical setting makes impossible rather than for what it makes inevitable.<sup>1</sup>

With the passage of time, man's life style has changed considerably: he prepares food quickly in a smaller kitchen, and prefers watching television to formal entertaining; he will air condition his house rather than design its form to take advantage of the sun, wind, and rain; he changes jobs so frequently that his ideal home might be a camping trailer. And it is this vision of the ideal life that dominates his forms. In short, he needs more flexibility than his ancestors, yet we find him using his most sophisticated technology to build a 19th century house.

There is no "physical determinism", then, for the

<sup>1</sup>A. Rapoport, House, Form and Culture (Englewood Cliffs: Prentice-Hall, Inc., 1969) p 26.

house is a "social unit of space".<sup>2</sup> Fully satisfactory housing must be: (1) socially and culturally valid, (2) economical, including long term maintenance, (3) able to preserve the occupants' health. So long as these qualifications are met, the form of the house can be dictated by current fashion.<sup>3</sup> Despite labor unions' efforts, the best environmental design features an evident fusion of art, architecture, and industrial engineering.<sup>4</sup>

Technologically, the construction industry has always lagged behind others. Yet, there is widespread belief that modern technology will somehow solve the world's housing problems. Though industry may offer economic help by hiring unskilled workers, there have been no cost breakthroughs sufficient to entice private industry to house the lowest classes unaided, and government subsidies have been necessary.<sup>5</sup>

A major phase of industrialized construction is the development of modular, prefabricated components. Actually, there is nothing new about prefabrication: We know of ancient African dwellings that could be dismantled and moved periodically. Prefabricated systems are of 2 types: "tinker-toys" -- these containing predominantly

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<sup>2</sup>Ibid., p 42.

<sup>3</sup>Ibid., p 135.

<sup>4</sup>"The Architect and Industry: The A.R.A.", Progressive Architecture (Jan., 1970), p 30.

<sup>5</sup>United Nations, Science and Technology for Development, vol. V: People and Living (N.Y.: The U.N., 1963) p 9.

small, stick-like pieces, and "boxes" -- those built of larger, space enclosing forms. Most construction systems embody 5 principal components: (1) the structure, including floors, bearing walls and columns, and roof, (2) non-bearing partitions, (3) a prefabricated toilet room, (4) linear mechanical elements, (5) furniture. Variations are feasible; for example, kitchens are frequently prefabricated, and much of the furniture may be built-in.<sup>6</sup>

It is simpler for unskilled workers with a minimum of equipment to build with small elements. The "Mitchell Frame" takes advantage of this fact; it consists of small, precast concrete elements (columns, beams, and planks), that can be assembled into 4 story units, without special equipment.<sup>7</sup> Non-supportive panels are fabricated of indigenous materials. The cost is about \$75 per square meter. A prototype development was built in Greensborough, North Carolina, and 2 bedroom units rented for \$75 per month. If a family devoted 25% of its income to shelter it would require a \$3,600 income, a figure that excludes the families of greatest concern in this paper.<sup>8</sup>

Conventional construction includes minor prefabrication, but through time prefabricated units have become larger, the ultimate being the mobile home, or "20th Century Brick", as noted architect P. Rudolph calls it. These can be as much as 20 m. long, 4 m. wide, and 3.3 m. high. At

<sup>6</sup>W. McQuade, "An Assembly-line Answer to the Housing Crisis", Fortune (May 1, 1969) p 99.

<sup>7</sup>R. Lesko, "Economics of Precast Concrete Construction", Building Research (March 1966), p 46.

\$70 per square meter, they are much cheaper than conventional construction (which costs about \$120 per square meter for comparable quality).<sup>9</sup> So that people won't conceive of them as trailers, they are commonly shipped to construction sites aboard flatcars. Codes and zoning regulations have caused delays in public acceptance which could be overcome if the units were well designed and in great enough demand; where housing supply is shortest relative to need, quantity controls quality. Mobile homes are advantageous where real estate is heavily taxed and personal property is not, but they pose characteristic problems: Labor savings must be sufficient to cover the additional cost of transporting the larger units to the building site. There are multiple benefits derived from doing a majority of the work off the site: The cost of labor within the factory is generally lower for similar tasks because of superior working conditions and greater efficiency attainable with larger machinery. There is less work loss due to bad weather, especially when concrete is involved. But the practicality of on-site labor increases with the scope of the project. Because specialized crews can move faster in the dense urban fabric, the larger pre-fabricated unit is perhaps best suited to rural areas.<sup>10</sup>

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<sup>8</sup>"Lowering the Cost of Housing", Progressive Architecture (June, 1968), p 94.

<sup>9</sup>Ibid., p 96.

<sup>10</sup>Male, loc. cit.

Though "box" systems can be constructed faster than the "tinker-toys", they have less flexibility. Final savings depend upon the balance between labor and materials costs. The 1,300 man-hours now required at the site to build the average low-cost, 4 room house could be decreased to about 750 through greater prefabrication.<sup>11</sup> Because of the considerable initial capital required, there are difficulties financing large scale mass produced housing, especially the "box" scheme. See Fig. 5.

Materials often used for construction in Puerto Rico include concrete made cheaply from natural fibers.<sup>12</sup> It can be poured by relatively unskilled laborers to form a home that is earthquake, hurricane, and vermin proof.<sup>13</sup> In this regard, round houses can better withstand violent storms: A prototype developed by Rondette, Inc., can survive a 200 km. per hour wind. The cost of a 3 bedroom unit is \$6,700.<sup>14</sup> Steel remains relatively expensive and usually requires more skilled labor for erection.<sup>15</sup> In the nearby Virgin Islands, a private builder recently claimed a technological breakthrough: His modular houses will consist of 2 units -- a living room-kitchen, and a bedroom-bathroom, both built in his factory. The house will sell for only \$1,400, or \$96 per square meter.

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<sup>11</sup>McQuade, op. cit., p 100.

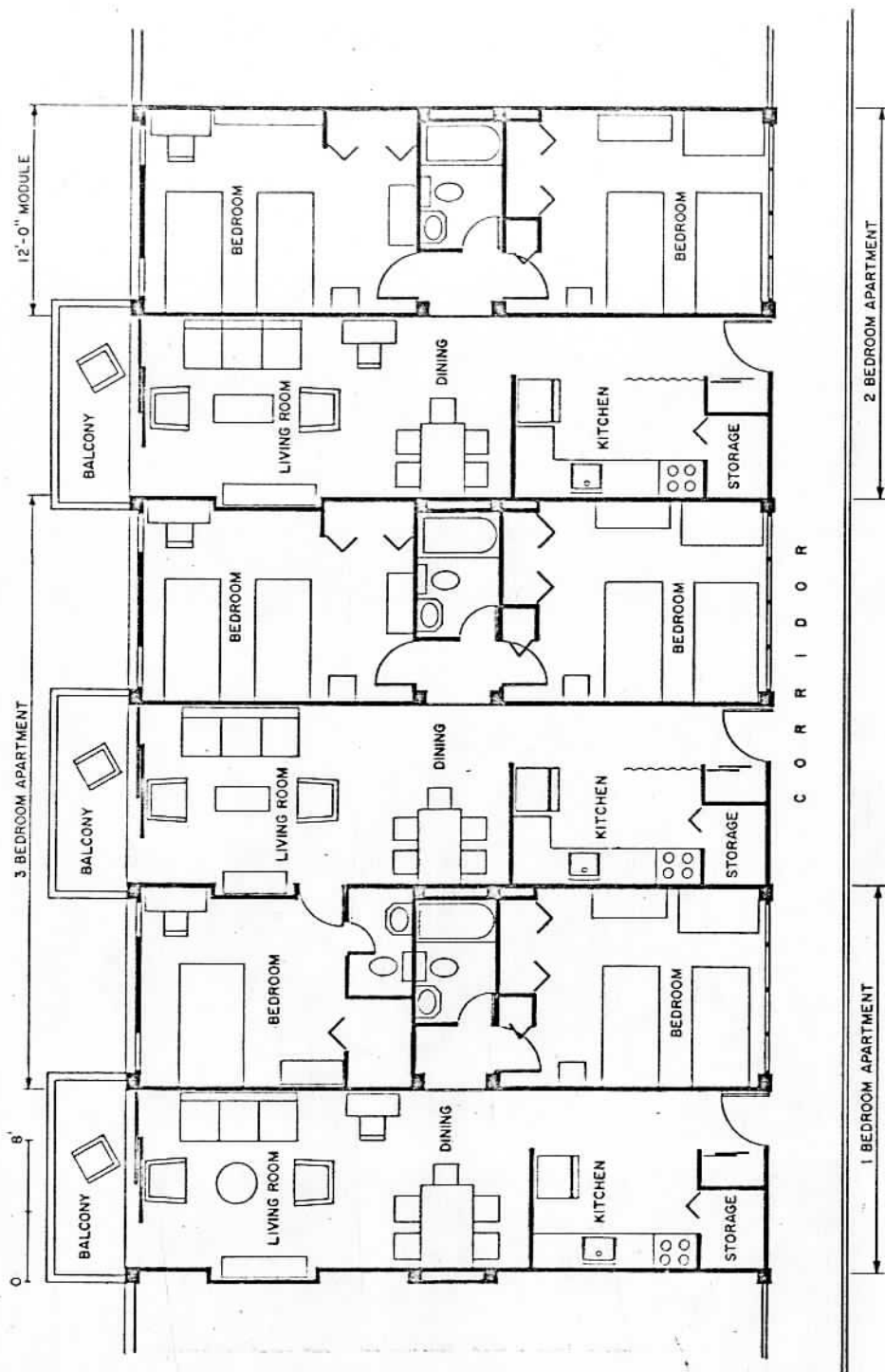
<sup>12</sup>H. Folley, personal interview, Syracuse, N.Y., Feb. 25, 1970.

<sup>13</sup>"Quake-Proof Houses Possible, U.S. Finds", The New York Times (May 8, 1962), p 9.

<sup>14</sup>"Rondette -- Prefab House in the Round", Popular Mechanics (April, 1969), p 172.

FIGURE 5

PLAN FOR LOW-COST HOUSING USING STACKED CONCRETE BOXES<sup>a</sup>



<sup>a</sup>Source: Progressive Architecture Magazine, (April, 1970) p 127.

But even this price is beyond the reach of many of the poorest families earning less than \$2,000 per year. See ibid p 32. To understand housing costs in perspective it is necessary to keep in mind that families earning only \$1,000 per year can afford only about \$200 per year for shelter. If they require 20 square meters of space to be financed over 5 years, construction costs cannot exceed \$50 per square meter.

Other low-cost efforts will be briefly described: As early as 1910, concrete homes were being built by unskilled laborers in California. Because cranes were not available, walls were poured at a 45 degree angle with the ground and lifted plus.<sup>17</sup>

"C.I.E.V.A.", an organ of the Pan American Union, promotes programs of technical cooperation among Latin American countries. In 1957, it developed a portable machine to convert local materials into concrete blocks.<sup>18</sup> See Plate 5. However, in Puerto Rico, poured-in-place concrete has proven more practical due to its greater ease of alignment.<sup>19</sup>

Lockheed Aircraft Corp. built 60 units in Puerto Rico from 1966 to 1968, using a new system called "Panel-Loak". Concrete wall panels 60 to 120 cm. wide and 2.4 m. high were cast on the site.<sup>20</sup> Each house took 6 un-

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<sup>15</sup>Folley, loc. cit.

<sup>16</sup>"v.I. Builder Claims Housing Breakthrough", The San Juan Star (March 13, 1970), p 29.

<sup>17</sup>H. McCoy, How California Architects (N.Y.: Reinhold Publishing Corp., 1960), p 79.

<sup>18</sup>Union Panamericana, C.I.E.V.A. 1958 - 62 (Washington: Organizacion de los Estados Americanos, 1962), p 17.

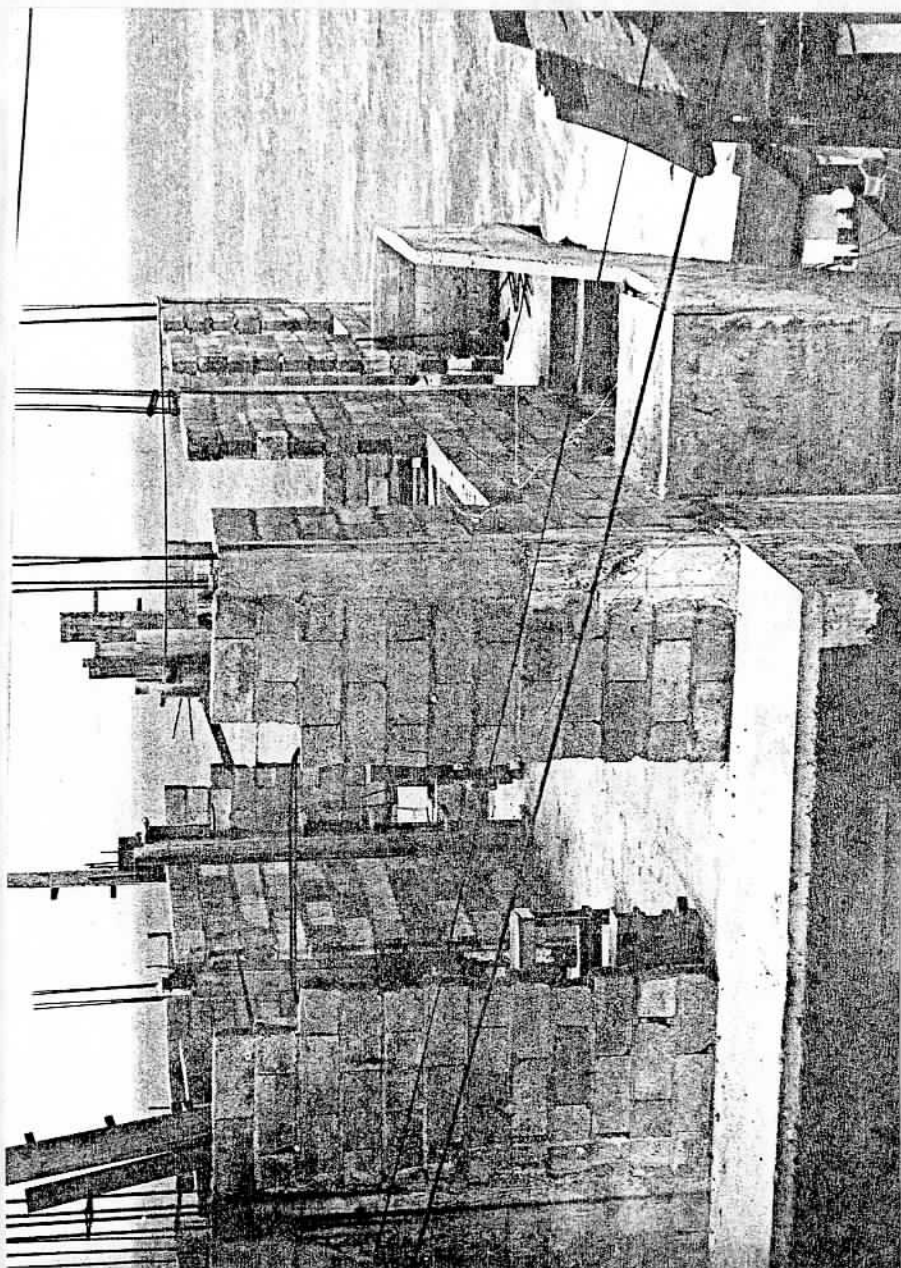
<sup>19</sup>Corrada, loc. cit.

<sup>20</sup>"Lowering the Cost of Housing", loc. cit.



PLATE 5

A NEW HOME OF CONCRETE BLOCK



25% COTTON

skilled men 2 days to build.<sup>21</sup> Including supervision, costs ran \$45 per square meter, including some mechanical equipment and vinyl-asbestos floors.<sup>22</sup> See Plate 6.

Wood prefabrication has been employed successfully by migrant workers near New York City earning only \$1,560 per year. Houses consist of 4 modular elements: posts, beams, girders, and wall panels. No excavation is required. A unit 4 meters square can be erected in 4 hours. Workers have formed their own construction business, and intend to build a factory to manufacture the components. Each paid \$6,600 for 100 square meters of space, but the market value of each finished house is \$11,500.<sup>23</sup> C.R.U.V. has built permanent housing combined with wooden structures that are replaced as the economy progresses.<sup>24</sup>

Recently, asbestos cement has been used in tropical zones where it can be produced cheaply. The material is lighter and stronger than ordinary concrete. If cast hollow, voids can be filled with insulation and utility lines. Corrugated sections are used for roofs in Bogota to span 6 meters. Wind frames replace panels to increase design

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<sup>21</sup>W. Gregory, "Technology for Housing Stir Skepticism", Aviation Week and Space Technology (Oct. 7, 1968), p 100.

<sup>22</sup>Lasko, loc. cit.

<sup>23</sup>"Self-Help and Beyond", The Architectural Forum (March, 1970), p 52.

<sup>24</sup>United Nations, op. cit., p 174. See also "700,000 Live in Slums", The San Juan Star (March 23, 1970) p22.

PLATE 6

WORKMEN CONSTRUCTING PANEL-LOCK HOME

(Source: Lockheed Aircraft Corp.)



flexibility.<sup>25</sup> A drawback of this type of construction is the need for cranes.

Among untried ideas is one for demountable geodesic domes built of bamboo supplied to each family already cut to modular size. The flexible, streamlined structures might be quite durable in a hurricane.<sup>26</sup>

### Public Housing

Over 3500 million has been spent on public housing in San Juan. Most was sponsored by the United States through guaranteed interest and amortization of bonds. Puerto Rico obtains more Federal aid per capita for low-cost housing than any state.<sup>27</sup> There are critics who maintain that the price of this aid has been political subservience.<sup>28</sup> Housing reflects U.S. standards whether or not they apply in Puerto Rico. In at least one case, lower class units were so well constructed, it proved more profitable to developers to sell them as middle class condominiums. Every public housing project has included a community center with shopping, and an outdoor recreation area. In some condominiums, families are allowed to rent units at \$65 per month if their potential incomes

<sup>25</sup>J. Zettel, "An Extruded Asbestos Cement Building System", Building Research (March, 1966), p 62.

<sup>26</sup>W. Crane, personal interview, Syracuse, N.Y., April 17, 1970.

are high enough to buy them eventually, and there are maximum age qualifications.<sup>29</sup> Persons relocated from slums due to urban renewal have been given first choice of apartments in the new buildings when they could afford them. Relocated squatters are seldom reimbursed for their houses, and never for the land they relinquish.<sup>30</sup> Other slum dwellers are subsidized to improve their houses and remain stationary.<sup>31</sup>

In 1965, 12 poor families, left homeless by C.R.U.V., staged a live-in before government headquarters, but within a week were forced to move to an empty lot. Some of these families had bought houses not knowing they were to be torn down. When their possessions were dumped on the ground, they had to leave jobs to prevent looting.<sup>32</sup>

When the central city land is too valuable for public

<sup>27</sup>T. Caplow and S. Stryker, op. cit., p 228.

<sup>28</sup>This was clearly the opinion of the Puerto Ricans who took over the conference scheduled for May 15-6, 1970 at Oswego, N.Y. See Friedlander, op. cit., p 82.

<sup>29</sup>"Consolidated Housing Program Sent to Congress", The San Juan Star (March 20, 1970), p 49. See also "Bahia Unites Now Ready", The San Juan Star (Feb. 13, 1970), p 20.

<sup>30</sup>J. Reiner, "Social Planning -- Alternatives to Failure", lecture, Syracuse, N.Y., Feb. 18, 1970.

<sup>31</sup>H. Wells, The Modernisation of Puerto Rico (Cambridge: Harvard Univ. Press, 1969) p 174.

<sup>32</sup>"V.I. Judge Orders Halt to Home Destruction", loc. cit.

housing, the poor people are forced to live on the urban fringe, far from work.<sup>33</sup> Public housing has generally been built on sites unattractive for technical reasons as well as location. If it were planned for better areas the poor would be allowed easier access to urban amenities they cannot afford independently. Formerly unusable sites can often be made available through modern technology.

Relocation is the process of social change in a microcosm. It is an irreversible decision, but one not made by the people being moved. It can protect depressed sections of the population while helping the people build a base from which to seek better lives on their own. See Table 6. When the process is ill-thought out, people retrogress to other slums.<sup>34</sup>

Urban renewal has made relocated people more aware of laws and their rights:

Out of the need for protecting the right to land and a decent house will come the necessity for respecting each other's rights, respect for contracts, courts, and the rule of precedent.<sup>35</sup>

Slum tenants most willing to move to public housing are generally those with more stake in the future. See Table 7. Improvements in employment opportunities can cause

<sup>33</sup>D. Peres, "Dwellers Score Tokio Area Conditions", The San Juan Star (March 18, 1970), p 12.

<sup>34</sup>Back, op. cit., p 38.

<sup>35</sup>O. Abrams, "World Housing Needs", The New York Times (July 17, 1960), p 8.

TABLE 6  
REASONS FOR STAYING AND MOVING<sup>a</sup>

(Italic figures indicate percentages)

	SLUM DWELLERS			PROJECT TENANTS	MOVERS	
	General Sample	Stage I	Stage II		From Slums	From Projects
<b>WHY DO YOU WANT TO STAY?</b>						
Like neighbors	14	14	5	9	11	—
Good neighborhood	5	—	8	11	—	50
Good location (work, schools)	22	—	8	—	—	—
Like dwelling	—	7	3	43	22	10
Healthy, safe	3	4	3	9	—	—
Own house	38	39	26	—	56	30
Feeling of belonging	16	—	32	—	—	—
No place to go	—	4	—	9	—	—
Other	3	32	13	21	11	10
<b>NUMBER OF RESPONDENTS WHO WANT TO STAY</b>						
	37	28	38	47	9	10
<b>WHY DO YOU WANT TO MOVE?</b>						
Dislike neighbors	5	2	2	10	—	9
Bad neighborhood	17	25	10	3	—	27
Far from work, schools	3	4	6	6	—	—
To get ahead in life	15	9	8	—	22	9
Dwelling inconvenient	37	29	10	3	33	9
Cost too high	3	2	—	23	—	9
To buy a house	—	2	—	26	—	9
Change in family status	—	5	—	3	—	—
Must leave	27	—	35	—	—	—
Other	14	23	27	26	44	27
<b>NUMBER OF RESPONDENTS WHO WANT TO MOVE</b>						
	79	56	48	31	9	11

TABLE 7 — FACTORS ASSOCIATED WITH DECISIONS TO MOVE<sup>a</sup>

(Italic figures indicate percentages)

	FINALLY WITHDREW			FINALLY MOVED IN		
	First Accepted	First Rejected	Total	First Accepted	First Rejected	Total
1. NUMBER OF CHILDREN						
Median	1.8	1.9	1.9	3.1	3.7	3.2
2. FAMILY TYPE						
Percent Standard (Spouse and wife living in family)	73	68	70	76	89	79
3. PERCENT LEGALLY MARRIED (Standard family only)	51	68	61	67	76	70
4. PERCENT OF FAMILIES WITH ADDITIONAL ADULTS	22	25	24	12	14	12
NUMBER OF FAMILIES	64	105	169	127	28	155

<sup>a</sup>Source: M. Hillspough, G. Breckenfield, M. Colcan, The Human Side of Urban Renewal (N.Y.: Ives Washburn, Inc., 1960).

families to be more socially aspiring. See Table 8. Others are desperately needing of public support. Older people worry most about immediate needs.<sup>36</sup> Almost 90% of those moving would prefer finding their own shelter to accepting the public housing but their financial status is such that they have no choice.<sup>37</sup> See Table 9.

Average rent in the 4 story public housing complexes (caserios) is \$14 per month. Slum units average \$22 per month, but tenants are often far behind in payments. Average slum apartments have smaller rooms and are more crowded than caserios.<sup>38</sup> In a recent survey, 65% of those living in slums liked it, while only 22% preferred public housing. Slums were considered by most of those interviewed to be better places to rear children than public housing.<sup>39</sup>

That crime rates have been unaltered, indicates that conventional public housing is not influential in social terms.<sup>40</sup> Neighborhood solidarity is the elusive key to successful relocation. Though new neighborhoods may be given added political respect, public housing is most disliked

<sup>36</sup> Ibid., p 47.

<sup>37</sup> Ibid., p 65.

<sup>38</sup> A. Hollingshead and L. Regier, op. cit., p 238.

<sup>39</sup> Ibid., p 240. See also infra, p 62.

<sup>40</sup> W. Hillepaugh, G. Breckenfeld, and M. Colean, The Human Side of Urban Renewal (N.Y.: Ives Washburn, Inc., 1960), p 223. See also R. Torres, "City Master Plan Almost Set", The San Juan Star (Feb. 2, 1970), p 1.



TABLE 8  
SOCIO-ECONOMIC STATUS OF FAMILIES<sup>a</sup>

(Italic figures indicate percentages)

	SLUM DWELLERS			PROJECT TENANTS	MOVERS	
	General Sample	Stage I	Stage II		From Slums	From Projects
MEDIAN FAMILY INCOME	\$1357	\$1312	\$1675	\$776	\$1207	\$1460
EMPLOYMENT STATUS OF HEAD						
Regular & full-time	68	68	58	54	58	81
Irregular and/or part-time	17	14	19	27	25	13
Unemployed	15	18	23	19	17	6
HOUSEHOLDS WITH MORE THAN 1 INCOME RECEIVER	56	64	58	39	67	50
HOUSEHOLDS WITH NON-WORK INCOME	42	52	48	52	58	19
EDUCATION OF HEAD (Mean grade)	2.76	3.64	3.46	3.42	3.66	3.50
OCCUPATION OF HEAD						
Semiprofessional, managerial, clerical	1	20	8	4	25	25
Skilled & semiskilled	43	30	46	29	33	50
Stand owners, lottery salesmen (marginal)	17	10	10	8	—	19
Service, laborers	25	22	13	40	25	—
Unemployed	14	18	23	19	17	6
NUMBER OF HOUSEHOLDS	69	50	48	48	12	16

TABLE 9 — GENERAL ATTITUDES TOWARD HOUSING PROJECTS<sup>a</sup>

(Italic figures indicate percentages)

	SLUM DWELLERS			PROJECT TENANTS	MOVERS	
	General Sample	Stage I	Stage II		From Slums	From Projects
DO YOU THINK IT IS A GOOD IDEA TO BUILD HOUSING PROJECTS?						
Yes	74	84	81	92	78	95
No	26	16	19	8	22	5
WHAT ELSE DO YOU THINK THE GOVERNMENT SHOULD DO TO IMPROVE HOUSING?						
Improve economic conditions	12	6	2	—	17	—
Give away houses	8	4	9	3	—	—
Build houses & sell on installments	25	21	30	33	39	19
Give loans & let people get houses	16	20	9	12	11	19
Give land & loans for building	3	4	1	4	—	5
Aided self-help	7	2	1	3	11	5
Give the land	10	14	22	11	17	24
Don't know	9	17	6	18	—	9
Other	10	12	20	18	5	19
Number of respondents	116	84	86	78	18	21

<sup>a</sup>Source: H. Millsbaugh, G. Breckenfield, and M. Colean, The Human Side of Urban Renewal (N.Y.: Ives Washburn, Inc., 1960).

because it is excessively large, unfamiliar, hard to find, and replete with traffic hazards.<sup>41</sup>

So long as families are rejected from public housing when their incomes rise above \$2,500, they have little incentive to improve their financial position, for to do so would sacrifice all public support. By eliminating the higher incomes from public housing, potential community leaders are lost.<sup>42</sup> An argument for government subsidies rests upon the premise that rent should depend upon ability to pay. If guaranteed rents are used to finance private construction, tenants could be housed in scattered buildings which avoid the stigma of "public housing".<sup>43</sup> About 400 units are considered the maximum public housing desirable in one place.<sup>44</sup>

Public housing commissioners impose harsh restrictions upon inhabitants and frequent inspections injure tenants' pride. Living standards of the controlling bureaucracy are incongruous with those of the tenants -- a distinction not so evident in slums. Loss of freedom is a major force: People are prohibited from building lunch counters, or any other form of commercial enterprise in the projects. They cannot board relatives, nor are they allowed to raise animals.

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<sup>41</sup>M. Millsbaugh, G. Breckenfeld, and M. Colean, op. cit., p 233.

<sup>42</sup>H. Franklin, loc. cit.

<sup>43</sup>J. Jacobs, op. cit., p 324.

<sup>44</sup>H. Page, Puerto Rico: The Quiet Revolution (N.Y.: The Viking Press, 1963), p 150.

In the slum, people help each other in emergencies and extend each other credit, but this kind of neighborhood solidarity is lost in the new projects. Feuding neighbors report each other to housing authorities continually.<sup>45</sup>

A questionnaire sent to housing authority commissioners by the National Association of Housing and Redevelopment Officials revealed that 35% of public housing families are female-headed, though there were few female commissioners. Nonwhites are also underrepresented on commissions.<sup>46</sup> The median annual income for commissioners was about 3 times that of the tenants. Fewer than 3% of the commissioners had ever lived in public housing, and 57% spent less than 2 hours a week in this capacity. Many commissioners rejected families with severe problems from the projects. Most would like to see stricter enforcement of their regulations on the tenants "to prevent the project from deteriorating to another slum". Inertia within the Housing Authority obstructs advancement of the poor.

A new urban complex, San Juan Center, is scheduled for completion in 1985. The 1,000 acre site formerly housed 7,500 persons. A \$50 million Model Cities project is nearby, in Hato Rey. Stores within the complex were promised to members of the Popular Democratic Party, in power during development. Now the Statehood Republican Party wants to replace the commercial area with a community center. To get

<sup>45</sup> Back, op. cit., p 107.

<sup>46</sup> C. Hartman and G. Carr, "Housing the Poor", Trans-Action (Dec., 1969), p 49.

matching funds from the Federal Government, the planning has been rushed.<sup>47</sup> Much of the project will be devoted to 4,500 units of housing. Because of high rents, most residents in the new complex will be from outside the area, though social classes will be integrated to some extent.<sup>48</sup> Parks are included along with other community facilities, offices, shopping, and a plaza. Plans include a station on the proposed rapid transit line.<sup>49</sup>

A sequel to the Habitat structure built in Montreal has been designed by M. Saffie for San Juan.<sup>50</sup> Called "Habitat Puerto Rico", it too is expensive, at \$17,000 per 3 bedroom unit. (The cost is less per unit than the Montreal design because of the greater scope of the project -- 800 units on 20 acres -- and technical refinements.) Though "Habitat" presents no new solutions to social problems, some physical design elements are of interest: The site is a steep hill left vacant by other developers. Community facilities are combined with offices at the crest, where the view is best. The project is being developed by Fomento Cooperative with Federal subsidy. Most units will be cooperatively owned, but low-income families will also be included. With the subsidy, rent for these families will be \$95 per month. The purpose of building rather expensive apartments for low-income families is probably to

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<sup>47</sup>M. Suarez, "Local Dispute May Paralyze Model Cities", The San Juan Star (Feb. 27, 1970), p 1.

<sup>48</sup>"Huge Residential Community Planned for San Juan", The New York Times (June 4, 1961), sec. VIII, p 16.

<sup>49</sup>G. Ortiz, "'Blind' to Make Cester's Housing", The San Juan Star (March 30, 1970), p 28.

profit those responsible for construction, though Pomento Cooperativo should benefit from the extra income at public expense. Financing falls under sec. 221 (d) 3 of the National Housing Act. A factory will produce as many as 3 box-type sections per day. Construction will be in phases and continue for several years.<sup>51</sup>

#### Mutual Aid

When government and private enterprise together cannot help the poorest families another approach is required such as mutual aid, a concept finding roots in the barn raisings of American pioneers. In a variation, self-help, each family builds its own house unaided. This technique has proved quite successful in rural areas. The Government may provide utilities at the junction of 4 lots, and families move their old houses or build new ones nearby.<sup>52</sup> "Packet houses", consisting of materials and instructions for families to build their own houses are sold by the Government. Supervision is provided at low cost.<sup>53</sup> Centers have been located

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<sup>50</sup>T. Eavis, "Architect Designs a San Juan Habitat", The New York Times (Aug. 4, 1968) sec. VIII, p 1.

<sup>51</sup>"More Saffie", Architectural Design (Jan. 1969) p37.

<sup>52</sup>B. Taper, "Profiles -- A Lover of Cities I", The New Yorker (Feb. 4, 1967); p 39.

<sup>53</sup>T. Izquierdo, personal interview, Syracuse, N.Y., March 9, 1970.

throughout the island where men can learn to read plans and build with the packaged materials. Over 10,000 3 room houses built this way cost \$450 each.<sup>54</sup> Owners pay \$15 down and \$3.50 per month for 10 years on an interest-free loan.<sup>55</sup> They are organized in rural communities of about 30 families in each. Participants post "Labor Bonds" of \$5.25, and receive a cement mixer, demountable forms, and transportation. Latrines are built for \$15 each.<sup>56</sup> In laying out these settlements, water lines are installed first in order to be available for mixing cement.<sup>57</sup>

In a solution for steeply sloping sites, concrete prefabricated septic tanks are set into the hill-side, forming terraced platforms. A sanitary sewer connects tanks on the same level of the slope. Families build houses on these terraces using prefabricated panels. Even a roof may not be necessary at first.<sup>58</sup>

In a self-help project in Isabela, new wooden units will cost \$2,100 each, paid over 10 years. Workers build their own homes of seasoned lumber and are credited for the trade-in value of their old homes.<sup>59</sup>

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<sup>54</sup>L. Roberts and R. Stefani, op. cit., p 229.

<sup>55</sup>E. Hanson, Puerto Rico -- Land of Wonders, op. cit., p 91.

<sup>56</sup>R. Phillips, "Self-Help Works for Puerto Rico", The New York Times (April 15, 1962), sec. VIII, p 1.

<sup>57</sup>"Water Lines Give Puerto Rican Town New Lease on Life", The New York Times (Sept. 15, 1963), sec. VIII, p 1.

<sup>58</sup>J. Casasco, "Slums of Hope and Despair", Americas (June, 1969), p 13.

<sup>59</sup>"C.R.U.V. Awaits Surinam Delivery", The San Juan

Some mobile units have been built of steel for use in the urban fringe areas. Their cost in quantity would be \$70 per square meter.<sup>60</sup> Because these structures would last 40 years, long term maintenance might justify the initial high cost. (Ordinary mobile homes with wood frames last only 7 years.)

The San Juan Planning Board must approve plans for new housing to assure that they include community facilities and construction of high standards. Unfortunately, many communities look like Levittown. A more diverse approach is required to meet the variety of human needs for shelter and community life.

Self-help concepts can be used successfully in the city: A prototype mutual aid development, San Jose, was constructed in 1945.<sup>61</sup> It houses 30,000 and includes a community center. Whole houses were moved there by squatters.

At near full employment, self-help is impeded because specialists in the construction trades are far more efficient. In high density areas, advantage may be taken of specialization if families are organized to work on each other's houses. Group loans have a better chance for repayment than those made to individuals. Urban construction

Star (April 7, 1970), p. 3.

<sup>60</sup>"House of Many Parts", Architectural Forum (Nov., 1967), p. 78.

<sup>61</sup>p. Calcerreda, Housing in Puerto Rico Under the Mutual Aid and Self-Help Programs (San Juan: The Commonwealth of Puerto Rico, 1960), p. 32.

generally requires more exacting standards than rural housing.

At El Embalse, 12 large families raised \$10,000 to cover construction expenses. Some new materials were purchased centrally at a saving, and delivered as needed to avoid theft.<sup>62</sup> Cement was the major cost (30%) though new insular plants might reduce this factor. A savings society created during construction was preserved afterward for maintenance. The project took a year to complete.

In 1958, 10% of the new units produced in San Juan were of mutual aid construction.<sup>63</sup> Areas to be developed were chosen by the Government. With this approach, families use their time productively to supplement resources. Thus they can increase property without necessarily expanding income, and neither savings nor consumption need be sacrificed. Even if mutual aid cost as much as private construction, the fact that it requires less initial capital makes it more easily implemented. Families do not necessarily build houses they will inhabit for an extended period, for mobility to find better jobs must not be curtailed. Workmanship is best when workers do not know which house will be theirs, and houses are drawn by lot.<sup>64</sup> Superior workmanship improves marketability. In England, mutual aid projects have been distinguished by above average workmanship due to the great pride of workers in helping themselves.<sup>65</sup>

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<sup>62</sup>G. Hanson, Puerto Rico -- Land of Wonders, op. cit., p 292.

<sup>63</sup>R. Corrada, et al., Self-Help and Mutual Aid Housing (San Juan: Commonwealth of Puerto Rico, 1960), p 4.



The more the house is prefabricated the less time it takes to build, and attention should be paid to the ratio between material and labor costs. Prefabrication can improve morale and motivation by shortening the work time per house.

In another type of mutual aid housing, families purchase cores -- the central part of the house standardized to include basic shelter and plumbing facilities. By mass producing this most costly segment of the house, construction costs are reduced and work done by families is simplified. In 1957, cores cost the Government \$2,500 each, while public housing was built for \$9,000 per unit. The cooperation of municipal authorities in providing paved streets, sidewalks, and public sewers gave a core housing project at Juncos the character of a private suburban development.<sup>66</sup> (Simpler cores used at Juncos cost only \$1,000 each.) Families later add to the cores by their own designs. Materials needed to complete a home might cost an additional \$500.<sup>67</sup> In another prototype development in Puerto Rico, core units were changed so much in 6 months that they were no longer recognizable.<sup>68</sup> When Government aid to core housing projects is great there should

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<sup>64</sup>Ibid., p 5.

<sup>65</sup>R. Corrada, "The Place of Self-Help and Mutual Aid in the Total Housing Program", op. cit., p 97.

<sup>66</sup>Calcerrada, op. cit., p 17.

<sup>67</sup>C. Abramo, Housing in the Modern World, op. cit., p 166.

<sup>68</sup>Ibid., p 179.

be public control over resale of these units, even after improvement.<sup>69</sup>

Social workers have been successful in educating people as much as 3 years ahead in the proper use of new and unfamiliar facilities.<sup>70</sup> Children often teach parents how to manage new types of housing.<sup>71</sup>

Mutual aid families are organized by financial situation, condition of existing housing, knowledge of construction methods, availability, compatibility, and their motivation for rehabilitation. Families must sign contracts promising that they will work the required number of hours, attend preconstruction meetings, build only the prescribed housing at first, and build together in the same area. They must be responsible for maintaining their homes.<sup>72</sup> Workers can hire professionals for particularly difficult parts of the construction such as wiring, plumbing, and excavating. Work is done in stages so that all units are kept at the same level of completion -- families cannot move into their homes until all are ready. Otherwise, finished families may not want to keep working.

Requiring an equal number of hours work per participant may not be wise in terms of preserving motivation

<sup>69</sup>Iden, Forbidden Neighbors, op. cit., p 169.

<sup>70</sup>R. Carrada, "The Place of Self-Help and Mutual Aid in the Total Housing Program", op. cit., p 93.

<sup>71</sup>Millsbaugh, op. cit., p 223.

<sup>72</sup>U.S. Dept. of Agriculture, Self-Help Housing for Low-Income Rural Families (Washington: U.S. Govt. Printing Office, 1967) p 5.

among the better workers. A principal objective is to stimulate people to develop their individual human potential; in this regard mutual aid is directly allied to the "Operation Bootstrap" concept. Further, mutual aid is a permanent solution while public housing is intended to be temporary.<sup>73</sup> In the long run, investment in people is better than investment in houses; in time of emergency, workers will retain useful skills and self-confidence. Farmers trained this way in construction can find employment during the agricultural off-season.<sup>74</sup>

In one San Juan project, prospective inhabitants spent 3 days a week working on their houses, and eventually lost wages from their regular jobs.<sup>75</sup> Clearly, construction should have taken advantage of more technical aids such as prefabrication. Other problems experienced with urban mutual aid by the Puerto Rico Planning Board were: (1) Getting families organized for a project proved quite difficult, (2) There were excessive administration requirements, (3) When special machinery was purchased, costs were higher than originally anticipated, (4) Lack of experience resulted in poor workmanship.<sup>76</sup>

With faith these problems can be overcome through

<sup>73</sup> Calcerrada, op. cit., p 31.

<sup>74</sup> Page, op. cit., p 108.

<sup>75</sup> C. Abrams, Housing in the Modern World, op. cit., p 170.

<sup>76</sup> R. Corrada, "The Place of Self-Help and Mutual Aid in the Total Housing Program", op. cit., p 19.

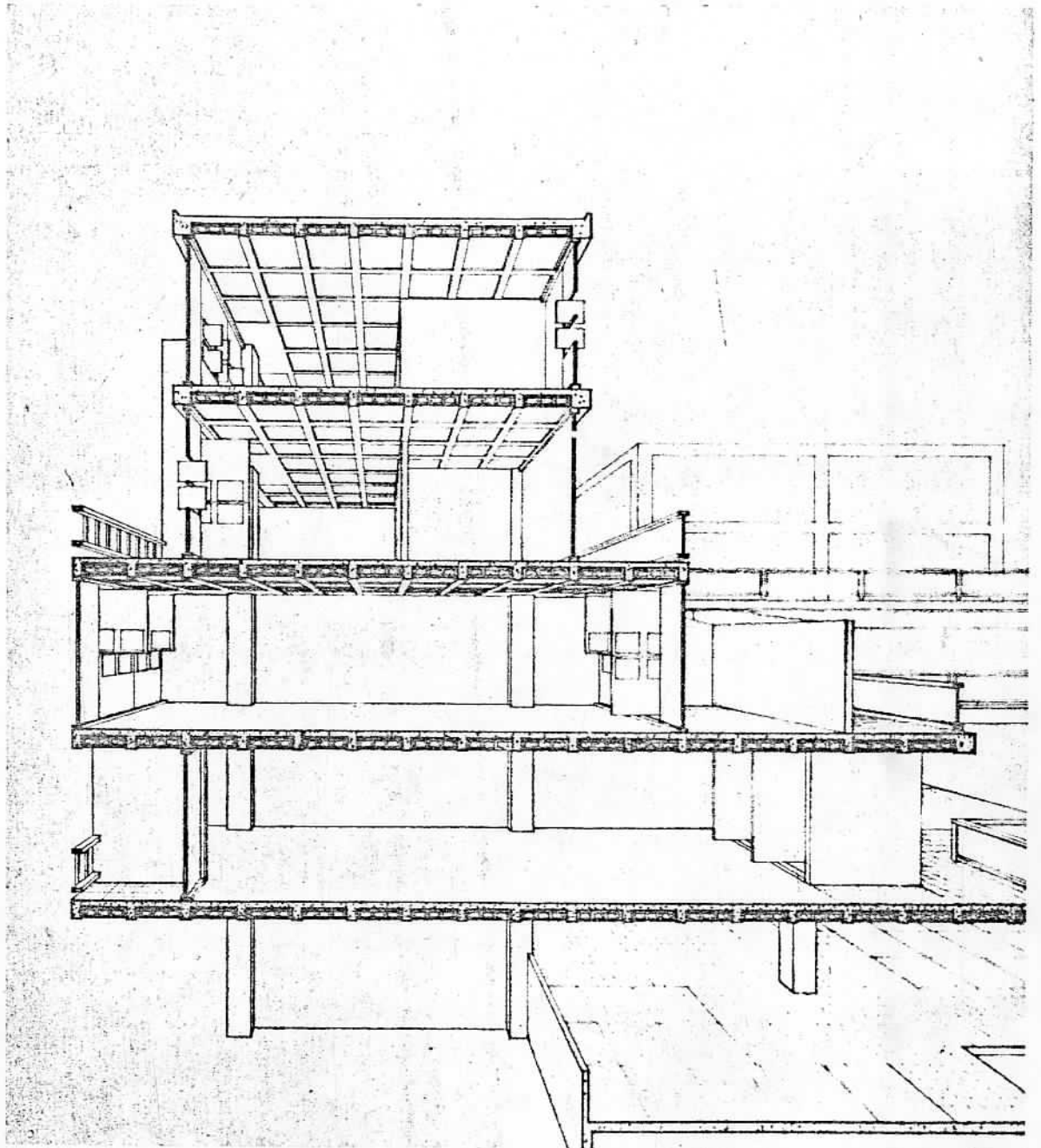
greater awareness by planners of relevant social issues, and extended administrative experience acquired with time. Some construction methods do not require special machinery and minimize the training needed by workmen. (See supra p 48.)

Condominiums so popular in Puerto Rico offer certain advantages: The Government retains ownership of the land to prevent abuse of low-income people by speculators. Where densities are too high to permit the building of single-family detached houses, mutual aid could be used for multiple housing: A design for such housing won the 1968 award in Progressive Architecture magazine. The complex, La Puntilla, would be built on filled land opposite Old San Juan from La Perla and would eventually replace it. The site is presently replete with slums and empty warehouses.<sup>77</sup> Though the structural concept is not radical, it is intended to be easy to maintain; a 2-way poured-in-place concrete slab with infill of native hollow clay tile will contain utilities. See Fig. 6. Concrete block is used for walls between units and around utility cores. Partitions supplied by tenants could be of plywood or material from their previous homes, to render a theme of diversity within unity.<sup>78</sup> The designs by J. Waampler of C.R.U.V. include 400 units and many public facilities. The ground floor would open into plazas of various sizes. Low-cost units will rent for \$18 per month. Other apartments would be sold as condominiums for \$15,000

<sup>77</sup>"Progressive Architecture's Fifteenth Annual Design Awards Program", Progressive Architecture (Jan., 1968) p 88.

<sup>78</sup>M. Koth, J. Silva, and A. Dietz, Housing in Latin

FIGURE 6  
CONSTRUCTION SYSTEM FOR LA PUNTILLA<sup>a</sup>



<sup>a</sup>Source: Progressive Architecture Magazine, (Jan., 1968), p 90.

or lease-purchase units, renting preliminarily for \$145 per month. A third of La Parla will be restored, with the remainder developed into a park.<sup>79</sup>

Puerto Rico has become a showcase for development of mutual aid housing; countries such as Brazil, India, and Nigeria, have sent over 10,000 observers to the island to see what is being done.<sup>80</sup>

Public housing has been designed and administered by an upper-middle class insensitive to the changing needs and values of low-income tenants. A more viable approach to housing the poor would exploit the most significant technical advance of recent times, mass produced prefabrication. Flexible core units would shorten the time required to build concrete houses by means of mutual aid. Other technical progress suggests the construction of frames supporting many such cores at densities dictated by future urban growth. The lowest-cost structural system so far developed, "Panel-Loek", should be employed in finishing living units. Planning for low-cost housing should utilize modern engineering in developing formerly unusable sites near low-income employment.

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America (Cambridge: M.I.T. Press, 1965), p 205.

<sup>79</sup> T. Donald, The Remaking of a Culture (N.Y.: Harper & Bros., 1959), p 10.

<sup>80</sup> Office of the Commonwealth of Puerto Rico, op. cit., p 36.

## V PROPOSED HOUSING PROGRAM

### Design Recommendations

A thorough examination of the manifold efforts, past and present, to assuage the housing crisis of developing societies has established that mutual aid is the single most viable approach. When conditions of a specific site indicate that a mutual aid solution is applicable, it should be implemented with all necessary force to overcome constraints prolonging the gross neglect of societal responsibility in sheltering the most needy sector. In addition to factors noted on p 70, other prerequisites required for successful mutual aid include available financing, adequate transportation to the site, and the designation of housing as a desirable land use on the municipal master plan. Material costs must be high in relation to labor costs.

Designs must reflect social values to make the best use of limited land resources and yet serve the growing population. These social values include pride of home ownership, and recognition of the priorities established by lower classes noted earlier. Mobility must favor the gradual rise in living

standards underway. (See JUNKE, p 44-5.) Planning control by a central authority is enhanced by a usufruct land title arrangement. In Canberra, Australia, a similar arrangement has caused land to appreciate rapidly.

Slums and squatter settlements should not be destroyed before relocation has been completed. As there exists a severe housing shortage it is irresponsible to demolish units no matter how bad they may seem to upper class planners, before we can assure the provision of housing that displaced people can afford. A 3% vacancy rate is the maximum that can be considered reasonable.<sup>1</sup> There are but 4 reasons to destroy a slum: (1) It is physically dangerous, (2) It is not worth repair, (3) Rents could not rise even if repairs were made, (4) The site is needed for public use. If communities must be displaced they should be moved together though some economic aggregation is desirable. By concentrating low-income families, mothers cannot find casual housework in nearby homes.<sup>2</sup> Location of inexpensive housing near employment is extremely important.

Housing design must consider both visible and latent functions for each space, as form is determined by the relationship between them. Riots have been caused by social inadequacies though physical climate was sound: In Kingston, Jamaica, such riots shattered the summer of 1966.<sup>3</sup>

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<sup>1</sup>C. Abrams, "Criteria for Urban Renewal", Architectural Record (May, 1962), p 155.

<sup>2</sup>R. Franklin, loc. cit.

<sup>3</sup>B. Brolin and J. Seisel, "Mass Housing: Social Research and Design", Architectural Forum (July, 1968), p 66.



Education and planning are not humanitarian until we want them to be: They can be devised to preserve the status quo, or drastically worsen conditions for subjects in order to enhance the controller.<sup>4</sup> Planners may try to be just, but be thwarted by the prevailing political climate, including the need to win Federal aid by following prescribed formats.<sup>5</sup>

### Governmental Financing

While Puerto Rico retains its economic and political ties with the United States, it is most reasonable to expect that the needed thrust to solve housing problems will emerge from that relationship. As evidenced by Federal spending in other sectors (notably military) the relatively small allocation to supply housing cannot be defended in economic terms alone. Political issues appear to be at the root of the observed disparities.

North American investors will quickly react to a chance to augment their own resources, however, and it is in this light that a solution may be found. Companies extending the very long-term loans already so popular may expect rich

<sup>4</sup>D. Gurin, "Key to the Villas Miserias", Nation (Oct. 5, 1964), p 199.

<sup>5</sup>C. Abrams, "Housing Policy: It Must Offer a Way Out of Despair", Architectural Forum (Aug., 1965), p 34.

rewards if rampant inflation can be controlled through use of a dynamic price index to calculate interest. As noted on p 37, this scheme has worked well in Brazil.

When such loans finance mutual aid construction, materials are provided at low cost to owners and labor is supplied by the inhabitants. Thus, there is a direct relationship between home ownership and the mobility of new personal savings resources. Government should back credit cooperatives rather than finance construction directly, as this would encourage the formation of local financing agencies that would persist beyond present usage, and encourage people to engage in long-term savings. Monthly payments should be kept as low as possible in line with the rent families paid for prior housing. If policies set forth here are carried out, the entire economy should benefit over the long term, as people invest in themselves as well as a tangible product.

#### Construction Implementation

The low rise frame incorporating utilities appears to be the best solution when density precludes a detached unit approach. The open frame serves as the core of mutual aid schemes discussed above. Elevators and cellars should be avoided for economy.

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Legal regulations applying to concrete-wood construction dictate that floors cannot exceed 500 square meters; the distance from each residence to the nearest exit cannot be greater than 33 meters, and any floor larger than 400 square meters requires at least 2 exits.<sup>6</sup>

Structures should be built to support additional stories that will be necessary when the land appreciates sufficiently. Densities can be higher than U.S. standards; perhaps up to 45 families to the net acre.<sup>7</sup>

Unfortunately, the more advanced the building technology, the more uncertain the cost equation; no advanced structure can assure livability when social issues have been ignored by design. Unique housing styles can segregate a class of people forced to live in a distinguishing manner. Any distinct segregation of classes is liable to cause serious fiscal and political disparities.

Though technological research is being executed rapidly, any substantial cost breakthrough has yet to be seen. More effort should be directed toward perfecting conventional techniques in view of the growing severity of the housing problem.

In an attempt to find ways of lowering the costs of public housing, the School of Architecture at Pratt Institute found that interior corridor plans are the least expensive, though difficult to design.<sup>8</sup> A solution allowing

<sup>6</sup> Puerto Rico Planning Board, Building Regulations (San Juan: By the Planning Board, 1968), passim.

<sup>7</sup> K. Lynch, Site Planning (Cambridge: M.I.T. Press, 1962), p 145.

apartments to have 2 exterior walls for through ventilation requires corridors on every third floor. The cheapest acceptable construction encompasses a concrete frame with regularly placed columns, concrete block walls, and exposed concrete floors. Ceiling heights need not exceed 8.25 m. Rooms can be small because Puerto Ricans prefer to spend as much time as possible enjoying the healthy outdoors. Living rooms could double as bedrooms. Little can be done to lower the cost of electrical wiring, as appliances should be minimized. Copper was found to be the cheapest material for prefabricated piping, in view of maintenance, and plumbing would be run above the floors in a loop vented system. Most fixtures could be reduced in size from the standard.<sup>9</sup>

Other design features that can materially improve housing without necessarily raising the cost include: exterior sunshades, pitched roofs covered with a reflective substance, tall spaces for maximum insulation and air circulation, and single ply wood partitions within units.<sup>10</sup> Openings can be left under roofs to allow passage of hurricane winds. Units should be sited to catch cool breezes. Grading can be minimized by placing structures on widely spaced piers. Recessed terraces can shade occupants from afternoon heat. Horizontally louvered windows should be used throughout.<sup>11</sup>

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<sup>8</sup> School of Architecture, Pratt Institute, Methods of Reducing the Cost of Public Housing (N.Y.: N.Y. State Division of Housing, 1967), p. 3 at passage.

<sup>9</sup> V. Szplowin, "The Realities of Puerto Rico's Housing Problem", San Juan Review (Feb., 1966), p. 8.

<sup>10</sup> J. Bailey, "Building a Better Tenement", Archi-

Steps to be followed in the execution of such a project are as follows: (1) Design an inexpensive unit to satisfy the needs of the families involved, (2) Design a supporting structure to accompany these units on a specific site, (3) Mass produce construction components in factories hiring formerly unemployed workers, (4) Assemble these components, tools, and instructions into packets, (5) Establish centers where packets can be purchased, financing arranged, and guidance made available for construction.

Mutual aid is the most viable approach to housing the poor when conditions noted on pages 70 and 75 are found. New construction methods discussed on p 47-56, especially the low-cost "Panel-Block" system, should make mutual aid more practical than in the past. In high density areas, a concrete frame should be constructed in the manner of La Puertilla, discussed on p 72. Units would be finished and inhabited by poor families before their former homes in the slums and squatter settlements were destroyed.

U.S. lending institutions should provide "seed loans" as noted on p 35 to encourage the development of insular savings institutions, in line with the "Operation Bootstrap" program.

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textural Formas (March, 1966), p 68. In the case of multiple housing, concrete block walls are still necessary between apartments.

1968), p 60. <sup>11</sup>"Cool But Not Costly", Architectural Forum (July

## VI CONCLUSION

This investigation has demonstrated that the poor are willing to help themselves and would profit from a provision of expertise in fulfilling their own goals to improve the environment.

Housing must reflect social as well as physical needs, including: (1) the need to feel an important part of urban society; (2) the need to acquire education or skilled training so as to rise in social stature within new classes based upon these determinants; (3) the need to practice frugality because of greater opportunity to gain wealth in the city; (4) the need to have existing neighborhoods recognized and preserved in relocation; (5) the need for construction that is sensitive to a life style reflecting cultural heritage and climate.

Further study should reveal a more detailed explanation of these needs but at this time, it is apparent that home ownership resulting from actual aid allows satisfaction of these needs more consistently than any other approach investigated. Housing patterns must reflect not only political power within the community, but a more just order. Only then can this "Showcase of Democracy" inspire developing societies throughout the world to attack their housing crises as survival demands.

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