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OFFICE OF HOUSING

SQUATTER SETTLEMENTS AND HOUSING POLICY

Experiences with Sites-and-Services in Colombia

by

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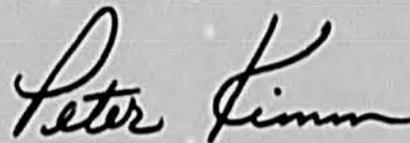
Dear Colleagues and Friends:

As we enter into the 1980's the Office of Housing is entering its third decade. The Office continues in its commitment to the proposition that it should be possible for all to have a roof overhead, a clean place to live, and access to potable water and other services in this century. The key direction is one which features realistic solutions for everyone, rather than unrealistic ones for the few.

We are pleased to present this initial volume of the Office of Housing Occasional Paper Series. We anticipate a quarterly publication in the hope that we may share our views and those of our colleagues with you.

We are gratified for our initial paper to present a work by Dr. Edward Popko now at Harvard University. We have enjoyed our collaboration with Dr. Popko. This work on sites and service policy has provided us with an excellent opportunity to share and exchange views on that subject. It is in this spirit of sharing and cooperation that this paper is issued.

Sincerely,



Peter M. Kimm
Director
Office of Housing

to my wife Geraldine

Abstract

The current sites-and-services policy used for government housing projects in Colombia evolved from previous attempts to lower housing costs through industrialization and aided self-help techniques. This new policy closely resembles the housing processes found in progressive squatter settlements where families build their own homes over long time periods. Since 1970, international development agencies have further encouraged the use of sites-and-services in larger and more numerous projects. In 1973 planning authorities in the capital city, Bogota, passed legislation to allow sites-and-services to be used by private developers and serves as a model for a national housing policy.

Both government and private developers in Bogota experienced initial success with sites-and-services, but then applications for new projects dramatically declined and homeowner investment in existing ones slowed. Inexpensive land that could be serviced was harder to find, core house construction was more expensive than anticipated, and projects were not reaching the low-income families planners had hoped to house. Project planners believe that future projects would be less expensive and reach more low-income families if they built smaller lots, eliminated core-houses and reduced initial infrastructure levels still further.

This research analyzed one slum upgrade and two sites-and-services projects to see why recent projects have failed to meet planners' expectations and to see if the postulated policy changes are likely to improve future projects. Several construction and investment processes were observed that seriously question the effectiveness of the suggested policy changes.

Income earning is often as important as shelter for the owner and his family. From 20% to 30% have planned their homes for apartment rentals, store fronts, small warehouses or manufacturing. Additional rental units are housing up to 30% more families in projects than authorities originally believed. However, building for earning income does delay construction while owners stockpile additional material and accumulate more capital.

Renters are younger, have smaller families, and have incomes similar to the owners. Thus projects did not reach lower income groups through renting. It is likely that renters are even better off than owners because they have the same incomes at earlier points in their lives.

Owners tend to make rational home investment decisions and are well aware of general rent levels, house prices, and the comparative costs of buying into a squatter settlement or

pirate barrio.

Although self-help construction has produced dwellings with four and five stories of rentable units, owners build only to the extent that marginal revenues from rents (at their time preference) exceed the marginal costs for adding additional units. The magnitude of renting and income earning through the dwelling has been systematically underestimated because government records tend to monitor mortgage holders -- the original beneficiaries -- and not dwelling occupants as census does.

Owners generally build their provisional shacks themselves. Materials are relatively cheap when compared to labor costs. This process reverses though when permanent materials are used. Owners tend to contract structural pieces like masonry walls, columns, and tie beams and then finish the interior work themselves. Although self-help construction implies that owners build their homes themselves, in most cases, owners are actually managing the building. Owners with salaried incomes show higher tendencies to hire contractors and build quickly than owners whose income is on an hourly or piece work basis. Construction skill is not a reliable measure of a family's potential to benefit from self-help type housing. More reliable measures seem to be managerial skills and wage type (salaried or hourly).

Eventual housing cost is not as important as the form of payment when potential owners compare government offerings to illegal alternatives. The surveys from three projects suggest two types of low-income families that do not invest. Some simply speculate on the rising land values and high demand for government units. Others do not invest because of double rent. This occurs when they are already paying the maximum mortgage payment on the vacant lot. They can not get enough capital surplus to begin construction and therefore must also pay rent to live elsewhere. Double rent complicates project administration because corrective policies tend to be mutually exclusive. Forcing owners to invest eliminates undesirable speculators but it also eliminates desirable families with double rent problems. Subsidizing households alleviates double rent but also increases speculator profits and decapitalizes projects accordingly.

Housing starts in sites-and-services projects appear to be decreasing at the same time starts in pirate barrios are increasing. Although initial environmental quality is low, lots are almost twice the size and half the cost as authorized government projects. Government projects have not lowered housing costs or increased revenue producing land uses by increasing the efficiency of infrastructure layouts and land parcelling. Recent legislation has only lowered initial requirements.

In view of the observed housing processes, the postulated policy changes are not likely to make future sites-and-services projects

more effective because they tend to reduce owner's income and increase their housing expenditures. Decreased lot sizes will reduce the owner's income earning potential, and eliminating core units will increase the instances of double rent.

An alternative set of capital programs is proposed that can better achieve policy goals by recognizing the dual purpose of homeowner investment. Polarizing plot offerings, reversing assignment-income practices and reducing project scale will make future projects more competitive with illegal housing alternatives. Projects should offer large vacant lots with high potential for income earnings and small plots with habitable core units. Small lots with cores should be targeted to lower income families while large vacant lots be targeted to higher income families. This policy is the opposite of the current practices that assign lots with partially built homes to high-income families.

Future projects will require systematic information on market conditions which are likely to change during project implementation. Project design will center around subdivision, selection of beneficiaries and readjustment of technical assistance once projects begin. Projects must have adequate information flows on the market characteristics outside the project and on design configurations given various objective functions and cost trade-offs. Applicants for projects will continue to outnumber what governments can provide. The problem of selecting beneficiaries will be first to determine which families are admissible and then to decide which type of family will benefit the most from the two kinds of lots.

Acknowledgments

Colombians have taught me most of what I know about architecture and planning in developing countries. Their warmth, creativity and entrepreneurship have always prevailed. I hope this research records in a small way some of what makes Colombia and its people great.

I have learned a great deal about building a home from the families in the barrios where I worked over the years. The Pulido family -- Otilia, William, Oscar, Nubia, and Jaime -- were my best teachers. Together they have built three houses in succession. They began with a cardboard shack when they joined an invasion in 1963. They replaced it with a larger, more substantial bamboo shack by 1969. Today they have a three-story brick house and rent rooms to other families. This research is about the transition they and others have made.

Getting started and sticking to a consistent line of inquiry were my biggest problems in conducting this research. Professors Lisa Peattie, Horacio Caminos and Don Schon, and my wife Geraldine, succeeded in helping me to do both, and created a spontaneous, natural climate for learning. From each I learned something very special. Lisa taught me how to listen to what people say -- they really do know how the housing system works. Horacio's work showed me the power of step-by-step cumulative research. He has come closer than anyone I know to applying the scientific method to urban dwelling environments. Don convinced me that an adequate description is at least half the solution of a problem. The metaphors one uses do matter, because they encourage the transfer of insights from one context to another. Geraldine taught me the value of straight and simple writing. This research is a tribute to her intellectual interest and to the power of a paste pot and a Xerox machine.

All the case studies in this research were projects of Bogota's Popular Housing Bank (Caja de la Vivienda Popular). Arqa. Elssye de Alacla and Soc. Laureano Gomez from the Social Investigation Unit spent considerable time reviewing their projects for me. Dr. Climaco Rodriguez, the unit director, was very generous in giving me access to internal project records. I hope these findings will be useful to them as they plan future projects.

I have followed the physical change of barrio Las Colinas for almost 10 years. It was not until I met Sister Miguel, the director of Social Work of Barrio Las Colinas, that I had any appreciation of the richness and depth the barrio's social evolution. I want especially to thank her for providing me with the census data that led me to discover the dual, shelter-income earnings role of housing.

I particularly want to thank Philippe Annez for the many hours of constructive debate about home investment in developing countries. If there is a shred of economic insight in this research, it can be attributed to him. Reinhard Goethert of the MIT Architecture faculty, has also been very helpful and has generously supplied me with many case histories and comparative data on developing countries.

Over the years, many people have offered me friendship and support that have been invaluable assets in seeing this research through. Among those who offered encouragement and advice were Kathy Hall in Bogota, Urban Studies graduate students Keith Stevenson and Brian Blaesser, Professor Thomas Willemain, and Allan Schmidt, Director of the Laboratory for Computer Graphics and Spatial Analysis at Harvard University. And to Sarah Jeffries for her editorial assistance.

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This research reflects the author's opinions and in no way reflects official policy or the endorsement of the Caja de la Vivienda Popular or any other government agency. Whatever errors may exist are my responsibility alone.

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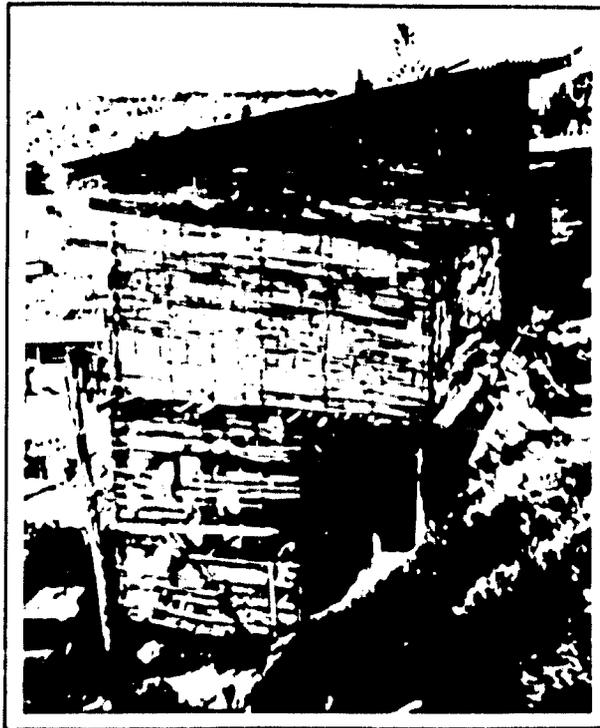
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Chapter 1
Squatting and the Low-Income Housing Problem



A great deal of what is known about squatter settlements results from deliberate institutional attempts to formulate housing policies for them. The earliest views of the slum were diagnostic-prescriptive; the slum was a cancer in the city; its growth must be stopped and its presence eliminated. Early housing policies attempted to do away with the slum altogether. Most of these attempts have failed, because slums were more integrated into the urban economic, political, and social system than had been thought. After trying to build complete houses for the poor, officials recognized that they made up a labor force that could further reduce costs by implementing government projects. This required close supervision and good plans for people to follow, as well as collaboration from settlers if projects were to succeed. Unfortunately, most of these conditions could not be sustained on a large scale. More recently, officials have observed that many slums progressively evolve into high-standard housing with a minimum of institutional intervention. This occurs when settlers have certain tenure, employment, and service delivery conditions. Based on these observations, officials attempted to lower housing costs still further by turning over all design and construction responsibilities to the dweller.

This newest policy, called sites-and-services, is similar to the self-help model of the progressive slum. The main focus of planning is now on legalizing land ownership, developing public services, and providing building credit. According to the policy, governments make capital investments that basically stimulate private sector investments in housing. There is an implicit prediction about what beneficiaries will build, based on what was observed in the progressive slum. After numerous projects in dozens of countries, the observed results, however, have differed frequently enough from what was expected. The assumed relationship between public and private investment is now in doubt. This chapter briefly reviews the low-income housing situation in Colombia, and the evolution of policies that have led to sites-and-services. What is interesting about this evolution is the fact that policies are more and more like the development processes found in squatter settlements that the former policies tried to eliminate.

SQUATTING

In 1950, 40% of Latin America's 161 million inhabitants lived in cities, while the remaining 60% were farmers thinly dispersed in rural areas. Within the next ten years, these percentages began to reverse; by 1960, 48% of the population lived in cities; 52% in the country. This reflected an urban growth rate of 64%. In 1975, the continent's total population exceeded 290 million, with

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57% in urban centers of more than 2000 people. (1)

Before 1930, Buenos Aires was the only city of one million. By 1950, Mexico City, Rio de Janeiro, Sao Paulo, Havana, Lima, and Santiago had been added to the list. Ten years later, Recife, Bogota, Caracas, and Montevideo had also reached a million. In 1970, 16 cities had reached a population of one million or more, and by 1980, at least ten more will have done the same. The International Labor Organization has predicted that Mexico City will be the world's largest city, with 32 million persons by year 2000; that Sao Paulo, Brazil will have 26 million, and Bogota, Colombia will triple in size to over nine million people by that time. (2)

Until the natural growth rate of cities took over, migration was the single most important cause of growth of Latin American cities. Studies repeatedly show that the most important reason for migration to cities is economic improvement. In most Central and South American countries, there is a large rural-urban wage differential. Even when there is high urban unemployment and modern sector jobs are not likely to be created fast enough to accommodate them, migrants come to the city. They know that they will eventually be better off than their rural kin.

Migration studies in Colombia, by Joan Nelson and William Flinn, show that communication with friends or family already living in the city is the most common way migrants learn of potential destinations. Migrants often rely on these contacts for help until they get established. (3) (4) Flinn's study also shows that migrants to Bogota's slums are as likely to be from a city or from towns over 2000 population as from rural areas and that migrants come relatively short distances (under 200 miles) from neighboring states. He states that migrants are not all campesinos, but that many are young men who have made several

(1) Summary calculations made from Table A. In Kingsley Davis, World Urbanization 1950-1970 Volume I: Basic Data for Cities, Counties and Regions. Berkeley: University of California, 1969., pp. 64-69.

(2) "ILO: Mexico City to be World's Largest." Boston Sunday Globe. 29 October 1969, Sec. A, p. 77.

(3) Joan Nelson. "Sojourners versus New Urbanites: Causes and Consequences of Temporary versus Permanent Cityward Migration in Developing Countries." Economic Development and Cultural Change. 24(July): 721-757.

(4) William Flinn. "The Process of Migration to a Shantytown in Bogota, Colombia." Inter-American Economic Affairs 22(Autumn, 1968): 78-88.

smaller moves before. (1) Thus migration is not simply a peasant escape from agriculture and violence in the countryside as was previously thought. It is a rational, purposeful search for better economic conditions.

Migrants have characteristics that are important to the urban housing problem. When migrant income is compared to locational patterns, the less affluent settle immediately in center city rooming-houses. These apartments, or inquilinatos, used to be older town mansions until they were subdivided, resubdivided, and rented at exorbitant profits to accommodate four to ten times their original number of occupants. Inquilinatos were effective reception areas because they provided access to center city service sector employment without long term commitments to leases. Both are necessary prerequisites for housing when finding work requires mobility. Today, inquilinatos are less effective because the buildings are being replaced by more expensive office and commercial space, and their access to the center city is less important as cities decentralize service sector jobs.

More affluent migrants, and those unable to find cheap rooms in inquilinatos, move to squatter settlements where they pay rent. Migrants will rent until they have found stable jobs and begin to raise families. At this point they are culturally oriented to urban living, integrated into at least the informal economic sector. They begin looking for housing they can afford, or land on which they can build. Public and commercial sector housing has been almost nonexistent for low income families. Government housing agencies, hard hit by inflation, high administrative costs, and rising urban land prices, have not met more than about 2% to 3% of the low-income housing demand in Colombia. Privately contracted housing has been even less accessible because units cost are almost 30 times above rental thresholds. Faced with these realities, many urban poor resort to illegal housing for their families: they become squatters themselves.

Squatting is a logical consequence of the explosive population growth within a city, and has a profound effect on the city's physical, economic, and social development. According to a conservative estimate, it provides shelter for more than 30 million people in Latin America alone. It accounts for about one-fourth of all housing in Latin America, and in certain cities three-quarters of all human dwellings fall into this category.

Squatting is as much a problem as it is a solution. It has contributed to urban sprawl, and preempted government planning. It has also achieved housing for the very poor; and channeled individual and community energies into productive self-help.

(1) Ibid., p. 81

Squatters evoke images of desperately poor people living in shacks on steep slopes overlooking the city, or along the highways in its peripheries. There are images of violence, crime, broken homes, and political radicalism. The truth, of course, is different. Generally conservative, squatters form tightly knit family groups looking for ways to become home owners.

Almost every country in Latin America has its own term for squatter settlements. The most common are tugurio, barriada (not to be confused with barrio, which means neighborhood), favela, barrio pirata (pirate neighborhood), paracaidista (literally meaning parachutist, or one who drops in from the sky), invasion, and casas brujas (witch houses). These Spanish words, descriptive as they are, do not recognize that many squatter settlements improve and immense self-help takes place. The slum, in fact, is often a transitory phenomenon in a continuum of upward mobility. These words do, however, identify several important characteristics of squatting: illegality of tenure, disregard for governmental processes through individual action, and a commitment to build a dwelling without proper services or without regard for environmental standards.

In a pioneering study of the world's housing problems, Charles Abrams has categorized squatters according to the form of tenure they hold. The most common are owner, tenant, landlord, speculator, semi-, and invader squatter. The owner squatter owns his shack but not the land; he erects the shack on any vacant plot he can find, public lands and those of absentee owners being the most prized. The tenant squatter pays rent to another squatter. His goal is to advance to squatter ownership. A landlord squatter is usually more established, and has rooms or shacks to rent. Speculator squatters consider squatting a business venture: they expect the government, rightful owner, or even a new "owner" to pay them to move off the property. The semi-squatter has clandestinely built his shack on private land, and subsequently comes to terms with the owner but continues to ignore local building regulations. An invader squatter is part of a group that, after the invasion, will join the rest in protecting the property against intruders, both private and public. (1) In Colombia, these tenure classes are broadly aggregated into two general squatter settlements or tugurios: invasion and pirate barrios.

(1) Reworded and edited. In Charles Abrams. Man's Struggle for Shelter in an Urbanizing World. Cambridge: MIT Press, 1964, pp. 21-22.

Invasion Barrios

Invasion barrios are the most dramatic of the squatter settlements. They are outright seizures of land by an individual acting independently, or by a large number of people acting through an invasion promoter. Some invasions are rooted in political demonstration, such as the invasions of Centro Pro Vivienda in Colombia. Others are purely business ventures. Some are prompted by the landowner himself. He will sell plots on land not likely to be approved for such use, capture a low-wage labor pool, and even collect additional tribute from the government for damages suffered. In Cali, Colombia, it is believed that a large invasion, later called El Rodeo, was arranged by the owners of the flood plain where the invasion took place. Knowing that the city would not approve any plan for residential subdivision (the cost of utilities would be too high), the owners arranged for an invasion organizer to steal plans from the Municipal Planning Office and to sell plots to prospective invaders. After the invasion, the owners petitioned INVICALI, a low-income housing agency, to indemnify them for their losses. Through INVICALI, each family was required to pay the owners in order to get official title. The owners had now collected twice for the same parcel of land -- once through their invasion promoter, and again through INVICALI. The double payment scheme brought the price well above the market value for the land, because the city did most of the collection and legal work for them.

The best-documented invasions are in Peru. Case reports often use paramilitary metaphors to describe how squatters organize in anticipation of official and private reaction. Target sites are reconnoitered, lots often staked out beforehand, and invasions timed to occur when the landowner or the police are least able to counter. Often several "ripple attacks" are required to overcome police sieges or to rebuild torn-down beachheads. (1) Police may cordon off the site permitting people only to leave. Since persons attempting to enter would be arrested, invading families often bring sufficient supplies to survive a siege of several weeks. Invaders often recruit old people, women, and children to help out, because police will not generally attack them.

In Colombia, invasions follow one of several general strategies. If a few families are invading, they try to attract as little attention as possible. They attempt to negotiate directly with the landowner for some kind of agreement to sell the land. At least they request permission to remain in exchange for some kind of service, such as work, or guarding the land against other squatters.

(1) Barrio El Rodeo in Cali, Colombia was totally burned to the ground 11 times, but the invaders persisted until they finally won out in 1968.

An alternative strategy uses techniques similar to the Peruvian cases, and tries to popularize the desperate housing situation and the lack of governmental concern for the people. City officials are usually forced into a compromise between the invaders and the landowner. The former is required to make at least token remuneration for the land. He must agree to some form of community organization and control for carrying out public works projects, administering technical assistance and loan programs, as well as maintaining environmental and health standards. When hundreds, and sometimes thousands, of people invade, their sheer numbers, together with the support of sympathetic press, militant university students, and sometimes opposition groups, assure success in getting land.

According to Colombian law, invasions come under a set of codes that relate to "complication of the process of eviction with the passage of time." (1) From the beginning, invasions on either public or private land are under the jurisdiction of "public order" and the municipal police. They continue to be solely a public order problem for the first thirty days. If the police do not manage to evict within this period, invaders cannot be evicted by force without individual subpoenas from a civil judge. Since the legal entanglement requires time, invaders usually stay, because new families are attracted to successful invasions and often double or triple the original invasion size. Ironically, not only do new invaders decrease the danger of eviction. They also complicate future attempts to upgrade the settlements' services and legalize tenure, because they were not part of the original invasion plan.

Colombias' Civil Code protects squatters' rights with the "passage of time." Articles 2528 and 764 of the Civil Code state that living on the land for twenty years is sufficient to qualify for title. Families often save very detailed receipts from utilities and construction materials to accumulate proof that their time has been served.

Most of the significant invasion settlements in Colombia were started in the late 50s and early 60s. The growth rates in cities of 200,000 or more were at their highest. (2) Many vacant, small sites were still available adjacent to center city service employment. The land - swamps, tidal basins, or steep slopes - was not considered buildable, but it was close to developed areas with schools and transportation. It was, in addition, possible to pirate water and electricity. Spectacular invasions such as

(1) Ramiro Cardona. Las Invasiones de Terrenos Urbanos. Bogota: Tercer Mundo, 1969, p. 75.

(2) Departamento Administrativo Nacional de Estadística (DANE). 8 Censo Nacional de Población: Resumen General. Bogota: Imprenta Nacional, 1967.

Siloe and El Rodeo in Cali; Barrios Juan XXIII, Las Colinas, and Policarpa Salavarrieta in Bogota; Barrios Candelaria, Boston, Fredonia, Olaya Herrera, La Magdalena, and Chambacu in Cartagena; and Barrios El Bosque, Carriza, Primero de Mayo, and Santo Domingo in Barranquilla, attracted researchers to find out more about invasions and the self-help process.

The primary function of the invasion is to secure land for housing. Land speculation is a secondary motive. John Turner argues that settlers' inability to qualify for loans, find government housing, or substitute non-monetary resources, are the main reasons that people resort to invasions. (1) Even when families can afford it, they are reluctant to buy a house with a long-term mortgage, because the title will not be secure for years. Although invasion squatters do not possess legal titles they are unlikely to be challenged unless the land is very valuable. This is one reason that well-organized invasions often select public property and marginal land when development costs in the normal land market would be prohibitive. (2)

Case studies of invasion barrios have shown that the proportion of those rural migrants who invade has decreased over the past 15 years while the sons and daughters of first generation urbanites are making up the large proportion of invaders. Turner attributes shifts in historic squatter settlement patterns to the changing growth rates in the economy, and the population of cities. (3) In "early transitional cities" with low growth rates, settlements are often in the center city and inhabited largely by rural migrants. They tend to serve as reception areas for "bridgeheading" settlers when they are looking for jobs and becoming accustomed to urban life. As cities grow, the proportion of low-income migrants from smaller towns and pueblos grows. In this "mid-transitional city," low-income settlements are generally near peripheral industries, midway to center-city service employment. Squatters in these settlements usually work,

(1) John F.C. Turner. "Uncontrolled Urban Settlements: Problems and Policies." University of Pittsburgh Conference, Pittsburgh Pa., 1966.

(2) The Colombian invasion group Centro Pro Vivienda has changed its tactics over the last five years. They no longer pick sites near the mountains surrounding Bogota. Their full-time lawyers have found that the Sabana de Bogota has many abandoned or tax delinquent sites that are easier to build upon and not likely to be challenged by the police. Their last three invasion barrios, Nuevo Chile, Clas, and Soacha, used this new technique.

(3) John F.C. Turner. "Housing Priorities, Settlement Patterns and Urban Development in Modernizing Countries." Journal of the American Institute of Planners. 24(November, 1968): 341-363.

even if for minimal wages. If they also have threshold tenure, they undergo consolidation rather than bridgeheading development, and will substantially improve their homes and the infrastructure.

In Bogota, most of the available inner city sites (with the exception of several large, well-guarded sites owned by the Catholic Church) were occupied by the late 60s. In the "late transitional city," population growth begins to level off, and there is a gradual decline of invasions and increased participation in pirate barrios. Turner's pioneering model of how squatter settlements form, was based on initial field work in Peru in the late 50s and early 60s. Other researchers such as Anthony Leeds, William Mangin, William Flinn, Lisa Redfield Peattie, and Orvill Grimes, have broadened squatter research to include a wide variety of developmental circumstances.

Recent work by Georges Vernez shows that in the case of Bogota, the center city is beginning to lose its unique receiver and stepping-stone functions for migrants. He argues that: 1) although migration to cities is decreasing, Bogota's natural growth caused an excessive demand for cheap rental houses that could not be satisfied fast enough by conversion of old center city mansions into high-density tenements and cheap hotels; 2) the supply of cheap inner-city housing was constrained by the low residential mobility of those dwellers occupying that stock; and 3) the change in land use in the center city from residential to commercial and office uses, has led to a growing predominance of the pirate barrio as the principle form of illegal housing in Bogota and other large Colombian cities. (1)

Unlike other cities in Colombia and even Latin America in general, Bogota has had relatively few invasions. While invasions account for 5%, 16%, and 22% of the population of Cali, Barranquilla, and Cartagena respectively, it is less than 1% in Bogota. (2) Vernez speculates that Bogota is unique because: 1) it has a scarce amount of public or low-value land, 2) the police and army have been efficient in removing or arresting would-be invaders, and 3) Bogota's climate, at 9000 feet, is cool and rainy year-round, requiring a more substantial commitment to the first invasion hut, and low-income families may be reluctant to make this investment given the high probability of removal. (3)

(1) Georges Vernez. "The Residential Movements of Low-Income Families: The Case of Bogota, Colombia." New York: New York City - Rand Institute, 1973, pp. 4-10.

(2) Jaime G. Valenzuela. "Barrios Populares en America Latina." In Ramiro Cardona (ed.), Migracion y Desarrollo Urbano. Bogota: Asociacion Colombiana de Facultades de Medicina, 1970, p. 208.

(3) Georges Vernez. "Pirate Settlements. Housing Construction by

The pirate barrio has become an important alternative to invasion barrios.

Pirate Barrios

Pirate barrios differ from invasions. In most urban areas, governments try to control the subdivision of land for residential construction with zoning ordinances that reflect the planned expansion of the city. Pirate barrios appear when landowners subdivide and sell building plots without prior permission from city authorities. Because of the high demand for housing sites, people are willing to buy land and construct houses with the hope that the city can be coerced into providing the required services. Basically what happens is: 1) lots are purchased from a person who has conventional title; 2) some "color of title" is given to the purchaser, often in the form of an installment contract with a promise of recordable title at the end of the payment period; 3) division of the property has not been approved by the proper authorities, hence the word "pirate"; 4) urban services (water, electricity, sewers) required in conventional subdivisions are partially or completely lacking; and 5) housing built by purchasers is without required permits. (1) Thus, pirate barrios are formed by legal transactions of land at market prices, but are developed by illegal construction that is sometimes below standard, and without services before construction.

Not only do pirate barrios preempt the government's planning authority, their developers reap substantial profits that could more than pay for the water, sewage, and power connections that reasonable profits to spare. Instead, they start large developments and abandon them, leaving the new owners to coerce services from the city.

Two published reports recently estimated the magnitude of pirate barrios in Bogota, where the phenomenon is the most common. Georges Vernez in 1970, estimated that 45.3% (204,182 families out of 451,000) of the total families of Bogota live in pirate barrios. This contrasts with only 1.1% of the families in Bogota that live in invasion barrios. (2) A second study in 1972, by

Incremental Development and Low-Income Housing Policies in Bogota, Colombia." New York: New York City - Rand Institute, 1973, pp. 7-8.

(1) William Doebele. "The Private Market and Low-Income Urbanization." The American Journal of Comparative Law. 25 (No. 3): 542.

(2) Georges Vernez. "Bogota's Pirate Settlements: An Opportunity for Metropolitan Development" (Ph.D. dissertation, University of

the Departamento Administrativo de Planeacion Distrital in Bogota, estimates that 38.4% of the total area of the Special District of Bogota is illegal, and that 59% of this area is a direct result of pirate barrios. (1) Although both studies report their statistics differently and were done at different times, one can state that at least half of Bogota's population lives in illegal barrios. More recent estimates indicate that this percentage is increasing, and that 70% of all new housing, starts are now illegal. (2)

As a result of the World Conference on Human Settlements, Habitat-76, The ICT undertook an inventory of subnormal housing in the major cities of Colombia. They found that when invasions and pirate barrios were combined, 61.2%, 46%, 10.9%, and 36.2% of the housing stock in Barranquilla, Cali, Medellin, and Cartagena were subnormal. When the top 69 cities were included, 695,012 houses, or 44% of 1,586,030 units, illegally house about 4,952,165 persons. (3)

Pirate barrios differ from invasions in other ways. Most dwellers are neither as poor as invaders, nor as desperate. Most private landowners retain titles to the plots and dwellers are particularly aware of the consequences of defaulting on payments. Settlers usually do not have the initial social cohesion to organize against land speculators that invaders do. Often, they fear losing their investments if they default or complain to authorities.

Families who buy into barrio piratas often suffer abuses from landowners. The most common of these have been: 1) changing the total price of the lot by increasing down-payment, monthly payment, or the number of total payments; 2) selling lots that overlap each other, are located on public ways, or have already been sold to another buyer; 3) not delivering promised utilities

California, Berkeley, 1973), p. 24 and pp. 188-191. Also, Jaime Valenzuela. "La Estructura del Mercado de Vivienda en Bogota y la Magnitud de la Actividad Constructora Popular." Economia Colombiana. 93 (Junio, 1972): 8-21.

(1) Departamento Administrativo de Planeacion Distrital. "El Mercado de Tierra en Barrios Clandestinos de Bogota." Bogota: Departamento Administrativo de Planeacion Distrital, 1972.

(2) J. D. McCallum. "Bogota: Urban Development Realities and Plans." Geneva: World Employment Program, International Labour Office, 1975, p. 26.

(3) Instituto de Credito Territorial. Inventario de Zonas Subnormales de Vivienda y Proyectos de Desarrollo Progresivo. Bogota: Instituto de Credito Territorial, 1976. Tabulations from unnumbered city summaries.

such as sewerage, streets, and water taps; and 4) failing to complete contracts to sell the lot or to turn over the deed after receiving full payment for it. (1)

Government officials often make two arguments against pirate barrios: 1) they perpetuate a land-use pattern that is inefficient because the capital costs for services are always higher when houses are built before infrastructure, and 2) the growth of pirate barrios leads to poor construction standards and low environmental quality.

Land speculators make considerable profit by creating pirate barrios. However, they have generally been aware that making subdivision plans reflecting surrounding densities, and respecting street and block patterns of neighboring barrios, will increase the possibilities that the city will eventually provide full services. In terms of the first condition, these facts show that pirate barrios are significant improvements over the ad hoc planning often found in invasions.

In Colombia, as in many other developing countries, there are no financial mechanisms to capture the savings of low-income families, and to redirect money to more productive investments. The second argument claims that provision of public services increases more rapidly in pirate barrios than in other types of housing. It often follows that the relatively low-density pattern of the one- and two-story homes built through self-help, over-extends basic services and creates long-range maintenance problems for the city. Preliminary studies do not substantiate this argument. Densities are close to prescribed levels, and quality often exceeds government-produced units. (2) Housing units themselves, and the overall urbanization patterns, seem unlikely sources of planning difficulties.

(1) Losada Lora, Rodrigo and Hernando Gomez Buendia. La Tierra en el Mercado Pirata de Bogota. Bogota: Fundacion para la Educacion Superior y el Desarrollo, Junio, 1976, pp. 137-145.

(2) Departamento Administrativo de Planeacion Distrital. "Mercado de Tierras en Barrios Clandestinos de Bogota." Bogota: Departamento Administrativo de Planeacion Distrital, 1972, p. 75. "Cuadro No. 20 Tamano de Lotes Regularizados en Urbanizaciones Clandestinas de Bogota."

Summary

The most important forms of illegal housing in Colombia have been invasion and pirate barrios. In both cases there is an illegal, often clandestine, process that incrementally develops housing stock over long periods of time, perhaps as long as 10 to 15 years. The two are similar to the extent that families are consolidating their positions and channeling their investments to build new housing. In both cases, homeowners must have minimum guarantees of tenure and employment to continue building. The dwelling, be it a cardboard shack or a partially constructed brick house, is fully occupied before completion of the final structure. The incremental development is a gradual housing investment, a form of forced savings. The house becomes a hedge on inflation, and an opportunity to diversify income through renting and small businesses. Although the term self-help is used to describe the construction process, surveys indicate that very few people actually build their own houses. Families do spend considerable time stockpiling construction material, contracting bits and pieces when they can, and doing the lighter interior finish work. Construction is essentially self-financed with no savings and loan mechanisms to support it. Perhaps the most important overlap is that the total decision process for determining design, rate of construction, and finally, maintenance, is made by the dweller/occupier himself, rather than the government.

COMPETING WITH SQUATTING

Squatting creates a dilemma. On one hand, low-income families have made substantial improvements in both their homes and community environment through self-help. There is no doubt that they have built affordable housing, offered alternatives to large-scale welfare programs, and created assets that can be productively included in cities, tax bases. Community action programs, outgrowths of community spirit and organization, often develop to a high degree in squatter settlements, and create a mechanism for mobilizing and focusing self-improvement. On the other hand, squatter settlements cause problems for city authorities. They place unscheduled demands on urban services, sometimes block necessary public works projects, and perpetuate a tradition of planless urban sprawl. Even minimal planning could vastly increase initial health standards, and avoid starting urban layouts that make future services impossible or costly. In some cases, squatters develop land that might be better used for something else, or not developed at all. This is particularly true in cities where available squatting sites are already occupied, and prime agricultural land is becoming the target for future sites.

When 44% of the urban housing stock for the top 69 cities in Colombia is classified subnormal, it suggests that the housing

policy has not been particularly effective. Policies have ranged from unsuccessful attempts physically to eliminate slums by bulldozing or burning them, to a laissez faire permissiveness toward them. There is no single solution to squatting. It is instructive, however, to see what institutions have learned about low-income families and the housing system by trying to formulate policies and programs for them. It is surprising how early policies that viewed squatting as a negative phenomenon, are now using it as the model for new policies.

Technology Transfer Policies

Some of the earliest low-income housing policies 15 to 20 years ago saw the slum as a completely negative phenomenon, one that should be eliminated by providing the poor with low-cost housing units. Housing shortages were thought to be the reason that low-income families could not obtain housing at prices they could afford. Planners thought that shortages were caused by bottlenecks in the production process, by the lack of central management control, by insufficient capital mobilization, and by inadequate market organization. They assumed that subsidizing the capital, running costs of public housing, freezing rents at below market levels, or creating artificially low-cost repayment schemes would solve the problem.

Technology transfer solutions to public housing were particularly common in the late 50s and throughout most of the 60s. Significant research and development work was done at agencies such as the Inter-American Center for Housing and Planning (CINVA) sponsored by the Organization of American States. This international agency, in conjunction with national housing agencies such as Colombia's Territorial Credit Institute (ICT), was responsible for the training of hundreds of architects, planners, and engineers in the problems of prefabrication, project management, construction, new building materials, and overall design of suburban developments.

In Colombia, the ICT began production of public housing in 1956. From 1960 to 1975, it built 105,319 units all over the country. (1) The ICT Annual Reports from 1975 to 1977 show that the total production of housing "solutions" has steadily increased each year, from 33,095 to 54,129 units. However, the proportion of low-cost solutions each year, has steadily decreased from 44% in

(1) Jacques Mosseri. "La Vivienda Como Factor del Desarrollo Urbano: Hacia una Nueva Politica de Vivienda." In Ramiro Cardona ed., Migracion y Desarrollo Urbano. Bogota: Asociacion Colombiana de Facultades de Medicina, 1970, p. 263.

1975, to only 29% in 1977. (1) This industrialization program was one of the most substantial in Latin America. After almost 20 years of attempts to increase the production of low-cost housing, only 3% to 8% of the demand had been met. Government housing had failed, not because it was less attractive (the ICT received 40 to 60 requests for each dwelling it offered in 1970), but because the total resources allocated from the national budget were so small. The ICT and similar agencies in other countries, continue to operate, but they serve mostly middle-class families.

The philosophy behind the industrialized approach was partially correct. The housing industry functioned under its capacity, was in bad need of management, and lacked funds. Technology transfer managed to reduce the cost of finished units but, unfortunately, not enough to make a difference to squatters. The units were still two to five times above low-income rent thresholds, while commercial sector housing was almost 30 times more expensive. (2)

What happened? Why did industrialization not work for housing when it worked for so many other consumer goods? Policy planners did not realize that even the most optimistic projections for cost reduction and production increases would not be enough. Invasions and pirate barrios would still remain the only options for prospective homebuilders. The low-income housing market simply did not act the same way other markets did. Detailed cost analysis of government housing shows that significant portions of the final cost of a unit goes into administration, contractor profits, and labor. Squatters generally avoid these costs altogether. Industrialization did more than add to them: it created an economic system that excluded those systems more common to slums, i.e., small-scale contracting, second-hand, or indigenous building materials, and local small-scale industries. Government housing not only competed with the squatter's basic ability to build for himself, it promoted high-image, ready-to-move-into projects, with unrealistic standards. Families were often disoriented by single-family living, especially if they had been previously renting in *inquilinos*.

(1) Production totals and low-cost unit percentages calculated by combining sites-and-services with minimum solutions and combining basic, intermediate, and maximum solution categories for each reporting year. Data sources: Instituto de Credito Territorial Informe 1975, Informe 1976 and Informe 1977. Bogota: Instituto de Credito Territorial, 1975, 1976, 1977. Unnumbered charts entitled "Realizaciones del ICT" for the corresponding year.

(2) Georges Vernez. "A Housing Services Policy for Low-Income Urban Families in Developing Countries." Ekistics. 242(January): 8-14.

(3) See John F.C. Turner. "Housing Issues and the Standards

(3) When low-income families were deliberately recruited for projects, their unstable income streams could not sustain uninterrupted loan repayments. Eventually, wealthier families took over many projects as low-income families were forced to sell and return to *inquilinos*, invasion, or pirate barrios.

Technology transfer policies have generally delivered housing units as total finite packages. Their success is often measured by lower construction costs, increased production rates, rapid recovery of investment costs, and the replication of housing schemes at other sites. Retention of low-income target groups is rarely a goal if it jeopardizes recuperation of capital costs or project implementation. Projects assume complete control over the housing design, construction sequence, and sometimes even maintenance. Generally, people move in only when the dwelling unit or subdivision is completed. Time for development tends to be short (one to three years), with high emphasis on rapid cost recovery. Recipients tend to be risk-free clients who can demonstrate ability to pay.

This approach contrasts sharply with the squatter process. Here the owner/dweller develops a house over a long period of time (about 10 to 15 years) on a do-it-yourself, pay-as-you-go basis. The family lives in the home, and may obtain income by renting rooms, operating small shops, or even by creating small-scale industries. Much of the second-hand building material and labor in squatter settlements is provided within the economic system of the settlement itself. Housing investments remain flexible subject to priority spending for food, education for children, clothing, or sickness. The basic achievement of technology transfer policies has been to lower the cost of housing rather than to create low-income housing.

Aided Self-Help Policies

As squatting continued to grow, planners started to realize that the total design-and-build approach was not the right one. Policy makers were caught in a double bind. On one hand, if squatting was ignored, it created serious long-range growth and service delivery problems. On the other hand, official attempts to provide even minimal shelters were failing. It was necessary to retain the standards of public housing and at the same time significantly reduce the costs. Governments wanted to avoid policies that artificially wrote off costs by using non-recoverable subsidies or transfer payments to low-income families. The idea of aided self-help emerged, in which labor costs and contractors' profits in public housing could be largely

Problem," for a concise statement of the conflicts between planning with limited resources, and the use of housing standards to control environmental quality.

eliminated by using the client's labor as a substitute resource.

Aided self-help projects are less common to Colombia but have been used extensively in Peru, El Salvador, Bolivia, and several non-Latin countries. Essentially, approved applicants are pooled into teams to build several homes for themselves and others. They may build the entire unit, roofs only, or basic bathroom-kitchen units. The future owner is basically an unpaid labor source. Project management, dwelling unit design, building construction, and all materials are controlled and specified by the housing agency. Costs are lowered by decreasing the initial outstanding principal on the eventual mortgage the home owner pays.

Much of the experience and research developed for the industrialized schemes were transferred to aided self-help. Essentially, subdivision layouts, infrastructure systems, home designs, and construction techniques were transferable with appropriate concessions to the skill level of clients and available materials. Many innovative prefabricated core-houses designs, and construction techniques such as the CINVA-Ram block, making machine, and soil-cement were developed. Although aided self-help did manage to achieve partial cost reductions, this approach was unable to eliminate the need for vast initial capital investments such as infrastructure, or the high administrative costs associated with such detailed supervision.

Aided self-help is a step in the right direction. The dweller can move in during construction, he can develop his housing unit over a long period of time, and finally, he can reduce the costs through his own labor. Although the plan involves user participation before the housing stock is completed, it still carries over many of the paternalistic and dysfunctional relations present in technology transfer approaches: design and construction are still dictated by the government.

Owing in part to the dominance of architects in government housing agencies, it was assumed that the solution to the housing problem lay in the dwelling unit itself. The high political imagery associated with "building for the poor" reinforced the architects' commitment to physical housing design even when squatters had already demonstrated that they were capable of doing better by themselves. But the squatters were missing something more basic. In addition to better-paying jobs, they needed land that was near employment sources, a guaranteed land tenure scheme, basic infrastructure, and loan programs to accelerate their own building. Case studies of invasion and pirate barrios show that with even minimal thresholds in these areas, families could and would make long-term capital investments to build their own homes.

Sites-and-Services and Upgrading Policies

Faced with increasing housing deficits, government officials began to consider more fundamental policies that would raise environmental standards in settlements, and regain control over planning new housing. Within the past five years, two different but related policies have emerged that show great promise: sites-and-services and upgrade.

Sites-and-services policies are primarily aimed at restoring formal planning control over zoning, residential building, and subdivision layout that have been eroded by squatting. They are concerned with future housing stocks. Sites-and-services policies vary greatly, but all attempt to stimulate owners to build by increasing the supply of serviced lots, credit, and technical assistance. Programs support urban land banking, savings and loan plans, infrastructure, and technical assistance to stimulate home building. Policies tend to emphasize family consolidation, long-term development, self-help construction, and community formation. Success is measured by reduced subsidies to the poor, decreases in squatting, high rates of construction using permanent materials, increases in health and environmental standards, retention of the low-income population, and priority consumption (food, health, education, and clothing), as well as diversity in income and capital formation. Unlike technology transfer and aided self-help, home design and construction are determined, within certain limits, by the owner/dweller himself. In this sense, sites-and-services is very much like the squatting development we have already seen.

Upgrade policies are primarily concerned with legalizing and renewing existing settlements and are the bases for much of the urban land reform legislation. Policies are usually directed toward making vacant urban land developable. In addition, they legalize existing squatter settlements where there has been de facto ownership of the land. These are areas where squatters have not had sufficient confidence in tenure to risk major capital improvements in their houses or infrastructure. Legalization is important because the limbo status of settlements prevents them from receiving services from the city such as trash collection, fire and police protection, paving and storm drainage, sewers, and water connections. Although most settlements pirate electricity and water (usually paid for by a central metering point and barrio bill-collecting committee), public works agencies will not provide full services without official recognition of the settlement. (1) The city also sees

(1) Before the passage of Acuerdo 22 of 1963, Bogota's public agencies were prohibited by law to supply illegal barrios with services. Medellin, Colombia passed a municipal ordinance (Acuerdo 83 of 1964) authorizing the city to extend water and sewerage services to any dwelling unit in the city regardless of

legalization as an important way to bring the settlements under the control of existing building codes and health standards, and to receive revenue for services they may, in fact, already be delivering. Land tenure programs sometimes accompany sites-and-services programs where the former may cause displacement of settlers because of changes in land use, redensification, or public works projects. Tenure may range from complete ownership of the land to rights to build, lifetime ownership, or 99-year leases. Land tenure programs tend to be evaluated in much the same way as sites-and-services programs are.

A Closer Look At Sites-and-Services

The idea behind sites-and-services is simple. Governments purchase large areas of land, prepare them for building, install starter infrastructure, and sell plots to qualified home builders. In this respect, the policy resembles the pirate barrio. In much the same way as squatters had previously done, families erect temporary shelters, gradually replacing them with more permanent structures over 10 to 15 years. The essential differences between squatting and sites-and-services are guaranteed tenure, immediate infrastructure that improves health standards, and sometimes, loans for small businesses or building materials. Mortgages are usually paid off in 15 to 20 years, and builders have rights to sell their properties before this time, or use improvements as collateral for other loans. In theory, residents should be able to increase the value of their property as a hedge on inflation, diversify their incomes by renting rooms and space for small businesses, or use their property as a stepping-stone investment to obtain other housing. In Colombia, municipal legislation now permits private developers to build sites-and-services projects. (1) Project specifications are basically the same as for government ones.

Sites-and-services changes the basic role of planners; the final housing unit that was the focus in technology transfer and aided self-help approaches, is now under the control of the dweller. This shift introduces a new level of unpredictability about what settlers will do in response to government programs. Planners establish suburban layouts, reserving amounts of land for lots, schools, parks, commercial, and other communal uses. Individual lot sizes, proportions, and locations within neighborhoods are

legal title, but fully legalized settlements always have priority in capital improvements programs.

(1) Agreement 20 of 1972 and subsequent Decrees 1259 and 1260 of 1973 in Bogota enable private developers to establish minimum standard urbanizations with progressive capital improvements for public utilities.

determined from overall target densities, efficiency of infrastructure, desirable variances in lot prices, levels of initial utilities, and particular advantages lots may have for combined commercial uses. Essentially, the government is involved in land banking for acquiring the required land resources, capital improvements programming, screening applicants, enforcing codes, and collecting for public services and land payments. Generally settler selection is based on their ability to pay, although projects may draw from special pools of applicants, such as municipal employees or disaster victims.

Selecting settlers has become a problem in itself. Some project administrators point out that settlers must prove their capacity to make regular payments by showing stable employment or other financial potential. Applicants may be required to open savings accounts for a year for this purpose. The accrued savings is applied directly against the principal of the loan, thus lowering the outstanding mortgage. Loan defaulting is a serious threat to sites-and-services schemes. An effective collection system is important in maintaining sufficient cash flow to allow the project to be replicated at other sites, and to insure that complete utility connections can be made to each house.

The basic idea behind sites-and-services is not new. Small scale projects were implemented in Puerto Rico as long ago as 1935, in Uganda in 1950, and in Kenya in 1955. United Nations housing experts had recommended similar approaches for Liberia and Somalia in the late 50s and early 60s. (1) Colombia had attempted sites-and-services as long ago as 1958. What is new, however, is the encouragement this approach is now receiving from governments. This includes the international development agencies for large-scale use as an alternative for technology transfer and aided self-help approaches.

Although Colombia has no national sites-and-services policy, Bogota has developed municipal legislation to develop one. (2) In addition, the ICT provided about 12,000 plots nationwide through its Minimum Urbanization Program during the mid 60s. An additional 35,000 sites were developed with the urban sector assistance loans from the United States Agency for International Development (AID) in the early 70s. (3) The International Bank

(1) Grindley, William and Robert Merrill. Sites and Services: A Preliminary Study of the Experience and Relevant Issues. Washington: International Bank for Reconstruction and Development, Special Projects Department, 1971.

(2) Agreement 20 of 1972, Decrees 1259 and 1260 of 1973 provide the legal framework for sites-and-services in the Special District.

(3) United States Agency for International Development.

for Reconstruction and Development (World Bank) has underscored the importance of sites-and-services approaches by recently adopting it as their official loan and technical assistance stance for countries seeking help in low-income housing. (1) Table 1.1 suggests the importance of slum upgrading and sites-and-services projects by showing the World Bank's commitment in 15 countries. (2)

"Urban/Regional Sector Loan 514-L-063 1972 Performance." Bogota: United States Agency for International Development, Table II-2, 1974, p. 7

(1) World Bank. Housing Sector Policy Paper. Washington: World Bank, May, 1975.

(2) Abstracted from "Bank-Assisted Basic Urbanization Projects." The Urban Edge. (1, 1) p.5.

Project Experiments

In 1972, the World Bank formally adopted sites-and-services as its official loan and technical assistance outlet for new low-income housing and squatter upgrading. In 1974, the United States Agency for International Development (AID) began to incorporate sites-and-services programs into its mortgage guaranty program for developing countries. Since 1972, the Bank has assisted in about 149,000 new home sites, and upgraded 742,000 squatter plots in 17 countries, with loans exceeding 1029 million dollars. Although AID does not compile statistics country by country for sites-and-services -- the mortgage guaranty program does not use congressionally appropriated funds -- it is estimated that 30% of all its guaranties since 1974 were made for this purpose. Typical projects by both the Bank and AID have involved from 5000 to 7000 plots, with several exceeding 10,000. To date, a total of 26 countries have experimented with sites-and-services; most consider these projects to be prototypes to more permanent national programs. Although the Bank has become the main patron of sites-and-services, the combined Bank-AID emphasis has made it the most important low-income housing policy for developing countries in the past 10 years.

COUNTRY	\$US M	DATE	DESCRIPTION
Malaysia	72.0	7/72	Sites-and-services for 1400 households and 150 businesses; squatter upgrading for 2100 households and; creation of a sites-and-services unit for the Kuantan Urban Project.
Senegal	22.0	9/72	Project includes preparation of 14,000 sites in Dakar and 1600 in Thies, and criteria study for slum improvement in Dakar.
Nicaragua	30.0	6/73	Provision of 5900 lots serviced with individual connections; sanitary and shelter core units and industrial sites-and-services for employment generation.
Jamaica	45.0	5/74	The project consists of 6000 serviced lots, related infrastructure, and community facilities; sanitary core and shelter units, materials fund for self-help construction; and upgrading of two existing squatter settlements.
Botswana	44.4	5/74	Project includes preparation of about 800 sites-and-services plots and 1000 traditional plots; and upgrading of squatter areas affecting 1000 households.
Tanzania I	17.6	7/74	The project consists of about 8700 new serviced plots in three cities and improvements to basic services in existing squatter settlements totaling nearly 10,000 households.

Table 1.1 Bank-assisted basic urbanization projects.

COUNTRY	\$US M	DATE	DESCRIPTION
El Salvador	15.5	11/74	Development of 18,000 serviced lots in San Salvador and four secondary cities involving provision of water, sewer, drainage, unpaved streets, footpaths, and optional electricity at two service levels. Provision of building materials loans to expand core units, off-site infrastructure, and community facilities.
Indonesia	152.0	9/74	Improvement of 5500 ha of kampung settlements with roads, footpaths, storm drainage, water, sanitation, primary schools, and health clinics.
Korea	25.0	1/75	The project consists of 1893 serviced plots and related community facilities in Gwangju, Mogpo, and Yeosu.
Zambia	41.3	12/74	Servicing of 17,000 dwellings in four squatter settlements; preparation of 12,000 residential plots, 7600 in three overspill areas adjacent to upgraded settlements; and 4000 in six sites designed for sites-and-services.
Kenya	29.05	5/75	Project consists of preparation and servicing of 6000 residential lots with individual water supply and sewer connections; construction of 6000 sanitary core units, trunk sewers, stabilization ponds, and access roads.
Philippines	65.0	6/76	Upgrading of Tondo foreshore area of Minilla with sanitation, infrastructure, health, education, and social services. Servicing of sites, in adjacent Dagat-Dagatan, construction of commercial/industrial sites and loans for cottage industries.

Table 1.1 Bank-assisted basic urbanization projects (cont.).

COUNTRY	&US M	DATE	DESCRIPTION
Peru	43.2	6/76	The project includes basic and productive support infrastructure - water, sewer and electrical networks, 7200 water and 11,300 sewer connections, 16,300 electrical connections, 86 Km of access roads, and 5 health centers.
Ivory Coast	122.3	12/76	Project includes 380 ha of slum upgrading 70 ha of sites and services, community facilities, low cost housing programs, housing credit, two trunk sewers, and technical assistance.
India	90.1	9/73	The project consists of 39 subprojects in water supply, sewerage and drainage, garbage disposal, environmental hygiene, transport, and area development.
India	52.0	4/77	Upgrading and 13,500 serviced sites.

Table 1.1 Bank-assisted basic urbanization projects (cont.).

In Colombia, sites-and-services policies evolved from earlier attempts to lower housing costs through industrialization and aided self-help techniques. By 1970, the national Territorial Credit Institute (ICT), and Bogota's Popular Housing Bank (Caja), recognized that very low-income families in squatter settlements were already building more housing, at lower cost, than those in industrialized, or aided self-help projects. Both institutions shifted their investment programs away from total design-and-build to upgrading and sites-and-services. An AID urban sector loan in 1971, and an International Development Bank loan for project assistance in 1973, provided the resources for early experiments.

The Caja and ICT together, implemented a successful upgrading in Las Colinas, a large invasion settlement. From this experiment, new urban legislation (Agreement 20) was passed to enable the city to negotiate capital programs in illegal settlements on a

wider scale, and use substantially lower utility standards. Agreement 20 and two subsequent laws, formalized upgrading and sites-and-services as policies at Bogota's District Planning Board. The Caja was authorized to implement a pilot project, La Manuelita, to pretest the legislation, and the feasibility of allowing private developers to build sites-and-services. The project was successful, resulting in a private development program and a new, larger Caja project, called Las Guacamayas. This was to house families displaced by a District Planning highway, and other public works proposed under Agreement 20. The highway project was subsequently defeated but the Caja was authorized to continue to make plots available with all four levels of capital improvements. Unlike Las Colinas and La Manuelita, this project was the first real test of selling plots on the open market and competing directly with illegal pirate and invasion settlements. In effect it was the first test of the market potential of organized self-help programs. The demand for solutions in Las Guacamayas was overwhelming, but it was opposite to what the Caja had built. Vacant pones could not be sold, and applications for ones with habitable core units were more than fifteen to one. The Caja responded by shifting capital programs in the second sector of the project back to total design-and-build. District Planning was also experiencing a rapid decline in applications for privately developed sites-and-services. There was less low-cost sewerred land available than had been forecast, capital costs were still high even at the lower Agreement 20 levels and pirate barrios were offering larger lots for less money.

INVESTMENT UNCERTAINTY IN NEW PROJECTS

The unanticipated demand in Las Guacamayas, and the rapid decline of private sector applications to develop sites-and-services, cast doubts on the validity of self-help. Administrators in Las Guacamayas were also reporting that owners were tearing down or extensively modifying high-cost core units, and that construction technical assistance was unused. In some cases, families were not making any capital improvements, because they did not believe the city would reciprocate by delivering promised utilities, did not have enough capital to begin building or because they were simply speculating on rising land values.

These mixed results have raised questions about how the low-income housing system works, and how public investment can stimulate families to build. When these agencies moved from total design-and-build policies, where they essentially delivered housing as a complete package, to sites-and-services, where there was an implicit prediction about what families would do, substantial risk was introduced. The open-ended projects would now control fewer variables and rely on incentives to stimulate owners to build for themselves.

Despite these failures, authorities believed that the basic self-help concept behind sites-and-services was valid. They felt that future projects could achieve their objectives if the costs to beneficiaries could be lowered further. It was proposed to reduce the two highest cost items for owners -- land, and on-plot core units. Planners expect that smaller plots without core units would be significantly cheaper to provide and to administer; thus projects would accommodate more families, reach lower income groups, and compete more favorably with private barrios. Chapter 2 will review the details of how sites-and-services policies intend to achieve these goals.

Chapter 2
The Sites-and-Services Policy



The sites-and-services policy is different from the industrialization and aided self-help policies that preceded it. Instead of planning complete housing units, government agencies now use capital programs as incentives to stimulate families to build their own housing. This chapter details the four main policy instruments: 1) land banking and legalization, 2) infrastructure and utilities, 3) technical assistance, and 4) loans programs. This will show how capital programs are supposed to increase the supply of housing, reach lower income families, improve the efficiency of land use, and reduce illegal housing by offering legal alternatives. The international development agencies, particularly AID and the World Bank, have promoted sites-and-services in many countries including in Colombia. Their projects in other countries will provide a basis for comparing the Colombian experiences.

LAND BANKING

The basic objective of land banking is to consolidate sufficient land stores, and to parcel it into lots that provide families with the areas they need for their homes. For most projects, there is a threshold number of building lots needed to justify administration and capital start-up costs. Sites-and-services projects are becoming larger and larger; the most recent one in Bogota is more than 2500 lots. Because of their size, sites have been limited to peri-city locations that make employment accessibility a serious planning consideration. Often, there is poor regulation of land use in these areas, and prime agricultural land is sold off for low-density housing or small-scale industries. Lima, Santiago, and Bogota have already experienced these transformations. In these contexts, land banking is a policy instrument for increasing the productivity of land by maintaining high quality agricultural land, or by replacing it with efficient residential layouts.

Although the term banking is commonly used, pooling might describe the process of consolidating building sites better. Public purchase, preemption proceedings with compensation, or use of public lands for sites usually do not imply the scale that land banking does. Out of the 10 countries that had World Bank-financed projects by 1975, only the following approached the size of land banking: Senegal, with 400 hectares in Dakar; 1225 ha in combined sites-and-services, and squatter upgrading in Dar es Salaam, Tanzania; and 470 ha combined projects in Lusaka, Zambia. (1) The scale of these projects has been exceptional. Some caution should be used in equating project size with the scale of intended development. These figures comment only on the total size of land acquired in a single project. A project of

(1) World Bank. Housing: Sector Policy Paper. Washington: World Bank, May, 1975, Annex 11, p. 70.

134 ha in El Salvador, has 8000 lots with 60 to 120 square meters each, while in Lusaka, Zambia, a 470-ha site accommodates 4000 lots of from 210 to 324 square meters. In rounded figures, the smaller lot size in the El Salvador project yields almost seven times the number of building plots per hectare than the Lusaka project does.

Implementors of sites-and-services hope that projects will be attractive alternatives to squatting and illegal speculator developments. However, the size of typical projects is not such that it acts as a regulatory instrument in the private land market. In fact, in some countries, cities are prohibited by constitutional law from engaging in land banking.

Land costs constitute from between 15% to 45% of the total cost of a single-family dwelling. The overall location of the project with respect to employment, urban services, and environmental amenities, accounts for most of the variability. Physical planning greatly influences where a project falls in this range. Site preparation, platting charges, and initial service levels have secondary effects on cost. Regulation of density, lot sizes and proportions, existence and mix of residential support land uses, and general circulation and access routes through the site, are other sources of cost variability. These costs are important because they determine the lower economic threshold of families admitted to projects, number of projects the government can build, and ongoing costs to the city for maintaining service delivery.

Valuation

Pooling land by market purchase, transferring public lands to commercial markets, or compensation payments under preemption procedures, creates many practical problems. It is difficult to measure what the market prices for land are and the effect that collusive practices may have on inflating them. The pricing problem is complicated by the fact that the use to which land can be put is also a planning policy and subject to negotiation. Using public land does not avoid the valuation problem because land is a project input the cost of which is a capital investment with an expected rate of return. As land is a scarce resource, social justifications for using it for housing must still be weighed against the opportunity costs of alternative uses to which it land could be put for the same goal.

International development agencies have been in a worse position than national agencies with respect to estimating and valuating land prices. As a result, the largest underwriter of sites-and-services, the World Bank, has taken the following

disbursement policy: (1)

- 1) exclude land costs from disbursement eligibility;
- 2) obtain assurances that land prices used are reasonably comparable to existing local levels;
- 3) include land costs (with a comparable valuation for land already held) in total project costs for purposes of economic evaluation, and the allocation, of costs between public authorities, commercial interests, and families;
- 4) agree that reimbursement of land costs by families can be channeled into a rotating fund that may be used, inter alia, for future land purchases for sites-and-services programs;

Recognizing the valuation problem, land banking components of sites-and-services projects will require development of a financial plan that includes the basic purchase of land; overhead costs of the agency and its operations attributable to the project; and reserves for uncollected payments from families; and delays in sales, rentals, or leases. Since land is one of the most significant project costs, governments may choose to lower its cost artificially, as a means of indirect subsidy to prospective families; that is, land already held by governments may in fact be sold at below market value.

Land Tenure

Owning land is the most basic incentive for families to build. Tenure is the combination of property rights by which private persons and organizations can hold and control land (and building improvements) under government protection.

There are two main tenure schemes in today's projects. Freehold schemes empower the landholder to control use and development, subdivision, leasing, and sale of his land, subject to statutory planning controls and subdivision regulation. In leasehold schemes, the landlord controls the use and development of the land while the landholder has the use of it on the terms and conditions set out in the lease contract.

Tenure can range from rental, or long-term leases to complete ownership. In rental schemes, the user pays a fee for use of the dwelling and/or rights to occupy the site. Land leases are longer-term uses of the dwelling or site and are for periods of up to 99 years. In full ownership, the owner retains complete hold in the dwelling and the land on which it is built. Other tenure combinations are possible when authorities stipulate that resale of lots must be to the government, or can only be

(1) World Bank. Sites and Services Projects. Washington: World Bank, 1974, p. 15.

transferred to blood relations. Depending on the location of the site, titles may spell out the way land-holders are to be compensated if their land is ever preempted for public works or other uses. This usually applies only to upgrading cases where portions of existing settlements may be blocking public works projects.

Case studies of squatter settlements and illegal subdivisions frequently make the generalization that along with employment, secure land tenure is the main condition encourages families to make long-term capital improvements. John Turner, an early proponent of tenure, showed that there is a direct relation between the level of physical development in a settlement and the level of tenure of the settlement's residents. (1) His research showed that squatter settlements tend to evolve from a transient occupancy with no initial or permanent tenure and easily disassembled shelters, to legal occupancy with institutionally recognized forms of tenure, with complete structures and utilities of modern standards. He concludes that increased tenure always precedes increased housing investment, and that a certain threshold is required before home builders will use permanent materials and build complete structures.

Few proponents of sites-and-services question the importance of tenure. What is surprising, however, is that very little research has been done relating kinds of tenure to levels of housing investment. William Doebele's research in Bogota's pirate barrios found that low-income families are willing to make rapid and substantial capital investments in building homes in illegal settlements with no more assurance of tenure than a promise of purchase-sale or, "promesa de venta" (a contract to make a contract), from the sellers. (2) Since an estimated 1,682,000 persons, out of Bogota's 1972 population of 3,250,000, short range to stimulate home building. (3)

Land banking and tenure programs work differently in upgrade projects. Here, land banking supplements under-capacity residential support land uses, rather than creating new sites for

(1) John Turner. "Uncontrolled Urban Settlements: Problems and Policies," Cambridge: Massachusetts Institute of Technology, 1966. Prepared for the United Nations Center for Housing Building and Planning Seminar on Development policies and Planning in Relation to Urbanization.

(2) William Doebele. "The Private Market & Low-Income Urbanization." The American Journal of Comparative Law, 25 (No. 3): 542.

(3) Alcaldia Mayor de Bogota. Mercado de Tierras en Barrios Clandestinos de Bogota. Bogota: Departamento Administrativo de Planeacion Distrital, 1973.

home construction. Squatter settlements generally lack overall planning. Invasion organizers often reserve land for future schools, markets, or roads, only to have these areas taken over by accretion, or by families recruited to reoccupy sites where the police have forcibly evicted people. In either case, land banking refers to annexing additional land or consolidating under-utilized land for these purposes.

Legalized settlements become part of the city's tax base, thus often providing the only means cities have to collect for services they may already be providing. Legalization also formalizes the relationship between the settlement and city authorities. In Bogota a settlement cannot qualify for local or national government programs until it has formed a community action group (Junta Directiva de Accion Comunal) and registered itself with the city. On registration, the settlement is assigned a tax number that is used in all subsequent legal transactions. A junta is necessary if the settlement wants to obtain water, electrical or sewer connections, to qualify for technical assistance programs, or simply to solicit bus service.

Site Selection and Planning

Land is generally the single most expensive capital investment governments make in sites-and-services projects. It is also a significant part of the home builder's investment. The three major factors that influence site selection are 1) the location, 2) the amount of land needed, and 3) the way it is utilized.

Location

Accessibility to employment is one commonly cited reason for liking or disliking a project. Low-income families from poor locations are willing to spend disproportionately high amounts of time and money commuting. The urban population as a whole will not do this. Another cost of living far from work accrues when several working members of a family travel to and from their jobs twice a day in order to have the midday meal at home.

In the past, most of Bogota's service sector jobs were located in center city. This is less true today because there has been a trend to decentralize commercial enterprises. Jobs such as day maid, construction labor, or manufacturing work are associated with middle- and upper-level residential areas or with peri-city industries. On one hand, this relieves the pressures for center city sites. On the other hand, it introduces uncertainty into sites selection because: 1) lower-income groups may not have stable employment patterns, 2) settler recruitment may take place while sites are being evaluated, or 3) employment may be related to heavily urbanized areas in which there are no available building sites.

Employment accessibility is still an important factor in today's projects, but others, such as zoning and the project budget, are becoming more important as project size increases. In Bogota, recent legislation restricts sites-and-services projects to land areas already serviced by the municipal sewer network. This alone eliminates all but close to 10% of open space within the sewered area of the city.

Choosing a site within the sewered perimeter is subject to a set of financial constraints: principally, land cost, preparation, and off-site infrastructure costs. Typically, project planners will assume a basic set of land-use and infrastructure standards that are within the municipal codes. Basic infrastructure costs and affordable plot size can then be calculated. Final selection of a site thus implies selection of physical standards that are affordable by the group to be housed.

Land Utilization

New sites-and-services legislation in Bogota specifies two general sets of guidelines. One regulates the engineering aspects of public utilities, i.e., sizes of water mains, level of electrical service, and the kinds of sewer systems that can be used. The other set of regulations, and most important for site planning, specifies what kinds of residential support land-uses are required. Generally, the cost of nonresidential land, such as vehicular and pedestrian circulation, parks, schools, and markets, must be paid for by occupants of the residential portions. In terms of sites-and-services projects, the three variables that distinguish all land uses are final user, implementing agent, and placement of control or legal tenure. From this perspective, all land uses fall into one of four categories: (1)

- 1) Private land is residential, commercial, and for small industries. It is essentially under the control of individual users identified in a legal tenure agreement. Property development is totally under the control of the owner and only partially influenced by building codes or project regulations in terms of what can be built. Use of private land is limited to relatively small numbers of individuals. In terms of the local and national government, private land is revenue-producing, that is, there is direct taxation and the possibilities of recuperating capital gains through betterment taxation.
- 2) Semiprivate land is held in joint ownership through condominium or cooperative arrangement. Court areas and

(1) Abstracted from Caminos, Horacio and Reinhard Goethert. Urbanization Primer. Cambridge, Mass.: MIT Press, 1978, p. 92.

shared access ways to lots are typical examples. Generally, the project tenure system defines who is responsible for its development and maintenance. Users are limited to the groups sharing the resource. Similar to private land, it is revenue producing for local and national governments.

- 3) Semipublic land refers to land and facilities used by the community itself. Open spaces, playing fields, schools, and to some extent, markets, are examples. Semipublic land does not produce revenue for public authorities except in cases where there is a user-fee. Examples would be stalls rented in commercial structures and used as markets, or small-scale manufacturing concerns. The design and regulation of these areas is by public authorities.
- 4) Public land refers basically to streets and pedestrian ways that offer unrestricted access and use. Individual tenure rights do not extend to this land, and public authorities have maximum control over its design and regulation. Public land does not usually produce direct revenue but may do indirectly, when nearby private and semiprivate land increases in value, and betterment taxes are levied.

How much land is needed for a sites-and-services project? For a flat or moderately sloped site (under 20%, or 1:5 rise over-run), the total area is derived from a gross density based on what families can afford to buy; the amount of semiprivate, semipublic, and public land needed to support that density; and the efficiency of utilities. Case studies by the Urban Settlement Design in Developing Countries Group at Massachusetts Institute of Technology indicate from 250 persons per hectare (p/ha) to 500 p/ha is optimal. (1) Below this range, utilities become disproportionately expensive for the service population. Above this range, self-help projects are not feasible. These figures are generally consistent with those used by the international agencies. AID recommends from 250 to 300 while the OAS uses 600 p/ha, or about twice that amount. (2) (3)

(1) Gross density is the density of the overall site including lots and streets. Net density includes only the lot area.

(2) Agency for International Development. Proposed Minimum Standards. Washington: Department of Housing and Urban Development. Ideas and Methods Exchange No. 64, 1966.

(3) Organizacion de Estados Americanos. Propuesta Sobre Normas Minimas de Urbanizacion. Bogota: Centro Interamericano de Vivienda y Planeamiento, 1968, p. 7.

The amount of land that is needed is also affected by subdivision design. Pedestrian and vehicular circulation patterns are most influential in determining design. Land area used for circulation through the project typically ranges from 20% at the lower densities, to 30% at higher densities. Pedestrian and vehicular circulation can be either public or semiprivate, depending on block design and tenure system. In cluster blocks, a distinction is made between circulation through the project and access to individual lots. The latter does not require a dimension for vehicular traffic. Thus it may be considered semipublic area in which the lot owners who front the access way bear part of development and/or maintenance costs. In certain cluster designs, up to 30% of the circulation area may be semipublic.

A wide range of physical layout studies shows that density and circulation area have very low positive correlations, circulation remaining almost constant at 25% of the total project area. For example, going from a low gross density of 50 to 1000 p/ha (a 20-fold increase in density) only increases the total circulation area from 20% to a little over 30%. Changes in the gross density of residential areas have much more effect on the total site area, however.

Residential area is the proportion of private land used for home building lots. This area is under the maximum individual control defined by the legalization terms of tenure. The percentage of residential area within a project decreases as the effective density range increases. Going from a low density of 50 p/ha to 1000 p/ha decreases residential land from 60% to 50% of the total site area. Efficiency studies indicate that when these proportions are exceeded, the results will be lower public responsibility (area under public domain) and cost (more taxable land for supporting public areas), but at the expense of less efficient utilities and service delivery. (1) When proportions are below these ranges, insufficient private areas mean greater public responsibilities and higher supporting costs.

Schools, commercial areas, and open space also influence the total project area. Schools account for the most significant semipublic land use because they imply large recreation areas as well. When schools are included, site area ranges from 15% at the lower densities, to 30% at higher densities.

(1) Caminos and Goethert Ibid. Also, Gattoni, George and Praful C. Patel. In Residential Land Utilization, Case Study, Nairobi, Kenya. Masters in Architecture Thesis, Massachusetts Institute of Technology, 1973.

SUBDIVISION AND UTILITIES

The basic objectives of subdivision design are to: 1) maximize the number of building lots in the project and the variability of lot cost to accommodate the widest possible income distribution among families, while 2) minimizing capital and operating costs for installing and maintaining utilities, and 3) providing all families with as equal access to public and semipublic areas as possible.

Once a site has been selected a number of overall design problems must be dealt with. Through-site circulation is considered first. If the site is adjacent to existing urbanization, roads will be largely dictated by established patterns. More typically however, projects are located on the periphery of the city where through-site circulation must be determined from estimates of the longer-range development of the area, and projected public works implemented by nonhousing agencies. In cities where zoning and subdivision are guided by a master plan, this plan may in fact, already have determined the location of major circulation routes.

There are several reasons that through-site circulation is done first. Most sites require at least minimum preparation, such as leveling or recontouring for drainage control. Initial infrastructure, such as sewer and storm trunk lines, are usually placed under the streets, and in areas of high rainfall, the streets, themselves may be drainage conduits. Construction vehicles require at least minimally conditioned surfaces to move equipment, workers, and materials from point to point on the site.

Roads and accompanying drainage account for the highest proportion of on-site utility costs. Thus it is particularly important to minimize the number of roads in any project. A common technique in Colombia is to establish a hierarchy of streets and the utilities associated with them. Streets at the highest level are wide, asphalt-paved, well lit, have curbing, and storm drains, and may include sidewalks. At the lowest level, they are narrow, and not likely to have sidewalks or storm drains. The houses that front these roads or paths may be the only sources of lighting, and paving may be no more than compacted gravel or soil. A hierarchy of roads, paths, and utilities is an efficient way to match public expenditure with expected use. (1) Once overall through-site circulation is established, secondary roads within the site are considered. Block designs establish the frequency, width, and class of roads needed. Cultural travel norms will also help determine modes of

(1) Instituto de Credito Territorial. Estudio de Normas Minimas de Urbanizacion, Servicios Publicos y Servicios Comunitarios. Bogota: Instituto de Credito Territorial, 1971. Unnumbered illustration p. 310 entitled "Perfiles de Vias."

travel, travel times for particular trips, speeds, and frequency of trips.

The block is the basic unit of residential subdivision. The choice of what design to use profoundly affects initial and longer-term operating costs. Inappropriate designs waste land, reduce taxable property, and lead to higher service charges for utilities.

Theoretically, a block could consist of as few as four lots grouped around some common point such as a well or sanitary unit. More typically, however, a block is a double row of lots back-to-back. Figure 2.1 shows several gridiron block designs found in Western countries. The overall length and width are functions of the area, proportions, and the number of lots it contains. Blocks of this kind are usually bound on all four sides by public circulation. The distances between streets in either direction is called the circulation interval. (1)

The interval or spacing between lines of circulation is a compromise between small intervals that maximize pedestrian accessibility to various points on- and off-site, and large intervals that reduce the total number of streets and thus the overall proportion of the project area used for circulation. Accessibility and circulation intervals are inversely related; accessibility rises when intervals are small and there are more streets, but so do costs and the proportion of land not available for home construction. In Colombia, municipal ordinances regulate the maximum circulation interval. Often the distance is related to the maximum distance that fire equipment can pump water. This is approximately 100 M, which means the maximum block length is about 150 M to 200 M; water could be pumped 100 M from either end of the block and still reach all points.

For simple gridiron designs with back-to-back lots, circulation intervals are very sensitive to changes in lot proportions. For example consider the differences between two block designs in which the only change is the proportion of the lot. The first contains 22 square lots each 100 M². The second design contains lots of 100 M², but the proportions have been changed from 1:1 to 1:2.7. By changing just the lot proportions while holding the lot area and block length constant, the second design yields 36 lots and the first only yields 22. The interval spacing of the circulation parallel to the short side of the block has increased with the deeper lots. The block width has increased from 20 to 33.32 meters, while block length and street width were held constant in order to compare the results. This means the second

(1) For a complete analysis of circulation types, see Horacio Caminos and Reinhard Goethert. Urbanization Primer. Cambridge, Mass.: MIT Press, 1979.

design has 30% fewer streets parallel to the long axis of the block than the first design; a significant cost reduction right away. Figure 2.2 shows the two block designs side by side. An index of efficiency of lineal utilities (e.g., streets, water and sewer lines, or electrical networks) results when the ratio of the block circulation length is compared to the block area. (1) This index, called the R factor, or unit circulation length (UCL), is computed by dividing the total circulation length by the block area. Block length for the first case is 220 M (half the perimeter of the block, the other half belongs to the adjacent blocks), and 140 M for the second. Block areas are 4000 M² and 8000 M² respectively. This results in UCLs of 0.06 meters of utilities per hectare for the first design and 0.03 for the second. The second is therefore twice as efficient as the first because only half the amount of lineal utilities is needed to service the same area.

Figure 2.3 shows an alternative block design called the cluster; it is common in many non-Western cultures. Unlike gridiron blocks where the circulation interval is a function of the lots, cluster designs are independent. (2)

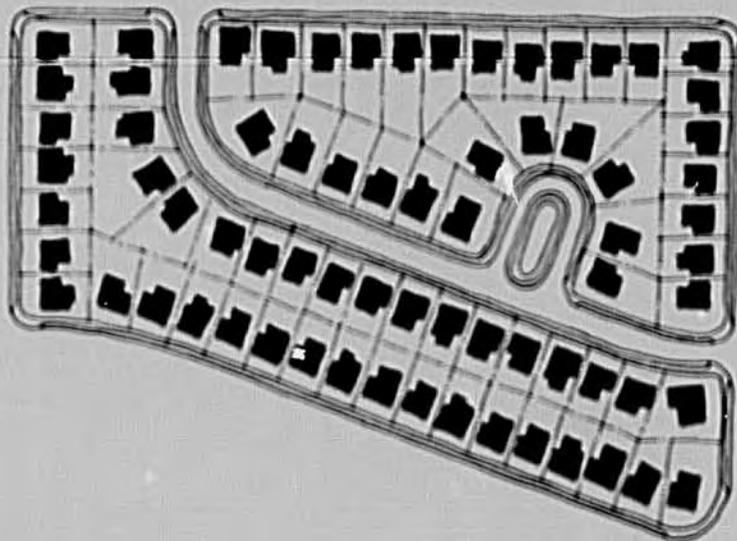
(1) Horacio Caminos. "A Method for the Evaluation of Urban Layouts," Industrialization Forum, 3 (December, 1971).

(2) Cluster plan abstracted from Fundacion Salvadorena de Desarrollo y Vivienda Minima. "Urbanizacion Popotlan - Sector 2, Apopa Departamento, San Salvador." San Salvador: Fundacion Salvadorena de Desarrollo y Vivienda Minima, Division de Operaciones, Departamento de Proyectos, 1979.

a)



b)



c)

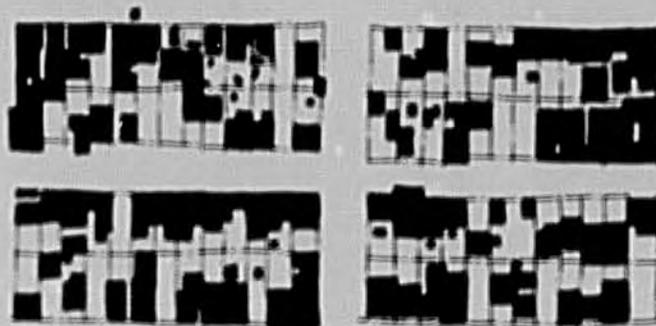
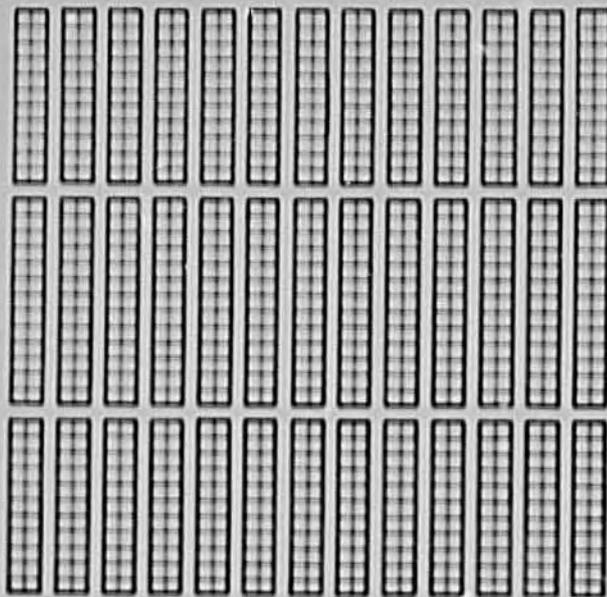
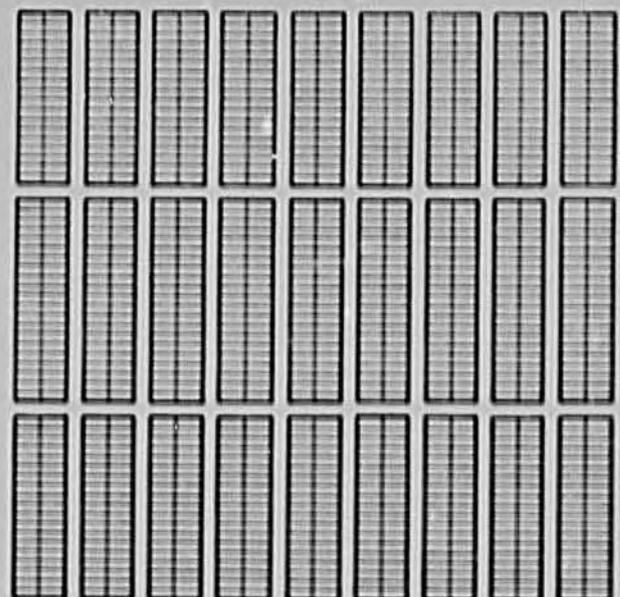


Figure 2.1 Typical gridiron blocks.



1:1 Lots



1:2.76 Lots

Figure 2.2 Comparative gridiron block designs.

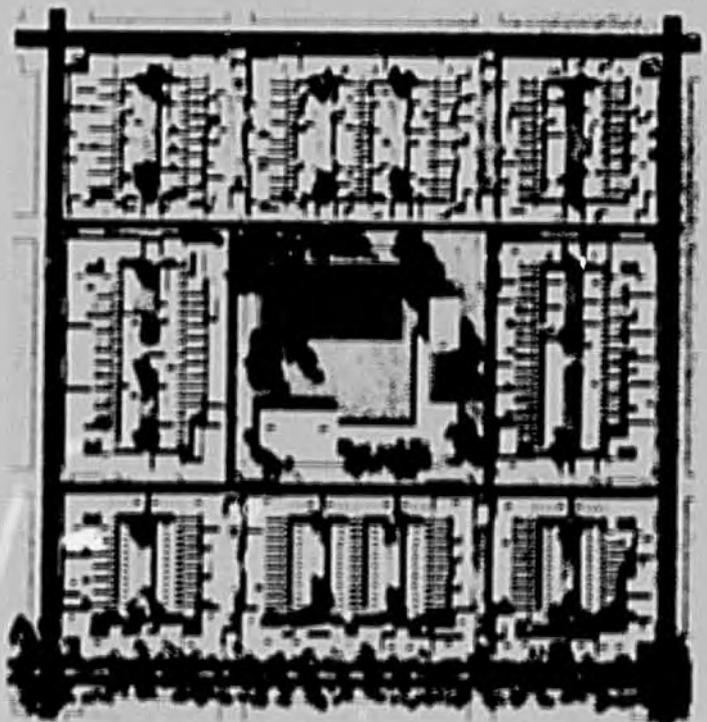
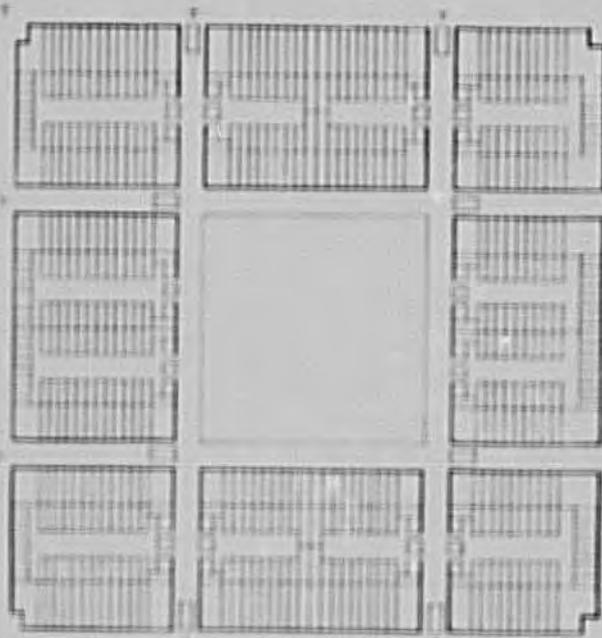


Figure 2.3 Typical cluster blocks.

(1)

(1)

Illustration courtesy of Horacio Caminos and Reinhard Goethert.

Cluster designs divide circulation into two classes instead of just one: 1) circulation through the site and 2) access to individual lots. With this distinction, a constant but considerably improved index for unit circulation length, and percentage of private and semiprivate land utilization, results. Horacio Caminos and Reinhard Goethert show that all cluster designs for a constant density of 600 p/ha result from varying lot proportions from 1:1 to 1:4 and areas from 20 M² to 400 M² result in UCLs of 150 meters per hectare (M/ha) and percent of land for residential use (%Res) of 62.5% respectively. (1) This is a considerable improvement over the 232 M/ha and 55% values for the mean 160 M² lots in gridiron designs.

Although the block is the basic unit of subdivision, the lot is the single most important one for the beneficiary. Its size and proportions dictate what he will pay, what he can build and on some sites, the kind of construction he must use. The improved efficiency of lots with narrow fronts and deeper setbacks has already been shown, but there are limits. For small lots, under 100 M², almost all of the site will be built on unless they are on steep slopes. As lots get longer relative to the fronting circulation, utilities become more efficient (more lots are being served per lineal meter of pipes, wires, etc.) but the house plans themselves becomes less efficient because of long, wasteful corridors. The smaller the lot, the more serious the lost space. Home builders may have to go to multifloor construction to achieve the necessary space. Adding floors requires structural flooring, bigger foundations, stair wells, and load-bearing walls.

Small narrow lots have other problems when the site is sloped. If the street fronting the lot is the principal axis for utilities such as sewerage, and in most cases it is, it is more feasible to run the long axis of the block parallel to the slope's contours to get proper drainage angles. This means the long axis of the lot is perpendicular to the slope contours and will require the maximum amount of cut and fill to excavate a flat building site. What may be an efficient block design from the standpoint of utilities may, in fact, be a very inefficient use of the lot's area.

How big should lots be? A World Bank survey of 80 proposed and completed sites-and-services projects in 27 countries found that most were above 150 M². Table 2.1 shows distribution of lot sizes in the surveyed projects. (2)

(1) Caminos, Horacio and Reinhard Goethert. Urbanization Primer. Cambridge, Mass. MIT Press, 1978. p. 113.

(2) Praful C. Patel. Sites and Services: Survey and Analysis of Urbanization Standards and On-Site Infrastructure. Washington:

PLOT SIZE M	% COMPLETED PLOTS	% PROPOSED PLOTS	% OF TOTAL	COUNTRIES
0-100	15	41	23	Colombia, El Salvador, Guinea, Jamaica, India, Indonesia, Korea, Morocco, Pakistan
101-200	69	21	55	Colombia, Chile, Guinea, Indonesia, Iraq, Kenya, Nicaragua, Pakistan, Senegal, Zambia
201-300	8	14	8	Colombia, Kenya, Senegal, Tanzania
301-400	1	24	9	Botswana, Kenya, Zambia

Table 2.1 Distribution of lot sizes in World Bank projects.

When lot sizes are weighted by their quantity within projects, 12 World Bank projects in 10 countries and 54 non-Bank projects in 54 countries, have mean values of 160 M². The standard deviation (SD) for each group differs, however. Bank projects are less variant in lot sizes at 56 SD, while non-Bank projects are almost three times as variant at 139 SD. (1)

Table 2.2 shows the lot sizes recommended by international development agencies. (2)

International Bank for Reconstruction and Development, Transportation and Urban projects Department, 1974, p.7.

(1) Ibid. Mean and standard deviation for grouped data performed on "Data Matrix: Survey of 10, Bank Sites-and-Services Projects," Annex A, p.10, and "Scanning Survey of Sites-and-Services: Summary Chart," Annex A, pp.2-3.

(2) Grindley, William and Robert Merrill. Sites and Services: The Experience and Potential. Washington: International Bank for Reconstruction and Development, International Development Association, 1973, p.16.

INTERNATIONAL AGENCY	AREA	LOT DIMENSIONS AND MINIMUM FRONTAGE	ASSUMED FAMILY SIZE
United Nations Relief and Works Agency (UNRWA)	105 M	2 7.5M X 14M 1 : 1.9	5
US Agency for Interna- tional Development (AID)	100 M	2 5M X 16.7M 1 : 3.5	5
Organization of American States (OAS)	40 M	2 5M X 8M 1 : 1.6M	6

Table 2.2 Lot sizes recommended by international agencies.

What is interesting about these recommendations is that not only are lots undersized when compared to implemented projects, their size and proportions will yield very poor efficiency ratings in gridiron block designs, the most common design in current projects. In the last few years, sites-and-services projects have increased in scale. The tendency is to cut project costs by using smaller lots. When the lot area falls below 100 M², the advantages of cluster over gridiron designs are dramatic.

Utilities and Costs

The basic utilities in every sites-and-services project are water, sewerage, roads, storm drainage, street lighting, and electricity. These utilities are reasonably permanent installations, and once designed and installed, are not often affected by growth. In most cases these are extensions of a much larger service network installed and maintained by nonhousing agencies. Regulating the initial level of utilities to lots is the most common way project planners adjust the standards and costs of lots to match families' ability to pay.

Surveys of World Bank projects show that on-site infrastructure is about 33% of the total site cost. (1) Table 2.3 shows utility costs per lot for 18 worldwide sites-and-services projects. Table 2.4 shows utility costs per lot for another 18 projects that did not include street lighting or full electrical service to each lot. For projects not including these services, water costs remain relatively constant with fully serviced projects, although the latter had higher costs for sewerage and roads with

(1) World Bank. Housing Sector Policy Paper. Washington: World Bank, 1975, p. 40.

drainage. Costs for these two categories of utilities had significantly higher variance in individual project costs, however, as indicated by the higher standard deviation for these means.

	WATER	SEWERAGE	ROADS/ DRAINAGE	STREET LIGHTING/ ELECTRIC	TOTAL
Mean	16.01%	33.26%	34.94%	15.79%	100.00%
SD	5.11	7.16	9.84	9.72	

Table 2.3 Mean and standard deviation of utility costs per lot for 18 sites-and-services projects.

(1)

	WATER	SEWERAGE	ROADS/ DRAINAGE	TOTAL
Mean %	17.98%	37.74%	44.27%	100.0%
SD	7.8	16.03	12.72	

Table 2.4 Mean and standard deviation of utility costs per lot, 18 project without street lighting or electricity.

(2)

(1) Praful Patel Ibid. Mean and standard deviation for grouped data performed on "Data Matrix: Survey of On-Site Infrastructure Costs per Plot," Annex A, p.5. Percentage cost figures weighted by total number of lots within each project. Total of 50,784 lots included in survey.

(2) Praful Patel Ibid. Annex A, p. 5, performed only for appropriate projects (45,535 lots).

Most of the projects that did not have the full complement of services were located in Senegal and Zambia. The total development costs per capita in those countries are the lowest of any of the 10 countries included in the World Bank survey. (1) Unit circulation length tables and percentages of land for private and semipublic use have been constructed for lot areas from 20 M2 to 400 M2 and proportions 1:1 to 1:4. When lot area is used as the independent variable, analysis shows for a constant density of 600 p/ha that almost all the variance in UCL can be explained by changes in lot area in gridiron plans. The relationship of lot area to UCL is best expressed as a negative power function where the dependent variable is UCL and the independent variable is Lot Area (LA). Table 2.5 summarizes the relation for four lot proportions. (2)

LOT PROPORTION	UNIT CIRCULATION LENGTH
1:1	UCL = 1020.3 (LA ^{-.23})
1:2	UCL = 914.2 (LA ^{-.25})
1:3	UCL = 837.6 (LA ^{-.25})
1:4	UCL = 827.3 (LA ^{-.25})

Table 2.5 Unit circulation length.

The object of subdivision design is to lower the value for UCL, or the total lineal utilities needed to serve an area. Comparing the above functions, lots with proportions 1:4 will always be more efficient than 1:1, that is, they will require less from utilities per area. The earlier example of block design verified this. What is not so obvious is that even when lot sizes exceed 400 M2, which is already 2.5 times the mean value for current

(1) Praful Patel Ibid. Annex A, p. 13 "Comparison of Development Costs for Sites-and-Services Plots in 10 Bank Projects - Adjusted to per Capita GNP of US \$200."

(2) Summary power curves derived from geometric analysis of lot areas from 20 M2 to 400 M2, and proportions 1:1 to 1:4. UCL tables first constructed by the author in "Supermanzana: the Orderly Subdivision of Land," Massachusetts Institute of Technology, Department of Architecture, 1969. Reported in Caminos and Goethert, Ibid, pp. 114-115. Coefficients of determination (r²) for UCL functions are 0.92, 0.99, 0.99 and 0.99 for proportions 1:1, 1:2, 1:3 and 1:4 respectively.

sites-and-services projects, the value for UCL in gridiron designs will never be less than 155 M/ha. More likley, UCL values will be around 232 M/ha.

Adjustments to lot area and proportions also affect the percentage of land for private and semiprivate uses. When lot area (LA) is again used as the independent variable and the percentage of land for residential use (%Res) is compared for a constant density of 600 p/ha, almost all the variation in %Res can be explained by changes in LA. Table 2.6 summarizes this relationship. (1)

LOT PROPORTIONS	PERCENT OF LAND FOR RESIDENTIAL USE
1:1	%Res = 20.35 (LA ^{.17})
1:2	%Res = 26.93 (LA ^{.13})
1:3	%Res = 30.82 (LA ^{.11})
1:4	%Res = 33.20 (LA ^{.10})

Table 2.6 Residential land use.

The object of subdivision design is to maximize the amount of home building sites. From the above equations it can be seen that lots with proportions 1:4 provide more usable residential land area than those with proportions 1:1. For the mean lot area of 160 M² the differences between 1:1 and 1:4 are 48.22% and 55.15% respectively, or 15% more residential area for the narrower lots. Using 1:4 proportions, the maximum percentage of residential land will not exceed 60% even with large lot areas of 400 M².

(1) Summary power curves derived from Caminos and Goethert, Ibid., pp.114-115. Coefficients of determination (r²) for %Res functions are 0.97, 0.97, 0.98 and 0.97 for proportions 1:1, 1:2, 1:3 and 1:4 respectively.

Summary

Two general subdivision layouts have been discussed, gridiron blocks with individual lots, and clusters made up of lots, in condominium. The lot in a gridiron block fronts a public street that is both circulation through the project and access to the lot. Street layouts are a direct function of the lot size. Thus street length and utilities can only be partially influenced by changing the lot. In clusters, lots and dwellings are grouped around semiprivate courts or paths. These access ways are held in condominium by those who share it. Unlike the street in gridiron layouts, cluster access ways allow for several kinds of tenure arrangements, maximizing user control over land that will produce revenue for the city.

The following rules of thumb summarize what has been said about subdivision design:

- 1) Longer blocks increase efficiency, no matter what the lot area or proportions are, because they eliminate streets. As the circulation interval increases, there is a corresponding decrease in accessibility through the site.
- 2) Lots with proportions 1:1 produce the least efficient subdivision layouts, while those approaching 1:4 are more efficient.
- 3) Larger lot areas are always more efficient than smaller ones.
- 4) The minimum (most efficient) realizable unit circulation lengths for standard sized lots (160 M²) and 1:4 proportions will only be about 232 M/ha in gridiron designs; for clusters, it can be as low as 150/ha.
- 5) The maximum (most desirable) private area in a project site for standard lots of 1:4 proportions will not exceed 55%.

Staging Infrastructure

One feature of the sites-and-services policy is the ability to commence large-scale projects with significantly lower initial capital costs for infrastructure. This is accomplished in two ways. First, dwellers may be responsible for substantial portions of the infrastructure. They may install or maintain portions of it through different levels of community action and mutual help. Cluster designs are well suited for this because they are convenient administrative units. Second, projects can be implemented in stages. Regardless of whether or not the community participates in the installation of infrastructure, the fact that it can be progressively installed over much longer terms, offers more flexibility in scheduling and financing.

Sites-and-services projects thus far show an enormous range of infrastructure staging. In minimal projects, only community water stations, pit latrines, public showers, and unpaved streets

are offered. In more advanced projects, each lot has electrical, water, and sewerage connections. The ability to offer such a wide range of service levels is a way to increase the variability of lot prices to accommodate the widest possible income distribution among families.

The World Bank uses a generalized physical typology to classify projects. (1) It identifies four prototypes, each according to initial infrastructure and construction: 1) subdivision with basic services, 2) subdivision with basic sanitary core, 3) subdivision with a constructed sanitary core and minimal living area, and 4) subdivision with fully developed dwellings. In the first, plots have communal services or communal water and individual pit latrine, or individual water and sewerage connections. The second has all services connected to the sanitary core unit. Type 3 is the same as 2, but there is also a constructed living area that may be a completed room, a shell structure, or just a roof. In type 4, there is a dwelling. Given the fact that sites-and-services projects leave the homebuilding decision to the user, this typology skews the importance of physical construction on the plot. Bank projects indicate that type 3 projects are not common, and type 4 are even less so.

Alfred Van Huyck offers an alternative 4-class typology that more adequately describes sites-and-services as encountered thus far: (2)

- Type 1 - Raw land, subdivided into plots with a common water tap serving a number of plots, common latrines, and unpaved streets
- Type 2 - Plots, each serviced by a water tap and with its own latrine, septic tank or sewer connections
- Type 3 - Plots, each serviced as above, and with a small outbuilding containing the core facility
- Type 4 - Plots, each serviced, and with a partly finished house that could be a slab, a slab with supports and roof, or one complete room on which additions can be made

This schematic has two advantages over the former. Each type discriminates on the basis of sewerage and water service levels. These services, when combined, account for over half of the

(1) Praful Patel Ibid. Unnumbered figure adjacent to page 3.

(2) Alfred Van Huyck. Planning for Sites and Services Programs. Washington: Department of Housing and Urban Development, Ideas and Methods Exchange, 1971, p. 23.

initial infrastructure costs. The typology is also in line with the policy intention to maximize the beneficiary's control over building of his house. When authorities do construct on the lot in Types 3 and 4, it is more for health purposes than for dictating house design or construction.

From 1972 to 1978, World Bank-assisted projects have progressively moved from Type 1 to Types 2 and 3. In 1972, Senegal had the earliest Bank-assisted project. This \$22 million project called for a Type 1 design with communal stand pipes and pit privies for 16,000 lots. Two years later, a large project in Tanzania called for similar initial service levels for 10,000 lots, but added open ditch storm drainage. More recently, however, Bank-assisted projects have definitely shifted toward Types 2 and 3. In the two latest reporting years, 1976 and 1977, the Bank participated in eight new projects totaling 75,775 lots, of which 69% were Type 2 or higher, while only 31% were Type 1. (1) This same trend is also occurring in Colombia's sites-and-services programs.

Staging and Block Design

Staging infrastructure is related to block design. It has been pointed out that cluster designs differentiated between circulation through the site and access to individual lots. This leads to better private and semiprivate land utilization and to lower infrastructure costs. In terms of staging, clusters are considerably more flexible than gridiron designs. They offer more possibilities and options for separating public authority, and individual responsibility for implementation. For example, the access way is semiprivate land held in condominium or cooperative ownership. This arrangement allows several staging options: 1) a full one-third to one-half of all project utilities, those associated with the access way, can become the responsibility of the dwellers abutting it, thus the timing and sequencing can be governed by a small group consensus, 2) the access-way connection to through-circulation routes offers a access-way to anticipate future service connection points; there is the option of aggregating costs such as materials, technical assistance, or even service billing in larger units; and 3) important infrastructure costs such as sewer manholes, cleanouts, and water meters can be drastically reduced.

Staging affects both utility costs and the total buildable area of the lot. Basically, there are two overall approaches for laying out the sewer system regardless of block design: sewers

(1) International Bank for Reconstruction and Development. "Sites-and-Services Upgrading: A Review of World Bank-Assisted Projects." Washington: International Bank for Reconstruction and Development, Urban Projects Department 1978.

can be either put in the center of the street and connected to lots by way of smaller drain pipes, or they can be put in the center of the block and connected in a similar way. When the street, or access, way is used, home builders frequently build bathrooms, kitchens and laundry rooms closer to the fronts of the lots to reduce the length of connecting pipes.

Another approach frequently used in gridiron designs is to run the sewer line down the middle of the block, serving up to four lots with a single connection. Thus the sewer network is entirely on public land; while for clusters it is on semiprivate land. There are two reasons to prefer the former: accessibility, and structural integrity. Pipes must remain accessible for maintenance, extension, and meter reading. Normally, load-bearing walls and foundations cannot cross or be located any nearer than a meter, if the pipe alignment and structural integrity are to be preserved as adjacent buildings settle over time.

The midblock approach is becoming more widespread in use as projects begin to shift from Type 1 to Types 3 and 4. When core sanitary units are included, it is cheaper to service four units placed back-to-back around a common connection point, than it is to service only two units back-to-back with feeder lines running from the center of the street. When detailed plans are prepared for cost estimating, however, it turns out that the cost is the same, and that midstreet locations are more flexible to implement, maintain, and enlarge.

Building codes in Colombia require separate network connections for each dwelling unit connected to the system. For health reasons, the effluent from one unit must not depend on the patency of another unit's system to discharge into the network. Therefore, if one unit's system becomes clogged, it does not, in turn, clog up others further back on the line. In some cities, there are additional requirements for each unit to have its own cleanout facilities. In practice, a single point connection cannot be made for four units. A number of Y connections are required even for the most minimal network connections. When detailed construction plans are compared, extra joinery costs required by the midblock design lose their real cost advantages over that needed in the midstreet approach.

If the differences in costs are minimal, why is it an issue? Because of need for an easement in the midblock design, from one to three meters at the rear of each lot traversed by the easement will be unusable for construction. An average lot of 160 M² and proportions 1:2.5, or 8 M X 20 M, will lose 15% of its buildable area just to maintain the easement. The greatest difference between approaches is the complication of trying to repair, enlarge, or maintain the the system as the project matures and lot-owners build up their homes. What is curious is the fact that all Type 3 and 4 Bank-assisted projects in Latin America

have promoted midblock designs. Midblock designs with grouped sanitary core units were implemented in Jamaica for 40% of that projects 6000 lots for five projects totaling 8000 lots in El Salvador, and for 6400 lots in Nicaragua's earthquake reconstruction project.

Project Cost Components

The main cost components in projects are land, site preparation, on-site infrastructure, and plot development. Figure 2.7 shows the approximate distribution in projects assisted by the World Bank.

COST ITEM	UNWEIGHTED MEAN	RANGE
Land	21%	14-28%
Site preparation Topo/survey work	13%	0-19% (1)
On-site infrastructure Water supply Sewerage Surface drainage Roads and footings Public lighting Electricity	33%	10-27%
Plot development	33% <u>100%</u>	4-62% (2)

(1) In one case 61%
(2) In four cases 0%

Table 2.7 Percentage distribution of development costs for World Bank-assisted sites-and-services projects.

(1)

A World Bank survey of 19 projects underway in 10 countries shows that when land cost is included in the lot purchase price, families pay from 13% to 22% of the mortgage principal for the unimproved land alone. (2) The wide variance results from

(1) World Bank. Housing Sector Policy Paper. Washington: World Bank, 1975, p. 72.

(2) Praful C. Patel. Sites and Services Projects: Survey and Analysis of Urbanization Standards and On-Site Infrastructure. Washington: International Bank for Reconstruction and Development, 1974, p. 11.

different levels of initial lot development, i.e., partial dwellings such as sanitary core units or minimum shelters, and materials loans for construction. These inputs decrease the proportion that families pay for the land.

RECOVERING COSTS

There are three main ways to recover costs from project beneficiaries: 1) mortgages, 2) taxes, and 3) user charges. Mortgages recover the largest portion. Mortgage accounting is subject to a number of conditions, each of which can be used as a policy instrument to align cost recovery with beneficiaries' ability to pay. Taxation has always been a major land-use policy instrument. In the broad context, there are four general types: land value incremental tax, betterment levy, tax on speculative short term capital gains, and penal tax on vacant land. The first three aim at recovering public investments that change land value, while the last encourages development of unimproved lots.

Mortgages

Mortgage accounting is relatively simple. Capital improvements charged to beneficiaries are recovered through a stream of payments. Normally, mortgage holders make a down-payment against the debt. This is followed with regular monthly payments that pay part of the principal and an interest charge on the outstanding debt. Payment terms are typically from 10 to 20 years. A mortgage accounting example is shown in Figure 2.4 and Table 2.8.

Mortgages have three elements: down-payment, payment period, and interest rate on the outstanding debt. Down-payments are not always required but when they are, they are designed to: 1) lower the amount that the family will pay in interest charges over the years they are paying off their debt, 2) reduce the risk that borrowers will default, and 3) create a higher cash flow when projects are being occupied. Some argue that down-payments are unreasonable barriers to entry in low-income housing programs. Families traditionally have little or no savings. Therefore, down-payments create economic stratification in projects because wealthier families are given preference over the neediest. Others argue that without this barrier selecting families would be even more complicated, and that banks would not lend to project authorities because the perceived risk of arrears or defaults is too high.

The mortgage period is really two variables in one: how often the payments are made, and for how many years. The most common practice is to amortize the debt over 10 to 20 years with continued monthly payments. Interest is the rate of return on capital, or simply the price of borrowing money. Low-income families generally cannot qualify for conventional bank loans and lower down-payments and interest charges in projects are major benefits for them. In the past, most interest rates in Colombian projects were fixed; the mortgage-holder continued to pay the same rate for the entire term of the loan and paid a fixed amount each month. The first and last payments could be higher than the others if there were closing and title transfer fees. Today, the trend is toward lower down-payments and longer-term loans. A survey in a recent sites-and-services project in Bogota, found that families applied for project housing based on the down-payment and monthly quotas. The total cost of the lot and core unit was not very important to them. Longer-term loans are higher risks. Lowering down-payments reduce the cash flow when projects first start and there is less of a financial commitment to the government. If inflation is high, the buying power of the money with which families repay will decrease. Governments may hedge their capital recovery by using a variable interest rate that is adjusted upward as future payments are made.

MORTGAGE ACCOUNTING EXAMPLE

A family buys a lot with sanitary core unit in a sites-and-services project, valued at P\$27,800. The family cannot make any down-payment, but can meet monthly payments of P\$300 (25% of their P\$1200/Month income) for 15 years (180 payments). The lending agency charges 10% interest on the outstanding balance. The direct reduction loan amortization schedule for this loan:

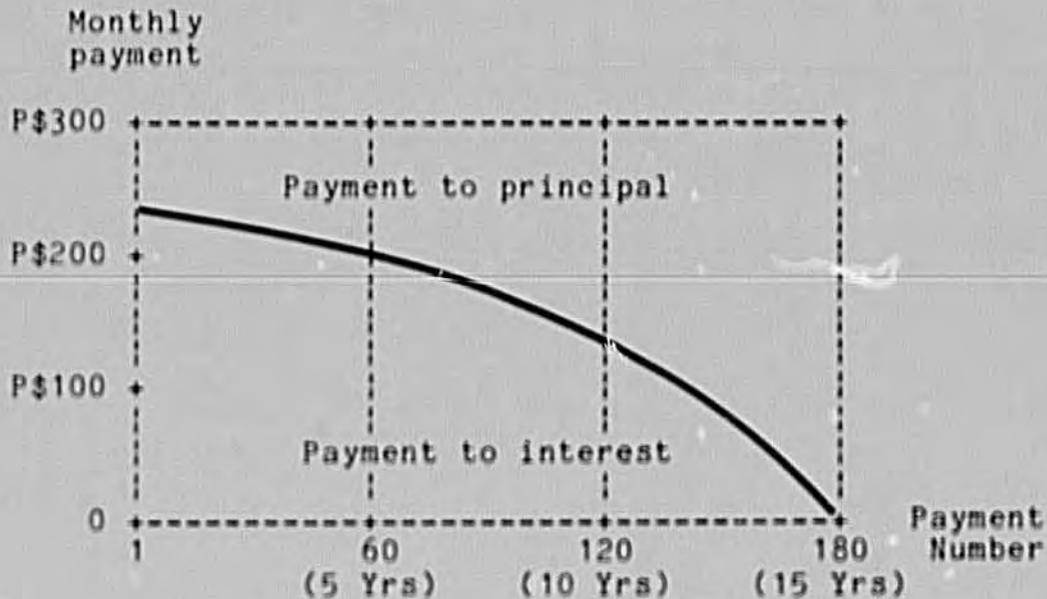


Figure 2.4 Payment for interest and principal.

PAYMENT	PAID TO INTEREST	%	PAID TO PRINCIPAL	%	REMAINING BALANCE	TOTAL INTEREST PAID TO DATE
1	232.08	77	67.92	23	27,782.08	232.08
15	232.72	75	76.28	25	26,769.62	3,419.62
30	213.60	71	86.40	29	25,546.03	6,696.03
45	202.15	67	97.85	33	24,160.23	9,810.23
60	189.18	63	110.82	37	22,590.75	12,740.73
75	174.49	58	125.51	42	20,813.18	15,463.18
90	157.85	53	142.15	47	18,799.99	17,949.99
105	139.01	46	160.99	54	16,519.92	20,169.92
120	117.67	39	182.33	61	13,937.61	22,087.61
135	93.50	31	206.58	69	11,012.99	23,662.99
150	66.12	22	233.88	78	7,700.67	24,850.67
165	35.12	12	264.88	88	3,949.26	25,599.26
180	0.00	0	300.00	100	0.00	25,850.56

Table 2.8 Direct reduction loan amortization schedule.

In addition to longer-term loans, there is a trend toward increasing the ways in which families can pay off their mortgages. Usually there are combinations of down-payments and yearly terms. Picking one establishes the other. The mortgage schedule in Table 2.10 shows the value in pesos for four types of solutions in a recent Colombian sites-and-services project. The solutions are similar to those in the typology suggested by Alfred Van Huyck. For each type of solution in the first column, the table states its approximate value (1974 prices), qualifying income levels, the interest rate being charged, and the monthly payment. To suggest the effects of inflation, each solution's price in 1978 and the compound yearly increase that occurred in four years, has been footnoted.

Table 2.10 was calculated by using two different interest rates and several combinations of down-payment and yearly terms. Once the monthly payment is determined, the minimum family income is calculated. The policy here is that the family should not pay more than 30% of its income for housing payments. Banks generally will not lend mortgage money when monthly payments exceed 20% to 30% of that amount. Case studies of low-income rents indicate that lower-income families spend disproportionately higher amounts of their income for rent than higher-income groups do. The example schedule assumes the maximum proportion of income paid to rent. Although the schedule appears to offer payment flexibility, the difference between the choices does not indicate it. When inflation is high, it is better for a family to get the most expensive solution for which they can qualify, to pay it off over the longest term allowable, and not to make any down-payment if possible. Notice, for example, that for Type 1 solutions, a family making P\$800/Month will pay twice the down-payment that a family earning just P\$20 less per month will. Similar discontinuities exist between other income groups. Prospective families are quick to perceive these inconsistencies and will inflate or deflate their declared incomes to avoid them. Note also, that lower-income families have fewer long-term choices, while higher-income groups tend to get the shorter terms. This distribution implies that poorer families are higher risks. If the price increase between 1974 and 1978 is indicative of the true increase in value of the solutions, there is less risk associated with Type 1 than Type 4 solutions, because there is less to lose should there be a default.

How can mortgage be brought into line with the risks and families' ability to pay? If the 1974 solution costs, interest, minimum income levels, and monthly payment are held constant for the sake of comparison, the maximum affordable loan can be determined for each income group. This is the maximum mortgage a family can get, and thus the maximum solution for which a family can qualify without a down-payment. Table 2.11 shows a revised amortization schedule based on this approach for 10-, 15-, and 20-year terms. To arrive at these figures, all that was done was

to assume the corresponding monthly payments for each of the three terms at the given interest rate. Notice, that based just on monthly payments and a fixed rate of interest, most of the lower-income families can pay off their housing solutions with no down-payment at all (column 4). Notice, too, that none of the higher-income groups can afford their homes without a down-payment.

What can families afford if they also have savings for a down-payment? In addition to borrowing money from friends and relatives, there are two institutional alternatives for accumulating down-payments - social loans, or personal savings. Social loans, or prestaciones sociales, consist of a series of non-taxable forced savings programs for employees with regular salaried jobs. When the employer has more than P\$200,000 fixed capital, he must pay one month's salary extra each year to his employees. This is called the prima de servicio. Smaller employers pay half this amount. The prima, in essence, is a free month's wage. Another type of loan is the auxilio de cesantia. For each year of employment, an employee accumulates one month's salary based on the average salary for that year. The employee can collect his cesantia when he: 1) quits his job, or 2) wants to buy a house or make additions to an existing one. If one assumes that the employee has had a minimum wage job with a large employer for at least five years, he would have accumulated about P\$13,500 in forced savings programs. This includes the assumption that he will always spend his prima on other things.

Personal savings are another important source of down-payment capital. In order to quantify how much savings can be expected from different income groups, the marginal propensity to save must be estimated for all those included in the project. Assuming that savings is a function of income, the question is for each additional peso of income, how much more will the family save? Table 2.9 approximates the marginal propensity to save in Bogota in 1974. (1) For each level of monthly income, the chart states the likely amount the family could save in one year and what percent of the yearly income would be saved. Essentially, as income rises so do savings, but not in a lineal way. The more a family earns, the higher a proportion of that income could be saved. It follows that higher-income families are in a better position to make down-payments than poorer families. If one also assumes that families can save for at least two years toward their down-payment, the savings indicated in Table 2.9 can be doubled. Adding this new increment to the affordable capital in Table 2.11 (column 4), results in a revised set of affordable housing levels (column 5). Table 2.11 also shows the resulting value of the solutions that those in each income level can now

(1) Estimates for the marginal propensity to save were derived from home interviews in 1975.

afford. Note that some of the income groups in Type 4 solutions still do not have enough down-payment to qualify. It is likely that families with this level of income will also be using their prestaciones sociales as part of their down-payments. The revised schedule offers several advantages over the former: 1) lower income groups have more long-term choices without down-payments, 2) down-payments are now based on likely savings levels rather than arbitrary mixes of down-payments and term years, and 3) there is a smoother transition between trade-offs than before.

INCOME (MONTH)	SAVINGS (YEAR)	PERCENT INCOME
700	1136	14%
800	1384	14%
900	1635	15%
1000	1890	16%
1100	2148	16%
1200	2409	17%
1300	2673	17%
1400	2939	17%
1500	3207	18%
1600	3478	18%
1700	3750	18%
1800	4024	19%
1900	4301	19%
2000	4579	19%
2100	4858	19%

Table 2.9 Estimated savings in pesos.

TYPE OF SOLUTION	1974 VALUE IN PESOS	MINIMUM INCOME	PERCENT DOWN PAYMENT				TERMS			INT. RATE	PMT/MTH
			NONE	10%	20%	30%	10	15	20		
Lot 60 M2 with sewer connection, communal water tap, electrical connection, concrete sidewalks, and paved vehicular ways	\$18,400	780			1840			X	15%	23.77	
		800			3680	X			15%	237.48	
		810	X						15%	242.28	
		860	X					X	15%	257.62	
		900			1840	X			15%	267.16	
Type 1 plus electrical connection to lot, and 10 M2 core unit	\$27,580	1025			5515			X	16%	307.00	
		1220			2757		X		16%	364.50	
		1230			5515	X			16%	369.60	
		1300	X					X	16%	383.70	
		1400			2757	X			16%	415.75	
Type 1 plus 15 M2 sanitary core unit and one small room & electrical connection to lot	\$31,500	1200			6302			X	16%	350.70	
		1320			3115			X	16%	394.50	
		1400			3115		X		16%	416.50	
		1500	X					X	16%	438.40	
		1600			3115		X		16%	475.00	
Type 1 plus 18 M2 living room, bath and kitchen unit, installed sewer, water and electricity to the dwelling	\$46,000	1500			13,800			X	16%	448.00	
		1600			13,800		X		16%	473.00	
		1720			9200			X	16%	512.00	
		1800			9200		X		16%	450.00	
		1950		4600				X	16%	576.00	
		2050		4600				X	16%	608.00	

* \$22,000; \$39,000; \$45,000 and \$75,000 respectively in 1978
4.5% 8.6% 8.9% 13.0% yearly increase

Table 2.10 Direct reduction loan amortization schedule.
for a Typical Sites-and-Services Project

(1)

(1) Caja de la Vivienda Popular. "Formulario de Solicitud de Vivienda Plan: Las Guacamayas." Bogota: Caja de la Vivienda Popular. 1974, p. 2.

TYPE	VALUE	MINIMUM INCOME	AFFORDABLE CAPITAL			AFFORDABLE CAPITAL AND DOWN-PAYMENT			DOWNS-PAYMENT	INT. RATE	PMT/MTH
			10	15	20	10	15	20			
1	18,400	750	14,685	16,928	17,992	17,353	19,596	20,660	15%	15%	234.00
		800	15,061	17,362	18,453	17,829	20,130	21,221	15%	15%	240.00
		810	15,250	17,572	18,684	18,068	20,390	21,502	15%	15%	243.00
		860	16,191	18,664	19,838	19,260	21,733	22,907	17%	15%	258.00
		900	16,444	19,532	20,760	20,215	22,803	24,031	18%	15%	270.00
		1000	18,827	21,702	23,067	22,608	25,483	26,848	21%	15%	300.00
2	27,580	1025	18,571	21,181	22,360	22,481	25,091	26,270	14%	16%	307.00
		1220	22,140	25,252	26,657	27,064	30,176	31,581	18%	16%	366.00
		1230	22,321	25,451	26,870	27,298	30,436	31,847	18%	16%	369.00
		1300	23,592	26,908	28,405	28,938	32,254	33,751	19%	16%	390.00
		1400	25,406	28,977	30,591	31,284	34,855	36,469	21%	16%	420.00
3	31,500	1250	21,777	24,838	26,220	26,596	29,657	31,039	15%	16%	360.00
		1320	23,955	27,322	28,843	29,407	32,774	34,295	17%	16%	396.00
		1400	25,406	28,977	30,591	31,284	34,855	36,469	19%	16%	420.00
		1500	27,221	31,047	32,776	33,636	37,462	39,191	20%	16%	450.00
		1800	29,036	33,117	34,961	35,992	40,073	41,917	22%	16%	480.00
4	46,000	1500	27,221	31,047	32,776	33,636	37,462	39,191	14%	16%	450.00
		1600	29,036	33,117	34,961	35,992	40,073	41,917	15%	16%	480.00
		1720	31,214	35,601	37,583	38,824	43,711	45,193	17%	16%	516.00
		1800	32,666	37,257	39,331	40,715	45,306	47,380	17%	16%	540.00
		1950	35,388	40,362	42,608	44,267	49,241	51,487	19%	16%	585.00
		2050	37,203	42,432	44,794	46,640	51,869	54,231	21%	16%	615.00

Table 2.11 Revised direct loan amortization schedule for a typical sites-and-services project.

Taxation

Taxation is an additional way of recovering costs from beneficiaries. The most common taxes involve general levies, betterment, and capital gains. General levies are annual charges associated with the costs for maintaining public services such as public education and health facilities, or fire and police protection. Tax rates can be fixed, but more commonly they are fractional amounts of the assessed value of real property. The increased value of real property that results from private investment in a project is called the earned increment. This can be approximated and used as a basis for charges for public services that are not recoverable through direct user fees, such as utility bills, or by taxing property when it is sold.

Not all increases in land value result from investments made by the owner himself. Government action, whether positive (e.g., by executing public works or other land improvements), or negative (e.g., by the imposition of restrictions on other land) can substantially change property values. Taxing the increased value that results from government action is the principle of betterment levies. (1) (2)

Unlike a capital gains tax that occurs only when the property is sold, betterment levies can occur any time. The basic principle of betterment argues that: 1) only a small part of increases in land values are because of improvements made by landlords or tenants, and 2) increased value results from direct capital improvements in the project site, and an overall development effect in the off-project area. Capturing the betterment accruing to land and housing owners from public inputs, therefore requires that this unearned increment is taxed, or otherwise obtained for public use. Betterment taxation attempts to recoup the costs of public investments through user fees and service charges, rather than through a general tax revenue system. In Colombia, betterment taxation is called valorizacion, and is a major way of recovering public works investments. (3)

(1) Orville Grimes. "Urban Land and Public Policy: Social Appropriation of Betterment." Washington: International Bank for Reconstruction and Development, Bank Staff Working Paper No. 179, 1974, p. 1.

(2) When land development results in decreased land values, it is called "worsement." For a complete presentation of the theoretical differences between betterment and worsement, see R. Turvey. Economics of Real Property. London: George Allen and Unwin, 1957.

(3) See William Doebele. "Valorization Charges as a Method for Financing Public Works in Bogota, Colombia." Washington, World Bank, 1975.

Non-project forces also effect the value of land. Rising demand results from increased population and the expectation that future land prices will be even higher than current ones. Land supply is relatively inelastic, constrained by the physical limits of metropolitan land areas, market withholdings by owners, and the shortage of resources for servicing new areas.

Capital gains taxes are levies against the difference between the market value and the base assessed value of real property when it is sold or transferred to another person. Since this tax occurs only when properties are sold, it can be deferred indefinitely.

Capital gains taxes do two things - they increase revenues from projects, and they make short-term speculation more difficult. The major sites-and-services projects in Colombia require occupants who have clear titles to make the first offer to sell the property to the implementing agency. If the occupant does not yet have clear title, he must sell to, or at least transact the sale through, the agency. There are several reasons for this. When homeowners make improvements to their lots and construct dwellings, the market value at the time of sale is usually substantially higher than the base assessed value of the original purchase. The implementing agency can recuperate part of its costs by taxing a portion of this gain in value. Another reason for controlling the transaction is to recuperate any outstanding debts from the seller before he gets his money from the buyer. Given the fact that agencies coordinate the transaction, the seller receives some measure of protection against buyers who are poor credit risks. In some cases, original project beneficiaries may have had deferred property tax exemptions. By controlling the transactions, the agency can release property from exemption status and update the assessed value for taxation.

Unlike income tax that taxes 100% of wages and salaries, capital gains taxes are levied only on a fraction of the gain. This makes capital gains a regressive tax, because higher-income groups generally derive more of their wealth through means other than salary or wages. As the tax rate is lower for this kind of income, the wealthier tend to benefit more from capital gains taxation than do the poor.

Chapter 3
Project Case Studies



Ten years of experience with sites-and-services shows that the relation of public to private investment is still unclear. Lots remain unsold despite high demands for plots in illegal settlements, projects repeatedly serve higher income groups than administrators prefer, and many forms of technical assistance have doubtful effects on improving environmental conditions. Chapter 2 reviews the scope of typical upgrade and sites-and-services projects and shows the key decision points in every project: selecting beneficiaries, determining physical design, allocating costs, and supplying technical assistance. It also shows that not all planning decisions are made under uncertain conditions.

This chapter looks at three projects -- one upgrade, and two sites-and-services -- to see what the effect of government capital programs have been on private homeowner investment. Unlike the theoretical approach of Chapter 2, the emphasis here is on the way families actually build, finance, and use their homes, and how those practices differ from what the project planners had anticipated. Project analysis is important. First, it shows the responses of homeowners, many of which are surprising to administrators. Their surprise is, to some extent, an indication after which they did not fully understand the progressive squatter settlements after which they modeled these projects. Second, the projects demonstrate that much investment uncertainty and surprise is a product of poor planning. Obviously, hindsight is clearer than foresight but project experience is seldom cumulative and what is learned from one situation is rarely transferred to another. Projects simply do not keep close enough track of their own interventions to be able to know what the circumstances were that led to success or failure. The problem, oddly enough, is too much information.

In all projects, significant amounts of information were gathered to support critical decisions, yet many were still incorrectly made. Successful designs and administrative practices in one project are totally ignored in the next. While administrators complain that there is inadequate information on which to base investment decisions, project records and interviews with the beneficiaries themselves demonstrate the opposite. Information is available, analytical models do exist, and it will make a difference to project success to model the interaction of investment. What the case studies show even more, is the need to organize and structure the information already at hand.

The agency that implemented these projects produced a successful prototype that could have served as a model for future ones, yet those principles were abandoned. The lapse of institutional memory made a difference. Not only was the latest project less successful than the prototype, the experience led administrators to abandon self-help element altogether. This was unfortunate because the reasons for the failure were never researched, and it is just as likely that the same errors will continue in the new

line of projects. The point of the cases is not that the agency was incompetent or special -- it is neither. The point is to show how important adequate information and structure are to improving policy, and where projects themselves can provide that information. In the next chapter, the information needs for the main project decision points are analyzed, and an overall information framework is proposed.

Two of the case studies involve large projects with more than 1000 families. All involve located in Bogota and were developed by the Popular Housing Bank (Caja de la Vivienda Popular-CVP, or Caja). Las Colinas is a ten year old invasion barrio that was the first significant upgrade experiment in Colombia. Its apparent success led to numerous legislative changes that allowed Bogota's District Planning office and the Caja to transfer the self-help and minimum standards models used in Las Colinas to projects where new housing would be built. The legislation was first pretested in a small pilot project called La Manuelita. This was very successful and encouraged the Caja to apply sites-and-services to Las Guacamayas, a significantly larger project.

The idea behind Las Guacamayas was to use sites-and-services to offer a range of physical housing solutions that could attract and socially integrate the widest low-income range possible. The scope of capital investments in the projects was similar to those described in Chapter 2 although the physical layout of Las Guacamayas ignored most of the principles discussed. The Caja assumed that families would invest in the new project in a certain way. Once implementation began, however, they invested differently and undermined many of the Caja's programs. In some cases, the Caja simply failed to recognize that the "unexpected" investments were not any different than what had already taken place in their earlier projects. They did not structure their past records in such a way that they could recognize patterns when they reappeared. As a result, the newer projects made it difficult for families to earn income through their homes, forced some families to rebuild government-built units, delayed the occupation of some units for more than a year, and left many plots unsold or abandoned. Most of these problems could have been avoided had policy planners kept better records of their previous projects and reviewed them before undertaking new ones. Other "unexpected" investments were the result of poor engineering practices for which good solutions had already been worked out, but which were not integrated into the ongoing planning process. The following case histories can show what information is critical to projects, identify its sources, and indicate ways to structure it so that the policy-to-program-to-project experience will be cumulative and more rational than it now is.

CASE 1: UPGRADING

A Brief History of Barrio Las Colinas

Las Colinas is a large, mature invasion settlement built on two steep slopes overlooking Avenida Caracas and southern Bogota. A handful of families organized by the socialist group Centro Pro Vivienda, first invaded the site in August of 1960. After being quickly removed by the local police, they regrouped for a second invasion in September of the same year. This time approximately 800 families invaded the flood plain just below the twin slopes, while 200 more families occupied large lots further up. The plain area was occupied mostly by families who were renting in what was then peri-city barrios such as San Carlos, Claret, Las Cruces, Belen, Veinte de Julio, San Jose, and Tunjuelito. These families were not directly affiliated with Pro Vivienda but took advantage of the situation to obtain land. A combined army and police assault soon removed them, but was unsuccessful in evicting the 200 families up on the slopes. These families were not only difficult to reach, they were organized into tight, mutual defense committees and had brought enough food to sustain a month-long siege. After repeated attacks against their shacks and power lines, and with invaders entering and leaving the occupation site, the police guard began to diminish. Slowly, new families joined, and by 1963 Las Colinas swelled to 700 families. Most of the newer arrivals were renters from center city barrios but others were coming from neighboring departments where they were escaping the aftermath of the "Violencia," Colombia's civil war. Today, Las Colinas has more than 2000 families, only 270 of which are original invaders.

Unsuccessful attempts to evict invaders from another large Pro Vivienda invasion at Barrio Policarpa, together with the high visibility that Las Colinas had from a major highway, made upgrading more politically feasible than eradication. In 1963, first steps were taken to legalize the land tenure when Bogota's mayor bought the land from the San Carlos Foundation, a non-profit entity representing government, church, and private social development agencies. The approximate cost to the city was P\$290,000. For three years little seemed to happen, until the Caja de la Vivienda Popular (Caja), a low-income housing bank, was given the legal mandate "to prepare plans and programs for housing designed to replace slums." Las Colinas would be their first upgrade project.

The first systematic attempt to study Las Colinas was made in 1967, by the Colombian Center for Construction (Centro Colombiano de la Construcción-CCC) at the request of the Caja. Their survey was to provide the basis for upgrading. The CCC census counted 6236 inhabitants, over 67% of whom were under 20 years of age. The barrio contained 940 families with an average family size of

6.5 persons. (1) All of these figures were far above anything expected by the authorities.

Employment among residents was very low. Only 15% had permanent employment, 10% more had at least part-time jobs. Although the CCC study does not state the size of the labor force, define who is considered "economically active," or give the age groups included, it is clear from the reported income distribution in Table 3.1 that incomes were very low, and that charging for eventual upgrading and services would be difficult. (2)

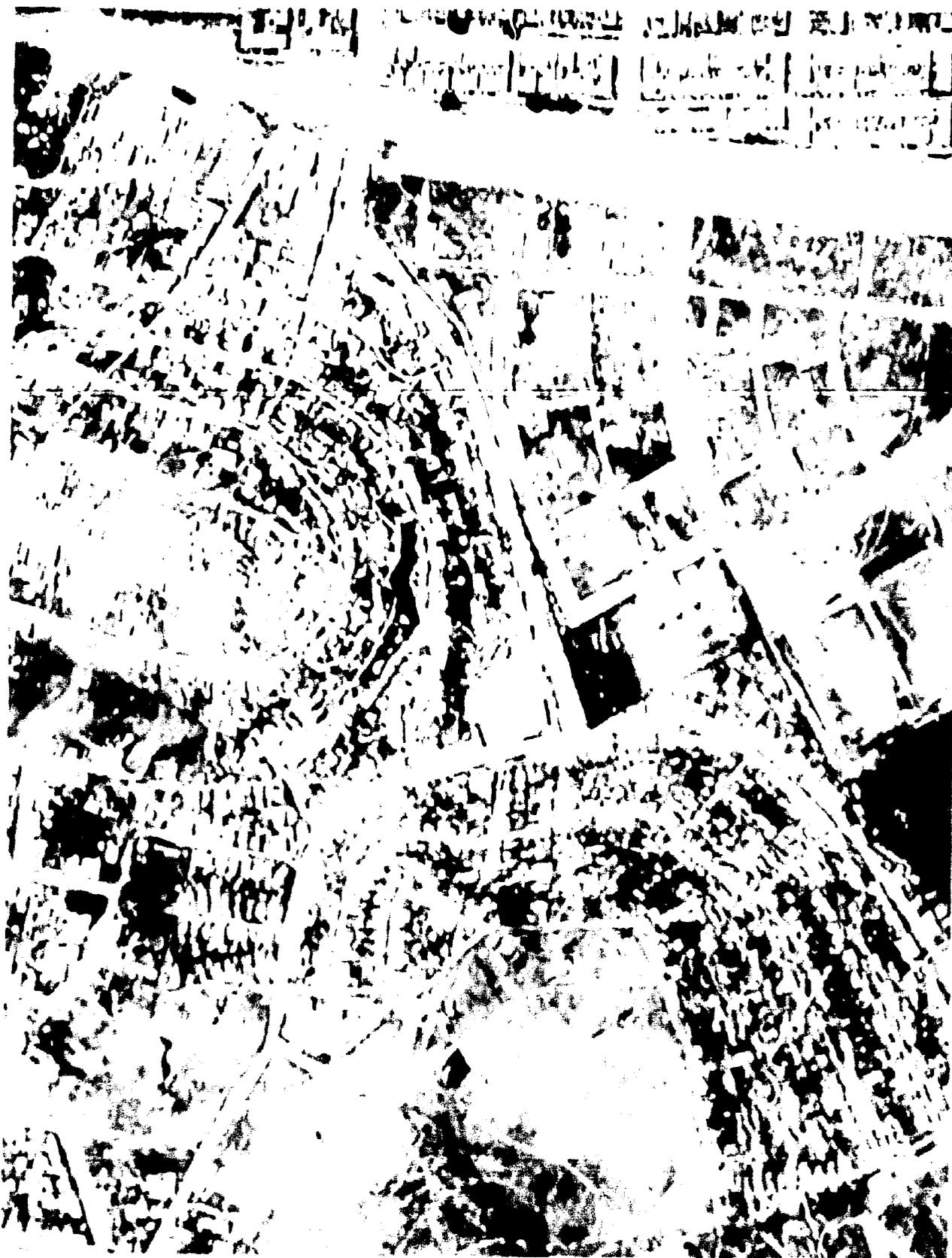
INCOME (MONTH)	FAMILIES	PERCENT
1- 200	37	4.02
201- 400	153	16.63
401- 600	212	23.04
601- 800	119	12.04
801-1000	112	12.17
1001-1200	53	5.76
1201-1400	25	2.72
1401-1600	19	2.07
1601-1800	9	0.98
1801-2000	10	1.09
2001- UP	25	2.72
NO ANSWER	41	15.87
TOTAL	920	100.00

Table 3.1 Family income prior to upgrading Las Colinas (1969).

Las Colinas' land area is 12.16 ha, and since the first invasion has been densely settled. By 1967, the average was 77.5 dwellings/ha, or 512 p/ha. Ten square meters per person is considered the minimum for healthy living but less than 2% of the residents had this much space, while more than 80% lived in five square meters or less. Although the original invaders secured large lots for themselves, they quickly subdivided them and sold parcels to new arrivals.

(1) Centro Colombiano de la Construcción. Las Colinas, Bogotá: Caja de la Vivienda Popular, 1969.

(2) Ibid., Unnumbered table entitled "Ingresos Familiares y Numero de Personas por Familia," p. 31.



By 1967, 40% of the lots were from 70 to 100 square meters, while 60% were only 10 to 30 square meters. The larger lot sizes are less desirable in Las Colinas because reclaiming the full area requires substantial cut and fill. Even today, houses on the steeper slopes occupy less than 50% of their lots. None of the design standards referred to in Chapter 2 advocates lots smaller than 60 square meters; those in World Bank projects have been averaging 160 square meters.

Although the CCC survey never stated how they determined a building's condition, they reported that 69% of the houses were in a dangerous state, 16% were marginal, 8% were poor, and only 7% could be considered up to standard in any way. (1) Most of the shacks were reported to have had dirt floors, and open fires inside for cooking. They were made of combustible, non-permanent materials such as wood, cardboard, bamboo or tarpaper stretched over pole frames. Before the Caja initiated its upgrading program, 63% of the houses had outside latrines, and 17% were using septic fields.

High densities, substandard construction, and the total lack of utilities contributed to extremely poor health conditions that prevailed in Las Colinas. Between 1964 and 1967, there were more than 800 recorded cases of illness, principally flu, bronchitis, tuberculosis, and gastrointestinal disease. In these four years alone, over 540 children died. In an emergency move to alleviate the severe health problem and to gain support in an upcoming election, the municipal government installed 40 public water faucets in 1968. Improvements in health standards later became the first priority of the Caja's upgrade program.

Pro Vivienda, which organized the Las Colinas invasion, was also organizing others as a means of obtaining political support to win City Council appointments. Original invaders supported Pro Vivienda by paying as little as P\$3, or as much as P\$800, a month dues for the "rights" to their lots. Families also paid five pesos a month for clandestine water and light connections. Pro Vivienda's income could have been as high as P\$5000 to P\$8000 a month.

Within three years of the invasion, dissatisfaction with Pro Vivienda began. There was no evidence that they had invested or would invest any of the dues in barrio improvements. By 1965, there was a decisive split between Pro Vivienda loyalists and more moderate families who wanted to form a Community Action Group (Junta de Accion Comunal) for the purpose of negotiating with the city. Many families stopped paying their dues despite pressure from the more militant loyalists. Prior to the Caja's intervention in the barrio, almost all of the families were against any collaboration with the city whatsoever. By the time

(1) Ibid., p. 37.

the CCC survey was conducted in 1967, the situation had reversed and Pro Vivienda was withdrawing its program. Families had begun to realize that without legalization and land titles, neither the city nor they themselves would make any significant capital investments to improve the situation. It was also becoming clear that in Las Colinas a chaotic land-use pattern was evolving. Not Pro Vivienda's original plan, the invaders who subdivided their lots, or the postinvasion arrivals, made future utilities any easier to implement. Families were also becoming more concerned with the degrading health conditions.

In addition to the home interview survey, several other data-gathering efforts were under way. A team of CCC surveyors prepared a detailed map of the settlement that consolidated land uses, equalized lot boundaries, and indicated where roads and stairways up the slopes should be located. A number of lots were to be removed from under high-tension lines and from the base of a cliff in danger of collapsing. Later, more houses would be removed to make room for a school and a community center. Compensation to these families took the form of relocation to one of the Caja's other low-income projects.

Students from the National University hastily implemented another survey to determine family needs for housing, infrastructure, education, and social services. Although the survey design was criticized by both the Caja and the CCC, several important trends appeared:

- 1) 88% of the residents wanted to stay even though only 7% of the houses were in good condition;
- 2) 77% said they would contribute labor and/or money to the rehabilitation of their homes;
- 3) 88% had built their current house alone or with the help of their family;
- 4) 55% would be satisfied with material and technical assistance from the government;
- 5) 79% wanted to buy their land from the government;
- 6) 56% gave the first priority to the improvements of sanitary conditions;
- 7) 80% said a sanitary unit with water should be provided before construction of the housing unit itself;
- 8) 53% said they would spend P\$26 to P\$50 a month, for improvements in their house, 10% would spend P\$51 to P\$75 a month and the rest would spend no more than P\$25;

By early 1968, data gathering was completed and preliminary upgrading in three areas had begun: 1) provision of infrastructure using new minimum standards (later known as Normas Minimas and the basis of sites-and-services legislation), 2) construction of self-help housing, and 3) construction of a

community center to coordinate socioeconomic programs. Implementation of the upgrading was to last five years, from January 1969 to December 1974.

Upgrading and Government Investment

Infrastructure received the highest priority. Residents wanted an immediate improvement in health conditions and the Caja agreed that it was easier to install utilities before construction on the lots began. Installing utilities demonstrated the city's commitment to upgrading and involved the residents in the process. Vehicular roads, essential for initiating garbage collection and moving equipment, were built by direct contract between the Caja and private companies. Paving, drainage, and sidewalks on the main lower-slope roads cost approximately P\$888,000. (1) Pedestrian roads and stairways were built by the barrio residents themselves at a cost of P\$183,000 for materials. The World Food Organization donated food rations for the Caja to disburse to the residents as payment for their labor contribution. Poor accounting and seemingly arbitrary reimbursement created considerable antagonism between the Caja and working families. The Electric Power Company installed pre-cast concrete poles and strung lines along the major roads at a cost of about P\$230,500. Water and sewer lines were installed down the back of each lot making connection to free-standing sanitary units to be built by each lot owner. For technical reasons already pointed out in Chapter 2, the Caja thought that this was cheaper than running them down the center of the street. The cost of the water and sewer system was about P\$673,000 (P\$486,500 for sewers and P\$186,500 for water). Not all lots would have the full complement of services. Families refusing to sign with the Caja did not get water and sewer connections. Lots in the steepest areas received only water and light. The decision to use free-standing sanitary units was based on the CCC survey that showed that more than half of the houses already used free-standing kitchens and 60% had separate latrines. Both of these statistics turned out to be incorrect.

The CCC estimated that the cost of the average lot, basic housing materials, and infrastructure would amount to P\$56 a month if paid over 20 years. Utilities would cost about P\$24 a month. Residents would be expected to pay slightly more when service connections and maintenance were included. Only 34% of the families could afford this, another 32% could with longer-term loans. The remaining families would receive construction loans to the extent that they could make payments, or they could "rent" the land and have monthly payments applied to an eventual title.

(1) Joshua Nelson. "The Las Colinas Plan: Case Study of an Urban Rehabilitation Plan in Bogota, Colombia." Bogota: Ford Foundation, 1970, p. 25.

Based on the results of the home interviews, the Caja initiated its second program by developing two housing prototypes. The first was a multi-family, five-story structure for housing families displaced from the danger area (the cliff that was base and from under the high-tension power lines) and from the planned school site. The second prototype was a small, two-room house with a detached sanitary core unit at the back of the lot. This design portrayed three stages of expansion with collective back-to-back core units, despite the impossibility of building on Las Colinas' 30% to 50% slopes. Early CCC and Caja proposals promoted prefabricated building components. It was believed that a reduced number of standard components would simplify project administration, and make construction training easier by limiting the number of necessary skills people had to learn. Much of the planning assumed that self-help construction meant that families would do the actual construction, just as it was reported they had done in the National University survey. By the time mortgages were being signed, a more conventional construction approach was taken because it was feared that contractors would charge more for erecting these unfamiliar units. The Caja and the Peace Corps drafted plans for families who could not formalize their own designs. The prototype idea was apparently abandoned by the time any construction began.

A typical loan package included the price of the land (subsidized at P\$24 per square meter), construction materials, labor, and technical assistance. Loans would be administered in two stages: 1) P\$6000 for purchase of the lot and materials for the sanitary unit, and 2) up to P\$11,000 for dwelling construction. Families had to begin repaying the first loan, and initiate the sanitary unit to qualify for the second loan. Terms were 8 years at 4% for the first stage loan and either 15 or 20 years at 6% (2% included for life and fire insurance) for the second loan depending on its amount and the family's income. A typical loan package for a family of three and an income of P\$900 per month was as follows:

STAGE 1	A) lot and land preparation	2800
	B) Sanitary unit	3400
STAGE 2	A) Construction materials	7920
	B) Labor	3430
	C) Technical assistance	240
	TOTAL LOAN	<u>P\$17,790</u>

Mortgages would typically be paid off in 15 or 20 years at P\$115 or P\$200 per month. Initial resistance to signing long-term loans with the Caja has totally disappeared today. Colombia's inflation rate has been above 25% for the past eight years and families now consider their 150- to 200-peso a month payment a gift.

The Caja planned to have several materials depositories in the barrio as outlets for common bricks made in their own factories. Cement, sand, reinforcing steel, water tanks, roofing decks, and wood were also available. Caja architects determined the minimum amount of each material needed to implement the family's house plan. Homebuilders simply ordered what they needed as they went along. Delivery was made to lots or to nearby queuing areas on the steeper parts of the slope. Periodic inspections by Caja architects insured that families met construction standards, followed their plans, and were not selling materials on the black market. The architects issued promissory notes to contractors and laborers up to the loan eligibility of each family. Notes were redeemable at the Caja's central office where some control over wage rates and fees could be exercised.

The third upgrade program focused on improving the social and economic conditions in Las Colinas. Day care and social work centers were proposed in addition to the school. Staff and equipment were promised by myriad agencies.

The three upgrade programs were estimated to cost about P\$5,796,400, although some project studies suggest it was closer to P\$9,276,500 when the costs for the preliminary studies and community organization were figured in. In January of 1969, the Caja finally requested 7.5 million pesos from the Bogota City Council. The CCC estimated that the Caja itself could pay about P\$1,978,000. The mayor's office would donate the land it bought from the San Carlos Foundation for P\$299,856 plus another P\$309,600, the value of the site for the proposed community center. The utility companies' investment of P\$1,442,400 would be recuperated in monthly service fees and connection charges. Residents' labor for installing utilities was estimated to contribute an additional P\$618,171. The district health, welfare and public works departments would finance construction and operation of the community center totalling P\$2,049,900. Community labor and cash contributed by the residents would total P\$238,120. (1) After the plan was made public in January, the Council allocated 5 million pesos to the Caja for the first year's operation. The Caja eventually received only P\$3.328 million. The addition of other Caja funds brought the first year's budget to P\$5,128,000.

Shortly after public disclosure of the plan, a joint Caja and CCC committee was established to coordinate it. The committee reevaluated the CCC's proposed budget and found that the scope of

(1) The total cost figures for all three stages are unclear. The CCC rehabilitation report lists more than 37 international, national, department, district, private, and local agencies that had proposed some level of investment in the plan. (Ibid., pp. 44.1-44.3). Cost estimates used here are from Joshua Nelson (Ibid. p.33).

the upgrading work was generally underestimated. The Caja needed material for 820 houses, not 800, and to clear 250, not 160, shacks. The new estimate was set at P\$19,261,216, only to be revised upward again in 1970 to P\$19,657,216, almost twice what had been originally projected.

Once physical construction began, it became obvious that the infrastructure was going to be more expensive than had been anticipated. The water and sewer companies refused to lower their standards for piping, even though there had been an agreement to experiment with new minimum norms. The steep slopes and filled latrines made sewer placement even more difficult than expected. Electrical installations ran almost 60% higher; the CCC estimated P\$230,488 but the final cost was closer to P\$390,000. The only apparent explanation for the increase was that more lines were needed than originally planned.

The cost of the two main vehicular roads and the pedestrian roads throughout the barrio was almost three times as expensive as estimated. The CCC study estimated P\$650,000 but poor workmanship, undermined road beds from clogged sewers, and higher traffic loads than planned ran the final cost up to P\$1,763,000.

The water company changed its connection fees several times. They objected to operating two systems simultaneously, the new one currently being installed, and the older, 40-tap system installed, by the mayor in 1968. The Caja eventually negotiated a P\$500 to P\$680 per house connection fee and a flat service rate of approximately P\$15 per month for the water itself. Household payments would be about P\$372 a year for both during a "grace period" of three years. The rate would be renegotiated after that time. The water company was particularly reluctant to make this final arrangement with the Caja because Las Colinas was already receiving subsidized water rates through a barrio rating policy that differentially charged for water based on a socio economic index.

After receiving higher bids from the water and sewer company, a private contractor was selected to install the sewer system for approximately P\$1,100,000. Little attention was paid to showing residents how to use it. The system often clogged and undermined the concrete roads, and flooded some houses. People were throwing their garbage into the system because trash collection was not yet initiated on a wide enough scale. It is likely that the lack of concrete roads also prevented widespread collection.

By July of 1969, four months after loan contracts had been signed with most families, the Caja was being threatened by barrio residents because no materials had yet been delivered. It was also becoming clear that a P\$17,000 loan would not be sufficient to build a minimal house. Families were already paying masons 10% to 25% of the value of the job to lay brick walls, even though they told the Caja and National University interviewers

that they had the skills and would build their own houses. Families soon realized that they were going to need two story houses to get enough habitable space on the steeper slopes. They actually needed loans closer to P\$30,000, or P\$12,880 higher than the average Caja loan.

Had the Caja and the CCC paid more attention to structuring and analyzing their original home interviews, many of these problems could have been avoided. The P\$30,000 increase for building a house could have been anticipated. In the first place, eligibility for the second loan required families to have stable employment to meet the additional mortgage. Regular employment greatly increases the opportunity costs for doing one's own construction work assuming that one has the required skills. The Caja assumed that people would build their own houses simply because they said that they had built their shacks themselves. What was overlooked was the fact that the secondary materials families used to build their shacks were cheap, commonly available, and required only low levels of skill to assemble. Shacks were generally single-floor, post and beam structures, with short roof spans and non-structural floors and foundations. Poorly constructed shacks will rarely collapse; they will sag and lean long before they fall down. Building in brick, however, is entirely different.

Housing construction got off to a slow start. The Caja delivered only about P\$200,000 in materials each month. This was used up in one week. By September 1970, only eight houses and one hundred eight sanitary units had been completed to minimal plans. Another three hundred sanitary units were in the process of construction. The Caja had funding for only two construction inspectors and four laborers to supervise all building activity. Many families built additional multipurpose rooms to reduce overcrowding, and ignored the loan conditions that the sanitary unit be built first. Some families sold their material at a substantial profit on the black market. Caja personnel were unable to monitor such a large site, and could not give families adequate technical assistance in implementing the plans drawn up by the Peace Corps volunteer.

By 1973, almost four years after the plan was announced, some were just beginning to build. The output capacity of the Caja's brick factory in barrio Primero de Mayo had been lower than anticipated and many families had to supplement what they were able to get from the Caja with more expensive bricks and cement bought from local vendors.

Another unanticipated cause of slow construction starts was the fact that from 35% to 45% of the families had designed their houses for income earnings. They intended to build extra space to operate small shops, or rent rooms or entire floors. Others planned to do light manufacturing or use space for warehousing. Building for income earnings requires more foundations,

structural flooring, reinforced retaining walls, and sometimes, additional entrances and utility connections. The commitment to income earnings must be made at the point permanent materials are used. The additional start-up materials are considerable and families often had to delay construction until they accumulated the extra material and capital. Nowhere in the CCC analysis of Las Colinas does it mention earning income through the dwelling. This is very surprising when it was estimated that 30% of all provisional shacks had some form of enterprise in them when the CCC was doing their survey. The entire Caja program viewed the house simply as a shelter problem and ignored the very common practice of using the home to supplement income. (Income earnings is so important that it is covered in a separate section.)

Upgrading Results

The Caja's program had a very significant effect on improving housing in Las Colinas. In just eight years, over 79% of the owners who had signed loan agreements were living in brick dwellings largely financed through Caja loans. The Caja reported in 1977, two years after their formal program ended, that 804 families had received some form of housing solution, with an average aid value of P\$21,428 each. (1)

The Caja's upgrade program terminated with the closing of their field office in 1975. That same year, a total census of the barrio was conducted by a local Catholic charity called Social Work of Barrio Las Colinas (Obra Social del Barrio Las Colinas). (2) Although the census was designed to measure the educational needs of the children and the vocational training levels of their parents, a significant amount of housing-related information has been inferred. The census showed that the growth rate of Las Colinas was still high. Approximately 1200 families, or 7500 persons, were now living there. Only 270 families were original invaders and almost 30% of the population was renting. By 1976, there were 616 brick, 37 wood, and 3 prefabricated houses built to acceptable standards. Only 140 bamboo, mud, and tar-paper shacks remained. Most belonged either to original invaders who did not sign contracts with the Caja, or to recent invaders who had squatted in the vacated danger zone after the Caja's field office was closed.

Other conditions had also improved. Employment stability had greatly increased, as had the overall income level. Although the

(1) Caja de la Vivienda Popular. "Caja de la Vivienda Popular 1942-1977," Bogota: Caja de la Vivienda Popular, 1977.

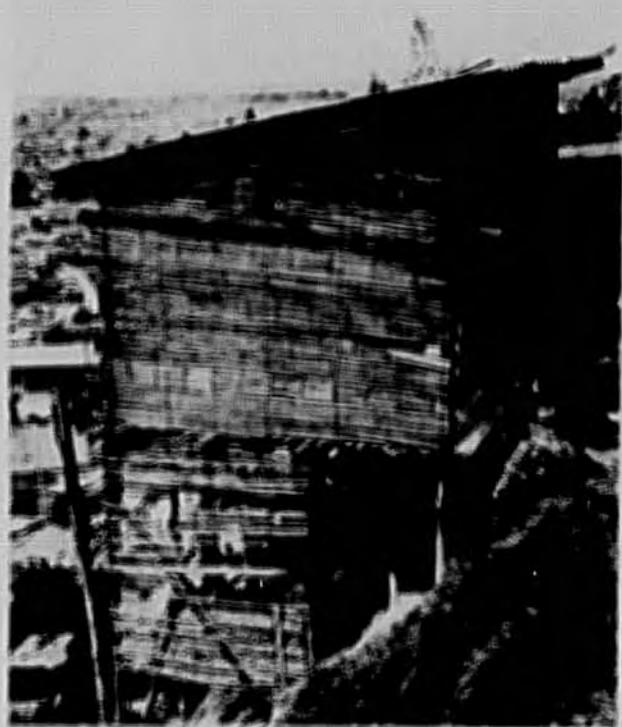
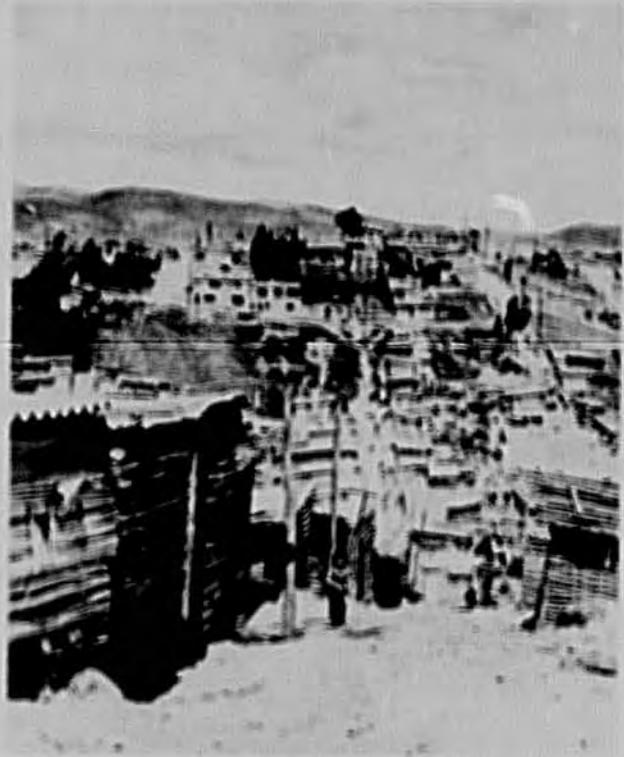
(2) Appendix B contains an annotated example of the questionnaire used by Social Work of Las Colinas.

Social Work categories differ from the CCC's original survey, Table 3.2 shows that overall family incomes had greatly improved.
(1)

INCOME (MONTH)	FAMILIES	PERCENT
500-1000	298	27.40
1001-1500	321	29.50
1501-2000	185	17.00
2001-2500	131	12.00
2501- UP	154	14.10
TOTAL	1089	100.00

Table 3.2 Family income after upgrading Las Colinas(1975).

(1) Centro Comercial de la Escuela Mediana. "El Estudiantil."
Bogota: Obra Social del Barrio Las Colinas, 1977.



Typical streets and invasion shacks before upgrading.



Permanent infrastructure, sanitary units, and home construction two years after the Caja's upgrading begins.



Upgraded construction eight years after the Caja's program.

Income Earnings Through The Dwelling

Although shelter is the first reason families invest in their homes, it is not necessarily the only, or the most important one. When more than 1100 householders in Las Colinas were asked if they used their homes to supplement their incomes, 28% said that they did. Another indication of the magnitude of income earnings is the fact that almost 40% of all householders surveyed said that they were renters. When the difference between owners' and renters' family sizes are considered, almost 30% of the entire barrio population is renting and providing a new landlord class with a highly liquid source of income. (1) Not only is renting rooms, apartments and entire dwellings common, a significant number of owners and renters operate retail stores, light manufacturing, and warehouses.

Given that renting was relatively low in Las Colinas before upgrading began, there is little doubt that public investments such as materials loans and utilities, helped achieve a significant housing multiplier. Materials and utilities are not enough in themselves to cause owners to build rental units. Land values must also be rising because of 1) better transportation to the barrio, 2) increased housing demand by overall growth in the city, and 3) greater attractiveness to the barrio because of overall development. Capitalizing on increasing landvalues through rents is one way landowners can realize liquid income from it.

It is important to understand the significance of this source of income to owners in order to see if renters are from the low-income groups that projects hope to reach, and whether policies such as rent control have any effect on rental markets and home investment. Although a survey was not specifically designed for analyzing renting, typical rents from the open surveys can be used. Combined with income and tenancy data they provide an estimate of what land and dwellings are worth, and at what point building more rental property will be a poor investment. It is particularly important to know where government investment makes a difference, and how to monitor and evaluate income earnings through the dwelling.

Who are these renters and business entrepreneurs, and how are they benefiting from public housing programs? When households were disaggregated into those who used their homes for income earnings and those who do not, the following breakdown resulted. Of the 676 owner households, 35% used their homes for income earnings. Of the 427 renters interviewed, 15% used their rented space for income earnings. Not surprising is the fact that 60%

(1) A weighted average of 675 owner households has a mean value of 6.38 persons (S.D.=2.70) while renters have a mean of 4.70 persons (S.D.=2.32).

of all owners using their homes to supplement their incomes, did so by renting out individual rooms and small apartments. Over half of the houses in Las Colinas had multiple private entrances. Given that only 35% were currently renting space out, about 15% to 20% more owners had already designed their homes for that purpose.

Almost 71% of all renters live in a single multipurpose room. Only 4% rent entire houses while about 25% rent 2- and 3-room apartments. Rents for single rooms are from P\$400 to P\$600 per month depending on location, quality of construction and level of services. Apartments are commonly two or three rooms, generally on the same level with private entrances. Typical rents are from P\$1200 to P\$1900 per month. (1)

In addition, 20% of all owners and 15% of all renters operate small retail shops or engage in light manufacturing and warehousing within their homes. Small general stores, shoe repair shops, bakeries, dressmakers, grocery and dry goods stores, tailors, fruit and vegetable stands, fuel depots, and bars are the most common.

Who are landlords attracting? The survey shows that renters are very definitely young married couples with one or two children. Unlike renters in more developed countries where they tend to be bimodal by age -- numerous young households, relatively few middle-aged renters, and again, many elderly ones -- these renters are almost exclusively under 35 years of age. When the age of the household head is tabulated by tenancy, there is a dramatic cross-over from predominately renting before 35, years of age to predominately owning after 35. (Table 3.3 shows that the number of renter households sharply declines after 35 while the number of owner households sharply increases.) The chi-square and significance level indicate that age and tenancy are very interdependent.

Where do all the elderly go? Las Colinas is an upgraded invasion barrio. Most invaders were young families 18 years ago, putting them in their mid-40s today. It is common in Colombia to find grandparents moving in with their children or having their children move in with them. Either way, the oldest son or son-in-law will be considered the household head. Table 3.3 shows the combined effects of the young invaders and grandparent-cum-children households. (2)

(1) Rents stated in 1978 prices.

(2) When the ages of a household's dependents are tabulated, one frequently encounters young children and an elderly person. Presumably this is an aunt or uncle.

AGE OF HEAD OF HOUSEHOLD	TENANCY		ROW TOTAL
	OWNER	RENTER	
15-24	5	75	80
	6.3	93.8	7.9
	0.8	20.1	
	0.5	7.4	
25-34	85	143	228
	37.3	62.7	22.5
	13.3	38.2	
	8.4	14.1	
35-44	205	81	286
	71.7	28.3	28.3
	32.1	21.7	
	20.3	8.0	
45-54	221	48	269
	82.2	17.8	26.6
	34.6	12.8	
	21.8	4.7	
55-64	86	19	105
	81.9	18.1	10.4
	13.5	5.1	
	8.5	1.9	
65-74	30	7	37
	81.1	18.9	3.7
	4.7	1.9	
	3.0	0.7	
75-84	6	1	7
	85.7	14.3	0.7
	0.9	0.3	
	0.6	0.1	
COLUMN TOTAL	638	374	1012
	63.0	37.0	100.0

CHI SQUARE = 249.77 DF = 6
SIGNIFICANCE = 0.0000

Table 3.3 Age of the household head by tenancy in Las Colinas.

The general cross-over pattern from renter to owner, holds for all renters with one major deviation: those who use their space for income earnings definitely start out renting almost 10 years later in life, and continue doing so for much longer. They also have significantly higher incomes and family sizes than renters without such dwelling use. Starting out later seems consistent with the fact that opening a business usually implies an apprenticeship somewhere else, increased formal education, or a period where start-up capital and equipment are accumulated.

In light of what was said about their age one expects renters in general will have lower incomes than homeowners as a whole. There is a maxim that associates increased age with increased income. From Table 3.4 it is surprising to see that owners are only slightly better off. Their incomes are not as dramatically different as one would expect for their ages or for having accumulated the wealth needed to build a home.

	HOUSEHOLD INCOME					ROW TOTAL
	\$500- \$1000	\$1001- \$1500	\$1501- \$2000	\$2001- \$2500	\$2501 & UP	
TENANCY	-----					
OWNERS	178 26.7 59.9 16.5	190 28.5 59.2 17.5	104 15.6 56.5 9.6	85 12.8 64.9 7.8	109 16.4 71.2 10.0	666 61.3
RENTERS	119 28.3 40.1 11.0	131 31.2 40.8 12.1	80 19.0 43.5 7.4	46 11.0 35.1 4.3	44 10.5 28.8 4.1	420 38.7
COLUMN TOTAL	297 27.3	321 29.6	184 16.9	131 12.1	153 14.1	1086 100.0

CHI SQUARE = 9.69 DF = 4
SIGNIFICANCE = 0.0459

Table 3.4 Tenancy and household income in Las Colinas.

Table 3.4 has a high number of observations (1086). Even slight variations will tend to show statistical significance, yet the strength of association between tenancy and income is very weak. Based on this table alone, the claim can not be made that renters are any richer or poorer than owners on the whole. Although there is little statistical significance to the overall income differences, there are some minor differences. There are also specific ways in which owners use their homes. Do the owners who do not use their homes for supplemental income differ from those

who do offer rooms, run small shops, or manufacturing, or those who do both? This comparison shows a reasonably strong association. Essentially, owners who only rent out rooms or apartments do not have significantly different out incomes from owners who do not use their houses for income. Owners who use their homes for income supplement in other ways, however, have notably higher incomes than owners who do not. It is reasonable to expect that owners who rent out rooms as well as operate shops, etc. would be very investment-conscious. Indeed they are, because their incomes show the greatest overall increases when compared to those who do not use their homes for income.

The case of renters using their space for small shops and manufacturing is much the same as for owners: they show higher income than renters who use their space only for shelter. It is interesting to note that there is no significant difference between the income distribution of owners and renters who engage in retail shops. One might expect store owners to derive some increased income over renters simply because they are permanent residents; this survey of homes in which there is a business does not show that difference.

Summary

Reviewing these results: 1) there is no income difference between owners and renters as a whole, or between owners who rent out space and the renters who consume it, 2) owners who simply rent out rooms or apartments have only slightly higher incomes than owners who did not, and 3) only the minority of owners who either run shops for themselves or run shops and rent out space as well, have significantly higher incomes than renters.

The lack of association between income and tenancy means that one cannot reject the hypothesis of independence between income and tenancy. One must accept that for this particular upgrade project at least, renters are the same as owners. Thus the idea that upgrading might reach families with still lower income through renting, seems unlikely. Not only is this project not reaching a lower income group as Table 3.4 shows, the age differential between owners and renters that was noted earlier, indicates that renters are likely to have higher permanent incomes than owners because they have the same incomes at an earlier time in their lives.

Owners and Renters

The lack of significant differences between owners' and renters' incomes would be an important research finding. It is necessary, however, to be more confident that this is true, and not falsely base conclusions on the results of just one or two tabulations. Other ways to check income differences are to see if 1)

owner-renter employment types are significantly different, 2) spatial location affects owner-to-renter ratios, 3) sex or migration of the households differ, or 4) materials used in the dwelling relate to tenancy type.

The survey uses nine general categories of employment. When the number of households is tabulated in each, there is still very little difference in the distributions between owners and renters in each occupational category. (1)

To see if owners living in certain areas tend to have more renters than others, the owner-to-renter ratio in each block can be compared to that of the overall barrio ratio. To make a proper comparison, one must exclude renters of commercial property because their businesses are likely to relate to a few main circulation routes through the barrio. Tabulating owner-to-renter ratios block by block shows that there is very little central tendency for rental property, that is, room and apartment renters do not cluster near major roads, markets or areas where more public services are available. With very few exceptions, the residual difference between the proportion of owners and renters on each of the 40 blocks in the barrio did not vary significantly from the distribution of the barrio as a whole. There is, however, a definite cluster effect among the retail stores, as one would expect, and renting is a phenomenon equally widespread throughout the area. All locations in the barrio are not equally well developed or desirable to live in, and locational differences are reflected in varying levels of building permanency and the rents charged, not particularly in the ratio of owned to rented households.

Renting in Colombia is generally considered an inferior kind of tenancy. Just how strong the urge is to own land is shown by the high number of renters becoming land-owners themselves after 35 years of age. One could further hypothesize that those families who continue to rent do so largely because they have low incomes and can not afford to own property and build.

The analysis links age, income, work, and location with tenancy. It is useful to know if the sex of the household head shows any systematic relationship with tenancy. One might expect to see a higher proportion of female household heads renting because self-help construction is usually associated with males. Also, women generally have lower overall incomes than male heads of households. A test of this hypothesis shows no statistical association, however.

(1) Significance level is 0.00496, chi-square is 15.83 with 8 degrees of freedom, and 851 observations. Work categories are: hourly employee, business man, construction, salesman, chauffer, musician, mechanic, maid, or other.

TENANCY	SEX OF HOUSEHOLD HEAD		ROW TOTAL
	MALE	FEMALE	
OWNER	527	125	652
	80.8	19.2	61.7
	61.4	62.8	
	49.9	11.8	
RENTER	331	74	405
	81.7	18.3	38.3
	38.6	37.2	
	31.3	7.0	
COLUMN TOTAL	858	199	1057
	81.2	18.8	100.0

CHI SQUARE = 0.13 DF = 1
SIGNIFICANCE = 0.7184
PHI = 0.01

Table 3.5 Tenancy by Sex of household head in Las Colinas.

From Table 3.5 one can only conclude that the institutional mechanisms that lead to the land titling in this upgrade program are no more discriminatory toward sex than overall barrio renting markets.

It is often speculated that upgrade projects increase rural to urban migration by legalizing squatting. If migrants do not live with friends when they arrive, it is likely they will rent. When household heads were asked where they lived prior to moving into the project, owners and renters showed exactly the same distribution: 76% of both reported that they had lived previously in Bogota or some other city, while only 24% were from rural areas. Rural migrants tended to come from the neighboring departments of Boyaca and Tolima. The vast majority who reported they were previously in another city said they were still from the department of Cundinamarca where Bogota is located. Table 3.6 shows the exact distribution and the extremely low chi-square values obtained.

TENANCY	PROJECT PRIOR RESIDENCY		ROW TOTAL
	URBAN	RURAL	
OWNERS	515	160	675
	76.3	23.7	61.3
	61.3	61.1	
	46.7	14.5	
RENTERS	325	102	427
	76.1	23.9	38.7
	38.7	38.9	
	29.5	9.3	
COLUMN TOTAL	840	262	1102
	76.2	23.8	100.0

CHI SQUARE = 0. DF = 1
SIGNIFICANCE = 0.0000
PHI = 0.0

Table 3.6 Tenancy and prior residency in Las Colinas.

The results are consistent with those from the open interviews. Most of the owners who invaded said they were previously paying rent in either Bogota's center city inquilinatos or in one of the numerous poorer barrios on the perimeter of what were then the city limits (Barrios 20 de Julio, Marco Fidel Suarez, San Carlos, Las Granjas, San Vicente, Las Cruces, or Restrepo). Only a few invaders were recent arrivals from the campo. Given the same rural/urban split for owners and renters, Las Colinas seems to be offering much the same to newly formed families looking for land as the previously mentioned barrios offered the owners 18 years ago. Owners reported that the renters generally stay less than a year, it seems that the barrio is a queuing area for families looking for land in the very active pirate barrios, or waiting for an opportunity to invade themselves. (1)

It is unusual to get such low measures of association as indicated in Table 3.6. The observed counts in each category are almost exactly what their expected theoretical values would be if the table had been determined from the marginal row and column values only. When the total number of observations is as large

(1) On several occasions, the author had interviewed families in invasion barrios and found that they were residents of Las Colinas. Basically, they said that they were getting land for themselves or one of their children and paying rent elsewhere in the event the invasion fails.

as 1102, even slight variations yield significant chi-square values, because that measure is directly proportional to the number of observations. Although the table results appear quite consistent with our open interviews, one can not help thinking that there might be a third variable that is masking the complete interaction.

There is a fairly typical pattern for developing a house for rental use. Therefore one would expect there to be more owners living in permanent material dwellings than renters, when taken as a proportion of the total. Table 3.7 shows that there is only a slight association between tenancy and the predominant construction material used in the dwelling.

	DWELLING MATERIALS		ROW TOTAL
	PERM	NON-PERM	
TENANCY			
OWNERS	524	143	667
	78.6	21.4	61.2
	59.5	68.4	
	48.1	13.1	
RENTERS	356	66	422
	84.4	15.6	38.8
	40.5	31.6	
	32.7	6.1	
COLUMN TOTAL	880	209	1089
	80.0	19.2	100.0

CHI SQUARE = 5.39 DF = 1
SIGNIFICANCE = 0.0202
PHI = 0.07

Table 3.7 Tenancy by dwelling material permanency in Las Colinas.

It is no surprise that 78.6% of the owners live in permanent dwellings while the other 21.4% live in moderately improved shacks. At first inspection, the high percentage of renters in permanent dwellings may seem contrary evidence to the dwelling construction pattern described in Chapter 1, but it is consistent. Homeowners are very aware that their land values are rising. There is little doubt that they will build permanent rental space as soon as they can, simply because this allows them to capture more of the location rents than provisional shacks do. This is particularly important when store fronts and apartments are in the offing because they imply full services, private entrances, individual kitchens, and bathrooms -- major investments rarely associated with shacks.

The demand for commercial space is another important way in which dwelling construction relates to tenancy. The number of rooms inhabited is moderately associated with the renter's shelter income-earnings preference. Table 3.8 shows that when people are categorized by what they rent, renting entire houses is not very common; only about 5% do so.

DWELLING USE	FACILITY RENTED			ROW TOTAL
	ROOMS	APARTS.	ENTIRE DWELLING	
SHELTER ONLY	265	82	14	361
	73.4	22.7	3.9	84.5
	87.5	75.9	87.5	
	62.1	19.2	3.3	
INCOME EARNINGS	38	26	2	66
	57.6	39.4	3.0	15.5
	12.5	24.1	12.5	
	8.9	6.1	0.5	
COLUMN TOTAL	303	108	16	427
	11.0	25.3	3.7	100.0

CHI SQUARE = 8.22 DF = 2
SIGNIFICANCE = 0.0164

Table 3.8 Dwelling use by facility rented in Las Colinas.

Whether or not a family will rent a single room or an apartment depends on the use of the space for earning income. Although 62% of all types of renters rent single rooms, there is a higher proportion of apartment renters among renters using their home for income earnings than those that do not. This suggests that owners who rent out store fronts with habitable back rooms are offering renters a package deal in which the housing aspects are as important as the commercial aspects of what is rented.

Although there appear to be surprisingly few differences between owners and renters, renters definitely influence owners' investment patterns. To build rental space, it is necessary first to solve one's own shelter needs. One expects to find some younger, smaller families renting space to the extent that their unstable earnings will permit. Middle-aged owners are likely to be the least able to rent. Their ongoing expenditures for food, clothing, and education may preclude additional ones for building because their family sizes are the largest. As families grow older, and children begin moving out, parents can spread out and consume more of the house for themselves, rent some of the surplus out, add still more space and rent it, or rent or sell the entire house.

This scenario argues for a strong relationship between the owner's life cycle and his investment in building rental space. The strength of this relationship can be tested by tabulating the owner's age and the way the dwelling is used for income earnings. Table 3.9 summarizes how 629 owners of different ages used their dwellings: 54.7% do not use their homes at all for income earnings, while 45.3% do. The low number of young and old owners is consistent with the age of the households at the point upgrading began in Las Colinas. What is surprising is the fact that statistically there is no association between the age of the owner and the way the house is used. This appears to contradict what has been said about life cycle and dwelling use. If one ignores the few cases at the extreme age groupings, Table 3.9 shows that dwelling use is relatively constant and does not vary with age as expected/

Measuring the use of the dwelling for income earnings requires some indication of the intensity of use. Table 3.9 merely states whether or not a certain use exists, it does not indicate how much it is used. When the owner's age is tabulated by the total number of families living in the dwelling, an entirely different relationship is found.

		DWELLING USE			
		NO DWELLING EARNINGS	DWELLING EARNINGS RENTER	DWELLING EARNINGS SHOPS	ROW TOTAL
OWNER'S AGE					
15-24		2	2	0	4
		50.0	50.0	0.0	0.6
		0.6	1.2	0.0	
		0.3	0.3	0.0	
25-35		44	36	17	85
		51.8	28.2	20.0	13.5
		12.8	14.7	13.9	
		7.0	3.8	2.7	
35-44		118	80	40	208
		56.7	24.0	19.2	33.1
		34.3	30.7	32.8	
		18.8	7.9	6.4	
45-54		122	84	44	212
		57.5	21.7	20.8	33.7
		35.5	32.2	36.1	
		19.4	7.3	7.0	
55-64		40	38	17	85
		47.1	31.9	20.0	13.5
		11.6	17.2	13.9	
		6.4	4.5	2.7	
65-74		16	11	3	29
		55.2	34.5	10.3	4.6
		4.7	6.1	2.5	
		2.5	1.6	0.5	
75-84		2	4	1	6
		33.3	50.0	16.7	1.0
		0.6	1.8	0.8	
		0.3	0.5	0.2	
COLUMN TOTAL		344	163	122	629
		54.7	25.9	19.4	100.0

CHI SQUARE = 10.88 DF = 12
SIGNIFICANCE = 0.5392

Table 3.9 Owner's age by dwelling use in Las Colinas.

What is happening is that the life cycle of the owner is associated with the presence of the second and third renters, but not with the first. This means that the first housing multiplier results as soon as families build what they need for themselves and for an additional family. Essentially, this multiplier comes at the beginning of upgrading when the house design (foundations, entrances, etc.) is set up for income earnings. This is why the dwelling use is so constant in Table 3.9. The existence of the second or third renters is related to the life cycle of the family, which means that this multiplier occurs later on. It is likely to result from space freed by departing children or incremental secondary construction financed by the owner himself long after the upgrading intervention ceases.

Summary

The discovery that there are no differences between owners and renters is significant. Homeowners do not tend to rent to families with incomes lower than their own. Although it may be done in some cases, the overall distribution of owners and renters indicates that there is no general case for the practice. The notion that owners will tend to maximize their incomes by renting out their improved dwelling while they remain in the unimproved shack also must be rejected. At this point, one can state that renting is serving a highly transient young family group waiting to become landowners themselves. The upgrade area is serving much as the older center city inquilinos did years earlier. Although the benefits of the projects are not reaching a lower income group through renting, they are at least reaching young families with the same income, while pressuring owners to accelerate their own home construction. Thus there is an economic symbiosis, owners derive real income increases and renters find acceptable short-term housing.

The study of life cycle indicates that owners who have not planned to rent out rooms by the time they initiate permanent construction are unlikely to do so later. Those who do will have at least one renter at all times. As families age and their children start leaving home, part of their freed space and some secondary construction will be used for second and third renters.

Rents, Housing Prices, and Private Investment

The rents charged and the prices for which owners are willing to sell their homes imply a subjective interest rate or rate of return on capital investment that home builders expect. For owners who do not use their homes for earning income, prevailing rents are a good measure of the value of their house. Rents are future benefits and are performance measures of capital investments in the home. When a family builds rental property, they are postponing current consumption. Their willingness to

postpone can be reduced to a time preference for some future consumption. An owner's particular time preference will influence his willingness to save. If his time preference is low, he will probably save more, occupy less of his home himself, and will build up rental property at a higher rate than builders with higher time preference -- all other things being equal. Families with high time preferences are just the opposite. They will tend to invest for income earnings through their homes only if the return is high.

Research on time preference is relatively new, but very promising as a model for evaluating private investment. It can be used with other indicators to measure building rates, housing multipliers, dwelling maintenance, and owner reaction to rent control and zoning changes affecting multi-family and commercial uses of houses. Although an exact relationship between time preference and income is itself a research problem, it is generally believed that low-income groups have the highest time preferences, which tend to decrease as their incomes rise. A general pattern is the higher the current to future income, the lower will be the rate of time preference; while the lower the current to future income, the higher will be the rate of time preference. Very low-income families have very high time preferences. They can not further reduce their current consumption of certain things such as food and shelter in order to "invest" in the future no matter how much better off they might be tomorrow for having done so.

Rents in Las Colinas ranged from P\$300 to P\$600 a month in 1978 for single rooms measuring approximately twelve square meters. Rooms were generally made of rough-finish brick walls without interior stucco (obra negra), and had cement floors, and ceilings. Rented rooms rarely have separate street entrances, individual utility connections, or private baths and kitchens. A family of four will typically cook and sleep in these single multipurpose rooms.

Apartments are two or three general rooms with private entrances, and cooking and bath facilities. Although rents range from P\$1400 to P\$3000 a month, most were under P\$2000. Utilities are usually included in the rent because the water and power companies will not make multiple connections to houses in barrios where residents receive subsidized flat rates.

The turnover rate for rental rooms is very high. The average stay is less than one year, while apartments turn over every two to three years. The introduction of rent control in 1975 encouraged owners to turn over renters quickly to keep rents high. Even though rent control was rarely enforced in Las Colinas, the fact that Colombian law protects the renter from eviction regardless of his payment history, keeps owners on guard. If a tenant has occupied a unit for at least seven months, if he is evicted, the owner must allow him to remain up

to one year rent-free while he looks for other housing. Owners will rarely sign a lease and will accept a renter only if he is highly recommended by friends. Las Colinas' central location and good public services create high demand for units. Owners rarely have to look for very long to fill them.

From interviews of residents in 1978, it was found that almost every homeowner knew what prevailing rents were, and that most knew the current market value of their homes. No one interviewed suspected that there was a systematic relationship between what they were charging for rents and what they would sell their houses for. One family, whose income was P\$3900 per month, reported that their second-floor apartment rented for P\$1450 per month and estimated that their home would bring about P\$200,000. A second family, with an income of P\$1350, built the Caja's minimum house and rented out two rooms for P\$325 a month. They themselves lived in two other rooms that they had considered renting out at P\$400 each. They were recently offered P\$54,900 for their house but thought that was a low offer. A third family built a three-story brick walk-up with a first floor store front. They used to operate the store themselves and live in two smaller back rooms that were connected to a standard Caja sanitary unit. The upper floors were rented for P\$1400 and P\$1300 per month. Their income from rent and two part-time jobs was \$5300 pesos a month. Today they have rented out the shop and back rooms for P\$900 a month and have moved into the second-floor apartment. Although their lot is not as well located as it once was for a local shop, they think that they can sell the house for at least P\$275,000 and maybe as high as P\$300,000 if they convert the ground floor into another apartment. For each of these cases, one can calculate the time preference that families have for the capital investments in the homes.

The present value of a stream of future rents is a good approximation of the value of a house. It measures the present value of total revenues from rents that the dwelling can produce at a given time preference or interest rate. To estimate the value of homes, one must impute a monthly rent for any rentable space not currently occupied, and any rentable space that the owner himself is occupying. The rents for unoccupied space or that the owner "pays himself" can be estimated by comparing the size and quality of the space with that of similar space already rented out. Algebraically, the present value of a future rent stream is as follows:

End of discounting period

$$(a) \text{ Present value of capital} = \sum_{\text{Year}}^{\text{Year} = 1} \frac{\text{Rent}}{(1 + \text{Time preference})^{\text{Year}}}$$

Although the theoretic present value of future rents is derived from an infinite number of years of rent from the capital, it turns out that homeowners in Las Colinas have high time preferences and that a simpler and more convenient equation will approximate the same present value of rents just as well: (1)

$$(b) \text{ Value of capital} = \frac{\text{Future rents from capital}}{\text{Time preference}}$$

If the first family can rent their second-floor apartment for P\$1400 per month, it is likely that the first floor occupied by the owner himself would rent for P\$1400 to P\$1500 per month. If the owner would sell the house for P\$200,000, his time preference -- expected interest rate on his investment -- is about 18%. (2) The second family who built the Caja's minimum house currently has two rent streams of P\$325 a month, and they estimate that the rooms they occupy would rent for P\$400 a month. If one assumes that their offer of P\$54,900 was about 10% lower than what they could get by advertising a little, their time preference is about 21%. (3) The third family already has units rented for P\$1400 and P\$1300 per month and could probably get P\$1300 to P\$1400 for the converted ground floor. If they sell their home at the lower offer of P\$275,000 their time preference will be 17%; at the higher offer of P\$300,000 it will be 16%. (4)

(1) When the end of the discounting period is infinity, formula (a) becomes (b).

(2)
 $TP = 12(P\$1450 + P\$1500) / P\$200,000$
 $TP = 0.18$

(3)
 $TP = 12(P\$325 + P\$325 + P\$400) / P\$60,500$
 $TP = 0.21$

(4)

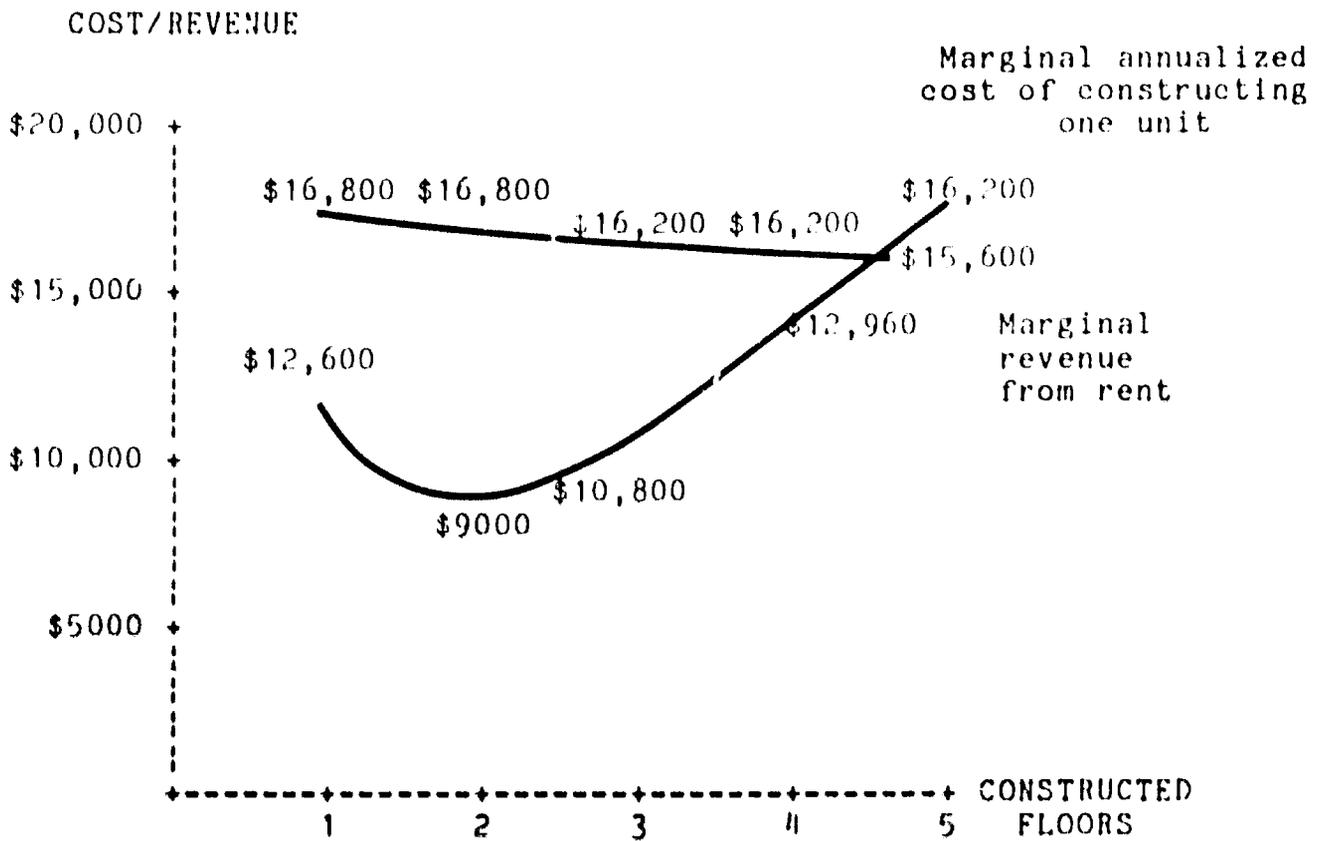
All of these time preferences are relatively high and tend to reflect the low incomes of the residents. Although one might question how representative these values are, the inverse relationship between time preference and income appears to be confirmed. The second family has the highest time preference and the lowest income while the first and third owners had progressively higher incomes and decreasing time preferences.

Time preference is also useful in estimating future construction. One owner interviewed had designed his house for multi-floor construction. The first floor cost about P\$70,000 to build. The second floor cost P\$50,000 to add because most of the expense of the first floor went into additional foundations and structural flooring. The owner's second floor tenants pay P\$1400 for an apartment very similar to the one on the first floor where the owner lives. The same contractor who built the first two floors estimated that third, fourth, and fifth floors would cost approximately P\$60,000, P\$72,000, and P\$90,000 to build. Costs increase 20% to 25% per floor beyond the second because masons charge much more for the additional scaffolding, logistics, and labor involved in moving materials up several floors. The owner said that rents decrease the further up renters have to walk. He would have preferred to build additional space at the rear of the lot but the excavations required would cost more than multi-floor construction.

Using the rent from the second floor apartment and imputing a rent for the first floor apartment where the owner lives, one can generally estimate that the owner's time preference is about 18%. If rents from third, fourth, and fifth apartments would be about P\$1350, P\$1350 and P\$1300, one can see that it will not be profitable for the owner to build beyond four floors. Figure 3.1 graphically shows the marginal cost and revenues for the existing and proposed construction. Note that the point at which marginal costs of construction equals marginal revenue from rents is midway between four and five floors. Building five floors will definitely not be profitable, while building four still is.

$$\text{TP(1st Offer)} = 12(\text{P}\$1400 + \text{P}\$1300 + \text{P}\$1300) / \text{P}\$275,000$$
$$\text{TP(1st Offer)} = 0.17$$

$$\text{TP(2nd Offer)} = 12(\text{P}\$1400 + \text{P}\$1300 + \text{P}\$1300) / \text{P}\$300,000$$
$$\text{TP(2nd Offer)} = 0.16$$



FLOOR	RENT/MONTH	MARGINAL REVENUE RENT/YEAR	MARGINAL COST/APT	MARGINAL ANNUALIZED COST
1	1400	16800	70000	12600
2	1400	16800	50000	9000
3	1350	16200	60000	10800
4	1350	16200	72000	12960
5	1300	15600	90000	16200

(1) Time Preference = 18%

Figure 3.1 Marginal cost and revenue for multi-apartment construction in Las Colinas.

Although the open interviews do not deal with enough cases to establish precise estimates of time preference as a function of income, one can see that any policy that regulates income earnings through the dwelling will have a serious impact on this upgrade project. Regulation can take several forms -- rent freezes or roll-backs, eliminating multi-family and commercial zoning, or banning tenant at will leasing.

Rents have already been frozen at 1975 levels although this has had little direct effect in Las Colinas. It is possible to estimate its impact if enforced. Table 3.10 shows that the income distribution of homeowners is highly related to the ways in which they use their houses. Not every owner derives rent income even though the current market is very good. 57.6% of homeowners do not use their homes at all for income earnings. Presumably rent control will not affect their incomes, but might have secondary effects on depressing the values of homes.

From Table 3.10, one can see that 22.7% of the owners derive income from rents and another 4.8% from combined rents, and other sources such as small shops or light manufacturing businesses. A total of 27%, or 171 households, would therefore be directly affected by rent control enforcement. If one supposed that the lowest income families (monthly incomes between P\$500 and P\$1000) were renting out just one room at the minimum P\$300 rent, about 30% to 60% of their total income would be from this source. Higher income families with P\$2501 per month incomes would derive 56% of their incomes from rents if they rented out a single apartment at the prevailing rent. Even though these figures are approximations, it is certain that rents will be a significant part of these families' incomes.

Freezing rents will tend to decrease family incomes and their time preferences are likely to increase as a result. There are two general income cases. If families can offset their rent losses through increases in wage, their time preferences will remain unaffected. If they can not, their real income begins to fall as inflation rises, and their time preference will increase.

	HOUSEHOLD INCOME					ROW TOTAL
	\$500- \$1000	\$1001- \$1500	\$1501- \$2000	\$2001- \$2500	\$2501- UP	
DWELLING USE						
NO DWELLING INCOME	98 27.4 60.5 15.8	116 32.4 64.4 18.7	56 15.6 55.4 9.0	39 10.9 51.3 6.3	49 13.7 48.0 7.9	358 57.6
RENT ROOMS & APARTMENT	40 28.4 24.7 6.4	40 28.4 22.2 6.4	18 12.8 17.8 2.9	19 13.5 25.0 3.1	24 17.0 23.5 3.9	141 22.7
COMMERCIAL ENTERPRISE	20 21.7 12.3 3.2	14 15.2 7.8 2.3	21 22.8 20.8 3.4	16 17.4 21.1 2.6	21 22.8 20.6 3.4	92 14.8
BOTH RENT & COMMERCIAL	4 13.3 2.5 0.6	10 33.3 5.6 1.6	6 20.0 5.9 1.0	2 6.7 2.6 0.3	8 26.7 7.8 1.3	30 4.8
COLUMN TOTAL	162 26.1	180 29.0	101 16.3	76 12.2	102 16.4	621 100.0

CHI SQUARE = 23.89 DF = 12
SIGNIFICANCE = 0.0210

Table 3.10 Household income by dwelling use in Las Colinas.

The second family who built the Caja's minimum house had a total monthly income of P\$1950. If their time preference shifted upward just 4 percentage points to 25%, the present value of their future rents would be worth P\$50,400 instead of the former P\$60,800. This is a 15% loss. Owners can do two things. They can crowd more renters into existing structures. Obviously, no one will be building new rental units at this time. More renters might require owners to occupy less space themselves to make more space rentable. Owners can also stop maintaining the building and let them depreciate to a point that approximates the new present value of rents. Even if they eliminate all maintenance, it is unlikely that they can depreciate the building fast enough to break even. For the lower-income groups, the overall effect of rent control will be to depress the capital value of homes, force owners to overcrowd, and cause a lower than normal level of maintenance to occur.

Summary

Examination of rents, housing prices, and construction, points out that owners by and large make rational choices in their home investments. Although few owners knew how they determined rents or sales prices, there was a high degree of consensus. None of the families interviewed was aware that rents, home values, and land values were related. Their investment patterns, however, showed that they were maximizing the ground rent by building as much additional construction as they could afford up to the point where marginal costs and revenues converged. Time preference appears to be a very promising aid. Its principal advantage is convenience. Although the analysis clearly shows that significant variances exist, it seems to offer further investment discrimination among families with similar incomes.

LEGALIZING GOVERNMENT INTERVENTION IN SLUMS

Public investment programs in slums are limited not only by capital resources but also by the nature of the laws regulating public programs targeted to slum areas. Upgrading invasions and pirate barrios in Bogota required a series of enabling legislation to authorize municipal authorities to disburse capital improvements to settlements in which: 1) the land was fraudulently or otherwise illegally obtained, or 2) construction had occurred that had not been approved.

In response to the growing number of invasions and the dramatic effect that barrio piratas were having on Bogota's development, the mayor's office submitted legislation that would allow the city to initiate capital and technical assistance programs in barrios where there was de facto possession of the land, or where clear title was held but normal urbanization and house construction had not taken place. Agreement 22 was the first major piece of legislation designed to normalize government intervention in slums. (1) The intent of the agreement was to restore planning control over low-income housing starts that had been preempted by speculators, to allow residents legal means of obtaining services, to formalize a system for redressing speculator abuses that citizens suffered in clandestine settlements, and to bring newly urbanized land into the tax base of the city. Agreement 22 states that any barrio in a "special residential" zone that had elected and registered a Community Action Group (Junta de Accion Comunal) with District Planning was eligible for technical assistance, low-interest development loans, and public service delivery regardless of their tenure or past construction history.

To define what zones were "special residential," the mayor's office sought and won the City Council's approval of Agreement 51 to draft a new land zoning scheme for Bogota. (2) The legislation called for the classification of all residential areas and each was to be assigned an eligibility code for city programs. Invasion and pirate barrios were designated R-E (residencial-especial), or special residential zones.

Agreements 22 and 51 formalized government intervention in illegal settlements by designating eligibility criteria for public programs, but the legislation had not yet defined the scope of the city's services. It was not until Agreement 65 in 1967, that

(1) Consejo del Distrito Especial de Bogota. "Acuerdo 22 de 1963." Bogota: Departamento Administrativo de Planeacion Distrital, 1963.

(2) Consejo del Distrito Especial de Bogota. "Acuerdo 51 de 1963." Bogota: Departamento Administrativo de Planeacion Distrital, 1963.

minimum design standards for vehicle and pedestrian roads, potable water, electrification, and land use were defined. (1) The basic approach of the legislation was to usher total redevelopment plans into settlements that were politically ready to deal with the city.

Once a settlement was selected for legalization, District Planning (Departamento Administrativo de Planeacion Distrital) would commission a redevelopment plan. They would orchestrate a single development effort negotiated among the public sector agencies such as the light and water companies, the ministry of land and taxation and the national housing development banks. Las Colinas was the first major experiment in this new approach.

Within the first year of the Las Colinas project, it became clear that widespread upgrading in Bogota's slums could not be achieved if every new settlement required a simultaneous consensus and coordinated investment program to be successful. Las Colinas' project overruns already showed that the advantages of lowering project costs through self-help programs were more than offset by the increased administrative costs of coordinating several development programs at the same time. What was needed was a way to make upgrading and legalization efforts logical extensions of regular public service agencies' capital programs without the requirement that they all be undertaken simultaneously. Administrative costs could then be reduced by transferring project implementation from single purpose slum development agencies like the Caja, to the service delivery agencies themselves. Projects requiring community participation could also mobilize residents for fewer projects at a time, another lesson learned in Las Colinas.

In view of the Caja difficulties in Las Colinas and the increasing pressures to expand low-income housing programs in the Special District, the mayor's office made three amendments to Agreement 65. The law now allowed for: 1) long-term development programs, 2) reduced design standards, and 3) project implementation by either public or private entities. In fewer than two pages of changes to article 13, Agreement 20 of 1972 made a significant leap forward by allowing a new minimum housing standard -- sites-and-services. (2)

The changes mandated by Agreement 65 stated four new policies. First, physical development need only supply the following:

(1) Consejo del Distrito Especial de Bogota. "Acuerdo 65 de 1967." Bogota: Departamento Administrativo de Planeacion Distrital, 1967.

(2) Consejo del Distrito Especial de Bogota. "Acuerdo 20 de 1972." Bogota: Departamento Administrativo de Planeacion Distrital, 1972.

- 1) general automobile and pedestrian circulation routes through the development, built on stabilized base densities;
- 2) potable water stations administered by the water and sewer companies of Bogota and checked by the Secretary of Public Health;
- 3) public street lighting built to post and wiring specifications stated by the energy company;
- 4) public telephones within 1 kilometer of the settlement;
- 5) latrine on each lot;
- 6) public clothes washing facility with drainage; (1)

Second, the above conditions could be met by either government, non-government, non-profit agencies such as the Caja, or by incorporated private investors. Third, all projects must have an officially registered Community Action Group. Fourth, District Planning must sanction the design, financing, material selection, and home building process. The same department must keep an information data registry through the Superintendent of Banks of any report of noncompliance by developers. The last policy is the first attempt in Colombia to formalize an ongoing information system to measure the effects of low-income housing policy.

The implications of Agreement 20 were immense. Prior to this law, all physical infrastructure had to be in place before plots could be occupied. Initiating a project always involved large amounts of start-up capital. Previously, any delay in the approval or inspection of utilities, paving, or drainage decapitalized the project and delayed occupation. Lowering minimum design standards and allowing the lots to be occupied as soon as the water and power systems were approved, would lower initial capital requirements, produce immediate returns on investment, and occupy lots more rapidly. The legislators were clearly impressed with the power of private enterprise in Bogota's pirate barrios, and were hoping that a similar investment effect would result from the law.

Reducing start-up costs in new projects would be paramount if Agreement 20 projects were to compete with pirate barrio speculators. Figure 3.2 shows the anticipated impact that the law would make on a typical project. (2) The utility cost per lot using the former standards was approximately P\$6412 while the

(1) Consejo del Distrito Especial de Bogota. "Acuerdo 20 de 1972." Bogota: Departamento Administrativo de Planeacion Distrital, 1972, p. 1.

(2) Departamento Administrativo de Planeacion Distrital. "Aplicacion de las Normas Minimas de Urbanizacion y de Servicios." Bogota: Departamento Administrativo de Planeacion Distrital, Unidad de Mejoramiento y Coordinacion de Barrios, 1978.

Agreement 20 standards allowed a 65% reduction to about P\$2206 per lot. (1)

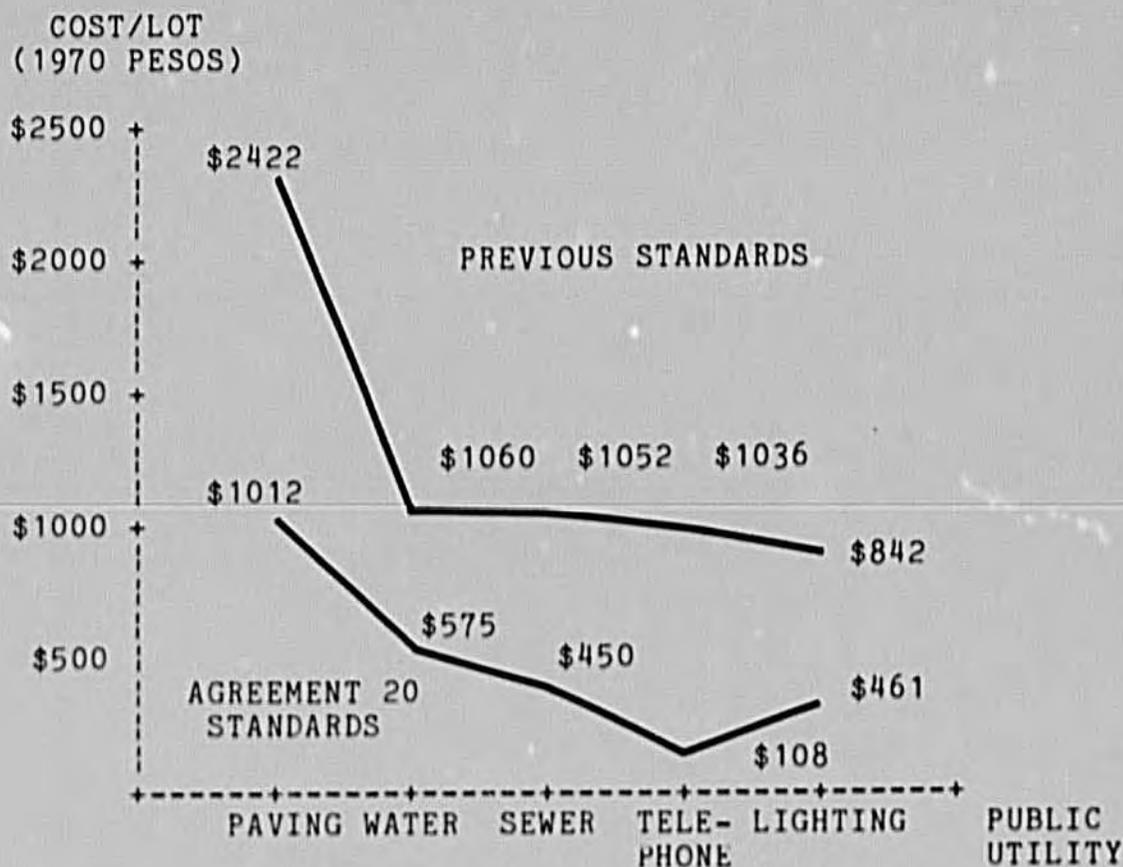


Figure 3.2 Agreement 20 impact on public utility costs.

Agreement 20 refers to itself as preventive action because it focuses on new housing starts. The same year, Agreement 21 was passed authorizing corrective action in existing R-E barrios. (2) Three kinds of settlements were identified in the legislation: 1) legal settlements that were deteriorating because they had grown

(1) Cost items include: 1) paving - base, topping, and sidewalks; 2) water - meter, lot connection, and part of the network; 3) sewer - lot connection and part of the network; 4) telephone - phonesets, cables, and underground channels; and 5) lighting - meters, lot connection, line transformer, and part of the network.

(2) Consejo del Distrito Especial de Bogota. "Acuerdo 21 de 1972." Bogota: Departamento Administrativo de Planeacion Distrital, 1972.

beyond the capacity of their infrastructure, 2) invasion and pirate barrios, and 3) projects started under Agreement 20 but abandoned by the developers because of bankruptcy or corporate dissolution. The intent of Agreement 21 was to guarantee that every home builder would have access to water and street lighting on principal roads. Lighting implies electrification throughout, and power drops to each lot. To encourage the utility companies to step up infrastructure programs in R-E zones, Agreement 21 authorized them to charge standard tariff rates for individual lot connections. The law stated that profits resulting from connections were to revert to a rotary fund to finance further extensions of basic trunk lines.

In invasion or pirate settlements, owners were required to build and maintain latrines until a sewer network was installed. Any readjustment of the lot plan because of roads or reclaiming open space was to be elaborated by District Planning and implemented by the Community Action Group in that barrio. Under the law, the group was eligible to draw capital funds from the rotary fund to the limit of their per capita eligibility to finance mutual-help public works programs. Agreement 21 requires District Planning to form an interagency commission for urban renewal projects. Commission members from each of the public service agencies determine the technical and financial feasibility of upgrade programs. The minimum service level was left to the discretion of the corresponding representative. Bogota's public service agencies were enthusiastic about this provision because it restored their autonomy. They now had control over the design standards that judged the level and quality of their service output. District Planning was further obligated by Agreement 21 to register approved renewal plans with the Land Registry division of District Planning, where land values would be assessed and taxation levels determined.

While Agreements 20 and 21 were being prepared for the City Council, the ICT, District Planning, and National Planning, together commissioned a Bogota-based planning firm, Consultecnicos Ltda., to prepare a technical review of the minimum standards approach to urbanizing land. (1) The findings of this study became the basis for District Planning's project licensing procedures, and two supplemental legislative mandates issued in 1973, covering the responsibilities of private developers in Agreement 20 projects.

Decrees 1259 and 1260 in 1973 were direct results of the Consultecnicos Ltda. study and essentially provided the technical

(1) Consultecnicos Ltda. Estudio de Normas Minimas de Urbanizacion, Servicios Publicos Y Servicios Comunitarios: Primera Parte Normas Fisicas Y Aspectos Generales. Bogota: Instituto de Credito Territorial, 1971.

base for Agreement 20 projects. (1) Decree 1259 specified the requirements for vehicular and pedestrian roads, access to and minimum areas for lots, open space, and utility service levels. Developers were to provide permanent water taps, storm drains, latrines, street lighting, and power connections to each lot. Projects could not exceed a maximum density of 100 lots per hectare, and single-family residences could not exceed three floors. Developers must submit to District Planning a basic topographic plan, a lotting plan, land title, and proof that there were no property liens against the site. (2) The Technical Coordinating Committee for Public Services and New Works would review the plans, assign street names, and number each plot for tax registration purposes. The city maps were also updated to reflect the new plan. Approval of projects was estimated to take six months. Failing one or more licensing steps, the developer was required to repeat the full sequence.

As soon as District Planning approved a sites-and-services project, binding letters of intent were exchanged with the developer, stating what each party would do and in what sequence. Developers were then required to turn over all work and sanitary facilities to public works officials no later than six months from contract signing. The city would monitor the project in four to six field inspections to insure that standards were being met, and that the project would not fall behind.

Decree 1260 was an engineering reference document for each of the service networks associated with a sites-and-services project. Detailed specifications were outlined in the following areas:

Water consumption
Flow estimation
Types of tubing
Hydrant locations
Staged construction
Lot connections

Combined storm and sewers
Flow estimation
location of inlets
Inspection chambers
Staged construction

Sanitary sewers
Flow estimation
Tubing
Inspection chambers
Clean-out boxes

Electrical
Demand rates
Transformer capacity
Voltage fluctuations
Pole design
Wiring specification

(1) Alcalde Mayor del Distrito Especial de Bogota. "Decreto Numero 1259 de 1973" and "Decreto Numero 1260 de 1973." Bogota: Departamento Administrativo de Planeacion Distrital, 1973.

(2) Agreement 20 project licensing procedures are described in: "Consulta Previa Normas Minimas (F-1A)," "Plano Topografico Normas Minimas (F-1-1A)," "Esquema Basico Normas Minimas (F-3A)" and "Proyecto Y Respuesto Normas Minimas (F-3A)" available from Departamento Administrativo de Planeacion Distrital, Bogota.

Staged construction	Public street lighting
Lot connections	Frequency of lights
Materials specification	Light intensity
Storm drains	Pole design
Flow estimation	Wiring specification
Location of collectors	Telephone service
Inspection chambers	Underground cables
Staged construction	Pole height and spacing
Materials specification	

Summary

Agreement 20 and Supplemental Decrees 1259 and 1260 are significant legislative advances. In much the same way that the self-help model contributed to redirecting policy away from total design-and-build approaches, the pirate barrio model contributed to increasing the marketability of low-income housing through private sector participation.

Agreement 20 is too general to evaluate the investment consequences of sites-and-services but the supplemental Decrees 1259 and 1260 are not. Although 1260 goes into considerable technical detail about capital programs, there is a major omission that could institutionalize poor policy performance from the start -- there are no specifications for layout design. Four uncoordinated provisions spanning both decrees, indirectly set design: 1) 19.3% of the total site area is to be designated open space, 2) densities are limited to 100 houses/ha, 3) single-family dwellings may not exceed three floors, and 4) two-family dwellings cannot be built on lots smaller than 75 square meters. (1) The analysis of alternative block designs in Chapter 2 shows that approximately 20% of the site area used for open space could, in fact, be revenue-producing (by land taxation) only if cluster designs are employed. When circulation area is considered, approximately 45% of the entire project area will be non-taxable land if gridiron designs are used. Since Decree 1260 does not mention layout, one can assume that the traditional gridiron block design will dominate. At the legal limit of 100 houses/ha, lots will be approximately 60 to 80 square meters. Decree 1259 requires every lot to have a minimum 6-meter front, thus the lot proportions will range from 1:1.7 to about 1:2.2. The combined effect of the gridiron design and small lots is disastrous. The amount of private land that is taxable is minimized, while the amount of infrastructure per dwelling unit is maximized. (2) In terms of the families who buy

(1) Ibid., Decreto 1259, pp. 4-5.

(2) See Chapter 2 for gridiron and cluster comparisons.

these lots, income earnings potential through the houses is seriously limited. Given the space requirements that Las Colinas residents displayed, families will have to build three floors just to satisfy their own needs. Even when buyers are successful in obtaining the larger lots required for two-family dwellings, it is unlikely that 80 square meters will allow enough space for an entire apartment even with multi-floor construction; single rental rooms seem more likely.

CASE 2: SITES-AND-SERVICES

La Manuelita Experiment

To test the feasibility of Agreement 20 legislation, in 1971 the Caja undertook an experimental sites-and-services project called La Manuelita. Approximately 300 lots were proposed to test Consultecnicos' findings, to measure project implementation times and costs using the new minimum standards, and to evaluate the applicability of draft legislation (Decreets 1259 and 1260) to future Caja projects. About 60% of the beneficiaries were to be selected from families displaced from ICT and Caja slum upgrade projects in barrios Las Colinas, Altamira, Egipto, and others. (1) The remaining 40% would be randomly selected from low-income project applicants.

A small site measuring 3.52 ha was purchased in the township of Suba, a northern suburb of Bogota. Initial studies of the site indicated that a density of approximately 75 houses/ha would result from traditional gridiron plans. Further lot studies showed that the densities could be increased 10%, or from 265 houses to 291, without any changes in the lot dimensions if a cluster system was used instead. Although the Caja had never used clusters before, they were impressed with the fact that higher densities were obtained with less infrastructure. The final design grouped 30 small lots measuring 6 X 9 meters around a 20 X 30 meter open area or court. In one corner of the area a water tap, sanitary facility, six laundry stations and seven showers were located.

On each lot, the Caja constructed a single brick multi-purpose room measuring 3.5 X 3.15 meters and a detached latrine stall at the rear. Because of the simplicity of the sites-and-services approach, the Caja finished the basic project design, contracted the basic urban work, and began installing utilities in less than six months. District Planning monitored the progress of La Manuelita and thought that six months was a desirable implementation time for all Agreement 20 projects. Decree 1259 was still in draft form and was changed accordingly.

By January of 1973, the public works agencies had completed the first phase of installing utilities, and the Caja permitted families to move in. All 291 lots had sewer connections, while 149 had water supplied to the lot. The other households filled water tanks by running hoses from the taps in the court to their

(1) Caja de la Vivienda Popular. "La Manuelita: Como Plan de Desarrollo Progresivo con Normas Minimas." Bogota: Caja de la Vivienda Popular, Distrito Especial de Bogota, 1976, p. 5.

lots. (1) Project costs mounted to P\$1,511,00 for the land and start-up utilities, and P\$1,684,600 for the one room and latrine built on each lot. The ICT charged the Caja an additional P\$46,700 for technical, legal, and financial services during the project. The value of lots was set at P\$11,140 and mortgages designed accordingly.

Because of the fact that most beneficiaries were receiving lots in Manuelita as compensation for displacement from upgrade projects elsewhere, the ICT and the Caja decided to subsidize the mortgage terms. Families were to pay only P\$91.34 per month for 12 years, without any down-payments. The interest rates were approximately 6% per year, of which 2% was for life and fire insurance. Standard bank mortgage interest in 1975 in Bogota was about 18%.

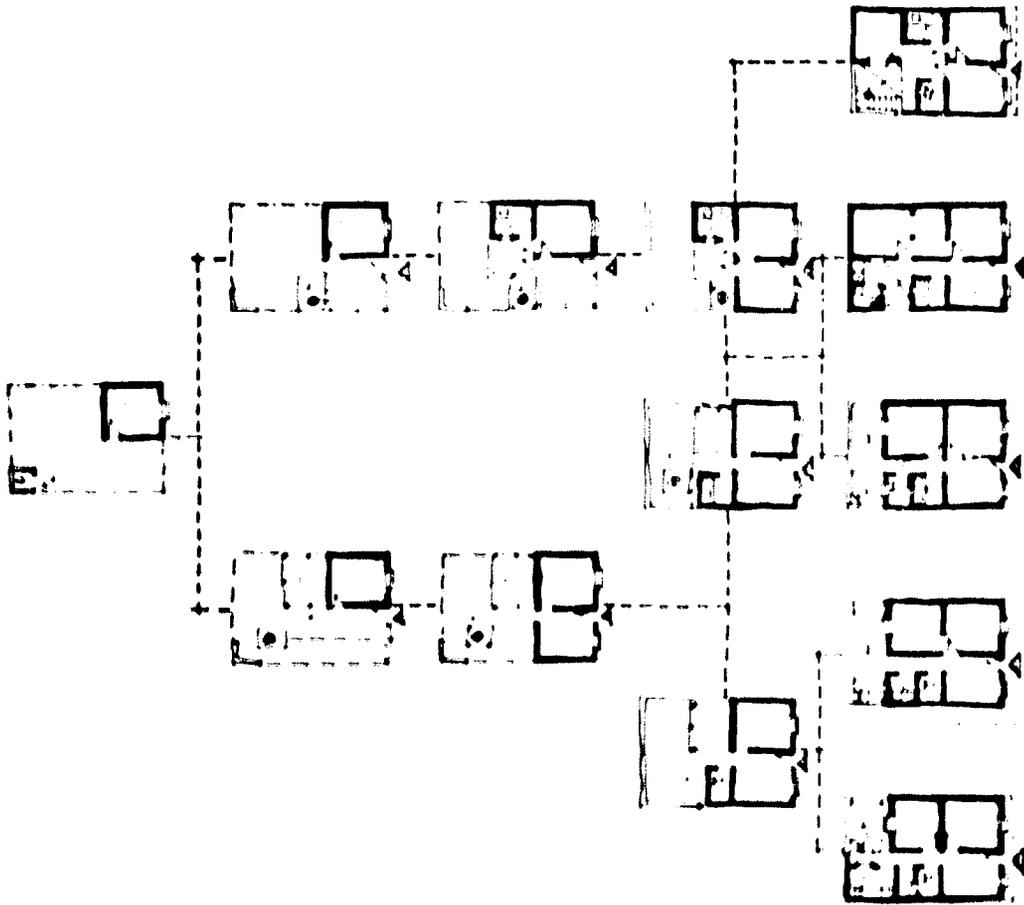
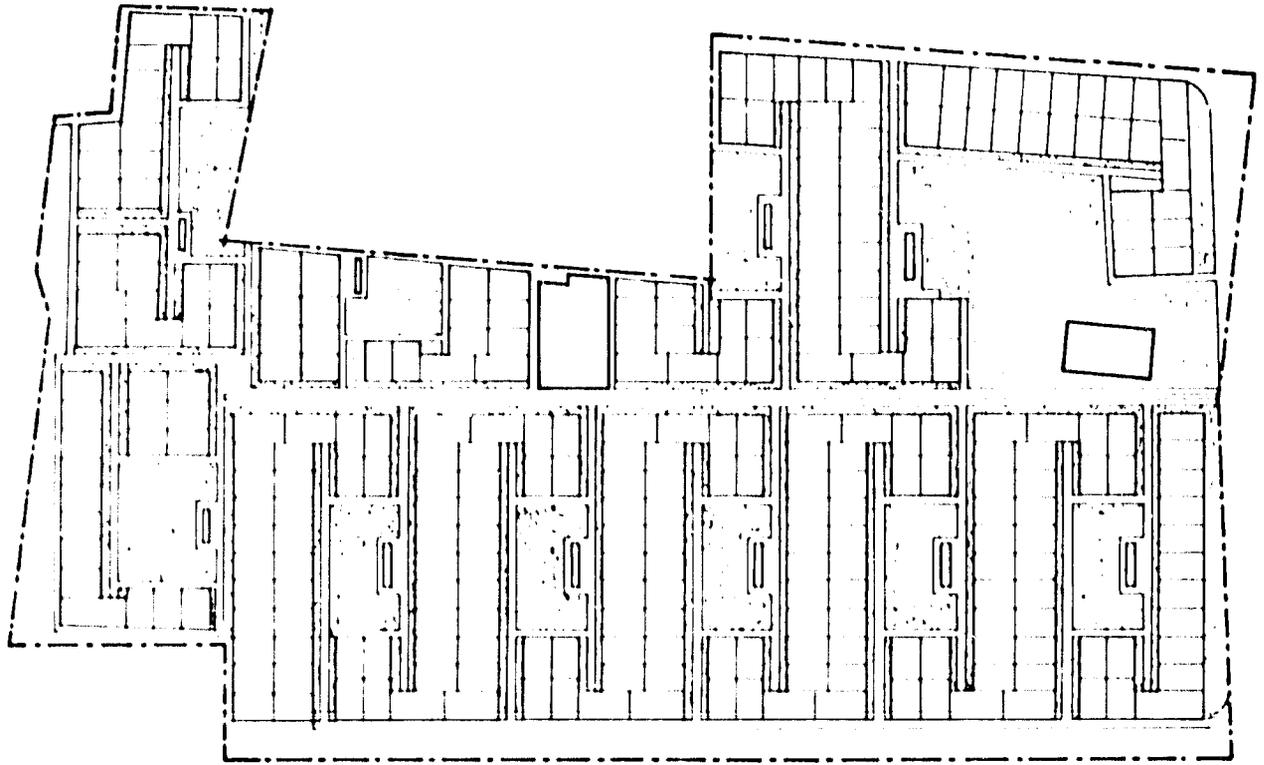
In 1976, the Caja conducted a census in La Manuelita to determine how rapidly families were building and what their income levels had become. Interviewing 283 owners and 30 families who were renting, the total project population was estimated to be 1820 persons. (2) In general, family sizes were only slightly under the mean of those in Las Colinas, and the overall income distribution was almost identical. Table 3.11 shows the census tabulation.

The Caja was particularly interested in measuring how rapidly families had expanded their single room units. An inventory of each lot after three years' occupation showed that 200 out of 291 lots had at least doubled the constructed area, while 58% had quadrupled it. (3) These advances were impressive enough but a surprisingly high number of families, 68 or one-fourth of the beneficiaries, had not made any investment at all. After three years, they were still living in the 10-square meter room the Caja had built. The Caja did not attempt to cross-tabulate construction with other variables to find out why these families did not invest. Interviews with their field personnel involved in the census, stated that lack of income was the principal reason. The response to the construction question from the other 215 families showed just the opposite. These families had invested an impressive P\$5,511,600 in their homes within three years. This means that each family invested about P\$25,635 in their home, or about 4.4 times as much as the Caja invested in constructing the original room and latrine on each lot.

(1) Caja de la Vivienda Popular. "Un Caso Especifico de Solucion en Bogota - Colombia." Jalapa, Mexico: Sociedad Interamericana de Planificacion, Seminario Africo-Latino Americano Sobre Asentamientos Humanos Marginados, 1977.

(2) Ibid., p. 8.

(3) Ibid., "Grafico Numero 10."



General site and dwelling plans for La Manuelita.



Typical home construction in La Manuelita (1973).

INCOME (MTH)	FAMILIES	PERCENT
- 700	23	7.34
701-1200	74	23.64
1201-1700	74	23.64
1701-2200	66	21.07
2202-2700	34	10.89
2701-3200	21	6.71
3201- UP	11	3.51
NO ANSWER	10	3.20
TOTAL	313	100.00

Table 3.11 Income distribution in La Manuelita.

The Caja estimated that a single brick room and accompanying latrine stall cost P\$5800 to build. This figure does not include the land or such work as the communal facilities located in the court area. The families who did invest, invested about P\$8545 per year in addition to meeting their monthly P\$91 mortgage payment. This resulted in housing expenditures of about P\$9600 each year.

Although lot sizes in La Manuelita are very small, there are surprisingly high numbers of families, 24% in fact, who use their homes for income earnings. Of the 215 families who expanded their homes, 171 had built at least 45 square meters or more (enough space to house another family or operate a store), yet 30 families were renting and 11 stores were operating in owner-occupied dwellings. (1)

Based on the success of Manuelita, the Caja decided to use the core unit and cluster design again, in a substantially larger sites-and-services project called Las Guacamayas. Here, applicants would not be subsidized to the extent they had been in La Manuelita. Thus it was important to determine from this project what families could pay for housing. Income seemed the best indicator the Caja had for determining affordability and investment potential.

(1) Decrees 1259 and 1260 that required lots with two-family dwellings to be at least 75 square meters were still in draft form when the Caja undertook La Manuelita.

Assuming that income leads to investment, what proportion of income was being spent on housing? If the 68 families who did not invest had insufficient incomes to do so, a new average family income for the investors can be estimated by removing 68 families from the lowest income groups in Table 3.11. If the upper income limit in La Manuelita is assumed to be P\$5000 per month and the mean income within each group is weighted by the corresponding number of families, a new mean income of P\$1920 per month is obtained, or P\$23,031 per year. Thus a yearly housing investment of P\$9600 and an average yearly income of P\$23,031, indicates that housing alone accounted for 42% of family expenditures in the first three years of the project. Using income only, this surprisingly high household expenditure might even be underestimated in the above calculations. This is because three basic assumptions - low income families are non-investors, the maximum income is less than P\$5,000 per month, and self-help inputs are undervalued - will tend to raise the income average while lowering the investment.

An analysis similar to this probably led the Caja to set the maximum limit on mortgage payments in Las Guacamayas at 30% of monthly income. Thus, applicants would be eligible for different housing types within the project based on meeting a mortgage payment not in excess of that amount.

Although most families in La Manuelita invested impressive amounts in home improvements, the relation between investment and income is still unclear. The survey and subsequent analysis were not structured well enough to provide evaluation information. Mortgage payments amounted to only 11% of household expenditures, thus 89% was free for direct capital improvements. Rapid consolidation cannot possibly occur if these percentages are reversed. High housing investments raise another question. Where does the capital come from in the first place? Wage and salaries simply can not account for everything. Families are likely to be using funds from other sources not measured by survey questions about income. Some of the more important institutional sources in Colombia are the mandatory employers' savings funds for workers (Prestaciones Sociales), credit unions, and employees' cooperatives. Their effect is to increase a family's access to capital and to decrease their expenditures for other things, especially food and clothing. At the least, families are able to consume more without spending more. Informal credit systems, loans from friends, and contributions from family members living in the house also figure. The high number of families who use their homes for apartments and stores argue that investment leading to income is just as likely as vice versa.

Private Sector Sites and Services

By 1973, District Planning had all the legal and administrative procedures in place and was accepting applications from developers for minimum-standard projects under Agreement 20. In the first six months, 12 applications to develop 52 ha had been received. Within the next year, the number would dramatically increase to 62 projects and 720 ha. In 1975 and 1976, the numbers of applications had remained constant at about 63 per year, but the total area of projects was declining somewhat. (1) By 1977, both the number of applications and project area had significantly dropped to only 49 applications with 410 ha, the lowest yearly level since Agreement 20 procedures had begun.

Although the number of applications declined every year after 1974, the number of approved projects and the total project area processed steadily increased until 1977. At that time the decrease in applications resulted in only 19 approved projects and 183 ha of urbanization. (2)

Privately developed sites-and-services were definitely on the decline. A brief review of proposal rejections and land availability within the sewered area of Bogota suggests several reasons. The single most common reason for rejecting an application was that the proposed site was beyond the municipal limits or outside the sewered land area of Bogota. All the rejected applications in 1973 were for this reason, 60% in 1974, 48% in 1975, 30% in 1976, and 14% in 1977. The second most common cause was location of a project in a zone not designated for residential use. Rejections for this reason steadily increased each year from 13% in 1975 to 49% in 1977, as the amount of low-cost land within the District was progressively built up. Although Bogota's 1968 city limits were extended in 1975 in anticipation of Agreement 20, the eligible area (within the sewered perimeter) was only about 10% of the annexed areas. (3)

(1) Departamento Administrativo de Planeacion Distrital. "Aplicacion de las Normas Minimas de Urbanizacion y de Servicios." Bogota: Departamento Administrativo de Planeacion Distrital, Unidad de Mejoramiento y Coordinacion de Barrios, 1978.

(2) Estimations for 1977 were supplied in an interview with Arq. Luis Carlos Jimenez of the Oficina de Regularizacion y Mejoramiento de Barrios at Planeacion Distrital, August 1978.

(3) Consejo del Distrito Especial de Bogota. "Acuerdo Numero 25 de 1975." Bogota: Departamento Administrativo de Planeacion Distrital, 1975.

Several research groups outside District Planning had noted that both invasions and pirate barrio activity were definitely increasing. Staff members from the slum improvement office at District Planning conducted a brief survey of lot prices. They found that licensed developers were charging from P\$25,000 to P\$45,000 for lots, and speculators were selling lots for almost half this, or from P\$14,370 to P\$35,570. In terms of financing, developers charged P\$500 to P\$800 per month while speculators charged only P\$377 to P\$538. Two obvious causes of price difference are the higher level of initial services in Agreement 20 projects, and higher land cost within the sewered perimeter of Bogota. Just beyond the city limits, speculators were offering almost twice the lot size for half the price. Apparently, lowest-income families could not afford the legal settlements and preferred to buy into pirate barrios where they could get more for their money. Since families in both kinds of settlements have assurances of title, it is clear that the increasing growth of pirate barrios was because families wanted cheaper land at the sacrifice of more initial amenities.

Summary

La Manuelita and early Agreement 20 projects proved that under certain conditions, sites-and-services was an effective housing policy. In less than five years, 132 projects had urbanized almost 1000 hectares of land. But the long-term effectiveness of the policy was in doubt. (1) The failure of more recent projects showed that the main bottleneck in housing continued to be the supply of low-cost serviceable land. While pirate barrios just beyond the city limits increased their share of new housing starts, it became clearer that District Planning had not correctly estimated the land mass affected by Agreement 20, nor had the utility companies compared the proximity of their service networks to the new R-E zones.

(1) Ibid., totals from graphs.

CASE 3: SITES-AND-SERVICES

A Brief History of Barrio Las Guacamayas

In 1971, through District Planning the mayor's office undertook integrated development program for Bogota's eastern mountain area. The program was called the Integrated Program for the Urban Development of the Eastern Zone of Bogota, or PIDUZOB. The city proposed to 1) rehabilitate the forest regions that protect the soil on the slopes adjacent to Bogota, 2) develop urban recreational facilities in this area, 3) increase public facilities such as schools and hospitals, and 4) expand the existing sewer and water systems to include older slum areas in the south, and new luxury housing in the north. The centerpiece of the plan was a new perimeter north-south highway called Paseo Bolivar that would link all of the eastern-most barrios. In anticipation of relocating approximately 1500 low-income families displaced by the southern portion of the highway, the ICT and Interamerican Development Bank authorized the Caja to design and implement required low-income housing. (1)

The PIDUZOB plan called for 1480 new houses, 820 renovations, and 2000 sites-and-services lots. The new units were to be built in Barrios Lomas I and II, while Barrio Las Guacamayas was to contain more than 3000 serviced lots. About 500 would be reserved for families displaced from the highway right-of-way. The Caja was a logical choice to implement the housing portion of PIDUZOB because they already had implemented three major projects in the south, and were currently experimenting with minimum standards in Barrio La Manuelita. (2)

Unanticipated public opposition to PIDUZOB forced District Planning to abandon the highway portion of the plan, but the Caja was authorized to continue with Las Guacamayas. (3) Shortly after the defeat of the PIDUZOB highway, the mayor's office issued a directive to the Caja making Special District employees

(1) Alcaldia Mayor de Bogota. Programa Integrado de Desarrollo Urbano Zona Oriental de Bogota D.E. Bogota: Alcaldia Mayor de Bogota, Departamento Administrativo de Planeacion Distrital, 1973, pp. 272-274, section "Subprograma No. 4 Habitacional."

(2) Caja projects in southern Bogota include: Barrio Los Laches (629 units), Las Colinas (804 upgraded lots), and Las Lomas I (834 units).

(3) See Gabriel Murillo and Elisabeth Unger. "Case II Programa Integrado de Desarrollo Urbano de la Zona Oriente de Bogota (PIDUZOB)." in Poder e Informacion. Bogota: Canal Ramirez, Antares, 1977.

eligible for 75% of Las Guacamayas units. (1)

In 1973, the Caja purchased approximately 500,000 square meters of land from the Agriculture and Forest Society (La Sociedad Agrícola y Forestal), a subsidiary of the cement piping company Tubos Moore, that supplied the sewer and water pipes for the Las Colinas upgrading. From the outset, the Caja was committed to the cluster design that had been so successful in La Manuelita. This time they would also introduce several different housing types, ranging from serviced vacant lots to nearly completed houses. Eventually, designs were limited to four types of units: A, B, B1, and C.

Type A - Cleared, 60-square meter lots with sewer connection, communal water tap, concrete sidewalks, and paved vehicular and pedestrian ways. Lots would sell for P\$18,400. Minimum qualifying income was P\$780/month.

Type B - Same as type A, but with an electrical connection and a single 10 square meter multipurpose room. Estimated value was P\$27,580 (1974 pesos). Minimum income was P\$1025/month.

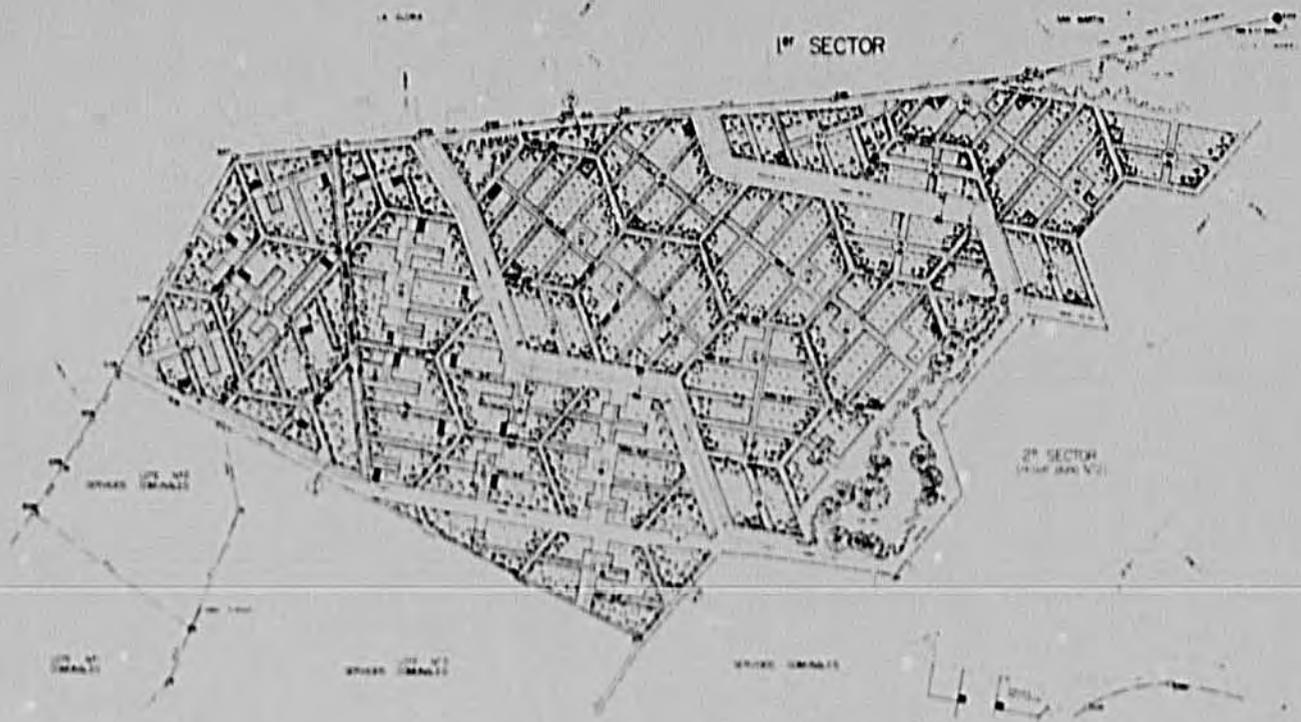
Type B1- Same as type A, with a 15-square meter room, kitchen, and electrical service. Estimated value in 1974 was P\$31,500. Minimum income P\$1200/month.

Type C - Same as type A, with an 18-square meter multipurpose room, kitchen, and bath. Full electrical service to the unit. Estimated value was P\$46,000 in 1974. Minimum income P\$1500/month.

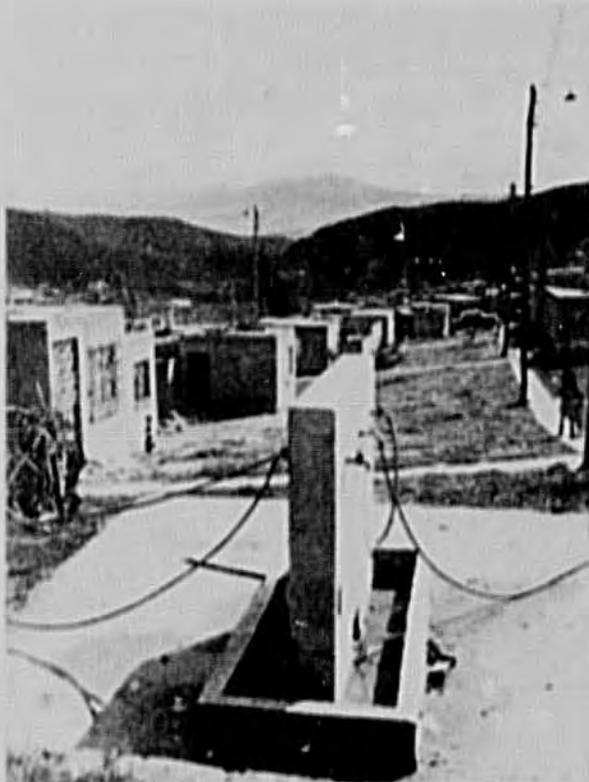
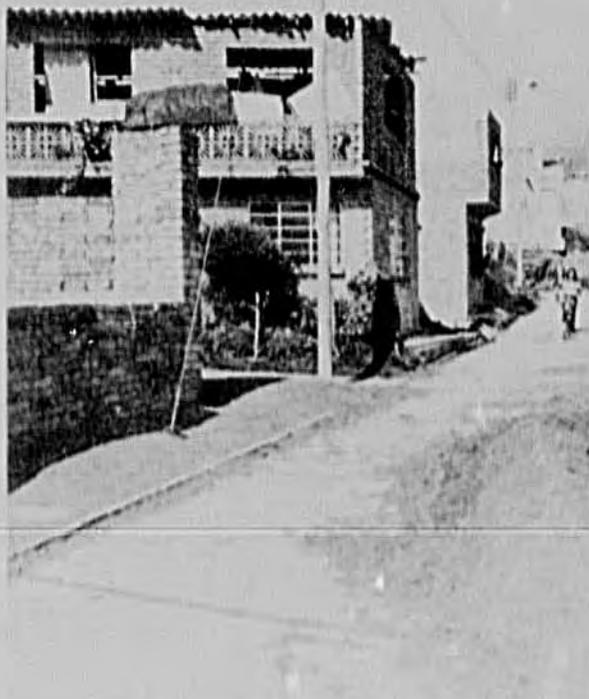
By 1976, the Caja had 624 type A, 156 type B, 161 type B1, and 279 type C solutions under way totalling 1219 units in the first sector of implementation. In advance of starting the second sector, the Caja distributed 10,000 application forms to workers' unions, Special District employees, PIDUZOB-affected families, and to the Caja's field office in southern Bogota to test the market response. In less than one month, 7366 completed applications had been received - the response was overwhelming. Table 3.12 shows the general pattern, especially the popularity of type C units. (2)

(1) Caja de la Vivienda Popular. "Resolucion No. 2 de 1975 (Articulo 2)". Bogota: Caja de la Vivienda Popular, Junta Directiva, 1975.

(2) Revised from: Caja de la Vivienda Popular. "Plan de Vivienda Las Guacamayas - Caracteristicas del Plan y de los Solicitantes." Bogota: Caja de la Vivienda Popular, Oficina de Integracion Social, Grupo de Divulgacion, 1976.



Overall site plan of Las Guacamayas (1st Sector) and typical B, B1, and C dwellings.



Typical housing clusters, public water stations and pedestrian walks in Las Guacamayas (1978).

UNIT TYPE	SPECIAL DISTRICT	PIDUZOB	PUBLIC WORKS	GENERAL PUBLIC	TOTAL	PERCENT
A	72	7	103	464	646	8.77
B	95	17	43	641	796	10.81
B1	124	30	32	1096	1282	17.40
C	1012	96	48	3486	4642	63.02
TOTAL	1303	150	226	5687	7366	100.00

Table 3.12 Applicant source for housing in Las Guacamayas.

Even though the ICT had forecast a housing deficit in excess of 135,000 units for Bogota in 1970 (only to be revised upward to 218,000 in 1975), the response took the Caja by complete surprise. (1) Not only was the demand much higher than anticipated, it was opposite to what the Caja had already built. For 624 vacant type A lots, there were only 646 applicants. By the time applicants were screened, there would be more lots than eligible families. The demand for B and B1 units was just the opposite; 796 families applied for 156 B units, and 1276 families applied for 161 B1 units. The demand for type C units was higher yet -- 4642 applications were received for just 279 units. Not only was the market for minimum sites-and-services plots totally overestimated, applicants obviously wanted as much on-lot construction as they could possibly qualify for.

In response to the demand, the Caja redistributed the capital investment program for the second sector which was still in the design phase. Type A lots would be vastly reduced from 51% to 15% of the sector, and type B1 units would be eliminated altogether to simplify construction and administration. B units would be 35% of second sector construction; up from 13% in the first sector. The most dramatic construction shift would be in the number of nearly completed housing types. Type C units would now be 40% of the second sector instead of 23%, and a completely finished unit, type D, would be introduced on 10% of the lots. What started off as a minimum standard sites-and-services project that would benefit PIDUZOB and Special District employees, was evolving into a traditional low-cost housing project for the general public.

(1) Centro Nacional de Estudios de la Construcción. "Oferta de Edificaciones Urbanas en Bogota 1977." Bogota: Centro Nacional de Estudios de la Construcción, 1977.

The public investment shift back toward total design-and-build housing greatly disturbed Agreement 20 advocates. They argued that access to low-cost serviceable land was still the main problem facing low-income families. They pointed to the increased invasion and pirate barrio activity that was now being reported by researchers at the Fundacion para la Educacion Superior de Desarrollo (FEDESARROLLO). (1) Yet sites-and-services in this project and in the private sector Agreement 20 projects seemed to be failing.

The apparent failure of sites-and-services and the decline in Agreement 20 licenses, showed that more than just lowering the cost of serviced land was involved. The fact that Las Colinas, La Manuelita, and early Agreement 20 projects were successful raised questions regarding the differences in circumstances under which these projects were implemented. Obviously, part of the investment uncertainty surrounding projects is linked to the beneficiary himself and his market options.

Selecting Beneficiaries

The only restrictions imposed on applicants by the Caja were that families have low incomes but stable employment, preferably have dependents, not be more than 50 years old, have lived in Bogota a minimum of two years, and not own land within the Special District. There was no requirement that families agree to build within a specific period if accepted. (2) One possible explanation for the skewed demand for partially completed dwellings was that the admission criteria simply eliminated families similar to those who benefited from pirate barrios and earlier Caja projects. Of all the criteria, income and accumulated capital appear to have been the most important. A sample of 1840 applicants taken from the Caja project records shows that families were well above the minimum incomes required for each type of unit. Type A applicants had almost twice the required income. Types B, B1, and C applicants also exceeded the minimum income but to a lesser degree, with 111%, 70%, and 81% more than the minimum required. (3) The mean income for families

(1) Rodrigo Losada Lora, and Hernando Gomez Buendia. La Tierra en el Mercado Pirata de Bogota. Bogota: Fundacion para la Educacion Superior de Desarrollo, 1976.

(2) Arqa. Elssye de Alcalá and Soc. Laureano Gomez, interview at the Caja de la Vivienda Popular, Oficina de Integracion Social, Bogota, July 1978.

(3) Revised from: Caja de la Vivienda Popular. "Plan de Vivienda Las Guacamayas - Caracteristicas del Plan y de los Solicitantes." Bogota: Caja de la Vivienda Popular, Oficina de Integracion Social, Grupo de Divulgacion, 1976.

applying for types A, B, and B1, solutions most comparable to La Manuelita and Las Colinas was approximately P\$2719/month in 1976. The mean income for owners in Las Colinas was about P\$1731/month when the Social Work survey was taken a year later. Allowing for small differences when comparing income figures one year apart, applicants to the project still earned 50% to 60% more than families in Las Colinas. A second survey of Las Guacamayas in 1978 shows that families who were eventually accepted into the project were earning P\$3616/month almost twice what Las Colinas families were earning. (1) The selection process definitely favored the highest-income families because the mean incomes for applicants as a whole is significantly below that of accepted families.

There is little doubt that the families who were admitted were better off than those in either of the earlier Caja projects. Given the need to reduce subsidies in Las Guacamayas, ability to pay appeared to be a sound admission criterion. The higher-income groups would probably make rapid initial investments while their accumulated savings lasted but cease to invest when their mortgage payments took up the majority of their capital. On the other hand, the lowest-income families who could least afford it, were actually making double housing expenditures. Since the lot was not initially habitable, families had to continue paying rent elsewhere until a provisional shack was built or enough permanent construction had taken place. Secondly, families had to finance the start-up dwelling. The longer they delayed building, the longer they maintained double rent because they still had to make their mortgage payments.

This suggests that income criterion alone may not be sufficient to determine a family's real ability to pay, and it may incorrectly match solutions to families. The lowest-income families who can still meet the payments for B and B1 solutions might best be allocated these instead of type A units, while high-income families could be assigned A or B solutions.

The Caja application records do not have enough identification information to relate a family's initial solution preference and capital sources directly to their eventual housing investments. Some general patterns support the above argument, however. Applicant records show that families had already accumulated capital in addition to wage and salary income. Table 3.12 shows the accumulated capital from savings and workers' benefits (cesantias) from a sample of 1840 project applicants. (2)

(1) Appendix C contains an annotated example of the evaluation survey used to evaluate Las Guacamayas in March of 1978.

(2) Ibid., p. 22.

ACCUMULATED CAPITAL(P\$)	A	B	B1	C	TOTAL	PERCENT
UNDER 500	24	29	34	21	108	5.87
500- 1000	9	10	8	9	36	1.96
1001- 5000	73	90	121	164	448	24.35
5001-10,000	31	43	85	316	475	25.81
10,001-20,000	21	16	53	380	470	25.54
20,001-30,000	2	9	14	152	177	9.62
30,001-50,000	2	1	5	96	104	5.65
50,001-80,000		1		19	20	1.09
80,001-100000				2	2	0.11
TOTAL	162	199	320	1159	1840	100.00

Table 3.13 Accumulated capital of applicants to Las Guacamayas.

The counts for each accumulated capital range indicate that less than 8% of the applicants, had under P\$1000 start-up capital. Leaving out type C applicants, most A, B, and B1 applicants had already saved about P\$6500. Applicants for type C are not as representative of the investment system of self-help and minimum standards, because the initial solution approaches a minimum home.

The Manuelita experiment showed that there was significantly more home investment than could be explained by income expenditure alone. Although specific information was not gathered, accumulated capital was obviously important since investments were significant. Most families were being compensated for losses in property because public works and would not otherwise qualify for housing. It would be useful to summarize the relationship of income to accumulated capital because the amount of down-payment that families can make, or initial construction that can be undertaken, will have more effect on future investment potential than their ability to make monthly payments. The mean housing expenditure that families will eventually make can be more closely approximated if data from both Las Guacamayas and La Manuelita are combined. When the mean capital accumulated for applicants entering Las Guacamayas is tabulated with their monthly incomes, a surprisingly low but constant capital/income ratio appears. Table 3.14 summarizes the ratios.

UNIT TYPE:	A	B	B1	C
MEAN CAPITAL(K) ACCUMULATED (P\$)	6545	6882	8222	15,486
MEAN INCOME (Y) PER MONTH (P\$)	2528	2678	2841	3518
RATIO K/Y	2.59	2.57	2.89	4.40

Table 3.14 Accumulated capital and income ratios in Las Guacamayas.

Accumulated capital/income ratios appear to be almost constant for families applying for types A, B, and B1 housing. Since the income distribution of families in La Manuelita and Las Guacamayas is almost identical, the mean household expenditure can be estimated by readjusting the reported home improvements in La Manuelita with capital accumulation data from Las Guacamayas. If one assumes that the applicants to La Manuelita had similar accumulated capital ratios as applicants reported in Las Guacamayas, the 42% of income spent on housing that was forecast earlier would have to be readjusted downward to approximately 28%. (1) It must be kept in mind that the Caja assumed from investments made in La Manuelita, that families in Las Colinas could spend 30% of their income on mortgage payments and still invest in construction. Because accumulated capital was not part of a family's investment records, the Caja overestimated what a family could invest after meeting mortgage obligations.

Double Rent

One hypothesis for the lack of demand for type A solutions is that the prevailing rents that applicants were already paying were enough to finance B, B1, and C units. Presumably, no family can afford to pay a mortgage for a vacant lot, invest sufficient capital to build a provisional shack (whose value would be minimum when permanent construction started), and continue paying

(1) The mean income for Las Guacamayas is approximately P\$1665/month. Accumulated capital according to Table 3.14 is about P\$6500. The reported mean household expenditures of P\$8545/year in La Manuelita would have to be decreased by a third part of the savings each year. Thus a more realistic estimate of the portion of income spent for housing in Manuelita is P\$6378/year or about 28% of the mean yearly income P\$23,000.

rent until the shack is built. Type A recipients who cannot build immediately are paying double rent. The fact that families already occupied rent-free dwellings in the two previous Caja projects is a curious oversight. In Las Colinas, families occupied their shacks for eight years before the Caja's upgrade project; in La Manuelita, families had single rooms from the beginning. Admittedly the 10- to 18-square meter rooms offered in La Manuelita and Las Guacamayas B, B1, and C units caused considerable overcrowding, but only one rent (or mortgage payment) was required at rates comparable to rents elsewhere for similar amounts of space.

Of the 95% of applicants interviewed, almost all said they were previously renting single rooms (62%), entire houses (29%) or space in a slum (15%). Presumably the families who rented in slums were similar to those who rented rooms in Las Colinas. That would mean that 75% of the applicants were already living in spaces equivalent to the initial areas of B, B1, and C units. The application sample also shows that only 2.8% were paying less than P\$230/month rent, the minimum payment for type A solutions. (1) Almost half (48%) of the household were paying rents between P\$230 and P\$500/month. while 41% were paying more than P\$500/month. This means that almost all of the applicants could move to at least B or B1 solutions and still have the same rent expenditures as before. The other 41% could even afford the additional amenities that type C units offered. Any difference between monthly payments and their current rent expenditures is capital available for construction. Considering only income and rent, the skewed demand for partially built units now appears quite logical. If the double rent hypothesis is correct, one will expect to find either many type A owners who simply could not get enough capital ahead to start at all, or a small, number whose income was in the highest group and who made more investments than normally expected.

Summary

Although the skewed demand for solutions in Las Guacamayas took project administrators by surprise, there was more than enough information to have predicted this response. (2) The defeat of

(1) Ibid., p. 23.

(2) The major sources for this information in 1974 were:

- a) Fundacion para la Educacion Superior y el Desarrollo (FEDESARROLLO). Derecho y Desarrollo Urbano: Configuraciones Juridicas Sobre Relaciones de Propiedad de Terrenos en las Urbanizaciones Piratas de Bogota. Bogota: FEDESARROLLO, 1974.
- b) Jaime Valenzuela, and Vernez, Georges. "Construccion Popular y Estructura del Mercado de Vivienda: El Caso de Bogota". Bogota: Departamento Administrativo de Planeacion Nacional,

Paseo Bolivar might have been unforeseen in 1974 but it was also unlikely that affected families would be compensated with vacant lots (type A solutions) as the project design intended. Instead, families would more probably have insisted on equitable compensation for having lost their homes thus increasing the pool of applicants for the already oversubscribed B, B1, and C units. The lessons of Agreement 20 projects and Las Guacamayas also make it clear that the market for sites-and-services and pirate barrios is the same. For the former to succeed, it must offer competitive advantages such as large lots that permit income earnings through the dwelling, and financing that avoids double rent.

Project Design

The physical design of Las Guacamayas greatly influenced public and private investment in the project. The Caja decided early to continue with the cluster approach that had proved so successful in La Manuelita. The fact that automobile ownership was almost zero meant that the Caja could again separate circulation through the site from access to individual lots thus allowing for more private and semiprivate land. (1) With the proper design, this could greatly increase the total number of lots possible and thus the amount of future tax revenues.

Instead of a rectilinear layout with parallel and perpendicular block faces as used in La the Manuelita, the designers decided on hexagonal clusters within which they would place six to eight conventional gridiron blocks containing small square lots. The centers of some clusters would be left open to create semiprivate and semipublic spaces. Two groups of artists' sketches, one from the Consultecnicos report on minimum standards and another from the Peruvian PREVI competition for low-income housing, justified abandoning the proven Manuelita design. (2)

1972.

- c) Georges Vernez. "Pirate Settlements, Housing Construction by Incremental Development and Low-Income housing Policies in Bogota, Colombia." New York: New York City-Rand Institute, 1974.

(1) See Chapter 2 - Clusters for definitions of terminology.

(2) Consultecnicos Ltda., Estudios de Normas Minimas de Urbanizacion, Servicios Publicos y Servicios Comunitarios: Primera Parte Normas Fisicas Y Aspectos Generales. Bogota: Instituto de Credito Territorial, 1971. plate 1-15.

David Serna Cardenas. "Agrupaciones de Vivienda - Vivienda Baja de Alta Densidad Proyecto Experimental de Vivienda - PREVI - PERU." Escala (52-53).

The choice of hexagonal clusters, gridiron sub-blocks, and small square lots was disastrous from the start. The maximum possible density was only 54 lots/ha, well below the 82 lots/ha achieved in La Manuelita. (1) In order to service each lot and to make each gridiron block accessible to vehicular streets, the designers fully serviced the perimeter of the hexagonal cluster as well. The resulting utility network had almost twice as much infrastructure per lot as in La Manuelita.

Accommodating the gridiron blocks inside the hexagonal perimeters introduced still more problems. The conflicting geometry resulted in many small trapezoidal lots and unusable triangular plots; the designers simply designated them "green areas" and ignored the waste. The long axes of gridiron blocks differed from cluster to cluster with no systematic relation to the 10% slope. Owners would have to contend with building their houses at arbitrary angles to the contours and natural lines of drainage. About one-third of the lots would require more excavation than normal simply because of conflicts between lot and contour orientation. (2)

Three solutions (B, B1, and C) offered at least a simple multipurpose room. The room was set back midway and to one side of the lot. Since the axes of many gridiron blocks were neither parallel nor perpendicular to the natural slope, there was no way to level partially each lot to simplify building the core units. Instead of a single-party wall on a common foundation shared by two abutting units from adjacent lots, each unit had to be built as a separate free-standing element. Not only did this require more labor and materials, it took longer to complete a grouping of similar units.

The Caja had designed a four-bedroom plan that could be built by adding progressively onto the core unit. Although it was distributed to all owners as a model, only 23% of them said they used it at all. The restrictions imposed by small lots were numerous. The entire lot had to be covered with construction. A minimum of two floors was needed to obtain enough habitable space for a five-member family. The internal stairway eliminated almost 20% of the area of each floor. The original designs were so cramped that many families who bought the expensive B1 and C units tore them down and rebuilt their bathroom and kitchen units at the rear of the lots.

(1) Caja de la Vivienda Popular. "Urbanización Las Guacamayas - Cuadro General de Areas". Bogota: Caja de la Vivienda Popular, 1977.

(2) See Chapter 2 for the technical trade-offs of gridiron and cluster designs on sloped sites.

Building Processes

As in Las Colinas, owners in Las Guacamayas almost always built their own provisional shacks themselves but did not do the major work on their permanent dwellings. This is surprising, because it is generally assumed that low-income families have a low opportunity cost for doing their own building, and that they will build permanent dwellings if they have basic training.

The same building process as in Las Colinas occurred in Las Guacamayas. Owners always built their provisional shacks themselves because the materials are relatively cheap and little or no equipment is needed. Foundations are seldom needed and poor construction rarely results in a total collapse of the building. Once permanent materials are employed, the situation is reversed and materials cost much more than labor. Owners first consider income earnings through the dwelling and begin to stockpile materials. When enough material is at hand, they contract the structural pieces but complete the interiors themselves. Plastering and pouring floor slabs are the only components for which there is significant variation in the accounts. Owners said that plastering does not require special tools, but considerable experience is required to do an acceptable job. Floor slabs are one of the few structural components that owners may attempt themselves. Generally it is simple to do but requires several individuals to help out for a short period of time. A thirty-square meter slab may need as many as ten workers for half a day. Owners often describe the pouring as a neighborhood event where everyone helps for three or four hours in return for lunch.

Home interview data from Las Guacamayas reinforce what families described. Table 3.15 shows the principal labor used to build each of the four solution types. Types B and B1 have been combined because their distributions were identical. By inspection, type A owners did most of the construction themselves while B/B1 owners did the least.

Since many of the owners of type A solutions erected provisional shacks in the first year, it is not surprising to see that 47% built their own dwellings. Table 3.15 also shows that labor from neighbors and family is surprisingly small. It is generally believed that mutual help -- families helping one another build -- is an important way to pool labor and skills, but this does not seem to have happened in this project. Only 26% of the families said they had ever received help from neighbors, while slightly more, 31%, said they had helped their neighbors at least once. Most of the families engaging in mutual help owned the minimum A solution.

PRINCIPAL LABOR SOURCE	SOLUTION TYPE			ROW TOTAL
	A	B/B1	C	
OWNER	82	42	52	176
	46.59	23.86	29.55	54.83
	65.60	48.84	47.27	
	25.55	13.08	16.20	
FAMILY & NEIGHBORS	15	4	9	28
	53.57	14.29	32.14	8.72
	12.00	4.65	8.18	
	4.67	1.25	2.80	
CONTRACTED LABOR	28	40	49	117
	23.00	34.19	41.88	36.45
	22.40	46.51	44.55	
	8.72	12.46	15.26	
COLUMN TOTAL	125	86	110	321
	38.94	26.79	34.27	100.00

CHI SQUARE = 18.70 DF = 4
SIGNIFICANCE = 0.0009

Table 3.15 Construction labor sources
in Las Colinas.

One expects contracting to be higher for B/B1 and C than for A. Permanent materials are used from the start and families are apparently willing to pay contractors. The even distribution of owner and contractor construction for the B/B1 and C solutions is consistent with the theory that contractors build the structural parts and the families do the interiors.

The fact that the higher-income families contract more of their construction can lead to the wrong conclusions about the opportunity cost of the owners' labor. It is often argued that owners contract because they earn more at their jobs than they must pay for construction labor. This is true sometimes, but owners consistently report that they have to be present at the sites most of the time that contractors and laborers are working. They spend their time checking that contractors actually put the stockpiled materials into the building. Over-watering cement, substituting inferior quality bricks inside walls, and leaving out reinforcing in slabs are all ways contractors siphon off materials for use on other jobs when they are not supervised. The owners rarely have plans or drawings prepared, and must also constantly supervise to insure that construction fits their needs.

Although owners spend time supervising, they do not generally forego wages. Those with permanent employment generally have fixed salaries. Many owners are able to reduce their work input or make other work arrangements without decreasing their incomes. Under these conditions, an owner's opportunity cost could be zero while supervising much of the construction, as he foregoes nothing in doing so. Owners also describe additional benefits from their employment: using their employer's facilities to make arrangements for building, buying materials or supplies on the margin of larger orders for their employer, transporting materials with company vehicles, or borrowing tools and equipment for short terms.

On the other hand, lowest-income families have just the opposite kind of employment characteristics and opportunity cost for building themselves. While almost 60% of the owners with salaried incomes bought type C solutions, less than 10% the type A owners had such employment. Most of the latter earned their incomes on an hourly basis as travelling salesmen, artisans, day laborers, or in some other self-employed way. (1) For them, a reduction in work means a direct reduction in income. Owners in this case have three building options: 1) contract work only to the extent that they can earn more at their job than what they will have to pay for equivalent construction labor, 2) build when their opportunity cost is zero, such as on weekends, holidays, or during slack work periods if they are seasonally employed, or 3) stop working altogether and build while their savings last. The opportunity cost for owners without salaried jobs is further complicated by the fact that the self-employed spend a disproportionately high amount of time in the necessary job search that does not derive income in and of itself.

The Caja believed that the owners' own construction skills would be important if the project was to succeed. They were particularly concerned that only half of the applicants claimed to have any construction experience at all, and that only 10% actually worked in the industry. After making substantial investments in a construction training program through the National Apprenticeship Service (Servicio Nacional de Aprendizaje-SENA), the Caja was eventually forced to all but eliminate the program because of poor attendance. The interviews show why: owners were not doing the building -- they were managing it. When owners were surveyed after two years, they reported that the main obstacles in building were lack of transportation for materials to the site (58%), general material shortages (16%), and problems with adapting construction to the small site (17%). Only 5% said that they had encountered any technical difficulties. Because the Caja assumed that owners built their own dwellings, they made no attempt to include

(1) See Appendix C, survey form question 7 for employment categories.

contracting in their project-monitoring efforts. The obstacles they did find, however, suggest completely different technical assistance. Obviously, transportation is a problem but if owners tend to contract structural pieces while doing finishing themselves, technical assistance should include on finding fair prices, giving legal assistance in contract-making, and training owners to judge the quality and completion of work.

Private Investment

A 50% survey of all occupied sites in March of 1978, reported that 352 families had already invested an average of P\$21,171 per household. When the investment data are further disaggregated by solution type, 135 type A owners invested about P\$17,500 each, while B, B1 and C owners invested approximately P\$23,000, P\$13,900, and P\$27,700 respectively. Table 3.16 shows the general trend that results from weighing the mean value of each income and investment class by the number of families in each cross-category.

Table 3.16 reports only the weighted mean values for owner incomes and the investments reported. Within each income class, significant variance was found. With the exception of the lowest income group, investment appears to rise with income but at a decreasing rate. The skewed investment figure for the lowest income group cannot be fully explained. It is known that the Caja compensated a number of families with incomes under P\$1000/month with type C units. These families were not required to make down-payments or to meet the scheduled rates. This allowed them to channel most of their household expenditure into direct capital improvements similar to the way owners did in La Manuelita. Still this does not account for everything. When an expected investment is computed for each income group based on imputed capital accumulation (see Table 3.14), known mortgage terms, estimated residency of 18 months and housing allowances, the observed trend in Table 3.16 seems to indicate that the lowest-income families are still spending more than expected while the highest-income families are spending less.

The lowest income groups are the ones that sites-and-services is supposed to benefit most and the skewed investment can not be dismissed. A family earning under P\$2000/month simply can not be investing P\$10,000 and P\$30,000 in a house plus making mortgage payments, without having access to much more capital than was reported to the Caja. Although it is difficult to test income, the Caja took great care to check each applicant. Not only are the high investments suspect, the Caja's 50% sample of occupied lots found only 139 owners living on type A lots when more than 600 vacant lots were assigned to applicants. This indicates that many owners are not building at all. This could mean that they have insufficient funds or simply that they are speculating on the land.

Income/Month Investment

500	11,257
1250	3928
1750	8500
2300	15020
3300	20,050
4500	21,090
6000	21,288
8500	21,958

Table 3.16 Income and household
investments in Las Guacamayas.

The survey seems to have uncovered several exceptional types of owners: 1) low-income owners who make no investment at all, 2) low-income owners who make much more than expected, and 3) high-income owners who make significantly less investment than expected. Owners of vacant lots who invested nothing could simply be speculating on the land or they could be unable to make investments because they were paying double rent. The sudden demand for second-hand materials in Las Guacamayas dramatically increased the cost of building a provisional shack. Owners reported that they now had to pay between P\$12,000 and P\$15,000 to build a small bamboo and plastic sheet dwelling. Bogota's high-altitude cold and continuous rain will not permit more modest shelters. Thus having to pay double rent is probably a significant reason for not building. Other families, however, have made significant investments - more than their income and accumulated savings would have predicted.

Owners might have undeclared capital, be backed by extended family or speculators who maintain the owner as a front, or have no mortgage down-payment to meet because they received the house as compensation. Although field data show that important investment exceptions exist, the lack of systematic record-keeping prevents one from knowing the causes. Families who invest more than expected are the most difficult to trace but they also are less important. The most problematic are the low-income families who are not building at all because corrective policies tend to be mutually exclusive. One policy approach could be to require all families to build. This would reduce speculation on vacant land but the same policy would also tend to eliminate desirable families with legitimate double rent. Another approach could be to lower the housing expenditures for the lowest income group. This would reduce double rent and allow families to invest more in construction. The same policy,

however, tends to increase speculators' profits because it lowers their investment.

Construction Rates

Although the variance was large, overall figures show that substantial private investment had taken place in the first two years of occupation. Yet there were also signs that the initial surge would rapidly subside. More than 83% of the 341 families who responded, said that they were stopping all construction; almost all (96%) said they had exhausted their capital and could not obtain further financing.

One of the main reasons for stopping construction was an unprecedented inflation rate of 31% that was met with only a 12% increase in real income. In terms of construction, the Colombian Chamber of Construction (Camara Colombiana de la Construccion-CAMACOL) showed a 71% overall price increase for labor and basic materials in Bogota during the first two years of the project. (1) (2) Prices for several key items were even higher. Brick had more than doubled in cost and cement and labor were almost twice as expensive by the end of the second year. Not only had construction slowed dramatically in the first sector, but the Caja was forced to increase substantially the prices for second sector units. This decision led to open confrontation with families who were promised units on the basis of their original applications but were now being asked to pay more. Solutions A, B, B1, and C that sold for P\$18,400, P\$27,580, P\$31,500, and P\$46,000 in 1976, would be sold for P\$22,000, P\$39,000, P\$45,000, and P\$75,000 in 1978. While vacant plots only increased 9% in price each year, the B, B1, and C solutions that had brick core units went up 17%, 18%, and 25% each year as a result of inflation. Although the Caja intended to reduce subsidies in Guacamayas, even the planned increases did not keep pace with the reported CAMACOL figures. The composite index for labor and basic materials shows that from 1975 to 1976 (the year the Caja completed the first sector) prices rose 20%, only to increase 28% the next year, and 34% the year after that.

(1) Some caution must be exercised when using CAMACOL indices. Its financial and membership support comes from trade associations and materials vendors who have a vested interest in keeping prices as high as they can.

(2) Camara Colombiana de la Construccion. "Indice de Costos de las Insumos Basicos de la Industria de la Construccion en Bogota, D.E." Bogota: Camara Colombiana de la Construccion, Seccional Cundinamarca, 1978.

(3) Ibid., calculated from CAMACOL chart Index "Indice de Costos de Construccion 1969-1978 Seccional Cundinamarca."

(3) The policy decision to eliminate type A and B1 units in the project's second sector only increased the Caja's losses. Virtually all the planned solutions would require brick construction and be totally subject to the price increases.

Summary

The cluster design used in La Manuelita achieved high densities and low utility requirements per lot, yet it maximized revenue producing land without overcrowding. The plan for Las Guacamayas was much less successful, however. Hexagonal clusters, gridiron blocks, and small square lots lowered the net density 34% and almost doubled the infrastructure per lot over the previous design.

Construction patterns in Las Guacamayas show that owners do not build most of their homes themselves; they manage their construction. This pattern operated in earlier Caja projects. Labor costs tend to be much less than for permanent materials, thus owners stockpile materials when prices are right, contract and supervise the major structural pieces, and finish the lighter interior work themselves. Despite considerable investment, technical assistance to train owners to build has not been successful. Owners generally do not report technical problems; rather, material transportation to the site, and adjusting dwellings to the small lots are the main obstacles.

Data show that significant investment is taking place. Investment generally increases with owner income but at a decreasing rate. Three exceptional investment cases appear to be operating simultaneously: very low-income owners of type A lots who make no investment, low-income families who make substantially more investment than expected (based on income and savings), and high-income owners who make much less of an investment than expected. The low-income cases are the most troublesome because policy solutions tend to be mutually exclusive. Requiring families to build forces owners to invest who might otherwise speculate on the land. The same policy eliminates desirable families with legitimate double rent. Subsidies that attempt to help families overcome double rent also tend to increase speculator profits. Owners generally report that they are stopping further construction because inflation has exhausted their capital resources sooner than they had expected.

Chapter 4
Conclusions and Recommendations



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The case studies in the previous chapter described a housing process that differed considerably from what the Caja or District Planning had anticipated. The most serious differences were the objectives that families had for building their homes, the way they choose to build and finance them, and the effects that subdivision design had on decreasing their incomes and increasing their household expenditures. Unexpected results of recent projects and legislation are less surprising now because the investments that homeowners make appear to be rational economic responses to a combined need for shelter and income. Project uncertainties that administrators have experienced stem from the fact that owners have various objectives in projects. The costs and benefits that regulate their investment choices only partially overlap with those currently anticipated and influenced by project administrators.

The most effective uses of the case data will be to clarify the owner's housing objective, to array his investment choices, and to see where policy can reduce cost and increase benefits in future projects. Case studies show that the interrelationships between lot sizes, income earnings, rental units, ability to pay, subdivision layout, and technical assistance are more complex than administrators had previously believed. The proposed policy changes for new sites-and-services projects are unlikely to reduce overall costs per household, make wider use of the policy, reduce loan risks, or reach lower income groups simply by reducing initial utilities again, by decreasing plot sizes still further, or by eliminating on-plot core units.

This chapter reviews the main features of the observed housing process and formulates recommendations that are more likely to achieve the goals of sites-and-services. Reducing the risk in future projects and deciding how best to implement these recommendations will depend on having systematic information on market conditions and investment responses in previous projects, as well as on families' current needs and resources. Insuring the proper information is obtained depends on the way individual agencies are organized and make decisions. A general framework for determining what should be gathered and how it should be organized will be formulated.

INVESTMENT PATTERNS IN PROJECTS

The main differences between what District Planning and the Caja had anticipated and what actually occurred in their projects, can be traced to incorrect assumptions about the objectives of home building, the way self-help processes work, the ability of families to pay for housing, and the impact of subdivision design on owners' incomes and housing expenditures.

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Building for Income Earnings

Analysis of dwelling usage in one upgrade and two sites-and-services projects, show that home investments for the purpose of earning income through the dwelling are at least as important as those made for sheltering the owner himself. The upgrade case, and one sites-and-services case show that between 20% and 30% of owners deliberately planned home construction to permit renting rooms, apartments, and store fronts, and operation of small warehouses or manufacturing concerns. It is hypothesized that failure of authorities to sell all the plots in the latest sites-and-services project, is due in part to excessively small lot sizes, and zoning restrictions for multi-family dwellings that reduce income potential.

Renting rooms and apartments is the most common form of income for owners; the additional rental units housing up to 30% more families. Although owners often rent their shacks, the main decision to design a dwelling for this purpose occurs when families begin to build with permanent materials. At this point foundations, bearing walls, separate entrances, stairwells, and individual utilities and services must be anticipated. It is difficult to distinguish families who have not yet built, but who are accumulating additional capital to build for income earnings, from those who are speculating on vacant land, or who are unable to afford any improvements. Only when construction begins can they be separated.

Building for income generally delays construction, while owners stockpile the additional materials and accumulate capital. Once construction starts, they tend to rent out units as soon as there is minimal space for themselves. Although tenants change frequently, there will always be at least one family or individual renting from the time the owner offers the service. Second and third renters appear later in the life cycle of the owner's family, and tend to occupy space left by departing children. Renters are definitely younger and have smaller families than owners, although they generally become owners themselves before the age of 35. Aside from their age and family size, renters are not as significantly different from owners, as is commonly believed. Migration, employment, and income distributions are almost identical. At least for the cases surveyed, projects cannot claim to be indirectly reaching lower income groups through renting. In fact, it is likely that renters are better off because they have the same incomes as owners at earlier points in their lives. It can be expected that their permanent lifetime incomes will be correspondingly higher.

Rents charged, housing sale prices, and construction planning demonstrate that owners, by and large, make rational investment decisions. No family interviewed was aware that rents were related to land values or to housing prices, yet there was widespread and consistent knowledge of what market prices should

be. The present value of the stream of future rents generated from a dwelling, closely approximates the value of the dwelling. When owners build rental property, they are willing to postpone current consumption to make the necessary investments in their dwelling. This can be described as an interest rate, or time preference, that they expect that investment to yield. Interviews show that low-income families have very high time preferences, between 15% and 21%, and that it is inversely proportional to income. Although self-help construction has produced dwellings with four and five stories of rentable units, owners will build only to the extent that marginal revenues from rents (at their time preference) exceed the marginal costs for adding additional units.

The high time preference makes rental property owners vulnerable to any policy affecting that stream of income. Rent freezes or roll-backs, changes in multi-family zoning or limits on tenant at will leases, tend to affect lower income groups disproportionately. This leads to overcrowding of existing dwellings, decreased maintenance, and suspension of new apartment construction.

The failure of renting to reach lower income groups is disappointing, but the surprisingly high housing multiplier shows that projects are more successful than project administrators had believed. The scope of renting and income through the dwelling has been overlooked, because project records only monitor mortgage holders - the original beneficiary - and not dwelling occupants, as census data bases do.

Self-Help Construction

All projects surveyed showed a consistent building pattern. Although owners generally build provisional shacks themselves, they do not construct the major portions of their permanent dwellings. Only the very lowest-income families show exceptions. Owners build their own provisional shacks because the materials are relatively cheap compared to labor. Light-weight materials such as bamboo, wood, and cardboard are easily assembled with common hand tools. Structures tend to be simple post and beam systems and do not need foundations. Poor construction rarely results in a total collapse.

Once construction begins in permanent materials, the process reverses. Owners consider income potential and begin to stockpile material. When enough is on hand, they contract the next structural piece such as masonry walls, columns, tie beams, or a slab. Unless the owners already have construction experience, contracting these pieces is a form of insurance against doing poor jobs themselves. They do complete the interior painting, partitioning, and carpentry themselves. Labor is a much smaller portion of the cost of a permanent home.

Materials are not generally reclaimable if construction must be redone, and collapse of a brick and concrete slab building is usually fatal. Although self-help construction implies that owners build their homes themselves, it is more accurate to say they manage their building.

It is argued that when owners contract it is because they have a high opportunity cost for doing it themselves. They will continue working at their jobs and hire someone to work simply because it is cheaper to do so than forego wages. This reasoning falsely attributes contracting-to-wage trade-offs. Owners do not use written contracts, specifications, or house plans. Therefore they must be present at the job site during construction to insure that the contractors do not steal materials, delay the work, or build something unacceptable. Interviews suggest that the propensity to contract is related to owners' income streams. Owners with salaried incomes show higher tendencies to hire contractors and build quickly, than owners whose income is on an hourly or piece-work basis. Salaried owners can reduce their work without seriously affecting income, but hourly workers decrease theirs directly.

The level of construction skills is not a reliable measure of families' potential to benefit from self-help housing. Technical assistance should not be expected to stimulate building by improving these skills. Instead, programs that increase competition among contractors, assist owners in purchasing and transporting materials, and protect disadvantaged families headed by elderly, sick, or women, appear to be more appropriate. More reliable measures of self-help participation seem to be managerial skills and wage type (salaried or hourly).

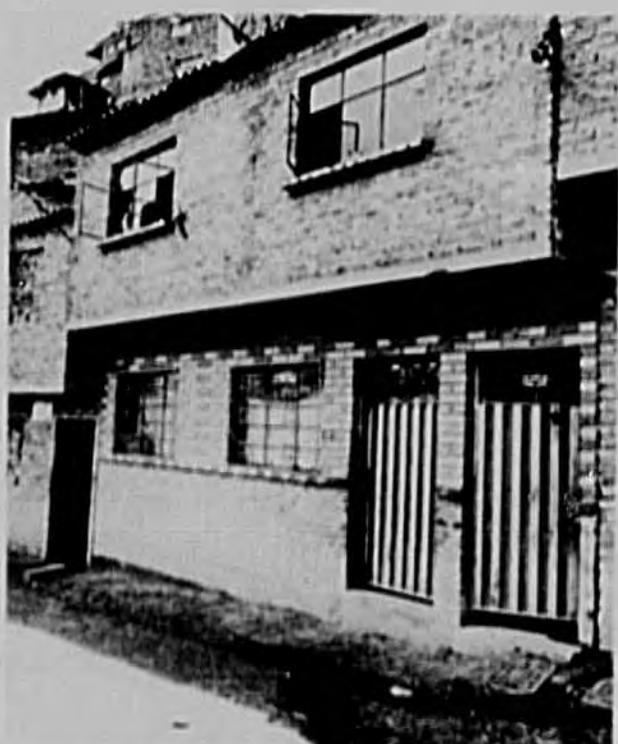
Ability to Pay for Housing

Housing expenditure patterns in three projects suggest that eventual cost is not as important as the form of payment and that family income is not a dependable indication of beneficiaries' ability to pay. Financial terms for mortgages generally estimate that families can pay between 25% to 35% of their income. There is a tendency not to require substantial down payments for the lowest income groups because they have no savings or worker benefits. They may be admitted to projects principally as compensation for property losses because of eviction by public works projects or upgrading in slums. Housing investment in projects tends to rise with income, but at a decreasing rate. The cases show three significant exceptions: 1) low-income families who invest nothing, 2) those who invest more than could possibly be accounted for using income and savings estimates, or 3) relatively high-income families who invest much less than expected. Low-income families who do not invest tend to be speculating or paying double rent. Families who invest more than expected, tend to accumulate capital from an "extended family."

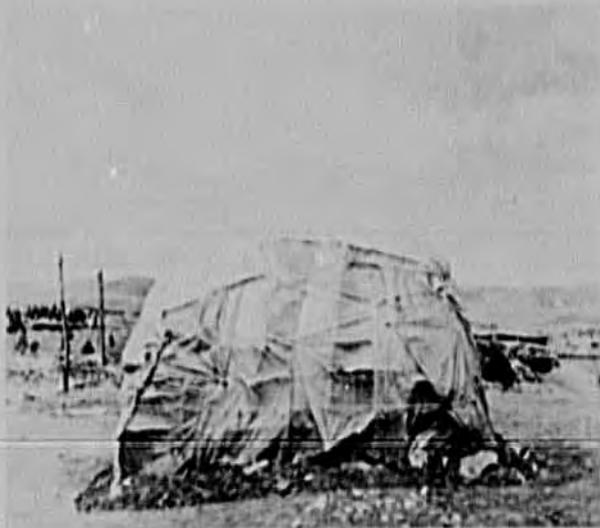


1
3

2
4



Building for income earnings: 1) original invasion shack with improvements is used for a local store and houses the owner and his five children; 2) permanent construction begins with double strength foundations, load bearing interior walls and separate private entrances; 3) second floor units under construction; and 4) the complete dwelling houses three families.



Typical building patterns: 1) families generally erect their own invasion tent; 2) family and neighbors gradually improve the invasion shack; 3) homeowners contract permanent construction and the heavier structural pieces; and 4) neighbors help pour a roof slab.

Owners say that these kinds of families are fronts for speculators. They use the family to develop the property in exchange for whatever housing they achieve during the construction process. Non-investing low-income families are the most worrisome. Double rent occurs when families are already making their maximum expenditure just to meet mortgage payments. They cannot get enough capital surplus to begin construction and thus continue living elsewhere paying rent in addition to their payments.

Inflation exacerbates double rent. Large sites-and-services projects suddenly increase the demand for provisional materials. Accelerated construction in other sectors increases the demand for and the cost of bamboo, asphalt paper, wood, and plastic. (At one time these materials were the mainstays of shacks; presently they are being used for scaffolding and formwork in multifloor office and apartment buildings.) Owners claim that a non-permanent shack that can withstand Bogota's cold and rainy climate costs only about 20% less than building a single multipurpose room directly in brick. When families cannot obtain plots with habitable core units, they choose not to build shacks, and pay double rent while accumulating the additional capital to build directly in brick.

The double rent phenomenon complicates project administration because corrective policies tend to be mutually exclusive. That is, requiring families to build forces owners to invest, who might otherwise speculate on the land. The same policy eliminates desirable families with legitimate double rent problems. Policies that subsidize household expenditures to alleviate double rent will increase speculator profits accordingly.

No systematic review of mortgage arrears was done, but social workers report that families who use their homes for income have better repayment records. Owners report that they do not depend exclusively on their homes for income; presumably the better repayment is because of some stabilizing effect that diversified income sources have. With the exception of the highest income groups, income shows no systematic relationship with dwelling use. A more accurate indication of families' ability to pay, therefore, appears to be differences in wage type (salaried or hourly), and tendencies to use the home for income-earnings. It is likely that lower income-families with income earnings potential can be admitted to projects without seriously increasing the risk of mortgage arrears.

Subdivision Design

The dramatic surge to build minimum standards housing developments that began in 1971 with new physical design legislation has largely subsided. Despite the lower capital

requirements to initiate projects, pirate settlements appear to be increasing their share of low-income housing starts. The failure of this legislation to make more of an impact was due, in part, to 1) overestimations in the amount of low-cost vacant land that is within the sewered perimeter of the city, 2) unrealistically high forecasts for public utility extensions, and 3) an underestimation of the costs of developing projects even to minimum standards. Although initial environmental quality is low, lot sizes in pirate barrios just beyond the city limits are almost twice the size of lots in authorized projects, and are selling for less.

The most recent sites-and-services project in Bogota encountered difficulty in selling its vacant lots despite a city deficit, estimated in 1971 to be near 135,000 units. The demand for lots that had at least a one-room core unit were more than fifteen applications for every unit built at that time. Double rent and income from the dwelling polarize demand. Homebuilders choose between smaller government plots with a habitable core unit that eliminates the need to pay double rent, or large illegal plots in pirate barrios that offer income potential.

Little attempt has been made to lower project costs and develop revenue-producing land by increasing the efficiency of infrastructure layouts and land parcelling. Agreement 20 and subsequent legislation have only lowered initial requirements. Pressure to improve legislation by including criteria for overall design and layout is decreasing. Fewer projects are possible in the remaining sewered land, and agencies react to recent project failures by shifting back to total design-and-build.

CONCLUSIONS

The observed housing process describes a set of market conditions and owner responses that are significantly different from what agencies had expected. The cases show that the demands and investments that owners make are far more rational and predictable than had been believed. The unexpected results of past projects show that the implicit self-help model that agencies were using was inappropriate, and perhaps more important, that their experience with three projects and new legislation did not accumulate over time to form a better model.

The case studies show that the interrelationships among lot sizes, income earnings, rental units, ability to pay, subdivision layout, and technical assistance, are far more complex than believed. The cases also show that policy changes being proposed are unlikely to reduce overall costs per household, make wider use of the policy, reduce loan risks to beneficiaries, or reach lower income groups by simply reducing initial utilities, decreasing plot sizes, and eliminating on-plot core units. These policies will not make future projects more effective because

they tend to reduce families' incomes and increase their housing expenditures. Instead, the observed housing process suggests an alternative set of capital programs that can still achieve the objectives of sites-and-services, if different capital programs are used.

Rent levels in invasion and pirate barrios indicate that small plots with cores are affordable by low-income groups that normally fail to build because they are paying double rents. The cases show that this group is not likely to overcome double rents or make high investments in permanent construction until later in their lives when their incomes are more stable and higher. This group can be expected to pay near the maximum affordable amount because their mortgage payments more closely approximate their total housing expenditures. Large vacant lots with sites that favor income through the dwelling should be targeted to the higher-income groups with salaries and construction management skills. The profile of this investor is similar to that of the entrepreneur found in Las Colinas, who built rapidly once tenure was guaranteed. This group is likely to be able to overcome the short-term double rent that starting off with a vacant lot implies, and still make the higher initial investments required when building for income earnings. By polarizing plot sizes, increases in land values that result from public investments will affect the large-plot holders more than those who own smaller ones. Owners will capitalize on this increase by tending to build quickly, construct in permanent materials, and invest in rentable units. Requiring families to build will avoid land speculation, without the undesirable side effects of eliminating low-income families with double rents, because this latter group is now allocated to habitable core units.

Building small lots with core units for lower-income families and targeting large vacant lots to higher-income families is the opposite of what agencies are now proposing. Agencies argue that costs per household are best reduced by eliminating the highest cost items -- land and on-plot construction. This policy was used to some degree in Las Guacamayas and it resulted in decreased income earned through the dwelling, and double rent expenditures for the lowest income groups. This policy might be appropriate under different market conditions, but in Bogota, there is an active private market for illegal building sites. The difference between building a provisional shack and a permanent habitable core is not much. If these conditions did not exist, the proposed change might lead to more effective projects.

Technical assistance in new projects must focus on increased access to low-cost materials, and increase utility service levels to vacant lots. Programs that obtain lower-cost materials by purchasing them in large quantities, and services that transport materials to building sites, are appropriate. Emphasis on income earnings implies higher demands for service connections and

street paving. Technical assistance should increase competition among contractors, encourage building cooperatives, and help small construction-related businesses, such as materials depots.

The new policy approach requires two different kinds of lots. Cluster subdivision layouts offer a hierarchy of plot locations suitable for integrating small lots with larger ones. This cannot be achieved with current gridiron designs. The exact mix of small and large lots is determined by the level of cross-subsidy required to finance additional on-plot construction that is not covered by mortgage financing. Cluster designs tend to maximize revenue producing land. They are inherently more efficient than traditional designs. They also offer more flexibility in lowering development costs by allowing network extensions to approximate more closely the capital recovery rate. Minimum standards are already low, and it is unlikely that project costs can be lowered any more by affecting initial utility levels. The appendices to Agreement 20 legislation should include criteria that reduce infrastructure costs because more efficient designs are being used.

The decline of Agreement 20 projects and the inflationary effect that large projects have had on construction costs, suggest that smaller projects such as La Manuelita are more appropriate. Relaxing legislation that requires sites to be within the sewered perimeter will increase the number of eligible sites, lower the amount spent for land, and increase the chances of finding sites near employment sources.

THE BUYERS' MARKET

These recommendations stem from the observation that low-income families generally make rational economic investments in their homes. Many are attempts to make new sites-and-services projects more competitive with pirate barrios because this offers the potential of lowering housing costs for the lowest income families through cross-subsidies. In order to make new projects self-financing, the larger vacant lots must be allocated to families who can make higher payments. These lots are intrinsically worth more because they are larger, have higher income earnings potential, and are more likely to increase in value from public investment in infrastructure. The family who can best use this lot and afford the payments is similar to the kind of family who would normally buy into one of Bogota's numerous pirate barrios. The characteristics of these families and how they would compare new sites-and-services projects to pirate alternatives is very important in planning new projects.

Several recent studies of Bogota's pirate barrios (1) have found

(1) Rodrigo Losada Lora, and Hernando Gomez Buendia. La Tierra en

that household heads tend to be older (over 25 years old) and have larger families (5.6 persons average) than families who invade or who traditionally apply for sites-and-services projects. More than half of the households interviewed in the Losada and Gomez study said they had monthly family incomes under P\$1250 per month, and only 10% earned more than P\$2500 in 1975 pesos. About half of these families had stable salaried incomes; 75% had at least one member working full time and 19% had two or more. While these income ranges are only slightly above those for recent sites-and-services projects, the main difference is greater income stability -- more families have salaried jobs in pirate barrios. (1)

Although there is considerable variation in lot sizes in pirate barrios, they are consistently two to three times larger than what is currently offered in sites-and-services projects. Most lots average 150 square meters, while recent sites-and-services projects average only 65 square meters. While lot sizes are definitely higher in pirate barrios, initial public utilities are much lower. For example, most of the surveyed lots had electrical connections (legal or contraband), but less than 20% had the more expensive water or sewer connections that sites-and-services generally start off with. Buyers in pirate barrios generally expect to have to coerce the promised services from the city. Small barrios are sometimes successful in organizing families against subdividers who do not deliver what they promised. Larger barrios generally imply community representatives and have been more successful at having the city

el Mercado Pirata de Bogota. Bogota: Fundacion para la Educacion Superior y el Desarrollo, FEDESARROLLO, 1976.

Georges Verner. "Bogota's Pirate Settlements: An Opportunity for Metropolitan Development." Berkeley, California: Ph.D. Dissertation, University of California, Berkeley, 1973.

Departamento Administrativo de Planeacion Distrital. "El Mercado de Tierras en Barrios Clandestinos de Bogota." Bogota: Departamento Administrativo de Planeacion Distrital, 1972.

Fundacion para la Educacion Superior y el Desarrollo. Derecho y Desarrollo Urbano Configuraciones Juridicas Sobre Relaciones de Propiedad de Terrenos en las Urbanizaciones Piratas de Bogota. Bogota: Fundacion para la Educacion Superior y el Desarrollo, 1974.

(1) Losada and Gomez found that 25% of the owners in the pirate barrios were using their homes for income earnings (op. cit. p.93) and that between 22% and 33% of the families living in these barrios were renters (op. cit. p.9). Both of these findings are consistent with the survey results from Las Colinas and La Manuelita.

to install the services than they are at having developers do it.

Land costs in pirate barrios are very inconsistent but they are usually below the prices in sites-and-services projects. In 1972, lots measuring from 130 to 170 square meters were selling for between P\$6000 and P\$14,500. Some of this extreme variation is because of differences in lot size, location, and service levels. Research shows that even equal size lots in the same barrio, sold on the same day, have extreme price variances. This indicates that there is high market flexibility in pirate barrios, but it also suggests that potential buyers must spend considerable time searching for bargains and negotiating terms.

The most significant difference between pirate barrios and government projects are financial terms. Families in pirate barrios make significantly higher down-payments and have fewer years to pay off the balance. Down payments may be as high as 25% of the total value of the lot. Few owners pay more than 20% of their income for monthly payments even though the remaining debt is amortized in only 18 to 48 months. Although developers advertize "no interest" financing, there is an implicit interest charge because they tend to give 10% discounts to families making a single cash payment. Less than 10% of the buyers ever pay cash.

Financial terms in government projects are much more generous than in pirate barrios. If a down-payment is required at all, it will rarely exceed 15% of the value of the lot and on-site construction. Mortgages are typically amortized over 10 to 20 years instead of just two to four. Interest rates are typically 5% below conventional mortgages, or about 15%, but families are generally expected to pay as high as 30% of their income for initial monthly installments.

Pirate barrios are illegal. Surveys show that residents have a high degree of understanding of the legal system as well as confidence in its outcome. Most families are aware that the lack of title means that they do not have to pay taxes and that the subdivider does. Buyers know that a person who has lived on a lot without ownership papers for at least a year would be protected by the law against efforts of the actual owner to repossess the property. About 60% of the families interviewed by Losada and Gomez thought that they could sell their properties based on the strength of their papers and payment receipts. Only 26% believed that they could use their documents for a conventional bank loan, however. Most banks will deny a loan, however even if the owner has a legal title simply because the property is located in a pirate barrio. Even though pirate barrios are illegal, the relationship between buyers and subdividers is relatively good despite some conflicts over the

final price of the lot, (1) payment conditions, delivery of promised utilities (especially water and sewerage), and the actual title transfer.

At the present time, Bogota has relatively few sites-and-services projects that are even semi-competitive with barrio piratas. Prospective buyers are faced with a series of trade-offs. Barrio piratas are easier to get into but they entail risk, and it can require considerable search time to find low-cost lots. Government projects have much more favorable financing, although monthly payments typically take more of the family income than in pirate barrios. Down-payments are lower and loans are paid over many more years than in pirate barrios. Although down-payments are higher in pirate barrios, owners pay less of their monthly income to amortize their debt to the developer. Currently, pirate barrios are offering significantly more land at a lower price than government projects. Government projects, however, have higher levels of initial infrastructure, guaranteed tenure and properties can be sold or used as collateral for additional loans at any time; this is not always possible in a pirate barrio.

PLANNING NEW PROJECTS

The case studies drew on only a small fraction of the same data that were routinely collected and available to the Caja and District Planning, yet they show that the self-help model using was inappropriate for the prevailing conditions. Their model may have been valid at one time but it clearly was no longer working in Bogota. Failure to detect changing conditions that undermined their investment programs also questions their real ability to learn from their own projects and to apply what is learned to the next one.

The subdivision design, beneficiary selection, and technical assistance recommendations form a new model based on how owners have been investing in past projects. Investment decisions were subject to market conditions such as rents, labor, and material costs, and to the owners' own shelter needs and financial resources. These conditions are likely to change for future projects, and in turn, imply other changes to government investment strategies. Detecting these changes and learning their consequences will be important parts of planning projects. If housing agencies have not learned from the information they already had, adding more information, per se, will hardly reduce the risks or change the outcomes of new projects. Insufficient

(1) According to the Losada and Gomez survey, very few families report significant price changes once they have made an agreement with the owner. The biggest difference is between the first quotation and the actual contract price.

information will not be the main problem; it will be the processing capacity of these agencies to attend to what is collected and effectively use it in evolving investment strategies. Therefore, an important extension of this research will be to formulate a set of rules for each recommendation that will increase that capacity. Without these rules, superfluous data will accumulate. Attention will again become the chief bottleneck, and it will get narrower and narrower as higher level investment decisions are made.

Every project takes place in an information-rich environment. The building process that families describe and the way they use their homes for income earnings are extremely rich in information. It is also information that originates outside the agencies and in forms and quantities beyond their control. In new projects, agencies will have to have an "interface" for selectively obtaining and transferring this kind of information into formats supportive to their decision making. Other information will come from within the agencies themselves. They have full control over project records and they are, in effect, ongoing memory of what they wanted to achieve, what investments they made, and what the responses were. The fact that agencies can exert control over their own project records is a formidable head start in insuring that the proper information flow results.

An investment model can conserve attention and reduce project risk only if it has clear and testable decision rules. The policies recommended by this research depend on a specific set of conditions. These conditions dictate the content or the kind of information that will be needed, but the way agencies are organized and interface with their information sources will dictate the form that an actual system will take. A real institutional client is not necessary to lay the basic framework for a system, although the case studies suggest who the clients might be. The problems that the case studies identify are not problems of departmentalization or coordination of operating units. They are problems of deciding what investments to make and obtaining the information to insure that the proper choices are made.

The three most important decisions in new projects will be subdivision design, selecting beneficiaries, and readjusting technical assistance once projects begin. Only a few of these decisions currently have clear rules and adequate information support. The framework that is developed here recognizes that each policy recommendation contains its own decision problems. Not all the investment decisions in new projects will have the same consequences, have the same deadlines attached or be made in the same way. Some decisions will be repetitive in nature while others will occur infrequently. Some will reduce future options

while others will increase the alternatives. These differences are the basis for categorizing: 1) the sources, scope, detail, currency, accuracy, and frequency of use of information, 2) the way the information is packaged into specific services, 3) the costs and benefits of using better information, and 4) the kinds of problems that are likely to arise when implementing a system. The object in developing a framework is to recognize these differences and to show how a system ought to be determined from them, and not to design one around institutional practices that the case studies already demonstrate are grossly inadequate.

Subdivision Layout

Subdivision design will be the single most important decision in new projects because it is here that the basic costs and benefits for both the agency and the owners are established. These costs and benefits will determine the kind of demands a project can meet, the impacts it will have on pirate barrios, and the kinds of investments that the agency expects owners to make.

Land, infrastructure, and on-plot construction are approximately equal capital investments and are from 60% to 80% of the total cost to agencies. (1) The basic objective of subdivision design is to maximize the amount of land that can be turned over to beneficiaries, and to minimize the amount of utilities needed to service that area. Both objectives are subject to a number of constraints and trade offs. Families have minimum requirements in order to build their homes, and income earnings through the dwelling will impose further constraints. Agencies also want to maximize revenue-producing land uses and minimize the longer term costs of maintaining services.

Layout decisions are relatively permanent and investments in infrastructure can not be easily changed once they are in place. Usually there is not detailed knowledge of who the final beneficiaries will actually be when project planning starts. Beneficiaries are selected during the final design stages only when the location of the project, the mix of solution offerings, and the financial terms can be announced. At this point, project administrators have a clearer idea of who should be admitted to the project and on what basis applicants will be screened.

Subdivision design begins with basic assumptions about the characteristics of the intended beneficiaries and the housing options that they have outside of the project. The overall housing market, especially the illegal ones such as invasions, pirate barrios, and inquilinatos, determine the market conditions that projects must meet. There are essentially three steps in

(1) See Chapter 2 Project Cost Components for detailed cost breakdowns.

deciding what subdivision layout is best for a given site. The first is to estimate the maximum possible gross density that can be achieved by the project. The gross density will be a function of the following variables:

- 1) characteristics of the target households such as income, housing expenditures, possible down payments, current rent levels, and expenditures for transportation and utilities;
- 2) financial terms such as interest rates, down-payments, and recovery period;
- 3) total capital costs that the agency can expect to recover from households;
- 4) distribution of capital costs to households such as land, infrastructure, on-plot structures, and shared communal facilities;
- 5) utility standards and unit costs such as land, infrastructure, on-plot construction and communal facilities.

Each of the above variables can be expressed in terms of the others. The choice of the dependent variable is strictly a matter of convenience.

The second step is to use the gross density found in the first step to estimate plot sizes and the amount of land needed for semipublic and public uses like vehicular circulation through the site, parks, open space, and community facilities. Only an overall land use distribution is important at this point. Plot sizes will be a function of shelter and income earnings needs, as well as of offerings in illegal settlements.

The third step is to approximate an actual layout for the site by establishing: 1) lot proportions, 2) vehicular street widths and spacing, 3) block design and 4) lot access paths if they are not already included. The spatial arrangement of these components is subject to the conditions of an actual site although some general layouts can be made using hypothetical ones. The efficiency of any layout can be measured by using the unit circulation length and R factor techniques described in Chapter 2.

The resulting layout is now the basis for estimating the more detailed infrastructure costs of paving, service networks and site preparation costs if excavation is required. These three steps are repeated for alternative designs for each of the sites being considered. Essentially, the design process is an iterative one in which a set of well-defined procedures is used to generate successively better plans. The housing processes observed in past projects serves as a heuristic for determining which plans are the most appropriate.

The subdivision layout procedure just described has several very important decision characteristics. First, the procedure is hierarchical. It begins with a general set of basic assumptions

about the housing market, project costs, families' dwelling needs, and their ability to pay for housing. These assumptions are initial parameters that have a predictable and cumulative effect on the final subdivision design and, in turn, on the conditions and constraints that guide the selection of beneficiaries. The second characteristic of the procedure is that it is highly algorithmic, that is, mathematical cost accounting and measures of layout efficiency can be applied. (1) Standardizing technique and measurement increases the testability of each parameter in the design process and affords a basis for comparing alternatives. It is also likely that more alternatives can be considered when the process is as standardized as this one, because procedures can take advantage of various computational aids.

The information required to make layout decisions has definite characteristics. The primary sources of the information used in the first step are largely external to the agency. If the actual beneficiaries are not already defined when design begins, their family sizes, income, savings, and expenditures for rent and transportation will have to be estimated. Samples from pirate settlements will provide a basis for estimating the characteristics of the families who will be allocated the large vacant lots. Planning the exact mix of large and small lots, establishing financial terms, and selecting beneficiaries will require more precise information about the families who are now buying into pirate barrios. The most important information will be their: 1) family size and life cycle, 2) total family income, 3) employment type (salaried or hourly), 4) financial terms of their lots (down-payment and monthly quotas), 5) lot size, 6) initial infrastructure especially water, sewerage, and street paving, 7) financial sources (salary, cesantias, savings, loans, or bonus), and 8) accessibility to employment.

Samples of residents in invasion and inquilinatos will approximate the characteristics of families receiving the smaller lots with core units. The primary source for cost data will be the agency itself. Records from previous projects provide the basis for estimating construction, infrastructure, and administrative costs. Building codes such as Decrees 1259 and 1260 regulate the minimum sizes of the small lots and the minimum utility levels for the larger ones.

(1) See Alan C. Bertaud et al. "A Model for Analyzing Alternatives in Urban Project Design." Washington: International Bank for Reconstruction and Development, Urban Projects Division, 1978. and Horacio Caminos et. al. Urbanization Primer Cambridge: The MIT Press, 1979.

Selecting Beneficiaries

The traditional criterion for selecting beneficiaries has been ability to pay, has been the main measure of that ability. The analysis of La Manuelita and Las Guacamayas, however, shows that this measure is unreliable -- low-income families make much higher investments than expected, while higher income families make less -- and that it compromises a major policy objective -- wealthier settlers are selected over the poorer families whom the policy intends to help. The objective of selecting beneficiaries in the past has been to minimize public expenditure per household. In new projects, the objective will be to maximize the number of low-income families that can be admitted, subject to a set of constraints such as the project budget, the total number of lots, and the maximum acceptable level of mortgage arrears.

Low-income families have the highest potential of benefiting from projects but the agency's risks are also higher. These families are also not paying for the full value of their lots and core untheir, and the agency must recover part of its costs from the families assigned to the larger lots. The assignment problem does not have an obvious solution because the project budget will not allow all the lots to be given to the lowest-income families.

The assignment procedure in new projects will differ from traditional ones in other ways. Small lots with core units are targeted to low-income families while larger vacant lots go to wealthier ones. The subdivision design process that was described earlier defines the number of these lots based on a market analysis of what comparable rents and offerings are in illegal settlements and what the required levels of cross-subsidy will have to be to make the project as self-financing as possible. New projects therefore, should not experience the skewed demand that Las Guacamayas did, but the demand for lots will probably exceed what what agencies can provide. The selection process essentially determines how many of these applicants can be accommodated.

The first step in the selection process is to define the pool of admissible families. The pool may be further subdivided into types of families that the agency wishes to give differential treatment. Legislation of Agreement 20, and bank-lending regulations impose eligibility conditions of age, income, health, or family size. Agencies may also require minimum residency to avoid increasing rural to urban migration, require families to demonstrate their ability to make regular payments by opening savings accounts, or not accept applications from families who have been evicted from other projects or who already own land elsewhere.

The second step in the selection process is to interpret the constraints. Selection can not allocate more lots than were

built or allocate the same one to more than one family. The total amount of subsidy for any set of allocations can not exceed the budget. The subsidy is the difference between the solution's cost and what can be recovered from the beneficiary. New projects will attempt to reduce mortgage arrears by eliminating double rent for low-income families and encouraging higher income families to use their homes for income earnings. To keep mortgage arrears within acceptable limits, the likelihood that a particular type of family assigned to one of the two solutions will default must be estimated. The cost to the agency of the default will depend on the type of solution that was allocated.

The third step will be to maximize the social benefit of the project -- the number of low-income families admitted -- by systematically allocating types of families to one of the two solutions. First allocations are only to see which constraints are binding. It may be possible to relax one or more of them to increase the benefits still more. (1) Although the total number of lots was determined in a prior market analysis, it is possible that, given an actual pool of applicants, higher social benefits could be achieved if not every lot is assigned. This is unlikely to happen if the market analysis was correctly done, but it could occur if subdivision design overestimated the scale of the project, did not achieve the proper ratio of large lots to small ones, or if the applicant pool differed significantly from what was anticipated. For example, the inflationary effects of UPACS on long-term loanable funds, or the defeat of the Paseo Bolivar highway project, could not have been anticipated two years ahead of time, but they contributed to the skewed demand in Las Guscamayac. It will be politically unfeasible to leave lots unoccupied when there is high demand even if assigning all of them means exceeding some constraints. Assigning these "extra" lots to displaced families is a practical solution to this problem.

Families who have been displaced by slum upgrading or public works elsewhere are often compensated with solutions in sites-and-services projects. There are two possible approaches. In the first, displaced families can be assigned to lots before the general applicant pool is considered. Admitting these families will affect only capacity. The second approach is to treat the total number of lots in the project as an inequality, make the assignments from the general pool, and then assign the remaining lots to compensated families if "extra" lots remain.

(1) Mathematical programming can maximize an objective function subject to a set of constraints. It is likely that only one or two constraints bind or limit the maximum benefit of the project. The shadow price or the cost of relaxing a constraint can be calculated and the selection policy be changed if appropriate.

(2) If every lot must be assigned in the selection process then

(2) A combination of the two approaches can be used if there are insufficient lots to meet compensation requirements.

It is likely that the number of admissible families within any type will still exceed the number of permissible allocations. When this occurs, families can be ranked according to secondary variables that were not in the aggregate model (Las Guacamayas gave final preferences to any employee of the Special District). The final selection will always be political, but the structured selection process will increase the likelihood that choices will have minimum risks and tend to reach the lowest income groups possible.

The most important characteristic of this process is that the main decision points are identified and the objectives of selection are explicit and testable. An institutional client is needed to determine the appropriate weights and measures for each constraint but the kinds of information that will be needed and their relationship to the selection decision, is now established.

The applicants themselves are expected to supply the basic data about their needs and resources. Establishing the validity of these data is a traditional problem that new projects will have to contend with. Income alone is not enough to determine a family's ability to pay. Entrepreneur abilities and the tendency of applicants to invest for income earnings through the dwelling will be important, too. The case studies indicate that construction skills are not essential and that the family's life cycle and employment type (salaried or hourly) are better indicators, but closer examination of the characteristics of successful landlords and shop owners is required.

Deciding which assignments are best depends on having a measure for risk. Mortgage records from previous projects are the best sources of data for determining the probability that a particular family and solution combination will default. Solution costs determine what the extent of the liability is to the agency if default occurs. The role of information in risk analysis is clearly an actuarial one.

The data base that is created by the selection process will serve additional purposes in project implementation. It is the basis

the total number of lots is an equality constraint because the total families assigned will equal the total lots available. But it is possible that more low-income families could be admitted if some lots were left unassigned. In this case, the total number of lots is an inequality constraint on optimization, that is, any assignment that maximizes the number of low-income families admitted but uses less than the total lots available is acceptable too. No assignment can ever assign more families than there are available lots.

for determining technical assistance. It is the only basis for judging the eventual success of solution matches and the effects of projects on owner investment.

Technical Assistance

Unlike subdivision design and beneficiary selection, the procedures for technical assistance are not established. Each of the projects surveyed showed a consistent building pattern -- i.e., families did not build the major portions of their permanent dwellings themselves, they subcontracted. The primary reason for owner-managed instead of owner-built construction has been the relatively higher costs of materials with respect to labor. Current market conditions in Bogota suggest that sub-contracting will be an important part of technical assistance in first projects. Under these conditions programs should increase competition among contractors, increase access to lower cost materials, and increase owners' managerial abilities.

But labor and materials conditions are subject to change. A successful materials program, for instance, could make it less economical for owners to continue contracting because labor might become the larger share of his costs. Owners might respond by demanding a different kind of technical assistance such as construction training for themselves.

New projects depend on cross-subsidies to remain self-financing. Owners assigned to the larger lots are expected to derive additional income by building rental units, stores, or running light manufacturing and warehousing operations. These owners are paying more for their land and utilities than the lower-income families assigned to the smaller lots. Properties must continue to be economically viable for the project to succeed financially. The income potential of lots is subject to change, however. The case studies showed that rent freezes or roll-backs, changes in multi-family zoning or limits on "tenant at will" leases not only decrease owner incomes, but also lead to overcrowding, lower building maintenance and suspended construction. Any of these conditions could undermine the project. Monitoring the income earnings potential of the large lots will be particularly important. The data system needed to do this will be organized like census data bases, that is, around occupants of the dwellings, and not strictly through the mortgage-holder as before.

The major difficulty in planning technical assistance will be predicting the future and the environment the agency works within. Public rejection of the Paseo Bolivar highway, UPACs inflationary effect on construction costs in Bogota, and the ICTs sudden shift away from funding sites-and-services projects are examples of unforeseeable events that undermined Caja programs. Information of this kind tends to be external to the agency, be

very broad in scope, highly aggregate, and generally historical. The agency needs an "interface" for selectively obtaining it and converting it to forms useful to its own purposes.

The information necessary to administer field programs is just the opposite of that needed to plan them. Operations is the main contact point between the agency and its clients. Project beneficiaries almost exclusively interact with operations level staff. Entry into projects, mortgage repayment, eviction, and construction bring beneficiaries into regular contact with some operations staff. Operations' client transactions are often the only way that administrators know how projects are going. It was not until the applications for Las Guacamayas were processed that management realized that what had already been built was the opposite to what the market was demanding.

The information characteristics of operations tend to be the opposite of planning. Specific technical assistance like a materials loan program imply well defined information that is narrow in scope. The sources of information tend to be from within the organization. Project records provide most of it and agencies can exert control over the procedures used to gather and synthesize it. Accuracy and timeliness are important in running a field program because data is very detailed and used frequently. Neither is characteristic of planning information.

GENERALIZING THE EXPERIENCE

In the past 20 years, there has been a progressive evolution in the treatment of squatter settlements and in building new housing for low-income families. Early attempts to industrialize low-cost housing, or to organize families to build government designed units, have given way to newer sites-and-services and upgrading approaches. This shift has completely reversed the way governments intervene in the housing system. Instead of physically eliminating slums altogether, or building completed housing units for families, agencies are now rehabilitating slums and creating incentive programs with land and utilities to encourage families to build their own homes.

The sites-and-services approach does not advocate building housing directly; instead, it provides low-income families with land, urban services, loans, and technical assistance, and depends on the homeowner to build the required housing. The shift from total design-and-build policies -- where agencies essentially delivered housing as a completed package -- to sites-and-services -- where families build their own houses -- makes prediction more important than before. Agencies now face higher risks in projects because they are more open ended and leave more for the homeowner to do. Failure is more visible than before because families may take as long as 15 or 20 years to replace their shacks with permanent construction.

The development model behind sites-and-services is based on a concept of how development took place in older squatter settlements. There is an implicit prediction that families could and would build their own housing if they were given the same components -- land, utilities, and technical assistance -- as in upgrading projects.

Initial private and public sector sites-and-services were initially very successful, but applications to build new subdivisions suddenly declined, and construction in existing ones dramatically slowed. These unexpected results not only question the assumptions behind the sites-and-services model, they question the extent to which planners actually understood the conditions that led to the redevelopment of older squatter settlements.

In order to improve future projects, the development model behind sites-and-services will have to be more explicit than it has been. Without a testable model of how homeowners invest and use their homes, there is no way to tailor government programs to the needs of beneficiaries, to anticipate changing market conditions that might undermine government programs, or to know who can really benefit from sites-and-services.

Implementation -- running a project well -- requires good data that can flow easily. Evaluation -- knowing which investments are best under a set of market conditions -- also requires systematic access to data. But more data will not change the outcome of future projects unless they follow from a testable model of the policy. Good information systems are parsimonious (do not need excessive amounts of data) and they are powerful in prediction and leverage because their model is good.

This research found that the investments that families make are economically rational. Families not only build their homes for their own shelter, they build them to increase their income earnings too. Families continuously decide what to build next, how to use it, how to build it, and how to finance it. They compare government projects to illegal alternatives in pirate barrios, manage construction, and build rental units to the extent that the marginal revenues from rent exceed their marginal costs for doing so. Their investment decisions clearly reflect their price options in the land, labor, materials, and rental markets.

The fact that families are economically rational is important because it forms a testable basis for tailoring capital investments to client's shelter and income needs. It is possible to anticipate demand, select beneficiaries, and design technical assistance programs with the market mechanism in mind. It is also possible to anticipate the effects of changing market conditions and to anticipate which ones might undermine project investments because the investment decisions that families make

are predictable within the range of these observed case studies.

The policies recommended here are based on a model of economic rationality because it best characterizes the observed building process. The usefulness of the model depends on how accurately it portrays housing investment, and on the objectives of the government agency carrying out the project. Even when projects attempt to increase political consciousness or to form communities, an investment model is useful because it points out issues that could be used to mobilize and focus families.

An economic model simplifies the information requirements for planning and monitoring new projects. The marketplace is now the focus of attention. The investments that project administrators can expect have an explicit and measurable relationship to conditions such as labor and materials, land available, and time preferences. Gathering data does not require complex or elaborate systems; certainly less so than for the information currently gathered by most projects. This research used a very small part of the same information that is routinely available to project administrators, yet the analysis sufficiently accounted for many of the "unexpected" outcomes of recent projects.

The aim of the model is not to reproduce the reality of implementing a project in all of its complexity. It is to capture only what is essential to understanding the structure and behavior of home builders. The goal is to increase the effectiveness of housing policy by creating a testable view of the larger housing system; a view that can incrementally change and integrate with other views as new experience and evidence accumulates.

Appendix A
Statistical Methods and Report Formats

CONTINGENCY TABLES

All of the contingency or cross-tabulations were derived from the computer program Statistical Package for the Social Sciences (SPSS) or from the author's written programs for the Hewlett Packard 65 programmable calculator. (1) All table formats used in this research follow the SPSS standard regardless of how they were derived. (2) Every contingency table shows the cross-category counts for two variables. There is one table row for each category of the dependent variable, and one table column for each category of independent variable. The total observations and percentages of the total observations for each row and column are reported in the margins of the corresponding row and column. For every combination of row and column category the following four summary statistics are reported: 1) total observations for this row-column combination, 2) percent of observations for this combination within the row, 3) observations as a percent of the total column, and 4) observations as a percent of the total observations in the table. Below each table the exact chi-square value, degrees of freedom (DF), and the level of significance of the table is computed. For 2 X 2 tables, the phi (ϕ) statistic of association is also reported. These statistics have the following meaning and formulas.

CHI SQUARE

The chi-square (χ^2) test is a general test that determines whether or not frequencies that have been empirically obtained through observation differ significantly from those that would be expected if there was no systematic relationship between the two variables. To measure the difference between the observed and expected frequencies, the following value is derived:

$$\chi^2 = \sum \frac{(f_o^i - f_e^i)^2}{f_e^i}$$

where f_o and f_e refer to the observed and expected frequencies for each table row-column combination. The f_o frequencies are those that were observed or measured from the surveys. The theoretically expected values are calculated as:

(1) Information Processing Services at Massachusetts Institute of Technology supports Version 7.00 of the SPSS system maintained and distributed by SPSS Inc.

(2) Norman Nie et al. SPSS Statistical Package for the Social Sciences. New York: McGraw-Hill Book Company, 1975, p. 218.

$$r_e^i = \frac{C_i R_i}{N}$$

where C is the frequency in a respective column marginal, R is the frequency in a respective row marginal, and N is the total number of observed cases. Essentially, the larger the discrepancy between the expected and the observed frequencies, the larger chi-square becomes. Note that chi-square tests to see if two variables are related or not. It does not measure their strength of association.

DEGREES OF FREEDOM (DF)

To test for a systematic relationship between two variables, it is necessary to measure the probability of having obtained a chi-square as large as or larger than the one calculated for the table. The chi-square value itself is partially dependent on the number of observations and partially on the table size or the number of rows and columns. The degree of freedom is simply computed by:

$$DF = (Rows - 1) (Columns - 1)$$

SIGNIFICANCE LEVEL

The significance level is the probability of having obtained a chi-square as large as the one computed for a table with so many degrees of freedom. Social scientists traditionally accept a hypothesis that claims a systematic relationship between two variables if the significance level is 0.05 or less. This means that less than 5% of the time there would be a claim that there was a relationship, when in fact there was none. It is a measure of probability of committing this kind of error. Since the significance level is a measure of probability, its value can range from no possibility, or 0, to complete certainty or 1.

PHI

For 2 X 2 tables, the phi statistic measures the strength of association between two variables. phi corrects for the fact that the value of chi-square is directly proportional to the number of observations in the following way:

$$\text{phi} = \frac{\sqrt{\chi^2}}{N}$$

When phi is 0 there is no relationship between the variables, when it is 1 they are perfectly related.

REPORT FORMAT

		DWELLING MATERIALS PERMANENCY		
		PERMANENT	NON-PERMANENT	ROW TOTAL
TENANCY	OWNER	524 78.6 59.5 48.1	143 21.4 68.4 13.1	667 61.2
	RENTER	356 84.4 40.5 32.7	66 15.6 31.6 6.1	422 38.8
	COLUMN TOTAL	880 80.8	209 19.2	1089 100.0

Count
Row %
Total %
Column %

Total Observations

CHI SQUARE = 5.2377 DF = 1
PHI = 0.07175
SIGNIFICANCE = 0.02210

Tenancy by dwelling material permanency.

In the above contingency table example, 1089 households are categorized by the kind of tenancy they have and the level of permanency of their dwellings' materials. Owners comprise 667 or 61% of the 1089 households, while 422 or 38.8% are renters. A total of 880 dwellings are made of permanent materials and 209 in non-permanent materials. Owners living in dwellings made of permanent materials is the most frequent combination with 524 observed cases. This combination comprises 78.6% of all owners, 59.5% of all households with permanent dwellings, and 48.1% of all the households in the survey. If one hypothesizes that owners are more likely to live in dwellings of permanent materials than renters, the table would statistically support it. One would not expect to see a chi-square as large as 5.2377 for 1 degree of freedom more than 2.21% of the time just by chance.

The phi value indicates that although there is a systematic relationship between the row and column variables, their strength of association is very low.

Appendix B
Las Colinas Home Interview Survey

LAS COLINAS HOME INTERVIEW SURVEY

In the summer of 1975, the Commercial Center Middle School operated by the Catholic charity Social Work of Barrio Las Colinas undertook a complete census of the barrio. Their principal objective was to determine the future social and educational requirements of the families living there. Although the 1973 national population and housing census conducted by the National Administrative Department of Statistics (Departamento Administrativo Nacional de Estadística-DANE) had included Barrio Las Colinas, no barrio level tabulations were available in 1975. It did not appear that DANE would publish results within the next year or so.

At the suggestion of the middle school principal, six instructors organized students from fourth-year secondary school mathematics, sociology, and geography courses into a team for analyzing the changes that had taken place in Las Colinas since the 1963 invasion. Several faculty members went to DANE to solicit copies of the census form used in 1973 and advice on how to conduct their own mini-census. A questionnaire with 42 questions covering demography, income, housing, education, and social services was drafted. The faculty updated the Caja's plotting maps to reflect the growth and recent re-invasion construction that had taken place since the CCC base maps were made. Since the faculty wanted eventually to compare their data to Caja project records and to utility company files, they carefully preserved all three house addressing schemes (water, light, and Caja block-lot scheme for recording property deeds).

Twenty-six students were organized into interview and tabulation teams. A single student typically interviewed at 20 to 25 addresses with an average of two households per address. Las Colinas residents are very hostile to surveyors. Numerous groups -- the Caja, ICT, water and sewer companies, local architectural and social work students, and several international agencies like the World Health Organization, the World Bank, and the Ford Foundation -- have conducted surveys with limited degrees of cooperation from residents. The neighborhood residents, however, had been deriving inexpensive instruction and medical services for themselves and their children from the Social Work dispensary and school. This greatly enhanced the cooperation between residents and census takers.

Students were instructed to interview the head of the household of every family living at an address, and to return if necessary to complete an interview. The surveyors quickly discovered that there were many more families living in the barrio than had been estimated; lots were averaging at least two families each. Recording data for an average of six persons per household was more time consuming than had been anticipated. To speed up the process, twenty more students were used to help check the surveys and to tabulate the counts. By January 1976, approximately 1120

household interviews were completed and tabulated. Because of the tedious process of counting, only basic frequencies for each question response were done. In September of 1977, preliminary tabulations were reported in an 18 page monograph entitled "El Estudiantil" ("The Student Body"). (1) The tabulations used in this research were obtained by computerized analysis of a machine-readable version of the entire census. Grade-school students illustrated the history of the barrio by sketching scenes and quoting their parents' recollections of the invasion. analysis of a machine readable version of the entire census.

EXAMPLE CENSUS FORM

Survey questions cluster into six general categories: 1) family identification and migration, 2) age, sex, education, and employment of family members, 3) tenancy, dwelling size and construction, and business uses, 4) family income, and 5) vocational training and social services.

The contingency table analysis in Chapter 3 was derived from cross-tabulating the responses to the first 31 census questions. No attempt was made to interpret questions 32 through 42 on vocational training and social services. Unlike the first group, these later questions did not have systematic or mutually exclusive response categories. Figure B.1 shows a copy of the Social Work questionnaire; the questions are as follows:

Address of the dwelling and the corresponding Caja block and lot number

Name of the household head (1)

Relationship of the head to the family members: father (2), mother (3), and other (4).

Number of persons that currently live in the house (5).

Place of residency of household head before moving to Las Colinas: urban (6), rural (7).

Interviewer observations

Sex (9), age (10), highest type (11), and years (12) of education obtained, and current type of employment (13). Responses for up to 15 persons in addition to the parents.

Interviewer observations

Household tenancy: owner/occupier (16), apartment renter (17), room renter (18), and visitor (19).

Number of rooms occupied by the family (20).

Predominant construction material of the dwelling: brick (21), bamboo (22), tin (23), wood (24), and

(1) Centro Comercial de la Escuela Mediana, "El Estudiantil" Bogota: Obra Social del Barrio Las Colinas, 1977.

prefabricated (25).
Family business within the house or lot (26).
Family income per month including rent: P\$100-P\$1000
(27), P\$1001-P\$1500 (28), P\$1501-P\$2000 (29),
P\$2001-P\$2500 (30) and P\$2501-UP (31).
Interviewer observations, sex, age, highest type, and
number of years of education obtained (if any).

DIRECCION ACTU-L _____ ANTERIOR : M _____ L _____

1.	JEFE DEL HOGAR	2P	3M	4OTRO	5P.F.	6C1	7LUG. R	8Pa	9LUG. R
I									
II									
III									
IV									
V									

OCUPACIONES _____

P.	C.	M.	1 2 3 4 5 6 7 8 9 10 11 OTROS													
			1	2	3	4	5	6	7	8	9	10	11	OTROS		
I	12															
	13															
	14															
II	12															
	13															
	14															
III	12															
	13															
	14															
IV	12															
	13															
	14															
V	12															
	13															
	14															

OCUPACIONES _____

I	II	III	IV	V	INGRESOS												
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	OTROS		

OCUPACIONES _____

(1) Figure B.1 Las Colinas home interview questionnaire.

(1) Centro Comercial del la Escuela Mediana. "Formulario Censal." Bogota: Obra Social del Barrio Las Colinas, 1975.

Appendix C
Las Guacamayas Home Interview Survey

"LAS GUACAMAYAS" PROGRAM EVALUATION
POPULAR HOUSING BANK
SPECIAL DISTRICT, BOGOTA [COLOMBIA]

(1)

HOUSEHOLD IDENTIFICATION

1. Type of Solution: A/ B/ B1/ C
Household Head
Number of Families: 1/ 2/ 3

DEMOGRAPHY - ALL HOUSEHOLD MEMBERS

2. Person Number
3. Kinship: head/ spouse/ son/ other
4. Age: 0-4/ 5-9/ 10-11/ 12-14/ 15-19/ 20-29/ 30-39/ 40-49/
50-59/ 60 and more
5. Sex: M/ F
6. Civil Status: single/ married/ widow/ common law/
separated/ NI

ECONOMIC DATA - ALL HOUSEHOLD MEMBERS

7. Occupation: salaried employee/ hourly worker/ in
construction/ self-employed businessman/ artist/ traveling
salesman/ domestic servant/ housewife/ student/ none of
the above/ NI
8. Work Pattern: stable/ unstable/ NI/ NA
9. Monthly Family Income: up to P\$1000/ P\$1001-1500/
P\$1501-2000/ P\$2001-2600/ P\$2601-4000/ P\$4001-5000/
P\$5001-7000/ P\$7001 and above/ NI/ NA
10. Monthly Individual Income : - same as family income -

EDUCATION - ALL MEMBERS

11. Highest Level of Education Attended: primary/ secondary
professorial/ vocational/ other/ none/ NA/ NI
12. Number of Years Attended at Highest Level: 1/ 2/ 3/ 4/ 5/
6/ 7/ 8/ NI/ NA
13. Scholastic Assistance: yes/ no/ NI/ NA
14. Educational Source: public/ private/ NI/ NA

MIGRATION - HOUSEHOLD HEAD ONLY

15. Residency prior to Bogota: city/ small town/ rural/ born
in Bogota/ NI
16. Years of Residency in Bogota: under 3/ 3 to 5/ 6 to 8/ 9
to 11/ 12 to 20/ 20 and more/ permanent/ NI
17. Residency Prior to Las Guacamayas: north/ south/ east/
west/ center city/ NI

PREVIOUS HOUSING

18. Type of Previous Housing: house/ apartment/ rooming
house/ illegal slum/ incomplete house with services/ room/

(1) Abbreviations: NI = No Information NA = Not Applicable

NI

19. Previous Tenancy: renter/ owner/ free use/ NI
20. Monthly Rent: under P\$200/ P\$201-400/ P\$401-600/
P\$601-800/ P\$801-1000/ P\$1001-1500/ P\$1501 and above/ no
rent paid/ NI

CURRENT HOUSING CONDITION

21. Years Resident: less than 1/ 1 to 2/ 3 or more/ NI
22. Tenancy: owner/ renter/ sub-renter/ other
- 22A. Monthly Rent (for renters and sub-renters only): up to
300/ 301-400/ 401-500/ 501-600/ 601-700/ 701-1000/
1001-1500/ 1501 and above NI
23. What do you use your dwelling for: housing only/
housing-commercial/ housing-industry/ housing-rental/
commercial only
24. If you rent out space, how much do you receive from rent:
up to P\$200/ P\$201-400/ P\$401-600/ P\$601-800/ 801-1000/
P\$1001-P\$1500/ above P\$1500/ NI
25. Why did you buy this house: location/ cost/ form of
payment/ design/ other
26. Did you consult with your family before buying this house:
yes/ no/ NI

CURRENT HOUSING CONDITION - OWNERS ONLY

27. Purchasing this house has made family relations: better/
no change/ worse/ NI
28. Have you enlarged your house: yes/ no
29. If you haven't enlarged it, why: does not need enlarging/
no economic resources/ do not know how to build/ no help
from family/ other/ NI
30. Did you use Caja plans to enlarge the house: yes/ no/ NI
31. How did you enlarge your house: did it myself/ did it with
my family and neighbors/ paid labor to do it/ all the
previous
32. Have your neighbors helped you to build: yes/ no
33. Have you helped your neighbors to build: yes/ no/ NI
34. Housing problems are easier solved: by yourself/ by
neighborhood groups/ NI
35. What was the main problem you encountered while enlarging
your house: lack of technical knowledge/ problems
obtaining materials/ transporting materials/ fitting the
construction to the lot/ conflicts with neighbor's
construction
36. As a result of purchasing this house, you experienced:
more satisfaction than problems/ more problems than
satisfaction/ indifferent
37. Have you stopped construction: yes/ no
38. If so, why have you stopped: lack of economic resources/
labor shortages/ no time/ material shortages
39. State the area of both permanent and provisional
construction for the following spaces: bedrooms/ kitchen/
bathrooms/ dining room/ shops/ fencing/ foundations
40. State the total investment for additions thus far: up to

P\$2000/ P\$2001-5000/ P\$5001-10,000/ P\$10,001-20,000/
P\$20,001-30,000/ P\$30,001-50,000/ P\$50,001-100,000/ above
P\$100,000

41. How do you consider your house: too small/ sufficient size/ too large
42. How does it compare with your previous home: better/ equal/ worse
43. Are you thinking of continuing enlarging your home: yes/ no/ NI
44. Will you: continue to improve your house/ move to another barrio
45. Do you think more housing like this should be built in Bogota: yes/ no

PUBLIC SERVICES DATA

46. For the following services, state their monthly cost and rank their quality either good, fair or poor: 1) sewers (solution C only), 2) electricity, 3) public transportation, 4) sewers, 5) public telephones, 6) police protection, 7) commercial facilities, 8) pedestrian paths, 9) vehicular roads, and 10) parks and open space
47. The location of water stations is: acceptable/ fair/ unacceptable/ NI
48. Water stations: serve their purpose/ serve the neighbors only/ have caused difficulties with the neighbors/ other

PENDING SERVICES

49. What additional utilities are you considering: water/ electricity/ telephone
50. What difficulties have you encountered installing 1) water, 2) electricity, and 3) telephone

GENERAL

51. Indicate by order what you consider to be the most important for your family: better education/ better housing/ better nutrition/ higher security
52. Which do you consider the most profitable level of education for your children: primary school/ secondary school/ higher levels of education
53. Have there been births in this family since you have lived here: yes - how many/ no
54. Adapting to this barrio has been: difficult/ difficult but improving/ easy
55. Has the Community Action Group contributed to the development of the barrio: yes/ no/ NI
56. Do you participate in the Community Action Group: yes/ no
57. Does your family participate in: barrio work groups/ barrio sports groups/ other organizations/ none of the above
58. What do you consider is the best way to improve the barrio: through government entities/ through the community/ through both
59. Do you use the services of any of these agencies: Popular

Housing Bank (Caja de la Vivienda Popular-CVP)/ Colombian Institute for Family Welfare (Instituto Colombiano de Bienestar Familiar-ICBF)/ Pro Family (Pro Familia)

60. Do you or you family participate in vocational training courses from SENA: yes/ no
61. The SENA courses taught in the barrio: are useful/ somewhat useful/ aren't useful
62. How do you consider the technical assistance rendered by the Caja in the barrio: good/ fair/ poor/ NI
63. Have you received social assistance during you residency here: yes/ no
64. State in order of importance, the services that you consider the barrio needs.

OBSERVATIONS

CAJA DE LA VIVIENDA POPULAR
DEL DISTRITO ESPECIAL DE BOGOTÁ

EVALUACIÓN PROGRAMADA "LAS GUACAMAYAS"

Manzana _____ Lote _____

Dirección _____

1. Tipo de vivienda: A B BI C

Jefe de familia _____

Número de familia: 01 02 03

D E M O G R A F I A				D A T O S E C O N Ó M I C O S				E D U C A C I O N			
2. No. de personas en el hogar	1. Edad años	3. Sexo	4. Estado civil	7. Ocupación	8. Tipo de trabajo	9. Ingreso familiar	10. Ingreso individual	11. Nivel escolar	12. Último año aprobado	13. Asisten a escuela	14. Tipo de educación
Jefe	10	M	Casado	Empleado	Estable	1 Hasta 1.000	1.000	1 Primario	1	SI	1 Público
Cónyuge	25	F	Casado	Obrero	Inestable	2 1.001 - 2.000	1.500	2 Bachiller	2	NO	2 Privado
Hijo	30	M	Viudo	En construcción	3 No informa	3 2.001 - 3.000	2.000	3 Normal	3	No inf.	3 No informa
Otro	4 12 - 19	M	Unión libre	Comercio por otro negocio	4 No aplica	4 2.001 - 3.000	2.500	4 Técnico	4		
	5 20 - 24	F	Segundo	Particular	5	5 3.001 - 4.000	3.500	5 Otro	5		
	6 25 - 29	M	No inf.	Vendedor ambulante	6	6 4.001 - 5.000	4.500	6 Ninguna	6		
	7 30 - 34	F		Servicio doméstico	7	7 5.001 - 7.000	5.500	7 No aplica	7		
	8 35 - 39	M		Mayor	8	8 7.001 y más	7.500	8 No informa	8		
	9 40 - 44	F		Estudie	9						
	10 45 - 49	M		Ninguno	10						
	11 50 y más	F		No informa	11						
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											

(1) Figure C.1 Las Guacamayas home interview questionnaire.

(1) Caja de la Vivienda Popular. "Formulario para Evaluación Programa Las Guacamayas." Bogotá: Caja de la Vivienda Popular, Oficina de Integración Social, Marzo, 1976.

Figure C.1 Las Guacamayas home interview questionnaire (Cont.)

MIGRACION DEL JEFE DE FAMILIA				VIVIENDA ANTERIOR			
15. Lugar de procedencia o Bogotá	16. Años de residencia en Bogotá	17. Barrio de procedencia o San Guacamar	18. Tipo	19. Tenencia	20. Valor mensual		
Nombre	Menos de 2 años 1	Nombre	Liborio de acuerdo a las características	Arrendo	1	Hasta \$ 200	1
Ciudad	De 2 a 5 años 2	Nombre	Relaciones	Compra de hecho	2	201 - 400	2
Pueblo	De 6 a 8 años 3	Sexo	Casa	Usufructo	3	401 - 600	3
Rural	De 9 a 11 años 4	Color	Apartamento	No Informa	4	601 - 800	4
Nació en Bogotá	De 12 a 20 años 5	Capacidad	Inquilinato		5	801 - 1.000	5
No Informa	De 21 y más 6	Centro	Tepalcates		6	1.001 - 1.500	6
	Siempre 7	No Informa	Casaforte		7	1.501 y más 7	7
	No Informa 8		Piso		8	No pagado nada 8	8
			No Informa		9	No Informa 9	9

VIVIENDA ACTUAL					
Unicamente para propietarios					
21. Cuanto hace que vive en el barrio	22. Tenencia	23. Sexo	24. Cuanto recibe por arrendamiento	25. Qué tipo que usted compró este vivienda?	26. Consulte con su hijo la decisión de comprar este vivienda?
Menos de 1 año 1	Propiedad 1	Viviente 1	Hasta \$ 200 1	La utilización 1	Este vivienda? 1
De 1 a 2 años 2	Arrendo 2	Viviente económico 2	De 201 - 400 2	El costo de acuerdo a sus ingresos 2	SI 1
3 y más años 3	Subarrendo 3	Viviente-independiente 3	De 401 - 600 3	La forma de pago 2	NO 2
No Informa 4	Otro 4	Viviente-comunio 4	De 601 - 800 4	El tipo de solución de vivienda 4	No Informa 3
	Si contestó 1 a 2 preguntar este 22?	Comunio 5	De 801 - 1.000 5	Otro cual 5	
	22? Cuanto mensual	Este 3 pregunta 24	De 1.001 - 1.500 6		
			1.500 y más 7		
			Si información 8		

Vivienda Actual (continuación) para propietarios

41. Cómo considera su vivienda		42. Comparación con la anterior .		43. piensa seguir ampliando su vivienda		44. Si usted pudiera		45. Cree usted que es conveniente construir en Bogotá más viviendas de esta clase .	
Reducida	1	Mejor	1	SI	1	Mejoraría su vivienda	1	SI	1
Suficiente	2	Igual	2	NO	2	Se trasladaría a otra barria	2	No	2
Amplia	3	Peor	3	No Informa	3	Por que?		No Informa	3
Por que?		Por que				No Informa	3		

DATOS SOBRE LOS SERVICIOS

46. Servicios	Valor mensual del servicio	Concepto				Servicios	Concepto							
		Buena	Regular	Mala	Por qué ?		Buena	Regular	Mala	No aplica	Por qué ?			
1. Acueducto Solución C						5. Teléfono público								
2. Energía						6. Seguridad								
3. Transporte						7. Comercio								
4. Alcanarillado						8. Vías peatonales								
						9. Vías vehiculares								
						10. Zonas verdes								

Únicamente para soluciones A, B y B1

SERVICIO DE PILETAS				SERVICIOS DOMICILIARIOS FALTANTES - ranilla 01			
47. Localización		48. Funcionamiento		49. Qué servicios además de los instalados ha pensado obtener ?			
Aceptable	1	Ha respondido a las necesidades	1	1. Acueducto	1		
Regular	2	Ha facilitado las relaciones con los vecinos	2	2. Energía	2		
Inaceptable	3	Ha ocasionado diferencias con los vecinos	3	3. Teléfono	3		
No Informa	4	Otra cual		50. Qué dificultades ha encontrado para la instalación de :			
				1. Acueducto			
				2. Energía			
				3. Teléfono			

51. Indique en orden de preferencia lo que usted cree que es más importante para su familia :

Mayor educación	1
Mejor vivienda	2
Mejor alimentación	3
Más tranquilidad	4

52. Considera usted que es más conveniente para sus hijos

Una educación primaria	1
Una educación secundaria	2
Una educación superior	3

53. Durante la permanencia en el barrio ha habido nacimientos en esta familia ? SI NO Cuántos ? _____

54. El acomodarse en este barrio ha sido

Difícil	1
Difícil pero se ha sentido ayudado	2
Fácil	3

55. La Junta de Acción Comunal ha contribuido al desarrollo del barrio ?

SI NO No informa

56. Participa en las reuniones de Junta de Acción Comunal ?

SI NO

57. Participa su familia en grupos de :

Trabajo del barrio	1
Deportivos del barrio	2
Otras organizaciones cuales ?	3
No participa	4

58. Considera que el mejoramiento del barrio se logra a través de :

Las entidades del Gobierno	1
La comunidad	2
La unión de las dos anteriores	3

59. Utiliza los servicios del SENA .

De la C.V.P.	1
Del I.C.B.F.	2
De familia	3
	4

60. Participa usted o su familia en cursos de capacitación

Del SENA ? SI NO

61. Los cursos de capacitación que dicta el SENA en el barrio

Sirven mucho	1
Sirven poco	2
No sirven	3

62. Considera que la asistencia técnica que presta la CVP. en el barrio es :

Buena	1
Regular	2
Mala	3
No informa	4

63. Le han prestado asistencia social durante su permanencia en el barrio ? SI NO

En caso afirmativo Quien ? _____

64. Que servicios considera necesarios para el barrio en orden de importancia ? _____

OBSERVACIONES : _____

Appendix D
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