Evolution of Dwellings in Progressive Development Projects: Case Study El Gallo, Ciudad Guayana

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Abstract

Progressive development projects are aimed at enforcing the process of dwelling evolution which has been observed in informal settlements by providing conditions that are favourable for housing development. This study suggests that, under these created environments, dwelling evolution presented particular characteristics that differentiated it from similar processes in other contexts.

A long-term assessment of the phenomenon of dwelling evolution was conducted at "El Gallo", a progressive development project in Ciudad Guayana, Venezuela. Dwelling evolution was examined by observing aspects of the process that were relevant to the case study. These included changes in the dwelling area, spatial configuration and functional layout. The case study provided different levels of user participation in the early stages of development that were also considered in the analysis.

The findings indicated a marked change from the temporary dwelling to the permanent structure. This process differed from the gradual replacement of initial shacks that is characteristic of informal settlements. The findings also revealed that the early involvement of the user, as well as the utilization of user-responsive designs for the permanent structure, resulted in lesser stages of dwelling evolution and higher degrees of dwelling development.

Résumé

Les projects de développement progressifs ont pour but de renforcir le processus d'évolution des habitations, tel qu'observé dans les quartiers informels, en offrant des conditions qui sont favorable au développement des habitations. Cependant, cette étude suggère que dans ces environnements planifiés l'évolution des maisons a presenté des charactéristiques particulières différentes de celles observées dans d'autres contextes.

Cette étude montre le processus évolutif à longue-durée des maisons à El Gallo, un projet de développement progressif à Ciudad Guayana au Vénézuela. L'évolution des maisons a été évalué en observant certains aspects clef du processus du projet évalué. Les observations ont porté sur l'agrandissement de la surface habitable, la structure de l'espace bâti et les changements d'usage des espaces de la maison. Le project évalué a offert différents niveaux de participation aux usagers dans le développement initiale de leurs maisons, ce qui fut considéré parmi les observations.

Dans cette étude des changements drastiques ont été observé entre la maison temporaire et la maison permanente. Ces changements sont différents des changements graduels observés d'habitude dans les quartiers informels. Enfin cette étude révèle que la participation des usagers au début de la construction et l'usage de solutions qui répondent aux besoins des usagers pour les structures permanentes ont produit des maisons avec moins d'étapes d'évolution et avec des développements plus approfondis.

Extracto

Los desarrollos de vivienda progresiva buscan estimular el proceso de evolución observado en asentamientos informales al proveer condiciones favorables para que éste se produzca. El presente estudio sugiere que en estos ambientes generados, el proceso de evolución de la vivienda ocurre de una manera particular que lo diferencia de procesos similares en otros contextos.

Una evaluación a largo plazo del proceso de evolución de las viviendas fue conducida en "El Gallo", un desarrollo de vivienda progresiva en Ciudad Guayana, Venezuela. La evolución de las viviendas fue observada a través de características del proceso que eran relevantes al caso de estudio. Estas características incluyeron cambios en el área de la vivienda, en su estructura espacial y en su estructura funcional. El caso de estudio presentó diferentes niveles de participación del usuario en las etapas iniciales de desarrollo que también fueron considerados en el analisis.

Los resultados demostraron un marcado cambio de la vivienda provisional a la permanente que discrepa con el proceso gradual de substitución de la vivienda provisional característico de los asentamientos informales. Asi mismo, el estudio reveló que la participación del usuario en etapas iniciales de la construcción, y el uso de diseños adaptados a sus necesidades, resultaron en menor número de etapas de evolución y mayor nivel de desarrollo de la vivienda.

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Introduction

Progressive development has been the main component of sponsored housing projects during the last two decades. Based on observations of informal settlements, progressive development is the process by which dwellings evolve, shaped by the changing cultural, social and economic characteristics of the households. The cost-effectiveness and user-suitability of this process and the quality that dwellings eventually reached raised questions about the effectiveness of comparable conventional housing programs.[1] Strategies of progressive development focused their efforts on reproducing the process of dwelling evolution observed in informal settlements under sponsored housing projects.

Progressive development projects aimed at manipulating the adequate housing variables to encourage the user's participation and investment in the housing production. Most of the times, however, rather than duplicating the kind of housing observed in informal settlements, progressive development projects tried to replicate certain aspects of the process, reducing the time and public investment needed for development. This last point was specially true for basic housing strategies such as site and services, which attempted to use only features of the process (i.e, self-help or mutual aid) to build at the pace, standards and even designs proposed by the project. Expectations, however, were that the process of dwelling evolution was similar to that in informal settlements.

This research examines the process of dwelling evolution occurring in a progressive development project over a long-term period. The case study is a 27-year-old project located in Ciudad Guayana, a planned industrial city in the south-eastern region of Venezuela. The purpose is to analyze and understand the process of individual dwelling evolution of the existing housing stock at the settlement of "El Gallo." The study aims to obtain a long-term picture of the process of dwelling development and to document how the housing stock of "El Gallo" was produced. The study reveals priorities of household investment in their dwellings within the context of sponsored progressive developments. The research also extends the knowledge regarding progressive development projects in Venezuela. Ultimately, this study depicts housing as a dynamic and changing entity.

The Scope

Progressive development projects embrace any kind of housing approach, from upgrading existing settlements to more complete phased housing developments. This study considers progressive development projects that have been planned and implemented on land reserved for housing purposes. The construction of the dwelling in these developments is managed by the user, and it is expected to occur in an incremental way. Site and services and the multiple variations of the approach are part of these kinds of developments. However, since many authors agree that site and services never provide more than core non-finished dwellings, [2] this study also includes developments in which finished basic housing that can be extended is mixed with other types of housing, such as self-help and core housing. The study does not include projects such as upgrading, in which the process of progressive development is already occurring.

In terms of what was observed, the study endeavours to consider aspects of the evolution of dwellings that were documented during this process. Thus, the research limited itself to the study of physical aspects of the evolution of the dwellings. These aspects were observed directly in the field or in the graphic documentation collected for the study. The documentation that supports this work was recorded during the lifetime of the settlement. The material consists of written accounts of the planning and evolution of Ciudad Guayana, aerial photographs of the settlement taken regularly, and a field survey conducted by the author between July and August 1991. The survey collected data on household characteristics and provided detailed information on physical features of the dwelling. Aerial documentation recorded throughout the lifetime of the settlement provided excellent information on the process of dwelling evolution. The written material about Ciudad Guayana is very extensive and multidisciplinary. The diversity of approaches of the collected documentation was most useful to understand the extent of the process of dwelling development within the context of the city.

Organization

Chapter one is a literature review, which is divided into three sections. The first section introduces the significance of the process of dwelling evolution in low-income settlements, and how progressive development became a housing strategy for sponsored projects. The problems addressed by the research end the section. The second section reviews selected works that studied the process of dwelling evolution in progressive developments. The third section is an introduction to the case study: El Gallo. The characteristics of the project are described, followed by the geographical, historical and institutional background of the context of the project: the industrial city of Ciudad Guayana. General aspects of the creation, implementation and servicing of El Gallo are also presented.

Chapter two explains the method used to obtain and analyze the information collected by the research. The chapter is divided into three sections. The first section states the research questions of this research. The second section lists and explains the sources of information used in the research, the reasons for choosing El Gallo as a case study and the aspects of dwelling evolution to be considered by the study. The third section explains the strategy used to analyze dwelling evolution at El Gallo.

Chapter three contains the analysis upon which the study was based. Three dimensions of the process of dwelling evolution were observed at El Gallo: area increase, extension of the spatial structure and changes in the functional layout of the dwelling. Area increase was the enlargement of the initial structures by the construction of other structures. Records of area increase gave a picture of the growing process of the house up to what it is today. The extension of the spatial structure was the process produced by alterations to the house plan by the addition of new structures. Patterns of incremental development were drawn from the observations. Finally, changes to the use layout were recorded from uses given to the added structures and the consequent modification of the existing use layout. The relevance of these dimensions to the household was illustrated by the presentation of brief case stories. A concrete analysis of the surveyed sample was then made. A summary of the three dimensions of dwelling evolution at El Gallo concludes the section.

Chapter four is a summary of the findings of the research.

Chapter five concludes the study and is complemented by a discussion of the impact of its findings in the context of low-income housing.

Notes

1. "Conventional housing" is understood as the sponsored housing projects which provide a finished, standardized dwelling unit traditionally supported by international and local housing agencies.

2. As explained by Laquian: "The shelter component of sites-and-services projects may vary. A few projects do not have shelter at all. Most projects, however, have a variety of 'core units,' which might include a wall and a toilet, a kitchen, or even a room" (Laquian 1983:18).

Van Huyck defines sites and services more precisely by excluding them from any program that provides finished housing: "a wide variety of proposals come under the title 'sites and services,' the only similarity being that neither type provides complete houses" (Van Huyck 1971:23).

1.0 Chapter I. Dwelling Evolution in Progressive Development Projects. Review of the Literature. Introduction of the Case Study

Introduction

The following chapter presents a summary of the literature concerning this study. The chapter is divided into three sections. The first section presents general ideas about dwelling evolution in the housing process and about the concept of progressive development as an interpretation of this process.

The second section raises the problem that originated this research and presents selected works addressing it.

The last section narrows the case study from the broad area of progressive development projects. A short background of **Ciudad Guayana** is included at this point. Finally, the program and physical aspects of the case study are described.

A summary of the ideas relevant to the study concludes the chapter.

1.1 Dwelling Evolution

1.1a Progressive Development

Dwelling evolution in progressive developments, or *progressive development*, is the process by which initially very basic and even precarious forms of shelter eventually become lasting, durable housing. The process is managed by users and, consequently, housing is continuously tailored to the household's changing characteristics and needs. These individual interventions can affect the built environment above the dwelling level. In fact, progressive development is just the way many urban concentrations have been created.

Examples of progressive development were found in the evolution of dwellings in informal settlements by early researchers in housing, Charles Abrams, John Turner. William Mangin and Elizabeth and Anthony Leeds. From the initial shack to the consolidated dwelling, housing in squatter settlements was developed as the household's new needs appeared and priorities changed. In turn, the process of evolution of these man-built environments was a reliable reflection of the inhabitants' requirements and priorities. Observations of Mangin and Turner in Latin American squatter settlements support this affirmation:

> The classic sequence of housing locations, from the shared room of the young man or very young family to a rented tenement room of the young family, to the progressively developing settlement needed by the growing family reflects a logical sequence of responses to changing needs within the limits of the growing family's means (Mangin, W. and J. Turner 1968:158).

Nevertheless, dwelling evolution in informal settlements was not only the showcase to understand cultural, social and economic priorities, and needs of low-income households. The interactive relationship between dwelling and user was also a need in itself. Low-income households were dynamic pieces shaping their environment, and their dwellings had to be adapted to many different situations along the household life. This relationship between dwelling and user is pictured in the cycle of low-income households:

> The possessor of an urban homestead, even if it is not more than a shack on a plot of unserviced land, can rent a part or can use it as a shop or a workshop. The savings will, in general, be invested in the construction by stages of a dwelling with modern standards.... After the ten or fifteen years necessary for the completion of the first unit of their dwelling have elapsed, the average family has a higher priority for modern amenities and lower priorities for permanent tenure.... More important at this later stage will be the social status given by the quality of the dwelling environment and the social security given by its equity rather than by the inalienability of its tenure (Caminos H.; J. Turner; and J. Steffian 1969:vii).

These observations were fundamental in understanding that the failure of conventional housing programs was precisely in not meeting the household's housing needs. Observations drove beliefs that in any effort to provide housing to low-income groups, the household should be totally responsible for housing production.

> Dwelling environments are necessarily functions of their inhabitants and, as people's housing priorities are extremely varied, control of dwellings and neighbourhoods must be in personal and local hands (Turner 1976:118).

Not without scepticism, progressive development became the main component of low-income housing, and the basis for radical changes of sponsored housing

strategies. Nevertheless, progressive development also had decisive advantages over conventional approaches. On the one hand, housing could be made affordable when household needs were matched by the household's financial possibilities. On the other hand, environments were adapted to individual characteristics, needs and requirements, making housing satisfactory for users. These have been the two main principles that have supported the continuity of progressive development projects. As Laquian points out:

> The main principle behind basic housing is progressive development. This is the idea that shelter and services can be initially provided in the simplest and cheapest way. The housing package can then be gradually improved upon in stages, using the combined resources of the people, community, government, and other institutions. In the process, the shelter and services that evolve are in response to the basic needs of the people and their inherent capability to achieve those needs (Laquian A. 1983:8).

Today, after more than two decades of user-involved housing strategies, international and local sponsoring agencies rely on progressive development projects to meet the housing needs of the poor. Despite its extensive use however, the need to consider more effectively the aspect of dwelling evolution as a component of the planning process has been recently highlighted by several authors.

> Incremental development and speed are priorities in the design activity where housing cannot be viewed as an act of finished building (Hamdi, N. 1990:vii)

It becomes clear that understanding dwelling evolution in progressive development projects is a key element to reformulate policies and existing strategies of assistance, and to develop more assertive new projects.

1.1b Progressive Development Projects

Progressive development projects left the responsibility of incremental construction to the household. The intention of many of these strategies was to reproduce aspects of the process of housing occurring in informal settlements, that is, "the resources, skills, and personal motivations to provide adequate shelter for

themselves" (Laquian 1983:16). However, most of these strategies did not intend to duplicate informal settlements. For instance, site and services intended to raise housing 'efficiency,' maximizing land use and 'improving' speed of construction and standards of user-produced housing by providing aid for self-construction. Furthermore, the initial emphasis of such strategies was in "restoring planning control" (Van der Linden 1986:16), that is, the spatial arrangement of sites, streets, facilities and other physical elements (Goethert 1985:28). Meanwhile, the question of whether or not the process of dwelling evolution under new conditions would be analogous to that already observed was not even questioned. Progressive development and its benefits within these new contexts were taken for granted.

> All basic housing programs are based on the assumption that people will improve and consolidate their dwellings when they are assured of tenure and provided with the means and time to do so (Laquian, A. 1983:25).

Indeed, the simple fact that dwelling evolution in progressive development projects occurred within the legal urban framework affected the kind of housing produced. In informal settlements dwellings evolved without official or social acceptance. Other usual differences between contexts were the process of settling, the scale of development, settlement layout, plot layout, plot allocation, plot servicing, and so on.

There are good grounds to believe that the process of dwelling evolution in progressive developments has its own characteristics. Therefore, observations of this process in progressive development projects during long periods of time could provide new insights into household life in these different contexts.

1.1c Dwelling Evolution in Progressive Development Projects

Given that progressive development strategies are based on the observation of dwelling evolution of informal settlements, it is surprising that there are few studies considering the process of dwelling evolution within sponsored progressive developments. However, the study of dwelling evolution is gaining attention in progressive developments and in other housing strategies.[1]

Most of the studies in the area of progressive development have been on site

and services projects, and dwelling evolution or "consolidation" has been part of a broader evaluation of the projects. For instance, in a comprehensive evaluation of the Dandora site and services, McCarney reports how settlers did not meet levels of dwelling consolidation imposed by the project (McCarney 1987:105). Dwelling evolution was observed as a function of the time needed to reach desirable levels of consolidation. McCarney showed how speed of consolidation along the life of the project, did not match expectations set by rigid project timetables. On the other hand, Mellin outlined the incremental construction process of a site and services project in Ahmedabad (Mellin 1987:130). In his study, the process of progressive development was suggested by the different levels of development found in the housing stock 8 years after the project was implemented. Few studies, however, have in fact followed dwelling evolution along periods of the life of the settlement.

Among the studies that made long-term observations of dwelling evolution, this report will mention the works of the **O.A.S.- F.S.D.V.M.** 1977, in an evaluation of the site and services of "San José de Pino" in El Salvador (Organization of American States and Fundación Salvadoreña de Desarrollo y Vivienda Mínima); the work of Bamberger, Gonzalez-Polio and Sae-Hau 1982 in their evaluation of the World Bank site and services projects, also in El Salvador; and the work of Navarrete 1989 in the "Zihuatanejo" site and services, Mexico.

In all cases, studies were limited to the period of evolution until the dwelling reached its physical consolidation. Dwelling growth was rationalized in intervals of relevant evolution, called "stages of development" or "degrees of consolidation." The number of stages dwellings completed depended on the age and improvement of the dwelling during this time. The study of the World Bank site and services carried out between 1975 and 1980 was the longest of these studies (Bamberger, M.; et al. 1982:1). Evaluations of the F.S.D.V.M. and Navarrete were limited to 2 and 4 years of dwelling development, respectively.

The Bamberger, M. et al. study outlined the following process of consolidation:

1st stage: Enlargement of living space through the addition of area.

2nd stage: Security and family privacy enclosing the plot with walls.

3rd stage: Improvements in terms of physical (aesthetic) appearance, finishing and painting to the walls, better materials and decoration of the façade (Bamberger, M. et al 1982:183).

The study of "San José del Pino" had similar findings except that there was an initial stage in which households consolidated the basic habitable space into a more permanent structure before going through this sequence of stages. In addition, the study carefully regarded uses and position within the plot given to additions made during these stages. New additions were mainly kitchen areas, and they were located at the rear part of the plot. Some households also added more bedrooms, and a very small proportion built a second floor (O.A.S.- F.S.D.M.V. 1977:17-24).

The detailed study of Navarrete found a similar incremental process but occurring in a different sequence. In his case study, Navarrete observed that following the occupation of the initial basic area, the differentiation of the spaces for living and cooking and sleeping activities occurred. Only after that did households care about improving all these areas with more permanent materials.

Although the Bamberger et al. study was the longest of these evaluations, observations were limited to the time necessary to produce the house. After that, the incremental process of dwelling construction stopped or was considerably reduced.

> It would seem that 35 to 40 square meters is an acceptable area to most of the families (Bamberger et al 1982:183).

On the contrary, Navarrete acknowledges a continuity of dwelling evolution to further stages of the "consolidation process" (Navarrete 1989:55). Cited studies were restricted to the Latin American context, and it can be seen that the processes described had certain basic elements. However, dwelling evolution varied from project to project. Sometimes differences were slight, such as the time when a permanent dwelling was incorporated into the processes of form evolution. In other opportunities relevant distinctions can be made, such as whether or not households stopped the process of area increase of their dwellings.

Studies also created tools for the analysis of dwelling evolution. Incremental development could be observed in differentiable stages affecting the area of the dwelling. The order in which functions were added to the existing spaces indicated the priorities of the households. The location of these structures within the plot was a product of the available space left, but it was also related to the function of the additions.

1.2 Progressive Development Projects in Venezuela

1.2a The UMUP Strategies

One of the most basic progressive development approaches consists in the allocation of land and its progressive servicing while housing is built and upgraded. This approach, similar to rudimentary site and services projects, was experimented within several countries long before site and services became the main housing tool of the international development agencies.

In Colombia 12,000 plots with minimum standards -- roads and communal water taps -- were built during the early 1960s under the "Minimum Urbanization Program" (Goethert 1985:28). In Chile, basic urbanized plots, formally called "Operation Site" (Operación Sitio), were also developed. However, the strategy eventually evolved into simply demarcated plots that became popularly known as "Operation Chalk" (Operación Tiza) (Kusnetzoff, F. 1975: 50). Recently the idea of non-serviced plots has been brought to light again by Sharma under the name of "Planned Upgradable Sites" (Sharma S.K., 1990:41).[2] Research by the Minimum Cost Housing Centre has also used this concept, with the aim of providing new housing alternatives (Bhatt, V. et al, 1990).[3]

A similar approach was followed in Ciudad Guayana, Venezuela, where tracts of lands were subdivided and progressively serviced with the inhabitants' participation. The approach of these developments was like that of "projects of plots with minimum services," or "incremental housing schemes," and stressed the importance of upgrading both services and dwellings. These progressive development projects began in Ciudad Guayana in 1962, taking the name of "Progressive Urban Improvement Units," **UMUP** (Unidades de Mejoramiento Urbano Progresivo). The concept of UMUP proposed that, starting from minimum services, individual dwellings and public services be progressively improved in a government-user effort.

With very few fundamental changes, **UMUP** strategies are still in use in Ciudad Guayana as one of the strategies to avoid random squatting and provide services and housing to low-income groups.

1.2b General Background of Ciudad Guayana

Ciudad Guayana is a planned industrial city created as part of a decentralization strategy by the Venezuelan government in 1961. The city is located in

the south-eastern region of the country in the confluence of two main rivers, the Orinoco and the Caroni (see Fig.1). The site has an incredible resource potential, and it was expected to have a main impact on lowering Venezuela's economic dependence on its oil revenues. American iron mining companies had been on the site since the early thirties (Dinkelspiel, J. 1970:51). Today iron exploitation is a state monopoly. Bauxite is also extracted and processed into aluminum for exportation. Electricity is obtained from two dams in the Caroni River, which supplies 60% of the electricity consumed in Venezuela. A third dam is under construction.

The Ciudad Guayana's development agency, the Corporación Venezolana de Guayana (**CVG**), was created to lead the development process of the city in 1960. To assist the planning of the city, the CVG hired a multidisciplinary consultant group, the Joint Center for Urban Studies of MIT and Harvard.

By 1960 Venezuela had one of the fastest rates of urban growth among developing countries.[4] Ciudad Guayana already had a very high influx of migrants when it was created in 1961.[5] The housing consultant of the Joint Center affirmed:

> CVG reluctantly had to face the fact that it would not be possible to build Ciudad Guayana without slums. The city already has eight slum areas and around 5.300 'ranchos' [shacks] (Corrada 1966:5).

Since building sufficient housing to match the expected rate of migration was unfeasible, squatter settlements could be prevented if a containment strategy similar to that followed in Brasilia was implemented. Squatting would be allowed in adjacent areas of the new city. Relocation of squatters occurred as the housing construction process permitted. Squatter settlements were not upgraded since no land security was given; the squatting area was of transitory nature.

Nevertheless, a different approach was followed in Ciudad Guayana. The work of John F. Turner, associate researcher for MIT-Harvard at that time, along with William Mangin, crucially influenced the perspective of the Joint Centre team on the rural migration to urban areas. Squatting was to be guided towards settlement areas within the city, and shacks were to be built according to a community layout. The intention was to facilitate the replacement of the initial shack and the subsequent provision of public services (Ibid). The **UMUP** concept was introduced in the planning program of Ciudad Guayana as a means of giving security of land to the residents,

thus producing a quick response in the house construction. Like in some site and services, **UMUP** strategies avoided large investments of money in providing public infrastructure -- services were to be provided gradually -- and in relocating squatters from land needed for other purposes.[6] According to Corrada, the aim of the housing strategy was "to speed up and improve the upgrading process of squatter settlements" (Corrada 1966:6).

It was expected that given security of land, squatters would be encouraged to build by their own means. However, housing assistance was provided to accelerate the process of dwelling transformation. Relevant to this study, one of the ideas proposed the preparation of a construction manual based on the skills of squatters, so that materials were economically used and the quality of the shelter improved. The idea was materialized in three house plans which specified required materials and amounts to be efficiently used.

1.2c The Case Study: El Gallo

In 1963 a pilot project was undertaken in San Felix, on the west side of Ciudad Guayana. According to Corrada, the objective of the project was:"to determine the feasibility of guiding squatting and replacing shacks" (Corrada 1966:18).

As part of the "El Roble Pilot Project," 1,000 plots with minimum services (communal water taps, electricity and unpaved streets) were developed. In terms of housing, the program included 500 loans for construction materials. The program also sought to encourage the formation of community organizations within the neighbourhoods.

The **UMUP** projects were directed to the poorer low-income families. Construction loans were aimed at providing dwellings for these families, though it was expected that part of the families select other means to build their houses. The program reached three communities or "Neighbourhood Units" - **UV** (Unidades Vecinales), UV 102, UV 103 and UV 112. Among these communities the neighbourhood unit UV 112, "Urbanización Manuel Piar," but popularly known as **El Gallo**, was the case that involved Progressive Urban Development as the urbanization strategy. The others mixed this approach with conventional housing programs.

Some aspects of the El Roble program affecting El Gallo are worth mentioning at this point:

Land Tenure: The Development Agency CVG, owner of the land, leased the plots to the user with an option to buy after construction of a durable house. In doing this the CVG aimed to keep control over land use, thereby preventing land speculation while encouraging house investment. Initially, the yearly rent of the plot was about Bs 80 (US$ 18). Once the permanent dwelling was built, the 300 sqm plot would be sold for Bs 1,500 (US$ 330).[7]

Preferential Attention: Priority was given to the families that were relocated from the areas to be flooded by the construction of the first dam and the other areas affected by the development works. Families with total monthly incomes under Bs 500 were given preference, although a certain proportion of families of higher incomes was desired.

Construction Loans: The amount of the loan ranged between Bs 3,000 and Bs 4,000, based on estimates of the material costs. A minimum monthly income of Bs300 or a co-signer with the capacity to repay the loan was required.

Repayment Program: Repayment time was 20 years at an annual interest of 4%. No downpayment was required either for the land or for the material loans. Instalments were low at the beginning and progressively increased according to increases in income.

1.2d Initial Physical Aspects of El Gallo

Just before streets were laid out, El Gallo was a land extension with a strong slope towards the "El Gallo" hill, a historic site dating from the wars of independence. Although the area was cleared and urbanized in 1964, some of the oldest residents surveyed in this study had been living in El Gallo since 1962. El Gallo was in the most peripheral land of Ciudad Guayana, 1.5 km from the center of San Felix and 7 km from Puerto Ordaz. Transportation to the limits of El Gallo was by public bus or **por puesto** (jitney cabs), taking about 20 minutes from downtown San Felix, plus the journey from the limits into the settlement. Going to the industrial side of the city, Puerto Ordaz, all vehicles had to cross the Caroni River by ferry, making the time of travel about two hours.[8] El Gallo was bounded by one main perimetrical artery and two street segments of future avenues of San Felix (see Fig.2).

Initial infrastructure included 18 residential blocks, accommodating 434 plots and 12 intermediate green areas, where communal water taps were placed. All streets were unpaved and, according to the older settlers, they themselves planted the poles for the electricity (see Fig.3). A central area was reserved for the community facilities of the neighbourhood.

Residential plots occupied 42% of the El Gallo extension. Streets and pedestrian circulation occupied 28%, and the space reserved for facilities represented 30% of the area. The blocks were composed of back-to-back plots with 12-meter fronts and a 25-meter depth (300sqm). Given that the average household size was 6 people, density at El Gallo was 123.7 persons per residential hectare (see Fig.2).

The objectives that El Gallo and other UMUPs pursued for Ciudad Guayana can be summarized as follows:

- To provide an adequate environment for low-income settlers to invest in their houses (investment of private resources -- time, labour and savings -- in housing).
- To provide housing and land ownership to low-income families.
- To incorporate the urban squatters and the informal housing activity into the legal framework of the city.
- To reach a level of acceptable living standards for low-income inhabitants.

1.3 Summary

The chapter emphasized that the concept and different strategies of *progressive development* were based on the observation of the process of dwelling evolution in informal settlements. Progressive development in informal settlements is a reflection and, at the same time, a part of the household's needs. However, the study questions how dwelling evolution occurs under the conditions of progressive development projects.

The review of existing studies in the area outlined important aspects of the evolution of dwellings in progressive development projects. In general, studies concluded that dwellings increased their area through additions and changes made to the existing dwelling. The use given to the additions and the sequence in which these were built revealed the household's needs and priorities. The place within the plot

where additions were made was also relevant to the process.

On the other hand, dwelling evolution in progressive development projects has been observed during periods of time that revealed the process up to the construction of a "consolidated" structure. However, no studies have been made during longer periods. Thus, a long-term assessment of this process can provide new insights into housing in progressive development projects.

Finally, the case study of this research was introduced identifying the approach followed. Aspects of the background of the case study, as well as initial physical features of development and objectives of the project, were presented.

. Notes for Chapter I

1. Studies about dwelling evolution in other contexts than progressive development projects are quite recent. The most relevant titles collected in this research are:

. The work of Andrade-Narvaez, who explained dwelling evolution in invasion settlement using an analogy with cellular growth (Andrade-Narvaez, J., 1985 "Houseform Transformations in Santa Ursula, Mexico City."

. The study of Bazant, Nolasco and Gomez, which distinguished three phases of dwelling evolution (a formative, a developmental and a consolidation phase) in spontaneous settlements of Mexico (Bazant, J., M. Nolasco and J. Gomez 1981 "Aspectos Cualitativos de la Autoconstrucción de Bajos Ingresos" in "Memoria de la Primera Reunión Nacional sobre Investigaciones en Autoconstrucción" by the Consejo Nacional de Ciencia y Tecnología, Mexico).

. The study of Meer and Dinesh Mehta, which examined spatio-temporal patterns of evolution in two settlements: an invasion settlement, and a subsidized public housing settlement (Mehta, M., D. Mehta and V. Patil 1990 "Spatio-Temporal Patterns of Settlement Evolution Processes").

. The study of Tipple is perhaps the most recent. This study drew on the work of several researchers in the area of Transformations in Public Housing (Tipple, G. 1991 "Self-Help Transformations of Low-Cost Housing. An Introductory Study").

2. Sharma proposes a viable housing solution for low-income groups, manipulating the order of the sequence of development. Through the comparison of sequence of development in different approaches (conventional: land → services → house → people; site and services: land → services → people → house; slums: people → land → house → services). A different sequence is proposed to allow the user the earliest participation in a planned housing intervention (planned upgradable sites: land → people → house → services) (Sharma S.K., 1990:41).

3. The Self-Selection Process proposes the earliest user-intervention seen in a planned housing strategy. The users are involved in the early stages of selecting the size, location and characteristics of their plots (Bhatt, V. et al, 1990).

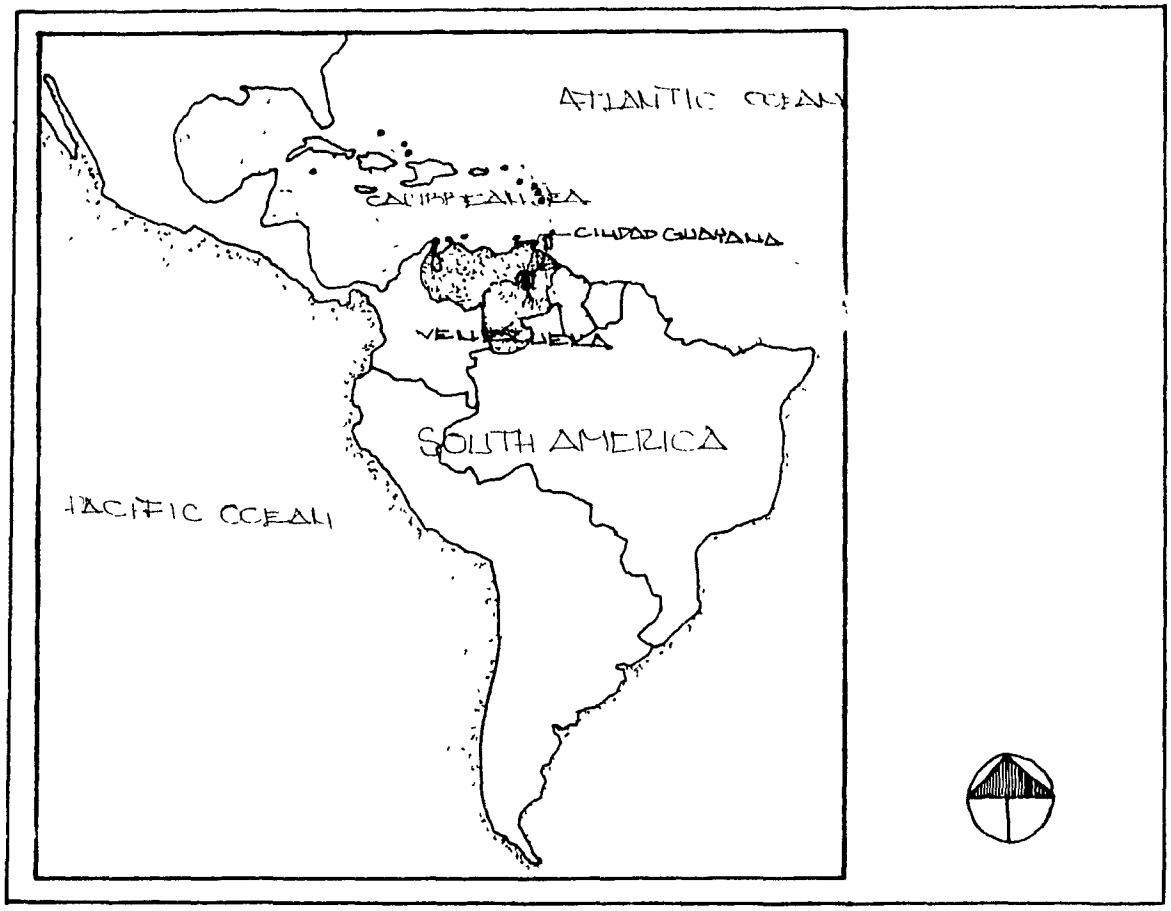
4. During the decade 1950-1960, the average annual rate of increase in urban areas was 5.8 per 100 persons, same as Peru and among the 5 Latin American countries with largest growth in urban population. However, being more than 60% urban, Venezuela has the second highest total growth in Latin America (Koth, M., J. Silva and a. Dietz 1965:11).

5. The interannual rate of population growth between 1960 and 1967 was 11% (Caminos, H., J. Turner and J. Steffian 1969:10).

6. Corrada comments that the average expropriation price paid to squatters was US$310 for a two-year-old rancho and US$890 for a ten-year-old one, compared with US$47 for the empty plot and US$324 for the plot after minimum services were provided (water taps, electricity and paved streets). (Corrada 1966:6)

7. Equivalences were estimated with the exchange rate for 1964 of Bs 4.50 per US$ 1.00. However, a better idea is given knowing that the program of UMUP was aimed at households with monthly incomes below Bs 500.00 or US$ 111 (Corrada, R. 1962:2). The average income in the country about this time was US$ 210 (Koth, M., J. Silva and A. Dietz 1965:54).

8. Figures are based on Lisa Peattie's experiences while living on San Felix (1968:78).



(Source: Caminos, H., J.Turner and J.Steffian 1969, Urban Dwelling Environments)

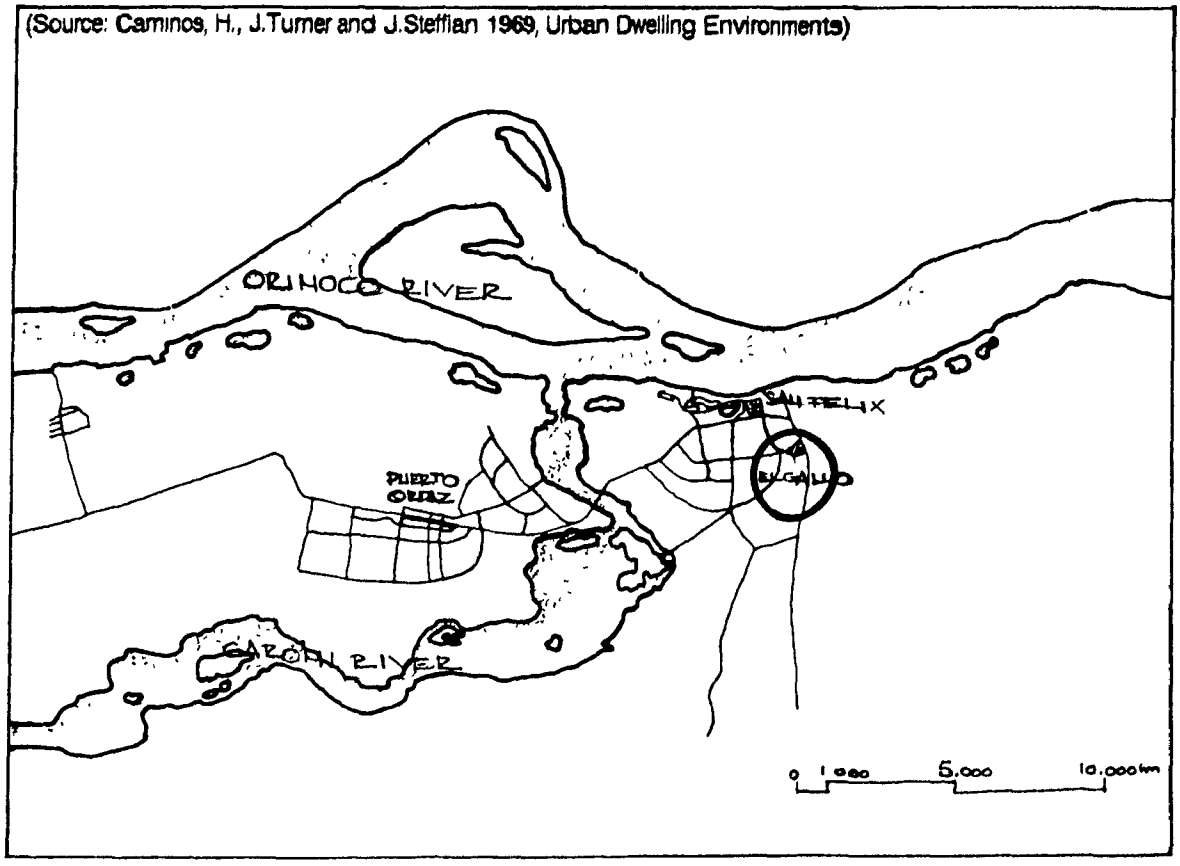


Fig. 1 Location of Ciudad Guayana and El Gallo

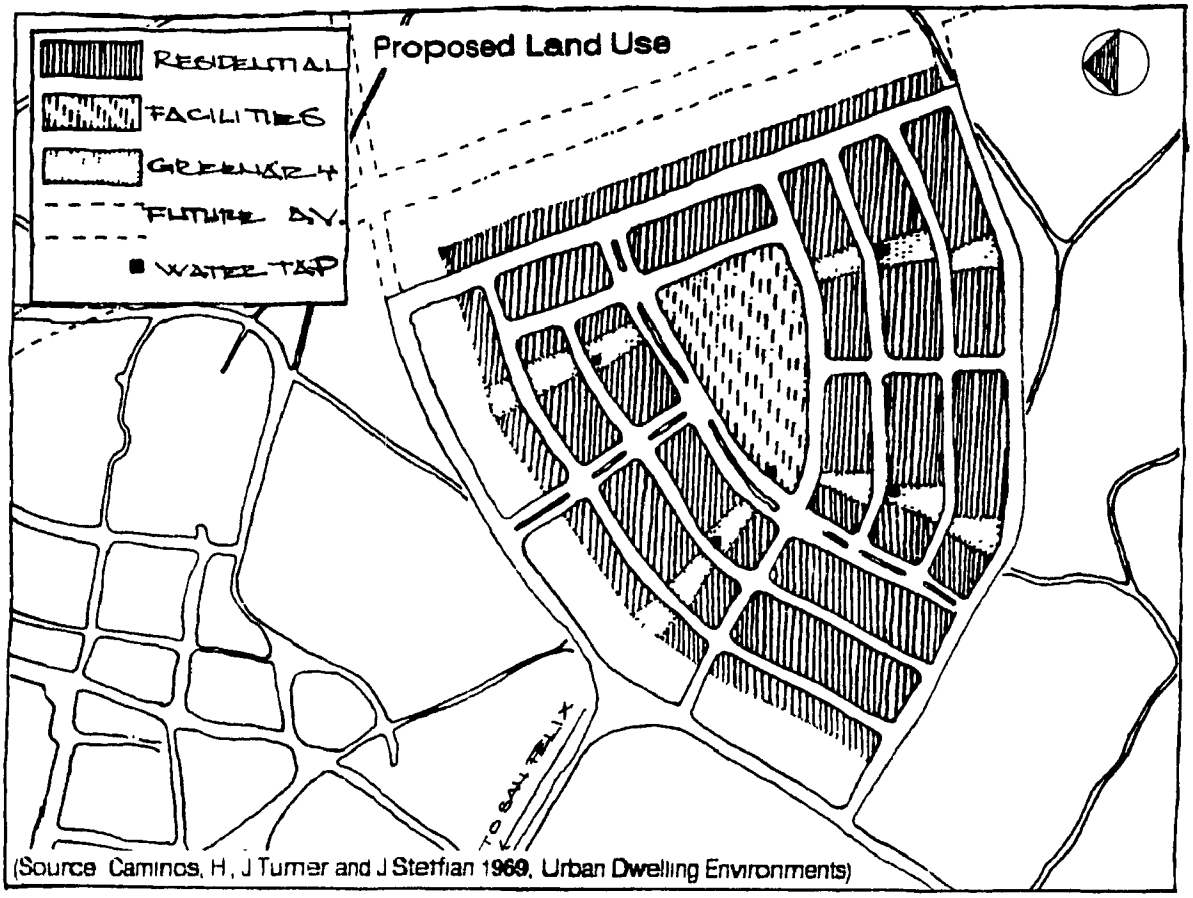


Fig. 2 El Gallo

Streets and Water Taps

(Source. Caminos, H , J Turner and J Steffian 1969, Urban Dwelling Environments)

Rancho at the rear of the plot

(Source Caminos, H , J Turner and J.Steffian 1969, Urban Dwelling Environments)

Fig. 3 Initial aspects of El Gallo

2.0 Chapter II. Method

Introduction

This chapter presents information on the process of documentation of the case study, the collection of the data and preliminary considerations for the data analysis.

The chapter is divided into three sections. The first section presents the questions that guide this research. The second section enumerates and describes the sources of information used to select and document the case study. An explanation of the strategy of analysis used for the study concludes the chapter.

2.1 Research Questions

The core question of this study is: **How do dwellings evolve in a Progressive Development project?** In order to narrow the scope of this interrogation to the case study, the following main and secondary questions were raised.

Looking to the process of dwelling evolution this study asks:

. How was the housing stock of the El Gallo Progressive Urban Development incrementally built over time?

How were dwellings initially built?

How were dwellings progressively built?

In order to identify aspects that affected the process of dwelling evolution in these developments the following question was included:

. Which aspects influenced the process of dwelling evolution at El Gallo?

Finally, to determine the kind of housing which is being produced under progressive development projects, the study asked:

. What are the characteristics of the housing that is being produced at El Gallo?

The study followed the guidelines of the *summative evaluation*, and the orientation of the evaluation was *qualitative* (King, J.,L.Morris and C.Taylor 1987). This approach of evaluation is holistic, "data collection and analysis occur interactively as an observation or other data suggest categories for the analysis and additional data needs." (Ibid :24) The objectives were to observe relevant information, and to accurately describe it with sufficient detail so that the documentation produced could be used for successive purposes (i.e., basis for planning or further research).

2.2 Sources of Information and Collection of Data

The study was based on primary and secondary data. The primary data were aerial photographs taken at different times during the life of the settlement and a survey of a sample of households in the settlement. The survey included personal interviews with the households, as well as house sketches and photographs of each dwelling. The secondary data consisted of demographic and housing statistics and archival documents about the program, project and implementation of El Gallo site and services.

The process of data collection followed three steps. The first step involved a revision of the documentation about housing and the UMUP projects found in the existing literature related to Ciudad Guayana. Other important sources of information were interviews made with key informants of the city. The second step included the design and field testing of the survey and procedures for data collection. This step involved initial inspections of El Gallo identifying relevant dimensions to be included in the study. Based on this information, the sample was selected, and the interview schedule was determined. The interview was field tested, and the necessary modifications were made to it. The last step was the collection of data and the obtaining of aerial photographs of and complementary archival documents on El Gallo.

2.2a Literature and Documentation on Ciudad Guayana

General documentation regarding the UMUP projects developed in Ciudad Guayana since its creation was found in the bibliography related to housing programs produced by the CVG and the Joint Center for Urban Studies of MIT and Harvard. Studies, papers and articles about Ciudad Guayana's process of planning, design and implementation, written mainly by Joint Center staff and other scholars, were found in the Rotch Library of MIT and the Francis Loeb Library of Harvard. Several doctoral and master's theses about the city were also found in these libraries. The Joint Center file maintained by its staff during their consulting period (1960-65) was found in the CVG library.[1] This file was an important source of daily memos, working papers and summaries about the problems faced during the design and implementation of the housing program and the first UMUP projects.

Specific documentation about the UMUP projects and existing evaluations of these were found in CVG's Urban Planning Department and the CVG library. Charts

and maps of Ciudad Guayana were also found in the CVG library. General housing statistics on Ciudad Guayana were taken from the "Censos de Construcción y Vivienda" (construction censuses produced periodically by the CVG's Statistics Department "Gerencia de Estadísticas e Informática").

2.2b Selection of the Case Study

Interviews with Key Informants in Ciudad Guayana:

Interviews were held with professionals involved in the urban development of Ciudad Guayana. These interviews provided personal insights from top decision-making figures responsible for the planning and functioning of the city. Also, the CVG's Department of Social Development provided information and documentation about the administrative procedures followed by the inhabitants in order to have legal access to the land. Finally, the Department of Audiovisual Productions of CVG provided excellent recorded documentation about the inhabitants' process of application, allotment and initial stages of development in Ciudad Guayana's UMUP projects.

UMUP cases of interest were discussed with the staff of the CVG's Department of Urban Planning, a team composed of two architects, a sociologist and a geographer. This department was responsible for the urban planning of the city until 1982. Thereafter, the local government assumed a leading role in the planning operations of the city. Still the CVG owned most of the city's land; thus it played a very important role in the development of the city. The UMUP cases were also discussed with the Urban Planning Director of the local government (an urban planner who had been working since 1989 in the city council after ten years of experience working in the CVG). The knowledge of these informants about each of the projects discussed was important to select the case study in such a limited time

There were no strict selection criteria because in several instances, the characteristics and features available to compare settlements were not analogous. Rather, the selection of the case study was done by counterbalancing these characteristics. However, some preferences were considered in choosing the case study. For instance, old settlements were preferred because they offered the opportunity to observe longer periods of dwelling evolution. A medium-size project was convenient to acquire the best approximate idea of the development of the whole

settlement in a short time. The intention was to select a settlement with the "average" characteristics of most low-income settlements of Ciudad Guayana, in terms of pace of development and growth, attention and support from official institutions, and so on.

Characteristics of the Case Study:

Three settlements were visited, and El Gallo was selected as a case study. Conversations were held with members of the community to confirm certain aspects of the settlement. The following is a descriptive list of the characteristics used to choose "El Gallo" as the case study.

.1 **Assistance**

As part of an experimental program on urban infrastructure and progressive housing improvement, El Gallo received less assistance than the finished housing programs in Ciudad Guayana. This assistance was comparable to programs of slum improvement.[2]

.2 **Servicing**

As declared by the neighbourhood association, El Gallo used the same conventional channels to receive services as barrios did. This is detailed in Chapter three.

.3 **Housing Provision**

People of El Gallo built their houses in the same way as those in Ciudad Guayana's informal settlements. Finished basic dwellings represented less than 50% of the housing stock. The other dwellings were "privately" managed.[1] Many houses were built by small subcontractors. Others involved self-help procedures.

.4 **Informal Activities**

Informal income-generating activities occurred at El Gallo, contributing to sustain the economy of low-income settlements. At El Gallo these activities included informal small construction, small shops of goods and services, and room renting.

.5 **Community Organization**

The community of El Gallo was organized similarly to the barrio's communal organization. Inhabitants can be involved in much individual and communal

work in the first stages of settling. However, the intensity of this organization diminished as the communal needs became satisfied.

Assistance was requested from the president of the neighbourhood association (Asociación de Vecinos) to access the houses, and to avoid distrust about the purpose of the survey among the inhabitants. The neighbourhood association was a community organization with the same functions as the barrio "junta." [4]

2.2c Initial Visits to the Site Identifying Relevant Dimensions

The study looked for relevant physical characteristics that reflected the process of evolution of dwellings at El Gallo. Initial visits to El Gallo looked for housing levels of consolidation, construction densities and housing diversity to determine relevant aspects to include in the study.

According to the bibliography and documentation reviewed, El Gallo was the focus of several housing programs. The first one, the loan program of "El Roble" Pilot Project, offered credits for construction materials enabling households to build one of three offered designs on their own. Although plans of the units were available during first observations, only one of them was recognized. It was later known that one of the designs was preferred well over the others by borrowers.

The second program consisted of basic finished units provided by the Malariology Division of the Health Ministry. These were finished dwellings that households became entitled to apply for after the settlement obtained individual services of electricity and water. These kinds of dwellings were identifiable, although several of them had been considerably modified in their external appearance.

The third program was also comprised of basic units, this time produced by the local housing agency Funvica (Fundación para la Vivienda del Caroní). It was the last formal attempt to replace remaining ranchos. Even though several of them had large porch extensions, dwellings were easily recognizable because façades did not have major modifications.

A large number of houses were conceived, financed and built by households themselves. These dwellings emulated designs of the other programs and became easily mistaken for those financed by loans. Moreover, in several instances the household did not know the origin of the dwelling because the occupants were tenants or because the house was inherited or bought from the first household. On the other

hand, none of the oldest inhabitants interviewed was able to identify all the housing programs implemented at El Gallo. They often confused programs with each other and the sequence in which they occurred.

A first attempt to differentiate the housing diversity of El Gallo yielded the following classification, which was the basis to select the sample:

- Formally Produced Dwellings: dwellings of the Malariology and Funvica housing programs, by which households received a finished basic unit.
- Formally Prescribed Dwellings: dwellings of the original Pilot Project and subsequent loan program, by which households received plans and specifications but were responsible for the construction process.
- Self-Produced Dwellings: self-built/self-managed dwellings, whereby households chose the financing method, design, materials and pace of construction of their dwellings.

The diversity of the original housing stock at El Gallo was identified only after aerial photographs were carefully examined. With the aerial documentation and the information collected in the field, it was possible to recognize the dwellings of all the groups mentioned before they were altered. This diversity is explained in section 3.1 of the next chapter.

2.2d Sample

A sample was selected and surveyed with simple criteria in mind: plots in which the first permanent dwelling was totally removed were avoided, average-size dwellings were included and a variety of dwelling forms, sizes and styles was surveyed. No discrimination was made in relation to household tenure or length of permanency in the dwelling. The large majority of dwellings at El Gallo had clear signs of good maintenance and still active evolution. Few plots were overdeveloped; however, they occupied almost the whole plot area and had second stories. These were also avoided in the sample.

The size of the sample (33 dwellings) was a function of the time that was available for the survey. Although dwellings of all groups were surveyed, the sample did not attempt to be representative of the whole housing diversity of El Gallo. The sample was rather a small portion of this housing diversity, and the analysis was limited to this sample.

2.2e Design of Interview, Interview Schedule, Field Testing and Modifications

An open-ended interview schedule was elaborated and field-tested in sample interviews which are not included in the final set of data. This process of field-testing yielded a version of the questionnaire that facilitated a better cooperation of interviewed people. Major changes made to the questionnaire consisted in simplifying the explanation of the purpose of the study, using popular language and local expressions and reorganizing the questions.

An average day during the survey process went from 8:30 am to 12:30 pm and from 2:00 pm to 6:00 pm. These hours were chosen in order to avoid interrupting families at meal time, and to take advantage of natural light for shooting pictures. Schedule arrangements were always made the day before in order to have the neighbourhood association president present during the interviews. Some time was lost because of the heavy rainy season.

2.2f Data Collection

Interviews were made by a team of two researchers. An interview routine began with the introduction of the researchers by the neighbourhood association president to the head of the family or an adult member of the household who knew about the family history since their arrival to El Gallo. The team explained the purpose of the survey and the different parts of the interview. After being authorized, one researcher walked around the house, making the sketches while the interview was being conducted by the other researcher. General introductory and anecdotal questions helped to gain trust of the interviewee. Each interview was usually completed in ten to twenty minutes. Sketching the plan of the house normally took 20 minutes, depending on the size of the house. Finally, taking general measures and pictures of the house took other 20 minutes. The time to survey one house was about 60 minutes.

Sketches of the plan of each dwelling were elaborated, indicating measurements, construction materials, furnishing, vegetation, and use of the space. An average of 20 slides was taken of each dwelling, showing interior and exterior aspects of the dwellings. Drafts and slides were used to draw detailed plans of each dwelling.

Thirty-three houses were surveyed at El Gallo in a period of two weeks. As mentioned earlier, the dependence on the availability of the neighbourhood association president and the weather were limitations on the working schedule.

2.2g Aerial Photographs

Aerial documentation consisting of photographs, charts, maps and plans of the settlement were collected from different sources. Aerial photographs were provided by the Venezuelan Ministry of the Environment and the engineering company that took them, Tranarg. Fortunately, the growth of Ciudad Guayana during the first ten years of existence was recorded yearly in aerial missions. The frequency of the missions was reduced in the last twenty years. However, a picture of the complete process was obtained with approximately 5-year intervals. The years selected were 1964, 1967, 1974, 1980, 1983, and 1987.

Negatives of the photographs were 25 x 25 cm in their original size, but they were enlarged to 100 x 100 cm. In the case of El Gallo this provided clear images of the dwellings in a 1:250 scale.

2.2h Archival Documents

Specific statistical information about El Gallo was extracted by the CVG's Statistics Department from statistical information stored in the computer files of the CVG. Information was obtained from the two censuses that were made of the complete population in 1967 and in 1974. The censuses of 1971, 1980 and 1987 corresponded to updates made of the previous censuses by sample surveying.

2.3 Strategy of Analysis

Based on field observations and limited by the data collected, a model of analysis was designed to obtain the best possible picture of how the sampled dwellings evolved over time. In order to show dwelling evolution, measurements taken were used to calculate the size of the dwelling, sketches of the dwelling plan were used to identify additions and changes to existing spaces, and current and past uses of the spaces were obtained through interviews. This information provided three dimensions of change that comprehensively reflected the process of dwelling evolution at El Gallo. In addition to this, the sample was stratified according the different origins of the dwellings.

Thus, a stratified longitudinal analysis was made to the sample in each of the following dimensions:

- **Area Increase** or increase of roofed area of the dwelling produced by the successive addition of new structures to the original one. Area increase of the dwellings was traced measuring the roofed area of sampled dwellings in the different times showed by the aerial photographs. The scale of the photographs allowed direct measurements of the dwellings; however, measurements were double-checked from plans drawn from the survey data. Profiles of dwelling growth were obtained by manipulating the figures of dwelling area over time.
- **Additions and changes to the spatial structure of the dwelling** were the successive changes of the shape of the dwelling according to the location of new additions in relation to the plot and the previous structure. Analysis of these changes was based on observations of the aerial photographs, house plans and households' testimonies about the process of construction. This dimension considered how additions were built with respect to the existing structure, as well as changes made to the existing spaces. Drawings were made of the initial and successive plans of each dwelling in order to obtain the incremental process of construction.
- **Additions and changes to the use-layout of the dwelling** included additions, as well as changes of space functions that altered the existing use-layout of the dwelling. This information relied mainly on the use of spaces observed during the survey, declarations provided by the households and in plans of the units originally built by the housing agencies. Changes in the use-layout revealed the changing functional priorities and needs of the household.

This study was based on data recorded over a period of 27 years, starting from the legal creation of the settlement up to August 1991. The available material had some limitations that needed to be clarified at this point. Aerial photographs allowed identification of periods of time within which changes in the dimensions of the study happened. However, when these changes occurred exactly could not be determined. Therefore, the study will consider changes occurring within these periods of time between one photograph and the next. These periods were called **stages of dwelling evolution or growth**.

Also, because several households skipped the "rancho" or shack stage, this was not considered the first stage of dwelling evolution as it usually had been in similar

studies. Furthermore, ranchos were built with temporary materials which were eventually replaced with a different structure built with permanent materials. Consequently, the first record of a non-permanent structure was called the **initial stage**, and it was separated from the first record of the permanent dwelling or **first stage**. This differentiation allowed comparisons between dimensions of the study (see Fig.4).

2.4 Summary

The chapter presented main and secondary research questions focusing the process of dwelling evolution in progressive developments projects. Sources of information were listed and described. The procedures to select the case study, to design the interview, and to collect the data were explained. Finally, a brief of the methodology to process the data collected for the analysis was described. Emphasis was placed on the three dimensions of dwelling evolution that would be observed, area increase, extension of the spatial structure and additions and changes to the functional layout. The procedures for the analysis were also described. Dwelling evolution was observed in stages of evolution, and the first permanent dwelling was the point of reference for the analysis.

. Notes for Chapter II

1. There are two more copies of this file. One is located in the Widener Library at Harvard, and the other one is at MIT.

2. In most pilot projects there is so much attention given to all aspects of the project that they are hardly realistic examples. Moreover, sometimes pilot projects receive special support to assure the "success" of the experience.

In Ciudad Guayana, several of the first UMUP projects received a great deal of attention trying to make them a model. For instance, the UD 102 and UD 103 are usually regarded by planners and those involved in their design as the best examples of the strategy. The amount of resources put into these UMUPs, however, does not make them an example either of affordability or replicability.

3. Observations at El Gallo coincide with MacDonald's comments that within the Ciudad Guayana site and services, public housing was less extensive than privately funded housing:

> Thus public housing made up a quarter of dwellings in sites-and-services barrios, private houses 31% and shanties 45% (MacDonald, John S. 1979:111).

4. The Junta is composed of residents of the community. Normally it has one or more persons with the ability to handle public relations and verbal expression. At least one member of the current political party will be in the junta.

> A barrio junta is a small committee consisting of between seven and nine residents. Its declared function is to represent the barrio before the city officials and try to obtain basic community facilities (Ray, Talton 1969:43).

Initial Stage. Construction of the non-permanent structure

(Source Caminos, H., J Turner and J Steffian 1969, Urban Dwelling Environments)

Example of Periods of Dwelling Evolution a)as occurred b)as studied

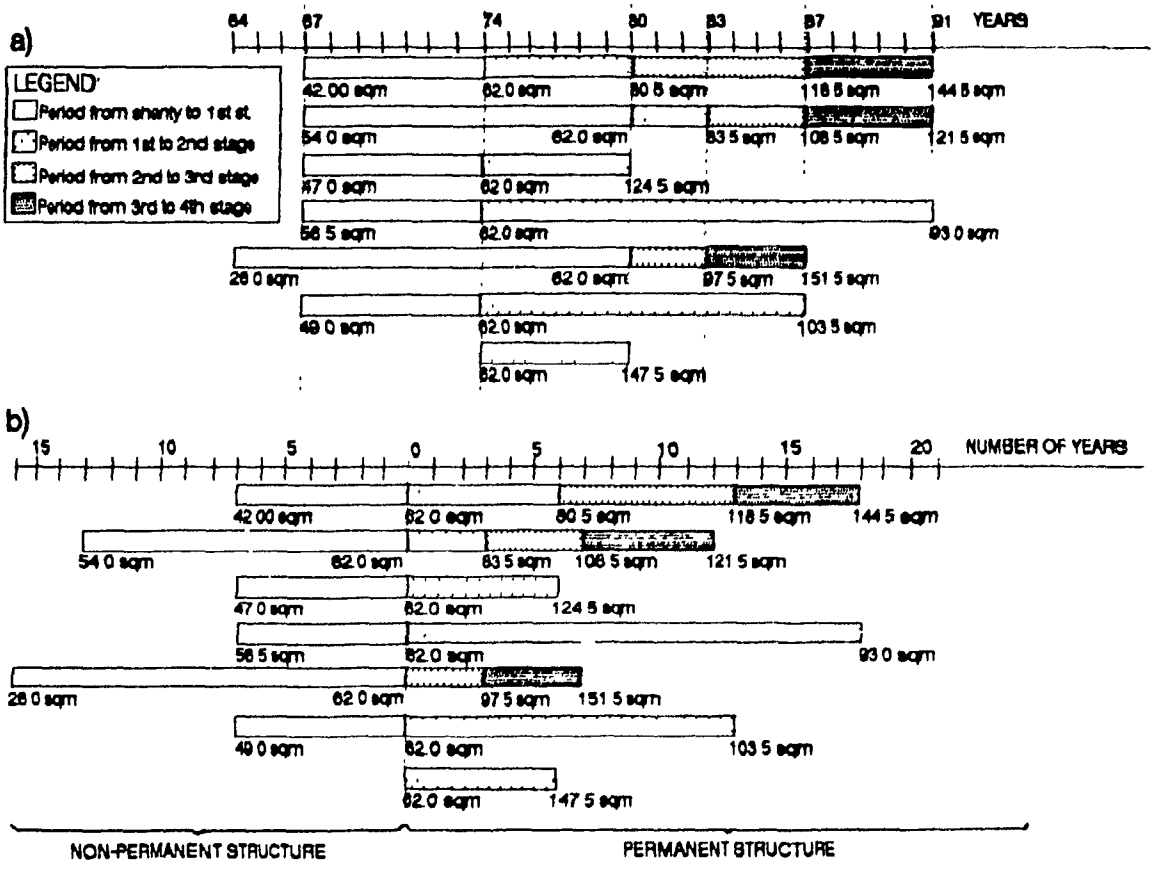


Fig. 4 Stages of Dwelling Evolution

3.0 Chapter III. Data Analysis

Introduction

This chapter presents and analyzes the data collected according to the proposed strategy. The chapter is divided into four sections. The first section is a summary of the evolution of El Gallo since its creation. The intention of this section is to familiarize the reader with the context and changing environment in which dwellings evolved at El Gallo, that is, how the land was distributed, how the site was settled, how services were provided, and how the housing stock of El Gallo was formed. In the second section selected case studies of El Gallo's housing stock are documented. This section introduces the household composition and the household's perspective of dwelling growth. The third part comprises the analysis of the sample on each dimension of growth and evolution. The last section integrates the information collected in a summary of the growth and evolution of the dwellings at El Gallo.

3.1 El Gallo, from 1963 to 1991

. Selection of Participants and Land Allocation

El Gallo, like most sponsored housing programs, followed a screening process to allocate land to applicants. As established in the guidelines of "El Roble Pilot Program," the selection procedure gave priority to families evicted by the construction of the first hydroelectric dam and by the CVG's infrastructure works. The directions for plot allotment stated that plots were to be equally distributed among applicants of the following four groups:

. Applicants with construction experience.

. Applicants with leadership skills.

. Applicants with monthly incomes below Bs200 (approx. US$44).[1]

. Applicants with monthly incomes between Bs800 and Bs1,000 (approx. US$178 to US$222). (Corrada, R. 1962:2 Annex C.0)

In an analysis of the selection process, Corrada mentioned that social workers responsible for the screening process exceeded their functions, selecting only the most needy applicants and rejecting "socially undesirable" families. (Ibid 1966:18). According to Corrada, the selection procedures contradicted the initial idea of having a

random representation of the social diversity of the low-income population of Ciudad Guayana (Corrada, R. 1966:18).

According to this view, El Gallo had been consistently considered a better-off low-income neighbourhood. Already in 1967 a survey of 30 households showed an average annual income of $766 (Caminos, H.& J.F.Turner 1969:218). Unfortunately, no data were available to know the household income and other characteristics at the moment of arrival in the settlement. However, according to Silva's observations, most of the people living in ranchos (55% of the households) were unemployed or employed on a temporary basis (Silva, J. 1964:10).

In a survey carried out in 1975, Daykin identified certain characteristics of the inhabitants of El Gallo. More than 85% of them came from the country's north-east or the Guayana region, where they spent their youth living in small cities or villages (centers of less than 50,000 inhabitants). Less than half were skilled workers, white collar workers and clerks or owners of medium- and small-size businesses with a small percentage of semi-professionals (6.3%). More than half lived in the city the previous 5 years, and lived in an average of 2 neighbourhoods before moving to El Gallo (Daykin, D. 1979:87-115).

. Settling and Facilities Provision

The process of settling began in October 1963. By October of 1964 all 434 plots were occupied. People themselves made their connections to the electricity poles, and attached rubber hoses to the water taps so water could be brought directly to the houses.[2] By the end of 1964 the main water pipeline and individual water connections were installed in a common effort between the public water department and the community. According to old neighbours, project plans, pipes, working materials and technical assistance were publicly provided. The inhabitants cooperated with their labour to install the water line. Inhabitants agreed among themselves that those who were not able to work themselves should look for representatives to do their job (i.e., relatives, friends or paid workers). Many of the technical assistants hired from the CVG to direct the works were inhabitants of El Gallo with experience in construction work. In 1975 El Gallo incorporated a sewer system under the same work participation scheme.[3] In 1976 the development agency built sidewalks and paved streets.

The community organization and participation described by the inhabitants

were remarkable. Common problems and needs were discussed in general assemblies. Water and sewage installation were considered achievements of the community, as well as the acquisition of the construction materials for the first school. Shortly before 1967, the CVG built a community center, where courses for adults were taught by members of several communities and special courses were organized for school holidays. Today community facilities at El Gallo include the school for kindergarten and complete basic education, which is directly funded by the Ministry of Education. The school offers a breakfast (Desayuno Escolar) for the students, which is funded by the Ministry of Family Support and Development and run by the inhabitants themselves. The sports courts and the neighbourhood association are run and funded by inhabitants. At the time of this survey, the neighbourhood association was organizing the construction of the church.

. Housing Provision and Diversity

According to aerial pictures of El Gallo taken between February and March of 1964, there were 123 occupied plots containing 121 "ranchos" or "barracas" (shacks) and 2 permanent dwellings. In August of the same year the total number of households living at the site increased to 300; of those, 241 lived in ranchos (55% of the total number of plots). The process of building the house in these initial stages varied from household to household. However, people usually moved into the plot after a rancho was built and then either applied for a loan to purchase materials or built a house on their own.

The purpose of the UMUP projects was to incorporate the urban squatter into the legal framework of the city, so the construction of a house was a main objective, and it was encouraged by giving the inhabitants the right to buy the land. However, the permanent house had to meet official standards and be accepted by the local engineering office. Meanwhile, the land would only be leased to the user. According to this scheme, the inhabitant was free to build a rancho, but was strongly advised to set it in the back of the plot so that the front space could be used for the final house. According to Daykin, the process was as follows:

> Residents [were] encouraged to construct their shacks toward the back of the lot allowing space for piecemeal construction of a cement block house toward the front. Once the cement block house [was] complete, the tin shack [was] removed (Daykin D. 1978:238).

With few variations this pattern was followed by most of the settlers.

To complement the housing aspect of the program, three ready-to-use house designs produced by the housing program were made available to the users who obtained loans to build their houses. However, one of the designs was preferred over the others by the borrowers. Several objections to the other two options were made by the inhabitants. Among them were the lack of a porch and the inconvenience of an internal patio during rain time (Silva J., 1964:16)(see designs a and b, Fig.5). The preferred design allowed easy future extensions to the house. Thus, it was reproduced with a range of variations, such as changing the dimensions, moving the doors and windows and even excluding the kitchen or the bathroom (see design c, Fig.5). Changes in the design brought serious conflicts with municipal authorities, who did not accept the houses. Other problems occurred when households of the loan program stopped the house construction before it was finished or did not remove the rancho immediately after finishing the construction work.[4] Nevertheless, official pressure did not succeed, and eventually, people finished dwellings at their own pace and according to their own spatial preferences.

When El Gallo obtained individual services, neighbours could apply for programs reserved for fully serviced developments. According to the Structures Inventory made by the CVG in 1967, between 1965 and 1966, 160 houses were built by the Malariology Division of the Health Ministry (see group A, Fig.5), which together with the 129 ranchos and 132 houses built before 1965, comprised the total housing stock of El Gallo. At the end of the 1960s, the areas where public taps were placed were subdivided and "invaded" by inhabitants' relatives and friends, resulting in 14 new plots to the original plot provision. The local housing agency -- Funvica -- intervened with a program of basic units to replace the remaining ranchos (see group B, Fig.5). A total of 54 units were added. Around the middle of the 1970s, the CVG itself divided the remaining "green areas" in plots for 31 new applicants who ended up building by their own means.

According to observations of the survey and the aerial photographs, the housing diversity for El Gallo was as follows:

.1 Formally Produced Dwellings:

- 206 units built by the Malariology Division of the Health Ministry.
- 54 units built by the local housing agency Funvica.

.2 Formally Prescribed Dwellings:

88 dwellings built according to three different plans and specifications under the "El Roble' Pilot Program, although some households started the proposed dwelling but finished it years later.

- 5 dwellings according to plan **a.**
- 8 dwellings according to plan **b.**
- 75 dwellings according to plan **c.**

.3 Self-Produced Dwellings:

126 dwellings varying widely in size, style and shape that were built at various times. The latest group of dwellings was started in 1978.

Five dwellings, however, could not be clearly identified as belonging to any of these groups.

3.2 A New Consideration: The User-Participation Level

The original diversity of El Gallo was relevant to the study because it also involved a different approach to housing. The three differentiated groups incorporated the user in the housing process at different times:

. In Formally Produced Dwellings, households received a finished basic unit; the user did not play a part in the production of the dwelling.

. In Formally Prescribed Dwellings, households received plans and specifications, but they were responsible for the construction process. At the same time they also enjoyed a certain amount of freedom which allowed them to make individual adjustments and variations. Households had a restricted or limited participation in the production of the dwelling.

. In Self-Produced Dwellings, households chose the financing method, design, materials and pace of construction of their dwellings. Households enjoyed a total participation in their housing process.

In the next section, case studies were selected to illustrate dwelling evolution according to these three levels of user-participation.

3.3 Housing Provision According to Levels of User-Participation: Selected Case Studies

This section portrays how dwellings grew and changed at El Gallo according to different user-participation groups. A summary of the characteristics of each group of sampled households is followed by a description of a case study of the same group. Graphic information about the house evolution and segments of the conversations held with households are used to illustrate each case study.

The purpose of the section is twofold: to present the household characteristics of each sampled group of dwellings, and close the gap between the survey observations and the households' view of dwelling evolution. The observations are summarized at the end of the section as they are analyzed in section 3.6 for the whole sample of this study. Table 1 summarizes general household characteristics of the sampled groups.

3.3a Formally Produced Dwellings: No User-Participation

This category includes the two different basic units offered to users. The program characteristics of both groups were very similar (both were publicly implemented programs based on the household's regular income). The difference between the number of units of each type found in the settlement (206 vs 54) reflected the number of units available from each program and the different times the programs were implemented. No evidence was found regarding the user's preference for either one of the two cores. Subgroups were presented separately to facilitate observations.

. Group A. Basic units of type 1

Most units of this group (7 out of 8) were preceded by ranchos. Households of these dwellings had been in Ciudad Guayana an average of 31 years. These families had been living at El Gallo from 23 to 29 years, with the sole exception of two households, which had been living there for considerably less time (7 and 15 years). Households were comprised of 5.62 persons on average, ranging from 2 to 10 people. All houses were owned by their users, only 5 of which were the original settlers. Of

the remaining group of owners, one had bought a rancho from the original settler and built the current house, another had bought a house and the last had inherited a house. However, just one of the households owned the plot. The others paid a monthly rent to the CVG for the use of the land. All units of type 1 were preceded by a rancho with one exception, which was directly built.

. Group B. Basic units of type 2

Again, only 1 of the 7 dwellings of this group was directly built. Households in this group had been in Ciudad Guayana an average of 27 years, but barely more than half of the time in El Gallo (an average of 14.42 years). The average household size was 8 persons. With the exception of one renter, houses were owned by their users, though only 2 out of the 7 were original settlers. Other households bought either a rancho (2) or a house (2) from the previous users. Six of the houses of the subgroup were preceded by a rancho. None of them owned the land. The following examples represent the households and dwellings of these groups.

House #301

This was one of the houses provided by the Malariology Housing Program. A high fence enclosed the front yard, which was totally cemented, except for an area for two big mango trees. There was no porch in this house, but the four chairs in the shaded front yard indicated there was no need for one. Exterior and interior walls had finishings and had been recently painted. Inside the house, the living room had been enlarged by the removal of one of the original bedrooms. This large space was furnished with two separate living room sets. The dining room had also been enlarged and was followed by an extension containing the kitchen area. This kitchen, together with two bedrooms, was part of the first extension made to the house. The new bedrooms were larger than the original ones. However, the windows of the original bedrooms were shut with pressed-board to gain privacy from the new bedrooms, thus leaving them without ventilation and light (see Fig.6).

An open veranda at the back of the house was added and was used as a laundry and drying facility. A structure covered with a tin roof at the rear of the backyard was being used to store bird cages and construction materials. The backyard was also paved, except for holes for two trees. Four adults and two children (a couple

and their two daughters and two grandsons) lived here. The father drove a taxi, the mother worked in the social department of the CVG, and one of the daughters did administrative work in a carpenter's workshop. The older daughter had recently divorced and returned home with her two children.

> We came here relocated from the land for the dam. We had a big rancho there. We built one here. There were two rooms at the beginning, but then we added two more when the girls were born. It was here at the backyard... see the lines on the concrete floor? We lived three years there. Then my husband bought this house. Malariology was building these houses everywhere. This one was also made by them. It was so small! I didn't want to move in because it was so small. There was no space for us. I cooked at the house and cleaned it, but I lived in my rancho. We first added the kitchen and these two rooms and finally tore down the rancho. People liked the way we made the new bedrooms seem larger than they are. The kitchen was big enough, but then we built over the "zaguan" [meaning the narrow side yard] and made it bigger.[5]
>
> The last thing we did was the new bathroom. It's larger! [than the old one]. And the veranda there in the backyard... it was for resting and chatting, but now we have the washing machine there. We chat in the front yard; it has trees so it is shaded. We also built that roof at the rear of the backyard. I have nothing there, just trash and the pigeon cages. My daughter likes pigeons, but when she married we got rid of them. They are so messy! See them over there? They still come here. My daughter divorced and came back home, she and my two grandsons.
>
> Now I am thinking of building rooms using that roof. Three rooms I could build. People can use the other "zaguan" to go into the backyard. Many people have done it that way, and I think it is a good idea. It is something for the elderly, you know. We have nothing but this house.

House #412

This house was one of the cores built by Funvica but was enlarged to more than twice its initial size. The front yard had some grass but no plants. Actually it was just an earth extension with little care taken of it. The façade was not modified, except for a big window that was opened to the front bedroom under the porch. One of the side yards was closed by two garage doors; the other one, by a high wall. All exterior walls had finishings and were painted.

A living-room set and a sewing machine occupied the former living/dining/kitchen space. The front bedroom had been changed into a shop, which

had remained closed for several years. The kitchen was moved to a large extension at the back of the original dwelling. The new kitchen was almost as big as the living room, making it possible to have a dining table inside. A back door opened to a large porch, which could be directly reached from the street through the garage doors. The porch had doors leading to two rooms and a second bathroom. This bathroom could also be reached through the other door in the laundry area. The laundry area opened to the other side yard, which was a carefully maintained garden with plants in cans and hanging pots. Wires crossing the area were used for drying laundry. A small area at the back of the house was used as a storage space for construction tools and materials. None of the exterior walls of the added sections of the house had finishings (see Fig.7).

There were seven people living in this house. A woman head of the household, her three children (two girls and a boy), an adult nephew, and a married couple who were renting one room.

> We bought a rancho from my mother-in-law here in this plot; she lived a short time here, but she didn't like it and moved to her daughter's house. It was there at the back [the shack]. It was so small! We never lived there... well, we lived a short time, but then my husband got a job, and Funvica built us the house. Not this house, the first one. It was just three bedrooms and the living room. I opened the shop in the front room with a few things. I used to sell candies and sodas. I still have the shop, though I don't sell any more. Those who know I have the shop still come to buy things, a softdrink, a snack. So I always keep something. I don't earn anything from the shop; it just pays for itself.
> My husband died in 1985.... Yes, '84 or '85, just when we were building the kitchen. The house was already paid and we were building the kitchen there at the rear. Things stopped then, you know. But my nephew came and helped me and my children to go on. He lives in one of the rooms there; I rent the other. I couldn't charge him anything. He is my best helper and also the only one who works here; he works so much. A couple live in the other. They are out all day. They don't have children. We've just finished the bathroom. It has two entrances, you see? It was my idea, so they can use it and us too.

3.3b Group C. Formally Prescribed Dwellings: Limited User-Participation

The sample included one dwelling of each of the less popular designs and 4 of the most popular. Except for one, these dwellings were not preceded by ranchos.

Households of this group had an average of 30 years in Ciudad Guayana, 22 of which had been at El Gallo. These households averaged 8.50 persons per dwelling. Houses were owned by their users with one exception, a household who was renting the house. All house owners were the original settlers, however, only one of them owned the land. In 5 cases, the house was the first building on the plot; no previous structure had been built.

House #92

House 92 was one of the houses financed by a loan of the pilot project. The house was 27 years old and had evolved considerably since its initial structure. The main façade had two stories hidden by dense vegetation of palms and trees. It was well painted and decorated. Lateral façades, as well as the rear façade, were not visible from the front and their raw concrete block was exposed.

The dimensions of interior spaces were generous. As in several of these houses, a third bedroom took the place of the proposed living room. The dining and kitchen area were also transformed into a big living room that exhibited a new living room set protected with transparent plastic sheets. Next to the living room was the kitchen, a large space containing two dining tables. A roof over the side yard beside the living room was built to add two bedrooms. All interiors were well finished and painted. Floors were shiny, finished on polished concrete.

A concrete roof over the porch allowed for an extra room which was reached by an exterior staircase. This room gave a two-story appearance to the house. The front yard was a reduced, but neat garden with a variety of plants, trees, small paths and masonry work (see Fig.8). The backyard was used to raise some chickens and to store construction materials, tools plus a variety of other things. There were 11 people living in the house. The couple and 3 children, the mother-in-law, 2 brothers and a sister-in-law, and one sister with her husband.

> We were already here. Hum, no..., well, I lived in that house down the road; I was born here, see? My husband came and bought this lot, and then we built this house. He asked for one of those loans they [the CVG] were offering. They gave us plans to build the house. My husband hired workers, and his brothers also helped. I worked too; I changed all the house. I didn't like the kitchen here inside... and the living room was too small too! I enlarged it and moved the entrance.

> We built as long as we had money, and then we moved in. The kitchen came later. At the beginning, it was just a roof in the backyard. But then we built it all, walls and roof at once... at the rear. The porch is not original either. It is bigger [than in the plan]. It is made with clay slabs and concrete.
> We built all this. My brother-in-law knows how; we helped him. He was the one who built the standpipes here at El Gallo. He was also hired by the CVG when the sewer was installed.
> Many relatives live here. That's why we built those two rooms there. My brother-in-law and my sister sleep there now. In the small room sleeps my brother during the day. He works in the steel mill, you know, in the night shift. Last year we built that room over the porch. We put the stairs outside, it's better. We are going to rent it, but my other brother-in-law lives there now.

3.3c Group D. Self-Produced Dwellings: Total User-Participation

This was the largest group in the sample (10 dwellings). Households in these dwellings lived an average of 23 years in the city and 20 of them at El Gallo. Seven dwellings were preceded by ranchos, while the others were directly built. The average size of these households was 6.10 persons. A large percentage of original settlers was also found among them (8); the other two had bought a rancho. All dwellings were owned by their users, but there was only one land-owner.

House #178.B

The distribution of this house was similar to the majority of the self-provided houses of El Gallo. Rooms were at both sides of a central circulation area, which was wide enough for a dining table. However, the plan was based on the most widely used plan which included the bedrooms on one side and the social areas on the opposite side.

Walls were crude concrete block outside and inside, but this was one of the newest houses at El Gallo. Access to three of the bedrooms was from inside the house, while a fifth bedroom was added to the fourth and these two were rented as a two-room unit. These rooms had direct access from outside. The kitchen and living room were the biggest rooms of the house. The latter was lit from a small window near the kitchen. All other rooms had better light except one, which had no windows at all. A rear terrace was added recently to wash and dry linen as a business, and another bathroom was in construction beside this terrace.

The front porch was a tin roof supported by wood poles. It was part of the old rancho, which was located at the front of the plot. Construction materials, as well as some tools, were stored under it (see Fig.9). There were 11 people living in this house, the couple, four sons, a daughter, two grandsons, and a tenant couple.

> We came here in 1977, when these new plots were allocated. We first built a rancho. It had four rooms and we lived there until we started building this house. We built the house in parts. See, part of the rancho was where the house is now. We didn't demolish it at once..., instead we built parts of the house while parts of the rancho were removed. We demolished everything except the living room and the kitchen..., well what is the porch now. I think we'll leave it; it's a fresh and big porch.
> My husband and I sleep in the first room, and the three boys in the second one. The girl used to have the third one, but then this couple came. My husband added that other room to make it like a small apartment. They also have a stove inside and we will finish the bathroom outside so they don't have to go inside the house. They work all day and don't have children.
> The small room is for my daughter. See, I was worried about thieves and bad people, so we didn't open windows to her room. The roof of the back terrace is also new. I do laundry for other people. Now I leave the laundry drying even when it's raining. Oh, there is still so much to do in this house! But you know, slowly... There is no money now.

3.4 Housing Evolution According to the User-Participation Levels

From these examples many observations can be made about the kind of changes that occurred and are occurring in the dwellings. Probably the most important observation is that no house is considered finished. The observations that follow are clustered around the three dimensions of analysis: area increase, changes in the spatial structure and changes in the use-layout.

- Area Increase

Dwellings #301, #412 and #178b were preceded by ranchos, while #92 was directly built. The rancho area varied from 26 to 60 sqm, depending more on the size of the household than on the time spent living in them. For instance, The rancho of household #301 was initially smaller, but it was enlarged for the two daughters even though the permanent dwelling was built within three years after they arrived. However, dwelling #412 was used by an old couple for about 6 years and was not

enlarged. Finally, dwelling #178b built a large rancho initially which did not change until the permanent dwelling was built, when it was removed.

When permanent dwellings were built, the area of the self-produced dwelling was far larger than the bare basic units (116 sqm as opposed to 59 and 62 sqm). Still basic units were smaller than the prescribed dwelling of the loan program which was enlarged in relation to the original plans. Eventually, all dwellings increased their initial dimensions independently of the way they were built. Households of dwellings #301 and #412 complained about the size of the basic unit, as well as about the dimensions of internal spaces, and started additions and internal changes. However, even after first additions were completed in all dwellings, dwelling #178b still was the biggest, although that was its last addition. The other dwellings kept building additions and, up to the time of the survey, the amount of construction that had been progressively added in these dwellings was similar to the first permanent structure built on the plot.

. Extension of the Spatial Structure

Ranchos were similarly laid out, and when the permanent structure was built, ranchos were removed. Household #178b left part of the rancho as a front porch of the dwelling. All dwellings had similar patterns of settlement, leaving front yard, backyard and side yards. However, dwelling 178b reduced one of the side yards to a small space for ventilation and widened the other side yard.

The household of dwelling #142 shrunk the living area to open a small shop in the front bedroom. Soon after, the household started building an extension in the backyard to relocate the small kitchen provided by the housing agency and consequently enlarge the living area. An extra bedroom was also added as part of this extension. Dwelling #301 started similar extensions toward the backyard immediately after the dwelling was built. Dwelling #92 relocated the kitchen in an added area toward the backyard too, but extra bedrooms were added in the side yard instead. Meanwhile, dwelling #178b added a large veranda and a two-room unit to be rented. The wide side yard of this dwelling became useful to give an independent access to the rental unit.

In the next stage of growth, dwellings #412 and #301 started new additions towards the backyard also for rental purposes. Dwelling #92 also added an

independent room to rent, but on top of the porch. Households of dwellings #178b and #301 expressed their intentions to keep extending their dwellings.

. Changes in the Use-Layout

Original use-layouts were also similar among all dwellings. However, almost immediately, kitchens in dwellings #301, #412 and #92 were relocated. New kitchens were cooking, dining and even social areas. In dwelling #92 the proposed kitchen was useless given the size of household, so it was not built. Instead, among the first additions, a large kitchen with room for two dining tables was built. New and larger bedrooms were also built in dwellings #301, #412 and #92. For formally produced or prescribed dwellings, additions during the first stages were made because existing spaces did not meet the household's needs and characteristics.

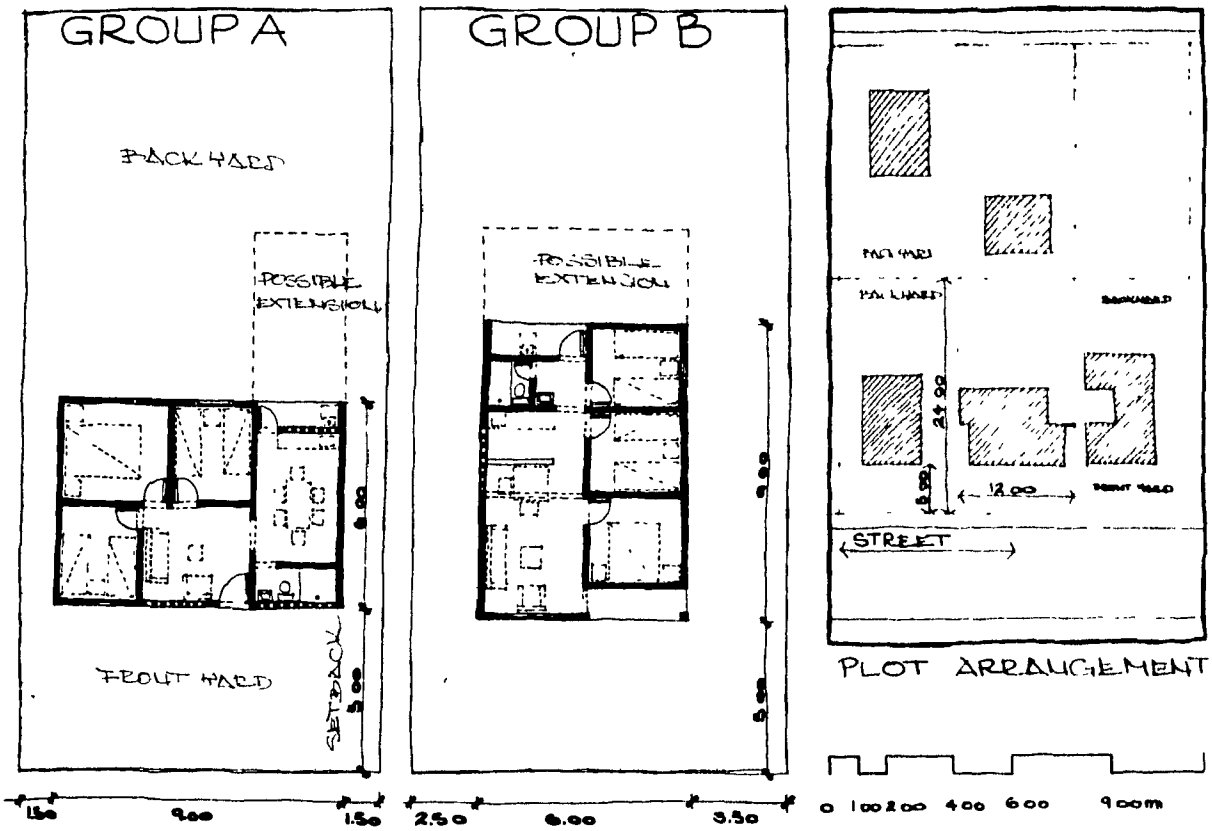
The self-produced dwelling was already built, meeting household requirements. Thus, first additions were made to obtain extra income from washing or renting since there was a demand for these activities. Young people started their search for housing looking for a cheap and secure room to live in. The same kind of additions were produced in dwellings #301, #412 and #92, but at later stages. Ultimately, households were very conscious that investing in their dwellings was a way to make a living for the future.

Table 1. Household characteristics of sampled groups.

characteristics / dwelling #		size #peop.	timein C.G.	timein ElGalo	origin settl.	#dwell. before	dwell. owner	plot owner	initial rancho
GROUP A	# 22	3	32	26	yes	2	yes	no	no
	# 72	10	30	23	no	1	yes	no	yes
	# 73	2	35	25	yes	2	yes	no	yes
	#101	4	30	29	yes	1	yes	no	yes
	#167	9	31	27	yes	1	yes	no	yes
	#189	4	29	15	no	1	yes	no	yes
	#301	6	34	27	yes	1	yes	yes	yes
	#320	7	27	7	no	5	yes	no	yes
GROUP B	# 18	8	32	28	yes	3	yes	no	yes
	# 50	10	28	8	no	3	yes	no	yes
	# 80	7	22	22	yes	0	yes	no	yes
	#321	9	20	10	no	1	yes	no	yes
	#412	7	27	12	no	3	yes	no	yes
	#429	9	28	19	no	1	yes	no	yes
	#446	6	32	5	no	2	no	no	no
GROUP C	# 71	7	12	2	no	6	no	no	no
	# 75	5	34	25	yes	2	yes	no	no
	# 92	11	32	27	yes	4	yes	no	no
	#147	9	35	28	yes	1	yes	no	no
	#177	14	31	26	yes	3	yes	no	yes
	#410	5	38	27	yes	2	yes	yes	no
GROUP D	#178a	10	26	14	yes	3	yes	no	yes
	#178b	9	14	14	yes	0	yes	no	yes
	#180	7	25	20	yes	1	yes	no	no
	#226	3	32	29	yes	1	yes	no	yes
	#226a	9	20	15	yes	2	yes	yes	yes
	#229	5	26	24	yes	1	yes	no	no
	#236b	5	10	10	no	0	yes	no	yes
	#253	3	25	24	no	1	yes	no	yes
	#343	7	26	25	yes	2	yes	no	yes
	#448	3	28	24	yes	1	yes	no	no

Legend: (Size #peop.: size of the household, Time in C.G.: time living in Ciudad Guayana, Time in El Gallo: time living at El Gallo; Original settler: whether or not the current household was the first on the plot; #dwell.before: number of dwellings inhabited before the current one; dwell. owner: dwelling ownership; plot owner: plot ownership; initial rancho: whether or not dwellings were preceded by ranchos).

Formally Produced Dwellings



Formally Prescribed Dwellings

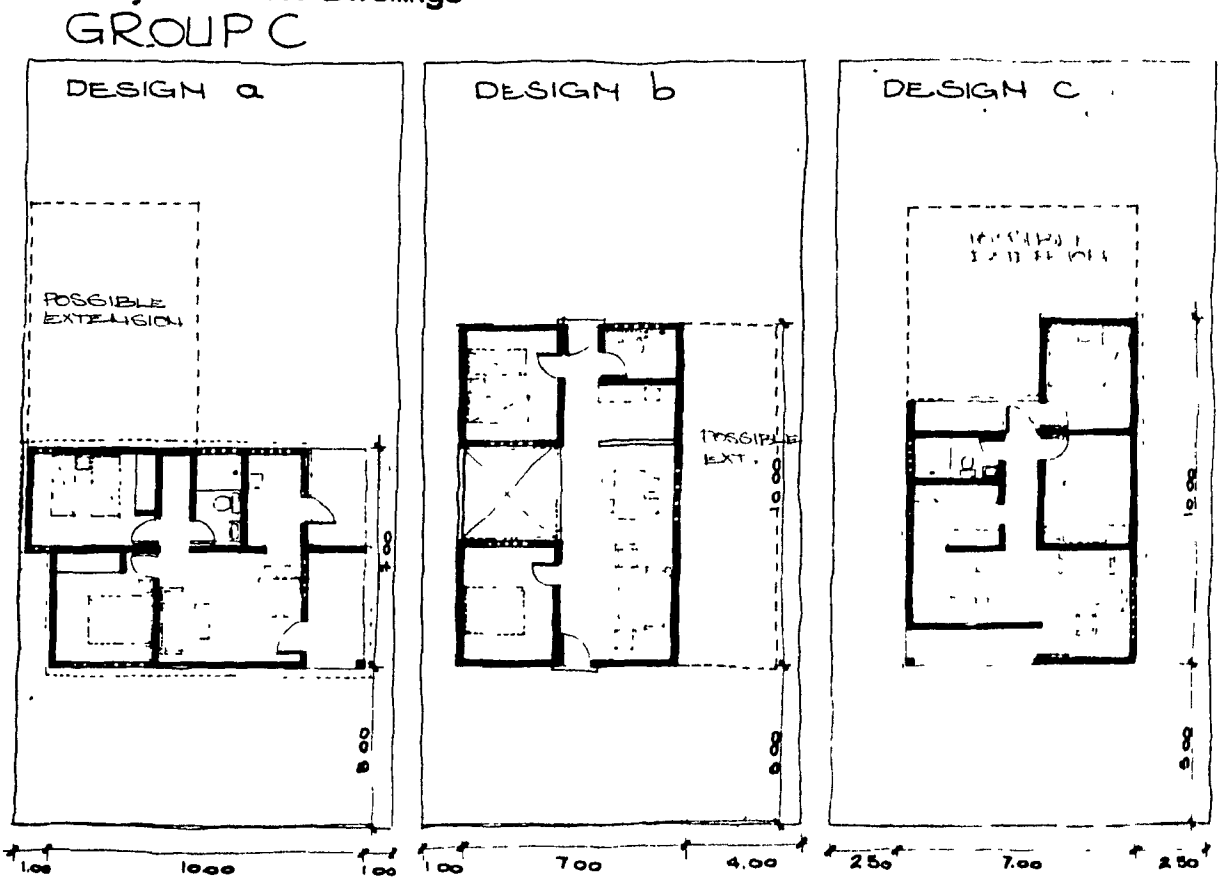
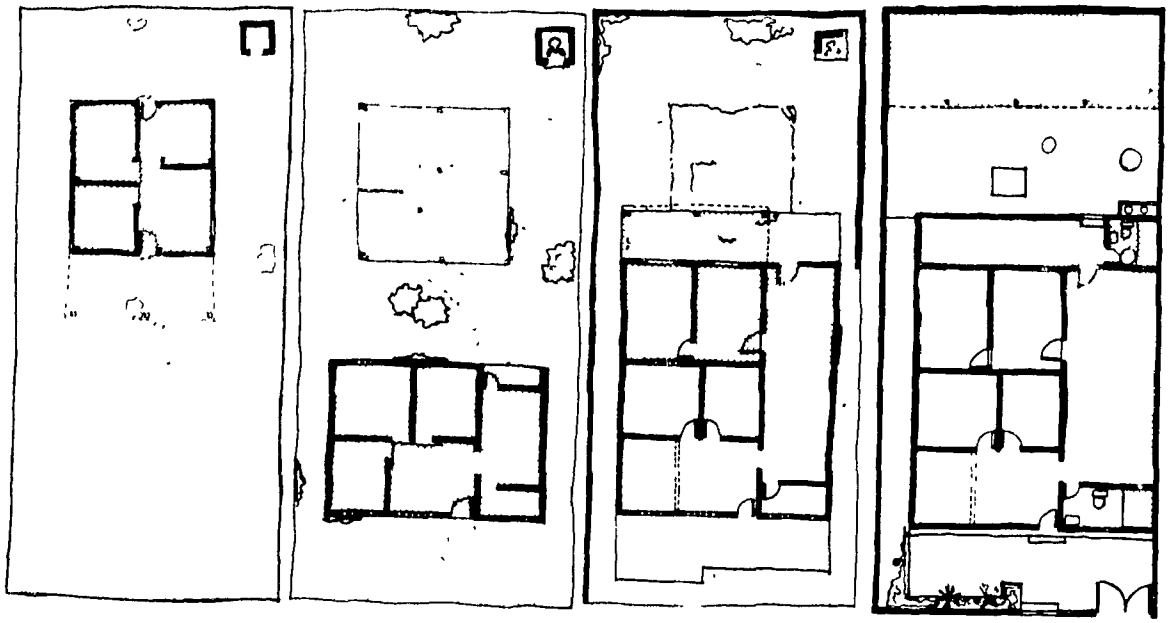
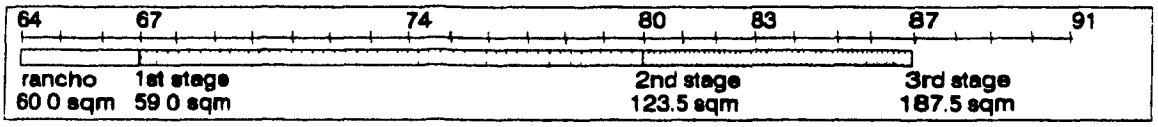


Fig. 5 Initial Housing Diversity for El Gallo





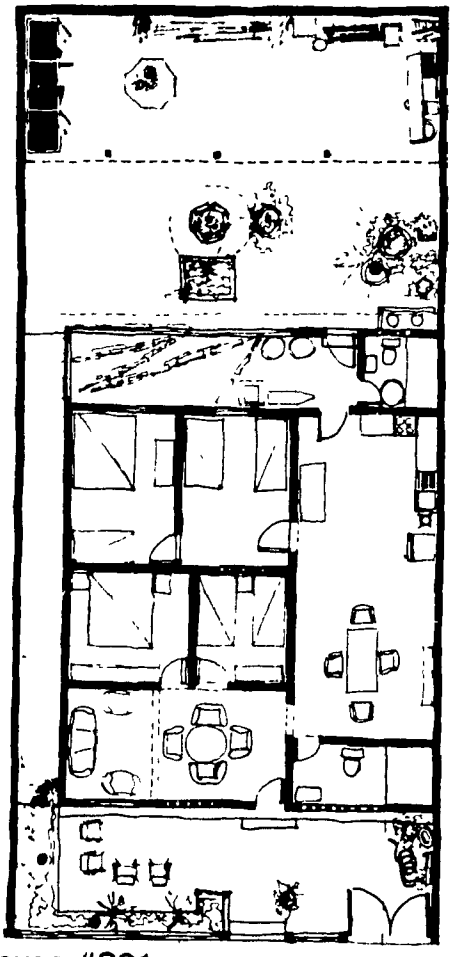
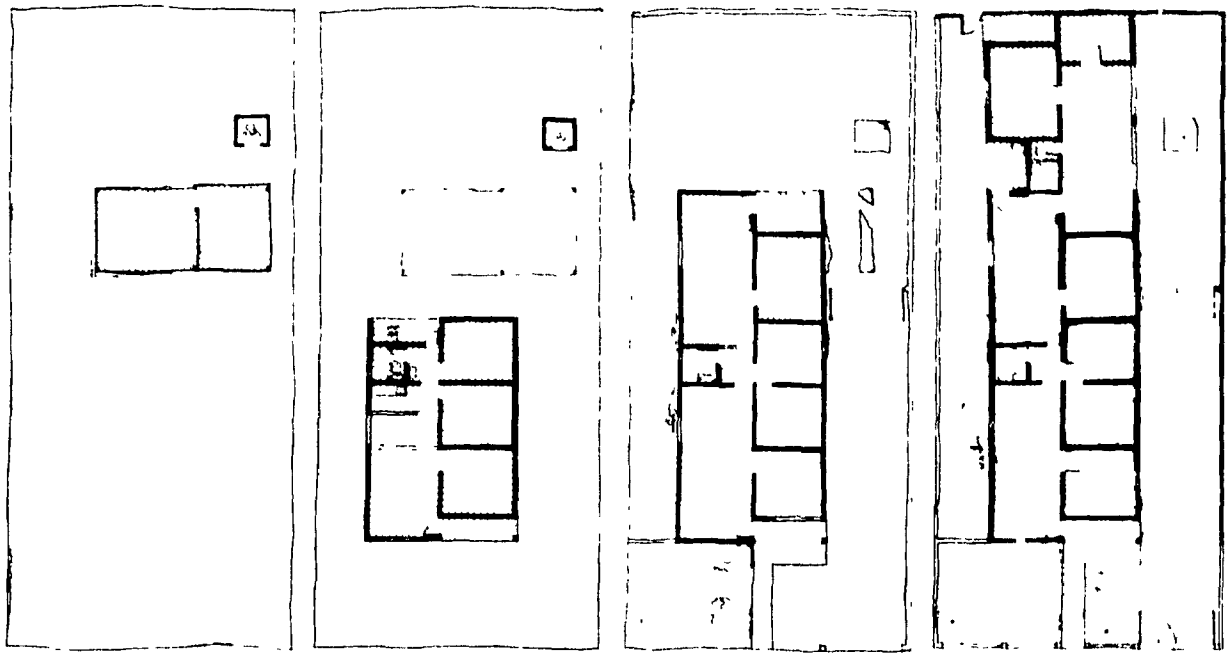
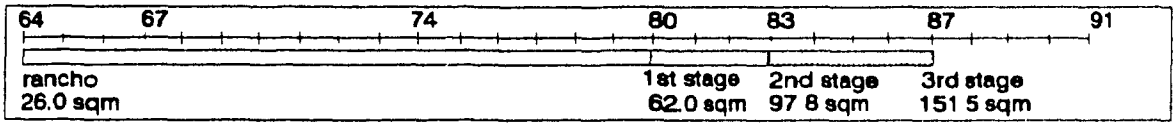


Fig 6 Group A. Formally Produced Dwellings. House #301





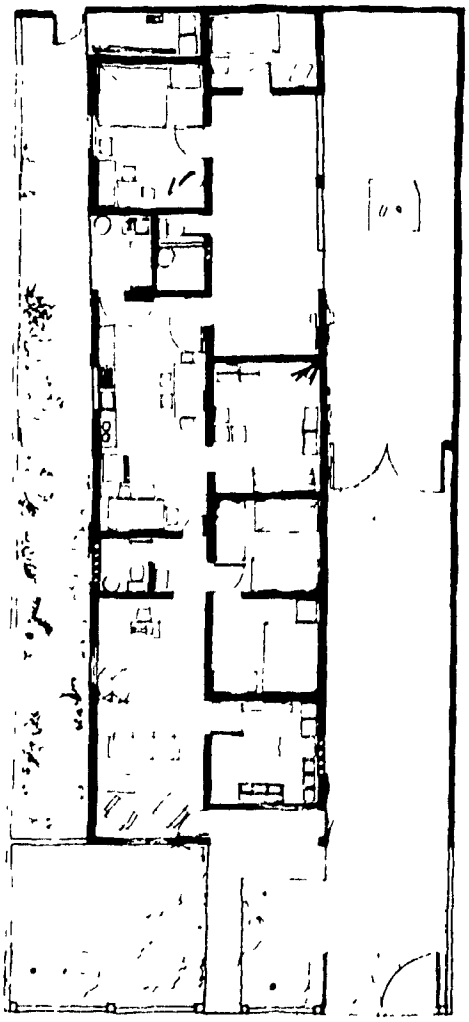
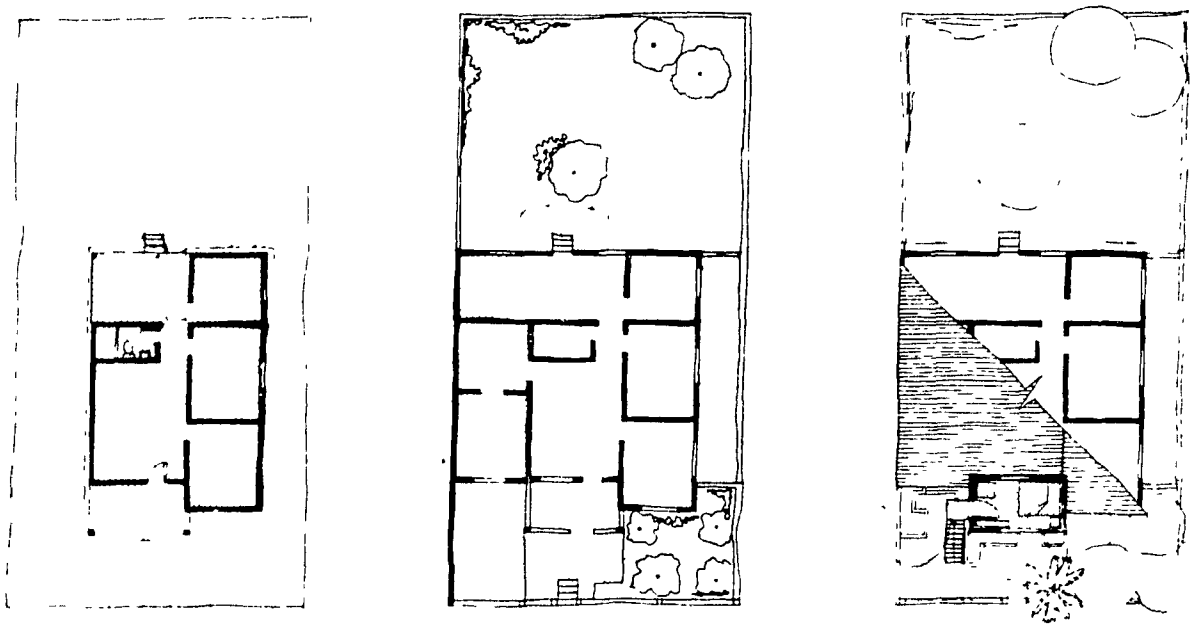


Fig. 7 Group B. Formally Produced Dwellings. House #410



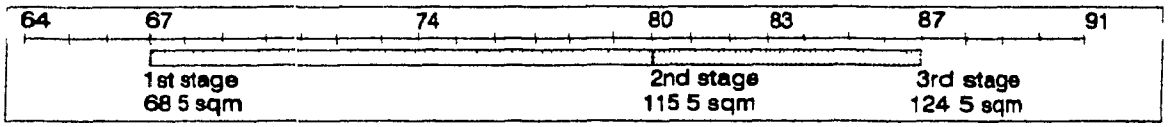
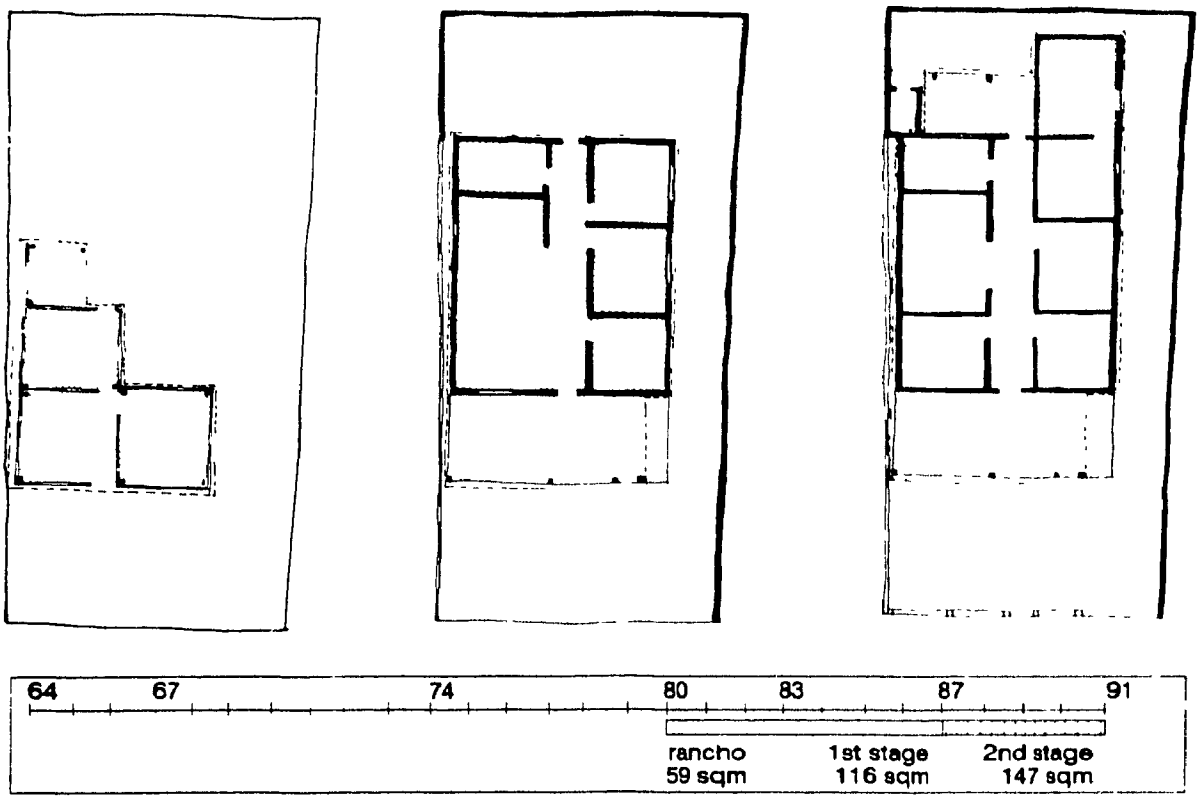


Fig 8 Group C. Formally Prescribed Dwellings. House #92



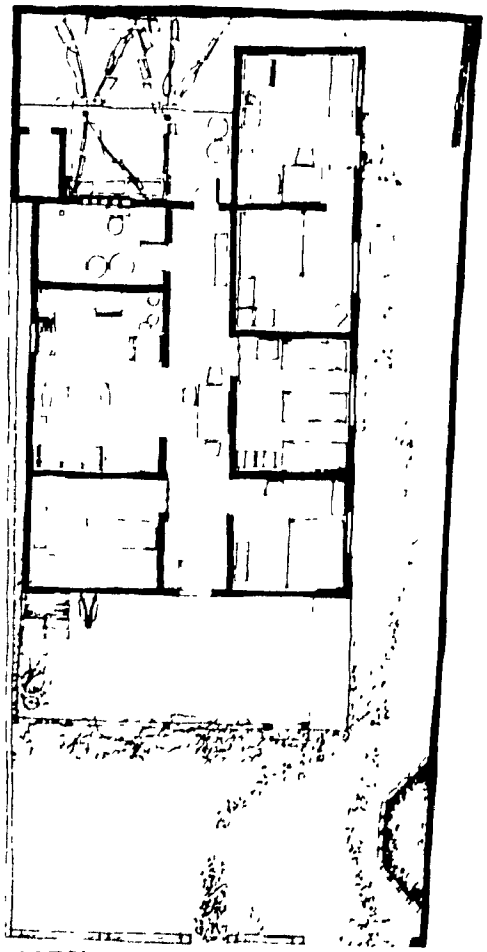


Fig. 9 Group D. Self-Produced Dwellings. House #178b

3.5 Dwelling Evolution at El Gallo

The following section of this report contains the analysis made for the sample of 31 dwellings of the three housing types. Groups were analyzed separately according to the three dimensions of the study. An analysis of each dimension is concluded with a summary of the most relevant observations.

The three analyses are summarized in the last section, which discusses relationships between changes in each dimension.

3.5a Area Increase

This section of the analysis is based on the aerial photographs of El Gallo taken in 1964, 1967, 1974, 1980, 1983 and 1987. Area increase was analyzed plotting the increases of dwelling area observed in the aerial data. Plans drawn from the survey provided the information for the year 1991 and increased the accuracy of measures taken in the photographs.

The following is an analysis of the area increase for each group of households:

. Group A. Formally Produced Units of Type 1

Most households in this group (7 out of 8) first built a rancho on the plot. The smallest initial area recorded for a rancho was 14.5 sqm, and the largest area recorded before the unit was built was 60 sqm. Ranchos averaged 32.6 sqm of area for the same time. Households spent from 2 to 3 years living in their rancho before building the basic unit.

The area of the new unit was 59 sqm, which in many cases was twice the rancho area (117.9% of rancho area in average). For other households, building the unit did not represent a relevant increase in the dwelling area and even in one case the new unit was smaller than the rancho. That explains why some households did not remove the rancho before the first additions were made as household of dwelling #301 mentioned in section 3.4a.

During the second stage, the dwelling area averaged 113 sqm, almost doubling the original unit area. The smallest dwelling was 74.5 sqm, and the largest 128.5 sqm. This was a considerable change (91.5% of the original area) if one considers that it happened within the 15 years after the first permanent dwelling was seen in the

aerial data.

The 6 dwellings that went on to a third stage increased their area to 143.8 sqm on average. This was a much smaller increase of 25.4% of the previous area, although the changes happened between 3 to 13 years after the last stage.

The fourth and last recorded stage was reached only by 2 dwellings that achieved 157 and 171 sqm each (164 sqm on average). This stage was recorded 4 and 11 years, respectively, after the last stage, which is about the same time that the remaining dwellings did not show further increases. Table 2 summarizes the area increase for Group A, provided cores of type 1.

. Group B. Formally Produced Units of Type 2

Ranchos existed in 6 of the 7 cases. The smallest rancho just before the permanent dwelling was built was 26 sqm, and the largest was 56.5 sqm. At this same moment, ranchos averaged 45.75 sqm, and most of them had been there less than 7 years, a longer time, however, than those of group A.

During the first stage permanent dwellings were built and average area increased to 62.0 sqm. The provided units did not represent a big improvement over the rancho area (52.7% added area) as it was for dwellings of group A.

All dwellings went to a second stage when the basic unit was enlarged. The average area for this stage was 104.3 sqm, and the smallest dwelling was 80.5 sqm, while the largest was 147.5 sqm. It is interesting that the largest dwelling was also the one which was not preceded by a rancho. All dwellings considerably increased their area after completing this stage (an average of 68.3%). The time between the first and second stage according to aerial photographs was 3 to 6 years for most of the households.

Only 3 dwellings of this group went on to a third stage. The average area for these dwellings was 126.1 sqm, the smallest being 108.5 sqm and the largest 151.1 sqm. Households completed this stage within the 7 years after the last time they were observed in the aerial data.

The last stage was reached by two dwellings which increased their areas to 121.5 and 144.5 sqm (133.0 sqm average), a marginal improvement on their last area. Table 3 summarizes the area increase for Group B, provided cores of type 2.

. Group C. Formally Prescribed Dwellings

Only one of the six sampled dwellings built a rancho in this group. Permanent dwellings were built between 1964 and 1967 following the plans and specifications given by the housing agency (see sections 1.3c and 2.3c). The sample included 2 cases of the less popular designs and the remaining 4 of the most popular. Due to the workable size of the sample, no separation was made between different designs. However, differences between designs were pointed out as observed.

The proposed area of the units was about 58 sqm. Three of the sampled dwellings complied with this area. However, one of them was the household that was living in the rancho. This household kept part of the rancho; therefore, building the permanent dwelling represented an increase of 102% of the previous rancho area. The remaining 3 dwellings were built with 5 sqm extra up to twice the proposed area. The average area for the first permanent structure was 80.7 sqm.

The second stage was built within the 3 to 7 years after the permanent dwelling was seen in the aerial photographs. The average area for this stage was 116.3 sqm. The smallest area was obtained by the dwellings of plans 1 and 2 (93.0 and 86.5 sqm, respectively). The largest area of the group was 105.0 sqm.
Table 4 shows the area increase for Group C, Assisted dwellings.

. Group D. Self-Produced Dwellings

Houses preceded by ranchos were 7 out of 10 in this group. The smallest rancho before the construction of the house was 34.0 sqm, and the biggest was 76.0 sqm. The rancho area for this group was the largest of the sample being the average 56.4 sqm.

Four cases deserve particular attention due to their special pattern of evolution. The first of these cases kept the whole rancho after the permanent dwelling was built. Each structure was being used by one family of the same household. The other three cases started building the permanent structure while living in the rancho. As the permanent dwelling increased, the rancho was dismantled. However, two of them kept some areas of the rancho. For the purpose of this study, these areas were included as areas of these houses because they were actually part of the dwelling.

When the first permanent dwelling was built, the average initial area was 111.2 sqm. This average was far larger than any other group at this stage. The smallest

initial area was 75.5 sqm, and the largest 128.5 sqm. The construction of the permanent dwelling represented an improvement of the living area of 101.7% over the previous area in the rancho. For most of the dwellings, completion of this stage was made within the 7 years following the time last seen in the aerial data.

All dwellings were enlarged in a second stage. The smallest dwelling was 101.5 sqm, and the largest 237.5 sqm (145.6% average). This represented a slight increase of 26.8% over the previous dwelling area. The time to complete this stage varied from 3 to 10 years since dwellings were seen in the last stage.

A third and last stage involving only 3 dwellings was observed. The smallest area was 150 sqm, and the largest 213.5 sqm; the relative area increase was 30.6% over the previous structure. For two dwellings the area increase was made within 11 years after the last stage and 4 years for the other. Table 5 presents the area increase of Group D, self-provided dwellings.

Summary of Area Increase.

Ranchos were built in about 3/4 of sampled plots in groups A, B and D, while almost all group C directly built the permanent dwelling. The smallest rancho was 14.5 sqm (group A), and the largest was 73.0 sqm (group D). All ranchos averaged 45.4 sqm. Rancho size varied widely between households of the same group, and there was no apparent relationship between rancho size and time living in the rancho. What did exist was a relationship between groups and their average rancho size. Group A had the smallest ranchos (32.6 sqm on average), group B followed (45.8 sqm on average), and group C had the largest (56.4 sqm on average).

After the permanent structure was built, all dwellings went on to a second stage. However, only 14 dwellings completed a third stage, and 6 dwellings a fourth stage. Contrary to what happened with ranchos, there was a relationship between the stages of area increase of the permanent dwelling and its size. Dwellings that went through more stages achieved bigger areas. This was always true for all groups, and the relationship becomes evident comparing average areas in each stage (see Table 6).

Cross comparison of averages between groups also shows that group B has the lowest area average in all stages of the permanent dwelling. The highest average dwelling area was that of group D for all stages. The dwelling growing activity slowed down over time. This can be seen in dwellings that stopped growing in the second and

Table 2. Area Increase by Stages of Evolution. Group A, Formally Produced Dwellings. Note averages are calculated using only dwellings involved in each stage

growth stg.	RANCHO STG		1st STAGE		2nd STAGE		3rd STAGE		4rd STAGE	
dwelling g.	sqm	year	sqm	year	sqm	year	sqm	year	sqm	year
house # 22	--	--	59.0	1967	146.0	1980	153.0	1983	--	--
house # 72	23.0	1964	59.0	1967	74.5	1980	89.5	1987	--	--
house # 73	22.5	1964	59.0	1967	98.0	1980	--	--	--	--
house #101	14.5	1964	59.0	1967	122.0	1980	154.0	1987	171.0	1991
house #167	40.5	1964	59.0	1967	128.5	1980	151.0	1991	--	--
house #189	25.0	1964	59.0	1967	97.0	1974	128.0	1980	157.0	1991
house #301	60.0	1967	59.0	1967	123.5	1980	187.5	1987	--	--
house #320	43.0	1967	59.0	1974	114.5	1991	--	--	--	--
AVERAGE	32.6	--	59.0	--	113.0	--	143.8	--	--	--

FIGURE 10. AREA INCREASE GROUP A

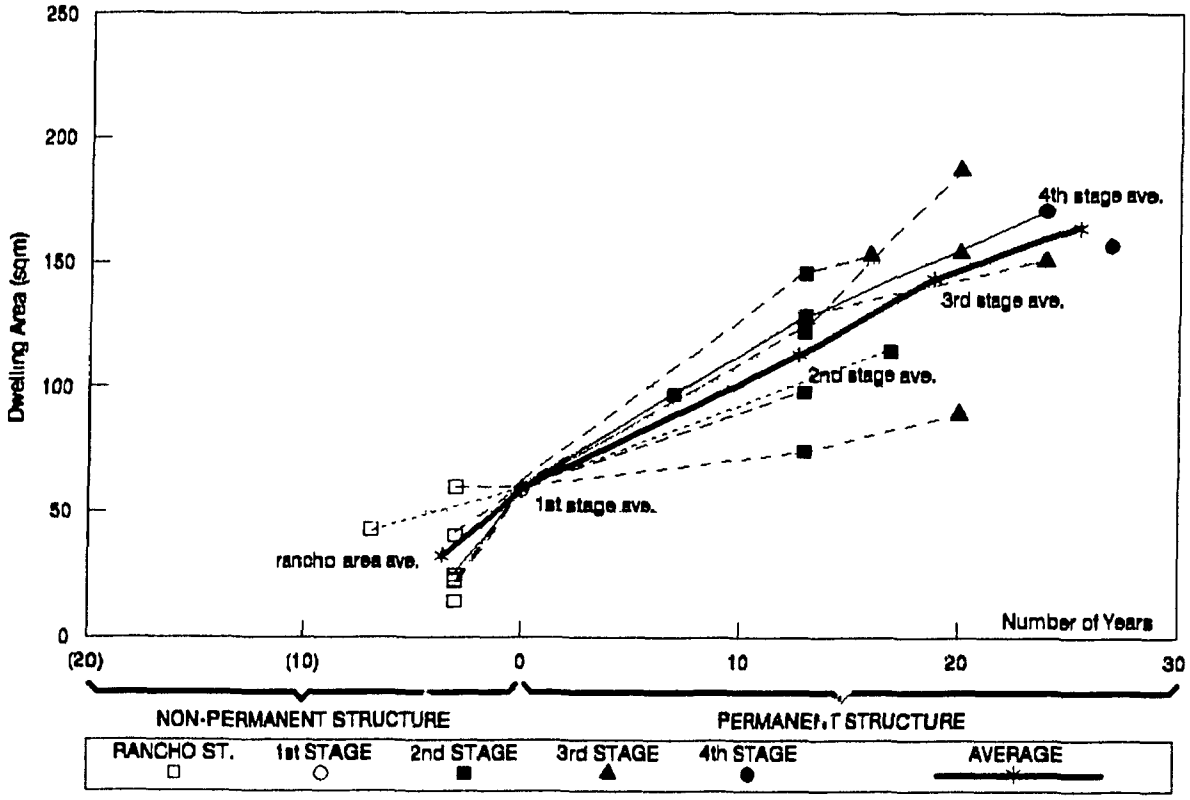


Table 3. Area Increase by Stages of Evolution. Group B, Formally Produced Dwellings.

growth stg. / dwelling g.	RANCHO ST		1st STAGE		2nd STAGE		3rd STAGE		4rd STAGE	
	sqm	year	sqm	year	sqm	year	sqm	year	sqm	year
house # 18	42.0	1967	62.0	1974	80.5	1980	118.5	1987	144.5	1991
house # 50	54.0	1967	62.0	1980	83.5	1983	108.5	1987	121.5	1991
house # 80	47.0	1967	62.0	1974	124.5	1980	--	--	--	--
house #3.1	56.5	1967	62.0	1974	93.0	1991	--	--	--	--
house #41	26.0	1964	62.0	1980	97.8	1983	151.5	1987	--	--
house #429	49.0	1967	62.0	1974	103.5	1987	--	--	--	--
house #446	--	--	62.0	1974	147.5	1980	--	--	--	--
AVERAGE	45.8	--	62.0	--	104.3	--	--	--	133.0	--

FIGURE 11. AREA INCREASE GROUP B

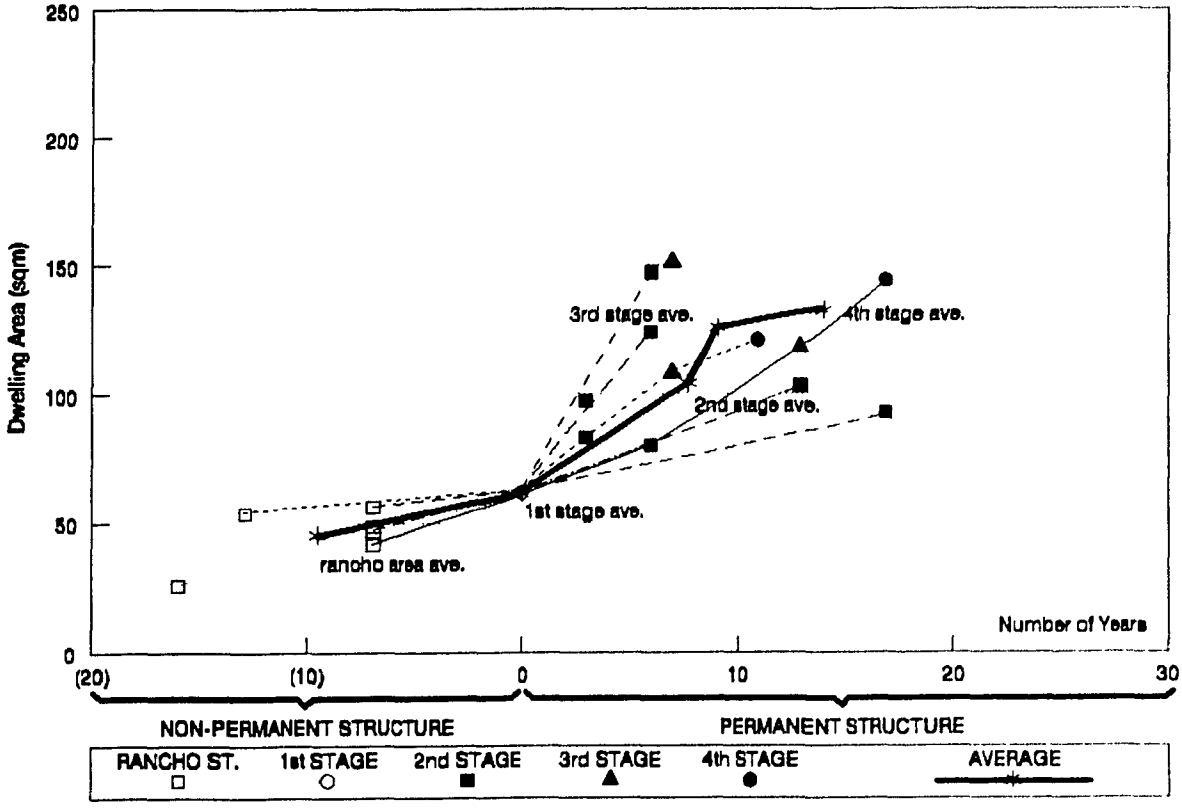


Table 4. Area Increase by Stages of Evolution. Group C.

growth stg.	RANCHO ST		1st STAGE		2nd STAGE		3rd STAGE		4rd STAGE	
dwelling g.	sqm	year	sqm	year	sqm	year	sqm	year	sqm	year
house # 71	--	--	59.0	1967	105.0	1980	--	--	--	--
house # 75	--	--	58.5	1967	93.0	1974	--	--	--	--
house # 92	--	--	68.5	1967	115.5	1980	124.5	1987	--	--
house #147	-	--	77.5	1964	86.5	1967	--	--	--	--
house #177	55.0	1967	116.5	1974	157.0	1980	--	--	--	--
house #410	--	--	104.0	1967	141.0	1980	176.0	1987	--	--
AVERAGE	55.0	--	80.7	--	116.3	--	150.3	--	--	--

FIGURE 12. AREA INCREASE GROUP C

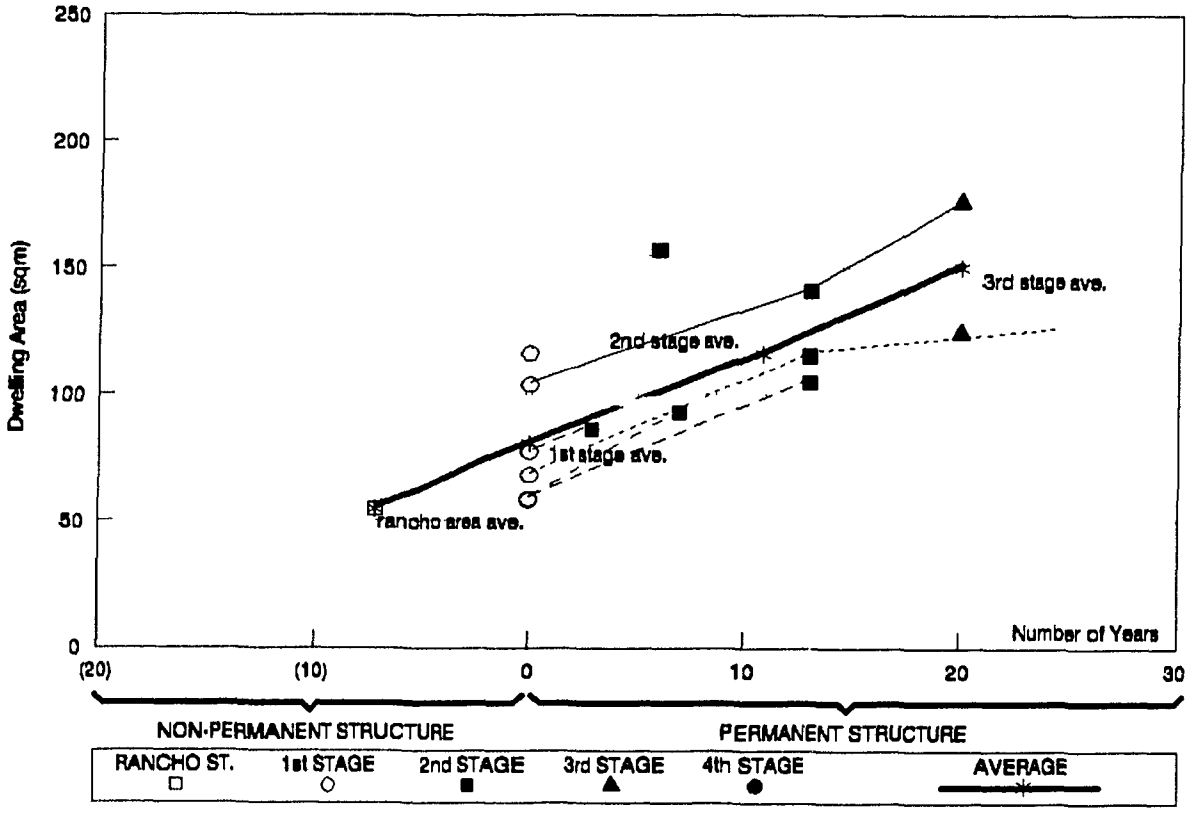


Table 5. Area Increase by Stages of Evolution. Group D.

growth stg.	RANCHO ST		1st STAGE		2nd STAGE		3rd STAGE		4rd STAGE	
dwelling g.	sqm	year	sqm	year	sqm	year	sqm	year	sqm	year
house #178a	76.0	1980	94.5	1987	105.0	1991	--	--	--	--
house #178b	59.0	1980	116.0	1987	147.0	1991	--	--	--	--
house #180	--	--	124.5	1967	148.0	1987	187.0	1991	--	--
house #226	41.0	1967	92.5	1980	108.5	1983	--	--	--	--
house #226a	73.0	1980	168.0	1983	237.5	1991	--	--	-	--
house #229	--	--	100.0	1967	159.0	1974	--	--	--	--
house #236b	68.0	1980	75.5	1983	101.5	1987	--	--	--	--
house #253	45.5	1967	128.5	1974	177.5	1980	--	--	--	--
house #343	34.0	1964	84.0	1967	121.5	1980	150.0	1991	--	--
house #448	--	--	128.0	1974	150.5	1980	213.5	1991	--	--
AVERAGE	56.4	--	111.2	--	145.6	--	183.5	-	--	--

FIGURE 13. AREA INCREASE GROUP D

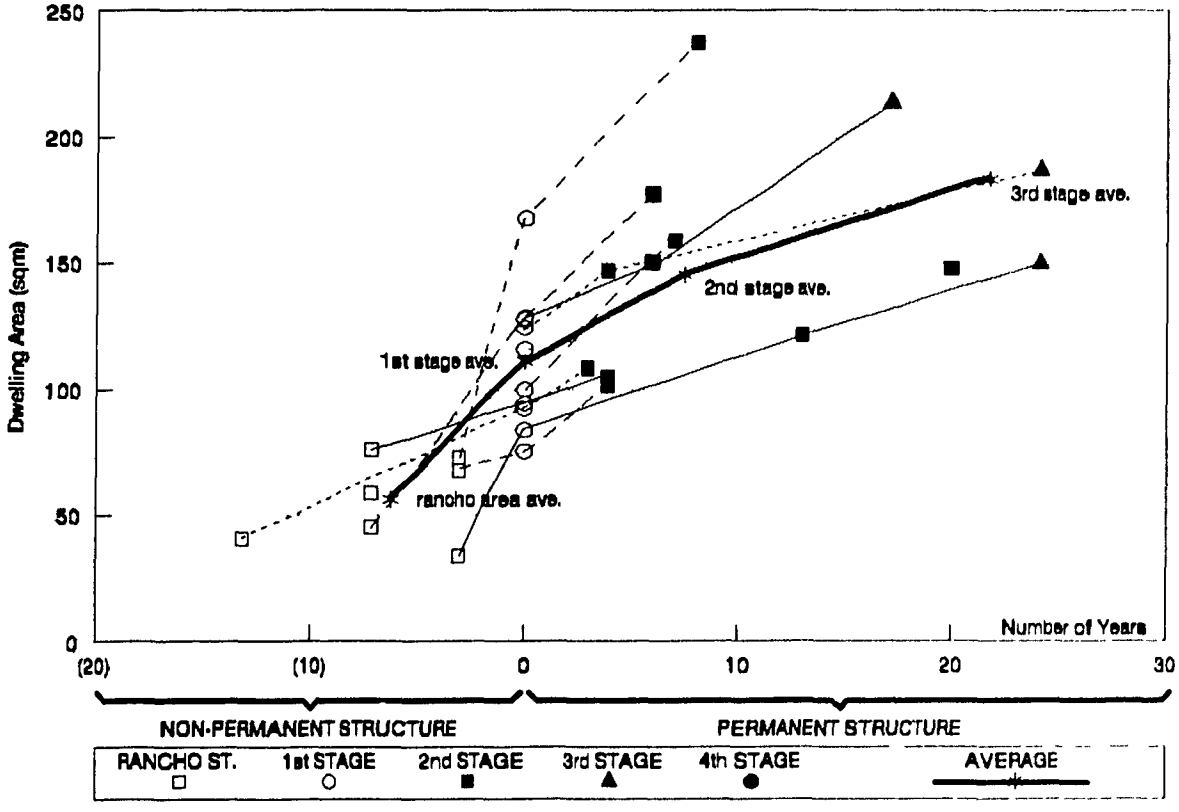
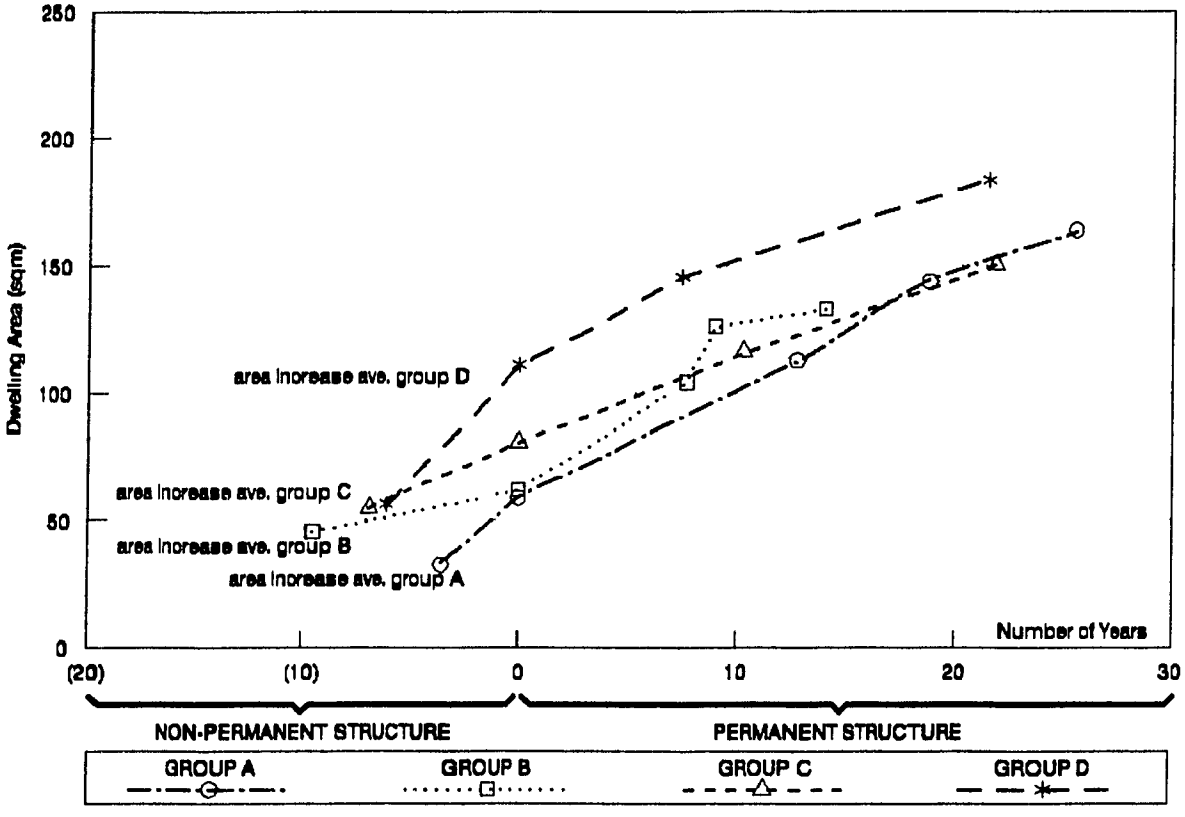


Table 6. Area Increase.

growth stg	RANCHO STAGE	1st STAGE	2nd STAGE	3rd STAGE	4rd STAGE
dwelling g	sqm	sqm	sqm	sqm	sqm
GROUP A	32.6	59.0	113.0	143.8	164.0
GROUP B	45.8	62.0	104.3	126.1	133.0
GROUP C	55.0	80.7	116.3	150.3	--
GROUP D	56.4	111.2	145.6	183.5	--
AVERAGE	45.4	78.2	122.2	149.4	148.5

FIGURE 14. AREA INCREASE FOR ALL GROUPS



third stages and that spent a long time without further area increases (7 to 13 years). Also supporting this, the amount of area added had continuously dropped from stage to stage. Thus, it would be assumed that eventually dwellings would stop further growth. Table 6 summarizes the findings for each group of dwellings.

3.5b Extension of the Spatial Structure of the Dwelling

This section deals with the physical changes of the dwelling. Patterns of change to the spatial structure showed the incrementa' process of dwelling construction.

Because ranchos became temporary structures, the addition of new spaces in these structures were rarely seen. At El Gallo, the rancho served to satisfy basic needs for shelter, while attention and resources went toward the construction of the permanent dwelling. This, at least, was the concept used by the El Roble pilot program in order to provide permanent housing at El Gallo. However, there was not substantial documentation supporting the pattern of shack replacement as the pattern followed by most squatters in Ciudad Guayana.

Considering the above explanation, in the present and next sections, the analysis of the non-permanent structure is separate from that of the permanent structure for three reasons. First, initial non-permanent structures are not common to all cases. Second, the growth of these structures is limited to a few cases. Third, the rancho is similar and evolves similarly in these cases. The first description of ranchos is extended to plots where ranchos were built. An analysis of permanent structures follows. As complementary information, the number of previous ranchos in each group is indicated at the beginning of each analysis.

Initial Structures. The Rancho

A large number of households built an initial non-permanent structure which was occupied immediately. As previously stated, these initial structures were called "ranchos" in Venezuela, but known as "barracas" in Ciudad Guayana. The rancho or barraca was the first investment in shelter usually made by land invaders and illegal dwellers in Venezuela.

The rancho is a simple wooden structure with walls and roof primarily made of tin. However, materials such as asbestos, wood planks and cardboard are also used,

though they are less seen in Ciudad Guayana. Ranchos are located in the front area of usually rectangular plots. Plots in invasion settlements are arranged back to back, forming blocks and having the smallest dimension as frontage. A rancho has a rectangular plan to accommodate separate living and sleeping area. However, four separate rooms are also laid out in a square plan (see Fig.15). Floors are compacted earth, and windows are few if any. Light and ventilation are provided from two opposite doors, one facing the street or public side, and the other facing the enclosed backyard. Extra ventilation is obtained by a 10- to 50-cm gap between walls and ceiling. Roofs are single sloped toward the backyard, but other combinations can be found. Internal partitions are made of tin, wood or cardboard sheets, but often a simple curtain is enough. Materials are reused from old ranchos or from scrap, but if they can be afforded, new materials are a secure investment because ranchos are disassembled and transported with household belongings. Moreover, the tin walls and roof can eventually become the roof of a more durable and bigger house.

Improvements to ranchos are carefully considered while the land is not secured. For instance, a solid door can be used in another house and therefore is likely to be found. A concrete floor cannot be taken away; thus it is seldom used in ranchos unless permanence is assured. At El Gallo, inhabitants made some improvements to their ranchos shortly after building them. Fencing the plot, painting the exterior, setting up front gardens and even ornamentation of doors and windows were improvements performed within ten months after building the ranchos (Silva J. 1964:9). Although ranchos at El Gallo were considered temporary structures, families spent up to fourteen years in them before they built their first concrete-block house. Some neighbours even kept part or even the whole original rancho that was integrated to the permanent dwelling (i.e., the front porch, a back veranda or an extra dwelling).

Nevertheless, the general perception of ranchos as temporal shelters rather than primary forms of dwelling to be improved, can explain why very few ranchos at El Gallo increased their size.

Permanent Structures

Group A. Formally Produced Units of Type 1

Of 7 households of this group, 6 were living on the plot when the permanent dwelling was built. Ranchos were removed after households moved into the new unit,

although in several cases this was not immediate. During the first stage, the dwellings were built by the housing agency. According to a local regulation, dwellings were set back 5m from the front limit.[6] The proposed unit also left small 1.5-meter spaces at both sides of the plot (the unit was 9m wide and plots were 12m wide). The inconvenience to use these narrow spaces was worsened when users built separation walls between adjacent plots. The largest open area was the backyard, which was expected to have the functions of the traditional urban "patio". The layout was efficiently assembled in a 59-sqm plan, although there were limited possibilities for expansion, keeping light, and ventilation of the existing spaces. However, it was possible to extend the laundry area toward the backyard (see Fig.5).

During the second stage (see Fig.16), 9 additions were built in the 8 dwellings of the sample, 7 of these toward the backyard and 2 toward the front yard. Additions toward the backyard were attached to the rear façade of the dwelling and occupied it either partially (2 cases) or totally (5 cases). The connection to these additions was made either by removing the rear wall of the kitchen, or by using the existing rear door. Three of the 5 full-width additions also added a row of one or more enclosed rooms using one of the lateral walls of the backyard. These rooms seem to have been built as subsequent additions, but these changes were not recorded in aerial pictures. Additions toward the front yard at this stage were also made to the main façade of the dwelling. One of these occupied the whole width of the façade, and it was connected to the dwelling through the previous front door. The other was a simple roof extension to park the household's taxi cab, although the front bedroom was given as part of the same extension. Other modifications of existing spaces were made by 5 households, which incorporated one of the bedrooms in the living room, and another one that removed the exterior wall of the front bedroom to open a shop.

In the third stage of evolution, 8 new additions were built in 6 dwellings of the group. Four of these additions were again toward the backyard, 1 toward the front yard, 2 toward the side yards and the last was a room in a second floor. Two of the 4 new additions toward the backyard were attached to the previous main structure. The other two were either against the rear wall of the plot or one of the sides that also faced a street (corner plot). The addition in the front yard was also attached to part of the façade. Lateral additions were made to gain area in the adjacent internal spaces rather than to add a new space. The second floor addition was made only on top of the

previous rear addition and was accessed through an exterior stairwell.

A fourth stage was reached only by 2 dwellings. From 3 additions made, 1 was made toward the side yard and the other 2 toward the front yard. Like the other additions in the side yards, this was made by roofing over the area between the dwelling and the lateral wall of the plot. One of the front additions was an independent structure occupying only part of the front yard. The other was the enlargement of a previous addition to the front yard.

Group B. Formally Produced Units of Type 2

Although all dwellings of this group were preceded by ranchos, they were totally removed after the basic unit was built. The unit's rectangular plan was also set back 5m from the front limit, and placed approximately in the middle of the plot width, leaving about 2.5m free on each side (the unit was 7m wide). In addition to the laundry area open to the backyard, there was a small front porch. The side yards of this unit were wide enough to be used as parking areas although few households ever had vehicles. The unit separated public and private blocks at both sides of the rectangular plan. Further growth was possible toward the backyard, keeping light and ventilation of the old areas (see Fig.5).

During the second stage of growth (see Fig.17), 10 additions were made in the 7 dwellings. Most of them were toward the backyard (6 cases), while the others were equally distributed between front additions and lateral additions. Most of the additions toward the backyard kept the dwelling width, but the width of one of them was also extended to the plot's side limit. All rear additions were connected to the existing structure through the previous rear door. Additions in the front yard were extensions of the porches in both cases. Finally, one of the lateral additions enclosed the whole side yard, while the other was a simple roof between the porch and the lateral wall of the plot as a parking place. Internal spaces were also modified. Almost all of the households had removed the wall that separated the kitchen from the living room to enlarge the latter. One of the dwellings opened up a window in the front bedroom to create a shop.

In the third stage, 6 new additions were built in 4 dwellings, 4 of these toward the backyard, 2 in the side yard and 1 in the front yard. Additions toward the backyard were similar to those made in the second stage, except for one dwelling, which also

added a separate enclosed structure for renting. The same was true for side extensions, which consisted of the area between the dwelling and the lateral wall of the plot. The extension in the front yard was an extension of the existing porch, although the living area was also enlarged with this addition.

Two dwellings had further extensions, both of them toward the backyard. One was like the other full-width additions attached to the back of the dwelling. The other was the enlargement of a detached rooming structure and the construction of another independent structure for bathroom purposes.

Group C. Formally Prescribed Dwellings

Only one of the six cases of this group was living on the plot before the dwelling was built. However, this is one of the few cases that kept part of the rancho as part of the dwelling. The two sampled cases of the less popular design choices made few extensions. One of them, just roofed the internal courtyard to have an extra bedroom (see Fig.5, design b). During construction, the original design was also modified when the front bedroom was changed from one side of the house to the other. The other dwelling also made changes during the initial construction (see Fig.5, design a). The kitchen and the bathroom were not built to gain an extra bedroom. The only recorded change afterwards was the addition of these functions in the rear. The most used plan from the choices given to participants was the one that easily allowed further extensions (see Fig.5, design c) During construction, these households also changed proposed dimensions and altered openings. Three of the sampled households never built the partition between kitchen and living room, and two of these dwellings also transformed the living area into an extra bedroom

During the second stage (see Fig.18), the 4 dwellings made additions toward the backyard, as suggested by the original design. The dwelling that kept part of the rancho built brick walls under the rancho to be used as kitchen area. Three of the dwellings also roofed the side yard all along the original house.

The same kind of lateral addition was made in two other dwellings in the third stage. New additions toward the backyard were made in 2 cases. One of them was as wide as the existing structure and attached to it. The other was an independent structure against the rear wall of the plot. Two dwellings also made small additions in the side yards, and one made a second-floor addition on top of the porch.

In the fourth stage, only one dwelling added an open veranda in the backyard.

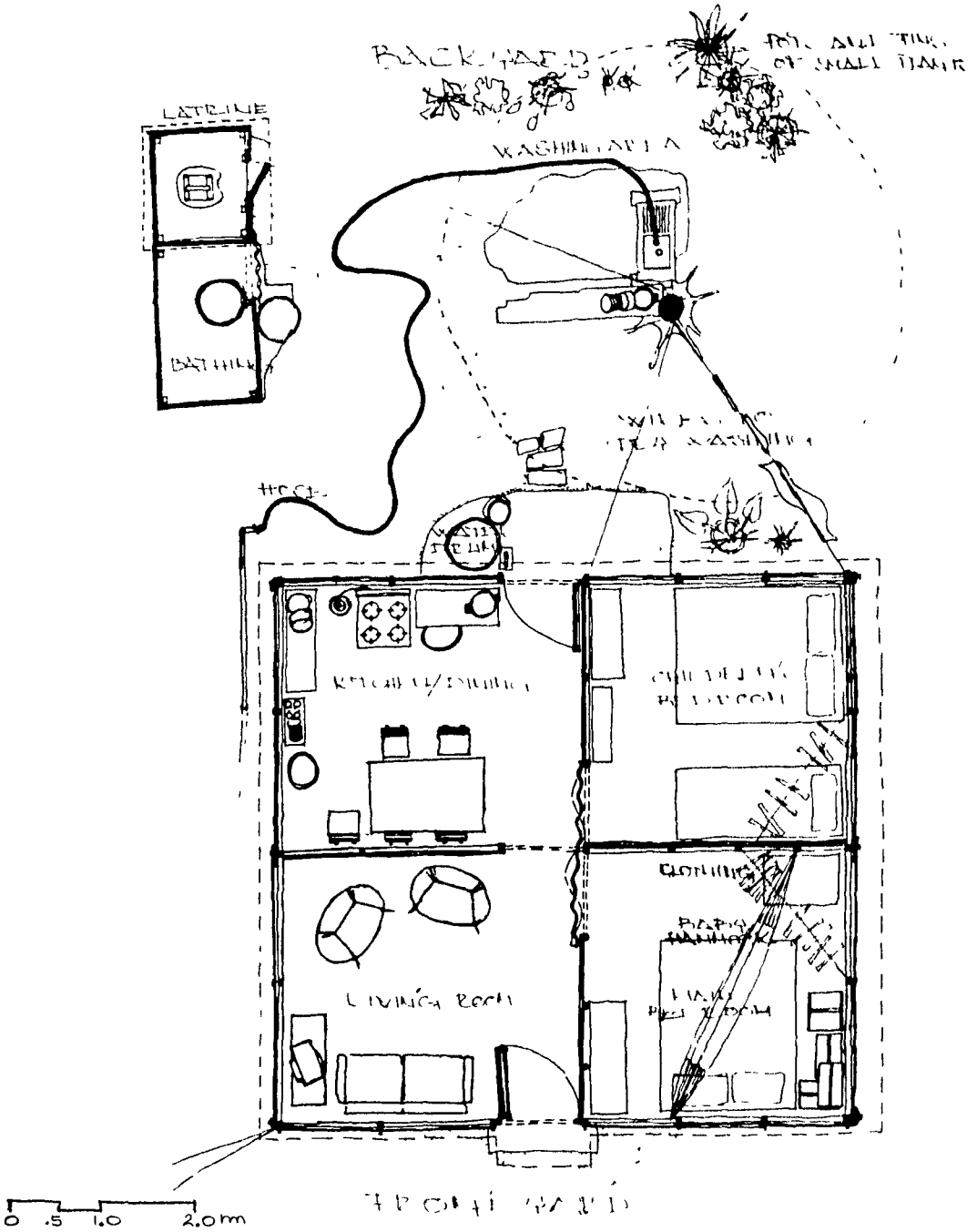
Group D. Self-Produced Dwellings

Of a total of 10 cases studied in this group, 7 were living on the plot when they built the permanent structure. As in groups A and B, ranchos were built on the rear half of the plot. However, 3 cases placed the rancho in the front half of the plot (see Fig.19). For several households the rancho played a different role during and after the construction of the permanent dwelling than that observed in the other groups. The rancho served as a shelter while the dwelling was built, and in 3 cases sections of the rancho or the whole rancho were conserved as part of the permanent dwelling (i.e., a porch, a kitchen living area for tenants, and an extra dwelling for relatives). Even if the rancho was totally removed, the other 2 dwellings progressively substituted it with the permanent dwelling instead of removing it at once.

In the first stage, most of the households built a very complete unit, except the two cases that built the dwelling in phases. The layout and physical appearance of the new dwellings clearly resembled publicly produced and prescribed dwellings, specifically those of Groups B and C. The basic plan used in all cases was a central axis dividing the block of public areas on one side from the block of private areas on the other. As in the other groups, dwellings were set back approximately 5m from the front. Dwellings were also separated from the sides of the plot; however, most of the space left was given to one of the sides, about 2.5m or more. The other side became just a physical separation of house and plot limit, generally about 1m wide.

During the second stage 13 additions were made to the 10 dwellings. Of these, 8 were additions toward the backyard, 3 toward the front yard and the remaining 2 in the side yard. Extensions toward the backyard were as wide as the dwelling, except for 2 cases. One of these was also attached to the existing structure but partially occupied the façade. The other was a detached structure built against one of the lateral walls of the plot. Additions toward the front yard were porch extensions in two cases, and the other was the front area of one of the houses built progressively. Extensions in the side yards were parking areas in both cases.

A third stage was reached only by 3 dwellings. One of them made a separate addition against the rear wall of the plot, another made an extension to the front porch, and the last added a roof between the dwelling and the lateral wall of the plot to make



(Source. Portela, M. Settlement Patterns in Unplanned Areas)

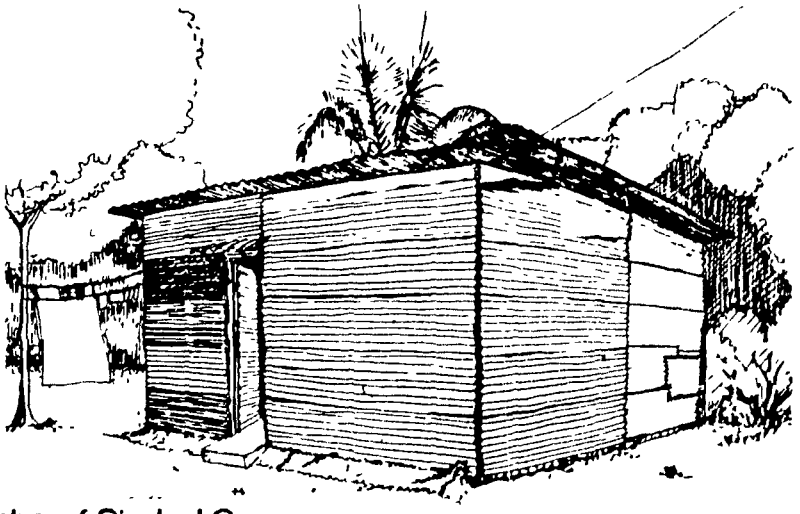


Fig. 15 Rancho of Ciudad Guayana

Figure 16 Extension of the Spatial Structure
Formally Produced Dwellings. Type B

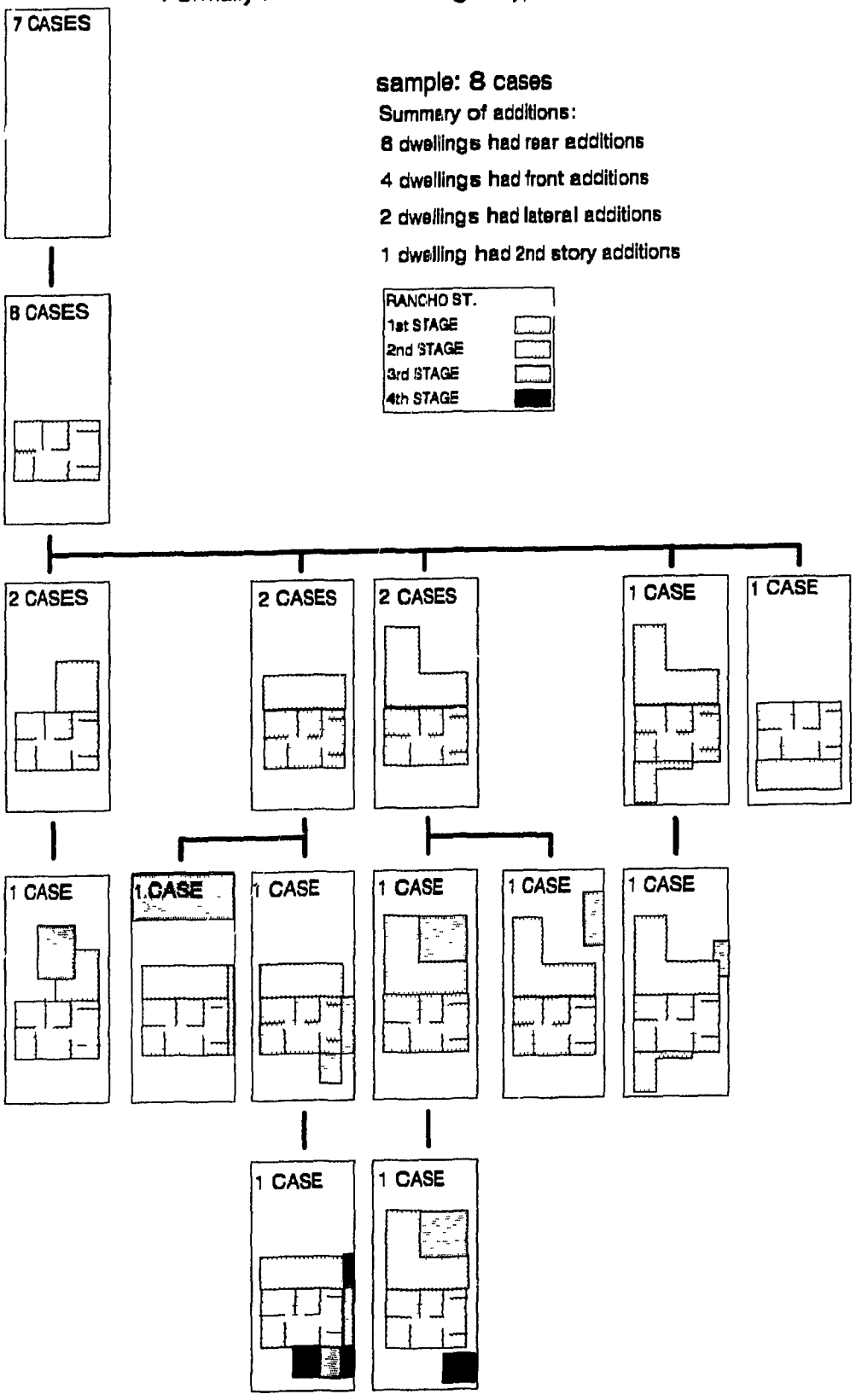


Figure 17 Extension of the Spatial Structure

Formally Produced Dwellings. Group B

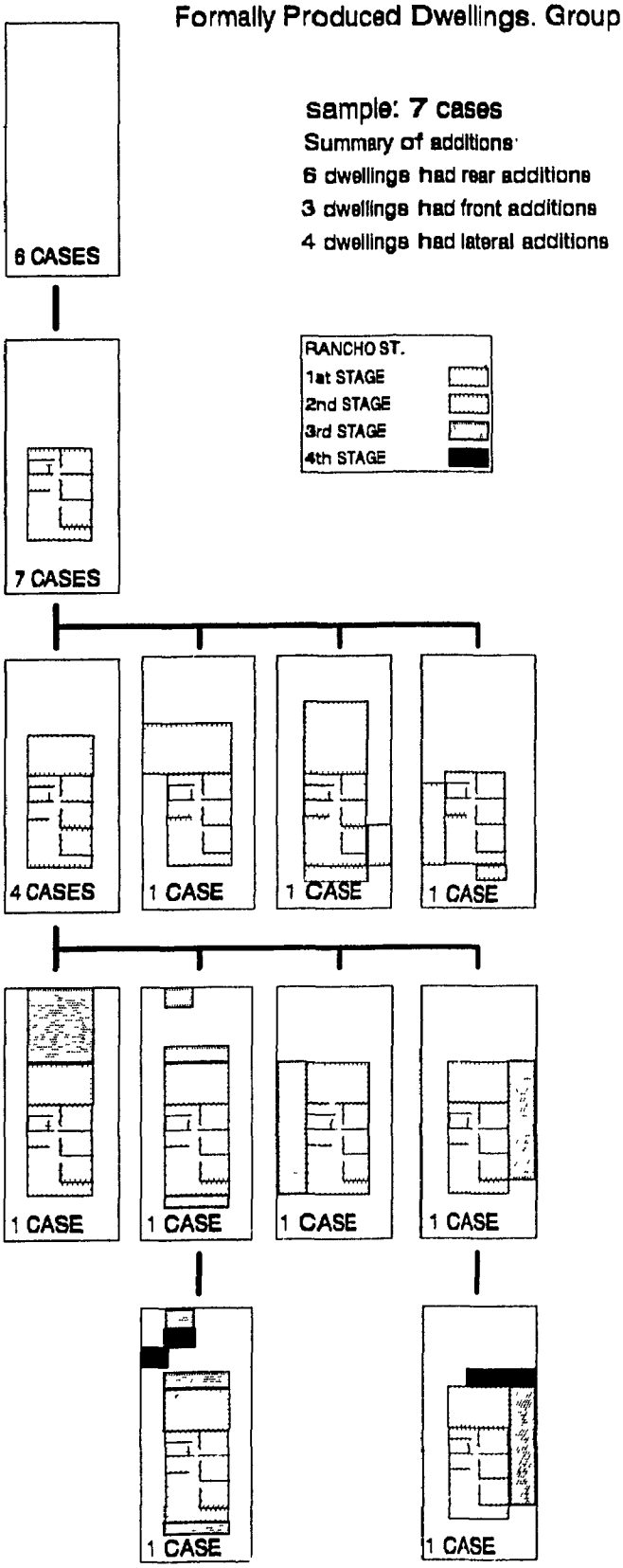


Figure 18 Extension of the Spatial Structure

Formally Prescribed Dwellings. Group C

sample: 6 cases

Summary of additions:

4 dwellings had rear additions

4 dwellings had lateral additions

1 dwelling had 2nd story additions

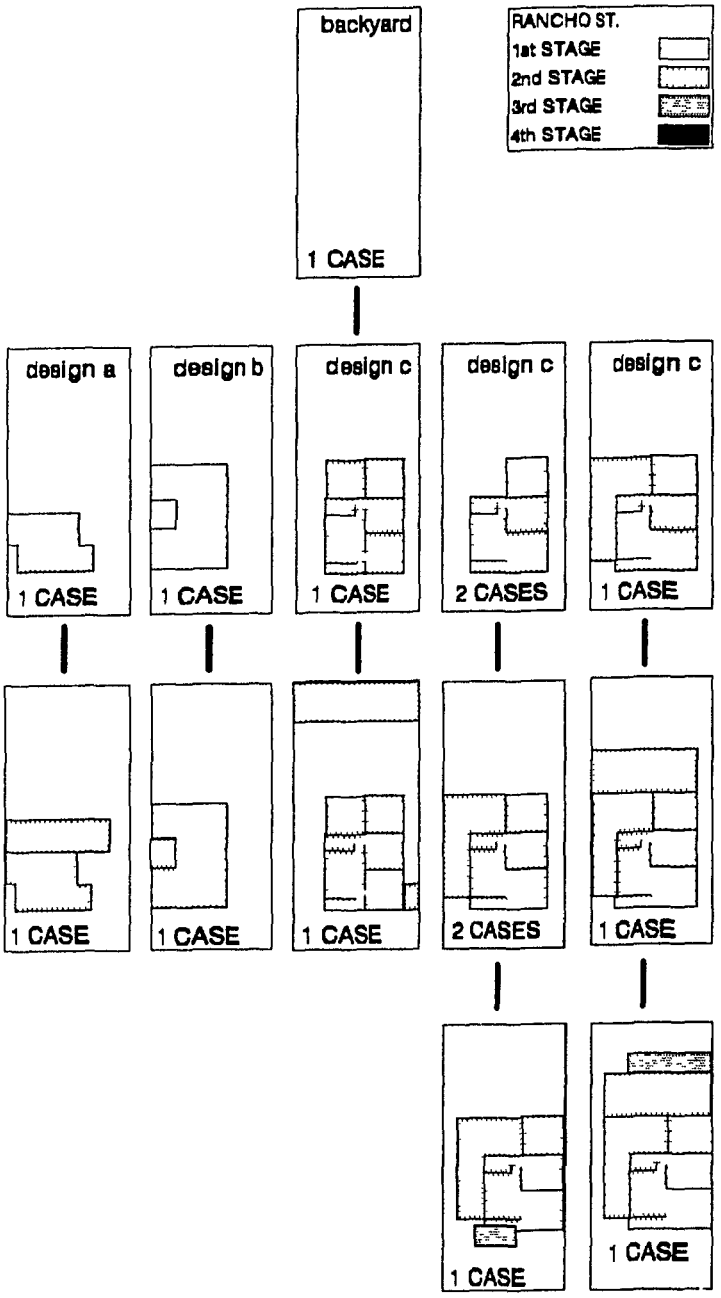
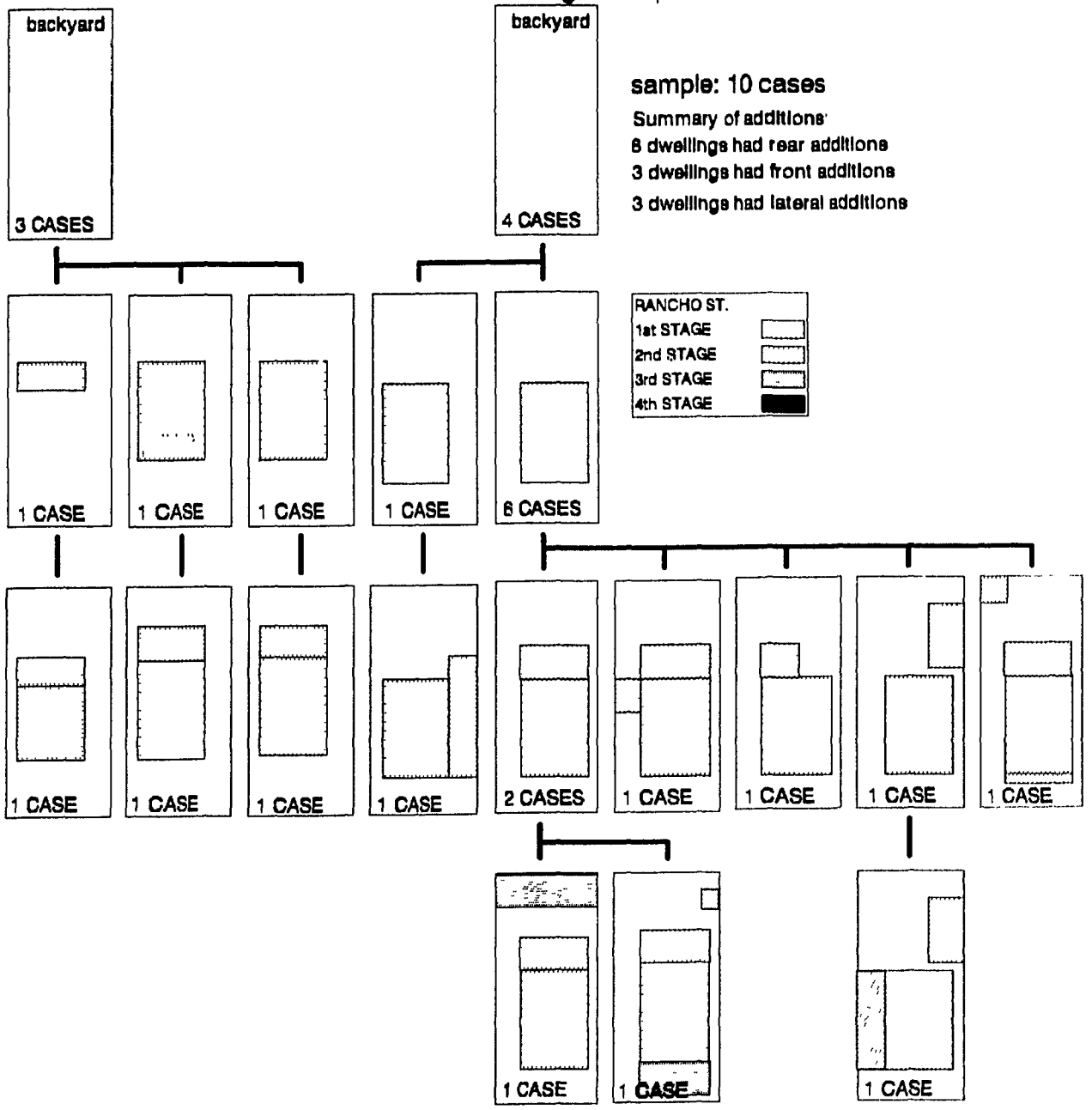


Figure 19 Extension of the Spatial Structure

Self-Produced Dwellings. Group D



room for a car-repair workshop.

Characteristics of Added and Leftover Areas

Rear Additions and Backyards

Since the backyard was the largest open area within the plot, most of the additions were made on it. Additions were either attached or detached to the previous structure. Most of the attached rear additions were as wide as the dwelling, especially in groups B, C and D. Partial additions were produced only in group A in any of the stages of growth. The reason was that consecutive attached additions to the backyard affected the light and ventilation of existing spaces in dwellings of group A (see Fig.20). Instead, dwellings of the other groups were able to build continuously towards the back, keeping light and ventilation in existing and new spaces (see Fig.21). Detached additions were generally built against one of the walls of the backyard (see Fig.22).

Rear additions could be either totally enclosed by walls (see dwelling #80, Fig.21) or semi-enclosed roofed areas (see dwelling #410, Fig.21). Enclosed additions contained one or more rooms that were used as extra-bedrooms, kitchens, dining rooms, bathrooms, rooms for renting and storage. Semi-enclosed and open additions were used as open corridors or verandas, laundry areas, dining and living areas and for storage of construction materials. In several instances, added spaces were being temporarily used for one purpose, but intended for another in the future (i.e., future rooms for renting were being used as storage places).

The leftover area of rear additions was the backyard itself. Already in the rancho stage, the backyard was demarcated with poles and wires. Plot walls were usually raised after the permanent dwelling was built and before first extensions were made. The territority defined by plot walls was such that several side-to-side neighbours built their own separation wall. Backyards at El Gallo became large open spaces planted with a variety of trees and plants. Sometimes domestic animals were raised, or construction materials such as concrete bricks, clay slabs, tin sheets or scrap material accumulated in them (see Fig.23). An area close to the dwelling was usually cemented and defined with pots and containers for plants, low walls, and even wires between trees and the rear façade. This area was used for laundry and drying in the open as well as for informal gathering and chatting. Despite the backyard's important

role, some households built up almost its entire area.

Front Additions and Front Yards

Front additions were seldom made, probably due to the possible consequences of violating local regulations. The most common extensions towards the front yard were open porches (see Fig.24). Only one household in the sample attached an enclosed extension to the front façade to relocate the social areas of the dwelling (see dwelling #73, Fig.25). Otherwise, extensions were small attached enclosures occupying part of the front yard for commercial purposes or simple roofed areas for parking (see dwelling #101, Fig.25).

Front yards as outdoor areas were separated from the street with low walls sometimes with high fences on top. A small number of these were planted with trees and small gardens and used as meeting areas in the evenings. Still others were temporarily used to keep sand or stone piles and other construction materials (see Fig.26). However, most of them were just land or cemented extensions without a particular purpose.

Lateral Additions and Side Yards

Lateral additions were built when side yards were wide enough to allow an extra space (2.5 to 3.0 m). Few cases built on the narrow side yards of dwellings of group A (see dwelling #301, Fig.27). Dwellings of group D generally had one side yard, the other being just a physical separation between the dwelling and the limit of the plot. Enclosing the side yards was an easy way to add extra dwelling area. Nevertheless, these kinds of additions reduced light and ventilation to adjacent spaces. Half of them (7 out of 13) were simply roofed spaces to protect a parking place or a laundry area (see dwelling #180, Fig.28). A small number were enclosed rooms that occupied part of the side yard, leaving the rest open (i.e., a kitchen or a bathroom). Enclosed lateral additions that were all along the dwelling had openings to the front (bedrooms or extensions of the existing bedrooms, see dwelling #50, Fig.27) and even independent accesses (rooms for renting, a grocery store, etc. See dwelling #71, Fig.28).

Side yards as outdoor areas were not more successful than their enclosed counterparts. Because they were needed to shed light on and ventilate adjacent

dwelling areas and to give tenants access to the backyard from the street, the uses for these open areas were limited to washing and drying, keeping the gas bottles, and storing materials. Very few side yards were treated as gardens, and others were enclosed to raise domestic animals (see Fig.29).

Second-Floor Additions and Internal Modifications

Second stories were built in just two cases of the sample, in groups A and C. Rooms were built on top of existing areas with solid roofs, which were not common in El Gallo. Access to these rooms was kept independent which made it possible to rent these areas.

Internal modifications occurred in most of the formally provided dwellings, modifications were made to adapt existing spaces to the spatial requirements of the household. This was usually done by joining adjacent areas or by giving a commercial use to these spaces. Front bedrooms were the most frequently modified spaces, either to open a shop or to join them to the living room (see Fig.30)

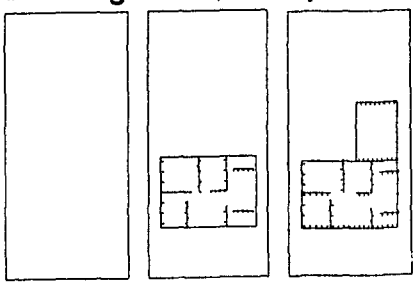
Summary of Extensions of the Spatial Structure

In the sample, 21 of the dwellings were preceded by ranchos, while the remaining 10 were built directly. In several cases, ranchos were used in conjunction with the permanent structure before any additions were made (see dwelling #301, Fig.6, section 3.3a). Also in two cases, the rancho was removed progressively while the permanent dwelling was replacing it over a period of several years (see dwelling #178b, Fig.9, section 3.3c).

Eventually, ranchos were torn down in all cases with one exception, in which the rancho was entirely kept as an extra dwelling for relatives. The other two ranchos were partially kept and became areas of the new dwelling. In one case part of the tin roof of the rancho was the front porch of the permanent dwelling. In the second case the roof and some walls of the rancho were kept to be used as a living/kitchen area for tenants of the dwelling.

Nevertheless, these 3 households that kept the rancho or part of it, and the two households that progressively removed the rancho, were the only sampled dwellings that did not follow the pattern suggested by planners about the rancho location and removal once the permanent dwelling was built.

Dwelling #320, Group A. Partial Addition



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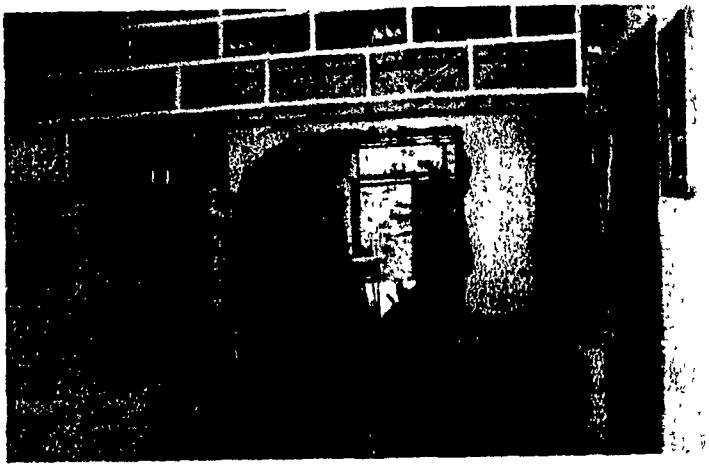
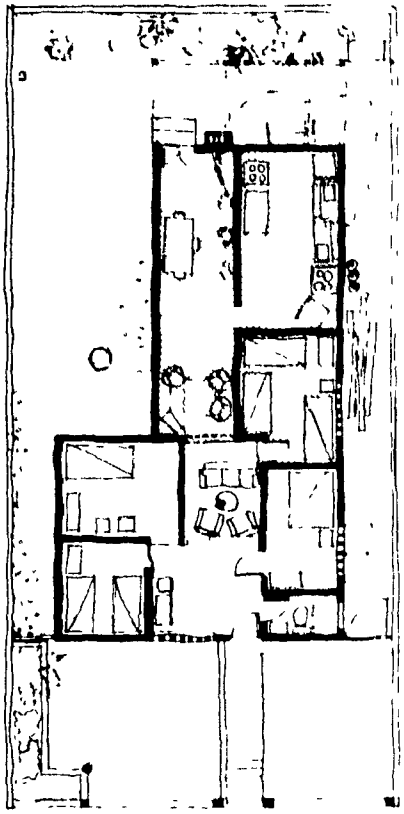
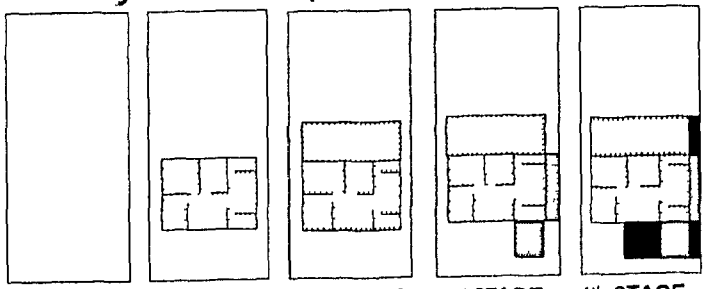




Dwelling #189, Group A. Full-Width addition



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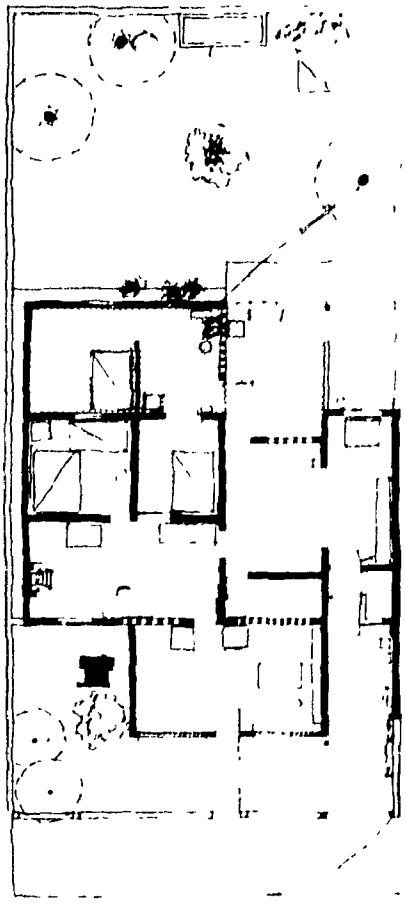
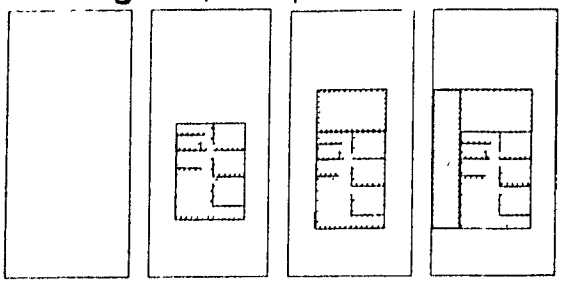


Fig. 20 Rear Additions

Dwelling #80, Group B. Enclosed addition



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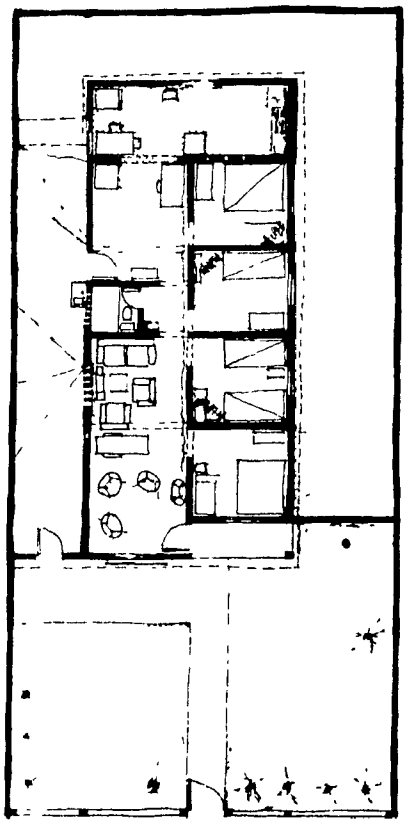
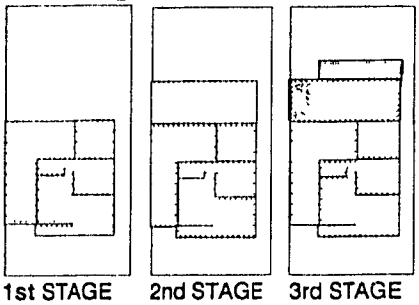


Dwelling #410, Group C. Semi-Enclosed addition



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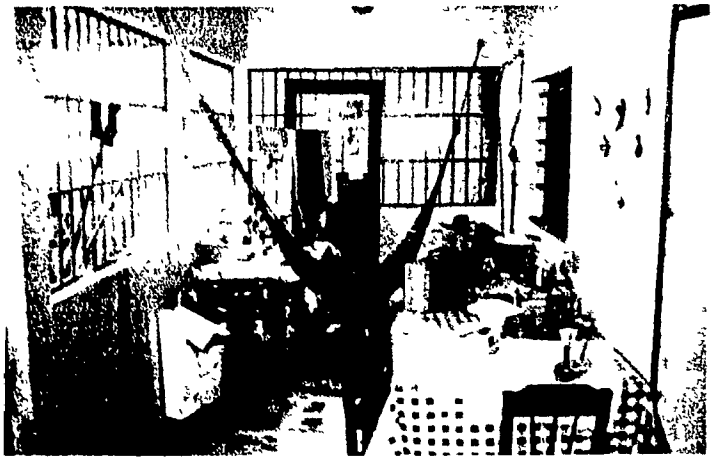


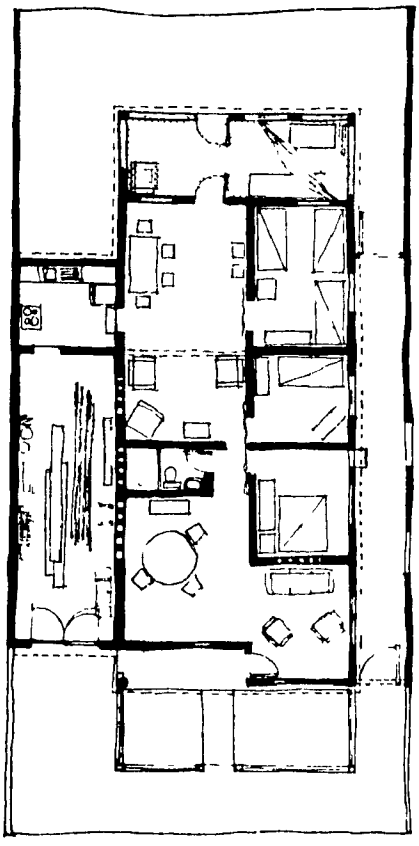
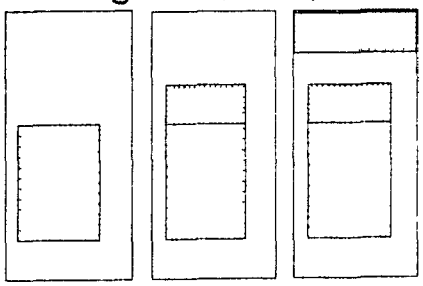


Fig. 21 Rear Additions

Dwelling #448, Group D. Detached addition in construction



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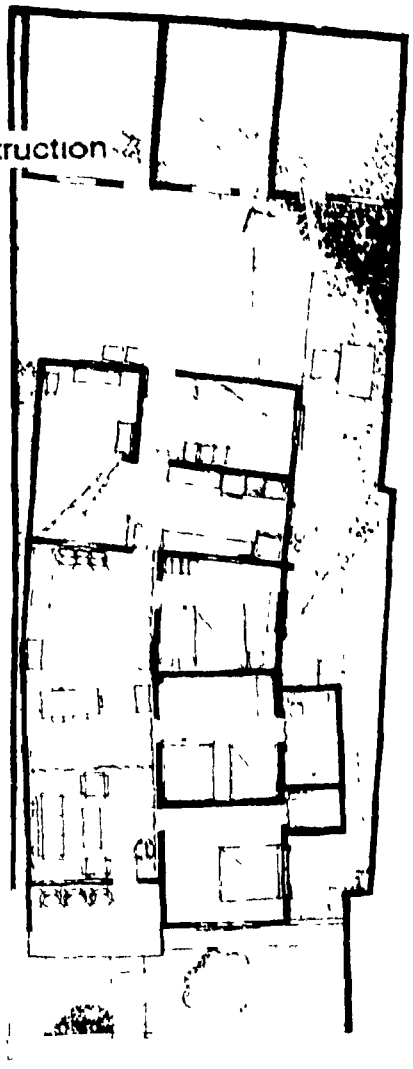
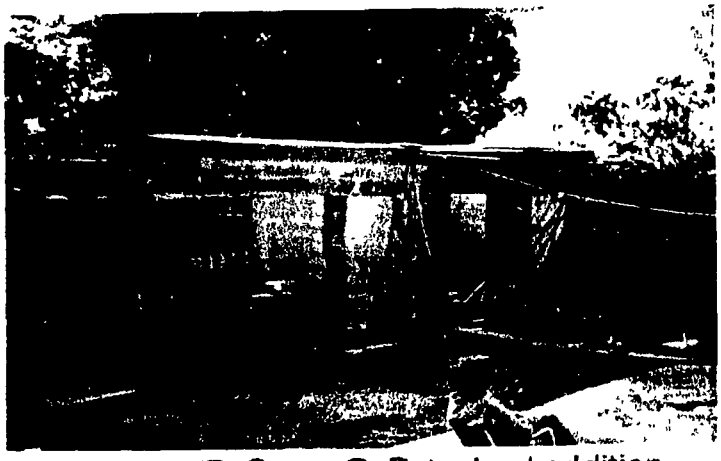
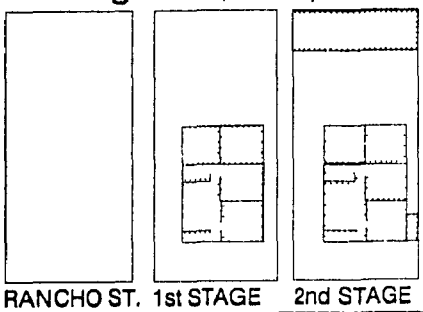




Dwelling #177, Group C. Detached addition



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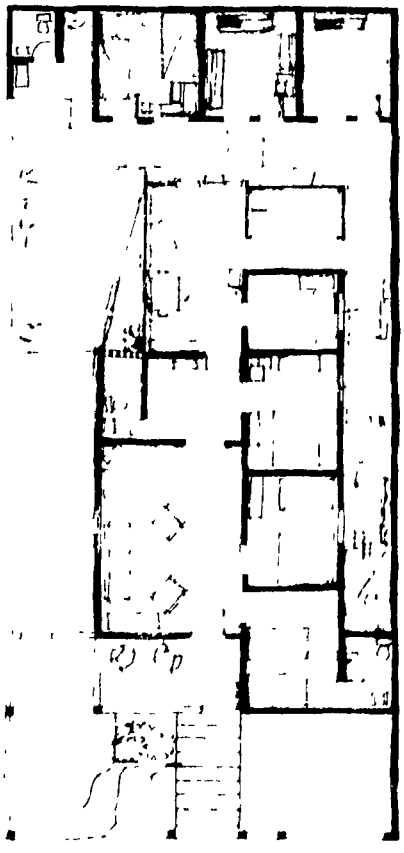


Fig 22 Rear Additions

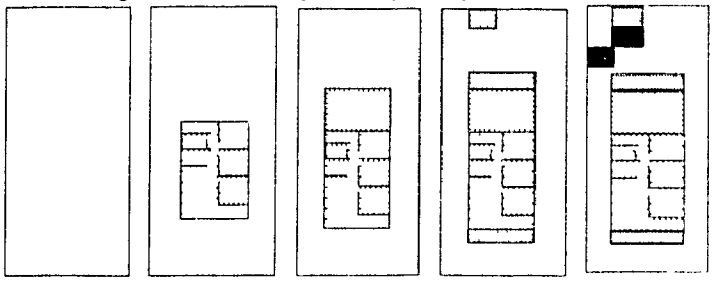
Backyards as gardens

Backyards for raising domestic animals

Backyards for storing construction materials

Fig. 23 Backyards

Dwelling #18, Group B Open porch extension



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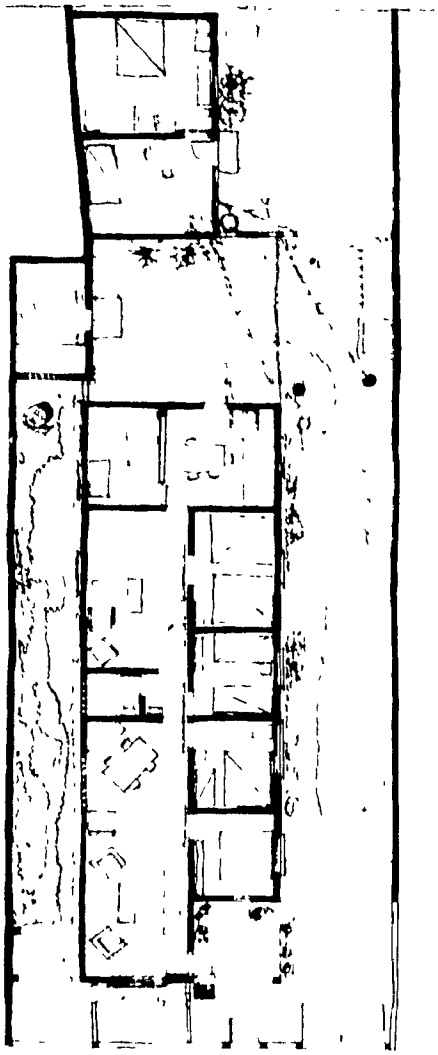
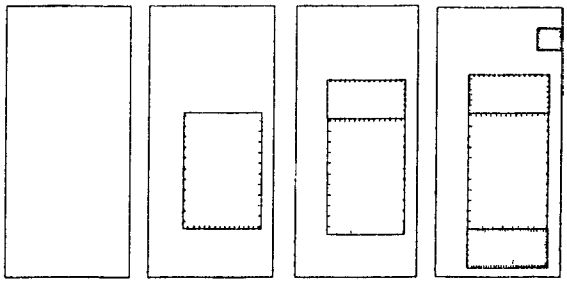


Dwelling #343, Group D Open porch extension



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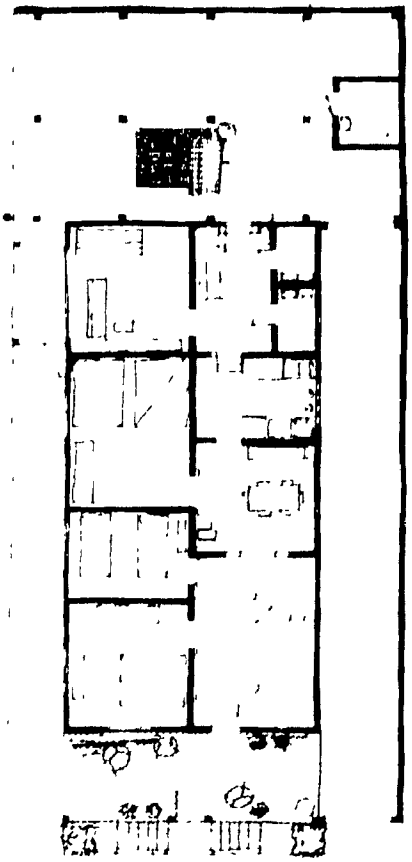
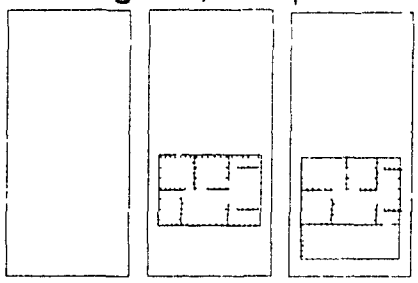


Fig. 24 Front Additions

Dwelling #73, Group A Enclosed addition



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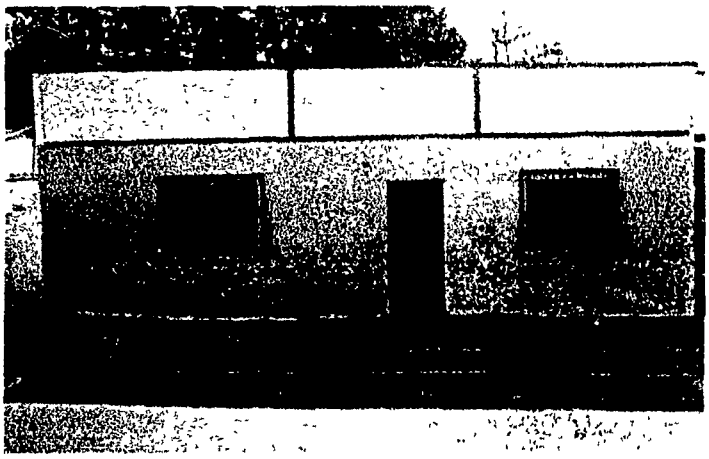
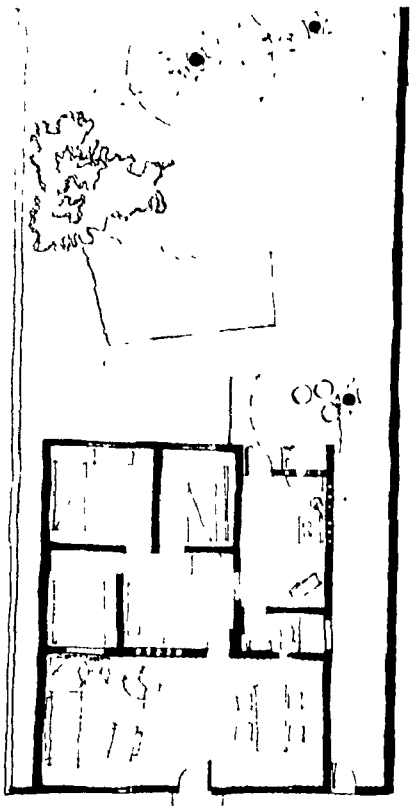
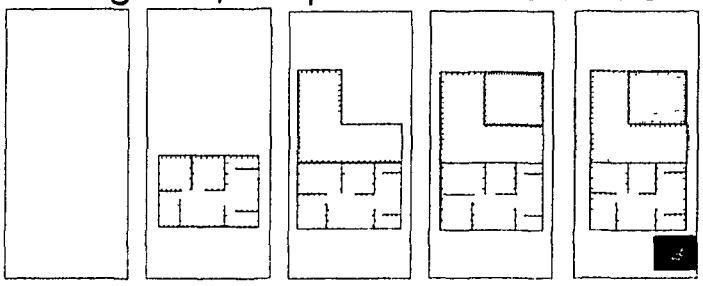




Dwelling #101, Group A. Enclosed detached addition



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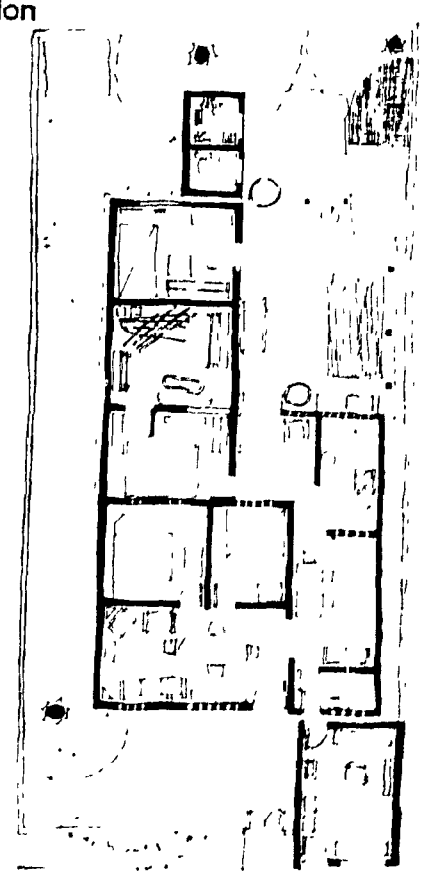
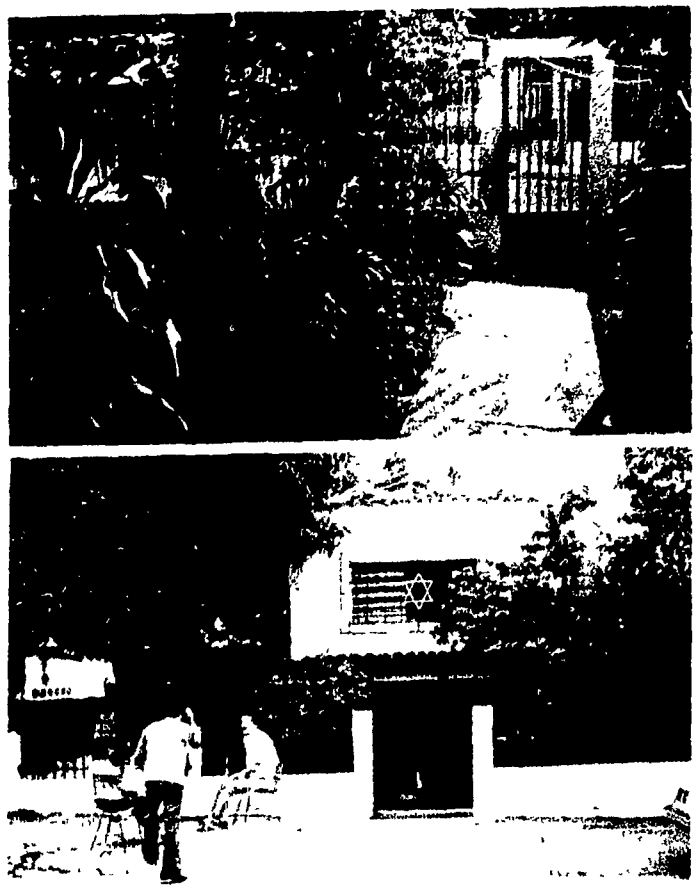


Fig. 25 Front Additions

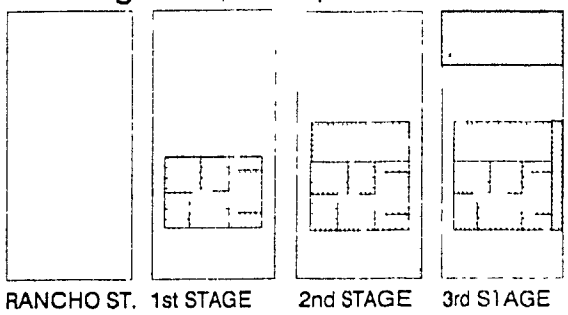


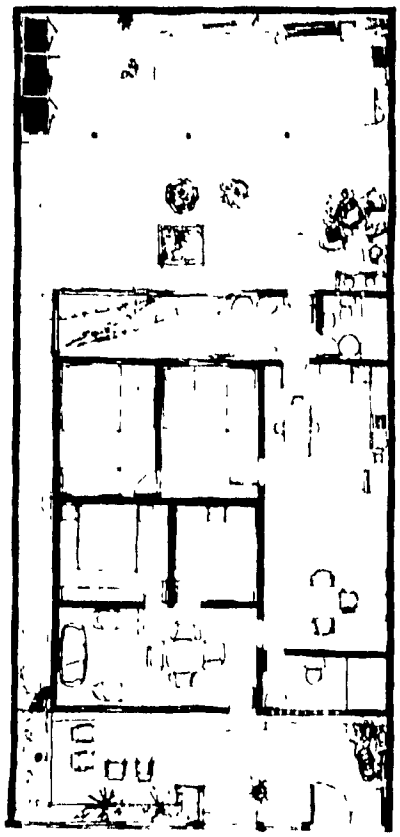
Front Yards as gardens and meeting places

Front Yards for storing construction materials

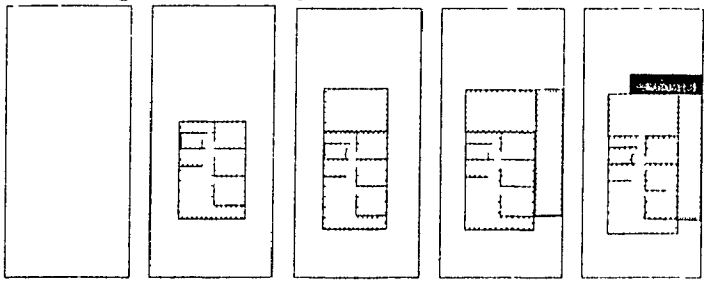
Fig. 26 Front Yards

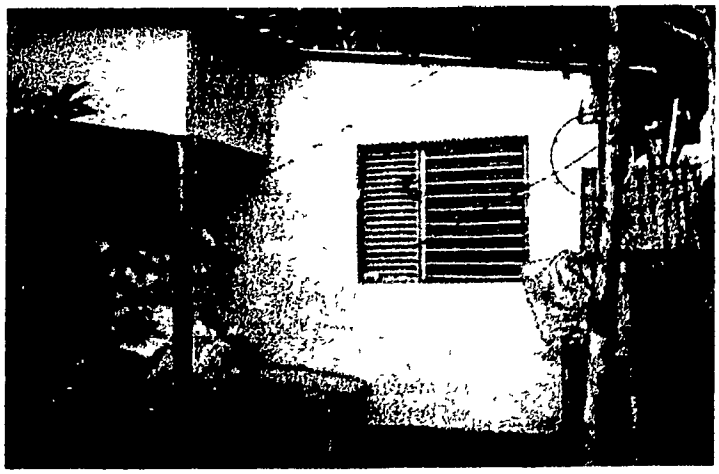
Dwelling #321, Group A. Narrow side yard





Dwelling #50, Group B. Enclosed additions





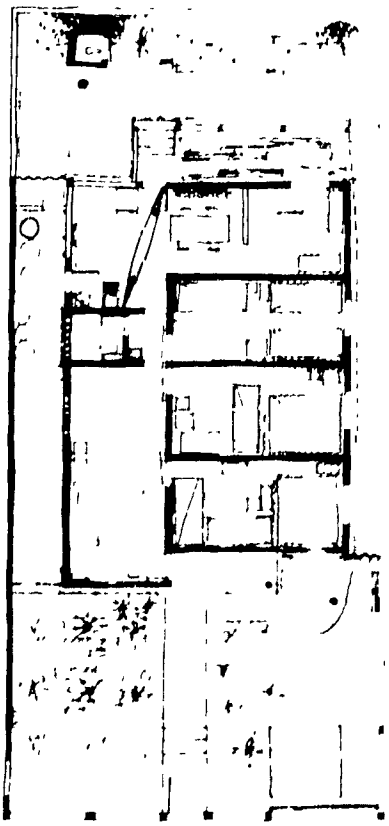
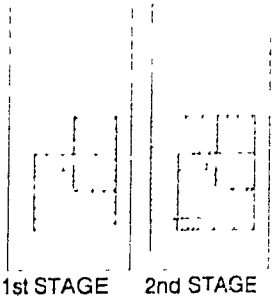


Fig. 27 Lateral Additions

Dwelling #71, Group C Enclosed addition



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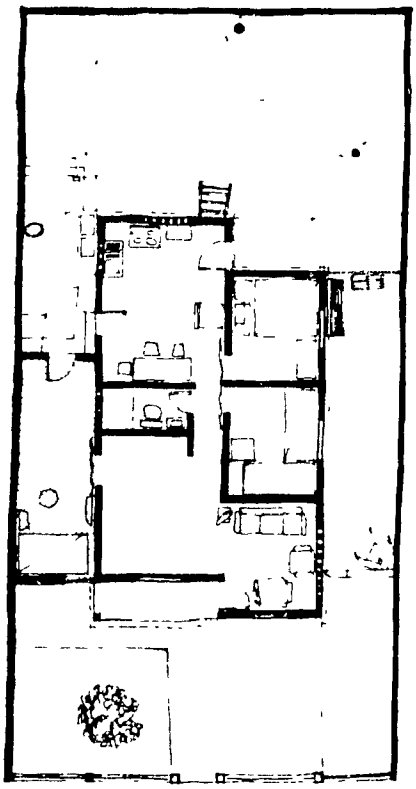
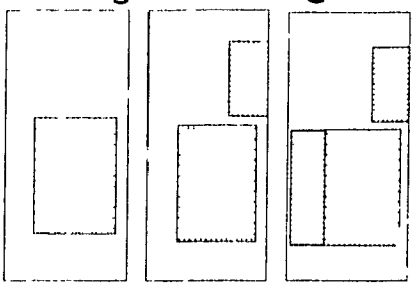


Dwelling #180. Garage and car-reparing space



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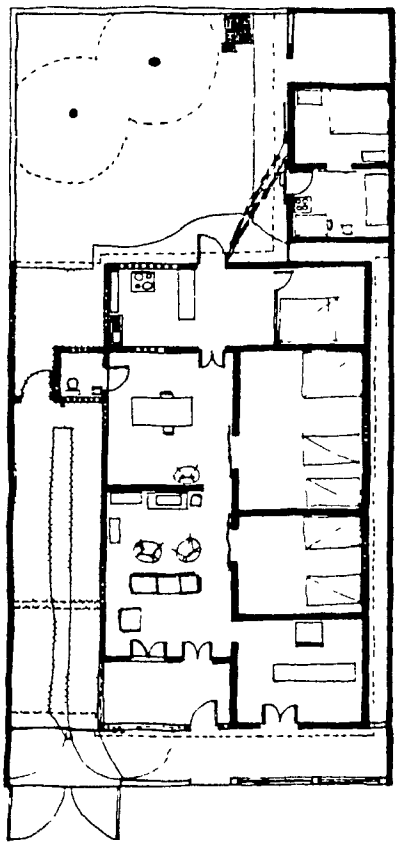


Fig. 28 Lateral Additions

Side Yards as laundry areas

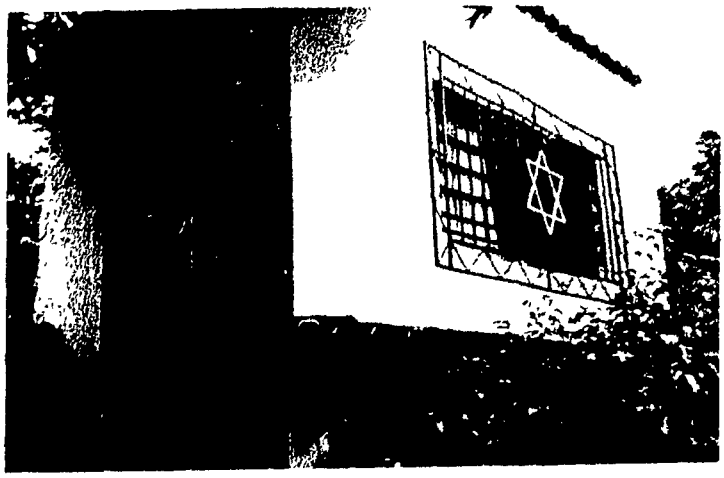
Side Yard as corridor to the backyard

Side Yards as ventilation spaces

Side Yards for raising domestic animals

Fig. 29 Side Yards

One-room addition over the porch



One-room addition at the rear of the dwelling

Integration of front bedroom and living room

Fig. 30 Second-Floor additions and Internal Modifications.

There is no doubt that the pattern of positioning the initial dwelling within the plot given by the formal models A and B influenced the choices of groups C and D. As a result, all dwellings left yards in front, sides and back of the plot, the last being the largest. However, the way that the plot became "filled up" by additions did not comply with the pattern of the detached dwelling. The separation walls between adjacent plots were raised, and the dwelling was expanded into backyards and side yards. Front yards were less used for dwelling expansion, although many were enclosed with low walls and fences. Of a total of 69 additions made in all stages of all sampled dwellings, 40 were made toward the backyard, 12 toward the front yard, 15 toward the side yards and 2 on second floors.

Additions toward the backyard were the most common. They represented 65% of extensions in the second stage, 47.8% of extensions in the third stage, and half of the extensions in the last stage. Most of the structures added on the backyard were attached to the rear façade of the dwelling (31 out of 40), occupying it totally, except for 2 dwellings of the group A, which made partial additions. These structures were enclosed by walls containing one large room or several smaller rooms. These spaces were used mainly as extra bedrooms and to locate or relocate the kitchen. In 5 cases the rooms of these additions kept independent accesses for rental purposes. Additions as described were made mainly during the first and second stages of growth. However, attached structures could also be open corridors or semi-enclosed verandas for varied uses such as dining areas, laundry areas or simple outdoor expansions. These open extensions happened when further growth toward the back was unlikely to happen again.

The sequences of attached additions toward the backyard were made more frequently in groups B, C and D because the dwelling layout in these groups made possible natural lighting and ventilation of successive additions. In contrast, even if open verandas were added as second extensions in group A, the light and ventilation of existing spaces became considerably affected.

Detached additions made to the backyard (4 dwellings) were enclosed structures of one or more rooms built against the rear or one of the lateral walls of the backyard. If these structures were not enclosed by walls (2 cases), it was because they were unfinished or were being temporarily used for different purposes (i.e., storage of belongings or construction materials). However, as declared by the households

themselves, these areas were built for renting as a source (or future source) of income.

Additions on the side yards were less frequent: 17.5% of the first extensions, 30.4% of the second extensions, and 16.7% of the third extensions (1 out of 6 cases). Additions were made after the walls between plots were raised, and in 8 cases the area was totally enclosed to be used as a kitchen, an extra bedroom or for commercial purposes. However, in 4 other cases, the area was just roofed to protect a laundry area or a parking place. Building on these areas was more frequently done if the side yards were about 2.5m wide or more. Four dwellings of group B, 3 of group C and 4 of group D made this kind of extension. In contrast, only 2 dwellings of the group A made extensions on their narrow side yards.

Despite the available space of the front yard, additions on it were least frequent. Only 7 were made as the first extension (17.5%), 3 as the second extension (13.0%) and 2 as the third extension (33.3%). One of them was as wide as the dwelling and totally changed the exterior appearance of the house. The other two were also enclosed areas for commercial use and another was an extension of one of these areas. Only one was a roofed parking area. All the extensions toward the front were made by dwellings of group A and B; however, as seen in other dwellings of the settlement, this was not an exclusive characteristic of these dwellings.

Second-floor additions were the last extension made in two dwellings. Both were rooms made in part of the roof area and with an exterior access through a staircase.

Internal changes were produced in dwellings of groups A and B during the completion of first additions. Two general changes were observed. Living rooms were enlarged and front bedrooms were transformed onto commercial premises. No changes were produced in existing spaces of groups C and D.

3.5c Additions and Changes in the Use-Layout of the Dwelling

This section refers to the changes produced in the functional layout of the dwelling as a consequence of adding nonexisting uses together with new structures or freeing functions from existing structures to incorporate them into the added one. The use-layout was also modified when changes of use occurred within existing spaces. The sequence in which new uses were added or existing uses were relocated suggested

household functional requirements and priorities. The criteria of analysis are as in the previous analysis. Differentiation was made between ranchos and the permanent structures because the rancho's use-layout was not modified, but it was substituted by the use-layout of the permanent dwelling.

Initial Structures

As mentioned in section 3.6b, planners at El Gallo allowed ranchos as initial shelters while the permanent dwelling was being built. In their characteristic form, ranchos were invariably divided in two functional blocks. The public block on one side contained a living room, dining room and kitchen in one or two separate spaces, and the private block on the other side contained one or two bedrooms. The living room of a rancho was a sitting area, and it was furnished with chairs and essential household items. The living room was used for social gatherings and formal encounters. Sometimes the living area was also used for dining, although the dining table would be in the kitchen if it was big enough. The kitchen was usually equipped with a counter or table for preparing food, some sort of closed chest or tall cabinet for storing food, and the stove. Traditionally kerosene stoves were used within the rancho and wood stoves, if any, were kept in the open. However, gas stoves and other domestic kitchen equipment such as refrigerators and small electrical appliances are commonly seen today in ranchos. A couple would have one bedroom when they had no children or young children. But if the family grew and resources allowed a separate room would be built for children and even a third to separate girls and boys (see Fig.15). For sleeping, the traditional hammocks were rarely seen, except for a baby's use. Instead, bedrooms were stuffed with two or three beds, cardboard boxes with personal belongings and wires laid between walls to hang clothes. Contrary to what could be expected, outdoor extensions such as porches or verandas were seldom built in ranchos.

Instead of locating the rancho in the front of the plot, as they usually were in squatter settlements, ranchos at El Gallo were set back to allow for the construction of the permanent dwelling. Backyards became considerably reduced; however, many household activities took place in backyards. An area for washing dishes and laundry was located in the open, next to the back door of the rancho, this was generally defined by cans and pots of plants, and small trees. Small enclosures for pit latrines

were built in a rear corner of the plot close to this area and, usually beside it, households installed a small unroofed enclosure for bathing. Wires were usually laid in several directions around this area to dry the laundry. Although the urban character of El Gallo discouraged activities such as cultivating small crops and raising domestic animals, even today they are common practices among few neighbours. Ranchos rarely included shops within their structure except for some services, such as hairdressing, which were done in the living area. However, stands or small enclosed structures were built in the front of the plot already in early periods of ranchos.

Permanent Structures

Group A. Formally Produced Units of Type 1

Uses assigned to the spaces of the type 1 unit reflected conventional standards of formal housing. In the first stage households were provided with the basic unit. Building plans showed a **living room** furnished with a medium-size sofa set and a center table. The master **bedroom** was furnished with a double bed, and the other two bedrooms with two single beds each. The **bathroom** was spacious and equipped with a basin, toilet and shower. In the **dining/kitchen** area, plans showed a dining table for six and a counter that included sink, stove and working space efficiently organized against the rear wall of the room. Finally, a small porch for doing the **laundry** connected the kitchen to the backyard.

During the second stage, modifications to the use-layout were produced in all the dwellings of the sample almost immediately after the unit was built. The following lists the uses added and changes due to these modifications:

- New **kitchen** spaces were built in 4 of the 7 sampled dwellings of the group, leaving the previous space for exclusive dining use.
- One, two and three extra **bedrooms** were added in 5 dwellings.
- A **living room** was added in one dwelling. However, the existing one was modified in 5 of the remaining dwellings.
- A new **dining room** was added by 3 households, leaving the kitchen/dining room as a kitchen exclusively in 2 cases.
- A large **laundry** area was added in 2 dwellings.
- A **bathroom** with separate toilet and bathing area was built in two dwellings.
- A **small shop** was opened in the front bedroom of the dwelling by making a

wide opening in the front wall.

- A **garage** was added in one case to park a taxi cab.

In the third stage, new changes in the use-layout occurred in 5 of the units. All these changes were produced by new uses given to added structures.

- A new **kitchen** was added in one dwelling to leave the kitchen/dining room for dining only.
- **Laundry** areas were added in 2 dwellings.
- A new **bathroom** was added in 1 case.
- **Rooms for renting** were built in 2 dwellings.
- A small convenience **store** was added in the front of one dwelling.

Another change in the use-layout was produced during the fourth stage of growth. Only two dwellings reached this stage.

- **Commercial premises** were built in both dwellings.
- A **garage** for a delivery truck was added to one of the shops.

- Group B. Formally Produced Cores of Type 2

During the first stage, finished units included a program similar to that of type 1 units. According to plans, a small front porch led to a living room, dining room and a small kitchen integrated in the main social area. There was no separation between these three functions, except for a low wall between the dining room and the kitchen. The bathroom had a toilet and shower, but the basin was outside at the entrance of the bathroom, in a small hall. Like in type 1 units, a small porch for laundry opened to the backyard. The private area of the unit included three bedrooms of equal size.

Additions also started almost immediately after units were built. Uses given to additions in the second stage are listed below:

- The **kitchen** was moved to a different space in 6 dwellings integrating the cleared kitchen area to the living room.
- The **dining** room was also changed in the same 6 dwellings together with the kitchen, although some households left a formal dining area in the same place and added a dining table in the kitchen.
- **Living** rooms were not added, but in 6 cases they became enlarged when the

kitchen was taken out of this space.

- One or two extra **bedrooms** were added in the other 6 cases. This addition was part of the same structure of the kitchen/dining space in 5 cases.

A **small shop** was opened in the front bedroom of one of the dwellings.

- An extra **bathroom** was built in 2 dwellings.
- **Front porches** were enlarged in 2 dwellings.
- A **parking** area was created, roofing the lateral setback in one dwelling.

The third stage was reached by 4 households. Changes of the use-layout in this stage were as follows:

- A **kitchen** became relocated again in the new addition built at the rear in 2 dwelling.
- An extra **bedroom** was built in 2 dwellings.
- One or two **rooms for rent** were built in 2 dwellings either within the same dwelling structure or in a separate structure in the backyard.

A **rear porch** was built as an outdoor extension for the tenants' use in one of the dwellings.

- An **extra bathroom** to be used by tenants and the household was built in 1 case.
- **Laundry** areas were built in 2 dwellings.

Two dwellings reached a fourth stage. Similar to type 1 units, additions in this stage were mainly spaces to generate income.

- A **veranda** was added where construction material was being stored.
- An enlargement of a **room for renting** to a two-room unit was built in one dwelling.
- The same dwelling added a **bathroom** to serve tenants and the family owner.

- Group C. Formally Prescribed Dwellings

All sampled households within this group moved into the plot during or after the house was built, with the exception of one household that was living on a rancho. Construction was either managed or done by the user according to plans and

specifications. During the first stage, when dwellings were built, the only changes affecting the use-layout were made in 2 dwellings that used the proposed living room to create an extra bedroom and integrated the living room into the dining area. The partitions that divided the kitchen from the dining area were not built in 3 dwellings, although the kitchen remained in its position during this first period. Finally, a large grocery store was made by building a roof over the side yard of one of the dwellings.

New changes were seen later in a second stage of growth in all cases. Unlike the first two groups, changes did not happen immediately after the first permanent dwelling was built, but there was a longer period of time without any construction activity. Changes are listed below:

- **Kitchens** were relocated into a new room in 3 cases.
- A **dining area** was included within the new kitchen in 1 case. In the other 2 cases the dining/kitchen space was freed for exclusive dining use.
- The **living** room became enlarged in the dwelling that separated kitchen and dining areas.
- A **room for renting** was built in the lateral setback of the remaining dwelling. It was accessed directly from the outside.

Other changes were made during a third stage of growth by all dwellings.

- **Extra bedrooms** for household use were built in 2 cases.
- Another **kitchen** was added in the back of the house together with a **laundry** area.
- A **room for renting** was added in one dwelling.

Another change, made only in one case, consisted of an open **veranda** in the back of the house, which was also used as a **laundry** area.

- Group D. Self-Produced Dwellings

In cases where the rancho was not removed after the permanent structure was built, it was kept totally or partially as part of the new house. Although houses had a similar spatial structure, the functional layout varied in some cases. In all cases use-layout included living and dining room space (sometimes these spaces were separated by partitions), a kitchen, three bedrooms and, in several cases, a front porch. There

was only one house that included a laundry area within the dwelling, and 4 dwellings were initially built without bathrooms. Two households included small business areas within their plots. The two cases that did not build a complete first permanent dwelling also reached a similar functional layout when the dwelling was completed.

In the second stage, 9 dwellings made modifications to the initially built permanent dwelling. The remaining two kept building their dwellings progressively. Uses added or changed are listed below:

- New **bedrooms** were added in 3 dwellings.
- **Kitchens** were relocated to the new addition in the backyard in 3 households.
- A **living room** as well as **dining room** were added as new areas in one dwelling.
- A grocery **store** was built in one case.
- One, two or three **rooms for renting** were built in three dwellings.
- Extended **laundry areas** were built in two dwellings for generation of an income.
- **Bathrooms** and extra bathrooms for the tenants' use were built in 6 dwellings.
- Front **porches** or extensions to them were built in 4 dwellings.

During the third and last stage for this group, only three dwellings were involved in additions to the dwelling. Changes to the use-layout were as follows:

- An extra **bedroom** was built in 2 dwellings.
- A **laundry area** was added in one dwelling.
- Roofed areas as **parking areas** were added in 2 dwellings; one of them was also used as a workshop by a car repairman.

Table 7 summarizes the described changes by group, indicating the uses given to added or modified spaces. Numbers on cells indicate dwellings per group that went through each change.

Characteristics of Added Functions

Extra bedrooms were added to provide room enough for the growing household. Added bedrooms were furnished with three beds and even two double beds,

wardrobes, chests and boxes to store the household's clothing (see Fig.32). Households of group C increased dimensions indicated in plans for the bedrooms while dwellings were being built. However, already-built bedrooms of groups A and B hardly allowed for more than two single beds. Few households decided to increase their dimensions. A large majority added more and larger bedrooms. Table 8 shows the average area of initially built and added bedrooms. In the table, groups C and D built large bedrooms from the beginning.

Kitchen areas built by households were larger than those formally provided or planned (see Table 9). But also kitchens directly built by households were laid out differently. The integration of kitchen activities within a counter area as proposed in groups A, B and C was adopted by some households. However, due to the traditional differentiation of these activities (see *initial structures* in section 3.5c), separate areas were arranged for washing, and food preparation and cooking within the new kitchens. The washing area was separated from the working area and often occupied a large portion of new kitchens, sometimes accommodating more than one sink. There were even dwellings that initially kept the washing activity outdoors, in the rear porch or in the open. Large kitchens also included a dining table for daily use and several other activities (i.e., family chatting, sewing or school homework). The kitchen was always placed in the rear area of the dwelling in direct relation with the backyard. Thus, each time that dwellings grew toward the backyard, the kitchen was relocated within the new area.

Table 9 shows the kitchen areas initially provided by formal housing programs and the changes made to them by households.

Living rooms became spacious areas for formal gathering. Living areas were furnished with upholstered living room sets, considered important household assets. These living rooms were reserved for special occasions while family gatherings occurred in other parts of the dwelling such as porches, kitchens or verandas. Most households of group C enlarged the proposed living room during construction. In group A, households enlarged the existing living room, incorporating one of the bedrooms into it. In group B, living rooms were also enlarged to relocate the dining

and kitchen areas. Most of the time, these enlarged living areas were too big for their intended use; however, they were badly proportioned to be furnished in the usual way. The result was long and narrow rooms with leftover areas often filled with extra furniture. There were even extreme cases in which, after a new living room was built, the original small living area was left with no particular use.

Dining rooms underwent similar changes. In groups A and B dining rooms were either relocated in new areas or enlarged after the kitchen was removed from the space. However, new dining areas were not clearly identifiable in all dwellings. Households did not conceive the dining room as a special, separate area. Several households adopted the idea of a formal dining area proposed by groups A and B, but also included a dining table within the kitchen, which actually was the dining area. Furthermore, though not frequently, some households kept the formal dining area beside the living room, added a dining room and kept the dining table within the kitchen. In table 10, the area that was considered as the dining room, was the one more frequently used for this activity.

Bathrooms built in groups A and B remained basically the same. However, added bathrooms were built separating bathing and toilet area. Despite the resemblance that new bathrooms had with the separate latrine and bathing area in ranchos, the layout had an obvious practical use of large households. Table 15 shows that, in general, the areas of added bathrooms were on average similar to the original ones.

Laundry areas were a potential source of income. Washing and ironing for better-off people were common activities in Venezuelan barrios. Entrepreneurial laundry areas as income generators were large roofed extensions that made it possible to dry clothes even while it rained. Several dwellings of groups A and B were enlarged for this purpose.

Commercial premises were also a main source of income. In a first instance, front rooms became small shops to sell goodies and sodas. Few changes were required to open a small shop, a bigger window, an additional door or a roof towards the street side. If business did not work out, or was not needed any more, the shop could always

be used as a bedroom again. Some households added structures for this particular use, but, contrary to what could be expected, few households added them in the front yard. Probably due to the setback regulation, people preferred to build toward the sides wherever it was possible. Table 12 shows the area of commercial premises added for that only purpose; it does not include existing bedrooms that were transformed into small shops.

Rooms for renting were the most common additions to generate income, although they required very specific characteristics. The isolation of rental rooms from the rest of the dwelling was almost a "standard" valued by tenants and landlords A separate access from the street was required, but also a certain degree of visual and acoustic privacy was considered convenient. These characteristics were best met in rooms facing the front either in lateral setbacks or on second floors. However, in group A side yards were too narrow, and even in group B dwellings relied on these spaces for light and ventilation. Thus, restricted by the available space, most of the rental additions were built as separate structures in the backyard, leaving independent access from the street through the side yards. Services provided for tenants' use were also important. The strategic layout of kitchens and location of new bathrooms allowed their use by both household and tenants. Table 13 shows the average area of rental rooms which, compared to Table 8, demonstrates they were bigger than household bedrooms.

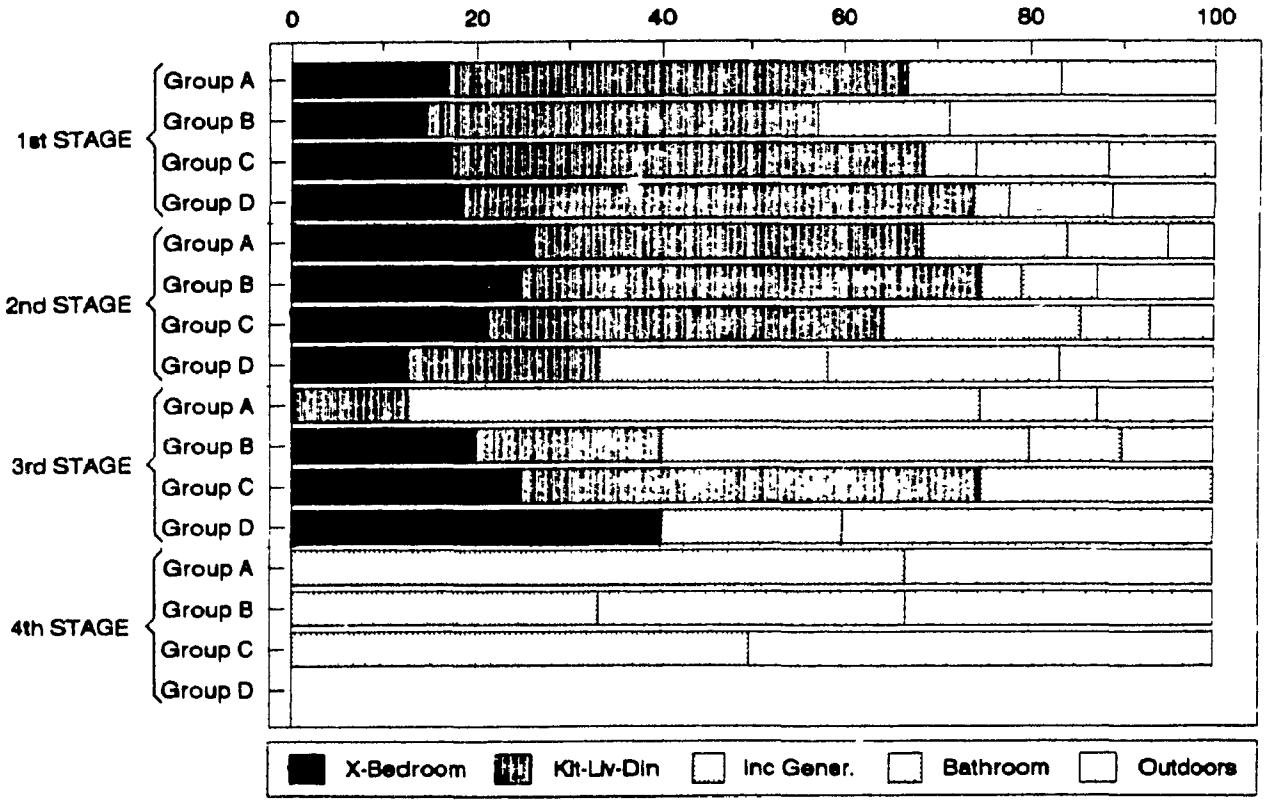
Front porches became the areas for informal social interaction. The importance of these areas is reflected in the dimensions given to them in dwellings of groups C and D. Porches were often enclosed by low walls and fenced with steel bars so they became protected outdoor areas. Nevertheless, only three households of groups B enlarged the small porch, and only one of the dwellings of group A added a front porch. It is also true that not having these areas did not stop people from gathering in front of the dwellings in the evenings or in the shade of trees. Table 16 shows the average area of porches for the different groups.

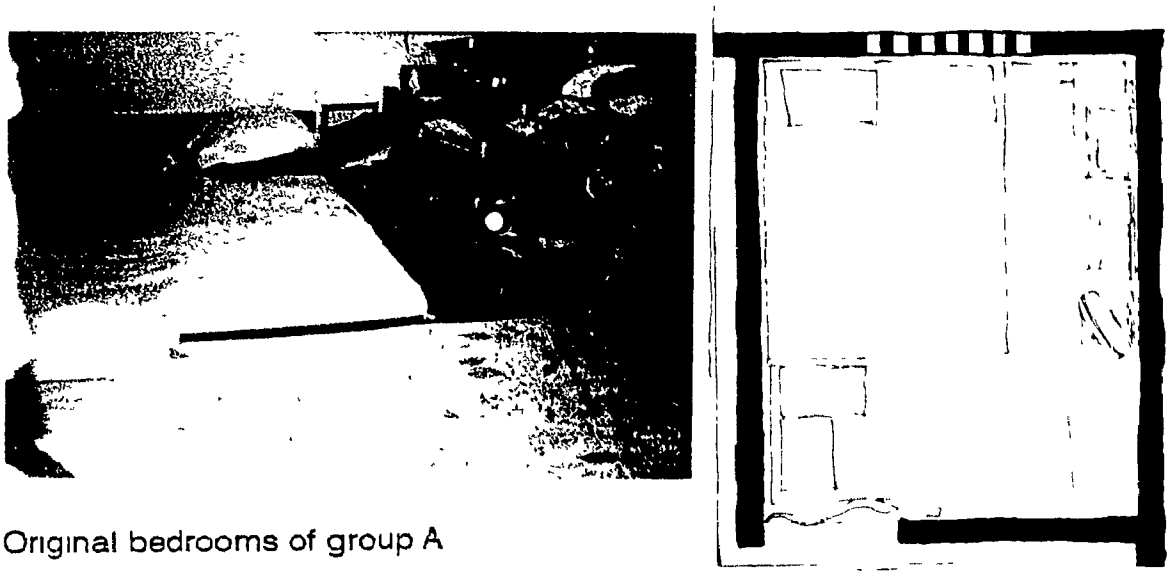
Parking areas were the simplest extensions made, being generally just a tin roof between the dwelling and the lateral wall of the plot. Six dwellings built these

Table 7. Changes in Use-Layout.(numbers within cells are frequency of dwellings adding the use)

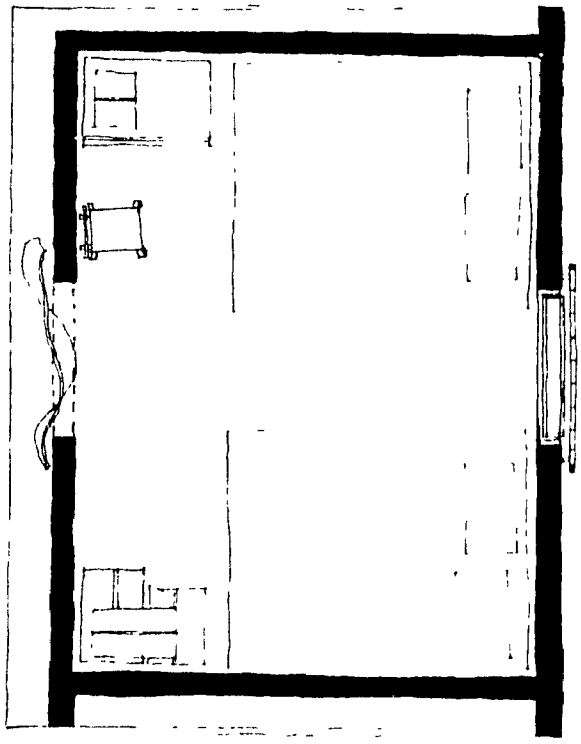
Stages	1st STAGE				2nd STAGE				3rd STAGE				4th STAGE			
Groups	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
dwgs/group	8	7	6	10	8	7	6	10	6	3	2	3	2	2	2	
Bedrooms	7	7	6	10	5	6	3	3		2	1	2				
Kitchen	7	7	6	10	4	6	5	3	1	2	1					
Dining-rooms	7	7	6	10	3	6	1	1			1					
Living-rooms	7	7	6	10	1			1								
Small shops			1	1	1	1										
Stores			1					1	1				2			
Rooms t/rent							2	3	2	2	1			1		
Laundry are.	7	7		1	2		1	2	2	2		1			1	
Bathrooms	7	7	5	6	2	2	1	6	1	1				1		
Porch/Verand		7	4	6	1	3	1	4	1	1		2	1	1	1	

Fig. 31 **Changes in the Use-Layout per group of dwellings. %**





Original bedrooms of group A



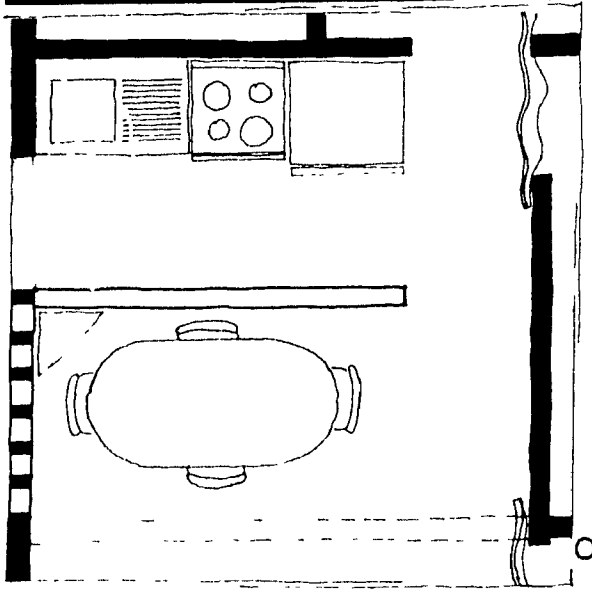
0 .5 1.0 2.0m

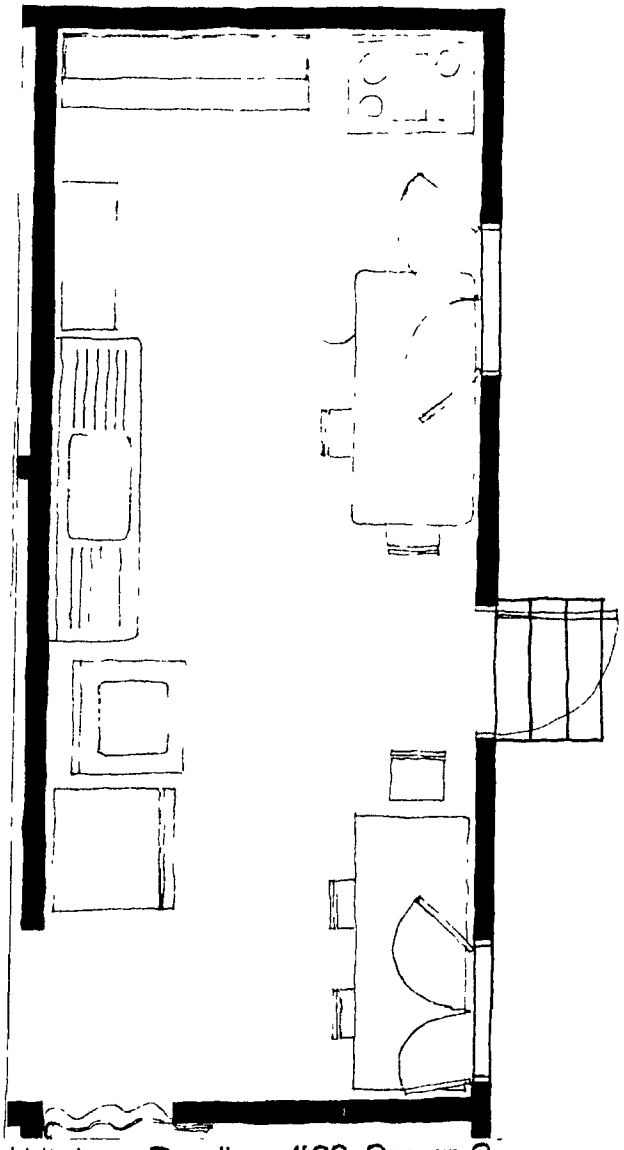
Added bedrooms

Fig 32 Bedrooms

Table 8. Average area of bedrooms per periods of growth.

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	8.19 sqm	8.00 sqm	10.75 sqm	12.64 sqm
Added later	12.34 "	9.71 "	9.42 "	10.28 "





Added kitchen Dwelling #92, Group C

0 5 1.0 2 0m

Original kitchen. Dwelling #321, Group B

Fig 33 Kitchens

Table 9. Average area of kitchens per periods of growth. (* as proposed on building plans)

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	3.08 sqm	3.22 sqm	5.29 sqm *	11.05 sqm
Added later	10.57 "	10.74 "	13.94 "	9.42 "

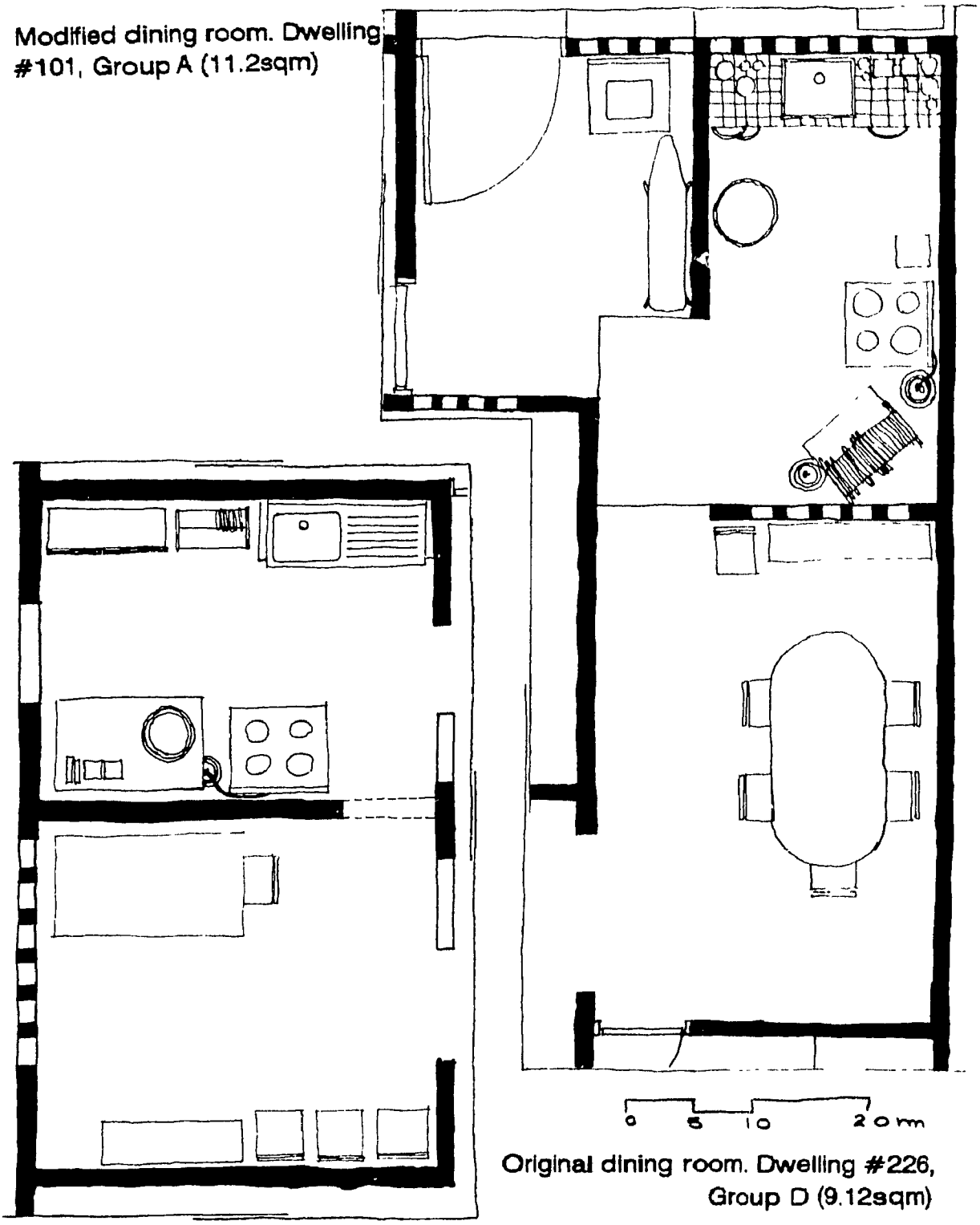
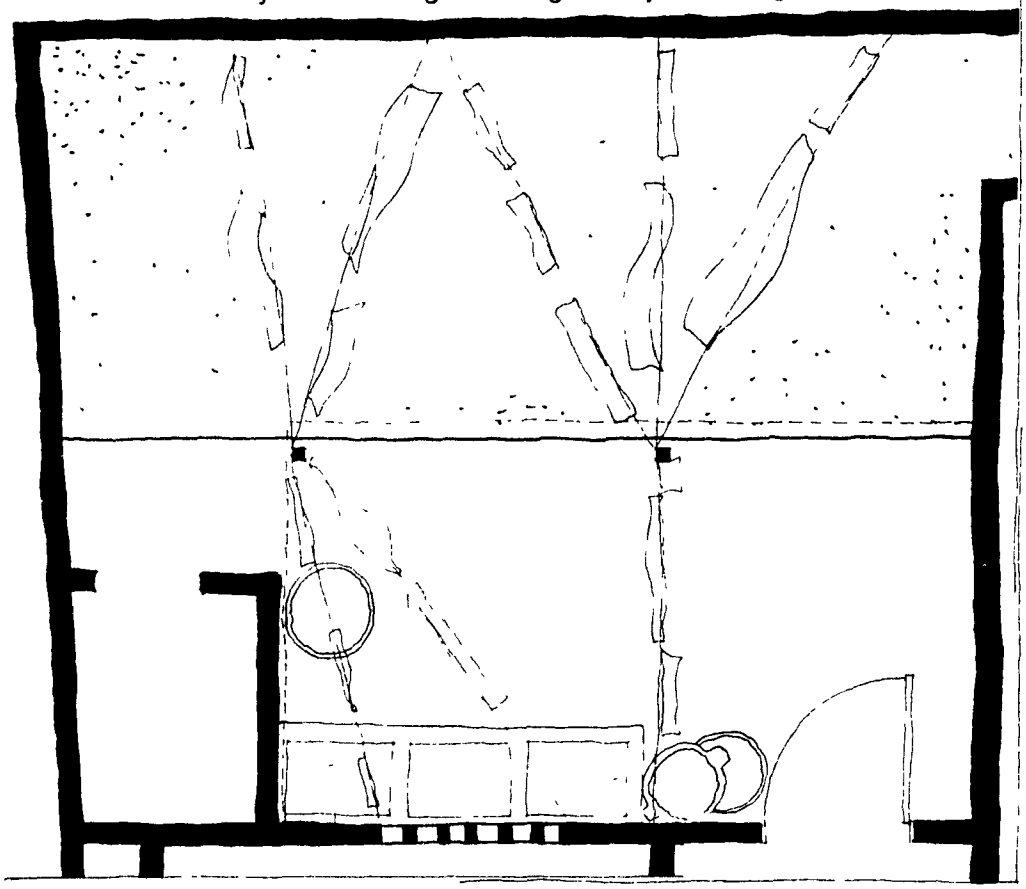


Fig. 34 Dining Rooms

Table 10. Average area of dining-rooms per periods of growth. (* as proposed by building plans)

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	6.80 sqm	5.30 sqm	7.00 sqm *	12.96 sqm
Added later	14.50 "	12.36 "	11.36 "	-- "

Laundry as income-generating activity. Dwelling #178b, Group D



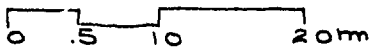
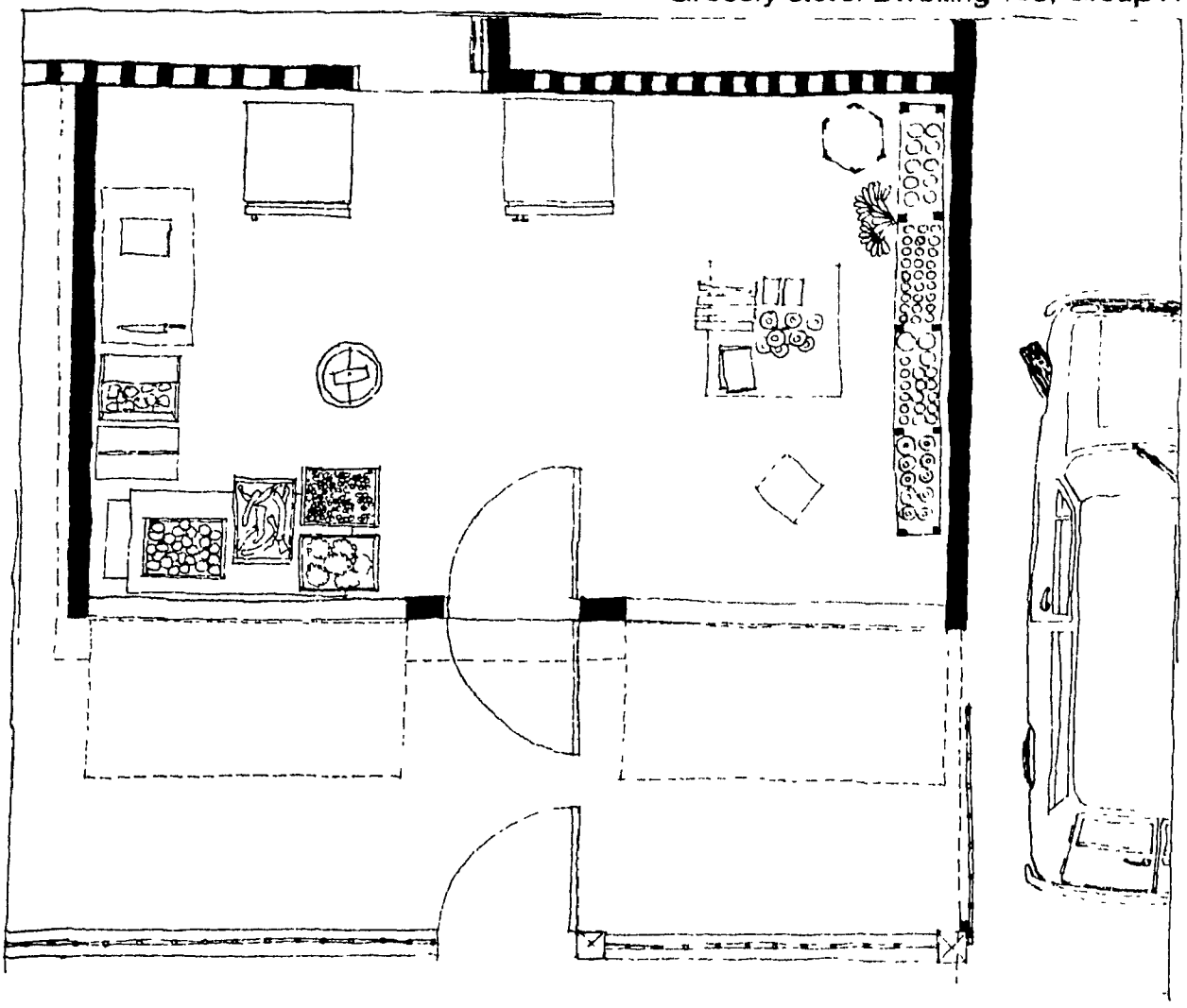


Fig. 35 Laundry Areas

Table 11. Average area of laundry areas per periods of growth.

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	2.61 sqm	4.29 sqm	-- sqm	-- sqm
Added later	14.48 "	14.91 "	15.76 "	16.43 "

Grocery store. Dwelling 189, Group A



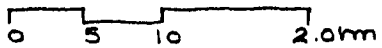
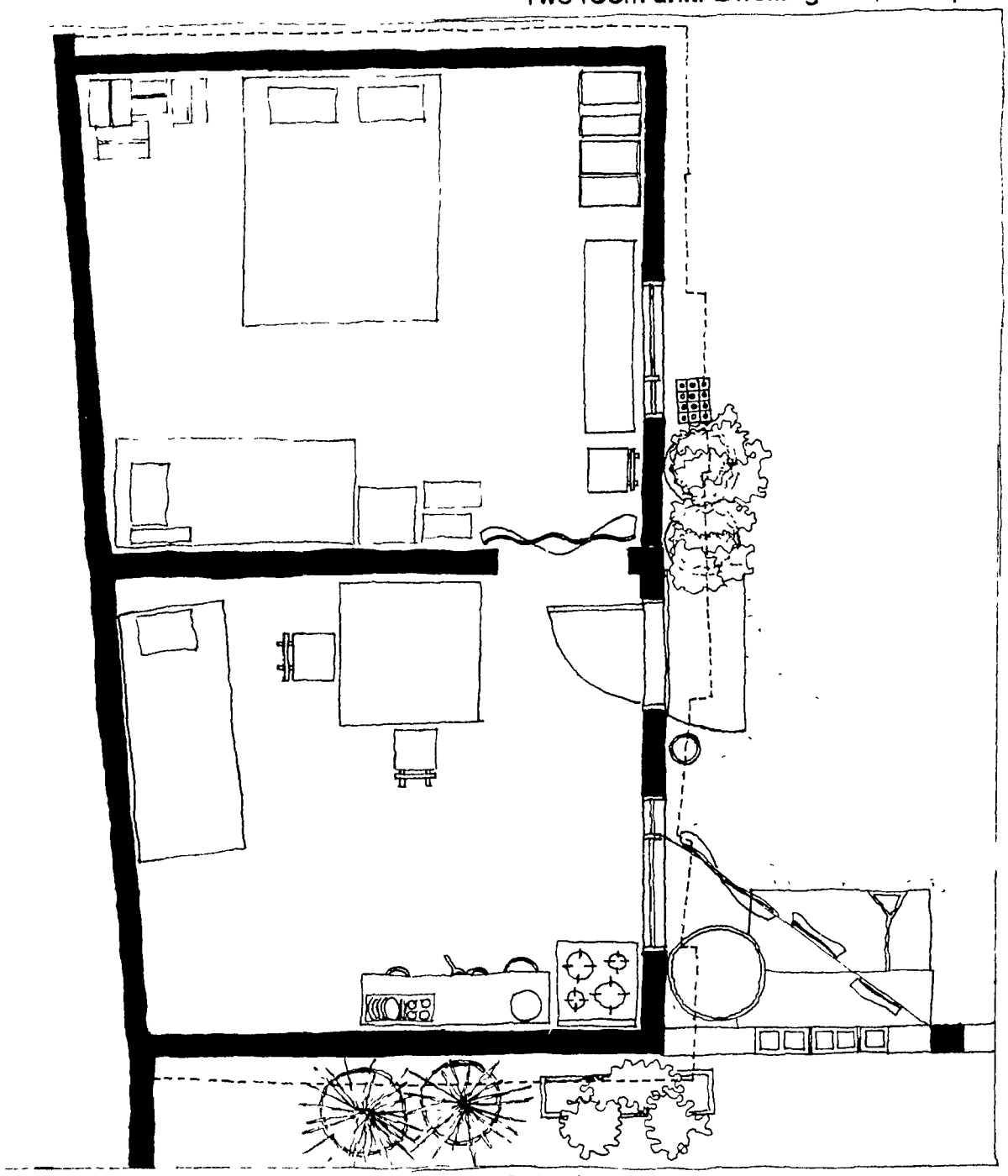


Fig. 36 Commercial Premises

Table 12. Average area of commercial premises per periods of growth.

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	-- sqm	-- sqm	-- sqm	-- sqm
Added later	22.50 "	-- "	29.75 "	14.80 "

Two-room unit. Dwelling #18, Group B



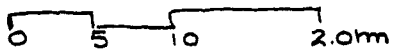


Fig. 37 Rooms for Renting

Table 13. Average area of rooms to rent per periods of growth.

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	-- sqm	-- sqm	-- sqm	-- sqm
Added later	10.34 "	13.07 "	10.93 "	12 82 "

Table 14. Average area of living-rooms per periods of growth. (* as proposed in building plans)

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	10.50 sqm	11.47 sqm	10.20 sqm *	15.27 sqm
Added later	18.26 "	19.68 "	16.12 "	-- "

Table 15. Average area of bathrooms per periods of growth.

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	3.90 sqm	3.08 sqm	3.50 sqm	4.13 sqm
Added later	4.61 "	4.86 "	3.61 "	-- "

Table 16. Average area of front porchs per periods of growth.

Period \ Groups	GROUP A	GROUP B	GROUP C	GROUP D
Init. built	3.00 sqm	3.00 sqm	-- sqm	-- sqm
Added later	5.20 "	10.70 "	15.76 "	16.17 "

Table 17. Total number of Bedrooms built on each group. (* construction of permanent dwelling)

	1st STAGE *	2nd STAGE	3rd STAGE	Bedrooms/dwell.
GROUP A f= 8	21 bedrooms	9 bedrooms	--- bedrooms	4.28
GROUP B f= 7	21 "	5 "	4 "	4.28
GROUP C f= 6	10 "	--- "	3 "	2.50
GROUP D f=10	28 "	4 "	--- "	3.20

roofs to park a taxi, a delivery truck and to cover the working area of a car repairman. Garages were directly related to income-generating activities or indirectly by preserving an income-generating property of the household, such as a taxi cab or a delivery truck.

Summary of Additions and Changes in Use-Layout

Changes in the functional layout by adding already-existing uses were made when existing spaces did not meet household requirements for these functions (i.e., location, layout and size of kitchen and living areas). Existing uses were added when they became insufficient for household needs (i.e., size or number of bedrooms). Additions of non-existing uses to the functional layout were made to satisfy new needs or individual requirements of the households (large laundry areas, commercial premises, and rooms for rent).

Dwellings of all groups were initially built with similar use-layouts, including living room, dining room, kitchen area (not necessarily separated in different spaces), and two or three bedrooms. In addition to this, groups A and B included a bathroom and a small laundry area. Bathrooms were also built in dwellings of group C, but not all households of group D did so. However, during the first stage, some households of these two groups already had small shops, stores and laundry areas to generate extra incomes.

During the second and third stage, the majority of households of groups A and B added more bedrooms, and separate kitchens and/or dining areas (see Table 7). In contrast, only 3 out of 10 households of group D underwent similar changes. None of the households of group C built extra bedrooms in the stage after construction of the dwelling either. However, they did add a new area to relocate the kitchen as was proposed.

There were several motivations for these changes, and some of them can be identified by reviewing the numerical data. For instance, 5 out of 7 households in group A and 6 out of 7 in group B built together a total of 18 extra bedrooms. Considering that these dwellings had already 3 bedrooms (see Table 17), both groups ended up with an average of 4.3 bedrooms per dwelling. If this figure is compared with 3.2 bedrooms per dwelling for group D, the difference suggests that it was necessary for groups A and B to have, on average, more than 1 extra bedroom than

groups C and D in order to accommodate the household. Consistent with what was suggested in Table 8, groups A and B needed larger and more bedrooms to match the bedroom area of "average" bedrooms of groups C and D.

The bathrooms of groups A, B and C seemed to have met household needs better than the other areas since only 2 households added a second bathroom during the second stage. Several households of group D added extra bathrooms at this stage, although 3 of them were building their first bathroom.

While groups A and B were installing small shops in their front bedrooms or enlarging the laundry areas to generate income during the second stage, grocery stores and laundry areas kept being added in group D. These last additions started during the third stage for groups A and B, becoming less frequent for group D Rooms to rent were built in groups C and D during the second and third stage. However, they were built for the first time in the third stage for groups A and B.

3.6 Summary of Dwelling Evolution at El Gallo

The following section summarizes relevant observations regarding the three dimensions of the analysis, area increase of the dwelling, changes in its spatial structure and changes of its functional layout. Information is presented according to stages of development.

Initial Structures

Only 32,3% of the first permanent dwellings were directly built in similar proportions in all groups. Many dwellings were preceded by non-permanent structures or ranchos that served as shelters until a permanent dwelling was built. Ranchos at El Gallo were the same type of shelter built in illegal settlements by land invaders. However, the settlement patterns of ranchos were different from those of informal settlements. At the request of the housing agency, the rancho was set back from the front of the plot to allow the construction of a permanent dwelling in the front area People improved certain aspects of these temporary shelters, but their size increased in very few cases even though people spent long periods of time living in them. The smallest rancho of the sample was from group A. It was 14.5 sqm and was used for about 3 years before the basic unit was built. The largest rancho was of group D. It

was 76 sqm and was used for about 7 years. It was also one of the three that was removed progressively while the permanent dwelling was built. On average, group A dwellings also had the smallest rancho area and were used for shorter periods of time. Group D had the largest average area for ranchos and were used for longer periods.

With one exception, non-permanent structures were removed after the permanent dwelling was built. Other two dwellings left parts of them as areas of the current dwelling.

The Permanent Structure

Households of all groups moved into a very complete first permanent structure. To summarize, formally prescribed dwellings were built first (most were begun between 1964 and 1967). They were followed by the formally produced dwellings of groups A (7 of them were built between 1965 and 1967) and B (built in the early 1970s). The final group were the self-produced dwellings of group D (most of them built in the middle to late 1970s). It is likely that households were willing to prolong their stay in the rancho in exchange for a first structure, bigger and better adapted to their particular needs. The permanent dwellings were built by continuous additions to the existing structure throughout the time that were known as stages in the dwelling evolution. These additions affected area, spatial configuration and use-layout of the dwelling.

. First Stage

In groups A and B, this time was when the basic unit was finished. For groups C and D, the first stage was the moment when the permanent dwelling was built. The average area for all dwellings at this point was 81.8 sqm. The smallest area average of the sample was for units of group A (59 sqm) and the largest was for dwellings of the self-produced group (111.15 sqm).

For 6 dwellings of group A (dwellings preceded by ranchos), the permanent dwelling was built within the next three years (between 1964-67) after the rancho was recorded last in the aerial data. For most of group B (4 out of 6 cases), the first stage was completed within the seven years after their last aerial record (between 1967-74). For the only household of group C that was living on the plot, it also took less than seven years to build the permanent dwelling. Most dwellings of group D were built

within 7 years (6 out of 7 cases) after the rancho was recorded for the last time.

Dwellings of groups A, B and C were designed as detached units and located within the plot, leaving 5-meter front yards, large backyards and side yards going from 1 to 2.5m. The pattern of building an isolated unit was imitated in self-produced dwellings. However, most of these dwellings left a narrow strip on one of the sides for ventilation, while the other side became 3 to 4m wide. Dwellings of group D also resembled the layouts of those of groups B and C, these three groups being the easiest dwellings to extend in later stages.

In general all dwellings had a similar functional layout in this stage, not only because two thirds of the dwellings were formal models, but also because self-produced dwellings imitated patterns of the formal models. Either way, dwellings at this stage came to satisfy shelter needs (i.e., living, eating and sleeping). However, already in this stage, groups C and D included small shops and workshops to generate extra income (see Fig.31).

. Second Stage

All dwellings made additions to the permanent dwelling. On average, sampled dwellings increased to 122.2 sqm. Within this figure group B was the smallest (average 104.3 sqm), and group D was the largest (average 145.6 sqm).

The second stage occurred within the following 13 years after the first stage in most of the dwellings of group A (6 cases out of 8), less than 6 years for most dwellings of group B (5 cases out of 7), less than 7 years for dwellings of group C (4 out of 6 cases), and less than 8 years for most dwellings of group D (8 cases out of 11)

Most dwellings made additions toward the backyards (26 out of 31), directly attaching the new structure to the rear façade of the dwelling (24 cases) or adding a separate structure in the backyard (2 cases). Backyard additions were used to add new bedrooms in 15 dwellings, relocate kitchens in 18 dwellings and relocate dining rooms in 13 dwellings. The other 5 dwellings added rooms for renting, and 3 added laundry areas to generate income.

Additions toward the side yards were made in 7 dwellings including all groups, excepting group A. Generally side yard additions were made after walls were built on the plot limits. Many of these additions were not totally enclosed to retain light and

ventilation to adjacent spaces. Side yard extensions in this stage were used to add extra bedrooms in 2 cases, rooms for renting in 1 case, and parking areas in another case.

Additions toward the front yard were made only in three cases of group A. The local regulation of the 5-meter setback discouraged this kind of intervention during the first years. These kinds of additions were made to add a living and dining room in 1 case, a parking place in the other and an extension of the existing porch in the last.

The relative higher use of backyard additions as private areas can be culturally explained. However, the fact that backyards concentrated most of the available area and were away from public view also influenced household choices.

In several basic units (groups A and B) internal transformations were made in existing spaces. In group A, 5 dwellings integrated one bedroom to enlarge the living room, one dwelling transformed the front bedroom into a shop and another integrated the same bedroom to the parking place in the front of the dwelling. In group B, 6 dwellings removed the kitchen from the kitchen living space, and 1 dwelling opened a shop in the front bedroom.

In general, additions and changes made in this stage responded basically to the need for extra bedrooms due to household growth, the inappropriateness of the existing spaces to household needs (formally produced dwellings) and income-generation activities.

. Third Stage

The number of dwellings that reached the third stage dropped to 14. Almost half of them (6) were cores of type A. The rest of the group was composed of 3 dwellings of group B, 2 dwellings of group C and 3 dwellings of group D. Dwellings averaged 149.4 sqm and again the largest area average was for group D (183.5 sqm) and the smallest was for group B (126.1 sqm).

The third stage happened within 7 years after the second stage for group A (4 out of 6 cases), the same time period for group B (the 3 cases that reached this stage), 6 years for all group C and 11 years for group D.

A total of 11 dwellings made new additions toward the backyard. Physical characteristics, as well as the use given to these additions, were similar to those of the second stage. Within these additions, bedrooms were added in 4 dwellings, kitchens

relocated in 3 and the dining room in one. Also an existing room for tenants was extended to a two-room unit and the roof of future rooms in another, second bathrooms were added in 2 dwellings, laundry areas in other 2 and a two-room commercial space was added in the backyard of a corner plot.

New side yard additions were made in 7 dwellings. Within these areas, bedrooms were added in 1 dwelling, a kitchen was relocated in another, laundry areas were added in 2 dwellings, a second bathroom was added in one dwelling and parking places were created in 2 dwellings.

Front yard additions were built in 3 dwellings, 2 of them were extensions of the existing porch, and one was a store built for the first time as an independent structure.

Second-floor additions were made for the first time in two dwellings, both to room tenants.

Many of the additions in this stage were made either to generate an income or to rent the space in the future. The workshop of the car repairman and rooms with independent access clearly indicated this. The most interesting fact was that these structures were either unfinished, unused or being used for other purposes. For instance, a small shop was being used as bedroom by a visiting son of the family when the house was surveyed. Open roofed areas were used for laundry and drying linen, an activity frequently performed in barrios by housewives to generate income.

. Fourth Stage

Only 9 dwellings reached this last stage. They were 2 dwellings of group A and 2 of group B. The average of area increase is lower than the average area for the third stage. The reason for this apparent decrease is that dwellings that went to a fourth stage were under the average area. Considering only the areas of the dwellings involved, area actually increased in all cases.

This last stage was reached within 4 and 11 years in cases of group A, and 4 years in both cases of group B.

Additions toward the backyard were both made by dwellings of group B. One was the extension of a room for rent to a two-room unit, and a bathroom was also added for tenants' use. The other was a veranda, although it was being used to store construction materials during the survey.

Additions toward the front yard were built in two dwellings of group A. One was the extension of an existing commercial premise, and the other was a new structure for the same purposes. An addition toward the side yard was made by this dwelling in which also a roof to park a new truck delivery was installed.

Notes for Chapter III

1. Using the exchange rate of Bs4.50 per U$1.00 existing in 1964.

2. There is no formal documentation, only the inhabitants' anecdotes about how services were formalized. However, in the most recent site and services that was being developed in Ciudad Guayana at the time of this study (UD 337), the settlers said that the Electricity Department inspected the irregular connections to the energy lines correcting any failure and installing a meter in order to receive a regular service. In relation to the water supply, it was observed that rubber hoses were not being used any more. Users installed a very efficient network of PCV and galvanized pipes that ran from the standpipes to each house. Some of the pipes were buried in the ground, making the network almost permanent.

3. Up to then, human waste disposal was solved using latrines that were built by a sanitation program of the Ministry of Health at affordable prices under the request of the household.

4. Dodge S. Charles 1968:220.

5. The "zaguan" is a narrow corridor that accesses the main patio in traditional urban houses. It is a typical element in the courtyard colonial dwelling, and people of El Gallo used the name to refer to any passageway that connected the exterior of the house with the backyard.

6. The front setback regulation is a common practice of Ciudad Guayana planning. This space is reserved for eventual expropriation due to widening of roads, sidewalks or other public works. The space is expected to be used as front yard garden and outdoor expansion. Contrary to the traditional continuous façade right on the plot front line inherited from colonial towns, this idea was rooted in the suburbs western cities.

4.0 Chapter IV. Summary of Findings

Introduction

This chapter summarizes the general findings on the process of dwelling evolution observed at El Gallo. Ideas have been organized in three sections to answer the questions raised by this research. The first section summarizes how dwelling evolution occurred at El Gallo, the second identifies aspects that influenced the process of progressive development of dwellings at El Gallo, and the last section describes the general aspects of the housing produced at El Gallo.

4.1 Dwelling Evolution at El Gallo

Based on observations during the lifetime of the settlement, this study discerned two periods in the process of dwelling evolution: the non-permanent structure and the permanent structure. The non-permanent structure was built by most of the households using non-permanent materials similar to those used in informal settlements. This initial dwelling was not considerably enlarged nor improved with permanent materials while it was used, although several dwellings were considerably small, and families lived in some of them for up to 16 years.

The non-permanent structure was removed when the first permanent structure was built. According to household preferences, many permanent structures were built under assisted self-help and basic housing programs, but many others were totally built by self-help means. In all cases these structures had a very complete layout and were considerably large compared with provisional structures. However, in the stages that followed, permanent structures were continuously modified by additions and internal modifications that often made the first dwelling unrecognizable. According to the dimensions of evolution observed in this study, identifiable patterns of evolution were found for permanent structures in the three different group studies of the sample; that is, area, spatial structure and use-layout changed in an identifiable sequence in dwellings of similar original characteristics.

The way dwelling area was increased in the three groups was not substantially different along their stages of evolution, suggesting that households had a similar capacity of construction. However, the average dwelling area along the lifetime of the

settlement was larger for dwellings that were initially in the hands of the households. Consistently, dwellings that followed prescribed plans, but were built by their users, were second in size. Finally, the basic units produced by the housing agencies were the smallest.

The extension of the spatial structure of the dwelling occurred differently among some of the studied groups. Most of the additions were continuously attached to the rear façade of the dwelling. tending towards the backyard, where most of the available space was. However, households of formally produced dwellings of group A found it difficult to make these kinds of additions. Whenever they were done, these extensions affected light and ventilation of rear spaces. Instead, dwellings of group B had no problem making consecutive rear additions. Also, building a roof over the wide side yards of group B dwellings represented a considerable improvement of the habitable area. Dwellings of group C and D had similar advantages, but they had fewer extensions on average probably because their initial area was larger.

The functional layout also evolved differently according to the type of dwelling. In general terms, dwellings of groups A, B and even C were built with conventional use-layouts which group D replicated. However, while in groups C and D dwellings were being enlarged with additions to generate income, dwellings of groups A and B were enlarging and accommodating many of the small existing areas to household functional requirements. Changes of these spaces often resulted in oversized areas; for instance, a small living room and a bedroom were joined in a long and narrow living room.

In summary, the evolution followed by dwellings was, in fact, a product of a progressive development process. Dwellings were continuously adapted to the household's specific characteristics, changing priorities and emerging needs. Progressive development, however, did not occur similarly in all dwellings. The following section explains factors that influenced this process and its outcome.

4.2 Factors that Affected the Process of Progressive Development at El Gallo

Two groups of factors were found to affect the process of progressive development of dwellings at El Gallo. These groups were factors which were inherent to the context in which dwellings evolved, and factors which were inherent to the dwellings themselves. Factors inherent to the context facilitated continuity and

freedom in the process of dwelling evolution that occurred at El Gallo. Factors that were inherent to dwellings caused the incremental differentiation in the process of evolution and the houseform that resulted from this process even in those dwellings that had similar origins.

4.2a Factors Inherent to the Context

. Availability of Private Open Space

The fact that the space used for dwelling growth was circumscribed by the plot limits facilitated the successive extensions made by households to their dwellings. Despite the pattern of detached units and the local setback regulation, which created constraints on the occupation of the open space, all additions were produced within the plot area.

When dwellings grew, about three-quarters of all additions were built on backyards, where most of the space was available. The remaining fourth was divided between side yard and front yard additions. Backyards were considerably reduced, and in many cases, side yards disappeared. Front yards were less occupied, mostly for commercial purposes. Although the tendency seemed to built up the whole plot, some dwellings started second stories without occupying open areas totally. Due to the activities developed in backyards, it is likely that open yards will be maintained.

. Local Regulations

Zoning regulations and construction controls were very flexible regarding the building activity developed by households. In 1964, local authorities of Ciudad Guayana were not prepared to supervise the kind of construction activity going on at El Gallo. Contributing to the relaxation of local authorities was the conflict of responsibility that always existed between the local government and the development agency. This conflict was especially evident in this kind of projects (financed and developed by the CVG -- a powerful development agency -- on the CVG's land, but regulated by the local government). To show how controls were eased, it can be said that confrontations did take place between the local housing authority and loan program participants who did not follow the exact plans and specifications for construction. Eventually, official pressure ceased and users were left with a great deal of freedom in building their dwellings.[1] Another fact supporting this is that most of

the inhabitants at El Gallo built on far larger areas than local building regulations allowed. Extreme cases built on almost all the 300-sqm plot. Moreover, neither the plans of the initial dwellings nor the plans of any of the extensions were ever registered at any local authority, as was legally required. In summary, even when El Gallo was not a product of a laissez-faire policy, the predominant conditions of flexible controls increased the freedom to make the dwelling grow. This tolerant situation could be described as being almost identical to that found in irregular unplanned settlements.

4.2b Factors Inherent to the Dwellings

. The User Participation Approach

Findings reaffirm that the more the user was in control of the process of dwelling development, the better the dwelling responded to user characteristics and needs. In basic dwellings produced according to official standards, users were introduced after the unit was built. Although the unit represented an improvement for these households in terms of the total area and quality of construction, many of the spaces went through modifications to meet household requirements.

Consistent with these findings, dwellings built by their users according to prescribed plans and specifications changed spatial dimensions, layout and use of the spaces during construction. The result was larger spaces and different layouts, but this also contributed to reduce the number of modifications made in these dwellings after construction.

Dwellings with the highest user-participation level were the largest first permanent structures and were also enlarged but not modified after being built. Moreover, these dwellings also went through fewer stages to reach their current form and were larger than dwellings of any other group.

. Design of the First Permanent Structure

The first permanent structure served as a 'support' for all the successive additions made to the dwelling. Consequently, its design was determinant for further interventions. When the two formally produced basic dwellings were compared (group A and group B), the importance of the permanent dwelling's design became especially clear. Dwellings of group A left narrow side yards on which extensions were seldom

built. Their internal layout also prevented continuous additions toward the backyard without affecting light and ventilation of existing spaces. Most of the users handled this problem by making partial or detached additions that minimally affected the rear openings of the existing structure. Finally, the connection with additions could only be made through the kitchen area unless other walls were removed.

Instead, dwellings of group B allowed continuous extensions toward the back and on the side yards. The internal layout also allowed an easy connection with further additions by extending the central axis. The user's preference for designs allowing for extension is seen in group C. Among the three different designs offered to households, people chose the one that facilitated backyard extensions. This preference was confirmed when dwellings of group D emulated the plans of groups B and C.

Other design considerations that affected the process of progressive development were the dimensions of the internal spaces. The reduced dimensions of kitchens, dining rooms and living rooms of formally provided dwellings motivated immediate additions and modifications to reaccommodate existing spaces. As stated earlier, enlarging these spaces by joining adjacent areas, often resulted in oversized rooms even compared to the self-produced dwellings.

4.3 Characteristics of Housing Produced at El Gallo

The characteristics of the dwellings produced at El Gallo are very much the characteristics of their households. As progressive developments, dwellings reflected household needs. Houseform at El Gallo is the combination of the spatial responses to these needs with the limitations imposed by the factors mentioned in the last section. The result is the growing diversity of El Gallo despite the common origins of many dwellings. The sequence of additions suggests the general pattern of household priorities.

During the first stages of growth measured in this study, the addition of extra bedrooms was responsible for a fair part of the area increase. In the three groups of dwellings observed, the number and size of existing bedrooms became insufficient to accommodate the growing size of the household. Of the 20 dwellings that added one or more bedrooms to the initial permanent structure, 18 were built during the first and second stages. Additions of this kind were made to obtain **extra habitable space.**

At the same time modifications in formally produced dwellings (groups A and

B) were made to enlarge existing areas of kitchens, dining rooms and living rooms. These changes were made to increase the size of the space and to modify the location or spatial arrangement of the space. The reduced kitchens of formally produced dwellings were almost immediately rearranged to include other functions such as dining and social gathering. Also, the reduced dining and living rooms were enlarged. Formally prescribed dwellings were not adapted to households' spatial requirements either. However, users modified the proposed plan while the dwelling was being built, thus saving time and resources. Additions and modifications of this kind were made to adapt existing spaces to the **spatial standards of the households**.

At several stages, additions and modifications were made in several dwellings to **generate extra income.** At this time, front bedrooms were transformed into small shops, or grocery stores were added in the front and side yards. Laundry areas were enlarged or added for washing as an income-generating activity. Finally, existing or newly added rooms were rented to tenants.

Finally, several households kept adding new areas to the dwelling either to increase the dwelling value or to assure a source of income for their future. In several instances rooms for renting were being built as a future source of income for the elderly. These additions had been slowly built for the last 4 years, and they were still not ready. For other households, the house was a means to elevate the housing entry level of later generations (Caminos, H., J. Turner and J. Steffian 1969:vii). As one household affirmed:

> Yes, maybe the house is too big just for us, but see, this is all I will leave to my sons. If they want, they can live here with their families. They can also rent it..., or sell it too! I have nothing else for them..., they will have this house.

Notes for Chapter IV

1. In 1962 Roderick Peattie's observations revealed the severity of the construction controls:

> "I witnessed horrifying scenes in which people who had decided they would rather move a doorway over a few feet, or had misunderstood the plans, or tried to make some other change, were forced to tear things out and re-do them. One man had reversed the positions of the kitchen and bathroom, and was told to change them back. It is true that the engineer's inspector argued forcefully that the published plans made more sense; but the owner had to go to a lot of time and expense in changing a house which was almost finished, just because he preferred his own room arrangement to that of the architect" **(Peattie, R.** 1962:4).

However, later in 1964, Silva showed the release of such rigid controls when he described the large number of changes found in the houses of the "El Roble Pilot Project" in his evaluation to the program **(Silva, J.** 1964:15).

5.0 Chapter V. Conclusions, Interpretation and Discussion

Introduction

The following chapter concludes this report. A summary of the research is presented, and findings of the study are discussed and interpreted. The significance of this research in the immediate context of El Gallo and in the field of low-income housing is examined. Recommendations for further research end the chapter.

The scope of the following conclusions is limited to the context and historical characteristics of El Gallo. Thus, applied to other situations, these conclusions may yield incorrect assumptions. Still, these conclusions are relevant to the process of dwelling evolution in progressive development projects.

5.1 Summary of Research

This study observed the process of dwelling evolution in progressive development projects. The literature review was concentrated on the process of progressive development occurring in planned sponsored projects. It was found that, based on observations of the informal settlement process, progressive development under different contextual conditions was not questioned, and its benefits were taken for granted. Studies in the area were reduced to the period of improvement up to the time when the dwelling was physically consolidated. Longer term evaluation of progressive development projects were not found.

Research was undertaken on a 27-year-old progressive development project in Venezuela. The intention was to observe the process of dwelling evolution and the kind of housing that was being produced under *progressive urban development projects* on a long-term basis. The case study showed dwellings built with different initial levels of user-participation. Dwelling evolution was observed in a survey sample using parameters relevant to the case study (i.e., area increase, dwelling spatial growth and plot occupation, and changes in the functional structure).

Survey dwellings followed identifiable patterns of evolution in size, spatial structure and use-layout. Patterns were affected by aspects of the surrounding context and by aspects inherent to characteristics of the initial dwelling. Consequently, different dwelling groups showed different processes of progressive development.

5.2 Discussion and Interpretation of Findings.

As progressive developments, dwellings at El Gallo were able to adopt new and diverse roles along their whole process of evolution. In this section, relevant issues of the process of dwelling evolution observed at El Gallo are discussed. The first concerns the role of the non-permanent structure in the context of El Gallo as a sponsored progressive development project. The second comments on the process of dwelling evolution that followed the construction of the permanent structure.

In principle, non-permanent structures at El Gallo were similar to ranchos built in informal settlements. Ranchos at El Gallo served as primary shelters while more basic household priorities were met (i.e., services and infrastructure were provided, sources of income were found and generated, and even a favourable social environment was developed among neighbours). However, the majority of tin shacks were neither considerably increased nor upgraded with better materials even when they were used for long periods of time. This fact, together with the sudden change in the pace of development caused by the construction of a very complete permanent dwelling and subsequent removal of the rancho, had no connection with the gradual process of shack replacement observed in invasion settlements of Ciudad Guayana during this study (Portela, M. 1992). Neither did this process have a relationship with the system of "piecemeal construction" described by several housing researchers as characteristic of low-income dwellers.

> The shanties were... housing in process of improvement. In particular the piecemeal system of building afforded great advantages to those who, like most of the poor in developing societies, have great variations in income from month to month (Peattie L. 1982:132).

Under El Gallo conditions of land security, ranchos did not show consolidation, and revealed their transient character because they were eventually substituted by permanent structures. The non-permanent structure revealed the primary household's aspiration for a minimum satisfactory habitable area. However, besides basic shelter during the initial stage, ranchos served to the purposes of capital accumulation that eventually allowed households to buy a basic unit according to official standards, or building a bigger, more complete first permanent structure. The size of ranchos reflected households' aspirations for the permanent dwelling, that is,

smaller ranchos were substituted by basic units of the housing programs. Instead larger ranchos were substituted by large self-produced dwellings.

It is difficult to ascertain why ranchos were removed when they could have been kept as part of the dwelling, as in fact did a minority of households (2 cases).[1] Is a fact that the temporary materials of ranchos contributed to their deterioration that ended with the total removal of the rancho. However, an idea that may have contributed to the demolition of the rancho was the household's adoption of the planner's belief that ranchos were a bad but necessary step on the way to obtaining permanent housing. Thus, once the permanent dwelling was built, the price households paid to gain credibility (i.e., that this stage was reached) was the demolition of the rancho itself. This interpretation can be specially true for Ciudad Guayana, where dwellings of certain quality such as those of El Gallo were seen as "casas" or houses. Instead, structures of similar quality in the hills of cities such as Caracas were still considered ranchos. In the long run, informal settlements obtained the largest benefits from this process because they gained far more official tolerance and social credibility (i.e., that shacks were actually temporary means of residence towards good-quality housing).

Those who lived in smaller ranchos improved their spatial conditions by moving to the small basic dwellings. Those who occupied bigger ranchos built bigger dwellings by themselves. Still, some households built their dwellings without going through the rancho stage. Self-produced dwellings followed the formal models either to gain the government's credibility of user commitment to build "good" government-like housing, or because households believed so. Imitation of the formal models, however, varied according to the builder's interpretation. For instance, the pattern of the detached dwelling was adopted, but often one of the side yards was reduced to a physical separation between the dwelling and the plot separation wall. More effective interpretations involved enlarging the front porch or using the central circulation axis to allow easy extension in the future.

The building approach of the permanent structure influenced the process of evolution that followed. Basic units built by the housing agencies had a compact, complete layout with higher standards of construction; however, aspects of the design, such as internal dimensions, were inadequate for household criteria, and the layout was not well adapted. Dwellings built according to provided plans and specifications

had similar problems, but households enlarged spaces and modified layouts when they were building the units. The level of construction standards was also reduced since the lateral façades of some dwellings were unfinished. Dwellings built totally by self-help means were the largest permanent structures. Aspects of the design of the first permanent structure allowed easy extension of the dwelling towards open areas of the plot. More user participation was reflected in straight-forward processes of evolution without internal modifications, and fewer stages to reach the current houseform.

5.3 Significance of the Study

While this study acknowledges again the effectiveness of progressive development in the housing system, it shows how dwelling evolution in progressive development projects can have different characteristics produced by internal and external interventions. Usually, projects are designed and launched to reproduce certain desirable outcomes and meet specific expectations. However, conditions prevailing in these projects and sometimes strategies that are introduced to "improve," "speed up" or make more "efficient" the process of evolution can affect the outcome in many different ways. This study showed how contextual characteristics of El Gallo, as well as the design and le el of user participation in the initial permanent dwelling, affected successive stages of progressive development. However, it is important to recognize that are other issues beyond the spatial aspects that are intrinsically related with the evolution of the dwellings and that were not included within the scope of these particular research (i.e., household's changes in income, size, and age or gender structure).

The findings at El Gallo add modestly to the body of knowledge of literature on progressive development. Progressive Urban Development Units, **UMUPs**, have been the main housing strategy in Ciudad Guayana these last years, and they are likely to keep being used. Simple facts such as knowing the characteristics of the additions and modifications that households make to their dwellings over time can be the basis for more assertive actions supporting or enforcing progressive development activities. Understanding the process of dwelling evolution in low-income developments would be an effective way to help the process that, in the case of Ciudad Guayana, zonings and bylaws have been unable to regulate.

5.4 Recommendations for Further Research

Long term assessments are particularly constrained by the availability and reliability of recorded data. The frequency, and often the methodology, in which censuses and surveys are made do not always suit the purposes of this kind of research. Household interviews are very important, but they may become troubled by informant's limited memories and the continuity of the household in the dwelling. Aerial documentation, if available, represents one of the most reliable sources to observe physical change. Nevertheless, a careful and detailed process of observation of aerial data becomes very time consuming. For similar studies, a first phase in which the housing diversity is identified in the aerial data according to the selected criteria, would allow to reduce the number of detailed survey samples needed, thus considerably reducing the time of data collection.

In the context of Ciudad Guayana, further studies of the non-permanent dwelling in recent **UMUPs** would reveal new insights into the function of these structures in progressive development projects. This would be essential especially if any kind of initial aid is to be provided. On the other hand, following the growth of progressive developments is necessary if services and infrastructure are, as they are now, the responsibility of the local government. Identifying the producers of physical evolution -- i.e., the drivers and catalysts of change -- would be an important step for further research. An interesting step within this trend could be to ascertain the extent in which other household processes -- family growth, income increase and economic stability, household aging, changes in the household composition (single- to multi-family), etc., affect the process of dwelling evolution.

In the context of low-income housing, the process of progressive development needs further understanding. As in Ciudad Guayana, progressive development is likely to be the main housing strategy for other developing countries in the near future. Local authorities would do well to follow the evolution of settlements and to identify real household needs, and the consequences of public and/or private interventions in low-income settlements. Perhaps the most important learning of this study is that the experience of El Gallo acknowledges again the dynamic participation of the low-income households under different conditions, and still leaves wide room for a positive participation for the many other actors in the evolving urban entity.

. Notes for Chapter V

1. Dodge reports that some settlers of Ciudad Guayana kept the rancho and rented it to poorer families (Dodge,C. 1968:220). This attitude has been more common in other progressive development projects. The Dandora site and services also encouraged the construction of temporary shacks while the permanent dwelling was built. However, non-permanent structures remained to be rented or used as storage areas even after the permanent dwelling was built (McCarney, P.L. 1987:90).

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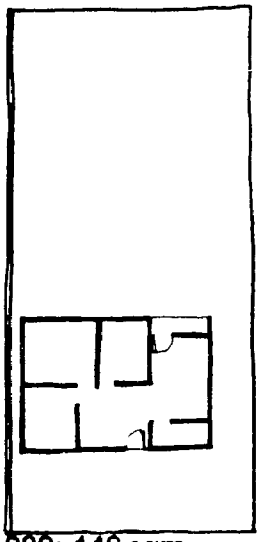
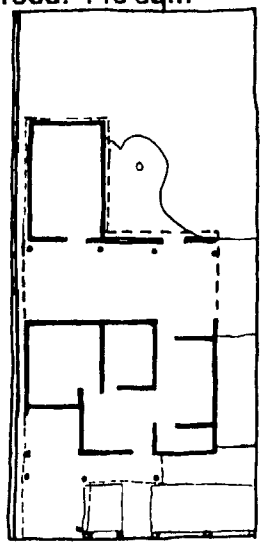
Appendix 1: Surveyed Dwellings

Fig.38 DWELLING # 22, Group A. Middle plot/ Household Characteristics

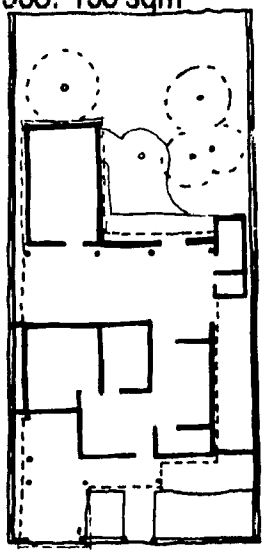
1967: 59 sqm



1980: 146 sqm



1983: 153 sqm



Size:	3 persons
Time in C.Guayana:	32 years
Time in El Gallo:	26 years
Original settler:	yes
# of dwellings before:	2 dwellings
Dwelling owner:	yes
Plot owner:	no

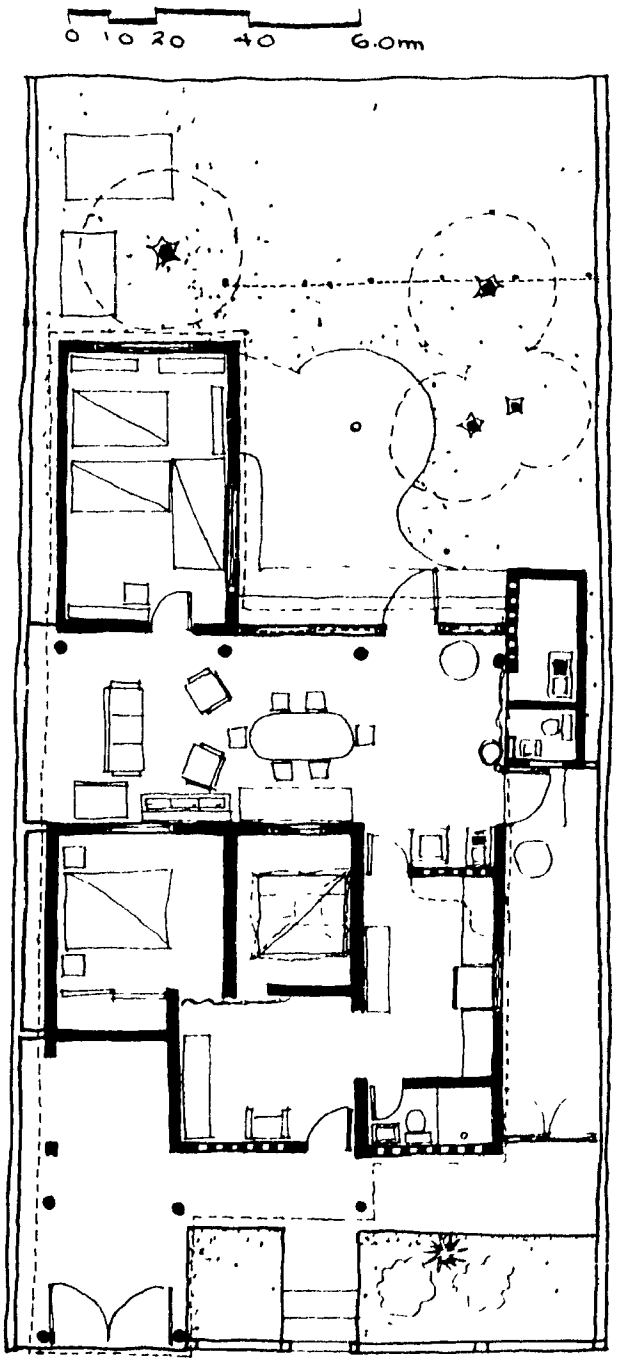
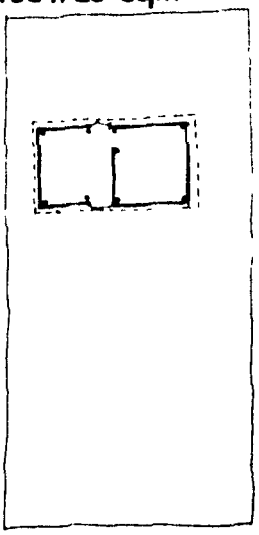
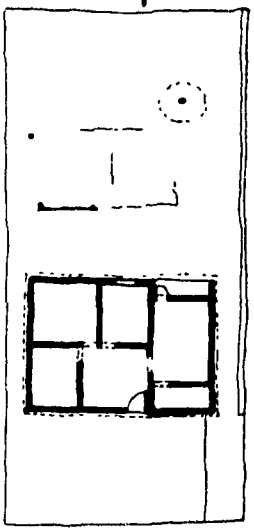


Fig.39 DWELLING #72, Group A. Middle plot/

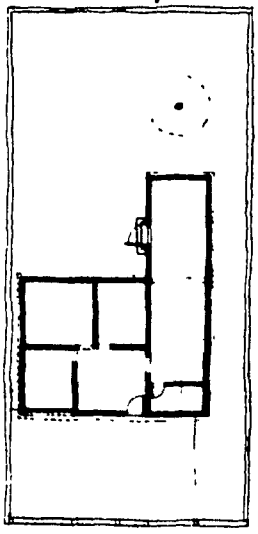
1964: 23 sqm



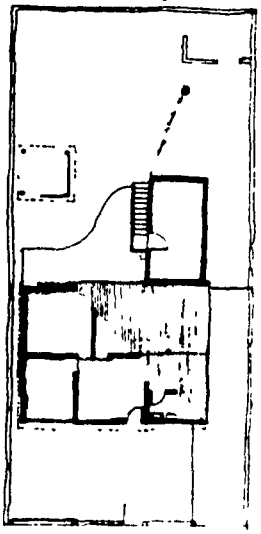
1967: 59 sqm

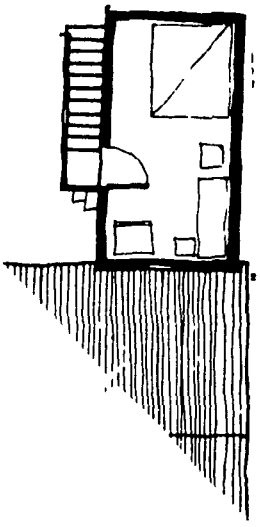


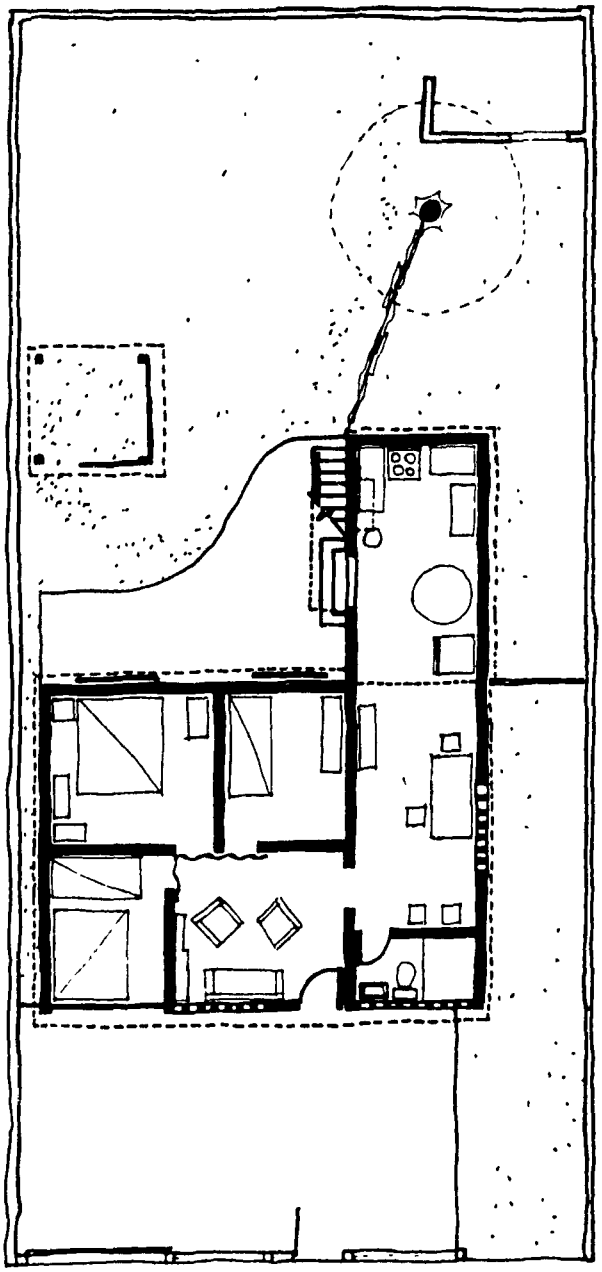
1980: 74.5sqm



1987: 89.5sqm







Household Characteristics	
Size:	10 persons
Time in C.Guayana:	30 years
Time in El Gallo:	23 years
Original settler:	no
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no

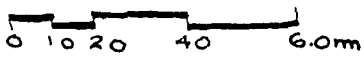
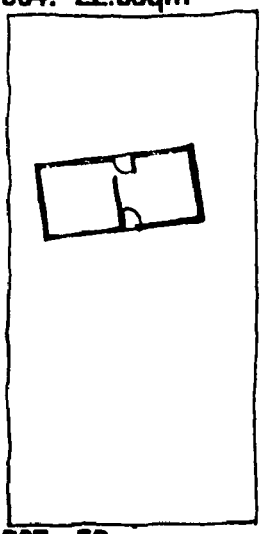


Fig.40 DWELLING # 73, Group A. Middle plot/ Household Characteristics

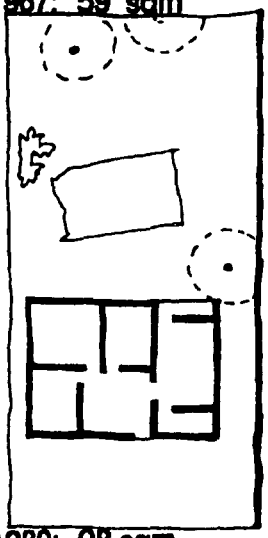
Size:	2 persons
Time in C.Guayana:	35 years
Time in El Gallo:	25 years
Original settler:	yes
# of dwellings before:	2 dwellings
Dwelling owner:	yes
Plot owner:	no

0 10 20 40 60m

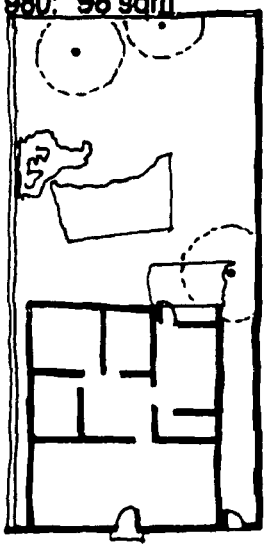
1964: 22.5sqm



1967: 59 sqm



1980: 98 sqm



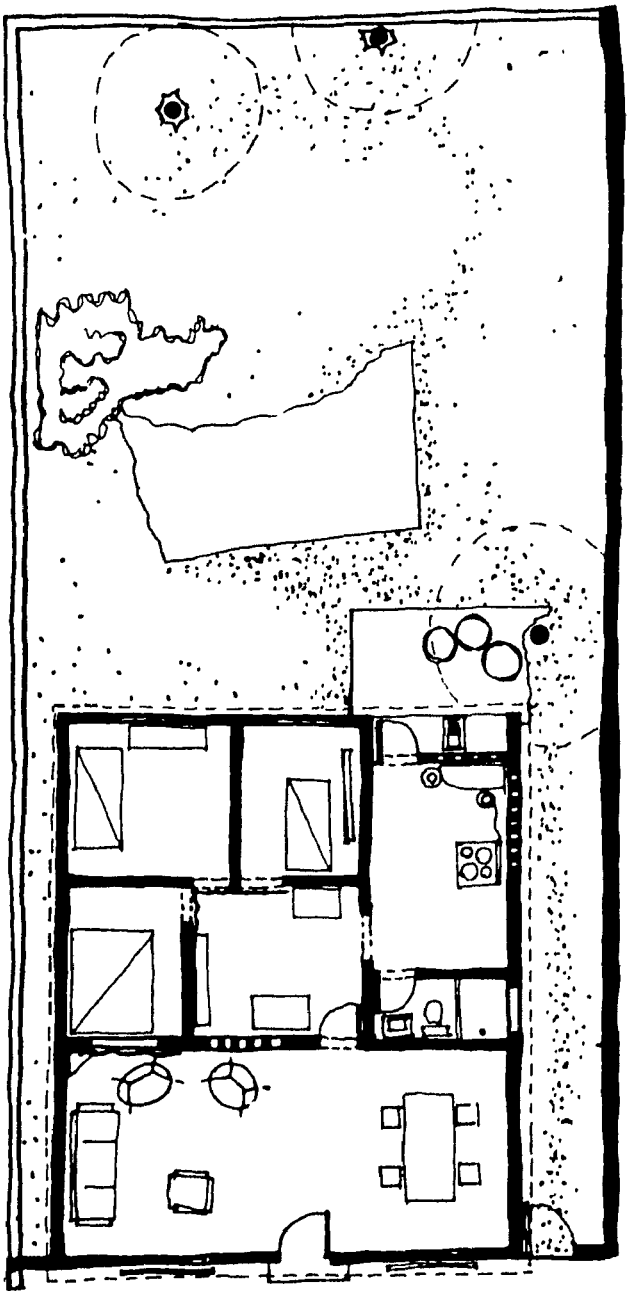
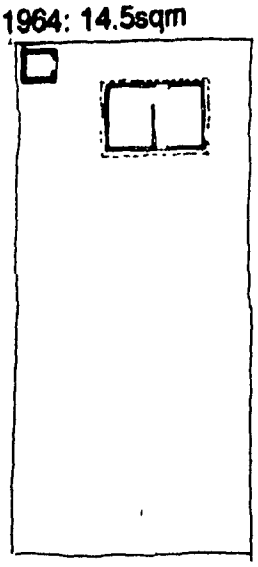
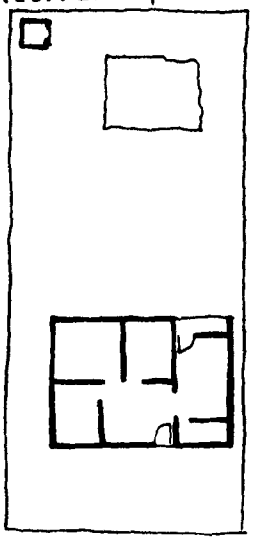
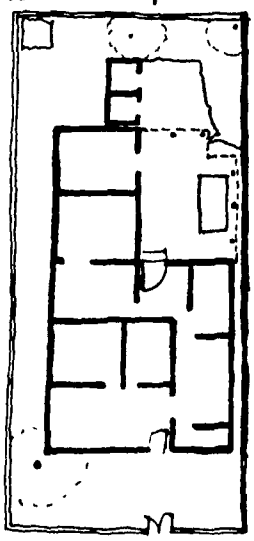


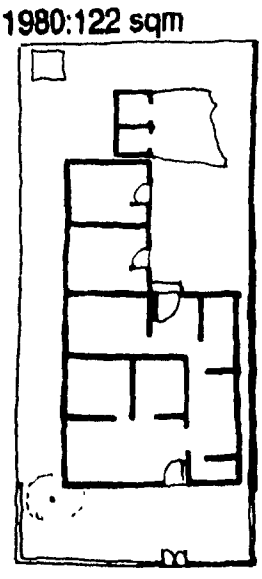
Fig.41 DWELLING #101, Group A. Middle plot/ Household Characteristics

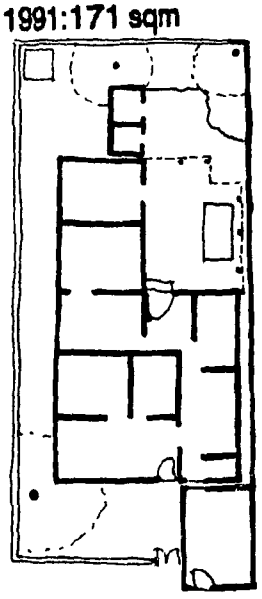
Size:	4 persons
Time in C.Guayana:	30 years
Time in El Gallo:	29 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no











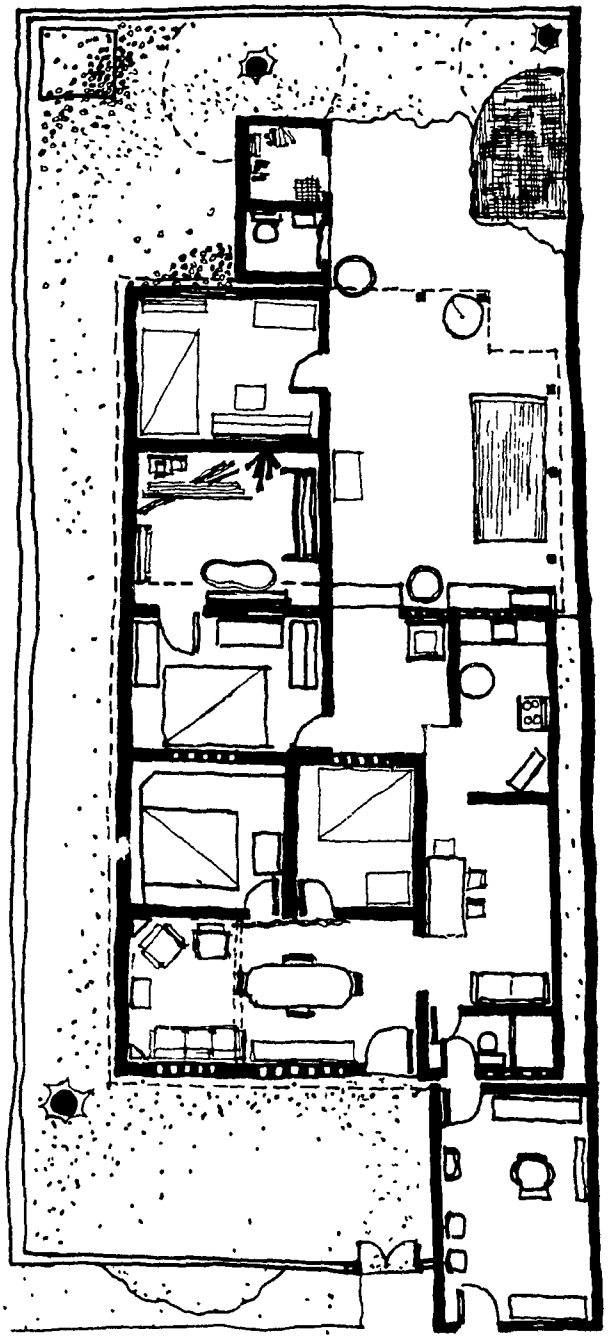


Fig.42 DWELLING #167, Group A. Corner plot/Household Characteristics

Size:	9 persons
Time in C.Guayana:	31 years
Time in El Gallo:	27 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no

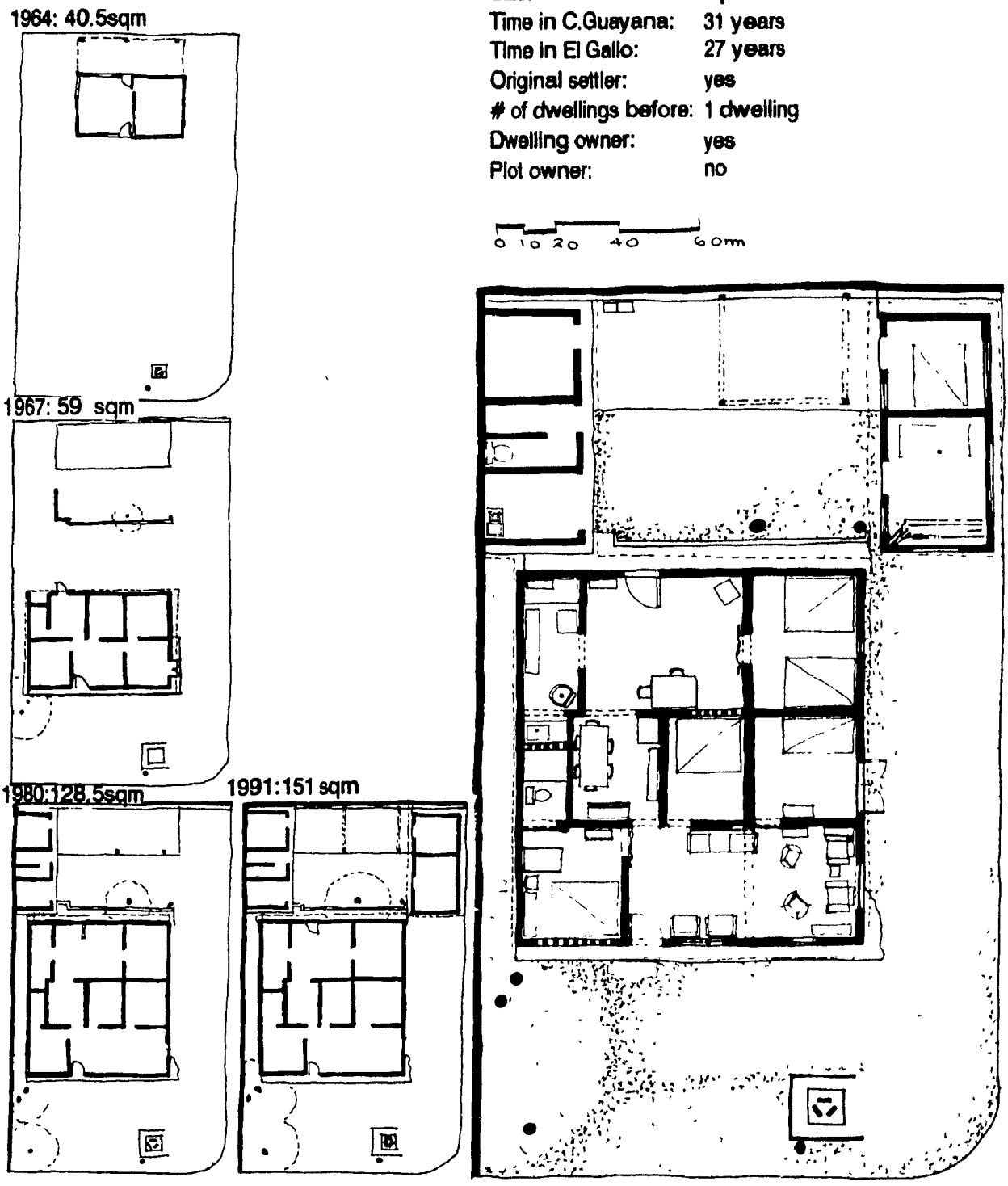


Fig.43 DWELLING #189, Group A. Middle plot/ Household Characteristics

Size:	4 persons
Time in C.Guayana:	29 years
Time in El Gallo:	15 years
Original settler:	no
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no

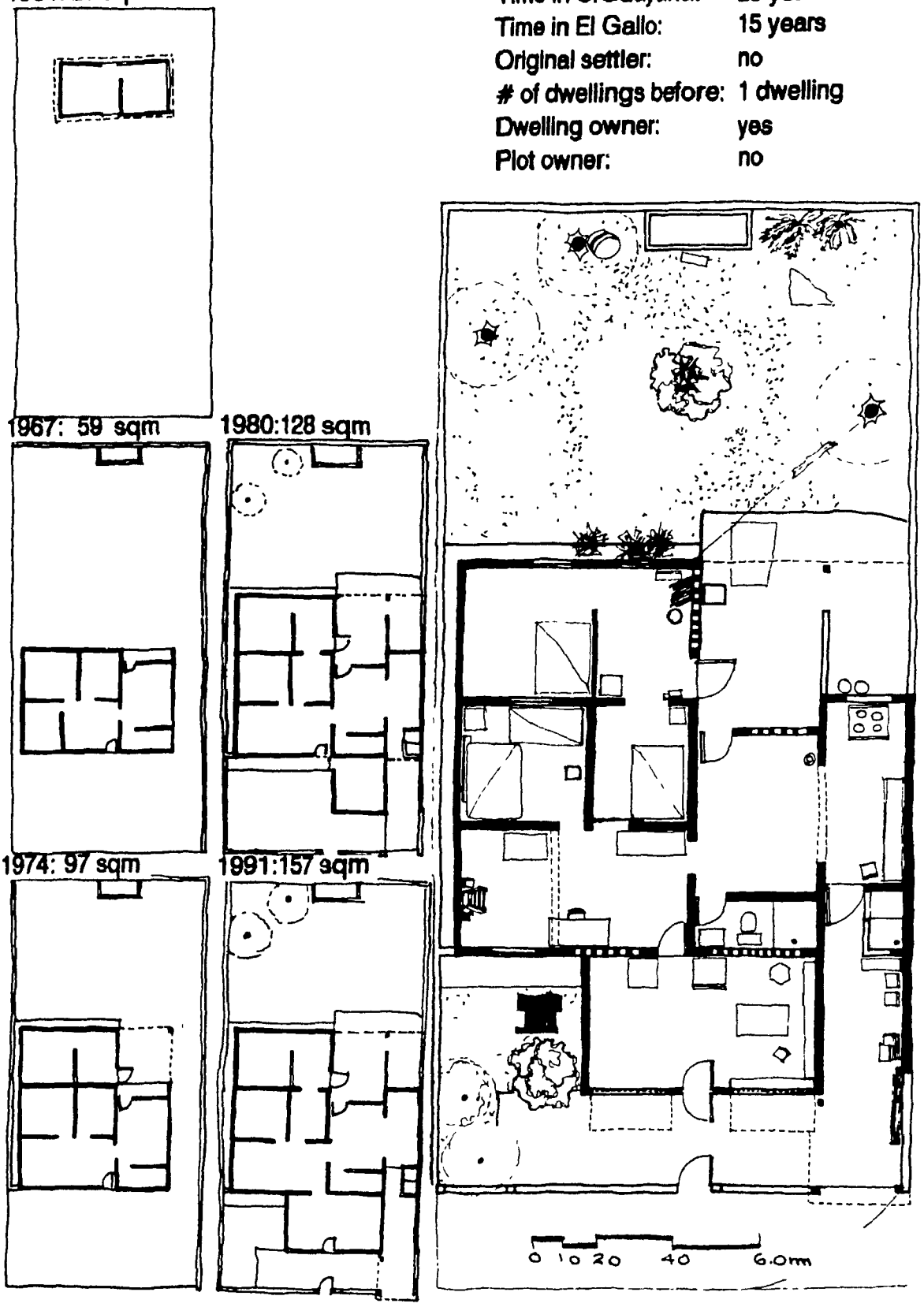
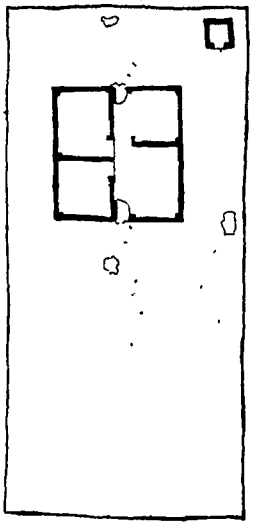
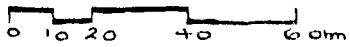


Fig.44 DWELLING #301, Group A. Middle plot/ Household Characteristics

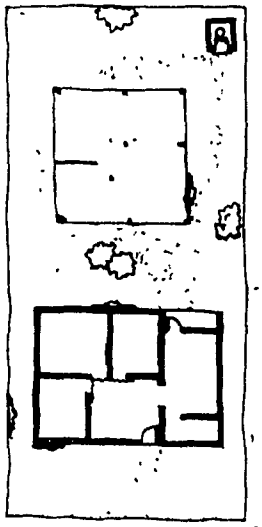
1964: 60 sqm

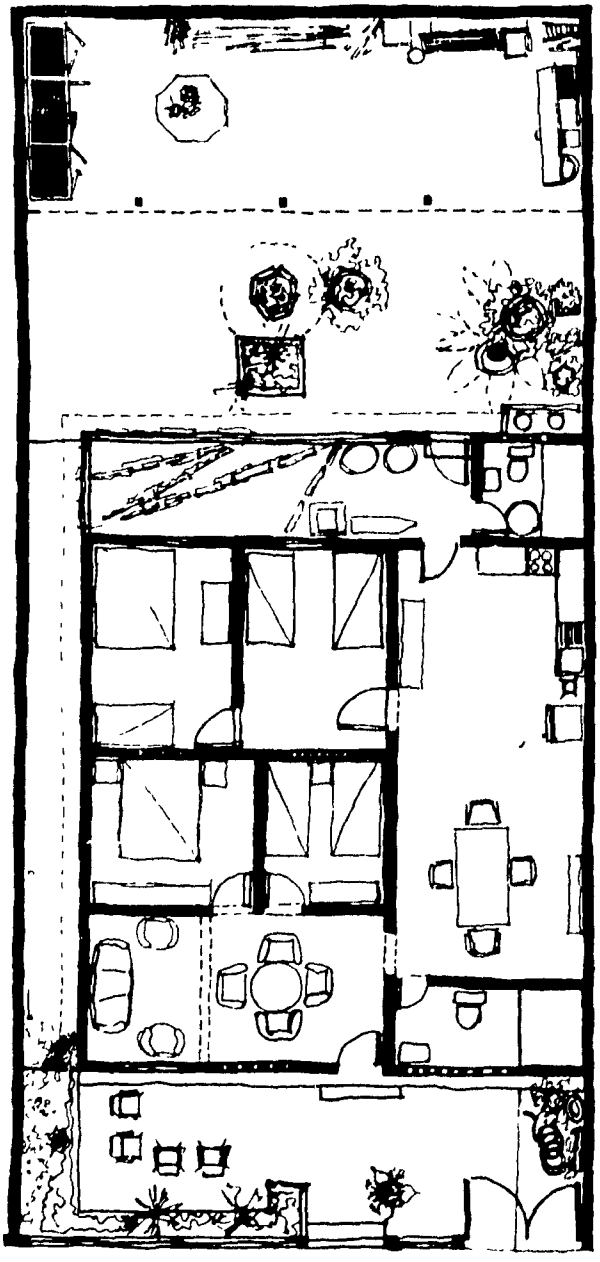


Size:	6 persons
Time in C.Guayana:	34 years
Time in El Gallo:	27 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	yes

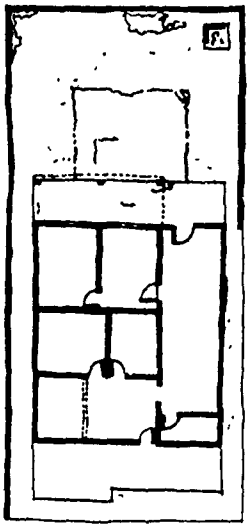


1967: 59 sqm





1980:123.5sqm



1987:187.5sqm

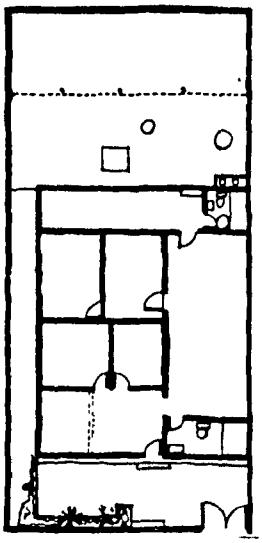
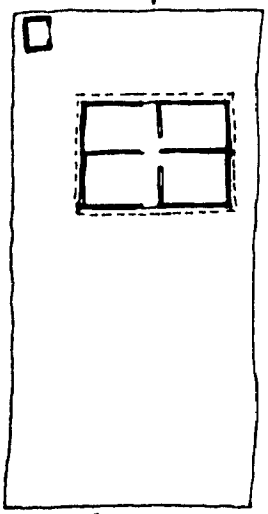


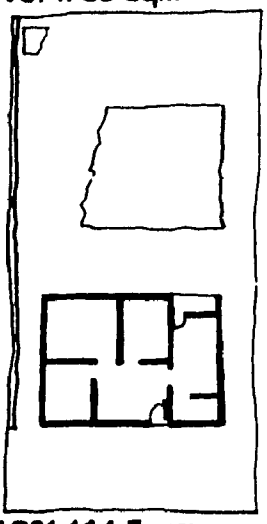
Fig.45 DWELLING #320, Group A. Middle plot/ Household Characteristics

Size:	7 persons
Time in C.Guayana:	27 years
Time in El Gallo:	7 years
Original settler:	no
# of dwellings before:	5 dwellings
Dwelling owner:	yes
Plot owner:	no

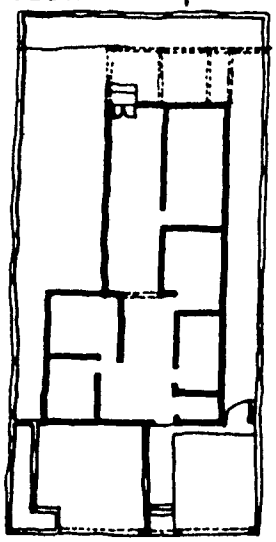
1967: 43 sqm

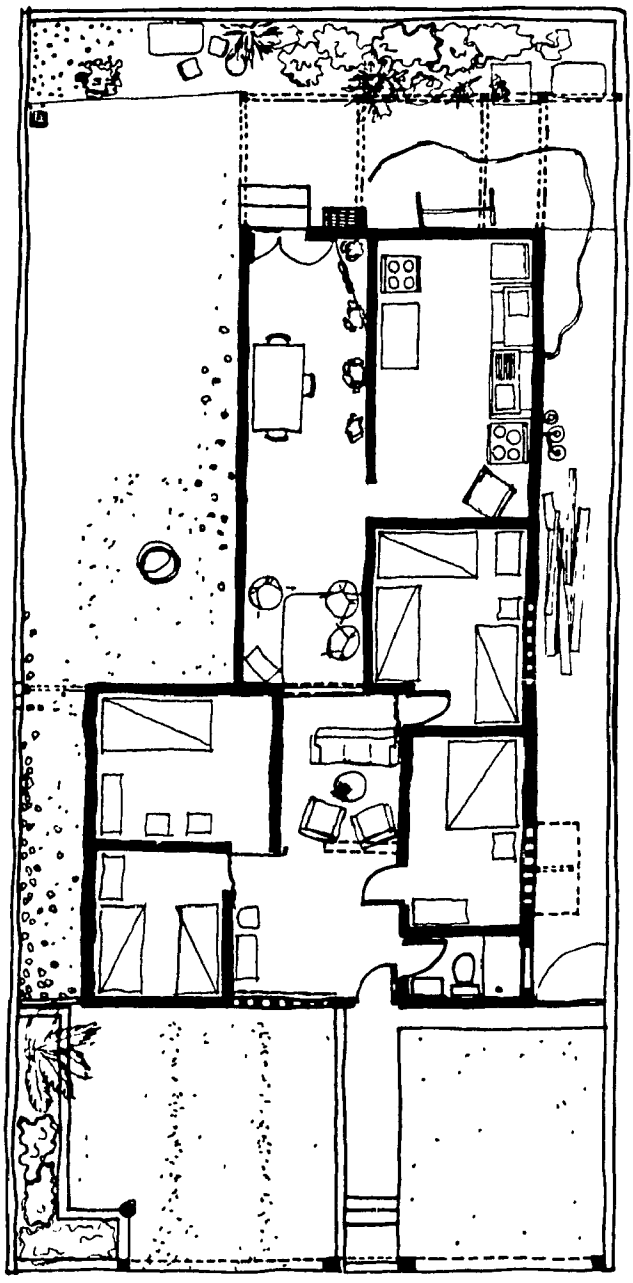


1974: 59 sqm



1991:114.5sqm

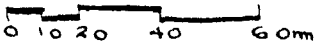




Household Characteristics

Size:	8 persons
Time in C.Guayana:	32 years
Time in El Gallo:	28 years
Original settler:	yes
# of dwellings before:	3 dwellings
Dwelling owner:	yes
Plot owner:	no

Fig.46 DWELLING # 18, Group B. Middle plot/



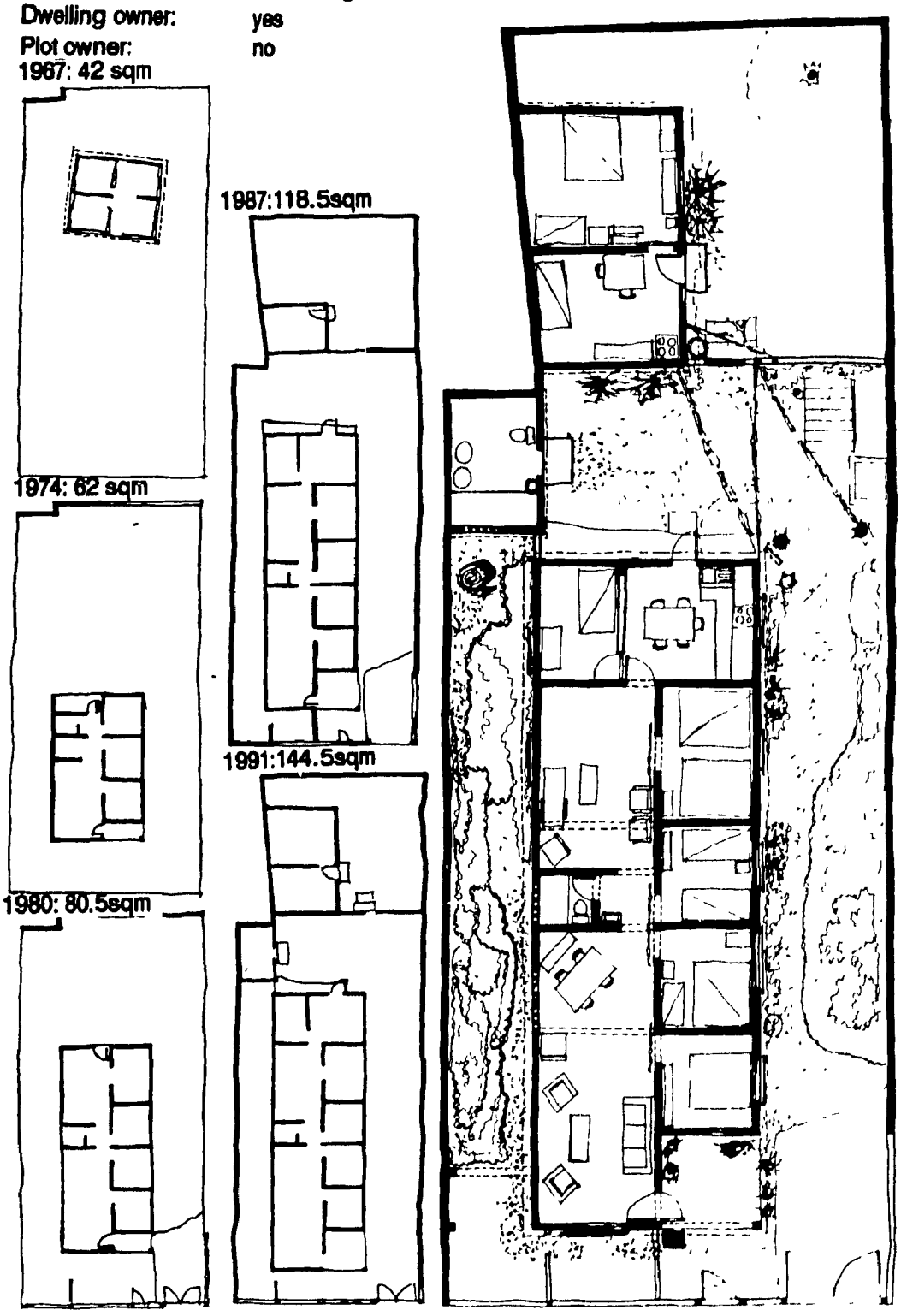
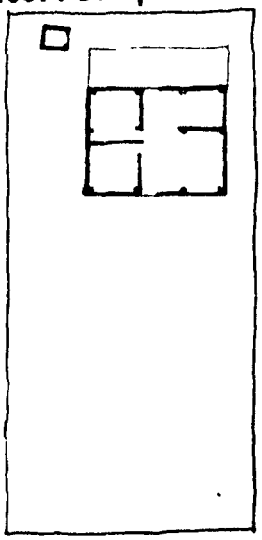
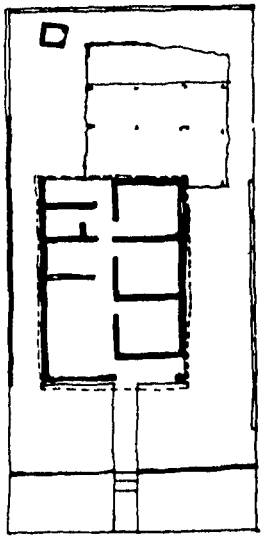


Fig.47 DWELLING # 50, Group B. Middle plot/ Household Characteristics

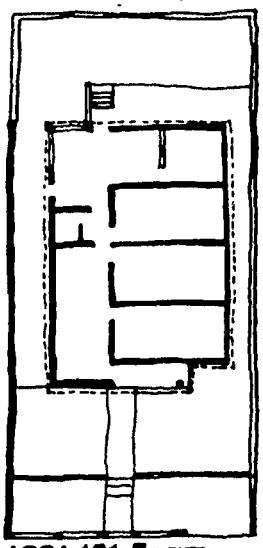
Size:	10 persons
Time in C.Guayana:	28 years
Time in El Gallo:	8 years
Original settler:	no
# of dwellings before:	3 dwellings
Dwelling owner:	yes
Plot owner:	no



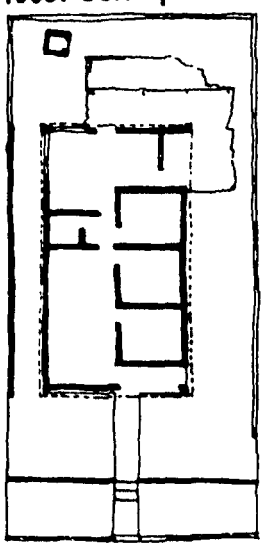
1967: 54 sqm



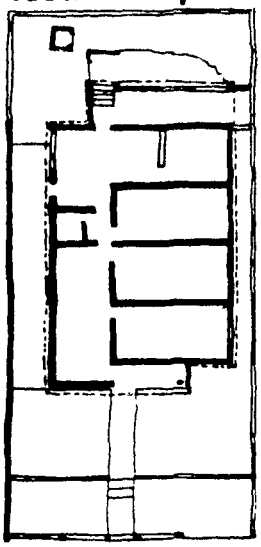
1980: 62 sqm



1987:108.5sqm



1983: 83.5sqm



1991:121.5sqm

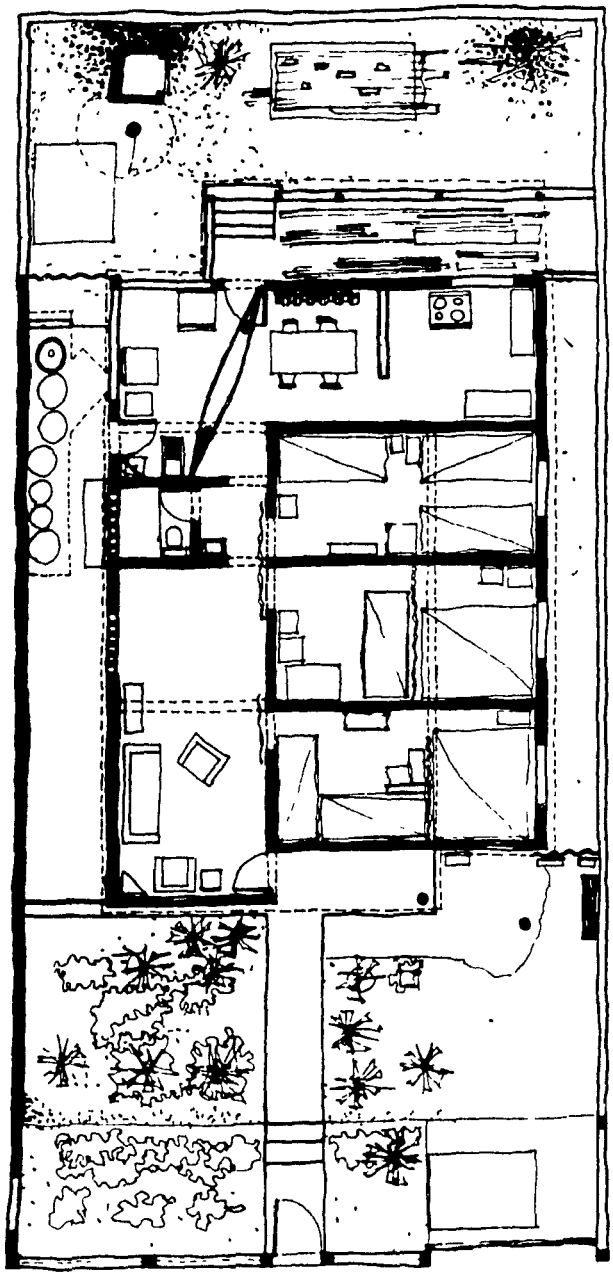
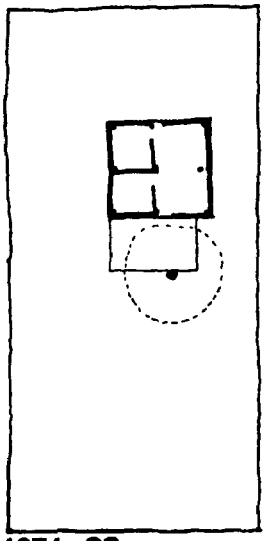


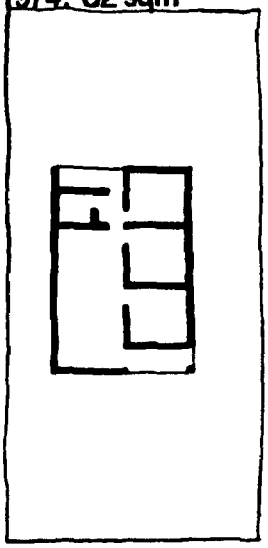
Fig.48 DWELLING # 80, Group B. Middle plot/ Household Characteristics

Size:	8 persons
Time in C.Guayana:	22 years
Time in El Gallo:	22 years
Original settler:	yes
# of dwellings before:	none
Dwelling owner:	yes
Plot owner:	no

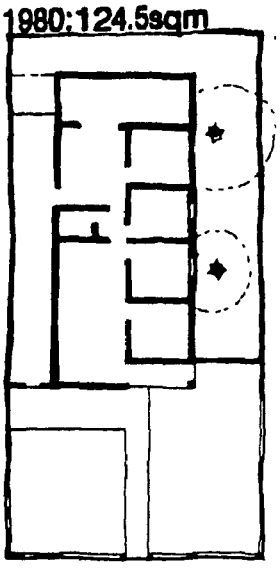
1967: 47 sqm



1974: 62 sqm



1980: 124.5sqm



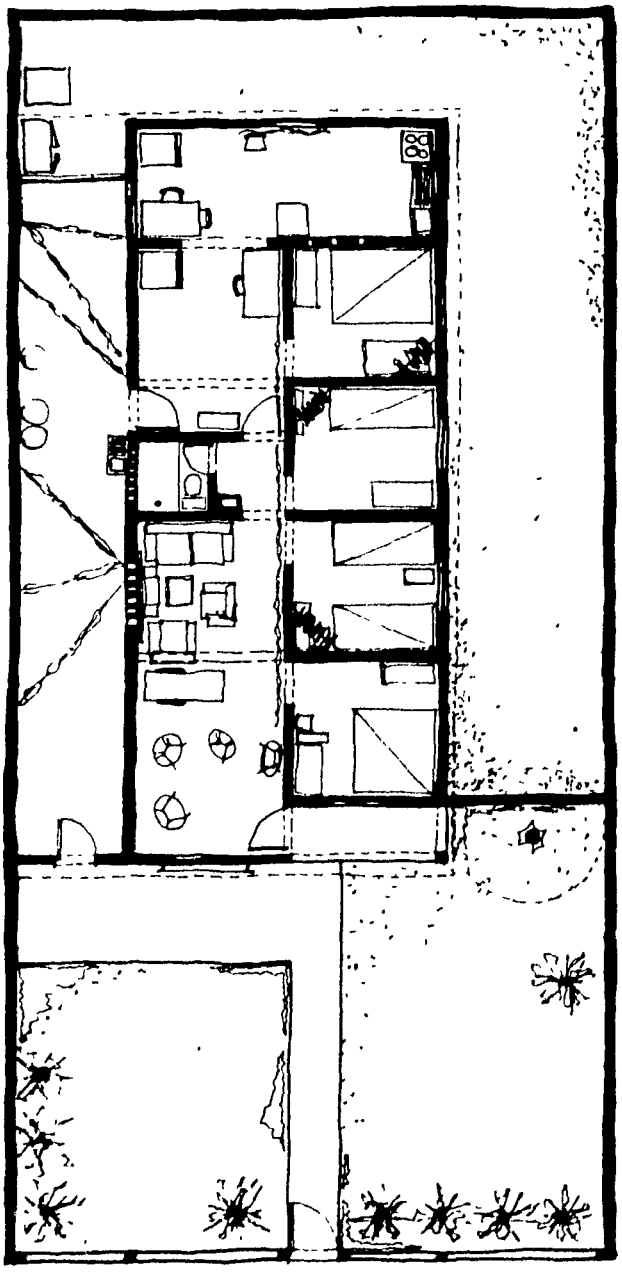
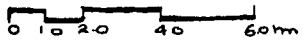
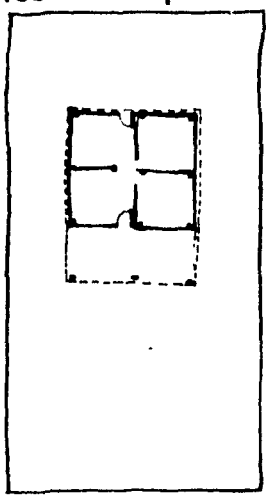


Fig.49 DWELLING #321, Group B. Middle plot/ Household Characteristics

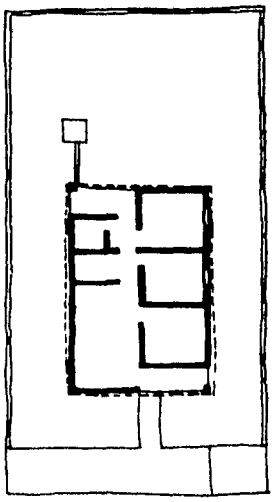
Size:	9 persons
Time in C.Guayana:	20 years
Time in El Gallo:	10 years
Original settler:	no
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no



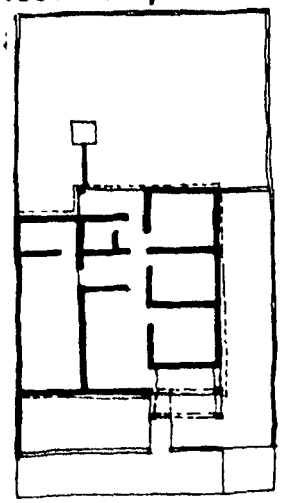
1967: 56.5sqm



1974: 62 sqm



1991: 93 sqm



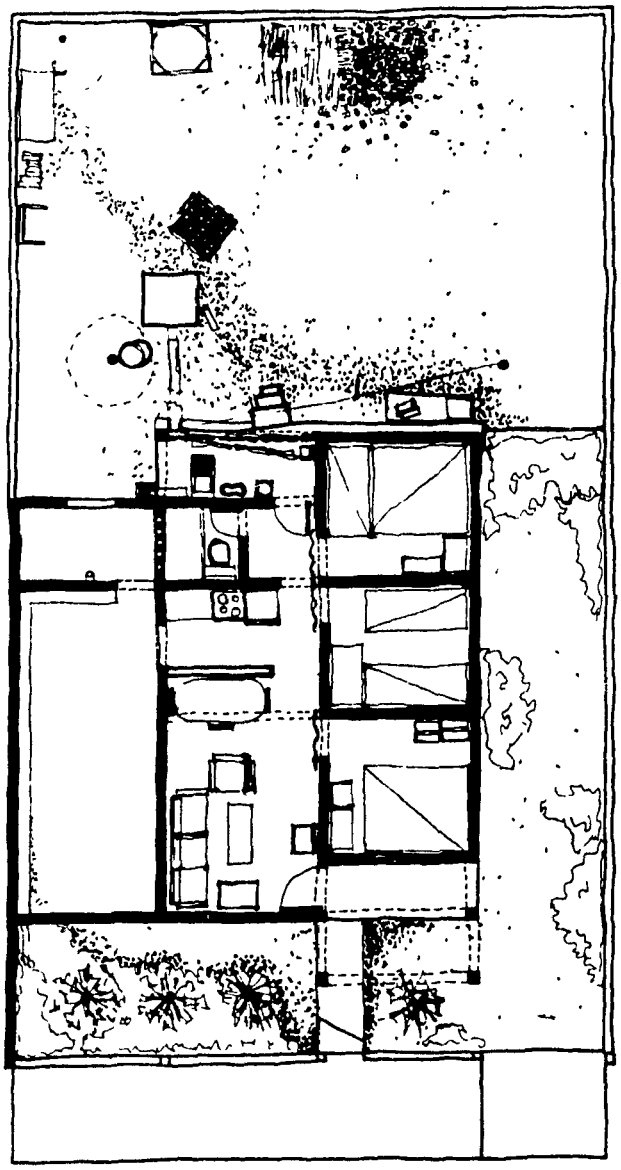
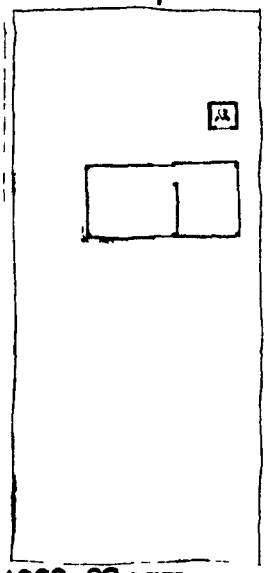
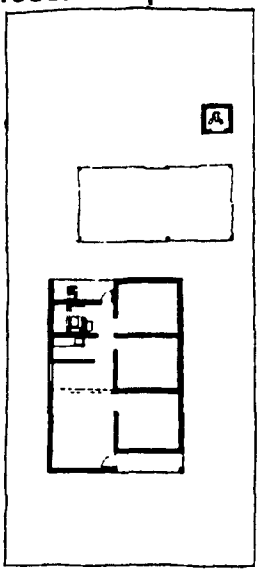


Fig.50 DWELLING #412, Group B. Middle plot/ Household Characteristics

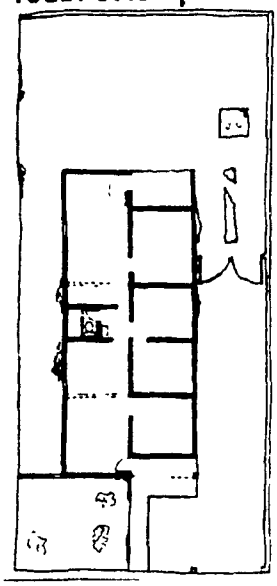
1964: 26 sqm



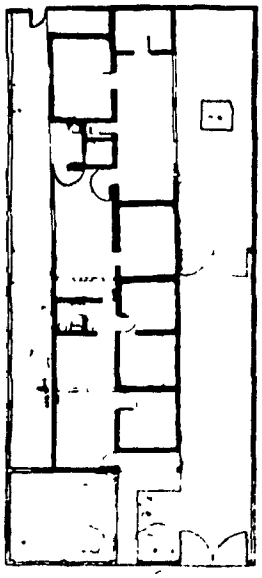
1980: 62 sqm



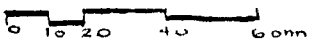
1983: 97.8sqm



1987:151.5sqm



Size:	7 persons
Time in C.Guayana:	27 years
Time in El Gallo:	12 years
Original settler:	no
# of dwellings before:	3 dwellings
Dwelling owner:	yes
Plot owner:	no



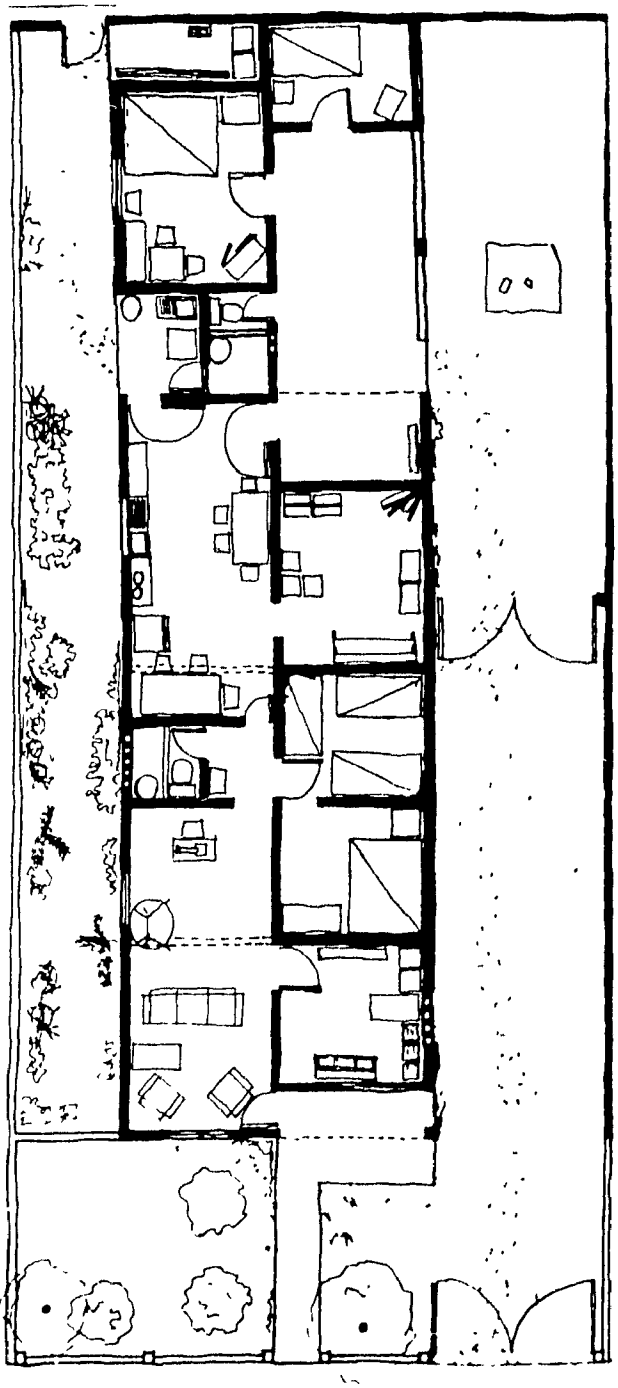
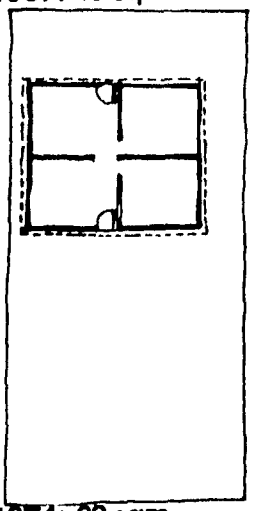


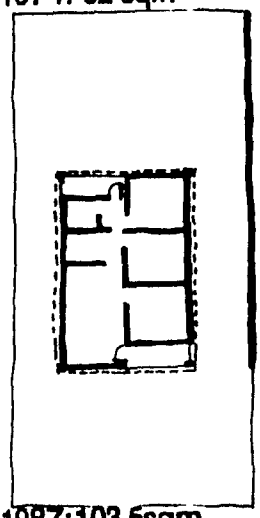
Fig.51 DWELLING #429, Group B. Middle plot/ Household Characteristics

Size:	9 persons
Time in C.Guayana:	28 years
Time in El Gallo:	19 years
Original settler:	no
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no

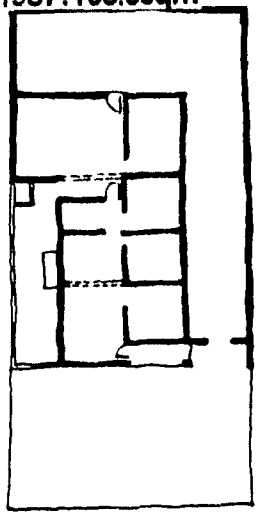
1967: 49 sqm

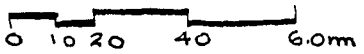


1974: 62 sqm



1987:103.5sqm





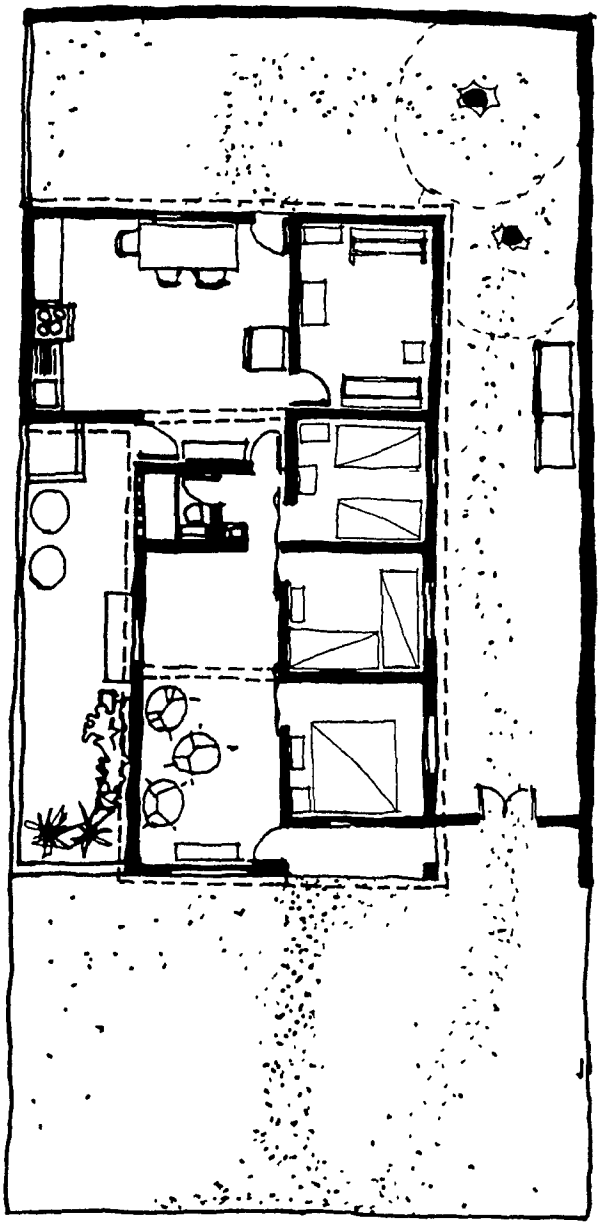
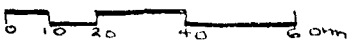
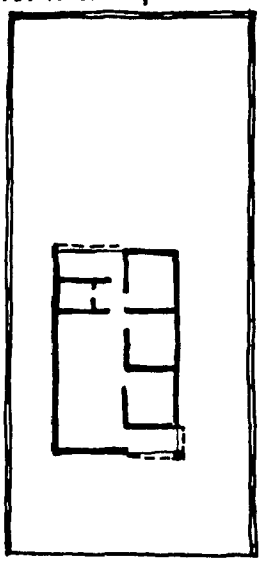


Fig.52 DWELLING #446, Group B. Middle plot/ Household Characteristics

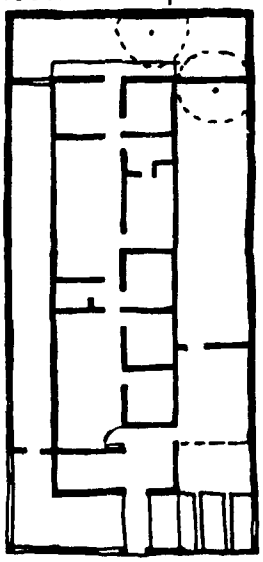
Size:	6 persons
Time in C.Guayana:	32 years
Time in El Gallo:	5 years
Original settler:	no
# of dwellings before:	2 dwellings
Dwelling owner:	no
Plot owner:	no



1974: 62 sqm



1980:147.5sqm



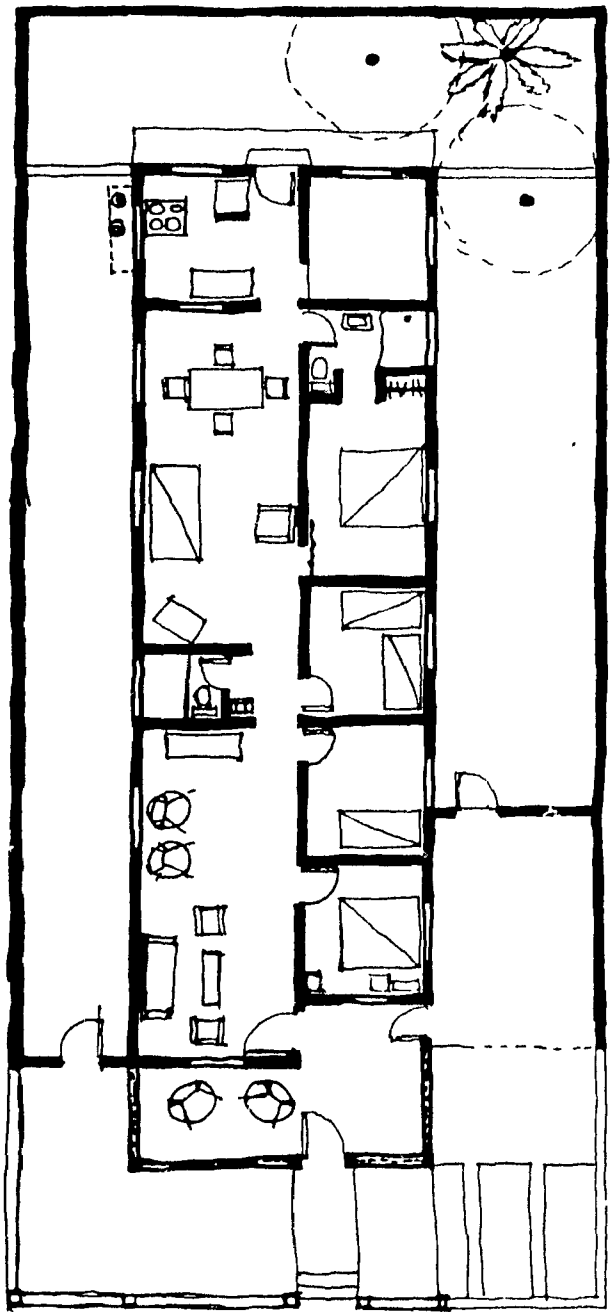
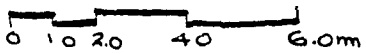


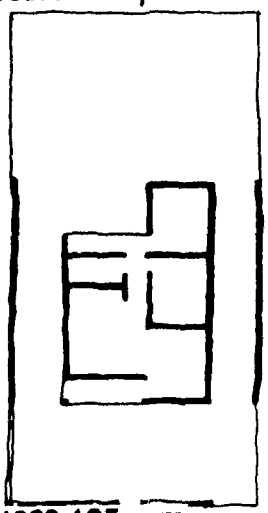
Fig.53 DWELLING # 71, Group C. Middle plot/ Household Characteristics

Design c

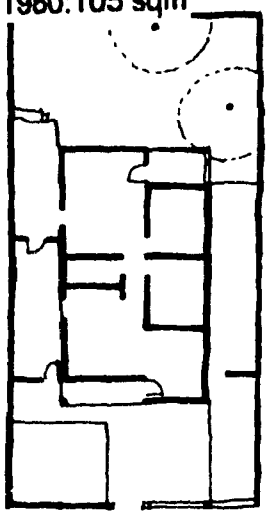
Size:	7 persons
Time in C.Guayana:	12 years
Time in El Gallo:	2 years
Original settler:	no
# of dwellings before:	6 dwellings
Dwelling owner:	no
Plot owner:	no



1967: 59 sqm



1980:105 sqm



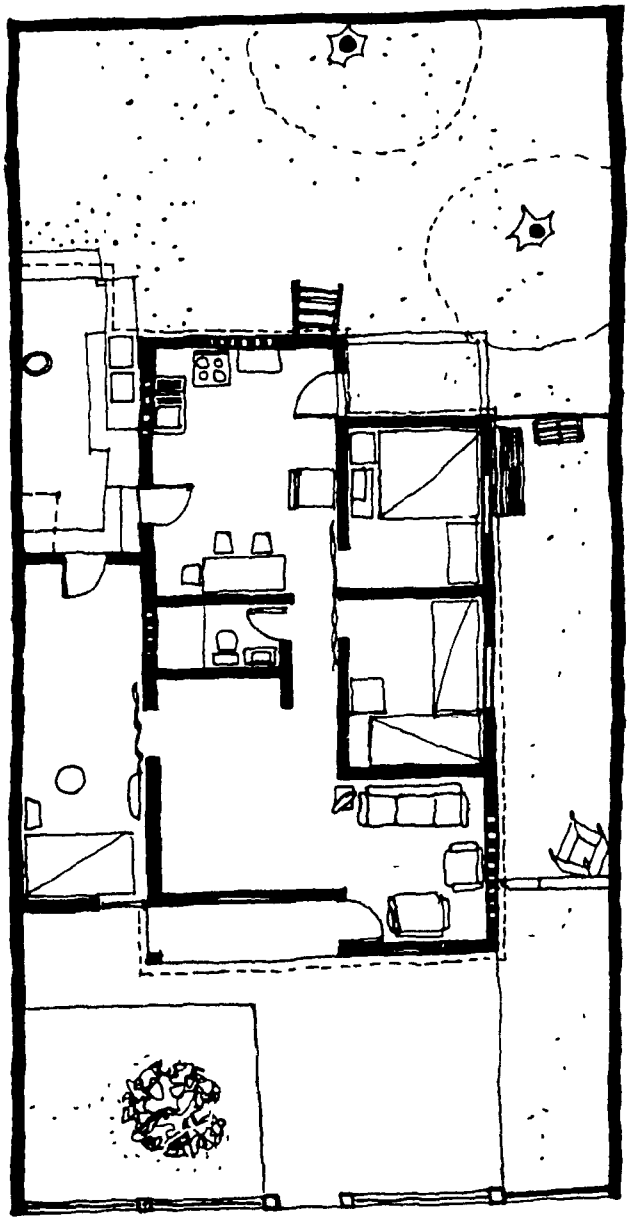
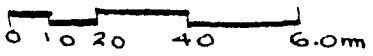


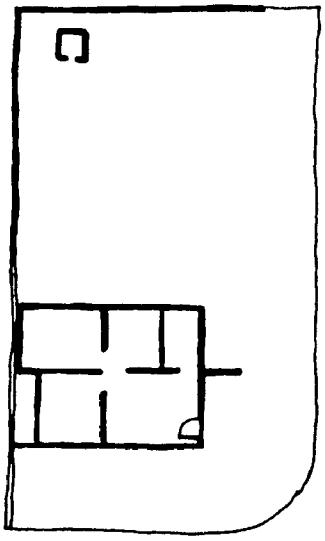
Fig.54 DWELLING # 75, Group C. Corner plot/ Household Characteristics

Design a

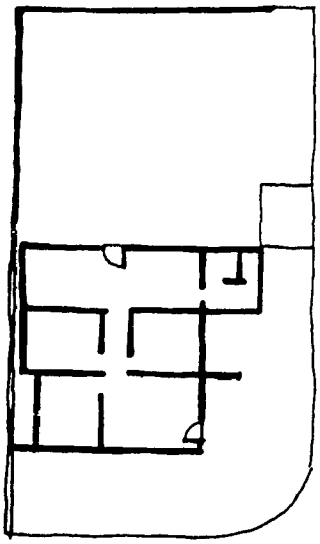
Size:	5 persons
Time in C.Guayana:	34 years
Time In El Gallo:	25 years
Original settler:	yes
# of dwellings before:	2 dwellings
Dwelling owner:	yes
Plot owner:	no



1967: 58.5sqm



1974: 93 sqm



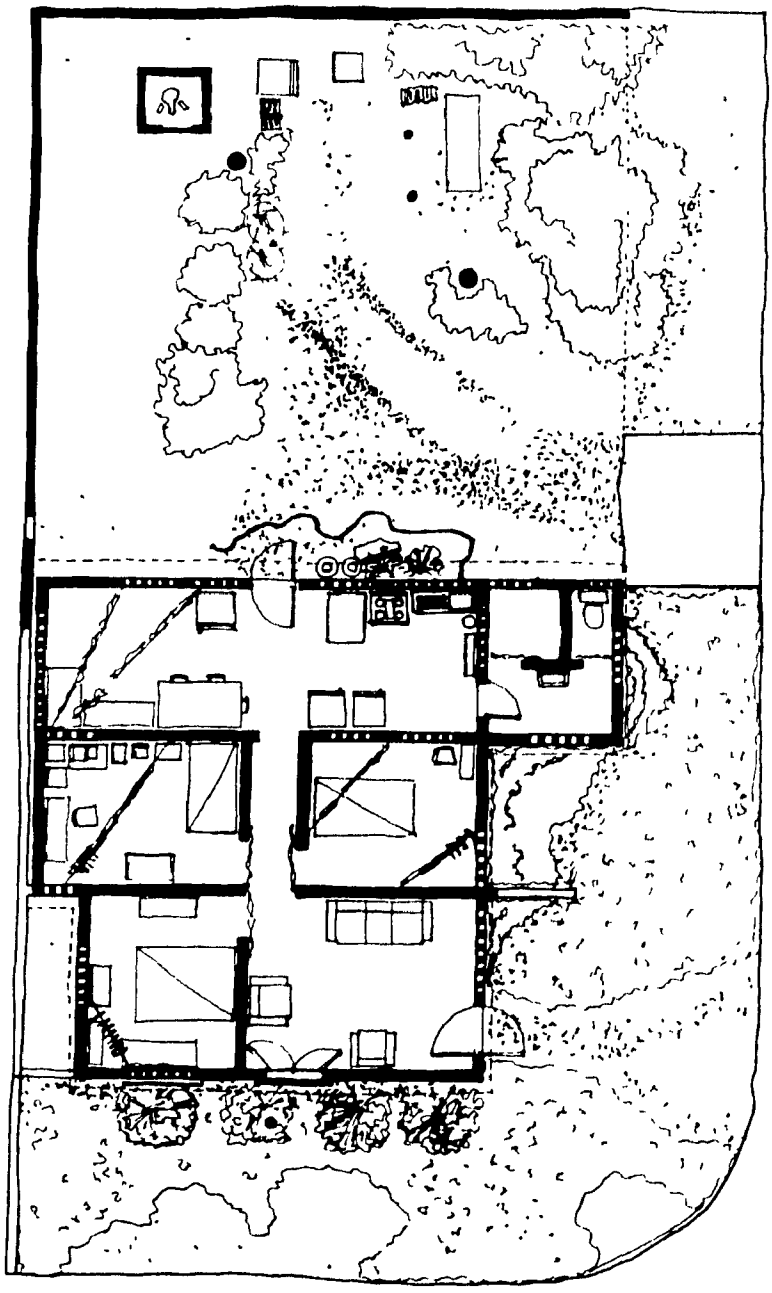
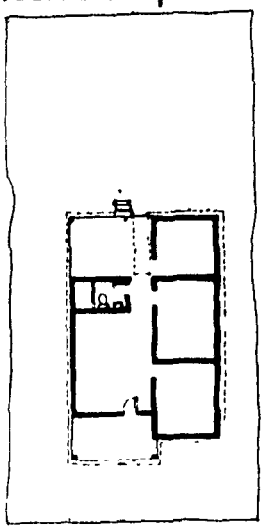


Fig.55 DWELLING # 92, Group C. Middle plot/ Household Characteristics

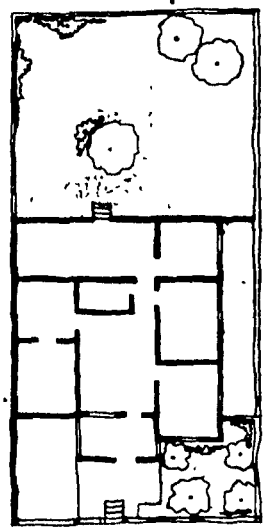
Design c

Size:	11 persons
Time in C.Guayana:	32 years
Time in El Gallo:	27 years
Original settler:	yes
# of dwellings before:	4 dwellings
Dwelling owner:	yes
Plot owner:	no

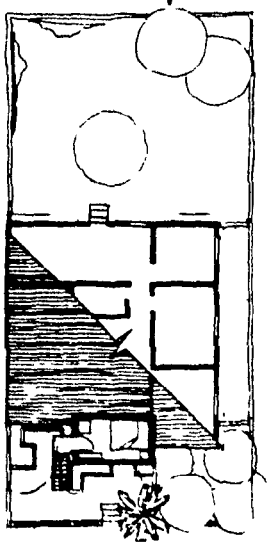
1967: 68.5sqm

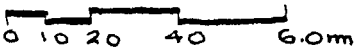


1980:115.5sqm



1987:124.5sqm





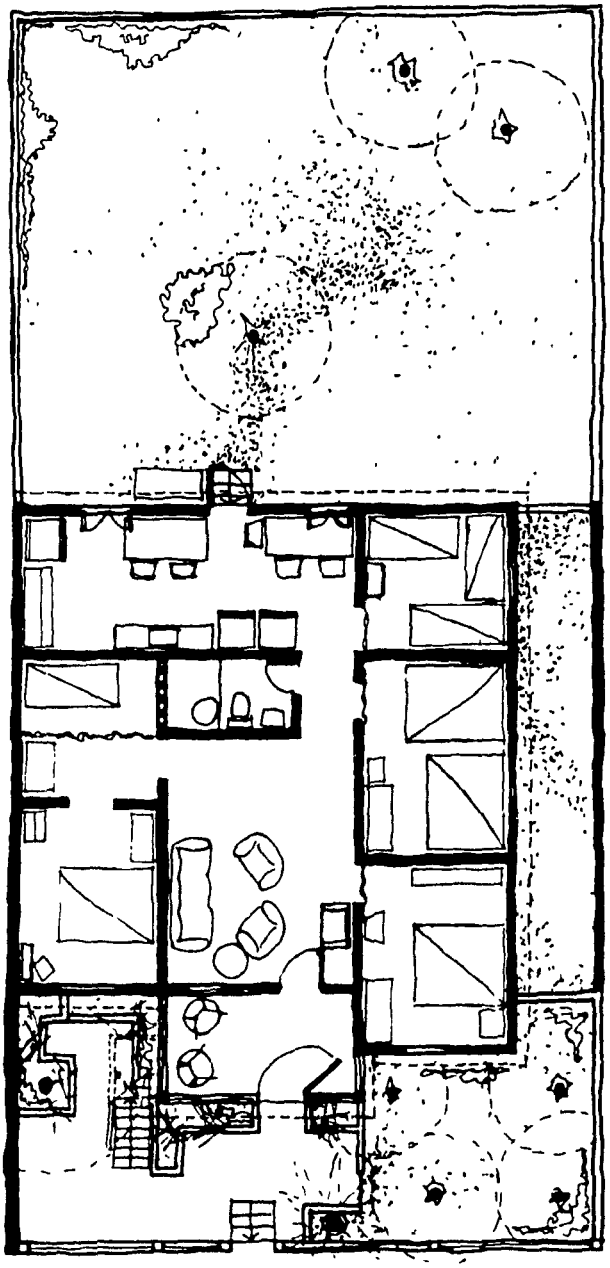
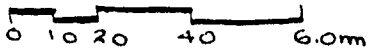


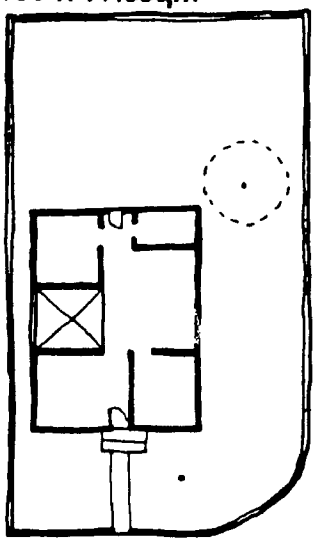
Fig.56 DWELLING #147, Group C. Corner plot/Household Characteristics

Design b

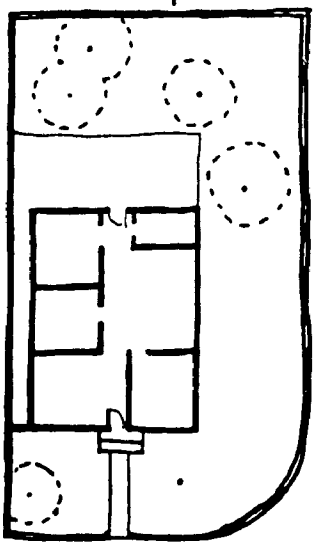
Size:	9 persons
Time in C.Guayana:	35 years
Time in El Gallo:	28 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no



1964: 77.5sqm



1967: 86.5sqm



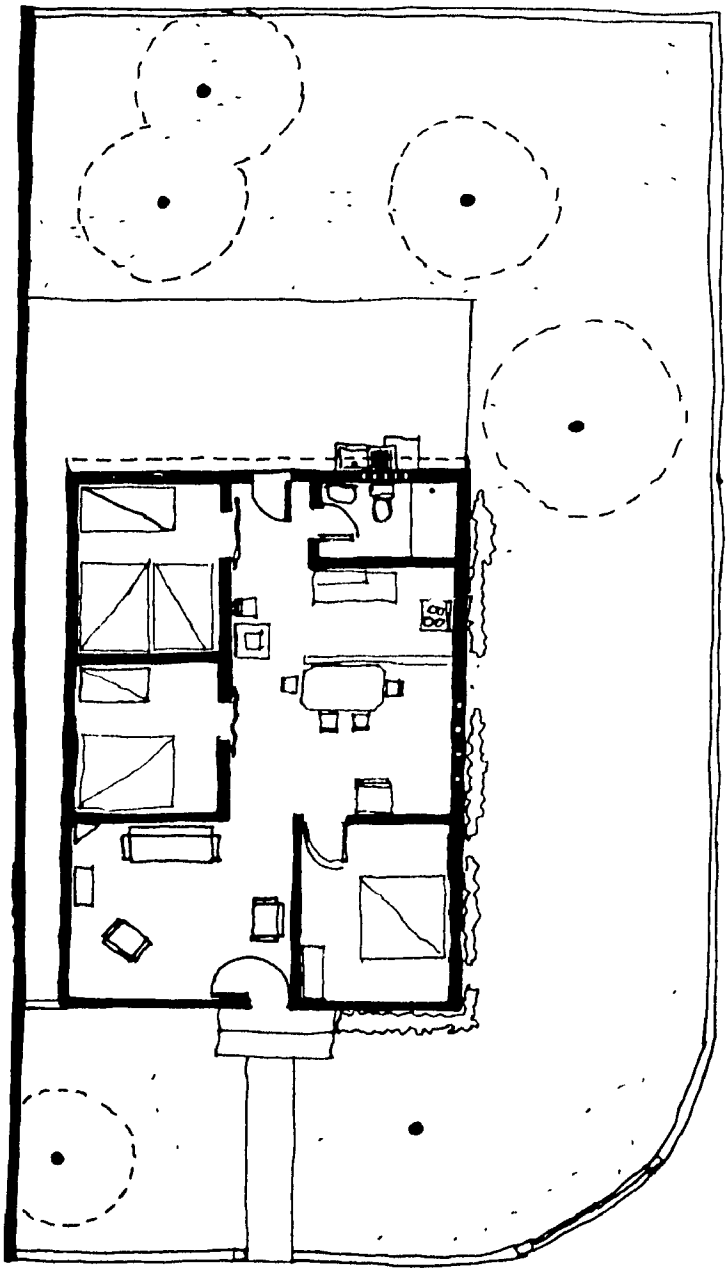
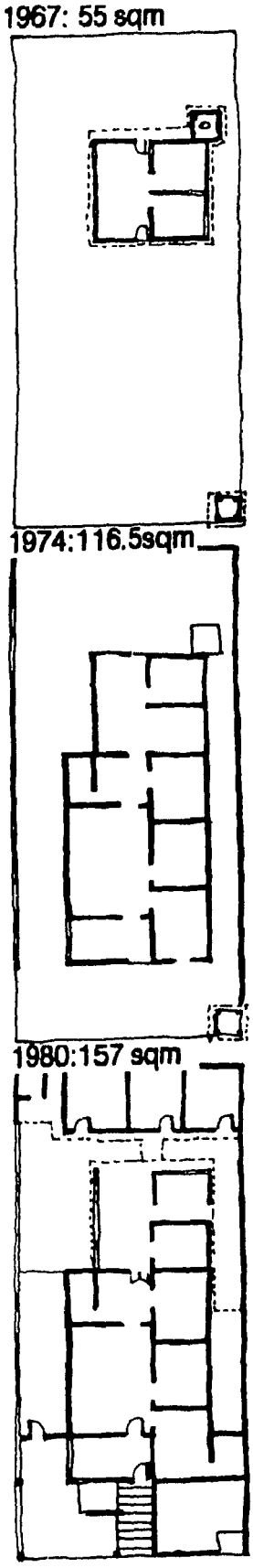


Fig.57 DWELLING #177, Group C. Middle plot/Household Characteristics

Design c

Size:	14 persons
Time in C.Guayana:	31 years
Time in El Gallo:	26 years
Original settler:	yes
# of dwellings before:	3 dwellings
Dwelling owner:	no
Plot owner.	no



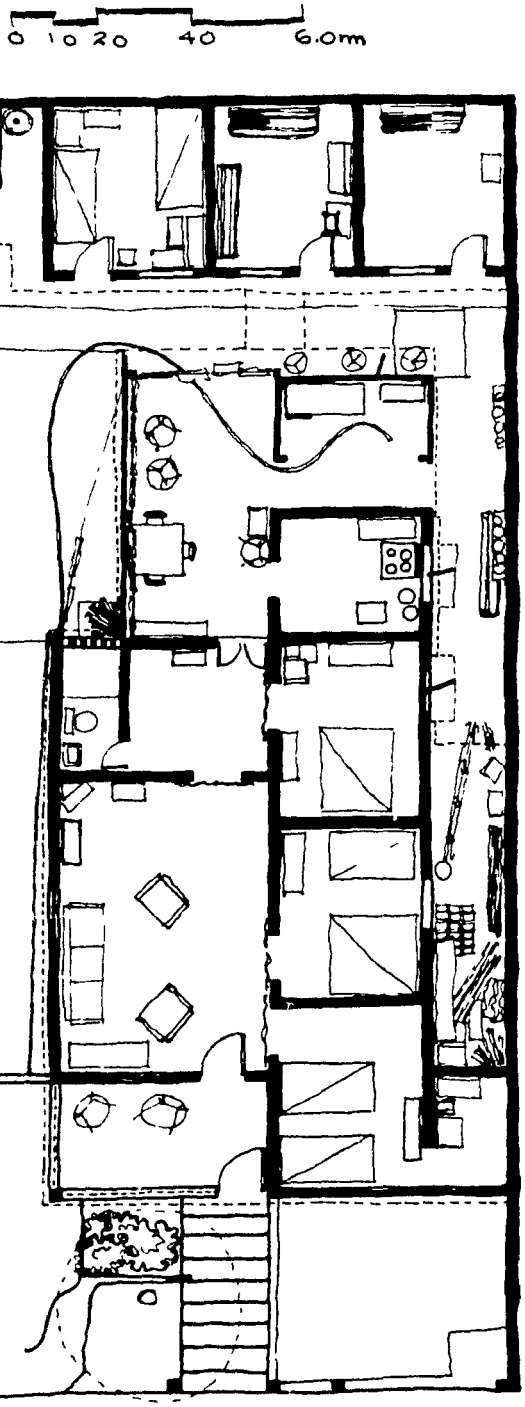
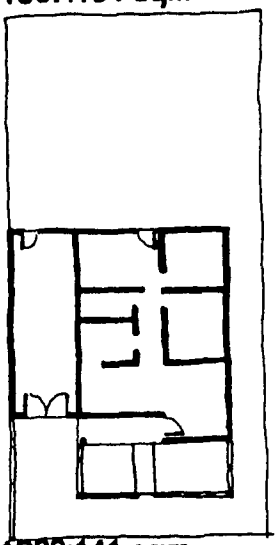


Fig.58 DWELLING #410, Group C. Middle plot/Household Characteristics

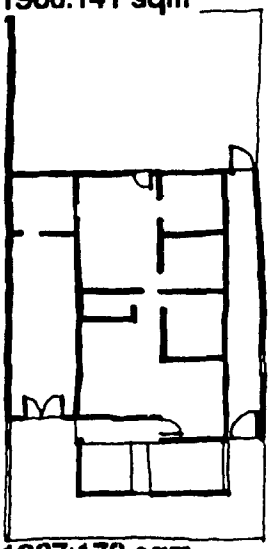
Design c

Size:	5 persons
Time in C.Guayana:	38 years
Time in El Gallo:	27 years
Original settler:	yes
# of dwellings before:	2 dwellings
Dwelling owner:	yes
Plot owner:	yes

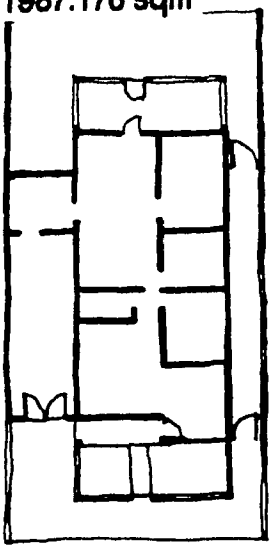
1967:104 sqm



1980:141 sqm



1987:176 sqm



0 10 20 40 60m

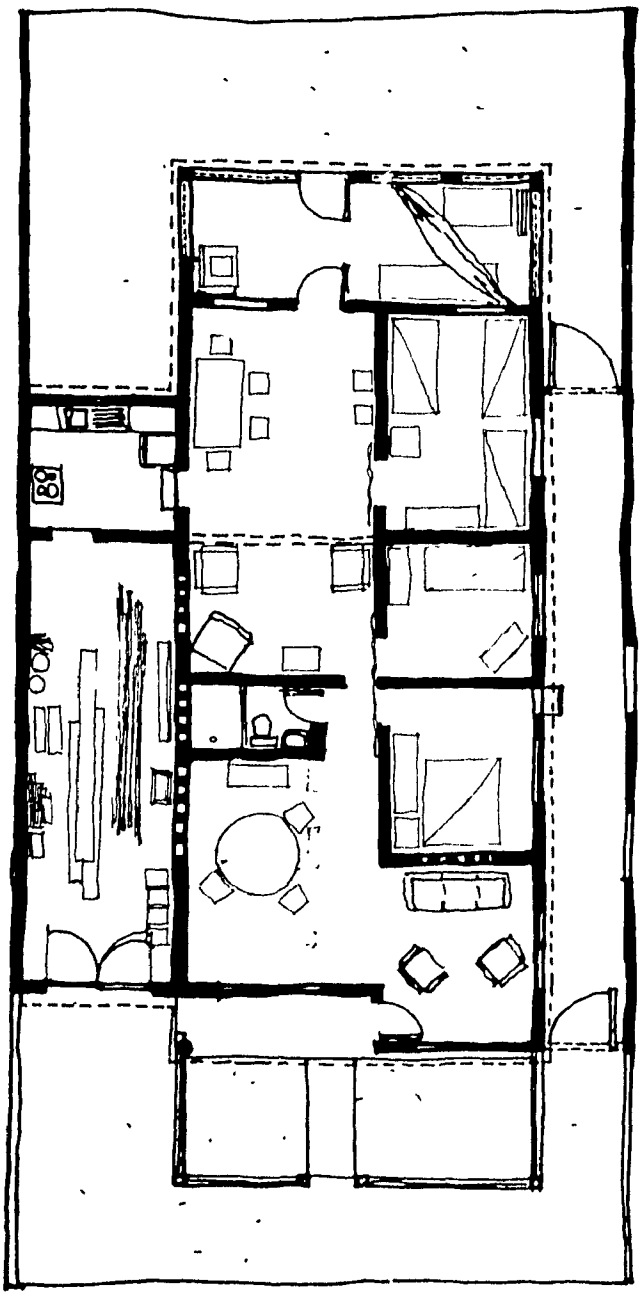
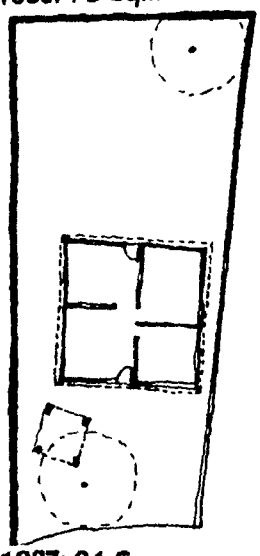


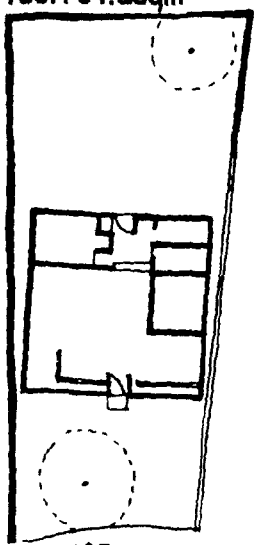
Fig.59 DWELLING #178a, Group D. Middle plot/Household Characteristics

Size:	10 persons
Time in C.Guayana:	26 years
Time in El Gallo:	14 years
Original settler:	yes
# of dwellings before:	3 dwellings
Dwelling owner:	yes
Plot owner	no

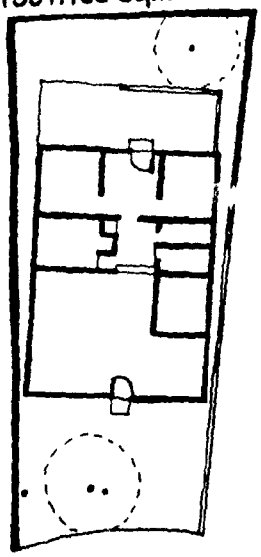
1980: 76 sqm

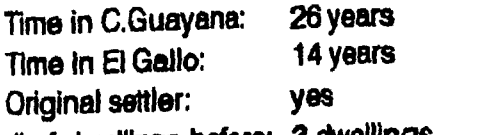


1987: 94.5sqm



1991:105 sqm





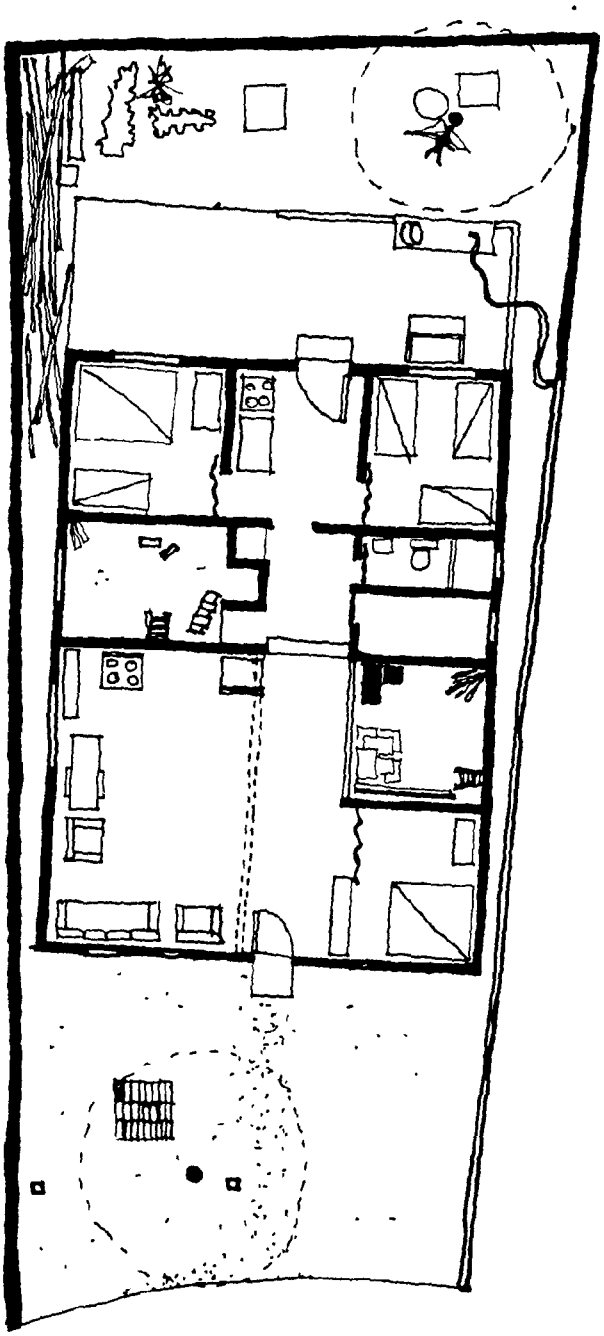
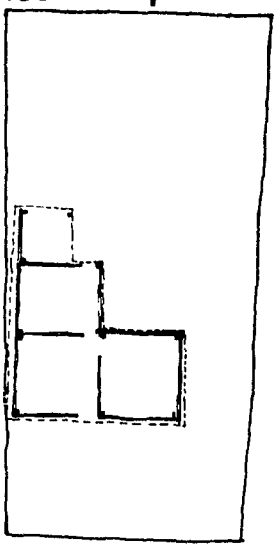


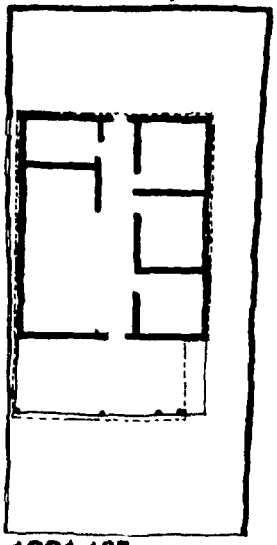
Fig.60 DWELLING #178b,Group D.Middle plot/Household Characteristics

Size:	9 persons
Time in C.Guayana:	14 years
Time in El Gallo:	14 years
Original settler:	yes
# of dwellings before:	none
Dwelling owner:	yes
Plot owner.	no

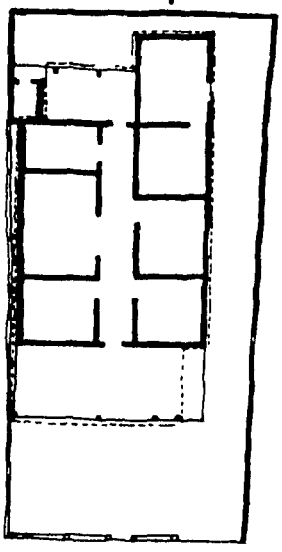
1980: 59 sqm



1987:116 sqm



1991:105 sqm



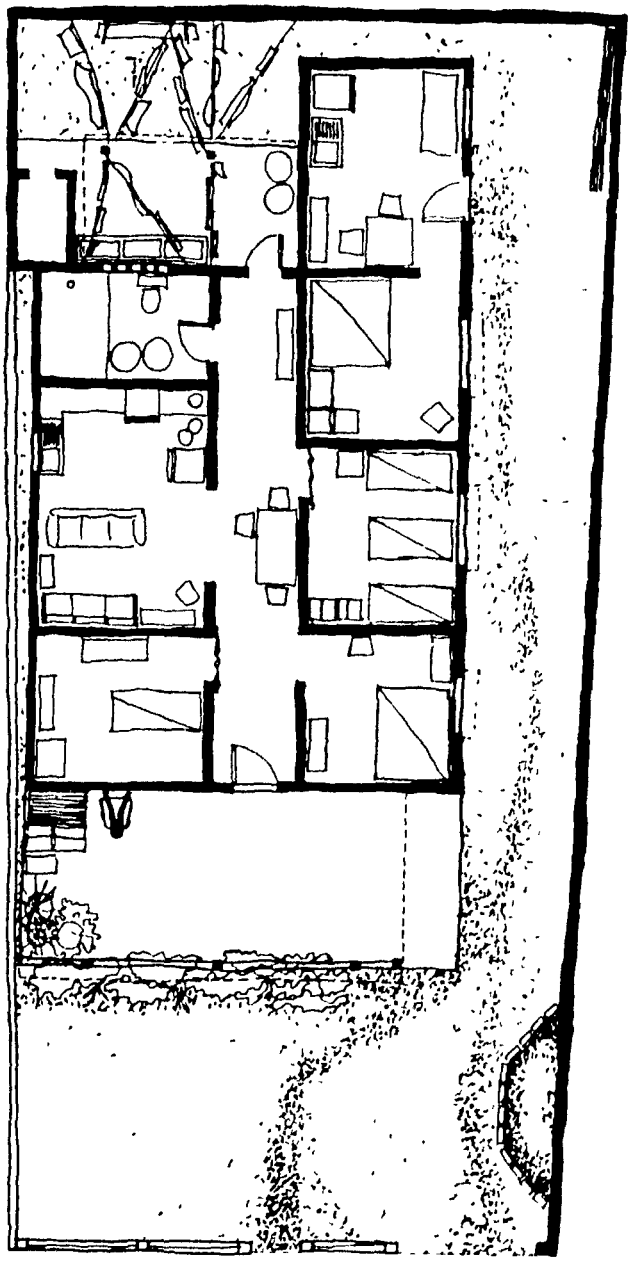
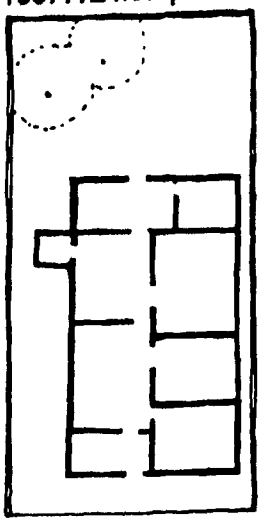


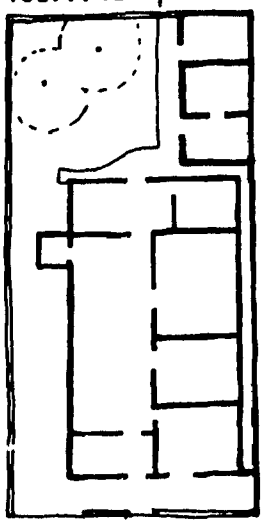
Fig.61 DWELLING #180, Group D. Middle plot/Household Characteristics

Size:	7 persons
Time in C.Guayana:	25 years
Time in El Gallo:	20 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no

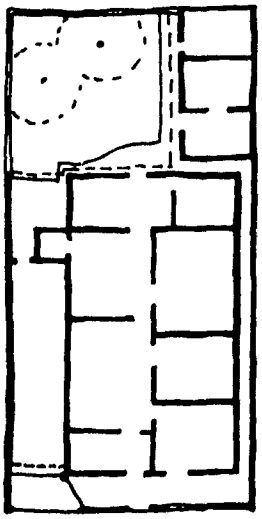
1967:124.5sqm



1987:148 sqm



1991:187 sqm



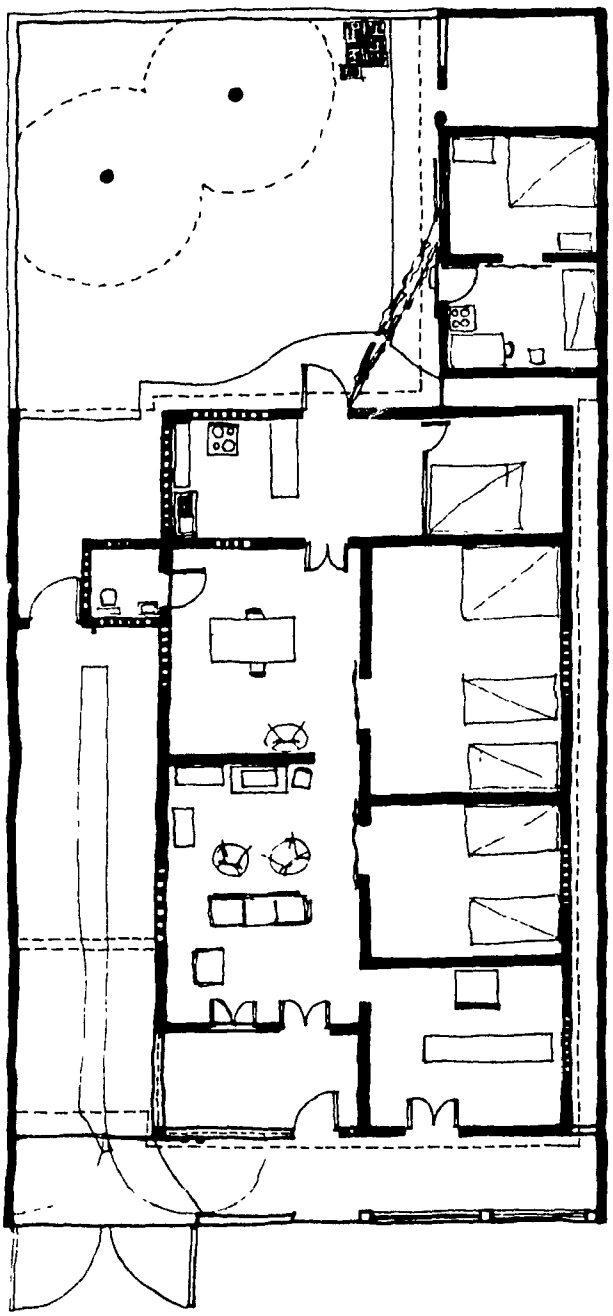
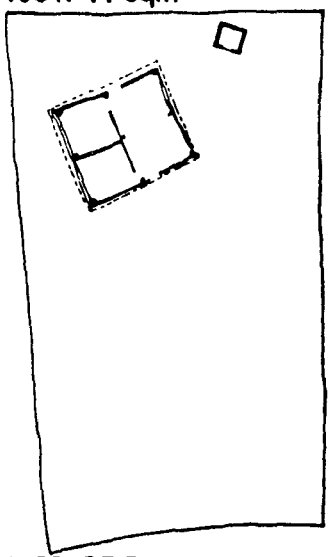
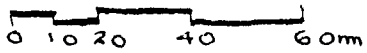


Fig.62 DWELLING #226, Group D. Middle plot/Household Characteristics

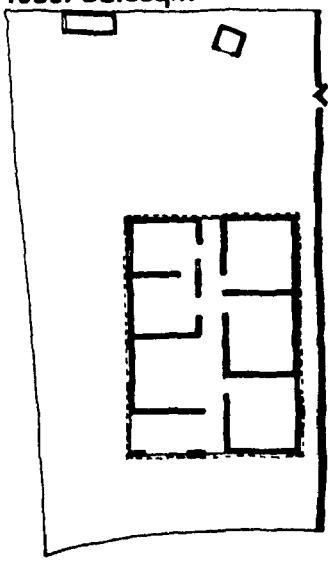
1964: 41 sqm



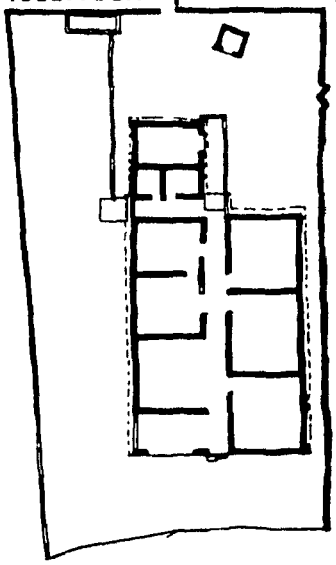
Size:	3 persons
Time in C.Guayana:	32 years
Time in El Gallo:	29 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no



1980: 98.5sqm



1983:108.5sqm



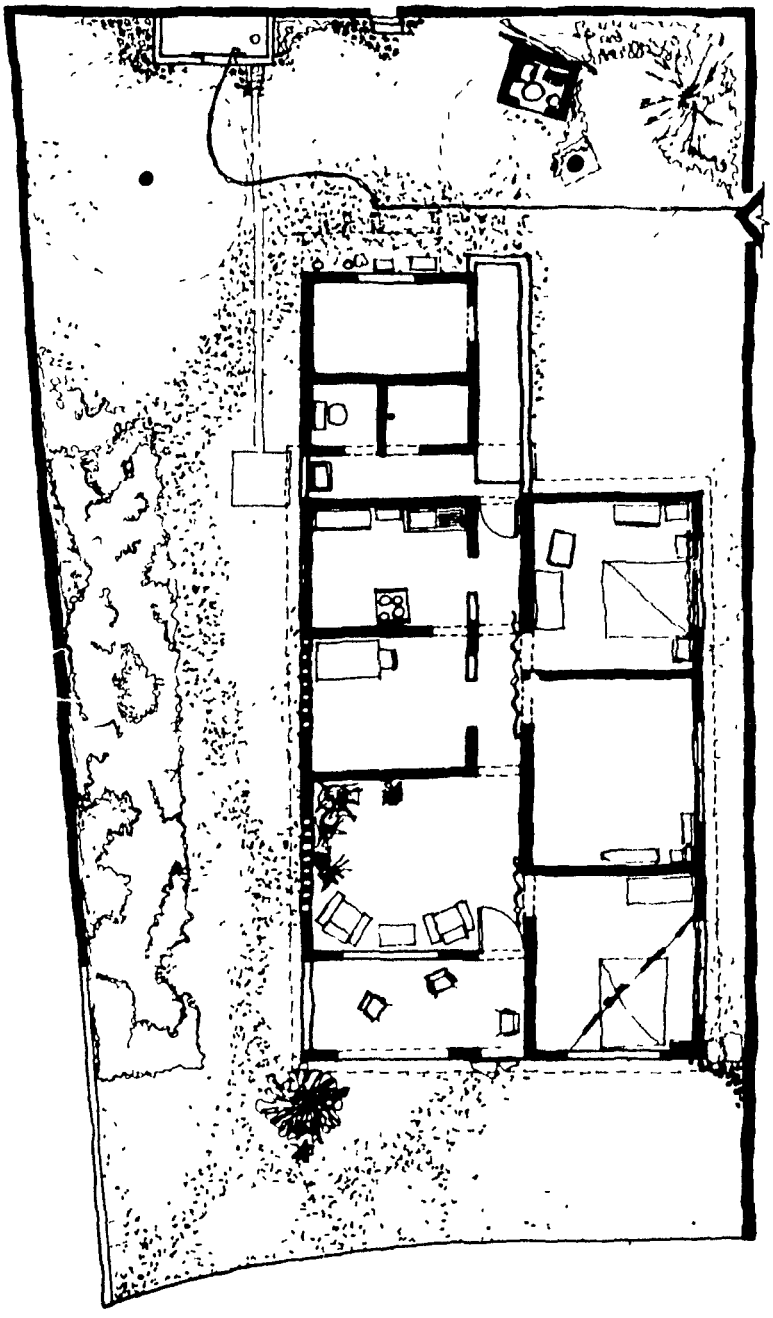
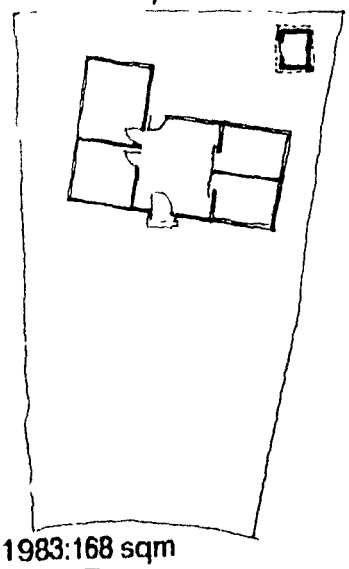
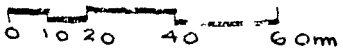


Fig.63 DWELLING #226a,Group D.Middle plot/Household Characteristics

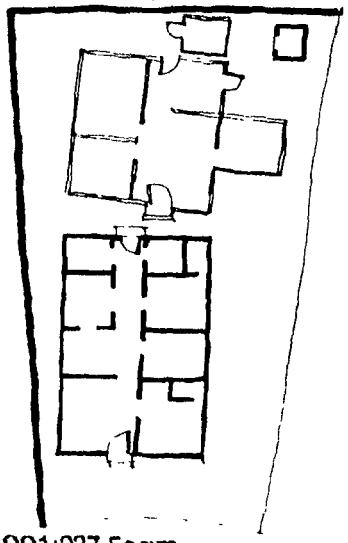
1980: 73 sqm



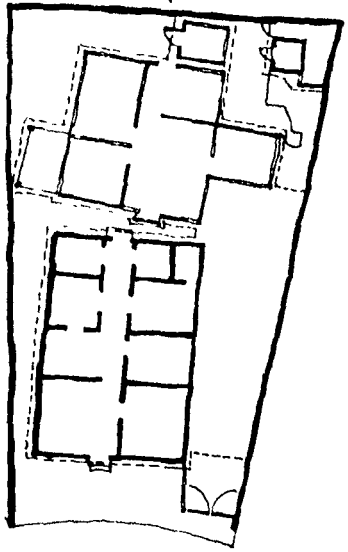
Size:	9 persons
Time in C.Guayana:	20 years
Time in El Gallo:	15 years
Original settler:	yes
# of dwellings before:	2 dwellings
Dwelling owner:	yes
Plot owner:	yes



1983:168 sqm



1991:237.5sqm



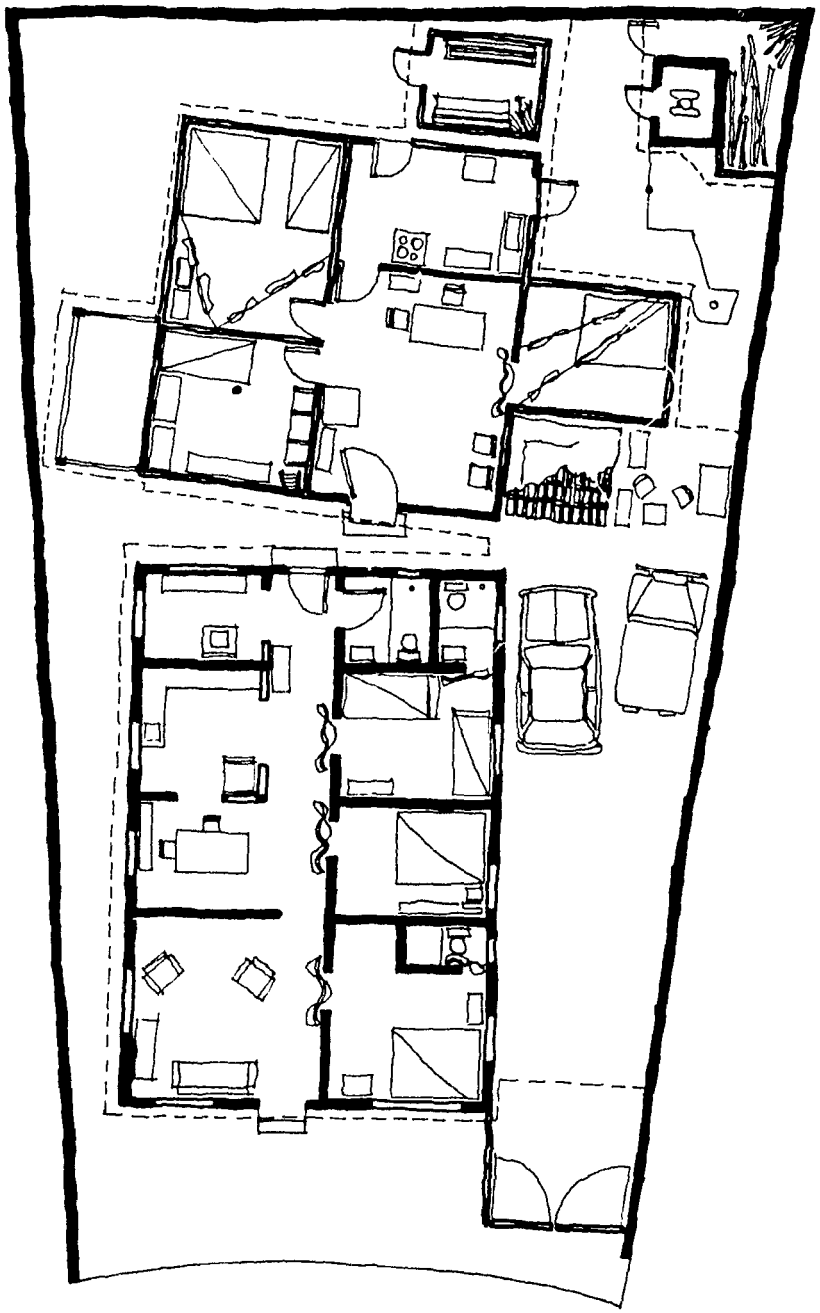
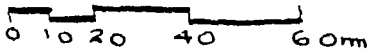
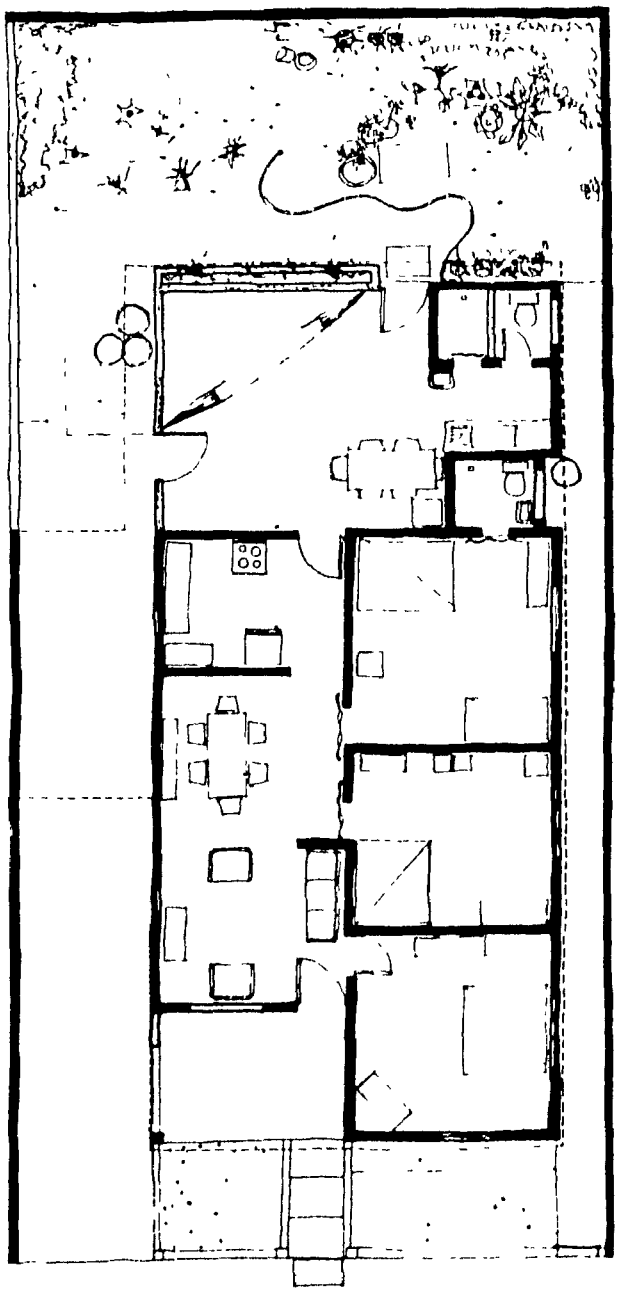


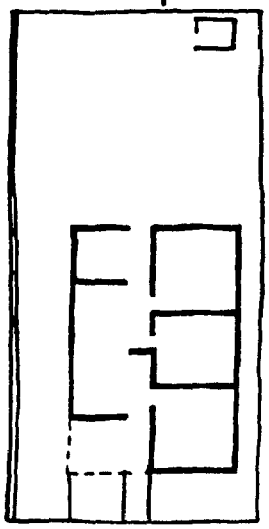
Fig.64 DWELLING #229, Group D. Middle plot/Household Characteristics

Size:	5 persons
Time in C.Guayana:	26 years
Time in El Gallo:	24 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no





1967:100 sqm



1974:158.5sqm

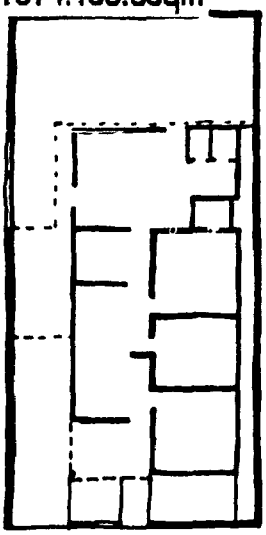
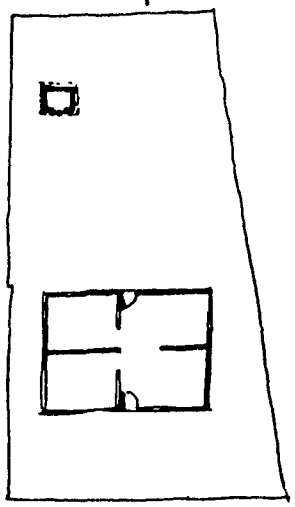


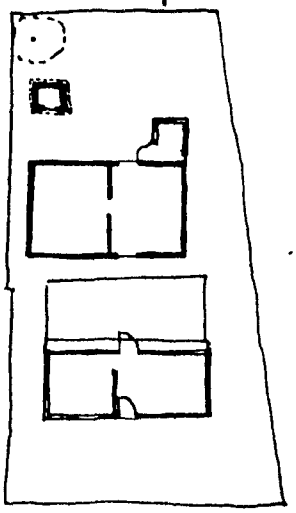
Fig.65 DWELLING #236b,Group D.Middle plot/Household Characteristics

Size:	5 persons
Time in C.Guayana:	10 years
Time in El Gallo:	10 years
Original settler:	no
# of dwellings before:	none
Dwelling owner:	yes
Plot owner:	no

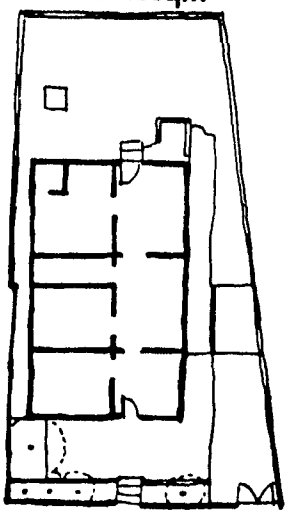
1980: 68 sqm

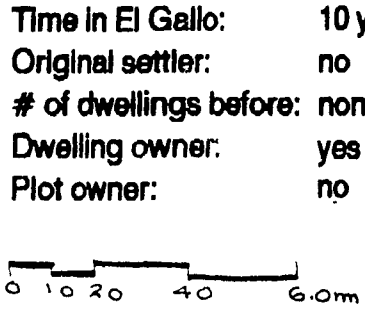


1983: 75.5sqm



1987:101.5sqm





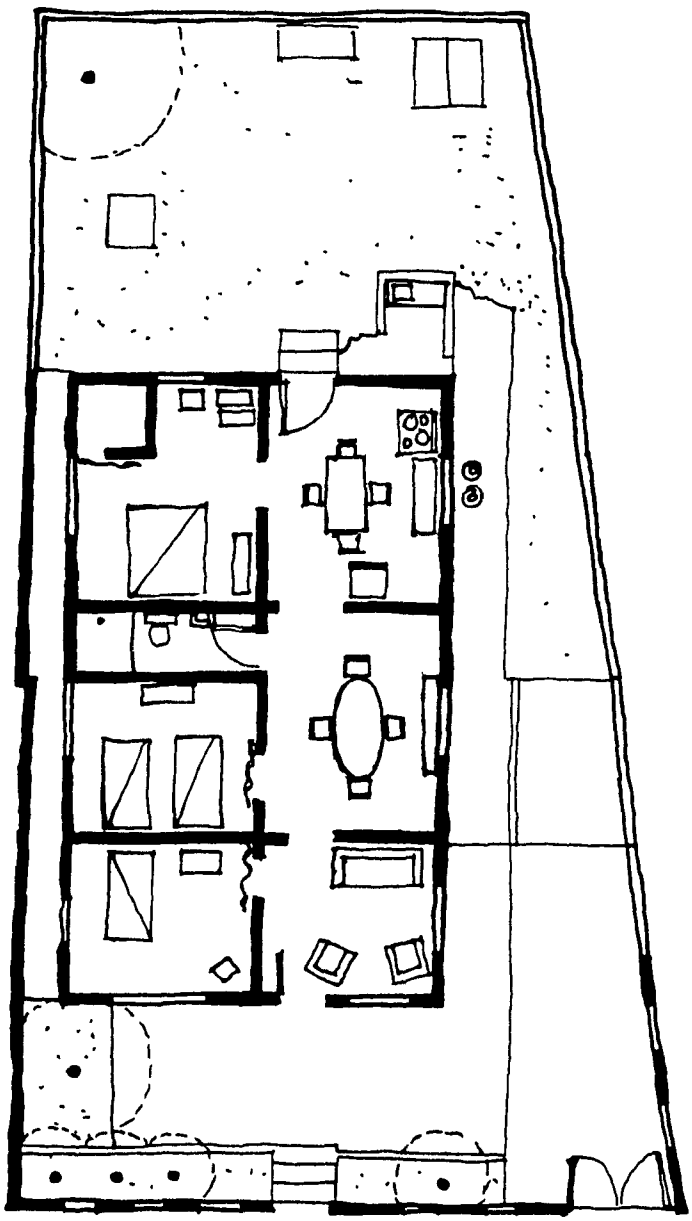
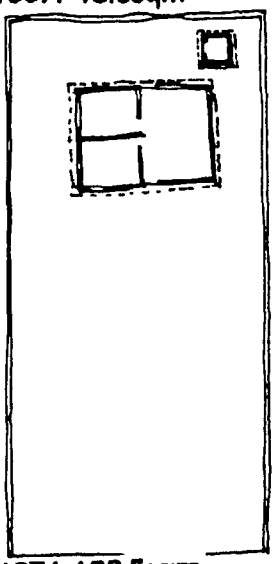
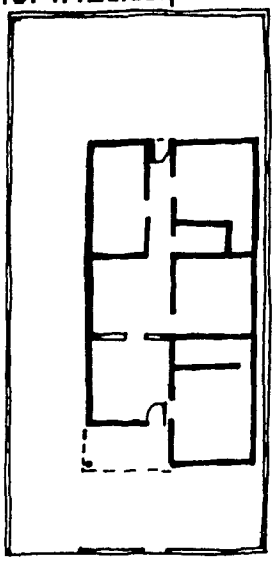


Fig.66 DWELLING #253, Group D. Middle plot/Household Characteristics

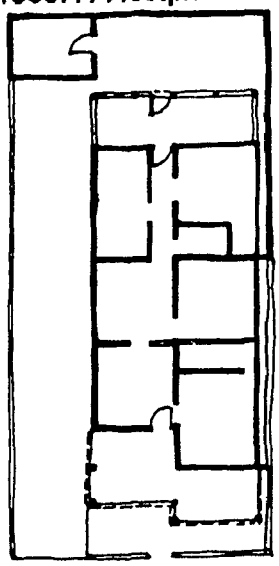
1967: 45.5sqm



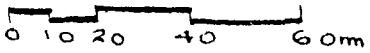
1974:128.5sqm



1980:177.5sqm



Size:	3 persons
Time in C.Guayana:	25 years
Time in El Gallo:	24 years
Original settler:	no
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no



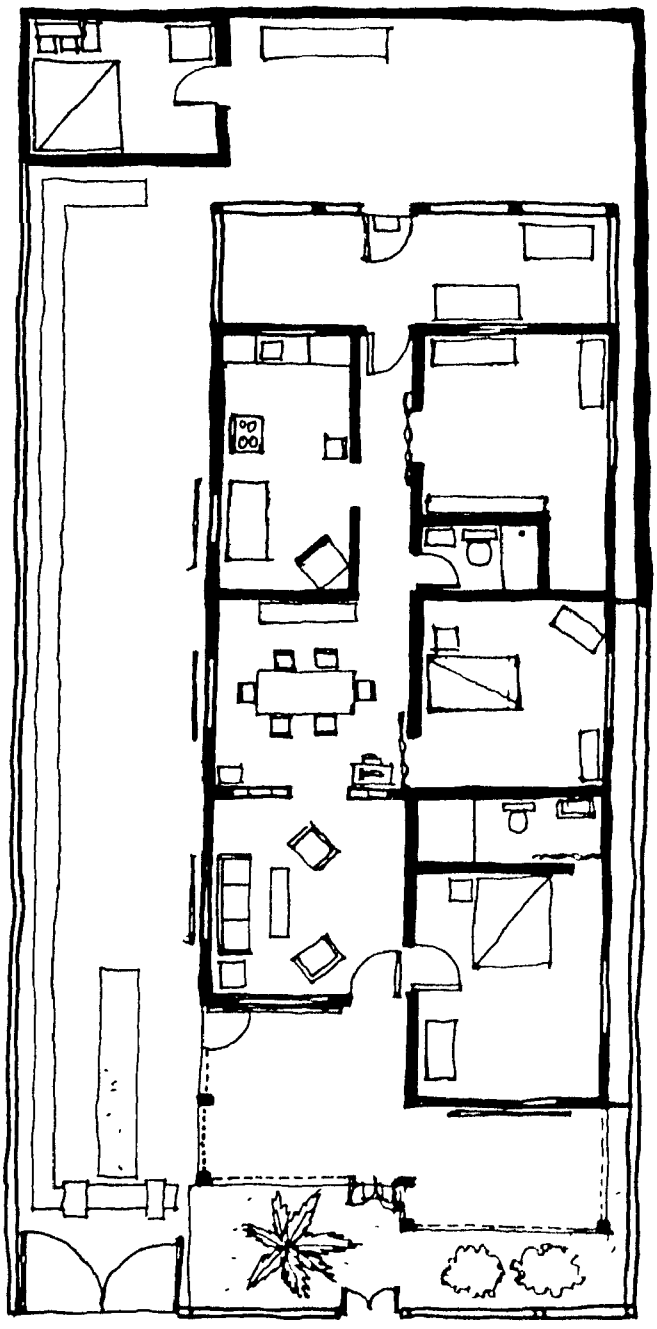
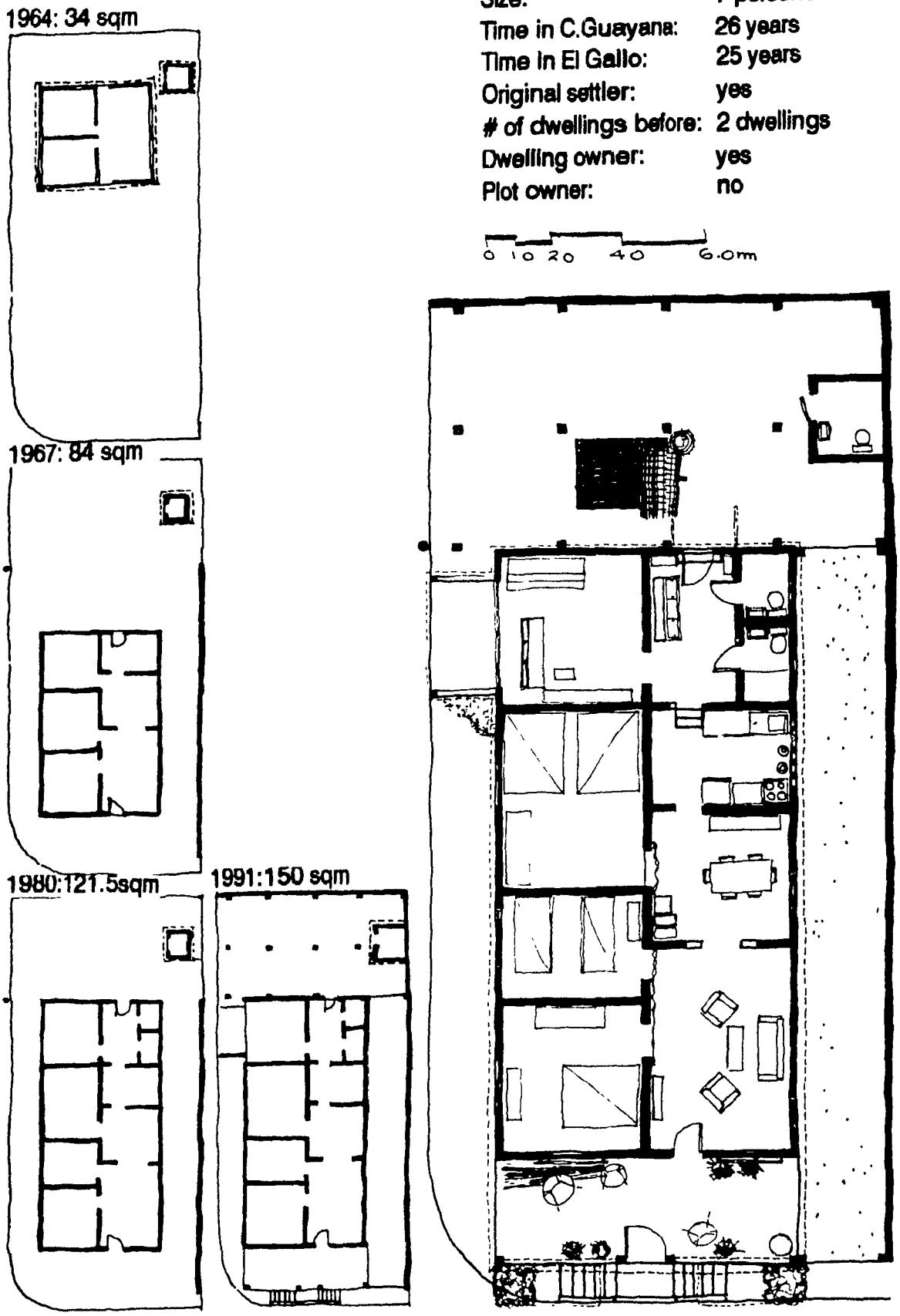


Fig.67 DWELLING #343, Group D, Corner plot/Household Characteristics

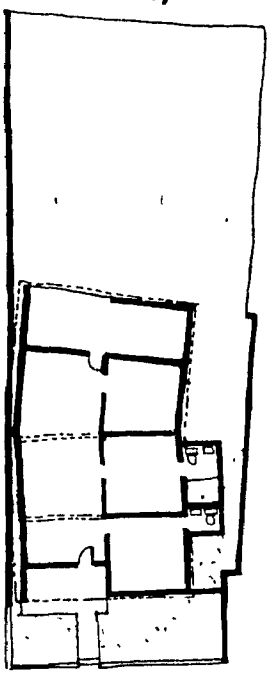
Size:	7 persons
Time in C.Guayana:	26 years
Time in El Gallo:	25 years
Original settler:	yes
# of dwellings before:	2 dwellings
Dwelling owner:	yes
Plot owner:	no



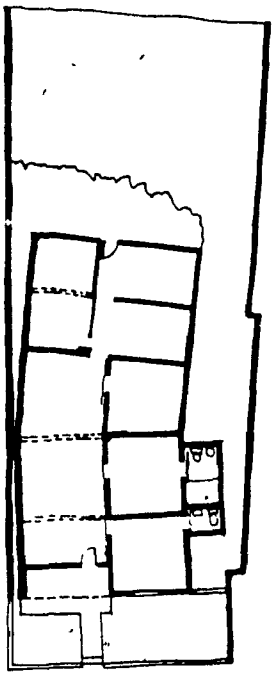
Household Characteristics

Size:	3 persons
Time in C.Guayana:	28 years
Time in El Gallo:	24 years
Original settler:	yes
# of dwellings before:	1 dwelling
Dwelling owner:	yes
Plot owner:	no

1974:128 sqm



1980:150.5sqm



1991:213.5sqm

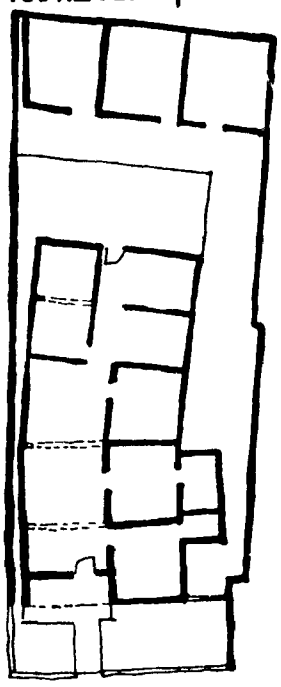
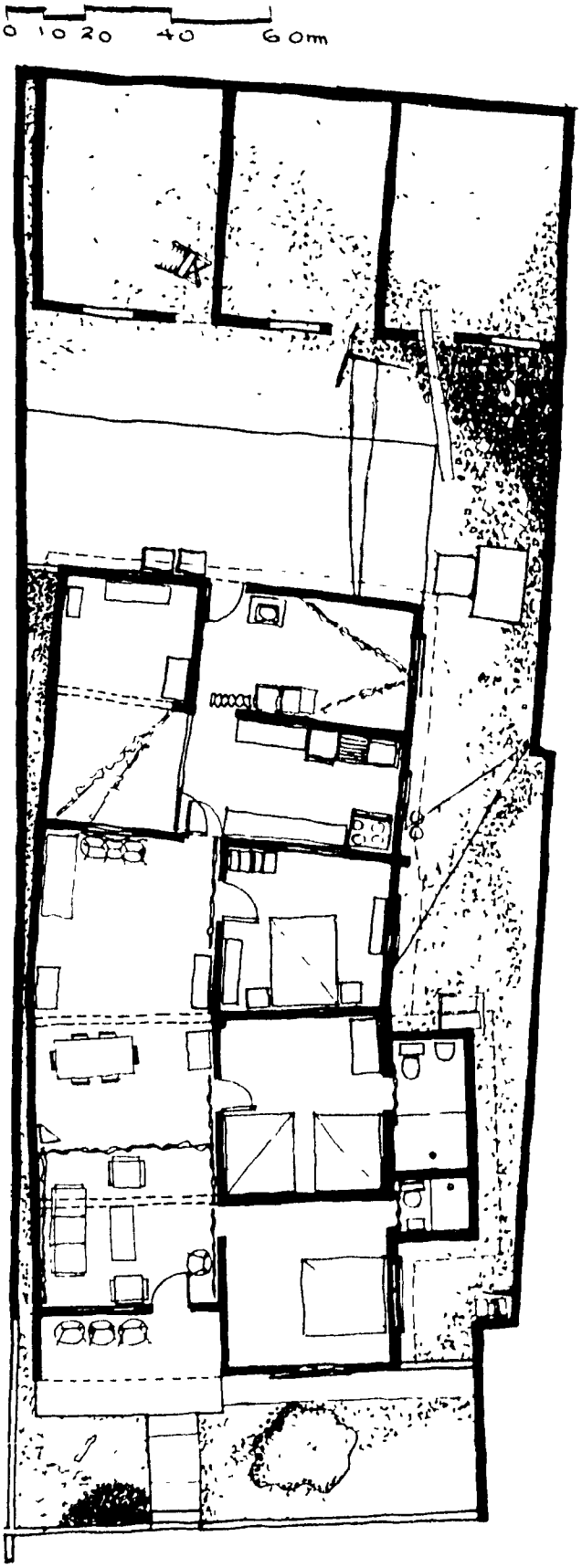


Fig.68 DWELLING #448, Group D. Middle plot/



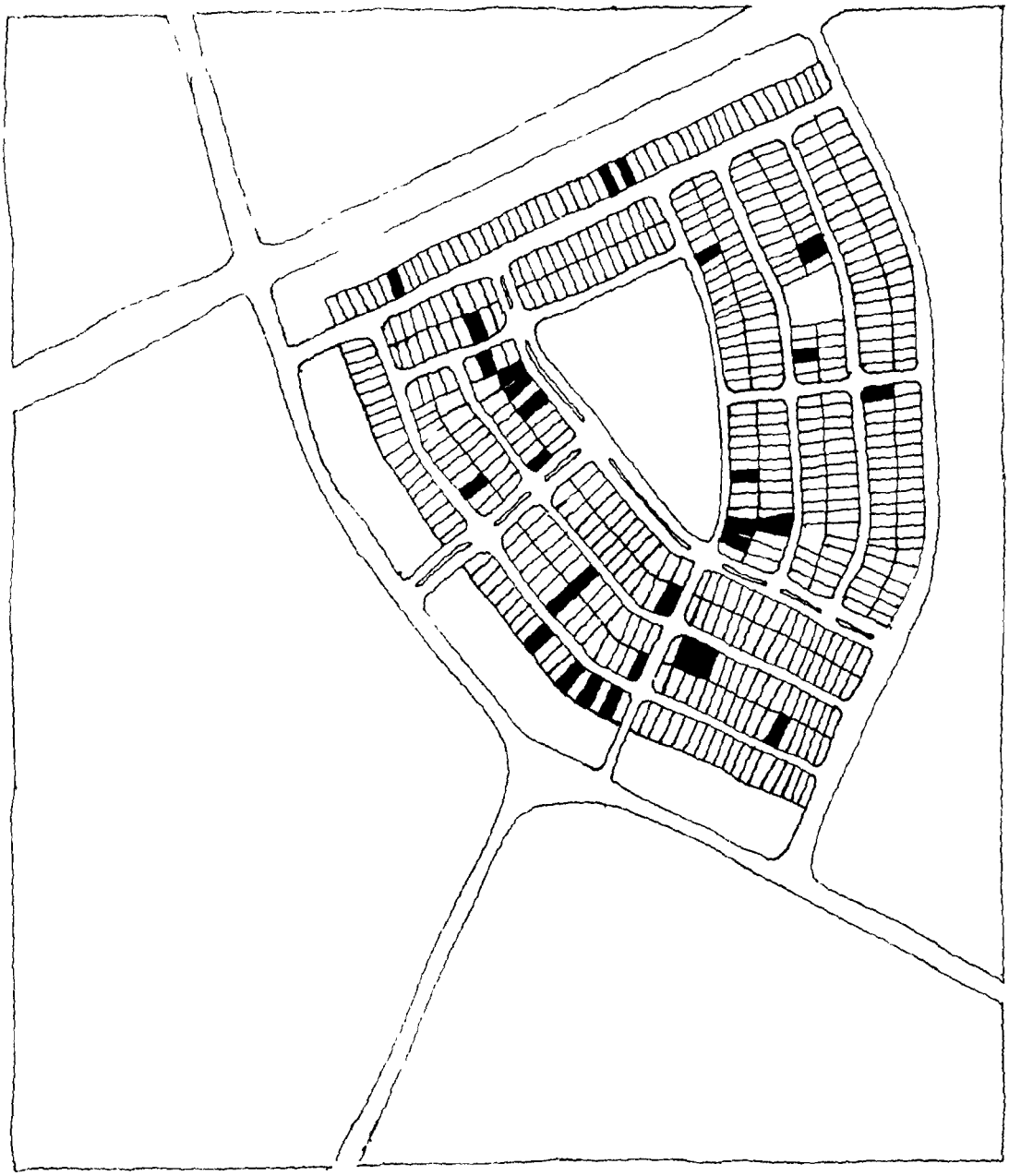


Fig.69 El Gallo, surveyed dwellings.

Appendix 2: Aerial Photographs (1967, 1980, 1987)

Fig. 70 El Gallo 1967 (Source: Venezuelan Ministry of Environment)


050158 053

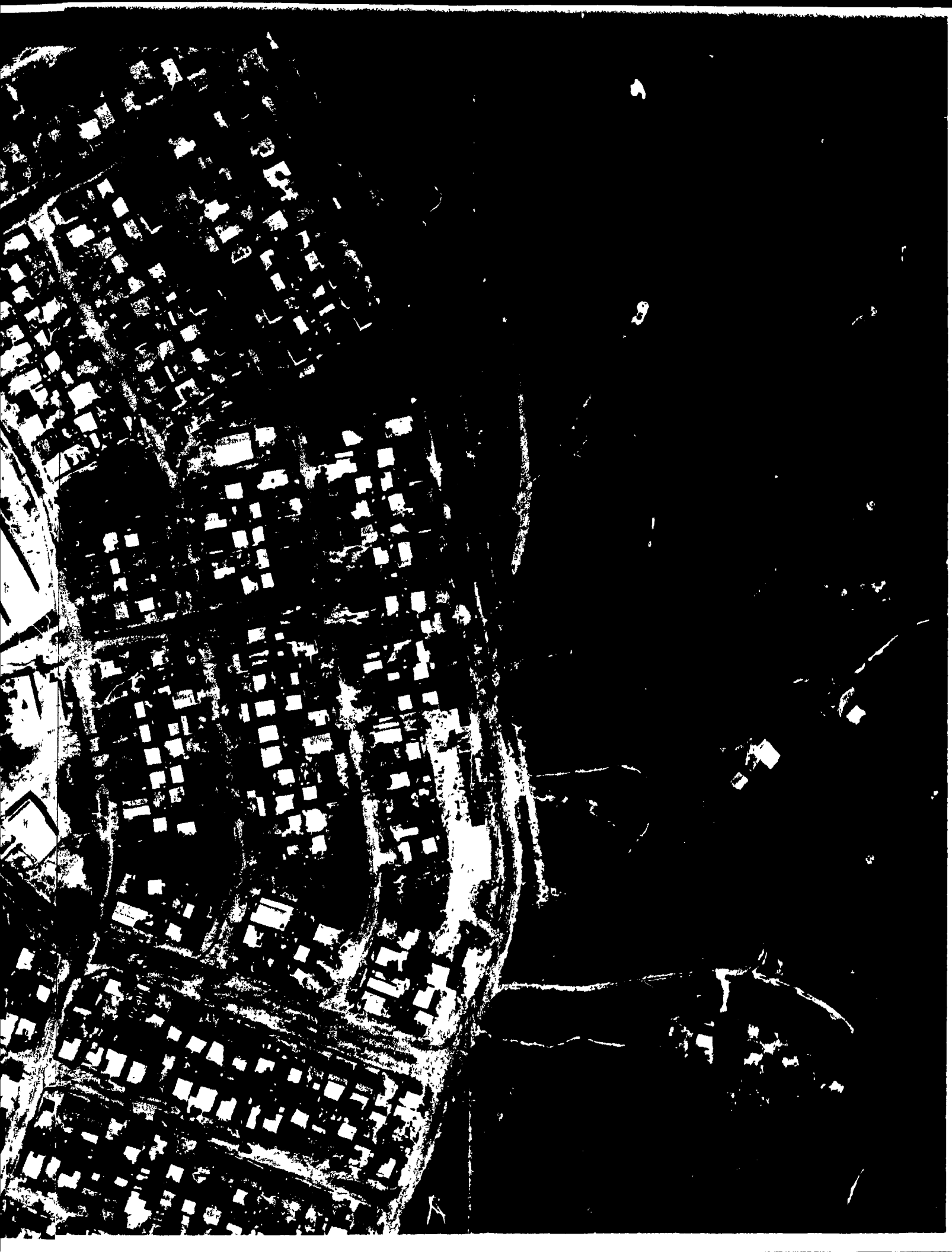
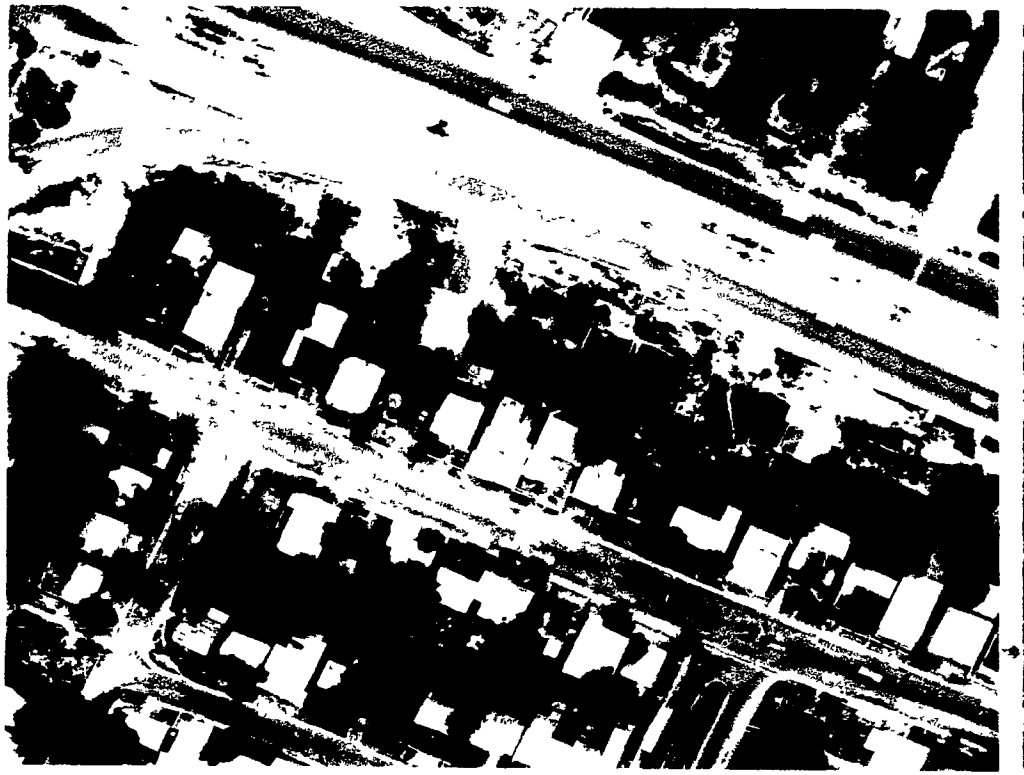


Fig. 71 El Gallo 1980 (Source: Venezuelan Ministry of Environment)



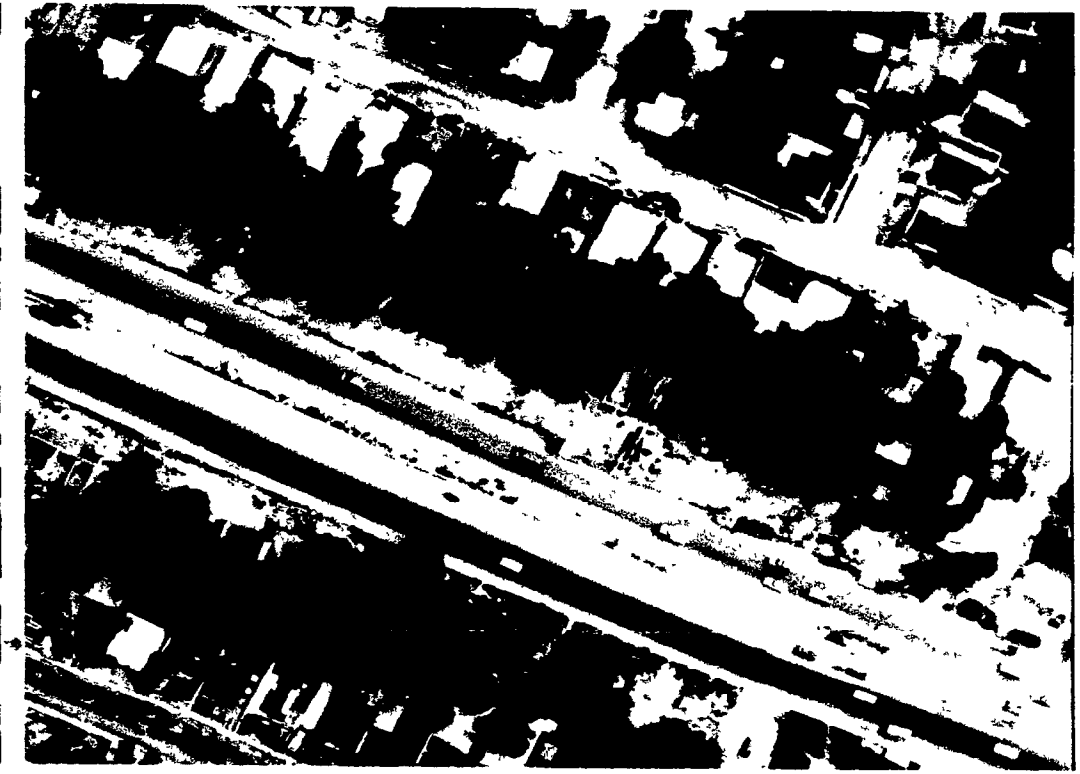


Fig. 72 El Gallo 1987 (Source: Venezuelan Ministry of Environment)