The Consolidation of Low Income Settlements in Brasilia: a comparative analysis[1]

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PRESENTATION

Claudio Acioly Jr. is a Brazilian architect, graduated in 1983, at the Faculty of Archtecture and Urbanism of the University of Brasilia, Brazil. He joined GEPAFI right after the implementation of Itamaraca project had been completed, which was GEPAFI´s first project. He took part on several upgrading projects, and in the formulation of plans and policy papers, in the design of housing projects and core houses. He became Candangolandia´s project coordinator.

In 1986 he came to the IHS for the 47th ICHPB, and was then invited to return for a Special Programme. This report is a summary version of the study developed in 1987, for which he deserved a special distinction.
After working as an Assistant in Education at the Faculty of Architecture of Delft University of Technology, the Netherlands, he was sent, in 1989, to Guine-Bissau by the Dutch Development Organization-SNV to occupy the post of architect at the Neighbourhood Upgrading Project of Bissau.

1. INTRODUCTION

This report is addressed to professionals involved with planning, design and implementation of Housing projects. Policy makers and decision takers will find it quite useful, as well, when (re)designing low income housing policies.
The subject of this report is the evaluation study of two low income projects implemented in Brasilia, between 1983 and 1985, when the local government carryed out a broad low income program which involved 8,317 families. The aim of the study was not to carry out a comprehensive evaluation of the program, called PAPE-"PROGRAMA DE ASSENTAMENTO POPULACIONAL DE EMERGENCIA', but rather it intended to evaluate the experiences of the Itamaraca and Candangolandia projects.

Three main considerations were behind the intention to carry out this study. Firstly, the necessity for an extensive and urgent evaluation exercise of the vast production of housing projects and urban layout designs.

Secondly, the State participation in the housing sector in Brasilia has provided several experiences in project design and policy implementation but have not been the subject of any kind of systematic evaluation.

Lastly, low income settlements' consolidation often occurs with residents' individual or collective efforts and very little support from the State, thus promoting agencies, planners, decision makers, designers, technicians have very little awareness about this process.

This study tries to assess the consolidation process taking place at the household level, called "housing improvements", and the efficiency of the progressive housing development approach applied for the first time in Brasilia. In this young pre-planned city, the government has always opted to provide conventional housing schemes and squatter (re)settlement to remote areas. This is a result of the centralized planning scheme which has ruled the planning sphere in Brasilia, leaving very little to individuals and private initiatives.

In this sense the study tries to emphasize the existence of self initiative within the scope of the projects; and presents the process through which residents implemented improvements in their houses, the way resources were mobilized and the reasons which led them to carry out such improvements.
Some attention will be paid to core house extensions, to evaluate the efficiency of the project design proposed, the solutions of the residents and their points of view about several project components.
Since the residents are the main actors in the housing improvement process and the key component in any evaluation study, their points of view and their most important concerns will be analyzed and used as one of the basis for the recommendations.

Another aspect of the study is related to project cost, which is an issue that has been undervalued in urban projects in Brasilia. Since it is a crucial matter in any kind of program, project or policy, the study attempts to analyze the urban layout designs applied in both settlements and its implication on project costs. It raises the implicit and explicit costs of each solution and the overall impact of these costs on target residents.

The study argues that the displacement of the original target income groups in these projects is related to such costs and to government urban land, housing and employment policies.

This is the first attempt to evaluate a government housing project in Brasilia, and certainly one of the very few conducted in Brazil in the form that it was carried out. On one hand, the Housing National Bank-BNH, in its 21 years of existence, conducted several evaluation procedures, however, they were mostly based on financial analysis schemes e.g. rates of return, total costs, employment and income generation ,etc. and eventually assessing the efficiency of a particular building material, building technique, production system, etc.
On the other hand, local promoting agencies have no tradition of carrying out evaluation studies on their projects. Thus a number of misleading approaches to project design and implementation are kept aside of any critical analysis - an analysis that could provide a chance for planners and designers to deepen their understanding about the consolidation of low income settlements and the process through which target groups achieve the benefits of the projects.

In this regard, evaluation studies arise as a specific area of study and require methods , support and an independent attitude from the professionals responsible for the task.
This report argues that evaluation is an important activity for generating information, it provides feedback to different stages of the project cycle and draws lessons from it for future projects.

A research was carried out during the second semester of 1986. A household survey was conducted using questionnaires, to a sample of 304 families, which represent more than 10% of the population of each settlements' universe.
A multi-method research technique was used in order to achieve more accurate data collection. The questionnaires were coded and analyzed through computer program, SPSS-PC (Statistical Package for Social Sciences for Personnal Computers), which became a very effective instrument for co-relating different information. In Chapter 6, the need for a methodological framework to carry out evaluation studies is emphasized.

Chapters 2 to 4 contain general information about the origin of the plan of Brasilia and the emerging housing problem in the city, with special reference to low income housing and an explanation about the program which promoted the experiences at ITAMARACA AND CANDANGOLANDIA.

Chapter 5, includes the description of both projects and a summary of essential data such as plans, location, number of families involved, density, implementation, costs, sponsor, etc...

Itamaraca was the first project implemented under the PAPE program, it is also the first slum upgrading project implemented in Brasilia, located in the fringe of the satellite city of Gama. The project provided 452 individual plots.

Candangolandia is a former labour camp, the first one constructed in Brasilia. It is a top location. It is located between the Plano Piloto and

the satellite city of Nucleo Bandeirante . Resident families were struggling for government recognition when the project started. It was the second largest PAPE's project: 2,236 individual plots.

Chapter 7 presents analytical considerations about project costs and its impact on the residents. The increase of housing expenditures with the cost recovery scheme to be applied by the Government of Brasilia is seen to have caused an impact on residents and their capability to afford living in the site. This is possibly opening the gate to a displacement process.

Chapter 8 presents the analysis of the layout design of both projects and its implications on the final cost of projects. It shows how a certain design can influence the costs of infrastructure and land which are important components in the overall cost of a project.

Chapter 9 describes several housing improvements undertaken in both projects. The implementation of a series of categories of improvements is presented as a range of improvement sequences which depend on residents' preferences, time and resources. This chapter presents a detailed comparison of these improvements in both projects.

In Chapter 10, presents an analysis of the core house project in Candangolandia, its performance and its capacity to facilitate the evolutionary process of housing improvements.

Chapter 11 presents the opinions expressed by residents about several project components. Their concern about general government policies were incorporated in the recommendations contained in the last chapter of this report.

The displacement process, which is present in every low income residential area in Brasilia, is explained in Chapter 12. The analysis centers on the fact that it is not a mere consequence of the increase of housing expenditures but a result of mistaken government urban policies.

Chapter 13 presents the general conclusions of this study. It underlines the importance of evaluation studies and the need for an accurate information regarding consolidation processes taking place at low income settlements. It argues for a shift in the relationship between clients and designers, clients and sponsors and the implementation of a more participatory policy.

Although this report is a very modest attempt to capture the dynamics of transformations in two low income settlements in an analytical and methodological framework, it may be the starting point for evaluation procedures in the city of Brasilia. It may also give a contribution to the studies over human settlement development processes in developing countries and help the professionals who are working on solving the dilemma of housing the poor.

2. THE BACKGROUND, THE URBAN AND HOUSING CONTEXT.

During the second half of the 19th century, certain concepts of city models started to flourish as rapid industrialization took place in Western Europe, claiming for the provision of adequate housing for the emerging urban labour. Urbanistic and architectural solutions were presented to solve health, socio-economic and political problems.

During the first half of the 20th century, through the CIAMs-International Congresses of Modern Architecture, these ideas gained strength and were formalised in its Charter of Athens and later by Le Corbusier´s works. They influenced the great majority of city plans put forward before and after the World War II.

This approach generated several variations not only in the continent where it was conceived, but also started and still continues to be the basis of much of the urban planning and design in Third World Countries. The most well known examples are Chandigarh and Brasilia, both fully pre-planned cities implemented in the 50´s in INDIA and BRAZIL, respectively.

The building of a new capital in the hinterlands of Brazil was inserted in Juscelino Kubitschek´s political program. As he was elected president of Brazil, in 1955, the decision to remove the capital from Rio de Janeiro was then materialized. The work submitted by architect Lucio Costa in a national competition, known as "PLANO PILOTO DE BRASILIA", was awarded with the contract and implementation began immediately. A network of labour camps for the workers was established by the government and building contractors responsible for different projects in order to provide housing to thousands of workers, traders, pilgrins, technical staff and so on, who marched towards the enterprise. On 21rst of april 1960, the new capital was officially inaugurated.

Throughout its 31 years of existence the State has strongly participated in the development of Brasilia, providing services, employment, housing and creating the main sources of income.
According to Costa´s Plano Piloto, the city was expected to reach 500 000 inhabitants after 25 years, maintanining its main characteristics as a terciary city and the seat of the national government. Surprisingly, the population reached 1,579,000 inhabitants in 1985, which means more than three times of what was estimated by the initial plan.
The city´s population growth rate was the highest among all brazilian state capitals in the last decade, jumping from 140,165 inhab. in 1960 to 537,592 inhab. in 1970, and 1,198,142 inhab. in 1980.

The existence of low income settlements(labour camps-acampamentos and squatter settlements-invasões) within the urban framework of the new capital was not tolerated by the authorities and the planning team. Several of them were bulldozed and families were evicted and moved to newly created satellite cities before the inauguration of the city.
This eviction policy continued until the end of the 70´s creating other satellite cities which have not resolved the dilemma of housing the poor. Several of these settlements still exist. Despite strict government control, these settlements continue its consolidation relying on the efforts of the residents.

At the end of the 70´s, the implementation of the city´s first master plan, PEOT-"Plano de Expansão e Organização Territorial do Distrito Federal" (Territorial Organization and Expansion Plan of the Federal District), consolidated in a total area of 5,771 km2 eight satellite cities: Nucleo Bandeirante, Taguatinga, Ceilandia, Brazlandia, Gama, Guara, Sobradinho and Planaltina. In 1985, the "planned" city of Samambaia and an are for urban expansion, called Aguas Claras, were both started.

During the 80´s, a small shift in State housing policies took place and a low income housing program was set up to meet the poorest groups, living in illegal settlements (invasoes and acampamentos). An independent unit was created to run the program and its first task was to carry out a census. The result was that in 1983, 89 settlements were mapped and 17,366 families were registered, an estimated number of 86,830 inhabitants.

As the result of the census was known, it became obvious that the four years of government inertia in the housing sector had caused the growth of squatter settlements, despite the strict police control over them. And so as the number of families subletting rooms in the satellite cities.
The replacement of the city governor and the committment of the new governor with urban development programs made possible the implementation of a low income program addressed to the poorest groups, with a different approach rather than the common eviction and resettlement solutions.
Despite sectoral efforts during different periods of city administration, the State has failed to provide housing alternatives to its many different income groups. Those in the most critical situations were the poorest groups living in satellite cities and illegal settlements.

The over-occupation of satellite cities was evident in residential plots where a new type of housing scheme developed. These were the tenants (inquilinos de fundo de lote) who occupied rooms/houses in backyards of plots, sharing services and sanitation facilities and paying very high rents.
The local government estimated more than 60 000 families living in this situation.
Furthermore, there are still some 100,000 families who have remained at the illegal settlements, which increases the estimated figure to 500,000 inhabitants, almost one third of the city´s total population living under critical housing conditions.

3. THE DEFINITION OF THE HOUSING POLICY: the PAPE program.

Originally, the program was named "Programa de Assentamento de Invasöes"(Squatter Settlement Program), but in its second year, during the budget allocation, it was renamed PAPE," Programa de Assentamento Populacional de Emergência"(Emergency Human Settlement Program). It started in 1983 and ended in january 1986.
An indepedent planning and project implementation unit was created to implement the program under the institutional scheme of the Social Service Secretary-SSS. It was called the GEPAFI-Grupo Executivo para Assentamento de Favelas e Invasöes (Executive Group for Settling Slums and Squatter Settlements). GEPAFI was a multidisciplinary team, and was formed by housing specialists from different local government agencies.
The target population was defined as those living in "non official" human settlements, labour camps and squatter areas, and residents were to pay a maximum monthly mortgage payment equal to 10 % of the Minimum Wage (MW = CZ$804.00 = US$55.30, Nov/86) which would be readjusted according to every minimum salary increase during a maximum period of 25 years.

The basic alternatives were:

a) "to upgrade the settlements (invasöes) where feasible and appropriate, or
b) to transfer the residents to new settlements created in nearby areas, or
c) to transfer the residents to residential areas established by the PEOT.

In order to choose the most appropriate alternative, each settlement should be looked at as a specific case. In any alternative, it will be necessary to provide plots, housing units, infrastructure and community services" (GEPAFI,1982:11)
The objectives of the program were to be fulfilled within the duration of the Governor´s term, from 1982 to 1984. These included: " To produce 20,000 plots serviced with water and electricity; To build 20,000 core units for residents of squatter settlements(invasoes);
To implement infrastructure for public use e.g. roads, public lighting, parks, etc; To build community services e.g. schools, daycare centers, health centres, telephone posts, post offices, police stations, etc;
To implement social development programs."(GEPAFI, 1982:12)

The program defined that the achievement of these main objectives would create an "increase of job opportunities in the building construction sector where the majority of family heads in these settlements, work".(GEPAFI, 1982: 13)

It stated, as well, that the implementation of social development programs "would stimulate people´s participation in the process of improvement and facilitate their adaptation to housing conditions in the new area."(GEPAFI, 1983: 13)
The GEPAFI established a conceptual framework which can be considered as very innovative for Brasilia. It gave emphasis to self-initiative among residents in solving housing problems and established a firm concept of housing as a process, in which an individual household would be responsible for further development and improvements on the unfinished core house provided by the Government.
"The conceptual basis of the projects implies that the population of each

locality and each family, in particular, will play an important role in housing improvements" (GEPAFI, 1984: 65).

The concept of **Housing as a process** is very clear in GEPAFI´s documents and proposals.
"The idea of housing as a finished object is set aside since it is a result of the designer´s concepts, with no concern to the real needs of the target population´.(GEPAFI, 1984: 71)
Concerning the concept of the core unit approach, " the red brick core house project has as a reference the evolutionary concept of housing. Though inappropriate in a short term period, it means an improvement step from the former house of the family. It intends to bring back the idea that a family must ´reconstruct´ its house constantly."(GEPAFI, 1984: 71)

It was never clear how people could participate in the process. Not in the implementation phase by providing their labour force, not in the early stages of the project cycle e.g. the definition of the problems and alternative solutions.

The origin of the **financial resources** is not explicit in GEPAFI´s reports. It states that the total cost of the program, including housing, infrastructure (priority to septic tanks solutions rather than a sewage network) and community services, would be estimated around 17,000,000 UPC, or US$124,440,000.00.
The cost per unit, including a plot and a housing unit, would be 300 UPC, or US$2,196.00.

4. THE INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION.

The situation in the housing sector was such that it was important to reactivate the government machinery in order to implement a housing program with such ambitious goals.
It was necessary to overcome the stagnant bureaucracy within state agencies and open the channels for decisions and implementing actions.

The SSS has been the government secretary responsible for housing matters. It had under its structure the local social housing agency-SHIS, which had been the biggest local implementing agency of the National Housing Finance System-SFH, during the 70´s. It has promoted the construction of almost 90,000 dwellings from 1962 to 1986 financed by the Housing Natinal Bank-BNH.
The creation of the GEPAFI in the institutional framework, showed in FIGURE 4.1, certainly re-activated the whole system involved with urban development programs in Brasilia. It provided an organization to which residents could direct their complaints and all other agencies involved with infrastructure services and facilities could refer to.
GEPAFI had easy access to decision makers and this really accelerated government decision and implementation, particularly, in some phases of the projects. It is noted that a very efficient scheme was organized in order to overcome any type of possible delays in the field work. Each project of PAPE had a Local Coordination Unit with a project coordinator and a representative of the Social Development Center concerned with activities in the areas where the projects were taking place (see FIGURE 4.2)

The GEPAFI became a very powerfull unit, responsible for policy making,

housing and urban development projects, problem formulation, census of squatter settlements, on site project management, technical decisions and full coordination of low income projects. The Housing Agency-SHIS became the financial agent of the program and was responsible to all contacts with building contractors and on site supervision of housing constructions. The local coordination scheme created by the GEPAFI for each one of the projects was responsible for the solutions for all problems related to implementation, community meetings, contacts and arrangements with other government agencies which were related to water, roads, drainage, electricity, demarcation of plots, building of core houses, etc... (see Figure 4.2)

Seven projects (listed below) were implemented in seven different satellite cities. Three projects were designed by private offices contracted by the Public Works Secretary-SVO.

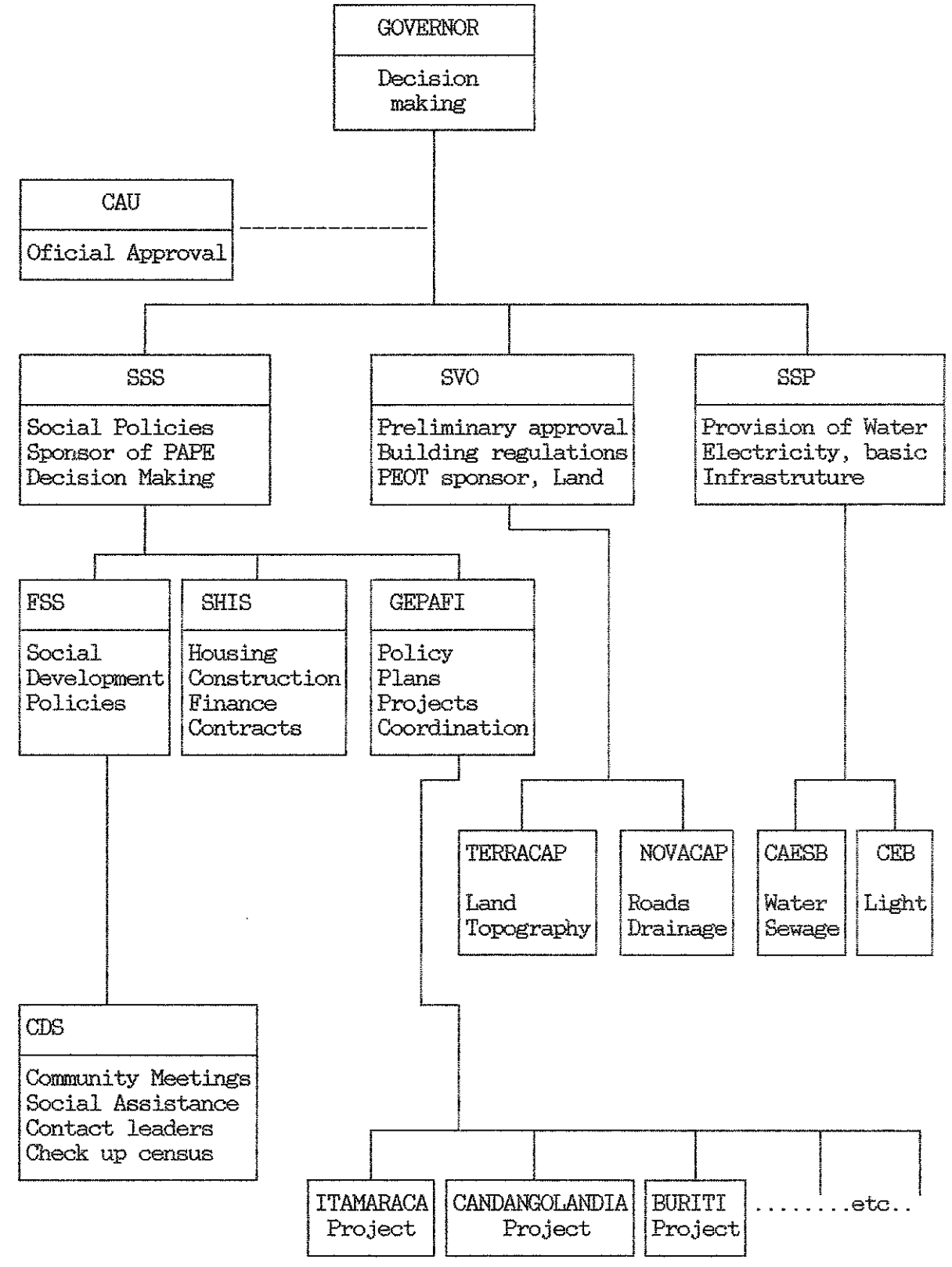
SATELLITE CITY	PROJECT NAME	NUMBER OF FAMILIES
Gama	Itamaraca	452
Sobradinho	Quadra 18	177
Brazlandia	Vila Sao Jose I-II	1072
Guara	QE 38	528
Taguatinga	QNL*	2864
Nucleo Bandeirante	Candangolandia*	2236
Planaltina	VIla Buritis II*	1000
total:	7 projects	8329

* Designed by private offices.

Although the program reached only 47.96% of the target population (17,366 families), and implemented only 41.64% of its intended program (20,000 plots) we might see PAPE as a quite successful program considering the time available and the number of plots provided in this period despite several constraints within the government machinery.

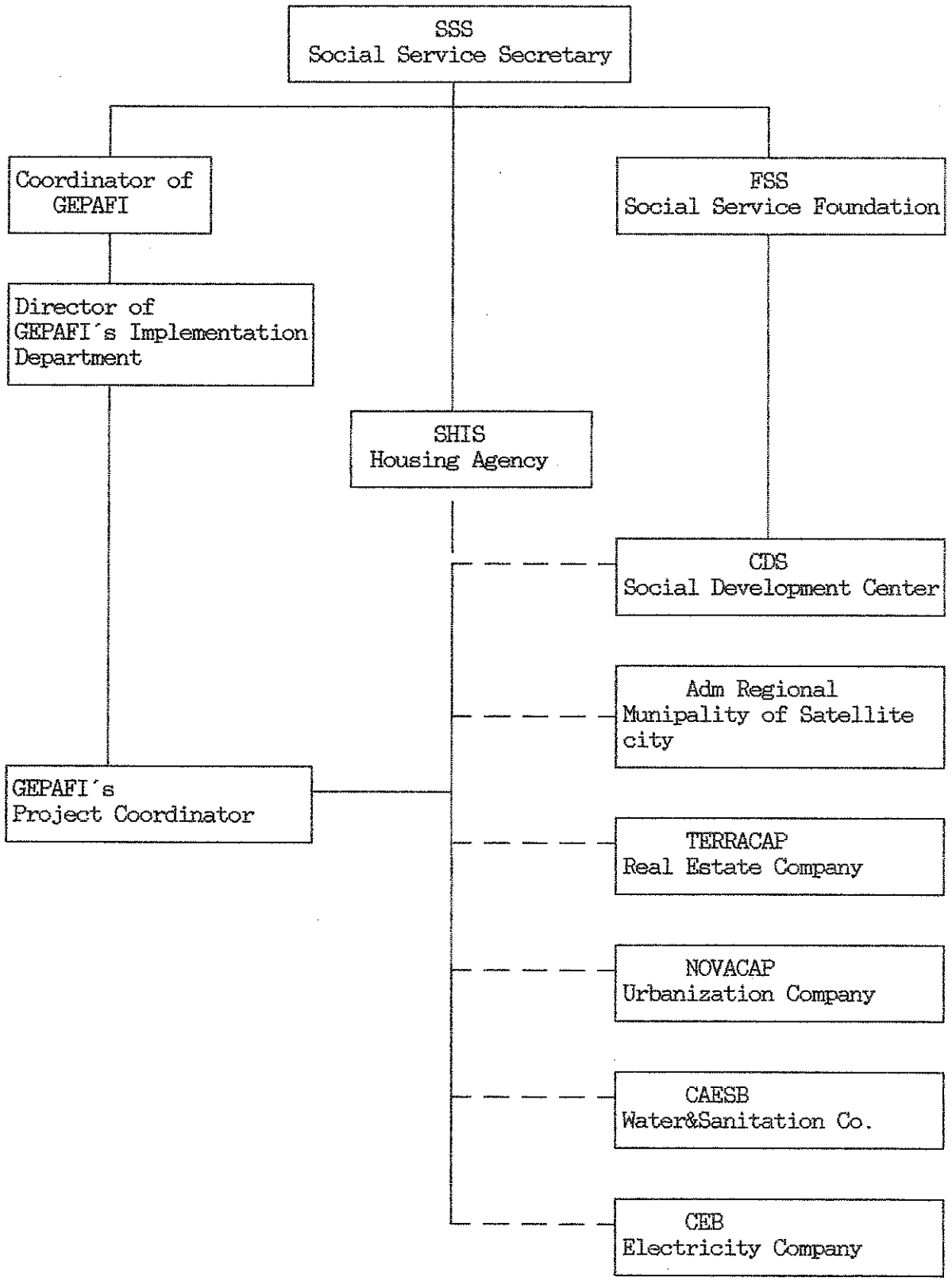
The most important constraint was, in fact, the existence and the implementation of PEOT-Expansion and Territorial Organization Plan, which is a plan that had been approved since 1978, under the responsability of SVO. While PAPE recognized the existence of squatter settlements and put forward the idea to upgrade them where they stand, under certain technical conditions, PEOT simply ignored the existence of such human settlements and implemented new housing schemes as far as possible from the centralized PLANO PILOTO. The conflicts among technicians and Government agencies brought out by two different concepts of urban development policies was then inevitable.

FIGURE 4.1: THE INSTITUTIONAL FRAMEWORK OF PAPE



LOCAL COORDINATIONS OF PAPE

FIGURE 4.2: FRAMEWORK FOR PROJECT IMPLEMENTATION AND THE LOCAL COORDINATION OF PAPE.



5. THE PROJECTS

5.1 THE ITAMARACA PROJECT.

This project is the first squatter upgrading project in Brasilia. It is located in the satellite city of Gama, 35 km away from the Plano Piloto. It was named after the Itamaraca Building Corporation.
During the first half of the 60's, when the construction of a popular housing scheme was under way, families built their shacks on the site and remained there until the project implementation of Itamaraca, in 1983.
The coming of the GEPAFI in the housing scene made the design and the implementation of the project possible in a very short time. It was so short that the residents only discovered they were going to be finally settled when the whole plan was already under way and the government machinery had been mobilized.
The CDS-Social Development Center of Gama got involved in the project with very little time to prepare the residents or to discuss the alternatives and project proposals. Everything was set to be imposed.
When project implementation started, the families did not realize that they were going to remain in their original plots, as specified by the layout design. They did not accept the scheme and requested to be relocated to the new plots created in the other side of the original settlement's location.
they were provided a cardboard core house, to be used as a temporary core house, and were allowed to use materials from former shacks.

5.2 THE CANDANGOLANDIA PROJECT.

Candango is the name used to call those who migrated to Brasilia in order to work in the construction of the city. Candangolandia stands for candango land, and it is the first labour camp built in the new capital, where public employees and workers were allowed to stay in the wooden houses, serviced with water, electricity and individual septic tanks or pit latrines. They received a document of authorization which was sold to other occupants despite prohibition on transformations or expansions on the existing structures. The government maintained strict control over the built structures and sometimes, even maintenance improvements were not allowed.
Families of varying socio-economic status occupied the area during the project implementation in 1985. In this period 787 families were settled in the project area. 244 families occupied what is known as the Velhacap, another labour camp located in the other side of the access road.

The layout design of the project considered the pre-existing settlement structures but during its implementation, every wooden house was demolished and families were relocated to red brick core houses in a different area. It was prohibited to use the wooden materials from their demolished houses for the expansion of core units.
The project was designed by a private office, contracted by the SVO, and residents were not included in any decisions until construction really started, and when the GEPAFI and the CDS of Nucleo Bandeirante started to hold continuous meetings to define the period of occupation, next door neighbours, families'registration, explanation of finance schemes, etc...
It is thought that the project area is geographically well placed. It is on the border line of the south exit highway and very near Plano Piloto with nice view of the Zoo and the airport.

The project created a lot of discussions in the local newspaper in which private housing speculators claimed that the area was more suitable for projects for higher income groups, and that the kind of unfinished type of houses built in the entrance of Plano Piloto was not according to the aesthetic discourse of Brasilia.

5.3 BASIC INFORMATION ABOUT THE PROJECTS.

All data provided in the following charts are summarized information about important issues which help to have a good picture of the projects.

ISSUE	ITAMARACA	CANDANGOLANDIA
ESTIMATED POPULATION	2,395 inhab.	11,180 inhab.
SITE GROSS AREA	11,10 ha.	62.22 ha.
AREA FOR RESIDENTIAL USE	6.04 ha.	30.51 ha.
TOTAL RESIDENTIAL PLOTS	452	2,236
GROSS DENSITY	215 inhab/ha	179 inhab/ha
NET DENSITY	441 inhab/ha	391 inhab/ha
PLOT AREA	120 m2	65 % 119-120 m2 19 % 120-160 m2 11 % 160-200 m2 3 % 200-260 m2 1.5 % 260-300 m2 0.5 % 300-... m2
PERIOD OF IMPLEMENTATION	july-december 1983	january-december 1985
PROJECT DESIGNER	GEPAFI	ENGEVIX, a private project design office contracted by SVO
SPONSOR	SSS, the Social Service Secretary, through SHIS and GEPAFI.	

ISSUE	ITAMARACA	CANDANGOLANDIA
LOCATION	Fringe of the satellite city of GAMA, 31 km of PP. It is located 40 km of the Central bus station of PP. Located nearby a commercial zone of the Eastern side of the city.	Between PP and the satellite city of Nucleo Bandeirante.Top location Fringe of the Zoo area, view of Airport. Located close to big shopping centers. It is 15 km from the Central Bus Station of PP.
ACCESSIBILITY	There are 6 bus lines in the route PP-GAMA. 2 lines serve the route to other satellite cities. 3 lines go to the eastern side of GAMA, where the Project is located. Access is difficult due to Project´s location: fringe. Access roads are unpaved.	There are 5 lines which connects Nucleo Bandeir. to PP and other places. An extra line serves the the settlement.Access is rather easy. South Exit Highway cross the fringe of Project site. Acess roads are all paved.
TARGET INCOME GROUPS	Residents of squatter areas of GAMA. Families earning less than 3 Minimum Wage. 78.77 % of families were in this category. 11.62 % had no income. 1 MW = US$ 55.30	Residents living in 15 squatter areas and 4 labour campings, all located in NUCLEO BAN-DEIRANTE. 63.48 % of the families earned less than 3 MW. 7.56 % declared no income.
SETTLEMENTS INVOLVED	Vila do Itamaracá, Gaminha, Setor Bancário Norte.	Acampamento: HJKO, DAE, Quacil, Velhacap and Candangolândia.Invasöes: Excedentes, Matadouro, Beco da Lama, Calu, Boca do Lixo, etc...
INFRASTRUCTURE PROVIDED	Serviced plot with individual connections to water supply and electricity systems. Public light installed. Sewerage system implemented but operation only started in 86. Unpaved roads served with underground drainage system.	Serviced plot with individual connections of water and electricy. No sewerage system. Unpaved roads with partly built underground drainage system. Main access road paved in 86. Public light available.

ISSUE	ITAMARACA	CANDANGOLANDIA
COMMUNITY SERVICES PROVIDED	Green areas available for children´s play ground and public parks. No school, no spaces available for public institutions: church, school, health centers, etc...	One existing school. A wooden catholic church declared a historical monument. 2 new schools & a small health center were built. Open public space occupied with the sunday market.2 children playgrounds and a park already built.Commercial plots available, one is already occupied.
RESIDENTS´ SOCIAL ORGANIZATIONS	There is one residents´ association and a newcomers´ organization. There are several religious groups well organized.	There is a residents´ association and one community organization, both claiming to be the legal representative of residents. There is a vendors´ association and several religious groups well organized.
COMMUNITY PARTICIPATION	No participation in decision making at any stage of Project cycle.	Every settlement had a legal organization which took part in decisions at the implementation phase: transfering and occupation schemes, rights of non listed residents. Efficient participation in this stage.
HOUSING OPTION	Serviced plot plus a wooden provisory core house of 23 m2. Sanitary facilities in the hands of residents.	Serviced plot plus a red brick core house of 31.35 m2. A sanitary facility is provided: individual septic tank.
CONSTRUCTION OF CORE HOUSE	Building contractors were hired by SHIS to execute the work. Technical supervision of construction and the financial resources were provided by SHIS as well. Resources allocated from Local Government´s fund.	
JOBS CREATED (directly)	884 jobs	2,683 (based on the data available for Itamaracá)

ISSUE	ITAMARACA	CANDANGOLANDIA
COST PER CORE HOUSE at 1986 rate.	US$ 183.67 (one hundred and eithty three Dollars and sixty seven cents).	US$ 807.00 (eight hundred and seven Dollars).
TOTAL COST PER DWELLING (based on the total cost of Project)	US$ 2,602.22 (Two thousand six hundred and two Dollars and twenty two cents).	US$ 1,756.97 (One Thousand seven hundred fifty six Dollars and nighty cents).
PROJECT FINANCE	Residents are asked to pay a monthly mortgage payment not exceeding 10 % of MW for a period maximum of 25 years, or 300 payments. Prices are annually updated according to the rates used in the raise of salaries. Total debt will be adjusted as well according to regulations of the National Housing Finance System,SFH.	
TOTAL COST OF PROJECT	US$ 1,176,202.91 (One million one hundred and seventy six thousand two hundred and two Dollars and nighty one cents).	US$ 3,928,578.02 (Three million nine hundred and twenty eight thousand five hundred and seventy eight Dollars and two cents).
DEVELOPMENT APPROACH	Future core extensions and improvements will depend on individual or families´ self initiatives. No support from Government. In 1986 some financial schemes were set by Foundation João XXIII and CDS to help with connections to sewerage system. Settlement development will depend on the investments put progressively by the Government.	Municipality of Nucleo Bandeirante provides 9 different models of core house extension free of charge.Improvements will depend on residents´ capacity. A program was set up to help poorest residents to built plot division walls using soil-cement blocks but it stopped after short time. Investments have been made in the area: paving, open market area, schools and health centers.

6. EVALUATION AS A FIELD OF STUDY.

From the 70's onwards, evaluation rose as a specific area of study with a considerable number of reports produced, not only in the matter of project performance but also on evaluation techniques, evaluation approaches, methodology and theoretical analysis.

The reports produced may differ from one another in terms of approaches but they are often based on similar framework, " all such reports, it is agreed, should define the projects objective, assess the way which it was implemented; and at the end of the day, compare the intended and the achieved, the rate of return (economic and financial), the total cost, output levels, completion dates, effects on target groups." (Mosley, 1983: 593)
According to the World Bank's guidelines, the aim is to promote monitoring and evaluation procedures from the preliminary planning stage to final implementation of projects, so existing gaps and constraints could be detected in order to achieve best performance at every stage of the project cycle of subsequent projects.
So far, its reports have maintained some basic characteristics: there is a strong emphasis on economic performance of projects, a cost-benefit analysis and quantitative measurements of projects' achievements; most of the reports are produced after completion of projects and at the end of the project cycle.

It is argued here that evaluation procedures have an important capacity to generate information, to provide feedback in the planning process and to assess the impact of a particular project on a certain social group.
It is concluded that evaluation is a learning process and should take place not only at the end of the project cycle but it should be a continious process occuring at the different phases of the planning scheme.
This report pays attention to the latest phase of the project cycle and analyzes the development of two Government sponsored human settlements.

6.1 THE METHOD EMPLOYED.

The method employed in this study consists of several activities which overlap each other:

a) the application of questionnaires.
b) the application of informal interviews, sometimes tape recorded.
c) the analysis of the reports, documents, memoranda and information provided by government agencies involved in the projects.
d) the analysis of local newspapers.

Besides these main activities, the professional role of this author was significant in the analysis of the data collected. He was also involved with policy inplementation and project design as a member of the project team of the GEPAFI. Specifically, he was project coordinator of the Candangolandia project from february 1985 to december 1985.

The research was carried out in such a way to ensure that any information missed would in one procedure, could be recovered by another procedure and this was a means to include all sources of information which could help in

the perception of the life in the settlements.
At least, the intention for implementing different methods of research was to achieve a broader and more qualitative view of the universe which this report is concerned with.

6.2 THE SAMPLE

Since the research was not supported, financially or materially speaking, by any private or public institution, it was not possible to implement a 100% household survey.
The choice fell on a research based on a sample. The definition of the sample was based on 10% of the universe, defined by a set of criterias.

In the case of Candangolandia, 250 households were surveyed which represents 11.18% of the total 2236 households.
It was not a random process which could have given every household equal chance to be chosen. The settlement was occupied during different periods by different communities with different social-economic background, located now in different sections of the settlement, and this was relevant when defining the areas to be covered by the survey.

In the case of Itamaraca, 54 households were surveyed which covers 11.94% of the total 452 households.

The total number of 304 households surveyed is 11.30% of the total 2688 households of the two settlements which represents a good base for analysis.

The multi-method approach employed in the research formed the methodological basis of this study. It proved to be a very efficient approach to the analysis of the projects of Candangolandia and Itamaraca. The results presented in the following pages demonstrate the dynamics at low income settlements and emphasize to planners, designers and decision makers to regard this process very carefully.

The following chapters will describe what was proposed, the impact and the costs involved in each one of the projects. An analysis will also be presented on the most important project components such as costs, design, housing improvements, impact on residents and their opinions on what was provided by the government of Brasilia.

7. PROJECT COSTS

7.1 PROJECT COSTS IN CANDANGOLANDIA

FIGURE 7.1, shows the costs of the project components in Candangolandia. The cost of the core houses is 290,88.64 UPC, or US$2,128,926.70. It is far the most expensive component, 54.19 % of total project cost, followed by Administration costs(tax,fee,interest), 74,332.15 UPC or US$ 544,014.71, representing 13.85 %, and Land, 58,136.00 UPC, or US$ 425,479.94, with 10.83 %.

FIGURE 7.1 : Project Costs for Candangolandia

	UPC	US$	Perc. %	UPC per unit	US$ per unit
LAND	58,136.00	425,479.00	10.83	26.00	190.28
TRANSFERING	5,425.00	39,703.95	1.01	2.43	17.75
TAX,FEE,INT.	74,332.15	544,014.71	13.85	33.24	243.29
ELECTRICITY	28,350.96	207,492.14	5.28	12.68	92.79
WATER SUPPLY	29,338.74	214,721.45	5.47	13.12	96.02
DRAINAGE	21,045.29	154,024.16	3.92	9.41	68.88
ROADS	21,412.64	156,712.67	3.99	9.58	70.08
PREPARATION	2,769.99	20,272.73	0.52	1.24	9.06
DESIGN	5,086.91	37,229.57	0.95	2.28	16.65
HOUSES	290,888.64	2,128,926.70	54.19	130.09	952.11
TOTALS	536,786.32	3,928,578.02	100.00	240.07	1.756.91
Monthly payment per unit (5 % real interest basis in 25 years time)				1.39	10.16

The big proportion of administration costs is due to the management arrangements of the Housing Finance System-SFH, in which the SHIS is the local implementing agency. It shows how the resources exhausted to make the system feasible, and undoubtedly how local housing agencies, as well as the Housing National Bank-BNH gained from projects like this.
The individual costs of the infrastructure components were not too different from each other in absolute values. Together, they represet 44.79 %, almost half of the total project cost. Since roads were unpaved and surfaced only with compacted local gravel, its cost is not so considerable. Plots were provided at a symbolic price, therefore the cost of land is not so significant as it should be.
The total cost of the project including land, infrastructure and

administrative costs is 536,786.32 UPC (US$ 3,928,578.02) and 240.07 UPC or US$ 1,756.91 per unit.
As it is stated in the norms of the National Housing Finance Sistem, the mortgage period was set for 25 years, considering a rate of 5% real interest for this period of time, residents would be required to pay a monthly mortgage payment of 1.39 UPC or US$10.16.

It is difficult to convince anyone that residents would be able to afford, and be willing to pay such an amount which represents a big proportion of their monthly income. However, the fact is that the amount of US$10.16 already represents 10 % of the average family income in Candangolandia. That part of their income was originally committed to recurrent expenditures on housing such as water, electricity, land taxation, etc.... This calls for an arrangement in the repayment scheme which considers this proportion very seriously. Otherwise, residents will not be able to cope with the impact of project costs.
The survey revealed that families are already paying land taxation-IPTU on their plots. This is an average of CZ$97.69 (US$ 6.71) per plot in Candangolandia. Since the annual payment can be given in two installments, it is argued that during the months when residents pay these installments, 3.03 % of their family income is committed to this housing expenditure item.

Looking deeper into the existing recurrent expenditures on housing among the residents, it is possible to build a clearer picture of the limitations families have in coping with future cost recovery schemes.

The recurrent housing expenditure, shown in FIGURE 7.2, includes the costs of water, electricity and transportation. Families´ monthly expenditure on housing reaches an average of CZ$ 178.15 (US$ 12.25) per family. It represents 11.07 % of the average family income in the settlement.

Due to the peculiar urban network in Brasilia and the centralised role played by the Plano Piloto, housing cannot be separated from the issue of transportation. Accessibility and the resulting transportation costs are very crucial elements in the assessment of the viability of low income projects.
Many low income residents work a few miles away from their homes and not everyone is provided transportation by his or her employer, which is very common in Brasilia. The transportation component becomes an extra cost on the family budget.
According to Bamberger et al (1982: 116), "it has usually been assumed by the World Bank and most other housing institution that a family can afford or should spend a maximum of between 15 and 25 percent of their income on housing. A proportion within this range has usually been used as guideline in the estimation of project affordability".
In the case of Candangolandia, the family recurrent expenditure on housing is at the borderline. Any increase in expenditure or any decrease in family income will create a lot of problems affecting families´ affordability.

The average of 2 MW was considered the reference income. Before participating in the project, 41.93 % of the families belonged to the under 2 MW income range. It is obvious that a substantial number of families will be having problems to afford living in the project area, with this commitment in their income.

FIGURE 7.2: AMOUNT OF RECURRENT EXPENDITURES ON HOUSING

MIDPOINT VALUE in CZ$	FREQUENCY OF CASES	MEAN in CZ$	MEDIAN in CZ$
23	49	178.15	126.50
82	56		
141	55		
200	35		
259	18		
318	08		
377	08		
436	02		
495	05		
554	02		
613	02		
672	04		
731	00		
790	03		
849	01		
908	01	Missing cases: 0	
967	01	Valid cases: 250	

1.00 US$ = 14.538 CZ$

The social economic data available demonstrated that a reasonable number of families do not have a steady source of income, and in Candangolandia, 7.56 had no steady income at all. We can predict occasional difficulties for families to afford living in the site in case any variation in family income takes place.
It was earlier mentioned that when land tax is paid, 3.03 % of the family income is committed to this payment. Adding the 11.07 % for recurrent housing expenditures, the residents therefore committ 14.10 % of their monthly family income on Housing. Under the cost recovery scheme of the project, residents would have to pay 1.39 UPC per month (FIGURE 7.1), which represents 10 % of the average monthly family income. This means that in a year, almost 25 % of family income is spent on Housing. It is to be noted that the costs of housing improvements, core unit extensions were not included among the items of housing expenditure.

If land is acquired at a free market price, the overall cost of the project would differ completely. In the case of Candangolandia land at free market price will increase the overall cost of the project to 3,574,165.35 UPC (US$ 25,704,741.71) and the mortgage monthly payment for a period of 25 years, 5% real interest, would increase from 1.39 UPC (US$10.16) to 9.24 UPC (US$67.63). The difference between the project government cost and its cost with land at market price is approximately 8.0 UPC (US$ 57.47) of subsidy on land per family.

It is very interesting to speculate more about the cost of land and its implication on project costs. It brings the evidences that if housing projects would not receive some kind of Governmental subsidy, they would

become unsuitable for low income residents, specially for the case of Brasilia. If we look at the Real Estate Public Auction of september 30th 1986, it is possible to build a figure with an estimated price of CZ$147,400.00 (US$ 10.138.94) per plot. Note that residents are rating their plots, without improvements, at mimimum price of CZ$140,000.00 (US$ 9,629.93) which represents a price per square meter higher than in high income residential areas, and this underlines the issue of State ownership of land and its side effects on land market. The case of Brasilia demonstrates that this ownership does not guarantee easy access to land, on the contrary, it causes more constraints than facilities.

But if we look at what residents are actually asked to pay, a maximum monthly mortgage payment equals to 10 % of MW, updated according to the rates used to raise the minimum salary, then we assume residents will pay 0.7556 UPC (US$ 5.52) per month (rates of 1986). When we compare with the values based on market prices, it leads us to the conclusion that there is in fact a high subsidy implicit in the costs to be recovered from residents, 92.00 % subsidy all through land.

Considering the values shown in FIGURE 7.1, which are the real and official financial figures of the project, the amount of subsidy is the difference between 1.39 UPC and 0.7556, or US$ 4.64, which is 54 % of subsidy trough land. Taking into account the average family income in the settlement, it is assessed that residents are able to pay more than what they are asked to pay, however this does not imply the possibility of cutting off the existing subsidies.
As a conclusion from the case of Candangolandia, we are able to state that:

first, the expenditures on housing already reaches the borderline of the affordability limit of 25 % of family income which gives some indications for future difficulties to be faced by residents.

Second, the amount of family income committed to housing expenditures does not include the costs of housing improvements implicit in the progressive development approach applied in the project e.g. extensions of core house, connections to infrastrucuture network, purchase of building materials, maintenance, etc...

Third, as soon as the monthly mortgage payment starts to be payed, it is possible to foreseen some impact of project costs on beneficiaries, and it can be more critical in case the amount to be charged does not consider carefully the weight of other expenses in a household budget.

Fourth, several items such as beginning of school year, clothing, raise of food prices, transportation, raise of land taxation, etc... influence the amount of financial resources people is able to committ to housing. These elements are likely to increase the range of difficulties.

Fifth, the Social Housing Agency-SHIS should be aware of the variations that very often occur in poor families´income when formulating the cost recovery scheme. It should consider the costs of project, the costs of recurrent expenditures and the costs of housing improvements.

Sixth, residents are asked to pay less than what they are in fact able to

pay. Nevertheless, the amount of subsidy through land should exist in order to make projects, like Candangolandia, affordable to low income residents.

7.2 THE CASE OF ITAMARACA: an attempt to lower the standards.

The case of Itamaraca was an attempt to lower project standards and achieve cost efficiency through the provision of houses.
The core units were financed by a social assistance institution and were supposed to be donated to residents; however, several families paid fixed installments during certain periods of time. The cardboard core unit was intended to save time and resources but the result, in terms of costs, proved a vain attempt. Beside the fact that this scheme created a lot of difficulties for the residents, it also did not make any significant impact on the overall project cost.
A breakdown of project costs is shown in FIGURE 7.2., The biggest cost component is made up by Benefits (water/electricity connections in the plots) 16.83 % of total cost, followed by the Sewage system, 16.80 %, and Drainage system with 15.58 % of total cost.

FIGURE 7.2: PROJECT COSTS IN ITAMARACA

	UPC	US$	%	UPC per unit	US$ per unit
LAND	11,752.00	86,009.36	7.31	26.00	190.29
BENEFITS	27,052.00	197,985.47	16.83	59.85	438.02
TAX,FEE,INTEREST.	15,026.00	109,970.79	9.35	33.24	243.30
ELECTRICITY	12,580.00	92.069.25	7.83	27.83	203.69
WATER SUPPLY	20,200.00	147,837.74	12.57	44.69	327.07
SEWAGE SYSTEM	27,000.00	197,604.90	16.80	59.73	437.18
DRAINAGE	25,036.00	183,230.97	15.58	55.39	405.38
ROADS	8,939.00	65,421.86	5.56	19.78	144.74
EROSION MITIGATION	13,127.00	96,072.57	8.17	29.04	212.55
TOTALS	160,712.00	1,176,202.91	100.00	355.56	2,602.22
Monthly payment per unit (5 % real interest, period of 25 years)				2.06	15.04

The cost of roads is insignificant because it was implemented by the Local Administration (Municipality of GAMA) and it consisted of a very elementary process of cutting off the alley and compacting the surface with preliminary gravel. The cost of the wooden core house was not included because it was a donation from a NGO Social Assistance Foundation.

Residents of Itamaraca were expected to pay a monthly mortgage of 2.06 UPC (US$15.04) in 25 years at a 5 % real rate of interest.
The survey revealed that residents are paying more for land tax in Itamaraca than in Candangolandia. In the former the average amount of CZ$159.39 (US$ 10.96) and in the latter CZ$97.69 (US$ 6.71).
This is an excessive rate for a settlement located 40 Km from Plano Piloto, more than twice that of Candangolandia; its population is poorer, and have more difficulties due to its limited employment areas,, lack of several basic services in the settlement, the presence of provisory core unit, etc.

Housing recurrent expenditures among families in Itamaraca did not seem to vary, however, residents are spending 1.69 % more than the families in Candangolandia. Families in Itamaraca committ an average of CZ$154.00 (US$ 10.59) monthly for water, electricity, sewage, transportation. This represents 12.76 % of the average family income.
As in the case of Candangolandia, it is assumed that during two months, when land tax is paid, families in Itamaraca committ 19.36 % of their average income on housing after adding on the two instalments for landtax which represents 6.60 % of the average family income.
The monthly mortgage payment of 2.06 UPC (US$ 15.07) represents 30.94 % of the average family income in the settlement committed to housing. This brings the families in Itamaraca 5.94 % above the maximum affordability level and this monthly mortgage paymment is likely to become a severe burden on the family´s income.

The population of this settlement is rather poor with very little chance to generate income from informal market activities, the provisory core unit forces residents to a permanent investment on the maintenance and improvement of their houses, and the proportion of family income already committed to housing is already far above the maximum accepted limit of 25 %. The conclusion drawn from this fact is that the project is unaffordable by the target population.
Even with implicit government subsidy through the provision of land, the project still remains beyond the means of the residents.

7.3 COMPARISON OF PROJECT COSTS.

There are some peculiarities in each project which does not allow the direct comparison of project costs.
The scale and scope as well as the services provided in each one of the project differ significantly.
A sewage system was introduced in Itamaraca, while in Candangolandia the red brick core unit with an individual septic tank was provided.
In both projects, the sanitation components were the most expensive item in the overall cost.
In the comparison of costs between each project, the following preliminary conclusions are presented:

1. Compared to Candangolandia, the overall cost of infrastructure in Itamaraca increased by 58.34 % while land cost decreased by 7.31 % of total cost. This has to do with the scale of the projects, the number of plots provided and the quantity of land addressed to other uses rather than residential.

Even though Candangolandia has 4.94 times more plots than Itamaraca, its project cost is only 3.34 times more than that of Itamaraca. It seems that the scale of the Candangolandia project permited more efficient use of infrastructure and consequently more dwellings were served, sharing lesser cost per component.

2. The proportion of land cost in Candangolandia is higher because obviously the project required more land for housing as well as for social infrastructure such as schools, health centres, playgrounds, churches, etc. Besides, there are several different sizes of residential plots in Candangolandia while in Itamaraca, it is a uniform size of 120 m2.

The GEPAFI emphasized that projects should have a maximum of 500 plots to optimize the use of infrastructure and facilities available in satellite cities where they were located. The logic was to avoid the investiments on the provision of community services which would naturally be necessary in large scale projects. The analysis of project costs has demonstrated that Itamaraca seems not to be a good example of this principle. Residents complained about the long distances to school, health centers and market places located in the satellite city of Gama but the settlement's scale does not demand the implementation of such facilities. If so, costs would be beyond any means of the population.

If the provision of two schools, a health centre and playgrounds were included in the cost of Candangolandia, the cost of this project would correspondingly increase.
In the assessment of project costs, it is necessary to look at these projects from the point of view of the benefits they produced over a short and long term period.

4. Considering that Itamaraca does not provide any community service and it is, proportionally speaking, more expensive than Candangolandia, it is argued that large scale projects produce better use of financial resources whenever they are based on an efficient and appropriate urban layout, which consequently means an optimization of infrastructure and land.
They may produce better benefits to residents and may provide better chances for the development of activities to generate income in the process of housing improvements and in the increase of the household living standard.

5. Looking at the costs of each project and the expected impacts on residents, it is wise to suggest that there are some aspects which should be considered in the design and formulation of future projects.
There is a need for deeper studies on project standards to produce more appropriate projects for a particular socio-economic group.
It is necessary to spend time and resources on research at the project design level in order to achieve more efficient settlement layouts.

6. Column "UPC PER UNIT" in FIGURE 7.2 demonstrated that every component's cost per unit in Itamaraca is higher than it is in Candangolandia (FIGURE 7.1). It suggests that the design applied in Candangolandid allows a more efficient quantitative share of project components'cost per dwelling, but only an analysis of both designs will allow a reliable statement.

8. IMPLICATIONS OF THE LAYOUT DESIGN ON PROJECT COSTS.

An urban settlement layout involves different components. The most important ones are land and infrastructure.
When these factors are overlapped when formulating the plans and considering most feasible layout alternatives, a design criteria is drawn producing a structure of plots, clusters and blocks, green areas, circulation paths, commercial areas, infrastructure channels, etc., The combination of all these elements will affect the costs and affordability of projects. Such costs are assumed and shared by Local Governments and beneficiaries, the latter assuming the greater cost in the long term period.

In order to allow an equal share of the benefits by a greater number of families in a certain project and to premit its replicability, Governments should strive for an economic standard of services, realizing economy in resources without loss of efficiency and quality.
Planners, architects, urban designers, etc. should design with the most efficient use of financial resources by optimizing the use of land, infrastructure and urban services. By doing so, the chances for projects to be within affordable limits of its target income groups can be greater.
Lately, several authors have studied the issue of costs related to settlement and urban layout, and argued in favor of a more effective design based on cost-effect analysis of specific project component.
Indeed, a particular layout with individual plots provides a different population density and requires different amount of land for circulation, residential use and other purposes, than a layout based on multi-family residential plots (high rise schemes).
This leads to the conclusion that the type of housing (typologies) provided in a project affects overall cost and raises the attention to the question of most effective population density, as well as, the ideal plot size, from the economic and cultural point of view.

8.1 THE PLOT SIZE IN CANDANGOLANDIA AND ITAMARACA

In Brasilia, the 120 m2 plot has been established as the minimum plot area for urban projects. The 6766 National Law on Land Subdivision establishes a minimum of 125 m2 for urban plots, with minimum frontage of 6.00 meters, except for projects considered of social interest, e.g.low income projects. However, it does not go into the matter of densities which this plot size would produce, nor the quality of the environment.

The definition of plot sizes for low income projects has always raised controversies and it is possible to identify some patterns in the arguments. One argues that there is a need for larger plots due to families'spatial needs to develop traditicional activities related to rural life style: food plantation, raising of domestic animals, etc... Others argue that small plots represent a design tool to diminish the impact of land taxation on lower income groups, and therefore the chances for social mobility or a displacement process by economically stronger groups are decreased. Others may argue that the dimensions (front and length) have a direct relation to infrastructure costs, therefore the narrower the better is the plot.

So, the use of land is certainly a usefull criteria to judge the efficiency of a settlement layout design.

In Candangolandia and Itamaraca, the standard plot size was 120 m2 (8.00 x 15.00 m, 7.50 x 16.00 m), with variations towards larger plots in the case of Candangolandia.

8.2 THE POPULATION AND THE HOUSING DENSITY.

Caminos and Goethert (1978: 84), argue that "the lower the density, the larger is the land required for a given population, which results in higher costs per capita in land and infrastructure.
Cameron (1980: 52), while studying housing densities for developing countries, concluded that the most desirable figure would be 150 dwellings per hectare.
In the cases of Candangolandia and Itamaraca, the densities were 36 dwellings per hectare and 40 dwellings/ha, respectively. It can not be ascertained whether both projects are costly purely from the density point of view and the criteria raised by Cameron.
Therefore, we must look on other issues, such as population density. It will present clear indication about how many people share a certain project component but it will still be impossible to assess the type and quality of living space that it produces.

Brandäo (1975: 13), argues in favour of a project criteria that would create an adequate density related to the costs of infrastructure and presents a gross density of 100 inhabitant/ha and net density of 250 inhabitant/ha as the most desirable density for popular housing schemes promoted by SHIS in Brasilia.
Based on his view, both projects in this study would be far beyond this criteria, since the net densities of Candangolandia and Itamaraca are 391 inhab/ha and 441 inhab/ha, repectively. But these figures do not sustain an argument to present both projects as economically feasible projects.
To evaluate the efficiency of a project design by looking only at one component, is not an easy task and is likely to lead to misjudgments and very subjective statements. Two or more examples should be compared before assessing the merit of the solutions presented.

Mascaró (1986: 260) argues that "if one wants to obtain important economies, he should search for alternatives in every component, more particularly in the circulation system, since it is responsible for more than half of the total cost of infrastructure".
Caminos and Goethert (1978: 86) argue that "the system of circulation is one of the most important components of the urban layout; it not only channels the movement of pedestrians and vehicles but, since it is on public land, it also determines the patterns of land utilization, land subdivision and the layout of utilities: water supply, sewage disposal, street paving, storm drainage, electricity and street lighting".

8.3 THE ROAD SYSTEM

While in Itamaraca, the amount of land used for vehicular roads reaches 12.11% of the total project area, in Candangolandia it reaches double than that, 24.17% (or 21.64% if the Access road is not considered). See FIGURE 8.1.
It may seem that Itamaraca's layout has a more efficient plan from the point of view of the circulation system, however, when the total area destined for

vehicular and pedestrian roads with green areas is included, the situation changes dramaticaly : Candangolandia has 40.80% of the total project site used for this purpose while in Itamaraca, it reaches 45.53%.
This means that in both examples almost half of the project area is set for public purposes, which represents a substantial amount of land to be maintained by the Government.(see FIGURE 8.1)
In the case of Itamaraca, very wide carriage-ways of pedestrian roads are the main cause for such a figure, while in Candangolandia, it is due to many green areas and an excessive circulation system.

FIGURE 8.1: LAND USE IN CANDANGOLANDIA AND ITAMARACA

	GREEN AREAS		PEDESTRIAN ROADS		VEHICULAR ROADS		RESIDENTIAL USE	
	AREA ha	%	AREA ha	%	AREA ha	%	AREA ha	%
CANDANGOLANDIA	0.357	3.21	3.352	30.19	1.345	12.11	5.424	48.85*
ITAMARACA	12.077	19.41	0.61	0.98	15.04	24.17**	30.518 ***	49.04

* If the land reserved for future expansion of the settlement is taken into consideration, the right figure would be 54.47 %.
** If the access road is not taken into consideration, the correct figure would be 21.64 %.
*** If mixed use plots are not considered, the right figure would be 28.525 ha.

FIGURE 8.2 presents a table of each settlement's detailed land use.
In Candangolandia, there are 2.72 m2 of pedestrian roads per dwelling, in Itamaraca it is 27 times more, or 74.15 m2 per dwelling. This indicates that the layout design applied in Itamaraca was not able to achieve efficient use of the land.
Looking at the circulation system, there are 103.91 m2 of roads (vehicular and pedestrian) per dwelling in Itamaraca while in Candangolandia it is 69.99 m2/dwelling. Both are high standards of roads per dwelling which increase project costs especially when pavements are added.

The total length of the circulation system in both projects are not very different from each other: the layout design in Candangolandia provided 6.11 mts of road per dwelling and in Itamaraca, 5.09 meters of road per dwelling.

Considering the different plot sizes and different frontages (8.00 / 10.00 / 12.00 m), there is evidence that, compared to Itamaraca, Candangolandia achieved a more efficient land utilization. In Itamaraca, plots with the same frontages (8.00 / 7.50 m) compared to Candangolandia did not exhibit a large difference: 5.09 m/dwelling to 6.11 m/ dwelling. (see FIGURE 8.2)

There are clearer arguments for the above conclusion after analysing the use and share of infrastructure network per dwelling in both layout designs.

Looking at the water supply system, a more equal and efficient distribution of this network is found in the case of Candangolandia, with 5.86 mts per dwelling, which is significantly below that of the existing average plot frontage in this project, of around 8.00 mts.

FIGURE 8.2: PROJECT COMPONENTS OF CANDANGOLANIA AND ITAMARACA

	CANDANGOLANDIA		ITAMARACA	
	TOTAL AMOUNT	AMOUNT per DWELLING	TOTAL AMOUNT	AMOUNT per DWELLING
WATER SUPPLY mts	13,113	5.86	4,377.7	9.68
DRAINAGE mts	7,615	3.40	1,633.	3.61
ELECTRICITY LT mts	14,060	6.28	3,889	8.60
ELECTRICITY LT mts	3,140	1.40	595	1.37
ROAD SYSTEM* m2	156,500	69.99	46,970	103.91
ROAD SYSTEM** mts	13,675.9	6.11	2,303.3	5.09
PEDESTRIAN ROADS m2	6,100	2.72	33,520	74.15
PROJECT AREA	62.22 ha 622,230 m2	278.27 m2	11.10 ha 111.020 m2	245.61 m2
RESIDENTIAL USE	30.51 ha 305,180 m2	136.48 m2	6.04 ha 60,480 m2	133,80 m2 #
GREEN AREAS***	12.07 ha 120,770 m2	54.01 m2	0.357 ha 3,570 m2	7.89 m2

LT = Low Tension HT = High Tension
\# Land for future expansion of the settlement is incorporated.
* Vehicular and pedestrian roads.
** Pedestrian roads are not included.
*** Pedestrian areas are incorporated.

In Itamaraca, it is 9.68 mts per dwelling, a rate which exceeds that of the average plot with a frontage of 7.5 mts. Possibly, the mistakes detected in the planning of the circulation system (pedestrian roads) affected the share

of infrastructure per dwelling.
The comparative analysis of the Electricity network seems to reinforce the question of efficiency in the layout applied in Itamaraca. It achieved 8.60 mts per dwelling, which is still higher than the average plot frontage in this settlement. Candangolandia showed a very efficient use of this system as well.
In terms of efficient use of the infrastructure network, Candangolandia provides a more positive result than Itamaraca, despite the high amount of land allocated to public space.

8.4 THE PROJECT LAYOUT AND COSTS: SOME CONCLUSIONS.

From Figures 8.1 and 8.2, we can state that in the circulation system, there is an excess of land allocated for pedestrian use in the case of Itamaraca. This issue can increase the project cost since the government will be responsible for its maintenance and future improvement. We can also predict that land taxation and other mechanisms of cost recovery may create pressures on residents´income.
In the case of Candangolandia, the design provided a substantial green area and the circulation system should be reduced to bring down the allocation of roads per dwelling.
It is a very expensive solution and quite problematic from the maintenance point of view. The vacant space is likely to become garbage dumps and due to the settlement´s top location, this vacant space will affect in the future the residents´ expenditure on land, an amount that could be higher in Itamaraca.

Another issue is the "cultural suitability of urban morphologies", which is also an important aspect to recognize in a settlements´ layout. It should be observed when analyzing upgrading schemes of pre-existing structures. This is a very long discussion and raises a number of subjective judgements.

This chapter intended to highlight the implications of a particular layout design in low income settlements on the overall cost of project.
Some evidences were presented showing that more appropriate designs could be achieved if the designers were seriously concerned about the socio-economic conditions of the residents. The examples demonstrated a waste in public resources in the land use plan and infrastructure which are project components that affect the final cost of projects.
In this regard, both projects are considered unsuitable for the target income groups they were designed for because they clearly showed a misuse of land for infrastructure.

The tax on land and utilities will be payed over a long period of time, and if residents are expected to invest some of their scarce resources on housing improvements, this is likely to become an unaffordable burden.

9. HOUSING IMPROVEMENTS IN CANDANGOLANDIA AND ITAMARACA

9.1 GERERAL INTRODUCTION.

In the previous chapter, we analyzed project costs and its effect on residents. The housing expenditure which consume a significant proportion of the families´income did not include the expenses on housing improvements.
In this chapter , we will analyze and explain the process of housing improvements and how residents mobilize resources in order to extend their living space and transform the original core house structure.
The consolidation process taking place at the household level will be looked at and the different sequences of improvements carried out by residents will be analyzed. It was possible to identify a variety of sequences of steps of improvements. A sequence of improvement was designed from the identification of the preferences of a resident to implement different categories of improvement in a chronological order. The explanations for certain preferences will be given in order to discover possible logic behind each step of improvement.

Even though the responses revealed a variety of these categories, they were limited to seven (7) categories.
The reason is that some improvements were considered more important and essential by the residents, and were often present in the questionnaires as one of the main topics in housing improvements in both projects. Because of this only the most important categories will be dealt with.
Other relevant aspects are also discussed in this chapter. Behind the implementation of a sequence of categories of improvements lies a series of co-related issues such as the type of spatial changes and the reasons to implement them, the type of building materials used, how resources were mobilized by residents, who were the main actors in the consolidation process in each one of the projects, etc...

The provision of a core unit was intended to be the basis of the progressive development approach. It was planned to facilitate a series of improvements and extension of the built area as a natural step in the consolidation process.
Looking at the process which took place in Candangolandia and Itamaraca, it is possible to verify the logical sequences of improvement procedures which are often constrained by financial resources, residents`preferences or by the core unit design itself.
The most frequent improvement carried out by residents were selected from the questionnaire code and divided into seven categories:

0 = NO IMPROVEMENT, when none of the improvements were implemented.

1 = PLOT DIVISION WALLS, when residents implemented its construction with bricks and concrete pilars, its foundation and further improvements such as plastering, painting, grids, frames and grid type of fencing.

2 = ELECTRICITY/WATER PLUMBING, when connections with the infrastructure network was implemented through pipes (covered or exposed), WC and kitchen connections.

3 = SANITATION SYSTEM, when residents replaced original septic tanks, built soakway pits or just implemented a new system.

4 = INTERNAL DIVISIONS, when internal divisions of wood or masonry were built inside the core unit structure, defining different spaces for household activities.

5 = SERVICED AREA ROOF, when a small extension of the roof was built in order to facilitate kitchen activities and laundry.

6 = CORE HOUSE EXTENSION, when residents extended the core house structure in order to provide bigger living room. On-going extension were also coded as core unit extension.

There are cases when these seven categories were not fully considered: for example, when residents simply demolished the core unit to implement their new project, or when it was relocated to give space for a new house or when a new dwelling was under construction, replacing the core unit.
Since these three actions do not fall under any other category, they were numbered 7, 8, and 9, respectively, and were included as a possible improvement occuring as the first and only one step of improvements.
With this arrangement, the methodology of sequencing was then established with the creation of six variables following the above seven categories.
These variables are called First Improvement, Second Improvement, Third Improvement and so on till Sixth Improvement.
The goal was to extract the residents' preferences to implement one or another category at every step of an improvement sequence, in a range from 1 to 6 improvements.
This sequence would then provide the variety of combinations of six categories (e.g. 123456, 921000, 263541, etc.). For example, sequence 26351, means that the resident first implemented the connections to infrastructure (2), then extended the core house (6), after which he dug another soakaway pit or built a new sanitation system (3) followed by the extension of the roof for the service area (5), then he built the internal divisions (4) and finally he consolidated his domain by constructing the plot division walls (1).

9.2 HOUSING IMPROVEMENTS IN CANDANGOLANDIA.

A majority of families implemented one of the categories of improvement. There were only three families who did not carry out any improvement in the core house.

A significant proportion (78.4 %) of the households surveyed, made the necessary connections to the services provided for the plot, which is the most costly component in a housing project. 18 % of the families first built Plot Division Walls, characterizing an intention to immediately consolidate the private family domain. Five families (2.0 %) had the construction of their new house under way and only three (0.4 %) opted to extend the core unit at this step.

In FIGURE 9.1, choice for the second improvement is shown to have a wide distribution among the five categories. A considerable number of families (25.2 %) chose consolidating their private domain by constructing the plot

division walls and a smalll number (4.0 %) chose to build a service area. There is a reasonable number of families (19.2 %) who made the connections to the infrastruture network for step 2 and 14.8 % invested time and resources for the improvement of the sanitation system provided with the core house. A considerable proportion of families (82.8 %) reached two improvements in the sequence, which means that 17.2 % did not complete second step improvement in a sequence of six.

FIGURE 9.1: SECOND IMPROVEMENT

	CATEGORY	FREQUENCY	PERCENT.%
NO SECOND IMPROVEMENT	0	43	17.2
PLOT DIVISION WALLS	1	63	25.2
ELECTRICITY/WATER PLUMBING	2	48	19.2
SANITATION SYSTEM	3	37	14.8
INTERNAL DIVISIONS	4	32	12.8
SERVICED AREA ROOF	5	10	4.0
CORE HOUSE EXTENSION	6	17	6.8
		250	100.0

As we look further in the sequence, the survey showed that 34.9 % of the families did not complete the third step of improvement although 18.1 % of the families made improvements in the sanitation system provided. This finding demonstrates a serious concern among residents which identifies one of the deficiencies of the project. The implementation of this third category depends on the residents´ perception that the project´s sanitation system was thought to be an inefficient technical solution, particurlarly because of its location in the plot. The plan did not consider the various options for core unit expansion.
There was a small decrease in core unit extensions from 6.8 % at Second Improvement to 6.0 % at Third Improvement. 16.1 % of families carried out internal divisions at this step and 11.6 % built the plot division walls.

At the Fourth Improvement step, no plumbing connections occurred. This is acceptable because the majority of families prefer to have water and electricity installed inside the dwelling immediately; but the number of families who did not complete the 4th step of improvement reached 57.6% of the families.
Figures on core unit extensions doubled that of the former stage (13.6%). Taking into account time and financial resources that it demands, it is not surprising that it occurs at later stages. There is a decrease of improvements in the sanitation system (3.2%), internal divisions (11.2 %) and the cover of the service area (12.4 %).

Looking at the Fifth Improvement, it becomes clear that a great number of

families were not able to complete the sequence of five steps of improvements (78.4 %). The extension of the core unit is the most significant category of improvement (8.0 % of the families), followed by order of preference: 6.4 % chose to cover the service area, internal divisions (4.4 %), sanitation disposal (2.0 %) and plot division walls (0.8 %). There were constraints in the improvement process which explain the decrease in the implementation of all categories.
It will be shown that this was not only a matter of preference and availability of time, but that it is related to the socio-economic status of the families.
At the last step of improvement in the sequence, it is obvious that a sequence of six improvements were reached only by 10.4 % of the families because 89.6 % did not implement improvement no.6. All the categories showed decreasing implementation and some, like Internal Divisions and Electricity/water/Plumbing connections simply did not take place.

An overview of the housing improvement process, shown in FIGURE 9.2 demonstrates that connections to the infrastructure network were undertaken by 246 families, almost 100 % of the families surveyed.

FIGURE 9.2 : TOTAL CATEGORIES PER STEP OF IMPROVEMENT IN A SEQUENCE OF SIX

		NUMBER OF FAMILIES PER STEP OF IMPROVEMENT IN A SEQUENCE OF SIX STEPS OF IMPROVEMENTS						NUMBER OF FAMILIES PER CATEGORY	
	CATEGORY OF IMPROVEMENT	1rst	2nd	3rd	4th	5th	6th	TOTAL	%
1	PLOT DIVISION WALLS	45	63	29	5	2	1	145	58.0
2	ELECTRICITY/WATER PLUMBING	196	48	2	0	0	0	246	98.4
3	SANITATION SYSTEM	0	37	45	8	5	3	98	39.2
4	INTERNAL DIVISIONS	0	32	40	28	11	0	111	44.4
5	SERVICED AREA ROOF	0	10	31	31	16	7	95	38.0
6	CORE HOUSE EXTENSION	1	17	15	34	20	15	102	40.8
7	CORE HOUSE DEMOLISHED	0	0	0	0	0	0	0	0
8	CHANGE PLACE OF CORE HOUSE	0	0	0	0	0	0	0	0
9	NEW HOUSE UNDER CONSTRUCT.	5	0	0	0	0	0	5	2.0
	TOTALS	247	207	162	106	54	26		
	%	98.8	82.8	64.8	42.4	21.6	10.4		

Water and electricity are two basic resquirements which residents consider important to better their present housing situation. Activities such as cooking, washing clothes, bathing, toilet necessities, watching TV and

ironing influence people to engage in improvements to provide space for activities which are carried out in household surroundings.

Summarizing the overall process shown in FIGURE 9.2, a significant number of families (40.8 %) undertook core unit extension, at different steps of the sequence, mobilizing necessary financial resources, labour and building materials in different ways. A considerable number of families (58. %) built plot division walls and which represents a clear preference to establish and consolidate the private household domain at the beginning of the sequence. That preference was shown as second (63 fam.) and first (45 fam.) improvement. A significant number of families improved the sanitation system, 39.2 %, and they prefer to do so at 2nd and 3rd improvement.
From Figure 9.2 it is possible to build a logic sequence ative sequence purely based on residents' preferences at every step of improvement, that means the most frequent categories of improvement revealed by the survey.

1rst IMPROVEMENT - ELECTRICITY/WATER PLUMBING (176 fam.)
2nd IMPROVEMENT - PLOT DIVISON WALLS (063 fam.)
3rd IMPROVEMENT - SANITATION SYSTEM (045 fam.)
4th IMPROVEMENT - CORE UNIT EXTENSION (034 fam.)
5th IMPROVEMENT - CORE UNIT EXTENSION (020 fam.)
6th IMPROVEMENT - CORE UNIT EXTENSION (015 fam.),

This gives the following main sequence of categories of improvement: 2136.
Undoubtely, categories 2 and 1 are preferred as the first improvement step, which may not be very obvious in the interview. The residents use their own logic and their own pace when they decide to improve their houses (see Figure 9.3). The decision depends on how much financial resources are available, how it can be mobilized and how much of the family budget will be committed to such an expenditure; how many compose exist the household, what are their most urgent needs and how much space is necessary to accomodate everyone according to their affordablility and their own concept of living together.

FIGURE 9.3 shows the combinations in the improvement sequences carried out by families. It provides the detailed figures summarised in Fig. 9.2 showing some interesting peculiarities. There is only one missing case and three cases of "no improvement". There is one case where only category 6 "core unit extension" was carried out with no further improvements, sequence 600000, because the family's urgent need was to enlarge the living space, and since this is costly and time consuming, the other categories will left until they are able to implement it.
Five families carried out sequence 230000. After the connections (category 2), the consumption of water increases significantly and since the sanitation system provided is inapropriate for the soil and is below the standard accepted by CAESB-Water and Sanitation Co. of Brasilia, building the sewage tank (category 3) becomes an obvious consequence. It shows again that there is a serious concern about sanitation among members of the settlement.
The most frequent sequence is 200000, (15.6 % of the families), which is the implementation of category no. 2, "Electricity/Water Plumbing", with no following improvements.
Sequence 210000 comes in second preference, (5.2 % of the families), which is basically the same sequence added by category no.1,"Plot divison walls".

FIGURE 9.3 : COMBINATIONS OF SEQUENCES OF IMPROVEMENT STEPS

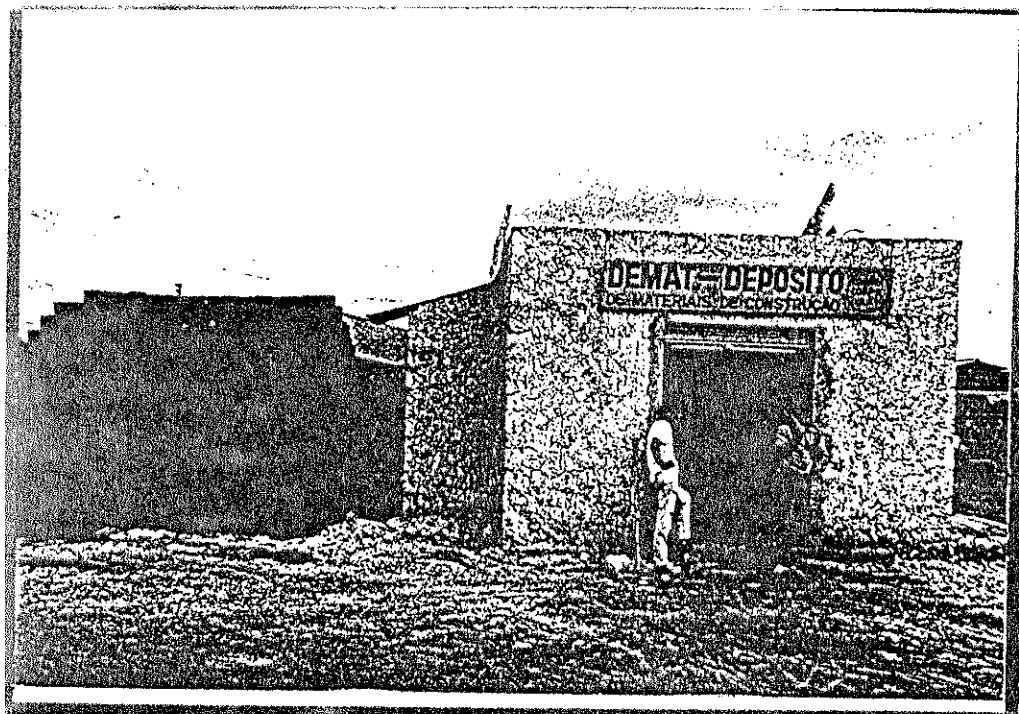
SEQUENCE	FREQUENCY	%	SEQUENCE	FREQUENCY	%
000000	3	1.2			
123456	8	3.2	215000	7	2.8
123460	7	2.8	230000	5	2.0
125000	7	2.8	234600	5	2.0
200000	39	15.6	240000	11	4.4
210000	13	5.2	260000	8	3.2
214000	7	2.8	261345	3	1.2
214500	5	2.0	912346	1	0.4

TOTAL OF COMBINATIONS REGISTERED: 87
VALID CASES: 249
MISSING CASES: 1
Only the most frequent combinations were presented in this figure.

Looking at the economic background of the families who carried out sequence 200000, it is inferred that 61.5 % of them have incomes below 3 MW, which is within the range of target beneficiaries of the program on one hand. It shows clearly that even though the poor families are attempting to improve their housing situation, there are several aspects which constrain them to complete more steps of improvements.

Brandäo (1975: 12), while analysing the project costs of the popular dwelling (44 m2) provided by the local Housing Agency-SHIS, during the implementation of PLANHAP-National Popular Housing Plan, in Brasilia, established that 25.15 % of the total cost, including all components, is exhausted on "installations"(plumbing, connections, pipes, lines,wires, etc.).
"In this case, practically 1/4 of the total cost of the popular dwelling built during the last years in Brasilia is committed to installations, and this cost will be proportionally higher by as much as the constructed area of the dwellings is decreased".(Brandao,1975: 13)

In Candangolandia, where an unfinished and unserviced core unit of 31.35 m2 was provided, the most costly component is a burden on the households' income, and may be the main reason why the sequence of six categories are reached by only 10.4 %.
Considering that recurrent expenses on housing is already 12.76 % of their income, and this is excluding the monthly mortgage payment (see Chapter 7), housing improvements become a very ardous process for the residents.
The progressive development process underlines the role of residents in the consolidation of low income settlements. The improvements which take place are everyday processes of transformation carried out by families and/or individuals with very little participation from the State. (see the photos in the next page).
After the analysis on sequences of housing inprovements, some key questions still remain unanswered.



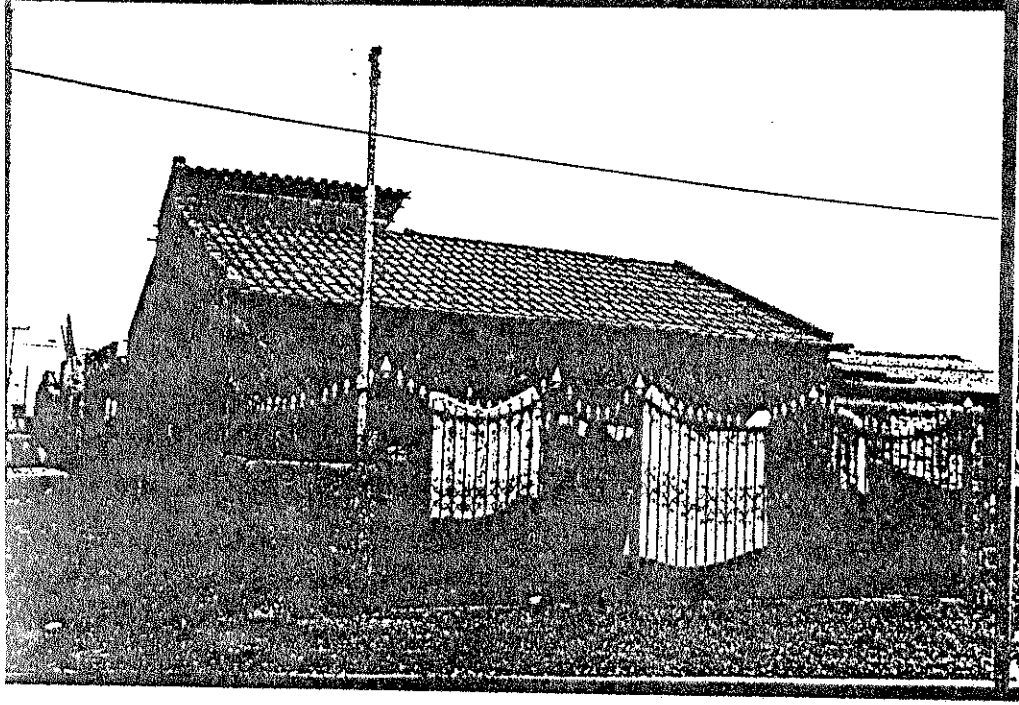
1	
2	3

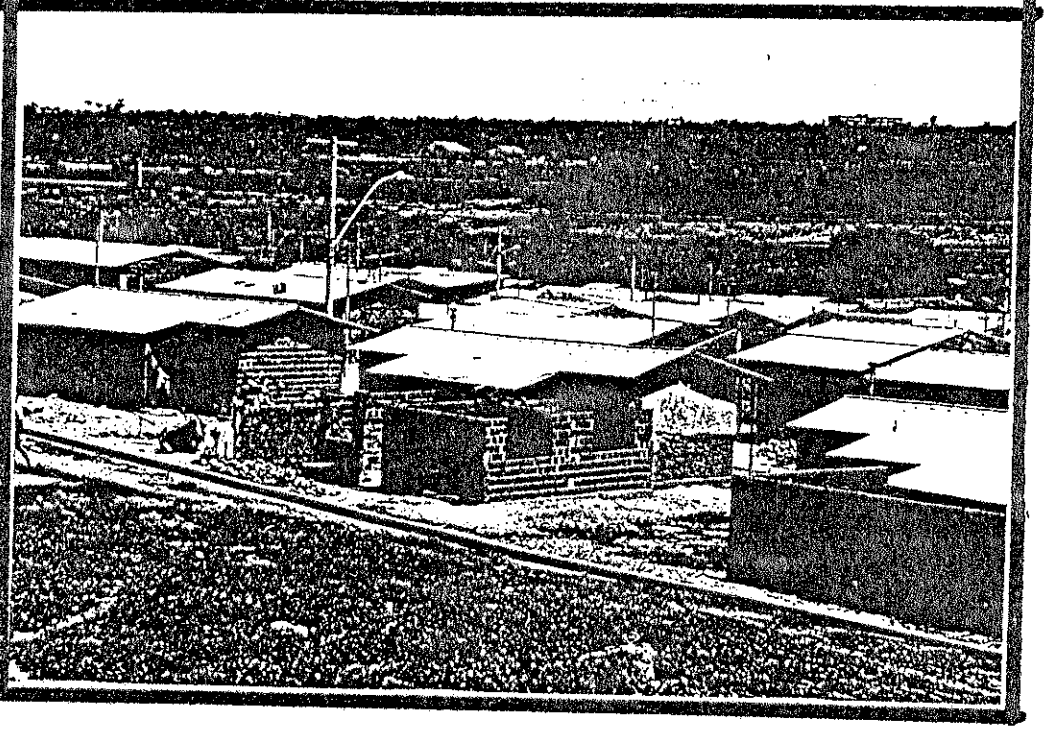
CANDANGOLÂNDIA

1. Resident rents her comercial space for a small size building material firm from Guará.

2. Resident changes the roof, implements a grid fence in the front, expands the core unit towards the left and back side, and develops his comercial activity in the back side of the plot.

3. The last row of houses occupied, dec/85. A resident carries out core unit expansion towards the back side of the plot. Implements the plot division wall as well.





Who sponsors such a process, how are financial resources mobilized, how much is spent by residents, what are housing expansions for and what kind of building materials are used?
FIGURE 9.4 gives the main uses for core house extensions. It emphasizes the predominance of the "need for bedrooms" since 30.6 % of the families declared that as the main reason for expansion together with other ones, such as for a kitchen, WC and living room.

FIGURE 9.4 : SPATIAL CHANGES AND PURPOSE FOR CORE HOUSE EXTENSION

PURPOSE FOR CORE EXTENSION	FREQUENCY	%
NO CORE EXTENSION	137	54.8
ONE/TWO/THREE BEDROOMS	12	4.8
KITCHEN	19	7.6
BEDROOMS + KITCHEN	32	12.8
BEDROOMS + KITCHEN + WC	5	2.0
BEDROOMS + KITCHEN + LIVING ROOM	3	1.2
BEDROOMS + KITCHEN + WC + LIVING ROOM	5	2.0
KITCHEN + WC	1	0.4
ROOMS FOR RENT	3	1.2
ROOMS FOR RELATIVES	5	2.0
NEW HOUSE	3	1.2
BEDROOMS + GARAGE OR COMMERCE	17	6.8
MISSING CASES	8	3.2
TOTALS	250	100

The intention to define private spaces was demonstrated such as for bedrooms, sitting room, storage place, etc. 28.1 % of the families included the kitchen acitivities with other spaces because it can be carried out with an existing tank, sink and a cooker, without disturbing the functions of a large family living together.
In Candangolandia, almost half of the households (49.2 %) are composed of 4 to 6 persons, and 19.2 % with over 6 persons. It means an average of 6 m2 per person in an original core unit.

There were a reasonable number of families (6.8 %) who included a garage and commercial activities as the main reasons for extending the core house. Automobiles are quite often seen in low income settlements of Brasilia. But, the city's urban structure prejudices this feature and compels the use of private and collective transport. Perhaps it is not appreciated that some savings are worth investing on an old car to compensate fo the inadequate and costly transportation system. Furthermore, it allows the resident self-sufficient mobility and it can be used as a source of income when used to carry passengers, furnitures, etc.
Only three cases declared the construction of rooms for rent. Although it is a small figure, the project may become a very attractive area for the development of a low income rental market due to its top location, close to Plano Piloto. Renters are already identified in great numbers in other satellite cities, it is possible to predict the same for Candangolandia.

84.9 % of the families who implemented categories 1, 3, 4 and 6, in the improvement sequence, used mainly red bricks, and the others used wood, recycled wood, concrete blocks and mixed materials.
There is an easy access to these materials since many small and medium sized building material suppliers from satellite cities (Ceilandia, Taguatinga, and Guara) organized local suppliers in the project area with informal credit and loan mechanisms to encourage its acquisition by residents.
The establishment of these branches in the project area were facilitated by families who were occupying "mixed use" plots and did not have financial resources to implement their commercial activities immediately. They rented out their space through different agreements to these firms. CHAPARRAL, the largest firm in retailing building materials was set up in the project area by purchasing a large commercial plot in the project from TERRACAP-Real Estate Co., and inaugurated a large branch in December 1986.

Looking at the building actor in the process of housing improvements, it became clear that the project approach permitted the building construction market to flourish. The participation of the contractor alone as the building actor is 37.2 % of the cases studied. In almost one third or 13.3 % of the cases, the owner alone was the the building actor. In 24 % of the cases , the owner was helped by contractors and relatives or friends. This is still below the number of families who contracted labour to implement improvement to their house.
Somehow, there was a considerable amount of resources, labour and finance, mobilized by residents.
The process not only provided space for a building material market but also for employment opportunity.
Interviews revealed that some residents shifted their informal activities to the building sector providing, an accessible and affordable service to residents as well as a profitable income generation for them.

44.4 % reported that resources to finance improvements come mainly from private savings. A very small percent (3.2 %) had those savings suplemented with loans from relative or banks. There were clear indications that several residents have a second source of income.
For example, the local sunday market, inaugurated during the period of the research, became the largest popular market in Brasilia. The neighborhood organization together with traditional traders living in the area, organized a market committee and registered 476 vendors to sell fruits, clothes, vegetables, cooked food, drinks, shoes, homemade art crafts, kitchen devices, etc. Several vendors were initiated to the business thus creating a response to the existing demand for it.

9.3 CONSOLIDATION OF CANDANGOLANDIA : remarks on housing improvements.

It was discussed in the previous chapter that the categories of improvements are undertaken to consolidate the private domain to fulfill particular needs and interests, and to extend living space for essential household activities.
Residents have different requirements and different possibilities to carry out improvements on their dwellings. These aspects brought out a variation of sequences of improvements which often depend on family income and availability of resources.
A great majority of the families (98.8 %) reached first step improvement. However, only 10.4 % reached the last step of the sequence of six improvements, which means that residents find it difficult to complete the full sequence.
The Government of Brasilia may have obtained substantial cost savings when it decided to leave the pipes and connections out of the core house project, but it left the most costly component, 1/4 of the total cost, in the hands of the residents. The impact of this cost and housing expenditure on the family budget is very significant and this may explain why very few families could go farther in the sequence of improvements.

The transformation of the houses follow the identification of requirements for living space. For example, the need for more private spaces within the built structure gave "the bedroom" as the main reason for extending the core house.
Where changes in the houses were seen, majority of cases used red brick as a building material and it is a surprising that 37 % of the families had a contractor as their main building actor. In 44 % of these cases, private savings funded this activity.

The consolidation process in Candangolandia demonstrated aspects of resource mobilization and the resident initiatives towards self help. The progressive development approach in this settlement had clear evidences that within the scope of the project, there is a process of income generation which is related to the magnitude of the residents´ needs and is achieved as a natural process of surviving within an urban economy. It is seen that the consumption of goods and basic commodities taking place within a flourishing "organized settlement", provided important means of income generation.
The progressive development approach allowed the appearance of a small scale network of activities related to housing improvements. The resources which are mobilized to finance these improvements through self help and mutual-aid processes and through contracting of labour cannot be underestimated by government policies.

9.4 HOUSING IMPROVEMENTS IN ITAMARACA

The physical transformations of the dwellings in the Itamaraca project are shown in Figure 9.5. 72.56 % of the dwellings had expansions using wood. They certainly followed the strategy proposed: "to extend the core unit with wooden materials, frequently brought from former shacks and transform it into a more consolidated dwelling in the near future, according to need, time, and resources".

FIGURE 9.5 : PHYSICAL TRANSFORMATIONS IN CORE HOUSES IN ITAMARACA

	CATEGORY OF IMPROVEMENT	FREQUENCY	%
0	CORE HOUSE AT ORIGINAL SITUATION	110	24.33
1	WOODEN FENCES AS PLOT DIVISION WALLS	50	11.06
2	PLOT DIVISION WALLS MADE WITH BRICKS	97	21.46
3	PLOT DIVISION WALLS ON BRICKS + FENCE	66	14.60
4	PLOT DIVISION WALLS UNDER CONSTRUCTION	22	4.86
5	CORE EXTENSION MADE ON WOOD	328	72.56
6	CORE EXTENSION MADE WITH CERAMIC BRICKS	06	1.32
7	WC BUILT WITH CERAMIC BRICK MASONRY	41	9.07
8	NEW HOUSE UNDER CONSTRUCTION WITH BRICKS	22	4.86
9	NEW HOUSE BUILT WITH CERAMIC BRICK	10	2.21
10	SEWERAGE CONNECTION	156	34.51
11	PLOT DIVISIONS (REAR SIDE)BUILT WITH BRICKS	04	0.88
12	CORE HOUSE DEMOLISHED FOR FUTURE NEW HOUSE	01	0.22
13	WOODEN CORE HOUSE RELOCATED TO ALLOW NEW HOUSE	01	0.22

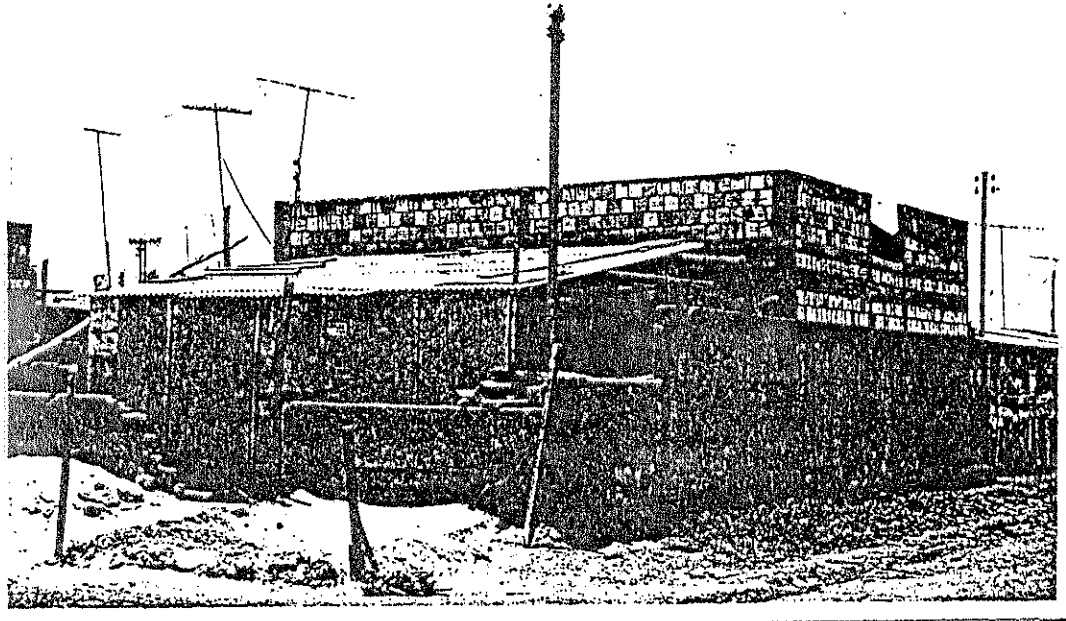
Looking at the number of dwelling extension with ceramic brick masonry (1.32 %) and the same materials for toilet extensions (9.07 %), it can be assumed that the strategy implicit in the progressive development approach used in this project simply failed at the end of the process, or for other reasons the pace of transformation was extremely slow.
The families chose different processes to change the "temporary house" to achieve a more "consolidated" and improved dwelling. In some cases, instead of maintaining the wooden structure while constructing the permanent structure, residents moved the wooden core unit to the rear side of the plot and constructed a new building completely detached from the core house; others simply started the construction from the back to the front side of the plot, maintaining the wooden structure placed at the front boundary of the plot (see FIGURE 9.6).
After 3 years since the first plots were occupied, the number of dwellings transformed into permanent structures built with ceramic (red brick) masonry is very low. Only 2.21 % of the plots show completed houses while 4.86 % of the houses are under construction. A reasonable number of dwellings (24.33 %) still remain in their original form (with no improvements). This is not enough to say that families are not willing to implement housing improvements.

There was a strong preference to invest first of all on the consolidation of private domain. 21.46 % of the families built red brick plot division walls and 11.06 % used traditional wooden fence, 34.51 % of the families chose to invest on the connections to the sewerage network.

FIGURE 9.7

PHOTOGRAPHS OF DIFFERENT SCHEMES OF CORE UNIT EXPANSION IN ITAMARACA.

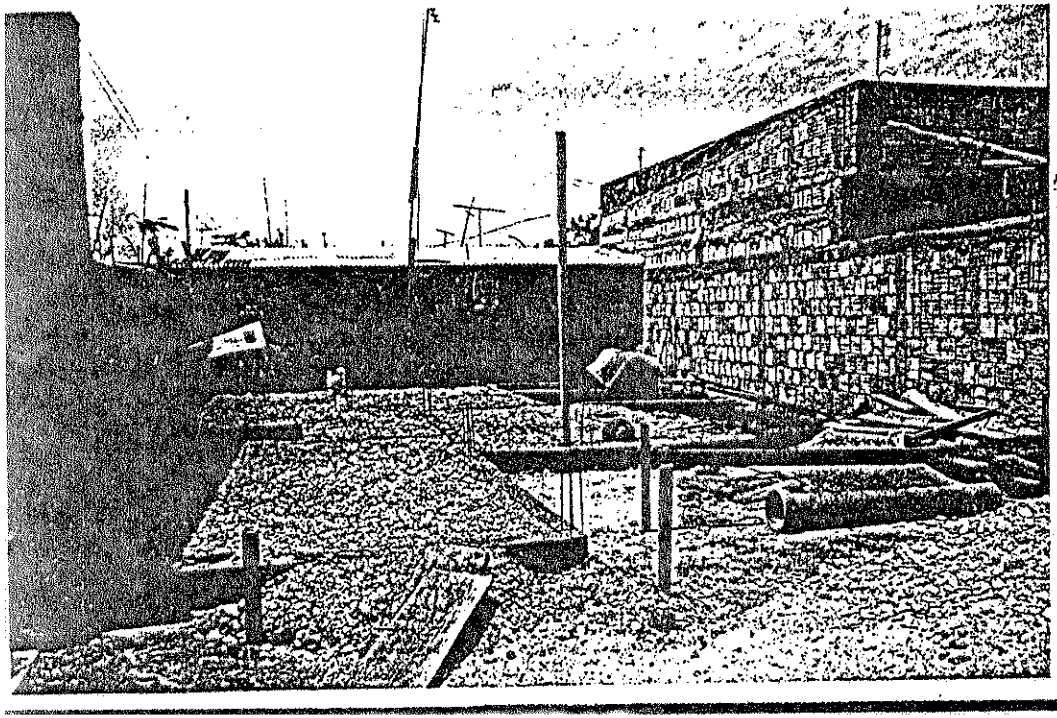
1	
2	3



1. Resident replaced core unit at the front limit of plot and developed red brick dwelling.

2. Resident replaced core unit at the back side of plot and slowly starts to develop a red brick dwelling.

3. Same as no.2 in early stage.



The low level of improvements refered to might be related to scarce financial resources in the locality, and a direct consequence of very low family income and high unemployment registered in the settlement. This is indeed the main complaint expressed by the male population during informal contacts with the researchers.
The provisory core unit itself could be one of the reasons for low improvements. Instead of facilitating housing improvements, it seemed to be the biggest constraint. It is thought that residents were obliged to spend time, money and energy on a temporary core at first, in order to achieve their most urgent requirements for housing. Once established, they start again to save, plan and create conditions to consolidate their dwelling. It takes time and means more work for the residents since the same job is done twice: first on the provisory core which will be demolished sometime, and then the housing consolidation which is the final goal for improving their living standard.

It is very difficult to assess the consolidation of a settlement by looking purely at its physical transformation. It is also likely that the researcher may make misleading conclusions specially if he is not aware of the socio-economic conditions under which such processes occur.
This reinforces the need, and argues in favour of a more profound research to be concucted using a household survey and informal interviews in order to capture the peculiarities of the settlement and its socio-economic caracteristics. The survey in Itamraca was carried out in the same manner as in Candangolandia and the results showed some different aspects of housing improvements.

The same procedure of setting up categories and sequence of improvements was built up and the analysis of the six steps of improvements produced some characteristics, shown in FIGURE 9.7.
It is quite obvious that infrastructure connections, category no. 2,was the preferred first step improvement and 'excreta disposal' was the second preference. 92.59 % of the families surveyed reached this category, and 74.04 % reached category 3 with "sanitation system" as the preferred second step. The appearance of this category (sanitation system) in this project is noticiable. In Candangolandia, the sanitation system was a consolidation step; in Itamaraca, the pit latrine was built and improvised by the residents without assistance by the government.
The sewerage network which was built during the implementation phase of the project did not actually function until 1986. This obliged residents to carry out their own solutions, with their own resources, under precarious conditions during the period of 1983 to 1986.

Category no.4, "internal divisions", was the third most preferred improvement carried out by 79.14 % of the residents.

Looking at the first three improvements carried out by the residents in this project, three main categories of improvements come out as the most preferred ones : connections to infrastructure, improvements on the sanitation system and internal divisions.
The connections to water and electricity system is an obvious improvement step since residents see it as an essential need of the household.

FIGURE 9.7: TOTAL CATEGORIES PER STEP OF IMPROVEMENT IN ITAMARACA

	CATEGORY OF IMPROVEMENT	NUMBER OF FAMILIES PER STEP OF IMPROVEMENT IN A SEQUENCE OF SIX STEPS OF IMPROVEMENT						NUMBER OF FAMILIES PER CATEGORY	
		1rst	2nd	3rd	4th	5th	6th	TOTAL	%
1	PLOT DIVISION WALLS	2	2	4	4	14	0	2	48.14
2	ELECTRICITY/WATER PLUMBING	36	8	3	1	1	0	50	92.59
3	SANITATION SYSTEM	4	28	4	3	1	0	40	74.07
4	INTERNAL DIVISIONS	6	9	23	4	0	0	42	79.14
5	SERVICED AREA ROOF	0	0	0	0	2	0	2	3.70
6	CORE HOUSE EXTENSION	2	4	10	23	2	0	41	75.92
7	CORE HOUSE DEMOLISHED	1	0	0	0	0	0	1	1.85
8	CORE HOUSE RELOCATED	3	0	0	0	0	0	3	5.55
9	NEW HOUSE UNDER CONSTRUCT.	0	0	0	0	0	0	0	0.00
	TOTALS	54	53	44	35	20	0		
	%	100	95.2	81.9	64.9	37.0	0		

Moreover, the core house was provided without sanitation facilities obliging residents to pay a special attention to this matter by themselves. Upon occupying the plot, the resident proceeded to install water and electricity connections through or at the rear side of the house and immediately had to start digging for a pit latrine.
In some cases, residents implemented these two categories at the same time, occasionally building the internal divisions of the core house, using wood usually brought from their former shack.

The household size explains this hastened activity. In Itamaraca, more than half of the families (55.6 %) consists of 4 to 6 members, and 35.3 % are made up of more than 6 members.
The original core unit space provided considered an average of 4 m2 per person which is thought to cause quite an overcrowded situation. This may have forced residents to split their dwellings in to small spaces and to obtain more private space for each person, no matter how small it is within the core house.
75.9 % of the families carried out category 6 "core unit extension", which reinforces the idea that the need for space for essential household activities and reasonable shelter, drive residents to carry out improvements, no matter how scarce their resources are.
An overview of the improvements implemented by the residents of Itamaraca is

shown in FIGURE 9.7, and in terms of preference the main sequence 234610 is reflected.

Even though the residents of Itamaraca certainly reached a sequence with more categories of improvements, somehow they have not been able to complete all six steps of improvements, which means that the famlies surveyed faced difficulties in changing their provisory dwelling into a more consolidated one.
Considering that this is expected to occur at the end of the sequence of improvements, the approach applied in this project simply failed and instead, brought more difficulties for the residents in improving their living conditions at the plot level.
This fact reinforces the results of the survey on physical transformations of the dwellings in the project, shown in FIGURE 9.5. On one hand, the provisory wooden core house have facilitated the immediate occupation of the new plots in a very short period of time, but on the other hand, it took time and a lot of financial and material resources from residents in the maintenance and repair of the provisory base. Unless residents remove the provisory core first, the sequence of improvements is implemented on this basis, and consequently the whole process is repeated twice when the permanent structure is built.

The same procedure applied for Candangolandia in order to identify the number of combinations and sequences of improvements implemented by residents, was done again for Itmaraca. It revealed 30 different combinations with only one missing case. Two combinations are pronounced: 234610 with 18.5 % of preferences and 234600 with 14.8 %.
The sequences which have only one step of improvement are those related to categories 7 and 8. As explained before, category 7 stands for "core unit demolished and replaced by a new house" and category 8 stands for "relocation of core unit to another place in the plot until the new construction is to be implemented."
These categories represent the future construction of a new house described in this report as the "more consolidated dwelling", a structure usually built with red brick masonry. It represents only 7.4 % of the cases which reinforces our previous statement, that the core unit solution applied in Itamaraca has failed in its basic concept: to be an instrument which will allow the extension of the residents' living space obtained in a sequence of improvements, during a period of time, leading to a more consolidated dwelling (e.g. red brick masonry structure).
However it is difficult to sustain the argument that the failure of the development approach in Itamaraca is a consequence of the core unit offered in the project. There are evidences that the socio-economic situation of residents play an important role on the conclusion.

The building actors involved in these improvements, are plot owners (61.1 % of families) and only 11.1 % of the improvements were carried out by contractors. The lack of financial resources turned residents towards self-help so as to lower the costs of housing improvements. Although the population of the settlement is very poor, resources were mobilized to obtain building materials; 31.5 % was brought from former shacks, and 38.9 % was achieved with the savings of the residents.
9.3 % of the families used red brick as building material. Mixed processes were implemented by 16.7 % of the families and 70.3 % used wooden materials,

recycled or new wood.

Three years have passed since the occupation of the plots in Itamacara and the majority of families have no recollection on the amount of money invested on the house, and when asked about the reasons for low improvements, 79.6 % indicated the difficulty to mobilize resources as the main constraint.
The assessment of project costs and its impact on residents in Chapter 7, stated that the average family income in the project is 2.0 MW, and that because of the cost recovery scheme, it is possible that residents will find it difficult to afford living on the site. It was also found out that the progressive development approach based on a provisory wooden core unit, and the weak capacity of the residents to cope with improvement costs, are the main two constraints on housing improvements in the settlement.

9.5. ITAMARACA : Conclusion Remarks on Housing Improvements.

It is clear that one of the poorest communities selected to be upgraded by the program faced a wide range of constraints.
Firstly, its location limited accessibility to employment, services, and facilities. It is very far from Plano Piloto and the satellite city of Gama could not achieve a reasonable balance of development. So, residents could not find local jobs nor possibilities to generate income at the formal and informal market.

Secondly, the recurrent expenses and land tax figure revealed that residents of Itamacara are paying a lot more for housing than those who are in a top location, closer to Plano Piloto, e.g. Candangolandia, and are likely not to afford the monthly mortgage payments.

Thirdly, as a consequence of being provided a provisory core house they are forced to invest resources in the maintainance of this cardboard structure, which falls apart after three seasons of rain, while trying to save money to buy building materials, store it and wait for the right moment to build their consolidated house. They are simply left without financial or material support, and could therefore lead to a replacement process by economically stronger groups. It is obvious that they may gain more profit by selling their plots at the free market instead of improvising means to afford staying on the site.

With these constraints the pace of consolidation is slow, despite the period of three years of recupation, however, it is the only way possible.
In fact, with the range of constraints faced by residents, it is felt that the consolidation in Itamaraca is turning out fairly well.

The residents'will exists, even if there are no resources available.

The economic constraint is seen as the main obstacle of the residents to achieve better living conditions. The provisory core house, which was the concept basis of the progressive development approach of the project, increased the difficulties of the residents to cope because it consumed their energy, time and scarce resourses.

9.6 CANDANGOLANDIA AND ITAMARACA : A Comparative Analysis of Housing Improvements.

The level of improvements achieved by residents are summarized in FIGURE 9.8.

FIGURE 9.8 : TOTAL CATEGORIES OF IMPROVEMENT CARRIED OUT BY RESIDENTS IN ITAMARACA AND CANDANGOLANDIA.

CATEGORY OF IMPROVEMENT	CANDANGOLANDIA		ITAMARACA	
	FAMILIES	%	FAMILIES	%
1 PLOT DIVISION WALLS	145	58.00	26	48.14
2 ELECTRICITY/WATER PLUMBING	246	98.00	50	92.59
3 SANITATION SYSTEM	98	39.20	40	74.07
4 INTERNAL DIVISIONS	111	44.40	42	79.14
5 SERVICED AREA ROOF	95	38.00	2	3.70
6 CORE HOUSE EXTENSION	102	40.80	41	75.92
7 CORE HOUSE DEMOLISHED	0	0.00	1	1.85
8 CORE HOUSE RELOCATED	0	0.00	3	5.55
NEW HOUSE UNDER CONSTRUCT.	5	2.00	0	0.00

It is seen that a majority of the residents made connections to the water supply and electric energy systems.
In Candangolandia, category number 1,(Plot Division Walls), appears as the second most frequent improvement while in Itamaraca categories 4, 6 and 3 appear as the second, third and fouth most frequent improvements carried out by residents. In Candangolandia, category 3,"Sanitation System", appears as the final improvement step in the consolidation process because of the need to relocate the existing system provided by the governement, which had faulty characteristics and were considered an inadequate solution. In Itamaraca this category was a provisory and immediate step in which residents built a pit latrine system.
"Internal Divisions" and "Core Unit Extension" are categories of improvements directly related to spatial requirements. In both projects it was verified that residents were very concerned in defining certain spaces for essential household activities.
In both projects, the size of the household and an overcrowded housing unit urged residents to extend their living space.
Based on the original core house area in each settlement, the space allocation in Candangolandia was 6m2 per person and 4 m2 per person in Itamaraca. Undoubtedly it does not represent the ideal situation,especially in Itamaraca, where 35.3 % of the households are composed of more than 6 members.

Based on the frequency of the categories of improvements expressed by the residents the main sequence of 2136 was pronounced in Candangolandia and 234610 in Itamaraca.

In Fig. 9.9 it appears that there are more residents achieving more steps of improvements in Itamaraca than in Candangolandia.

FIGURE 9.9 : COMPARISON BETWEEN THE STEPS OF IMPROVEMENTS ACHIEVED BY RESIDENTS IN ITAMARACA AND CANDANGOLANDIA

	CANDANGOLANDIA		ITAMARACA	
STEP OF IMPROVEMENT	FAMILIES NOT REACHING IT	% OF FAMILIES REACHING IT	FAMILIES NOT REACHING IT	% OF FAMILIES REACHING IT
1rst improv.	3	98.80	0	100.0
2nd improv.	43	82.80	3	98.14
3rd improv.	87	64.80	10	81.48
4th improv.	144	42.40	18	66.70
5th improv.	196	21.60	34	37.03
6th improv.	224	10.40	54	0.00
	Sample: 250 households		Sample: 54 households	

Even though 10.4 % of families reached the end of the sequence of six improvements in Candangolandia, and no one has reached it in Itamaraca, proportionaly, the residents in this project have completed more steps of improvements.
In relation to the socio-economic condition which allowed these sequences of improvements, the differences between the two become apparent. 61.1 % of the plots in Itamaraca had the plot owner as the main building actor and only 11.1 % of the residents reported improvements implemented by contractors. In Candangolandia, 37.2 % of the cases had improvements carried out by a building contractor and only 24 % was implemented with the participation of the plot owner.
This fact brings out the point that mobilization of resources was very significant in Candangolandia and extremely modest in Itamaraca, where most of the building material used in housing improvement were wood brought from former shacks. In Candangolandia red brick is bought at the free market and there purchased under special arrangements, that meant that a large proportion of the residents´ savings were invested in the building process.

Residents of both projects had insufficient financial resources to invest in housing improvements, but it was more critical in the case of Itamaraca.

The core house provided in both projects had any kind of main installations e.g. pipes, connections, wires, vaulves, etc.... It is known that it is a project component which accounts for 1/4 of the total cost of a popular dwelling unit in Brasilia. This certainly limits further investments on housing improvements because of the high disbursement of capital upon occupation of plots. It disturbs the household budget and postpones future steps of improvements, especially among the cases with very low family income.

The progressive development approach applied in both projects can be

regarded as a very potential mechanism to support the development of low income settlements. Even though there were clear evidences of its failings in Itamaraca, an urban scenario involving a dynamic building process was demonstrated in Candangolandia, complemented by a series income generating activities.

In Candangolandia, 89.5 % of the dwellings surveyed had been occupied for a period of 12 to 18 months.
An accelerated process of transformation, was more evident here than in Itamaraca. It is not only related to higher family income, settlement scale, better accessibility to resources and employment but also to the provision of a consolidated core unit, made of red bricks (ceramic).
Indeed the core unit provided a strong basis for future development, expansions, improvements, which created jobs in the building sector, within the limits of the settlement.

The comparison of the consolidation process in Candangolandia and Itamaraca, raises two other important variables that should be considered in any evaluation procedure: time and resources.
These, combined with other variables should give a good basis for assessing and understanding the pace and the speed of consolidation in low income settlements. It also raises questions concerning the constraints, and give explanations about the process by which residents are managing to improve their dwellings and their living standards.

There is a need to look deeper into the development and consolidation of low income projects which will certainly affect, qualitatively, the awareness of planners, designers and governmental authorities.

10. CORE UNIT PROJECT ANALYSIS.

The progressive development approach in the PAPE program was based on the provision of an unfinished core house unit which was to be the starting point for residents to undertake necessary expansions, which would naturally lead them to an ideal dwelling depending on their needs and living standard. The designers expected that the plan of the core house would facilitate residents to make alternative housing expansions depending on their decision, time and resources.

The residents of Candangolandia were furnished a red brick core unit, 31.35 m2 in flor area, fiber cement roof with wooden structure, paved floor, cardboard windows, wooden doors, toilet pot, a septic and soakway tank. The foundation was made of concrete blocks, 35 cm deep, laid over a surface of 5 cm of ciclopic concrete. A reinforced concrete ring beam supports the outside walls, and is 10.0 cm thick and 10.0 cm in diameter (see in the annex).
This report avoids an assessment of the type of technical solutions related to the quality of building materials, or the adequacy of the materials used e.g. the roof, the wooden structure, the foundation, etc... It pays attention to the adequacy of the architectural planning and appropriateness of the core unit project for providing multiple alternatives for housing expansions.

10.1 THE ANALYTICAL CRITERIA

The evolutionary housing concept of the project should be analyzed through a pre-established criteria.

The criteria is that a core unit project is considered efficient as long as it permits a multi-variation of housing improvements and expansion alternatives with as little change on the original structure as possible.

Survey results indicated that low icome families could not cope with the costs and time required in rebuilding and repairing the preliminary structure provided.

If a resident needs to demolish walls, change or create windows and doors, or replace essential facilities of the core unit in order to obtain more area for living space, it is evident that something is wrong with the process. The project may not also be flexible enough or the expansion step itself requires radical changes.
It is acceptable for a small part of the original structure to be demolished in order to create a new door for access to the adjoining extension, and that the number of doors created is related to the number of enclosed spaces created on the adjoining expansion of the core house. The natural extension of the original structure did not imply any demolition on its structure to create new windows because the two existing ones are sufficient to provide light and ventilation for internal subdivisions based on the minimum areas permitted by the building code: 6 m2 for rooms and 9 m2 for living rooms. Any future windows was considered to depend on the number of rooms created.

The core house project allows a maximum of two rooms for internal subdivision, and the rooms created during the expansion process will depend strictly on household size and the amount of resources available.

10.2 THE DESIGN PROCESS

Di Lullo (1981: 9) describes three design models in which the roles and the relationship between the sponsor, the designer, the financing agent, the dweller and the builder are established at different stages of the process through which the housing product is achieved.
MODEL B, as he describes, "depicts the customary design and production of centrally sponsored housing schemes either directly undertaken by a housing agency, commissioned to another party, or tendered for. It is characterized by the predominance of technical criteria and by the absence of the beneficiaries in the process until the scheme is delivered"(Di Lullo, 1981: 11).
Projects implemented under the PAPE program fit the description of this model.. The decision making process entailed in the formulation of the type and form of the residential unit and its programme was a "one way", top to bottom, decision taken by the head of the GEPAFI and the Social Service Secretary. The decision was based on the following Costs Savings criteria:

(1) Minimum area of construction as possible; (2) semi-detached houses in order to save on the costs of one wall, beam, foundation, and the structure of the roof; and (3) minimum provision of basic services e.g. water and

electricity plumbing, connections, connections, valves, wires, pipes, etc...
The designers of the GEPAFI followed the criteria strictly when developing a residential project which would reach the acceptable price limit.
The residents did not participate, at any point, of the design process and had no influence on the final scheme delivered.

The relation is very impersonal, and the housing project resulting from the GEPAFI´s own concept of the final beneficiary´needs is based on the social-economic survey it carried out during the census on squatter settlements in the first semester of 1983.
Considering that the housing design was achieved through a very centralized scheme; and that residents had no influence on the process, their needs were interpreted from very abstract data characterising a very impersonal relationship between the designer and the client;therefore, not very much can be expected from this design process.
The project designed by the GEPAFI provided very little sound alternatives and the Municipality´s designers were not able to consider the socio-cultural-economic background of the clients while designing alternatives for core unit expansions.
The lack of user´s participation during the design process and in the post design phase (expansion) can be assumed as one of the main reasons why the solutions presented by the Governement (GEPAFI and Municipality of N.Bandeirante), failed to fulfil its main concept: to provide multiple alternatives for core unit extensions in a simple and least cost way.

Although the progressive development approach applied in Candangolandia can be considered as an innovative way of dealing with housing projects in Brasilia, it repeated the same procedures of the delivery of the housing product used in the conventional housing schemes so often implemented by the SHIS, the Government Social Housing Agency, in Brasilia.
The type of residential project has changed but the procedure has maintained its conventional characteristics: lack of residents´participation, emphasis on designer´s role, top to bottom delivery scheme, etc...
"The projects have become as much of a turn-key affair as the earlier attempts at packaged housing, the only difference being that the dwelling units are provided in incomplete forms. The dwellers are identified only at the completion of the ´core´ units so that their share of responsibility for the project is reduced to undertaking extensions to the core after occupation,in addition to payment of the instalments for the land and initial improvements".(Das, 1984: 38)

One aspect becomes clear and should be understood as one of the direct consequences of the limitation of the design process: from the very beginning of the project cycle, at the early stages of the core unit design, there is no evidence of any serious concern for the suitability of the project in relation to the socio-economic conditions of the residents. It seems that the question of costs implicit in each alternative for housing improvements e.g.core unit extension, have been simply neglected.
The situation is that the GEPAFI left out any serious study on core unit extensions which could, at least, raise certain questions about the efficiency of the project in responding to its main concept on the evolutionary housing design approach. Furthermore, the GEPAFI did not provide the residents any schemes, causing a lot of time, money and other problems to implement extension of the core unit because they had to wait

for the development of the Municipality´s models (hence, losing time), or hire a private designer to develop a scheme which had to be approved by the same Municipality , or simply do it illegaly.
However the main problem was not because the GEPAFI did not provide expansion schemes but because it did not consider possible extension alternatives and their implicit costs while designing the project.
And this shows, to say the least, a complete lack of responsibility on the part of a government institution responsible for planning, design and implementation of low income projects.

10.3 THE MUNICIPALITY´S MODELS

One hundred and two (102) families (40.8 % of the families surveyed) carried out core unit expansions. 71 Families used the schemes provided by the local goverment authority, the Municipality of Nucleo Bandeirante, and 31 families implemented their own schemes.

For the purpose of this report, only two examples of these nine different plans will be presented. (see annex)
We can identify two variants: the core extension towards the side space available as a continuation of the existing roof structure, and the extension towards the rear side of the plot. All of them involve one radical change: the replacement of the sanitation pit. The extension towards the rear side implies the construction of a gutter between the two roofs, and very little change in the original core structure.

The plans proposing the extension towards the rear side of the plot were preferred by 51 families or 70.42 % of the residents who implemented the Municipality´s models.
The ananalysis of the data revealed that model 7 was the popular expansion model.
It is a plan which involves few changes on the core unit; it permits the extension of the structure towards the rear side of the plot; it leaves out a free area along the vacant side space of the plot thus providing access to the backyard which becomes a natuaral free pathway for infrastructure connections, and giving the option for opening windows or doors to it.
It designed the kitchen and the service area towards the rear side of the plot which is a plan that is culturaly acceptable to the residents. Studies on the functionality of a popular dwelling have indicated favourable reactions on plans characterized by the location of the kitchen and household services at the rear side of the house, facing the backyard.

Model 7 is not very costly and does not disturb the household life because the construction can be carried out progressively, starting from the rear side towards the core unit. There is no need for big changes on the original structure which facilitates the maintenance of residential activities inside the core unit.
The analysis of these models presented evidences on the lack of concern by the designers of these models and of the core unit project. It demonstrated that residents prefer a solution that takes the existing structure into account as well as simple economical alternatives for core unit extensions.

10.4 THE RESIDENTS' MODELS

Some solutions derived by the residents themselves are presented in the annex.
A majority of the residents preferred to expand their core house towards the rear side of the plot, confirming the preferences for model 7 of the Municipality. It emphasizes the strength of cultural aspects in the consideration of suitable spatial arrangement for the average household.
There is a strong argument for this choice.
Several studies have revealed that families have a tendency to place the kitchen and the areas for cleaning, laundry and washing activities at the backyard, because it is a private activity and mainly done by the housewife. Besides that, children are very often kept in this area, so the mothers can carry on with their daily duties while looking after the children.
Most examples revealed that residents preferred to undertake core unit extensions without having to transform most of the original structure.
It is indeed an obvious choice because these changes uses up resources which could otherwise be saved for the extension of the original structure.
The examples clearly show the preference for the maintenance of the original strutucture while extending the living space (see in the annex)

The feature which is present in the plans carried out by residents and present in all the 8 models of the Municipality is the displacement of the existing sanitation system.

The analysis of Housing Improvements, in Chapter 9, revealed that the construction of new sanitation pits was a category implemented by 39.2 % of the families surveyed.
Looking at these models, it becomes clearer why such a category of improvement is carried out by a significant proportion of the residents
Any attempt to extend the core unit structure implies the displacement of the whole system.

10.5 THE SANITATION PITS

In Candagolandia, the core house project included a sanitary disposal system described as a septic tank solution based on the minimum standard established by the Brazilian Technical Norms No. 49 (NB 49).
Instead of the usual rectangular chambers connected to a soakaway pit, the type of system applied in Candangolandia consists of one cylindric retention chamber of 1.50 m deep and 0.80 m diameter, linked to a cylindric soakaway pit of 3.00 m deep and 0.80 m diameter, where the effluent is disposed.

From a technical point of view, in the first place, the type of soil in the settlement is not appropriate for septic systems. The clayey type of soil creates a lot of problems in draining. Residents were forced to build a second extra pit or soakway.
In the second place, the high underground water level at the northern part of the settlement makes the solution offered technically not feasible in this location. Residents use it simply as a toilet disposal and drain the waste water (e.g. sink,tank, shower) to public spaces.
Finally, the existing local regulations for septic tanks prescribed by CAESB, for a household of 7 members, offers a minimum standard solution

which is more suitable for higher income groups.

From a planning point of view, the sanitation system were poorly located because residents had to remove the whole system when they decided to extend the core house. When residents decide to extend their living space, they have to face the consequence of replacing the tanks and the soakaway pit. Those who opted to occupy the whole frontage of their plots, extending the house to both sides of the plot, prefered to build a new system because they did not want contaminated draining pipes to cross their houses whenever the rear side tanks are cleaned. Those who opted for extension towards the rear side of the plot were obliged to remove the system to another location in the plot.

Residents showed great awareness about the need for an efficient sanitation disposal. Data on the use of the sanitation system shows that more than half of the families(56.0 %) used it adequately. 6 % had drained their system once or twice and used it adequately and 2.0 % showed inadequate use, and drained it once or twice. This confirms that the system did not have a good performance in certain areas of the settlement. The concept of "adequate use" is applied when its use does not mean the contamination of the open space, private or public.

Considering the fact that there were no systematic instructions to families before, and after occupying the plots, this is a very interesting figure and confirms that low income residents are much more aware of the principles of household hygiene and conscious of their problems than planners think they are. However, 33.2 % of the families are shown to have used the system inadequately which may be a contradiction.

However, when we look at how the sanitation system works in the cases of those families who used it inadequately, it is felt that the "inadequate use" is a consequence of an inadequate project option, completely inappropriate from a technical point of view.
Another constraint faced by residents is the fact that the Government did not provide good assistance for cleaning the tanks since there was only one vaccum truck attending the whole area of Nucleo Bandeirante (20,000 inhab.). According to a CAESB's truck driver, "the capacity of the truck's tank is 9000 liters and three houses fill up the tank. If the system is built by the resident, the truck is filled up at once, after only one house because the resident usually builds a much bigger tank. Anyway, they have to pay CZ$ 38.70 each service and we clean an average of 18 septic tanks a day".(interview in 8/12/86)

The system is considered inapropriate. The assistance for cleaning is inadequate and costly if it needs to be done very often, so the only way out is to drain the waste water out to public spaces under the responsibility of the State. 13.2 % Of the families are said to drain the water from sink, tank and shower to the street and 9.2 % drain only the tank water, and prolong saturation time of the system for as long as possible.

10.6 CONCLUSION REMARKS ON THE CORE HOUSE PROJECT

From the analysis of the core house project in Candangolandia an important criteria by which a core unit project should be looked at has been developed.

First, a plan is considered more efficient if it allows many alternatives for expansion. Second, the core unit plan is more efficient if it requires only a few changes on the original structure. Third, the core unit project is more efficient when it is suited to the economic status and cultural practices of the residents.

Looking at the alternatives presented by the Municipality of Nucleo Bandeirante and those carried out by the residents themselves, it is stated that:

1) The user´s partipation at the design phase would have provided important input which could have made the evolutionary concept of the project more efficient.

2) During the design process, the GEPAFI did not consider simple and economical alternatives to do core unit extensions. Its emphasis on cultural aspect of the project is recognised, but could have achieved more acceptability by combining the cultural and economic aspects. A more sensitive attitude is expected of a housing sponsor.

3) The core unit extension models provided by the Municipality of Nucleo Bandeirante reinforces the need for user´s participation during the design process. The solutions presented were very costly and required a lot of effort from residents, so that the lowest income families could not cope with the solutions.

4) As far as the design is concerned, the locations of the entrance door, the WC and the sewage system are the main inappropriate features of the project.

5) The inclination of the roof is another constraint residents face when they want to expand towards the backyard since it requires the construction of a gutter, or raising of the structure walls. The designer thought that residents would prefer to extend the house to the other side of the plot, but the preference was on the other direction.

6) Land use regulations requires 1.5 m frontage limit on plots which implies more costs on pipes, connections and lines, etc. Residents should be permited to occupy the plot up to the front boundary line.

11. THE RESIDENTS' POINT OF VIEW.

Up to this point, there has only been a presentation of the findings of the survey carried out in two projects implemented in Brasilia, and some analytical considerations, speculations, and conclusions from the point of view of a professional who is interested to discover the failures and the constraints of government projects, and raise questions about low income housing in Brasilia.
There were attempts to show how housing improvements and the consolidation of low income settlements, no matter if they are legal or illegal, have depended mainly on the incredible effort of the residents. They are named differently: the urban poor, slum dwellers, low income groups, economically weaker groups, the available labour force, invaders, squatters, etc.
They represent a large proportion of total populations in developing countries and it is the same picture in Brazil.
They are found in every urban center in Brazil, the head of a family, a woman or a man, struggling to find a job, to improve his dwelling, educate his children, geting together with other neighbours to demand for urban equity and push the government to provide services in their neighbourhoods.

In Brasilia, the authorities who have governed the city, have not been able to solve the problem of housing the urban poor who migrated into the city in order to support its construction with their labour force, called as CANDANGOS. Who are they? What do they think about the housing packages provided by the State? What are their needs and what do they request? Do they have any opinion to give about the projects ? Are they aware of the solutions to their problems?

11.1 CHARACTERISTICS OF THE TARGET POPULATION

The census of 1983, carried out by the GEPAFI on illegal settlements, showed that 60.9 % of almost 18,000 families interviewed, lived in Brasilia for 10 years or more and half of them were working in Plano Piloto, 11.7 % were working at their settlements and only 52 % had a working document signed by their employers. The majority, 75 %, earned below 3 Minimum Wage. 77.1 % declared that they would like to receive a plot serviced with water and electricity and only 20.4 % wanted a finished house like the conventional housing scheme implemented by the BNH, the Housing National Bank.
The families come largely from the NE and Central Brazil. The Northeastern region of Brazil suffers occasional droughts and families flee to large towns contributing to excess in labour force. Both regions have serious difficulties experienced by rural areas which lack facilities and government support.

Among the families surveyed in Candangolandia, 48.9 % gave "search for employment" as their main reason for coming to Brasilia. The same reason was indicated by 63.0 % of the families surveyed in Itamaraca where 77,8 % had been living for more than 10 years in the city. A higher figure of 87 % was found in Candangolandia, one of the earliest labour camps built in the city. In Itamaraca, 20.4 % of family heads work in the service sector ad 14.7 % in construction. In Candangolandia, the service sector again accounts for 21.2 % of the families and 11.2 % in commerce and transport, and 10.8 % work as public employee.

11.2 OPINIONS ABOUT THE HOUSE

When residents were asked to compare their former house with their new house at the projects, 50.4 % in Candangolandia and 51.9 % in Itamaraca, declared that their new house is better.
In Candangolandia, 18.8 % declared that the new house is better because of security of tenure.
In both settlements, the majority repplied with only one opinion.
Combinations of answers revealed the importance of security of tenure for residents when considering the housing improvements.

11.3 OPINIONS ABOUT THE PROJECT

The type of project offered by the government, was seen as "above regular standard quality" by 45.2 % of residents in Candangolandia and by 92.2 % of residents in Itamaraca where only 7.8 % stated it as "below regular standard". The same response was given by 31.6 % of the families in Candangolandia.
The difference of opinion is considered to be surprising.
The residents who received the provisory core unit have less complaints about the project than those who received a red brick core unit, which was thought to be a much better solution than the former one.
It seems that a greater variety of requests and needs to be fullfiled, are registered by residents of higher income. Poorer residents seem to be easily satisfied with very little that is provided, for long as their basic needs are met.
Though it is very polemic, some evidences in Itamaraca revealed some kind of corelation between income and level of consciousness expressed by residents. It seems that there are some implications between a residents´income and his concern about his living standards and on the quality of his new environment.

In Itamaraca, families were more worried about their monthly earnings, how to maximize their scarce resources, what they will eat the next day, how they will manage to pay their expenses rather than if the houses or roads are well constructed,or if the material is good or not. There was no time for speculations or complaints. It was a matter of surviving and keep on living as some residents explained in the interviews. It is obvious that it is not so simple as it appears. There are some socio-political components which affect the level of complaints in a settlement like Itamaraca, in Brasilia.
Here, the survey revealed that 44.4 % of the residents had no opinion about the core unit project and only 29.6 % declared that the building material is not appropriate. It is quite amazing that, after our analysis of the performance of the provisory wooden core house, it did not receive from the residents the complaints one would expect, while in Candangolandia, half of the families surveyed gave more than one opinion about core unit poject. There was a desire for a more finished house or at least a house with the basic services provided e.g.connections to the bathroom, kitchen, electricity lines, etc.. Only 13.6 % had no comments at all, and non attatched houses stands as the main second opinion (13.2 % of the families).
When asked about their reasons for low improvements, 58.8 % in Candangolandia and 79.6 % in Itamaraca declared that it was due to scarcity

or difficulty in mobilizing resources.

11.4 OPINIONS ABOUT SERVICES AND FACILITIES PROVIDED IN THE PROJECTS.

There was a great concern expressed about services and facilities among families in both settlements. In Candangolania, 22 % wanted a health centre and did not accept the one constructed because of its size and standard. 17.2 % declared that the services available were not sufficient, 50 % of the residents expressed two opinions. The Second opinion indicated the need for a Police station and a marketplace. By Adding opinion one and two, the requirement for a Police station was expressed by 20 % of the families.
A combined opinion one and two was expressed by 44.3% of the residents in Itamaraca.
The informal interviews revealed that there was a serious concern about public security in both settlements,especially by women, who were threatened by unemployed workers and "marginals" hanging around the neighbourhood, especially at night. They complained about the lack of interest from the authorities on this matter.

11.5 OPINIONS ABOUT THE SETTLEMENT PROJECT.

Very interesting points of view were revealed when asked about the settlement project in general.
In Itamaraca, 37 % stated that vacant space for leisure did not exist and 42.6 % wanted parks, a green area, and a children's play ground. In Candangolandia 21.6 % stated that the vacant space available should be used for housing programs and 20 % stated that there were not enough leisure facilities provided.
These responses are seen as different ways of understanding the areas they live in and how the free open space is perceived by the residents. It also gives indications that certain issues seem very abstract to residents, especially when asked using a questionnaire. It is through interviews and face to face contact that this type of concern can be appreciated.
The availability of vacant space in both settlements, green areas and others with undefined use seem to annoy residents but they did not have any idea about its impact on their living, in terms of costs.

In Candangolandia, 30.4 % were concerned with the way roads were planned by criticizing its width: 18.8 % stated that roads were narrow, 11.6 % criticised the curves as too short. It showed an awareness about how roads should look like but there was a major complaint about pavements and improvements.
Among 46.3% of the residents in Itamaraca complained about pavements, and only 9.3 % made comments on the design scheme of roads.
The appearance of an urban environment and how it is perceived by residents is a very subjective opinion but the predominant urban scheme applied in Brasilia is thought to have made a bif influence on low income residents.
The parameter or the standard accepted as signs of urban development in their areas were seen as the same ones that as in Plano Piloto and several satellite cities.
Several projects in Brasilia have brought out complaints from residents based on this comparison with the development in Plano Piloto and other satellite cities. The urban layouts in both projects disturb the residents

very much as they would like to have more straight roads, large avenues, commercial zones, etc...

11.6 OPINIONS ABOUT THE PLOT SIZE.

In Candangolandia, 41.6 % declared it is" good enough" and 46 % stated it as "too small".
The plot sizes vary significantly in the lower part of the settlement, so that it is possible that this opinion may vary, however,the family income of the residents is quite heterogenous so the disatisfaction could be from the higher income groups.
In Itamaraca, 57.4 % stated that the plot size was " too small" and only 29.6 % accepteds it as " a good size".
The question of plot size is again a very polemic issue in low income projects. It has been argued by several authors that sizes of plots play a very important role in the process of displacement. Land taxation tends to increase with improvements in the settlemnt and plot sizes usually affect the overall cost of infrastructure, which causes direct and indirect impact on residents´income.

Studies carried out by the GEPAFI, revealed that the ideal plot size for low income families in Brasilia, would remain between 160 and 200 m2 based on a series of activities carried out within the household domain: washing clothes, children´s entertainment, growing of herbs and vegetables, raising domestic animals, etc.
Considering the cultural background of the residents, it is an acceptable argument, but considering their economic status and their employment situation, it is quite hard to support this argument in favour of large plots.
Some efforts should be exerted to determine efficient plot dimensions and relate it to more flexible land use schemes and building regulations, e.g. the obligatory 1.5 m plot frontage limit, proportion of occupation permited, etc.
The people should have more freedom to solve their space problems so that more alternatives should be offered.
Indeed, several residents complained about their plot sizes mainly because very little area is left after house expansions have been implemented, and for income generating activities.
About infrastructure, 66.7 % of families in Itamacara stated it as " good"
In Candangolandia, 70 % complained about the sewage system. Since the individual system provided there was a very problematic solution, the answer is very obvious.

11.7 OPINIONS ABOUT COMMUNITY PARTICIPATION.

There is a striking picture when government policies are discussed in relation to the residents´ concern about one key aspect of urban policies and this revolves around community participation and neighbourhood organization.
In Candangolandia, 60.4 % made no comments about community participation, and 10.8 % declared they do not know what it means.
In Itamaraca, 55.6 %, stated that they did not have the slightest idea about participation. The proportion of residents who know what participation means, is very low, 25.2 % in Candangolandia and 9.3 % in Itamaraca.

To appreciate these figures it is necessary to know that Brasilia has not achieved political independence from the National Government (the governor is nominated by the President,there is no city council or system alike), and political participation is very limited and the consolidation of the city occured when the country was ruled by a military regime.
This situation may have inhibited people´s initiative and their interest to participate in decisions that affect their lives.
The paternalistic attitude which has charaterised government programs in Brasilia has also reinforced the passive role of residents in urban projects.

Even though residents´ organizations and community builders have gained some measures toward a better collective movement in order to obtain access to government programs, very often they are not recognized by the residents in their own settlements, and therefore it has been difficult to gain recognition and spread information about their work.
In Candangolandia, 34 % refused to make any comment about Neighborhood Organizations and only 27.6 % knew about its existence.

Since the families surveyed were from different areas before project implementation, it is understood why they did not know about an organization which supposely represents the whole settlement. However,election and political disputes took place in the settlement and that may mark the beginning of a process of political participation.
In Itamaraca, 35.2 % of the families knew about neighborhood organizations. They made several comments and one stands out very clearly: 11% stated that there is lack of good leaders.
After 20 years of military regime, it will take some time for the citizens to start using their rights in a more democratic environment where they can increase their awareness through discussions about their problems in their everyday life with their neighbours, in their unions, and in their organizations.

This sense of responsibility means more awareness of citizen´s role and state obligations in a society without fear of political activities, and will certainly facilitate the coming and development of true leadership. It will come as a result of a long process of changing, which is already occuring in the Brazilian society.
In this process, community leaders have an important role in the settlements´ life. They will be the ones who will raise issues to the government, will meet government authorities, organize committees and create a network of essential information , which will encourage changes.
For changes to take place at city level, they first need to start at the settlements´ level and at the neighborhood level.
FIGURE 11.1 shows the main concerns about neighbourhood organizations in both settlements together. "Not applicable" stands for those who did not know anything about the organization.

10.9 % of the residents think it is necessary but do not participate and only 3.0 % think it is necessary and participate in the meetings and discussions. Only 1.0 % belong to an organization.

FIGURE 11.1 : RESIDENTS' COMMENTS ON NEIGHBOURHOOD ORGANIZATION IN ITAMARACA AND CANDANGOLANDIA

COMMENTS MADE BY RESIDENTS	FREQUENCY	%
NOT APPLICABLE	156	51.3
NOT NECESSARY	19	6.3
NECESSARY BUT NO PARTICIPATION	33	10.9
NECESSARY AND PARTICIPATION	9	3.0
PARTICIPATION AND MEMBER	3	1.0
IMPORTANT AND SHOULD BE REINFORCED	19	6.3
IT IS NOT STRONG	14	4.6
IT IS VERY STRONG	5	1.6
IT IS NOT EFFICIENT	11	3.6
IT SHOULD PRESSURE FOR INFRASTRUCTURE	4	1.3
IT SHOULD REQUEST FOR BUILDING MATERIAL LOANS	1	0.3
IT LACKS GOOD LEADERS	20	6.6
OTHER ANSWERS	4	1.3
MISSING CASES	6	1.9
TOTALS:	304	100 %

11.8 OPINIONS ABOUT GOVERNMENT POLICIES.

The respondents stated several concerns which they would like to recommend to the Government for action in terms of policy and programs.
In Candangolandia, only 25.6 % had" no comments" as their first opinion. 32.4 % wanted government support to buy building materials or for building material loans.

The other replies were proportionally spread among different concerns regarding houses for tenants, upgrade the favelas, housing for the poor, etc. Very few people opted for conventional housing schemes, "finished houses", and only 12 % had no idea about it.
In Itamaraca 27.8 % had no idea about the schemes and 20.4 % claimed for an upgrading program for other settlements. 68.5 % of the families expressed single opinions. It is obvious that the preference for housing lies on non conventional schemes. FIGURE 11.4 presents the frequencies of first opinions concerning government programs in both settlements together.
When asked what solution they would like to receive, 28 % identified building material loans or financial support for building their house.
Only 23.4 % had no comments to make.

FIGURE 11.4: RECOMMENDATIONS TO THE GOVERNMENT BY THE RESIDENTS OF ITAMARACA AND CANDANGOLANDIA.

OPINIONS EXPRESSED BY RESIDENTS	FREQUENCY	%
NO IDEA ABOUT IT	45	14.8
NO COMMENTS TO BE MADE	71	23.4
UPGRADE SQUATTER SETTLEMENTS	16	5.3
BUILD HOUSES FOR TENANTS	5	1.6
IMPLEMENT A SERVICED PLOT PROGRAM	12	3.9
IMPLEMENT A BROAD HOUSING PROGRAM	12	3.9
BUILD HOUSES FOR ALL THE POOR	15	4.9
OCCUPY VACANT SPACE WITH HOUSING	2	0.7
SUPPORT ACCESS TO BUILDING MATERIALS	85	28.0
LEGALIZATION OF TENURE OCCUPIED PLOTS	3	1.0
FINISHED HOUSES PROGRAM	15	4.9
OTHER ANSWERS	20	6.6
MISSING CASES	3	1.0
TOTALS :	304	100

11.9 CONCLUSION REMARKS.

The last figure shows a clear tendency towards non- conventional housing schemes and demonstrates that residents are capable to give their opinions about what type of housing package they would like to receive.
A broad view on residents´opinions was also presented concerning different aspects of a housing project, which concerned the policy, the project, the core house, the plot, the services and facilities and their community organization.
It is argued that residents are more aware of their problems than planners think they are.
There are socio-political and economic circumstances which constrain residents to be more independent and self confident in their efforts towards better living standards.
Due to lack of experience in discussing their problems with decision makers, residents tend to be less aware of their role in the housing process and are not able to influence governmental decisions.
Obviously the struggle to survive in an urban environment with these disadvantages and the effects it has on people´s behaviour, cannot be undervalued.
However it is thought that starting a different approach towards housing by accepting people´s participation as a means to make projects more effecient may change the picture completely.
If governments want to achieve more efficient programs and design more appropriate projects from the point of view of the provider,(the state), and the receiver,(the residents), it must change its policies to include more flexible, dynamic and participatory schemes.
It is about time that the final beneficiary be given a chance to interact with government agencies and express what they think is better for them, instead of being forced to consume housing packages they never asked for.
People´s participation can take place in different ways and this will require a reorganization of the whole process of housing production in

Brasilia, from planning to final implementation, which will establish an institutional framework where the State, the private sector, the building sector and the residents play crucial roles.
In the process of reorganizing the institutional framework and the planning scheme of Brasilia, evaluation studies will become an important instrument for providing vital information and constant feedback, which will consequently change, qualitatively speaking, the awareness of residents, technicians, government authorities and decision makers involved in housing programs.

12. THE DISPLACEMENT PROCESS.

In Candangolandia, the survey discovered 22 cases with indications that they were newcomers to the settlement, giving evidence that some displacement has already occured.

After checking the 22 cases with the records of the SHIS, in april 1987, 11 cases proved to be newcomers.
The number represented 0.49 % of displacement occuring in the settlement after a little more than 18 months since the first occupation of the plots.

One striking feature the newcomers revealed in the survey was their place of origin.

In the early '70's during the climax of squatter erradications, around 80,000 families were evicted from areas surrounding the Nucleo Bandeirante and moved to the newly created Satellite city of Ceilandia, 35 km Plano Piloto. Ten years later, some of them returned to where they were evicted from buying plots in the low income residential projects.

This brings out four points which should be looked into when studying the displacement process: where the original occupant goes to, and why they sell their house, who are and where do the newcomers come from?

Despite information from interviews which indicated that the newcomers knew the former occupants and that they had left for their hometowns in the Northeast and Central Brazil, it is not possible to answer the first two questions due to the lack of reliable information.
However, there were evidences that the newcomers were mainly from other satellite cities. These early desplacements may be due to several factors: the location of the project is excellent due to its easy accessibility to employment, services and facilities; the price of dwellings and plots in the locality is quite high due to the limited housing market and government control over land; the lack of a housing policy towards tenants in satellite cities and towards other income groups which create pressure over the existing housing stock, increases the value and encourages commercial transactions with owners among the lower income groups; and the existing unemployment situation which drive people in urban economy to exchange their house for capital.

In Itamaraca, the majority of newcomers were from Gama, as tenants;
Eleven cases were found and representing 20.37 % of displacement, with two cases having had a third resident. It is a very high displacement rate in three years time considering that these transactions were illegal and

dangerous for those involved because PAPE made it explicit that residents were prohibited to sell the dwellings within the following period of five years. The government had the right to have the houses expropriated "in court" and the newcomers evicted without any kind of refund.

In Itamaraca, the newcomers organized themselves to obtain government recognition of their rights to own the plots, claiming that they too are low income residents.
During an interview with the leader of the organisation, he declared that there were 300 newcomers living in the settlement, 66.37 % of the total residents. It may not be a reliable figure but it indicated that the displacement rate in the settlement may have been greater than what the survey revealed.

12.1 EXPLAINING THE DISPLACEMENT PROCESS : the constraints to access to land and misleading government urban policies.

It is not the intention to analyze the critical political and economic situation of Brazil during the first half of the 80's which was reflected in Brasilia by the crisis in the building sector, employment, migration, etc. rather, the analysis will revolve around the government urban policies which led to the growth of a very critical housing problem in the city.
The emerging house tenants (inquilinos de fundo de lote) has identified one of the factors of the housing problem and it has turned out to be a serious and key topic of low income housing in Brasilia. They represent more than 60,000 families and there is a well organized tenants'organization (Associacao de Inquilinos) in every satellite city.
The practice of subletting rooms and houses in the backyards of residential plots in satellite cities is increasing the tenant population. Their large informal housing market is the only housing alternative accessible to low income groups because the government control has not permitted the natural growth of squatter settlements, which could provide an obvious alternative to legitimate housing. There are evidences on existing renting possibilities available in these areas but with more constraints than in the satellite cities.

From this point of view, the emergence of "tenants" in the housing issue in Brasilia, is regarded as a solution rather than a problem.
Subletting rooms and houses in satellite cities is an informal practice, and tenants become victims of a flourishing informal rental market, exploited by plot owners who charge different prices every month.
Because of this, tenants have claimed for urgent government action for serviced land and they have threatened to invade vacant land in order to receive the same treatment the families living in "invasoes" (squatter settlements) received through the PAPE program.

Government response have not been able to diversify housing options e.g. site and services schemes, guided land development, upgrading, etc. rather it has insisted on promoting comprehensive master plans, land use plans and conventional housing schemes which did not really sympathise with the constraints of low income families.
It has also not supplied the housing market with sufficient quantity of land for different initiatives for individuals, cooperatives, private sponsors and public housing. It retains more than 60 % of land property in the

Federal District but has never had a land policy, so far. The only attempt is by promoting public auctions.

The Real Estate Company-TERRACAP carries out public auctions irregularly. The actual sale price of plots are 300 % to 600 % above minimum prices set at the start of the auction.

The lower income groups are completely excluded from this land market for two main reasons: a) the actual prices are too high and b) if they could afford the sales prices, they are uncapable to meet the financial and legal conditions. Despite the fact that it is impossible for low income groups to participate in these auctions, other income groups are also constrained to house themselves out of these government schemes.

Even though the local Housing Agency-SHIS has produced around 90,000 units for the popular sector between 1962-86. These housing schemes have been out of reach by the lowest income groups because of the income requirements imposed on the beneficiaires.
From 1982 onwards, marked a period of four years without any government housing program. The housing market situation was under an extreme pressure; satellite cities were overcrowded. There was a crisis in the building sector and unemployment in the city. It was in that atmosphere when the PAPE program started supplying the market with almost 9,000 plots in different locations.
The result was that, on one hand, those who received the benefits of the program but were unemployed and could not afford the costs of recurrent housing expenses and improvements. On the other hand, they used their housing rights to manipulate the urban economy, hoping to benefit from the market price of such an important commodity.
It is well known that there were several families who commercialized their dwellings in other projects implemented during the PAPE program, but no research has been carried out to find the reasons why this process has occured, where the original occupant has gone, what use did he make of the money gained from selling the house and what kind of cycle can be identified?

Undoubtedly, the low income housing program revitalized the housing market by responding to the demands of the low income groups.
Families who wanted relief from excessive rental conditions, have mobilized sufficient resources to buy plots at quite reasonable prices and have improved to a more stable and improved housing situation. Here is where the processes of displacement occurs..
The speed of displacemnt then depends on how poor the families settled in the projects are, what their capacity to generate income really is and the location of the project in relation to Plano Piloto.
It is to argued, though not precisely, that the rate of displacement in Candangolandia is increasing because of its excelent location in relation to the Plano Piloto which provides access to employment, urban services and facilities, and allows an internal process of income generation. The situation is different in Itamaraca where there is a high rate of displacement. This is directly related to the local physical socio and economic condition of the project which have created a series of limitations to the residents, making it difficult for them to afford living on the site. These were: high cost of transportation, lack of employment changes in the

surrounding area, no opportunities for income generation activities in the settlement or in the satellite city, unsuitable project schemes, etc...
A different picture of these settlements could be drawn if employment policies would accompany housing programs, and if access to housing were less restricted thus reducing the pressure and the demand over the existing housing stock.

While housing policies remain dissociated from employment policies and income generating programs, it will be very difficult for low income groups to cope with the costs for housing expenditures.
What is argued in this report is that without a shift in state housing and land policies, Brasilia is destined to live with a Housing sector which will continously face the problem (or the solution, from the residents' point of view) of tenants and the displacement of low income groups by economically stronger groups.
It also argues for a change in the conceptual approach which rules all planning in Brasilia defining it to be eternally a terciary city.
The existence of small industry enterprises in satellite cities presents a potential that should be supported. It will facilitate the establishment of small and medium sized industries which could decentralize the role played by the Plano Piloto in the employment market.
A more liberal approach would also provide more opportunities to generate a balanced development among satellite cities, servicing them with essential facilities to urban life.
This shift would certainly help the consolidation process of low income settlements located within these areas, providing opportunities for income generation hence supporting the housing improvements carried out by residents. If so, the rate of displacement will certainly be diminished.

13. GENERAL CONCLUSIONS.

Some important conclusions were reached from this study. The first one is related to the main subject, the consolidation of two low income settlements in Brasilia.
Settlement consolidation is a process of continuous changes, and it is taking place with very little participation from the State. Sadly, it is occuring with sponsor agencies, planners, project designers and technicians who have very limited knowledge about this process. Changes are acomplished basically through the efforts of the residents by investing their own savings and spare time, creating a complex network of housing improvements in order to raise the quality of their living environment.

Only systematic evaluations bring out the failures or successes of a particular goverment policy, program or project; it is also an important instrument and will reveal the process of settlements's tranformations.
The information gathered will certainly provide several essential input to support changes in planning, design and implementation activities in housing and urban development projects. It should not be an individual initiative but rather an institutional effort which should establish a process of evaluation at three main stages of housing projects : planning, implementation and consolidation.
This report concludes that an independent evaluation unit should be incorporated in the institutional structure of the recently created Housing Secretary in Brasilia and must develop an assessement framework for every

project sponsored by the Secretary. It should establish a range of criteria for evaluation and project assessment, and carry out continuous researches about housing projects which should be undertaken at the three stages mentioned above. This is the only way projects can be assessed to feedback important information to earlier stages of the project cycle.

The study also brought out the importance of a research method. The multi-method approach employed in this research proved to be very efficient. The use of different research techniques provided a broad universe of informations to sustain the study, and proved to be a very accurate instrument for data collection. The use of computer analysis became an effective analytical tool which permitted the organization and establishment of a series of co-relations, and a view on several aspects of housing improvements in both projects in an easy and rapid way.

The importance of the two case studies and the findings of the survey, together with other sources of information, provided evidences to sustain arguments about the influence of the existing urban condition and the effects of government urban policies on the local situation of each project. It reinforces the need for evaluation studies as an instrument to feedback not only important information and lessons for future projects, but also as a tool for approaching housing and urban development from particular issues at a project level to general aspects at the city level.

The following conclusions are given based on the analysis of the case of Candangolandia.
From the point of view of housing improvements, settlement development, local income generation, residents´self-initiative, accessibility, project costs and displacement process, the project can be considered as successful. From the point of view of its implementation and environmental impact, its layout design, the core house project and the individual sanitation disposal solution, the project is considered as a non successful.

The situation of Itamaraca is not very promising. From the point of view of the residents´self-initiative, the project may be considered succesful. In all other consideration, the project is thought to be unsuccessful. These points include costs, the process of housing improvements, the development of the settlement, the lack of income generating activities, the location and the issue of accessibility, the existing displacement process and the layout design applied with its costs consequences.
The residents of Itamaraca besides being very poor, are the ones who have faced the consequences and the costs of inappropriate technical solutions.

The in-depth study of both projects have brought evidences which has led to the conclusion that they do not represent good examples of efficient solutions.

The analysis of the red brick core house project in Candangolandia demonstrates that the design process did not apply the evolutionary concept of housing improvements which is the basis of the progressive development approach . There was a lack of users´participation which could have given better knowledge about their needs to planners and designers, and avoided the tremendous effects on the cost of core unit expansions. This fault was exhibited in the location of certain components of the project e.g. WC,

sanitation pits, main entrance door, etc. which constrained residents' individual solutions.
The lack of installation components (water plumbing, electricity connection, pipes,etc.) suited the project sponsor's budget so that the most costly project component was shifted to the account of the beneficiaries, seriously affecting the poorest families.
The analysis of housing improvements in Candangolandia presented a remarkable dynamic process with which residents mobilised resources to obtain a better living standard. However, the poorest families had difficulties in implementing house improvements, and this leads to the conclusion that a large scale project must provide different types of housing options for different income groups.

It is suggested that the poorest families should receive a more completed unit while the better off groups may be offered elementary structures, serviced plots or building materials since they are able to mobilize resources. This means that a reasonable cross-subsidy scheme should be established on the project including an effective building materials loan system as well as the reorganization of an effective institutional framework to support these projects.

The layout designs in each one of the settlements produced serious consequences in important components such as land and infrastructure affecting the overall cost of each project. This could become a contributing factor, in a long term period, to the displacement process of target project beneficiaries.
If the total cost of projects is considered for cost recovery schemes, it is likely to affect the tenure of the lowest income groups in the projects because they will not be able to cope with the increase of expenditures on housing.

The housing expenditures in both settlements was seen to be a significant proportion of family income, and the monthly mortgage payment will definitely increase this proportion and bring more pressure on the family income. It is noted that it is very difficult for residents to cope with the costs of living in the settlement projects, and that when the cost recovery scheme is implemented, an icrease in the displacement process can be expected.
What is argued that when arranging cost recovery schemes, the Government should be sensitive to the existing variations in monthly family income and consider this when establishing the value of the monthly mortgage payment. Otherwise, it is likely to become the main contributor to the displacement of the real target groups of low income projects.

The displacement process have already started in both settlements but it is not only resulting from the chain of effects created by various project components. Government policies on urban land, housing and employment have important implications on this process.
The participation of the Government in low income housing in Brasilia is essential through the provision of land. However, the Government detains the majority of land property under its control and has not formulated any land policy so far which means that the access to land becomes very difficult for many income groups, and becomes the main constraint for housing that is not part of government scheme. Thus the existing policies

of the Government of Brasilia becomes an important reinforcement mechaninsm in the displacement process.
Economically stronger groups put pressure on weaker income groups and this is how a cycle of displacement occurs in every low income residential area in Brasilia.

The evaluation of two low income projects in Brasilia produced evidences which demand the need for a shift in policy based on three main concerns :

1) An efficient Land policy which would provide easier access to land and create opportunities for other actors to participate in the housing sector through private development schemes, cooperatives, individual instruments, etc...
2) A diversified Housing policy which should include conventional and non-conventional schemes such as public housing, slum upgrading, sites and services, etc. in order to meet the requirements of different income groups, and,
3) An effective Employment policy which encourages income generating activities to support self initiatives of residents and the establishment of small scale industries.

The classical approach to employment generation through the building sector and through the terciary sector such as services and public administration, is simply not sufficient to cope with the needs of the city´s growing population.
The progressive development approach applied in Candangolandia and Itamaraca was an innovative approach in Brasilia, a pre-planned city, since it has been so accustomed to government´s conventional housing schemes and the classical solution of squatter eviction and resettlement projects to remote areas.

In Candangolandia, there appeared a small scale network of actvities related to housing improvements and settlement consolidation. The progressive development approach demonstrated an effective way of saving government resources. It does not involve big amounts of investments all injected in one project thus saving the residents from the effects of costs.
It gives a chance for residents to adapt to new housing conditions and time to develop self initiatives in the housing improvement process.
The residents´ self initiative should be supported in the (re)design of future policies and the Government has an important role to perform as an animator, and as a supporter at the household level e.g. providing building material loans, technical support, etc. and introduce improvements at the settlement level e.g.infrastructure, services, facilities, etc.
In this scheme, the gap between the State and the residents may be narrrowed if the institutional framework includes other actors in the housing process e.g. NGOs, building materials firms, etc.
"While one cannot discount the importance of learning from NGO managed experiments´particular aspects which may have wider significance (for financing, technology choice, etc.) the solution lies in effective governmental and community co-operation through local structures. As when external NGOs appear on the scene, and prepared to play an enabling role (rather than designing for the users) they should be encouraged to be so. Enablement implies creating a climate for local action to be effective" (Das: 1984,pp 44).

Local participatory schemes have risen out of an urgent need to improve technical solutions, specially at the plot level.
It is a must that the residents´needs are considered in future projects. Their participation in the design process and in the decision to choose the best possible project alternatives is a way of achieving more appropriate housing projects.
The analysis of the projects designed by the Municipality of Nucleo Bandeirante claerly showed that technicians know very little about the socio-economic background of their clients. It emphasises the need for a change in the relationship between clients and designers.
It argues in favour of a (re)structure of the design model towards a more equitable scheme which could favour the participation of clients and designers in the delivery of housing projects.
In this matter, people´s participation in the definition of the problems, in the design of possible solutions and in its final implementation, is considered to be the most necessary and relevant component in housing and urban development projects in the city of Brasilia.

14. GENERAL RECOMMENDATIONS

14.1 AT THE POLICY LEVEL

14.1a Housing Finance

The creation of a Housing Fund to be used exclusively by the Housing Secretary to support low income housing programs. The housing fund may be financed from a proportion of the Real Estate Co.-TERRACAP´sales of land which may be submitted at the end of every administrative period.

14.1b Land Policy

The formulationn of a long term Land policy in order to facilitate access to land for the various income groups. The sale of plots for high rise residential blocks in the Plano Piloto, which belong to national and local Government agencies, should be included in the land package. The revenue generated from these sales used to subsidize low income housing projects.

14.1c Planning and Building Standards and Regulations

Revision of land use plans and building regulations in order to acomodate a more efficient subdivisions of individual residential plots in the Plano Piloto and Satellite Cities, as long as it does not adversely affect the services and infrastructure network. This implies that existing restrictions on the occupation of plots e.g. frontage of limits, proportion of vacant space, etc. will have to be revised, as well.

14.1d Housing Policy

The Adaptation of a Housing policy with diversified options e.g. slum upgrading, sites and services, guided land development, conventional housing schemes, etc. in order to respond to the requirements from different income groups.

14.1e Loans System

Development of a building materials loans system to support sites and services schemes, squatter upgrading programs, and progresssive development schemes based on core unit projects. Local government agencies such as the SHIS-Housing Agency, CDS-Social Development Centers, BRB-Regional Bank of Brasilia and local small and medium sized building material firms should be incorporated in an institutional structure to provide easy access to building materials.

14.1f Field Offices

The creation of local field offices at project sites in order to achieve an efficient network for people´s participation, communication and effective dissimination of information. The idea is to shorten the distance between residents and planners, incorporating them in a decision making process. The framework must be suffiently flexible to allow participation of NGOs.

14.1g Independent Project Unit

The creation of an independent project unit specifically for slum upgrading and sites and services projects, while SHIS continues to implement more conventional housing schemes for public employees and middle income groups. The unit should operate under the office of the Housing Secretary.

14.1h Evaluation Unit

The creation of an independent evaluation unit under the Housing Secretary. It will carry out evaluation studies, project assessment, surveys and researches and should report directly to the Secretary.

14.1i Social Development

In the office of the Social Service Secretary-SSS, the creation of a housing and social development group within the CDS's institutional scheme in every satellite city. The idea is a long term process of immersion with the poorest groups to provide the link for continued and interaction with the local field offices' team.

14.1j Employment

An effective employment policy and income generating program should be included in every housing and urban development program to support residents in their self-initiated activities. Other mechanisms of the local Government should be identified in a broader employment policy.

14.2 AT THE TECHNICAL LEVEL

14.2a Project Level

To implement large scale projects using the progressive development approach where different housing options are offered to meet different levels of affordability.

14.2b Professional Motivation

To support training programs and research initiatives related to project design and technical standards in order to motivate professionals involved in housing projects to develop less costly solutions and low cost technologies which will reduce the burden of projects on beneficiaries and the government's budget.

14.2c Building Regulations

Systematic revision of building construction standards and requirements which are considered to be too high for low income families e.g. minimum standards for building areas, plot occupation, sanitation systems, water and electricity systems, roads, etc.

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ANNEX

ANNEX 1 LIST OF ABREVIATIONS AND MEANINGS OF PORTUGUESE TERMS

Acampamento	labour camps
Adm. Regional	Regional Administration/Municipality
Associação de Inquilinos	Tenants´ association
BNH	Banco Nacional da Habitação Housing National Bank
BRB	Banco Regional de Brasilia Regional Bank of Brasilia
CAESB	Companhia de Agua e Esgoto de Brasilia Water and Sanitation Company of Brasilia
CAU	Conselho de Arquitetura e Urbanismo Concil for Arquitecture and Urbanistic Matters
CEB	Companhia de Eletricidade de Brasilia Electricity Company of Brasilia
CDS	Centro de Desenvolvimento Social Social Development Center
CZ	Cruzado/Brazilian currency
FSS	Fundação do Serviço Social Social Service Foundation
GEPAFI	Grupo Executivo para Assentamento de Favelas e Invasões Executive Group for Settling Slums and Squatters
Inquilinos de fundo de lote	Tenants who occupy rooms in the backyard of plots
Invasões	Squatter settlements
IPTU	Imposto Predial Territorial Urbano Urban Building and Land Tax
MW	Minimum Wage
PEOT	Plano de Extensão e Organização Territorial Expansion and Territorial Organization Plan of Brasilia.
PLANHAP	Plano Nacional de Habitação National Housing Plan
PP	Plano Piloto/Lucio Costas´ Pilot Plan of Brasilia
SHIS	Sociedade de Habitação de Interesse Social Ltda. Government´s Social Housing Agency
SVO	Secretaria de Viação e Obras Public Works Secretary (Construction and Roads Secretary)
SSS	Secretaria de Serviço Social Social Service Secretary
SSP	Secretaria de Serviços Públicos Public Services Secretary
TERRACAP	Companhia Imobiliária de Brasilia Government´s Real Estate Company of Brasilia
UPC	Unidade Padrão de Capital Standard Capital Unit

ANNEX 2 CURRENCIES AND EXCHANGE RATES

US$ 1.00 = CZ$ 14.538*

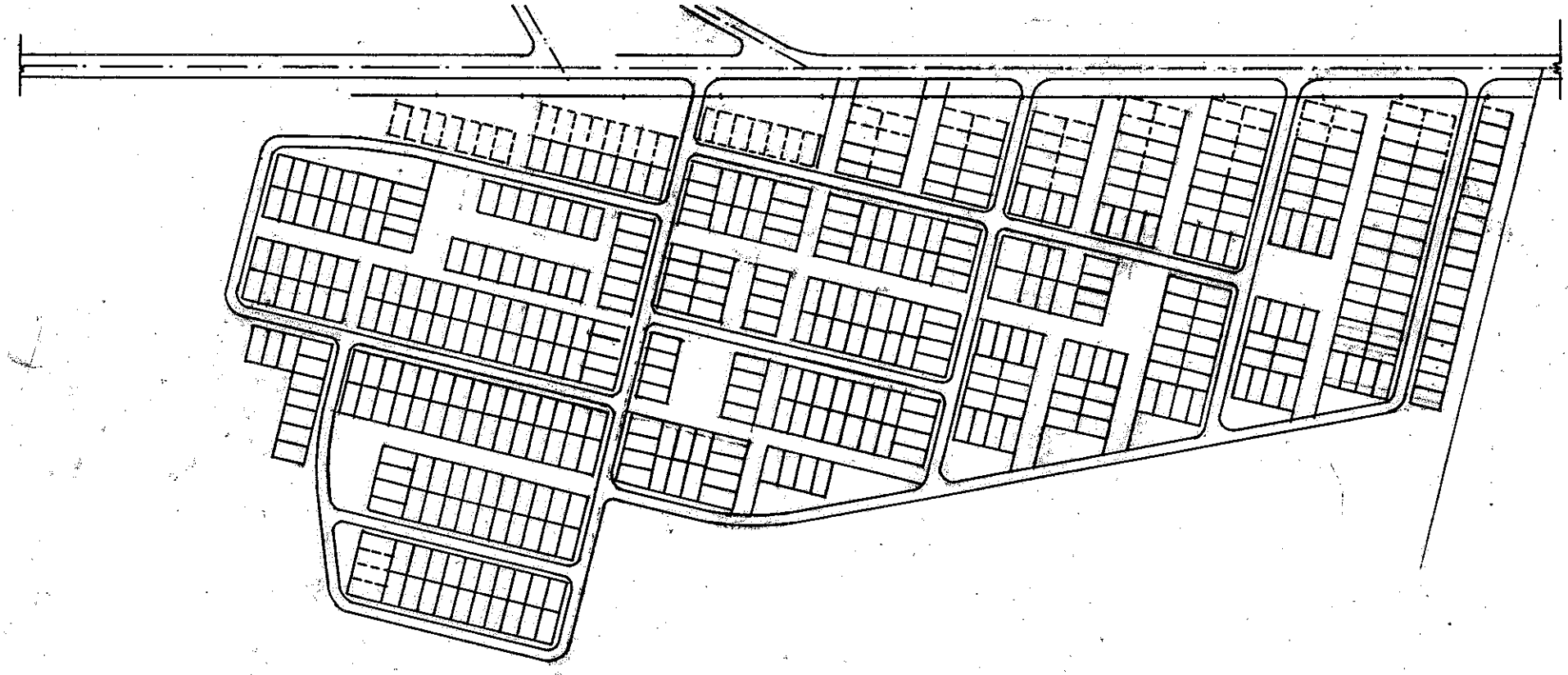
1.00 MW = CZ$ 804.00 = US$ 55.30 .

1.00 MW = 7.55 UPC

1.00 UPC = 1.00 OTN =CZ$ 106.40 = US$ 7.318 .

Official rate Dec/1986.
US$ = American Dollar.
CZ$ = Cruzado, brazilian currency.
MW = Minimum Wage in Brazil.
UPC = Standard Capital Unit, which was replaced by OTN (Obligations of the National Treasure) when the new economic Plan, called Cruzado Plan, was established in 28 of February 1986. It is a capital unit which has its exchange rate to CRUZADO immediately updated according to the rate of inflation. It should give the most precise financial figure.

URBAN LAYOUT OF ITAMARACÁ



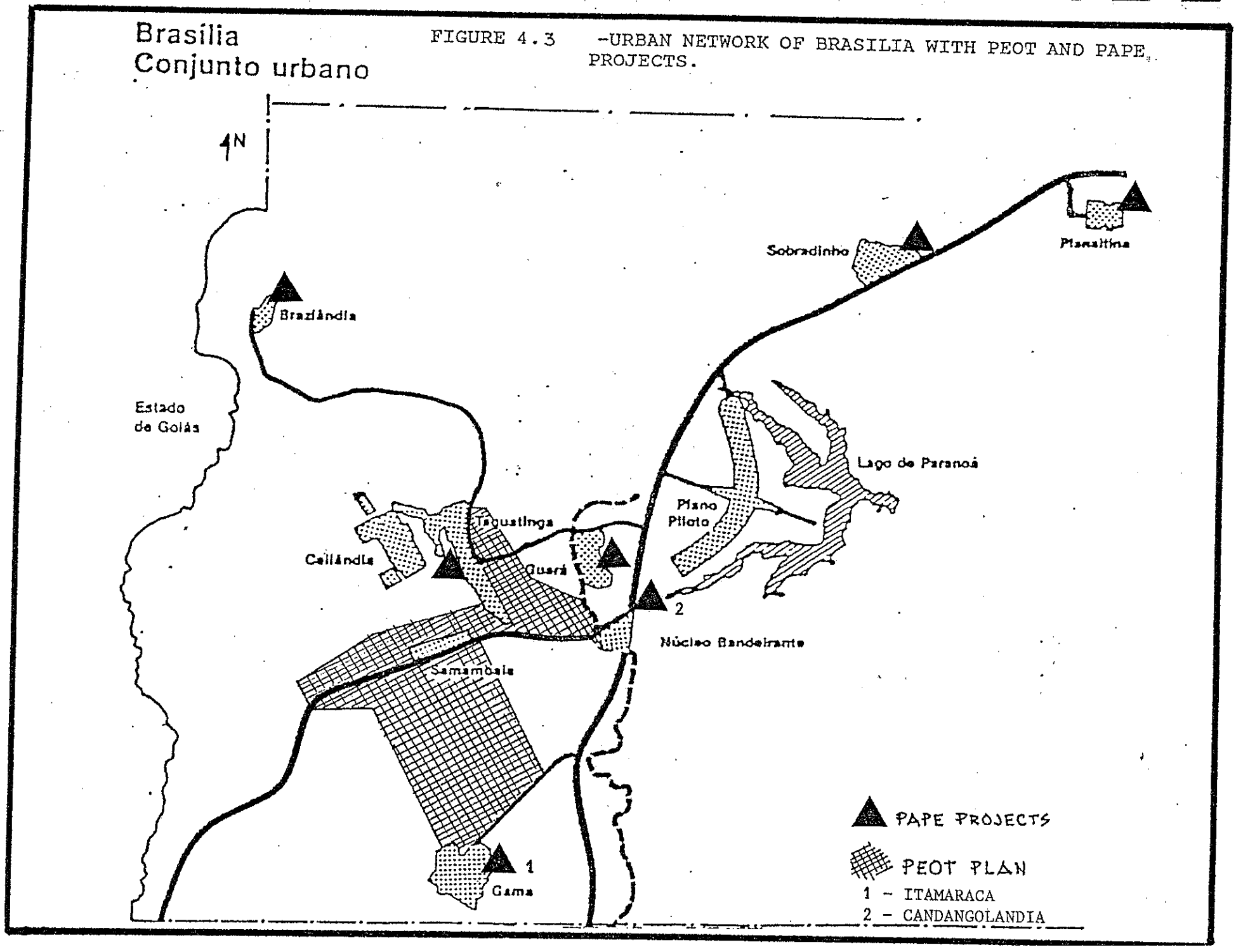
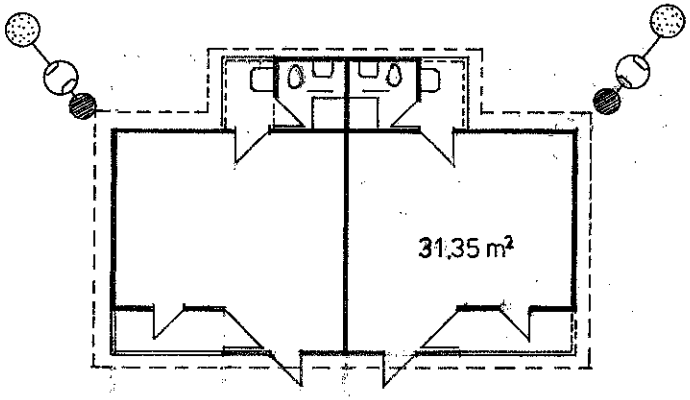
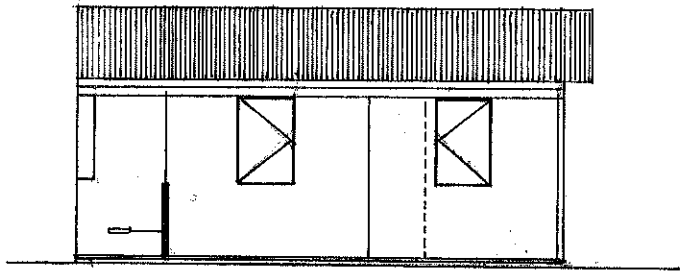
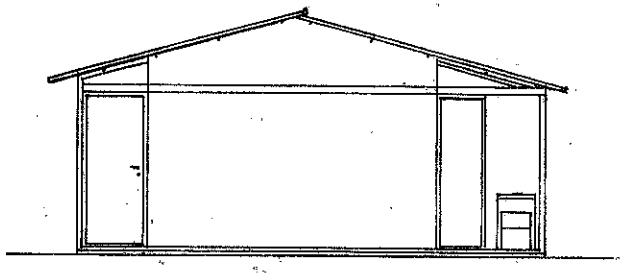


FIGURE 4.3 -URBAN NETWORK OF BRASILIA WITH PEOT AND PAPE PROJECTS.

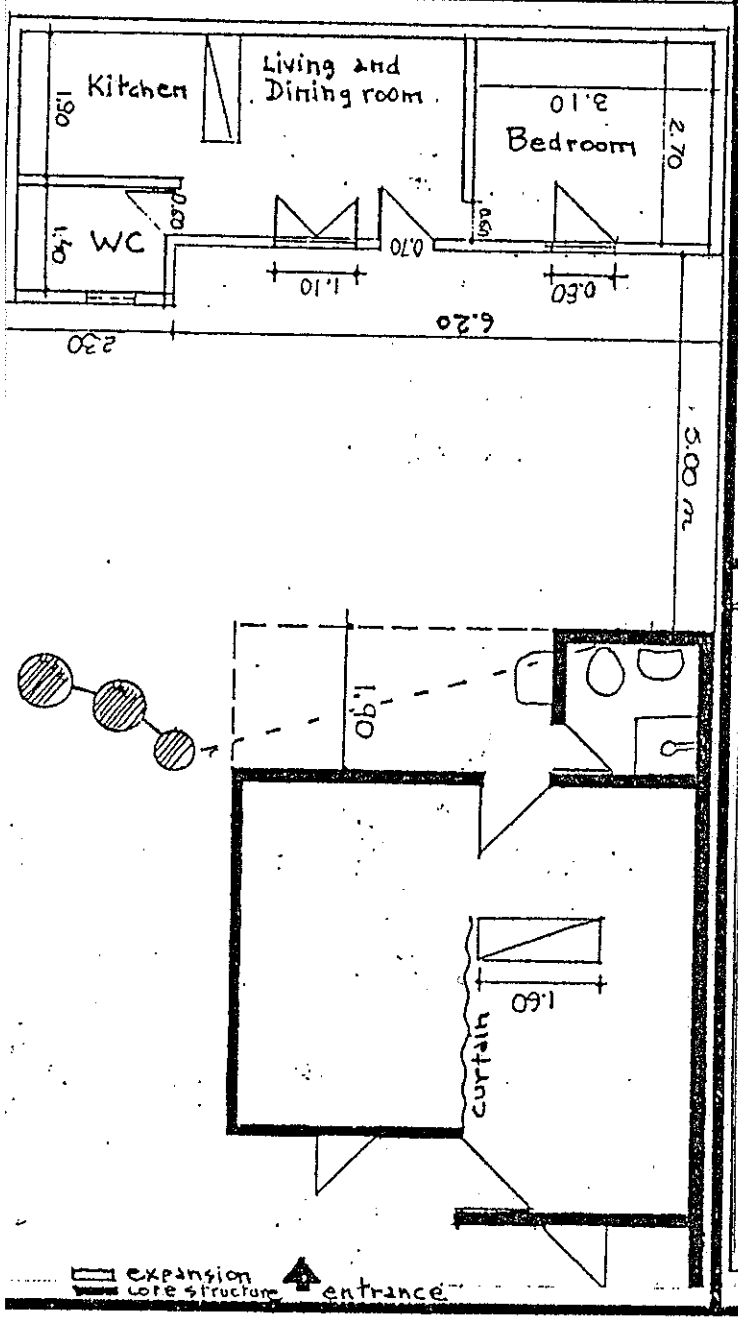
PLAN OF REDBRICK CORE HOUSE







PLOT LAYOUT AND HOUSING SCHEME

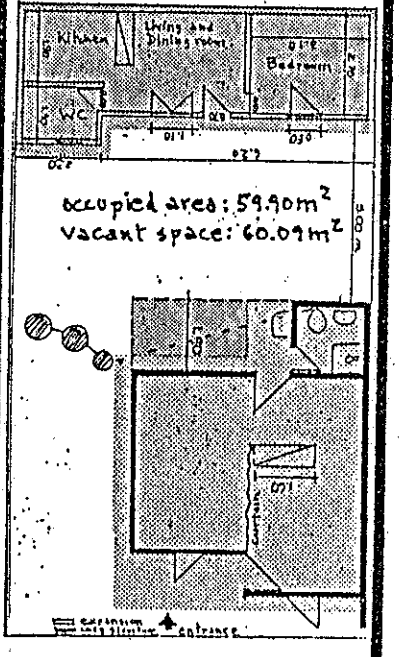


COUNTRY:	BRASIL
CITY:	BRASILIA 18/10/86
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	QB 3 - CONJ C - C/15
OWNER:	IVAN MACEDO COELHO
PLOT AREA:	120 m2
PLOT DIMENSIONS:	8.50 x 15.00
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ☐ NO ■
TOTAL AREA EXPANDED:	23.24
DIRECTION	SIDE ☐ FRONT ☐ BACK ■
BUILDING ACTOR:	OWNER + RELATIVES
RESOURCES:	OWNER'S SAVINGS
INVESTMENTS:	NO IDEA
% ORIGINAL STRUCTURE REMAINED:	100
DATE OF OCCUPATION:	APRIL/85

SUMMARY AND OBSERVATIONS:
THIS EXAMPLE SHOWS THE PROSPECT FOR RENTAL MARKET. IN THE AREA. THE RESIDENT INVESTED SOME MONEY IN A TYPE OF BUILDING WHICH WILL GIVE HIM A LONG TERM PROFIT AND AN EXTRA INCOME. THERE'S NO CHANGE IN THE CORE UNIT.
THERE ARE 2 FAMILIES LIVING IN THE PLOT, A TOTAL OF 7 PERSONS.
THE OWNER'S FAMILY INCOME IS CZ$ 2,012.00.

Questionnaire no. 110

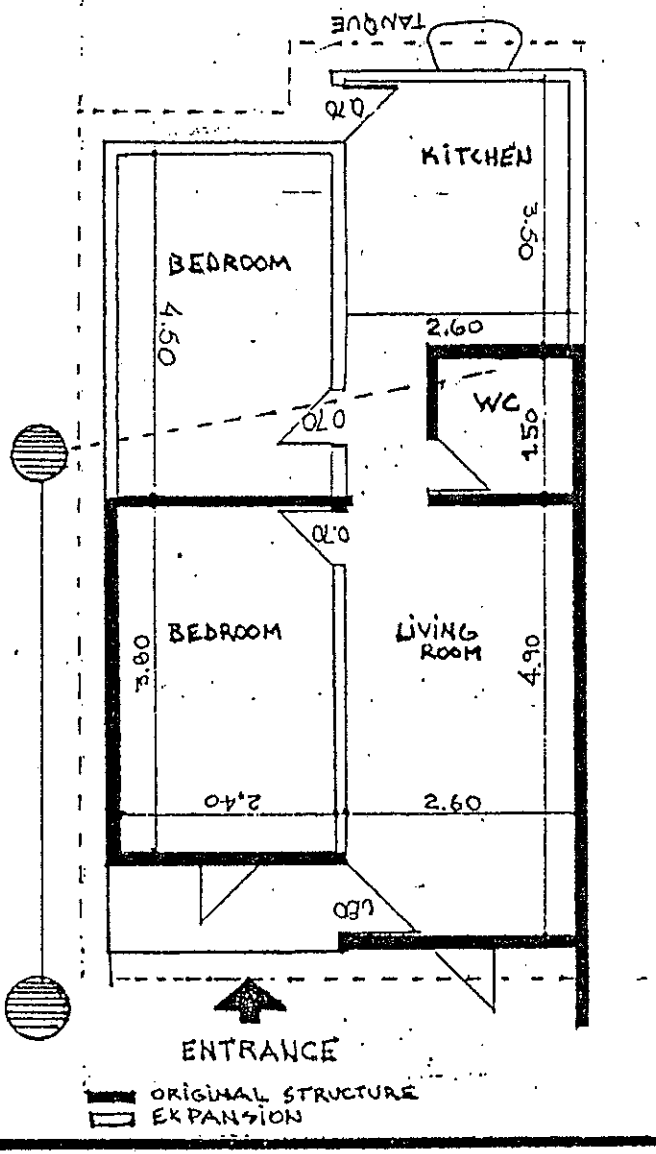
COVERED AREA



	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	0	2
NUMBER OF WINDOWS CREATED	0	3
LENGTH OF WALLS CREATED	0	25.90 m
CORRIDOR	—	0
NUMBER OF DOORS DESTROYED	0	—
NUMBER OF WINDOWS DESTROYED	0	—
LENGTH OF WALLS DEMOLISHED	0	—
NUMBER OF ROOMS CREATED	0	4
BUILDING MATERIAL	Red Brick	Red Brick

AIM OF EXPANSION: Building another house with four rooms to be RENT.
LENGTH OF NEGOTIATED WALLS:

PLOT LAYOUT AND HOUSING SCHEME



COUNTRY:	BRAZIL
CITY:	BRASILIA 2/11/86
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	QR 1 - CONJ. G - c/23
OWNER:	NESTOR TEIXEIRA
PLOT AREA:	120 m²
PLOT DIMENSIONS:	8.00 x 15.00
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ■ NO ☐
TOTAL AREA EXPANDED:	21.75 m²
DIRECTION	SIDE ☐ FRONT ☐ BACK ■
BUILDING ACTOR:	CONTRACTOR
RESOURCES:	OWNER'S SAVINGS
INVESTMENTS:	No idea.
% ORIGINAL STRUCTURE REMAINED:	100
DATE OF OCCUPATION:	MARCH/85

SUMMARY AND OBSERVATIONS:

THE RESIDENT IMPLEMENTED AN EXPANSION OF THE CORE UNIT MAINTAINING THE BASIC STRUCTURE, AND ONLY EXTENDING THE ROOF STRUCTURE. NO GUTTER WAS CONSTRUCTED.

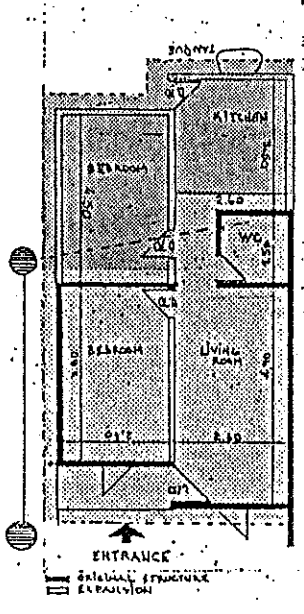
IT IS AN EASY SOLUTION WHICH CHARACTERIZES ONE MAIN CULTURAL FEATURE: "The location of the kitchen towards the backyard."

IT IS PECULIAR THAT NOR THE KITCHEN NOR THE BEDROOM HAS WINDOWS.

THE SPACE LEFT ALONGSIDE THE CORE REMAINS FREE FOR EASY ACCESS TO THE BACKYARD AND TO PASS THE SEWAGE CONNECTIONS. ANOTHER PIT WAS CONSTRUCTED. THE OCCUPATION OF THIS SPACE WOULD BE THE NATURAL SOLUTION DUE TO THE ROOF STRUCTURE. THE SOLUTION IS QUITE EFFICIENT.

COVERED AREA

occupied area: 55.2 m²
vacant space: 64.73 m²



Questionnaire no 60.

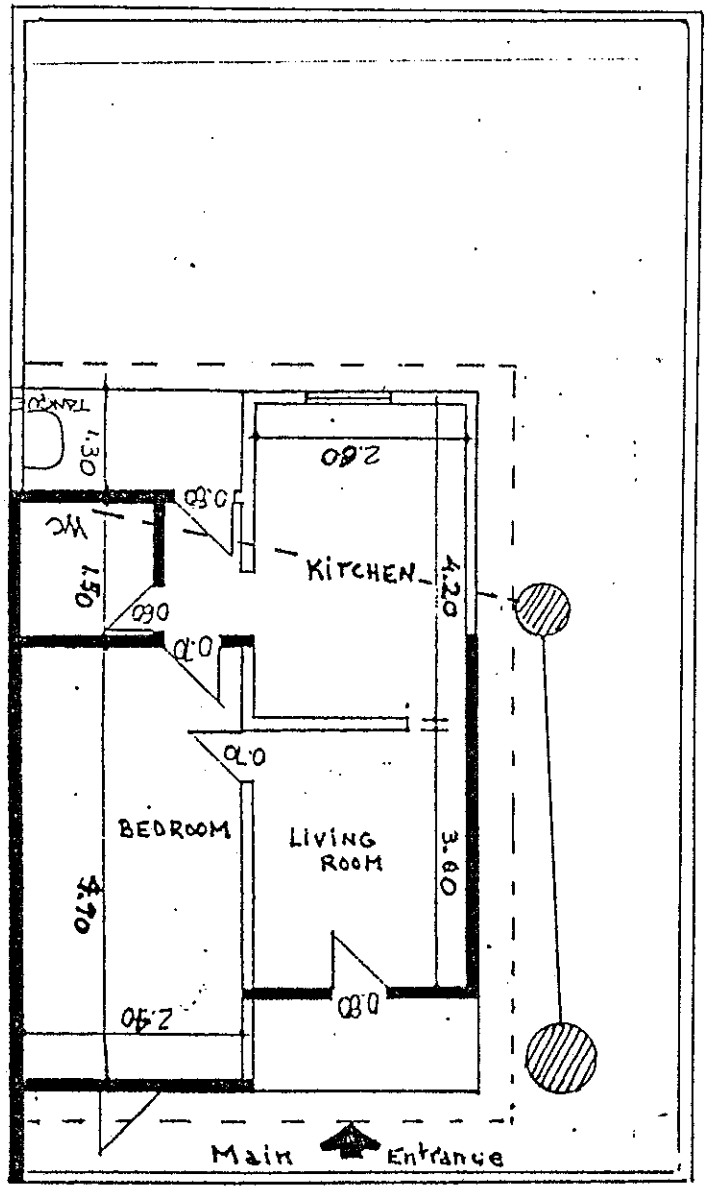
	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	1	2
NUMBER OF WINDOWS CREATED	0	0
LENGTH OF WALLS CREATED	3.10 m	16.90 m
CORRIDOR	—	1.50 m²
NUMBER OF DOORS DESTROYED	0	—
NUMBER OF WINDOWS DESTROYED	0	—
LENGTH OF WALLS DEMOLISHED	0	—
NUMBER OF ROOMS CREATED	2	2
BUILDING MATERIAL	Red brick	Red brick

CONSIDERING THAT THE CORE UNIT PROVIDES 28.85 m² OF USABLE SPACE, THE EXPANSION BRINGS A TOTAL OF 49.60 m² OF USABLE AREAS, 12.40 m² PER PERSON. THE HOUSEHOLD SIZE IS 4 PERSONS.

FAMILY INCOME: Cz$ 2,500.00

AIM OF EXPANSION: The creation of a bedroom and a kitchen.
LENGTH OF NEGOTIATED WALLS: 3.50 m

PLOT LAYOUT AND HOUSING SCHEME



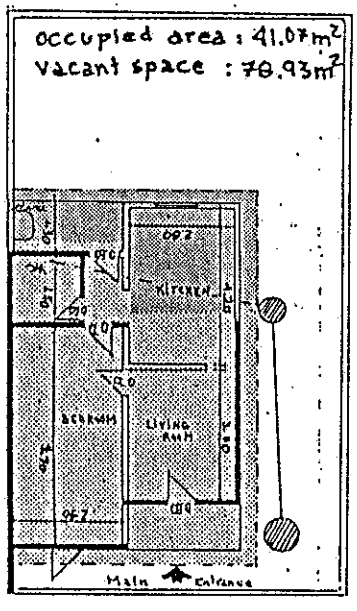
core unit structure
expansion

COUNTRY:	BRAZIL
CITY:	BRASILIA 25/10
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	QR 3 - CONJ. A - C/ 06
OWNER:	JOÃO BATISTA LIMA
PLOT AREA:	120 m²
PLOT DIMENSIONS:	8.00 x 15.00m
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ■ NO ☐
TOTAL AREA EXPANDED:	8.84
DIRECTION	SIDE ☐ FRONT ☐ BACK ■
BUILDING ACTOR:	OWNER
RESOURCES:	OWNER'S SAVINGS
INVESTMENTS:	NO IDEA
% ORIGINAL STRUCTURE REMAINED:	85
DATE OF OCCUPATION:	APRIL/85

SUMMARY AND OBSERVATIONS:

15% OF THE CORE UNIT WAS DEMOLISHED. THE REPLACEMENT OF THE MAIN ENTRANCE DOOR AND THE CREATION OF A LARGE KITCHEN AREA, PROVOKED 15% OF LOSS OF THE ORIGINAL STRUCTURE.
THE PLACE OF THE SERVICE AREA IS MORE SUITABLE TO DEVELOP ACTIVITIES OF WASHING AND CLEANING. THERE IS AN EXCESS OF DOORS IN THE BEDROOM.
THE EXPANSION FORCED DE REPLACEMENT OF SEWAGE TANKS ~~AT~~ THE FRONT SIDE.
THE RIGHT SIDE OF THE PLOT REMAINS UNOCUPPIED.
Questionnaire no. 91.

COVERED AREA



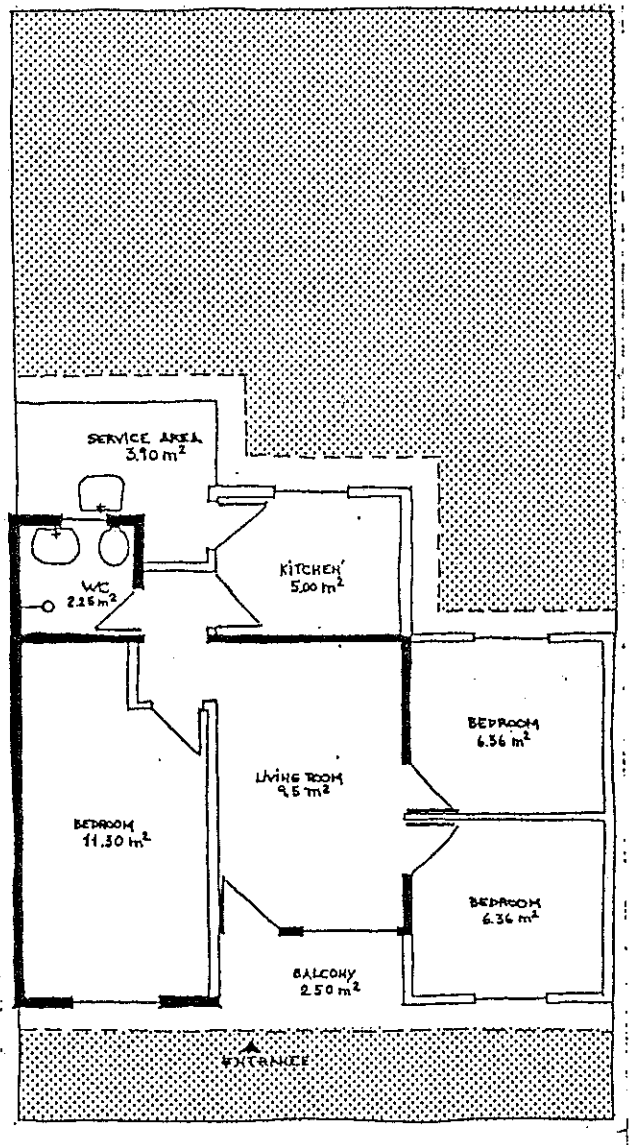
core unit structure
expansion

	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	2	1
NUMBER OF WINDOWS CREATED	0	1
LENGTH OF WALLS CREATED	6.90 m	8.70
CORRIDOR	—	1.2 m²
NUMBER OF DOORS DESTROYED	1	—
NUMBER OF WINDOWS DESTROYED	1	—
LENGTH OF WALLS DEMOLISHED	3.40	—
NUMBER OF ROOMS CREATED	2	1
BUILDING MATERIAL	Red brick	Red Brick

FAMILY INCOME IS CZ$ 2.000. THE HOUSEHOLD SIZE IS 4 MEMBERS, WITH EXPANSION, THERE IS 9.42 m²/person.

AIM OF EXPANSION: To create a kitchen in the back side of the house.
LENGTH OF NEGOTIATED WALLS: 0

PLOT LAYOUT AND HOUSING SCHEME



Model 4

COUNTRY:	BRAZIL
CITY:	BRASILIA
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	
OWNER:	MUNICIPALITY
PLOT AREA:	120 m²
PLOT DIMENSIONS:	6x15.00 m
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ■ NO ☐
TOTAL AREA EXPANDED:	24.79
DIRECTION	SIDE ■ FRONT ☐ BACK ■
BUILDING ACTOR:	
RESOURCES:	
INVESTMENTS:	
% ORIGINAL STRUCTURE REMAINED:	90

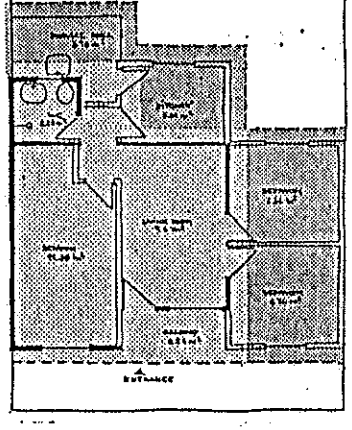
SUMMARY AND OBSERVATIONS:

TWO DIRECTIONS TO THE EXPANSION SOLUTION. TOWARDS THE RIGHT SIDE OF THE PLOT, THE SOLUTION CREATES TWO BEDROOMS AND A NEGOTIATED WALLS, LIKE IN MODEL 3.

TOWARDS THE BACK SIDE OF THE PLOT, IT CREATES A KITCHEN AND A SERVICE AREA. IT DOES NOT IMPLIE THE REPLACEMENT OF THE SEWAGE TANKS BUT DISTURBS INTERNAL ROOMS WHEN THEY WILL NEED TO BE CLEANED. SO, A WAITING PIPE FOR SEWERAGE CONNECTIONS IS MADE. THERE IS AN INCREASE OF THE NUMBER OF DOORS AND A VETY POOR SOLUTION FOR THE KITCHEN.

COVERED AREA

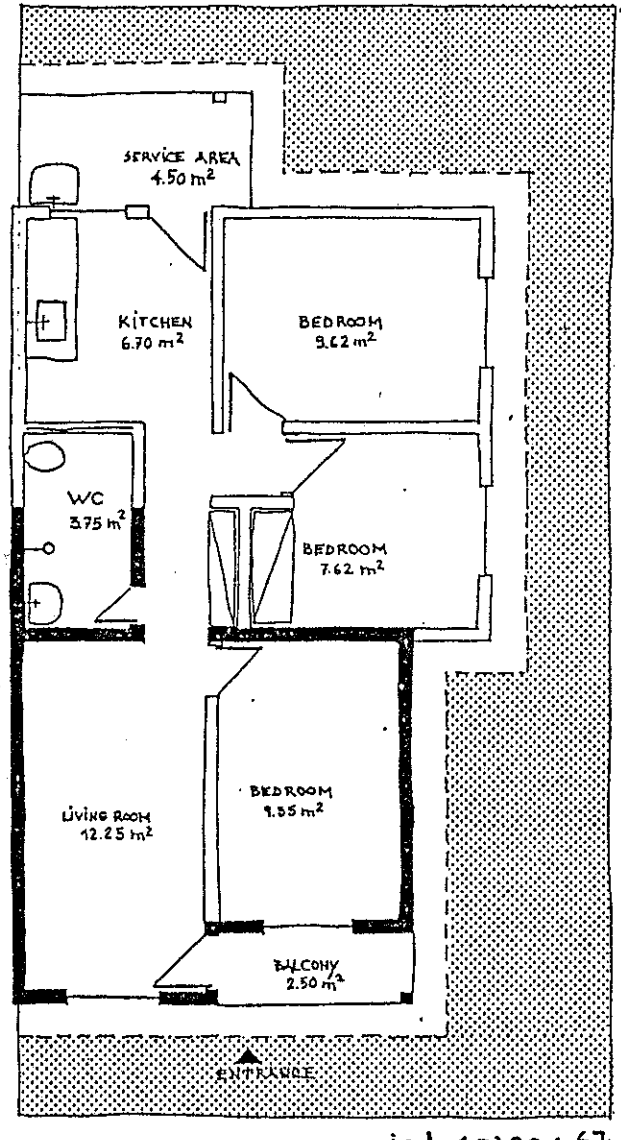
occupied area: 56.14 m²
vacant space: 63.86 m²



	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	3	2
NUMBER OF WINDOWS CREATED	1	3
LENGTH OF WALLS CREATED	5.00 m	15.70 m
CORRIDOR	1.00 m2	—
NUMBER OF DOORS DESTROYED	1	—
NUMBER OF WINDOWS DESTROYED	1	—
LENGTH OF WALLS DEMOLISHED	2.10 m	—
NUMBER OF ROOMS CREATED	2	3
BUILDING MATERIAL	red brick	red brick.
LENGTH OF SEWERAGE TUBES		
LENGTH OF ELECTRICITY TUBES		
LENGTH OF WATER TUBES		

AIM OF EXPANSION: CREATION OF TWO BEDROOMS & KITCHEN AND A SERVICE AREA.
LENGTH OF NEGOTIATED WALLS: 5.10 m

PLOT LAYOUT AND HOUSING SCHEME



occupied space: 67.42

vacant area: 52.58 m²

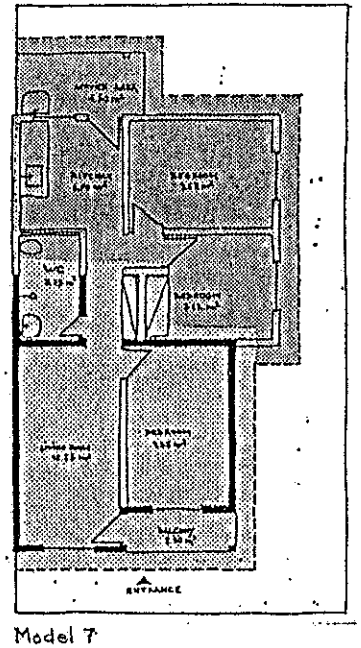
Model 7

COUNTRY:	BRASIL
CITY:	BRASILIA
PROJECT:	CANDANGOLANDIA
ADDRESS:	
OWNER:	MUNICIPALITY OF NB
PLOT AREA:	120 m²
PLOT DIMENSIONS:	
VERTICAL EXPANSION	YES ☐ NO ☒
HORIZONTAL EXPANSION	YES ☒ NO ☐
TOTAL AREA EXPANDED:	36.07
DIRECTION	SIDE ☐ FRONT ☐ BACK ☒
BUILDING ACTOR:	
RESOURCES:	
INVESTMENTS:	
% ORIGINAL STRUCTURE REMAINED:	93

SUMMARY AND OBSERVATIONS:

IT IS AN EXPANSION IN ONLY ONE DIRECTION, TOWARDS THE BACK SIDE OF PLOT AND DOES NOT IMPLY ANY CHANGE IN THE CORE UNIT. THE ONLY CHANGE HAPPENS AT THE EXPANSION OF WC. IT CREATES A REASONABLE LIVING SPACE FOR A FAMILY OF 5 MEMBERS WITH ENOUGH CONFORT. IT IMPLIES THE CHANGE OF THE SEWAGE SYSTEM AND MAINTAINS THE FREE RIGHT SIDE SPACE. THERE IS A LOW LEVEL OF BROKEN WALLS. IT MAINTAINS THE ORIGINAL FACADE. IT IS CULTURALLY VERY MUCH ACCEPTABLE SINCE IT MAINTAINS THE WC AND KITCHEN TOWARDS THE BACK SIDE. IT IMPLIES A CHANGE IN THE ROOF STRUCTURE SINCE THE ROOF AND THE STRUCTURE WALLS NEED TO BE RAISED.

COVERED AREA



Model 7

	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	1	3
NUMBER OF WINDOWS CREATED	0	3 + 1 ventil.
LENGTH OF WALLS CREATED		26.5 m
CORRIDOR	1.5 m²	0.64
NUMBER OF DOORS DESTROYED	0	—
NUMBER OF WINDOWS DESTROYED	0	—
LENGTH OF WALLS DEMOLISHED	1.50 m	—
NUMBER OF ROOMS CREATED	2	3
BUILDING MATERIAL	red brick	red brick
LENGTH OF SEWERAGE TUBES		
LENGTH OF ELECTRICITY TUBES		
LENGTH OF WATER TUBES		

AIM OF EXPANSION: CREATION OF TWO BEDROOMS AND A KITCHEN AND A SERVICE AREA.

LENGTH OF NEGOTIATED WALLS: 4.00 m

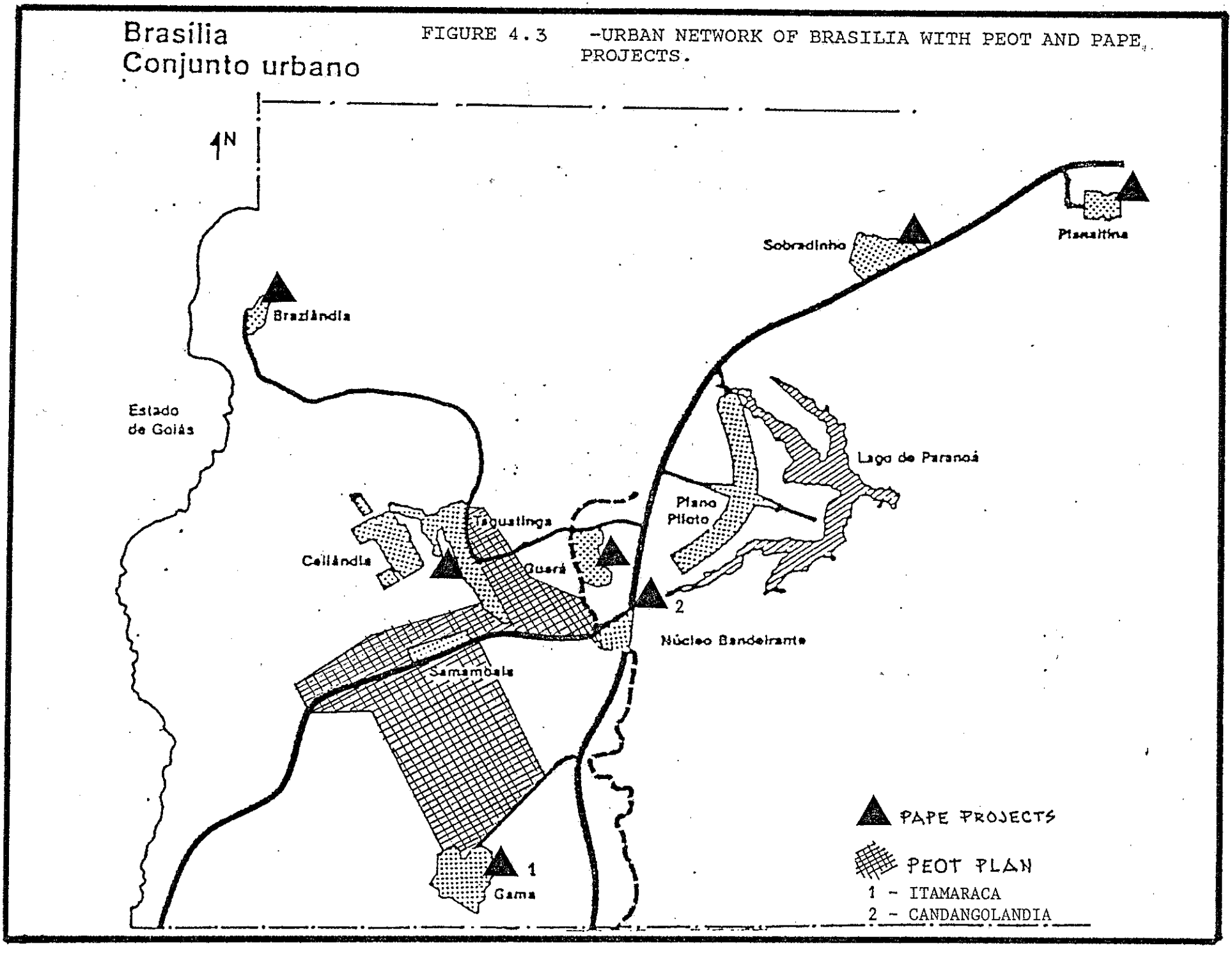


FIGURE 4.3 -URBAN NETWORK OF BRASILIA WITH PEOT AND PAPE PROJECTS.

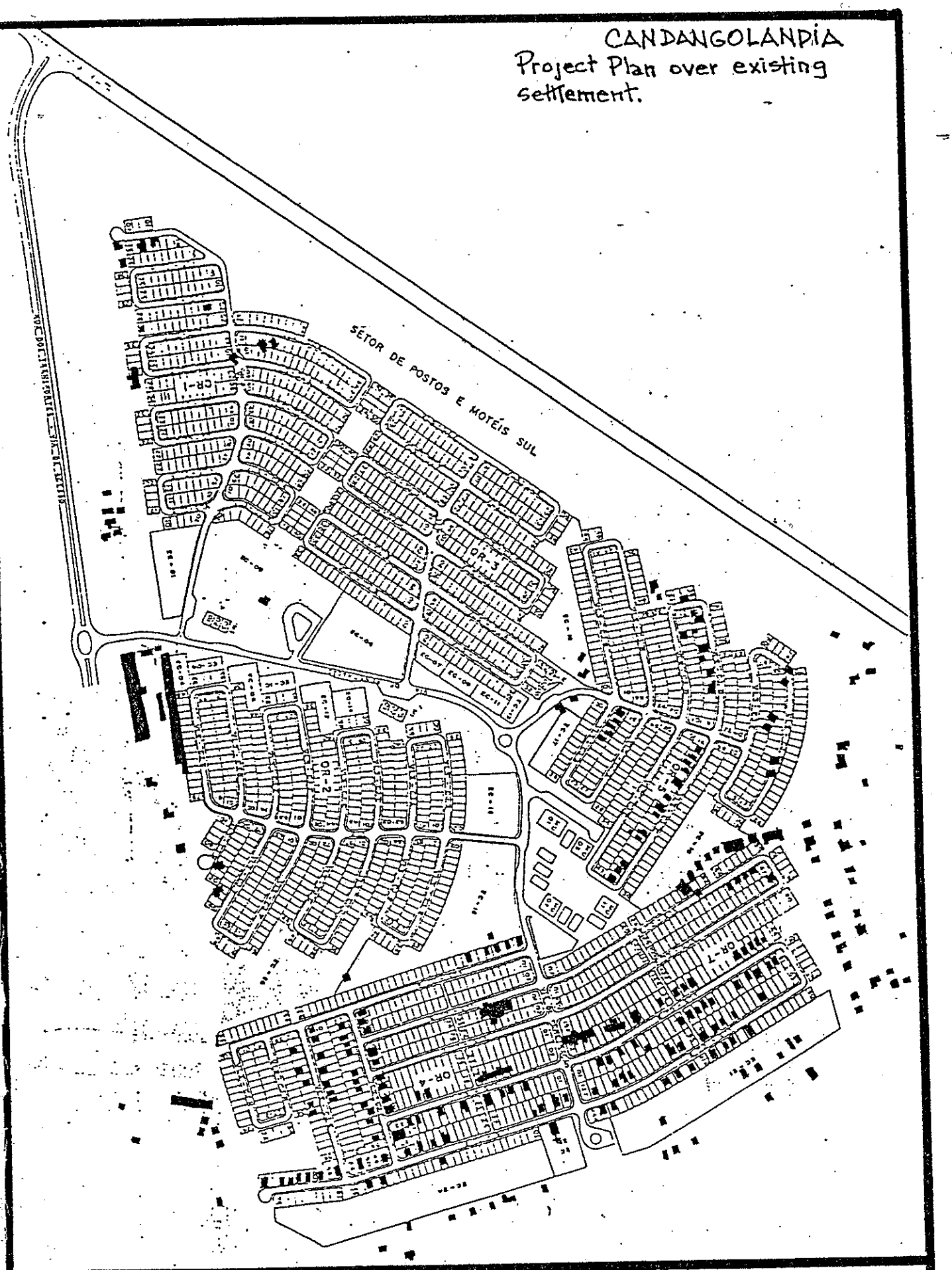
ITAMARACÁ

Project Plan over existing settlement

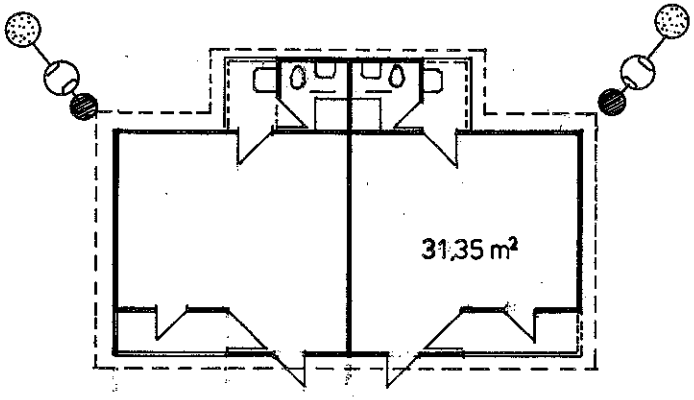
Invasão

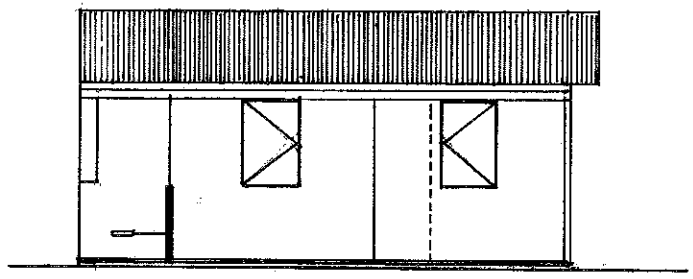
loteamento

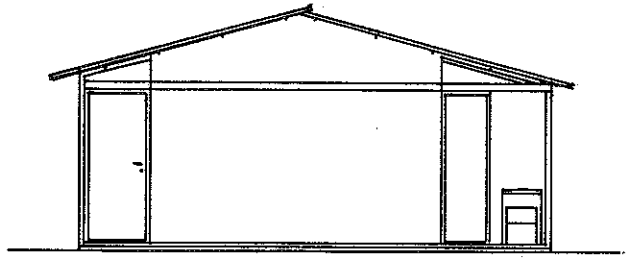
CANDANGOLANDIA
Project Plan over existing settlement.



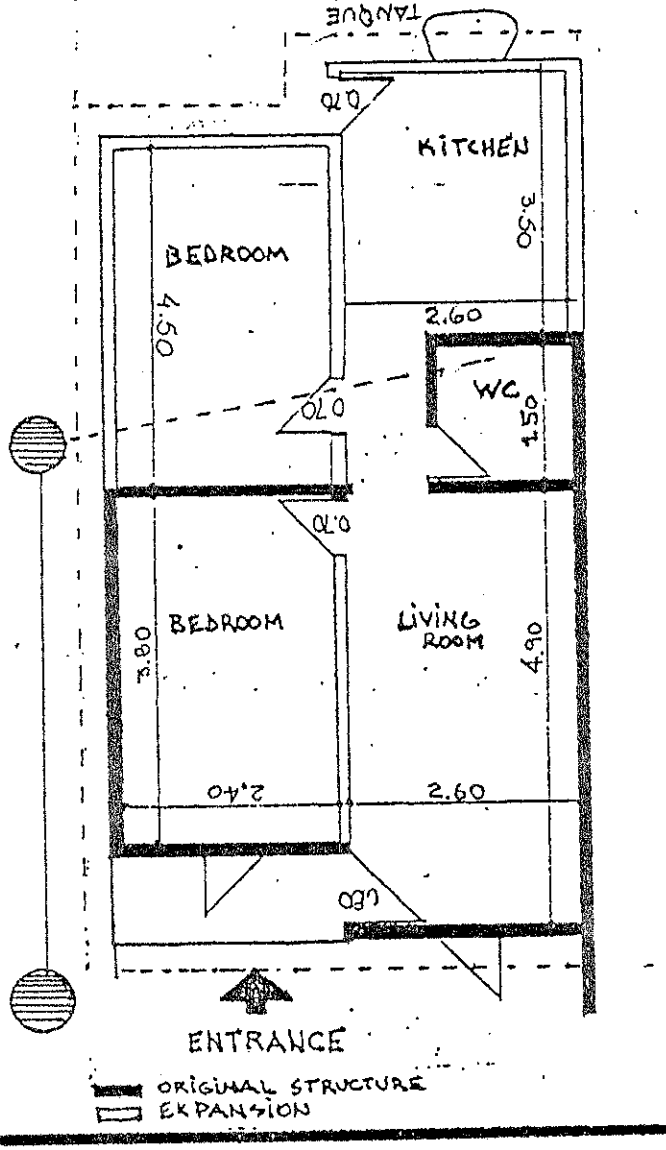
PLAN OF REDBRICK CORE HOUSE







PLOT LAYOUT AND HOUSING SCHEME



COUNTRY:	BRAZIL
CITY:	BRASILIA 2/11/86
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	QR 1 - CONJ. G - c/23
OWNER:	NESTOR TEIXEIRA
PLOT AREA:	120 m²
PLOT DIMENSIONS:	8.00 x 15.00
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ■ NO ☐
TOTAL AREA EXPANDED:	21.75 m²
DIRECTION	SIDE ☐ FRONT ☐ BACK ■
BUILDING ACTOR:	CONTRACTOR
RESOURCES:	OWNER'S SAVINGS
INVESTMENTS:	No idea.
% ORIGINAL STRUCTURE REMAINED:	100
DATE OF OCCUPATION:	MARCH/85

SUMMARY AND OBSERVATIONS:

THE RESIDENT IMPLEMENTED AN EXPANSION OF THE CORE UNIT MAINTAINING THE BASIC STRUCTURE, AND ONLY EXTENDING THE ROOF STRUCTURE. NO GUTTER WAS CONSTRUCTED.

IT IS AN EASY SOLUTION WHICH CHARACTERIZES ONE MAIN CULTURAL FEATURE: "The location of the kitchen towards the backyard."

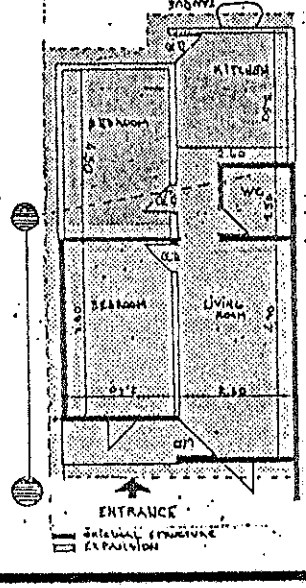
IT IS PECULIAR THAT NOR THE KITCHEN NOR THE BEDROOM HAS WINDOWS.

THE SPACE LEFT ALONGSIDE THE CORE REMAINS FREE FOR EASY ACCESS TO THE BACKYARD AND TO PASS THE SEWAGE CONNECTIONS. ANOTHER PIT WAS CONSTRUCTED. THE OCCUPATION OF THIS SPACE WOULD BE THE NATURAL SOLUTION DUE TO THE ROOF STRUCTURE. THE SOLUTION IS QUITE EFFICIENT.

COVERED AREA

occupied area: 55.2 m²

vacant space: 64.73 m²



Questionnaire no 60.

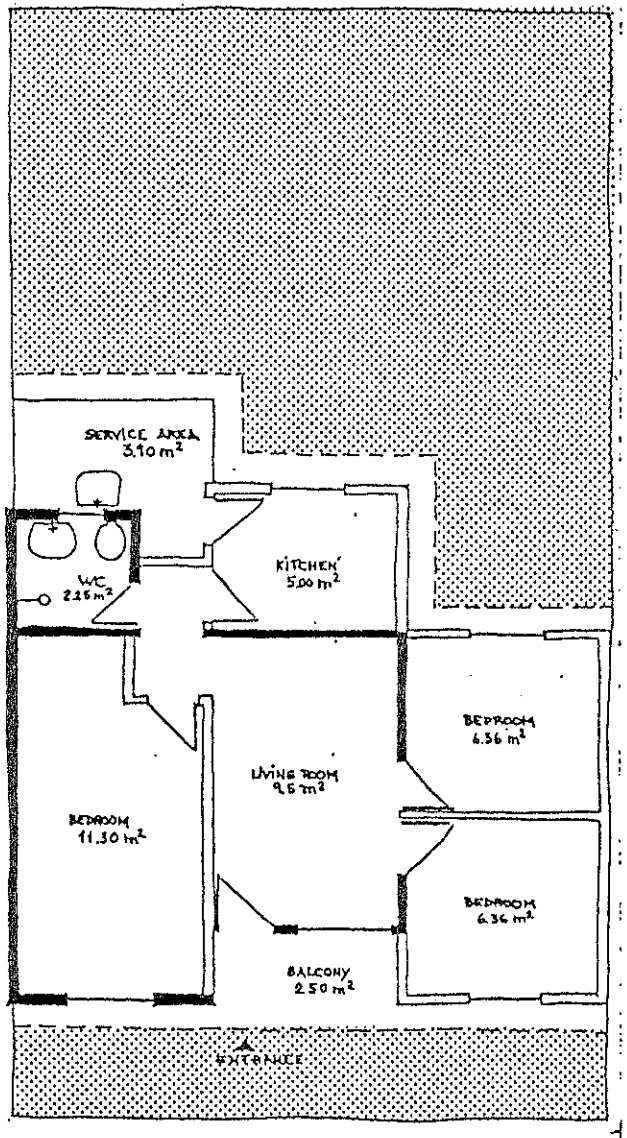
	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	1	2
NUMBER OF WINDOWS CREATED	0	0
LENGTH OF WALLS CREATED	3.10 m	16.90 m
CORRIDOR	—	1.50 m²
NUMBER OF DOORS DESTROYED	0	—
NUMBER OF WINDOWS DESTROYED	0	—
LENGTH OF WALLS DEMOLISHED	0	—
NUMBER OF ROOMS CREATED	2	2
BUILDING MATERIAL	Red brick	Red brick

CONSIDERING THAT THE CORE UNIT PROVIDES 28.85 m² OF USABLE SPACE, THE EXPANSION BRINGS A TOTAL OF 49.60 m² OF USABLE AREAS, 12.40 m² PER PERSON. THE HOUSEHOLD SIZE IS 4 PERSONS.

FAMILY INCOME: Cz$ 2,500.00

AIM OF EXPANSION: The creation of a bedroom and a kitchen.
LENGTH OF NEGOTIATED WALLS: 3.50 m

PLOT LAYOUT AND HOUSING SCHEME



Model 4

COUNTRY:	BRAZIL
CITY:	BRASILIA
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	
OWNER:	MUNICIPALITY
PLOT AREA:	120 m²
PLOT DIMENSIONS:	6x15.00 m
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ■ NO ☐
TOTAL AREA EXPANDED:	24.79
DIRECTION	SIDE ■ FRONT ☐ BACK ■
BUILDING ACTOR:	
RESOURCES:	
INVESTMENTS:	
% ORIGINAL STRUCTURE REMAINED:	90

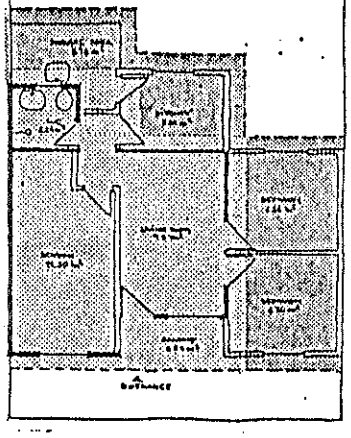
SUMMARY AND OBSERVATIONS:

TWO DIRECTIONS TO THE EXPANSION SOLUTION. TOWARDS THE RIGHT SIDE OF THE PLOT, THE SOLUTION CREATES TWO BEDROOMS AND A NEGOTIATED WALLS, LIKE IN MODEL 3.

TOWARDS THE BACK SIDE OF THE PLOT, IT CREATES A KITCHEN AND A SERVICE AREA. IT DOES NOT IMPLIE THE REPLACEMENT OF THE SEWAGE TANKS BUT DISTURBS INTERNAL ROOMS WHEN THEY WILL NEED TO BE CLEANED. SO, A WAITING PIPE FOR SEWERAGE CONNECTIONS IS MADE. THERE IS AN INCREASE OF THE NUMBER OF DOORS AND A VERY POOR SOLUTION FOR THE KITCHEN.

COVERED AREA

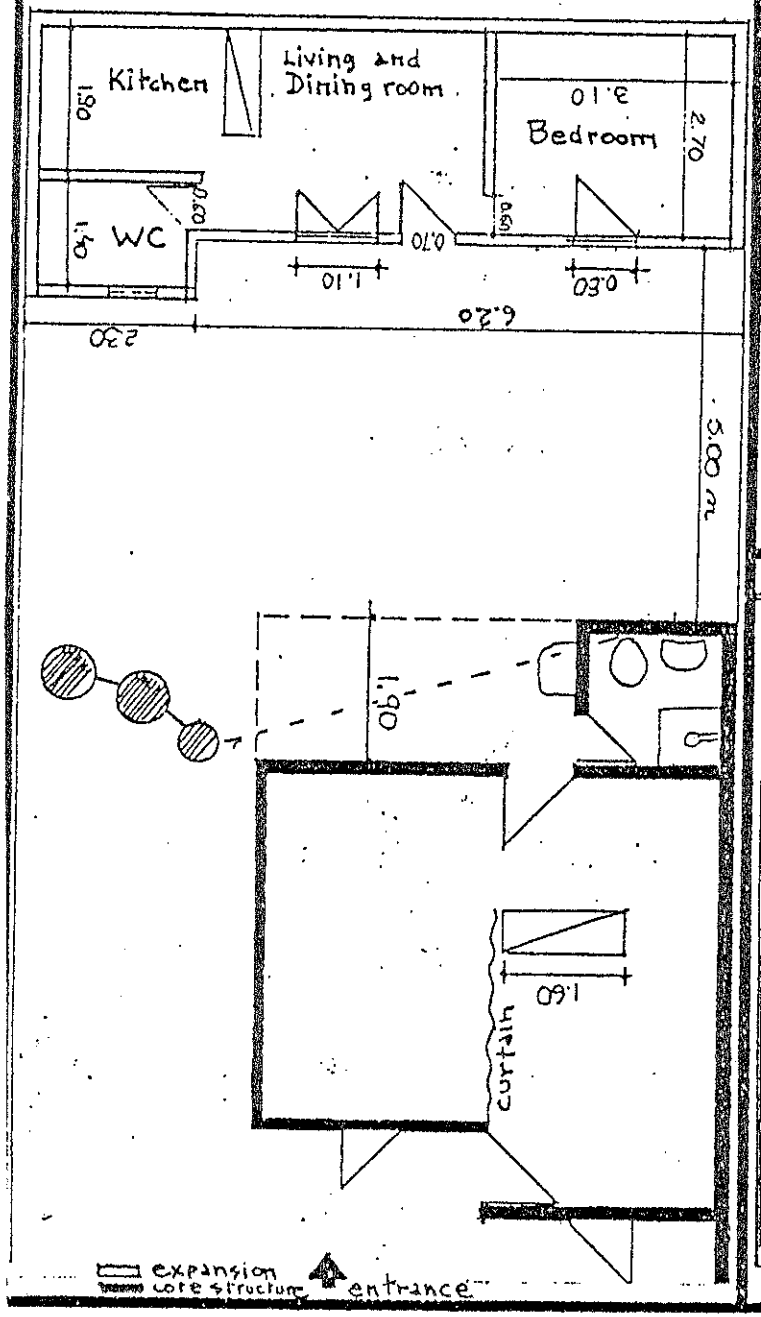
occupied area: 56.14 m²
vacant space: 63.86 m²



	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	3	2
NUMBER OF WINDOWS CREATED	1	3
LENGTH OF WALLS CREATED	5.00 m	15.70 m
CORRIDOR	1.00 m2	—
NUMBER OF DOORS DESTROYED	1	—
NUMBER OF WINDOWS DESTROYED	1	—
LENGTH OF WALLS DEMOLISHED	2.10 m	—
NUMBER OF ROOMS CREATED	2	3
BUILDING MATERIAL	red brick	red brick.
LENGTH OF SEWERAGE TUBES		
LENGTH OF ELECTRICITY TUBES		
LENGTH OF WATER TUBES		

AIM OF EXPANSION: CREATION OF TWO BEDROOMS & KITCHEN AND A SERVICE AREA.
LENGTH OF NEGOTIATED WALLS: 5.10 m

PLOT LAYOUT AND HOUSING SCHEME



COUNTRY:	BRASIL
CITY:	BRASILIA 18/10/86
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	QR 3 - CONJ C - C/15
OWNER:	IVAN MACEDO COELHO
PLOT AREA:	120 m²
PLOT DIMENSIONS:	8.50 x 15.00
VERTICAL EXPANSION	YES ☐ NO ☒
HORIZONTAL EXPANSION	YES ☐ NO ☒
TOTAL AREA EXPANDED:	23.24
DIRECTION	SIDE ☐ FRONT ☐ BACK ☒
BUILDING ACTOR:	OWNER + RELATIVES
RESOURCES:	OWNER'S SAVINGS
INVESTMENTS:	NO IDEA
% ORIGINAL STRUCTURE REMAINED:	100
DATE OF OCCUPATION:	APRIL/85

SUMMARY AND OBSERVATIONS:

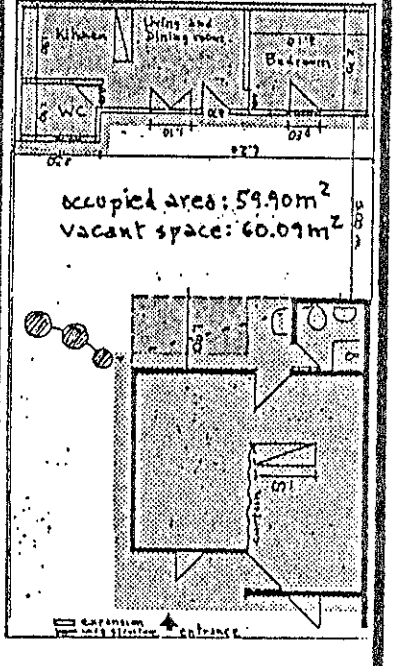
THIS EXAMPLE SHOWS THE PROSPECT FOR RENTAL MARKET. IN THE AREA. THE RESIDENT INVESTED SOME MONEY IN A TYPE OF BUILDING WHICH WILL GIVE HIM A LONG TERM PROFIT AND AN EXTRA INCOME. THERE'S NO CHANGE IN THE CORE UNIT.

THERE ARE 2 FAMILIES LIVING IN THE PLOT, A TOTAL OF 7 PERSONS.

THE OWNER'S FAMILY INCOME IS CZ$ 2,012.00.

Questionnaire no. 110

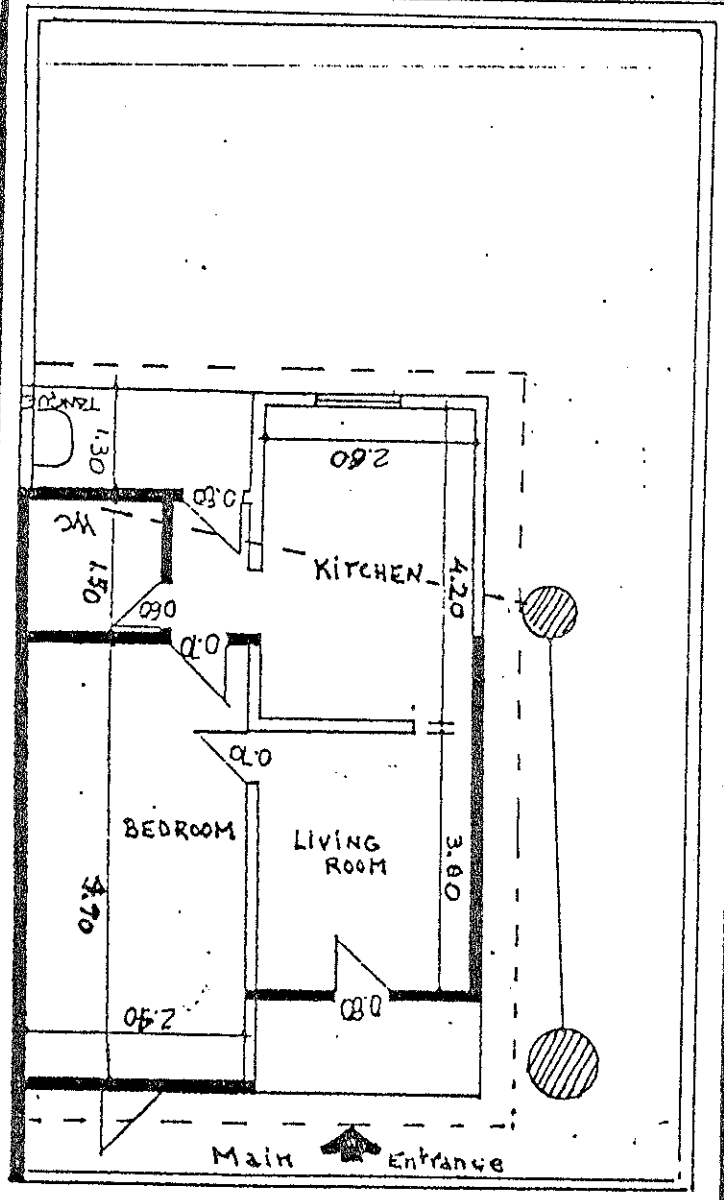
COVERED AREA



	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	0	2
NUMBER OF WINDOWS CREATED	0	3
LENGTH OF WALLS CREATED	0	25.90 m
CORRIDOR	—	0
NUMBER OF DOORS DESTROYED	0	—
NUMBER OF WINDOWS DESTROYED	0	—
LENGTH OF WALLS DEMOLISHED	0	—
NUMBER OF ROOMS CREATED	0	4
BUILDING MATERIAL	Red Brick	Red Brick

AIM OF EXPANSION: Building another house with four rooms to be RENT.
LENGTH OF NEGOTIATED WALLS:

PLOT LAYOUT AND HOUSING SCHEME



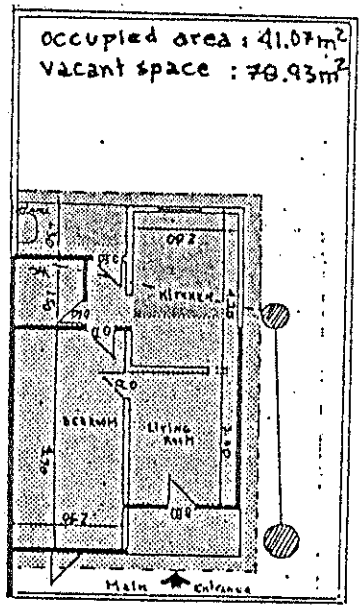
core unit structure
expansion

COUNTRY:	BRAZIL
CITY:	BRASILIA 25/10
PROJECT:	CANDANGOLÂNDIA
ADDRESS:	QR 3 - CONJ. A - c/ 06
OWNER:	JOÃO BATISTA LIMA
PLOT AREA:	120 m²
PLOT DIMENSIONS:	8.00 x 15.00m
VERTICAL EXPANSION	YES ☐ NO ■
HORIZONTAL EXPANSION	YES ■ NO ☐
TOTAL AREA EXPANDED:	8.84
DIRECTION	SIDE ☐ FRONT ☐ BACK ■
BUILDING ACTOR:	OWNER
RESOURCES:	OWNER'S SAVINGS
INVESTMENTS:	NO IDEA
% ORIGINAL STRUCTURE REMAINED:	85
DATE OF OCCUPATION:	APRIL/85

SUMMARY AND OBSERVATIONS:

15% OF THE CORE UNIT WAS DEMOLISHED. THE REPLACEMENT OF THE MAIN ENTRANCE DOOR AND THE CREATION OF A LARGE KITCHEN AREA, PROVOKED 15% OF LOSS OF THE ORIGINAL STRUCTURE.
THE PLACE OF THE SERVICE AREA IS MORE SUITABLE TO DEVELOP ACTIVITIES OF WASHING AND CLEANING. THERE IS AN EXCESS OF DOORS IN THE BEDROOM.
THE EXPANSION FORCED DE REPLACEMENT OF SEWAGE TANKS AT THE FRONT SIDE.
THE RIGHT SIDE OF THE PLOT REMAINS UNOCUPPIED.
Questionnaire no. 91.

COVERED AREA



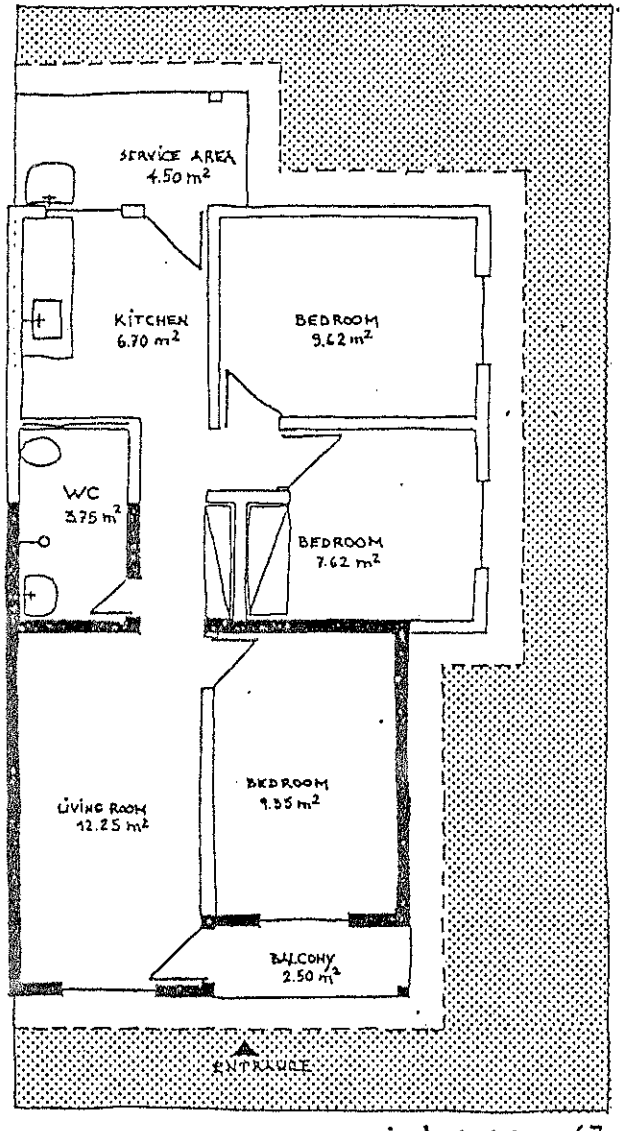
core unit structure
expansion

	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	2	1
NUMBER OF WINDOWS CREATED	0	1
LENGTH OF WALLS CREATED	6.90 m	8.70
CORRIDOR	—	1.2 m²
NUMBER OF DOORS DESTROYED	1	—
NUMBER OF WINDOWS DESTROYED	1	—
LENGTH OF WALLS DEMOLISHED	3.40	—
NUMBER OF ROOMS CREATED	2	1
BUILDING MATERIAL	Red brick	Red Brick

FAMILY INCOME IS Cz$ 2.000. THE HOUSEHOLD SIZE IS 4 MEMBERS, WITH EXPANSION, THERE IS 9.42 m²/person.

AIM OF EXPANSION: To create a kitchen in the back side of the house.
LENGTH OF NEGOTIATED WALLS: 0

PLOT LAYOUT AND HOUSING SCHEME



occupied space: 67.42

vacant area: 52.58 m²

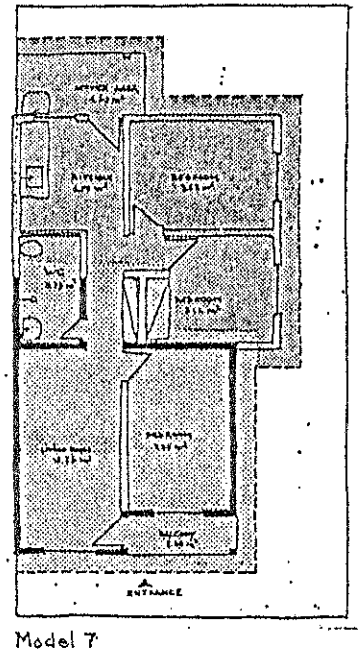
Model 7

COUNTRY:	BRASIL
CITY:	BRASILIA
PROJECT:	CANDANGOLANDIA
ADDRESS:	
OWNER:	MUNICIPALITY OF NB
PLOT AREA:	120 m²
PLOT DIMENSIONS:	
VERTICAL EXPANSION	YES ☐ NO ☒
HORIZONTAL EXPANSION	YES ☒ NO ☐
TOTAL AREA EXPANDED:	36.07
DIRECTION	SIDE ☐ FRONT ☐ BACK ☒
BUILDING ACTOR:	
RESOURCES:	
INVESTMENTS:	
% ORIGINAL STRUCTURE REMAINED:	93

SUMMARY AND OBSERVATIONS:

IT IS AN EXPANSION IN ONLY ONE DIRECTION, TOWARDS THE BACK SIDE OF PLOT AND DOES NOT IMPLY ANY CHANGE IN THE CORE UNIT. THE ONLY CHANGE HAPPENS AT THE EXPANSION OF WC. IT CREATES A REASONABLE LIVING SPACE FOR A FAMILY OF 5 MEMBERS WITH ENOUGH COMFORT. IT IMPLIES THE CHANGE OF THE SEWAGE SYSTEM AND MAINTAINS THE FREE RIGHT SIDE SPACE. THERE IS A LOW LEVEL OF BROKEN WALLS. IT MAINTAINS THE ORIGINAL FACADE. IT IS CULTURALLY VERY MUCH ACCEPTABLE SINCE IT MAINTAINS THE WC AND KITCHEN TOWARDS THE BACK SIDE. IT IMPLIES A CHANGE IN THE ROOF STRUCTURE SINCE THE ROOF AND THE STRUCTURE WALLS NEED TO BE RAISED.

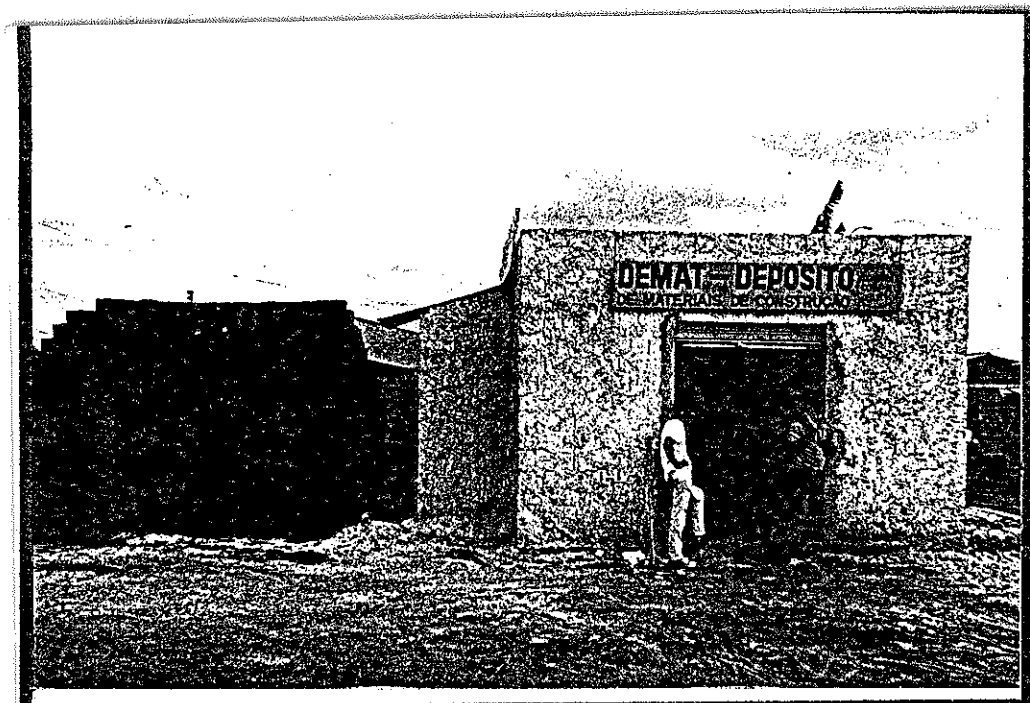
COVERED AREA



Model 7

	CORE UNIT STRUCTURE	NEW EXPANSION
NUMBER OF DOORS CREATED	1	3
NUMBER OF WINDOWS CREATED	0	3 + 1 ventil.
LENGTH OF WALLS CREATED		26.5 m
CORRIDOR	1.5 m²	0.64
NUMBER OF DOORS DESTROYED	0	—
NUMBER OF WINDOWS DESTROYED	0	—
LENGTH OF WALLS DEMOLISHED	1.50 M	—
NUMBER OF ROOMS CREATED	2	3
BUILDING MATERIAL	red brick	red brick
LENGTH OF SEWERAGE TUBES		
LENGTH OF ELECTRICITY TUBES		
LENGTH OF WATER TUBES		

AIM OF EXPANSION: CREATION OF TWO BEDROOMS AND A KITCHEN AND A SERVICE AREA.
LENGTH OF NEGOTIATED WALLS: 4.00 m



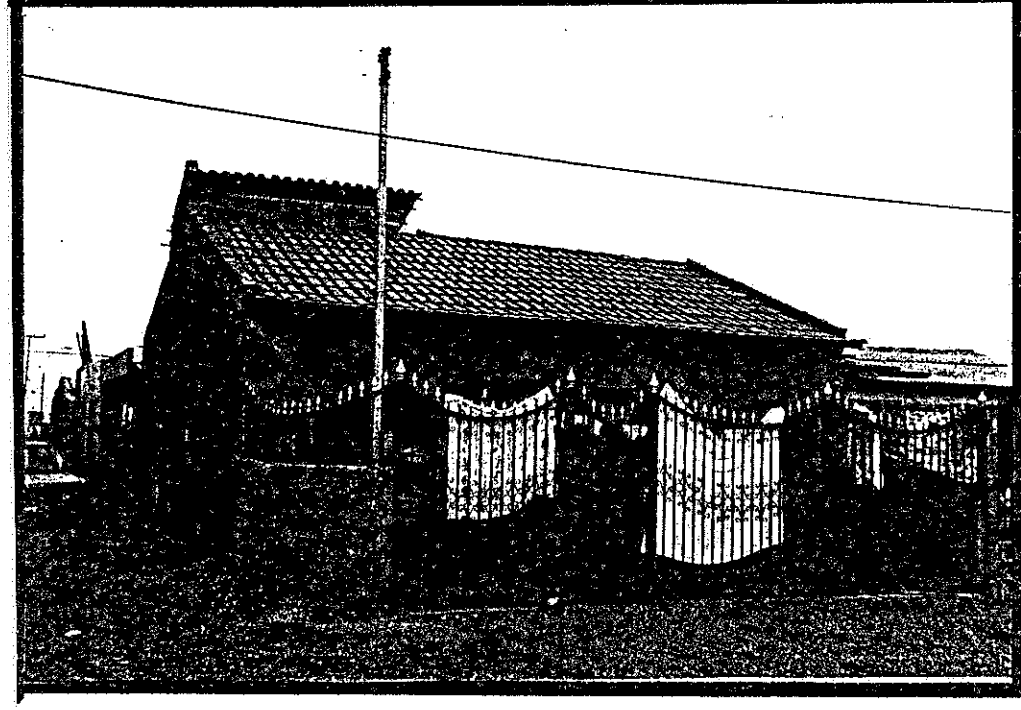
1	
2	3

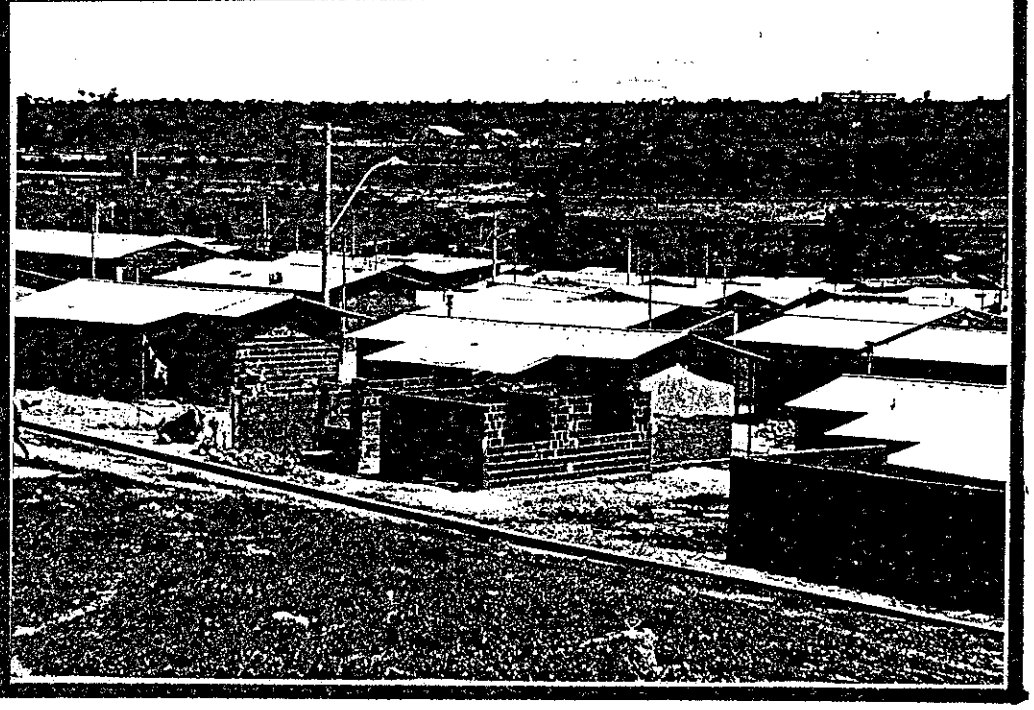
CANDANGOLÂNDIA

1. Resident rents her comercial space for a small size building material firm from Guará.

2. Resident changes the roof, implements a grid fence in the front, expands the core unit towards the left and back side, and develops his comercial activity in the back side of the plot.

3. The last row of houses occupied, dec/85. A resident carries out core unit expansion towards the back side of the plot. Implements the plot division wall as well.





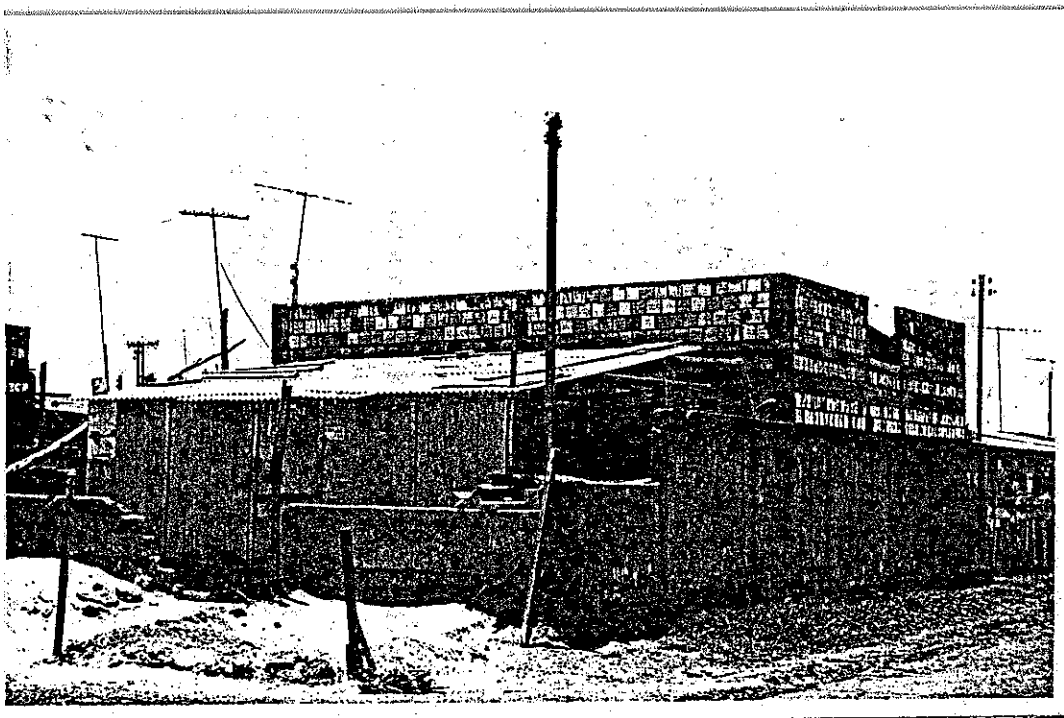


FIGURE 9.7

PHOTOGRAPHS OF DIFFERENT SCHEMES OF CORE UNIT EXPANSION IN ITAMARACA.

1	
2	3

1. Resident replaced core unit at the front limit of plot and developed red brick dwelling.
2. Resident replaced core unit at the back side of plot and slowly starts to develop a red brick dwelling.
3. Same as no.2 in early stage.