INCREMENTAL HOUSING PROJECT IN BOGOTÁ, COLOMBIA: THE CASE STUDY OF "CIUDAD BACHUÉ"

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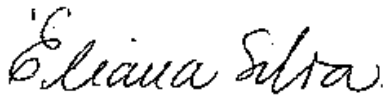
Statement of authenticity of material

This thesis contains no material which has been accepted for the award of any other degree or diploma in any institution and to the best of my knowledge and belief, the research contains no material previously published or written by another person, except where due reference has been made in the text of the thesis.



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ABSTRACT

This research analyzes the case study of incremental housing of Ciudad Bachué in Bogota, Colombia**.** Ciudad Bachué is a social housing project under the modality of urbanized land (or site and services, S&S) and houses of progressive development. The analysis of results reveal that Ciudad Bachué is a successful project in terms of the experienced housing growth, and the evolution of community facilities and services within the settlement. Households of single-family and multi-family options provided in the project developed their houses even more than planned for. Furthermore, the housing growth and modifications experienced diverse magnitudes due to seven key determinants: (i) increments in family income, (ii) changes of the perception of tenure security, (iii) settlement layout, (iv) prototype size of multi-family buildings (too small for households size with an average of 5.7 members), (v) location of dwelling units within a building and of buildings within the settlement, (vi) collaboration amongst neighbors in multi-family housing, and (vii) design of façades of multi-story prototypes. Many households of multi-story housing solutions developed horizontal and vertical unplanned housing expansions: on the rear of plots (infringing public and community streets), and towards the rear of their apartments. In addition, on community property they built unplanned housing extensions on community stairs, hallways and community streets. In the case of single-family options, households developed unplanned expansions on adjacent open spaces and community streets. Finally, Ciudad Bachué offers some lessons for planning similar multi-story incremental housing projects in Colombia and abroad. These suggestions might help to revive the (multi-story) incremental housing policy in Colombia, and take advantages from its twin benefits of pooling land costs (due to multi-story) and reducing construction cost (due to incremental).

Key words: incremental housing policy, sites and services, multi-story incremental housing, Ciudad Bachué, self-construction housing, self-management housing, houses of progressive development.

EXECUTIVE SUMMARY

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This research analyses housing growth in Ciudad Bachué, a settlement in Bogota, Colombia, which was planned to be built incrementally. The overarching objective of this study is to identify and evaluate the determinants and motivations of housing investment in Ciudad Bachué, particularly on the multi-story housing solutions. In addition, the study contributes to the debate on the potential of incremental housing policy in pooling land and reducing construction costs.

This research uses the general methodology of case studies to examine the incremental housing project of Ciudad Bachué. Furthermore, it interlinks three different dimensions of the case study— national/municipal, settlement, household—to identify the triggers of housing growth.

This research presents the background of the incremental housing policy in Colombia and Bogotá. It explains the role of the state housing entities in the implementation of this policy, since it was promoted in 1958, examining the diverse financial mechanics, housing modalities, and the most emblematic incremental housing projects that housing institutions have carried out. It introduces the minimum urban standards that established the guidelines to formulate solutions of progressive development for popular neighborhoods in Colombia during 1972-1990. Additionally, the research reviews the economic and social circumstances of the 80s and 90s in Colombia that promoted the policy of incremental housing. Finally, it reflects upon the changing role of the state in the housing policy, particularly on the promotion of incremental housing projects in Colombia since 1991.

The study describes the main characteristics of the Ciudad Bachué settlement. It introduces the site location, the changes in the settlement plans, including facilities and services and the land use (residential and commercial). Moreover, it explains the urban structure of the settlement, which followed the abovementioned established urban standards. It also analyzes the participation of multiple stakeholders in the development of public services within the settlement.

The main findings of the research in a settlement level are:

- Ciudad Bachué is a lively, walkable and high-density neighborhood.
- Ciudad Bachué is well connected to the city networks and it has multiple non-fenced footpaths and vehicular access that facilitate the mobility within the community.

- The community services are not well-distributed into the settlement, because the original plan was not carried out; in addition, the settlement of Bochica divides Ciudad Bachué into two parts.
- There is an excessive provision of public spaces. However, the sectors of single-family houses in Ciudad Bachué II, Villa Cristina and Las Carolinas had proven an effective use of public streets and open spaces.

Additionally, the study analyzes the housing growth of row housing and group of buildings of Ciudad Bachué. The methodology of the Global Consortium for Incremental Housing by MIT was used for reviewing housing investment in the settlement. For each prototype, it describes the main characteristics of initial provisions, including their vertical and horizontal components of progressive expansions.

The main findings of the research in a housing design level are:

- The housing design of the settlement was influenced by modern architecture concepts of progressive housing development.
- The project combines 10 different housing prototypes (with less than 100 m^2 for the starter core), from which five are single-family housing and five are multi-family housing, based on two principles:
    - Single-family houses initially provided basic or minimum houses of one or two floors that included planned horizontal (on internal open spaces or in the rear of second floor), and vertical expansions of up to two additional floors and a terrace.
    - Multi-family units predominate in the settlement. These prototypes consist of one-story and duplex apartments, and most of the starter provisions included progressive development.
- Households of single- and multi-family prototypes expanded their houses more than what had been planned for vertical and horizontal developments.

- The most common unplanned expansions in single and multi-family housings impact on adjacent community and public spaces. The latter raises the debate over recovering public areas occupied by unplanned expansions between the community and the District Planning Secretary.
- The amount of unplanned expansions of multi-story prototypes along with their similarities shows a high level of collaboration among neighbors of Ciudad Bachué that has contributed to legitimize the unplanned expansions in the settlement.

Furthermore, this research analyzes the impact of unplanned housing expansions. Unplanned expansions were carried out on community property, public alleys and streets, and atop of other neighbor's apartments. Overall, such practice has increased the social welfare of the community: households increased the space of their initial provisions; the unplanned expansions on the rear of plot responded to safety problems (e.g. crime) on underused public alleys; and the unplanned extensions on community property increase the use of spaces on housing clusters.

On the other hand, unplanned expansions also have negative effects:

- **From an aesthetic perspective, some people think that informal expansions on community spaces created disorder and a sense of chaos** (Suárez, 2008) that might impact on the values of adjacent properties.

- **The weight of vertical unplanned expansions might cause future problems on the building structure**, as buildings were not designed to this purpose. Some neighbors on the ground floor apartments complain that the weight of additional expansions makes difficult to open some doors in their apartments.

- **Unplanned expansions reduce the accessibility to housing clusters, due to the large appropriations of community streets** (e.g. with front gardens or additional rooms). For this reason, in 2008 an administrative/legal process began to recover public spaces in Ciudad Bachué.

- **Neighbors face collective action problems such as that they do not want to point towards disturbing unplanned expansions**, as they fear it would risk the removal of other desirable ones.

The research concludes that Ciudad Bachué is a successful project in terms of the experienced housing growth, and the evolution of community facilities and services of the settlement.

In Ciudad Bachué, housing growth and modifications experienced diverse speeds, as households´ needs would evolve (e.g. changes on family patterns) and their resources would allow. However, families typically invested intensively in their houses during two particular periods: before moving into the house, during which households invested to complete (in some cases rebuilt) and make comfortable their houses; and during the first decade and beginning of the second one, when most of the families continued upgrading the house, and built expansions.

Furthermore, seven key determinants for housing growth in Ciudad Bachué were identified:

- **In the case of multi-family buildings, the prototype size (too small for households with an average of 5.7 members) was the main trigger of housing growth.** Therefore, households in most of the multi-story prototypes (C, D, E and F) were encouraged to build unplanned expansions. In contrast, apartments of prototype B had the most suitable dwelling size amongst the multi-story options. On the other hand, even though the single-family prototypes included proper spaces for developing planned expansions, households of type A1 and A2 built unplanned expansions, but few of them were for additional rooms (for further details see the Section IV of Housing Design for progressive development).

- **The settlement layout, due to the excessive provision of public spaces, which were initially underused and later partially or completely encroached upon by unplanned expansions.** In effect, there exists a pattern of these expansions in the multi-story prototypes C, D, E and F: all ground floor apartments have built on the rear of the plots, on public streets, where the back of buildings face to each other. Conversely, none of the type B built unplanned expansions on internal pedestrian alleys, because their buildings already faced to each other with private back yards or shops.

- **The location of dwelling units within a building and of buildings within the settlement codetermined the magnitude of housing growth.** In the case of single-family units, prototypes A1 and A2 abutting the open space of the future Ave. ALO has proven as one

of the most advantageous locations within the settlement. In fact, some households expanded significantly the area of their house. For multi-family housing, the most advantaged locations were the ground and last floors. Households in other ground floor apartments (type C, D, E and F) had space for developing horizontal unplanned expansions towards the rear of their plots, and apartments on the last floor did not depend on others when building vertical expansions on top of their own properties. **On the other hand, the position of the apartments located in the middle floors of the latter building types is the least convenient for housing growth: due to the sandwich position, households depended on the negotiation/cooperation with others neighbors** to build unplanned horizontal expansions atop of lower-floor apartments.

- **The collaboration amongst neighbors in multi-family housing has been a significant determinant for expansions.** Although the process of incremental housing has been more intense for neighbors of units on the middle floors of buildings, the amount of unplanned expansions and their similarities shows a high level of collaboration among neighbors of Ciudad Bachué, that have contributed to legitimize the unplanned expansions in the settlement. In contrast, neighbors of single-family housing have had relatively more independency for building their unplanned developments. The type B is the only multi-story solution, where neither the lower nor the upper unit's expansions depended on other households' actions.

- **The design of the façades of multi-story prototypes influenced unplanned extensions on community property.** For instance, the façade's design which have uncovered (no roof) stairs and hallways, both made of rails, discouraged unplanned extensions.

- **The increments in family income, due to the financial contribution of children** (e.g. when most of the children began to work).

- **The changes of the perception of tenure security for the unplanned expansions, as consequence of the land conflict.** In 2008, the District Planning Secretary approved a proposal for recovering the public spaces in Ciudad Bachué, which has discouraged neighbors of investing in informal expansions, due to fear of demolition, even though they need the space.

In contrast, the results did not show evidence that the access to construction licenses, the repayment of debt for purchase of the core unit, neither the access to public services were relevant determinants for the housing growth in the settlement. The latter may not play an important role as most families had already expanded the small core units at or after occupation, when later infrastructure projects (e.g. BRT) could have triggered a new phase of construction. Still, expansion capacity is not fully saturated**.** For instance, some neighbors of upper-floor apartments might expand their houses if the informal expansions are legalized.

Lastly, Ciudad Bachué offers some lessons for planning similar multi-story incremental housing projects in Colombia and abroad. These suggestions might help to revive the multi-story incremental housing policy in Colombia, and take advantages from its twin benefits of pooling land costs (due to multi-story arrangement) and reducing construction cost (due to incrementalism). **Recommendations include:**

- **To ensure suitable public spaces in the settlement, but without overpassing the needs of the community.** To do this, before the implementation of the project or in its earlier phase of development, it is important to assess and, if necessary, to adjust the land use of the settlement with the participation of the community, in order to:
    - Give a better use of the land.
    - Increase the social welfare of the community.
- **To provide housing prototypes with different provisions and size, but with suitable spaces for future progressive developments, such as apartments of prototype B.** A suitable housing size avoids, paired with proper use of public spaces, unplanned developments and may reduce the need for monitoring of informal expansions.
- **To empower community associations in the beginning of the project to ensure they are able to monitor and support housing growth as well as the progressive development of community services and facilities.**
- **To develop an urban structure that enables a street pattern of three levels**: vehicular roads of rapid transit, vehicular roads to access settlement sectors, and pedestrian streets.
- **To ensure that all services and facilities are well distributed in the neighborhood.** For example, big recreation areas or community services should be positioned strategically in order to all settlement's sectors can easily reach them.

- **To include community's participation**, for example for the selection of construction technology to avoid households replacing core structures, instead of completing and expanding their houses.

Motivation for this study

During my last Master's internship, I had the opportunity to travel to Bogotá with the aim to analyze the housing investment of the incremental housing project 'Ciudad Bachué', a settlement in the north-west of the city.

Commuting to the site, and conducting interviews with community leaders and households for two months gave me a compressive view of the incremental housing approach to cope with urban housing deficit, in the current context of rapid urbanization, particularly with the development of multi-story housing solutions. It was an intense process of learning and overcoming the obstacles intrinsic to the analysis of a mature incremental housing project with informal expansions.

Due the complexity of the project and my strong interest on this field, I decided to dedicate my thesis exclusively to the case study of Ciudad Bachué.
I hope my findings on housing investment might aid in managing and planning better incremental housing projects and programs in other countries, and contributing to re-vive the approach of multi-story housing solutions in Colombia.

Acknowledgments

I wish to thank my supervisor Prof. Matt Nohn for his feedback and commitment in reviewing the study, who also helped me to improve my writing skills.

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Last but not least, I would like to dedicate my work to my family for its love and patience.

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INTRODUCTION

I INTRODUCTION

I.1 Research problem

Despite the advantages of ´multi-story incremental housing´ developments (reducing construction costs for social housing projects, and pooling of land cost) to cope with the urban housing deficit in a context of rapid urbanization, since the 80s these initiatives have not been promoted more in the housing policy agenda of Colombia. For this reason, this study focuses on examining the experience of the incremental housing project of Ciudad Bachué, which combines single-family and multi-family solutions of progressive development. The lessons learnt from this case study might apply to others international housing projects and programs, and contribute to revive the multi-story incremental national housing policy of Colombia.

I.2 Objective

This research analyzes the case study of incremental housing of Ciudad Bachué in Bogota, Colombia. Ciudad Bachué is a social housing project under the modality of urbanized land (or site and services, S&S) with houses of progressive development. It provided starter units ready to move in, but with incomplete and expandable components that households have gradually developed. Furthermore, Ciudad Bachué was an experimental project that combined single-family and multi-family housing options, and the first one in Colombia introducing incremental components in multi-family provisions.

The aim of this study is to identify the main determinants of housing investment in Ciudad Bachué. These triggers might aid in explaining the challenges and potentials of the development of the project. Then, some recommendations will be pointed out for an improved planning and management of similar projects of incremental housing in Colombia and abroad.

I.3 Relevance

Rapid urbanization globally has led to an increasing relevance of multi-story housing developments, due to high cost of urban land. Prohibitive land prices at locations close to employment opportunities are a key obstacle to developing affordable housing projects at good locations. In this context, the case of Ciudad Bachué illustrates specific opportunities and challenges that are intrinsic to multi-story incremental housing. Moreover, it may inform other housing projects and programs on how to incorporate high-density incremental housing options in other countries, with the objective of combining advantages of both multi-story development (pooling land costs) and expandable starter unit provision (reducing construction cost).

Incremental housing projects may be understood as a means to share costs and responsibilities of affordable housing provision between the public sector and citizens. Therefore, this study seeks to contribute to the debate regarding the potential of incremental housing projects to cope with the urban housing deficit of affordable houses. Many planned incremental housing projects exist across the world, but few projects offer multi-story buildings designed for expansion (Goethert and Nohn, forthcoming).

The selection of the Ciudad Bachué settlement as a case study was based on the following characteristics: it is a project of houses of progressive development, it is mature, and it provides multi-family housing prototypes. Ciudad Bachué is an established site and service project (around 35 years old) initiated at the end of the 70s. It is one of the few projects of incremental housing in the world with multi-story housing design. Given these characteristics, it poses specific challenges and potentials. Identifying these challenges is considered relevant for the development of other multi-story incremental housing projects in Colombia or abroad.

However, choosing Ciudad Bachué presented multiple challenges. First, it is a big settlement (7,124 housing units) that requires significant time to understand its complex realm of housing provision and transformations. Second, during the last years a controversy has arisen between the community and the government over the legalization of unplanned expansions on public or community land. As a consequence, some dwellers refused to provide information, fearing that it may jeopardize the legalization process led by the community. Finally, due to the settlement age,

it was difficult to access official information on the original settlement plan and housing typology. However, thanks to the support of community leaders, neighbors and officers at the Housing Ministry, it was possible to undertake the research.

I.4 Research Questions

The central question this research seeks to answer is, 'what are the determinants of housing investment in the incremental housing project: Ciudad Bachué, Bogotá, Colombia?'

Multiple subordinate questions, reflected in the structure and sections of this document, support answering the central question, including:

- What are the challenges and potentials of Sites & Services programs?
- What are the different modalities of Sites & Services?
- What macro-economic circumstances, and housing institutions have influenced the incremental housing policy in Colombia?
- Has the settlement characteristics of Ciudad Bachué facilitated housing investment on the site?
- Has the housing growth in Ciudad Bachué been successful?

I.5 Hypotheses

The research expects to validate the following hypothesis regarding the possible determinants for incremental housing investment in Ciudad Bachué:

Hypothesis 1: "Housing expansion has diverse speeds and magnitudes of growth due to mix of income and starter options".

Hypothesis 2: "Increments in family income have a positive impact on housing growth/modifications".

Hypothesis 3: "The release of the financial debt of starter core purchase – or repayment of former debt – affect positively or negatively housing growth".

Hypothesis 4: "Changes in family pattern (household size, age of children, marriage and family growth) influenced housing investment".

Hypothesis 5: "*Improved access to public services (e.g. education, transport and health) and a better infrastructure determine housing investment".*

Hypothesis 6: "Changes in (perceived) tenure security affect housing investment".

Hypothesis 7: "Access to (formal) construction licenses in compliance with building standards affect housing investment".

I.6 Document Structure

The content of this research is organized in three sections, as depicted below.

***The section I* is this introduction.**

An initial background on *Section II* introduces international approaches on housing policy, and presents the main macro-economic circumstances of Colombia that influenced the incremental housing policy in Bogotá. Additionally, it reflects upon the changing role of the state in the housing policy, and particularly on the promotion of the multi-story incremental housing projects in Colombia since 1991.

***Section III* presents the characteristics of the Ciudad Bachué settlement.** It introduces the site location, the changes in the settlement plans, including facilities and services and the land use (residential and commercial). Moreover, it explains the urban structure of the settlement, which followed the urban minimum standards established since 1972 for popular neighborhoods of progressive development in Colombia. This section concludes with presenting relevant problems and challenges that the settlement faces today.

***Section IV* examines the housing design for progressive development of the different prototypes of Ciudad Bachué.** It also presents the incremental housing developments of selected family case studies. Furthermore, this section matches the potential determinants of housing investment cited on the initial hypotheses to the results of the study. Finally, some challenges and potentials of the project are identified.

***The Section V* presents the conclusion of the research.**

I.7 Methodology

This research uses the general methodology of case studies to identify the determinants and the motivations for housing investment in the incremental housing project Ciudad Bachué. Case studies methodology has many advantages and disadvantages. As advantages, it allows explaining more in detail a particular experience, and facilitates identifying common characteristics between this and similar experiences. As disadvantages, it draws on qualitative data that may be difficult to interpret objectively. Likewise, it is difficult to make generalization based on particular contexts. It is important to note that this research focuses mainly on analyzing qualitative information.

For the analysis of the different dimensions of this case study— national/municipal, settlement, household – three different methodologies were used. One for understanding the national/municipal level focuses on describing the main macro-economic elements of Colombia that influenced the incremental housing policy in Bogotá. A second methodology for analyzing the settlement level on site characteristics. Finally, a methodology of housing design and for reviewing the modifications of houses, which is based on family interviews. The inter-linkages of these three dimensions will enable to identify the triggers and effects of planned and unplanned modifications of starter housing units.

I.7.1 Methodology for the national political economy level

This methodology was based on desktop research. Firstly, it focuses on reviewing specialized and international literature, that describes the alternatives of providing affordable houses through the housing policy of site and services. Secondly, it examines the history of housing policy in Colombia since 1950, focusing on incremental housing strategies. The information was gathered from official housing reports, previous studies and thesis about Ciudad Bachué, and other academic books.

I.7.2 Methodology for the settlement level

This dimension focuses on describing the evolution and main characteristics of the site. First, this methodology starts describing the settlement location and its connectivity within the city at its beginning and nowadays (transport links). Second, it compares the evolution of urban settlement plans. Third, it identifies the location of open spaces, and investigates the amount and distribution of infrastructure provisions of the site, such as community facilities and services. Fourth, it analyzes the urban structure of the settlement, which includes examines the street pattern and mobility, the spatial urban hierarchies, and the land use (residential and commercial). Lastly, it presents the findings of settlement level.

The methodology for gathering settlement data was based on the analysis and comparison of site maps, housing plans, official reports, governmental websites and newspapers with the observation and pictures of the current situation of the settlement that provide evidence for its evolution. In addition, the data was complemented through face-to-face interviews with officials from the Ministry of Housing, community leaders and households.

This methodology illustrates settlement maps of Ciudad Bachué based on the approach to present the makeup of the settlement of the research Aranya by the (Vastu-Shilpa Foundation, 1990)**.** Some of the technical drawings from Aranya that this methodology pursues to replicate are shown below.

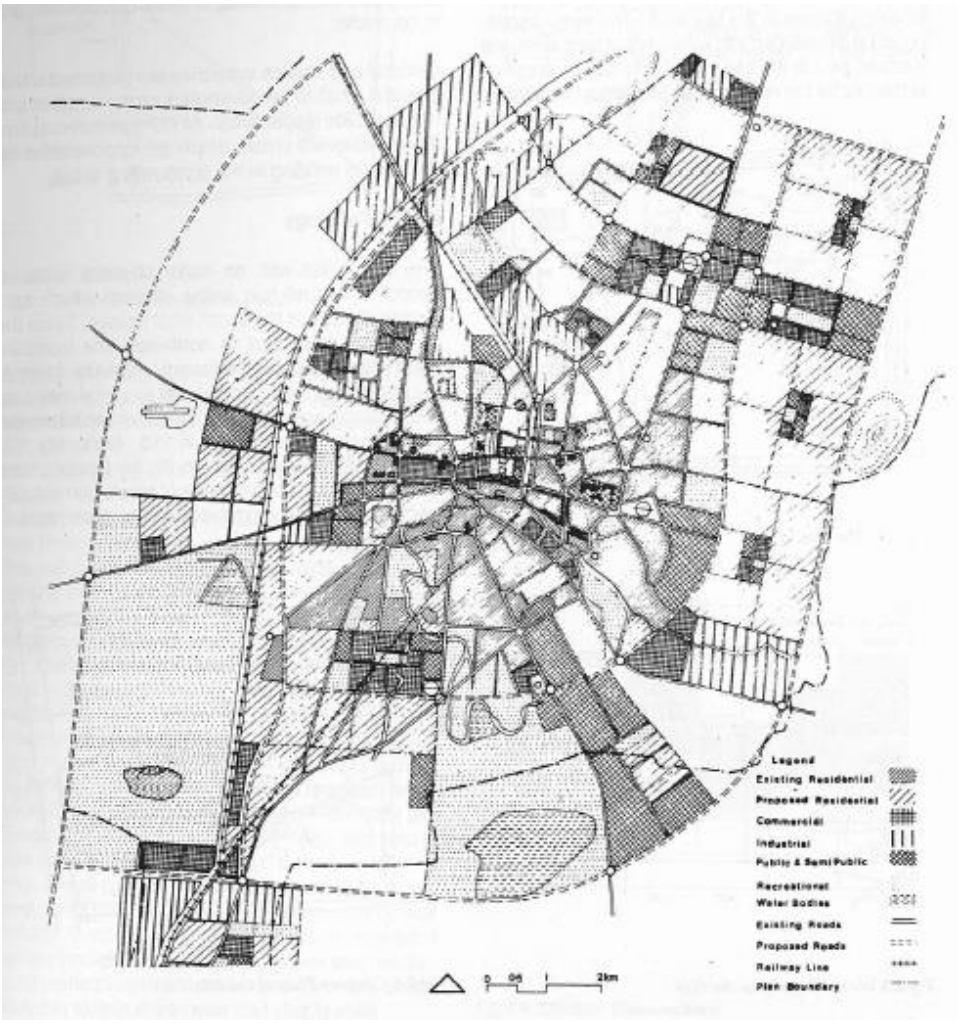


Figure 1: Location of the site.

Source: Vastu-Shilpa Foundation, 1990, p.11.

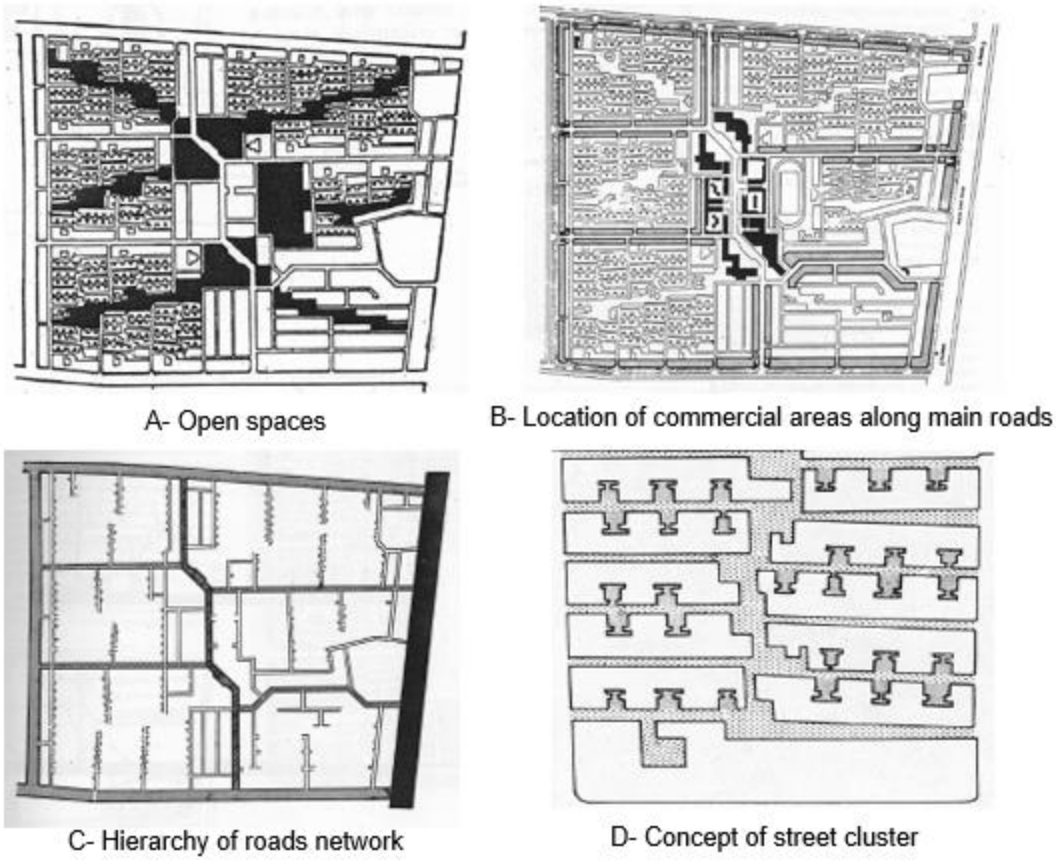


Figure 2: Settlement maps of Aranya's project.

Source: Vastu-Shilpa Foundation, 1990.

I.7.3 Methodology for the housing level

This evaluation is grounded on the methodology of the Global Consortium for Incremental Housing by MIT (2009) for reviewing housing investment. It consists of interviewing dwellers of different housing prototypes for documenting chronologically the physical changes of the house, the triggers of those physical changes (e.g. money available, family growth, etc.) and the financial sources that have supported them.

The survey involved a set of questions by themes, as follows:

- **Family growth:** this theme involves questions related to the evolution of family size, such as children raised in the house, family members moving in and out, rental tenants, the ages of family members, family education and health.
- **Physical changes of house:** this theme examines the house starting from initial provision and successive modifications. The interviewer goes room by room or floor by floor, depending on housing typology. Then, for each upgrade of the house, the following questions are asked.
    - When was it built?
    - What was the purpose? (e.g. adding a floor to accommodate a son's family, adding a shop).
    - How was it financed? (sources, loan terms, etc.).
    - What was the income/employment at the time? Who contributed to financing? (e.g. kids and family).
    - What was the reason/trigger for the improvement? (e.g. money available, family growth).

Finally, a graph/chart timeline summarizes how big was the house and family after the improvement (see below).

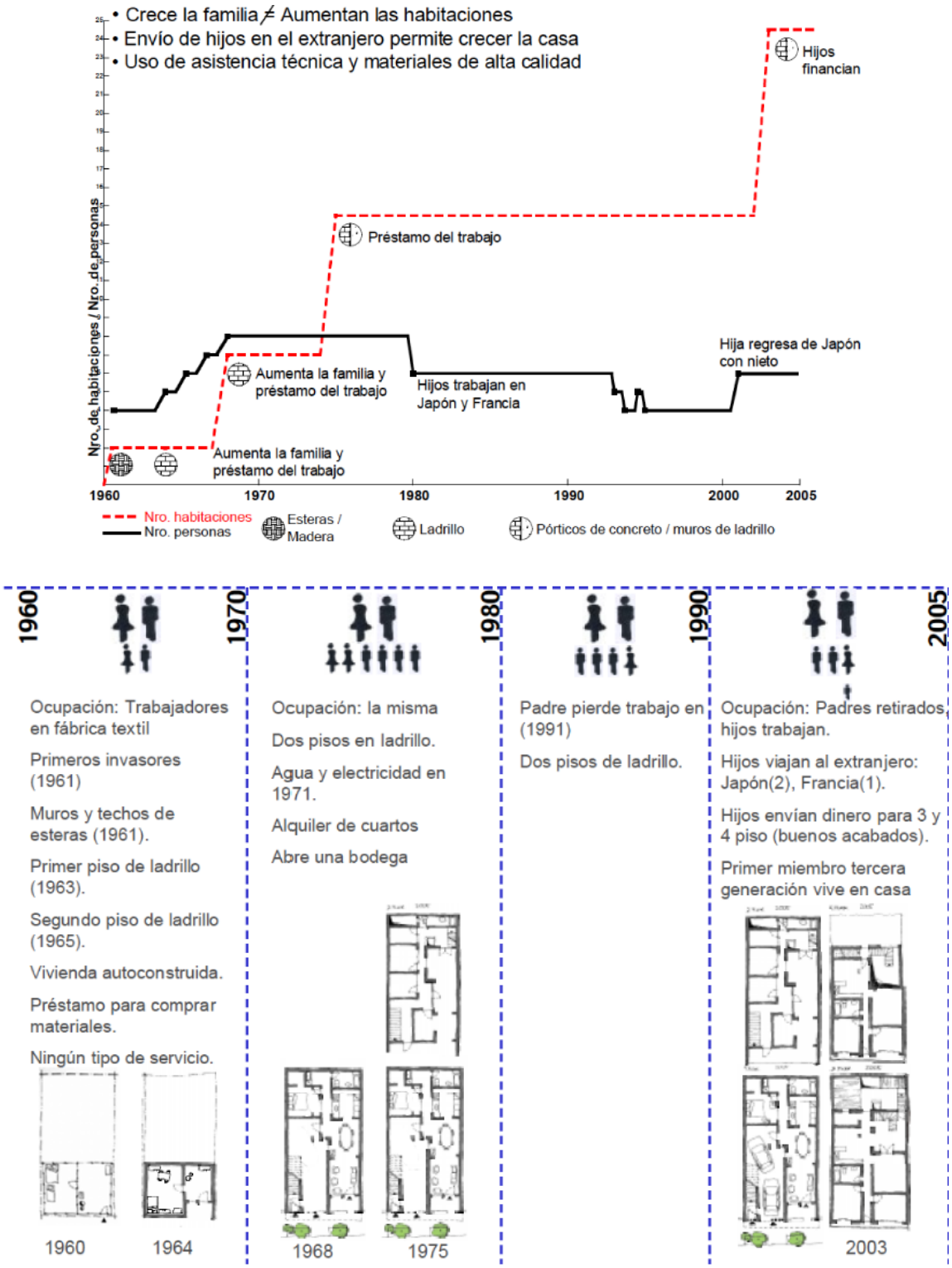


Figure 3: Example graph/chart for the analysis of housing investment.

Source: Global Consortium for Incremental Housing, 2009-2010.

Despite multiple challenges (see below) the methodology of the Global Consortium for Incremental Housing by MIT since 2009 offers a broad view to approach the study of housing investment everywhere. For further details about the methodology of housing investment see the link of the Global Consortium for Incremental Housing, MIT:

http://web.mit.edu/incrementalhousing/understandingFormat/level1BasicSurvey.html.

I.8 Challenges of the research

The methodology of housing level presents multiple challenges, as described below.

First, getting the trust of people is not easy, and it is even more difficult to enter into their houses. Moreover, as the survey features personal questions, particularly for the ones related to economic issues or finance people would get nervous and mistrust the interviewer. As a consequence, they can decline to answer some questions arguing security reasons. Even knowing that the information will be used for academic purposes, there are always doubts about how the real end use, hence this fear is complete understandable. To mitigate this problem, it is important to understand the culture and the context of the place to get the trust of dwellers. It is highly recommendable to know local people such as community leaders, the priest of the local church and any well-known people into the community that can serve as a good reference. In other cases, the support of NGOs, universities or urban institutions could help to guarantee the success of the process overall when the interviewer comes from other countries.

Second, there is not a standard questionnaire for the survey, since it depends on the context and the place of the study. **As a consequence, designing the way to ask the questions and the number of questions is challenging.** Moreover, elaborating politically correct questions which comprise at the same time all of required information is also a big task. The field experience and the interaction with local people can give some ideas about what is politically correct or not for the survey, but again if people trust on the interviewer this issue is not a problem at all. In the case of Ciudad Bachué the design of the survey was very difficult. At the beginning the survey suggested closed questions with selection options, but as with this methodology much information was missing, other versions were based on open and specific questions with a lot of details. Finally, the most practical "questionnaire" done was a simple blank piece of paper, where people would see the drawings of housing sketches/plans while notes were taken around this. But this last

approach required experiences and memory to do not miss information and do not lose the goal of the exercise "to find the determinants for fostering housing investment/expansion". Nevertheless, the last version of the survey could solve all political issues. In sum, it is not trivial to design a good survey for each context and it is crucial to recognize the importance of people's trust and the good references for success the project.

The rooms sizes could not be measured for all families. During the interview, with the approval of the family, this would be performed. However, in some cases, when it is not possible to enter into the house, families described how they divided, improved and expanded the house. In this, the interviewee describes how each room and floor looks, and how they have changed during the time. Finally, to close the interview a picture of the façade is taken.

Third, there are significant differences in the quality of information given by dwellers. Some dwellers could give a lot of information allowing to have a deeper analysis, whereas other dwellers just give few and vague data. These differences are inevitable. For this reason, it is important to do as much interviews as possible to select the most complete cases after the comparison of the sample's interviews.

Fourth, this methodology requires to organize the information chronologically, which is very difficult. Families did not remember the dates of the events. For this issue the interview included questions that help them to remember and link family events with housing investments (e.g. remembering the ages of a son when a room was built).

Fifth, conversely to the base methodology, the indicator of family income in Colombian pesos is not measured on this research, because of multiple reasons. Firstly, people did not remember the incomes they earned decades ago and, second, for some neighbors this question was unappropriated. In addition, collection of income information has proven to be notoriously unreliable.

Furthermore, this research presented other challenges as follows:

- **Due to a coincidence, the field trip was during in the major election's time,** in which household link any interview with political purposes.

- **It was difficult to access information on the original settlement maps and housing plans, because the Planning Secretary was reviewing some of them.** Also, the plans of housing typologies were incomplete in the information found on the Planning Secretary. However, with the help of households and community the remaining information was collected.

- **No official updates and public maps about the evolution of progressive development of Ciudad Bachué are available.** The Ministry of Housing is not responsible to update any map of the settlement, because they do not exercise cadastral functions. This situation makes increases the difficulties in understanding the settlement for dwellers and professionals alike.

Responding to this challenge, the Ciudad Bachué's Committee for Expansions has produced its own maps that reflect the real contemporary conditions of the settlement, and committee members have participated in many meetings, explaining even to the municipality the characteristics of the settlements and its developments.

I.9 Limitations

The project of Ciudad Bachué included five different single-family prototypes, that will be described in this research. However, in the case of row housing prototypes, the analysis of the result focused only on the types A1 and A2 for many reasons. First, it was not possible to interview families of the others prototypes (A3, A4 and A5). Second, due to the limited amount of time on the settlement, and since the type A1 and A2 are the most predominant starter options for single-family housing, they were the priority of this research.

SECTION II

BACKGROUND: POLITICAL AND TECHNICAL REFERENCE

II BACKGROUND: POLITICAL AND TECHNICAL REFERENCES

II.1 International Housing Policies

Incremental housing strategies has been around for decades. The incapacity of government and formal market to provide affordable houses for low-income people has fostered informal construction on smalls and informal plots of land in urban areas of global south countries. According to Wakely and Riley (2011), between 20 and 70 percent of the urban population in developing cities already produce their housing incrementally, the majority of them informally with little or no tenure security. In addition, typically they do not have proper infrastructure and services, and houses are built with substandard construction materials.

To respond to this situation, across the globe governments have carried out three main approaches to allocate housing for low-income households. The first approach is the conventional housing policy to subsidize complete houses, but this is not an affordable solution for governments and households that have to cope with rapid urbanization. The second strategy focuses on slum upgrading programs, which provide infrastructure and services and tenure security for encouraging housing investment. This strategy has been the mainstream response: letting people self-settle and upgrade later, as it is a practical (albeit suboptimal) approach to "solving" the land question. Most of governments run into land supply constraints, as located and serviced land becomes a highly-priced commodity, and as most of governments lack tools (such as land value sharing) for making it available without exhausting their own resources (Wakely and Riley, 2011). Finally, the third approach, focused on low-cost and high cost recovery, enables the provision of urbanized land (known as sites and services, S&S), where communities and households self-manage the incremental development of settlements and homes (Goethert and Nohn, forthcoming).

This research put emphasis in the latter approach of providing urbanized land for housing low-income people. Therefore, it examines the modalities, benefits and challenges of subsidizing S&S strategy.

II.2 Sites and Services Policy

The S&S ranges from demarcating plots without individual utility connections (leaving land available for the construction of facilities and services), but with access to common public water points, to fully serviced starter units ready to move in, which sometimes include planned components for expansion. Additionally, most of S&S programs consider two mechanisms of tenure security – individual freehold ownership, and collective titles (e.g. housing associations, co-operatives, and condominiums); and occasionally set up the financial strategies to cover at least part of the cost of starter units and housing developments (Wakely and Riley, 2011).

The modality of S&S that include incremental housing is especially attractive for governments of developing countries, which pursue an integrated housing agenda. Some of the major arguments to support this policy are:

- **Response at a large scale of houses and deliver rapidly:** incremental housing seems to be the only viable policy alternative of building affordable housing units at the scale, speed and magnitude of today's urbanization. This is particularly true for multi-story incremental housing, as it solves the problem of low-density of incremental approach in one-story settlements (Goethert and Nohn, forthcoming).
- **Affordable for all parties involved:** incremental housing may be the only housing strategy that is affordable for governments and households. It tackles housing financial challenges: public deficit, limited donor-support or low-income family's finance (Goethert and Nohn, forthcoming). Furthermore, the S&S programs adjust to the technical and financial capacity of both low and moderate-income households and public sector (Wakely and Riley, 2011) in (Goethert and Nohn, forthcoming).
- **Pooling of land prices:** as other vertical housing solutions, multi-story incremental housing aids in reducing cost within an environment of high land prices, by pooling land acquisition costs amongst a larger number of households (Goethert and Nohn, forthcoming, p.18).
- **Sharing responsibilities:** along with sharing cost between government and households, incremental housing is a mechanism for sharing responsibilities of decision-making in the housing process (Turner, 1976) in (Goethert and Nohn, forthcoming).

However, despite all of the benefits of incremental housing policy, today they do not dominate the worldwide housing agenda, as they did during the 1970s and 1980s; instead, the conventional approach to subsidize complete housing units prevails. Some of the main reasons against the implementation of incremental housing projects have been:

- **Consolidation time:** the consolidation of low-income houses and settlements is a slow process that takes decades to mature or is considered never ending (Wakely and Riley, 2011). Then, for political reasons governments may not be willing to start projects that they (or the dwellers) cannot complete within their mandate.

- **Short-term for cost-recovery:** lack of sanctions for non-payment of purchase of housing core, and underestimation of household's financial capacity, which typically is based on informal activities turned on low rates of cost-recovery, mainly due to the imposition of short-term cost-recovery administrations (Wakely and Riley, 2011).

- **Gentrification:** some projects imposed high-standards of design, which were non-affordable. In response, low-income households sold up to middle-income groups causing gentrification (Wakely and Riley, 2011). Collective titles aid to solve this problem.

To conclude, incremental housing approach is a policy with significant potential that can bring more solutions than problems in the long-term for cities of developing countries. For this reason, the paradigm is still valid through the focus on slum upgrading, tolerating (or accepting) the self-settlement of the urban poor, due to lack of formal and affordable land supply options. Now, incremental housing in the form of sites and services appears to resurface on the international agenda, which is evident inter alias in the Sustainable Development Goals, with the 'urban goal' 11 focusing on inclusive, safe, resilient and sustainable urbanization, and UN-Habitat's effort in promoting 'planned urbanization' for Habitat III.

II.2.1 International Incremental Housing Experiences

This section presents some experiences of site and services projects globally: the Parcelles Assainies in Dakar; Dandora in Nairobi, Kenya; Khuda-Ki –Bastee, Hyderabad, Pakistan and Las Presita, San Miguel, El Salvador. As any housing project, these experiences faced many managerial and operational challenges in their implementation.

Parcelles Assainies, Dakar, Senegal. Implemented in 1972. The office d'Habitat de Loyers Moderes, with a loan of the World Bank (WB), planned to develop 14,000 house plots of 150 square meters each on 400 hectares of land. The project included minimal infrastructure and sufficient public spaces, schools, health, community centers. Beneficiaries bought serviced plots and infrastructure with their savings and/or a 15-year soft loan at 7 percent interest, and then built their home. The project finished in 1981–82, five years later than planned due to many difficulties between the government and the WB. For instance, the project was disconnected from the urban context as a whole (Cohen, 2007 in Wakely and Riley, 2011).

Dandora, Nairobi, Kenya. The project emphasizes the community development as an integral part of the project's design and management. The project site was on the eastern fringes of the city with the easy access to its main industrial area. The first phase made 6,000 plots available each with a wet services core for three different income group. Community facilities included six primary schools, two health centers, markets, two community centers, and a sports hall. The project included 330 plots sold at market prices to subsidize the cheapest plots. The agreement with the WB set up a management unit with four divisions: administrative, legal, technical, and community development.

Khuda-Ki –Bastee, Hyderabad, Pakistan. In 1986 the Hyderabad Development Authority set out to simplify the provision of affordable housing to the lowest-income groups by imitating the informal housing process. The project included 3,000 plots. Beneficiaries were allocated an 80-square meter plot with no infrastructure for a payment of 30 Euro. No construction standards were imposed. After 8 years, the project achieved strong results. Private buses took residents to central Hyderabad and industrial locations every 30 minutes. The program was affordable and sustainable. Some of the characteristics that made successful the project are: the incremental nature of the

scheme, the continuous availability of plots and the issuing of dwelling permits (Wakely and Riley, 2011).

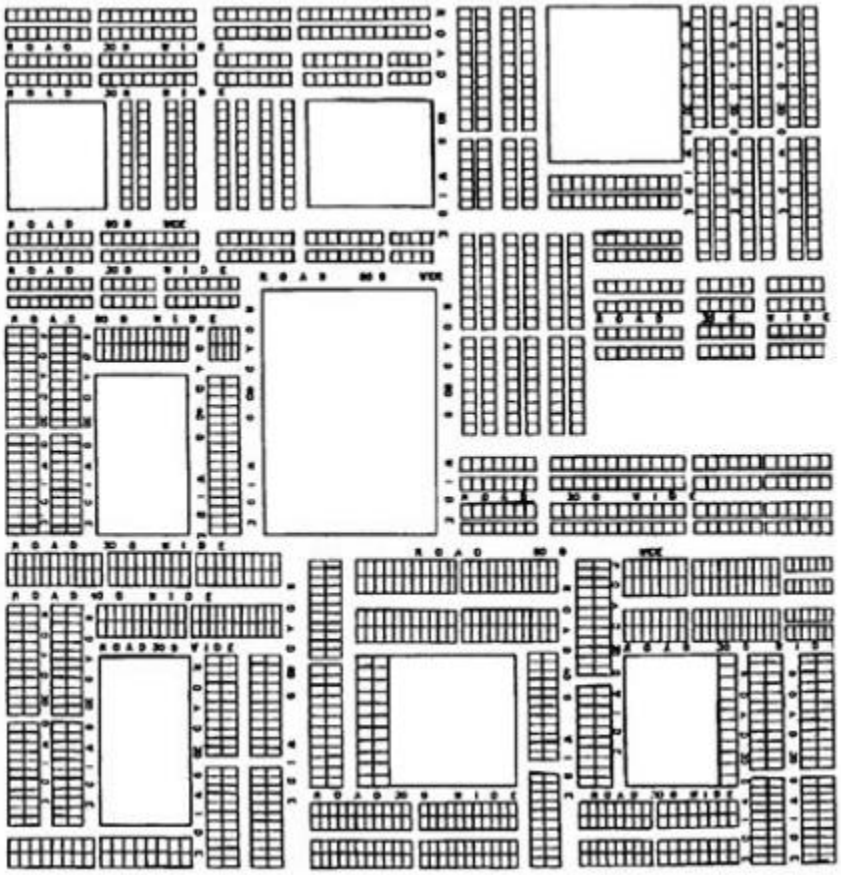


Figure 4: A sector of Khuda-ki-Basti.

Source: Ekram, 1995.

Las Presita, San Miguel, El Salvador. Began with the supply of 900 units by the implementing agency Fundación Salvadoreña de Desarrollo y Vivienda Mínima in the 1970s with a WB loan. It had an innovative clustered land development pattern (36 clusters, each with a large central yard surrounded by 12 to 15 houses), legal land tenure and core starter housing. Each core was built by 15 to 20 families. Participant families were selected through a long vetting process. The project includes community facilities included a primary school, park/playground and community centre.

Figure 5: Aerial view during construction, c.a. 1979.

Source: García-Huidobro, Torres Torriti and Tugas, 2003.

Figure 6: Initial starter core and developments.

Source: Eikerdt, Rosenberg and Martin, 2008.

PREVI, Peru. It began in 1973. The Peruvian government provided the construction funding, the building site and national workers; and the United Nations (UN) and United Nations Development Program (UNDP) provided technical assistance, international personnel and the international competition costs. The initial form of PREVI consisted of three pilot projects. The first pilot project, PP1, was for a new settlement of low-cost and contractor-built houses, with emphasis on new and improved design and building methods, based upon the results of an international competition in 1969. PP1 was an experimental project in many aspects such the design of the settlement based upon high density, the low-rise and growing house concepts, the configuration of housing clusters, the human-scale pedestrian environment, the improved house building methods and the settlement landscape plan. The plan included 26 different clusters of house types, and form small plazas at their intersecting nodes. Low-income dwellers purchased the houses with a low-interest rate through the Loan and Saving Association of Peru. This pioneering and original experiment of 500 housing is recognized by architects and policy-makers as a good example of what can be done to solve the housing problem in Latin America. However, in the process of expansion and growth the houses and settlement have suffered some deterioration in environmental standards, including overcrowding that compromise safety (García-Huidobro et al., 2003).

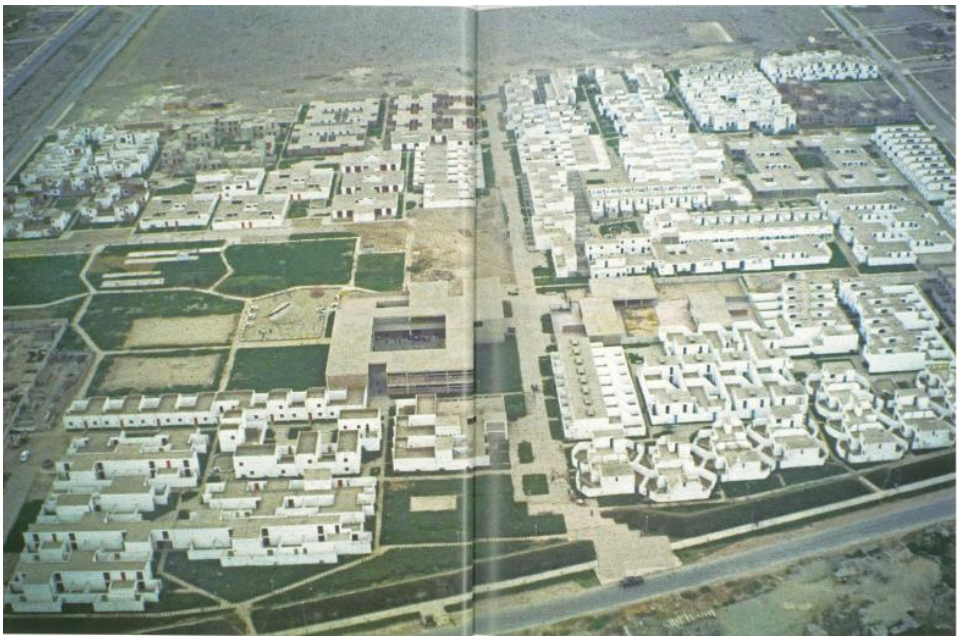


Figure 7: PREVI neighborhood aerial photograph, 1976.

Source: García-Huidobro, Torres Torriti and Tugas, 2003.

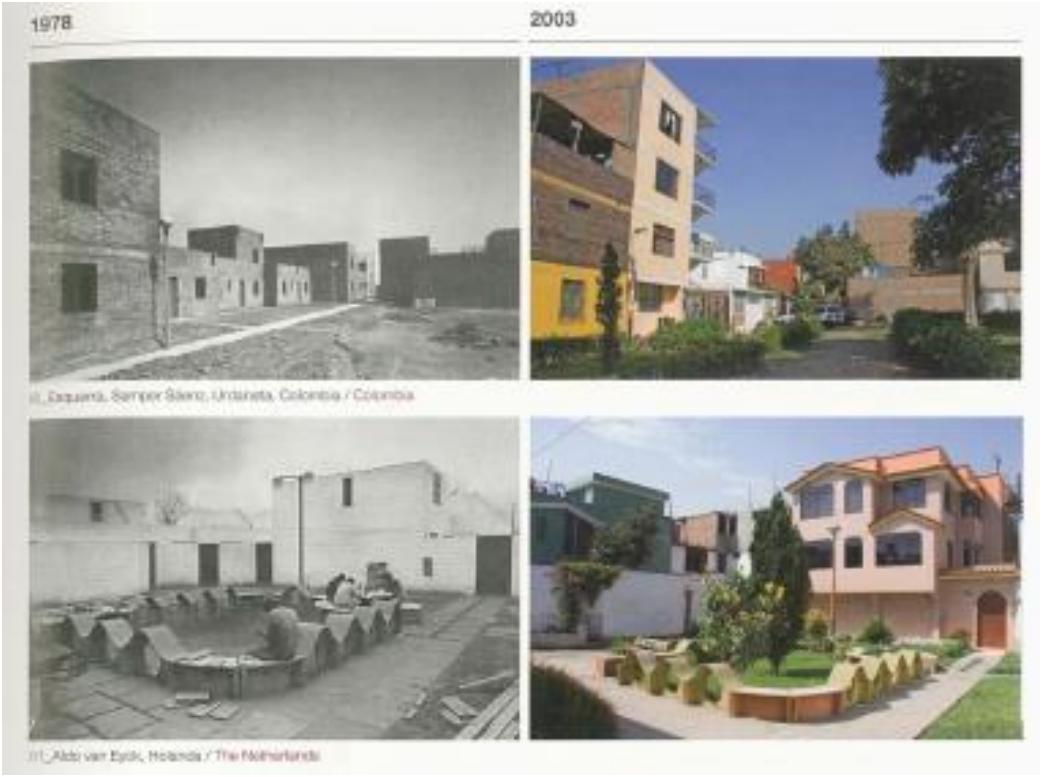


Figure 8: PREVI photos of housing evolution.

Source: García-Huidobro, Torres Torriti and Tugas, 2003.

II.3 The Political Economy of Affordable Housing in Colombia and in Bogotá

Since 1958, the approaches of self-management housing and self-construction housing were embraced and incorporated in mass social housing programs in Colombia. The difference of these approaches is based on from whom comes the workforce: if the workforce comes only from the head of family/owner with the support of the family the policy refers to self-construction housing; but if the workforce comes from master builders hired by the owner, who in some cases might contribute with labor, the policy is self-management housing.

These housing movements recognized the gradual/incremental process for housing construction, which is comparable to the spontaneous development of houses in informal settlements. Housing is understood as an activity in which households decide and participate. Furthermore, the idea of building their own house changed from the perception of dignifying the self-builder and it being morally healthy, to something more pragmatic as the consideration of the incapacity to supply complete houses for low-income dwellers.

In this context, the *Instituto de Crédito Territorial*[1], henceforth ICT, the entity leader in promoting social housing for low-income people in Colombia, developed action plans for promoting the mentioned approaches that involved the concept of incremental housing, or construction of incomplete houses of progressive development. **The objective was to cope with the substantial deficit of urban social housing (INURBE, 1996). The main programs the ICT were:**

- **Program of Urbanized Land:**
    - **Mutual Assistance or conducted self-construction:** This program began in 1958. The ICT financed and provided 100% urbanized land, housing construction materials, non-community labor and technical assistance. Later, the benefited group of families organized in a community associations built their houses conducted by

[1] **Instituto de Crédito Territorial—ICT:** was the main state institution that worked continuously for providing social housing solutions, and urban development during 52 years (1939-1991). Originally, the ICT aimed to address the construction of hygienic housing for rural population in Colombia. However, it adapted its operative structure to respond with the high demand of urban housing. Furthermore, it is recognized for its actions in providing affordable houses for low-income dwellers.

the ICT. During the construction, families were accommodated in temporary houses within the project's land. Additionally, households had to accomplish specific regulations, such as a minimum hours of labor per week per family.

- **Self-effort construction:** The initiative began in 1959. The ICT provided urbanized land, housing construction materials and technical assistant to the beneficiaries, who built their houses with only with their own labor. Later, in 1971 the system grew technically and reduced the participation of the head of family, who only contributed with excavation, foundation and finishing touches of the house (INURBE, 1996).

- **Direct construction system:** It began also in 1959. The ICT financed 100% of the projects, it bought land and via public bidding system hired construction companies for developing the land, and building houses. The companies presented multiple technical proposes, construction systems and materials. The ICT selected the project that ensured the quality of construction with an affordable price for m^2 of construction. It operated two modalities:

  - **Houses of progressive development:** based on the concept of self-management housing the ICT provided basic provisions ready to move in, but with incomplete components that families built progressively. This system targeted families that could not pay for finished housing and those of who could not participate in others plan of self-construction.

  - **Complete houses:** the construction companies built complete houses based on ICT's specifications. The target group of beneficiaries was middle-income households that contributed with a determined down-payment (INURBE, 1996).

The ICT allocated housing according to different shares. Firstly, a special share that included ICT's employees (10%), employees of public institutions (10%), the armed force (10%), employees of the presidency of the republic (5%), blind and deaf population, and others. Secondly, a share by official agreements. Finally, an ordinary share focused to households that accomplish all ICT's requirements, who were selected via random systems (Instituto de Crédito Territorial, 1979).

In 1971, the ICT launched a research that established the urban minimum standards for developing land and public and community services, which focused on formulating incremental housing solutions and at the same time enhancing the household's economic situation and the investment capacity of the country. The urban minimum standards were based on a theoretical model, that established guidelines for urban structure alternatives and sizing and designing group of houses. The urban minimum standards ruled the projects of the ICT and *La Caja de Vivienda Popular de Bogotá*[2] between 1972 and 1990 (INURBE, 1996).

The main objectives of the research were:

- To allow an increment of urban density.
- To develop an urban structure that enables a street pattern based on three levels: vehicular roads of rapid transit, vehicular roads for entering to settlement sectors, and pedestrian streets.
- To develop an urban structure that facilitates the progressive development of houses and the infrastructure and community services.
- To provide urban services to as many households as possible.

It proposed four level of urban groups to establish spatial hierarchies for "popular neighborhoods" in Colombia. The urban structure embraced private, public and community areas (INURBE, 1996). **The spatial hierarchies are:**

- **Plot:** housing area, that has a range of dimensions inside the alternatives of group of houses.
- **Super plot or group of houses (cluster):** the research introduced the urban concept of group of houses. A super plot has a maximum of 50 houses.

[2] **La Caja de Vivienda Popular de Bogotá (1942-1991):** it was one of the main decentralized housing state institutions. It was responsible, in a district level, of implementing housing actions planned by the municipality of Bogotá. It focuses on providing housing solutions for low-income people, however, it also carried out projects for middle-income people.

- **Block:** group of super plots between 50 and 100 houses. They could be surrounded by vehicular roads and pedestrian paths. The block size should be always the same regardless the shape or size of plots.

- **Super Block:** space formed by four or more blocks between 200 and 400 houses, always surrounded by vehicular roads.

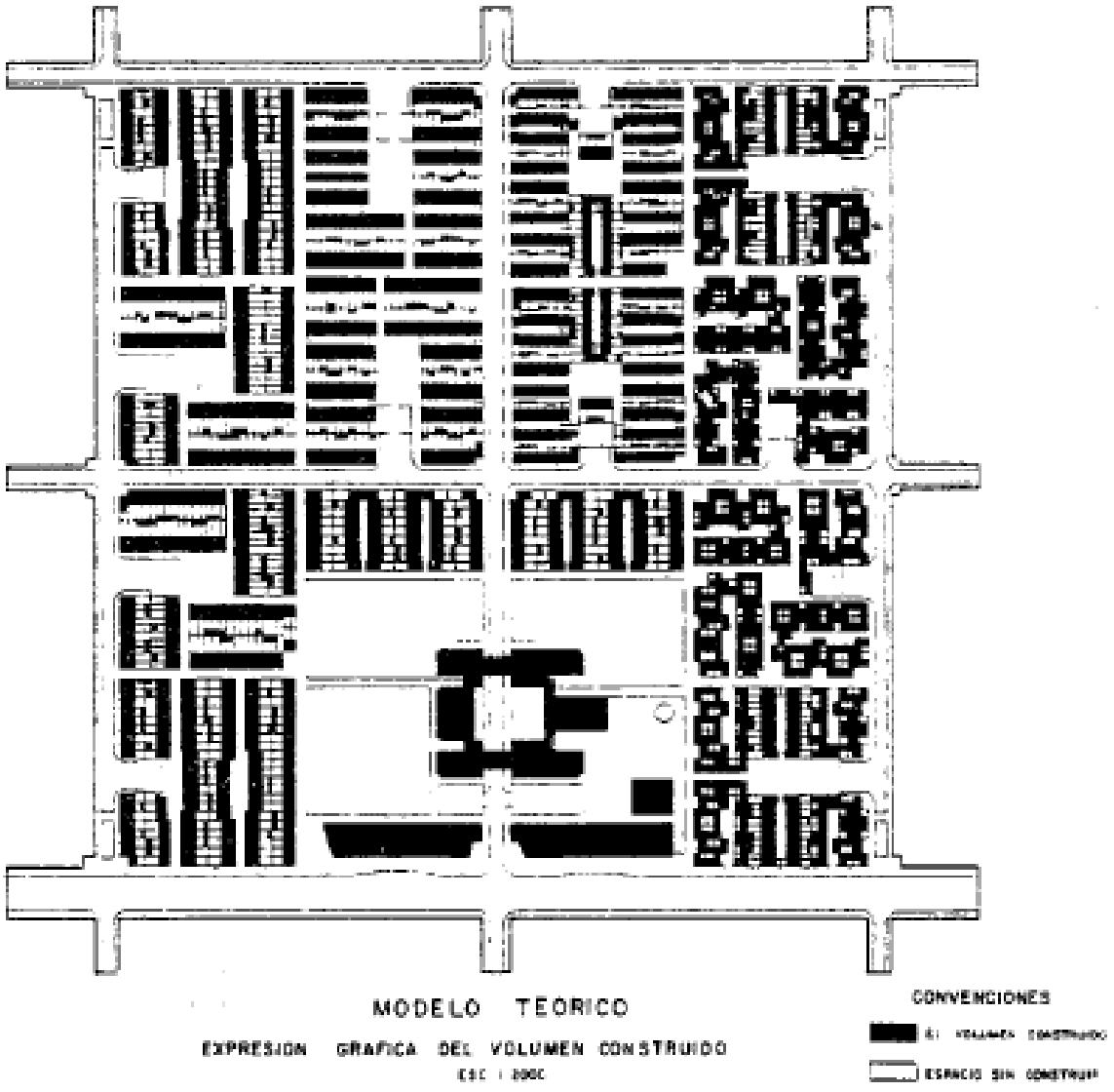


Figure 9: Theoretical Model of urban minimum regulation 1971.

Source: INURBE, 1996.

In addition, the study included an analysis of public services standards, such as: sewages, water, power, communication, pavement of roads, cost of urban roads, transit, parking areas among others (Parra and Ceballos, 1986).

In 1958, the ICT implemented the first plan of mutual assistance with the program of Aguablanca in Cali. In the following years, 90% of the ICT´s actions focused in the programs of houses of progressive development (INURBE, 1996).

Later, between 1960 and 1962, the ICT developed La Fragua, the first project of mutual assistance in Bogotá, which provided 632 houses. Each family self-built a basic starter core for another unknown family within the community, and when all families finished the construction, the ICT randomly allocated the houses. Once households moved in, the housing transformations maintaining the established housing dimensions began. On the other hand, the settlement design of the project followed the urban minimum standards previously mentioned (Figure 10) (Barrio La Fragua, 2012).

Figure 10: La Fragua: Settlement Design.

Source: Barrio La Fragua, 2012.

Nowadays, most of the families of La Fragua have set up an area of the house for operating shops. The idea of productive housing is one of the most common characteristic of low and middle-income neighborhoods in Colombia.

In 1961 the ICT, with the support of the Inter-American Development Bank, IADB, put in practice the modality of houses of progressive development of La Fragua, but in a larger scale, with the project of Ciudad Kennedy. Additionally, the ICT introduced with this project for the first time multi-family housing supply in its programs. Ciudad Kennedy experimented various modular constructions systems for building single and multi-family housing solutions. Last but not least, due to the magnitude of the project the modality of incomplete houses caused alarm in the country, and draw the attention of mass media at that time, which discussed the pros and cons of the policy (INURBE, 1996).

Figure 11: Map of Ciudad Kennedy, 1960.

Source: Instituto de Crédito Territorial, 1960.

On other hand, the district entity *La Caja de Vivienda Popular of Bogotá* also promoted projects of progressive development in the city, such as La Manuelita (1972) and Las Guacamayas (1976-1978). Both projects offered single-family solutions. The first one introduced a minimum unit of 9 m^2 in front of the plot to initiate the construction of houses. In the second one, the ICT experimented with a hexagonal urban structure (INURBE, 1996).

In 1975, the National Development Plan for developing popular neighborhoods in Bogotá introduced the housing policy Cities inside the City. This policy sought to solve the housing deficit through urban development with an integrated strategy that encompassed the reduction of socio-economic segregation of public services and housing through the provision of urbanized land and common areas with different housing prototypes of high density, and the reduction of construction costs for social housing projects (Parra and Ceballos, 1986).

Despite the efforts of the ICT and the increment of the qualitative and quantitative housing deficit, the social housing supply was reduced during the governments of López Michelsen and Turbay Ayala (1974-1978). Simultaneously, the state housing entities diminished significantly their participation in the housing market (ICT, *Banco de Crédito Hipotecario*[3], *Fondo Nacional de Ahorro*[4]), instead the private corporations of saving and housing gained control. However, they focused on housing for medium and high income groups (Restrepo, 2007).

Thereafter, in 1977 the ICT undertook the project of Ciudad Bachué. It combines single and multi-family solutions. Furthermore, it was the unique experiment of multi-story incremental housing carried out by the ICT. The project included the facility to pay the down-payment through one of the ICT financial modalities, the saving plan: "Plan Alcancía". With this plan, future beneficiaries had to save monthly a minimum average of money into an individual credit account for a term of nine months or one year. This saving plan was a financial strategy developed by the ICT for housing allocation. Additionally, preselected families received certificate

[3] ***Banco de Crédito Hipotecario:*** during the 30s and 40s the main financial source of social housing was the Banco Central Hipotecario. This public bank created new housing credit facilities and innovated introducing modern architecture concepts of community life with the construction of multi-family housing for working class, particularly middle-income groups (Restrepo, 2007).

[4] ***Fondo Nacional de Ahorro:*** it captured the annual severances of public employees to finance affordable houses (INURBE, 1996, p.42).

demonstrating they were beneficiaries of a social housing program of the ICT, which facilitated the use of their severances for housing investment[5] (Instituto de Crédito Territorial, 1979).

Between 1980 and 1981 the urban housing deficit was 1,242,000 houses according to the National Statistical Institute of Colombia, DANE. A third part of this deficit (approx. 200,000 houses) corresponded to low-income families with one minimum salary of that time (INURBE, 1996).

Año	Déficit	Unidades ICT	Préstamos BCH
70	539.944	11.404	23.146
71	586.082	13.997	27.217
72	637.465	20.190	19.717
73	693.239	23.887	14.161
74	753.779	18.926	3.676
75	819.492	20.926	-
76	890.820	22.282	-
77	968.243	-	-
78	1.052.282	-	-
79	1.143.502	-	-
80	1.242.517	-	-

Figure 12: Quantitative deficit and urban housing supply (1970-1980).

BCH: Banco de Crédito Hipotecario.
Source: (INURBE, 1996).

Nevertheless, the economic crisis at the beginning of the 80s fostered again social housing supply. The industrial production, commercial activities and construction sector were significantly impacted. Many companies closed down, exports declined, and the unemployment rate increased (10-15% in biggest cities). In this context, the government of Belisario Betancourt (1982-1986) focused on housing sector to reactivate the economy (INURBE, 1996).

[5] **Severances:** it is an unemployment insurance companies pay the equivalent of one month's salary to their employees when they retire or are fired. However, employees could use this resources for building or improving their houses.

The government of Betancourt continued the incremental housing policy promoted by previous governments. However, it introduced the policy of "non-down payment" for low and middle-income people, and the ICT was the main institution in implementing this new strategy. It provided three solutions that included the financing of housing development, as follows:

- **Urbanized land with sanitary unit.**
- **Minimum house:** basic unit with a multiple space, WC and kitchen.
- **Basic house:** living/dining room, one or two bedrooms, WC and kitchen.

However, this policy contributed to the financial crisis of the ICT, and other public and private housing entities, due to the poorest beneficiaries could not pay neither the monthly installments to these institutions.

In 1991 the government enacted the Law 03, known as "Gaviria law", which created the National System of Affordable Housing, established the family housing subsidy, and reformed the ICT (INURBE, 1996)**.** Consequently, the latter was gradually liquidated, and in its place appeared the *Instituto Nacional de Reforma Urbana y Vivienda de Interés Social*, INURBE (Pérez, 2014). The liquidation of the ICT entailed an amnesty process to refinance household's debts for all of its projects. The INURBE focused on administrating family housing subsidy and providing technical assistance to municipalities, communities and housing organizations. INURBE finalized its function in 2003 (Pérez, 2014).

Despite the new legislation in 1991, the policy of sites and services continued. However, the state changed its role in regard to housing for low-income groups, from financing and building to granting family housing subsidies. Doing this, it transferred to the private sector the responsibility of designing, building and financing affordable housing.

In the case of Bogotá, in 1998 the government created the land developer institution called Metrovivienda. One of its main functions to facilitate access to serviced land: it acquires land, subdivides it into plots and provides basic infrastructure (roads, water supply, drainage, electricity, or a sewage network) and services (such as schools, health, recreation space). Afterwards, private construction companies design and build affordable housing units, which are subsidized by the

government for low-income dwellers. Nevertheless, Metrovivienda may be understood as a modern facilitator of sites and services.

To conclude, the incremental housing era in Colombia was between 1958 and 1991, when the housing policy was driven by the state, and the leader institution in introducing and promoting the construction of incomplete houses of progressive development was the ICT. Thereafter, with the legislation of 1991, when the state officially abandoned its role of financing affordable housing, and the private sector took control of the housing market, the incremental housing projects were not promoted anymore. However, there exists some institutions (e.g. land developer banks) that still endorse some modalities of sites and services, but none of them involve expandable starter units (INURBE, 1996).

SECTION III

THE SETTLEMENT OF CIUDAD BACHUÉ

III THE SETTLEMENT OF CIUDAD BACHUÉ

Ciudad Bachué is a project developed by ICT that includes single-family and multi-family incremental housing. Due to its combination of housing options it was a vanguard project on the 1980s. For example, it was then internationally recognized in a symposium in Brazil about Integrated Housing Solutions as an important initiative for providing affordable houses.

The project began in July 1977 and it had two phases of construction. The first phase was called Ciudad Bachué I and the second phase Ciudad Bachué II. The latter was also developed in two phases, the first sector for multi-family housing and the sector B for single-family housing, which included two settlements: Barrio Villa Cristina and Las Carolinas. Originally, completion of phase I was planned at the end of 1978; however, due to delays in construction the phase finished later. According to households, the first group of houses of Ciudad Bachué I was handed over to the beneficiaries in 1980, and the second phase Ciudad Bachué II between 1983 and 1984.

Today, the project provides 7.124 housing units to 35,620 inhabitants: 4.580 houses in Ciudad Bachué I, and 2.544 houses in Ciudad Bachué II (INURBE, 2013)**.** However, originally more housing had been projected, but due to some changes in settlement plan these were not built. The targeted group of beneficiaries were poor people, but with mixed family incomes between (50 and 250USD/monthly) (Calderón, 1978).

III.1 Location

Ciudad Bachué is located in the North-West of Bogotá, in the municipality of Engativá. The location of the project followed recommendations from earlier research that proposed to boost the growth of city towards the west to counterbalance the expansion in the North (Bahamón, 1978).

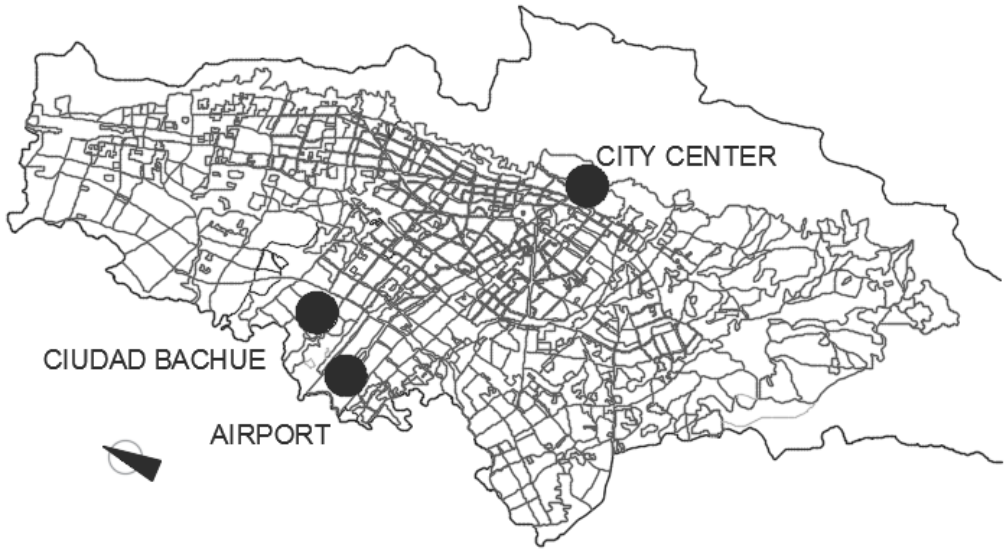


Figure 13: Location of Ciudad Bachué.

Source: author's illustration.

The connectivity of Ciudad Bachué has evolved from a peripheral to a central location of Bogotá. Located 17, 9 km from the actual city center, in 1977 the project was on the periphery and buses and taxis connected people to the networks of the city. Due to the city growth, Ciudad Bachué is today close to important avenues of the city such as Ave. Medellín, Calle 80 and Ave. Cali. Additionally, due to the development of the BRT system, the settlement became part of the city: in 2000 the first terminal of the Transmilenio (BRT), called Portal 80, was inaugurated at the corner of Ciudad Bachué. Besides the BRT, many feeder buses route through the site. Recently, more routes have been added incorporating buses from the Integrated System of Public Transport (SITP). Lastly, the Ave. Longitudinal del Occidente (ALO), proposed 65 years ago, would cross the city from the North to the South and touch Ciudad Bachué tangentially. With Enrique Peñalosa's election as the Mayor of Bogotá (2016-2019), the intention to begin the construction of ALO is again on the table. The elected mayor pointed out that the ALO will have a BRT line and integrate with a future subway station (HSB Noticias, 2015). In sum, the settlement might be soon even more connected to the city networks.

However, the construction of the ALO would probably have adverse environmental consequences and Ciudad Bachué would lose a large green space. Today the land planned for the ALO is used for households as a recreation area. The land has some football grounds and it has many walking paths for reaching the Portal 80 BRT station.

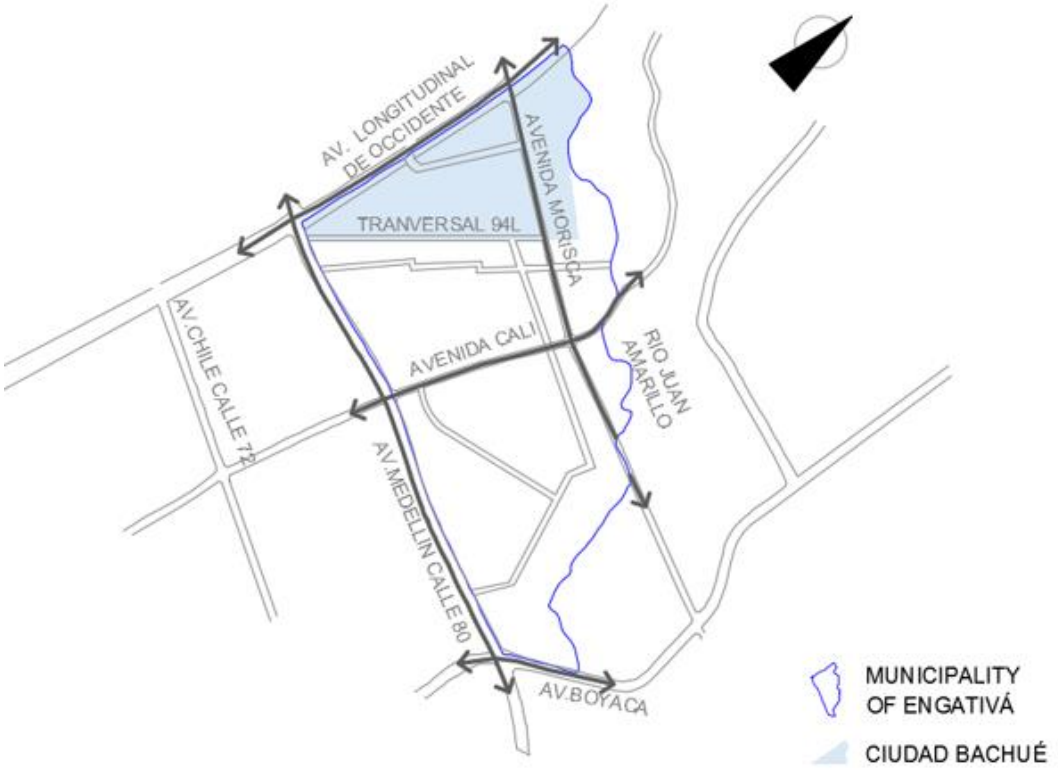


Figure 14: Location of Ciudad Bachué in Engativá and nearby arterial roads.

Source: author's illustration.

Additionally, since 1979 when initiated the stratification system (from 1 to 6) for residential areas in Colombia, the settlement entered into the category 2. The status 1 and 2 cover the poorer settlements; 3 and 4 apply for medium and low-income and medium and medium income people, and 5 and 6 correspond to residential areas of high-income people. The lower the number is, the lower are the fees payable for public services (such as water and sanitation, power and education).

III.2 Settlement plan

Originally, Ciudad Bachué's highly ambitious development plan included a large central space with major public amenities, which was not completed for unknown reasons. The central space ought to accommodate inter alias a civil square, a city hall office and areas for commercial activities. Other remarkable services and infrastructures that included the first urban plan were: theater, church, parks, and mass transport system. Instead of the central space, ICT built another social housing project called Bochica. As a result, today Sector I of Bochica divides the site of Ciudad Bachué into two larger zones, breaking the physical continuity of the settlement.

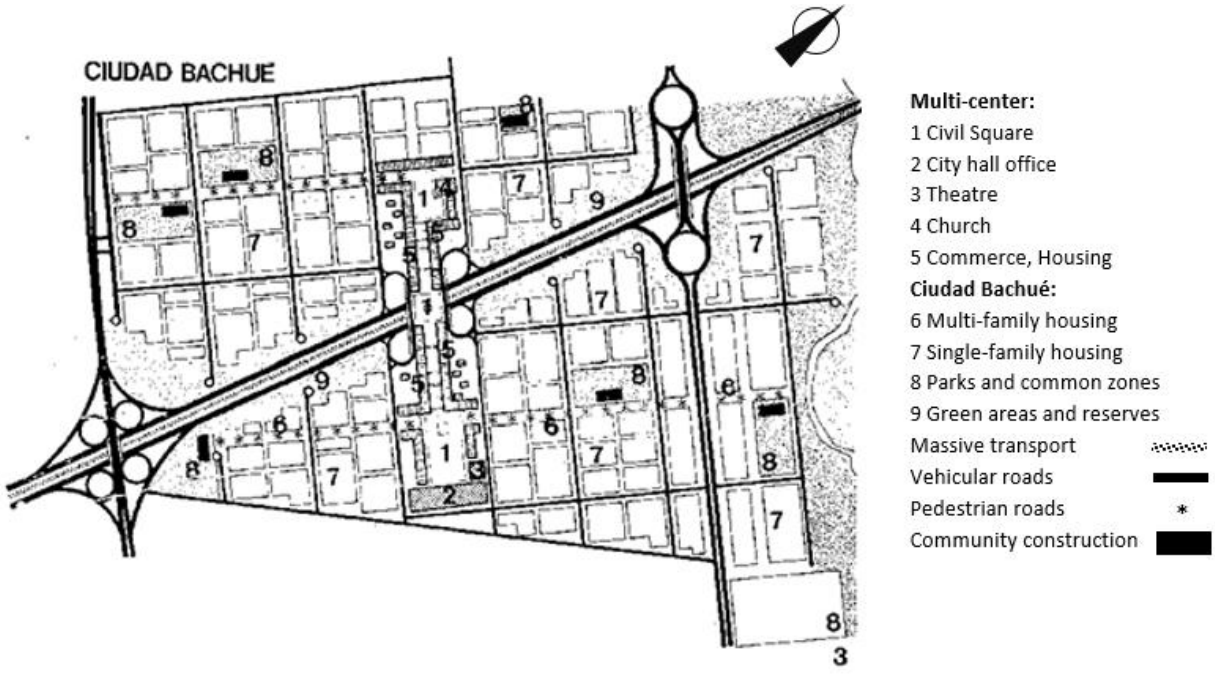


Figure 15: Master General Urban Plan for Ciudad Bachué.

Source: Calderón, 1978.

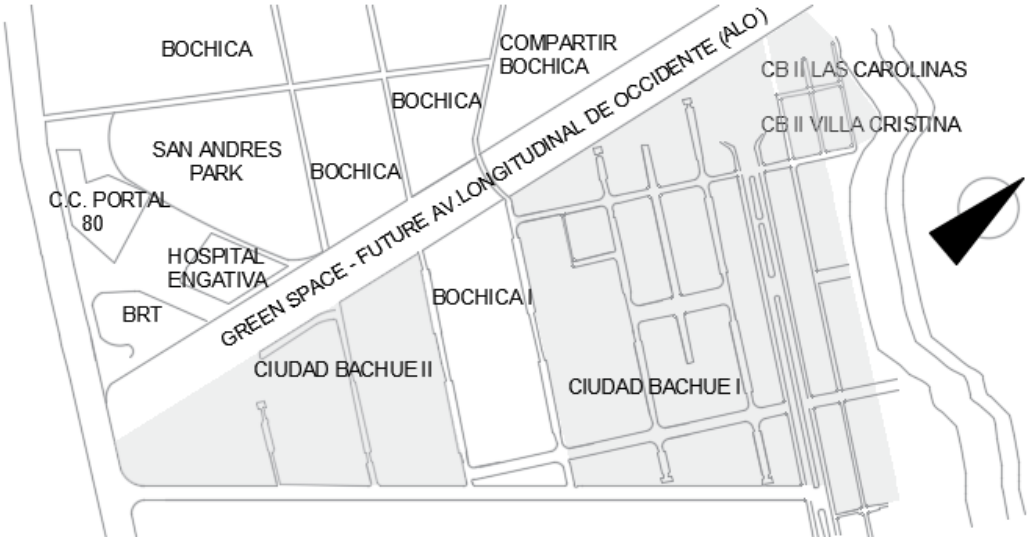


Figure 16: Urban Plan of Ciudad Bachué 2015.

Source: author's illustration.

Urban Plan #55 represents the general plan for the first years of the projects. This settlement map was updated by multiple revisions in several years, but it does not show the full implementation of the project. Indeed, the current settlement map elaborated for this research (Figure 18) shows the most important difference between the Urban Plan 55 and the existing situation. Firstly, this illustrates some parks and a sanctuary located in lands initially planned for housing clusters. Secondly, a land planned for a sub-power station that today is a parking area for the BRT system. However, it is important to note that this station operated for many years, but with the reforms of the ICT it was dismantled. Later, in 2009 this land was sold to Transmilenio. Finally, it shows a commercial area settled in land initial planned for a National University.

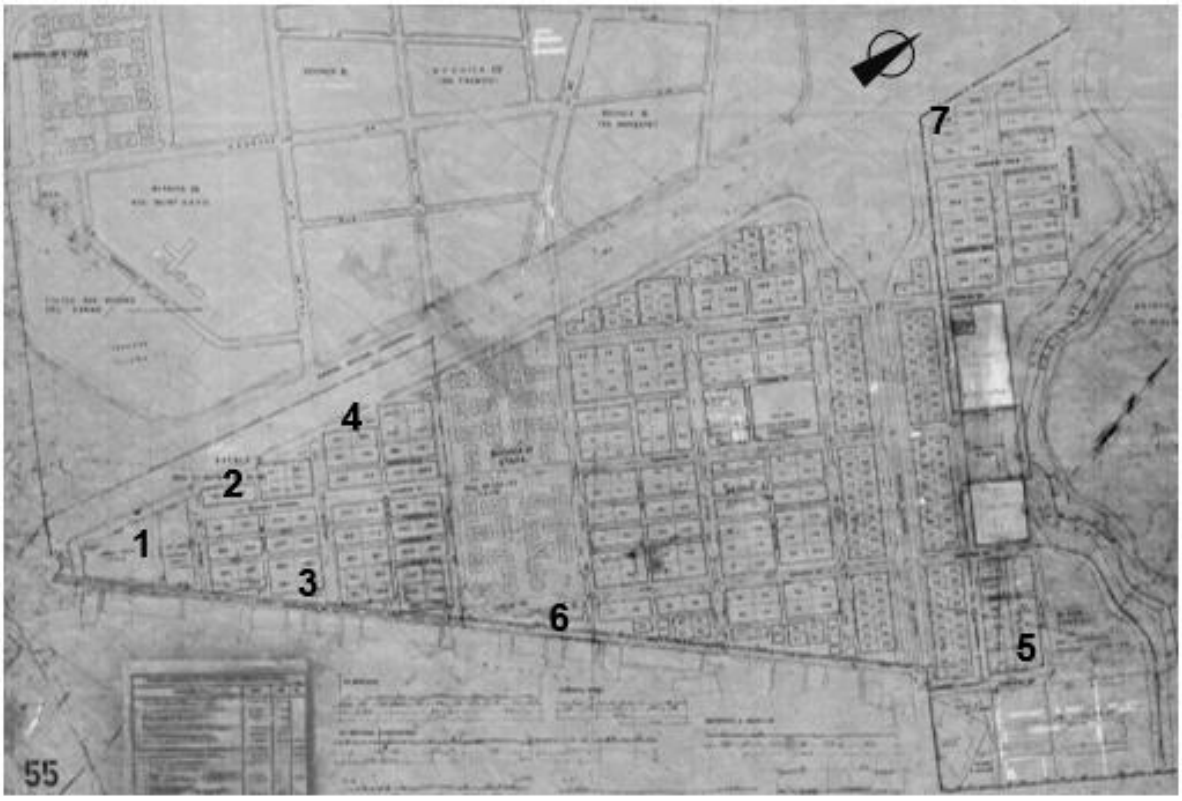


Figure 17: Urban Plan 55 of Ciudad Bachué and Bochica.

Source: Instituto de Crédito Territorial, 1980.

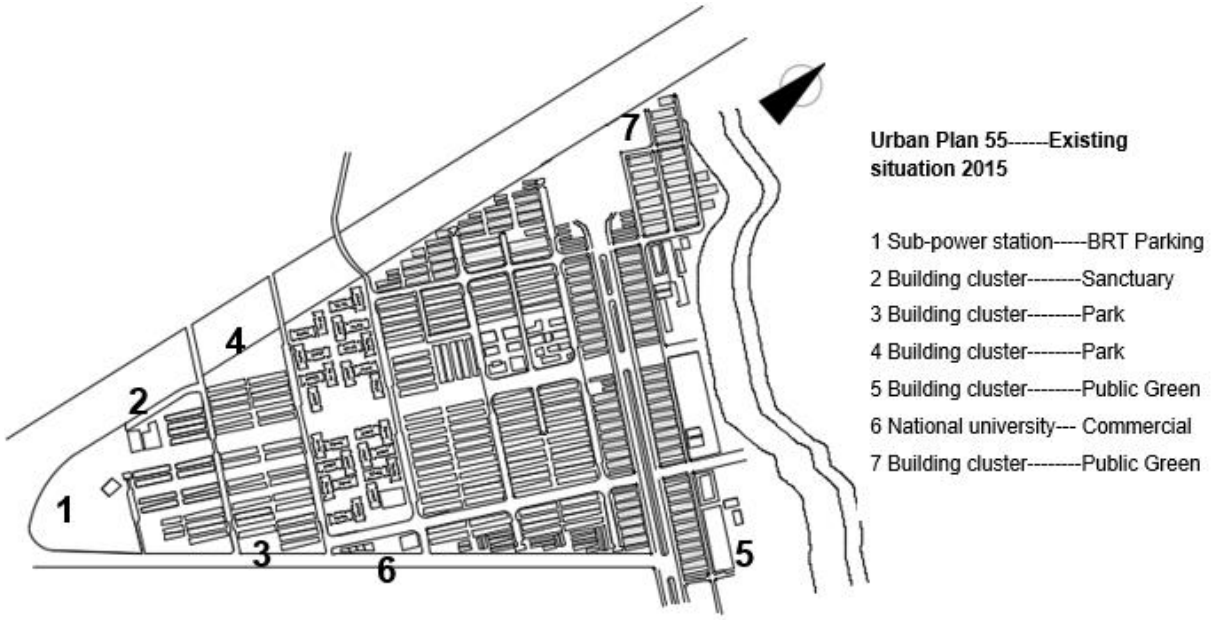


Figure 18: Settlement Map 2015.

Source: author's illustration.

III.3 Open spaces

The settlement has many open spaces such as recreation areas, football grounds, gardens, and parks. Moreover, it has a green belt and a natural reserve close to the River Juan Amarillo. It has a central garden (number 1 in the map below) that goes along all Ciudad Bachué II and part of Ciudad Bachué I. Additionally, the biggest place for recreation in the settlement is located in Ciudad Bachué I close to the church and the community rooms (number 3 on the map). Lastly, the settlement benefits from the tangential green area for the Ave. ALO.

Figure 19: Open Spaces.

Source: author's illustration.

III.4 Facilities and services

It important to note that the establishment of facilities and services in the project has involved many stakeholders such as public institutions through agreements and bailments with the ICT, the private sector, and the community of Ciudad Bachué. The settlement entails roughly 37,000 m^2 for education, 8,000 m^2 for gardens, 8,000 m^2 for community centers, 1,960 m^2 for health center and recreation areas for 100,000 inhabitants. In addition, it has 10,000 m^2 for a sub power station (Parra and Ceballos, 1986).

In order to build the facilities the ICT had some agreements with different public institutions. For educational facilities, the *Instituto Colombiano de Bienestar Familiar* (ICBF initial in Spanish) built two kinder gardens, one in Ciudad Bachué I (1985) and another one in Villa Cristina. Likewise, the municipality installed the Technical Institute Laureano Gómez in the 90s. Concerning health services, the Hospital of Engativá inaugurated a health center for primary care in Ciudad Bachué I in 1989.

In other cases, some lands and places of the project were given as a loan for a determined period of time. For instance, a land for the Dentist Centre Club Los Leones Antonio Nariño and the community rooms for FAMI, a pregnant women association linked with the ICBF. Initially, a police station was established on the community rooms, but nowadays there is a Center of Immediate Attention close by these community rooms.

Furthermore, over the last years, private institutions and households have built some educational centers, such as the Instituto Tomás Iriarte (a large campus) and the kinder garden Antonio Arboleda (located in a housing cluster). Likewise, the community have contributed building the church for Ciudad Bachué and a sanctuary in Bochica in 1982, and more recently a chapel in Ciudad Bachué II (Barrio Villa Cristina).

Three non-profit community associations focus on facilitating community life in the settlement, including the intermediation among neighbors for the resolution of conflicts. These associations are formed and led by neighbors of Ciudad Bachué. They carry out social programs for the community related to health, recreation, sports and the environment. Also, they have the mission to develop capacity building for community leaders and foster political culture. To finance their activities, they rent out at community facility: a place proper to hold events and meetings. Additionally, there is also one special committee for monitoring the progressive developments of the settlement.

It is also important to say that the multi-story housing community has managed differently the appearance of interior yards, in accordance with their preferences, money and needs.

In sum, despite the original master plan for Ciudad Bachué was not implemented, the settlement, with the participation of public and private institutions and the community, has developed several facilities and services that contribute with the relative self-sufficiency of the neighborhood.

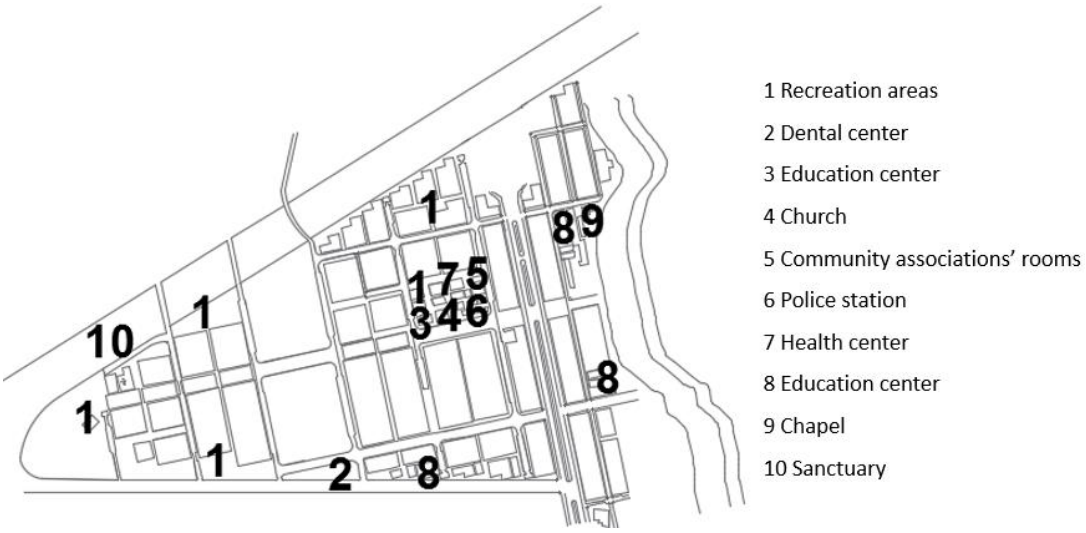


Figure 20: Facilities of Ciudad Bachué.

Source: author's illustration.

III.5 Street pattern and mobility

Ciudad Bachué has a triangular shape. It is surrounded by the future Ave. ALO, the Ave. Transversal 94L and the natural reserve of the river Juan Amarillo. Eight parallel vehicular roads cross the site from the west to the east, and two main vehicular roads connect it from the north to the south. Furthermore, **the settlement is very walkable due to a wide pedestrian network among parallel housing prototypes. A main pedestrian axis that connects the settlement from the north to the south.** In contrast to Bochica, Ciudad Bachué is not enclosed with fences, which ensure multiple access to the settlement.

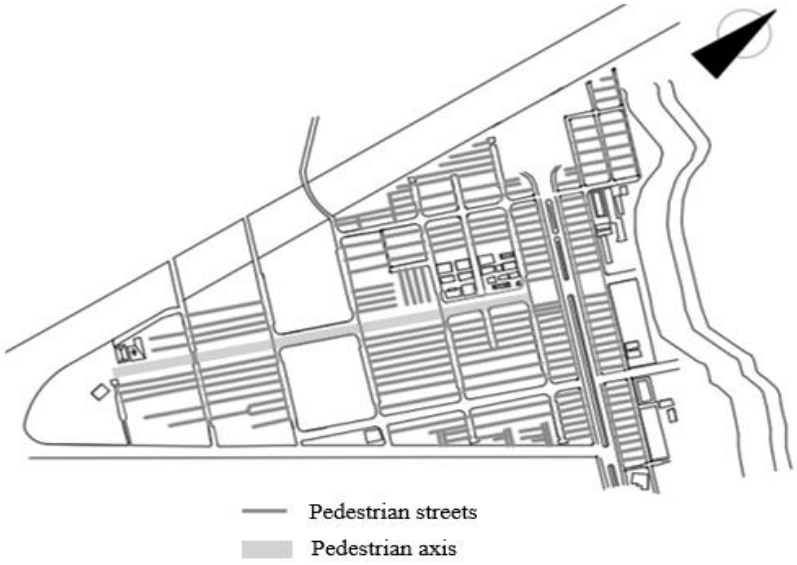


Figure 21: Vehicular and pedestrian roads of Ciudad Bachué.

Source: author's illustration.

III.6 Spatial hierarchies

From the perspective of spatial patterns, the settlement design was influenced by modern architecture concepts: it was divided in super blocks separated in super plots, which are grouped into communities.

III.6.1 Super blocks

The super blocks are areas surrounded by vehicular roads not less than 4 hectares (Parra and Ceballos, 1986). As it was explained in the previous section, a super block is a space formed by four or more blocks between 200 and 400 houses always surrounded by vehicular roads.

Figure 22: Settlement map showing the concept of Super Blocks.

Source: author's illustration.

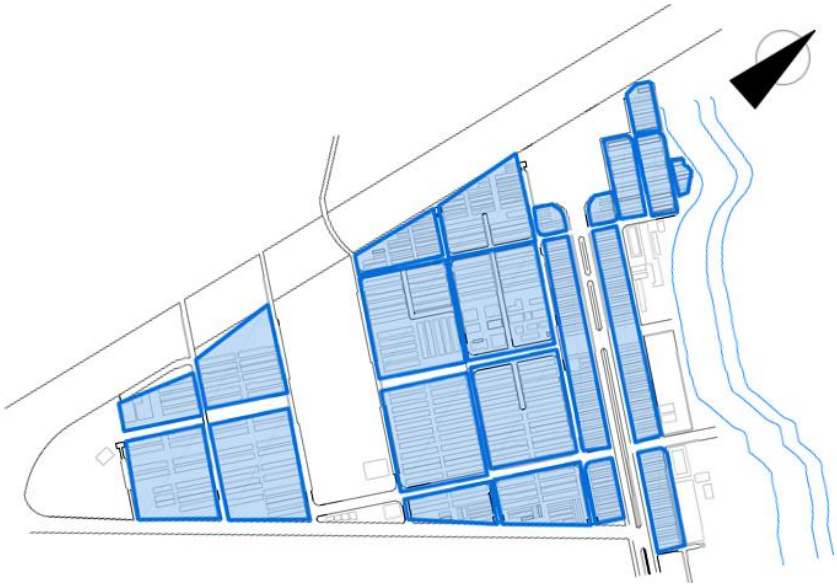


Figure 23: Settlement map showing the concept of Block.

Source: author's illustration.

III.6.2 Super plots

The super plots are areas formed by parallel group of houses or buildings no more than one hectare separated by common spaces and pedestrian paths (Parra and Ceballos, 1986).

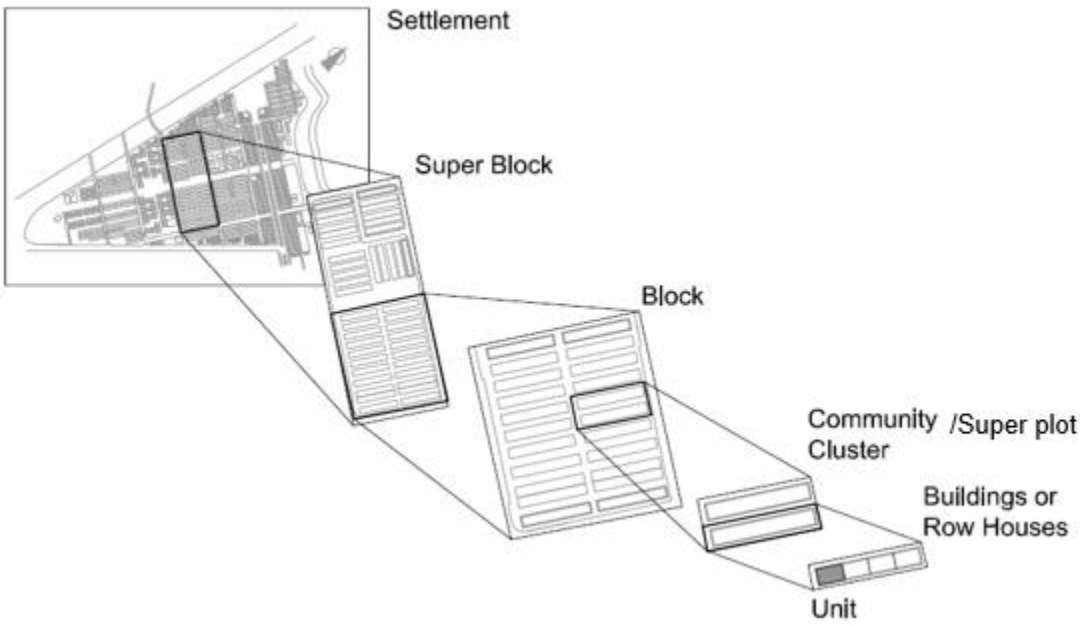


Figure 24: Spatial hierarchies of Ciudad Bachué.

Source: author's illustration.

III.6.3 Community clusters

On each super plot, row houses or multi-family apartment buildings are grouped into clusters that form a community. To do so, two row houses are grouped around a common interior yard. Alternatively, a group of two apartment buildings forms a cluster around common yard, stairs and hallways, which are all shared property.

At provision, these shared spaces were only partially finished to reduce initial cost. Consequently, dwellers collaborated during the first years of the project to complete the construction of community properties. Most of the communities of building cluster closed with gates the two accesses for improving security. Conversely, few communities of houses closed off their cluster with gates at the side access.

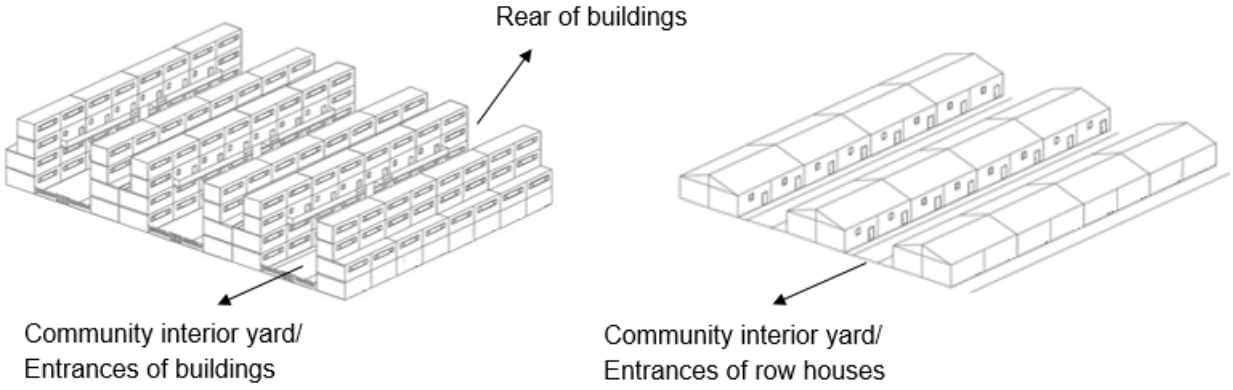


Figure 25: Drawing showing the concept of a (building or housing) cluster.

Source: author's illustration.

III.7 Land use

III.7.1 Residential

The initial cluster provision includes one or two-story houses and medium and low-rise buildings. Medium-rise buildings have four or five stories, while low-rise buildings have only three. Most of the prototypes included areas for progressive development in the rear of the apartments or on additional floors. Typically, after expansions building prototypes reach five floors, and row houses prototypes ranges from two to five floors (including a terrace).

The following initial provision of prototypes can be distinguished[6]:

- **A—row houses**
    - **A1—**located on a square plot: 1-story starter house with the option to expand on the open space for hanging clothes in the ground floor; and two additional floors and a terrace.
    - **A2—** located on a square plot: 2-stories starter house with or without a commercial unit, with the option to expand one additional floor and a terrace.
    - **A3—**located rectangular plot: 1 ½ story starter house and a back yard.

[6] **Disclaimer:** This research did not use the same official nomenclature of the *Instituto de Crédito Territorial* (despite some coincidences) for distinguishing the different starter units of the incremental housing project, Ciudad Bachué.

- **A4—** located rectangular plot: 1 ½ story starter house and a back yard; with the option to expand in the rear of the second floor; and one additional floor.
- **A5—** located rectangular plot: 1 story starter house and a back yard, with the option to expand two additional floors.

- **B through F—multi-story buildings of**
  - **B1—3-story building:** 1 duplex apartment on the first floor and an open space for clothes with the option to expand in the rear of both floors; and on the top 1 single-story apartment with the option to expand two additional floors.
  - **B2—3-story building:** 1 duplex apartment with a commercial unit with the option to expand on the rooftop of its shop; and on the top 1 single-story apartment with the option to expand two additional floors.
  - **C—4-story building:** 2 single-story apartments and on the top 1 duplex apartment with none planned expansions.
  - **D—5-story building:** 3 single-story apartments and on the top 1 duplex apartment with none planned expansions.
  - **E—3-story building:** 3 single-story apartments; with the option to expand to the rear of the second floor apartment and one additional floor for the third floor apartment.
  - **F—4-story building:** 4 single-story apartments; with the option to expand to the rear of the third floor apartment and one additional floor for the fourth floor apartment.

A detailed discussion on the different prototypes is found in the next section on starter housing and expansions.

III.7.2 Commercial

The plan of the project considered the creation of jobs opportunities, for this reason some housing prototypes include shops on the ground floors. Most of the housing with shops (or productive houses) where located in the main pedestrian and vehicular roads of the settlement (Map Figure 26). Furthermore, the inclusion of shops in the project, along with the installment of social facilities, aimed to achieve a relative self-sufficiency of services in the neighborhood (Calderón, 1978)**.** Additionally, over the years the commercial activities increased. The main

reason may be the construction of additional floor and spaces through planned and unplanned housing expansions. Also, there are cases with shops inside the interior yards of building clusters.

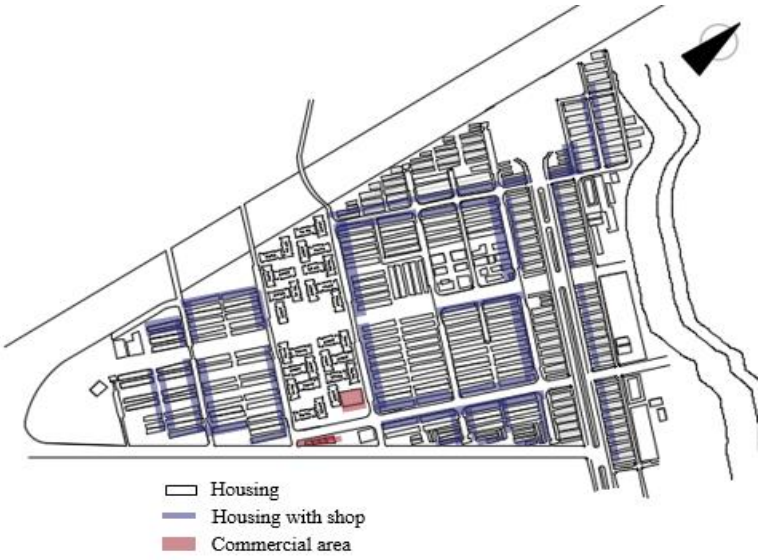


Figure 26: Land use of the Ciudad Bachué.

Source: author's illustration.

III.8 Conclusion of Settlement Level

Ciudad Bachué is a lively, walkable and high-density neighborhood. It has a relative self-sufficiency due to the productive housing evolution and its community facilities and services. **Furthermore, it is a well-connected neighborhood to the city networks and it has multiple non-fenced footpaths and vehicular access that facilitate the mobility within the community.** It has many means of transports and it surrounds by several arterial avenues of the city.

Ciudad Bachué turned from an isolated social housing project into an urban habitat:

> *"… is a node in a multiplicity of overlapping networks – physical (power, water and sanitation, roads), economic (urban transport, labor markets, distribution and retail, entertainment) and social (education, health, security, family, friends). The ability to connect to all of these networks makes a habitat valuable"*
>
> (Hausmann, 2013).

The project design for Ciudad Bachué accomplished the urban minimum standards for popular neighborhoods of progressive development in Colombia that rules the ICT and other housing institutions, between 1972 and 1990. In this sense, the project included the urban structure of four level to establish spatial hierarchies (plot, super plot or group of houses, blocks and super blocks), and it followed the guidelines on the minimum standards for sizing and designing its ten housing alternatives.

Nevertheless, the community services are not well-distributed in the settlement, because the original plan was not carried out; instead Bochica divides Ciudad Bachué into two parts. Additionally, some amenities are lacking, such as a cultural center and a library. The ideal community facilities for the settlement were included in the original ambitious master development plan of Ciudad Bachué, which comprised a large central space with major public amenities to accommodate inter alias a civil square, a city hall office, areas for commercial activities, theater, church, parks, and mass transport system.

On the other side, the commercial use is efficiently distributed as consequence of the evolution of home-based commercial units, which include: private primary schools and kindergartens, restaurants, supermarkets, bars, internet and coffee shops and repair shops.

Nowadays, the settlement is a relative safe site according to dwellers, and it has a permanent police center of immediate attention, as all neighborhoods in Bogotá. The following section will analyze how the settlement characteristics, and the gradual evolution of the neighborhood have facilitated or not housing investment in Ciudad Bachué.

SECTION IV

HOUSING DESIGN FOR PROGRESSIVE DEVELOPMENT

IV HOUSING DESIGN FOR PROGRESSIVE DEVELOPMENT

IV.1 Introduction

Modern architecture concepts of progressive housing development influenced the housing design of the settlement. For example, the multi-story housing prototypes were inspired by the Dom-Inó model, proposed by Le Corbusier in 1914. This model entails a simple structure of three stories and six columns connected by stairs that enables the use of industrial production systems (Suárez, 2008). In fact, the ICT, via competitive bidding, selected the company that proposed the most adaptable construction technology and most suitable materials for progressive development.

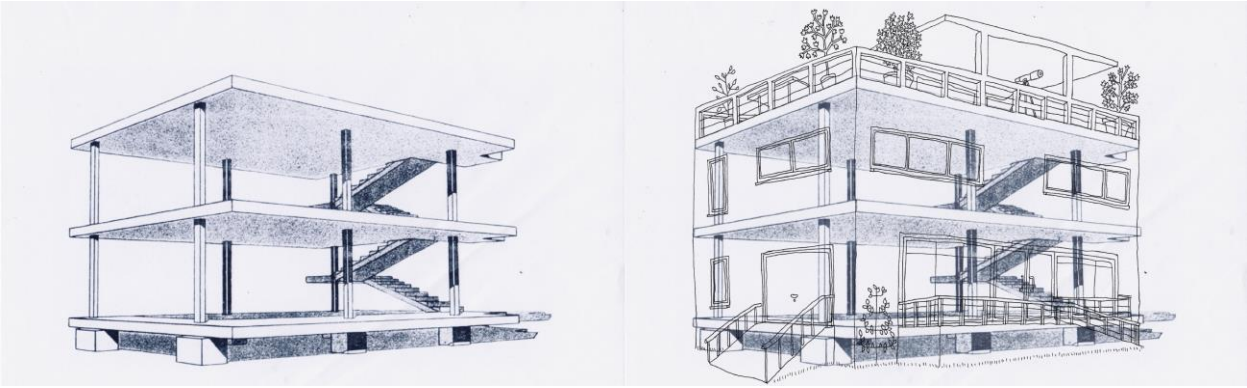


Figure 27: Example of Dom-Inó model.

Source: PEVAL, 1983.

Figure 28: Modular system of Ciudad Bachué.

Source: INURBE, 1996.

The ICT combines 10 different housing prototypes with not more than 100 m^2, from which five are single-family housing and five multi-family housing, based on two principles:

1. **Basic provision**[7]**:** multi-use space, kitchen, WC and a suitable space that ranges from one to four bedrooms.
2. **Minimum provision:** multi-use space, kitchen and WC.

The housing prototypes were distributed as shows the figure below:

[7] Some prototypes of basic provision or minimum provision included back yards.

Figure 29: Distribution of prototypes on the settlement's map of Ciudad Bachué.

Source: author's illustration.

Typically, basic provisions have planned areas for progressive development, while minimum provision always could be expanded horizontally or vertically according to prototype. Both single and multi-family housing have been expanded gradually, and with different levels of consolidation. However, in the settlement still remain few houses almost with the same initial provisions. The following subsections present the characteristics of housing prototypes with their respective progressive expansions.

IV.2 Single-family row housing

All row housing was built with modular structure of concrete panels and zinc roofs. Row houses of Ciudad Bachué I and II are on nearly squared plots (5x6.6 m); and ones of Barrios Villa Cristina and Las Carolinas are on rectangular plots on average 3x12 m (Instituto de Crédito Territorial, 1980). Single-family prototypes initially provided basic or minimum houses of one or two floors that included planned horizontal (on internal open spaces or in the rear of second floor), and vertical expansions of up to two additional floors and a terrace.

IV.2.1 Prototypes of row houses

Five different prototypes (A1 through A5) exist, as follows:

- **A—row houses**
    - **A1—**located on a square plot: 1-story starter house with the option to expand on the open space for hanging clothes in the ground floor; and two additional floors and a terrace.
    - **A2—** located on a square plot: 2-stories starter house with or without a commercial unit, with the option to expand one additional floor and a terrace.
    - **A3—**located rectangular plot: 1 ½ story starter house and a back yard.
    - **A4—** located rectangular plot: 1 ½ story starter house and a back yard; with the option to expand in the rear of the second floor; and one additional floor.
    - **A5—** located rectangular plot: 1 story starter house and a back yard, with the option to expand two additional floors.

The communities of single-family housing are formed by two rows of houses of the same prototype. Thus, A1 goes with A1, A2 with A2 and successively.

IV.2.1.1 Type A1: House prototype

Design: Initial Provision

- 1-story starter house (red, 33.33 m^2), with a minimum provision: multi-use space, kitchen, WC; and an open space for hanging clothes.

Planned Expansions:

- Vertical: two additional floors and a terrace.
- Horizontal: on the open space for hanging clothes.

Unplanned Expansions:

- Horizontal: On community streets (e.g. for front gardens or additional rooms). Houses on a corner lot expand onto adjacent public open space, too.
- Vertical: Up to one additional floor using the terrace slab.

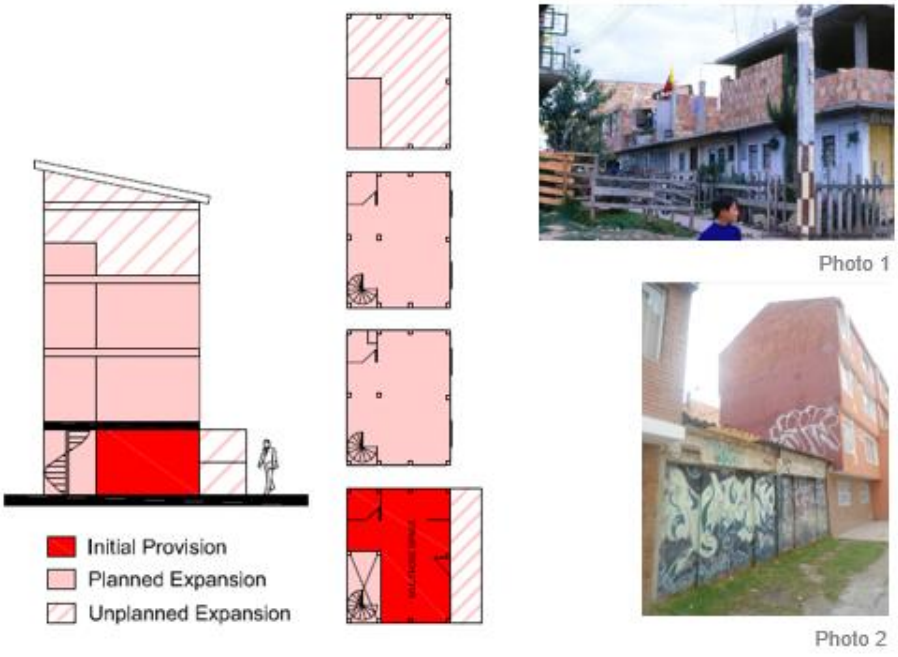


Figure 30: Type A1: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; (1): PEVAL, 1983 *and (2): author's photo.*

IV.2.1.2 Type A2: House prototype

Design: Initial Provision

- 2-stories starter house (66.66 m^2), with a basic provision: multi-use space, kitchen, WC, up to two bedrooms; and with or without a commercial unit.

Planned Expansions:

- Vertical: one additional floor and a terrace.

Unplanned Expansions:

- Horizontal: On community streets (e.g. for front gardens, back gardens or additional rooms). Houses on a corner lot expand onto adjacent public open space, too.
- Vertical: Up to one additional floor using the terrace slab.

Figure 31: Type A2: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; and (1,2): google earth's photos.

IV.2.1.3 Type A3: House prototype

Design: Initial provision

- 1 ½ stories starter house (52.5 m^2) with a basic provision: multi-use space, kitchen, WC, one bedroom; and a back yard of 13.1 m^2.

Unplanned Expansions:

- Horizontal: on the ground floor using the open internal backyard. In the rear of the second floor on top of kitchen, WC and internal back yard.
- Vertical: in average two additional floors.

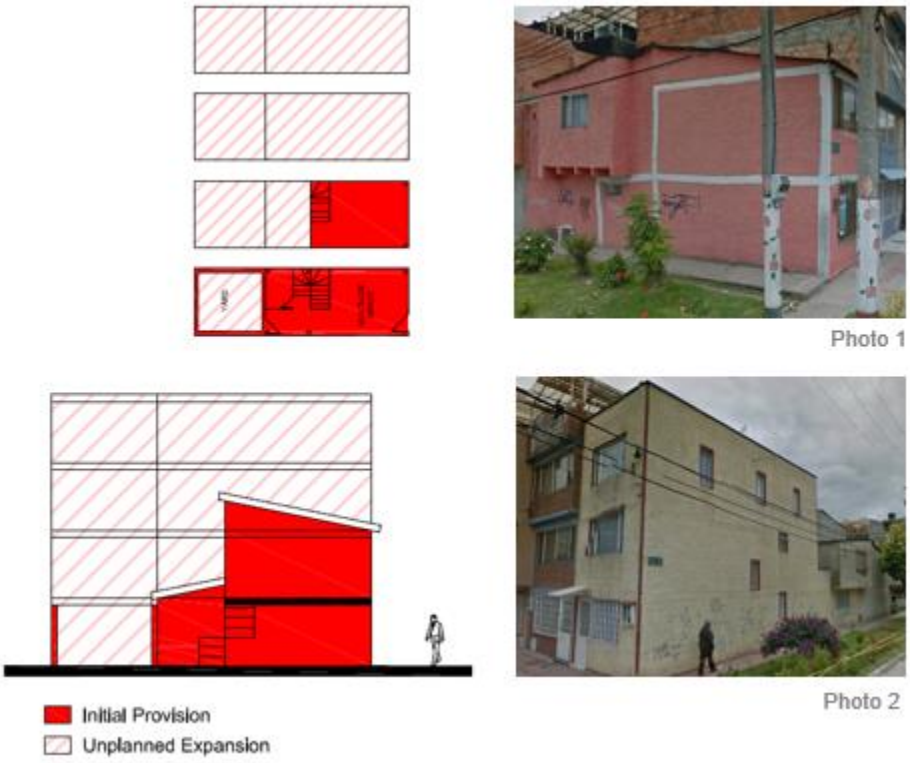


Figure 32: Type A3: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; and (1,2): google earth's photos, 2015.

IV.2.1.4 Type A4: House prototype

Design: Initial provision

- 1 ½ stories starter house (54 m^2) with a basic provision: multi-use space, kitchen, WC and one bedroom; and a back yard of 9 m^2.

Planned Expansions:

- Horizontal: in the rear of the second floor, on top of the kitchen on the ground floor.
- Vertical: one additional floor.

Unplanned Expansions:

- Horizontal: on the ground floor using the open internal backyard; and in the rear of second floor on top of kitchen, WC and internal back yard.
- Vertical: in average one additional floor.

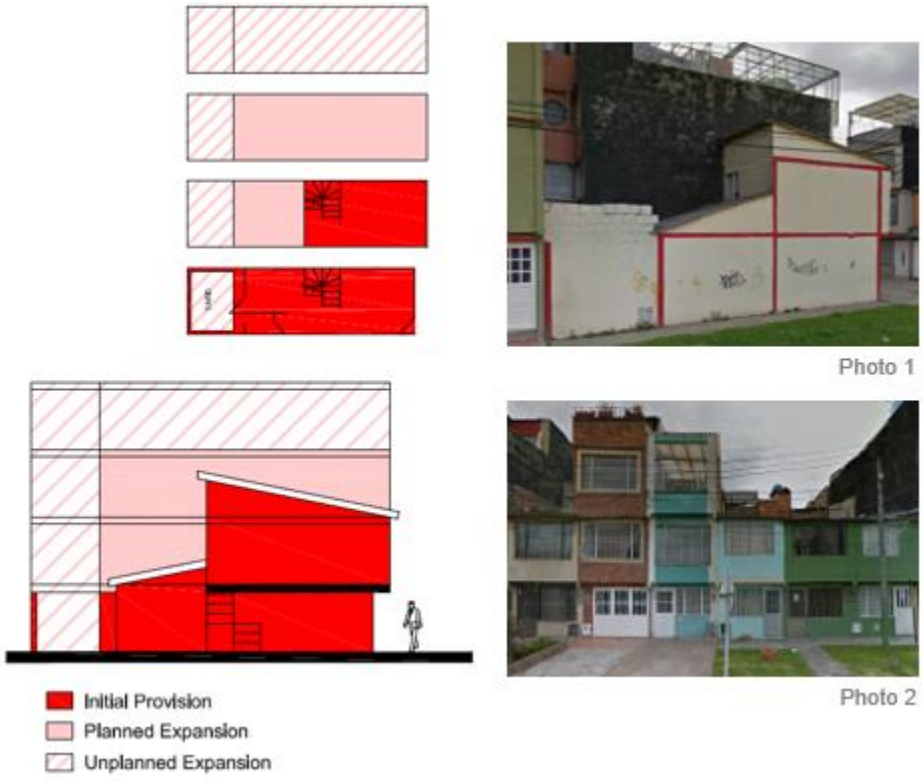


Figure 33: Type A4: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; and (1,2): google earth's photos, 2015.

IV.2.1.5 Type A5: House prototype

Initial provision:

- 1 story starter house (30 m^2) with a minimum provision: multi-use, kitchen and WC; and a back yard of 6 m^2.

Planned Expansions:

- Vertical: two additional floors.

Unplanned Expansions:

- Horizontal: on the ground floor using the open internal backyard; and in the rear of second and third floors on top of the backyard.
- Vertical: in average one additional floor.

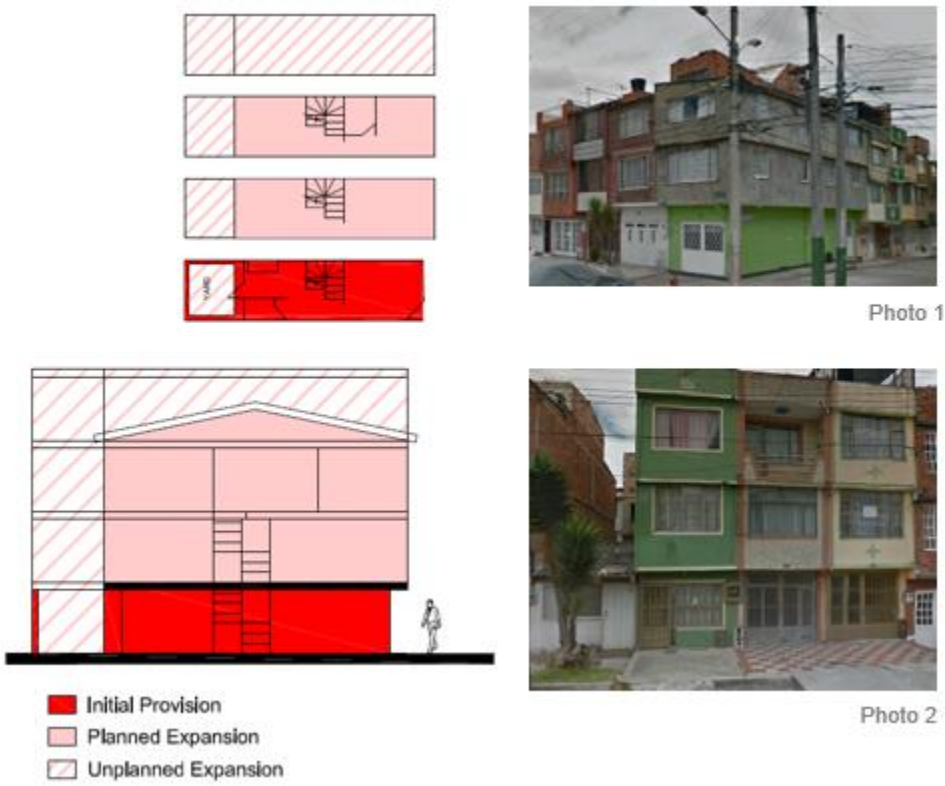


Figure 34: Type A5: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; and (1,2): google earth's photos, 2015.

In sum, the smallest starter options were the types A1 and A5 (33.33 m^2 and 30 m^2). The remaining prototypes A2-A4 ranged from 63 m^2 to 66.66 m^2, and the only solution that did not include a yard or an open space for hanging clothes was the type A2.

IV.2.2 Unplanned expansions of row houses

As it was described for each prototype, in addition to the planned expansions, row houses have experienced unplanned extensions.

The most common unplanned expansions for the prototypes A1 and A2 are:

- **Horizontal:**
    - Expansion of houses on community streets (e.g. for front and back gardens, or additional rooms).
    - Houses on a corner lot expand ground floor area onto adjacent public open space.
    - Houses expanded the second and upper floor's area pushing out each one a bit horizontally from the wall of the lower floor (e.g. 30 and 60 cm).
- **Vertical:** Up to one additional floor using the terrace slab.

In the case of A3, A4 and A5, the most common unplanned expansions are:

- **Horizontal:**
    - Expansion of houses on the ground floor using the open internal backyard.
    - In the rear of the second and third floors.
- **Vertical:**
    - In average up to two additional floors.

In sum, the unplanned expansions of prototypes A1-A2 are using community and open spaces, however, houses from A3 to A5 only built unplanned expansions inside their properties.

Figure 35: Row houses A1 and A2: Unplanned expansions of houses on community streets

Source: author's photo, 2015.

Figure 36: Row houses A1-A2: To the left: unplanned expansion onto adjacent public open space. To the right: expansion of second and upper floor's area pushing out each from the wall of lower floor

Source: author's, 2015.

Figure 37: Row houses A1-A2: Unplanned expansions for additional rooms using the community street

Source: author's, 2015.

IV.3 Multi-family housing

Multi-family housing predominates in the settlement. These prototypes consist of one-story apartments and duplex apartments, with or without provisions for progressive expansions. The apartments' size ranged from 31 m^2 to 86 m^2. Similar to the row housing, some multi-family prototypes were built with modular systems (concrete panels), while others with conventional construction materials (white stone bricks).

IV.3.1 Prototypes of multi-family buildings

Five different prototypes (B through F) exist, as follows:

- **B through F—multi-story buildings:**
    - **B1—3-story building:** 1 duplex apartment on the first floor and an open space for clothes with the option to expand in the rear of both floors; and on the top 1 single-story apartment with the option to expand two additional floors.
    - **B2—3-story building:** 1 duplex apartment with a commercial unit with the option to expand on the rooftop of its shop; and on the top 1 single-story apartment with the option to expand two additional floors.
    - **C—4-story building:** 2 single-story apartments and on the top 1 duplex apartment with none planned expansions.
    - **D—5-story building:** 3 single-story apartments and on the top 1 duplex apartment with none planned expansions.
    - **E—3-story building:** 3 single-story apartments; with the option to expand to the rear of the second floor apartment and one additional floor for the third floor apartment.
    - **F—4-story building:** 4 single-story apartments; with the option to expand to the rear of the third floor apartment and one additional floor for the fourth floor apartment.

Planned Expansions:

In summary, typically apartments were design with planned incremental expansions as follows:

- **Horizontal:** towards the rear of the apartments on the second and third floors, leaving open a space for hanging clothes and for natural ventilation and illumination on ground floor apartments.
- **Vertical:** up to two additional floors on top of last floors apartments.

Nevertheless, two housing prototypes did not include progressive developments (C and D).

IV.3.1.1 Types B: 3-story building with or without shop

This prototype refers to two slightly different provisions:

- **Type B1:** initial prototype without shop.
- **Type B2:** initial prototype included a shop.

IV.3.1.1.1 Type B1: 3-story building without shop

Design: Initial Provision

- One duplex apartment (red, 62 m^2) on the first floor with basic provision: multi-use space, kitchen, WC, up to three bedrooms.
- On the top a one-story apartment (green, 31 m^2), with a minimum provision: multi-use space, kitchen and WC.

Planned Expansions:

- Horizontal: rear yard of the duplex apartment on both floors, leaving open a space for hanging clothes and for natural ventilation and illumination.
- Vertical: two additional floors for the one-story apartment.

Unplanned Expansions:

- Optional filling of the space left open for hanging clothes in the duplex.

Figure 38: Type B1: Initial housing provision and progressive developments.

Source: Instituto de Crédito Territorial, 1980; author's illustration; (1): PEVAL, 1983*; (2): Photo by the author.*

IV.3.1.1.2 Type B2: 3-story building with shop

Design: Initial Provision

- One duplex apartment with a commercial unit (red, 83 m^2) with ground access and basic provision: multi-use space, kitchen, up to two WC, up to four bedrooms and a shop.
- On the top a one-story apartment (green, 31 m^2) with minimum provision: multi-use space, kitchen and WC.

Planned Expansions:

- Horizontal: on top of the shop.
- Vertical: two additional floors for the one-story apartment.

Unplanned Expansions:

- Horizontal: in the rear of the shop, and on the second floor of the duplex apartment; in the rear of the first floor of the one-story apartment.

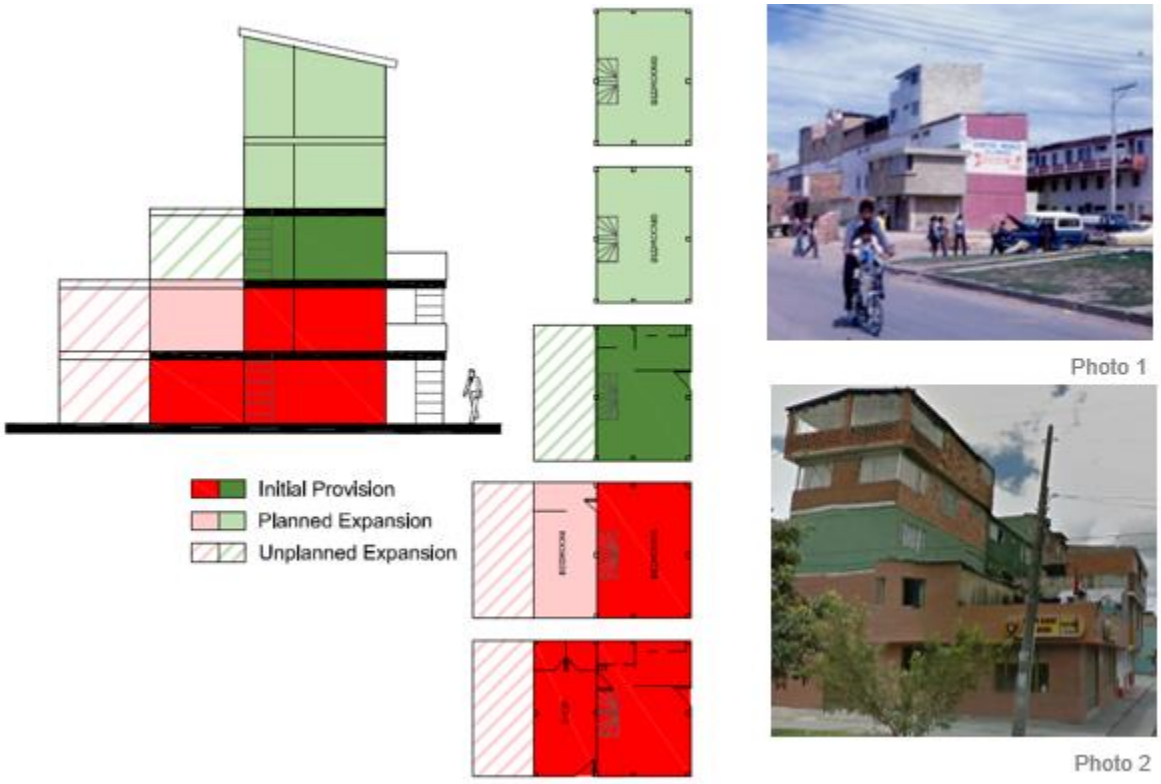


Figure 39: Type B2: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980*; author's illustration; (1):* PEVAL, 1983*; (2) google earth's photo, 2015.*

IV.3.1.2 Type C: 4-story building

Design: Initial Provision

- Two single-story apartments (red and green, 53.6 m^2 each) with basic provisions: multi-use space, kitchen, WC, up to two bedrooms.
- On the top one duplex apartment (blue, 64.5 m^2), with basic provision: multi-use space, kitchen, up to two WC, up to two bedrooms.

Planned Expansions:

- None.

Unplanned Expansions:

- Horizontal: in the rear of the single-story apartments; and the rear of both floors of the duplex apartment.

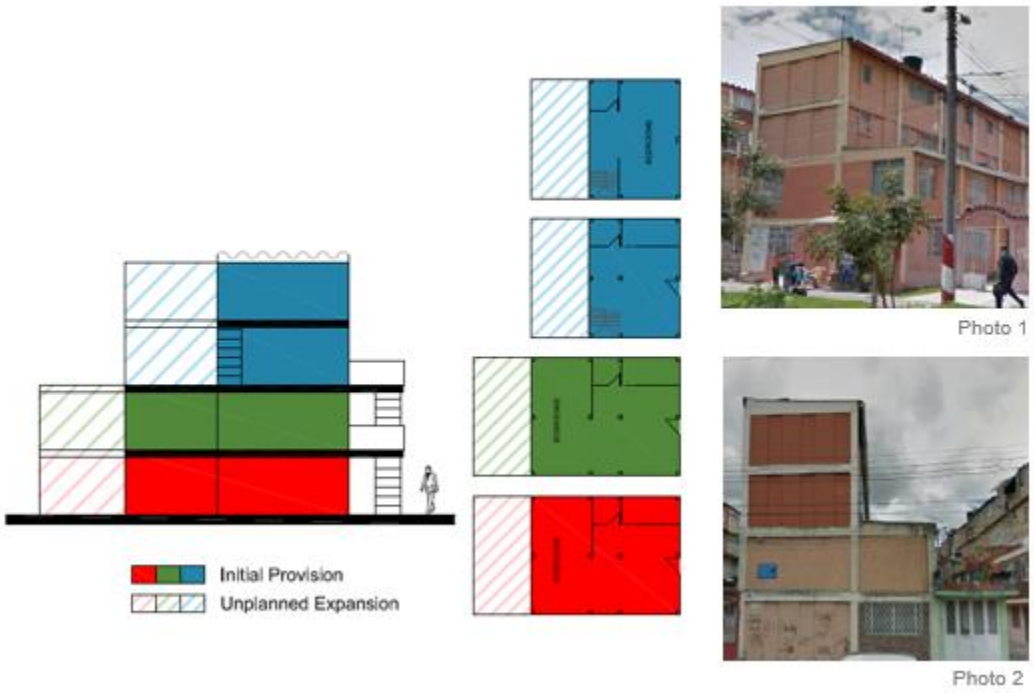


Figure 40: Type C: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; and (1, 2): google earth's photos, 2015.

IV.3.1.3 Type D: 5-story building

Design: Initial Provision

- Three single-story apartments (red, green and blue, 53.6 m^2 each) with basic provisions: multi-use space, kitchen, WC, up to two bedrooms.
- One duplex apartment (purple, 64.5 m^2) with basic provision: multi-use space, kitchen, up to two WC, up to two bedrooms.

Planned Expansions:

- None.

Unplanned Expansions:

- Horizontal: in the rear of the single-story apartments.

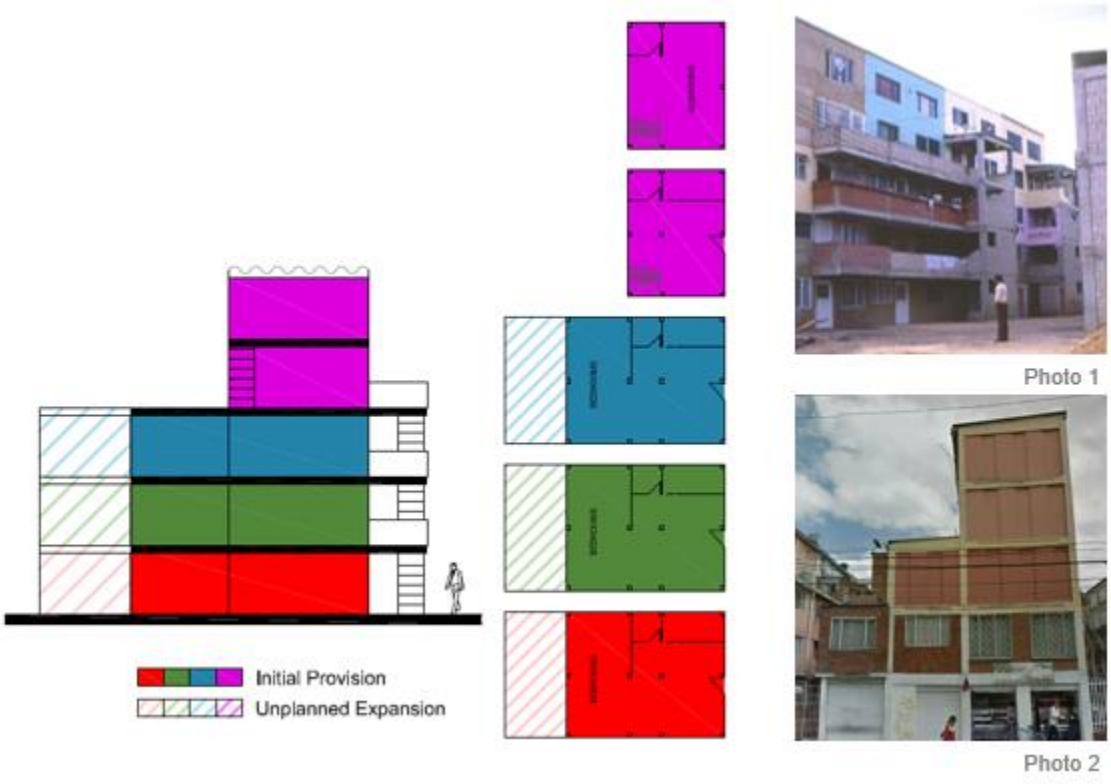


Figure 41: Type D: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; (1): PEVAL, 1983*; (2): google earth's photo, 2015.*

IV.3.1.4 Type E: 3-story building

Design: Initial Provision

- One single-story apartment (red, 53.6 m^2) with basic provision: multi-use space, kitchen, WC, up to two bedrooms.
- Two single-story apartments (green and blue, 32.25 m^2 each) with minimum provisions: multi-use space, kitchen, WC.

Planned Expansions:

- Horizontal: to the rear of the second floor apartment.
- Vertical: one additional floor for the third floor apartment.

Unplanned Expansions:

- Horizontal: in the rear of the ground- and first-floor apartments.

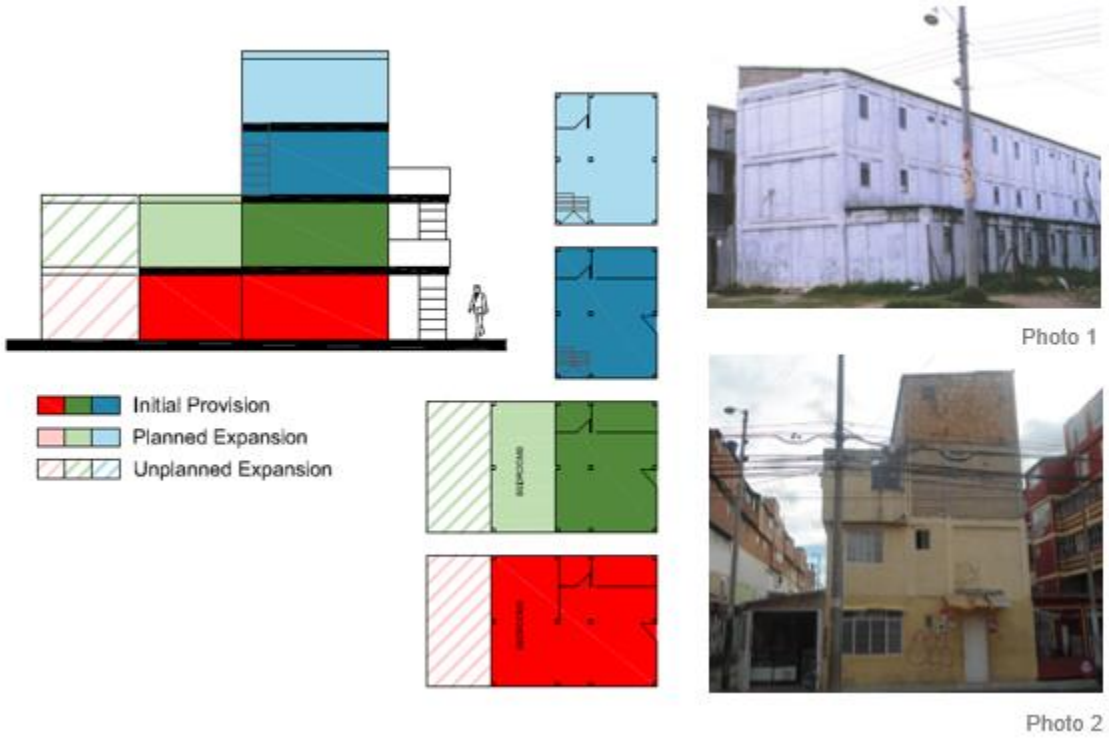


Figure 42: Type E: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; (1): PEVAL, 1983*; (2): google earth's photo, 2015.*

IV.3.1.5 Type F: 4-story building

Design: Initial Provision

- 2 single-story apartments (red and green, 53.6 m^2 each) with basic provisions: multi-use space, kitchen, WC, up to two bedrooms.
- 2 single-story apartments (blue and pink, 32.25 m^2 each) with minimum provisions: multi-use space, kitchen, WC.

Planned Expansions:

- Horizontal: to the rear of the third floor apartment.
- Vertical: one additional floor for the fourth floor apartment.

Unplanned Expansions:

- Horizontal: in the rear of the ground- and second- floor apartments.

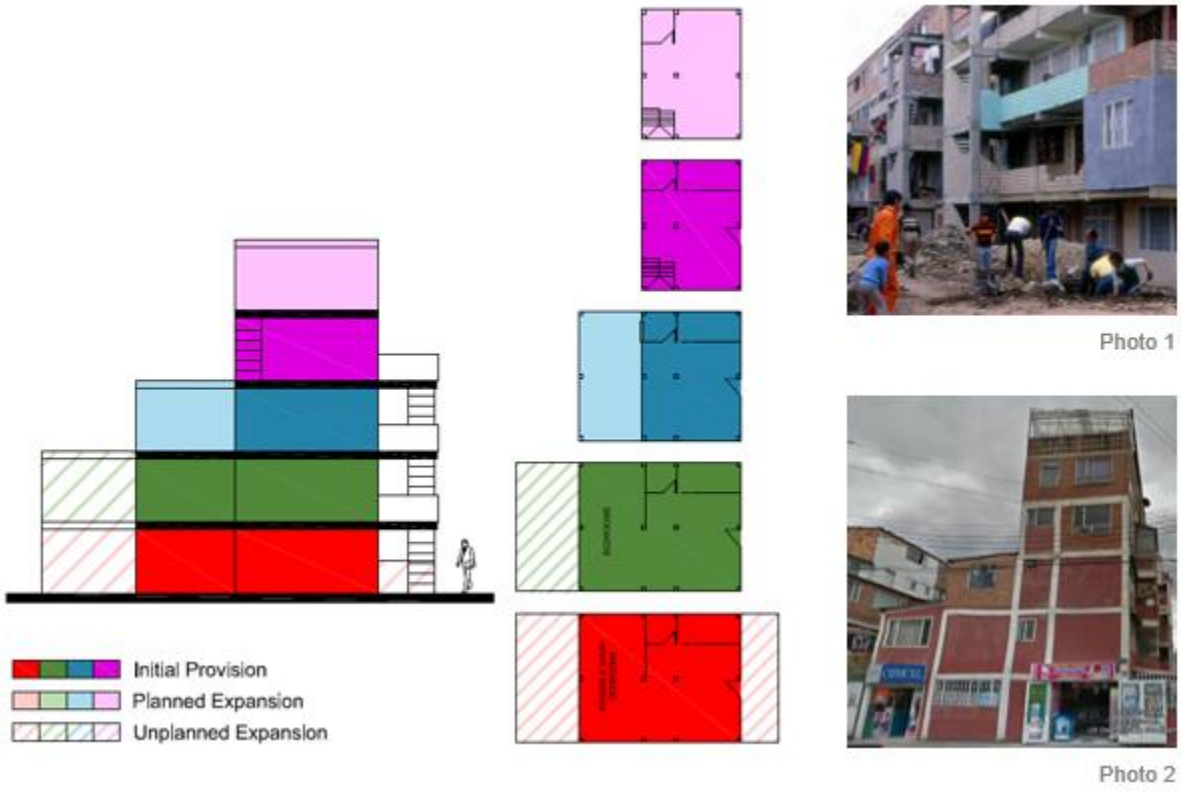


Figure 43: Type F: Initial housing provision and progressive development.

Source: Instituto de Crédito Territorial, 1980; author's illustration; (1): PEVAL, 1983*; (2): google earth's photo, 2015.*

In sum, in the settlement predominates multi-family housing solutions. Furthermore, all housing typology of starter base were ready to move in. The ICT provided basic and minimum provision with different sizes. The biggest initial provision for single-family housing was the row house A3 (79 m^2), and for the multi-family housing was the duplex of type B1 and B2 (82 m^2).

IV.3.2 Unplanned expansions in cluster or group of buildings:

Most of communities are formed by two multi-story buildings with the same or similar prototype. However, there are some communities at the end of super plots formed by a single-building.

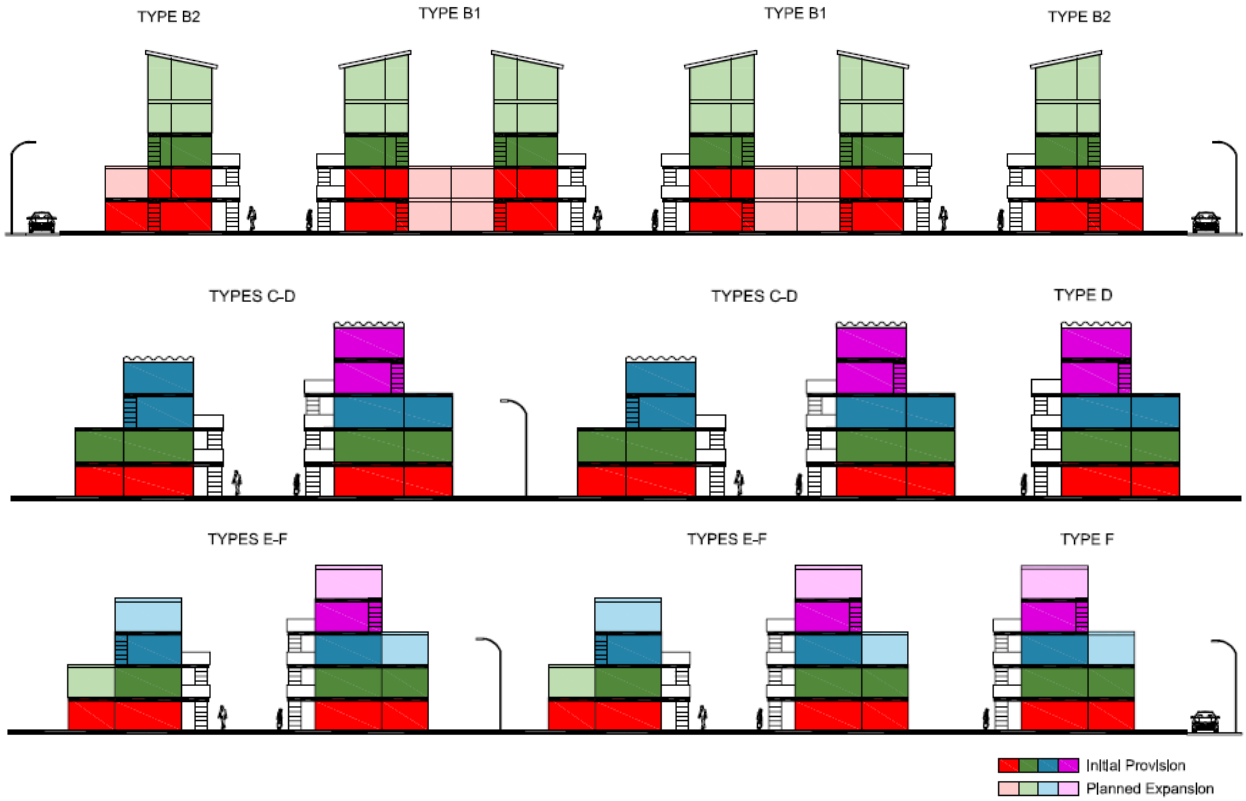
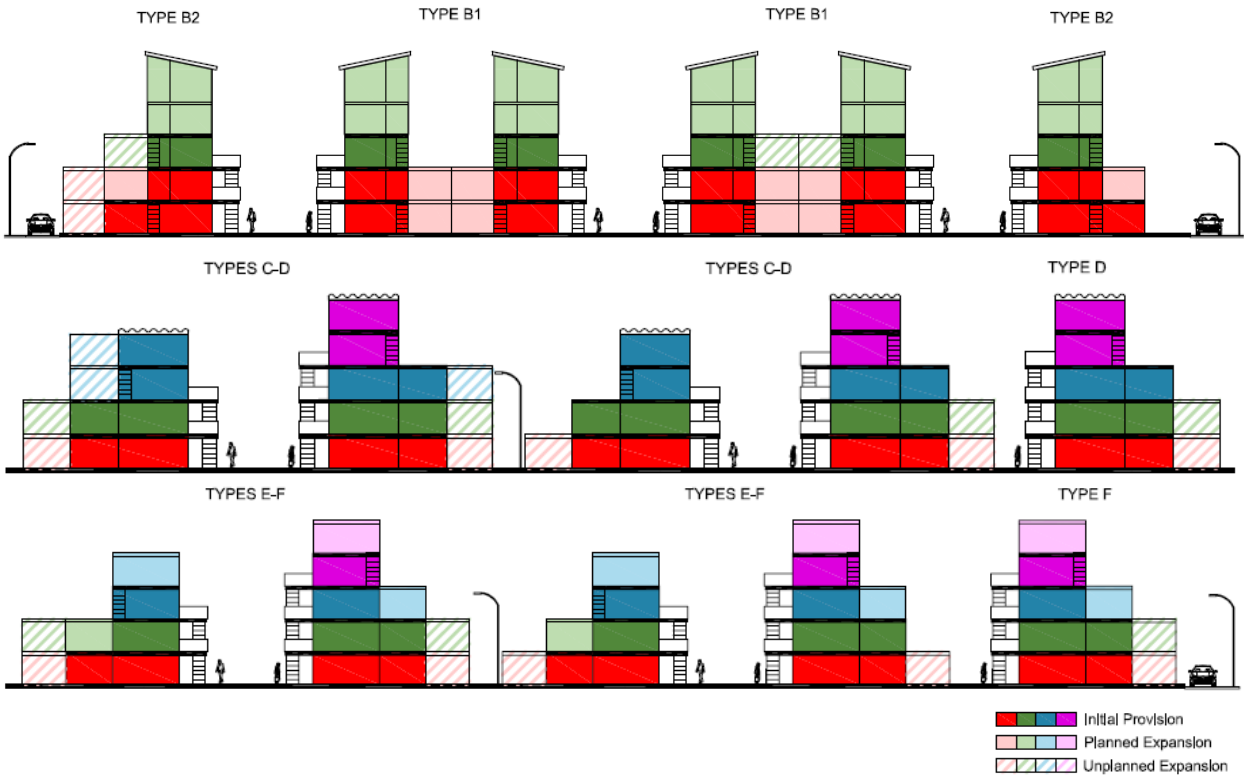


Figure 44: Group of buildings: Cross-cutting view of building clusters, including planned expansions.

Source: author's illustration.

As it was described above for each prototype, in addition to the planned areas for progressive expansions, building prototypes have experienced unplanned extensions on the rear of plots and in the rear of their apartments (including open spaces for hanging clothes) (Figure 45**).** Households of upper-floor apartments depended on the building structure of lower-floor apartments to develop unplanned expansions. Dwellers on ground-floor had to build stronger walls to carry their neighbors' extensions atop. The same is true for households of the apartments on the second, third and fourth floor.

In some cases, vertical unplanned expansions occurred one after each other, and in other cases dwellers built together and shared costs. For instance, a household of the second floor paid for a good slab to the neighbor on the first floor. Moreover, some lower-floor apartments preferred daylight, then they put low-cost roofing, on which the neighbor on top could not build.



Typically, households on the ground floors coordinated with next-door neighbors to build almost simultaneously horizontal informal expansions on public alleys.

Figure 45: Examples of building prototypes with planned and common unplanned expansions.

Source: Instituto de Crédito Territorial, 1980, and author's illustration.

The building clusters range from 48 to 96 dwellings, with 6 or 12 dwellings on the ground floor and three, four or five stories in height. The most populated housing clusters are type F and D with 96 families (approx. 550 persons), while the least populated is the type B with 48 families (approx. 275 persons). **Most clusters or group of buildings have their own manager/leader to deal with administrative expenses of the maintenance of common areas such as interior yard, gardens, stairs, hallways and gates.** In addition, they also organize meetings to keep inform the community regarding important issues.

IV.3.2.1 Public alleys and streets

Unplanned extensions of building prototypes towards the rear of plots occupied public pedestrian footpaths. In fact, a pattern for unplanned expansions on internal pedestrian alleys and streets exists in the settlement. On one hand, all households of type C, D, E and F built unplanned expansions on public alleys, where the rear of buildings face to each other as shown in Figure 46. Moreover, the prototypes E and some few cases of type B adjacent to vehicular roads built unplanned extensions on public streets.

On the other hand, none of the type B dwellers built unplanned expansions on internal pedestrian alleys, because their buildings already faced to each other with private back yards and shops as shown above in Figure 45. Additionally, it was identified only three cases of clusters of type B, where some households expanded their shops on public streets adjacent to vehicular roads.

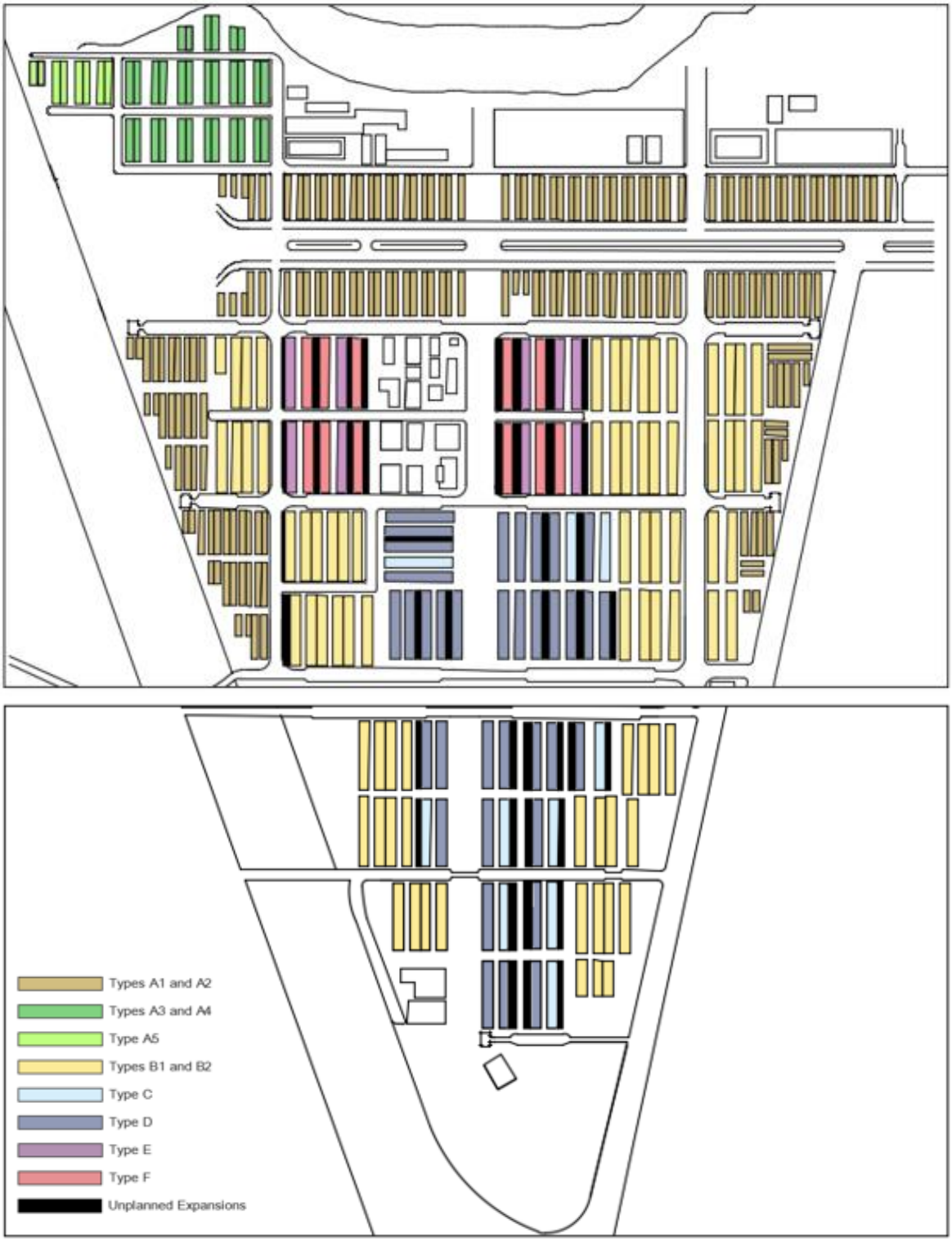


Figure 46: Settlement map with unplanned expansions on public alleys.

Source: author's illustration.

Unplanned expansions on pedestrian alleys can be recognized via small aisles with security gates installed by neighbors, which allow the access to their light posts (Figure 47). In other cases, these pedestrian alleys are partially occupied, due to inexistence of unplanned extensions on type B buildings, leaving open a narrow pedestrian pathway (Figure 48).

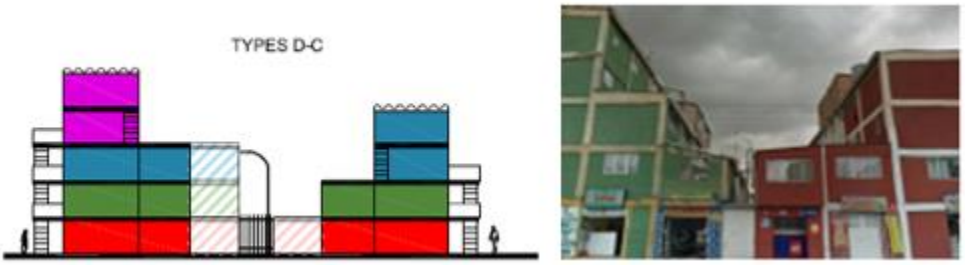


Figure 47: Example of closed public alley.

Source: author's illustration and google earth's photo, 2015.

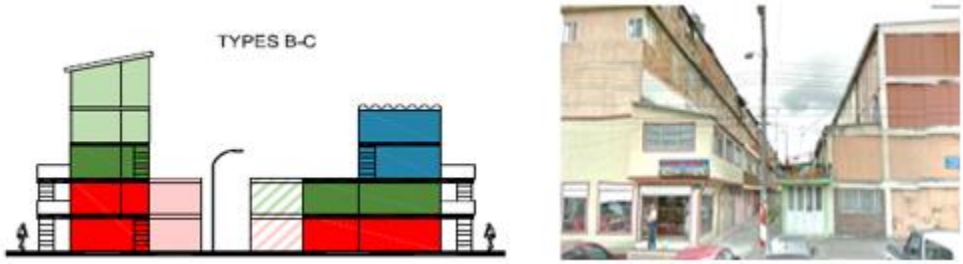


Figure 48: Example of public alley partially occupied.

Source: author's illustration and google earth's photo, 2015.

IV.3.2.2 Community property

The most common unplanned expansions on community property are located on the rooftop of staircase, at the end of hallways and in large courtyards.

- **Community stairs:** Some dwellers of last-floor apartments have expanded their houses by building on the rooftop of common staircases of building clusters (Figure 49). Some neighbors built only a terrace, and others closed the space with windows and installed a roof. This modification is common in all building clusters, except type B, where community staircase did not have rooftop (Figure 52).
- **Community hallways:** Some households of middle-floor apartments located at the end of community hallways have closed off a part of the hallway for security, but have not yet

housed it. However, other dwellers have incorporated these corners in front of their apartment into their living rooms (Figure 50).

- **Community yards:** Some households of ground floors apartments have expanded their private areas by adding too large front gardens within planned-as-common courtyards (Figure 50).

Figure 49: Examples of unplanned expansions on the community rooftop staircase.

Source: author's photo, 2015.

Figure 50: Extension on corners of community hallways.

Source: author's photo, 2015.

Multi-family housing of prototypes C, D, E and F could have two similar building façades. One with concrete walls for multiple hallways and staircases, and the other with rails for hallways and handrails for staircases (Figure 51). In the case of prototypes B, typically building façades have concrete walls for their hallways, and handrails for staircases (Figure 52). **The closed railing façade has encouraged unplanned expansions in community areas of buildings.**

Community organization can be also observed in the appearance of building façades. Recently some clusters of buildings are organizing a new phase of collective development: they have different projects to standardize and rehabilitate the appearance of buildings. For instance, they paint with the same color or construction material the façades, and reorganize the gardens of the interior yard. According to neighbors, over the last three years many communities started these initiatives, because they realized about the impact of the physical appearance has on increasing the value of their properties.

Figure 51: Examples of building façades of type D.

Source: author's photo, 2015.

Figure 52: Example of building façade of type B1.

Source: author's photo, 2015.

IV.4 Pros and cons of unplanned expansions

Unplanned expansions on community property and public alleys and streets have pros and cons for the community of Ciudad Bachué.

On the one hand, unplanned expansions increase the social welfare of the community. Firstly, households increased the space of their initial provisions. Secondly, the unplanned expansions on the rear of plot responded to safety problems on underused public alleys. And thirdly, the unplanned extensions on community property increase the use of spaces on housing clusters.

However, on the other side, unplanned expansions also have negative consequences. Firstly, from an esthetic perspective, some people think that informal expansions on community spaces created disorder and a sense of chaos (Suárez, 2008) that might impact on the values of adjacent properties. Secondly, the weight of vertical unplanned expansions might cause future problems on the building structure, as buildings were not designed accordingly. Thirdly, unplanned expansions

reduce the accessibility to housing clusters, due to the large appropriations of community streets (e.g. with front gardens or additional rooms).

Consequently, in 2008 an administrative/legal process began to recover public spaces in Ciudad Bachué. Additionally, todays neighbors face collective action problems such as that they do not want to point towards disturbing unplanned expansions, as they fear it would risk the removal of other desirable ones.

IV.5 Recovering public space in Ciudad Bachué

In 1999, a policy of clearing public spaces in Bogotá was established and the Administrative Department for the Defense of Public Space (DADEP) was created. This institution has the objective to formulate policies, plans and district programs related to the defense, supervision, regulation and recovery of public space (Alcaldía Mayor de Bogotá, 2015a) (Alcaldía Mayor de Bogotá, 2015b). It is responsible for enforcing the article 63 of the political constitution of Colombia of 1991 that states:

> *"The property for public use, natural parks, communal lands of ethnic groups, protected lands, the archaeological heritage of the Nation and other property determined by law are inalienable, imprescriptible and indefeasible"*
>
> (Perez Escobar, 1991, chap.2).

Since its establishment, DADEP, in coordination with local municipalities of Bogotá, has intensified its function of supervising informal expansions in the city that occupy public spaces, including Ciudad Bachué.

In 2008, the District Planning Secretary approved a proposal for recovering the public pedestrian streets in Ciudad Bachué, in accordance with Development Plan "Positive Bogota: To Live Better" that included within the goals of the city the recovering of 238,600 m^2 of public space (Alcaldía Mayor de Bogotá, 2008, chap. 2). In response, community associations of the settlement have requested the legalization of unplanned expansions. They argued that the design of the orientation of buildings and the large public space in the settlement encouraged unplanned progressive developments.

IV.6 Conclusion of Housing Design Level

The main findings identified from the analysis of the housing design for progressive development in Ciudad Bachué were:

1. **Households developed unplanned expansions using public streets, open spaces and community properties, such as community stairs, hallways and yards.** However, after the proposal of recovering public space by the District Planning Secretary, households have stopped their investments in unplanned expansions, due to the perception of tenure insecurity and possibility of demolition of these expansions.
2. **The location of apartments within the building determined the unplanned expansions on community property** (e.g. front gardens and housing extensions of hallways corners and rooftop of building staircase).
3. **The design of prototype B did not promote unplanned expansions in the public alleys within the settlement, neither housing extensions on staircase and hallways on buildings.**
4. **The amount and pattern of unplanned expansions of multi-story prototypes along with their similarities show a high level of collaboration among neighbors of Ciudad Bachué** that has contributed to legitimize the unplanned expansions in the settlement.
5. **Overall, the settlement layout provided excessive public and semi-private space, such as public pedestrian alleys and community streets, which were initially underused and thus encroached upon by unplanned expansions.** These expansions have increased the social welfare of the community, but also have negative effects on the community, such as legal problems of tenure security.

IV.7 CASE STUDIES OF INCREMENTAL CONSTRUCTION

This section presents selected representative interviews with families, who developed significant and common housing expansions: six cases of single-family housing and eight cases of single-family housing. Finally, the section presents the results of household interviews[8].

The initial aim of the analysis of the housing level in Ciudad Bachué was to interview at least one family of each housing typology, however the accessibility to dwellers along with the limited amount of time available in the settlement made it difficult to undertake this task. As a consequence, 14 families living in five out of the ten housing typology were interviewed. Nevertheless, the study includes all three archetypes: row houses, single-story apartments and duplexes.

For the multi-family housing eight interviews to families of the housing types B, D and F were conducted. Seven of them live in one-story apartments located in different floors of the multi-story buildings, and one lives in a duplex apartment. Concerning single-family housing, six interviews to neighbors of the housing typology A1 and A2 were accomplished. The target group was founder neighbors and heads of family with an average time of 30 years in the settlement.

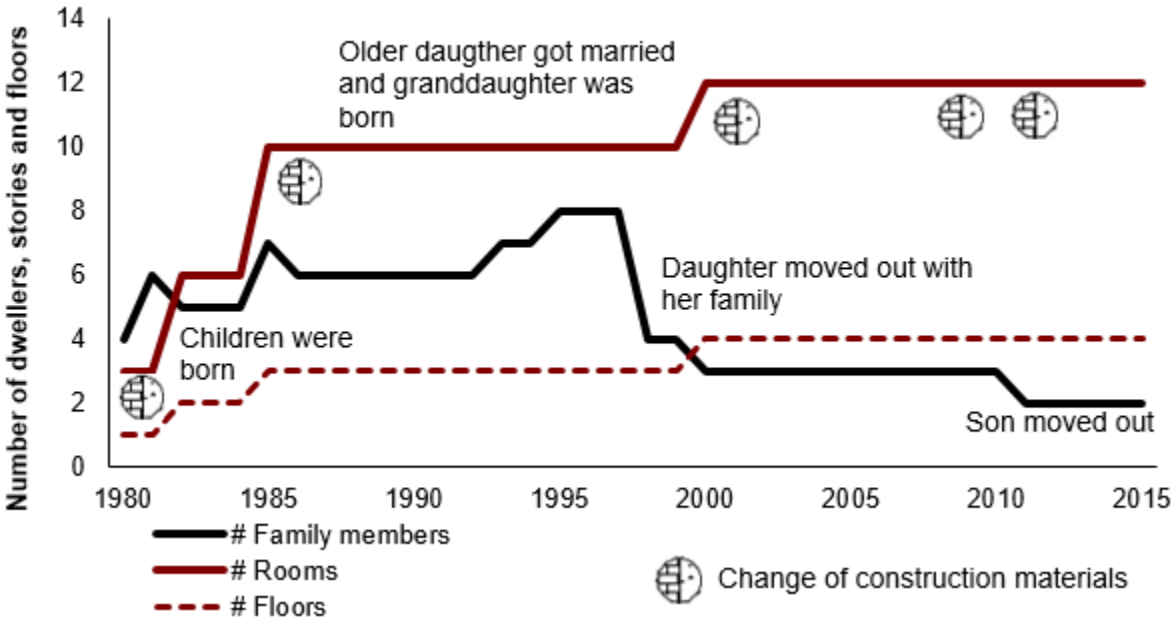
As it was mentioned in the limitations' section, this project considers only types A1 and A2 for the analysis of the results for many reasons. First, it was not possible to interview families of the others prototypes (A3, A4 and A5). Second, due to the limited amount of time on the settlement, and since the type A1 and A2 are the most predominant starter options for single-family housing, they were the priority of this research.

[8] For confidentiality, the last names of families were changed and addresses of houses are not presented.

SELECTED FAMILY CASE STUDIES

IV.7.1 Family Case Studies

IV.7.1.1 Family Buendía: Type A1

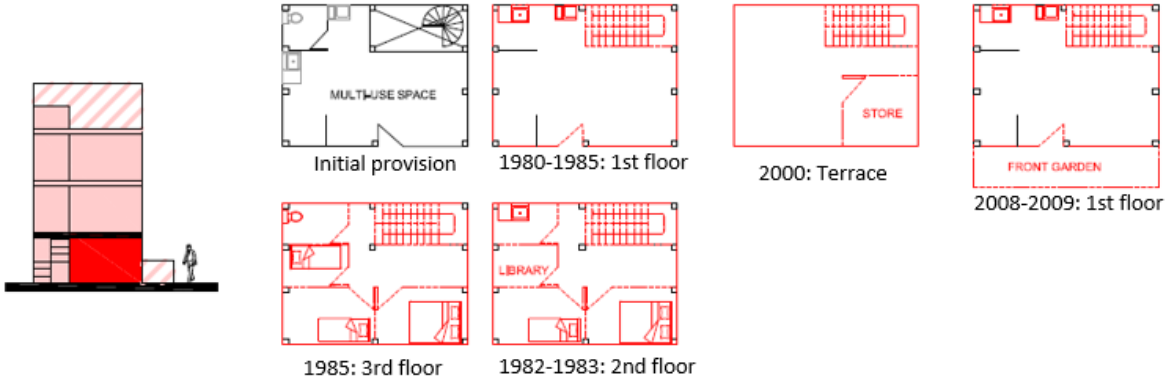


1980

Occupation: worker of textile fabric
Changed main door and windows (1980)
Built stairs and relocated WC under this (1982)
Built the second floor (1982)
Flooring of vinyl for second floor (1983)
Remodeled kitchen (1985)
Built third floor (1985)

2000

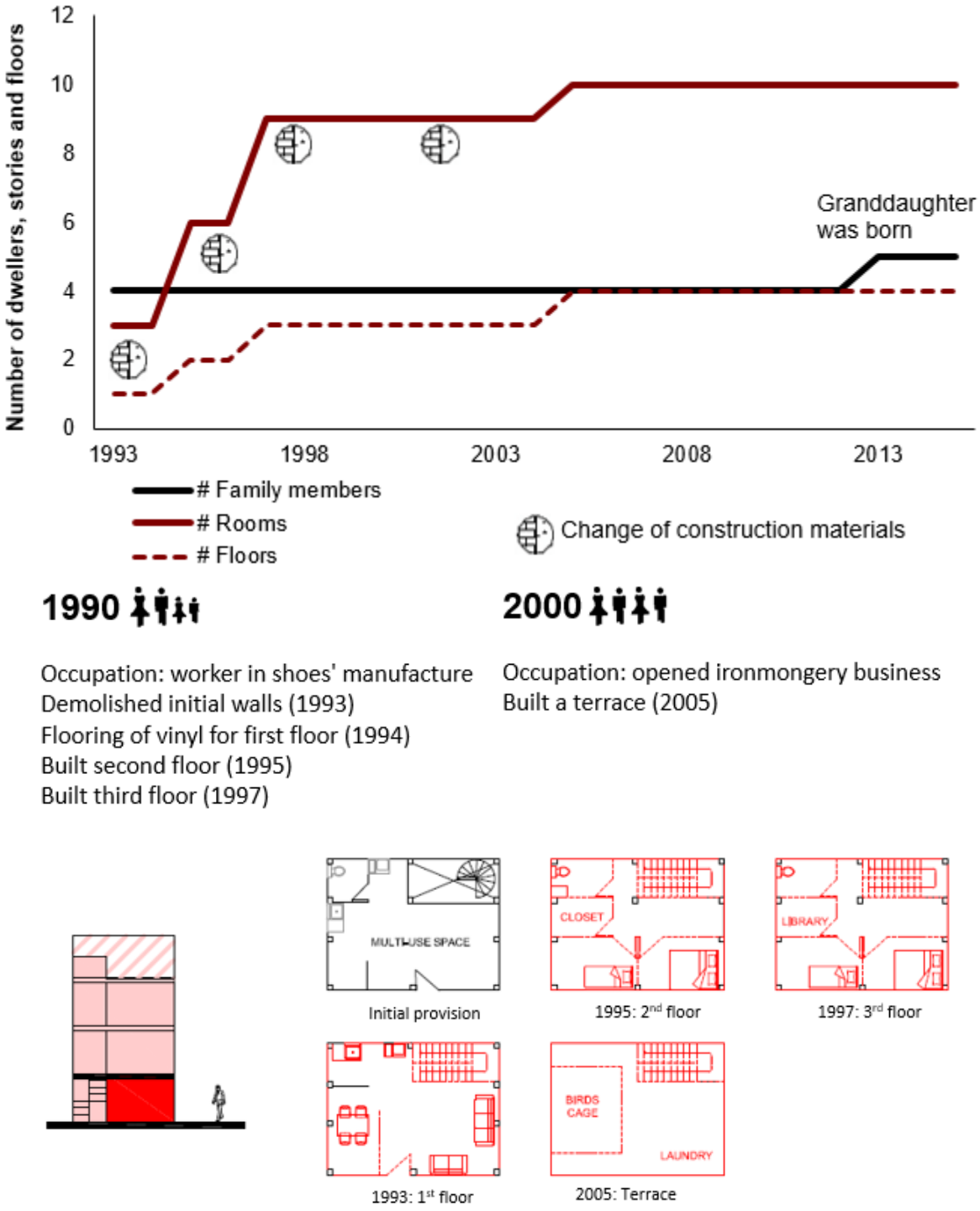
Occupation: same. Retired 2008.
Flooring of ceramic for second floor (2000)
Built the terrace (2000)
Flooring of ceramic for the first floor (2008)
Upgraded the façade (2008)
Expanded onto the front garden (2009)



Case study 1: Family Buendía: Type A1. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

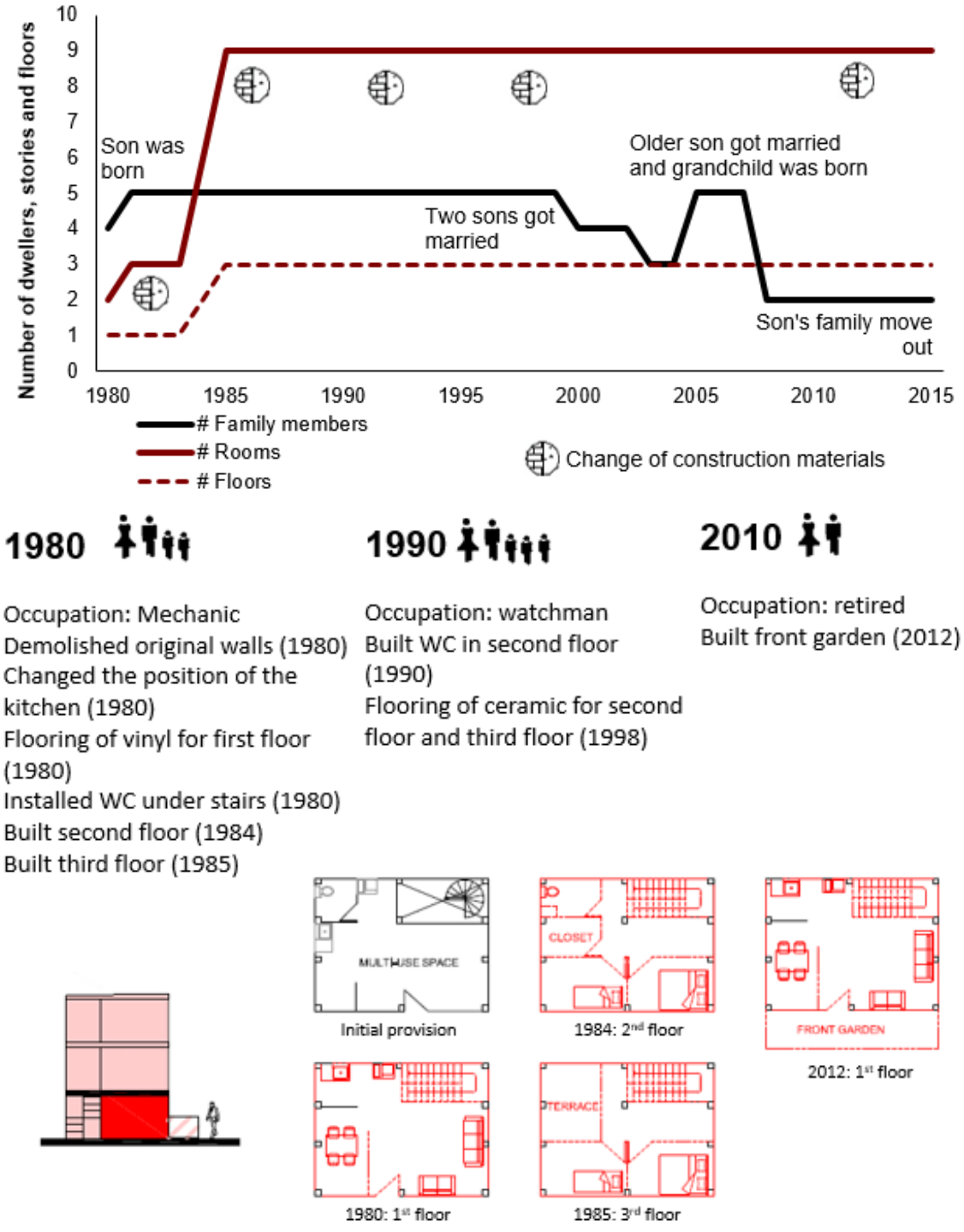
IV.7.1.2 Family Peñalosa: Type A1



Case study 2: Family Peñalosa: Type A1. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

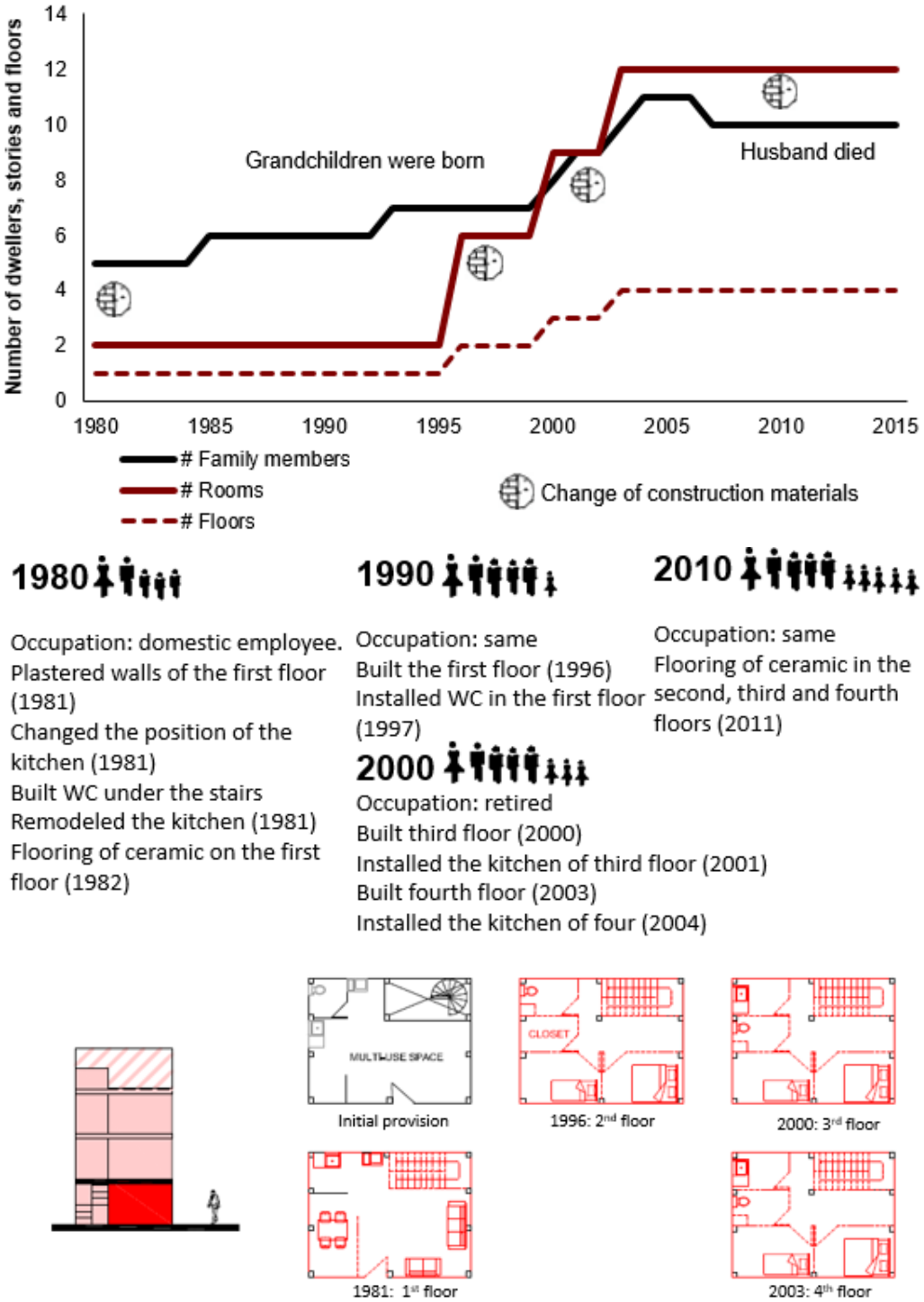
IV.7.1.3 Family Belarcasa: Type A1



Case study 3: Family Belarcasa: Type A1. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

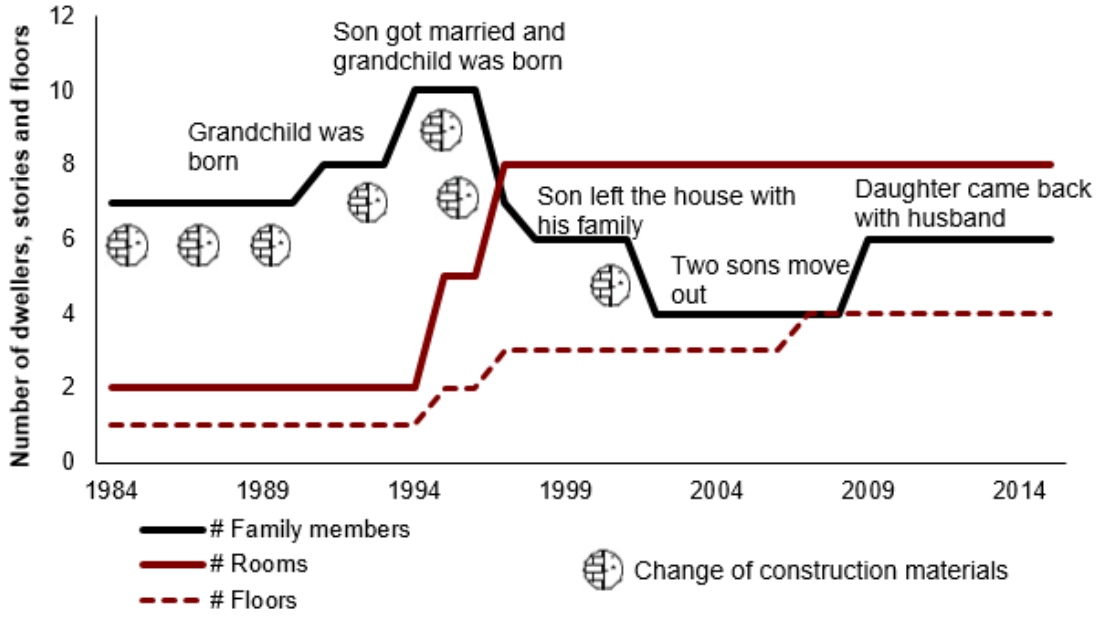
IV.7.1.4 Family Salas: Type A1



Case study 4: Family Salas: Type A1. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.1.5 Family Gomez: Type A1



1980

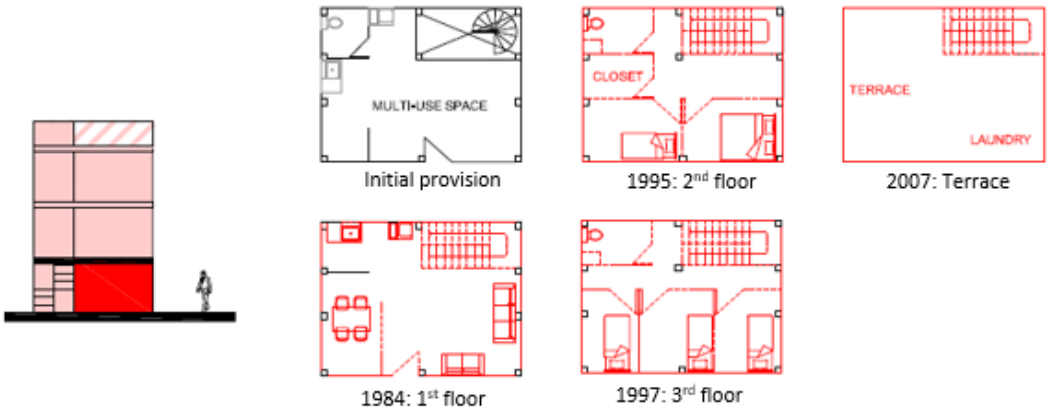
Occupation: Manager in a cinema (1984)
Flooring of vinyl for first floor (1984)
Flooring of vinyl for WC (1986)
Remodeled kitchen (1989)

1990

Occupation: same
Plastered façade of first floor (1992)
Built second floor (1995)
Built third floor (1997)
Flooring of ceramic all floors (1998)

2010

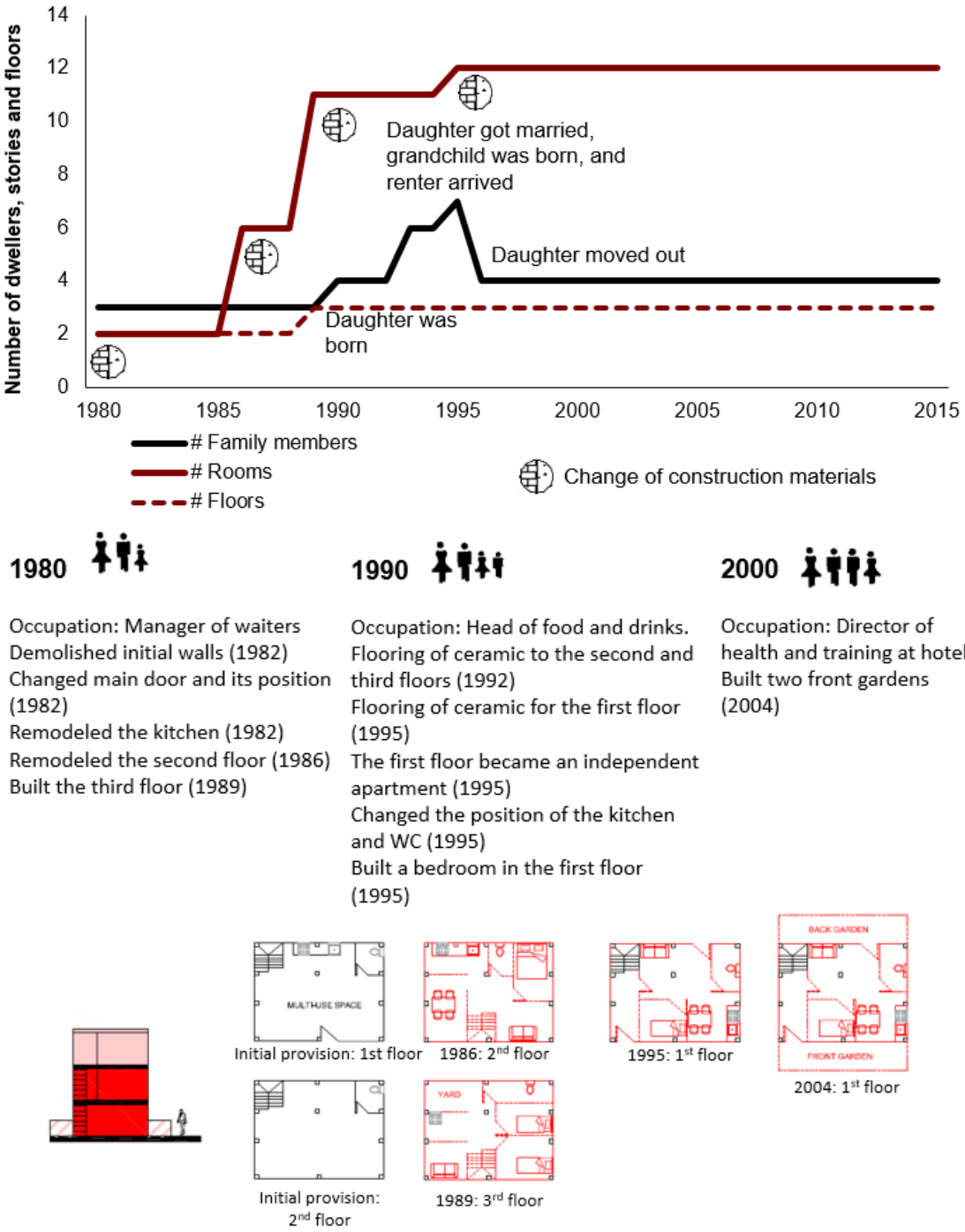
Occupation: retired
Plastered façade second floor with red bricks (2005)
Built the terrace (2007)



Case study 5: Family Gomez: Type A1. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

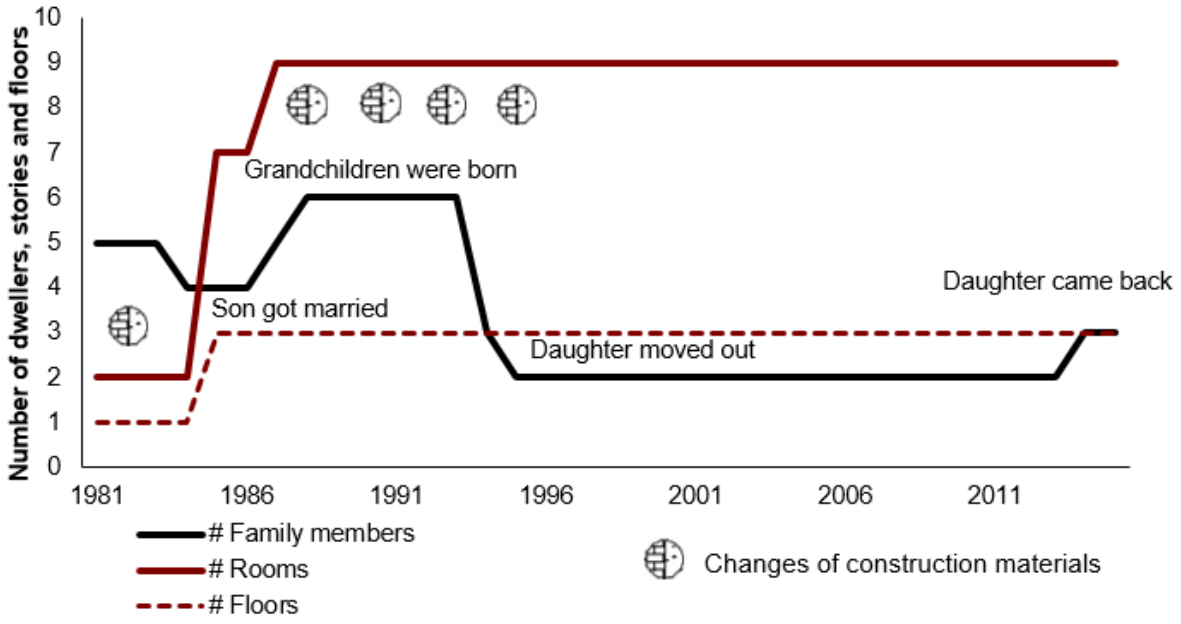
IV.7.1.6 Family Rosales: Type A2



Case study 6: Family Buendía: Type A2. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.1.7 Family Curvelo: Type B1

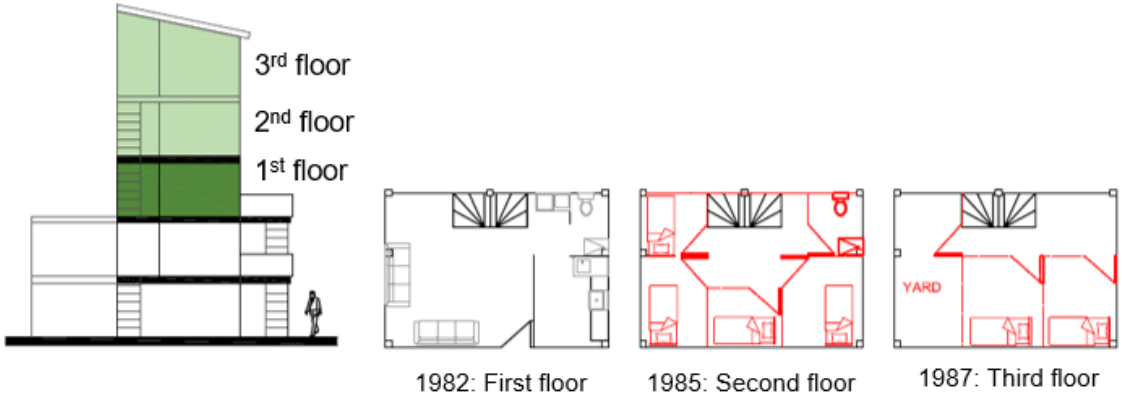


1980

Occupation: Public Employee
First floor: Flooring of ceramic in WC (1981)
Vinyl flooring for living room (1981)
Changed initial windows and main door (1982)
First floor: Replaced initial kitchen (1982)
Built the second and third floors (1985)
Second floor: Built four bedrooms and a WC (1985)
Third floor: Built two bedrooms and a yard (1987)

1990

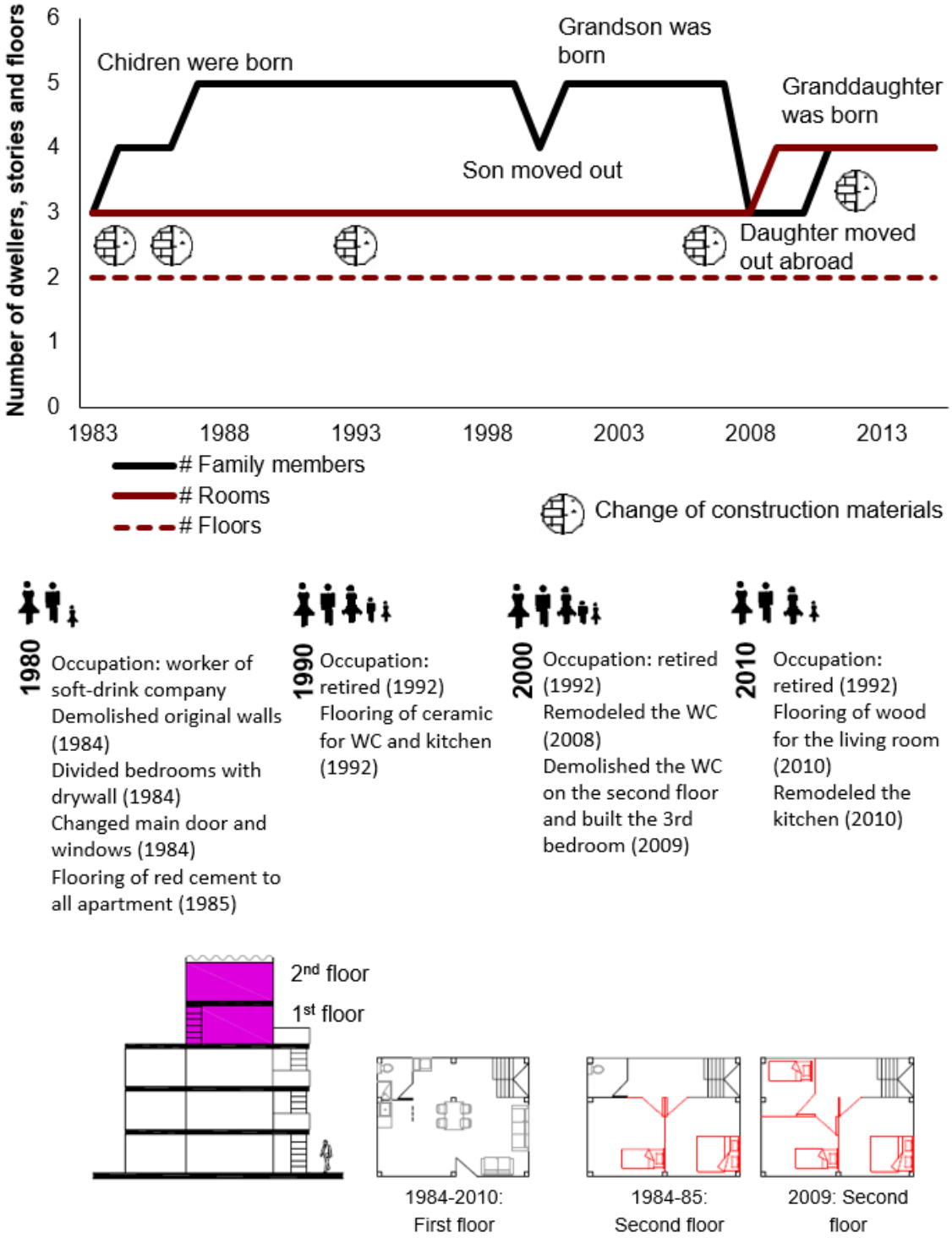
Occupation: same
First floor: Flooring of ceramic in living room (1990)
Second floor: Flooring of ceramic for WC (1993)
Second floor: Vinyl flooring in the bedroom (1995)
Third floor: Vinyl flooring in only one bedroom (1996)



Case study 7: Family Curvelo: Type B1. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

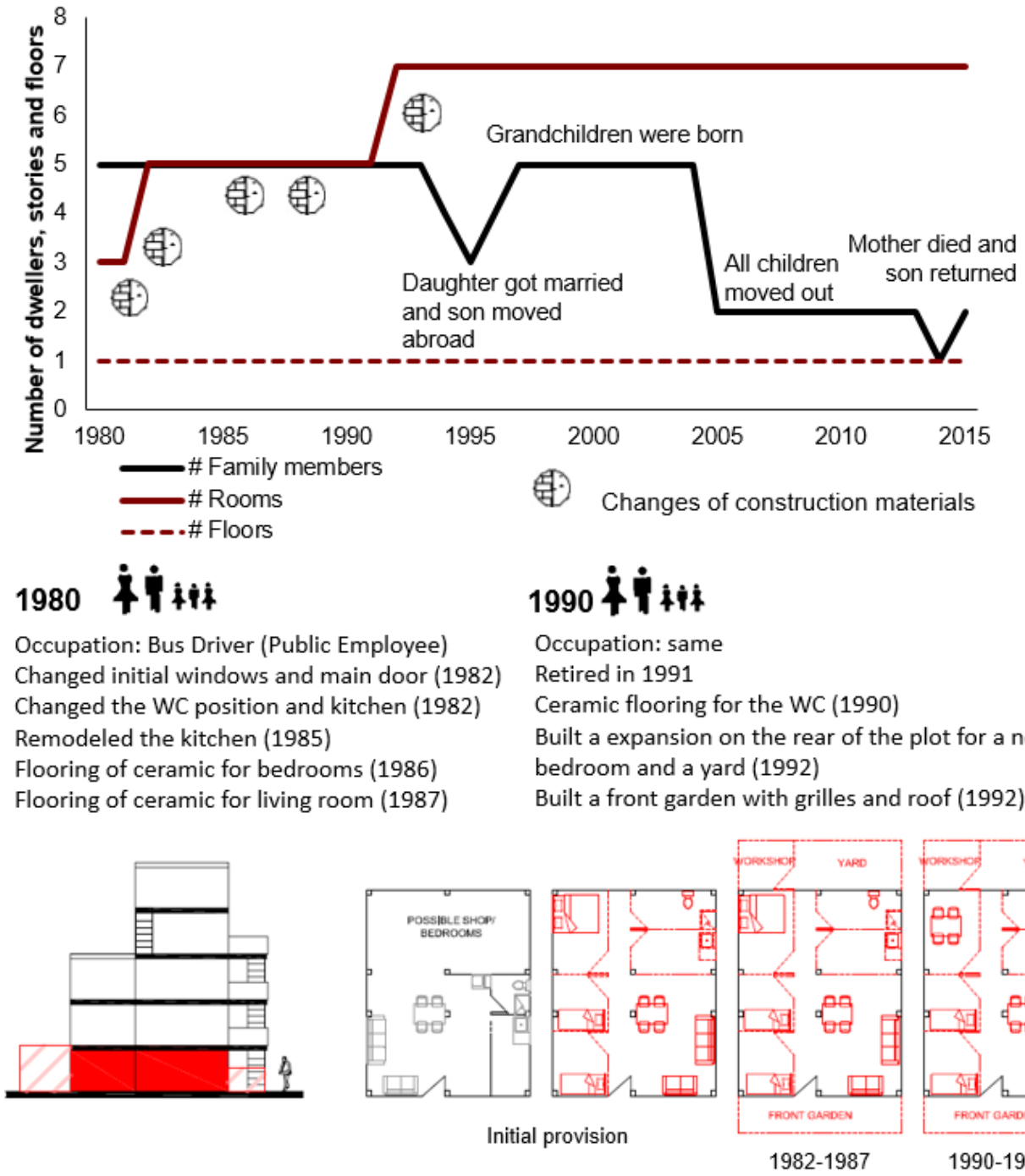
IV.7.1.8 Family Camarro: Type D



Case study 8: Family Camarro: Type D. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

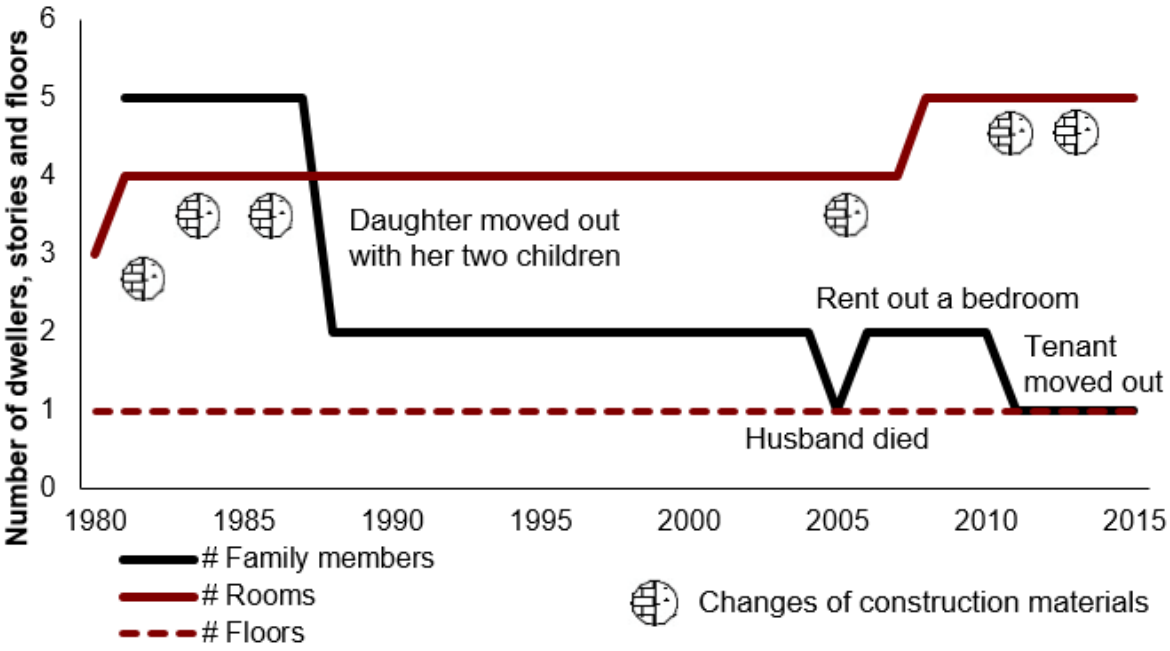
IV.7.1.9 Family Rondón: Type F



Case study 9: Family Rondón: Type F. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.1.10 Family Vacas: Type F



1980

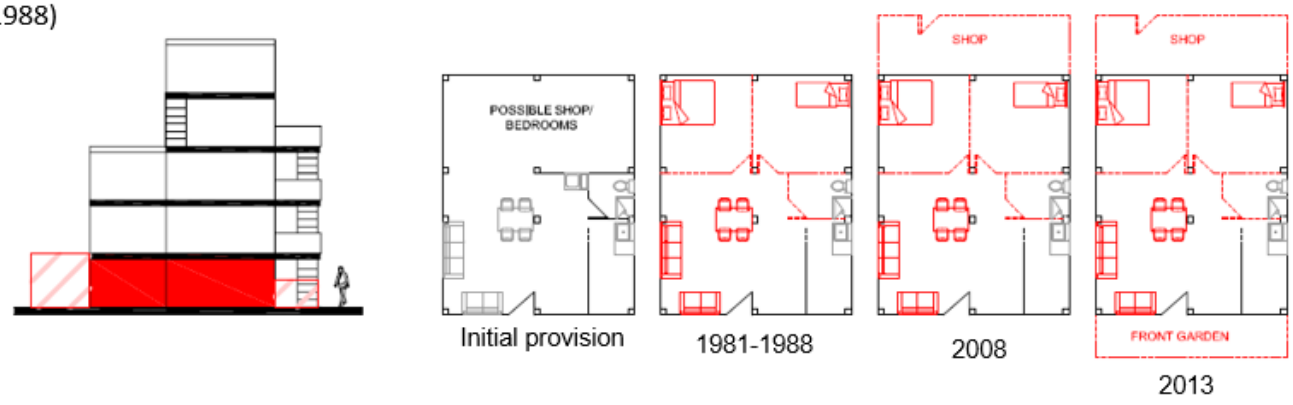
Occupation: Accouter
Changed the main door, windows (1981)
Changed the position of the laundry (1982)
Flooring of vinyl in the living room (1982)
Flooring of vinyl for the main bedroom (1983)
Flooring of vinyl in the second bedroom (1988)

2000

Occupation: the same
Flooring of ceramic in the all apartment, including WC (2005)
Built an unplanned extension for renting out (2008)

2010

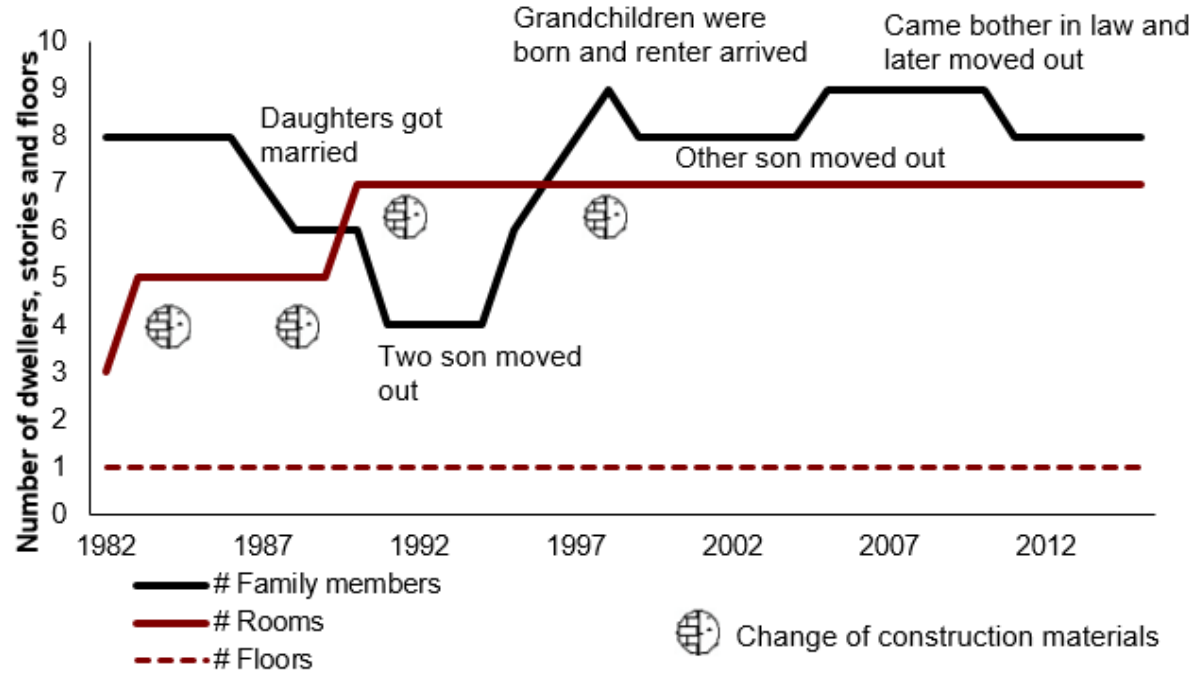
Occupation: the same
Remodeled the kitchen (2010)
Built a front garden (2013)



Case study 10: Family Vacas: Type F. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.1.11 Family Bertrán: Type F



1980

Occupation: vendor
Plastered walls (1983)
Moved the laundry place to the kitchen (1983)
Replaced windows and main door (1983)
Ceramic flooring in WC (1988)

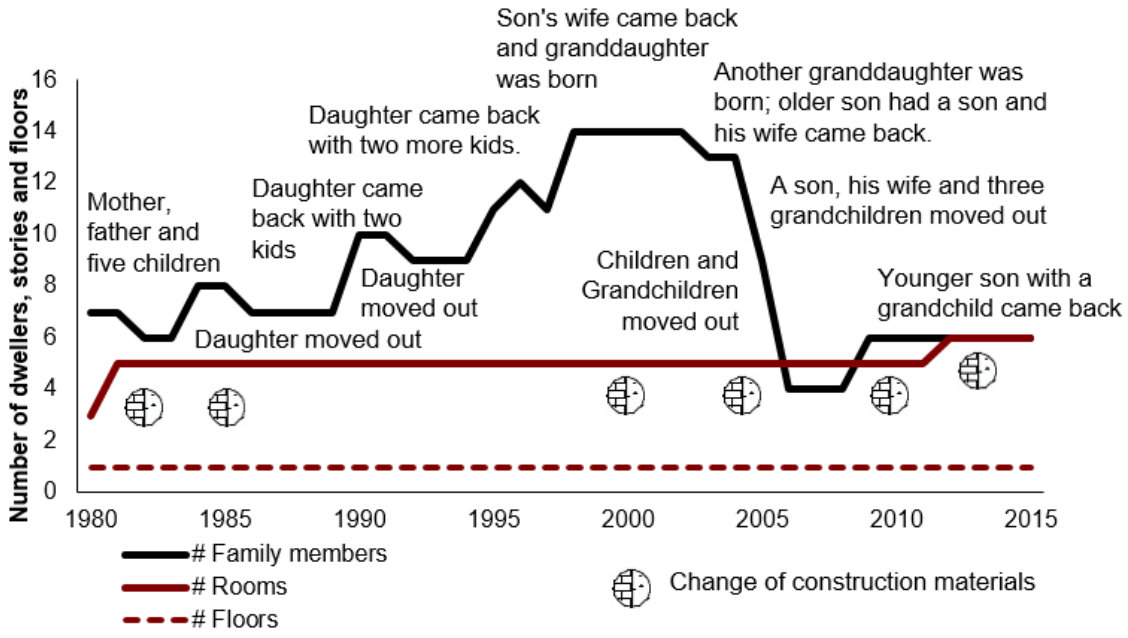
1990

Occupation: vendor
Built expansion on the rear of the plot for additional bedroom with WC and a yard (1990)
Flooring of vinyl for all apartment (1993)
Remodeled the kitchen (1993)
Changed bedroom doors (1998)

Case study 11: Family Bertrán: Type F. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.1.12 Family Veras: Type F



1980

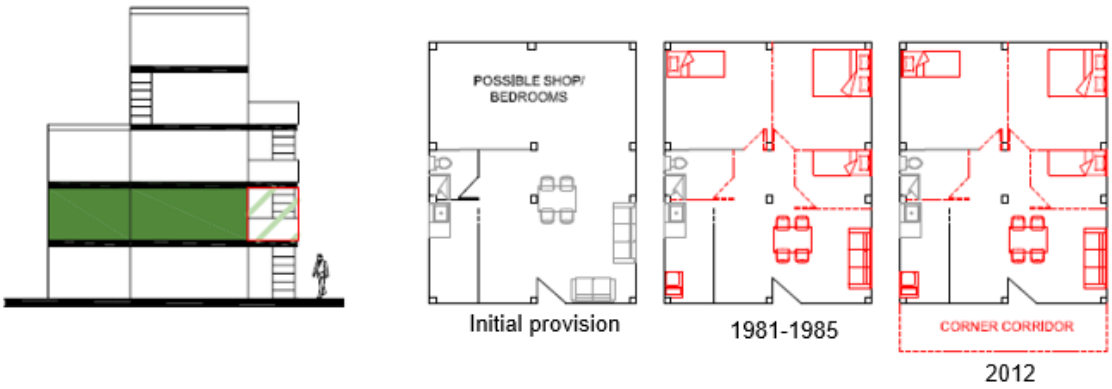
Occupation: Engineer in a telecommunication company
Changed main door (1981)
Friend's loan to buy const. materials
Flooring of vinyl for living room (1981)
Remodeled the kitchen (1982)
Changed the position of the laundry place (1982)
Flooring of ceramic for the WC (1985)

2000

Occupation: retired
Friend's loan to buy const. materials
Changed original windows (2000)
Flooring of ceramic (2004)

2010

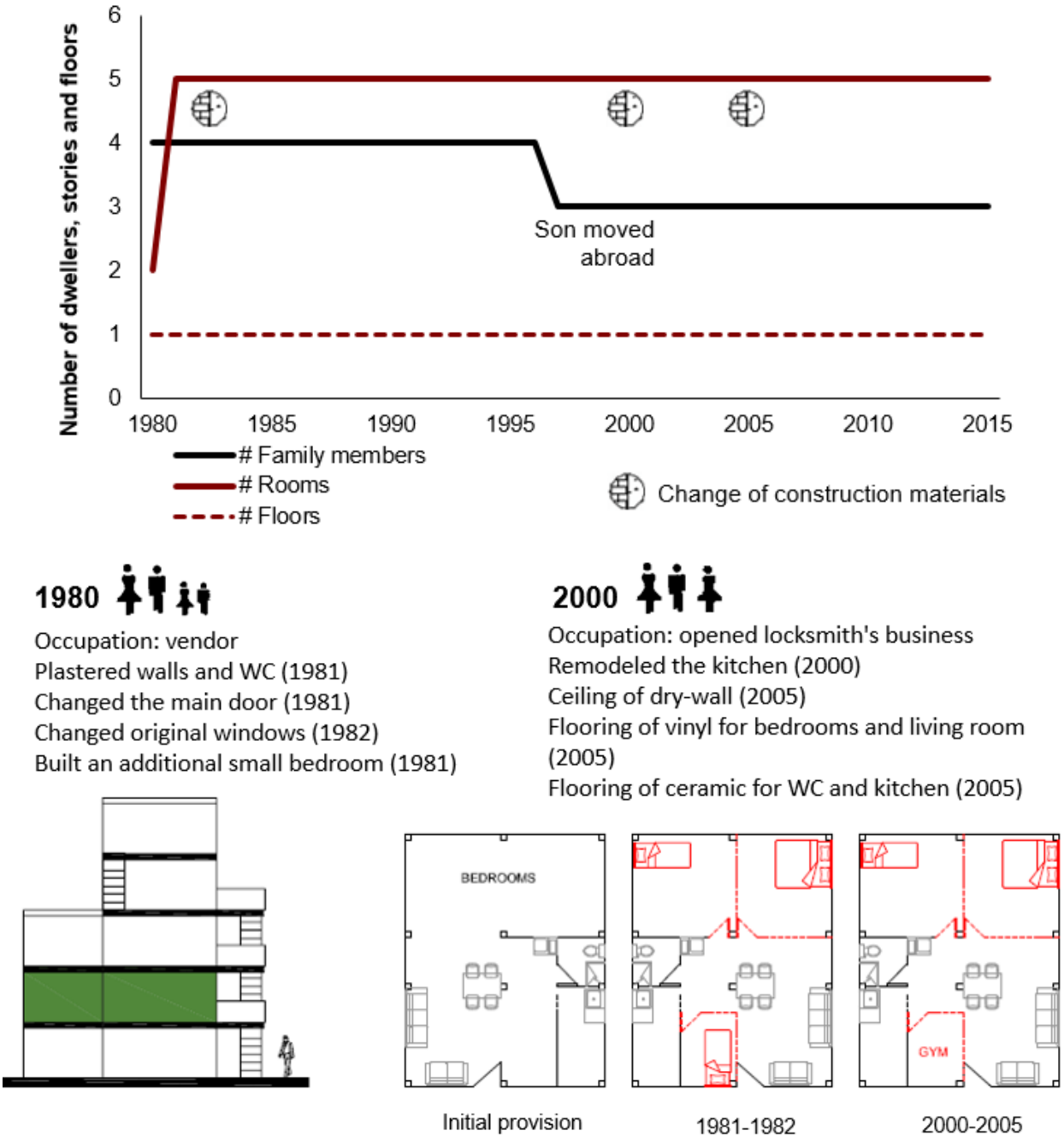
Occupation: retired
Family received heritage
Remodeled the kitchen (2010)
Extended the house to the corridor (2012)



Case study 12: Family Veras: Type F. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

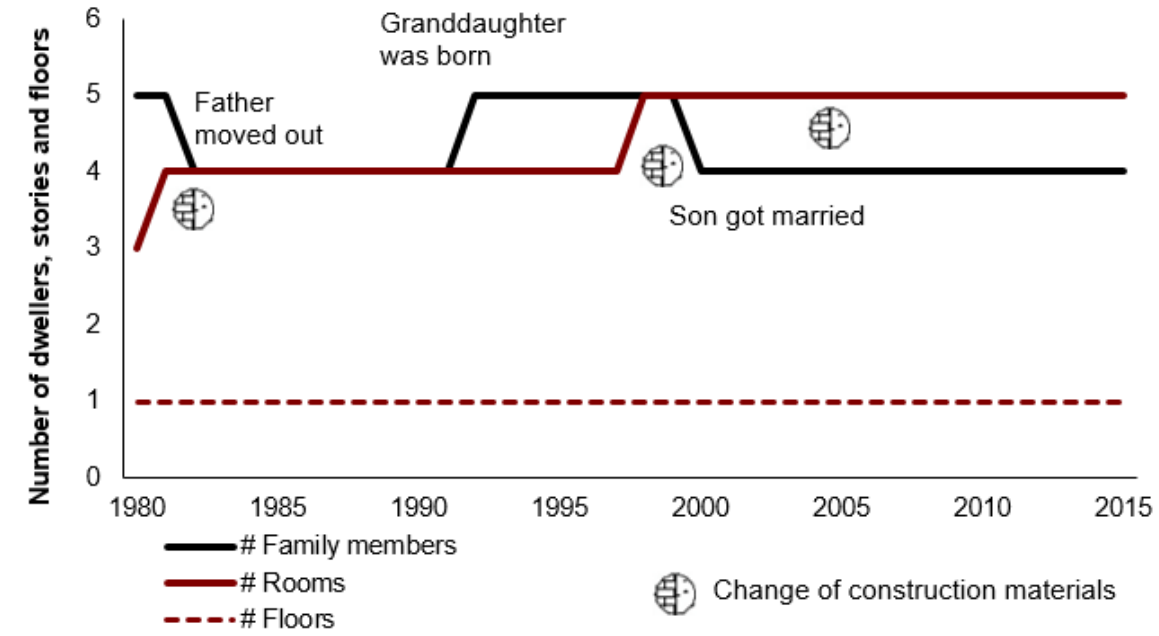
IV.7.1.13 Family Clarines: Type F



Case study 13: Family Clarines: Type F. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.1.14 Family Galindes: Type F



1980

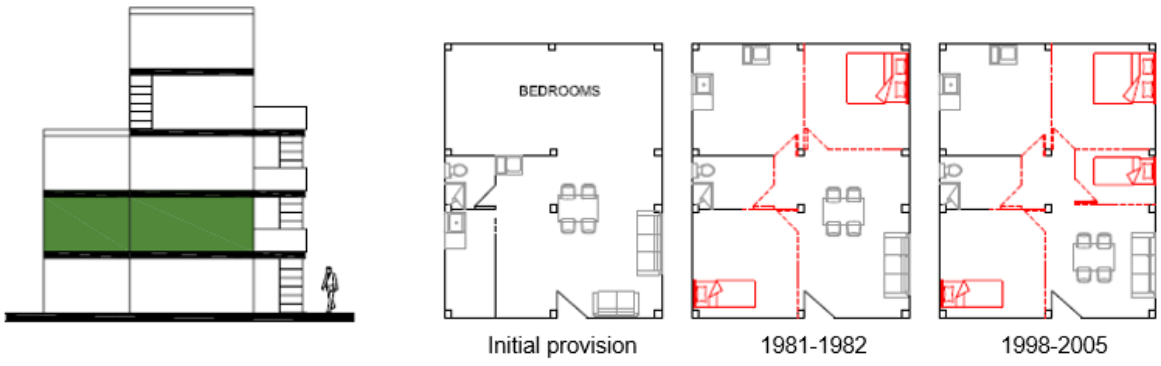
Occupation: Engineer/manager
Changed the original windows and main door (1981)
Changed the position of the kitchen (1981)
Flooring of red cement for living room (1982)

1990

Occupation: retired
Son financed with savings the modifications (1998)
Flooring of ceramic for WC (1998)
Built a small bedroom (1998)

2000

Occupation: retired
Son financed with savings the modifications (1998)
Flooring of vinyl for the two biggest bedrooms (2005)



Case study 14: Family Galindes: Type F. Timeline graph and housing plans.

Source: author's illustration based on the housing plans by the Instituto de Crédito Territorial, 1980.

IV.7.2 Findings of the Case Studies

The interviewed families arrived to Ciudad Bachué between 1981 and 1984, except one case in which the family bought the starter house from an initial occupant in 1993. The average size and composition of families at that time was typically five persons including younger parents between 30 and 40 years old and three children. Today, the heads of family are between 60 and 74 years old and most of them are retired.

Families living in multi-story buildings developed housing extensions differently. Some of the most interesting findings are:

- Many families in ground floor units built unplanned expansions to the apartment towards the rear of plots.
- One of the families of type F with an apartment in the second floor located at the end of the external hallway took advantage of this situation and included this external common area into the house.
- In the case of the duplex of type D, the family living there did not expand the house, as it was planned for.
- The one-single apartment of the typology B1 triplicated the area of the house with the addition of two floors, as originally planned.

For buying the house some heads of family asked for an employee loan and others invested their family savings. Before moving in, most of the families did some modifications to upgrade the housing's security and basic construction materials of the initial starter housing core. For instance, they replaced the initial windows and main wooden door (for bigger windows and a metal door); and changed the positions of the laundry place, kitchen and WC.

All households had to divide the spaces of the houses to accommodate the bedrooms. Some families demolished the initial walls of concrete or stone bricks and replaced them by conventional bricks. In this sense, most of the single-family housing of type A1 and type A2 started almost from the scratch, after having demolished all walls. It is important to note that for the demolitions dwellers did not touch columns, because they are considered common property and, of course, essential load bearing structures.

Once moved in, during the first decade and the beginning of the second one they continued investments to expand their houses, adding floors or building extensions in the rear of the plot or on the slab of downstairs' neighbors. More recently, they built front gardens with fences and sometimes roofs. In many cases, some parts of the houses have still original construction materials and some expansions are still ongoing today.

To finance housing modifications, families invested their severances, savings and used financial support of children (particularly in the last decade), who in some cases also contributed to housing cost. In few cases, families asked for an employee loan to finance housing changes. However, employee loans are the main source for refinancing during the ultimate purchase of the initial starter home during a time of debt amnesty, because the ICT was liquidating all its operations.

IV.7.3 Analysis of the results

The section validates the hypotheses with the findings of the case study to identify the main determinants for housing growth in Ciudad Bachué.

Hypothesis 1: *"Housing expansion has diverse speeds and magnitudes of growth due to mix of income and starter options".*

The analysis of the results suggests that housing growth and modifications in Ciudad Bachué has had diverse speeds, according to household's income and needs. Nevertheless, two main common phases of housing transformation were identified.

The first phase considers the time before moving into the houses, during which households invested intensively to complete and make comfortable their houses. Additionally, many families of row houses (type A1 and A2) rebuilt the walls of their houses, due to their perception of the initial material choice as undesirable.

The second phase refers to the first decade and the beginning of the second one, when families continued the improvement of construction materials and built housing extensions. However, some families waited until the third decade for developing these expansions.

Additionally, the results evidence that, in the settlement, the magnitude of housing growth has been also diverse as consequences of different factors:

- **The size and location of starter units**

Single-family housing:

Households of the row housing in Ciudad Bachué I (A1 and A2) doubled or tripled the size area of their houses. However, many families did even more than the planned expansions. For instance, they increased their houses building in front gardens located in community streets to expand the ground floor area (and sometimes the second floor) for additional rooms, especially, when the houses are located in less busy alleys.

Some households (types A1 and A2) with units facing open areas (e.g. for the future Ave. ALO), and/or located on the corner lots expanded their houses significantly through using adjacent public open spaces. Additionally, most of the houses expanded the second and upper floor's area pushing out each one a bit horizontally from the wall of the lower floor (e.g. 30 and 60 cm). Households of prototypes A3, A4 and A5 only expanded their units using their open internal backyard and in the rear of their floors, but they did not increase their house area on community streets (e.g. front garden) or using open public space.

Finally, it is important to mention that the unplanned expansions of houses A1 — A5 did not close complete any public street in the settlement. Additionally, the space provided for community streets was more efficient in the clusters of prototypes A3 through A5, due to the streets were narrower than the ones in the cluster of A1 and A2.

Multi-story housing:

Most of the initial sizes of multi-story housing provisions of planned progressive development, were not suitable for the household size (an average of 5.7 members) of the families, who arrived to Ciudad Bachué (Parra and Ceballos, 1986, p.23).

Particularly, the minimum provisions (32.25 m^2 for a multi-use space, kitchen and WC) of one-story apartments with planned horizontal expansions of the type E and F, located in the middle floors of these buildings prototypes. For this reason, households of these apartments

were encouraged to develop unplanned expansions on hallways in front of their houses. Additionally, they also depended more on neighbors' cooperation for developing horizontal unplanned expansions.

The most convenient minimum provision of one-story apartment was the one of type B (B1 and B2) in the third floor, as it included two additional floors for progressive development. Consequently, most of the families did not develop horizontal neither vertical unplanned expansions.

On the other side, the basic provisions of type C, D, E and F (53.6 m^2 for a multi-use space, kitchen, WC, and a suitable space for two bedrooms) were also too small for household size. Thus, families of ground floors developed unplanned expansions to the rear of plots that were usually followed by upper-floors. According to neighbors, households of ground floor apartments at the end side of buildings, which face main pedestrian paths or vehicular roads in the settlement, were the ones who initiated the horizontal unplanned expansions in public alleys, in order to operate commercial units.

However, the basic provisions of duplexes apartments of type C and type D were slightly bigger (64.5 m^2 without progressive developments), as consequence, most of the families did not build vertical unplanned expansions, though many of them develop housing extensions on the rooftop of building staircases.

Moreover, according to dwellers the basic provision of duplexes of type B had the most suitable size for families with 81.92 m^2, that reach 105.4 m^2 including the horizontal planned expansion on part of their own apartments. In response, typically households of type B did not expand their houses on community spaces neither infringe public streets adjacent to vehicular roads[9].

[9] It is important to say that most of all buildings that face vehicular roads were type B2.

- **Community and neighbor collaboration**

The cooperation among neighbors for building planned and unplanned progressive development has been one of the main triggers to determine housing investment. The cooperation entails sharing cost or just allowing neighbors to build on top.

In this sense, the results revealed that households of ground floor apartments cooperated with next-door neighbors to build horizontal expansions on the rear of plots. Additionally, many of ground floor apartments also cooperated with their neighbors on upper-floor apartments to carry out them atop. Similarly, households of the apartments located on the middle floors of buildings or "sandwich apartments", have to cooperate among them to continue developing the vertical unplanned expansions.

- **Settlement layout**

The settlement layout, along with the size and location of starter units, also contributes to determine the magnitude of housing investment. It did not facilitate only the planned expansions, but also diverse vertical and horizontal unplanned progressive developments.

In fact, the settlement layout provided excessive public streets, alleys and open spaces. Consequently, these initially underused spaces were partially or completely encroached upon by unplanned expansions. Thereby, people have found a better use, providing safety (closing less transit streets, which were dangerous), and more commercial activities within the settlement.

In the case of multi-family housing, households gave a better use for: public alleys, where buildings prototypes face two each other; public streets close to vehicular roads; and community spaces that facilitate housing extensions, such as the end of common hallways and the rooftop of common staircases.

Similarly, households of single-family housing also gave a better use to open spaces and community streets. However, in the case of Barrio Villa Cristina and Las Carolinas, the provision of community street was more adequate and did not encourage unplanned expansions (e.g. in front gardens).

Hypothesis 2: *"Increments in family income in have a positive impact on housing growth/modifications".*

The results suggest that increment in family income (e.g. when most of the children began to work) contribute with housing growth. In other cases, the head of family was promoted or changed to a better job, which also encouraged the planning of housing modifications.

Hypothesis 3: *"The release of the financial debt of starter core purchase – or repayment of former debt affect positively or negatively housing growth".*

The results do not show a positive relationship between the repayment of debt for purchase of the core unit and successive housing investment. Additionally, interviewed dwellers reported the houses of Ciudad Bachué were affordable, and the amnesty period for restructuring the debts of housing purchase was just the consequence of the compulsory liquidation of the ICT. Concerning other debts, families did not feel comfortable giving economic information, which limited the analysis of the connection between the release of debts and housing growth.

Hypothesis 4: *"Changes in family pattern (household size, the age of children, marriage and family growth) influenced housing investment".*

The results of the interviews validate the influence of this trigger over the housing growth for the following reasons.

First, when families arrived to Ciudad Bachué the household size (an average of two younger parents and three children) was the first motivation to develop the first housing expansions in response to the limited space of the initial housing provisions of most of the housing typology.

Second, in some cases the age of children is linked to housing growth. As it was mentioned, this is particularly relevant when they reached the age for work, because some of them became an important financial muscle for carrying out additional housing improvements.

Third, in most of the cases houses did not expand when families grew due to children getting married and grandchildren being born. This is explained mainly due to families already having transformed the house and for the moment new members came other children moved out.

Hypothesis 5: "*Improved access to public services (e.g. education and health) and a better infrastructure determine housing investment".*

The results did not present direct links between the access to public services and the improvements of settlement infrastructure, and housing investment. Nevertheless, the recent initiatives of some communities to upgrade and homogenize building façades reflect the positive perception dwellers have about the settlement. Moreover, recent (e.g. BRT) and upcoming projects (e.g. ALO Ave.) of urban mobility in the city might positively impact the valorization of houses in the neighborhood.

Hypothesis 6: *"Changes in (perceived) tenure security affect housing investment".*

The results evidence that changes in the perception of tenure security is affecting the housing investment in the settlement for unplanned/informal expansions due to the perception on tenure security changed in response to the proposal in 2008 for recovering the public spaces in Ciudad Bachué by the District Planning Secretary. Most of the neighbors did not invest more in additional expansions, due to fear of their demolition, even though they need the space. However, the investment in planned expansions has been not affected for changes in housing tenure, because since the beginning families had tenure security for starter units with planned progressive developments.

Hypothesis 7: *"Access to (formal) construction licenses in compliance with building standards affect housing investment".*

The results did not suggest that families diminished their housing investment for the planned neither unplanned expansions, due to the access to formal construction licenses.

IV.7.4 Challenges and Potentials of Ciudad Bachué

Challenges:

- The settlement layout provided more public and open spaces than the community needed, excluding the sectors of Barrio Villa Cristina and Las Carolinas.
- The planned progressive development for the multi-story housing prototype, especially smaller units, was not sufficient for the average family size that arrived to Ciudad Bachué. For this reason, households cooperated to develop horizontal and vertical unplanned expansions.
- The community services and facilities were not well-distributed within the settlement, due to the changes of the original master development plan.
- In the case of row houses, the construction materials were perceived as undesirable by households, for this reason they felt the need to invest on transforming the original structures.

Potentials:

- The project reduced the scale of segregation in providing community services and affordable housing to mixed-income households. The minimum and basic provisions increased the number of housing solutions. In addition, the ICT financed different housing prototypes, and subsidized core houses for the poorest families.
- It has a relatively high density that ensured more spaces for community services and facilities.
- It achieved a relative self-sufficiency in services, due to the evolution of home-based commercial units that have reduced the need of journeys outside the settlement.
- It reduced production cost, using construction technology for massive scale housing projects. Further, the project adjusted to the financial capacities of low-income households and the public sector.
- It developed an urban structure that enables a street pattern prioritizing pedestrian footpaths within the settlement, but also facilitating the mobility of vehicles through rapid transit avenues and vehicular roads to access settlement sectors.
- It developed an urban structure that facilitates the progressive development of houses, as well as, the infrastructure and community services.

SECTION V

CONCLUSION

V CONCLUSION

This research concludes that Ciudad Bachué is a successful project in terms of the experienced housing growth, and the evolution of community facilities and services of the settlement. Households of single-family and multi-family prototypes developed their houses even more than planned for. Additionally, the incremental housing process has built a sense of belonging/ a connection between the community and the settlement. Households recognize the effort they have done to develop the neighborhood.

In Ciudad Bachué, housing growth and modifications experienced diverse speeds, as household´s needs have evolved (e.g. changes on family patterns) and their resource allowed. However, families typically invested intensively in their houses during two periods of time: before moving into the house, during which households invested to complete (in some cases rebuilt) and make comfortable their houses; and during the first decade and beginning of the second one, when most of the families continued upgrading the house, and built expansions.

In regard to the hypotheses, this research concludes that there are seven key determinants for housing growth in Ciudad Bachué:

- **In the case of multi-family buildings, the prototype size (too small for households with an average of 5.7 members) was the main trigger of housing growth.** Therefore, households in type C, D, E and F were encouraged to build unplanned expansions. In contrast, apartments of prototype B had the most suitable dwelling size amongst the multi-story options. On the other hand, even though the single-family prototypes included proper spaces for developing planned expansions, households of type A1 and A2, built unplanned expansions, but few of them were for additional rooms.

- **The settlement layout, due to the excessive provision of public spaces, which were initially underused and later partially or completely encroached upon by unplanned expansions.** In effect, there exists a pattern of these expansions in the multi-story prototypes C, D, E and F: all ground floor apartments have built on the rear of the plots, on public streets, where the back of buildings face to each other. Conversely, none of the type

B built unplanned expansions on internal pedestrian alleys, because their buildings already faced to each other with private back yards or shops.

- **The location of dwelling units within a building and of buildings within the settlement codetermined the magnitude of housing growth.** In the case of single-family units, prototypes A1 and A2 abutting the open space of the future Ave. ALO has proven as one of the most advantageous locations within the settlement. In fact, some households expanded significantly the area of their house. For multi-family housing, the most advantaged locations were the ground and last floors. Households in other ground floor apartments (type C, D, E and F) had space for developing horizontal unplanned expansions towards the rear of their plots, and apartments on the last floor did not depend on others, when building vertical expansions on top of their own properties. **On the other hand, the position of the apartments located in the middle floors of the latter building types is the least convenient for housing growth: due to the sandwich position, households depended on the negotiation/cooperation with others neighbors** to build unplanned horizontal expansions atop of lower-floor apartments.

- **The collaboration amongst neighbors in multi-family housing has been a significant determinant for expansions.** Although the process of incremental housing has been more intense for neighbors of units on the middle floors of buildings, the amount of unplanned expansions and their similarities shows a high level of collaboration among neighbors of Ciudad Bachué, that have contributed to legitimize the unplanned expansions in the settlement. In contrast, neighbors of single-family housing have had relatively more independency for building their unplanned developments. The type B is the only multi-story solution, where neither the lower nor the upper unit's expansions depended on other households' actions.

- **The design of the façades of multi-story prototypes influenced unplanned extensions on community property.** For instance, the façade's design which have uncover (none roof) stairs and hallways, both made of rails discouraged unplanned extensions.

- **The increments in family income, due to the financial contribution of children** (e.g. when most of the children began to work).

- **The changes of the perception of tenure security for the unplanned expansions, as consequence of the land conflict.** In 2008, the District Planning Secretary approved a proposal for recovering the public spaces in Ciudad Bachué, which has discouraged neighbors of investing in informal expansions, due to fear of demolition, even though they need the space.

In contrast, the results did not show evidence that the access to construction licenses, the repayment of debt for purchase of the core unit, neither the access to public services were relevant determinants for the housing growth in the settlement. The latter may not play an important role as most families had already expanded the small core units at or after occupation, when later infrastructure projects (e.g. BRT) could have triggered a new phase of construction.

It is important to note that the motivation for most of the 'unplanned expansions' of multi-family housing prototypes (on the rear of the plots, or towards the rear of their apartments) **was mainly to provide more space to accommodate family members, start a business to generate income, and rent out additional rooms**. On the contrary, in the case of single-family housing, particularly A1 and A2, the main motivation for these expansions (community property and green spaces) was to have more comfort for the family.

Furthermore, the settlement's expansion capacity is not fully saturated. For instance, some neighbors of upper-floor apartments might expand their houses if the informal expansions are legalized.

Last but not least, studying Ciudad Bachué offers some potential lessons for planning similar multi-story incremental housing projects in Colombia and abroad. These suggestions might help to revive the multi-story incremental housing policy in Colombia, and take advantages from its twin benefits of pooling land costs (due to multi-story) and reducing construction cost (due to incremental).

This research suggests to consider:

- **To ensure suitable public spaces in the settlement, but without overpassing the needs of the community.** To do this, before the implementation of the project or in its earlier phase of development, it is important to assess and, if necessary, to adjust the land use of the settlement with the participation of the community, in order to:

    - Give a better use of the land.
    - Increase the social welfare of the community.
- **To provide housing prototypes with different provisions and size, but with suitable spaces for future progressive developments, such as apartments of prototype B.** A suitable housing size avoids, paired with proper use of public spaces, unplanned developments and may reduce the need for monitoring of informal expansions.
- **To empower community associations in the beginning of the project to ensure they are able to monitor and support housing growth as well as the progressive development of community services and facilities.**
- **To develop an urban structure that enables a street pattern of three levels**: vehicular roads of rapid transit, vehicular roads to access settlement sectors, and pedestrian streets.
- **To ensure that all services and facilities are well distributed in the neighborhood.** For example, big recreation areas or community services should be positioned strategically in order to all settlement's sectors can easily reach them.
- **To include community's participation**, for example for the selection of construction technology to avoid households replacing core structures, instead of completing and expanding their houses.

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