LOW INCOME FAMILY HOUSING WITHIN URBAN CONTEXTS

by

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Abstract

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This thesis will be a study of those physical aspects of urban environments which have a bearing on the physical solution of housing for laboring classes in the U.S.A. and Latin America. An attempt will be made to define the nature and extent of the low income family housing problem according to varying physical stages of urbanization. Within a physical framework, adequate low income family housing types and placement will be proposed.

PART ONE of this study approaches the problem analytically. The assumption is made that stages of urbanization differ in the U.S.A. and Latin America. An analysis of these assumptions will provide some conditioning aspects with which to face the housing problem. These stages are the contexts of the housing problem.

PART TWO of this work establishes the hypothesis that the prototypes of the housing solution depend on the comparative stages of urbanization. A matrix model will be proposed for comparison and analysis of the recommended solution at a given point in time.
The subject of the Part Three is the hypothesis that the location and density of the typical housing should be derived from the physical forces of the local context and its stage of urbanization. In reality, economic and social factors and their related political aspects are also important considerations, but this paper will concentrate on physical factors only.

In Part Four Houston, (the fifth largest American city), and Antofagasta, (the fifth largest Chilean city), two cities which are similarly related to their respective nations, will be examined as two different physical contexts that condition their physical housing solutions. The thesis will be completed by a diagramatic presentation of prototype designs for Houston and Antofagasta that illustrate the text's principles.
ACKNOWLEDGMENTS

The preparation of this work has left me deeply indebted to many. First, I wish to thank the members of my thesis committee for their many valuable contributions: Mr. Harry Ransom and Mr. Chartier Newton of the Architecture Department; and most especially Mr. Paul Kennon for his interest, patience and guidance of this thesis.

I would like to express my gratitude to the school of Architecture for awarding me a generous fellowship, without which the furtherance of my education would have been impossible. Also thanks are extended to Mr. O. Jack Mitchell for his dedication to the Graduate Student Program.

Finally, the author wishes to dedicate this work to those who are confronted with the problem.
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GLOSSARY OF TERMS

Society - cultural environment geographically located ranging from family to world level.

Urbanization - the process of becoming urban, moving to cities, changing from agricultural to other available activities in cities, and the corresponding changes in behavior patterns.

Urban - any populated center, regardless of its size or number of people living within.

Structure - used to describe the significant social, economic or physical elements (variables) which are fundamental.

social: those human processes which explain the urban fact such as population increase, migrations and other human process.

economic: those parameters used to establish a comparison between different living conditions in society.

physical: all the material arrangements in which human activities take place. Man made structures, (residences, industries, transportation, and parks), are predominant over naturally created elements in urban areas.

Context - the interrelated conditions in which something exists or occurs.
PART ONE

CONTEXT OF THE PROBLEM
I. INTRODUCTION

When one is involved in the design process, he must make decisions in order to offer alternative solutions. The less arbitrary the decision, the better the design will be. In order to avoid arbitrary decisions, it is necessary to know and understand the definition of the problem, that is, the context. Design in this way involves context and proposal.

In relation to this concept of design, the present policy designers, program designers, and physical designers who are attempting to solve urban low income housing problems are not succeeding, because they do not analyze the context as a part of the design proposal. They give predetermined solutions to any context. Their housing projects are guided by concepts of physical form "the building". Consequently, Part I will illustrate that each problem must be considered in light of its own context - each context being different. The establishment of the context will be the concern in this first part. It will be illustrated that contexts differ between United States cities, and Latin American cities.
II. HOUSING PROBLEM DERIVED FROM URBANIZATION OF SOCIETY

The concern of this thesis is to deal with the relation of certain housing problems and the nature of urbanization. Urbanization is considered as a highly complex irreversible fact, which is modifying all societies of the world: national, urban and rural. It is affecting the life style of virtually every person on earth.

In this work, urbanization is a process of change that is modifying the actual social, economic and physical structure of any given society. ¹ Thus, there is a process of change taking place in the physical structure, just as there are processes of change in the social and economic structures.

The physical manifestation of this process is the growth and contraction of cities, which is the natural result of population increase and shifts.

Almost all countries of both Americas are, and will be, characterized by an increase in their present population.² In the less developed nations of the South American Continent, such as Colombia and Brazil, the population increase has generally reached unprecedented proportions. The countries of the Latin region are population leaders. The fact that the United States and Canada lag behind the other American countries does not mean that by applicable standards their population is growing slowly. Their growth must be judged in comparison with other industrial countries of the world. By doing so,
it can be observed that these regions play the same role among industrial countries as Latin America plays among other developing countries.

As a result of the population growth, urban areas are going to be forced to expand. From a present average of 55% urban population the American continents, by the year 2000, will have 80% of the people living in cities. Clearly, the tendency is the urbanization of society.

The first problem for the people caught in this phenomenon "is to get a roof over their heads." Land, housing and allied services assume an important role for the urbanization of society. Determining the nature of this new urbanization constitutes a most challenging task for professionals who work with urban matters.
III. THE INTERDEPENDENCE OF SOCIETIES

The three structural orders of society (social, economic and physical) which are becoming urbanized are not only interrelated among themselves, but are also related throughout the world. Thus, socio-political, economic and physical orders of any given society are related at any given time with structures of other societies, and more closely with those to which they are directly associated. Therefore, rural societies in socio-economic and physical aspects are directly related to, and conditioned by those dominant urban societies. At the same time less developed societies which are often rural have direct or indirect repercussions on the dominant societies existing in urban areas. It is a reciprocal influence. Therefore, there results a dependence among different societies. One must be dependent in relation to the other.

Because societies have a geographic location, urban zones are defined by cities; cities are defined by nations; nations are defined by regions; regions are defined by continents; and continents are defined by the world context. This society of interdependence involves a chain of dependence. As a socio-political interdependence, for instance, the social and political system of any Chilean city is defined by the Chilean system. The socio-political Chilean system by the South American system, as a whole, is dependent on contemporary capitalism or socialism, which, in turn, are part of the world
system of interdependence.

In the same way, this interdependent system exists as an economic structure. At any given time, for instance, if one considers economic dependence, big cities have economic diversity and investment opportunities, while smaller cities depend on those big urban areas. Finally, an entirely rural society becomes economically subordinate to those urban areas, and receives cultural and material advantages in one way or another. This dependence among hierarchal societies is the product of history, especially since the Industrial Revolution.

Because different societies will be examined, it will be necessary to consider the socio-economic and physical relationships between them, and to analyze each of them as related to the other. To this author, the key to the problem is to understand the role and aspirations of each society. Must the less developed societies aspire to attain the material conditions existing in the leader societies? It is more realistic to develop graduated goals, progressing by stages as resources become available. This last assertion necessitates a conceptual framework which makes it possible to understand and accept the role that each society is taking as a specific social unit.
Society In The U.S.A.

The Industrial Revolution occurred gradually in Europe and North America. The invention trajectory grew rapidly during that time, while the industrial complexity grew relatively slowly. In this society technology was the leading field and new technological processes were invented which were expensive and wasteful. In this industrial development the social adaptations and adjustments emerged gradually, in secondary form, and were adapted to the demands of the industrial worker. Organized labor and educational institutions became effective at the end of the 19th century as a response to industrial demands.

Parallel to this development a new kind of ideology was emerging. The developing philosophy was consistent with a process in which one had to have freedom to experiment, to try an invention to see if it would work. This progressive development improved physical living conditions. Now the problem of life's necessities no longer exists except for some well known exceptions like marginalized groups. Most Americans in the U.S.A. have what can be described as acceptable living conditions. The problem has been reduced to a need for efforts to improve some, or all of the tools which direct existing resources to unsolved problems. The crux of the matter is the importance of existing institutions to deal with housing deficit.
According to history, Latin American society was emancipated as a colonial entity at a period of time when its development as a whole was incomplete. The origin of this society was based upon a transplant of socio-cultural and physical aspects from Spain, Portugal and other European countries. They acquired from them judicial and educational systems, law, city form and other cultural aspects. They still maintain this sort of cultural dependence on the European countries, in spite of political independence. When the Industrial Revolution occurred, Latin America was the hinterland of this movement because it did not offer the kind of idiosyncrasy that advancing countries offered. It is understandable that the development of its society as a whole follows the patterns of leader societies, and with time large Latin America cities attracted industrialization. Not only industrial sources are there, but scientific, technological and social advancements can only be developed within urban settlements.

In Latin America today more than 50% of the people do not live in cities. Prior to achieving an adequate socio-economic development, the governments of these countries are forced to provide social benefits for those in less developed rural areas. Supplying these social benefits requires a high level of experience, mentality and organization in order to use
resources properly. This higher level can only be obtained with time.
The Latin American situation differs from the U.S.A. in the sense that their social consumption goals have developed before the society has developed as a whole. This phenomenon exists in the Latin American society itself, at the city level, in institutions, and individual cases. Therefore it is important to understand the existence of two differing situations, the concerns of the two societies, and the contexts in which they exist.
IV. DIFFERENT STAGES OF URBANIZATION

Urbanization involves a modification by intensification of the existing city situations. A continuous urbanization process exists. Because greater cities are present in socially and economically developed nations, it is assumed that physical urbanization is parallel to both development processes.

Figure 1

Under developed → Developing → Developed → Super Developed

Almost Urban → Urbanizing → Urbanized → Highly Urbanized

Nations undergoing the urbanization process are best understood by comparing them to nations already urbanized; evaluating them by standards, steps and the patterns of those nations. One may suppose that an urbanizing nation must recreate the same steps taken previously by the already urbanized nation. The author, on the other hand, considers differences between urbanized countries and urbanizing countries and then between urbanizing countries in themselves. Behavior patterns of urbanization in the Latin American cities depend on specific circumstances; they have their own process of urbanization.
Classification Of Nations According To Stages Of Urbanization

To illustrate that each country has its own pattern and characteristics of urbanization, a matrix of annual population increase and population living in cities will be used. Eight of the American countries counted are growing at a very rapid rate, more than 3.5% per year. At the other end of the spectrum are countries with a growth rate of less than 2.5%, including the least developed, Haiti and Honduras and the most urbanized, Argentina and Uruguay. Canada and the U.S.A. are in a similar position in North America.

Figure 2

Data based on information supplied by John Friedmann.
## Classification:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>URBAN POPULATION %</th>
<th>AVERAGE RATE OF INCREASE</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td>less than 25%</td>
<td>less than 3.0</td>
<td>Very rural, with slow rate of population increase. Demands of urban housing are increasing slowly, representing an incipient urban context.</td>
</tr>
<tr>
<td>Honduras</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bolivia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecuador</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td></td>
<td></td>
<td>Average stage of urbanization with very high population increase. Great housing demands are existing in urban areas.</td>
</tr>
<tr>
<td>Most Countries (Eight Countries)</td>
<td>20-30%</td>
<td>more than 3.5</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td></td>
<td></td>
<td>Highly urbanized but with slow demographic increase.</td>
</tr>
<tr>
<td>Chile Cuba</td>
<td></td>
<td>less than 3.0</td>
<td></td>
</tr>
<tr>
<td>Uruguay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td></td>
<td>35-50%</td>
<td></td>
</tr>
<tr>
<td><strong>D</strong></td>
<td></td>
<td></td>
<td>Highly urbanized country with small rate of population increase.</td>
</tr>
<tr>
<td>U.S.A.</td>
<td></td>
<td>more than 50%</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>less than 2.5</td>
<td></td>
</tr>
</tbody>
</table>

The difference between the last two groups is that group 'C' has cities which are hyper-urbanized, their social and economic development is not parallel to their rate of physical urban growth. This is happening in Chilean cities which are included in group 'C'. For the purpose of this study it is assumed
that there are four stages of urbanization - highly urbanized nations, urbanized, urbanizing and little urbanized nations.

Similarly, for this study's purposes, the author assumes the existence of four city patterns. Each of these does not necessarily belong to each stage of national development (this will be explained in page 27).

a) Rural underdeveloped village  City type A  Underdeveloped

b) Intermediate developing town  City type B  Developing

c) Large city but not fully balanced development  City type C  Developed

d) Modern metropolis exhibiting all life's amenities  City type D  Super developed

e) The emerging urban pattern  City type E

In approaching the problem of cities, it is essential to recognize the existing of case 'E'. Encouraging development is taking place in the sprawling metropolitan regions of developed countries.

It will not be attempted in this work to arrive at such an image of this new urban pattern, but it is a fact that cities classified as case 'D' are becoming case 'E'. The same progressive development is applicable to other city typologies.
V. SOME CONSIDERATIONS OF URBANIZATION

Comparative Social Aspects

Today in the U.S.A. the differences between town and country, or between one state and another, are smaller than they once were. According to the usual theory, a person moves from one place to another in order to satisfy a goal that was unreachable at his first location. Demographic urbanization is thus seen as a response to individual goals, including cultural, economic, or material amenities. American society is characterized by a personal dynamism and a search for new and better elements.

American rural migrants are still moving to cities, especially towards larger cities, located in the faster growing states. (See Growth of Population page 44) Today rural migration to the cities is almost an accomplished fact. Mobility of the working class is more difficult within the city itself than mobility from rural areas to cities. The social problem of urban areas, related to housing, can be considered as the problem of marginal groups inside cities. They are usually static, Negro, American Indian and Mexican-American communities.
Traditional Latin American society is characterized by moving from rural areas to urban places (Figure 3).

The socio-economic conditions in the two sectors (rural-urban) are different. The growth of each of these areas depends on its own environmental qualities. Rural conditions are not good enough to compete with those better conditions located in urban settlements. Peasant movement is not a response to personal decisions, but to a forced situation; the product of undesirable rural socio-economic and physical conditions.
Among the more useful American population projections are those done by Homer Hoyt. All the projections given by Hoyt are based on the assumption that the world's population will increase at today's rate.

Without question, even more conservative projections seem to indicate a massive social urbanization in the future. It is likely that the next 50 years or less will double the present result of the 600 years of physical development in urban areas.
Comparative Economic Aspects

Economic aspects are usually conditioning the industrial development in cities. Industrial development brings within itself the potentiality of an urban development. Therefore, urbanization can and cannot exist accompanying industrial development.

A major difference between the U.S.A. and Latin America is that the U.S.A. had a correlation of urbanization and economic development. There, city growth was a consequence of economical diversification. In Latin American countries there exists what John Friedmann calls "Hyper urbanization" to refer to the non-equilibrium between the level of a country's urbanization and its economic development.

Friedmann shows that the concept of hyper-urbanization of almost all countries, especially Chile (Figure 5) is useful to illustrate the Latin American situation as a separate case. There is no similarity to North America.
In Latin America the countries that have the greatest G.N.P. (Gross National Product), such as Argentina, Uruguay and Chile, are characterized by a large increase of shanty town settlements. Keep in mind that these three countries have a slow population increase like the U.S.A., and that they are urbanized similarly. It is reasonable to assert that their urbanization, based on shanty towns, results from the lack of economic development, since the G.N.P. is one fifth that of the U.S.A.

Income Distribution In Both Americas

It can be argued that in the long run the U.S.A. is working its way to improve living standards through rising income. Today about one-fifth of the Americans live below the National Economic Poverty Level. Figure 6 illustrates this fact and the existence of a relatively even income distribution. Economically, sub-standard conditions in the U.S. are concentrated among Negros and other minority ethnic groups.

The situation in Latin America is very different. Figure 6 shows a partial viewpoint. According to estimates compiled for the United Nations, Latin America contains four income groups inside a homogeneous population - all widely spaced, with a very large percentage with extremely low income.
Urban economic structures in any given urban center are growing beyond their own city locations. No matter what its own stage of urbanization, village or metropolis, urban economy is absorbing the economy of the hinterland. The impact of this phenomenon on rural economy is that rural inhabitants see the way to become part of the urban economy and share the advantages of society. These inhabitants are socially and economically different from those majorities living in cities. Because there is economic poverty and because this poverty is present now in cities, the urban housing condition becomes problematic not only now but in the future.
Comparative Physical Aspects

Urbanization involves city growth. It demonstrates its effect in material aspects. The difference between adaptability to socio-economic changes in urban physical structure constitutes the difference between underdeveloped and developed nations. This physical adaptation exists in Northern countries while physical growth in developing countries goes beyond the real possibilities for adaptation.

In the U.S.A. the housing problem is caused by the improvement of economic conditions permitting the middle classes to move and leave obsolete dwelling. The low income group has the alternative to fill this vacancy. While in the Latin American context the problem is caused by the spreading of large self-built shanties due to lack of income. These shelters and land developments are the best that occupants can afford for themselves.

Physical order is a planning goal in the U.S.A. In the U.S.A. new feasible forms for cities are being proposed within its economic system which, in theory, could be built. In Latin American Nations the economic resources are becoming the goals. In L.A. they do not usually emphasize city planning. When they do, they must face new problems. One city that has been planned is Brasilia, but this plan did not make provision for the huge labor army that was forced to settle near the city, creating additional problems. It is a known fact that Brazilian housing conditions and urban environments are extremely poor, and becoming more chaotic than any other urbanizing countries.
Shanty Towns in Latin American Cities 1960

Shanty town growth in newly developing countries is not a temporary event. About half the population builds their houses in this way because it is their only possibility. Urban development schemes and minimum housing standards are not presently solving social or physical problems, especially those which result from scarce resources and behavior patterns in developing countries. Generally in Latin America construction control, lot size and health codes are not applied to a wide sector of the community. Therefore, the real problem is to analyze from a technical and economic point of view why these norms are not reached in these countries:

- the people do not know the norms
- they know them, but they disagree with the norms or
- they agree with them, but they do not have means
  - resources
  - knowledge
to enforce

Shanty Town Growth in Latin America

<table>
<thead>
<tr>
<th>Place</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile as whole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Antofagasta</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colombia, Buenaventura</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venezuela, Caracas</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Peru, Lima</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Arequipa</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- Chimbote</td>
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</tbody>
</table>

From data by United Nations. It seems to the author that the last two considerations should be kept in mind with reference to future urban direction.
VI. DEFINITION OF POVERTY

Although poverty in non-metropolitan areas exists, this study is primarily concerned with urban poverty and its relation to the housing problem. Standards used to define poverty are admittedly arbitrary, and there are many facets not able to be reduced to money. However, economic data is one of the most useful ways to know how many of our fellow citizens may be identified as poor. The Council of Economic Advisors of the U.S. uses annual family income of less than $3,900 per year to define the poverty level. Likewise the Chilean Government fixed a minimum legal wage of $400 (5,600 escudos) to define a yearly minimum family income for 1969. Both indexes are a rough and approximate measure and it is a known fact that these measures are below the real poverty level existing in any given time.

The following data will be considered in relation to poverty levels:

Figure 8

[Diagram showing the percentage of people qualified as poor in the U.S.A. and Latin America]

Figure 9 shows the residential location of poor people during 1967 in both regions.

Figure 9

<table>
<thead>
<tr>
<th>Inner City</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>51%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Poverty Belt</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
</tr>
</tbody>
</table>

United States

Latin America

In addition to regional differences in poverty levels, there are differences in the nature of poverty. Some poverty is the result of economic conditions, and some poverty is the result of social conditions. This study will not attempt to propose physical housing solutions which distinguish between poverty conditions which are the result of social circumstances and those which are the result of economic circumstances. It will base its proposals on the present context of the poverty situation rather than the cause of that situation. It assumes that all poverty situations require a physical housing solution regardless of the cause of the poverty.

It is a known fact that poor people, especially in Latin America, cannot resolve the housing problem within the existing framework of social institutions. One may then try to institutionalize certain behavior patterns of the people.
Slums, 'ranchos', 'fabelas' or 'callampas' are a normal aspect of today's city life. They are a physical manifestation of an existing culture, "the culture of poverty", as Oscar Lewis calls it.

A culture is a system of standard situations. Each of these situations specifies certain roles, certain allowed limits of behavior for the persons in these roles, and the requisite spatial setting for this behavior. Each situation thus specifies a certain physical pattern—and each pattern recurs many thousands of times in any given city. The form of the city is generated by the combination of these patterns. In this sense, the city, viewed as a purely physical system, is a direct concrete manifestation of the culture. Any attempt to change the physical organization is an indirect attempt to change the culture. 20

Because urban professionals almost always are not a part of the culture of poverty, they have difficulty setting goals which respond to aims and needs of that culture, therefore they have little success improving poverty areas. Finally, it is important to consider poverty as related to time and location. What is poverty in one context could be luxury in another. In the same way in a specific place, yesterday's luxuries become tomorrow's needs.
SUMMARY OF THE CONTEXT

In a diagramatic way the analyzed contexts belonging to the U.S.A. and Latin America are the following:

SOCIAL
When there exists such a percentage of people qualified as poor in Latin American nations, the numerical housing goals are unreachable. In the U.S.A. the housing goals can be the improvement or construction of a determined number of dwellings. These units are going to be occupied mostly by minority groups.

ECONOMIC
With this distribution of income in the U.S.A. housing goals may be reachable. Latin American housing goals must not be numerical, but they must be aimed to qualitative conditions.

PHYSICAL
Assuming that present socio-economic conditions will continue, it is possible to assert that future residential manifestations mean suburbs for the United States and an increase of shantytowns in Latin America.
SOCIAL

Because the average age is younger in Latin America, housing demands will be stronger than in the U.S.A. Social class composition in Latin America makes impossible the "turnover process" which exists in the U.S.A. (lately this process is becoming inefficient even in the United States).

ECONOMIC

Because the family is always in flux, family demands are constantly changing. A typical family today may be a typical family tomorrow. One way to measure this change over time is by an income curve, which represents: socioeconomic stability, amenities, more space, and other physical demands.

PHYSICAL

In any given time there is a great variety of housing demands. They are determined by distinct economic levels.

A good housing policy should give consideration to all groups of people, including the low income sectors.
SOCIAL
Nations have been classified in four groups, (see page 11) represented by a specific city type, based on population increase and percentage of urban population.

ECONOMIC
Because different economic developments are occurring, there are different stages of urbanization.

PHYSICAL
Each quadrant belonging to the low income sector demands a housing solution according to urban typologies A-B-C-D.

Housing problem considerations in this thesis.
PART TWO

HOUSING SOLUTION PROTOTYPES DEPEND UPON THE COMPARATIVE STAGE OF URBANIZATION
I. INTRODUCTION

The search for appropriate housing solutions is facilitated by comparing the stages of urbanization of the cities in developed countries, such as the U.S.A. and urbanization in the cities of developing countries of Latin America. The assumption as stated in Part One is that there are four developmental conditions in regions, countries, cities and zones within cities. In the Latin American region, there are countries which represent the first three cases (see references to groups 'A', 'B' and 'C' on page 11). In Chile there are examples of cities in each of the three stages of development: Santiago in Case 'C'; Antofagasta is Case 'B'; and most of the rural villages in Case 'A'. On the other hand Houston represents Case 'D'. It will be assumed that the first three cases represent Latin nations or cities and Case 'D' constitutes a prototypical American city.

Each one of these situations has specific patterns of city development. Just how applicable are established principles and theories about the urban growth of each one of these situations? Most of the theories about the changing city arose from studies of highly urbanized cities in the U.S.A. and Europe. How appropriate are they to the development of cities in very different settings and under conditions of rapid nation-wide change? The actual Latin American models of a
city's growth and, housing goals are presently imitating aspirations which belong to other developed countries. (Brasilia is a very obvious example). Their underdevelopment is becoming more critical because of the use of inappropriate models.

Latin American models of cities and housing standards are copied from developed countries in spite of the fact that invention and technological expertise in Latin American countries are many decades behind the developed nations. This study is an attempt to correct this inappropriate position and suggest a possible methodological alternative for identifying appropriate housing goals for each country and local urban context.
II. BASIC REFERENCES TO URBAN CONTEXTS

The following references are offered to illustrate the four developmental conditions assumed in Part One.

Case 'A' - Underdeveloped

In Bolivia out of 155,725 houses surveyed, 47.5% were without water and 54.2% without sanitation. Annual income per capita was only $65 in 1959.1

Case 'B' - Developing (See Figure 1)

The experiences of certain Peruvian cities are typical of urbanizing countries. During the past 25 years the population of Lima has trebled from less than 700,000 in 1940 to an estimated 2,100,000 today. In the same period the squatter population has grown from an unrecorded and relatively insignificant number in 1940 to a conservative current estimate of 25% (of the city's population). As in other urbanizing countries, the situation in "ciudades provinciales" is even more alarming. In Arequipa, the second largest city of Peru with a population of approximately 200,000, 50% are reported to be living in "urbanizaciones populares", clandestine lower-middle and working class subdivisions almost entirely on marginal desert land belonging to the state.2

The "bariadas" of Peru now represent a multi-million dollar investment in housing construction, local small businesses and public services, not to speak of the social and political investment in community organization. Such achievements hold lessons from which more advanced countries may well profit.3

Case 'C' - Developed

The planning of Brasilia was defeated by the development of slum, satellite cities. The shantytowns and "fabellas" around Caracas and Buenos Aires are one of the most terrifying problems of the world.4
Case 'C' - Developed (continued)

In oil-producing Venezuela, there is a great inequality of income. A family in Caracas may earn upward of $4000 a year, while a farm family may be earning less than $400.5

Throughout South America there is a general dissatisfaction with large housing projects. Costly mistakes have been made in the construction of satellite cities and superblocks.6

Case 'D' - Super Developed (See Figure 2)

Although the housing problem has taken on a wide variety of meaning over time, it has persisted as a major policy issue in American cities. In its most basic form, the problem is one of assuring an adequate minimum living environment for people too poor to pay for decent housing at market prices.7
Case 'B'.

In Antofagasta (Chile) there are 9,800 'ranchos' grouped in 23 neighborhoods representing approximately 40% of all the city's dwelling units. These neighborhoods are located on lots provided through 'Bienes Nacionales' since 1940. Part of them are on already occupied consolidated land. The layout irregularities lack adaptability to the topography. Due to the dry and mild climate, these dwellings are built with inappropriate and short-life materials and they reveal in general a rudimentary construction technique.
Case 'D'.

For Houston as a whole, the 1960 census shows the following facts:

- 44,825 families had income under $3,000 per year.
- 40,245 families and unrelated individuals lived in deteriorating housing.
- 6,733 families and unrelated individuals lived in dilapidated housing.

Therefore, almost 50,000 families (20% of the city's families) as of 1960 were living in substandard housing, either deteriorating or dilapidated.
According to the preceding references, it is reasonable to assert that every city is increasingly the refuge of a large number of poor, and it is the poor who now determine a great part of its physical growth. They demand housing, but housing is not only physical units. It involves certain land requirements such as recreational space, ad hoc utility services, and community centers. The question arises: Is it possible to offer the poor sector a complete solution? All cities do not have the same capabilities, nor the same situation. Presently, they cannot all offer a standard house. Typical housing should be evaluated according to the low income family needs of each local, urban condition. According to the last statement it is possible to assert that: housing requirements should be determined by the state of urbanization in which a particular city exists. In other words, not all nations or cities have the same problem, some have 20% poor people, others more than 50%, because some are growing faster than others. (See Figure 3).

For each developed condition it is possible to assert that:

Case 'A'

Urban land provision is the space problem for most of the underdeveloped urban contexts which must receive people flooding in from the impoverished rural districts. They must
provide planned squatter settlements or unplanned shanty towns will develop.

Case 'B'
In developing countries a good house is not necessarily one of high physical standards or a complete dwelling. The migrant must make his house out of any available materials so that he can conserve his scarce money for food and possibly education.

Case 'C'
Urban homes in a developed country must provide at least a semi-permanent residence. The poor are no longer as poor as they are in less advanced stages.

Case 'D'
In super developed countries such as the U.S.A. housing problems derive from the desire for mobility and from an incapacity to make certain improvements in existing vacant dwellings. It is evident that concentrated slum area living is often the result of lack of economical housing in better areas and social restraints on mobility.
Figure 3

**INCOME DISTRIBUTION CURVES**

- Low income sectors
- Underdeveloped
- Developing
- Developed
- Superdeveloped
- Little urbanization
- Urbanizing
- Urbanized
- Highly urban

**Region**

- **Latin America**
  - BOLIVIA
  - ECUADOR
  - COLOMBIA
  - PERU
  - VENEZUELA
  - BRAZIL
  - ARGENTINA
  - HAITI
  - URUGUAY

- **North America**
  - U.S.A
  - CANADA
  - CANADA

**City**

- (Texas) Rosenberg
- BRENNER
- (Chile) CALAMA
- SAN ANTONIO
- ANTOFAGASTE
- AUSTIN
- SANTIAGO
- HOUSTON

**Neighborhood**

- HOUSTON SWINEY AREA
- DENVER HARBOR
- SHARPSTOWN
- RIVER OAKS
- QUINTA NORMAL
- NUNOA
- VITAGURA
- POVERTY BELT
IV. SUBJECTIVE POSITION ON THE URBAN PHENOMENA

To expedite the establishment of the hypothesis, the author will present his subjective position regarding the city.

Cities have existed for about 6000 years; they are not a new event. People in the area surrounding the city have always wanted to get to the city. They wanted the conveniences and the communication which the city offered. Historically, the men outside the city have outnumbered the urbanites, but today the urban population outnumbers the rural population. Man's place is, and will be, in the city. Man is the only being that makes history, and the history of man is the history of civic-man. The nature of the city is obvious; the gregarious instinct of man. The city in this way makes men accessible to one another.

Initially it is necessary to distinguish between the activities and processes that make up urban life, and the physical environment in which these activities and processes take place. It is also necessary to remark that the physical environment and the activities are equivalent in importance; that is, there exists a mutual relationship between human behavior and physical environment. In essence, this author agrees with the following statement of Winston Churchill:

'We shape our buildings and then they shape us.'
Scheme Of Life Style - Urban Form

Social man, living in society, has multiple needs that he tries to satisfy during his existence. These needs range from organism - conservation to those derived from the act of wishing to comprehend and to express the relationship between himself, his fellow man, his environment and his surroundings. In fulfilling these needs he gets satisfaction that places him near happiness.

From the characteristics of the needs that man wants to fulfill in a given moment, he derives his conduct toward his natural surrounding and social environment.

In a society based upon labor division and a money exchange economy, these performances are interpreted in production and consumption of goods and services and a complicity of institutions which provide these activities. These activities are always modifying the natural resources and they are obtained over time and space. Physical modifications are and will continue to be interdependent on activities or life style. Physical modification constitute urban form and these are explained by socio-political, economic, and physical forces prevailing at any given time.
Life style is determined by the manner in which people spend their resources and time in any specific period of time and within a specific geographical areas (Figure 4). Urban form and life form are complementary aspects of the same cultural whole.

Figure 4

![Diagram showing the relationship between social man, activities, geographic habitat, life form, urban form, interests, natural resources, socio-political, economical, and physical habitat.](image-url)
V. ESTABLISHMENT OF HYPOTHESIS

**Housing solution prototypes depend upon the comparative stage of urbanization.** Previously it has been stated that the city is explained by socio-economic and physical relationships. In order to understand a comparative city situation, one must expand the scale of analysis to the national context, and contract it to the urban zone context. These contexts can be reduced to a matrix with three axes. The axes represent economic, social and physical structures respectively.

**Model Considerations** (See Figure 5)

(a) Each context has economic, social and physical aspects. The author does not discuss political aspects, because each one of these three aspects is considered to have a political dimension.

(b) The three aspects of a given context do not necessarily exist in equilibrium. The situation of the U.S.A. and Latin America can be compared graphically (See Figure 5b): In the U.S.A. as compared to Latin American cities, generally there exists an urban equilibrium resulting from the balance of social, economic and physical factors. Most Latin American cities suffer from 'Hyper Urbanization', in other words, the physical city structures are growing too fast in comparison to the economic and social aspects of development.
Figure 5

MODEL CONSIDERATIONS

a)  
- REGIONS
- NATIONS
- CITIES
- ZONES

b)  
- \textit{equilibrium}
- \textit{non-equilibrium}

Latin America

usb
gch

Non

physical

\textit{Hyper-urbanization}^*

\textit{physical}

Mexico

Canada

New York

Sharp Town

Swiney Area

USA

\textit{A}

\textit{B}

\textit{C}

\textit{D}

\textit{E}

\textit{F}

\textit{G}

\textit{H}

\textit{I}

\textit{J}

\textit{K}

\textit{L}

\textit{M}

\textit{N}

\textit{O}

\textit{P}

\textit{Q}

\textit{R}

\textit{S}

\textit{T}

\textit{U}

\textit{V}

\textit{W}

\textit{X}

\textit{Y}

\textit{Z}

\textit{aa}

\textit{bb}

\textit{cc}

\textit{dd}

\textit{ee}

\textit{ff}

\textit{gg}

\textit{hh}

\textit{ii}

\textit{jj}

\textit{kk}

\textit{ll}

\textit{mm}

\textit{nn}

\textit{oo}

\textit{pp}

\textit{qq}

\textit{rr}

\textit{ss}

\textit{tt}

\textit{uu}

\textit{vv}

\textit{ww}

\textit{xx}

\textit{yy}

\textit{zz}

\textit{aaaa}

\textit{bbbb}

\textit{ccccc}

\textit{dddd}

\textit{eeee}

\textit{ffff}

\textit{gggg}

\textit{hhhh}

\textit{iiii}

\textit{jjjj}

\textit{kkkk}

\textit{llll}

\textit{mmmm}

\textit{nnnn}

\textit{oooo}

\textit{pppp}

\textit{qqqq}

\textit{rrrr}

\textit{ssss}

\textit{tttt}

\textit{uuuu}

\textit{vvvv}

\textit{wwww}

\textit{x xxx}

\textit{y yyyy}

\textit{zzzz}

\textit{aaaaaaa}

\textit{bbbbbbb}

\textit{ccccccc}

\textit{ddddddd}

\textit{eeeeeee}

\textit{fffffff}

\textit{ggggggg}

\textit{hhhhhhh}

\textit{iiiiiii}

\textit{jjjjjjj}

\textit{kkkkkkk}

\textit{lllllll}

\textit{mmmmmmm}

\textit{nnnnnnn}

\textit{ooooooo}

\textit{ppppppp}

\textit{qqqqqqq}

\textit{rrrrrrr}

\textit{sssssss}

\textit{ttttttt}

\textit{uuuuuuu}

\textit{vvvvvvv}

\textit{wwwwwww}

\textit{x xxxxx}

\textit{y yyyyy}

\textit{zzzzzzz}
(c) Each aspect can be measured in many ways and at the regional level, city level or neighborhood level, for instance:

<table>
<thead>
<tr>
<th>Socially</th>
<th>Economically</th>
<th>Physically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of population increase</td>
<td>- Income per capita</td>
<td>- Number of dwellings</td>
</tr>
<tr>
<td>Birth rate</td>
<td>- G.N.P.</td>
<td>- Physical city size</td>
</tr>
<tr>
<td>Social Stability</td>
<td>- Number of industries</td>
<td>- Density</td>
</tr>
<tr>
<td>Institutions</td>
<td>- Volume of imports and exports</td>
<td>- State of physical environment</td>
</tr>
</tbody>
</table>

(d) To analyze a specific context completely, it would be necessary to obtain many models which examine all possible variables. The models, when superimposed, will illustrate the context, showing the specific location of the region, national, city or urban zones within the determined physical, social and economic conditions. The equilibrium state would exist when the analyzed urban context is close to the diagonal.

(e) When a nation is classified in a group (Group 'A' for instance) it is because:

1) It has a large quantity of people living in that type (Group 'A') of city.
2) The majority of its cities fall within this group (Group 'A').

The same system of classification is valid for zone or areas within a city.
EXAMPLE OF A MODEL

The regional contexts of this paper are North and Latin America. The intention of this example of a model is to identify the contexts of the housing problems of Houston and Antofagasta, so that physical prototypes and locations can be proposed. First, in this study the regional context will be examined, then the national context, and finally the city context. The model will select only one variable for each aspect of each context to illustrate the process.

Regional Context

Economic Aspects: The economic variable used in this model will be income level. U.S.A. and Canada are at the top of the economic axes, while Latin countries in general are at the base of the matrix. (See Figure 6) If data were available, social and physical aspects could be analyzed and superimposed for the regional context.

Figure 6
National Context

Social Aspects: Many social variables could be considered for analysis of the national context (rate of population increase, urban activities, education level). The rate of population increase will be used here. Figure 7b shows the rate of population increase for various sections of the U.S.A. (Case 'D' Superdeveloped) Figure 7 shows that the U.S. is highest on the economic axis, and varies along the social axis (rate of population increase). Note that Texas is in the third quartile.

Figure 7a shows the grouping of Latin American countries according to population increase and stages of urbanization. Case 'A' (underdeveloped countries) includes Peru, and Haiti. Case 'B' (developing) includes Venezuela, Brazil, Colombia, and others. Case 'C' (developed) includes Chile, Argentina, and Uruguay. Note that Chile has a rate of population growth similar to that of the total United States.

City Context

Physical Aspects: To analyze the physical aspect of the city context the number of dwellings will be used, other factors could be used (number of persons per dwelling, number of persons per acre). Figure 8 locates various cities according to their economic (income level), social (rate of population increase), and physical (number of dwellings) aspects.
Figure 7a

Figure 7b

Figure 7 - Rate of increase of the total population by states, 1920-1930. (Based on Fifteenth Census of the United States: 1930, Vol. 1, Table 6, p. 14.)

"GROWTH OF POPULATION"
Note that some cities (Houston, Santiago and Antofagasta) are outside of their general country context, shown in Figure 7.

Equilibrium

Figure 8 also shows the equilibrium line O -- A, which indicates the location of region, countries, or cities which are developing in a balanced way. Of those context which do not lie near the equilibrium line, some must raise their income levels or gross national product.
Others, such as most Latin American countries, must discourage migration to the cities and decrease their birth rate in order to approach equilibrium. There are many alternatives that can reach these two phenomena. 'Family planning' in Latin America could be one of the most accepted recommendations. Today, new rural villages, intermediate towns, and satellite cities are designed as proposals to face and control peasantry moving toward the cities. In any situation these and other existing proposals are matter to be decided by the political authorities.
VI. LOW INCOME HOUSING REQUIREMENTS BASED ON THE MODEL

This model represents a framework for analyzing and synthesizing the urban situation and identifying the housing requirements that are indicated for low income sectors. To demonstrate this, it is necessary to refer to the four types of cities of this study, and observe their main characteristics.

Figure 9

<table>
<thead>
<tr>
<th></th>
<th>A Under developed</th>
<th>B Developing</th>
<th>C Developed</th>
<th>D Super-developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCIAL Rate</td>
<td>2 - 2.5%</td>
<td>3.5%</td>
<td>2 - 3.5%</td>
<td>2%</td>
</tr>
<tr>
<td>Population Increase</td>
<td>2 - 2.5%</td>
<td>3.5%</td>
<td>2 - 3.5%</td>
<td>2%</td>
</tr>
<tr>
<td>ECONOMIC % Population Qualified As Poor</td>
<td>50%</td>
<td>40%</td>
<td>30%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Each situation has distinct social, economic, and physical conditions. For example; Houston, belonging to Case 'D', is close to the diagonal equilibrium line shown in Figure 8. The three aspects are developing in a balanced relation to one another. Antofagasta, representing Case 'B', is farther from the equilibrium state because of its rapid population
increase and its low per capita income. Briefly, the housing requirement for each stage of urbanization can be seen as graphed in figure 10.

Case 'A'
More than half of the population has a yearly income below the poverty level. These cases are small urban centers, usually rural, and with a slow population increase. Based on the previously stated physical, economic, and social characteristic, utilities and housing sites alone would be a feasible solution to provide for low income families.

Case 'B'
(See Figure 11.) There are fewer poor people than Case 'A', and the poverty level is above that of Case 'A'. But, Case 'B' faces a galloping population increase and a continuously changing city. Actually, this context constitutes the seeds of shanty towns. Urban economic resources cannot cope with migration and birth rate. Thus, in this context, it is necessary to impose socio-political measures to cope with the galloping population. Until restraints are imposed, professionals can do very little. Land, utilities, and temporary dwellings for great quantities of migrants would be perhaps the only realistic housing solution.

Case 'C'
Only 30% of the population are poor and poverty occurs above
that of Case 'A' and 'B'. The housing scarcity is less severe, but the poor cannot afford what is available. Neither the government nor the poor have the resources to supply complete dwelling and the community service requirements which must accompany them. In this context, where some economic resources do exist, a very economical dwelling should be provided in addition to land and utility supply which were provided in Cases 'A' and 'B'.

Case 'D'

(See Figure 12) Small minority groups (20%) are qualified as poor. The poverty level is comparatively higher than the preceding cases. At the same time, economic resources exist to provide the poor with a complete dwelling. In addition to complete dwellings, the solution must provide physical amenities. The need for physical amenities is more obvious in Case 'D' because the majority of the population has them.

Finally, each urban context, in time, will change its situation in order to achieve the next stage. The housing solutions are determined not only by the present context, but also by the development trajectory, their path to the advanced stage (See Figure 10). In the way Case 'D', for instance, has all the physical aspects that less developed situations do not presently have, but will have with time. Physical solutions
In Figure 10a, there exists a continuum of physical demands, from site and utilities to housing amenities. Corresponding solutions are necessary.
for progressive housing development which allows for pro-
gression to the next stage.

It is the subjective position of this author that the housing
goals must be scaled to the living standards of each situa-
tion's condition (See Figure 10a). In those places (Case 'A',
underdeveloped) where more than 50% of the existing are poor,
housing standards, such as those suggested for must be lower
than those of Case 'D' in order to be reached by these sectors.
On the other hand, existing living conditions for the poor of
Case 'D' must rise, so that they may achieve the same stand-
ards maintained by the majority social groups (middle and
upper) within their context.
Fig. 11  ANTOFAGASTA, low income family housing located in poverty belt zones.

Fig. 12  HOUSTON, low income families living in obsolete dwelling located close to city core.
PART THREE

PHYSICAL URBAN CONTEXT DETERMINES RESIDENTIAL LOCATION AND DWELLING DENSITY
I. INTRODUCTION

Low income family housing involves residential complexes scattered throughout cities. Different physical, social and economic urban structures in each city determine the location for new residential projects. Only physical patterns will be stressed in this study.

The purpose of this part of the thesis is to analyze the way in which some physical urban elements could define residential placement. To provide a frame of reference, a short explanation of the theoretical physical aspect of a city will be discussed. After choosing the best location for low income family residences, dwelling densities will be determined in a manner based upon the physical variables.
II. **THEORETICAL PHYSICAL ASPECT OF THE CITY: URBAN FORM**

In Part Two it was assumed that urban phenomena are constituted by *Life-Form* and *Urban Form*. This section will examine the major aspect of urban form which is the *Elements*. These elements are human population, natural resources, buildings and infrastructure. They may be *movable* or *stationary*. (Figure 1).

Other aspects of urban form which must be acknowledged, but will not be examined in detail in this section, include: *Granulation*: Modality or tissue in which some of these elements would be disposed over space with a relative location to other elements. (Figure 2).

*Focus*: Predominance of some elements over others.

(Fig. 3)
Density: Number of elements by surface unit at any given time. (Figure 4).

Fig. 4

Fig. 5

Figure: Geometric shape resulting from the form and its ordering elements at a given point in time. (Figure 5).

Movable Urban Elements

Man occupies certain conventional fixed spaces necessary for his activities. He can leave these spaces and occupy other spaces. Man lives and works in groups defined by different kinds of communication and location. Interaction requires that the person be in a different group and involves movement of both persons and goods. The flow of people, information, money and goods is the result of this group communication and location.

As cities increase in population and area, it is clear that a major factor of urban social structure becomes mobility. Mobility is one of the most important phenomena determining urban structure. Urban structure depends upon the cultural artifacts supplied by technological scientific discoveries. Mobility is responsible for specific applications of these
discoveries.

In some urban contexts an adequate mobility exists due to greater availability of technical, political and economic means which provide the majority of the people with an adequate transportation system. In other cities, the people are dependent upon their traditional systems because of a lack of technological advances.

**Stationary Urban Elements**

Fixed elements represent locations for the performance of activities and the spatial form of communication and transportation networks. Buildings are points of origin and destination. Transportation structures represent the existing relationships between places where activities take place.

For the purpose of this study they are grouped as shown here:

- **Points** - Residential
  - Community Services
  - Work Place
- **Lineal** - Circulation Network
  - Utilities
- **Surfaces** - Landscape

![Fig. 6](image-url)
Assumptions Concerning Stationary Elements

City Growth: Man is always organizing and modifying his physical environment. A city is almost always growing in time.

Urban Land: Natural resources such as urban land are valued according to the ease with which they can be changed or modified by fixed elements. Thus urban zones are of higher economic value than those less urbanized areas.

Transportation Network: Origin and destination are separated. Therefore, a transportation network appears and it is usually specified by the existing technological level.
Community Services And Work Places: The quality and spatial distribution of the public services (cultural, commercial, educational, recreational) must accommodate the whole community. In order to accomplish this, they could be either centralized or dispersed over residential zones.

Dwelling Densities: In cities there are specific organized spaces which are the result of man's land use constituting the location and density concepts.

Although the emphasis in this thesis is on the physical elements, one must be aware that the physical aspect is but one manifestation of the total social and economic urban structure, which, together with the physical structure, makes up the urban system.
III. PHYSICAL VARIABLES INFLUENCING RESIDENTIAL LOCATION

After establishing general theoretical aspects related to the city, it is necessary to examine different city typologies. These typologies represent various stages of urbanization which can be present simultaneously in a given nation. As an analytic method, it will be supposed that Cases 'A', 'B' and 'C' represent Chilean cities such as Calama, Antofagasta, and Santiago, respectively. Case 'D' constitutes a prototypical American city like Houston.

The main objective of this Section is to analyze housing locations which are related to the previous assumption concerning stationary elements:

a- City Growth
b- Urban Land
c- Utilities
d- Transportation Network
e- Community Services
f- Work Place Location

An appropriate residential location will be suggested taking into consideration all the variables simultaneously. Finally, in order to obtain a method of determining dwelling densities, it is assumed that this density results from the relative location of housing projects inside cities.
City Growth

City Growth In The U.S.A.

City growth is a result of natural increase in population and migration from non-urban areas. The U.S.A. is a nomad's country; therefore, mobility is the principal factor which is changing the city. Three kinds of movements appear:

a) Rural-Urban
b) Between Cities
c) Within The City Itself

a) In the U.S.A. advanced technology replaces the need for laborers in the rural areas resulting in rural-urban migration. There is a relatively good adjustment by the city to this migration because a well structured socio-economic organization exists and a mass communications media.

b) Mobility resulting from movements from one city to another is perhaps the most severe mobility problem affecting urban growth. This type of urban mobility in the U.S.A. is difficult to control, but it should—be considered as a new pattern of today's American cities.

c) Mobility within the city itself, on the other hand, is the result of improvement in economic conditions. Middle and upper income families move from one residence to another. A large percentage of new home building takes place in suburbia. Many families move from inner areas of cities to new suburban developments, leaving behind a large stock of vacant and
obsolete housing. In this process low income sectors play an indirect role. That is, they can improve their housing conditions based on this "Turnover Process", \(^1\) by occupying this vacant housing.

**Figure 11**

![Figure 11](image)

- low income
- L. America
- U. S.A.

**City Growth In Latin America**

In Latin American cities there is neither a good socio-economic organization nor a good agricultural production based on technological advances. These cities are not as capable, as the U.S.A., of achieving new urbanization. Shantytowns appear as an uncontrolled, spontaneous phenomena. These groups of minimal shelters are physical manifestation of the inability of the city to receive migrants from rural areas. The peripheral shantytowns are the last stop for the migrants. Before
settling in these shantytowns, these people have experienced a migration dependent both on a time factor and their income level.²

As an average, all migrants have as a goal a piece of land in the marginal city zones. So, it is not exaggerating to say that in Latin American cities, growth is based on shantytown settlement and resettlement. Therefore, it seems to the author that the provisional shanty is the key problem to be solved. It is a form of normal urban growth under historically unprecedented conditions.

The marginal urban growth of today is the inner ring of tomorrow's city. Cities of this region which are developing because of these settlements require planning just as any other normal urban growth requires planning.

**b) Urban Land**

Land and the shelter of a house are inseparable. The paradox of low income families living on high priced land in U.S.A., or Latin American families living on land without utilities or community services, is explained by the growth patterns of respective cities and by the few alternatives of housing offered to these sectors.

In the U.S.A. the wealthy families tend to occupy the best and cheapest urban land. They desire a considerable amount
of housing, exterior space, and amenities which exist in the super suburbs. Moreover, the other income groups are influenced by these families and tend to imitate their locational behavior. Middle income groups tend to occupy transitional zones between the two polar groups by obtaining land tenure, housing amenities, and accessibilities. The urban zones abandoned by previous groups are occupied by low income sectors.

In Latin America high income groups behave similarly; but low income groups, according to different city patterns, are almost always looking for peripheral urban land. This happens primarily because public transportation exists to carry them from their houses to city services. These two extreme groups, wealthy and poor, are influencing the pattern of land use within their respective environments. In order to simplify the problem one could say that land preferences are defined by accessibility and by the physical environment. Land price results from an addition of both; location and physical amenities.

**Land as a Location:** Land has a specific location within the city related to every other part of the city. This relation is dependent on transportation systems, which link all the parts together. Land values generally decrease with distance from the city core.
Land as Physical Environment: This characteristic is related to the land's location in the city and the environmental qualities such as view, lot size, existence of natural features, or climatic conditions.

Urban Land for Low Income Housing: Urban land for housing assumes two alternatives related to the low income family. First the optimum location of land for housing should be near the place of work. A rational pattern would be one which takes into consideration housing and place of employment. Second, physical amenities of the land are not considered essential by this group of people. What they want is ownership of a piece of land. In Latin American cities they are accomplishing this and indirectly acquiring some physical amenities such as views and good air. The cost of urban land located near core areas is prohibitive for low income residential purposes in America. Other activities such as commercial development displace housing unless it is high density, high income apartments for groups who can afford them. This is the actual tendency, not only in American cities, but also in the larger cities of Latin America.

c) Utilities

In a given type of urbanization, new construction, especially related to housing utilities and house package economy, increases steeply with the distance from the core. One must
say that in most Latin American cities the low income sector is growing "just over the hill". Every morning a few more shantytown huts are found on the nearby hill. It is known that these people do not have the initial investment required to obtain a roof over their heads. Needless to say, the government is forced to give them utilities. This means that the government must finance more than 50% of the total building costs in these "obras de urbanization". This amount does not consider land cost.

Recommendation for U.S.A. and Latin America: As a first recommendation for a residential location taking into account land and utilities, it would be feasible to locate toward the periphery, but within actual city limits, where utilities are existing. Cost of housing is according to price (including land) per unit. In the suburbs the same price would buy larger size sites. These larger lots are necessary for development of low density residential complexes.

d) Transportation Network

The physical manifestation of movement carried out by any community, according to a specific technological level, is determined by economic development. The transportation system modifies the relationship between residential and other activity points. Societies with high incomes or advanced technologies use faster and more modern methods of
transportation. Today they have the automobile and rapid transit by rail. In the future it is possible to think of helicopters and other more advanced means.

In less developed areas one observes the pedestrian and other traditional transportation systems pertaining to a more rudimentary technology. The more complex the urban situation, the more complex the transportation network. Pedestrian system, collective transportation, and especially the automobile are found in the most complex urban context. It seems to the author that the transportation network is the main element which determines the location of housing. Urban proposals are determined in geographical size by the area which it is possible to reach in a given time, using a specific type of transportation.

As a methodological approach, it is assumed that one half hour is the acceptable time to travel from residential areas to major activity places of the city. Considering the half hour time limit, housing location can be determined by the type of transportation available:

<table>
<thead>
<tr>
<th>Case</th>
<th>Type</th>
<th>Distance from Activity Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>'A' Pedestrian</td>
<td>1.5 miles</td>
<td></td>
</tr>
<tr>
<td>'B' Pedestrian-Bus</td>
<td>3 miles</td>
<td></td>
</tr>
<tr>
<td>'C' Bus</td>
<td>10 miles</td>
<td></td>
</tr>
<tr>
<td>'D' Automobile</td>
<td>15 miles</td>
<td></td>
</tr>
</tbody>
</table>
Transportation Network and the Low Income Sector: The relation of the transportation network to the low income sector will be examined according to the developmental conditions discussed in Part Two (See Figure 12):

Case 'A'
People's movements are without vehicular artifacts. The residential location would be determined by the distance that a man can walk in a given time; that is, if half an hour is the recommended time to spend in moving from residence to other city areas, then the house should be no more than 1.5 miles from the core of the city. Some sacrifices must be made by the residents of new residential projects located in distant areas, especially when resources are not available to provide vehicular systems.

Case 'B'
This situation is characterized by an incipient public transportation system. This kind of city has larger physical dimensions than Case 'A'. It is represented by the case of Antofagasta which will be studied. Without the existence of some organized network of collective transportation, low income families are too far from their daily activities. They are participating in city life, but spending long periods moving from residence to the city center or workplace. To be feasible future residential locations should at least consider
a combination of transportation systems in order to take advantage of the benefits of the city center.

Case 'C'

Capital cities in most Latin American countries use a combination of automobile, collective transportation and pedestrian system. The location of low income sectors is more dependent on mass transportation, because an existing massive network of public and inexpensive transportation, permits them to live in the outer zones without the loss of downtown benefits. The transportation system is related to the "primary city" which is the principal city center. Secondary centers appear, determined by periodical movements; and, finally, tertiary centers supply daily activities; such as school and recreation activities within walking distance.

Figure 12

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>pedestrian</td>
<td>pedestrian bus</td>
<td>bus</td>
<td>automobile</td>
</tr>
</tbody>
</table>
Case 'D'
This case represents the more developed existing transportation means. A high percentage of the population, including low income families, can afford the faster and more comfortable transportation system. The low income groups which generally work in downtown areas and industrial areas are accepting higher residential densities, bad environmental conditions and high rents. This is because of the inefficiency of collective transportation and because they are also more likely to use less expensive transportation means. (pedestrian) Future residential location, as in the previous cases, depends upon reasonable accessibility through the use of existing transportation technologies.

Community Service
Community services are those facilities offered by public-private agents for the benefit of all. Social welfare depends on their urban distribution and their being adequately equipped. They include shopping, cultural centers, recreation places and all elements inherent to residential needs. Low income sectors do not have the same choice of opportunities that the wealthier sectors have since they are more dependent on public welfare. These services, such as free public health, are so elemental and necessary that they are evaluated in a similar way to work opportunities.
Generally, for social and economic reasons, these services are distributed in a specific way throughout the city; for instance, shopping according to market requirements. Their location is conditioned by the technological level of transportation in each context.

In countries with a scarcity of resources, these services are usually offered by the government. The location is given by defined criteria in order to provide benefits to all the population. As the complexity of urban contexts increases, the role played by such services becomes more important; that is, hierarchical orders appear among them, due to their location and to their importance.

**Low Income Family and Community Services:** This relationship is also examined according to the developmental conditions (See Figure 13).

**Case 'A'**

Around the principal square all kinds of services are located. City life is constituted by the citizens activities and these are performed around "the plaza"; they include commerce, church, and schools. Residential location near this "core" is more convenient for low income projects.

**Case 'B'**

There appears a certain ramification of commercial activities
from downtown towards the suburbs. Theaters, schools, shopping facilities and other communal services are concentrated in some inner blocks in the city. Daily commerce occurs in a corner shop rather than on the main streets in suburbs. As in Case 'A' the investment in community services must keep in mind the benefit of the whole city. Residential location is mostly related to core areas as far as community services are concerned. It seems, then, that these two cases have very concentrated development patterns and, in both situations, residential development should be near the core zone of these cities.

Figure 13

A  B  C  D

low income
Case 'C'

Services are located according to range of importance and by frequency of use. Activities, such as administration, and government services, are located in the downtown area. Daily activities are located in secondary centers, small "barrios" where quotidian activities, such as ferias and play grounds take place. Low income people can be located more independently of the city core than in the previous cases.

Case 'D'

In the spread city, the satisfaction of common activities is more diversified. An homogeneous dispersion of new cores over the city is appearing. These are not playing the role merely of commercial centers, but of social, cultural, recreational, and work points of suburban regions. As in Case 'C', if these new points have the same benefits as those existing in the major core zone, then residential location could be related to any of the new cores.

Analyzing the four pattern stages, we could say that supplied services tend to be more dispersed as the transportation technology advances. The residential location is, therefore, more limited in the first type of city than in a modern city as far as service locations are concerned.

f) Work Place Location

Work places are the principal daily activity locations outside
of the home. Usually they constitute the main variable in which a family will base its residential location. Since work places are differently located for each of the different city typologies, each situation will be analyzed (See Figure 14); Cases 'A' and 'B'. These cities present compact environments around their inner core. Industrial activities are less important than in the latter cases. The work place is usually located in the downtown area.

Case 'B'

Some of the industrial activities are concentrated in a few points of the city. Usually low income residences should be close to the place of work or very near to those streets which will be future main roads.

Case 'C'

Residence is not necessarily close to work. The existence of a collective transportation system reachable by all sectors including the low income sectors, enables this. It would appear that a very strong relationship exists between place of residence and principal means of mass transportation. In this kind of context the street with a high density of public vehicles implies that residences are even in more distant areas. Low income sectors are possibly living out of the central core of the city.
Case 'D'

Work places for the low income sector are concentrated in the city core. Lately new points of work place are opening in the suburbs. These points are small cores similar to the principal one existing in all cities. In this case low income residence should be near the work place in the core of the suburban center. If an inefficient mass transportation exists, they must be located near these places in order to get to work in a short travel time.

Figure 14

A   B   C   D

work place
IV. RESIDENTIAL LOCATION

Some physical aspects determining the adequate location for new residential complexes have been introduced in this part of the thesis. They have been considered in an isolated form. At the same time, only physical variables were taken into account.

According to these physical aspects, there exists an 'optimum' location. This is obtainable by giving numerical values to those elements already analyzed. For instance, if urban land costs and utility costs are considered at the same time, it is seen that they are in an inverse relationship. (Figure 15)

![Figure 15](image)

However, they could provide the point where residential location is more convenient, to justify a low income project. In order to arrive at several optima, real values must be given to land cost, alternative utility values and transportation fares. To this author the optimum concept is always related to the real possibilities. It is preferable to say that the feasible location results from the balance of all
optimal independent variables. Transportation cost, work

place accessibility, and other variables are playing their particular role, and they are going to offer different optimum locations independent of the other elements.

The purpose of this part of the study is not to give detailed physical data, but only to illustrate an alternative way of determining residential location. The analysis of the residential location according to physical, qualitative variables. Finally there will be an attempt to put together analyzed variables avoiding the short comings of simplification and impracticality of many studies.

---

**Figure 16**

---

**Figure 17**

<table>
<thead>
<tr>
<th>SUPER CENTER</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>RING LIVING</td>
<td>+ o + - +</td>
</tr>
<tr>
<td>SUBURBS</td>
<td>- + 0 0 0</td>
</tr>
<tr>
<td>SUPER SUBURBS</td>
<td>+ 0 + +</td>
</tr>
</tbody>
</table>

**Recommended Location**

RING LIVING  SUP SUBURBS  RING LIVING  CORE ZONE
D C B A

+ important
- negative
unimportant
The choice of a house location usually involves a simultaneous decision about the future trip pattern of the family (accessibility) and the style of life which the family will follow. These uncontrolled variables and other factors, such as family cycle and income curve, are going to change the present analysis. For example, for some it is better to be near their place of work; for others, proximity to shopping centers will be important. It is clear that they are making decisions about personal levels of desirability.

According to the author's criteria, it would be possible to approach life styles in the same way as physical aspects. People's life style could be reduced to a matrix where family desires would be identified. In other words, it is necessary to eliminate the concept of the "ideal neighborhood". Not
all 'social optimums' can be obtained simultaneously in a given residential environment. Sometimes it is necessary to sacrifice some social aspects in preference to others.
V. **DWELLING DENSITY**

One of the most important characteristics of residential settlements is their density. Although human beings may be able to survive under conditions of extremely high or extremely low density, it seems desirable for low income sectors not to exceed certain maximum levels of density above which conditions of living do not seem compatible with their cultural pattern. On the other hand, dwelling densities should not be so low that the cost of infrastructure and utilities increases to the point of eliminating the possibility of the low income housing projects. Both maximum and minimum densities are strongly dependent upon city typology. Today the increase of long distance communication has permitted the materialization of some family wishes, such as more inside and outside space, home ownership, grass and trees, and other physical amenities. Analyzing the former assumption, it is possible to summarize that people are looking for:

1. Open Space

2. Larger And Better Housing

While the first condition cannot increase beyond the existing land possibilities, the second characteristic could be accomplished by high rise buildings.

**Determining Densities**

The object is not to arrive at an exact number or re-establish
a level of residential density more nearly optimal for low income families. Many studies have given useful information on the extreme conditions, but they have not defined a methodological way to recommend density.

To begin with, only physical variables are considered in this thesis, socio-political and economic decisions are not included in this work. It is known that new housing projects begin with a predetermined prefixed density. "Someone" says that we will use a certain density in a given urban area. Each urban situation requires different densities and they should have a methodological justification, not a recipe system nor an intuitive one.

For these reasons, some rural villages suffer the imposition of zoning plans and densities belonging to an industrialized context which requires more industrial zones, apartment buildings, parking, and other spaces. At the present state of this thesis, it will be possible to establish a way to arrive at density according to some physical variables.

Assume a future urban area in which it is possible to determine density according to usage projection and existing transportation technology. This fact is furnished, as has been expressed by different states of development. They indicate available urban ratios reached in a given time. In a general way Cases 'A', 'B', 'C' and 'D' respond to pedestrian, intermediate, massive collective transportation and automobile use
respectively. In each case it is assumed appropriate to take half an hour to arrive at every city's services from a residential location.

Better locations for low income settlements have been discussed. The locations are as follows: Core Zone, Ring Living Zone, Super Suburb, and Ring Living Zone respectively for Cases 'A', 'B', 'C' and 'D'. It is necessary to remark that residential locations were obtained working with physical variables only. At this point the political aspects are the most important. It may be recommendable, for instance, to locate new residential complexes inside cities. Actually Latin American governments are recommending the decongestion of their capitals.

If actual population statistics and projections for the following years are given, assuming that the poverty rate will remain stable, one can predict the housing demand for all low income families. As in the previous point, this step has many socio-political aspects; for example, it is necessary to know how many of the poverty sectors are going to have a housing solution.

If optimum criteria for better urban land uses for each situation are identified, then one can determine, in a general manner, the urban land proportion destined for residential purposes. It is obvious that land distribution for each urban,
activity depends on each situation. Case 'D' needs great quantities of circulation and parking spaces. Case 'A', on the other hand, needs great quantities of land for pedestrian and recreational zones (green areas).

Finally, inside the overall urban residential areas, the corresponding percentage of residential land for low income sectors and other social groups should be determined. As a methodological approach, land distribution should express the percentage of each social group relative to the whole urban society. Therefore low income groups should have 20% of urban land dedicated to housing and infrastructure if they constitute 20% of the total urban society.

These statements will be illustrated in the next part of this thesis in relation to the determination of densities for Houston and Antofagasta.
PART FOUR

Diagramatic Demonstration Of Housing Prototypes For Houston And Antofagasta
I. CONTEXTS OF HOUSTON AND ANTOFAGASTA

Houston and Antofagasta have been chosen because they represent the same position in a hierarchical range within their respective nations and because of data availability. Throughout this study these two cities are represented by cases 'D' and 'B' respectively. It does not seem necessary at this time to enter into descriptions, although it is correct to say that Antofagasta is an industrial administrative center like Houston but on a minor scale. (for more information, see annex page 1 to 5).

In comparison the physical aspects of these cities differ greatly (i.e. in urban land uses and in low income housing distribution). At the same time they have some similarities such as population trends and economic activity distribution.

In using Antofagasta (with 40% shantytowns) as a reference, it must be noted that it is not actually representative of most Latin American cities. Antofagasta, with 2.9% of the Chilean population, has a higher Regional Product per capita and therefore a higher income level. This is twice as high as that of Santiago, the capital, and of any other Chilean city.
The main characteristics to consider in both cities is that in the projection of actual percentages of low income families (Page 85 and 86), new demands will be affected by the newer attitudes of the younger adult faction. In other words, the younger population under twenty will require more housing in the future. Due to the younger mean population, and consequently increased projection, the situation in Antofagasta is more severe than in Houston. These two pages show the future zones occupied by the low income sector if the actual growth tendency of low income zones continues.
HOUSTON

source:
Population
Report, City
Planning Comm.
1966, table 1

estimated growth

low income

future growth

actual situation
ANTOFAGASTA

source: Estudio Pre-Inversional de Antofagasta, tomo I, p. 28.

actual situation

estimated growth

low income

future growth

m f

% 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

+70

10 20 30 40 50 60 70 80 90 100
II. APPROXIMATE DENSITY FOR LOW INCOME HOUSING PROJECTS IN HOUSTON AND ANTOFAGASTA

The preceding pages, related to density calculations, will be explained shortly (see dwelling densities page 79).

a) These constitute a visual approximation of future urban order. It is this urban growth framework in space and time, which is determined by urban professionals. (see plans on page 88 and 89).

b) Ring zones for both cities were suggested as the recommended diagrammatical notations in regard to low income family housing location. (see plans on page 90-91) For a wide spread city such as Houston, the outer area ringing the principal sub area I is the select zone. The two adjacent areas to the core area I are the chosen zones II and III in Antofagasta.

c) Future low income housing demands could be obtained from the population projections. Houston, with a 20% poor sector and 4,000,000 inhabitants, will have 870,000 persons below the poverty index in the next ten years. A family average of 3.3 persons\(^2\) means 263,630 families will be demanding housing. Antofagasta with 40% marginal poor, will have around 160,000 poor inhabitants, which according to an average of 5.2 members\(^3\) means 30,8000 poor families. (see graphic demonstration on page 93)
It responds to an automobile transportation system. Six areas will be in the future.
It responds to a pedestrian circulation system.
Houston

b)
Antofagasta

b)

SURFACE of AREA II = 6.25 SQ. MILES

4,300 ACRES

area II + area III = 8,600 (FUTURE URBAN AREA OF ANTOFAGASTA 24,000 A.)
d) Because a recommended or optimum urban land use does not exist, it will be assumed that the actual proportion of land destined for residences is adequate. Data suggests that the recommended proportion should be 60% for Houston and 85% for Antofagasta.

e) Finally, attributing 20% and 40% of residential land for low income sectors for Houston and Antofagasta respectively, it is possible to establish areas for residential purposes to locate low income families. Density results from the relationship between obtained areas and number of persons who exist below the poverty economic level. The areas were 17,680 and 3,084 acres for Houston and Antofagasta respectively. These areas, related to the number of poor people of each city, will give one the following densities:

a. Houston 51 persons/acre
b. Antofagasta 49 persons/acre

For comparison this first finding (a) is twice the actual density existing in some sectors of Houston such as Denver Harbor and Sharpstown. The obtained density for Antofagasta (b) coincides with the maintenance of the actual density existing in the poverty belt zone in that developing city.
c) **HOUSTON**

- Poverty level
- 4,000,000 inhabitants
- Population increase by 30% in 1980
- 870,000 persons

---

**ANTOFAGASTA**

- Poverty level
- 400,000 inhabitants
- Population increase by 40% in 1980
- 160,000 persons

---

d) **Urban Area 100%**

- Surface of AREA I: 144,000 Acres
- Urban area destined to residences: 88,400 Acres

- Surface of AREA II and III: 8,600 Acres
- Urban area destined to residences: 7,300 Acres

---

e) **Social Composition**

- Upper
- Upper Middle
- Low Middle
- Low

- Area for Low Income Families = 17,600 Acres
- Area for Low Income Families = 3,004 Acres
III. HOUSING PROTOTYPES FOR HOUSTON AND ANTOFAGASTA

The Site

In a general way, the adequate residential location in both cities was determined when adequate locations were defined for each type of city 'A', 'B', 'C' and 'D'. Approximate densities were obtained and compared to actual Houston and Antofagasta densities.

Since this thesis is concerned primarily with the housing problem the commercial zones and community centers are merely sketched in for location. (see plans in annex, page 6 and 7).

In the design, the flat terrain of Houston, the mountains of Antofagasta, and the environmental conditions (climate) have been taken into account in this design stage.

Socio-Cultural Considerations

Two social structures were mentioned because the low income sector in each area is different. In Latin America, housing has the implicit idea of a lifelong shelter. There is a saying: "I'm building the place where I will die". This is in contrast to the U.S.A. where people seek temporary dwellings. Housing constitutes a place where they will dwell during episodes of their lives. Housing represents mere points on a trajectory which is their life. This is not to say, however, that Americans are becoming a nation of nomads.® The low income sectors of Latin America differ from the U.S.A. due to increased awareness of social conditions. The poor conform
without aspiring to the social standards of the higher classes. In the U.S.A., where life's amenities are more patent, minority groups demand the material and social advantages of the middle income groups. Thus we see that in Antofagasta mass planning of shantytowns could be a feasible solution, but in Houston, low income families want comparatively more expensive housing such as garden apartments and townhouses.

Economic Considerations

It is known that the poor cannot afford the total cost of housing. With this in mind, the difference in subsidized construction would be due to the time necessary for completion. In Antofagasta it would be necessary for the government to subsidize housing for more than 50% of the population. In contrast, Houston's poor account for only 20% of the total population. So that faced with few resources, one of the alternatives for the Latin American government is to build very few complete houses. A better alternative would be to build incomplete houses over a long period of time, decreasing the amount of initial investment. This means a very slow physical development of housing.

On the other hand it is feasible to imagine in the U.S.A. the possibility of high and instantaneous subsidies, or large initial investments. This will allow completion of industrialized housing in a short time. This time would of course depend on the speed of construction necessary to achieve a
completely furnished dwelling. While North America could set numerical and qualitative goals, Latin American governments should establish qualitative goals only because numerical goals are unreachable. The quality of housing in Antofagasta should be measured by the possibilities of alterations that it offers when economic resources made are available by its inhabitants or by the government.

**Construction System Considerations**

Construction techniques in each nation are different. This will not be discussed further as adequate coverage would require a complete thesis. Since Houston is an industrial center, prefabricated housing could be made readily available by local suppliers. On the other hand Antofagasta, with an abundance of labor and a scarcity of industry, one would do better to dispense with any thoughts of industrially prefabricated housing and instead emphasize traditional construction based on local materials. To the author the self help construction is recommended. The two main points which are necessary to solve are: First to base housing construction on a labor prefabricated system where less skill and technicality is needed and second to provide an adequate housing structure, since this building component is the failure of most all shantytowns. In Chilean cities this problem is even more severe when destruction due to earthquakes is taken into consideration.
Physical Considerations

It must be assumed that all families need a house. Since housing is more durable than consumed goods, it is characterized by a high production cost and a long physical life. Because of the high cost and durability of housing, buyers want to obtain a certain stability and improvement (social, economic and physical) that are an integral part of their investment. Housing is made up of land and physical construction. It is plausible that land, which is permanent, offers stability and all of the factors inherent to an environment. Physical construction should contain the same quality that land offers such a stability and development. This is especially important in reference to low income housing. Houses, like instruments, become obsolete and wear out while the family living in them changes in number, members and life-style. Houses inhabited by low income families in Houston are built in such a way which makes them expensive to repair or to remodel. This forces the family to remain in its present neighborhood with a sub-standard house. Their housing and immediate environment instead of improving becomes even worse. This fact can explain part of the actual situation of the ghettos and slums.

Middle income families in Houston, like the poor, are faced with the same problems. But they have the alternative of moving to a better house elsewhere according to their income possibilities.
Low income families do not have the possibility of moving or even the alternative of choosing. As a consequence, the values of upgrading, have to be sacrificed for the values of permanent residences. This process, by which families on an ascending income curve move into better quarters, may also be viewed as a process of trickling down. The result is that the poorest families become occupants of the former dwellings of wealthier groups. An ill kept house can be blamed partially on the non flexibility of its design. A good example is the inflexible industrialized dwellings offered by some Latin American governments. The houses are becoming obsolete in a short time with no possibility of alteration.

With previously discussed premises, Antofagasta's housing institution such as CORVI, should design and offer some basic utilities and the outer structure or physical guidance with which to control the future housing growth.

Below this outer concrete structure a definite solution will result from considerations of family needs.

The outside structure will never change, but the house in itself has to be something that man, or one man and his helper could build in the course of their occupancy and when it is feasible by new economical resources.

What is being proposed for Antofagasta (and maybe for most of Latin American cities) is a massive 'structuration' of shantytowns. A great possibility in aesthetic consideration would
result by individuality being introduced into the design as contrasted to the traditional row house.

Houston housing authorities could supply a modular construction; a system in which three-dimensional sections of a building are mass-produced and then brought together into multiple dwelling complexes.

The proposal is a precast concrete structure which could accept cubical standardized rooms. These standardized boxes could be defined and arranged by the individual family's requirements.

The precast structures (columns and beams), could be located in the chosen area with the possibility of spatial expansion corresponding to future family expansion. This would alleviate some of the problems stemming from inflexible housing such as is prevalent today. Also, this plan would offer expansional advantages comparable to those of the wealthier classes.

The demonstration of the text's principles are graphically presented in the broadest possible terms, as a schematic proposal, which indicate a direction or prototype rather than a specific goal.
The author would like to add that, in addition to the apparent and readily explainable aspects of the projects, there are many aspects which have not been described and there are many aspects which have not been explained. This is because the schematic projects are chosen as a vehicle to show the socio-economical and physical implications of this approach with an eye open for the design process as they present themselves.

The motivation of this work is not housing design but to understand, to know and to settle the low income housing problem. Its finding are the involvement of my beliefs today with this problem in the present America.

The ideas formulated here are a confrontation between the urban society as its inhabitant, the housing as a building and myself as an architect. When the society moves into a computer age, the architects leave housing far, far behind. Almost everything that is possible to buy today came from a precisely engineered and varied production line, but not the house we live in, nor the living space for people too poor to pay for decent housing.

Freddy L. Aguilar N.
ELEVATION OF FOUR APPTS

Third floor

Second floor

entry by 1st floor (parking)

POSIBLE COMBINATIONS

column U

cubiculo

EMPTY

EMPTY

EMPTY

EMPTY

EMPTY
FEASIBLE ALTERNATIVES OF GROWING.
Structural guidance, which provides the control of future self help construction, and constant basic services (utilities) to each family. This design of structural frame leaves undesigned those parts which the users are most likely to decide, manipulate and personalize by themselves.

Large precast "U" columns which provide structural support, utilities and circulation to prefabricated rooms. These concrete rooms are made in "housing factories".
ANTOFAGASTA A family could have this frame with plumbing, and utilities. They could put together board by board, brick by brick, in a process that is at the mercy of stereotyped materials which they can afford only by progressive economical improvement.

They are incomplete dwellings capable of becoming houses which the designer cannot anticipate. Aesthetic values then depend largely on the degree to which they will be manipulated by the user in a continuous development.
Each prefabricated room represents a changeable and temporary part of a house. The sleeping, porch, living, and dining spaces are removable containers and all are joinable to one another. When it becomes obsolete it can be exchanged for a new one because this building is permitting the addition and removal of spaces, it is more a collection of parts, having different kinds of family needs. The cubicles are standard except for the opening
FOOTNOTES AND QUOTATIONS
PART ONE

1. "Urbanization can thus be viewed as a process of society as a whole, taking place through each of its basic structural orders and as a dimension of the process of change occurring in each of those orders".


2. "The combined population of the Americas will probably grow during the next 30 years to at least one billion from estimated 405 million today".


3. "In the North, it was increasingly the industrialist; in Latin America was the agrarian landlord".


4. "In a sense, vestiges of colonialism still remain in Latin American in the form of a centralized government in the capital and an attitude of paternalism toward local government".

Violich and Astica: COMMUNITY DEVELOPMENT AND URBAN PLANNING IN LATIN AMERICA 1967, p. 16 University of California.


6. "With 46% of its population in cities over 20,000 Chile must be considered one of the most hyperurbanized countries in the world".

IBID, p. 7

8.- Wingo Lowdon Jr: **RECENT PATTERN OF URBANIZATION AMONG LATIN AMERICAN COUNTRIES**  
March 1967, p. 8 Urban Affairs Quarterly.

9.- Hoyt Homer: **AMERICA URBANIZATION IN YEAR 2000**

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<thead>
<tr>
<th>Region</th>
<th>1960</th>
<th>1975</th>
<th>2000</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>millions</td>
<td>%</td>
<td>millions</td>
</tr>
<tr>
<td><strong>I. North America</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plus 1,000,000</td>
<td>67</td>
<td>34</td>
<td>84</td>
</tr>
<tr>
<td>1,000,000/500,000</td>
<td>18</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>500,000/300,000</td>
<td>12</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>500,000/100,000</td>
<td>22</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td>100,000/2,000</td>
<td>47</td>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>Rural</td>
<td>31</td>
<td>16</td>
<td>36</td>
</tr>
<tr>
<td><strong>II. Latin America</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>millions</td>
<td>%</td>
<td>millions</td>
</tr>
<tr>
<td>Plus 1,000,000</td>
<td>25</td>
<td>12</td>
<td>61</td>
</tr>
<tr>
<td>1,000,000/500,000</td>
<td>8</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>500,000/300,000</td>
<td>6</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>500,000/100,000</td>
<td>13</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>100,000/2,000</td>
<td>41</td>
<td>20</td>
<td>46</td>
</tr>
<tr>
<td>Rural</td>
<td>116</td>
<td>55</td>
<td>137</td>
</tr>
</tbody>
</table>

1. North of Mexico  
II. South of USA and all South America  
Source: *WORLD URBANIZATION, EXPANDING POPULATION IN A SHRINKING WORLD*  
Land Institute Technical Bulletin #45 p. 48

10.- Friedmann John: **HYPERURBANIZATION AND NATIONAL DEVELOPMENT IN CHILE**  
urban affairs quarterly, June 1967, p. 4

11.- Orshansky Mollie: **THE SHAPE OF POVERTY IN 1966**  
March 1968, p. 19  
12. - United Nations: **CATEGORIES OF INCOME GROUPS IN LATIN AMERICA**

**Group I**
Lower income bracket. The family belonging to this group has an average monthly income equal to 55 dollars. Includes unskilled rural-urban worker, domestic help, small artisans, street vendors.

**(50% of population)**

**Group II**
Intermediate income. Presumably includes public-private employees and skilled worker craftsmen living on modest income of 150 dollars as average monthly.

**(45% of population)**

**Group III**
Median-high income. It would include certain independent professional workers, merchants and medium-size property owners, high-level executives of public and private sectors. The monthly income of a family is some 800 dollars.

**(3.0% of population)**

**Group IV**
High income. It comprises the families of large property owner and entrepreneurs and a few professional people. The average income would be about 1,600 dollars.

**(2% of population)**

Source: Economic Development of Latin America in the post war period. O. N. 1964, p. 64

13. - United Nations: **WORLD CONDITIONS AND ESTIMATED HOUSING REQUIREMENTS**

14. - "It is hard to believe an alternative criterion could seriously alter the impression of vulnerability for the aged household, the family with many children, the non-white family, the family of a non-worker
or low-paid worker, and multiple dangers when two or more of these risk are combined".

Obyansky Kollic: WHO IS AMONG THE POOR
July 1965, p. 7

15.- Government of
Presidetle E. Frei: OFFICIAL CHILEAN NEWSPAPER
March 1969

16.- Council of Economic Advisor of the
U.S.A: TEN POINT PROGRAM TO ABOLISH POVERTY
1968, p. 3 Social Security Bulletin


18.- United Nations: POOR FAMILIES AND PLACE OF RESIDENCE

<table>
<thead>
<tr>
<th>Country</th>
<th>Total</th>
<th>Nonpoor</th>
<th>Poor</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. U.S.A.</td>
<td>49,834</td>
<td>44,525</td>
<td>5,309</td>
<td>11</td>
</tr>
<tr>
<td>Non-metropolitan</td>
<td>17,606</td>
<td>14,907</td>
<td>2,701</td>
<td>51</td>
</tr>
<tr>
<td>Metropolitan</td>
<td>32,226</td>
<td>29,617</td>
<td>2,609</td>
<td>49</td>
</tr>
<tr>
<td>Central</td>
<td>14,629</td>
<td>13,032</td>
<td>1,597</td>
<td>61</td>
</tr>
<tr>
<td>Suburbs</td>
<td>17,597</td>
<td>16,584</td>
<td>1,013</td>
<td>39</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Total</th>
<th>Nonpoor</th>
<th>Poor</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Latin America</td>
<td>48,977</td>
<td>24,488</td>
<td>24,489</td>
<td>50</td>
</tr>
<tr>
<td>Non-metropolitan</td>
<td>26,615</td>
<td>22,212</td>
<td>5,403</td>
<td>50</td>
</tr>
<tr>
<td>Metropolitan</td>
<td>19,362</td>
<td>9,681a</td>
<td>5,681a</td>
<td>50</td>
</tr>
</tbody>
</table>

Poverty belt

Source: I Social Security Bulletin
June 1967, p. 4
II Population Estimates for Urban and Rural areas United Nation p. 29
Miller and Reissman: Type of Poverty

Miller works on the bases of class and status. The two approaches can be welded together by cross-tabulating the two dimensions of the two variables of economic security and familial stability. According to the following figure, there exists four classes of the poor:

<table>
<thead>
<tr>
<th>Economic Security</th>
<th>Familial Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Insecurity Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

I. Stable poor: People who has economical and familial stability.

II. People characterized by economic secure pattern but an unstable family, i.e. alcoholics, older workers.

III. The copers: Families having a rough time economically but have personal family stability, i.e. large families of Negros.

IV. The unstable: individuals having either economic not personal stability and they constitutes a "multi-agency problem".

So any program to cope with poverty depends of each stage. When we talk about family stability, we are referring to psycho-sociological poverty; While the coper needs a job, the strained needs a social rehabilitation program. More than a house, majority are demanding some ad-hoc social projects. On the other hand mainly consolidator people, that is, the stable poor, needs adequate channels to go up in social and economical mobility.

Source: Social Class and Social policy. 1967, p.41

20. - Christopher Alexander: MAJOR CHANGES IN ENVIRONMENTAL FORM REQUIRED BY SOCIAL AND PSYCHOLOGICAL DEMANDS, Ekistic, # 79.
PART TWO

1. Abrams Charles: MAN'S STRUGGLE FOR SHELTER IN AN URBANIZING WORLD 1964, p. 55


4. Ekistics: REVIEW ON THE PROBLEM AND SCIENCE OF HUMAN SETTLEMENTS p. 352


8. Ministerio de la Vivienda y Urbanismo de Chile: ESTUDIO PREINVERSIGNAL DE ANTOFAGASTA tomo I, 1966, p. 64

9. The Housing Committee; Houston Council on Human Relations: A REPORT ON HOUSING FOR LOW INCOME FAMILIES 1967, p. 2

10. Sjoberg Gideon: CITIES 1968, p. 25


PART THREE

1. "Turnover is thus the basic process by which low-income groups improve their housing in the cities. It also has special significance as the way in which Negroes find place to live".

Frieden Bernard: THE METROPOLITAN ENIGMA
Housing and National Urban Goals, 1968
p. 18

2. Turner John: URBAN DWELLING ENVIRONMENTS
M.I.T. Press, 1969, p. 5-9

3. "In the more developed areas, where roads and good transport facilities exist; the price of land and completed building. Perhaps it is 10 % in the suburban areas, perhaps 0-20 % in the more accessible sections. In some of the poorer countries, however, land prices may reach 50 % of the combined cost or more, and in others, land will not be released at any price".

Abrams Charles: MAN'S STRUGGLE FOR SHELTER IN AN URBANIZING WORLD 1966, p. 29

4. "The positive sloping cost reflects that housing values generally increase with distance from the core".

Stegman Mitchell: AMERICAN INSTITUTE OF PLANNERS
January 1969, p. 24

5. Ministerio de la Vivienda y Urbanismo de Chile: PLAN HABITACIONAL 1969
Corporacion de Servicios Habitacionales, Program 1969

PART FOUR

1. Friedmann John:
   URBAN AND REGIONAL DEVELOPMENT IN
   CHILE.
   A case study of innovative planning
   Santiago Chile 1969, p. 21

2. United Nations:
   HOUSING CONDITIONS AND ESTIMATED
   HOUSING REQUIREMENTS 1965, p. 46

3. 

4. Master of Architecture Program
   Rice University:
   Ibid, p. 26

5. Ministerio de Vivienda y Urbanismo de Chile:
   ES TUDIO PREINVERCIONAL ANTOFAGASTA
   1968.


7. Op. cit. 2p

8. "The most significant feature of internal migration is its prevalence
   the fact than an American who dies in the house he was born in is
   atypical. Each year one person out of five in U.S.A, moves to another
   house".
   Peterson Peter:
   INTERNAL MIGRATION AND ECONOMIC
   DEVELOPMENT IN NORTH AMERICA

9. Housing Corporation of Chile
   Government.
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the Study of Design Determinants

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M.I.T. Press, Cambridge 1960

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Harvard University Press

WINGO, LOWEN JR.
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Resources for the Future Inc. 1965.
VERB, MAX
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WEBBER, MELVIN M.
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WILSON, JAMES Q.
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Inquiries into the Nature and Dimention of America's Urban Crisis.
Harvard University Press 1968.

EWALD, WILLIAM R.
Environment for Man

MINISTERIO DE VIVIENDA Y URBANISMO DE CHILE
Estudio Pre-Inversional Antofagasta
Tomo, I - II 1968.

JOURNALS AND PERIODICALS
ANTOFAGASTA, shantytowns are provisional walls and roof, which provide some protection against climatic conditions.

HOUSTON, substandard or overcrowded housing is the alternative to low income family, since there is not enough decent cheap housing available.
Houston urban land use

Population economic activities

- Mining
- Construction
- Transp., Comm., Serv.
- Manufactures
- Whole Retail Sale
- Serv., Misc.
- Finance, Insur.
- Government

From: Houston Job Site
Texas Employment Commission, Nov. 1967
Income distribution

from: Demographic Characteristics of HARRIS COUNTY, Research Bureau Community Council, Part II - 1963 p.22
antofagasta
urban land use

population

economic activities

from 'Estudio Preinversional de Antofagasta' Tomo I p.10

from 'Estudio Preinversional de Antofagasta' Tomo II p.10
antofagasta

Income distribution

- Low Income
- High Income
- Medium Income

From: Estudio Preinversional de ANTOFAGASTA, Tomo II p.19