

THE URBAN AND HOUSING DESIGN OF A SELF-HELP DEVELOPMENT
FOR BOGOTA, COLOMBIA, SOUTH AMERICA

A thesis submitted in partial fulfillment of the
requirements for the degree of Bachelor in Architecture
at the Massachusetts Institute of Technology.

April 4, 1965

.....

Dean Pietro Belluschi
Dean of the School of Architecture

.....

Professor Lawrence B. Anderson
Head of the Department of Architecture

Professor Herbert L. Beckwith
Chairman of the Thesis Committee

.....

Rodrigo Arboleda Halaby

.....

Adolfo Lau Chang

Cambridge, Massachusetts

April 8, 1965

Pietro Belluschi, Dean
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Dean Belluschi,

We hereby submit the thesis entitled, "The Urban and Housing Design of a Self-Help Development for Bogota, Colombia, South America," in partial fulfillment of the requirements for the degree of Bachelor in Architecture.

Sincerely,

Rodrigo Arboleda Halaby

Adolfo Lau Chang

T A B L E O F C O N T E N T S

TITLE PAGE.....	1
THE LETTER OF SUBMITTAL.....	2
THE TABLE OF CONTENTS.....	3
INTRODUCTION.....	4
THE PROBLEM.....	8
Population Growth	
Migration	
Deficit and Demand of Housing	
Self-Help: A Solution	
Ciudad Kennedy	
THE PROGRAM.....	22
Site Description	
Climatic Conditions	
Urban Context	
Planning and Land Use	
Community Facilities	
Dwelling Units	
THE URBAN DESIGN.....	37
The Concept	
Circulation	
Community Facilities	
The Cluster	
Orientation	
THE HOUSE DESIGN.....	46
The Concept	
Study of Prototypes	
Proportions of House Lots	
Proposed Dwelling Units	
ACKNOWLEDGEMENTS.....	59
BIBLIOGRAPHY.....	60

INTRODUCTION

"...one of the objectives of the American Republics during the present decade is:

To increase the construction of low-cost houses for low-income families in order to replace inadequate and deficient housing and to reduce housing shortages; and to provide necessary public services to both urban and rural centers of population."

Charter of Punta del Este
(Title I, item 9)
17 August 1961

The rapid demographic concentration in urban centers has engendered congested living conditions in most cities of Latin America, and the number of squatter settlements and slum neighborhoods stand as evidence of the erosion of human habitat. The effort made by several Latin American countries in the past years is both a belated and unprecedented response to the problems caused by prolonged unplanned and uncontrolled growth in urban areas.

This thesis is concerned with the urban and housing design of a self-help development in the city of Bogota, Colombia. It is our purpose to put forth in the design a social and economic concept that will organize this human settlement as a self-sufficient and self-contained community, and will provide the means to meet economic,

social and spiritual needs of the inhabitants. It is a basic assumption to this thesis that new housing alone is not sufficient to meet the social and economic problems of adjustment which are faced by families coming from previous conditions of poverty, ignorance and instability. And without an effective community development program to promote the growth of the neighborhood any housing project of this type will turn into an officialized slum.

This report is divided into four parts. The first part is a survey of the prevailing conditions for the purpose of defining the problem and establishing premises upon which the design will be based. Statistics concerning population growth, population movement, and housing deficit are discussed in this section. The experience of Ciudad Kennedy has been very valuable to this thesis, since it is a unique example of large scale urbanization in Latin America, which will ultimately house 100,000 persons. Comprised of a multitude of families who are receiving their first exposure to urban life; Ciudad Kennedy is illustrative of some of the major social and developmental problems which are encountered in the formation of urban communities.

The second part of the report is a description of the

design program. The program describes the reasoning undertaken in determining the size of the community on the basis of the proposed hierarchy of human groupings, the community facilities required for each human grouping, and the specifications that each one must meet. The inhabitants of the community are divided in four income brackets to establish the size of the house that each family can afford on the basis of 20-year loans. Finally, the site, its urban context, and the land use regulation that applies are discussed in some detail.

The last two sections describe the concept and the thinking that led to the proposed urban and housing design. The solutions are discussed in light of assumptions and established limitations.

A large portion of the research for this Thesis was compiled in Colombia during the Summer of 1964. One of the authors, Adolfo Lau, was fortunate to receive a fellowship from the Organization of American States to do thesis research at the Inter-American Center of Housing and Planning (CINVA) in Bogota. The other author, Rodrigo Arboleda, worked with a team of three architectural firms in the design of a Community of Medellin, Colombia, financed by a local insurance company. These two experiences provided the opportunity of gathering all pertinent

statistics; of observing several self-help housing projects; of understanding the existing social, economic, technical and environmental conditions; and of interviewing many people who are doers in the field of low-cost housing. In addition, Professor Horacio Caminos provided us with advise, encouragement, and an outline of his own research, that became of inmeasurable importance in the course of the design.

THE PROBLEM

"... if we proceed to look not at the facades of our buildings but inside, into the heart of our Architecture, we shall discover that the homeless or poorly housed millions who constitute the majority of the people on the earth, live under very bad conditions indeed.... This is the main architectural problem...."

Constantino Doxiades

Architecture in Transition

1963

THE PROBLEM

The growth of population, the migrations from the rural areas, and the inability of the public authorities to keep pace with the housing needs of the metropolitan area, have resulted in the congested living conditions and the amount of deficient housing in Bogota. According to the statistics the trend of the population growth and movement in the future will not ameliorate the prevailing conditions.

The following table illustrates the steady growth of population in Bogota:

Urban Population in 1000's					
City	1938	1951	1963	1971	Annual Rate of Growth (%)
Bogota	325.6	682.7	1287.7	2200.0	5.4

The rapid demographic concentration is due mainly to two phenomena: the lowering of the mortality rate due to improvements made in the fields of public health, and the trend of population movements. The latter fact is illustrated in the following table which shows the population distribution in Colombia:

Year	Population (%)		Population in millions		
	Rural	Urban	Rural	Urban	Total
1938	71.0	29.0	6.1	2.6	8.7
1951	61.0	39.0	7.0	4.4	11.4
1960	54.5	45.5	8.2	6.8	15.0
1970	45.2	54.8	9.2	11.2	20.4

The Colombian government has been cognizant of these trends; and in 1956 it reoriented its national housing policies in order to devote more systematic attention to the housing needs of its urban families. At that time the ICT (Instituto de Credito Territorial), Colombia's semi-autonomous housing agency, was relieved of its responsibility for low-cost rural housing and was authorized to channel its financial resources and technical expertise into housing programs exclusively for urban areas.

In spite of this change in policy, between 1956 and 1958, the beneficiaries of the ICT programs were families belonging to middle income groups. To rectify the situation, the ICT in 1958 prepared to launch substantially larger programs based upon new techniques of "esfuerzo propio" (self-help) and "ayuda mutua dirigida" (directed mutual-aid). Such techniques require the organized investment of the future occupants' spare-time, as well as their accumulated savings. They have proved to be a hopeful means of stretching the limited public resources that could be devoted to housing for marginal income families.

Although self-help alleviates some problems, it also creates new ones. Many housing projects of this type in Latin America have been failures because of the inability

to recognize the new limitations. A self-help housing project can be successful if its reality is properly understood, and the benefits derived will not only be in terms of unit costs, but also as it concerns the sociological superation of the nation. People of the lowest socio-economical strata in Latin America share common unfavorable traits, the most serious ones being the lack of initiative, community pride, and self-confidence. Self-help can be a very valuable tool in stimulating these virtues: the accomplishments illustrate the potential for self-improvement and the meaning of organization, while the hardships involved in the effort make evident the value of the results. These induced social virtues can have long-run consequences, such as the creation of a vital force in reshaping the nation and raising the level of accomplishment in all fields of human endeavor.

The largest self-help housing project ever undertaken in Latin America is Ciudad Kennedy. Located some ten kilometers to the west of Bogota's downtown business center, this massive new urbanization has a total area of 480 hectares (1185.6 acres) and is the former site of Bogota's International Airport. Construction started on December 17, 1961, when Presidents Kennedy and Lleras Camargo laid the first brick; the community will ultimately house 100,00 persons. It is, however, a very poor example of

sound urban planning. When completed, Ciudad Kennedy will be comprised of twenty "supermanzanas," each "planned" as an urban residential neighborhood unit with the required community facilities, services and open areas. The largest "supermanzana" contains 1,454 dwellings, while the smallest one only 354. Such a spectrum of neighborhood unit sizes reflects the shallow thinking that led to the urban design. The site plan of Ciudad Kennedy is the result of a circulation scheme to discourage fast traffic through its streets. It is apparent that such was the extent of the thinking in the minds of the designers.

The urban planning of Ciudad Kennedy reflects a very weak social and economic concept concerning a human settlement of this sort. Although land within the supermanzanas has been set aside for various community facilities and civic amenities, their construction has been delayed or postponed due to lack of funds on the part of several governmental and private entities to whom lots have been ceded or sold by the ICT. Since the responsibility of the ICT is defined in terms of building houses, it is generally not concerned with, nor does it have funds for, the construction of such community facilities as health centers, schools, hospitals, markets, or parks. In the case of Ciudad Kennedy, however, the

ICT took the initiative in some fields other than housing, perhaps under the pressure to ensure that the project would be a "show-piece" for the Alliance for Progress. In collaboration with the Ministry of Education and the Caja de la Vivienda Popular, the ICT allocated funds for the construction of eight primary schools (at the present time these schools are operating beyond capacity and many children in Ciudad Kennedy have not been able to enroll because of lack of space). The ICT also built the Kennedy School in Supermanzana No. 6. Commercial centers were also constructed by the ICT, and it is currently developing a huge urban park with cultural and recreational facilities.

The design of dwelling in Ciudad Kennedy fails completely in the recognition of the limitations of self-help. Conventional brick-walled and asbestos cement-roofed houses are much too complicated for unskilled self-help labor, and the result has been that only 25% of the total labor was done by self-help. To speed up the construction, the ICT had to contract professional builders to do the rest of the work, in total negation of the original purpose; and in spite of that, a house takes an average of 28 weeks to be completed.

In spite of the massive housing projects, such as Ciudad Kennedy, undertaken by the Colombian government with the

aid of the Alliance for Progress, the solvency of the housing deficit still is out of reach. The housing deficits are usually measured in two ways: quantitative deficit is the number of dwelling units needed, assuming that each family should live in houses meeting certain standards; in other words, it is the total number of families minus the number of dwellings that meet established standards; and the qualitative deficit is the number of dwellings that do not meet established standards; in other words, it is the number of dwellings in such a condition that there is need to demolish them or remodel them. The increase of the quantitative deficit in Bogota is illustrated in the following table.

Quantitative Deficit in Housing

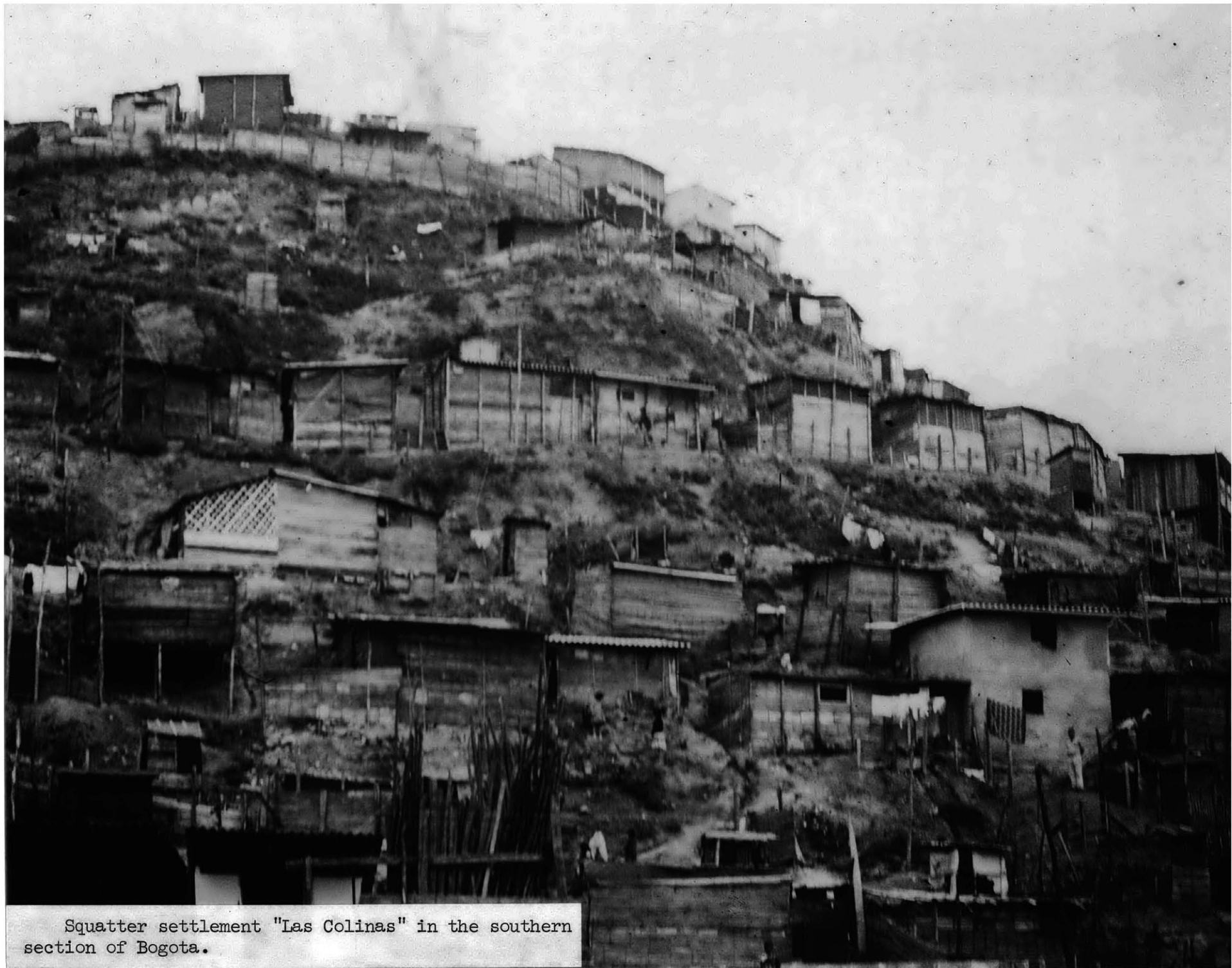
<u>City</u>	<u>1951</u>	<u>1957</u>	<u>1963</u>
Bogota	38,481	60,580	69,318

The reduction in the rate of increase of the deficit in the latter years is largely due to the aid received from the Alliance for Progress for the development of massive housing programs for families belonging to the lowest income groups. The reduction in the rate of increase of the deficit does constitute an improvement, but the shortage of housing still remains as a very serious problem.

To make the already critical problem more severe, there is today in Colombia a qualitative deficit of 250,000

dwellings that should be remodeled or demolished.

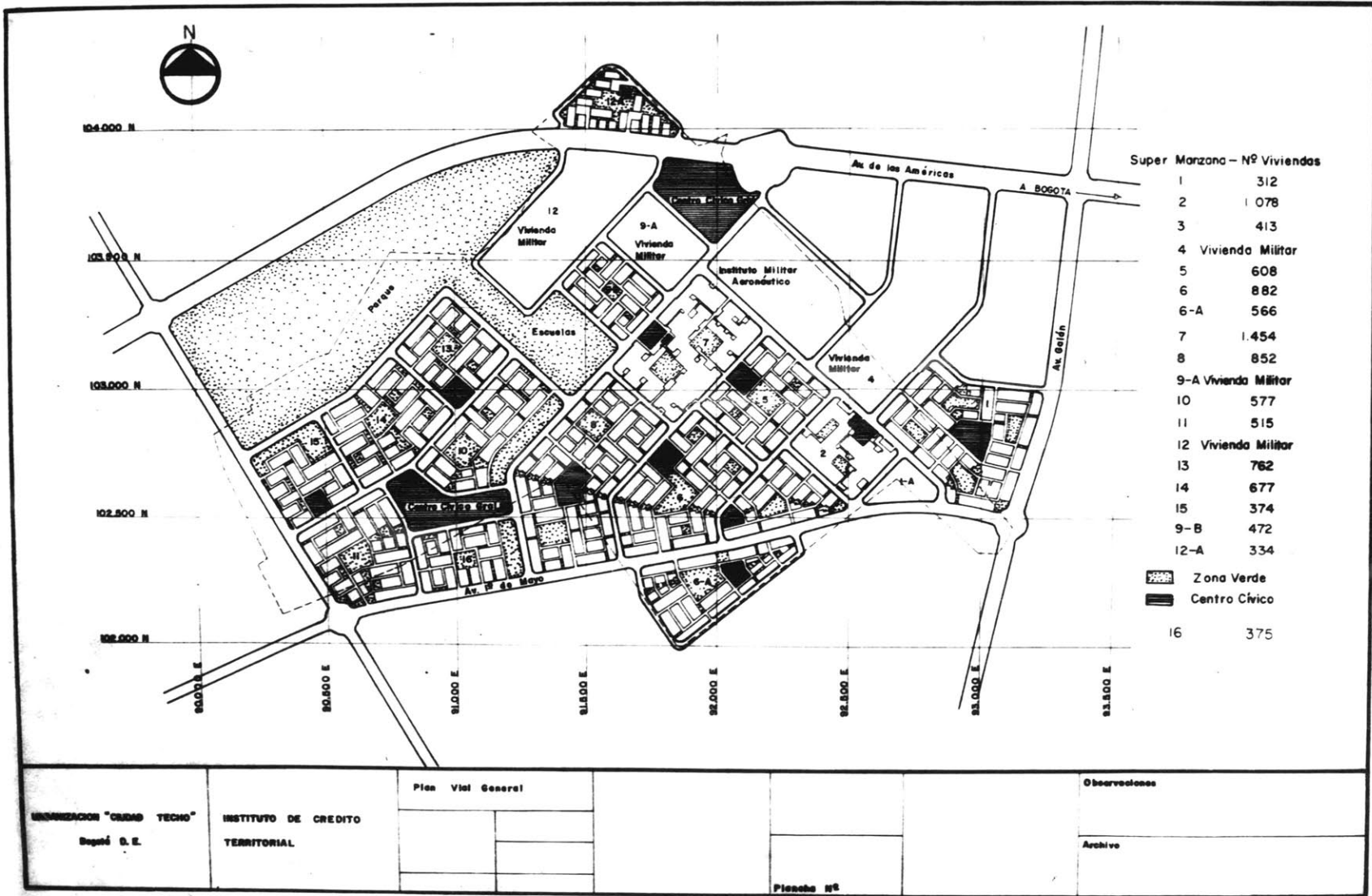
According to data released recently by the ICT, there are 150,000 applications for housing in file. At the present time, the ICT is only capable of building 25,000 dwellings per year, and the fulfillment of the present housing demand will be out of reach for a few years. Ignoring the fact that each year 50,000 new families apply for homes, it would take 6 years to meet the current demand.



Squatter settlement "Las Colinas" in the southern section of Bogota.



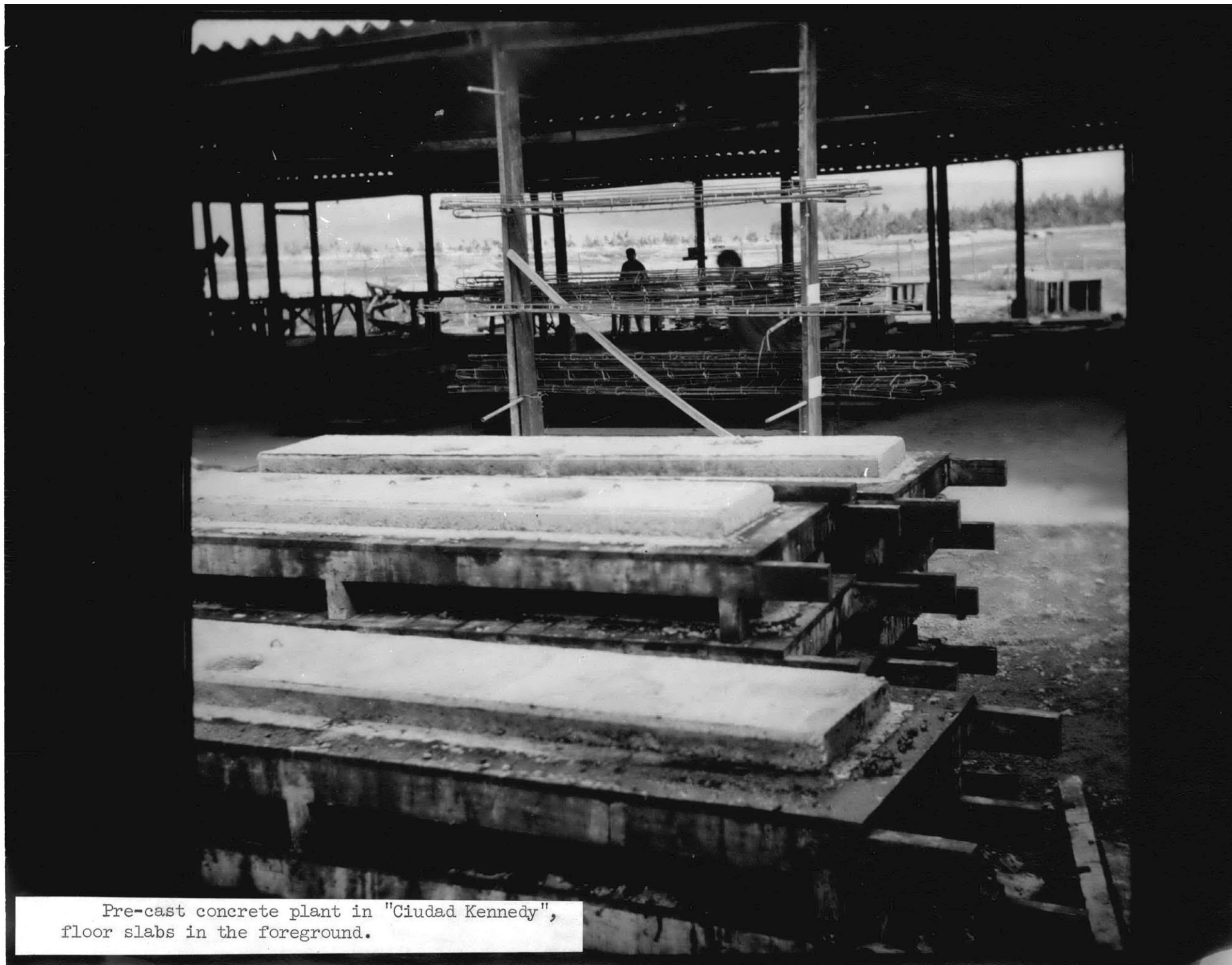
Child carrying water up to a dwelling in "Las Colinas"



CENTRO INTERAMERICANO DE VIVIENDA Y PLANEAMIENTO

1963-1964 II CURSO DE ADIESTRAMIENTO EN AUTOCONSTRUCCION

Site Plan of Ciudad Kennedy



Pre-cast concrete plant in "Ciudad Kennedy",
floor slabs in the foreground.



Self-help labor moving floor slab.



Merchant at improvised market in "Ciudad Kennedy"

THE PROGRAM

"... Architecture is organization.
YOU ARE AN ORGANIZER, NOT A DRAWING
BOARD ARTIST..."

Le Corbusier

If I Had To Teach Architecture

Focus 1938

THE PROGRAM

The ICT purchased in 1963 a tract of land adjacent to Ciudad Kennedy to build 2,000 dwellings by self-help methods. The site is located within the city limits of Bogota in an area known as "Timiza". It is shaped like a parallelogram, covering an area of approximately 720,000 square meters, and is mostly flat except in one corner where the land forms a shallow bowl surrounding a very beautiful pond. The city of Bogota is at 8,000 feet above sea level and the average temperature is 58°F. The sky is often overcast, and showers of very short duration occur several times during the day. At the end of this chapter are three charts compiled by the Instituto Geografico "Augustin Codazzi" with specific climatological data for the city of Bogota: Rainfall Distribution, temperatures, and prevailing winds.

This community of 2,000 families is to be a self-sufficient and self-contained neighborhood unit, with all the necessary community facilities; i.e. market, shops, schools, places of worship, health center, community center, administrative buildings, open spaces, etc. However, this community is not supposed to provide opportunities of employment to its inhabitants within the site. A rapidly developing industrial area located at approximately 5 kilometers from the site

will be the main source of jobs for the inhabitants. This industrial area is located along the road that connects the site with Bogots's downtown business center.

The families to be housed will themselves contribute to the effort through the application of various self-help methods. Most houses will have the ability to grow, should the need and economic status of the family change. All the beneficiaries will pay fully for the housing facilities provided to them by the ICT, on a long-term installment basis. The dwellings supplied will therefore be appropriate to the income of the families for which they are intended. This has rather unfortunate consequences: the neediest families belonging to the lowest income bracket will only be able to acquire the smallest houses, since there are no subsidies for low-cost housing in Colombia. At the end of this chapter is a table that summarizes the socio-economic conditions of the future inhabitants of "Timiza."¹

The land use requirements for "Timiza" according to Bogota's Planning Board (Acuerdo 30 de 1961 para residencia

¹In this chart all indications with reference to money are in terms of Colombian Pesos. In July 1964, the exchange with the American currency was US \$1 = \$10 (Colombian Pesos). It must also be noted that all future reference to money in this thesis will be in terms of Colombian Pesos.

obrera R-7e) are:

<u>Item</u>	<u>Minimum area requirement (R-7e)</u>
Area for dwellings	42.0%
Open areas	12.3%
Schools	4.7%
Roads	21.4%
Parking	3.6%

The urban design of the housing project should reflect a social and economic concept concerning human groupings. The size of the neighborhood units and all its elements are a direct consequence of such a concept. To determine the sizes of all the elements in the community it is necessary to develop a hierarchy of human groupings on the basis of shared community facilities, and the economic limitations of the project.

The following criteria are proposed as basis for the hierarchy of human groupings:

- the size of the schools
- the size of the community facilities
- distances as related to the travel time of the pedestrian
- traditional size of a neighborhood unit in Latin America.

The relative importance of these criteria depends on many factors such as the position of the group in the hierarchy, economic status of the inhabitants, climatological conditions of the area, traditional community activities, etc.

Before listing the proposed hierarchy of human groupings, it is necessary to determine a very important factor. An average house lot for a community of this type is 120 sq. m. plus 20 sq. m. (two rooms) devoted to future expansion, comes to a total of 140 sq. m. Since Planning Regulation R-7e requires that at least 42% of the area should be devoted to house lots, the total site area devoted to each dwelling should be $140 \times \frac{100}{42}$ or 330 sq. m.

The proposed hierarchy of groups is as follows:

A. Group No.1: The "block", "manzana", or minimum cluster

Criteria: The traditional block or "manzana" in is approximately 100 m. by 100 m. or 10,000 sq. m. with small corner shops for daily food supply and other shopping. The number of families in the cluster equals $\frac{10,000}{300-350}$ or 25 to 33.

Facilities: Corner Shop

Garbage Collection Station: the maximum distance between it and the farthest dwelling should not exceed 65 m.

Parking: 1 car per 6 families

B. Group No.2: The Kindergarten

Criteria: In accordance with the educational system in Latin America, a 2-year kindergarten can accommodate about 35 - 50 children per year, or a total of 70 - 100 children. Since children between 5 - 7 constitute 6% of the population, a community of 1,170 - 1,660

people is required to supply 70 - 100 children. If an average family size equals 6, the total number of families in Group No. 2 equals 1,170 - 1,660/6 or 200 - 270. A total of 9 Groups No. 1 form one Group No. 2. The area required to accommodate a Group No. 2 equals 200-270 x 330, or 66,000 - 90,000 sq. m.

Facilities: Kindergarten: Established standards in Latin America require that the building area of a school should provide 4 sq. m. per pupil, while the total site of the school must allocate 12 sq. m. per pupil. According to these indices, the building of the kindergarten should be 400 sq. m. and the site area 1200 sq. m.

C. Group No. 3: The Elementary School

Criteria: Elementary Education in Latin America has a duration of six years. Using an average of 50 - 60 pupils per instructor, and 2 sections per year, the elementary school should accommodate 600 - 720 students. Since 16% of the population are youngsters between 7 - 12, an elementary school will serve a community of 3,800 - 4,400 people, or 640 - 800 families. Approximately 3 Groups No. 2 form 1 Group No. 3. The area required to accommodate a Group No. 3 equals 240,000 - 280,000 sq. m.

Facilities: -Elementary School: The building area should be 3,000 sq. m., and the site area 8,000 sq. m.
- Food shops
- Pharmacy

D. Group No. 4: The Post-Elementary School

Criteria: The present conditions of welfare and culture in Latin America restricts the amount of youngsters that can afford a high-school education, as is known in the United States. Instead, Latin America needs technicians, craftsmen, industrial workers, skilled laborers, etc. In other words, the character of the post-elementary school is that of an Arts and Crafts School. This kind of institution needs to be provided with workshops, machinery, specialized equipment, etc.; and in order to be efficient it must serve at least between 800 - 1000 students. Since 9% of the population are youngsters between 13 - 18 a post-elementary school will serve a community of 9,000 to 11,000 people, or between 1,500 and 2,000 families. Approximately 2 Groups No. 3 form 1 Group No. 4. The area required to accomodate a Group No 4 equals 2,000 times 330 or 660,000 sq. m.

Facilities: The Post-Elementary School: the building area should be 4,000 sq. m., the site area 12,000 sq. m.

-Market: 2,000 to 2,500 sq. m.

-Shops: 65 sq. m. per shop; for a total of 125 shops an area of 8,125 sq.m. is required.

-Health Center: 3 beds per 1,000 persons, or 800 - 1,200 sq. m.

-Community Center: Administration 600 sq.m.
4 meeting rooms 1000
library 300
theater 1000
recreation 1000
4200 sq.m.

- Church: 1,000 sq. m.
- Parking: 1 car per 6 families for a total of 250 - 300 cars. Providing 35 sq.m. per car and expansion of 100%, the area required is between 8,000 and 12,000 sq. m.
- Outdoor Spaces: Rest, Recreation, and Play

It is noted that the area required to accomodate a Group No. 4 is of the order of magnitude of the site of "Timiza". The urban design of "Timiza" is concerned in developing a community that will meet the specifications of a Group No. 4.

The absence of subsidies and the amortization plan for low-cost housing in Colombia dictates that the size of the dwellings should be a function of the income of the family rather than the family size. It is a very unfortunate circumstance that must be contended with in the design.

The families to be housed in "Timiza" were divided in four income brackets as follows:²

<u>Income bracket</u>	<u>% of total families</u>
0 to \$500 per month	13.0
\$500 to 750	24.7
\$750 to 1000	28.6
\$1000 and up	33.7

²The breakdown of the inhabitants into four income brackets is illustrated graphically at the end of the chapter.

The size of the Colombian family is between 5 and 7 persons.

The amortization plan of the ICT operates according to the following policies:

- No subsidies are provided
- Twenty years is the maximum period of amortization
- Families whose monthly income is less than \$500 pay 20% of it in amortization
- Families whose monthly income ranges from \$500 to \$1,000 pay 25% of it in amortization
- Families whose monthly income is more than \$1,000 pay 30% of it in amortization

The houses at Ciudad Kennedy were chosen to determine the cost of construction for dwellings built with self-help labor. A 3 bedroom unit has a constructed area of 64.80 sq. m., and it costs \$15,000; while a 5 bedroom unit has a constructed area of 94.69 sq. m. at a cost of \$22,000. From this it was concluded that the cost of construction for dwellings of this particular type is \$232 per sq.m.

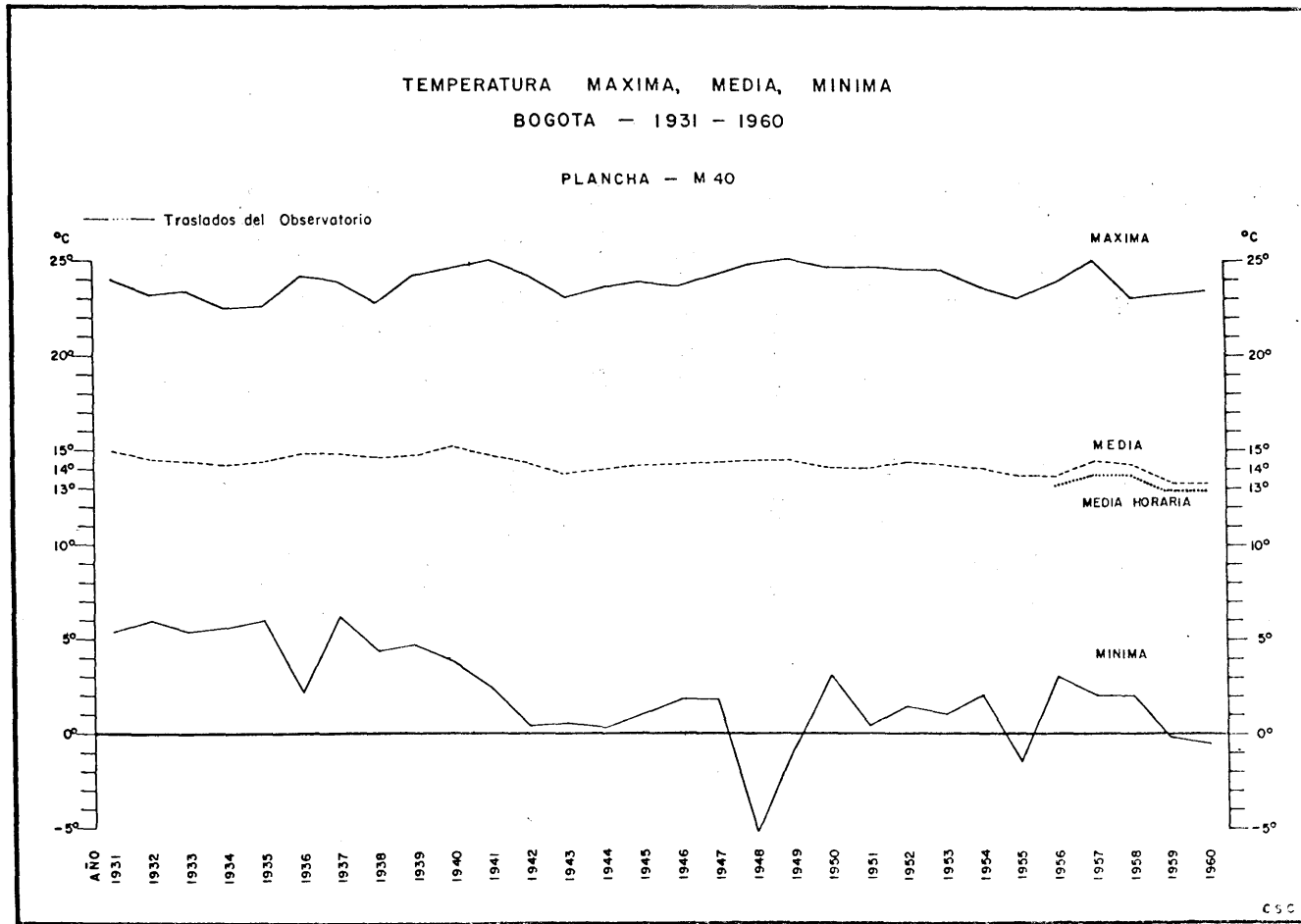
To ensure that the house is within the means of the beneficiary and can therefore be paid on reasonable terms within a period of not more than 20 years, the total cost (that is cost of house, land and land development) should

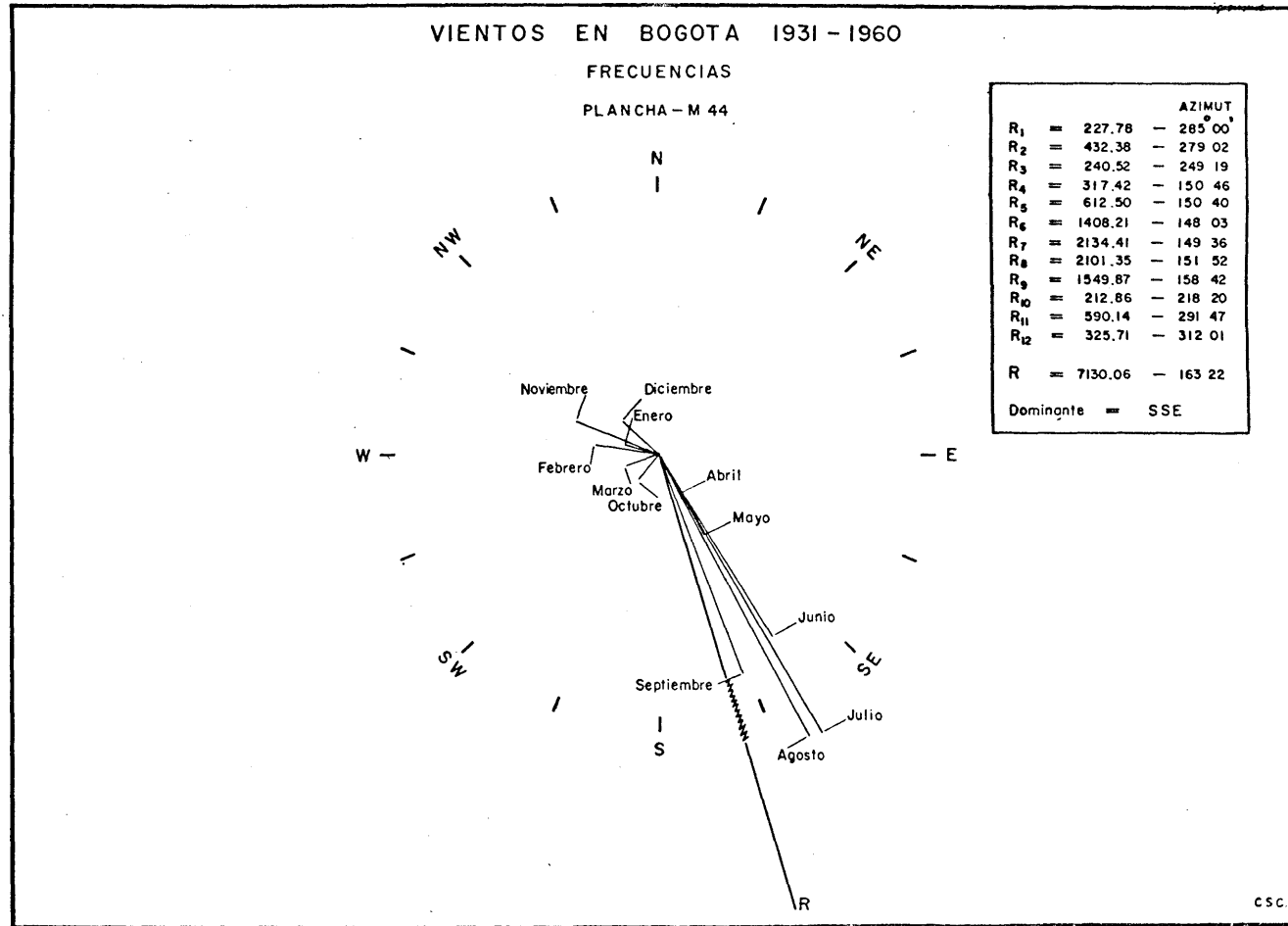
not exceed a certain ceiling, which has been established at approximately 2 - 3 times the annual income of the family for which the house is intended. According to this criteria, the following distribution was obtained.

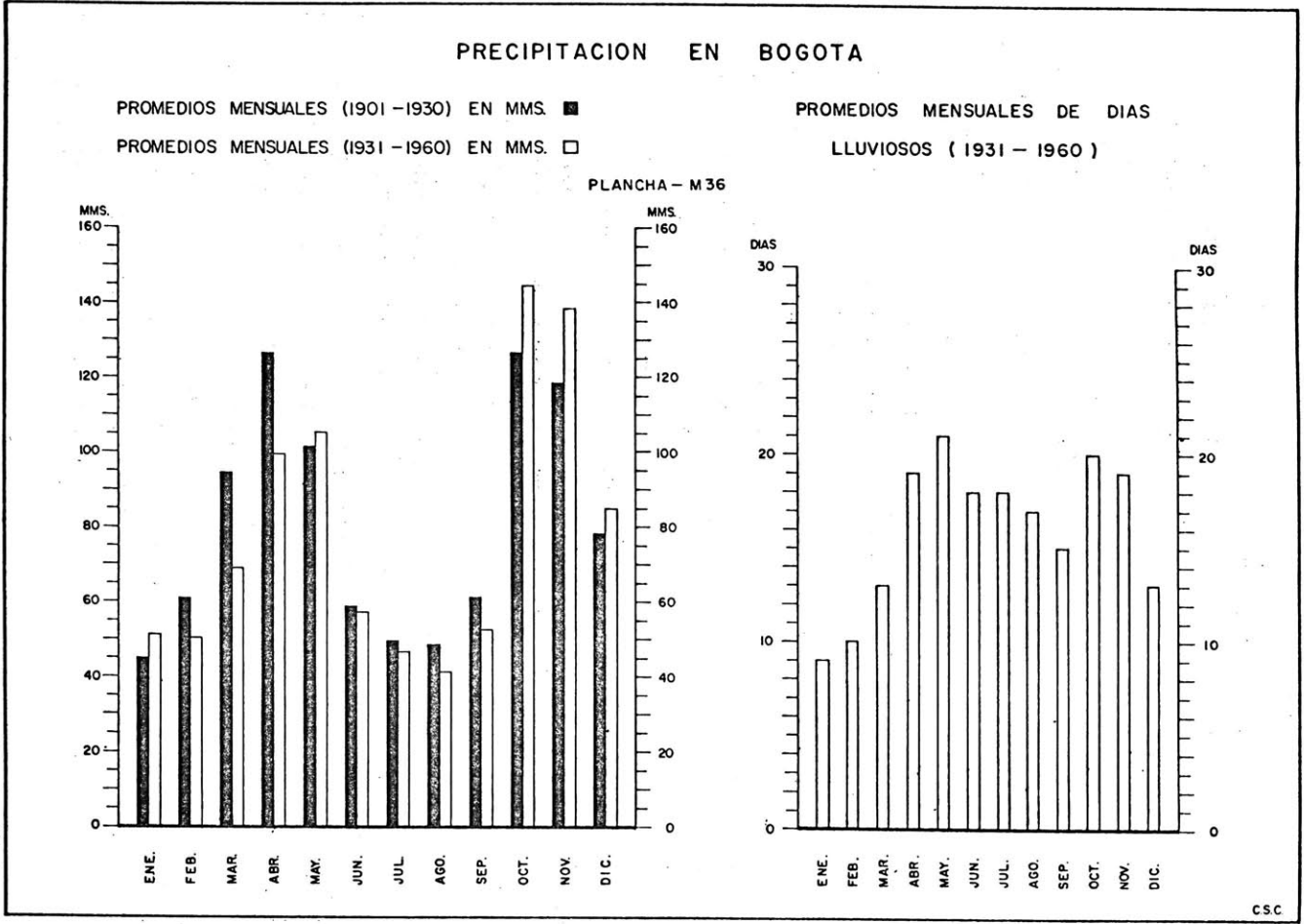
<u>Income Group</u>	<u>Percentage Breakdown</u>	<u>Size of Dwelling</u>
0 to \$500 per month	13.0%	30 sq. m.
\$500 to \$750	24.7%	60 sq. m.
\$750 to \$1,000	28.6%	100 sq. m.
\$1,000 and up	33.7%	130 sq. m.



Aerial photograph of the site: Timiza.







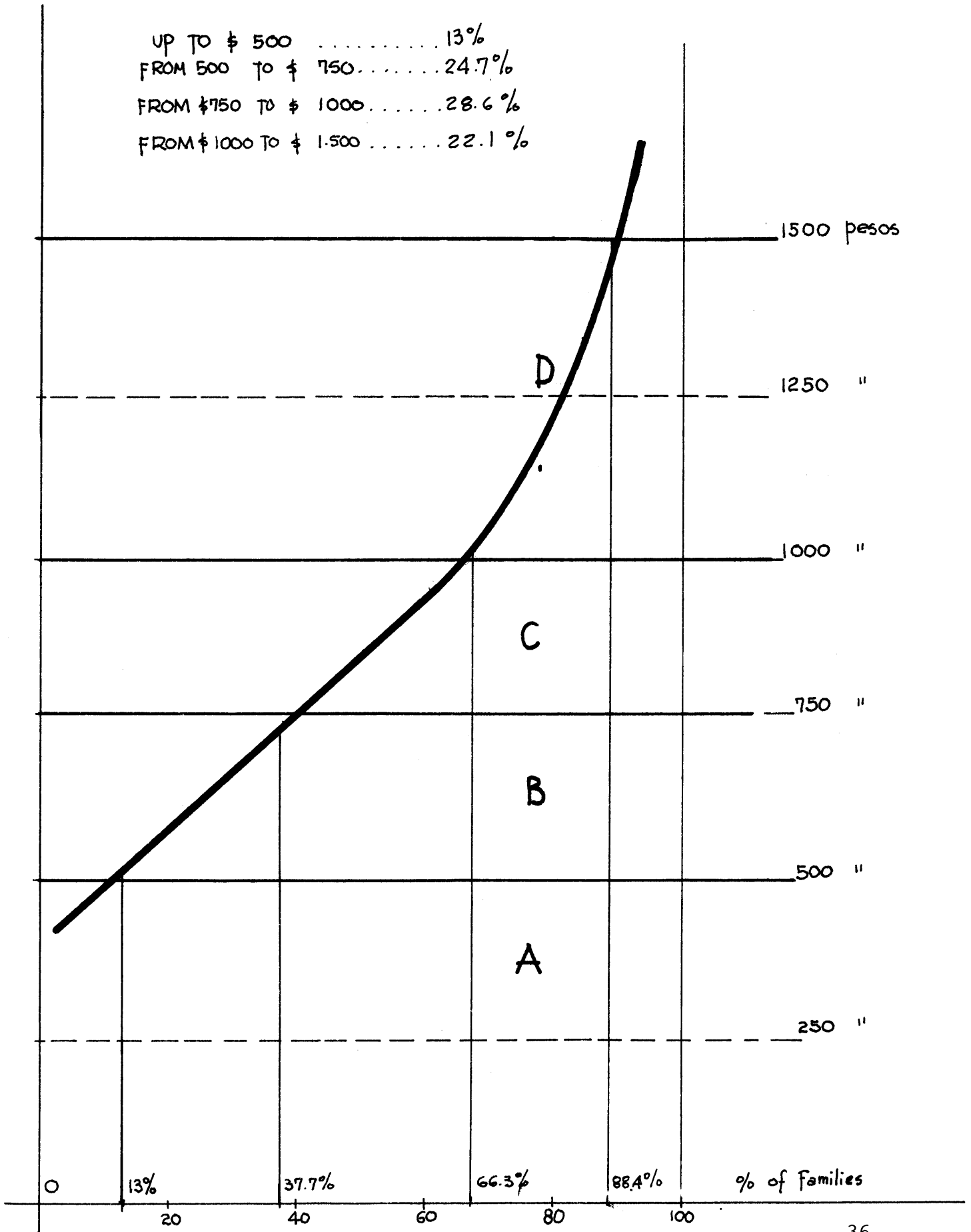
BOGOTÁ - COLOMBIA
 SOCIO ECONOMIC CONDITIONS

1	Urban Population in thousands 1" = 300	<p>1938 325.6 1951 682.7 1963 1281.7</p> <p>Note: annual rate of increase 54.5%</p>																												
2	Quantitative Deficit* of Housing 1" = 10,000 units	<p>1951 38,491 1963 60,880</p> <p>* Number of dwelling units needed, assuming that each family should live in houses meeting established standards</p>																												
3	Difference between Quantitative deficit and demand of Housing 1" = 10,000	<p>Deficit 1963 60,880 Demand 1963 56,000</p> <p>Note: Total number of applications distributed 154,000 * Demand = number of applications returned.</p>																												
4	Monthly Income Distribution of families demanding Housing 1" = 4000 pesos	<table border="1"> <thead> <tr> <th>Income Range</th> <th>Number of Families</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>up to \$ 500 pesos</td> <td>3,679</td> <td>100.00</td> </tr> <tr> <td>from 501 to 750 "</td> <td>6,993</td> <td>18.0</td> </tr> <tr> <td>" 751 to 1000 "</td> <td>8,085</td> <td>24.7</td> </tr> <tr> <td>- 1001 - 1500 -</td> <td>6,243</td> <td>28.6</td> </tr> <tr> <td>- 1501 - 2000 -</td> <td>2,015</td> <td>7.1</td> </tr> <tr> <td>- 2001 - 2500 -</td> <td>636</td> <td>2.2</td> </tr> <tr> <td>- 2501 - 3000 -</td> <td>317</td> <td>1.1</td> </tr> <tr> <td>\$ 3001 up</td> <td>343</td> <td>1.2</td> </tr> </tbody> </table> <p>Note: current exchange rates are \$10 pesos to one (1) dollar</p>	Income Range	Number of Families	%	up to \$ 500 pesos	3,679	100.00	from 501 to 750 "	6,993	18.0	" 751 to 1000 "	8,085	24.7	- 1001 - 1500 -	6,243	28.6	- 1501 - 2000 -	2,015	7.1	- 2001 - 2500 -	636	2.2	- 2501 - 3000 -	317	1.1	\$ 3001 up	343	1.2	
Income Range	Number of Families	%																												
up to \$ 500 pesos	3,679	100.00																												
from 501 to 750 "	6,993	18.0																												
" 751 to 1000 "	8,085	24.7																												
- 1001 - 1500 -	6,243	28.6																												
- 1501 - 2000 -	2,015	7.1																												
- 2001 - 2500 -	636	2.2																												
- 2501 - 3000 -	317	1.1																												
\$ 3001 up	343	1.2																												
5	Age distribution of applicants	<table border="1"> <thead> <tr> <th>Age Group</th> <th>Number of Applicants</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>from 21 to 27 years old</td> <td>5,667</td> <td>100.00</td> </tr> <tr> <td>from 28 to 46 years old</td> <td>20,106</td> <td>20.00</td> </tr> <tr> <td>from 46 to 59 years old</td> <td>2,918</td> <td>71.3</td> </tr> </tbody> </table>	Age Group	Number of Applicants	%	from 21 to 27 years old	5,667	100.00	from 28 to 46 years old	20,106	20.00	from 46 to 59 years old	2,918	71.3																
Age Group	Number of Applicants	%																												
from 21 to 27 years old	5,667	100.00																												
from 28 to 46 years old	20,106	20.00																												
from 46 to 59 years old	2,918	71.3																												
6	Persons per family	<table border="1"> <thead> <tr> <th>Persons per Family</th> <th>Number of Applicants</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>1 to 4 people</td> <td>11,021</td> <td>100.00</td> </tr> <tr> <td>5 to 7 people</td> <td>12,705</td> <td>59.2</td> </tr> <tr> <td>8 to 10 people</td> <td>3,810</td> <td>44.8</td> </tr> <tr> <td>more than 11 people</td> <td>735</td> <td>3.4</td> </tr> </tbody> </table>	Persons per Family	Number of Applicants	%	1 to 4 people	11,021	100.00	5 to 7 people	12,705	59.2	8 to 10 people	3,810	44.8	more than 11 people	735	3.4													
Persons per Family	Number of Applicants	%																												
1 to 4 people	11,021	100.00																												
5 to 7 people	12,705	59.2																												
8 to 10 people	3,810	44.8																												
more than 11 people	735	3.4																												
7	Monthly rents paid	<table border="1"> <thead> <tr> <th>Rent Range</th> <th>Number of Applicants</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>up to \$ 400 pesos</td> <td>9,462</td> <td>100.00</td> </tr> <tr> <td>from 401 to 500 -</td> <td>29,344</td> <td>33.4</td> </tr> <tr> <td>- 501 to 600 -</td> <td>4,856</td> <td>45.4</td> </tr> <tr> <td>- 601 to 750 -</td> <td>763</td> <td>17.1</td> </tr> <tr> <td>- 751 to 1000 -</td> <td>285</td> <td>2.8</td> </tr> <tr> <td>1001 and more</td> <td>92</td> <td>.8</td> </tr> </tbody> </table>	Rent Range	Number of Applicants	%	up to \$ 400 pesos	9,462	100.00	from 401 to 500 -	29,344	33.4	- 501 to 600 -	4,856	45.4	- 601 to 750 -	763	17.1	- 751 to 1000 -	285	2.8	1001 and more	92	.8							
Rent Range	Number of Applicants	%																												
up to \$ 400 pesos	9,462	100.00																												
from 401 to 500 -	29,344	33.4																												
- 501 to 600 -	4,856	45.4																												
- 601 to 750 -	763	17.1																												
- 751 to 1000 -	285	2.8																												
1001 and more	92	.8																												
8	Distribution of occupations among applicants	<table border="1"> <thead> <tr> <th>Occupation</th> <th>Number of Applicants</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>professionals, managers, technicians</td> <td>2,683</td> <td>100</td> </tr> <tr> <td>office clerks, salesman</td> <td>9,759</td> <td>9.6</td> </tr> <tr> <td>farmers, lumberjacks, miners</td> <td>212</td> <td>34.4</td> </tr> <tr> <td>drivers, artisans, laborers, machine operators</td> <td>12,184</td> <td>.7</td> </tr> <tr> <td>gardeners, barbers, maids etc.</td> <td>2,499</td> <td>43.0</td> </tr> <tr> <td>armed forces</td> <td>518</td> <td>8.8</td> </tr> <tr> <td>Teachers</td> <td>495</td> <td>1.8</td> </tr> </tbody> </table>	Occupation	Number of Applicants	%	professionals, managers, technicians	2,683	100	office clerks, salesman	9,759	9.6	farmers, lumberjacks, miners	212	34.4	drivers, artisans, laborers, machine operators	12,184	.7	gardeners, barbers, maids etc.	2,499	43.0	armed forces	518	8.8	Teachers	495	1.8				
Occupation	Number of Applicants	%																												
professionals, managers, technicians	2,683	100																												
office clerks, salesman	9,759	9.6																												
farmers, lumberjacks, miners	212	34.4																												
drivers, artisans, laborers, machine operators	12,184	.7																												
gardeners, barbers, maids etc.	2,499	43.0																												
armed forces	518	8.8																												
Teachers	495	1.8																												
9	Places of Origin and length of residence in Bogotá of applicants.	<table border="1"> <thead> <tr> <th>Category</th> <th>Number of Applicants</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Number of applicants considered</td> <td>4,122</td> <td>100.00</td> </tr> <tr> <td>Origin: natives to the city</td> <td>2,421</td> <td>14.5</td> </tr> <tr> <td>Origin: from natives</td> <td>1,701</td> <td>85.5</td> </tr> <tr> <td>Length of residence of migrants</td> <td></td> <td></td> </tr> <tr> <td>up to 2 years</td> <td>1,732</td> <td>71.1</td> </tr> <tr> <td>2 to 6 years</td> <td>5,898</td> <td>24.4</td> </tr> <tr> <td>more than 6 years</td> <td>16,589</td> <td>68.5</td> </tr> </tbody> </table>	Category	Number of Applicants	%	Number of applicants considered	4,122	100.00	Origin: natives to the city	2,421	14.5	Origin: from natives	1,701	85.5	Length of residence of migrants			up to 2 years	1,732	71.1	2 to 6 years	5,898	24.4	more than 6 years	16,589	68.5				
Category	Number of Applicants	%																												
Number of applicants considered	4,122	100.00																												
Origin: natives to the city	2,421	14.5																												
Origin: from natives	1,701	85.5																												
Length of residence of migrants																														
up to 2 years	1,732	71.1																												
2 to 6 years	5,898	24.4																												
more than 6 years	16,589	68.5																												
10	Kennedy City average figures. 1" = 200 pesos	<table border="1"> <thead> <tr> <th>Category</th> <th>1964 Value</th> <th>1963 Value</th> <th>% Change</th> </tr> </thead> <tbody> <tr> <td>Monthly monthly rent cost</td> <td>\$ 198</td> <td>\$ 24</td> <td>% decrease 53</td> </tr> <tr> <td>Monthly amortization</td> <td>\$ 64</td> <td>\$ 142</td> <td>scale 1/200</td> </tr> <tr> <td>Monthly monthly income cost</td> <td>\$ 142</td> <td>\$ 1,179</td> <td>% increase 59</td> </tr> <tr> <td>Present monthly income cost</td> <td>\$ 1,179</td> <td>\$ 1,179</td> <td>scale 1/200</td> </tr> </tbody> </table>	Category	1964 Value	1963 Value	% Change	Monthly monthly rent cost	\$ 198	\$ 24	% decrease 53	Monthly amortization	\$ 64	\$ 142	scale 1/200	Monthly monthly income cost	\$ 142	\$ 1,179	% increase 59	Present monthly income cost	\$ 1,179	\$ 1,179	scale 1/200								
Category	1964 Value	1963 Value	% Change																											
Monthly monthly rent cost	\$ 198	\$ 24	% decrease 53																											
Monthly amortization	\$ 64	\$ 142	scale 1/200																											
Monthly monthly income cost	\$ 142	\$ 1,179	% increase 59																											
Present monthly income cost	\$ 1,179	\$ 1,179	scale 1/200																											

In general people are satisfied with neighborhood

INDICATIVE BREAKDOWN OF FAMILY INCOMES FOR THE AREA OF "CIUDAD KENNEDY"

UP TO \$ 500 13%
 FROM 500 TO \$ 750 24.7%
 FROM \$ 750 TO \$ 1000 28.6%
 FROM \$ 1000 TO \$ 1.500 22.1%



THE URBAN DESIGN

The Concept

The site has certain unique characteristics that had to be contended with in the design. It is shaped like a parallelogram; two of its sides are bound by access roads while the other two are adjacent to undeveloped land; and the most beautiful portion of the site, a small pond surrounded by trees and vegetation, is located in a corner that is farthest away from the access roads.

The problem consists in designing a scheme in which the dwellings are organized by the community facilities and an interdependent system of roads that will serve and structure the community. All this, without neglecting the search for a meaningful urban form and profile.

This community is organized around a central spine containing most of the buildings intended for communal use. It is a central element conforming with the elongated shape of the site with two foci of activity at its extremes; the

market and the community center. The ligament between these two centers of activity is a pedestrian mall bounded by shopping arcades, low rise walk up apartments and small open spaces. The spine is to serve also as a link between the entrance to the development and the most beautiful and remote part of the site. This area which surround the pond is to serve as the main space for recreation within the community. Being such a precious place, it has been bounded by the Community Center, a post elementary school and low rise apartment buildings for two reasons: for the visual enjoyment of the people using these facilities and to introduce sufficient vitality into the area to prevent the formation of squatter settlements.

Two elementary schools serve the neighborhood, one at each side of the central spine. Each one is located to reduce walking distances of children living in the extreme portions of the site and to serve as the center of gravity for the two main groupings of dwellings. In addition, six kindergartens have spotted in the neighborhood

to serve more localized areas.

The Circulation

The circulation system consists of a main ring that surrounds and serves the central spine. Minor rings fed from the main ring serve the residential areas, while pedestrian ways link the different elements of the development in recognition to human scale.

The road profiles are in accordance with a modified V-system (Le Corbusier) used by the city of Bogota.

The circulation is conceived so that a person entering the development becomes immediately aware of its system, for the purpose of visual organization and orientation. The circulation system is also used to define the boundaries of the different zones and to aid in giving each one its integrity. The attempt was made to reduce the number of roads to a minimum without impairing the proper functioning of the development. However, the assumption was made that it is unreasonable to make

a person walk more than 65 meters carrying some weight (groceries, garbage, etc.), so that the farthest distance from a dwelling to a service road never exceeds the established maximum.

By achieving all these goals the circulation system should provide a basic frame for the development and proper function of the community.

Community Facilities The needs of a human settlement are not covered by the provision of housing alone. In order to insure its smooth functioning and to cover its various needs as a community a number of buildings with specialized functions must be provided. These facilities are inseparable parts of the settlement and their significance in serving the economic, social, and spiritual life of the inhabitants is of paramount importance.

The Market The market has been located at one end of the Central Spine, acting as one of its nodes. It is close to the entrance to

have the benefit of being near to the bus station, and being accessible to the inhabitants of Kennedy City. The purpose of the market in Latin America is three-fold: it serves the people by providing them a specified place to shop for food, clothes, house equipment, etc.; it provides a portion of the inhabitants with a means of livelihood; and it serves as a meeting place for housewives to gossip and discuss all those subjects which are of common interest. Housewives are expected to visit the market at least once a day, for the purpose of buying perishable foodstuffs. For that reason it is more important for a market to be built simultaneously with the houses than any other public building (even the school) if the community is to develop its own life from the beginning.

Shops

If the site is not immediately provided with the essential number of basic shops, isolated shops will spring up in many locations. According to surveys made, in a community of 2,000 families there must be about 125 shops to meet the demand. Each cluster of dwellings in the community has a "corner shop", for a total of 80

shops. In addition 45 shops are provided in the Central Spine to meet the required number. It is expected that these shops will be supplemented by many peddlars who use a small cart or carry their merchandise upon their backs or on their heads.

The Community Center The Community Center is located at the other end of the Central Spine, neighboring the area that surrounds the pond. The Church is probably the most important building in the Community Center; most activities will be vinculated in some way or another with it. Fairs (usually held in honor of a Saint) and open air Masses will be held in the plaza that is in front of the Church. In addition, space has been allocated for administrative offices, a health center, craft center, meeting rooms, post-office, police station, social service headquarters, fire station, bank and an auditorium that is to be shared with the post-elementary school. The Community Center also provides facilities to show movies and to hold dances on Saturday nights.

Recreation

The most attractive area of the site, which surrounds the pond has been reserved as an open space for the recreation of the Community. It is expected that families will spend some of their week-end afternoons there, or in the near by field of the post-elementary school watching a soccer match. In addition, small spaces have been provided for each cluster of dwellings to serve as children's playgrounds and more localized recreation areas for adults. At all times the attempt is made to create positive spaces, since the highest dwellings are merely two stories high; the use of trees becomes very important.

The Cluster

The minimum cluster of dwellings is considered the most important structure of the neighborhood, and the basis of their organization are localized community facilities. Among the ones considered were:

- a. Common outdoor space
- b. The corner shop
- c. The garbage collection station
- d. Space devoted to pedestrian circulation
- e. Parking facilities

It was found that the "corner shop" and the garbage collection station are the controlling factors; in both cases the maximum distance to the remotest dwelling determined the limit of the cluster. The assumption was made that it was unreasonable to make a person walk more than 65 meters carrying weight (garbage, groceries). This determined the separation between adjacent garbage collection stations, the location of corner shops, the maximum distance between two service roads and the size of the minimum cluster. The cluster turned out to be composed by 26 to 32 dwellings.

In each cluster the pedestrian ways can be used for emergency access of fire trucks and ambulances. All access ways are properly illuminated with artificial light at night for use and protection of the inhabitants. Each cluster is provided with or shares common outdoor spaces where children can play. Shops and garbage collection station have been placed next to the street to facilitate serving them and to make them accessible to adjacent

clusters. Parking is provided at the rate of one car per three families (a 100% increase in the need is included).

In designing these clusters the attempt is made to conserve the integrity of the different domains: public, semi-public, semi-private, and private. For instance, a buffer zone made up of trees has been provided to separate the very active inner ring of vehicle circulation and the residential zones.

Orientation

Finally it must be explained the orientation of the houses at approximately 45° with the North-South direction was chosen for two reasons: first, it allows morning sun as well as the afternoon sun to penetrate all dwellings; the afternoon sun can be controlled by means of curtains; second, the spaces formed by the rows of houses do not align themselves with the direction of the prevailing winds.

THE HOUSE DESIGN

The first consideration was to determine the appropriate type of housing that would meet the requirements of the program. The problems consists in designing a low-cost house to be built by self-help labor in the shortest possible time.

The types of houses considered were:

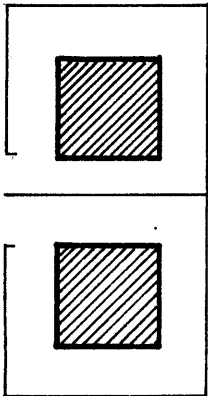
Detached house

Semi-detached house

Row house, with or without outdoor space

All of these types of houses were analyzed from the points of view of: cost, disposition of living spaces, outdoor spaces and core, required urban density, and privacy.

The Detached House



SUBURBAN HOUSES

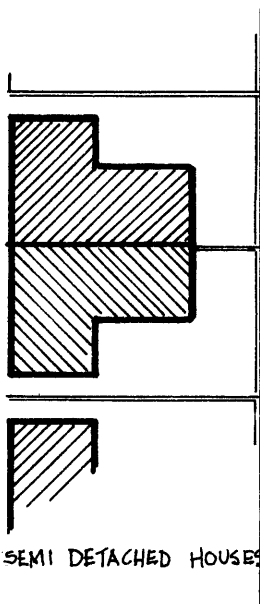
This typical arrangement of separate lot, single family house is the traditional agricultural or rural house not only in Colombia but everywhere in the world. Today, an adaptation of this type of house is known as the suburban house, considered as a transition between the country house and the urban dwelling unit.

However, we ruled out this idea since it

does not meet our requirements:

- Lot dimensions are too large to meet necessary densities.
- Surrounding spaces are virtually unusable and negative in character.
- Since the dwellings are free standing, it is impossible to share walls and cut down unit costs.
- It is extremely difficult to arrange these units in clusters that will have meaning and interest as a whole.

The Semi-Detached House

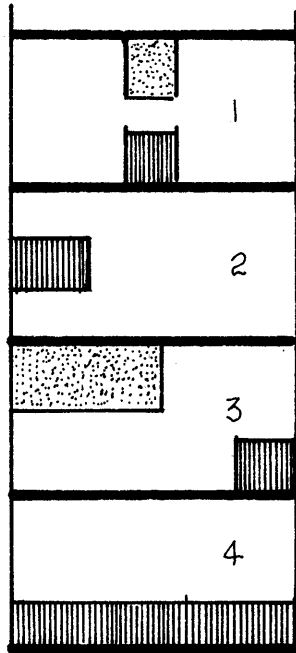


It can be considered as intermediate between a detached house and a row house. It consists of groups of two units arranged under a single volume, with an open space in between. The disadvantages of this type of housing are:

- Although an L-shape plan has good possibilities in the arrangement of living spaces, it necessitates more weather resisting walls.
- Required densities are hard to obtain.
- Only one wall is shared.

The Row House

It consists of a linear arrangement of houses having common walls known as "party walls." The diagrams illustrate the



 COURT

 CORE

ROW HOUSES

Lot Proportions

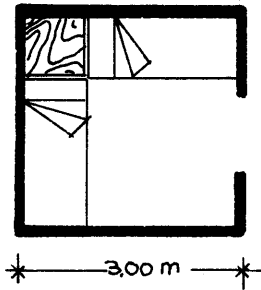
possibilities that were considered. This type of house was found to have the best characteristics to meet our requirements.

The linear arrangements of its units having common walls has many advantages:

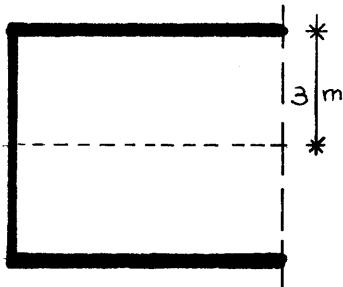
- The repetitive character of the arrangement can result in simplicity in construction, increased efficiency and savings in time and money.
- Past experience indicates that in this type of house, party walls and partition walls are the most expensive elements. Since the row house can have a minimum amount of exterior weather resisting walls considerable savings can be attained.

The proportions of the house lot are very important in achieving pre-determined densities and meeting low-cost limitations. A narrow lot usually results in reductions of space devoted to circulation within the site, and savings in the amount of service pipes that must feed the dwellings.

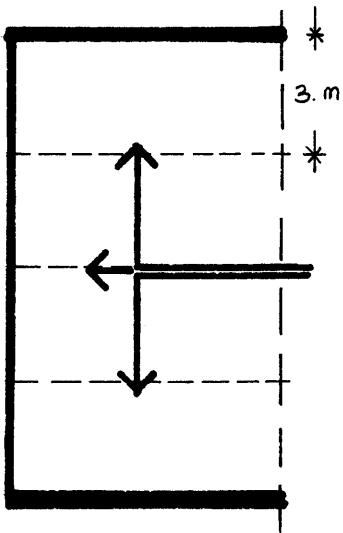
With this consideration in mind it is obvious that the optimum proportion will



be determined by functional requirements of the house itself. Sleeping spaces are basic to a dwelling. A bed is 2.00 x .90 m. If two beds are placed at right angles forming an L and an additional 1.00m is allowed for circulation, the minimum room and lot width is 3.00m. In 1929 Le Corbusier designed a minimum house (Barcelona Lotissement) where the lot width was 3.15 m.



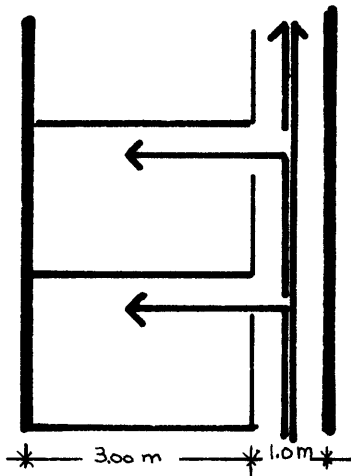
The next possibility is to place two or more of these basic units or modules side by side, obtaining lots width of 6.00, 9.00, 12.00 m. and so on.



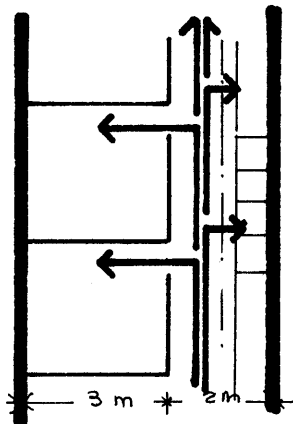
It was found that if more than two of these modules are placed together, it is impossible to maintain a single axis of circulation and transverse circulation becomes a necessity. When the unit is as wide as 4 modules, (12.00 m.) the secondary axis of circulation becomes highly competitive with the main axis and clarity as well as the interior space becomes seriously eroded. Thus it is valid to establish adequate range of

lot width between 3.00 and 12.00 m.

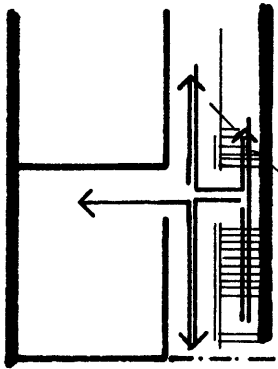
A 3.00m. wide house is basically a minimum dwelling but its proper use can only be assured if the inhabitants are educated in the urban way of life. A minimum dwelling would not be used appropriately by rural migrants who are still going through a period of adjustment. For this reason it was decided that the minimum lot width for this project could not be 3.00 m.



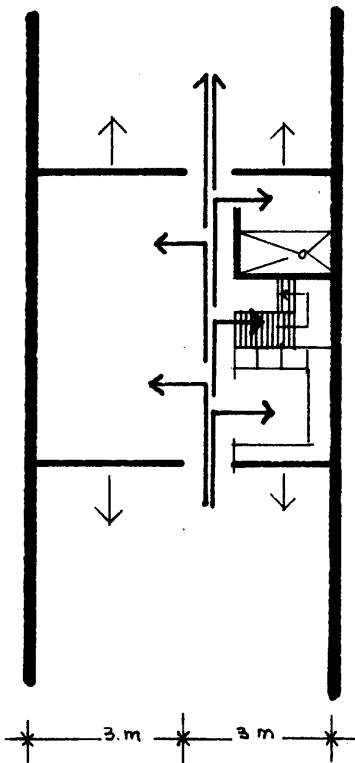
The 3.00 m and 4.00 m. wide houses are linear schemes in which all circulation is confined to one narrow band running parallel to the party wall, feeding the living spaces perpendicularly. Future growth is limited to the back of the house lot, and/or, vertically.



The 5.00 m. wide house is broken into two sectors: one of 3.00 m. wide for living spaces and the other of 2.00 m. wide for core and circulation. The 2.00 m. devoted to core and circulation can only accommodate a very narrow kitchen that would not meet the needs of the people in this community.



The second floor is impossible to subdivide without wasting a lot of space and getting a maximum of only two rooms. Further expansion would make cross ventilation impossible.

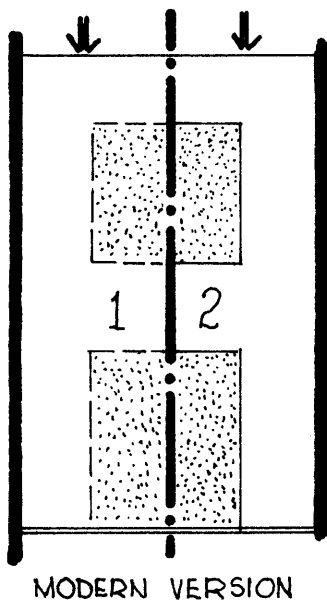
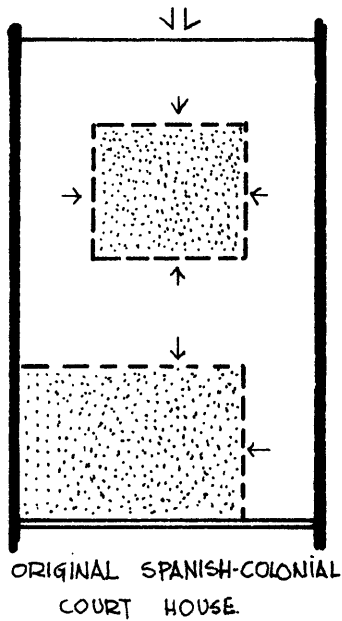


The 6.00 m. wide house is also broken into two major areas running parallel to the party walls. One for living spaces, the other for circulation and core. The second floor plan can be subdivided using the space to maximum advantage and efficiency. In addition, the house can have the ability to grow horizontally to the front and back of the lot, and vertically. It is a more flexible system. For these reasons it was decided that the minimum width in a dwelling unit could not be less than 6.00 m.

The depth of the lot was determined by the size of the house and the necessary outdoor space. This in turn is a function of the family size and income.

The Court House

The Court House is a variation of the row house. Basically it consists of a row house in which interior open spaces are



Requirements

incorporated at different points. It can be traced back to pre-historic times, but it can be found today everywhere in the world. The narrow lot court house in Latin America has its origins in the old Spanish Colonial House. The modern version has rather a dubious origin since it is merely the old house divided in two by a party wall without any re-adjustment in the dimensions. This kind of plan can work, but it is beyond the means of low-cost housing projects. In a house 6.00 m. wide, the scale of the interior court demands a large amount of fenestration in the enclosing walls. This would add new expenses that are not justifiable for a community of this type. It would be less expensive to roof over the inner space than to have these additional weather resisting walls.

In order to proceed logically with definite point of departure and with realized design limits, specific architectural conditions can suggest the spatial requirements. The following list of requirements was made to

be used as a guide in the design.

Accommodations:

- Common space(eating, resting, living)
- Cooking facilities
- Hygienic facilities
- Outdoor space(clothes drying, raising animals)
- Private space for parents
- Space for children(sleeping, playing, studying) - separation of the sexes when possible
- Storage
- Work space

Environmental Control:

- Protection against rain, cold weather and winds.
- Provision for adequate natural lighting, cross ventilation.
- Artificial lighting
- Burglar protection

Acoustic and Visual Privacy:

- Within the private domain
- Between public and private domains
- Between neighboring private domains

Responsibility:

- Clear boundaries (areas of ownership and maintenance should be defined)

Economics:

- Low cost construction
- Constrains of the amortization plan.

<u>%of families</u>	<u>Income bracket</u>	<u>House size</u>
13.00%	0 - 500	30 sq. m.
24.70%	500 - 750	65 sq. m.
28.60%	750 - 1000	100 sq. m.
33.00%	1000 up	130 sq. m.

Construction:

- Simplicity
- Minimum number of details
- Ability to grow
- Adequate for self-help construction

Proposed dwelling
Units

The proposed dwelling units for "Timiza"
consist of the following spaces.

- living spaces
- sleeping spaces
- core
- outdoor spaces

In this thesis, an effort is made to stop
using popular or generalized words in the
description of dwellings, to avoid deception
by association to one's own experience.

Deception by association can lead a design
away from the essential functional aspect.

of the spaces.

A "living space" is a place devoted for activities of social interchange, a point of reunion, conversation, recreation and dining. It is of interest to note that people in Latin America belonging to the lowest socio-economic strata, sit at the table for activities of social interchange that do not necessarily involve eating.

A "sleeping place" is a place devoted to private recreation and rest. In the design of these spaces privacy for the parents is given precedence over the separation of sexes among the children.

As described in the program, four sizes of dwellings corresponding to four different income brackets will be built. The four different types of houses to be built are as follows:

-30 sq.m.	expandable to 60 sq.m.
-60 sq.m.	expandable to 90 sq.m.
-105 sq.m.	expandable to 132 sq.m.
-132 sq.m.	non expandable

The 30.00 sq. m.
House

The lowest income group (0-500 pesos per month) can afford a house of 30 sq.m. in a 20-year installment plan. The cost of the house would be approximately \$10,000 pesos. It is a one room house with a core containing cooking and hygienic facilities. The common space is to be used for living and sleeping. This house is considered far from ideal. A family of three or more could not be supplied with the minimum of 12 sq. m. per person. Hopefully, the economic status of the family will change so that the expansion of the house can be realized. This house has a provision for expansion, by simply reproducing the same unit in the front yard. Constantino Doxiades built 15,000 houses with one main room and auxiliary facilities in Korangi, Pakistan for the lower income groups.

The 60 sq. m.
House

The 60 sq. m. dwelling is basically a 30 sq. m. house fully expanded. The lot is now 20m. deep and the expansion is confined to the back of the lot, leaving an open patio in between. If the family size is over five, minimum requirements of 12 sq.m. per person will not be met. People earning

between \$500 and \$750 a month can afford this unit.

The 105-132 sq. m.
House

The 105 sq. m. dwelling is organized around a linear core that provided maximum contact between the front of the house and the outdoor space in the back. These dwellings have two stories, with the possibility of a single-story addition in the front. The unit when fully expanded constitutes the 132 sq. m. house, which is considered sufficient to meet all the requirements. It contains a small sleeping space for the parents, separate sleeping spaces for male and female children living space, the core and the outdoor area. People that earn more than \$1000 a month can afford this house.

Note:

The materials, structure and system of construction of the dwellings will be described in detail after the completion of Phase III.

ACKNOWLEDGEMENTS

We wish to express our gratitude to the following people for their advise, criticism, encouragement and assistance:

Professor Horacio Caminos
Professor Albert G. H. Dietz
Professor Marvin Goody
The Thesis Committee
Johns-Manville, Somerville, N.J.
Instituto de Credito Territorial, Bogota,
Dr. Rafael Stevenson
Dr. Gabriel Andrade-Lleras
Dr. Rogelio Salmona
Dr. Herman Vieco
Dr. Augusto Gonzales
Dr. Raul Fajardo
The Organization of American States
The Inter-American Center of Housing and
 Planning, Bogota, Colombia
Dr. Paul Campbell
Dr. Augusto Enteiche
Professor Gorm Hansen

BIBLIOGRAPHY

Books

- Aloi, Roberti, "Mercati and Negozi" Ubrico Hoelpi Editore,
Milano, 1959
- Chermayeff, Serge, and Alexander, Christopher, Community and
Privacy, Doubleday and Co., Inc., Garden City, N.Y., 1963
- Doxiades, Constantine, Architecture In Transition, Hatchinsons
of London
- Hornback, J.A., Stores and Shopping Centers, McGraw-Hill, 1962
- Hailimann, Martin, Spain, The Studio Publications, Inc.
- Lynch, Kevin, Site Planning, M.I.T. Press, 1962
- Martinez, Carlos, Architecture in Colombia, Bogota, 1963
- Rodwin, Lloyd, The Future Metropolis, George Braziller, New
York. 1961
- Sitte, Camillo, The Art of Building Cities, Reinheld, 1945
- Schoenauer, N. and Seeman, S., The Court-Garden House, McGill
University Press, Montreal, 1962
- Stein, Clarence, Toward New Towns for America, Reinhold, New
York, 1957
- Weber, Wolfgang, Barcelona, Albertus-Veclag, Berlin

CINVA Publications and Reports

Cartilla de la Vivienda. Bogota, 1956

Cook, Peter. Materials, Products and Light Weight Prefabricated Building Components for Low-Cost Housing, Summer Research Project, 1962

Flowers, Dwight, Low-Cost Housing in Latin America. Summer Research Project, 1962

Hansen, Gorm. Experimental Building at Ciudad Kennedy, Bogota 1963

Lau, Adolfo. The Organization of a Self-Help Project: An Outline. Self-Help Housing Design for "Timiza": A Preliminary Study. Summer Research 1964

Moochtar, Radinal. Survey of Low-Cost Housing in Colombia. 1961

Ortiz, Angel. Investigation of an Experimental House, 1963

Primer Curso de Autoconstruccion; Equipo Colombia, Informe, 1962

Self-Help Housing Guide, Bogota, 1962

Williams, Terry. Self-Help Housing in Urban Environment,
A example : Ciudad Techo, Summer Research Project, 1963

Instituto Credito Territorial (I.C.T.) Publications

Informe al Senor Ministro de Fomento para su Memoria al
Congreso Nacional, 1963

La Demanda de Viviendas en los Programas del ICT y las
Condiciones Socio-Economicas de los Solicitantes.

Norma sobre Concesion de Creditos. Acuerdo No. 13, 1963

Reglamento de Autoconstruccion. Circular Reglamentaria
021, 1962

Solicitud de Credito al Banco Interamericano de Desarrollo.
Plan Bid 2, 1963

Other Publications and Reports

American Public Health Association. Planning the Neighborhood.
Public Administrative Service. 1948

American Institute of Architecture. Urban Design: The
Architecture of Towns and Cities. A series of articles:
December 1960
February 1963
April 1963
June 1963
August 1963
October 1963
December 1963
February 1964
April 1964
June 1964

Andrade--Lleras, Gabriel, Ciudad Techo y el Diseno Urban.
Revista Escala No. 4

Cement and Concrete Association. Housing from the Factory.
London, October 1962

Cinco Formulas Falsas Sobre Vivienda. Construcción
Colombiana, April - May 1964

Comparative Housing Study. Harvard School of Design, May 1958

Ekistics. September 1959. The Development of the Korangi Area.
page 207.
December 1959. Shops and Markets in Korangi. page 443

Kostka, Joseph. Neighborhood Planning: The Appraisal
Institute of Canada, 1957

Latin American Timber Trends and Prospects. United Nations
New York. 1963

Manual on Self-Help Housing. United Nations. New York 1964

ONU. Informe del Grupo de Trabajo Sobre Coordinación Modular
en Vivienda. San Salvador, El Salvador, 1962.

Peace Corps Site Discursive, Supermanzanas 11 & 15 in Ciudad
Kennedy, 1964

Peace Corps Site Discursive, Supermanzanas 13 & 14 in Ciudad
Kennedy, 1964

Other Publications and Reports-Cont.

Principios y Normas de Zonificacion, Parte I. Acuerdo No. 51
1963

Que es Ciudad Kennedy? Revista Escala No. 7

Royal Institute of British Architects. Community Centers
1946, The Housing Center.

M. I. T. Thesis Reports

Akashi, Naibu. A Community Center for Ichikawa, 1957
Master Degree Thesis

Carow, Jay, R., A System of Housing for Developing Nations.
1962, Masters Degree Thesis

Kastanlak, Bulent. Low-Cost Housing Development with Aided
Self-Help Method in Bayanum, Puerto Rico, 1962, Masters
Degree Thesis

Lockard, William, A System of Industrialized Housing for
Developing Countries, 1962, Masters Degree Thesis

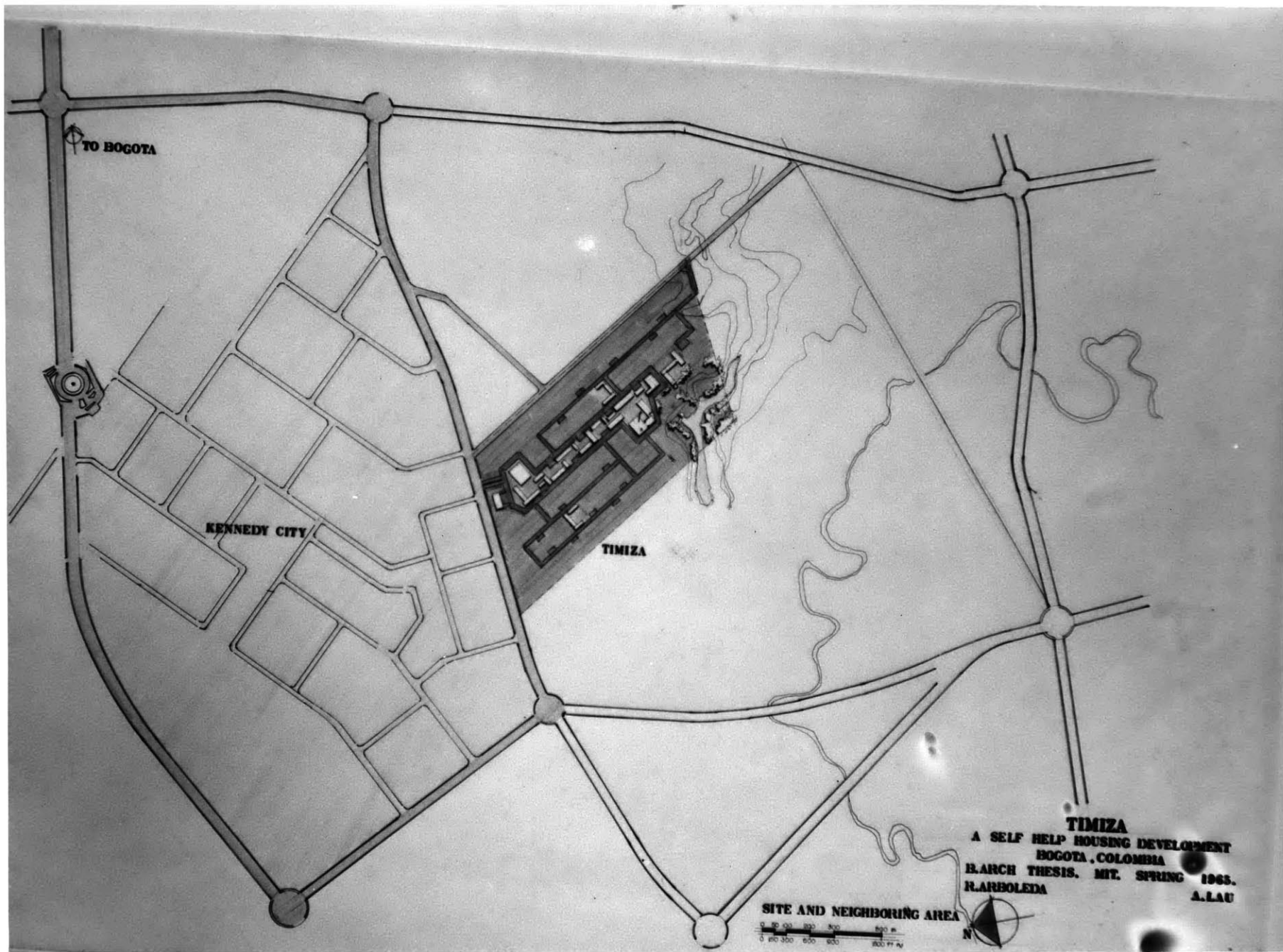
Newman, R.C. A System of Shelter for the Developing Nations,
1962, Masters Degree Thesis

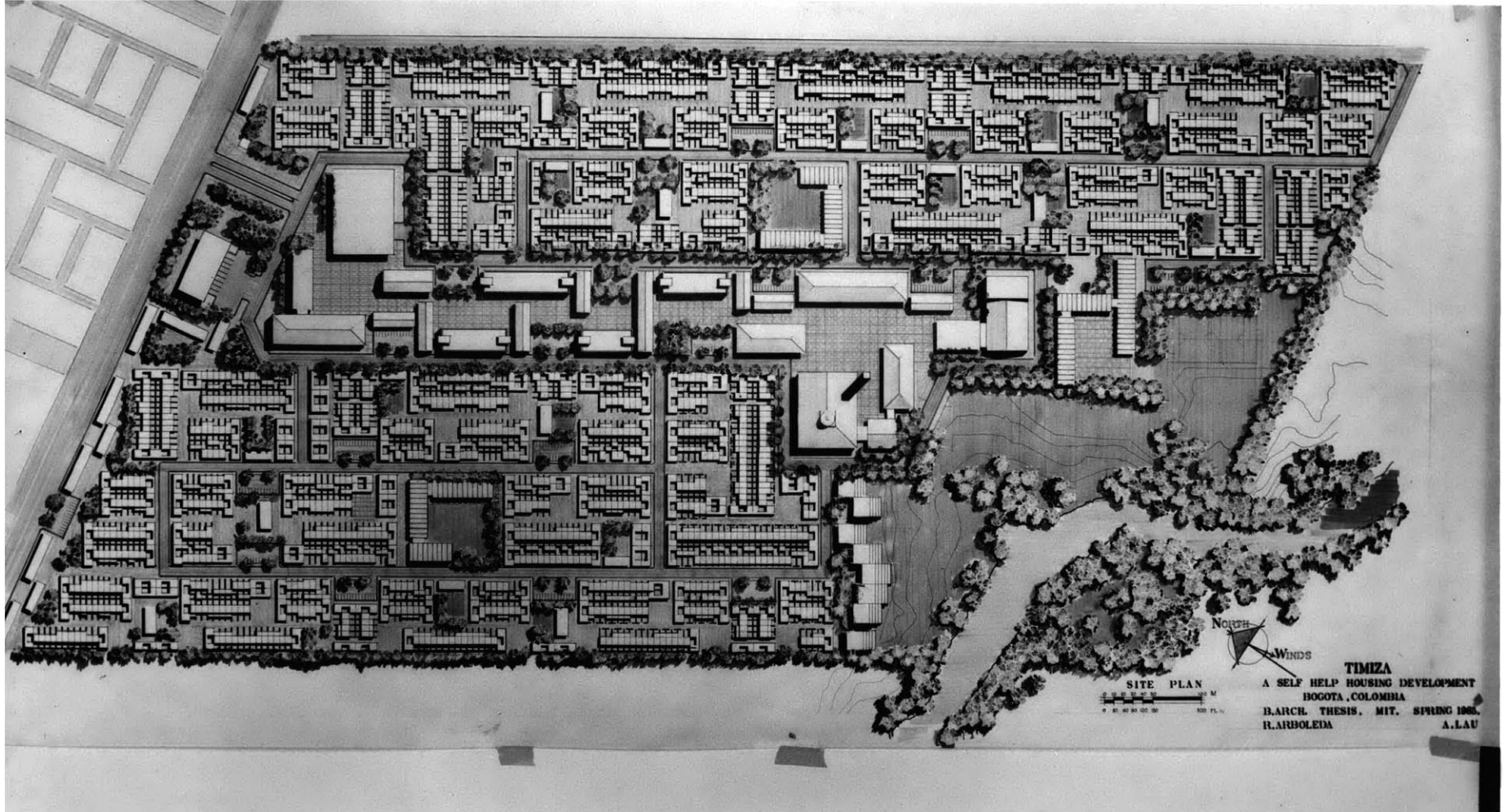
Silva, Julio. A System of Industrialized Housing for Developing
Countries, 1962, Masters Degree Thesis

Field Trips

February 26, 1965 Asbestos-Cement Plant and Research
Center at Johns-Mansville in Somerville, N.J.

February 16, 1965 Harvard Structure Laboratory, Professor
Mitchell. Conversation on Cellular Concrete

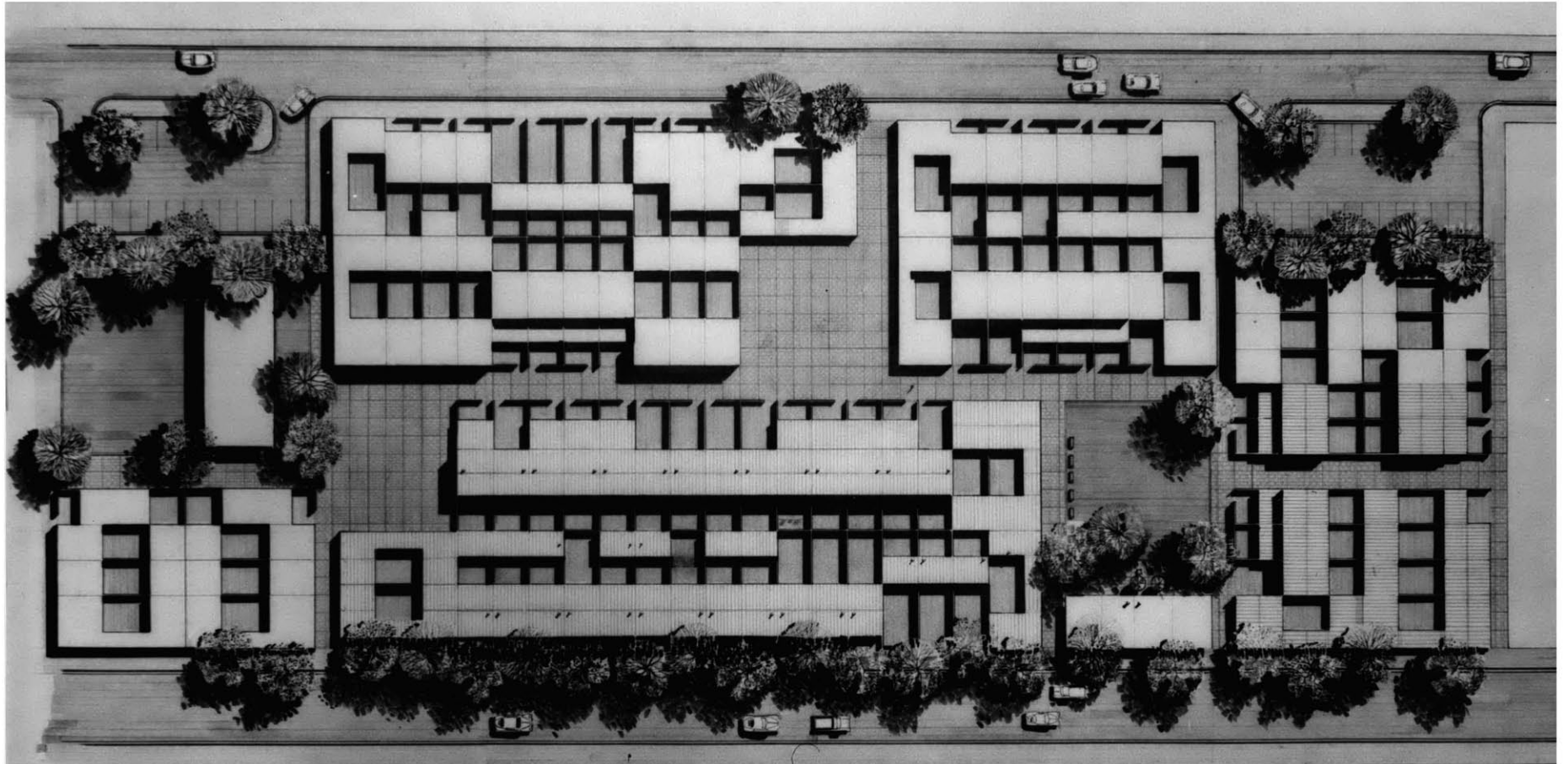




SITE PLAN
0 20 40 60 80 100 M
0 60 120 180 240 300 FT.

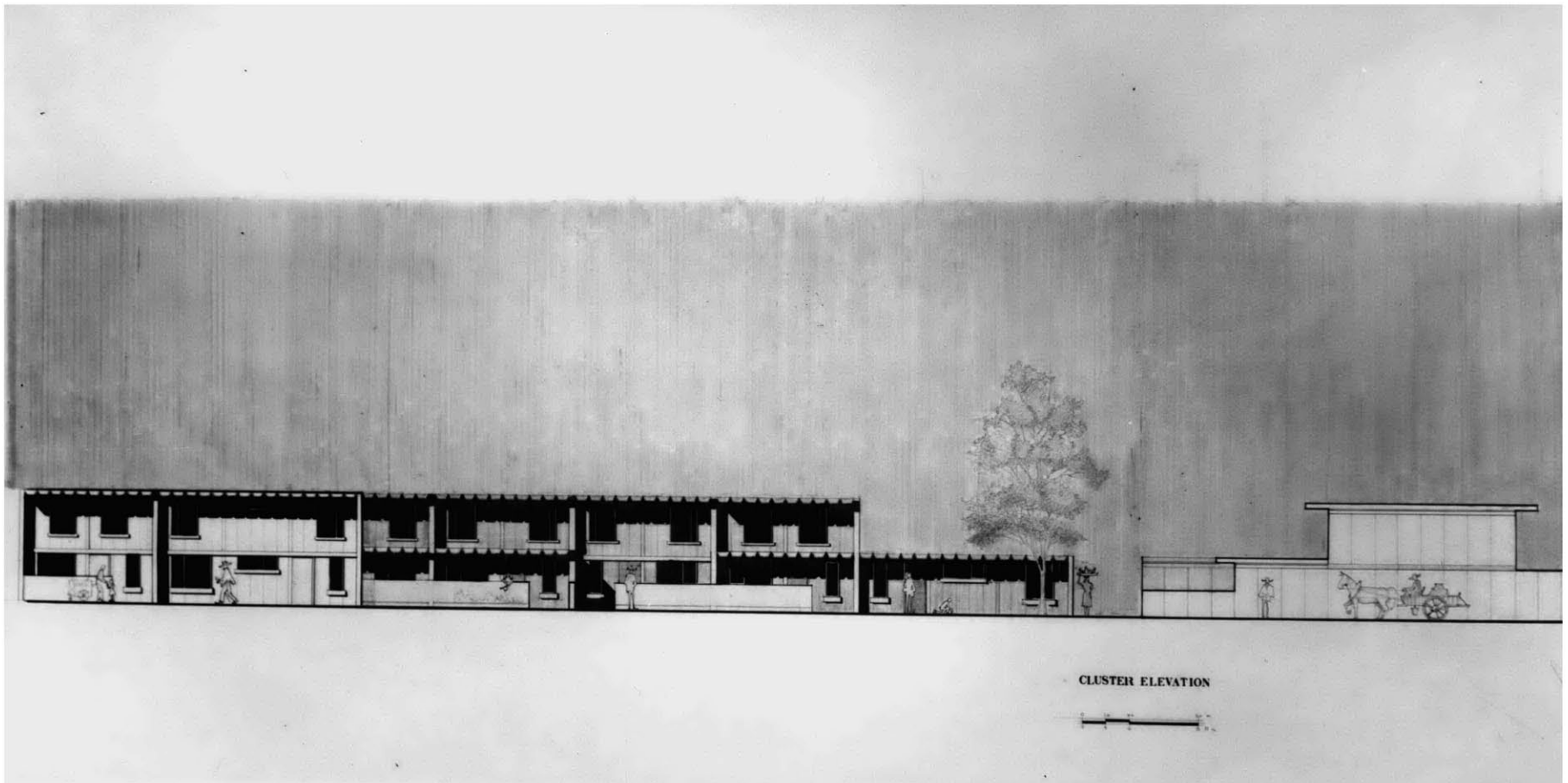


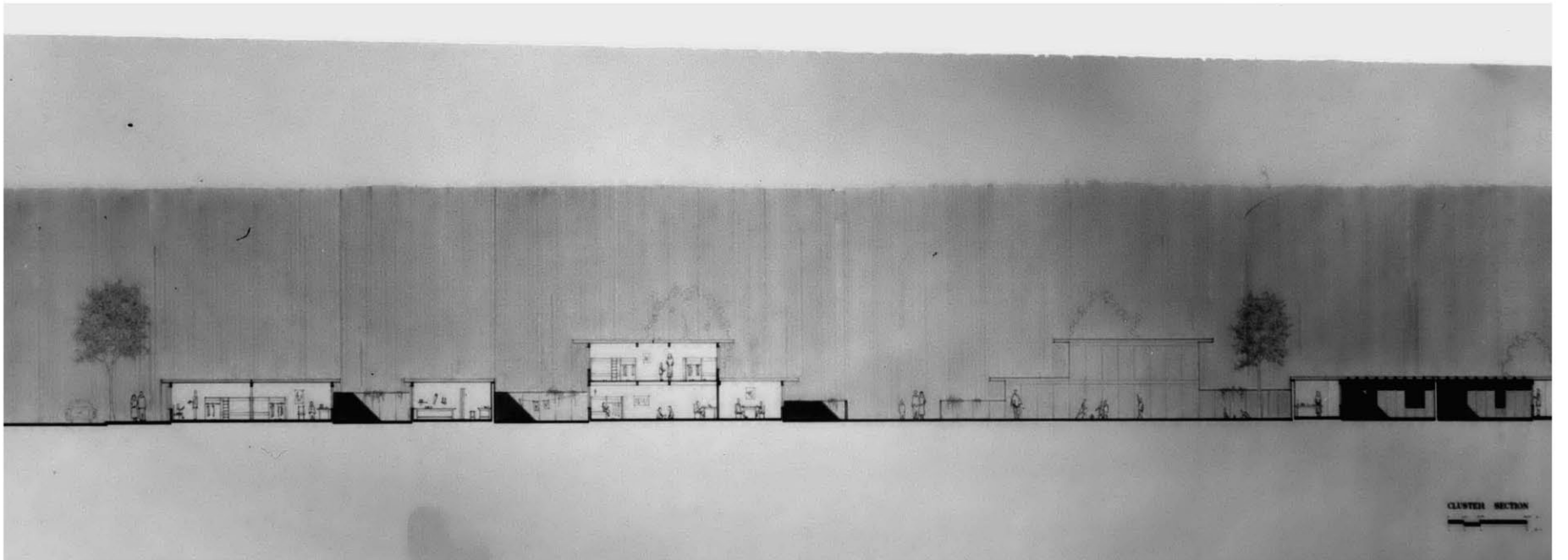
TIMIZA
A SELF HELP HOUSING DEVELOPMENT
BOGOTA, COLOMBIA
B.ARCH. THESIS, MIT, SPRING 1965.
R.ARBOLIDA
A.LAU



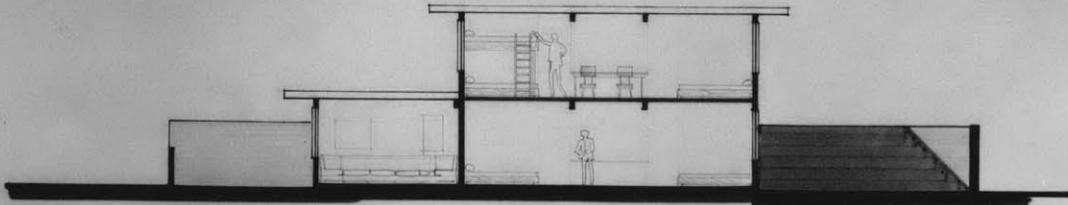
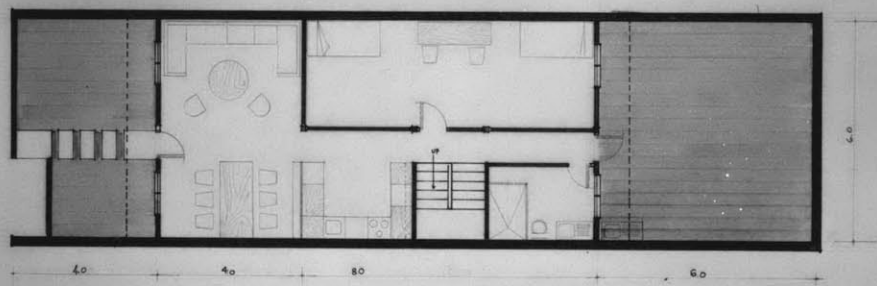
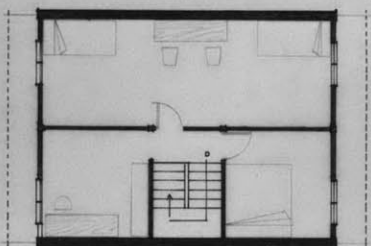
TIMIZA
A SELF HELP HOUSING DEVELOPMENT
BOGOTA, COLOMBIA
B.ARCH THESIS, MIT. SPRING 1965.
R.ARBOLEDA A.LAU

CLUSTER PLAN
0 10 20
0 10 20



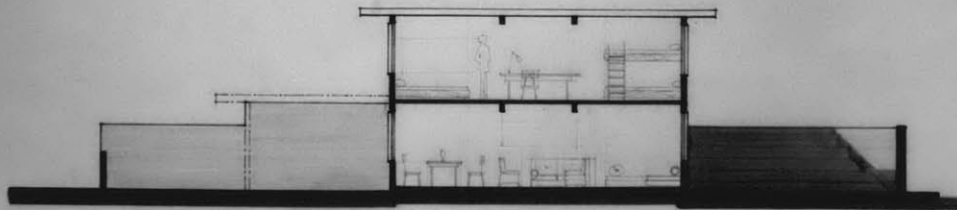
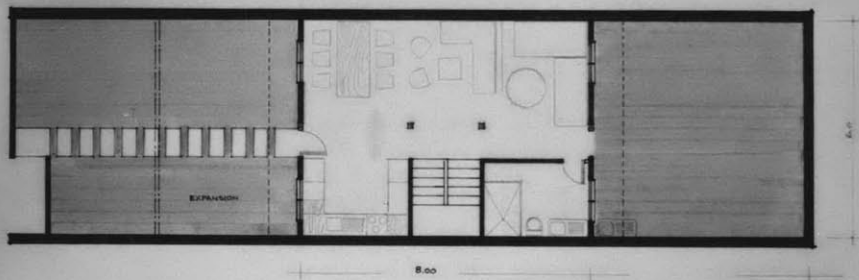
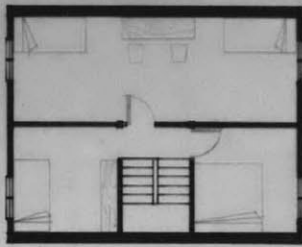


7



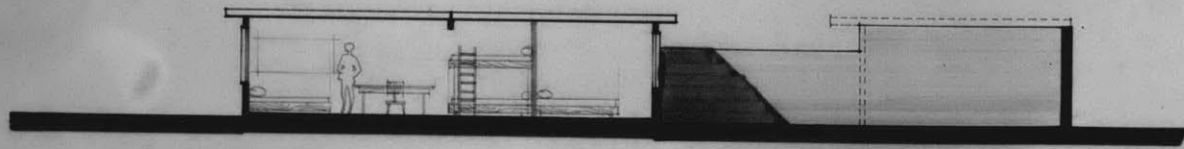
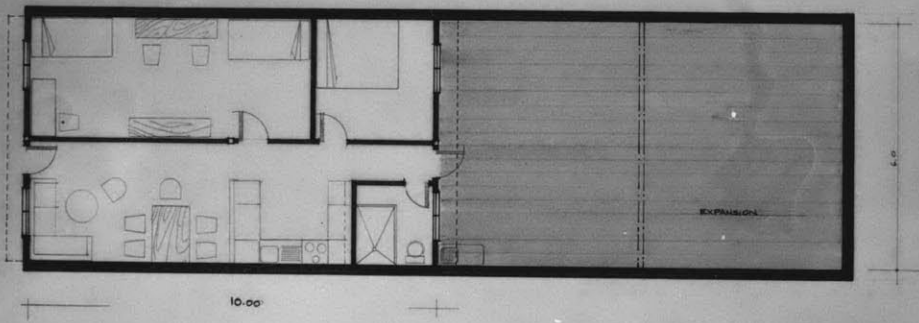
TIMIZA
A SELF HELP HOUSING DEVELOPMENT
BOGOTA, COLOMBIA
B.ARCH THESIS MIT SPRING 1965
ARBOLEDA A. LAU

120 SQ.M HOUSE
0 1 2 3 5 m
0 3 6 15 ft

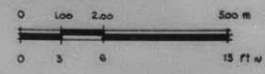


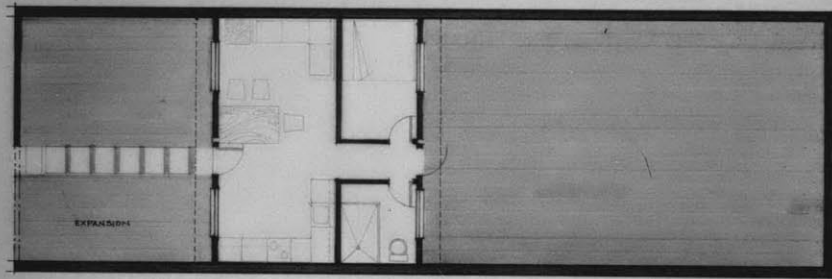
96 SQ.M HOUSE

0 1m 2m 3m



60 SQM HOUSE

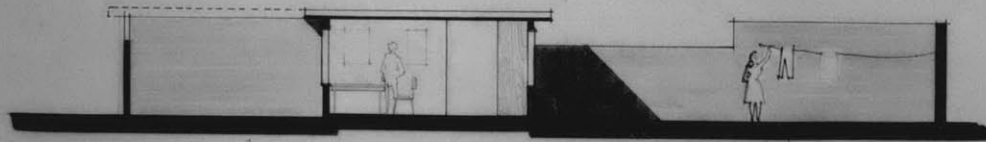




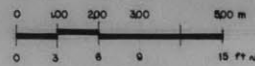
4.80

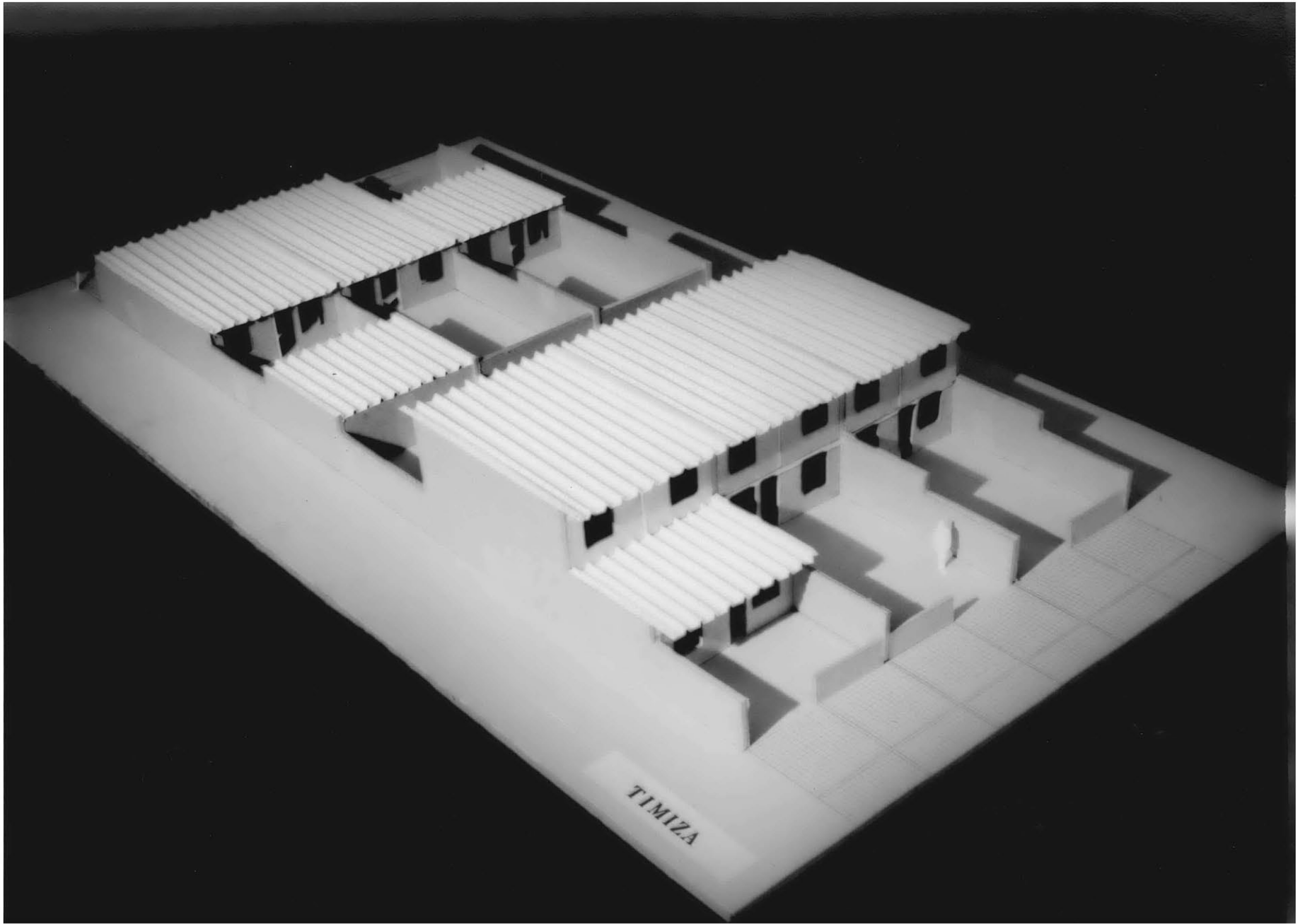
5.00

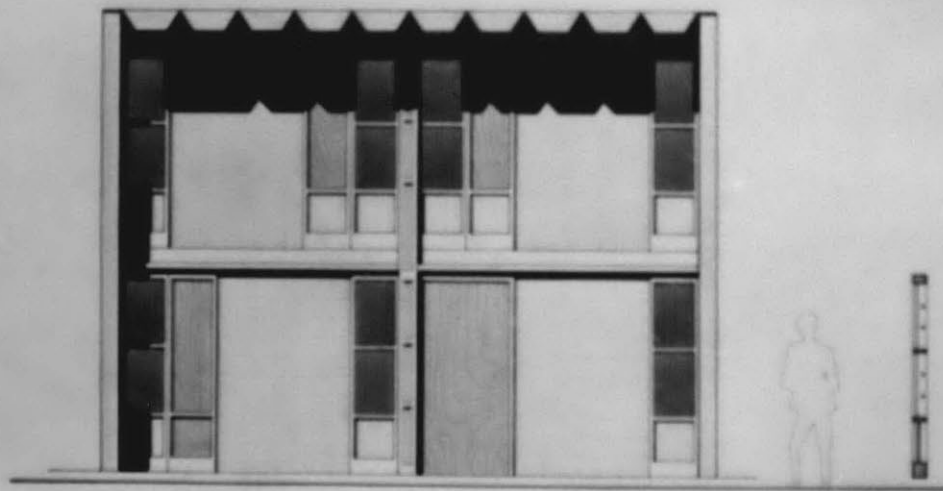
10.00



30 SQ M HOUSE

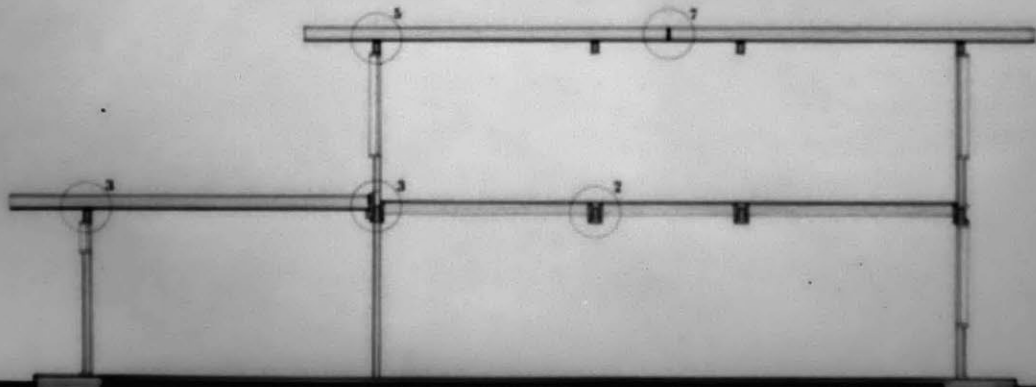
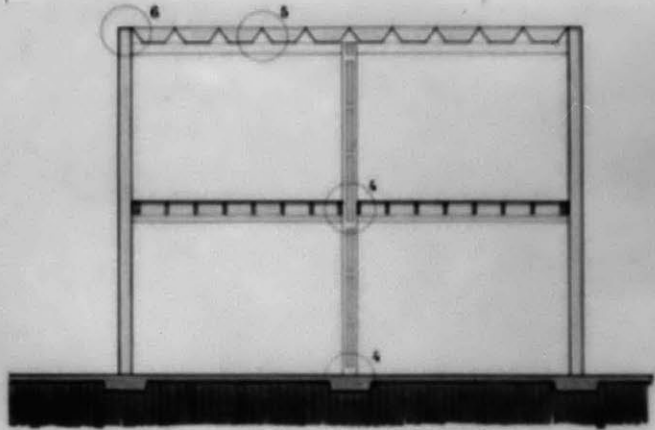






FRONT ELEVATION
SCALE 1:20

TIMIZA
PHASE III
R. ARDREDA A. LAU

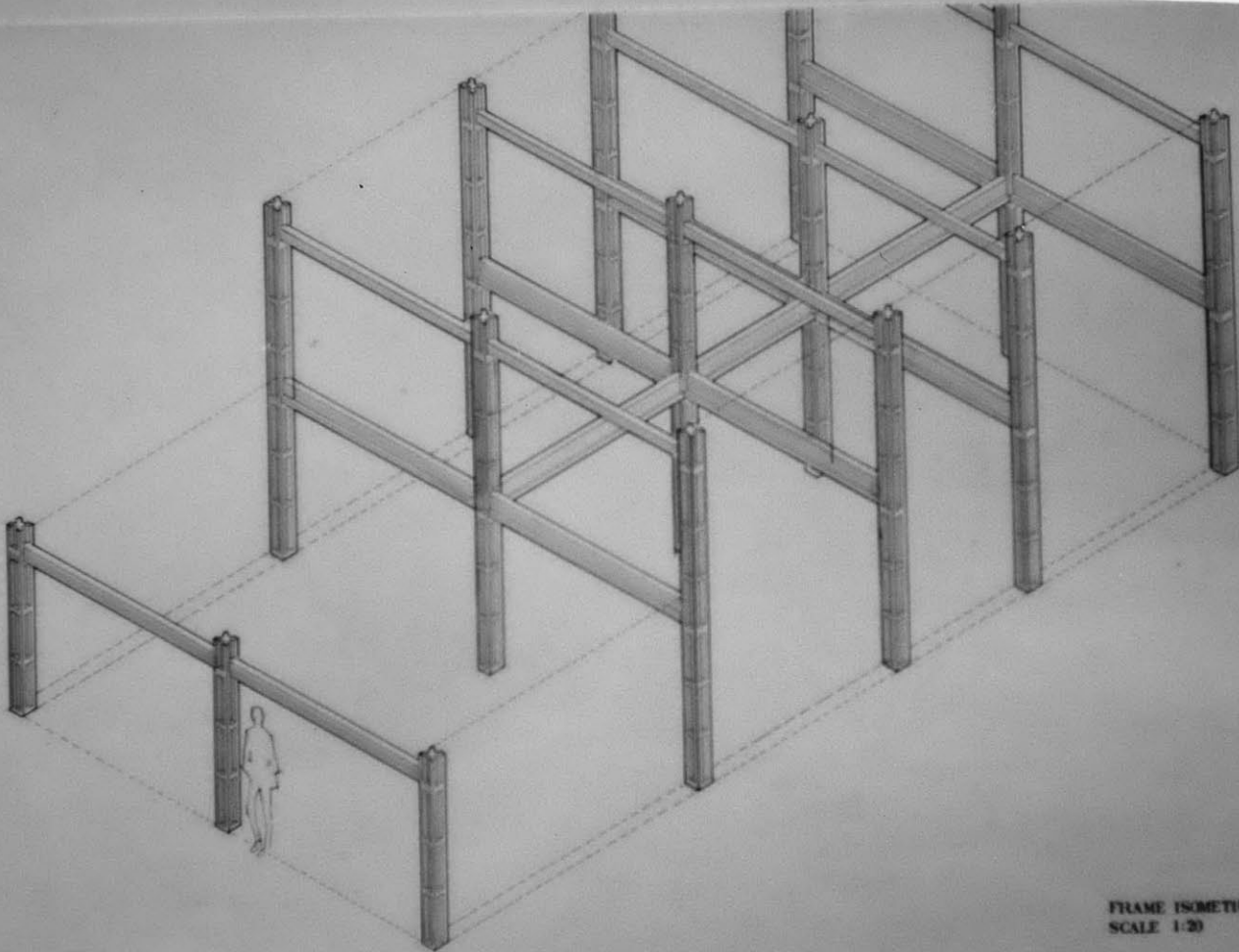


KEY SECTIONS
SCALE 1:20

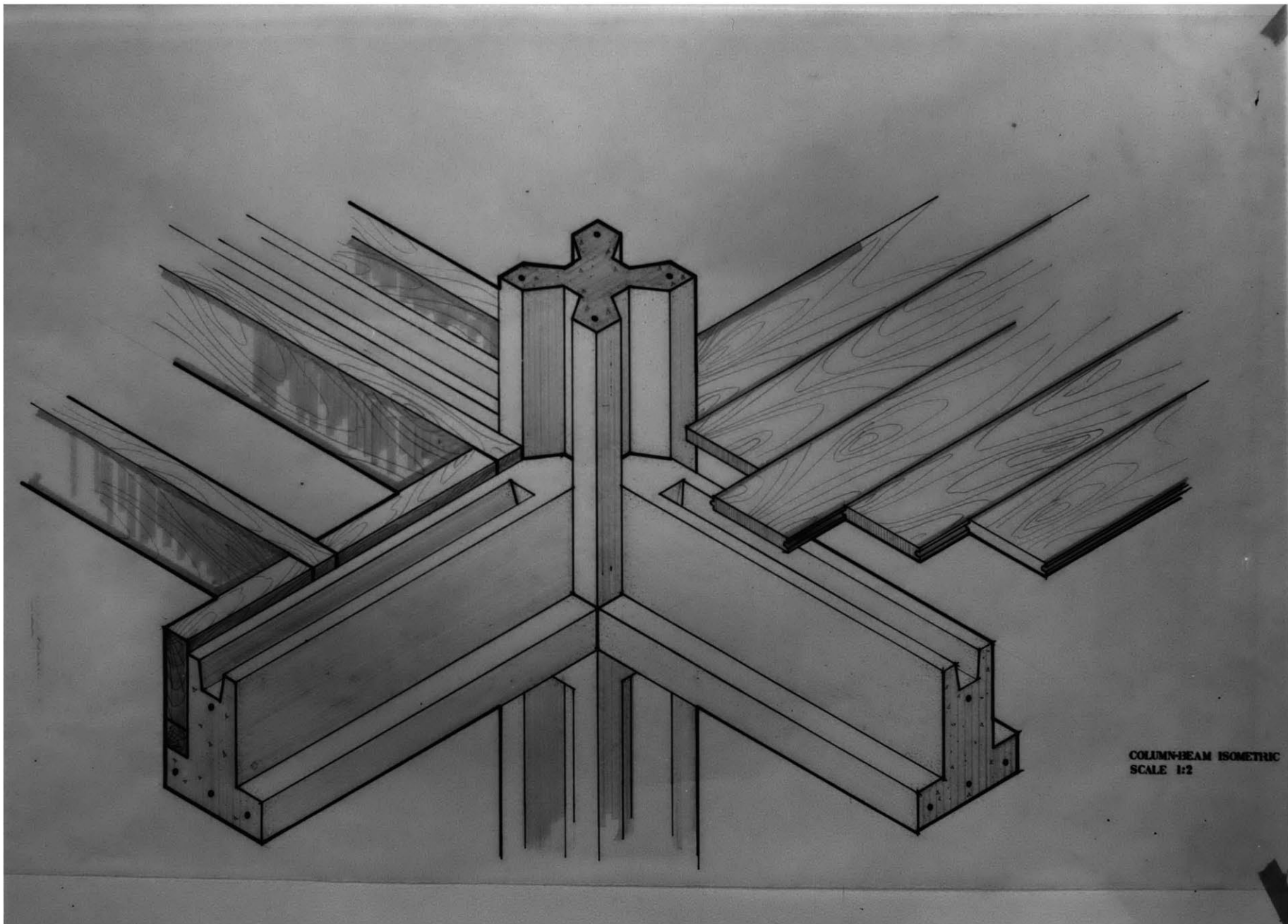
TIMIZA
PHASE III
R. AHMEDDA, A. LAU



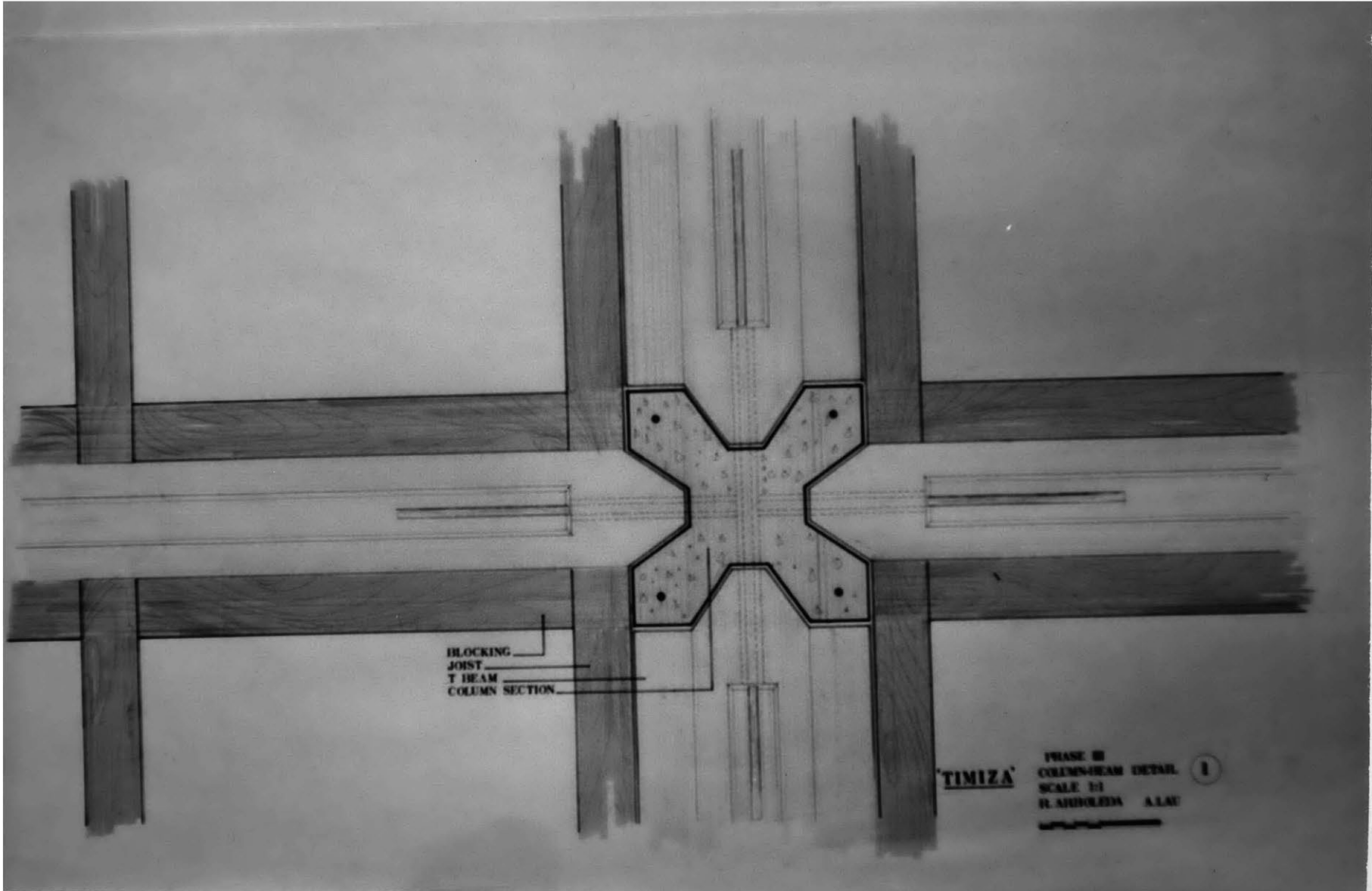
FRAMING PLAN
SCALE 1:20



FRAME ISOMETRIC
SCALE 1/20



COLUMN-BEAM ISOMETRIC
SCALE 1:2

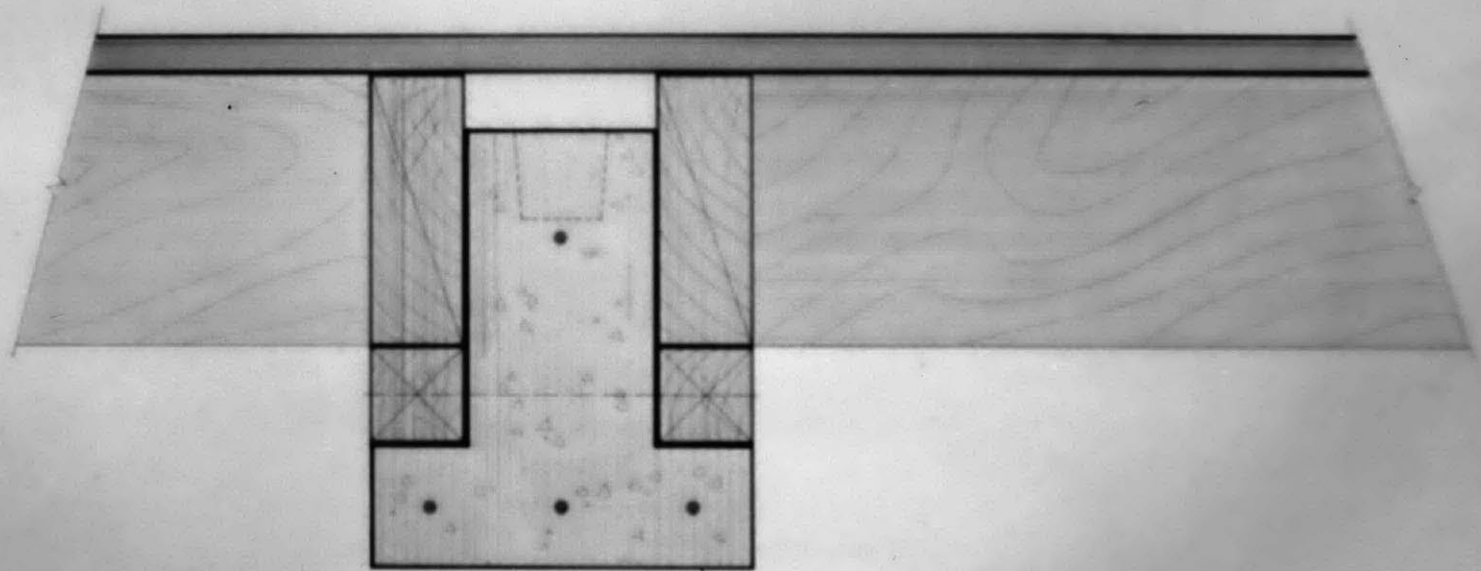


BLOCKING
JOIST
T BEAM
COLUMN SECTION

TIMIZA

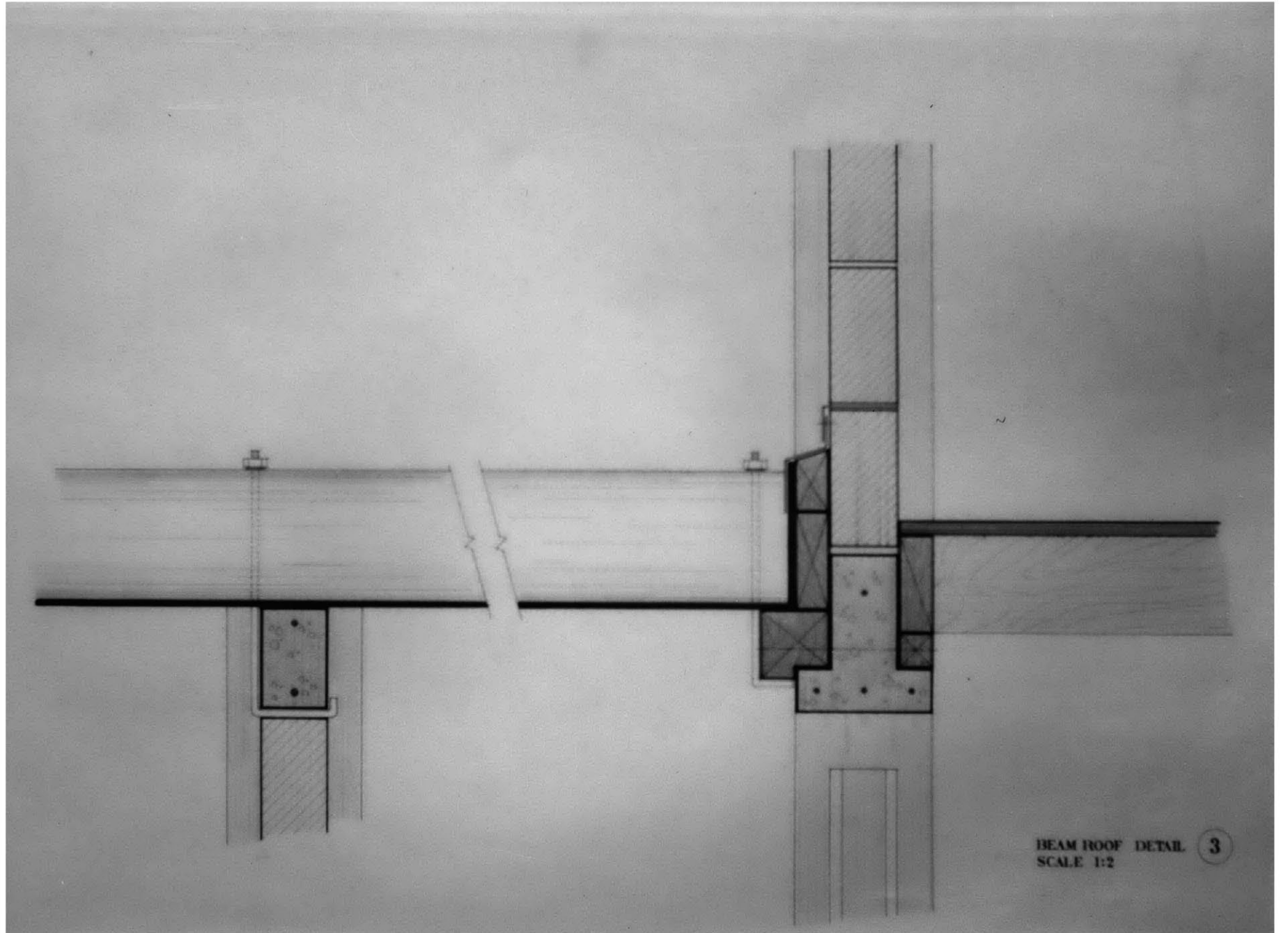
PHASE III
COLUMN-BEAM DETAIL
SCALE 1/4"
H. AHDOLEDA A.L.A.U.

1



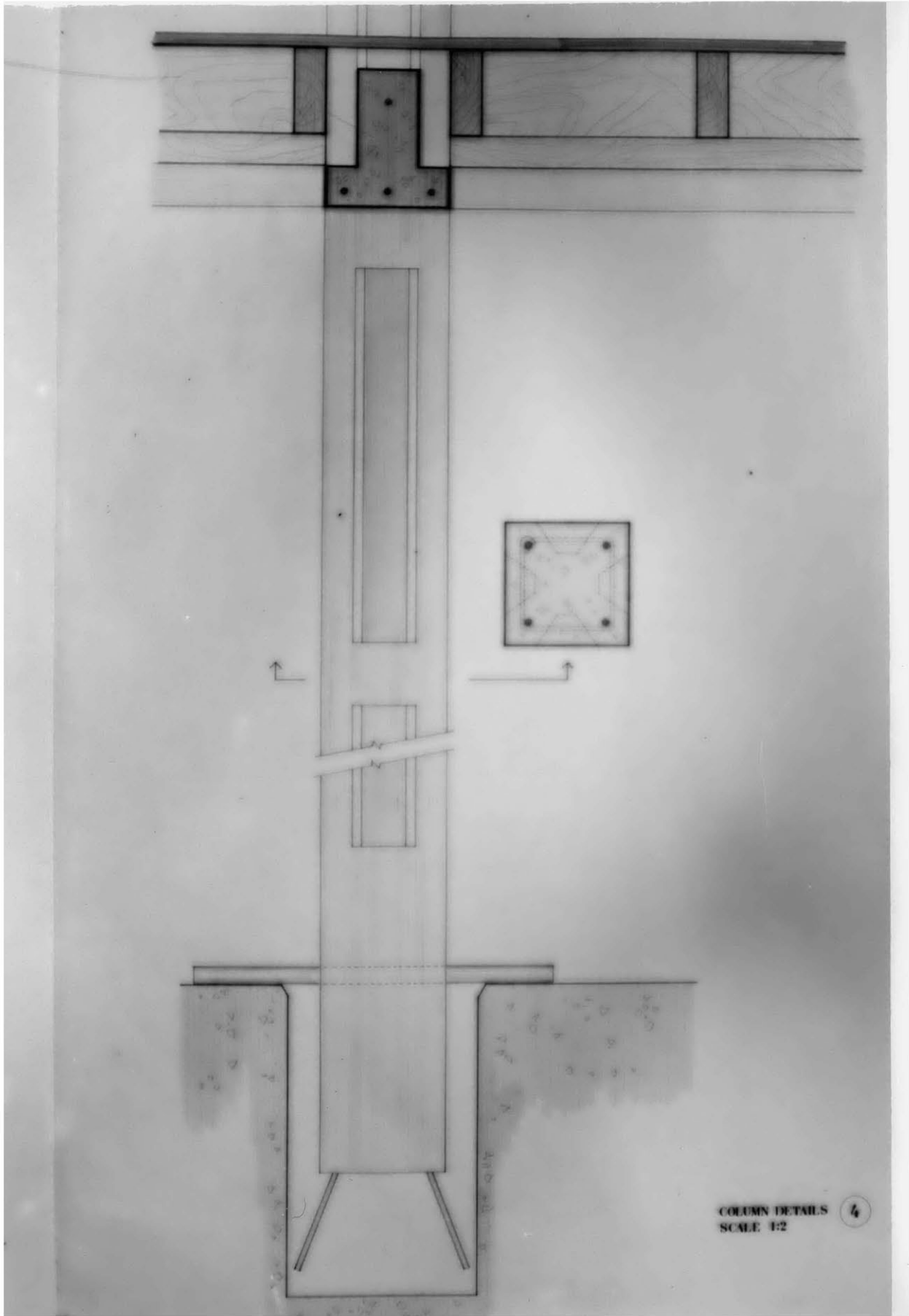
BEAM SECTION
SCALE 1:1

2

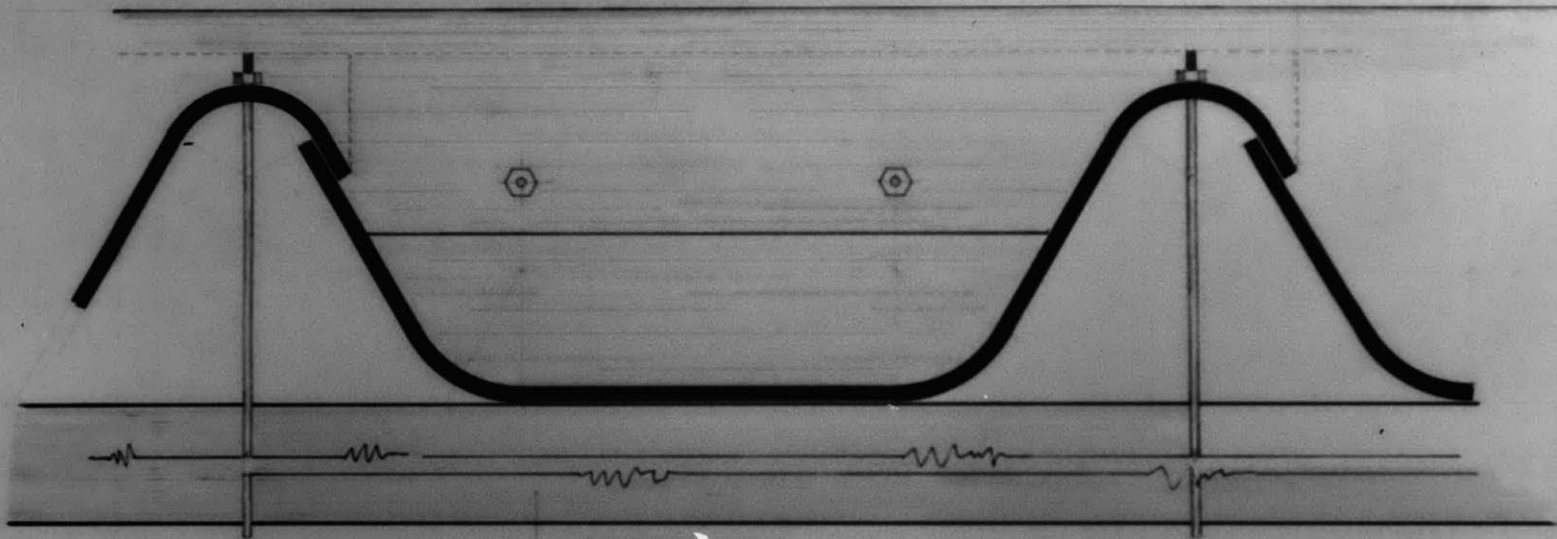


BEAM ROOF DETAIL
SCALE 1:2

3



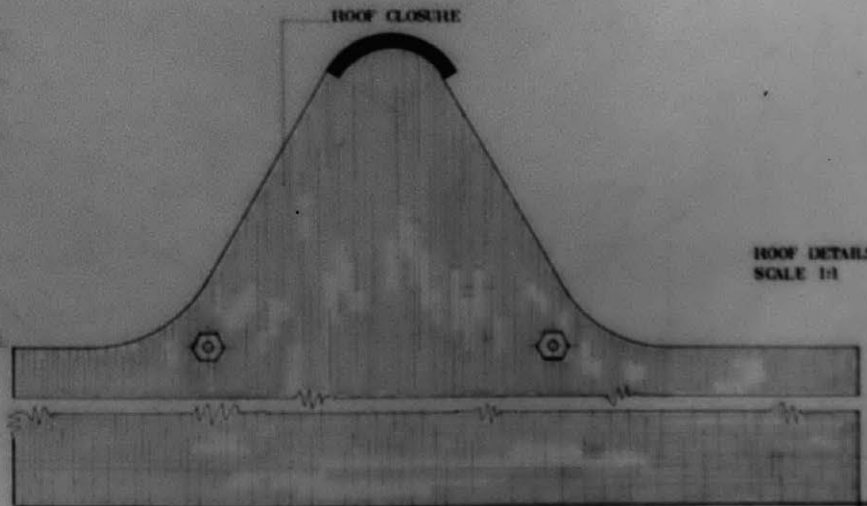
COLUMN DETAILS
SCALE 1:2



TRANSVERSE SECTION

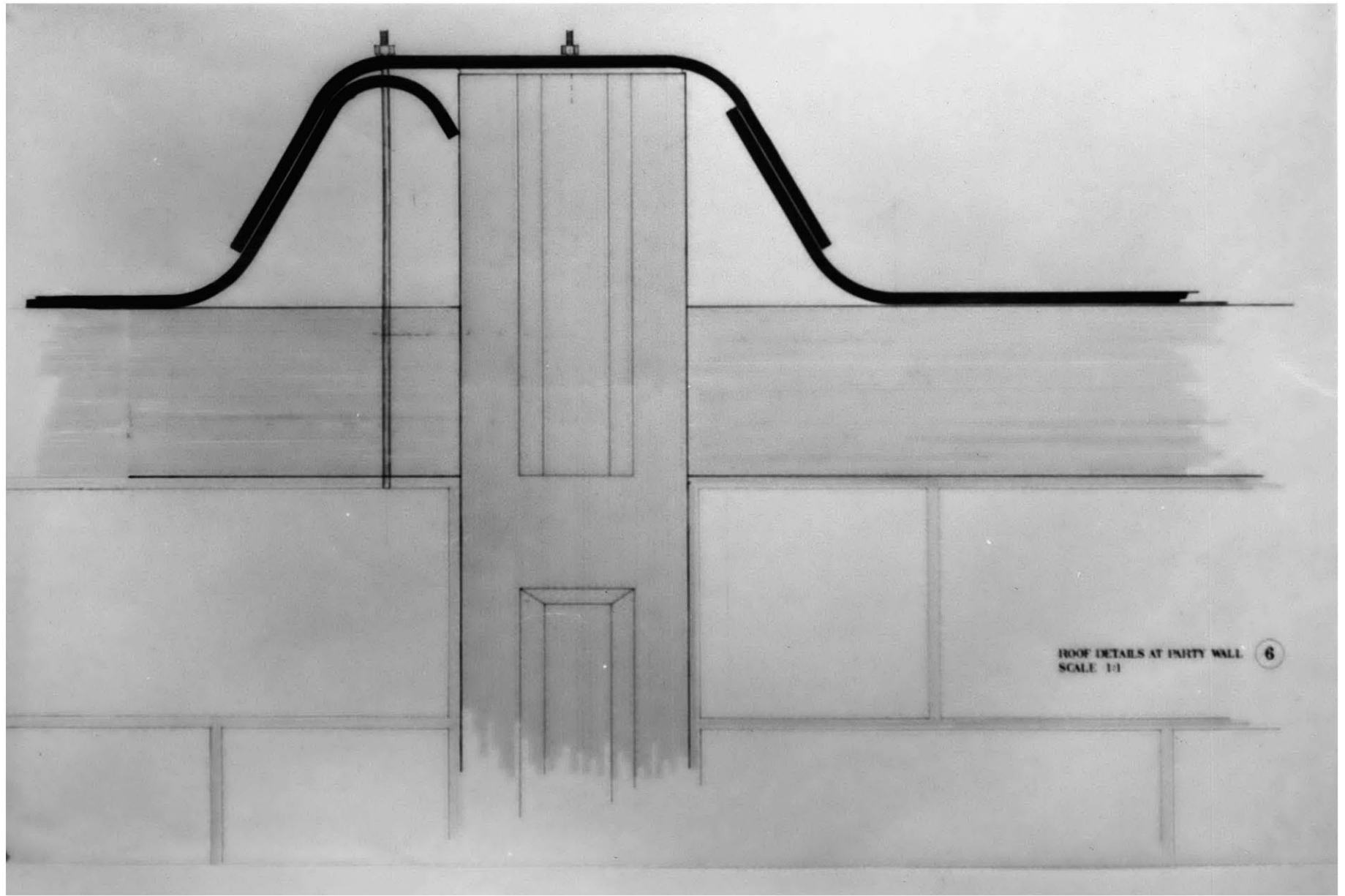


CLOSURE SECTION

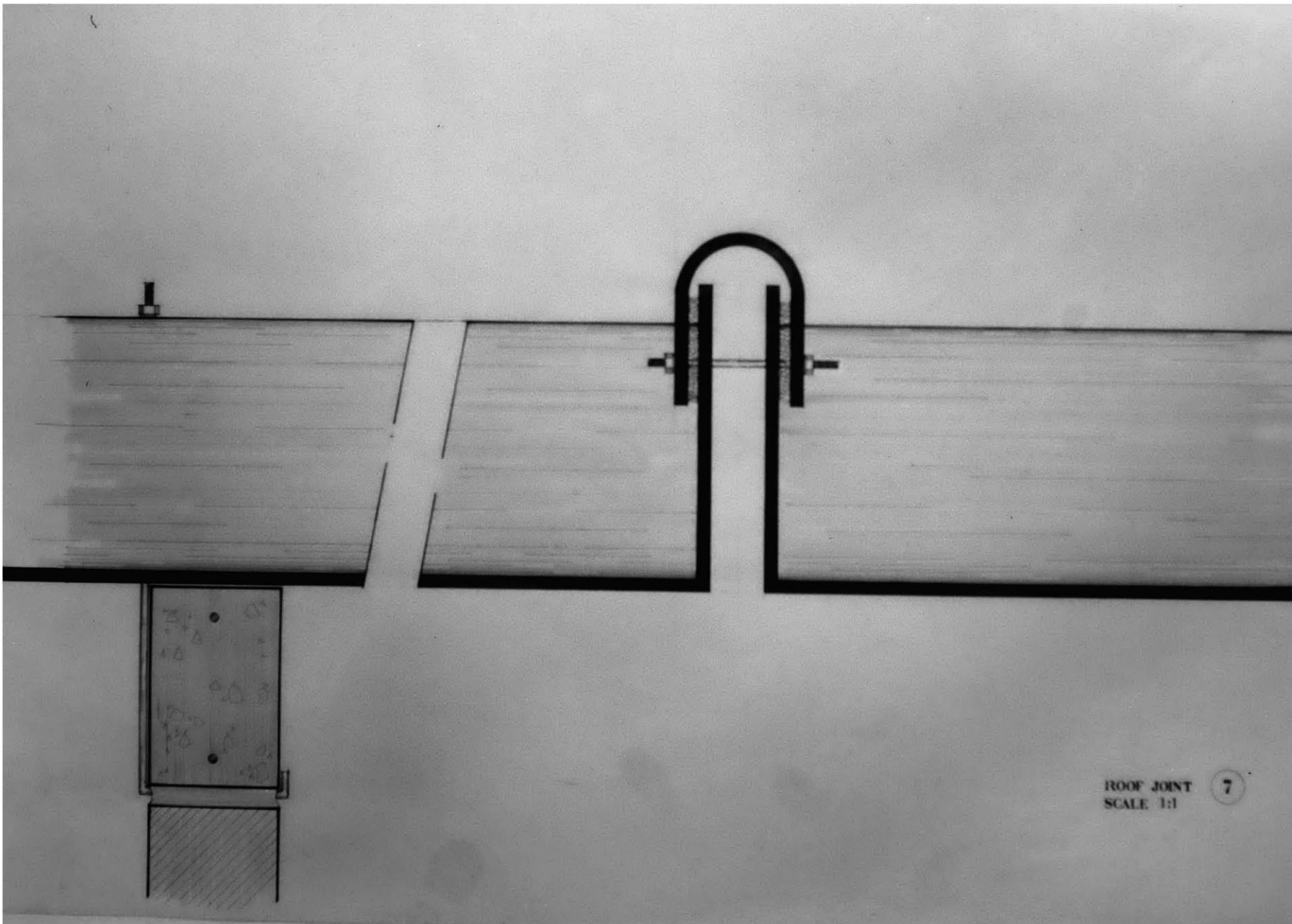


ROOF CLOSURE

ROOF DETAILS 5
SCALE 1:1



ROOF DETAILS AT PARTY WALL 6
SCALE 1:1



ROOF JOINT
SCALE 1:1

7

TIMIZA

CPM ARROW DIAGRAM
ADOLFO LAU

