

Growth and Transformation of a Mexican Village -
Ixpantepec Nieves, Oaxaca

by

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1979

Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Architecture
at the
Massachusetts Institute of Technology
June 1982

c Rafael G. Olguin

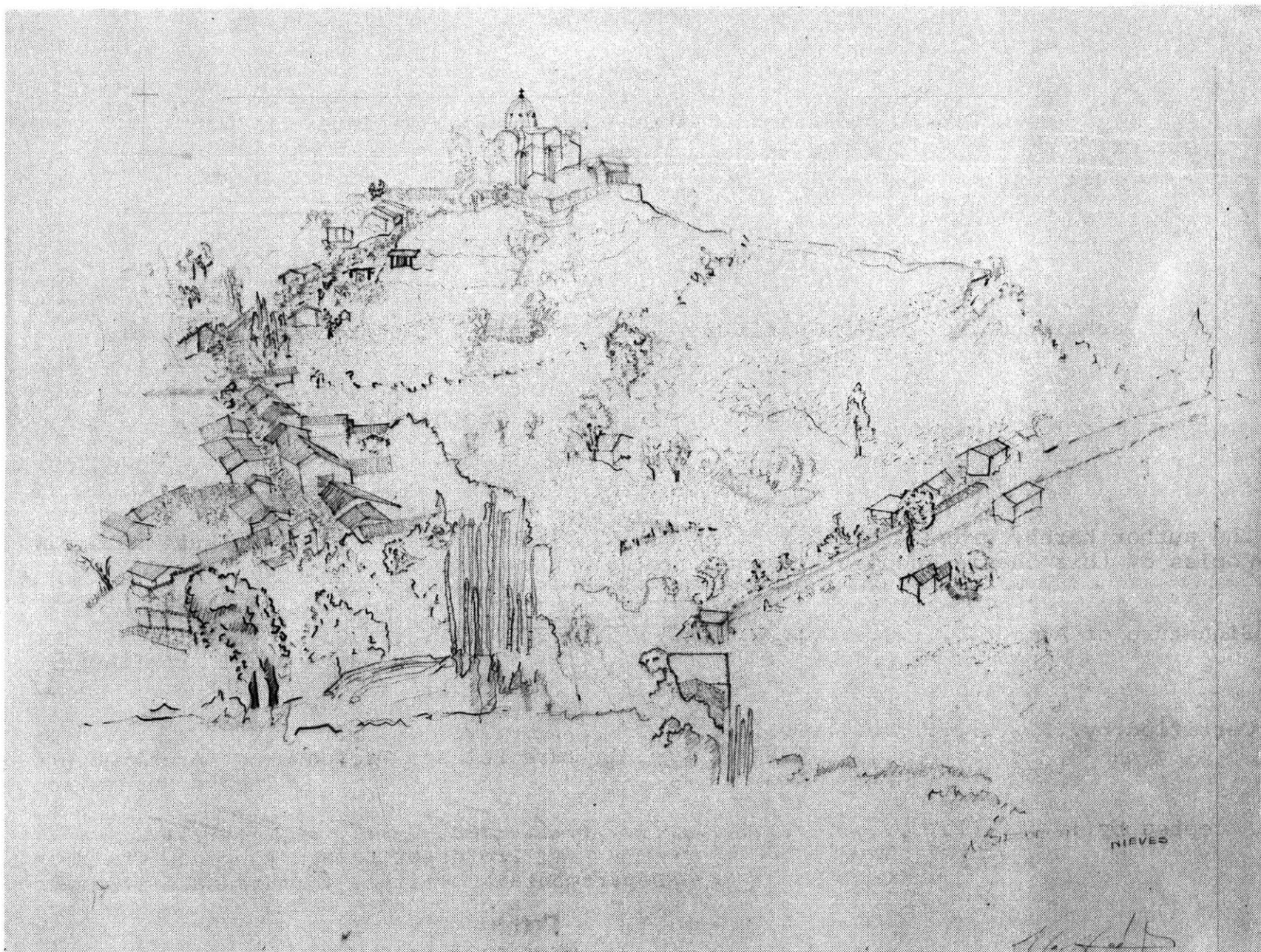
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Department of Architecture
February 9, 1982

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OF TECHNOLOGY



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Abstract

In Mexico today there is an accelerated migration of skilled organized labor from urban centers to rural settlements. This is primarily due to the increased exploitation of natural resources in rural regions and the establishment of new highway networks required to transport the goods. This thesis deals with the growth problems of the settlements resulting from the additional population and new functional demands. The major thrust of this work concentrates on a feasible proposal for a dwelling type that accommodates the new expansion and insures the architectural character of the existing village is preserved. The design decisions are based on information obtained through my on-site research and documentation of the physical form of a specific village, Ixpantepec Nieves, Oaxaca, Mexico.

Constancy and change elements of the physical environment were major concerns in providing the design alternative. How can a place adapt to changing needs of public and private life and still retain its identity? My investigation of this question resulted in the ensuing alternative, having generic potential as it interprets the character of the settlement, brings about meaningful change and relates to local values.

After studying the context of an existing village, projected physical growth assumptions were applied and architectural design principles were implemented to produce a design integrating the theme and variation of the repetitive rectangular building form found throughout the settlement allowing for individual identity and conservation of the "spirit of the place."

Thesis Supervisor: Imre Halasz
Title: Professor of Architecture

ACKNOWLEDGEMENTS

This Thesis
is
Dedicated
to
The Grandeur of God
in
the
Myriad Creatures, Hearts and Minds
of
those
Who Have Helped Me.

Glory to God
for the many gifts
He Has Granted me!

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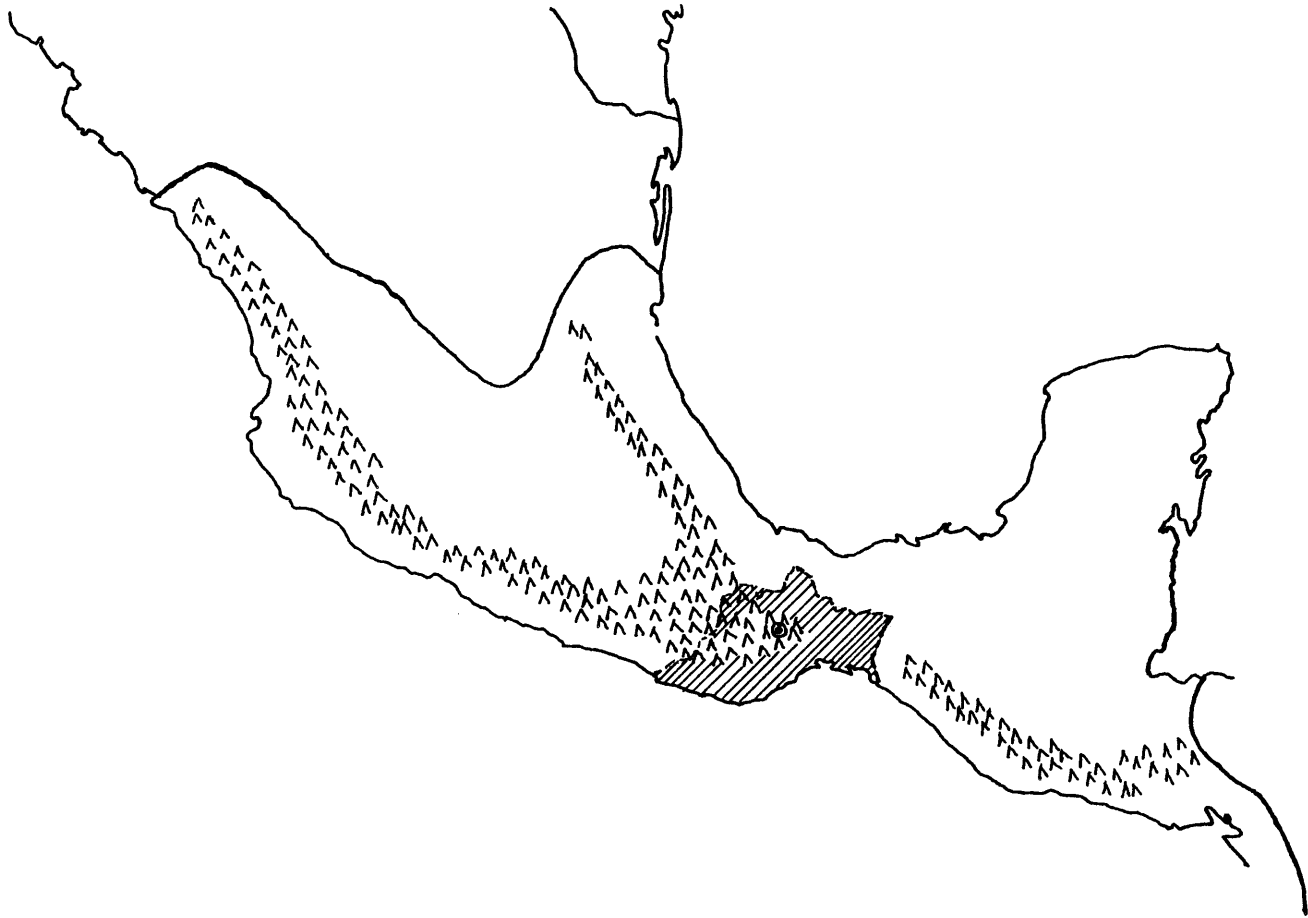
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INTRODUCTION

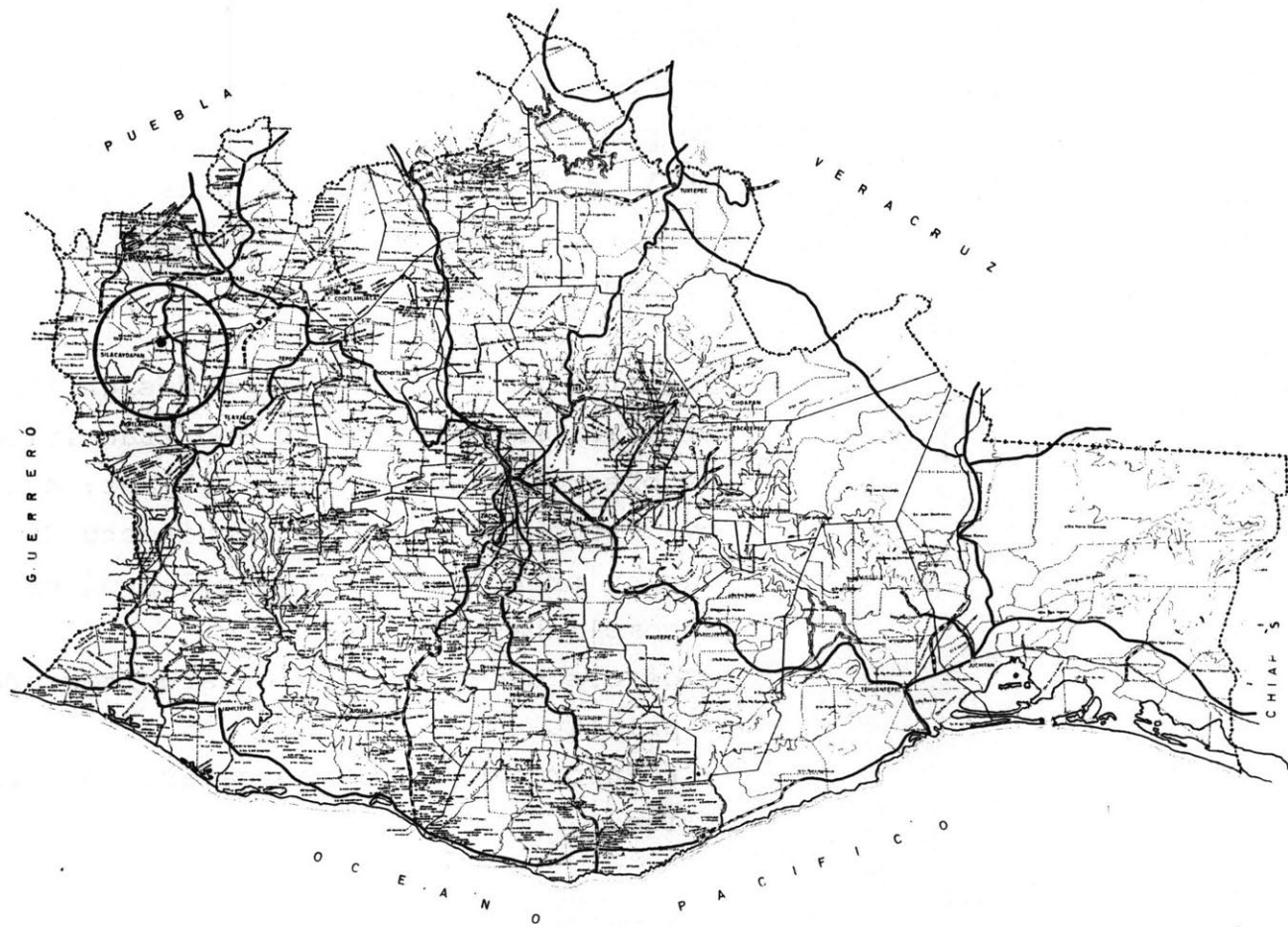
Many settlements in Mexico are experiencing new growth. This is particularly evident in the Mixteca Baja region of the state of Oaxaca, a place where the physical structure of the environment results from a close relationship between natural conditions and settlement morphology.

Problems of transformation are occurring today as a result of village expansion. The influx of new inhabitants, due primarily to increased exploitation of natural resources, has resulted in a confrontation between the demands of new growth and the preservation of the existing settlements.

The objective of this thesis is to examine a specific rural village in Mexico and to develop a feasible design proposal for a settlement type that will accommodate new growth.



MEXICO



STATE OF OAXACA

The balance between constancy and change of the physical environment is of major concern. In my design proposal I seek to preserve the "spirit of the place" while adapting and restructuring the traditional fabric to allow for the needs of contemporary society.

Design Problem

The problem is to create a design that will accommodate growth and transition by observing an existing village; and by developing explicit architectural design principles. Physical projection accomplishes the following:

- offers documentation of architectural principles
- reinforces as well as generates theories.

Design Issues

The major issues that have been considered include:

INTRODUCTION, continued

Design Issues, continued

- The Physical Setting
 - landscape - local topography places constraints on the location, attitude, grouping and design of the buildings
 - built form - the new design should complement the existing structures in terms of building form, methods and materials.
- Cultural, Economic and Social Issues
 - in order to revitalize the physical and social structure of the village it is desirable to adapt modern construction methods and materials so that they can be used in harmony with traditional practices
 - method of construction to provide employment for the local population and to create structures which are within native financial means
 - design must accommodate the functional demands of the incoming population - for example, indoor plumb-

INTRODUCTION, continued

Design Issues,
continued

- ing, subdivision of dwelling unit for privacy, additional public amenities (schools, clinic, market, etc.)
- provide examples of modernization in such a way that the current inhabitants might eventually partake of the new amenities.



IXPANTEPEC NIEVES, OAXACA

The Site

Throughout the Mixteca Baja region of Mexico in the state of Oaxaca, there are more than one hundred villages that have similar characteristics which are organically related to their physical environment. This thesis focuses on one of the villages, Ixpantepec Nieves, a settlement of 250 dwellings. By studying this village I will attempt to propose a strategy applicable to this or other villages.

Understanding the principles used in the original design of the settlement will aid in identifying a design proposal to accommodate expansion when new functional demands based on new values are introduced in the village.



PHYSICAL ENVIRONMENT

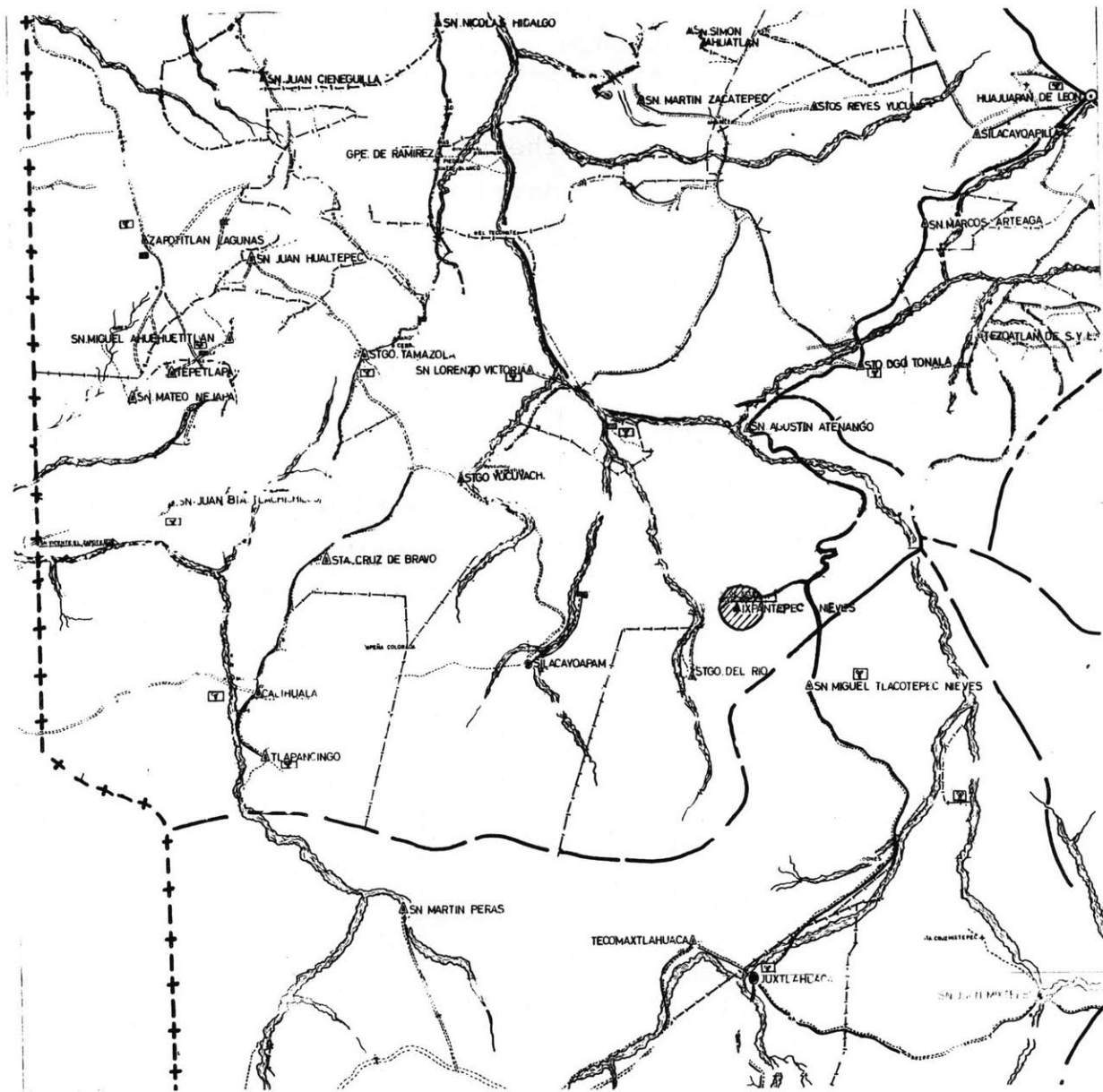
THE VILLAGE OF IXPANTEPEC NIEVES, continued

The Site,
continued

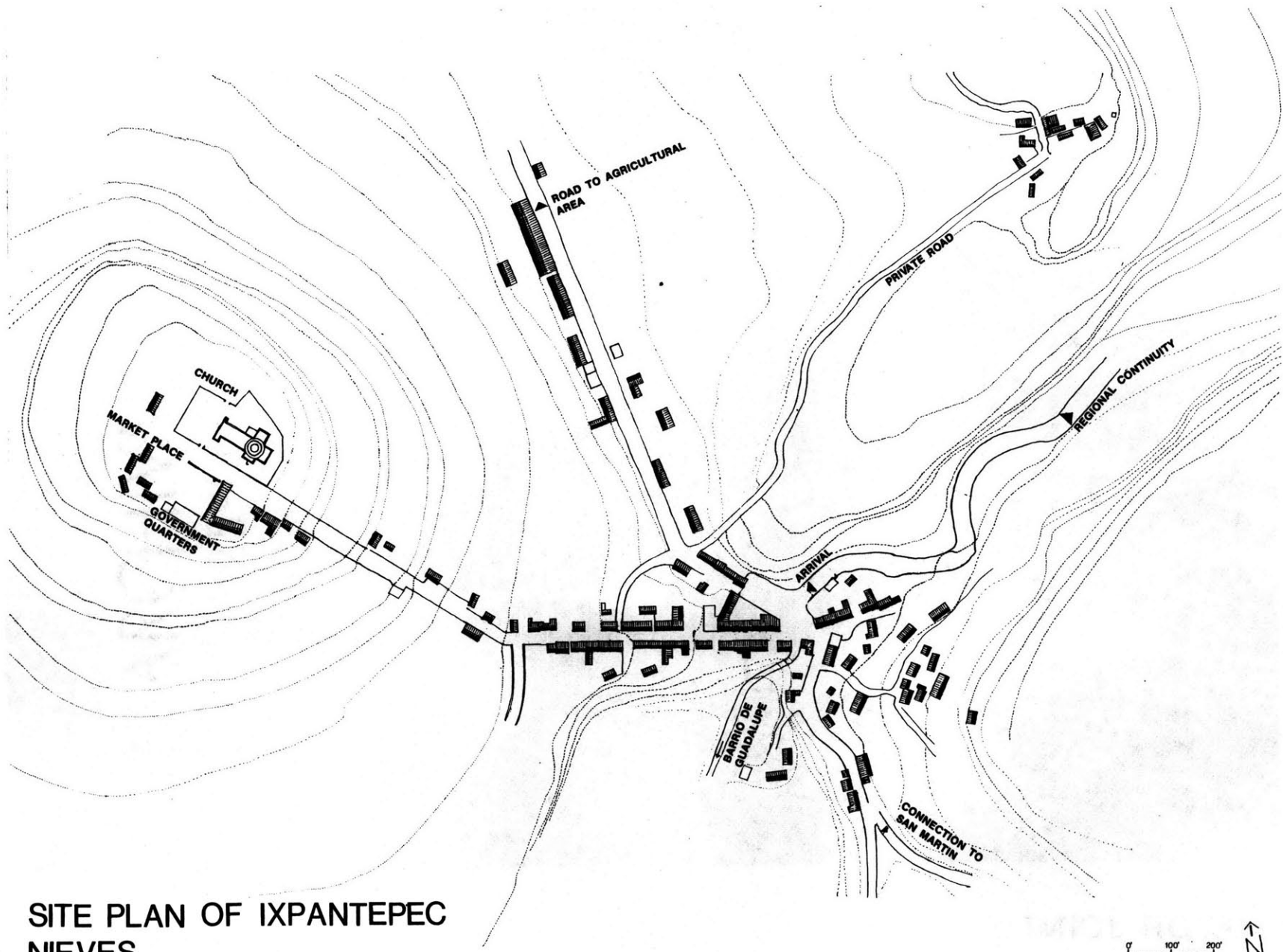
The settlement of Ixpantepec Nieves has developed out of a direct relationship between the topography and climate, and the built form/settlement morphology.

Located in a mountainous terrain, the current districts of the settlement are:

- religious center
- ceremonial access
- linear main street
- organic cluster on the hillside.



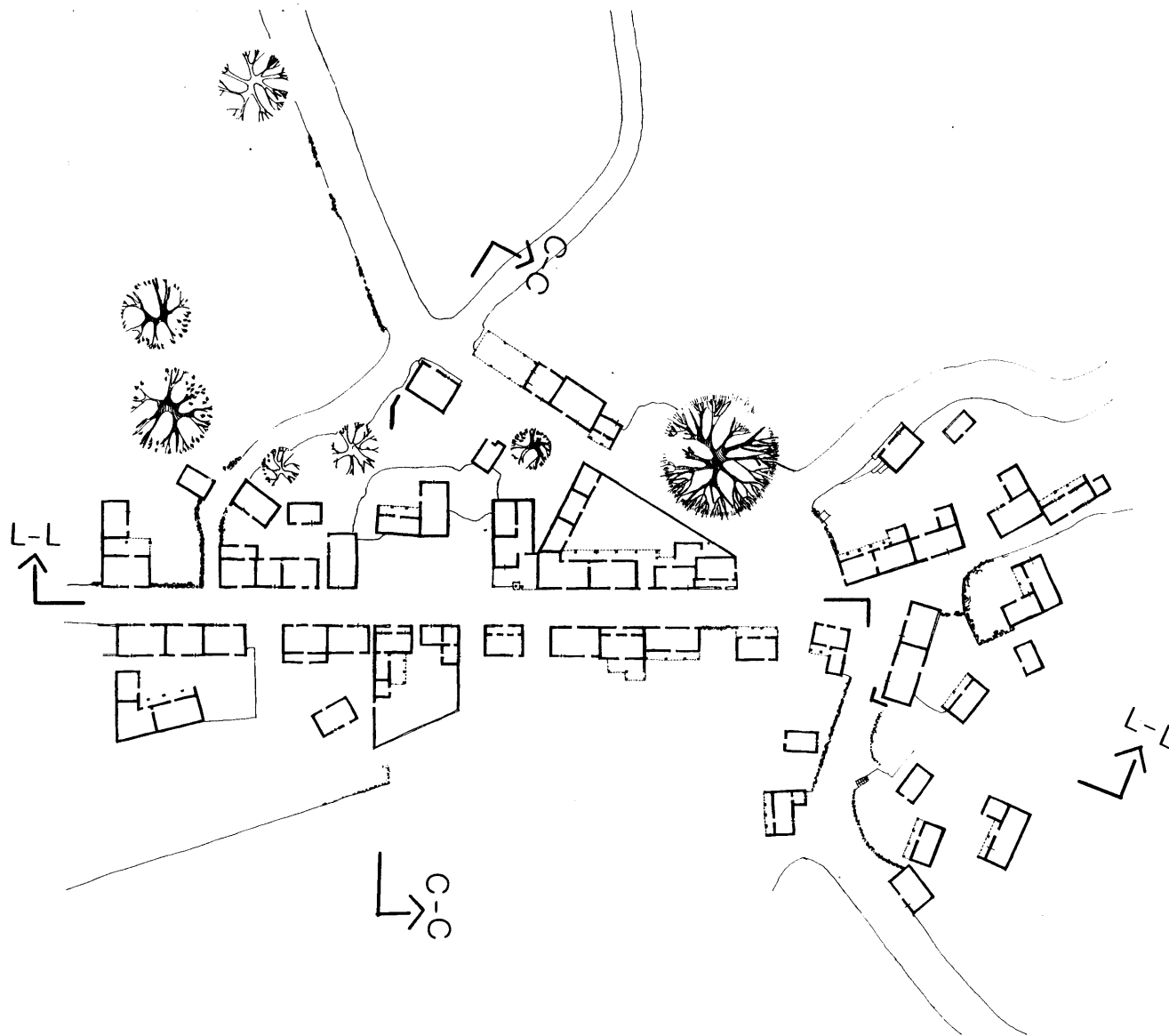
REGIONAL LOCATION



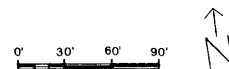
SITE PLAN OF IXPANTEPEC NIEVES



MAJOR JOINT

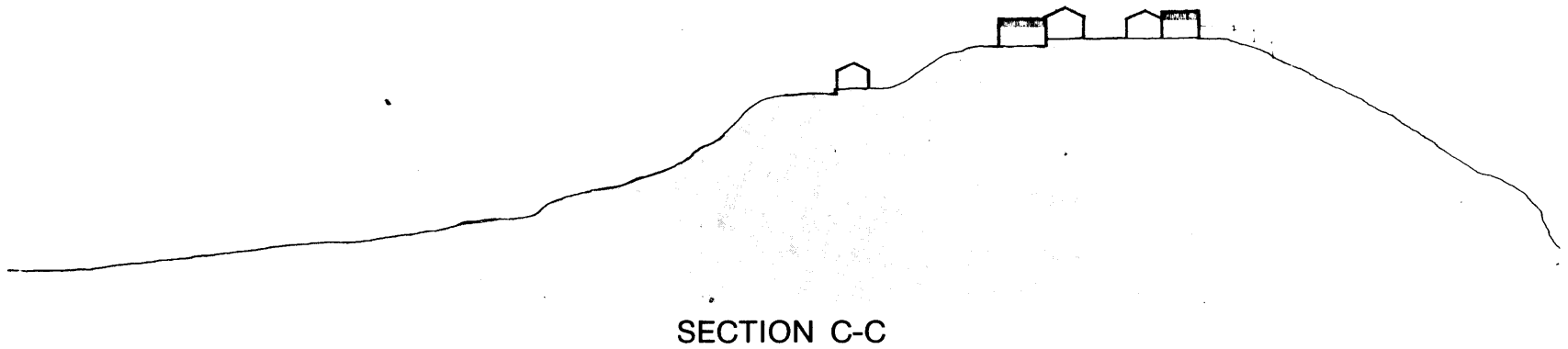


**EXISTING NETWORK
ARTICULATION**

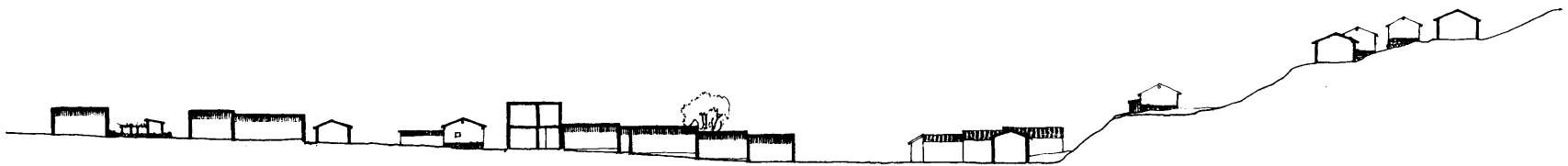




EAST VIEW, MAIN STREET



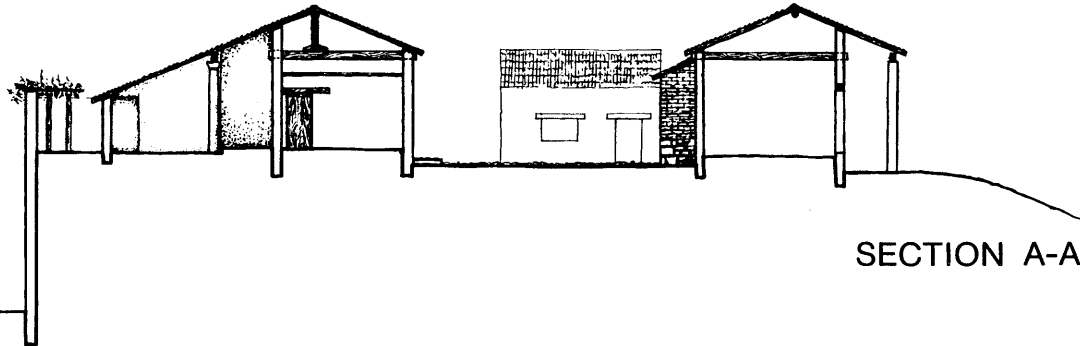
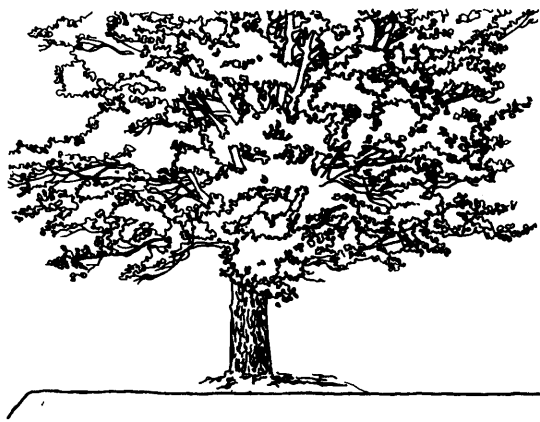
SECTION C-C



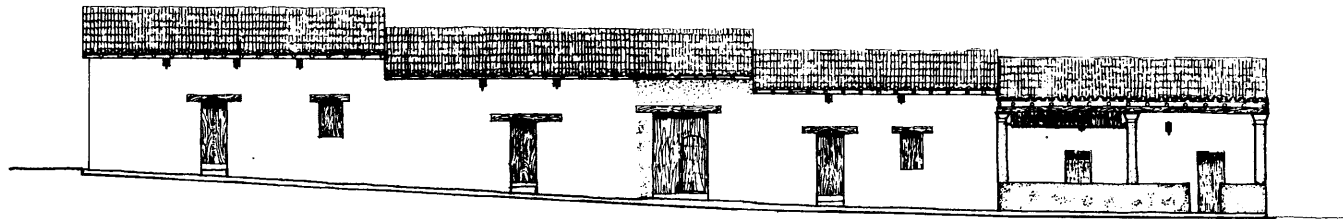
SECTION L-L

SITE SECTIONS
MAIN STREET

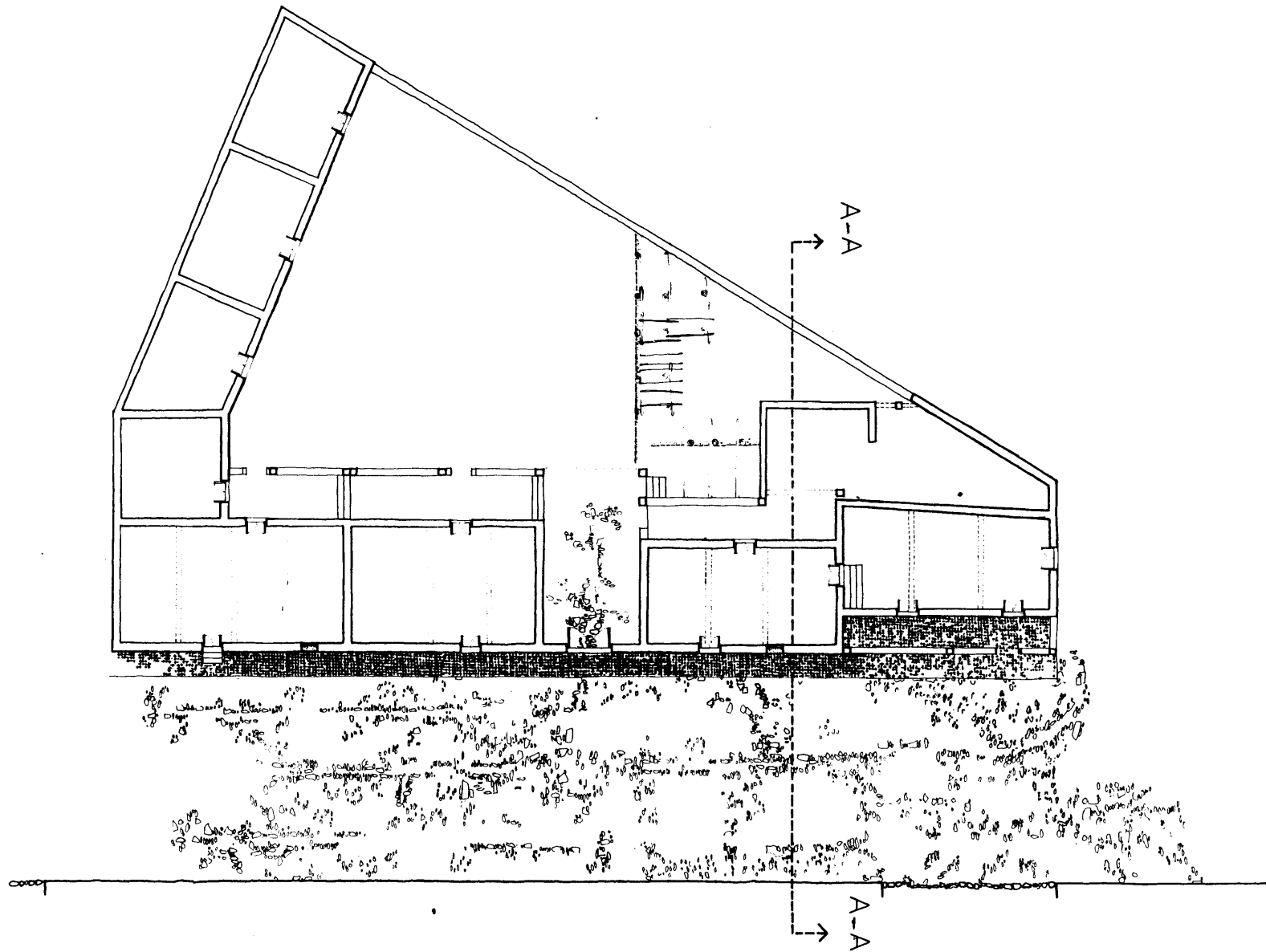




SECTION A-A



STREET ELEVATION



EXISTING HOUSE
TYPE



THE VILLAGE OF IXPANTEPEC NIEVES, continued

Unit Characteristics

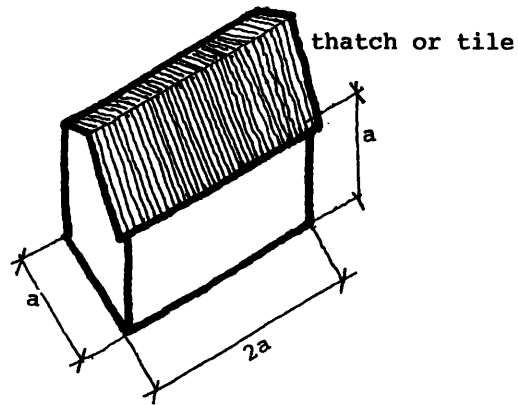


The particular characteristics that make up the range of dwellings that form the village are:

- repetition of one simple building type
- massive and enclosed construction
- conventionalized building method
- rectangular plan (due to building method)
- primary roof components of ridge-beam carried by bearing walls, and gabled roofs covered with red clay tiles
- rustic appearance as a result of exposing raw materials, e.g. foundation of rubble and walls of adobe
- stucco wall surface
- units have reductive potential by opening the long side of dwelling with a porch and additive possibilities by adding a kitchen or other room
- openings in the wall occur in the long side of the building as well as in the short dimension
- topographical adaptation

THE VILLAGE OF IXPANTEPEC NIEVES, continued

Unit Characteristics,
continued

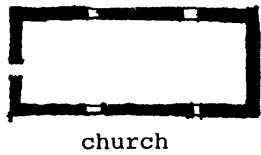
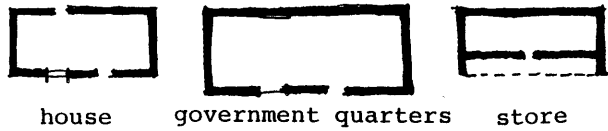


Unit of built
Additive component
Morphology unit
The element of aggregation
which recurs as the constant element
of assemblage

- each dwelling within the village has a strong sense of identity acquired through subtle variations on the same building method and organizing principles.

THE VILLAGE OF IXPANTEPEC NIEVES, continued

Unit Characteristics,
continued



The basic rectangular plan is inherent in all the buildings of the village and is found in

- dwellings
- public buildings
 - government quarters
 - market places
 - church

Same simple shape.

Form reappearing for different usage.

THE VILLAGE OF IXPANTEPEC NIEVES, continued

Unit Characteristics

Following are the architectural characteristics that compose the average 20' X 35' building unit.

Elements	Dimensions	Materials	Spatial Characteristics
Foundation	12"H* X 20" thick	rubble, mortar	
Walls	13'H** X 20" thick length variable	adobe, red brick, stucco, rubble, reeds	massive, continuous
Porches -area -pillars	6' deep, length variable 13' o.c.	adobe, red brick, rubble	post and beam
Doors -opening/ leaf -lintels	78"H X 42"W 6" X 10" approx. 6' length	wood, metal wood, concrete	double leaf - opens from center and swings inward
Windows -opening/ sash -lintels	24" X 36" variable 6" X 10" approx. 5' length	wood wood, concrete	wooden covering opens from side, swings inward
Roofs -tie-beam -rafters -ridge-beam -lattice -tiles	6" X 10" 10-12' o.c. 4" X 4" 2' o.c. 8" diameter 1" X 1" 8" X 14"	timber timber timber bamboo clay	continuous

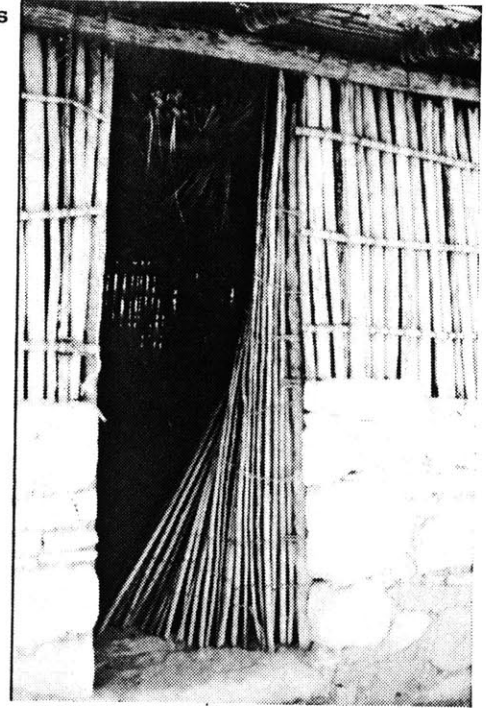
* above ground

** to the eave



Post and lintel detail

Reeds

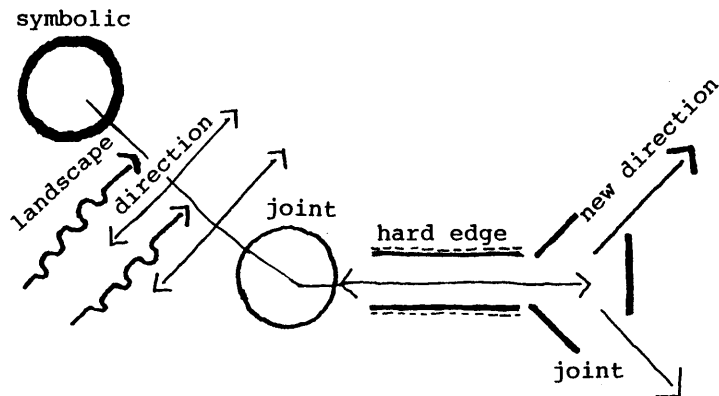


Door detail

Wall detail



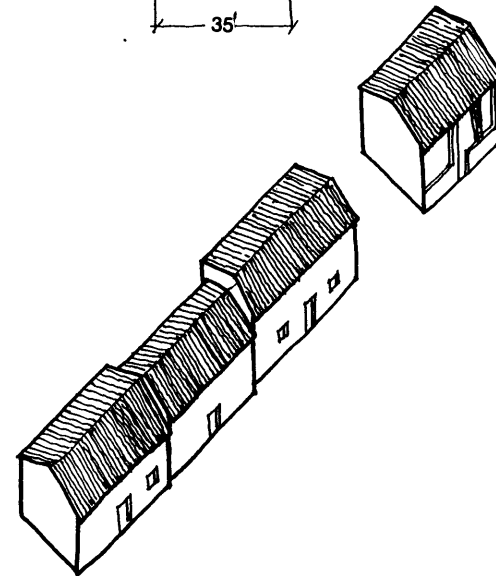
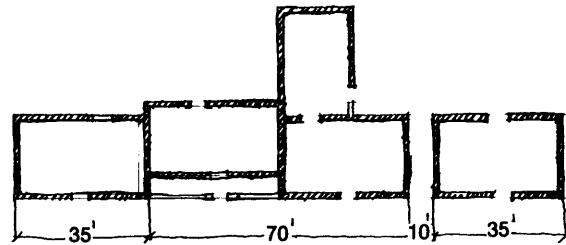
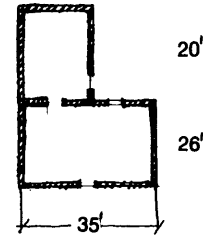
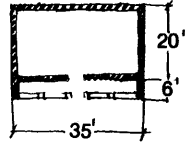
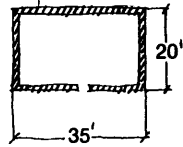
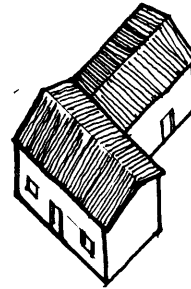
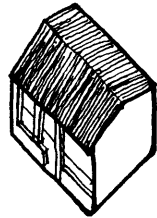
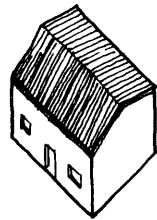
THE VILLAGE OF IXPANTEPEC NIEVES, continued



The following types of observations can be made about the way the units aggregate in the structure of the settlement:

- relationship between the unit and "fabric"
- directional aggregation
- non-directional aggregation
- relationship between the built environment and the natural landscape
- articulation of access network

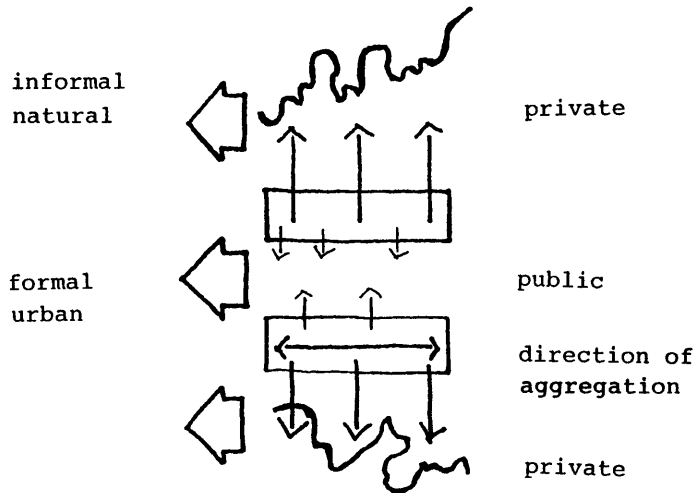
Due to the topography of the area the units form two kinds of clusters. On flat land the units are located in a linear sequence and flank the street, adjoining on their short sides. The units located on the steep slopes form clusters relating themselves organically to the site. The long side of the dwelling usually runs parallel to the contours of the site, overlooking the valley.



EXISTING UNIT TYPE

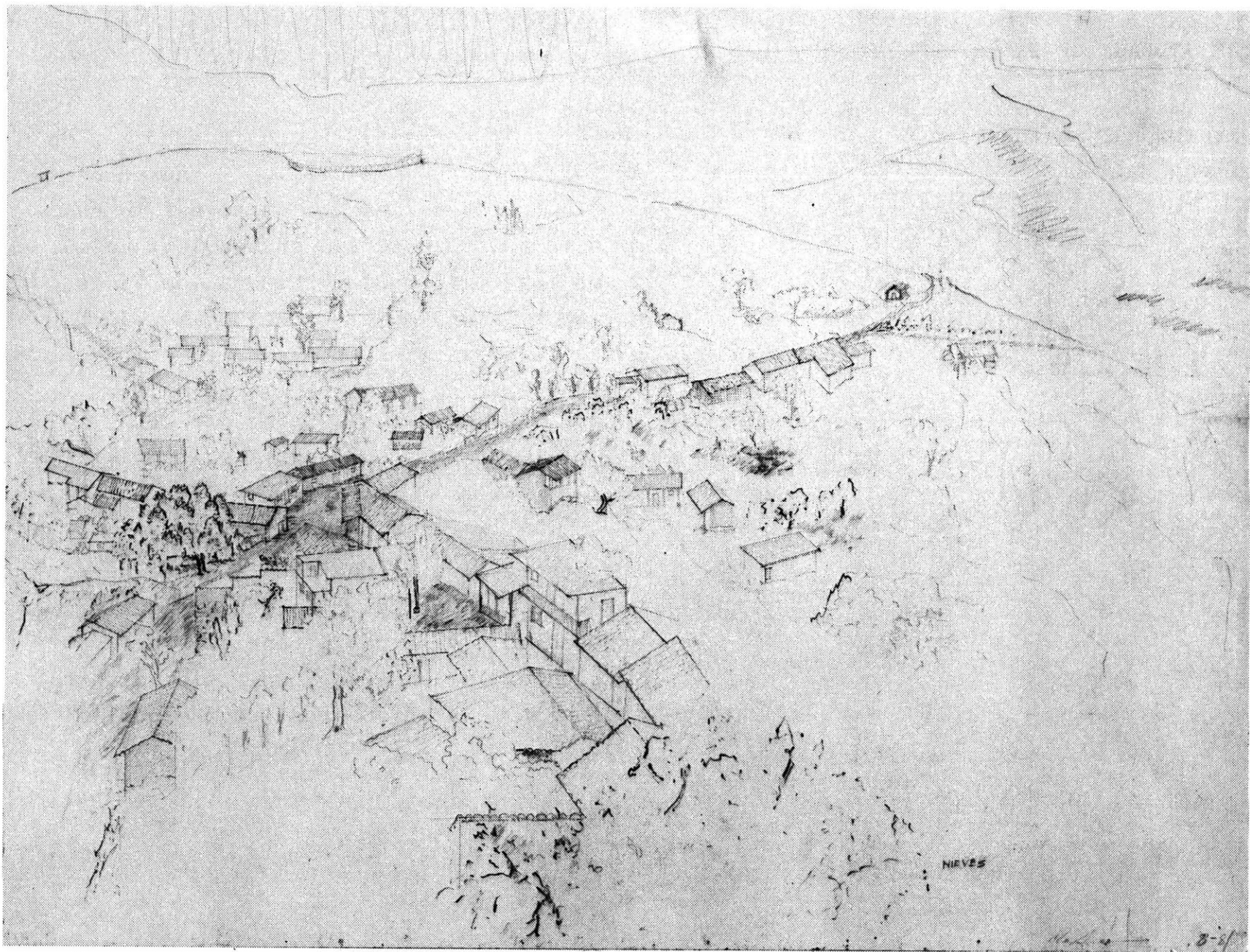
THE VILLAGE OF IXPANTEPEC NIEVES, continued

Directional Aggregation



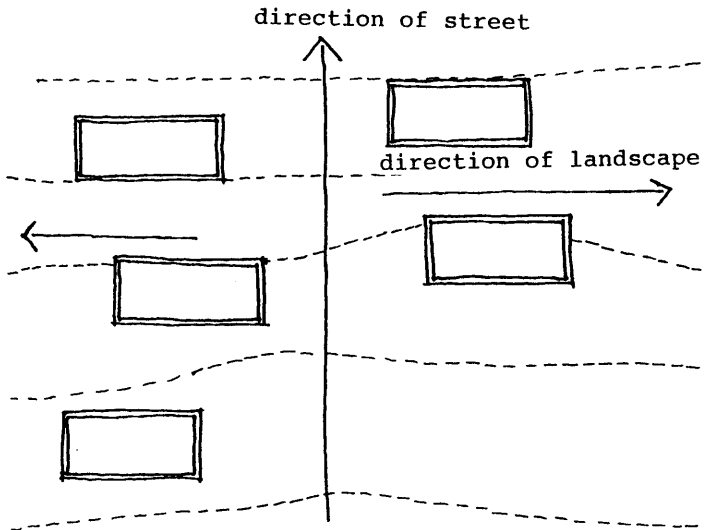
The unit is connected along its short side so that the longer side flanks the street and indicates the growth pattern. In the major street narrow spaces are left between adjacent houses; these allow views of the surrounding landscape. The basic unit always affirms the identity of the elements making up the collective line. Eave and ridge heights vary, but the ridge direction reinforces the direction of the street.

The street side of the dwelling is exposed to the public. The other side is exposed to a vast but potentially private natural landscape. This side offers seclusion, a high contrast to the public way.

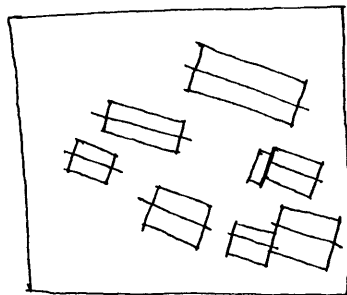


THE VILLAGE OF IXPANTEPEC NIEVES, continued

Non-Directional Aggregation



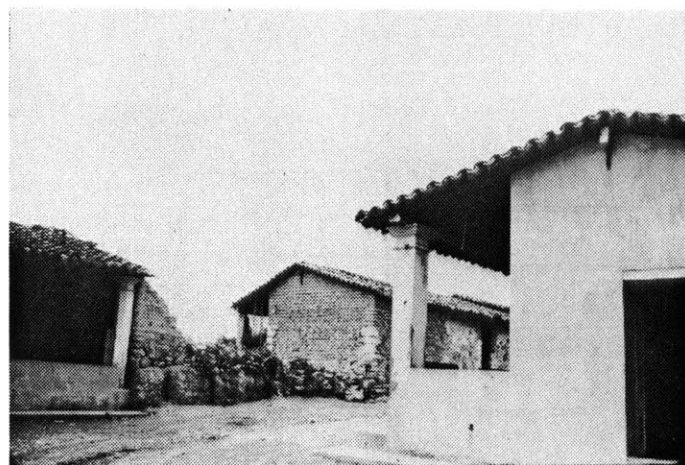
strolling sloping streets
locate discrete unit perpendicular to the street
parallel to the slope



The "organic" order results from adaptation to the natural environment. Public spatial structure bends with the topography. Buildings are scattered but the spatial structure achieves an organic order through the proximity of buildings and through the sharing of common forms and views. The houses on the east side of the site form a cluster and share a view of the valley and access.



1



3



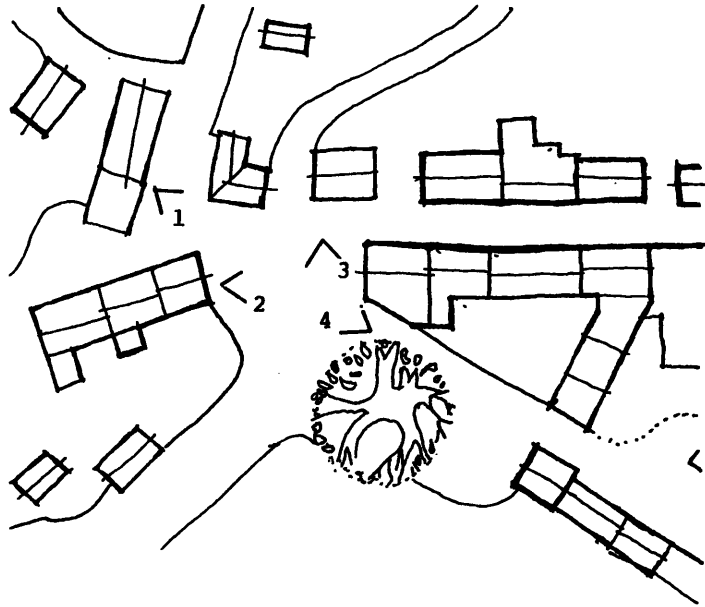
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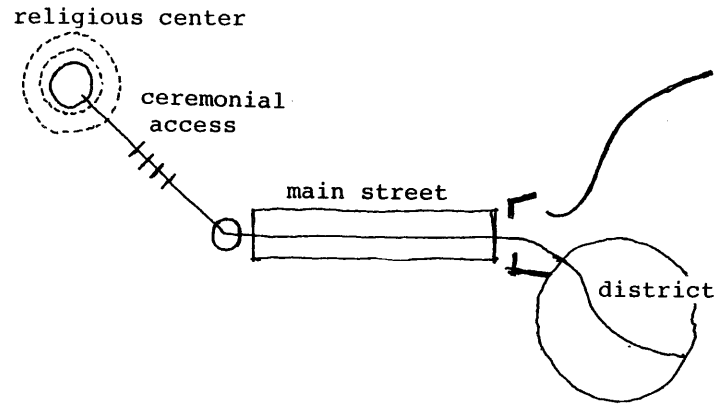
THE VILLAGE OF IXPANTEPEC NIEVES, continued

Network Articulation



Compositional form of public spatial structures is well defined. The public space is formed by the buildings. The building can be placed at the intersection and thereby establish direction of movement or orientation.

THE VILLAGE OF IXPANTEPEC NIEVES, continued



The public buildings are located at the highest point of the site. This strategic placement calls attention to these units as being the important elements in the settlement.

The major street becomes a bridge connecting the public buildings (church complex, government quarters and market place) at one pole with an organic cluster of houses at the other.

Social and economic changes are confronting Mexican villages in this area. New pressures for development will influence growth as a result of:

- exploitation of natural resources
- migration of organized labor to rural areas
- construction of new highways
- industrialization of society.

In the village of Nieves I am hypothesizing a need for fifty additional dwellings. Due to the increase in population and also because the new inhabitants are coming from urban areas additional services will be needed. These needs include:

- additional public buildings
- shopping facilities
- recreational areas
- sanitation facilities
- vehicular access

THE DESIGN PROBLEM, continued

Population Analysis

Population Current Projected Total
 Increase

-Adults	500	100	600
-High School Age	21	17	38
-Elementary School Age	500	100	600
-Under 6 Yrs.	479	83	562
TOTALS	1500	300	1800

NOTE - These figures are based on an average family consisting of six members.

Dwelling Requirements to Accommodate Projected Increase

Building	Existing	Required	Total
Dwellings	250	50	300

THE DESIGN PROBLEM, continued

Public Buildings
and Amenities

Existing Amenities	Dimensions	Projected Needs	*Projected Dimensions
<u>Buildings</u>		<u>Buildings</u>	
-Church	8640 sq. '	-Community Center	3300 sq. '
-Government Quarters	1575 sq. '	-Clinic	1000 sq. '
-Primary School	10050 sq. '	-Child Care Center	1600 sq. '
-Stores	875 sq. '	-Shopping Facilities	3500 sq. '
<u>Recreational Facilities</u>		<u>Recreational Facilities</u>	
-Basketball Court	4200 sq. '	-Soccer Field	81000 sq. '
		-Baseball Diamond	16129 sq. '
		-Playground	500 sq. '
<u>Public Open Space</u>			
-Church Courtyard	10080 sq. '		
-Town Square	11346 sq. '		
-Open Market	14000 sq. '		
-Streets	29' wide		
-Paths	11' wide		

*Note - These figures are based on Mexican government statistics.

The following issues need to be considered to provide a feasible design proposal:

- the village's "spirit of place" (importance of culture and existing built form) in terms of
 - location
 - spatial configuration
 - variation of local building method
- the public space as the primary element of the settlement's form and enclosure
- the functional demands of the new settlers
- the potential and evolutionary possibilities of the existing settlement's built environment
- the benefits and liabilities to the current community

The spatial articulation of the existing unit is not adequate to accommodate the demands of the new inhabitants. However, it is possible to incorporate the charac-

teristics of the existing units with compartmentalization of the new unit to provide space for privacy, indoor leisure activities, sanitation, etc.

The site for the new dwellings and public services should not interfere with the existing settlement but should ensure convenience and accessibility to both newcomers and existing citizens.

An additional road is necessary for access to the market place as well as to the dwellings; it should not obscure or destroy present patterns.

The next phase is a design proposal identifying how new values and needs can be integrated into the existing settlement.

The site selected for the alternative proposal is the area south of the existing main street. Here a steep pedestrian path is the only access to the religious center and open market places. The topography south of this intersection is conducive to building. The slope is less severe than in other areas; new dwellings could be organized in such a way that they reinforce the intersection; and, the area has southern exposure. If further expansion is needed it could be located northeast of the main street.

Public Buildings Location

To assist in social integration the additional public buildings should benefit the newcomers and the current citizens. Placement at the foot of access

THE DESIGN PROPOSAL, continued

Public Buildings Location,
continued

to the church will reinforce this now weak space. A large public outdoor space will be generated by the public buildings allowing for a place for groups to congregate. (Currently the religious center at the crest of the settlement and street corners are the only places where the community can meet.)

Vehicular Access Road

To merely extend the existing main street straight up the hill to the religious center would be expensive and would interfere with the major spine that has provided vitality to the village for a long time. The route identified in the proposal is practical, economically feasible, and does not obstruct the existing fabric.

Dwelling Unit

The design for the dwelling units utilizes the basic dimensions of the existing units as well as traditional construction materials in generating an "L-shaped"

THE DESIGN PROPOSAL, continued

Dwelling Unit,
continued

plan. One wing contains group living spaces; the other contains private individual spaces; and, utilities and services are at the junction of the wings. This dwelling offers more privacy and individual control of their dwelling. The plan has enough physical definition to provide privacy, yet it allows minor adjustments to suit the needs or desires of the inhabitants.

THE DESIGN PROPOSAL, continued

Spatial Organizational Qualities of the Unit

Existing Basic Unit	Proposed Dwelling Unit
One 20' X 35' rectangular unit.	Two 20' X 35' rectangular units combined into an "L" shaped configuration.
Massive and enclosed, continuous surface interrupted only by openings for light and access.	Massive and enclosed, continuous surface allowing for privacy, solar conditions and transparent and skeletal articulation where appropriate.
One combined living unit containing beds located permanently in the corners. Remaining space used as required for eating, conversing, entertaining, etc.	Enclosed spaces: -three bedrooms -living -dining -kitchen -bathroom
Kitchen is attached to the unit with access from the outside.	
The aggregation of the dwelling is on the short dimension of the unit.	This type of layout makes a private outdoor open space sheltered by the building form. Indoor spaces can be opened to the courtyard, if desired, for more openness and transparency.

THE DESIGN PROPOSAL, continued

Spatial Organizational
Qualities of the Unit,
continued

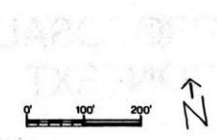
Existing Basic Unit
(continued)

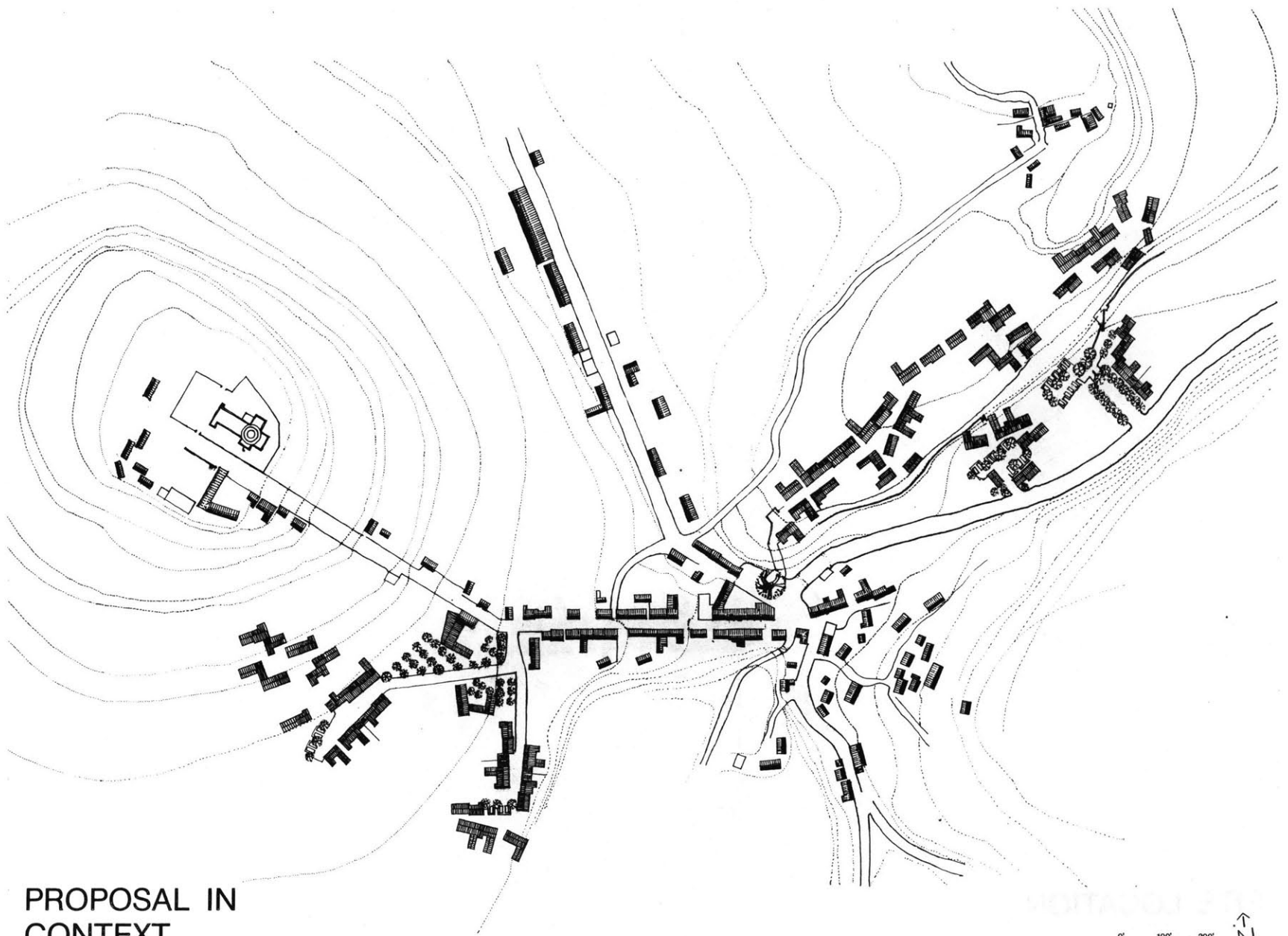
Proposed Dwelling Unit
(continued)

Through time lots have been subdivided to family members. The additional units have formed common outdoor spaces, i.e., streets and courtyards.	The one family unit has a higher degree of privacy and individual control of outdoor spaces.
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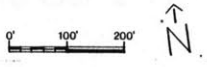


SITE LOCATION



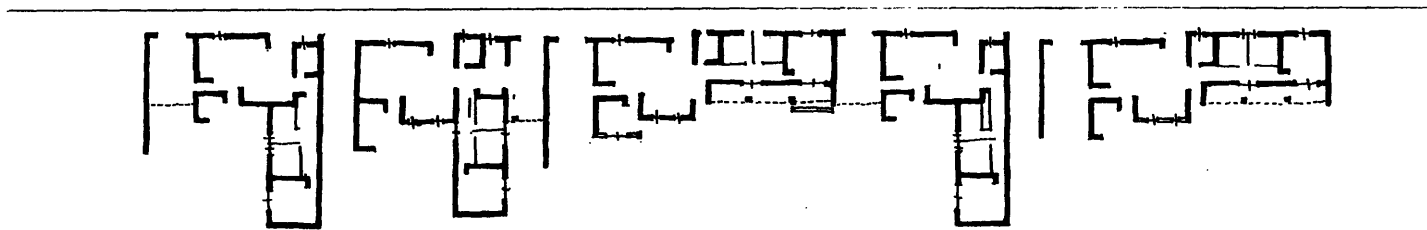
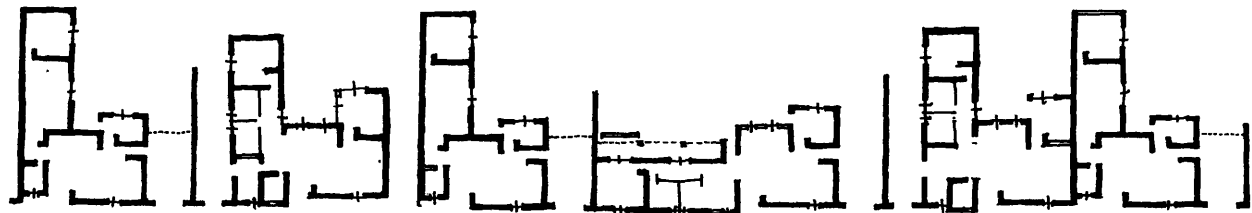


PROPOSAL IN
CONTEXT

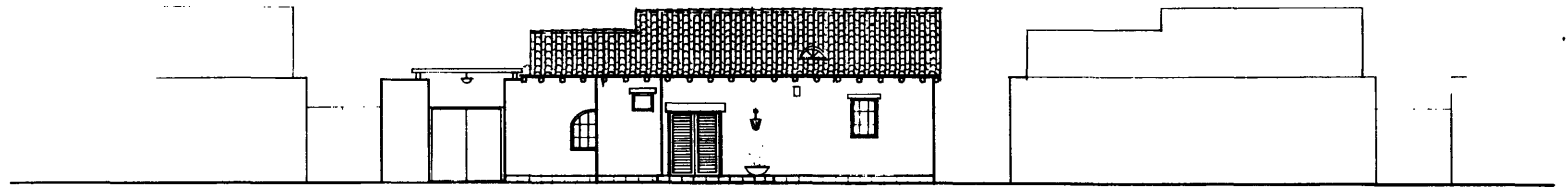




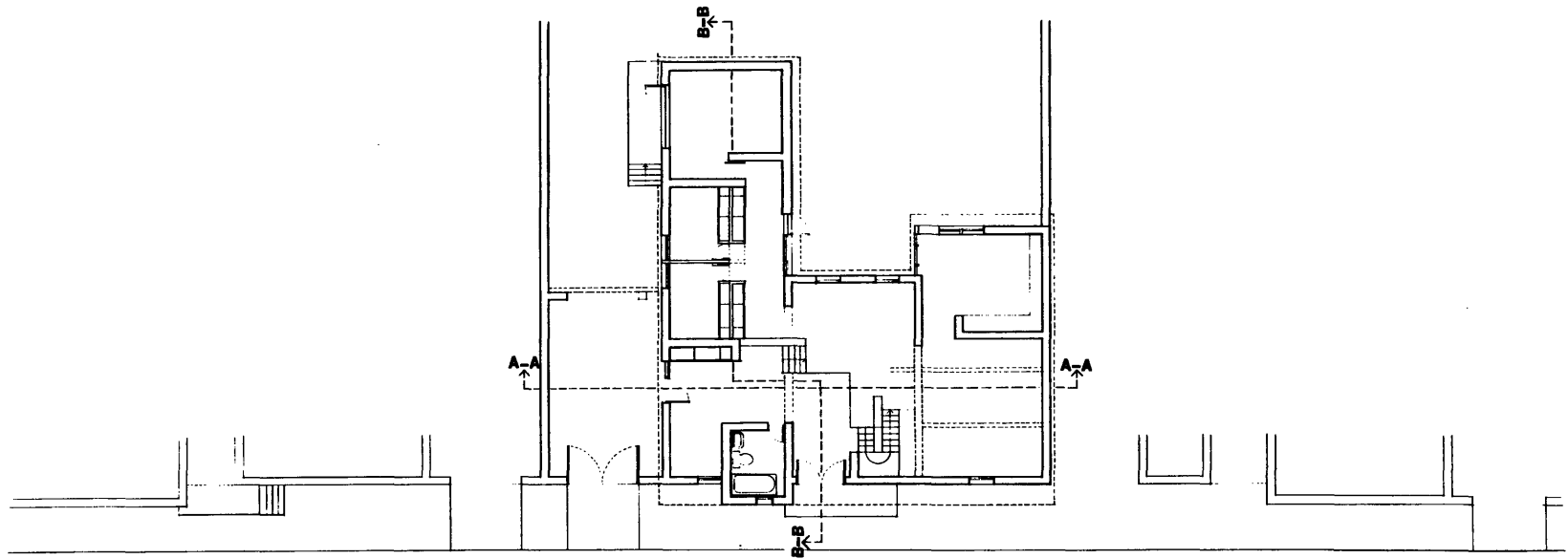
L₁ L₂ L₃



LINEAR UNIT
AGGREGATION



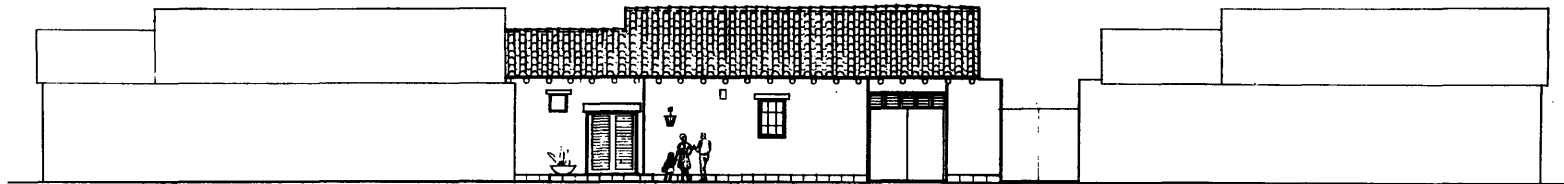
STREET ELEVATION



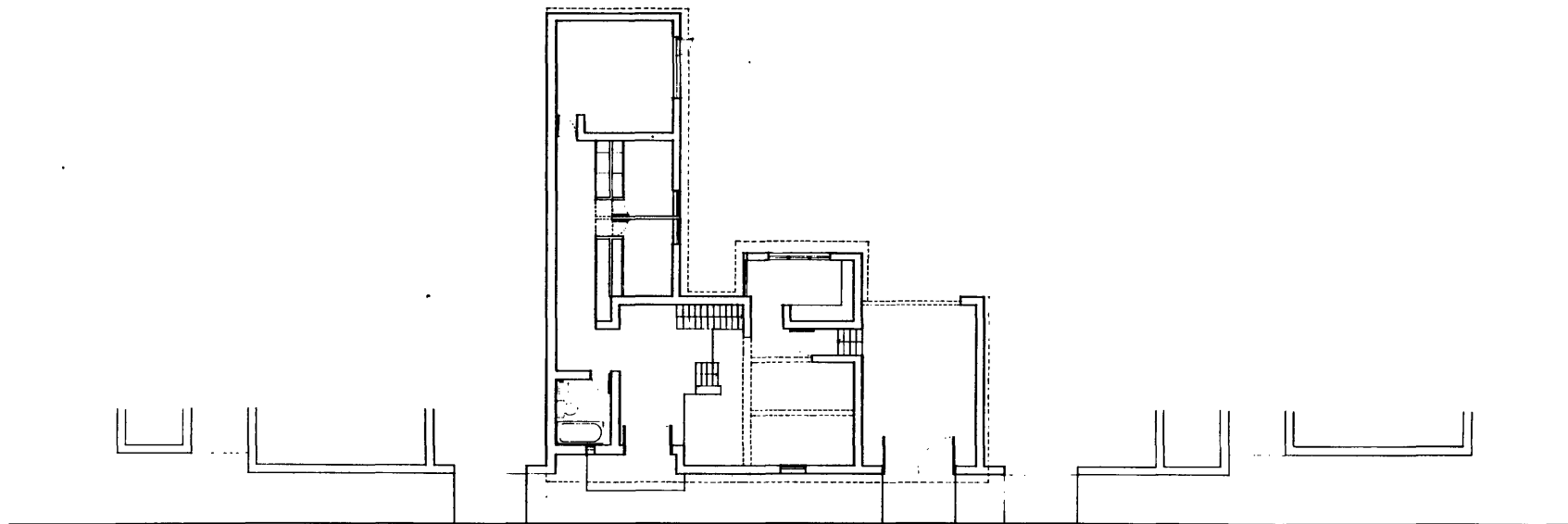
FLOOR PLAN SPLIT LEVEL

LINEAL UNIT L₁





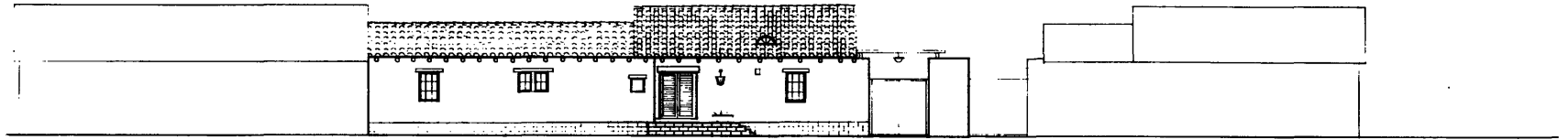
STREET ELEVATION



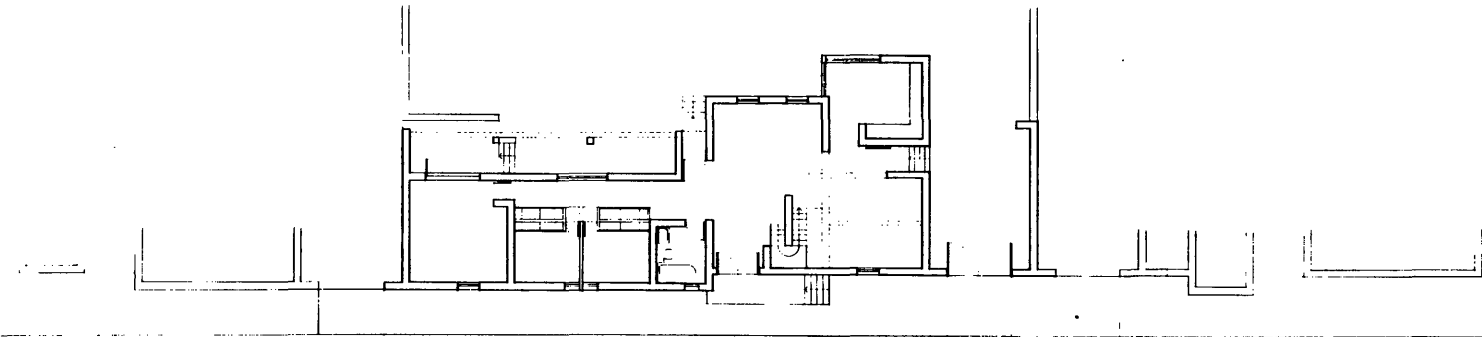
FLOOR PLAN SPLIT LEVEL

LINEAL UNIT L₂





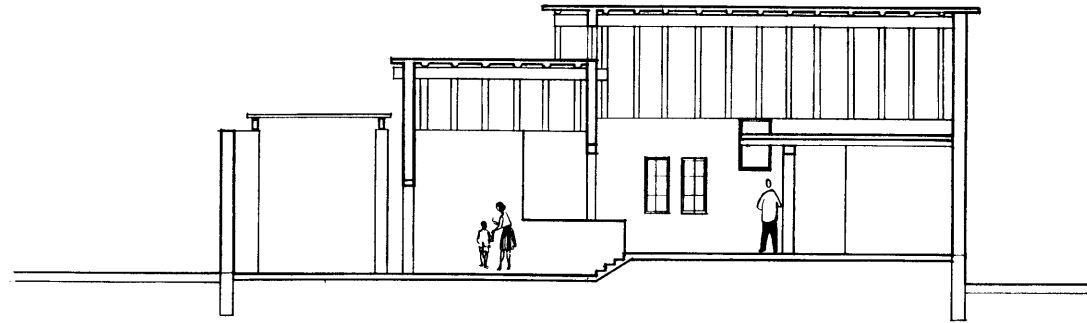
STREET ELEVATION



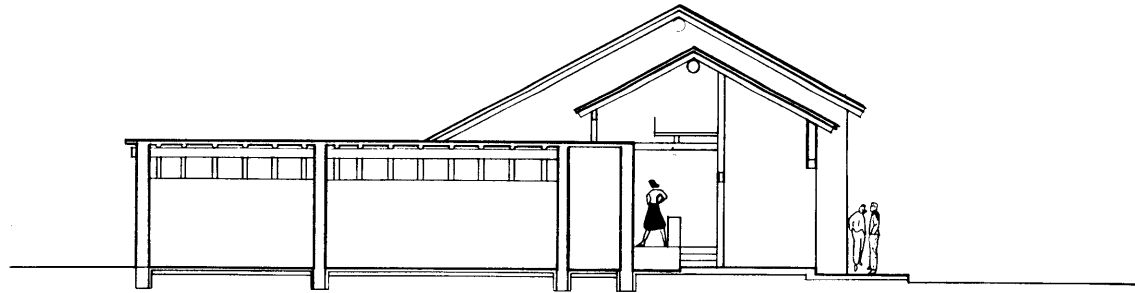
FLOOR PLAN

LINEAL UNIT L₃





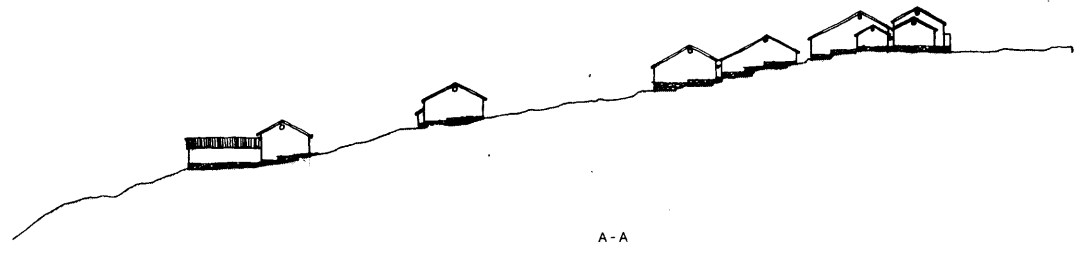
SECTION A-A



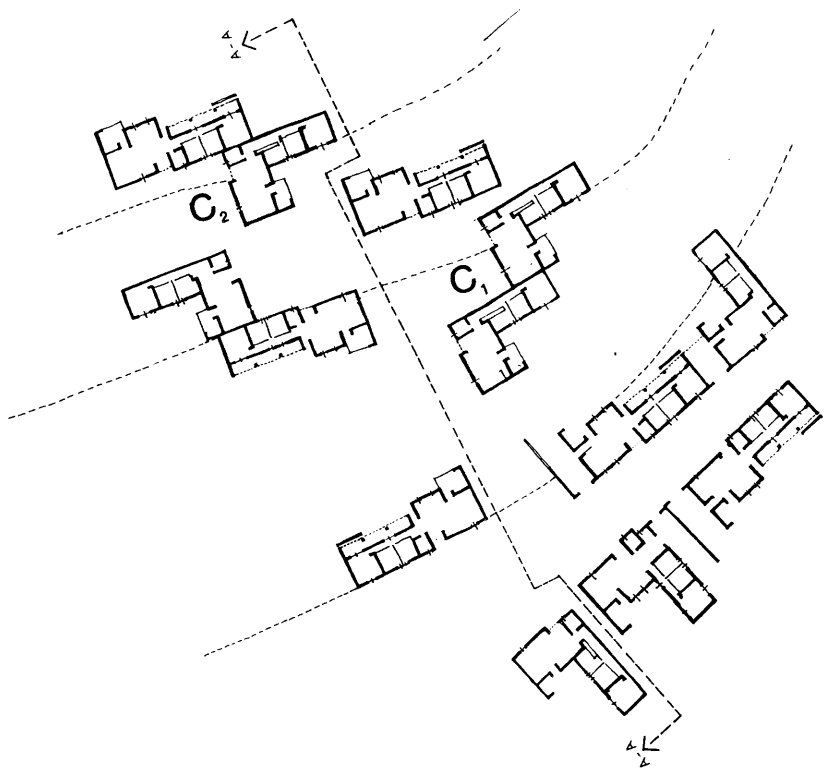
SECTION B-B

TYPICAL UNIT SECTIONS

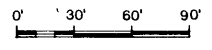


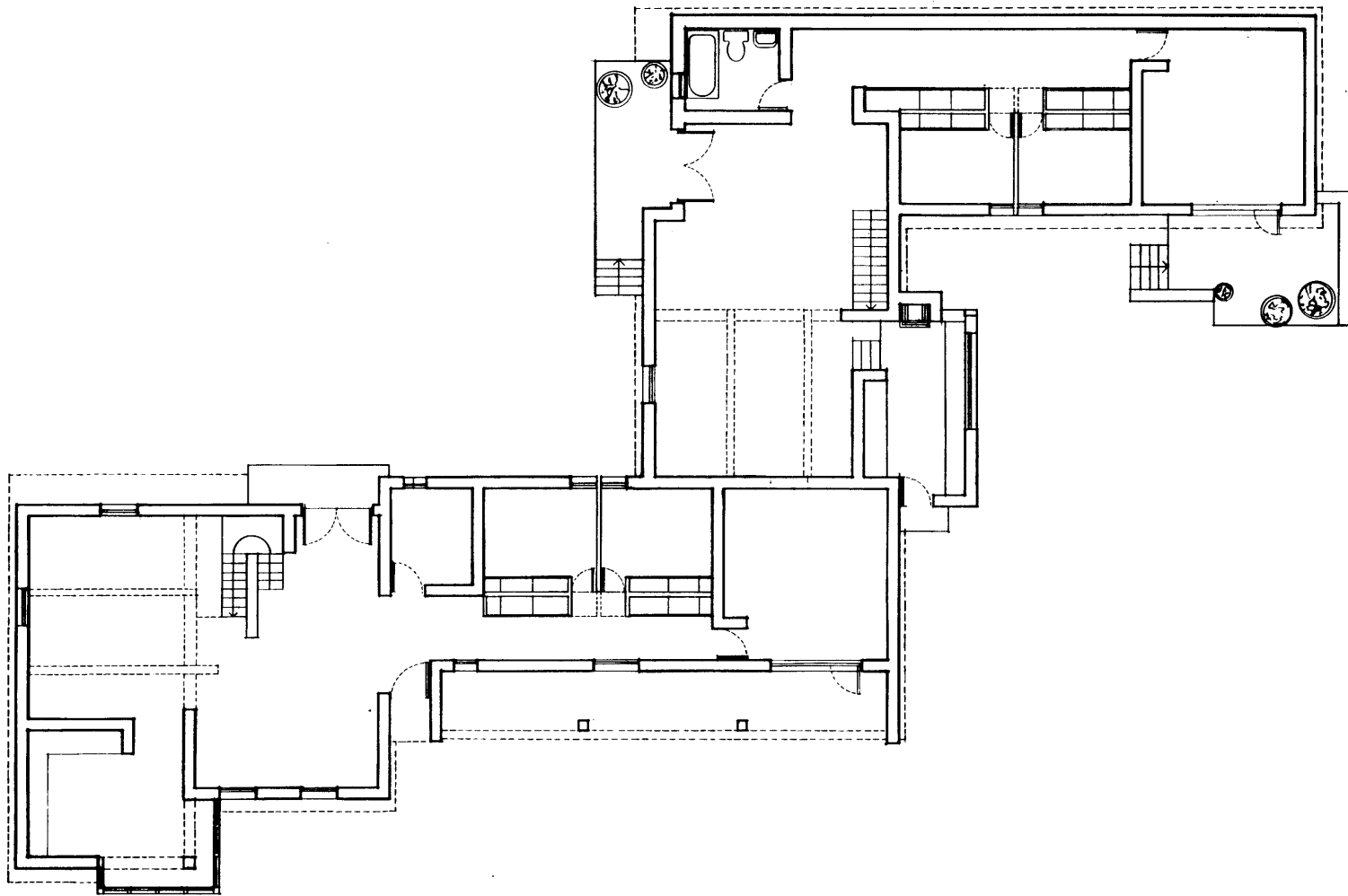


A-A



CLUSTER UNIT AGGREGATION

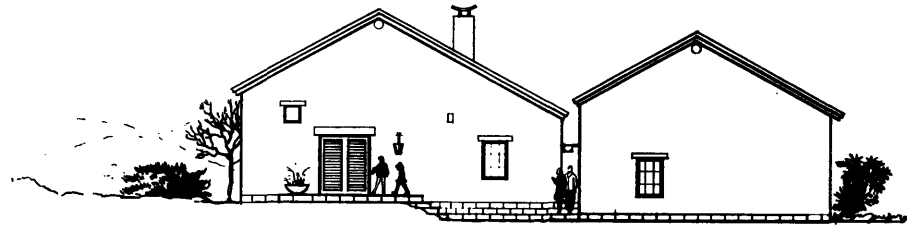




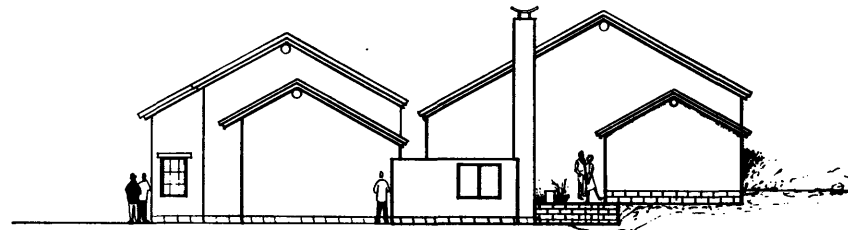
FLOOR PLAN

CLUSTER UNIT C₁

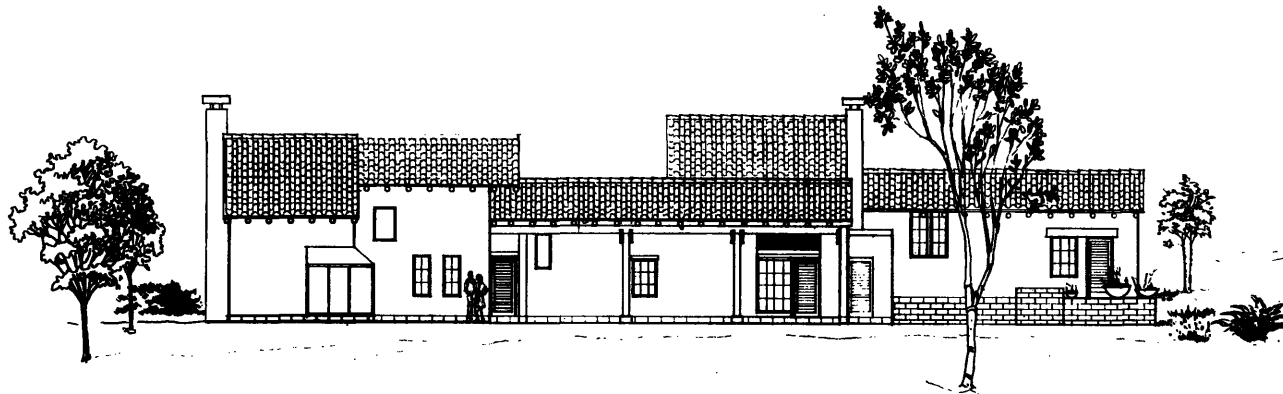




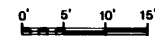
ENTRANCE ELEVATION



BACK ELEVATION



DOWNHILL ELEVATION



Conclusion

The expansion will identify itself as another district in the settlement. By adapting to the natural conditions of the landscape and incorporating the basic unit, the settlement can grow and cope with the transformation. Adaptation of the values of the new people and the existing structure, organization and form will provide a sense of place and continuation of settlement character.

Introduction

In the same Mixteca Baja region as the village Nieves, a canyon is located which has linear organization similar to that of the village. The canyon has been shaped by natural conditions of the environment as it directs the river's route. The village is a man-made place, where the units' subordination to the site topography builds the route of the main street.

Path interruption with
continuity and direction
provided by the river.



Linear Organization

- The repetition and grouping of linear forms paralleling the path of the river provide continuity, linking and forming enclosed spaces.
- The canyon walls are segmented and curvilinear to respond to site conditions, that is,
 - topography
 - water
 - climatic conditions
- The wall on one side of the river has a continuous rhythmical flow.
- The other canyon wall is continuously interrupted, shaping concave and convex spaces.
- A range of scales is evident from 20 foot boulders to 800 foot cliffs.
- The canyon gives a sense of location and place, enclosing and containing within its walls.



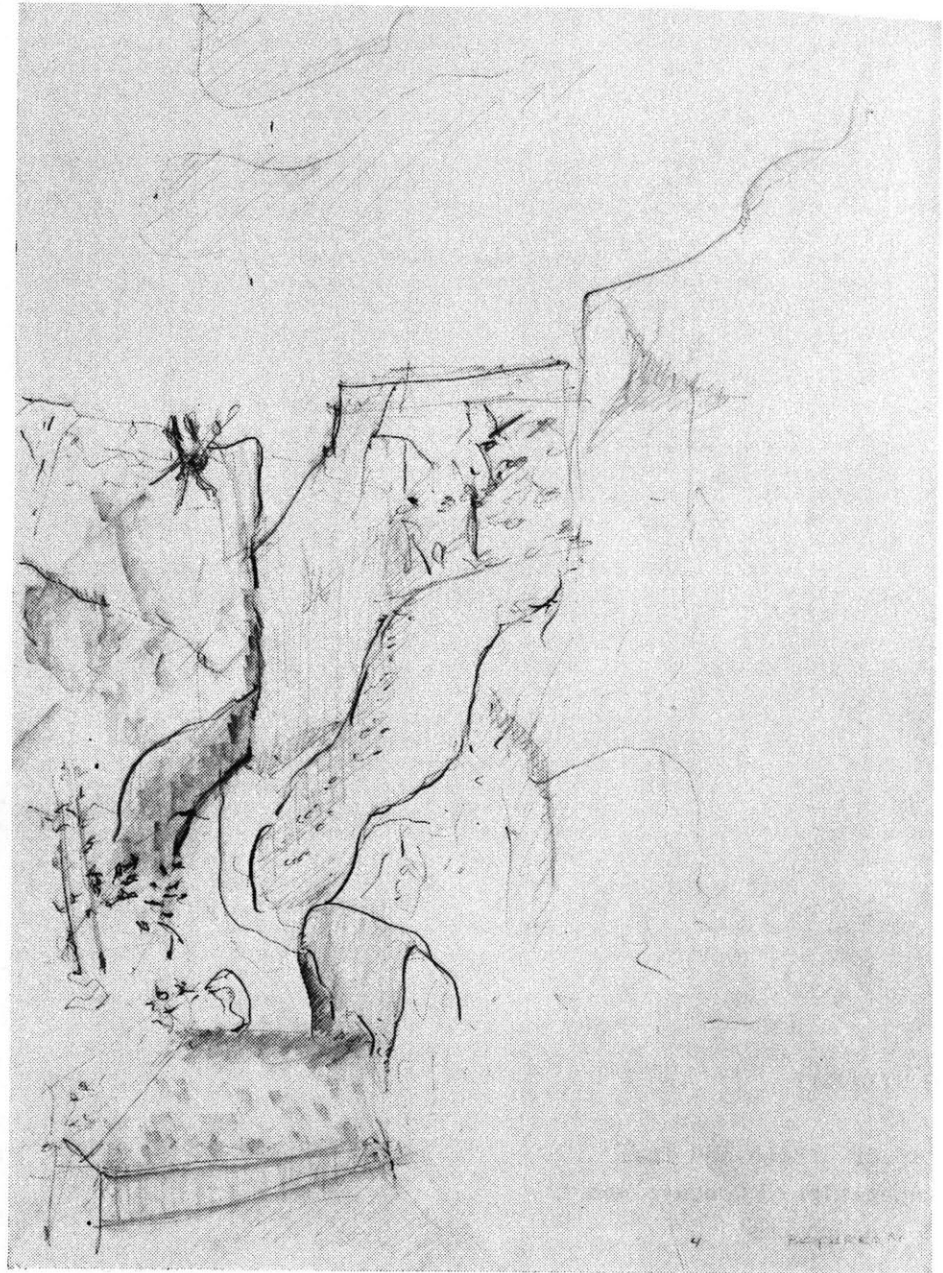
GATE Valley leads to an enclosed space
defined by mountain boundary



ENTRANCE

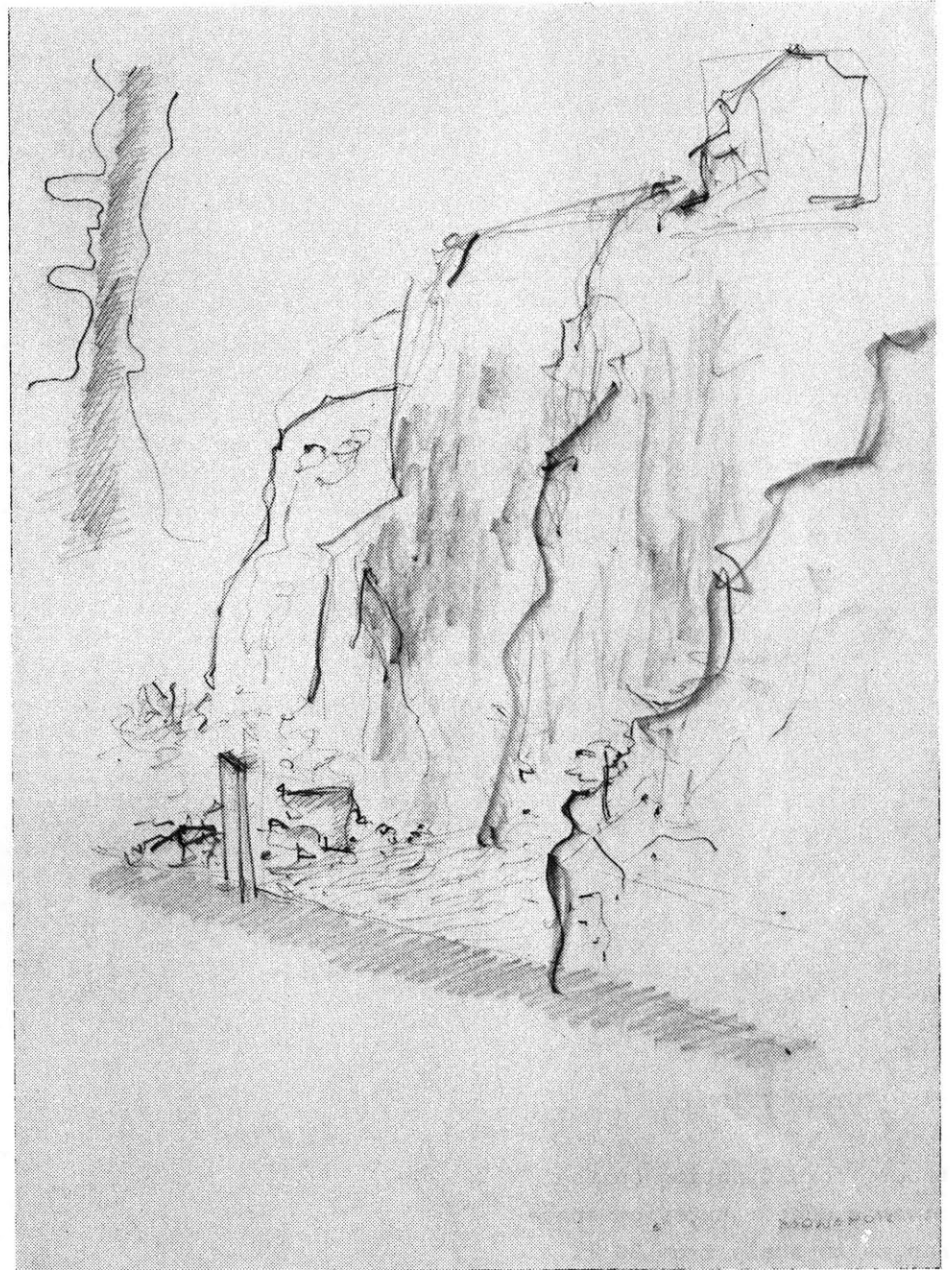
VIEW INTERRUPTION

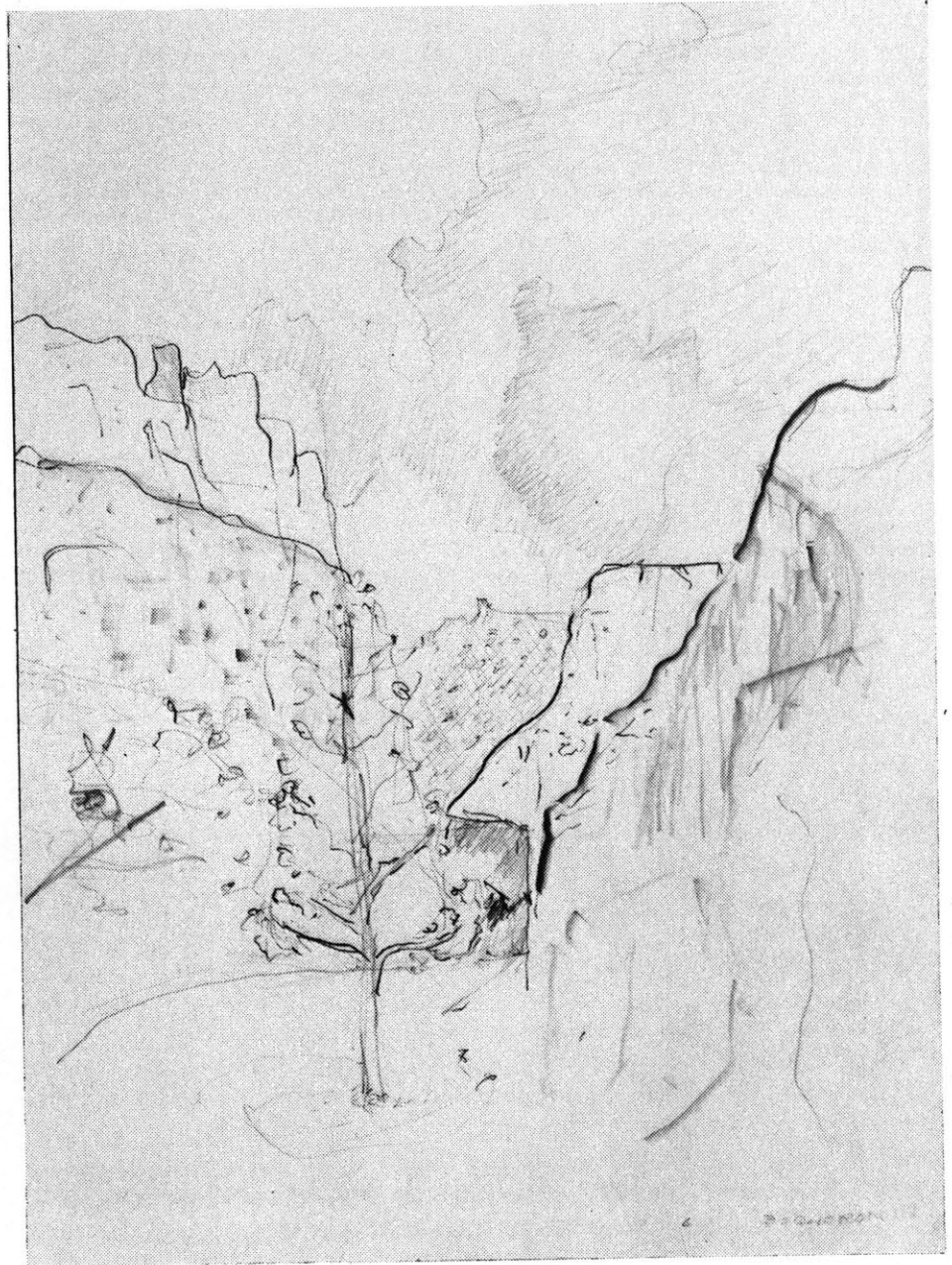
Linear form fronting on the
river's edge. Exterior space
ranges in scale from 20'
boulders to 800' cliffs.



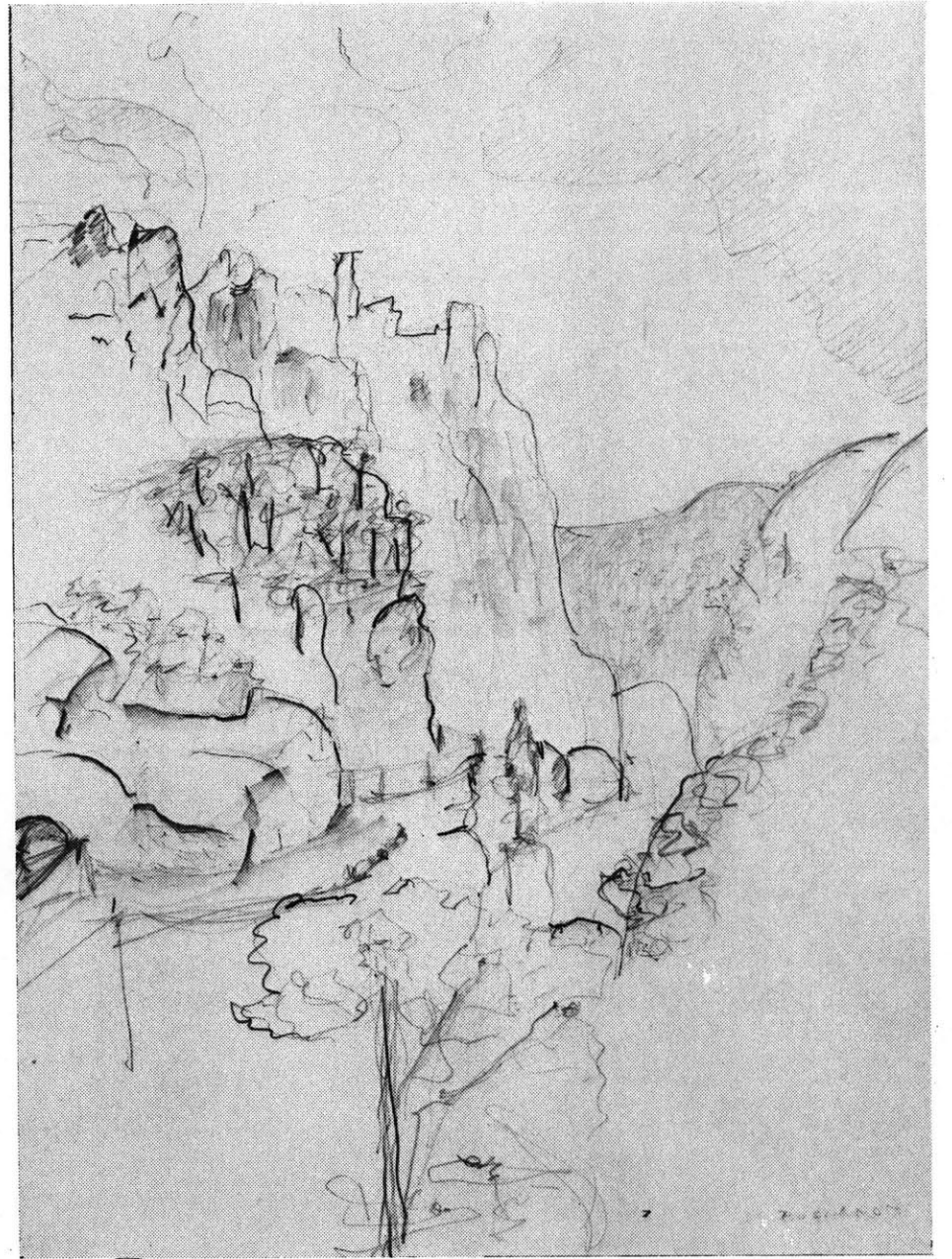
CONTINUITY

Linear growth and form
repetition. Concave and
convex spaces.





ENCLOSURE



LINK

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