

RICE UNIVERSITY

**Exchange in the Barranco:
Organizing the Internal Economy**

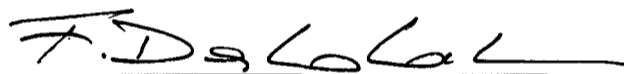
by

Yvette Herrera Durán

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
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Master of Architecture

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ABSTRACT

Exchange in the Barranco: Organizing the Internal Economy

by

Yvette Herrera Durán

This thesis problematizes the infrastructural and social boundaries of informal settlements established in anomalous depressed tissues within the gridded city. It does so by proposing a new urban strategy that intends to dissolve the edge condition as well as reconnect extracted points of the settlement as a means to pulsate the activity of the slum dwellers and to incorporate the informal settlement to the city. This new urban approach weaves the inverted topography of the barranco with two pieces of urban fabric that are interrupted.

La Limonada, one of Guatemala City's densest and most dangerous asentamientos situated in a barranco becomes the site of exploration.

The thesis grows out of three constants of this informal city: informal economies, steep grounds and lack of connectivity and proposes an acupuncture construction of exchange promenades that act as connective infrastructures, exchange platforms, and new public grounds. This Mobilizer engenders a new tectonic paradigm that serves a mediator in this gradient of exchanges between the consolidated city and the asentamiento.

ACKNOWLEDGMENTS

Michael, thank you for being an outstanding advisor and investing so much of your time and energy in me. For believing in me even when I had little confidence in myself. For understanding the barranco so perfectly. You are a hidden treasure, and I feel proud to have worked with you.

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dancing with the arm up in the air even in the most stressful charette nights.
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PREFACE

For years I have observed the patches of informal housing that quickly grow in the beautiful barrancos of Guatemala. These are believed to be anomalies in the system that should be completely displaced to the outskirts of the city. As a little girl I used to go with my family to some of these barrancos to preach to people. I remember always being surprised by the tiny walkways, the different materials used in construction, the houses that were almost hanging from the side of the slope. This thesis was born from my desire to share some of my architectural knowledge in solving some of the issues that these barrancos deal with.

It is important to understand the intent of this thesis. Informal housing has been a topic of discussion by many fields, from social to architectural. The purpose of this document is not to discuss nor offer a solution to the multiple social problems that exist in these communities. Instead, the goal is to discover a new way in which architecture can become a facilitator and an engine for the settlers to keep reinventing their economic ideas. This thesis proposes a new urban solution for the lack of connection between the city and the barrancos.

BARRANCO

What is a Barranco?

barranco: n. spanish word for ravine: a deep valley with steep sides that vary in slope steepness.

After a careful study of slopes, the city of Guatemala determined that a slope from 20 to 40 degrees is considered an area for ecological control that could be mildly occupied. A slope of 40 degrees or steeper is a dangerous area to build on and should not be occupied. The terrain's slope is key to identify the potential risks when confronting natural phenomena such as earthquakes and landslides.



Figure 1. Slopes of a barranco. Aerial view

Guatemala city sits in a valley. However, this valley is constantly interrupted by depressions in the topography which constitute a chain of barrancos. This marks the difference between Guatemala and other Cities with mountains and barrancos: Guatemala's barrancos create voids in the city grid

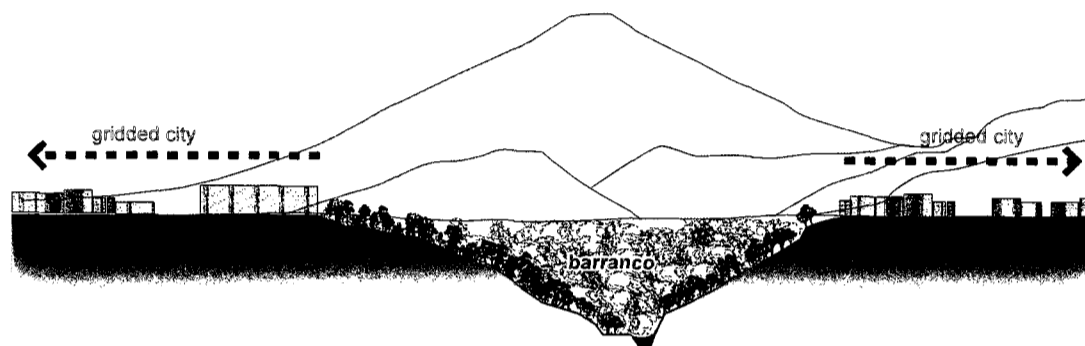


Figure 2. Barranco and the city: topography tissue

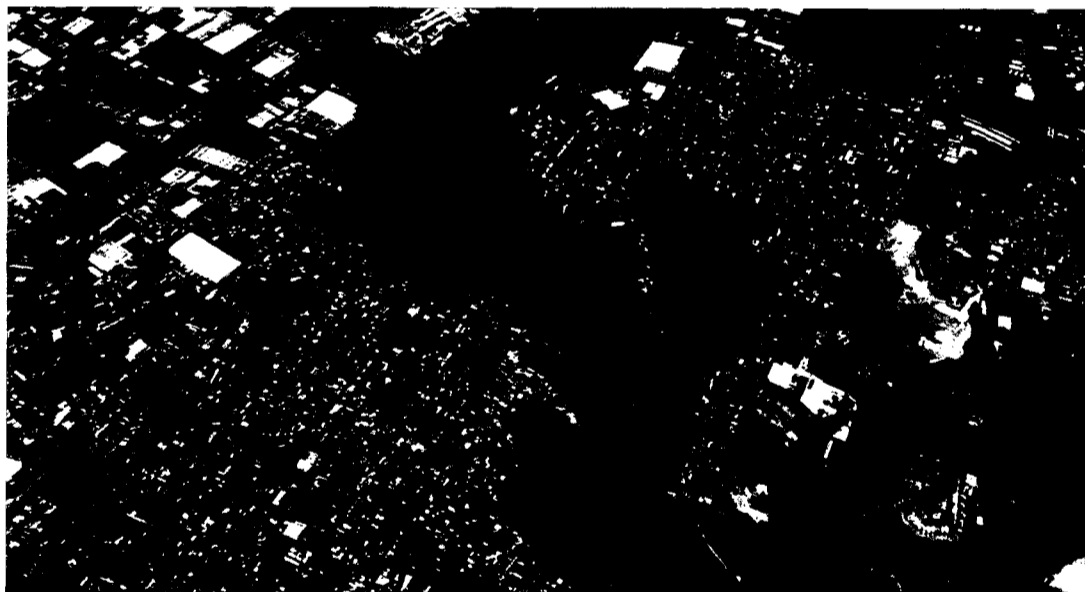


Figure 3. Aerial image of Guatemala's Topography. Google Earth

ASENTAMIENTO

What is an Asentamiento?

asentamiento: n. spanish word for an informal settlement or shanty town: a thickly populated rundown part of a city characterized by crudely build houses, inhabited by poor people.

Asentamientos typically lack public services such as water, drainage, electricity, paved walkways, public transportation and communication services. Often they also fail to have health centers, schools, parks and community centers. For the purpose of this thesis an asentamiento is one established in a barranco.

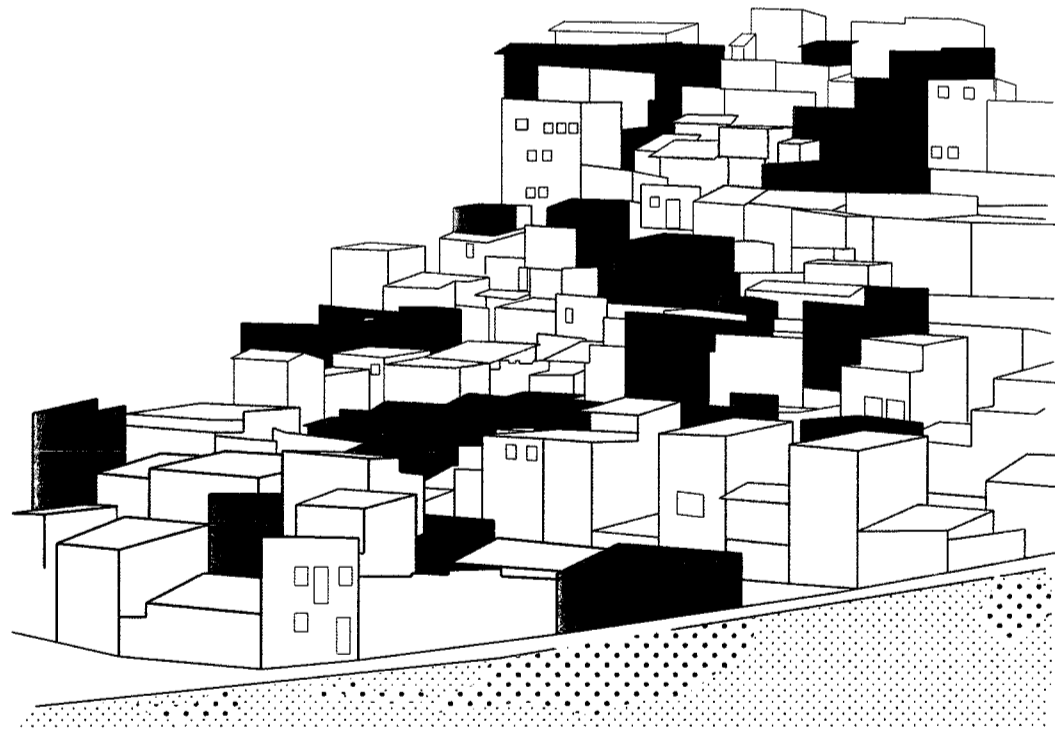


Figure 4. The housing fabric of an Asentamiento

With labyrinthine characteristics, through the years these asentamientos solidify into permanent cities within a larger city, composed of smaller discrete elements and with strong interactions within the settlers.

Houses in an asentamiento are self-built with waste materials. In extreme conditions they are made out of corrugated metal and the interior is covered cardboard for insulation. Foundation is very basic: footing goes 30 to 60 cms into the ground providing no structural support to withstand winds.

Circulation paths are often carved in between houses, or in a zig zag pattern through the slope other times at the edge of a slope. Many times they are made up of numerous steps.

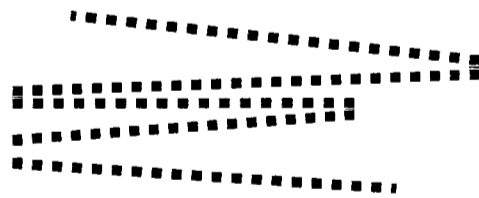


Figure 5. Zig Zag circulation along a slope

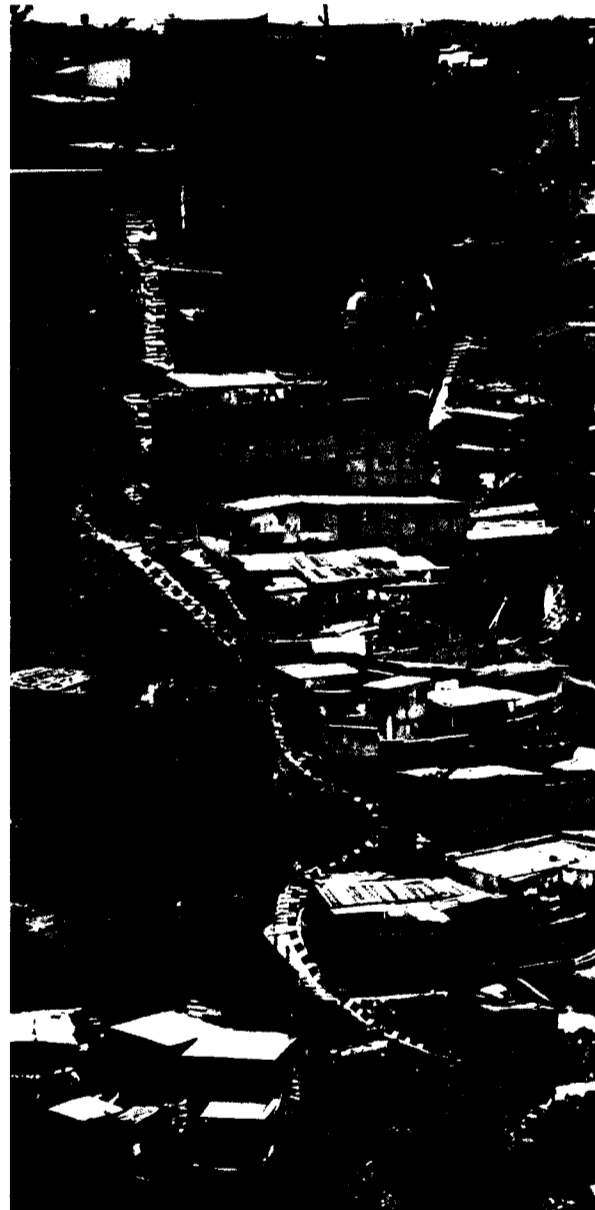


Figure 6. Construction and circulation in an asentamiento

WHO lives in an asentamiento?

An asentamiento is formed by three groups of people. The people coming from the countryside, who due to the decreasing access to agricultural land, political violence or fear to guerrilla, migrate to the city looking for a brighter future. Also an asentamiento is formed by people from the city who suffer a sudden economic crisis so they have to leave everything behind and settle in a poor area. Lastly it is also formed by those who are born in an asentamiento from members of the other 2 groups.

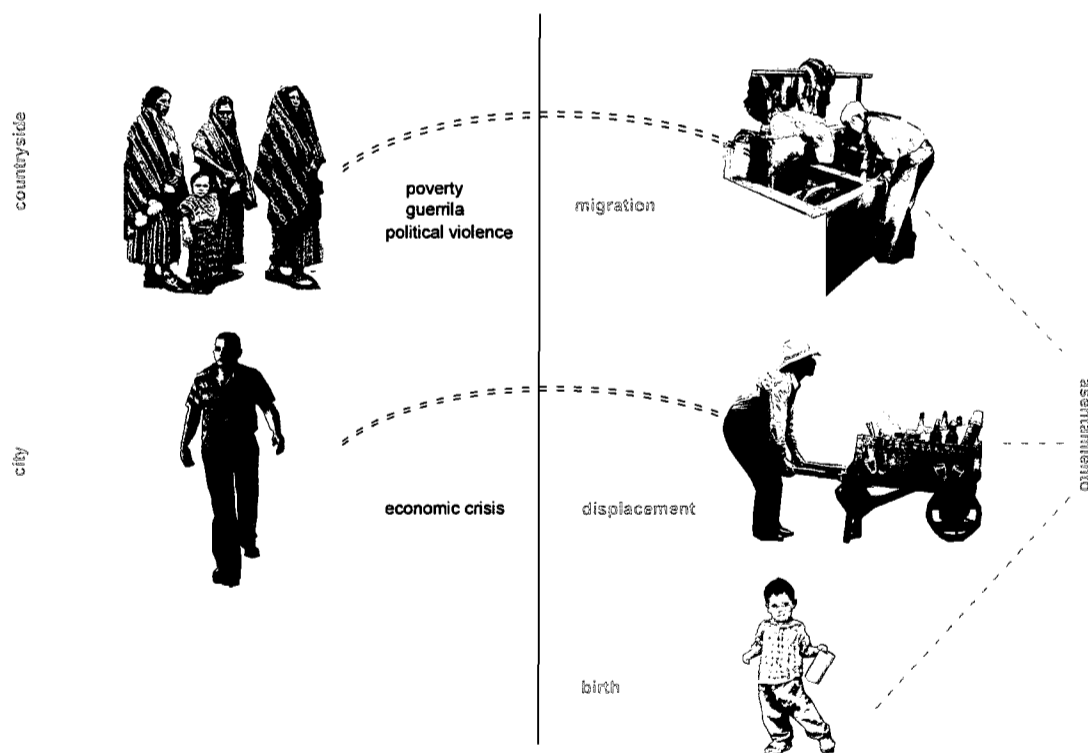


Figure 6. Inhabitants of an Asentamiento

For the purpose of this thesis

**TOPOGRAPHY
DEPRESSION + ASENTAMIENTO = BARRANCO**

Case Studies **EXAMPLES**

Informal housing and slums have fascinated many fields of study and have become a topic of discussion for a long time, Rio de Janeiro, Caracas, Medellin, Nigeria, India... are a few places that have worked with this topic.

What dominates across architecture/urban projects related to activating informal settlements is a concern for the education level of the population. Through cultural projects, such as schools, museums, performing art centers, the goal is to make the settlers aware of the potentials of their surroundings and make them active participants in the improvement of their society.

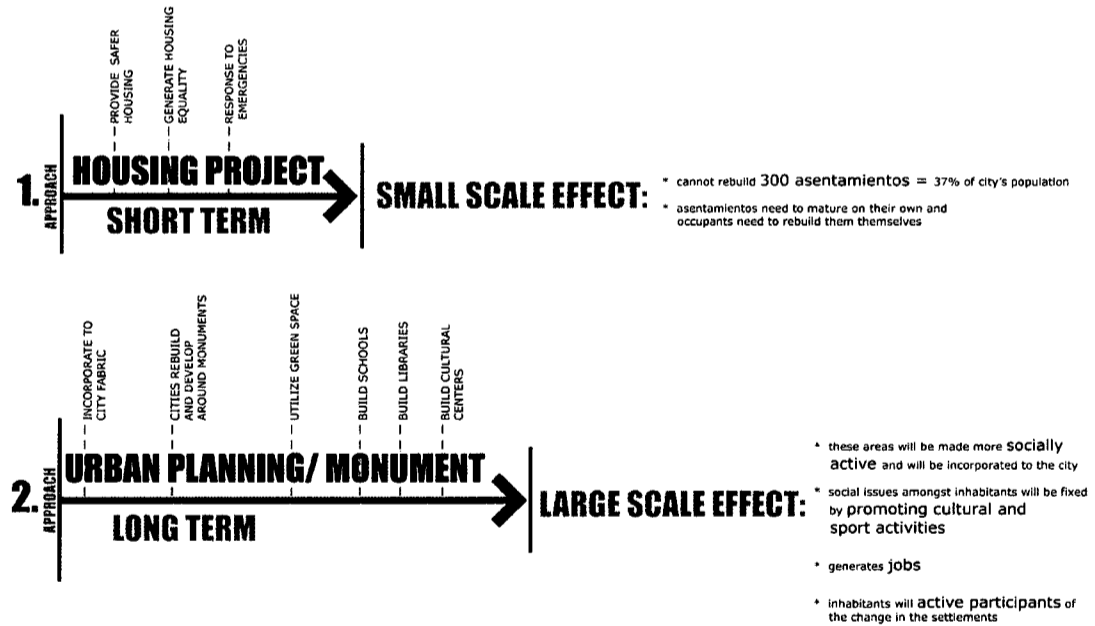


Figure 7. Approaches

Medellín, Colombia



Figure 8. Aburrá Valley, Medellín, Colombia

In 2005 a new plan was implemented, one that covered from urban planning to social relations. "Medellin la mas educada", Medellin the most educated, is a political decision. Education and Culture, the engines of the transformation. Five Library Parks and ten new public schools were part of the program and educational equipment to dignify the neighborhood.

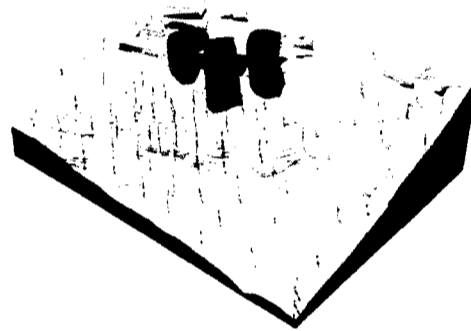
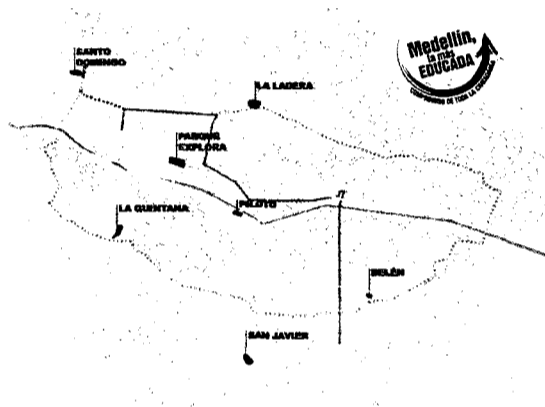


Figure 8. New Urban Plan for Medellin
Figure 10. New Open Spaces

Figure 9. Model of Santo Domingo Savio Library
Figure 11. Cable cars and Library

Río de Janeiro, Brazil



Figure 12. - Rio de Janeiro, Brazil

At the end of the 19th century, the first favela appeared when freed slaves and poor social classes occupied banks of rivers and hillsides. They learned building techniques with creative minimalist architectural solutions, making an intelligent use of space, having as a result disordered occupation.

Rocinha Urban Development, by Architect Jorge Jauregui, implemented two strategies: work with the different scales to respond to different needs and to work with social economic, physical and spatial aspects.

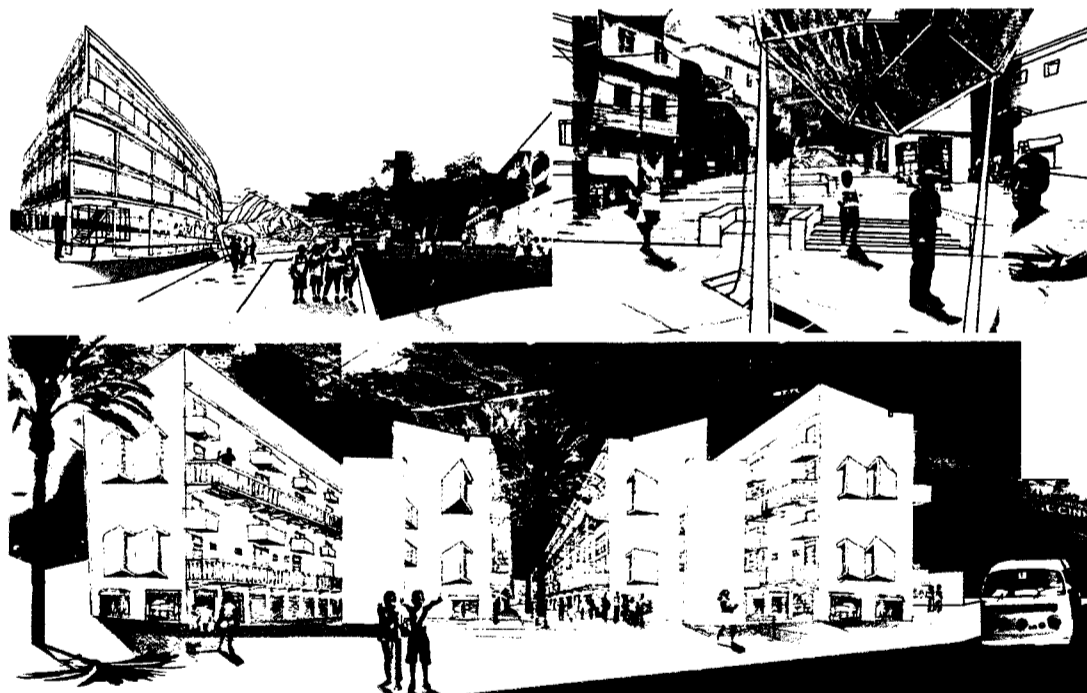


Figure 13. Proposal

NEW ACTIVATOR

HOW?

New approach to the asentamiento

The issues of asentamientos have been addressed from a top down approach. Most of them deal with a program that is housed in a box. Any urban approach taken by these projects is limited to parks, streets, side walks...

How can the unexplored aspect of urbanism in regards to connectivity be approached through the lense of infrastructure?

How can a solution for activating the asentamientos be born from what its own inhabitants have to offer, and how can architecture become a vehicle for such solution?

Stewart Brand, writer of the Whole Earth Catalog, has studied the squatter cities in Nigeria, India and Brazil and has observed that:

“Slum dwellers are doing urban stuff in new and amazing ways. People are trying desperately to get out of poverty, so there's a lot of creativity; they collaborate in ways that we've completely forgotten how to do in regular cities. The main thing is not to bulldoze the Slums. Treat the people as pioneers” (Stewart Brand, Save the Slums)

ECONOMY

What is the Economy in an Asentamiento?

Asentamientos are not just characterized by the level of poverty, the informal housing or their geographical location mostly in areas not apt for inhabitation. The commercial activities that come from within are very unique. **An informal and ever-changing economy is the engine of asentamientos.** There is a high level of illiteracy amongst the dwellers of this labyrinthine city. In order to survive, they create their own businesses and go out to the organized/gridded city to sell different products, wash cars, polish shoes, collect garbage. Some work inside the asentamiento selling food, teaching. The problem is that it ends up being a very individualized and not organized system with the "do it yourself" approach.

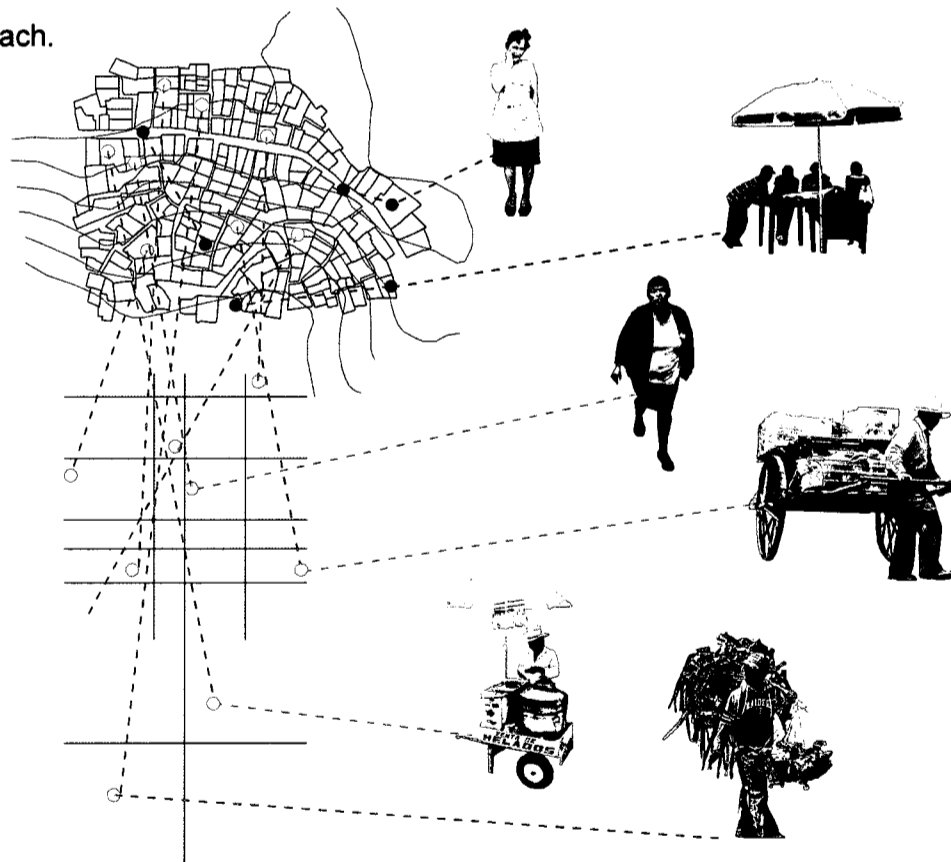


Figure 14. Commercial Activity in an Asentamiento

This thesis seeks to organize the economy of the asentamientos through establishing a commercial exchange first between the dwellers themselves and later on between the dwellers and the population from the planned city. Instead of the inhabitants having to walk the city streets to sell their goods, they should be given a space in their vicinity where they can manufacture, store and sell their goods, allowing them to be more efficient, and a place that the buyers can have easy access to.

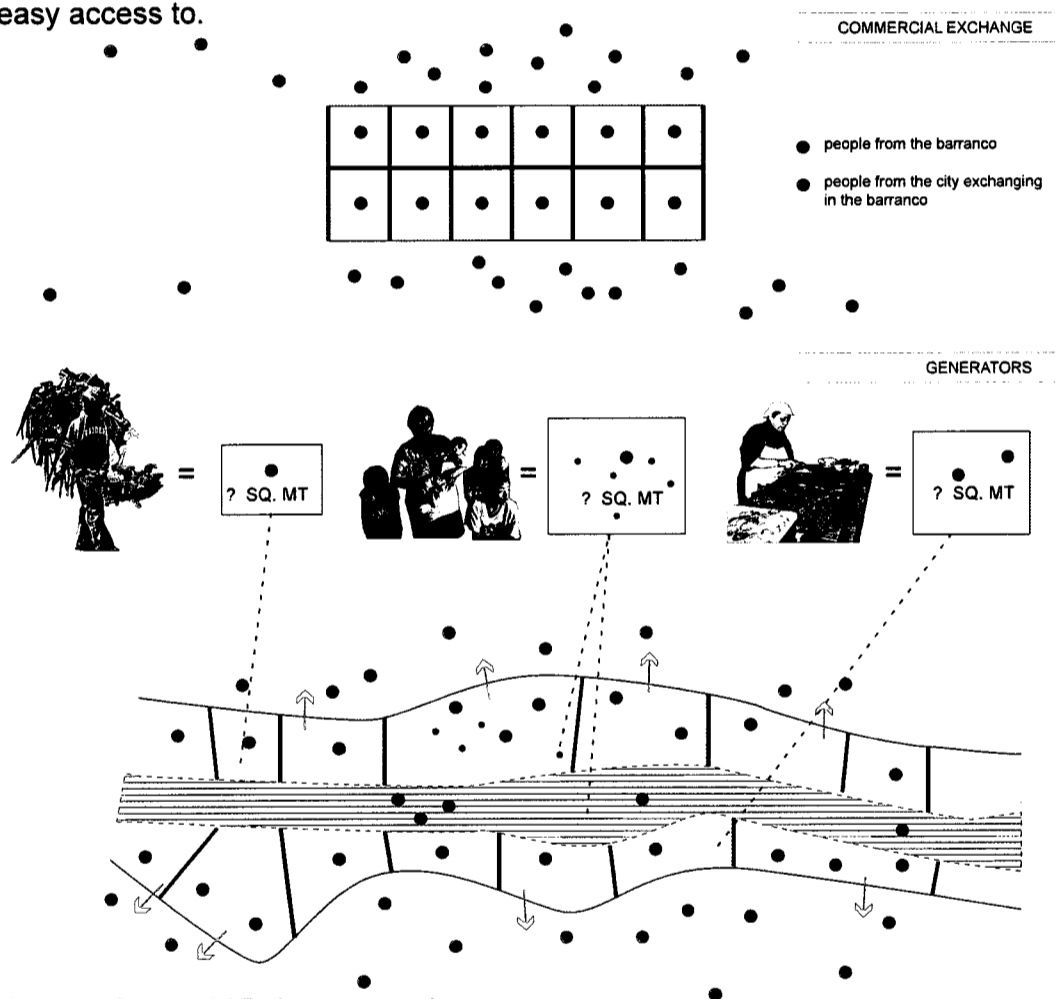


Figure 15. Commercial Exchange proposal

So the design planning questions that automatically rise are: how much square footage does each vendor need? Should there be a shared space where the families can hang around?

What is the function of a market in a city?

In highly dense cities, where blocks are covered with buildings, negative spaces of the urban fabric are made up by plazas, streets and parking lots and commerce is associated with these negative spaces. Why? Because people who live and work in these busy blocks will come out to the open spaces to meet with others, walk to nearby locations and this is why these open spaces are appropriate for pulsing markets. Once established, the markets have a radial effect in the neighborhood attracting people from a few blocks away. Pedestrian circulation and vehicular infrastructure delineate the space of commerce.

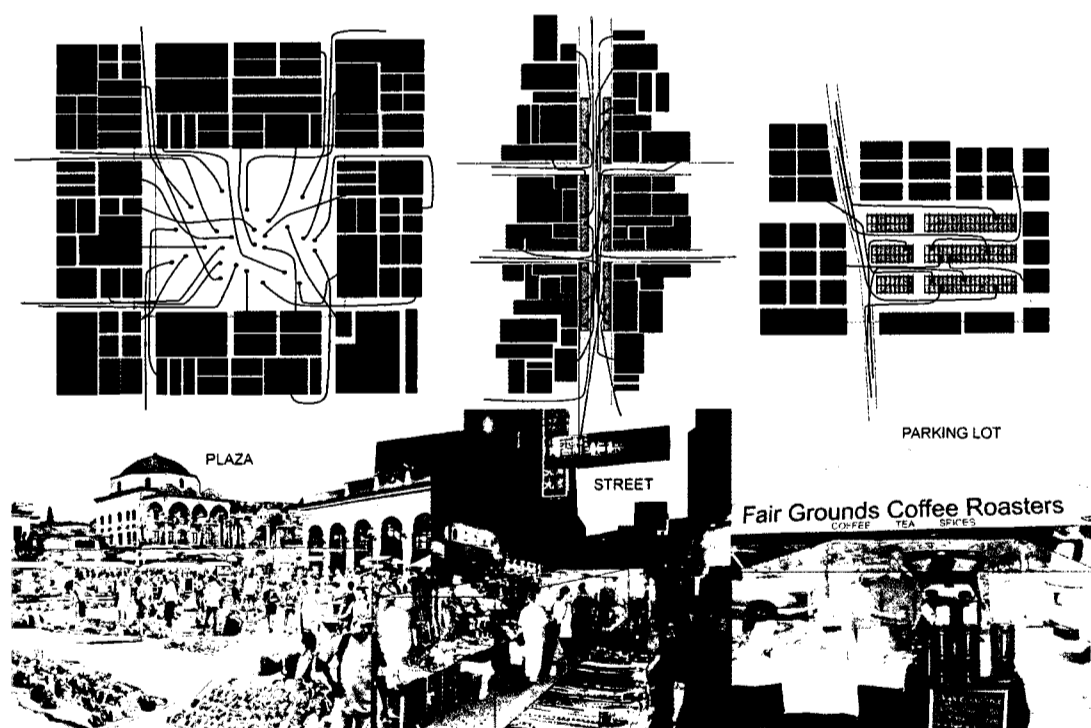


Figure 16. Markets diagram

But, how is this market concept within a city applicable to a space so dense that it's lacking open spaces, its circulation is labyrinthine and is sitting on a slope and therefore suffers of physical breakage away from the developed city?

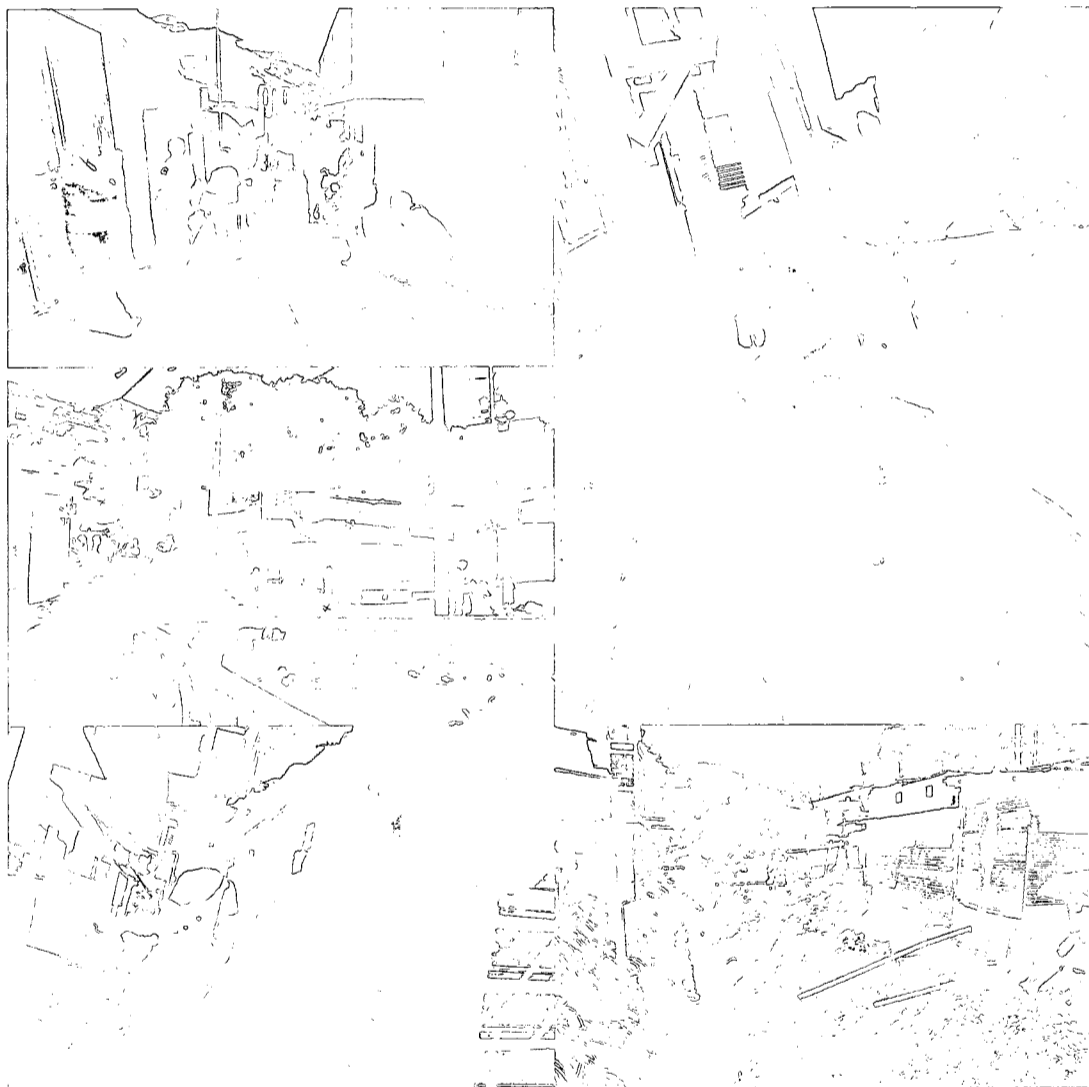


Figure 17. Inside a Barranco



Figure 18. Images of Asentamiento La Limonada

With a barranco having two sloping sides facing each other, the current mobility is limited to each side, up and down the slope. Only at the bottom are there points of connection between one side to the other. There is a small percentage of people who go out on a daily basis to the upper city usually for work. Currently people from the upper city do not access the barranco, and the small amount who do are looking for drugs.

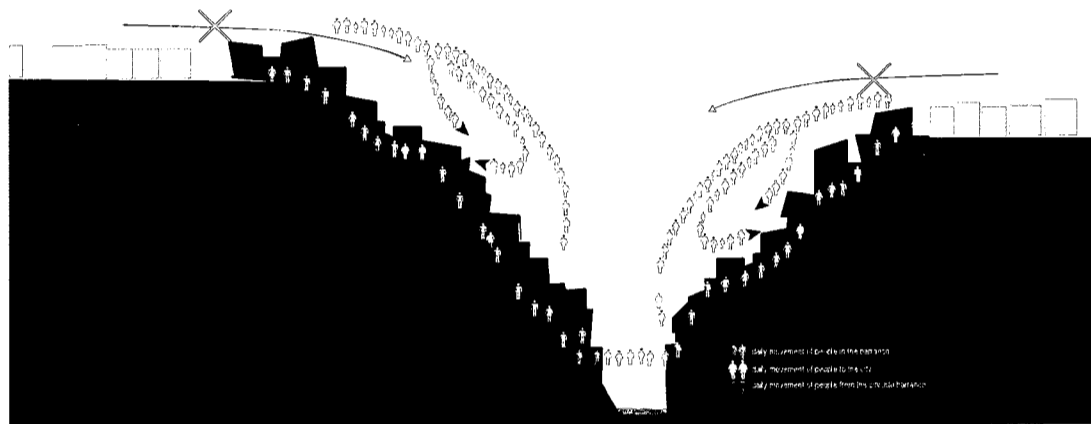


Figure 19. Current Circulation

The uniqueness of this topographical site is the open space that is formed by the 2 opposing slopes. It is a vast amount of air, negative space that is ignored. How can it be utilized to connect both sides?

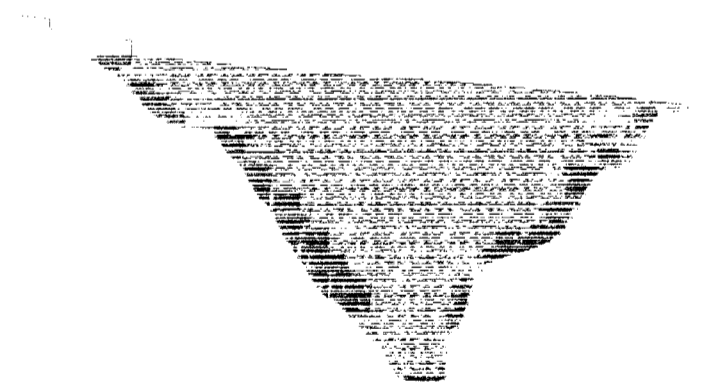


Figure 20. Void created by two facing slopes in a Barranco

The ideal mobility condition is to have dwellers move at different levels across, diagonally the barranco. Also to connect it to the upper city so that other citizens can enter the asentamiento which would in turn enhance the commercial exchange.

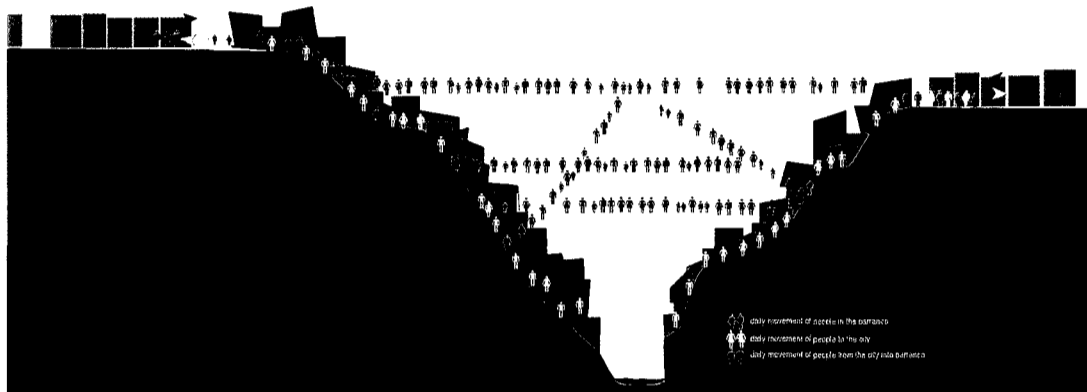


Figure 21. Desirable Circulation

PROPOSAL :

exchange promenades that act as connective infrastructures, exchange platforms, and new public grounds.

LA LIMONADA

La Limonada



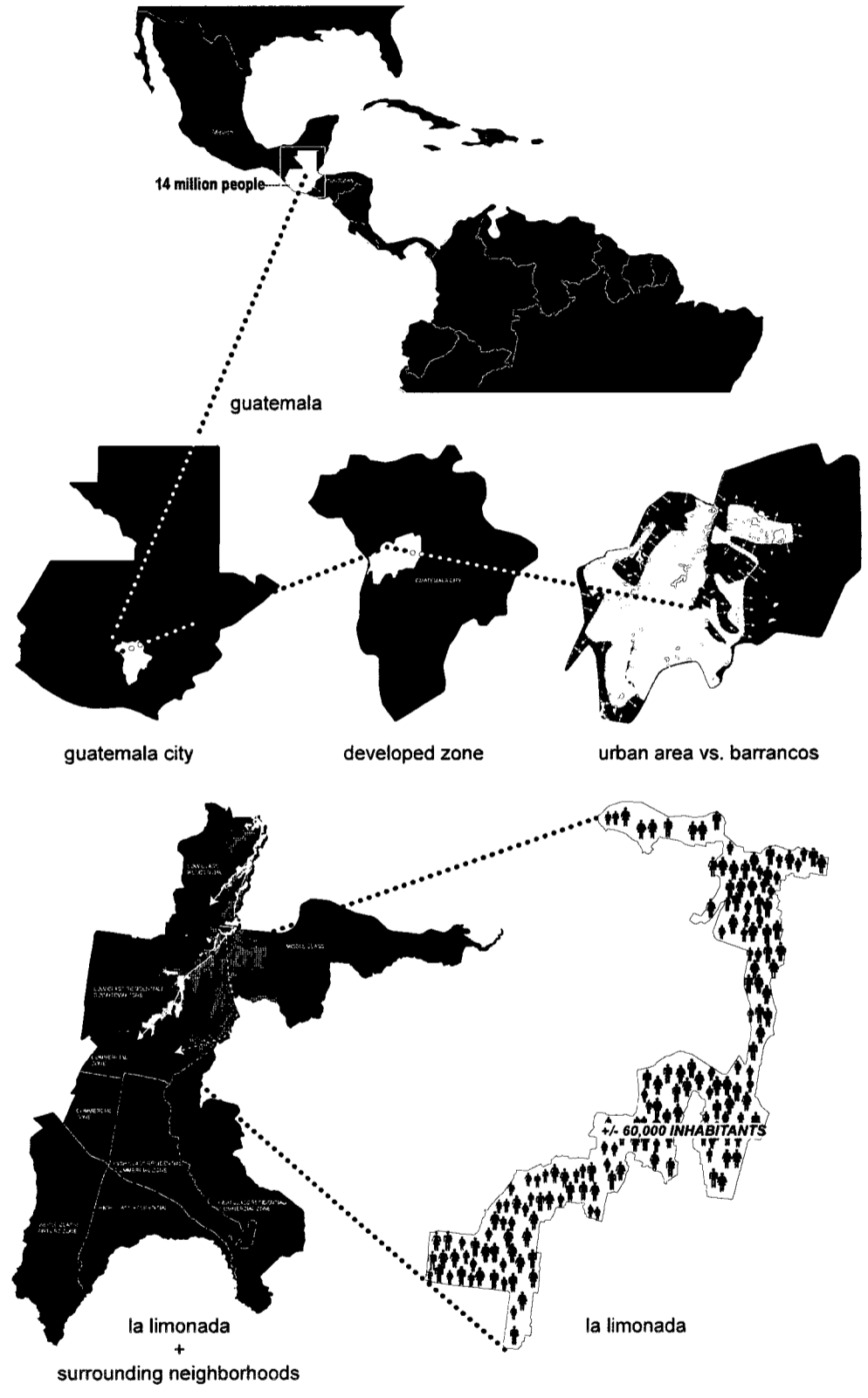


Figure 23. Site Location

Guatemala is located in the Central American Isthmus. Two thirds of Guatemala is located in the Central American Isthmus. Two thirds of the country are mountainous and 34% is covered with woodland.

Guatemala city is the largest city in Central America; 20 % of the 13 million country's population lives in the city.

Only a portion of the city, the grided and developed zone sits flat on the Valley. The rest is made up by a number of barrancos. Here, shown in solid are the Asentamientos, slums, that have grown in these barrancos, usually in the edge of the developed city.

We will be focusing in a set of settlements that are almost forming a continuous line, and its surroundings.

Within these asentamientos is the Limonada. Immediately surrounded by low class residential zones and commercial zones, it is very close to some high class residential zones.



Figure 24. Digital model of La Limonada and immediate surroundings

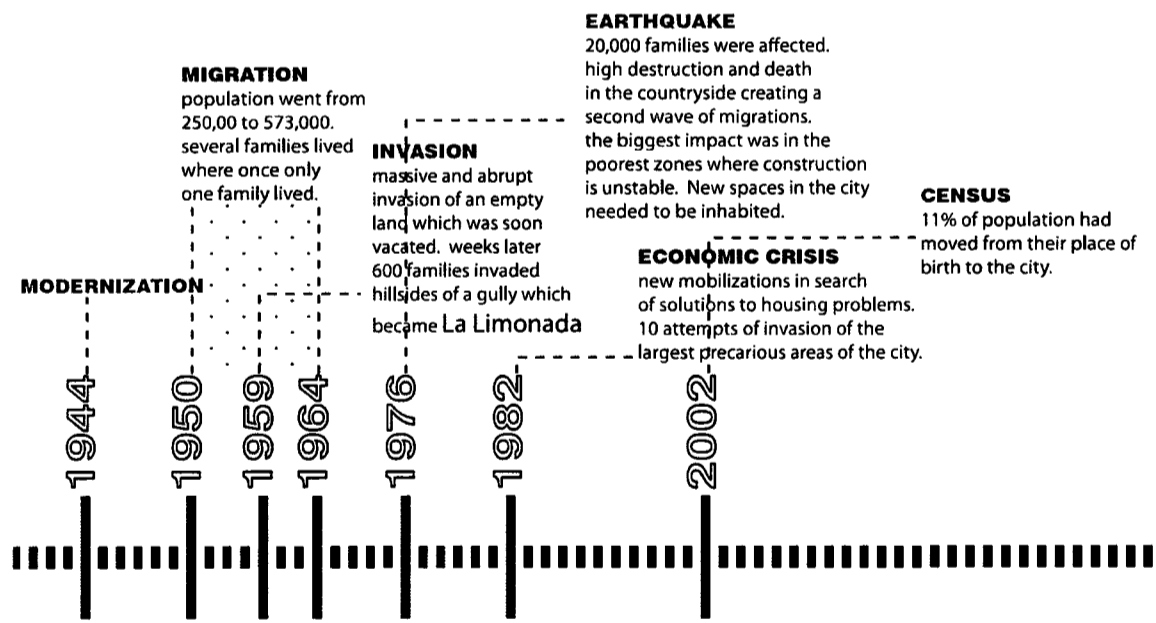
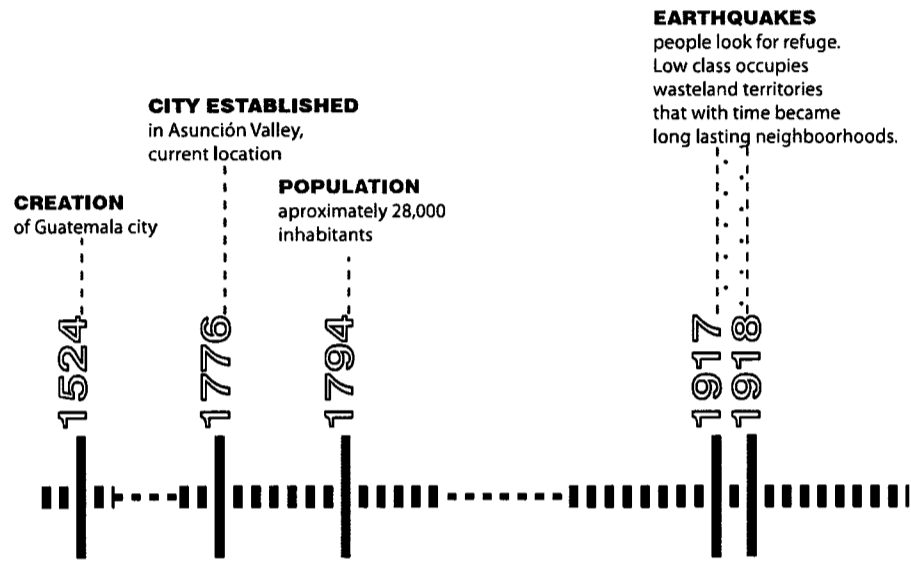


Figure 25. Time Line of Guatemala's History



Figure 26. Longitudinal Section of La Limonada



Figure 27. La Limonada in context

Barranco la Limonada sits inside the gridded city. It is 2 kms long and only 0.02 kms wide at its narrowest points.

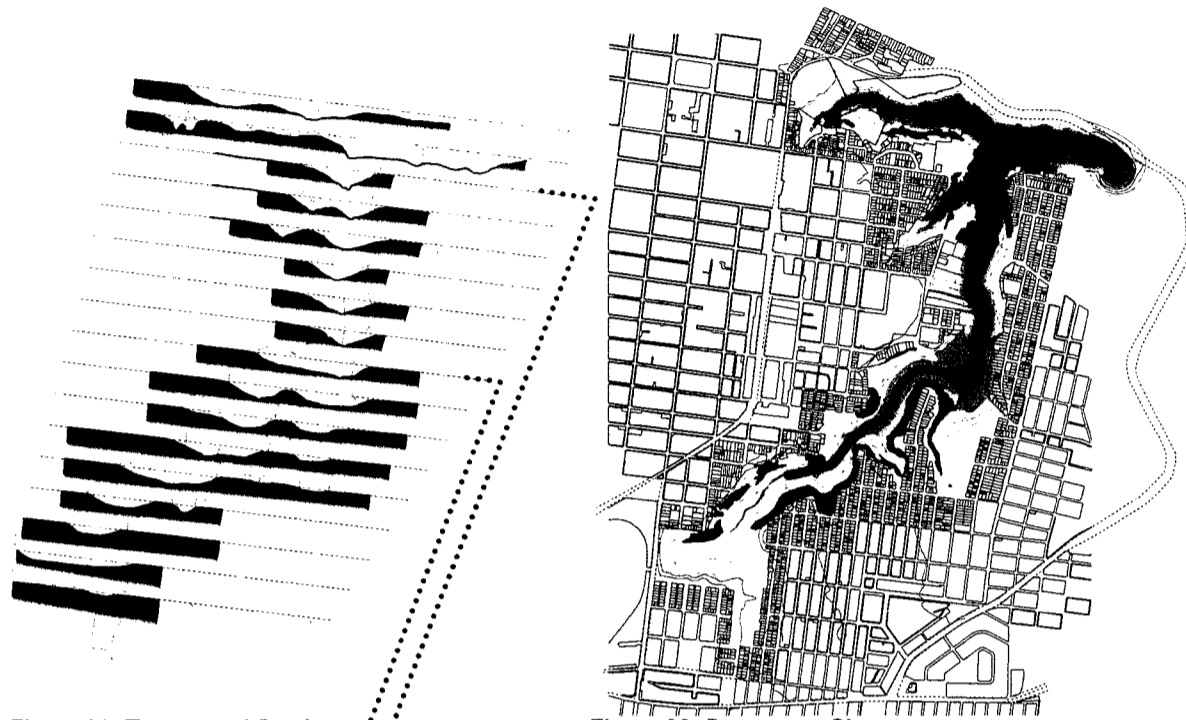


Figure 28. Transversal Sections



Figure 29. Dangerous Slopes

A river runs through the entire length of la Limonada. This barranco has a significant amount of dangerous slopes, considered too steep, therefore, should be conserved as natural protected areas.

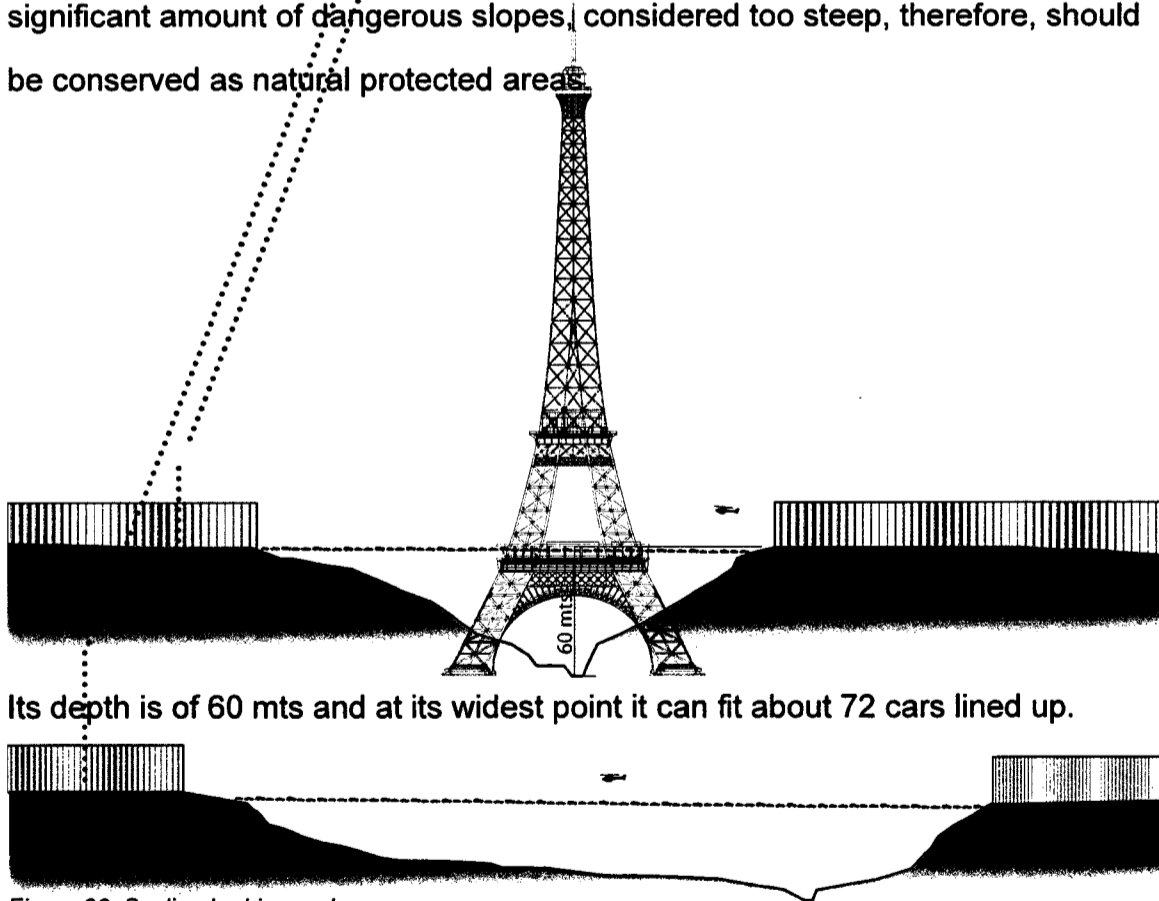


Figure 30. Scaling La Limonada

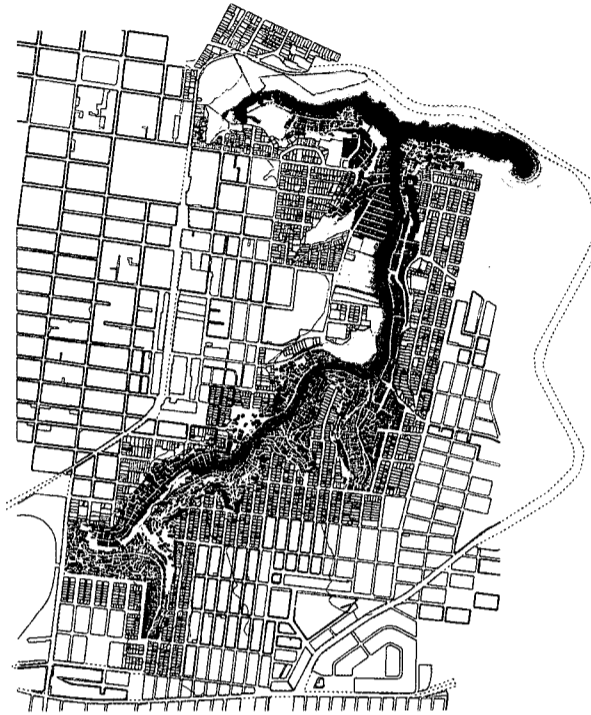


Figure 31. Housing

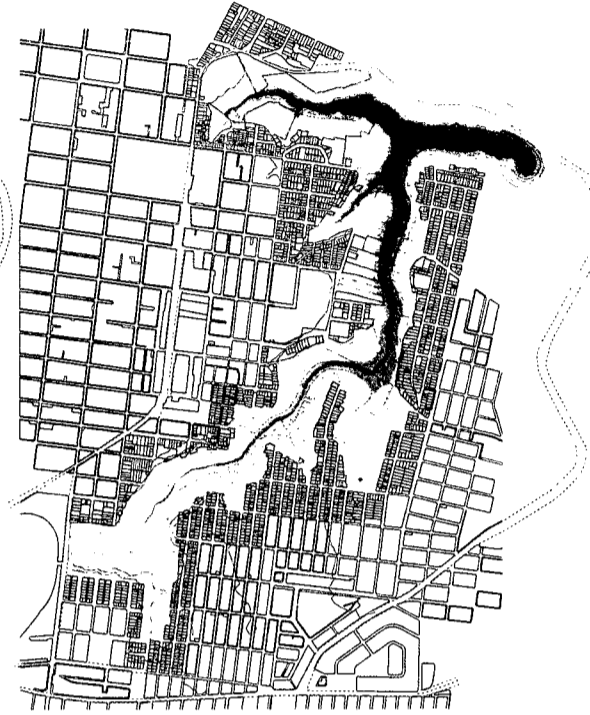


Figure 32. Circulation

Its labyrinthian characteristics come from the placement of the houses (fig. 31). Many of these houses have been built in very precarious ways on the “dangerous slope areas” therefore each time there is an earthquake or heavy rains these houses are victims of landslides.

The circulation inside the Limonada has no organization (fig. 32). The flow of traffic, pedestrian and seldomly vehicular, is based on the topographical lines of the site and is a product of the left over space between houses. It contrasts that one of the gridded city.



Figure 33. Zoomed in View of Circulation

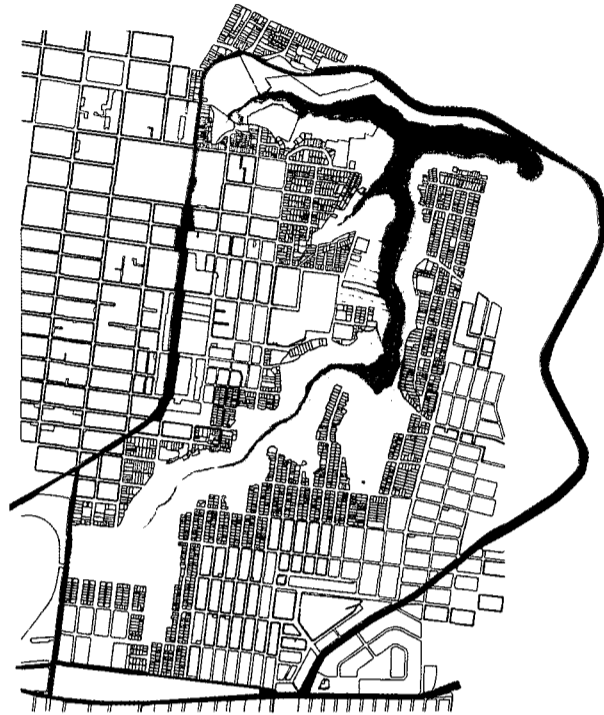


Figure 34. Circulation Artery



Figure 35. Densities

This barranco creates a long hole in the gridded city which currently needs to be circled around in order to get to other side of the city. Its isolation from The city is reinforced by the main circulation artery for the neighboring zones that goes around it, leaving the asentamiento in the middle.

The city of Guatemala has recently developed an urban plan to densify specific areas of the city. Because a large percentage of the population uses public transportation, there is an emphasis on developing the blocks adjacent to the circulation artery. This again reinforces how La Limonada is once again ignored.

Acupuncture



Figure 36. Accupuncture nodes

After a close look at these characteristics and understanding the barranco from its sections based on the circulation paths, the river, the steep slopes and the city connection, we can extract a set of nodes both at the level of the city and inside the barranco that call for connection amongst them and with the city above.

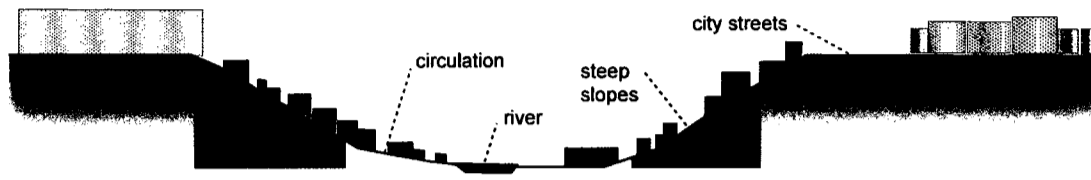


Figure 37. Acupuncture nodes characteristics

characteristics of a node:

- steep / dangerous slopes
- internal circulation nodes
- proximity to high density in city
- connection with city street
- connection to river

If the goal is to connect these points, what is a connector that is not about bypassing, like a bridge, but about linking more spaces?

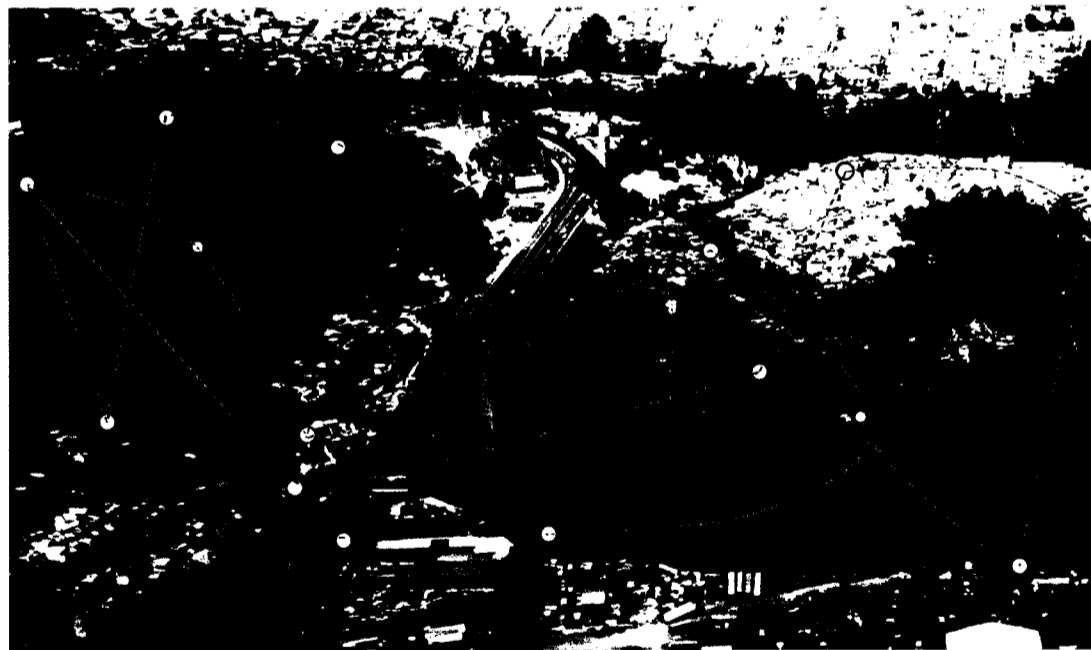


Figure 38. Connections Concept

CONNECTOR

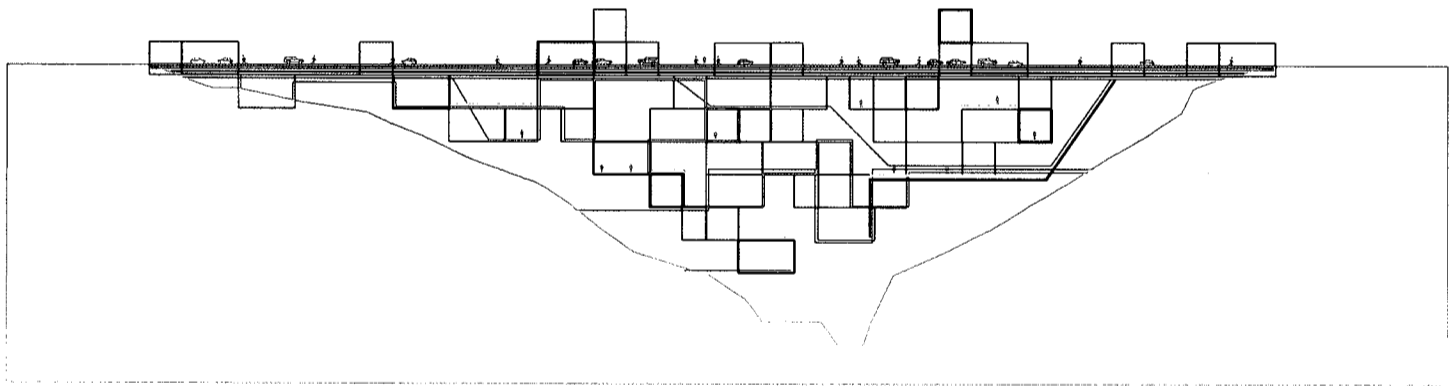


Figure 39. Preliminary Sectional Concept

Preliminary analysis

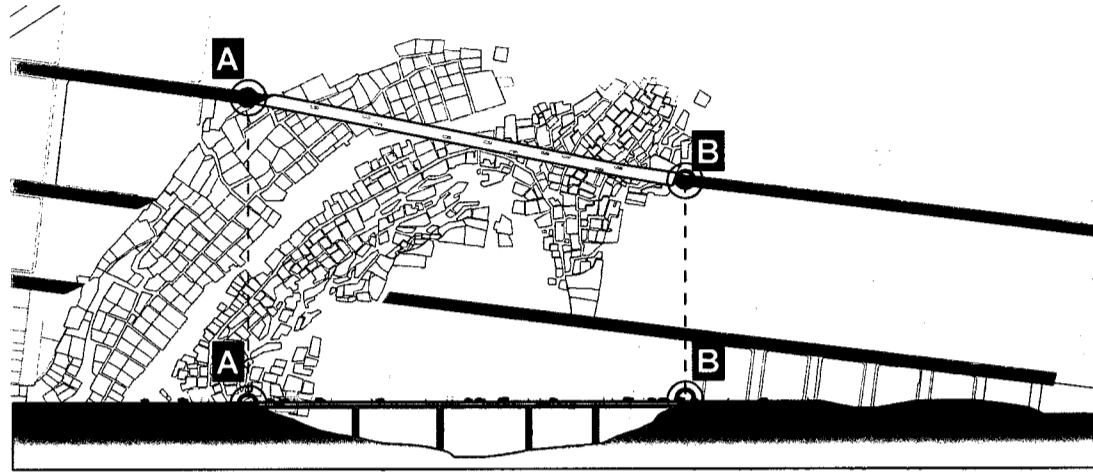


Figure 40. Typical Connector



Figure 41. Developed Approaches to Connector



THE MOBILIZER

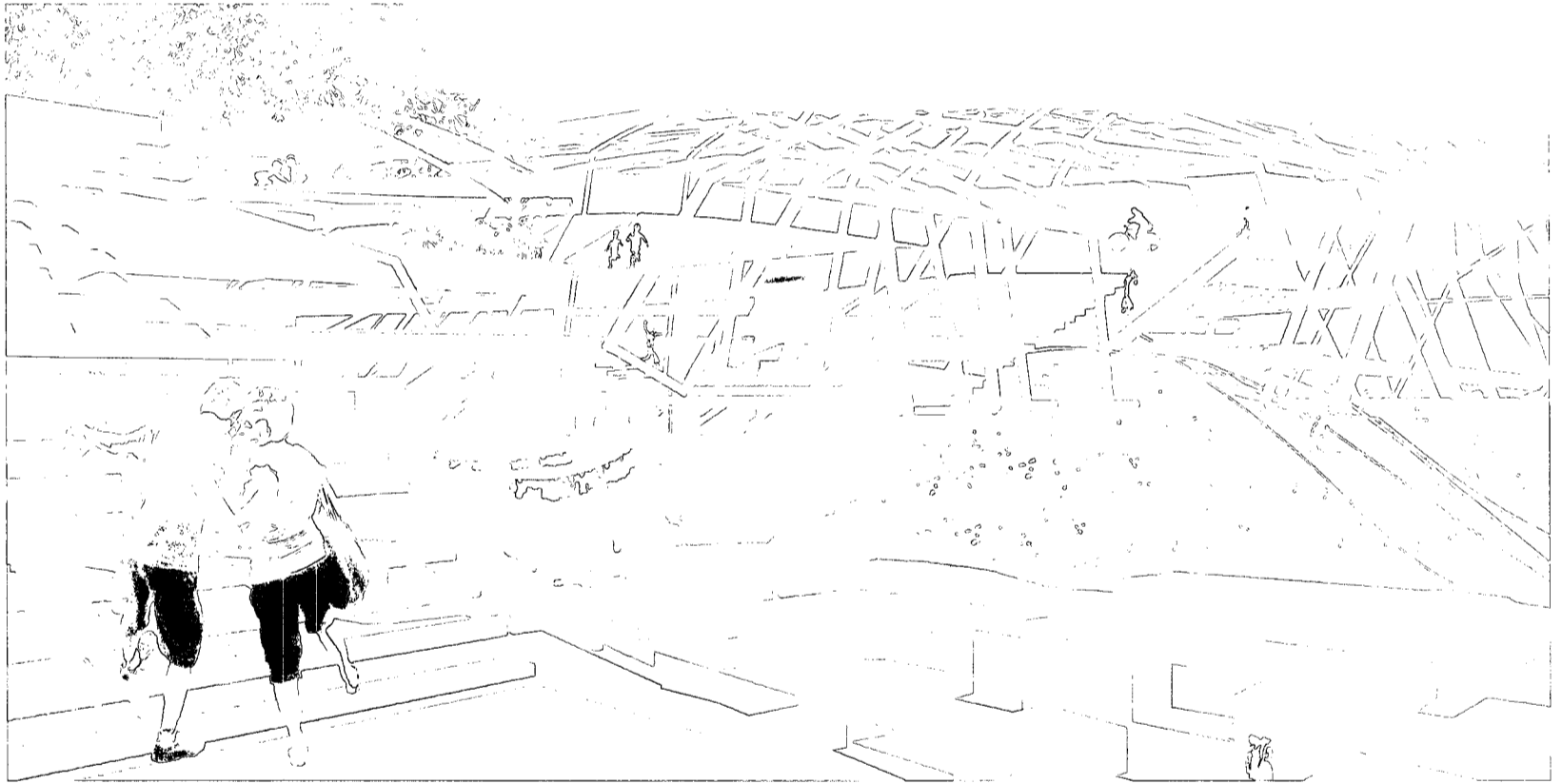


Figure 44. View of Mobilizer from platform

WHAT is the Mobilizer?

mobilize: v. to organize or adapt
to be or become assembled
to put into movement or circulation
to bring to a full stage of development

The mobilizer is born from the site conditions. It is a connector that addresses both the needs of the urban scale and of the user. In the Urban scale, it focuses on the larger issue of the asentamiento, disconnected from the city grid, through the lense of infrastructure. The city will be more inclined to invest in a project if it is beneficial to the gridded city. Hence, by solving the lack of connectivity from one side of the barranco to the next it expands the transportation network of the city. The expenditure is beneficial to the barraco since it provides an infrastructure to work with for the creation of exchange platforms.

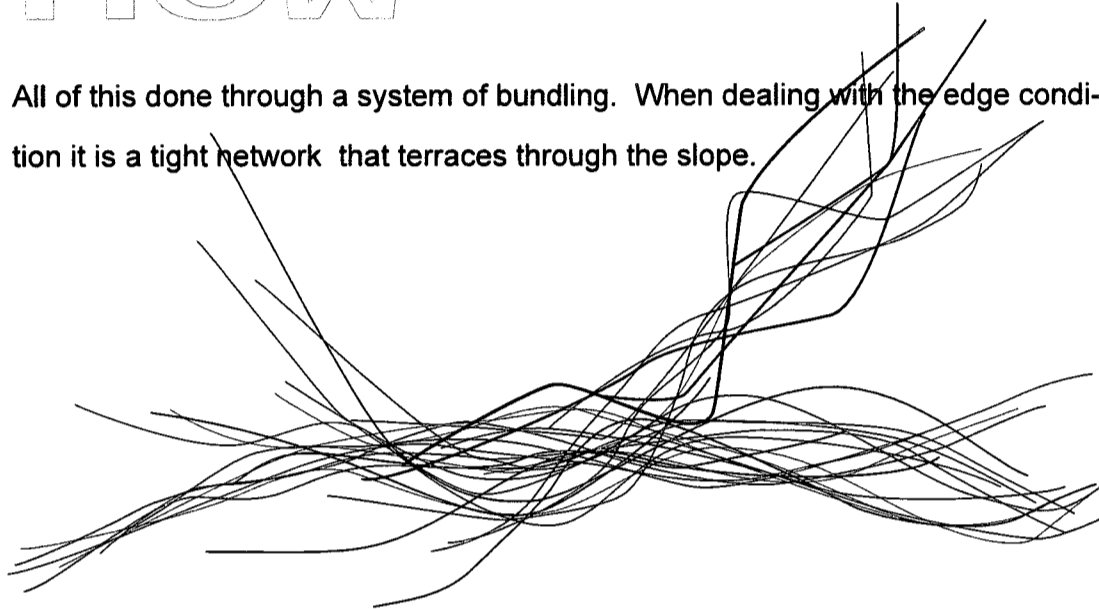
There are 2 main objectives that the mobilizer must accomplish:

- work with the edge condition of the barranco
- crossing the barranco



HOW BUNDLING CONCEPT

All of this done through a system of bundling. When dealing with the edge condition it is a tight network that terraces through the slope.



When crossing from one side to the other side of the Barranco, the parts of the bundle stretch apart from each other in a horizontal and a vertical direction.

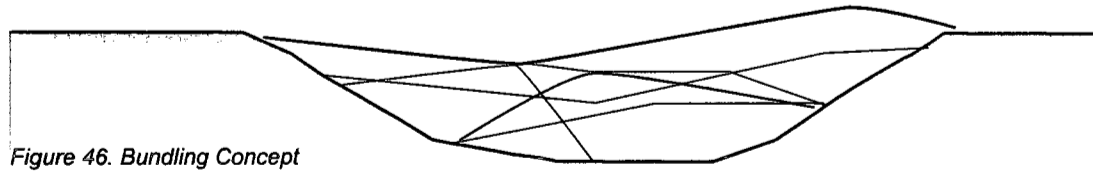
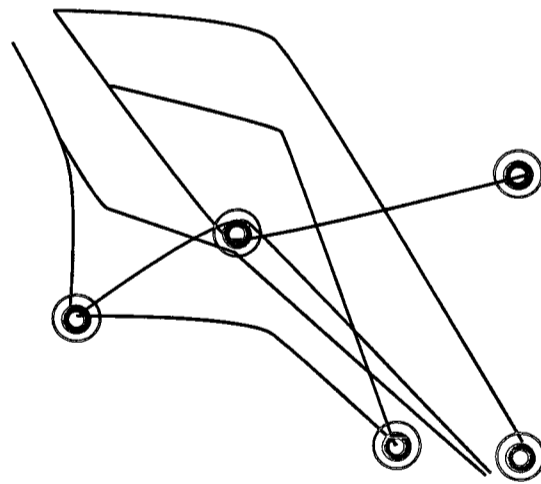


Figure 46. Bundling Concept



Figure 47. Urban plan of the Mobilizer

The Mobilizer is made up of multiple exchange platforms and a system of high-ways that allow vehicles to enter and cross the barranco (fig.47 see black bundle of platforms) Also, to protect the dangerous slopes a system of parks and green zones is activated (fig. 47 see green system).

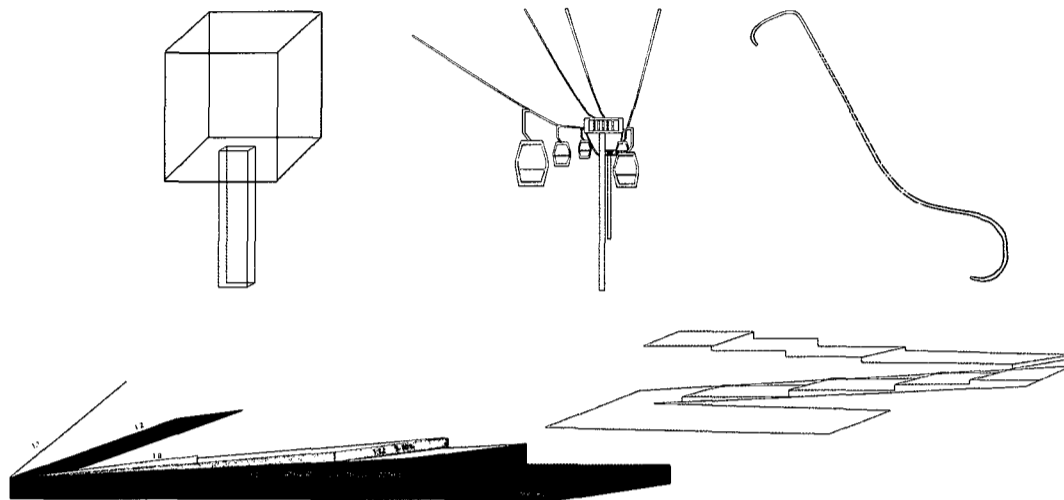


Figure 47. Tools used in the Mobilizer

The nodes where the Mobilizer enters the Barranco are often very narrow. Different transportation systems must be used to allow easy access to and from the Mobilizer to the Barranco: Ramps, stairs, elevators.,,



Figure 48. Plan of the Mobilizer

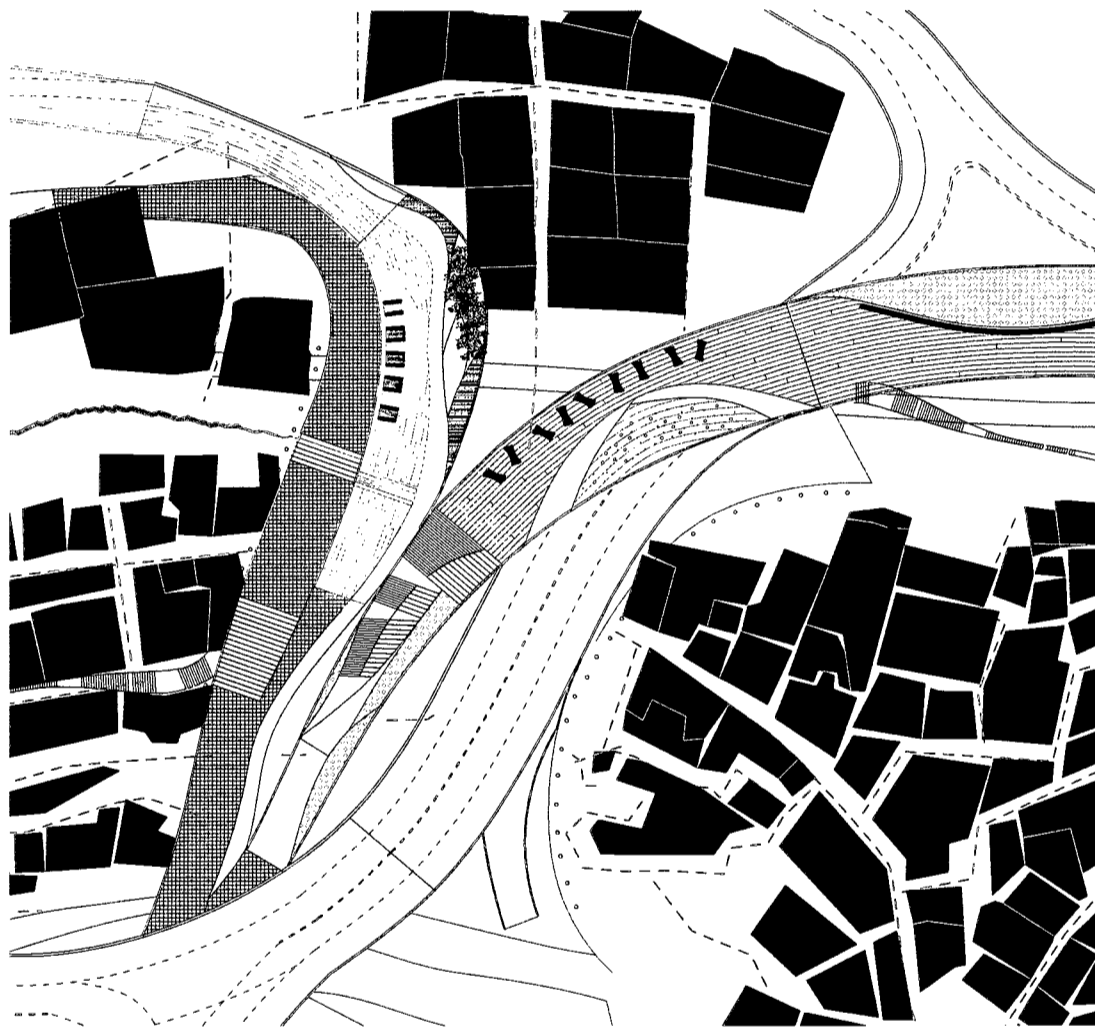


Figure 49. Close up view of the exchange platforms

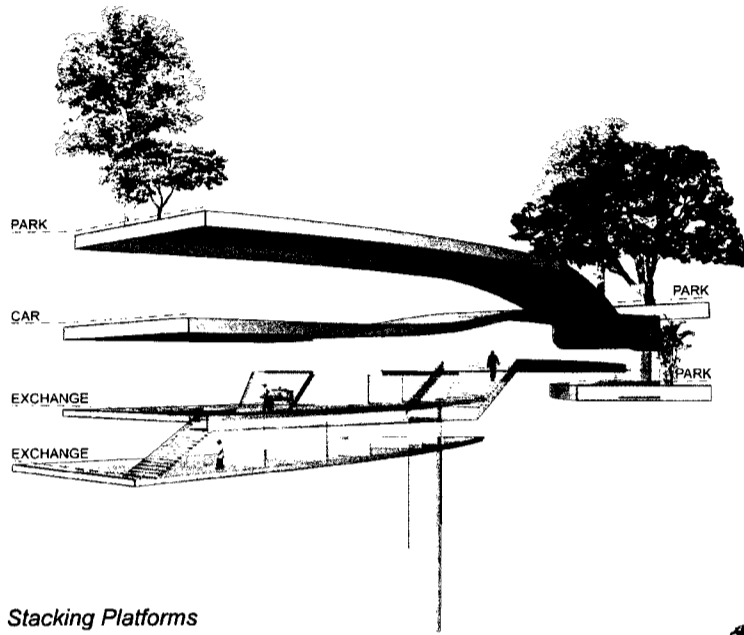


Figure 50. Stacking Platforms

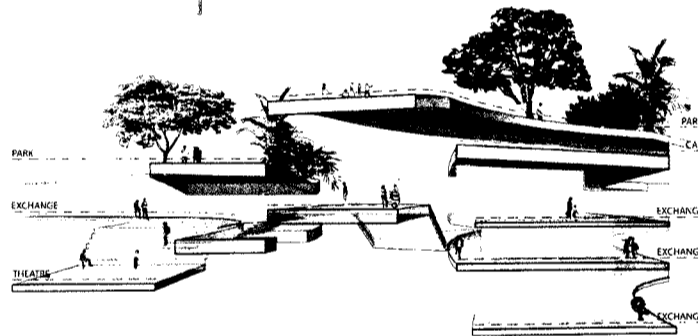


Figure 51. Bundle of Platforms

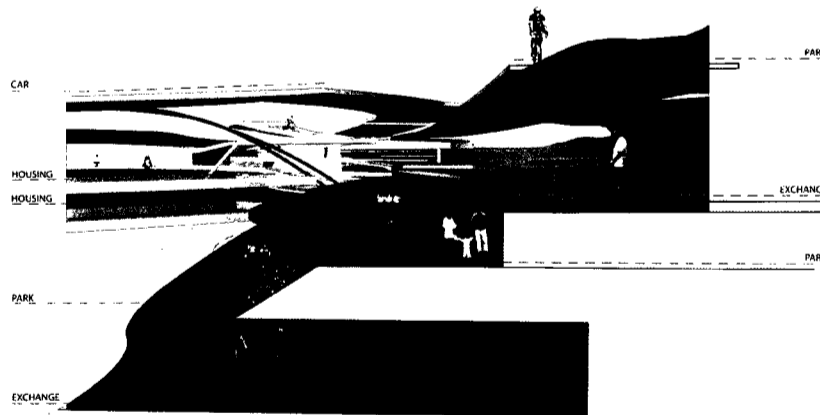
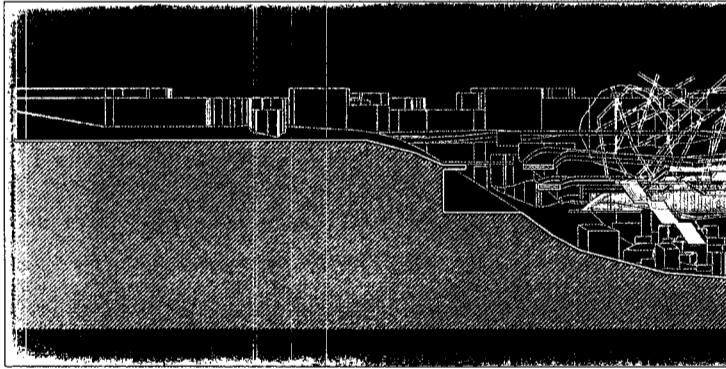
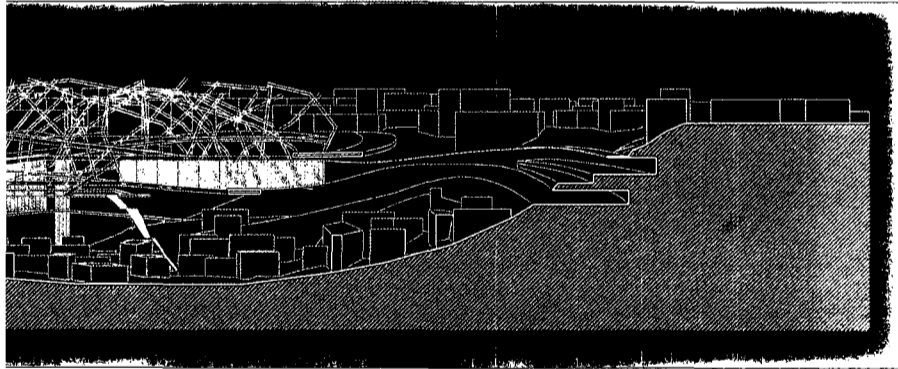
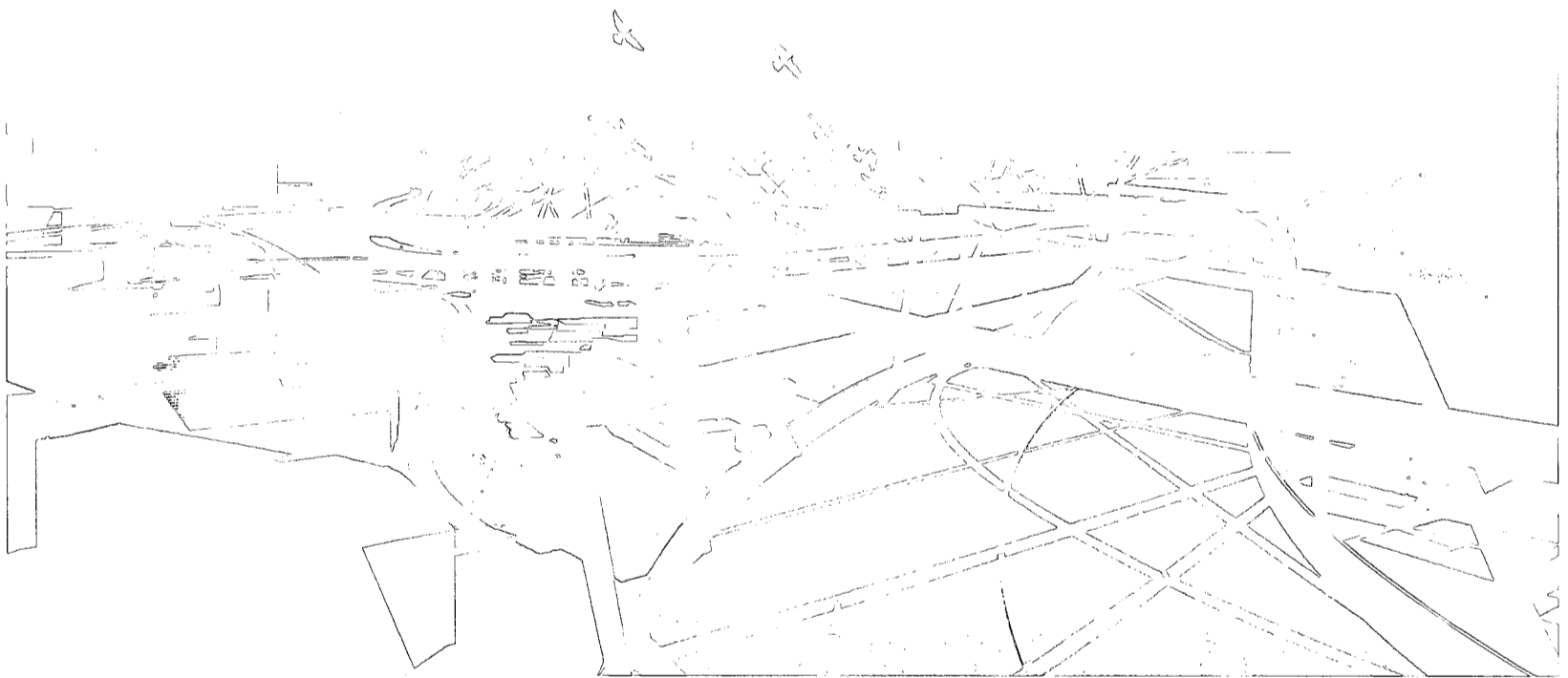


Figure 52. Terracing



47 *Figure 53. Transveral section of the Mobilizer*

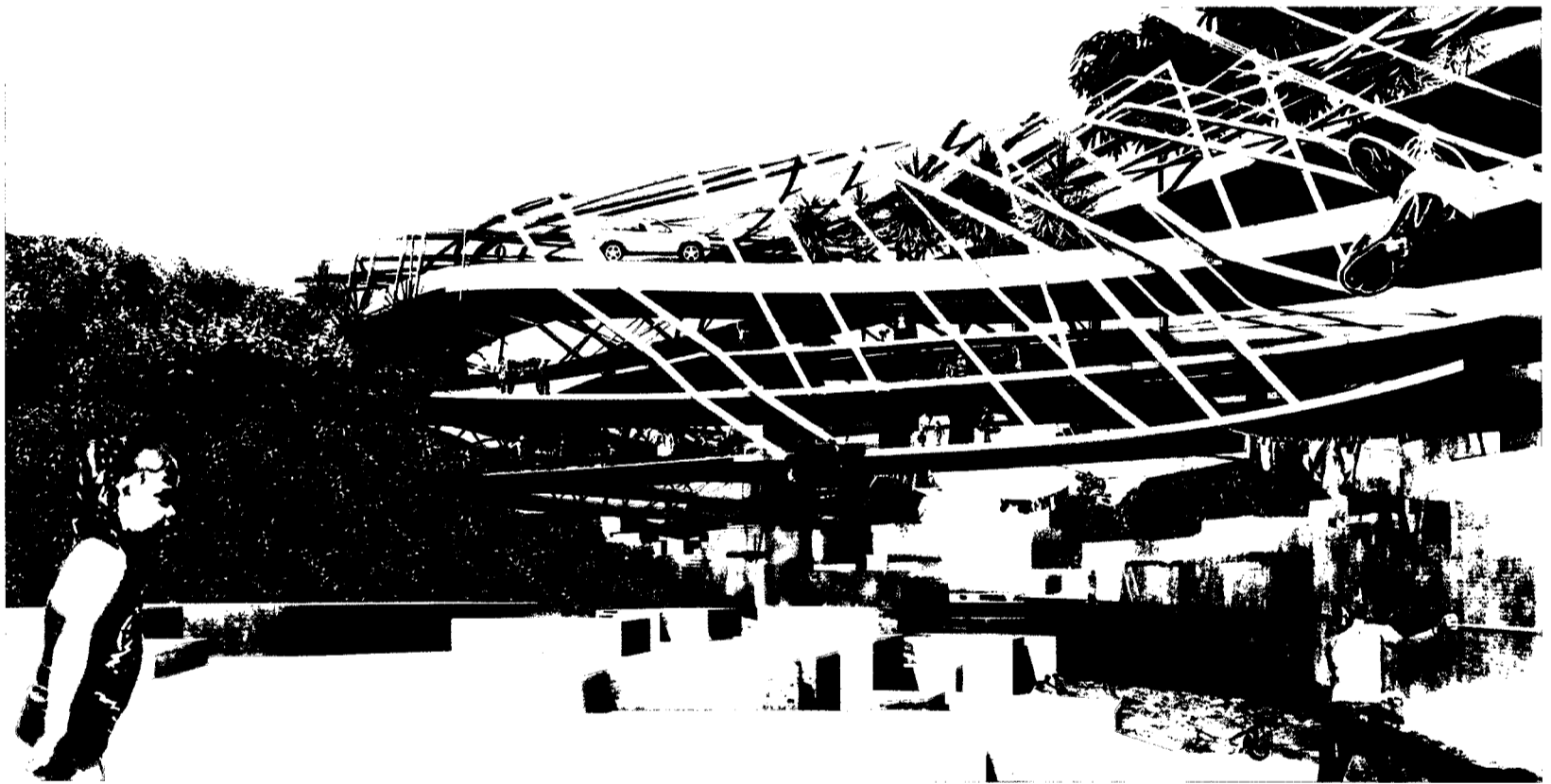




48 *Figure 54. Entering La Limonada. View from a Highway*



Figure 55. View of the Mobilizer from Terracing

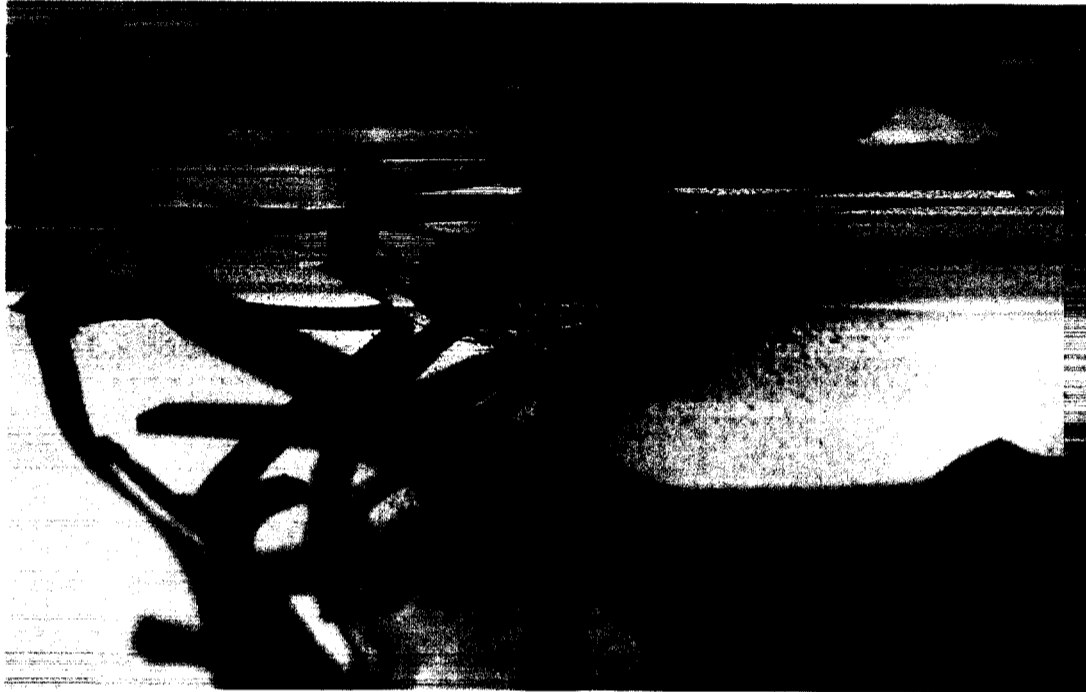


50 *Figure 56. View from inside La Llimonada*



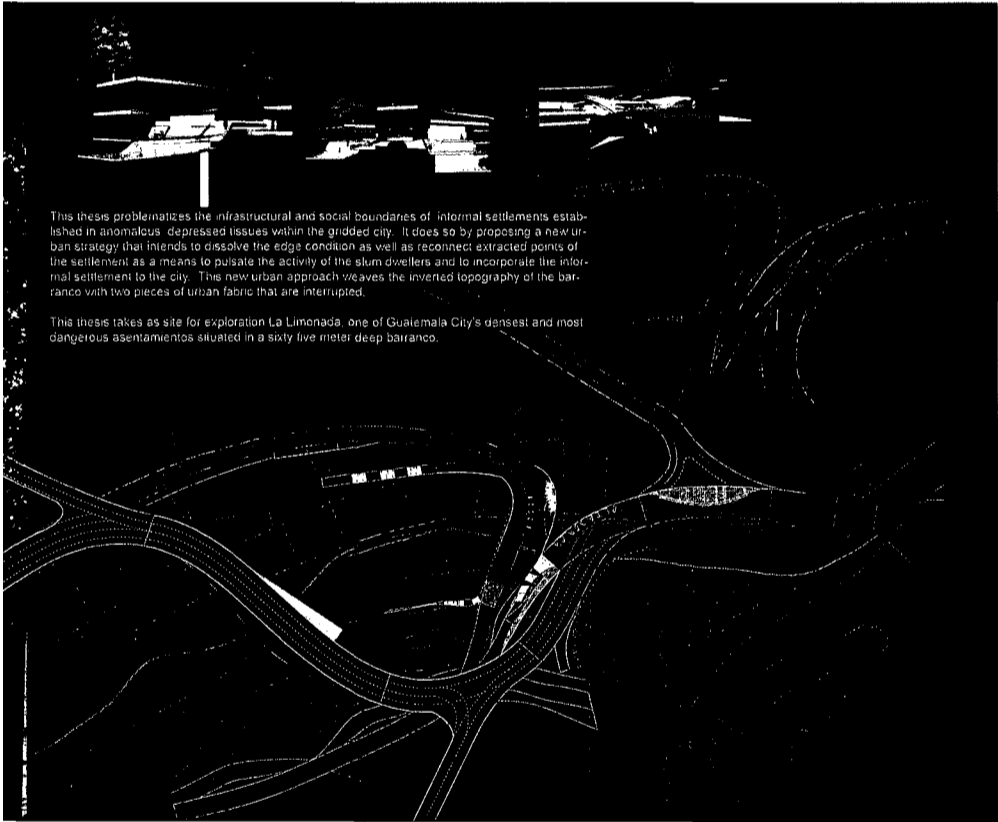


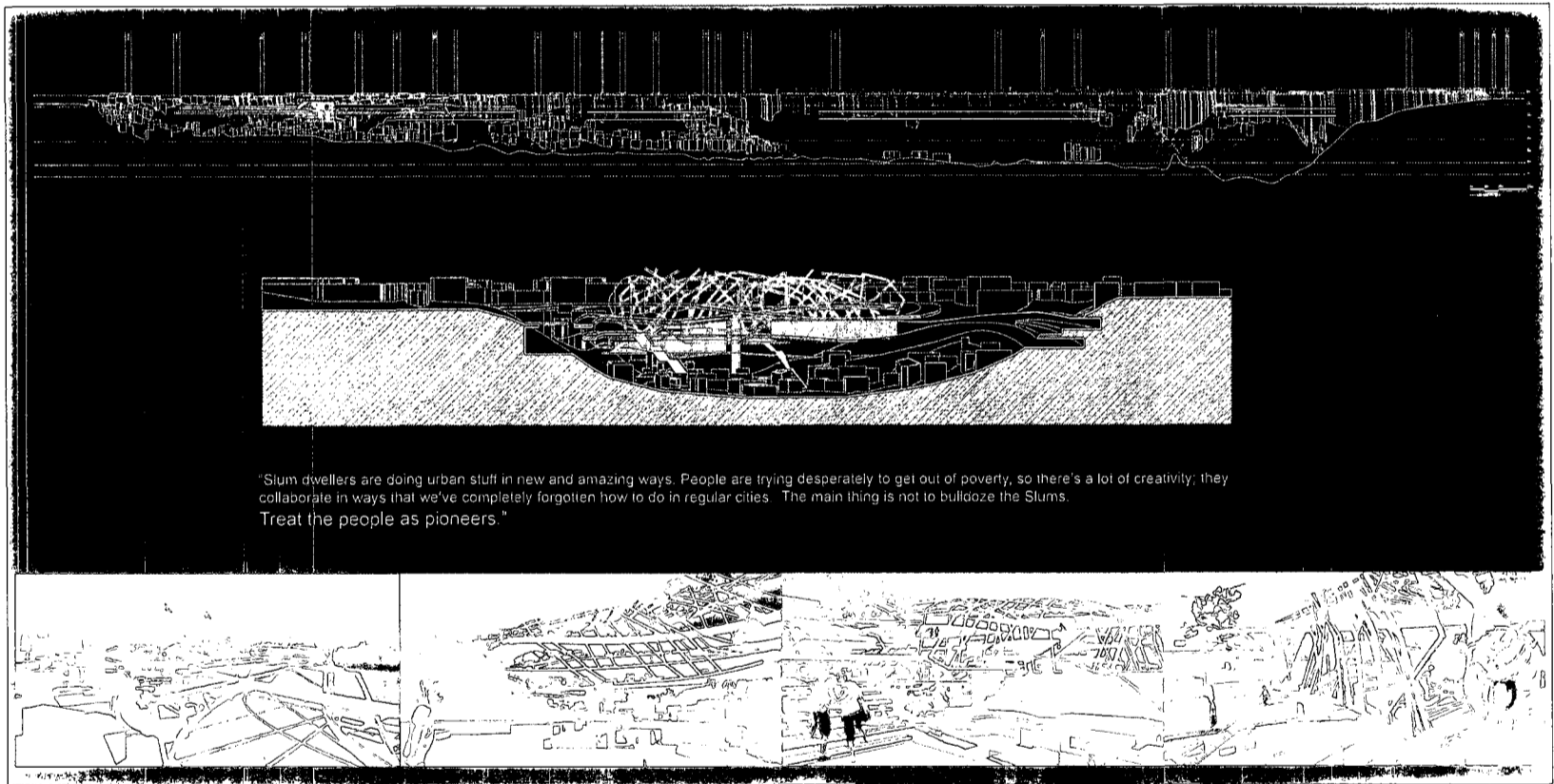
Final Model





Final Boards





Final Boards



Pictures of Final Review



Pictures of Final Review

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