

Syracuse University

SURFACE

Architecture Senior Theses

School of Architecture Dissertations and
Theses

Fall 2010

Micro_CASA

Amanda Jones

Follow this and additional works at: https://surface.syr.edu/architecture_theses



Part of the [Architecture Commons](#)

Recommended Citation

Jones, Amanda, "Micro_CASA" (2010). *Architecture Senior Theses*. 120.
https://surface.syr.edu/architecture_theses/120

This Thesis, Senior is brought to you for free and open access by the School of Architecture Dissertations and Theses at SURFACE. It has been accepted for inclusion in Architecture Senior Theses by an authorized administrator of SURFACE. For more information, please contact surface@syr.edu.

MICRO_CASA

AMANDA JONES | ARC THESIS | Fall 2010
Advisors: Francisco Sanin + Brian Lonsway

M I C R O _ C A S A

01_Condition

02_Method

03_Case Studies

04_Analysis

05_Conclusions

06_Design

07_Works Cited

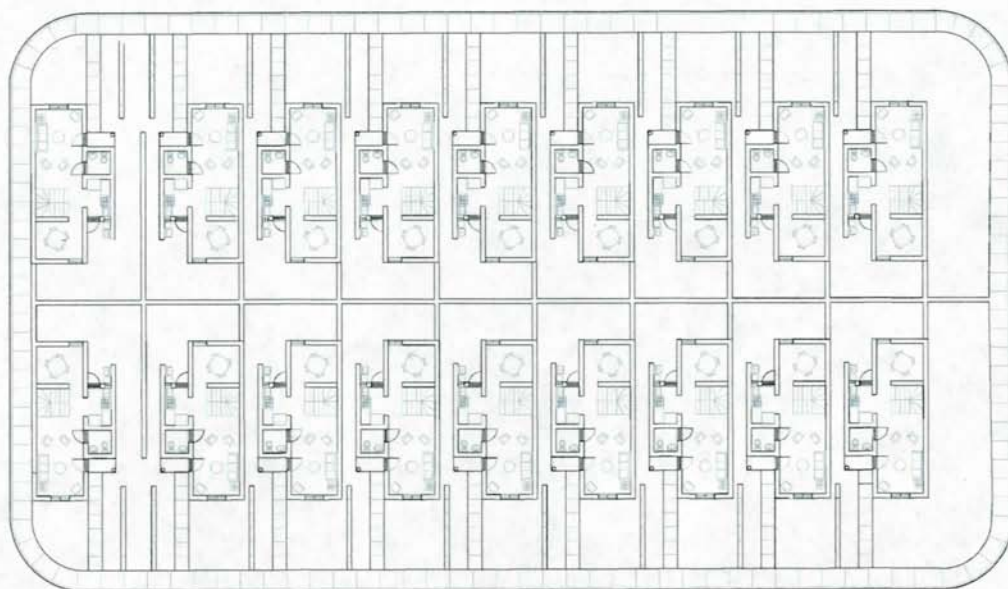
01
CONDITION

The city of Monterrey, Mexico is a large industrial city that seems to have limitless growth. Due to this growth there has been a race to provide sufficient housing for the population. One major way that this is occurring is through the development of planned communities on large tracts of land just beyond the border of the city's official urban footprint. This unique set of characteristics has led to spacial and economic realities that create many unique and interesting systems. Systems that both represent limitations and possibilities that can inform an architectural study and intervention in these areas.

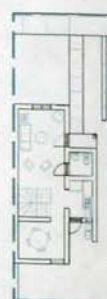
Neighborhoods with block after block of monolithic homes; which can be seen as far as the eye can see, are constructed by large conglomerate companies who's goal is to create the largest number of homes in the smallest area in order to achieve the largest amount of profit. These homes, which typically sit on a 960 square foot lot, are usually one or two stories tall and range from about 400-800 square feet. Common interior and exterior living space are sacrificed for rooms that can be called bedrooms, which increases profitability. Backyards, that are more like a back pathways, are quickly built over for additional living space and front yards become off street parking as families increase the number of cars that they own and get tired of fighting for on street parking. Gates on windows and doors must be installed before the home can be occupied. Front property lines are built out with walls and carports so that ownership can be extended to the street which in turn controls how people use this public space.

As these communities continue to develop, the innovative use of space increases to accommodate a population that was never meant to live in the original square footage of the development. The ebb and flow on the individual lot and between lots also increases as densities increase and the needs of occupants change over time. Some occupants work together, some don't. Some homes increase, some don't. Businesses come and businesses go. The question becomes, what can we learn from this intensive use of space and how can it inform a design project that attempts to intensify use of space in the existing footprint of these communities in a intensification of uses that is informed by the informal relationships that already exist.

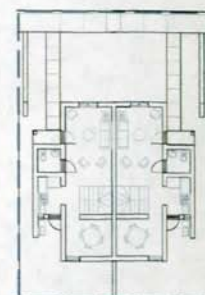
MONOLITHIC BLOCK EX-HACIENDA EL ROSARIO



L-entry



R-entry



Duplex

The same floor plan is repeated hundreds of times to fill in entire blocks. In this neighborhood the only variation is the occasional mirroring of a lot or a duplex lot which mirrors the same home

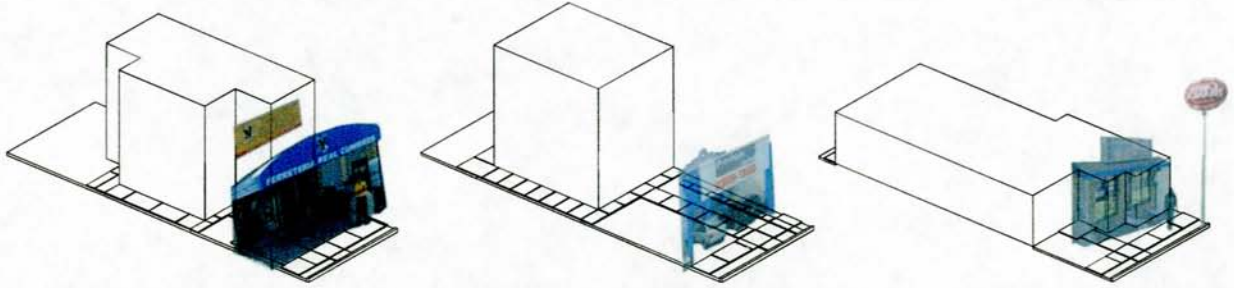
Average Space



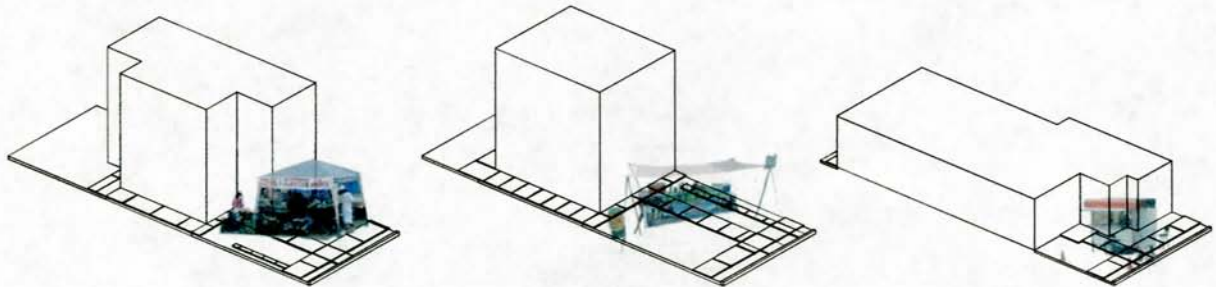
Lot 960 ft²
House 460 ft²
20,000 dollars

The dining room becomes an additional bedroom unless financing is available to build onto the front or back of the home.

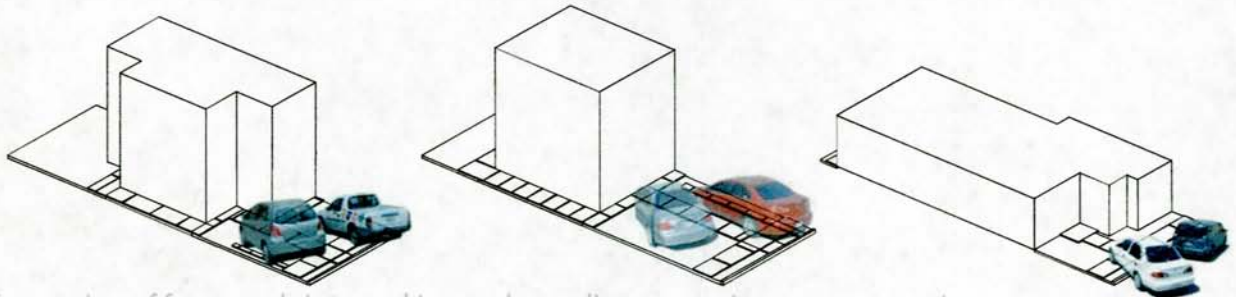
INTENSIFICATION OF USES



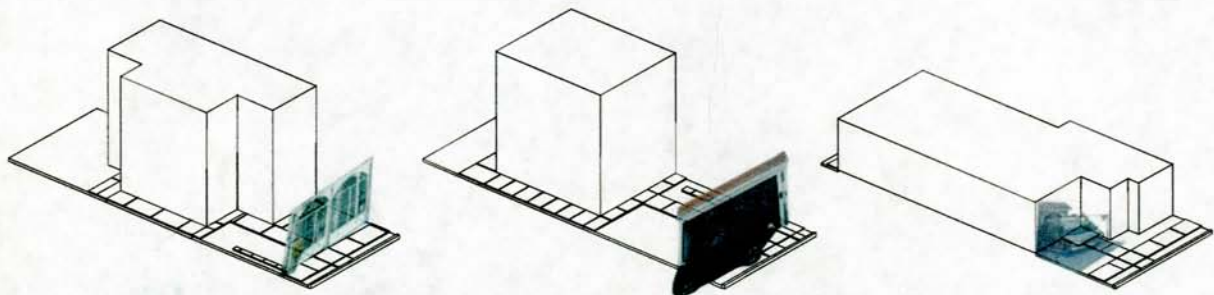
Conversion of private space to the home business becomes one means of survival



The mobile business allows for vendors to test different areas or different places for sales



Conversion of front yards into parking and guarding spaces is common practice.



Marked property boundaries all for better protection of possessions and home businesses.

02

METHOD

Understanding a city and the way that it develops can be a difficult process because of the many factors that affects the way people move through and create environments in the spaces that they occupy. In order to better understand why mirco-casas are being built intense **mapping** and **analysis** of the city is employed at various scales. Through this process, understanding of relationships and realities can be developed. It is important to use various scales including the city, neighborhood, the block and the individual house level in order to understand the overall relationships of the city and its municipalities by studying various economic, infrastructural, demographic and economic realities.

Additional mapping focuses on three neighborhoods that are geographically removed from one another to the south-east, north and north-west of the city. In addition to them being located in different parts of the city these neighborhoods were chosen because of their age and the relative amount of development that has occurred posterior to the original construction. Mapping and de-constructed at the block and house scale is also used in order to understand the original and subsequent uses of space and to best determine the best possible methods of entry into this urban phenomenon.

CASE STUDIES

In addition, it is also important to understand similar architectural **CASE STUDY** projects and how they have address similar problems or issues. Two projects of particular interest are those of Teddy Cruz and Alejandro Aravena of Elemental.

Teddy Cruz is of particular interest because of his deep acknowledgement of the processes that are involved in the development of a community and neighborhood. Critical to Cruz are the social and economic factors that many would see as limitations but that instead become conditions that allow for new forms of innovation. Innovative uses of space that can be applied to a new environment that on its own would never develop in such a way.

Elemental, on the other hand sees limitations as a means to focus the scope of a project to only the necessary minimum while at the same time building into its design the capacity for expansion. Porosity that can eventually be taken over by the occupant when time and economic conditions allow it to happen. It is a project about pre-planning for the unknown variables of future growth.

CASE STUDY

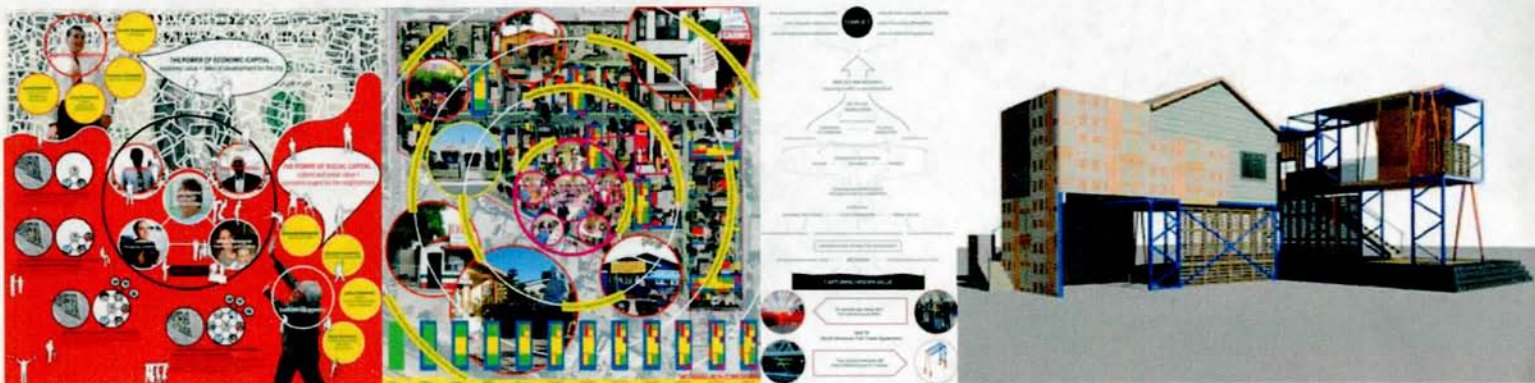
TEDDY CRUZ

Tijuana Case Study Tactics of Invasion: Manufactured Sites Teddy Cruz

Teddy Cruz describes how his practice in San Diego has used its experience of Mexican/US border conditions to inform a project of urban acupuncture that has the potential to bridge the enormity of a transnational divide that exists between two adjacent communities. In essence a simple prefabricated aluminium frame, Manufactured Sites could provide the much-needed, small-scale infrastructures and services for favela-like settlements.

This project focuses on low-income informal settlements in Mexico and how the manufacturing sector can be re-tooled to be used to help the communities in which they exist. While this is a critical sector of Mexican society there are many other groups that are also effected by the political and economic conditions but receive little or no attention because they are not the poorest of the poor.

Minimum standards for housing development should not be accepted simply because they are better than the worst case scenario. Large companies should not have the power to mandate what is acceptable for those of the middle class. Teddy Cruz touches on the importance of studying and understanding these conditions in the design process just as much as understanding spacial and programmatic conditions.



CASE STUDY

ELEMENTAL

70 HOUSING UNITS

Under construction

Location:

Monterrey (México)

Areas:

Land area: 6.591m²

Initial house: 40m²

Final house: 76.6m²

Initial duplex: 40m²

Expanded duplex: 76.6m²

Client:

Instituto de la vivienda de Nuevo León (IVNL)

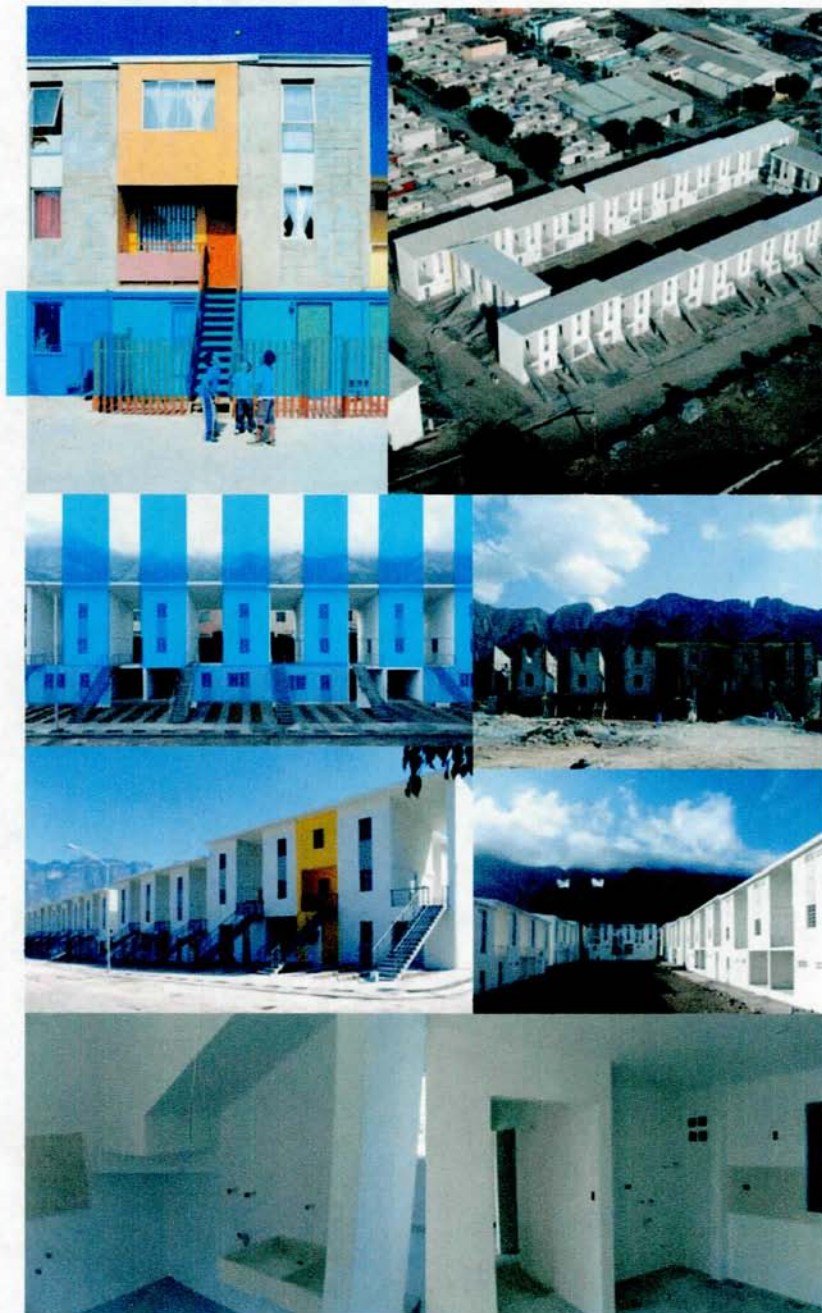
Engineering:

Área de Proyectos e Innovación tecnológica,
IVNL

Urbanization and specialization:

Área de Proyectos e Innovación tecnológica,
IVNL

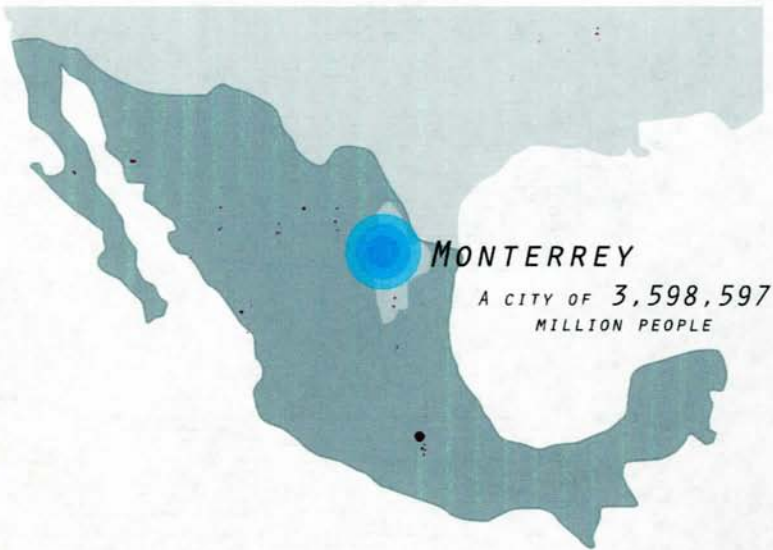
Restrictions: Santa Catarina is a city of 230,000 inhabitants, located in the state of Nuevo León, in the northwest of Mexico. This project is Elemental's first outside of Chile. The Government of Nuevo León, México, commissioned the design for a group of 70 homes on a site of .6 hectares in a middle class neighborhood in Santa Catarina. The required density suggests the application of the typology developed for the unique conditions because the climate in Santa Catarina is very different from the northern dessert climate of Chile for which the design was originally developed. Both sun and rainfall were factors that had to be addressed.



04

ANALYSIS

SITE



Monterrey is located in the north-east part of the country in the state of Nuevo Leon at the base of the Sierra Madre Oriental Mountains. It is about 135 miles from the border to with the United States.

It was founded in 1596 by Diego de Montemayor from Spain. Its proximity to the United States as well as its place as capital of the state of Nuevo Leon has allowed it to become an industrial center for both the state and country. Industries such as steel, concrete and glass have all played an important role in the development of the city. More recent companies include the Beer producer Cuahatemoc Moctezuma, Carrier, Daewoo, General Electric, Gamesa and LG.

This concentration of large business has created a better than average level of employment which in turn supports the demand for housing.



CITY + MUNICIPALITIES

This demand for housing exists in an environment that has many unique factors that have caused it to form as the micro-casa phenomena.

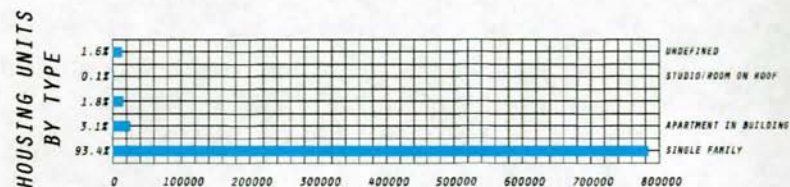
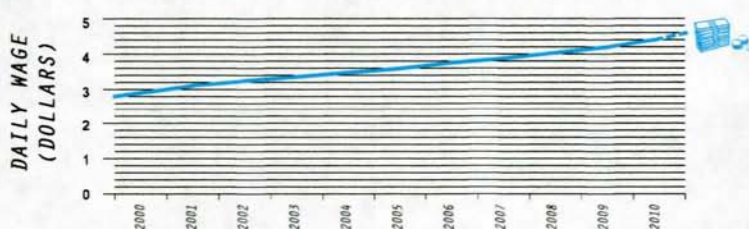
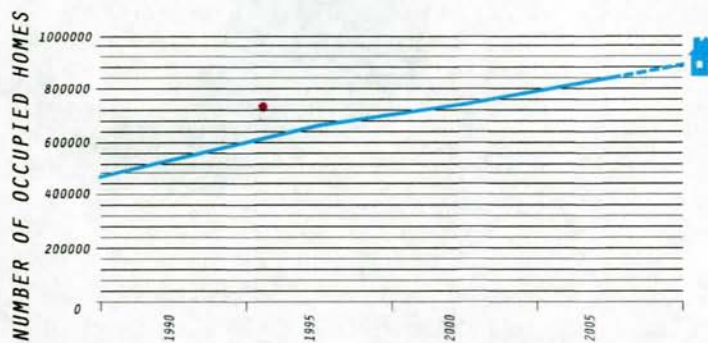
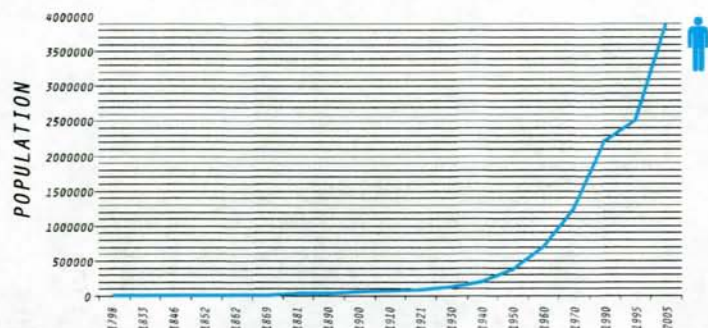
An explosion in POPULATION to a recorded 3,864,331 million people in the 2005 census has created a tremendous demand for new housing stock. Builders have focused on turning once agricultural land which is located just outside the formal urban footprint of the city in to developments of smaller and smaller homes on smaller and smaller lots in order to create maximum efficiency and maximum profit.

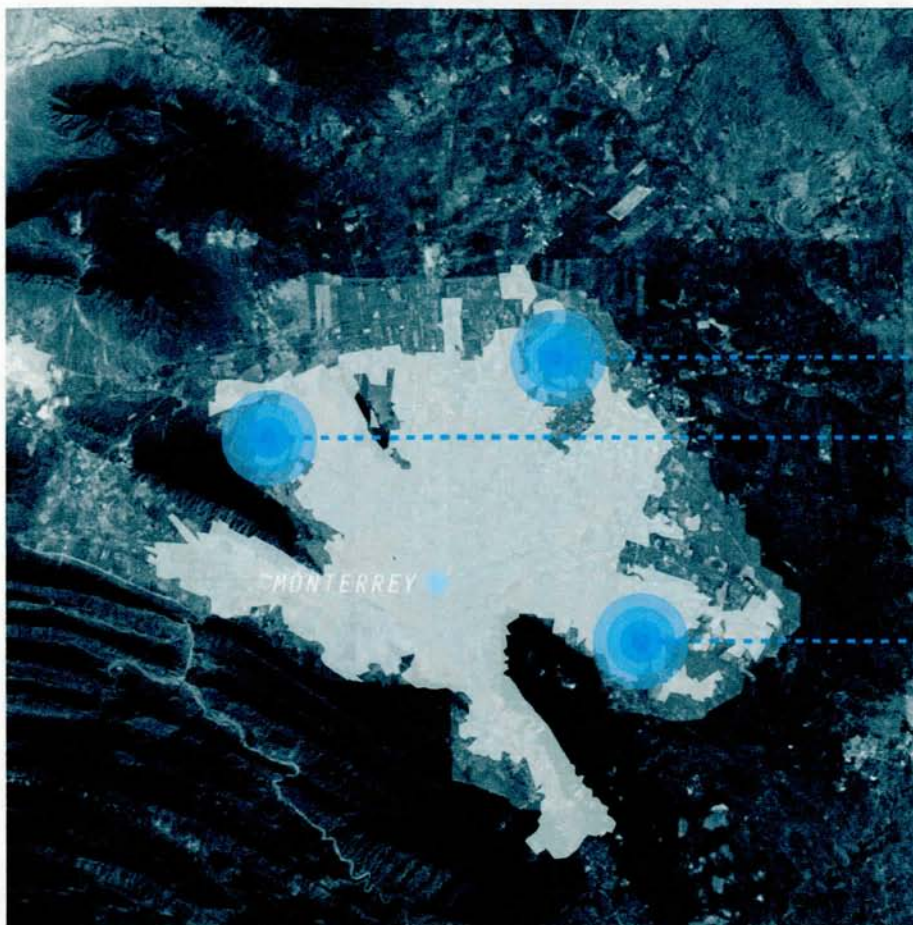
The ECONOMIC CRISIS of 1994, has causes many to lose their wealth because of the devaluation of the peso. This means that newly forming families don't have the benefit of accrued family wealth.

INFLATION has also continued to rise. Between 2007 and 2008 it rose to 6.5% from 3.8%. Inflation in 2009 is expected to be 4% a full 1% higher than The Bank of Mexico's minimum standards of 3%. Inflation means there is less money to spend on things like housing because more must be spent on necessities.

WAGES have also remained fairly low. In 2010 the daily minimum wage was increased to 4.36 dollars.

The availability of FINANCING has also been a huge problem. While programs like the Instituto del Fondo Nacional de la Vivienda para los Trabajadores—INFONAVIT) has helped to provide some small direct shot-term loans to builders. The low wages, high cost of living and low government limits on how much a worker can borrow has made afford ability a huge issue forcing construction to be smaller and of lower quality.





PASEO SANTA ROSA

REAL CUMBRES

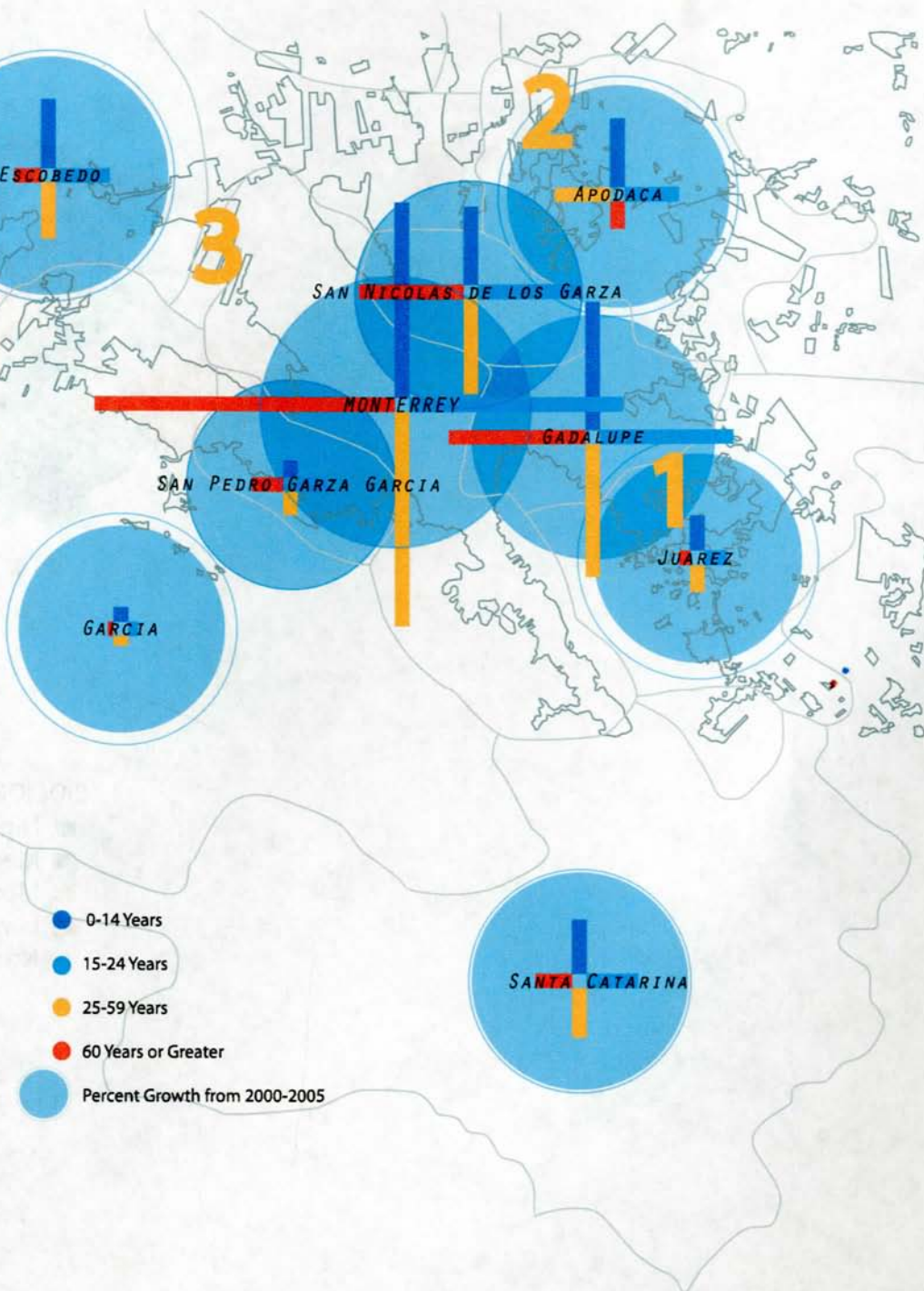
*EX-HACIENDA
EL ROSARIO*

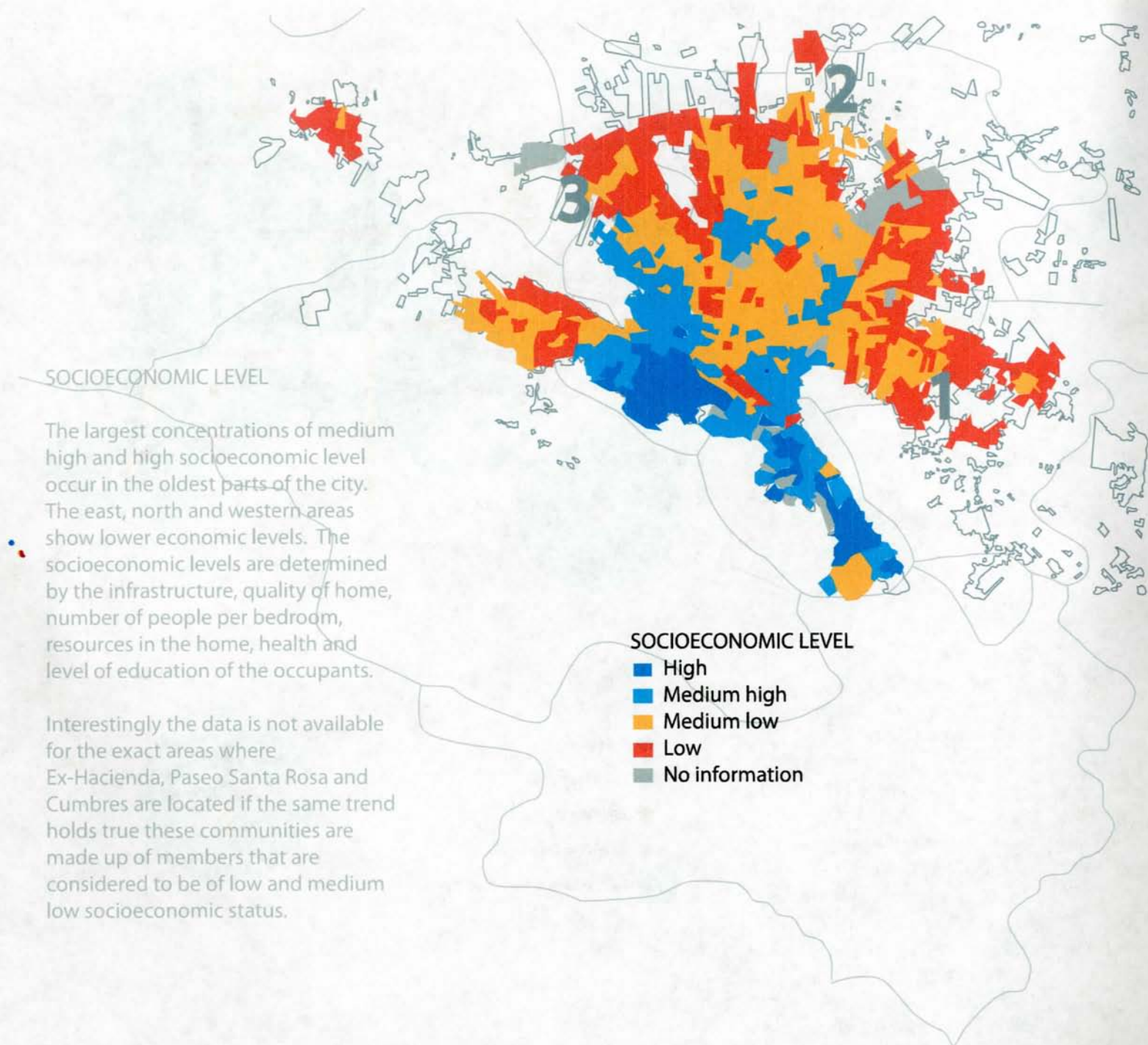
Fingers of horizontal development can be seen to stretch out from the historic city center to where the three neighborhoods that are analyzed for this research are located. Ex-Hacienda El Rosario which lies to the south-east of the city and can be the most difficult to travel to because highways follow the footprint of the Cerro de la Silla, so there is no direct path to this area from the majority of the more established areas. Paso Santa Rosa in the north-east part of the city is located much further from the city center but very close to infrastructure like the international airport and the national highway to the north. Real Cumbres in the north-west is the most established of the three neighborhoods. While it is the closest to the central area of the city it is also located near factories and is often congested with traffic and pollution produced by these businesses. All three of these developments are located just outside of the urban footprint of Monterrey but have been connected to the government water and sanitation systems in their respective municipalities.

AGE + POPULATION

The greatest portion of the population of the city is located in the oldest central municipality, Monterrey. This area, however, is not growing. The municipalities with the majority of their land outside of the official urban footprint of the city, where the micro-casa developments are located, have the largest percentages of growth.

These municipalities also tend to have younger populations because many young families are moving into these areas and out of their parents homes in the city center. With large amounts of cheap construction and relatively short commutes it is logical that those establishing a household for the first time would choose these neighborhoods.





Economic Level

Overall the majority of people in the city are of low and medium low income. The wealthy people, medium high and high, make up only 10% of the total population of the entire city.

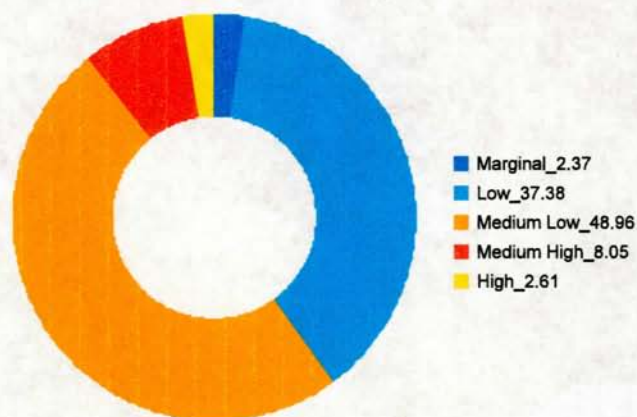
Apodaca, where Paseo Santa Rosa is located is primarily made up of low and medium low income households.

Guadalupe, where Ex-hacienda El Rosario is located is slightly more diverse in terms of income level with 5% marginal, 36% low income, 51% in the medium low, 6% in the medium high and under 1% in the high level.

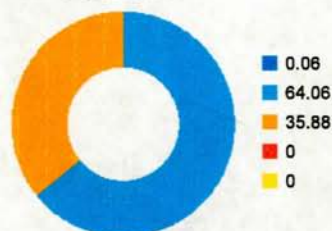
Escobedo, where Cumbres is located there is a shift back to the low level, with less than 1% marginal, 64% low and 35% medium low.

It is interesting to note that The municipalities in which our neighborhoods are located tend to be more geographically removed also have the greatest portion of marginal and low economic status occupants. The lower the price and quality of the land the greater the problems of poverty access to services.

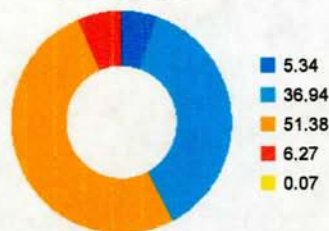
Economic Status Monterrey



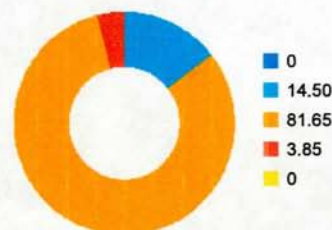
Apodaca



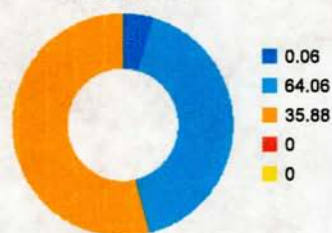
Guadalupe



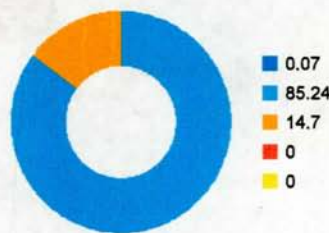
San Nicolas



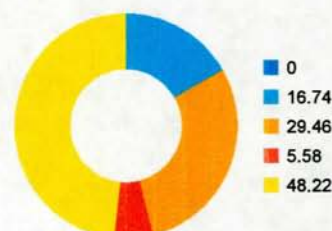
Escobedo



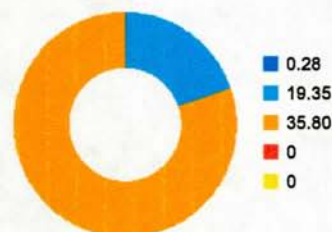
Juarez



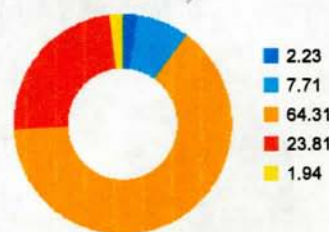
San Pedro



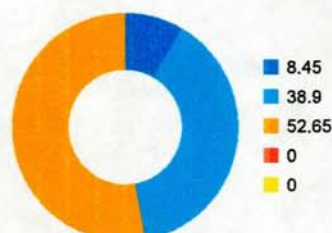
Garcia



Monterrey



Santa Catarina



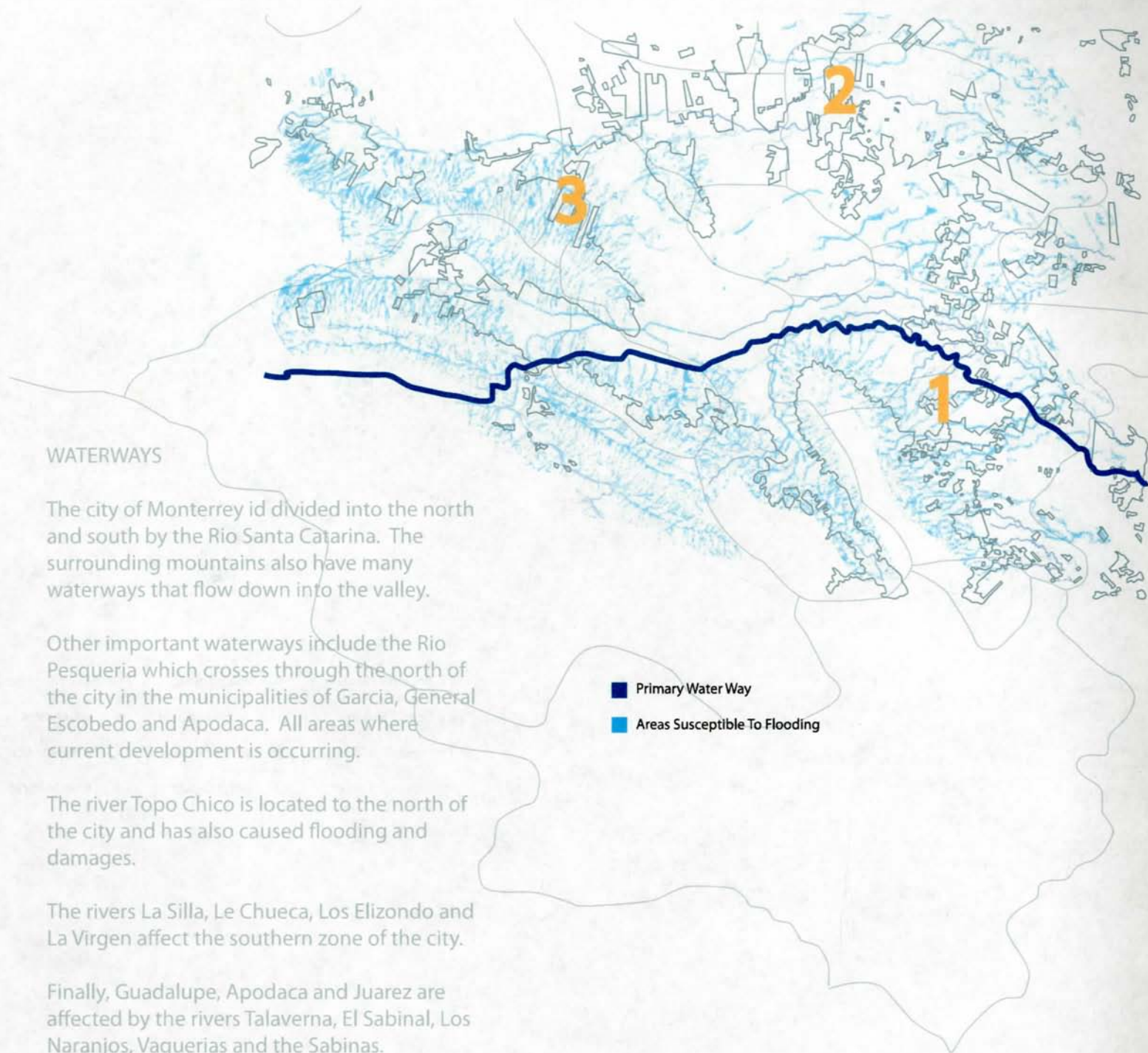
MEDICAL INSTITUTIONS

Overall Monterrey has a fairly good distribution of medical centers through out the city.

The highest concentration of private hospitals is located in the center of the city where development first started. Most of the government hospitals are also located in the center of the city which makes it more difficult for those that cannot pay for a private clinic or medical center.

Monterrey has only one regional hospital and no hospitals devoted solely to the needs of mentally ill patients.





URBAN INFRASTRUCTURE

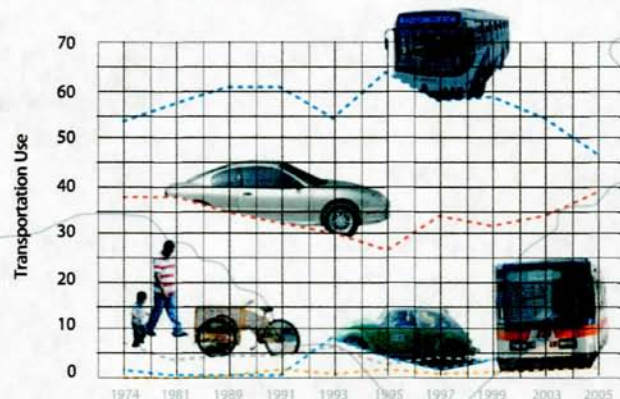
Monterrey has transportation infrastructure that consists of rail, metro, public and private vehicles and air travel. Rail is primarily used for the transport of goods from the manufacturing sector to the Northern border with the United States.

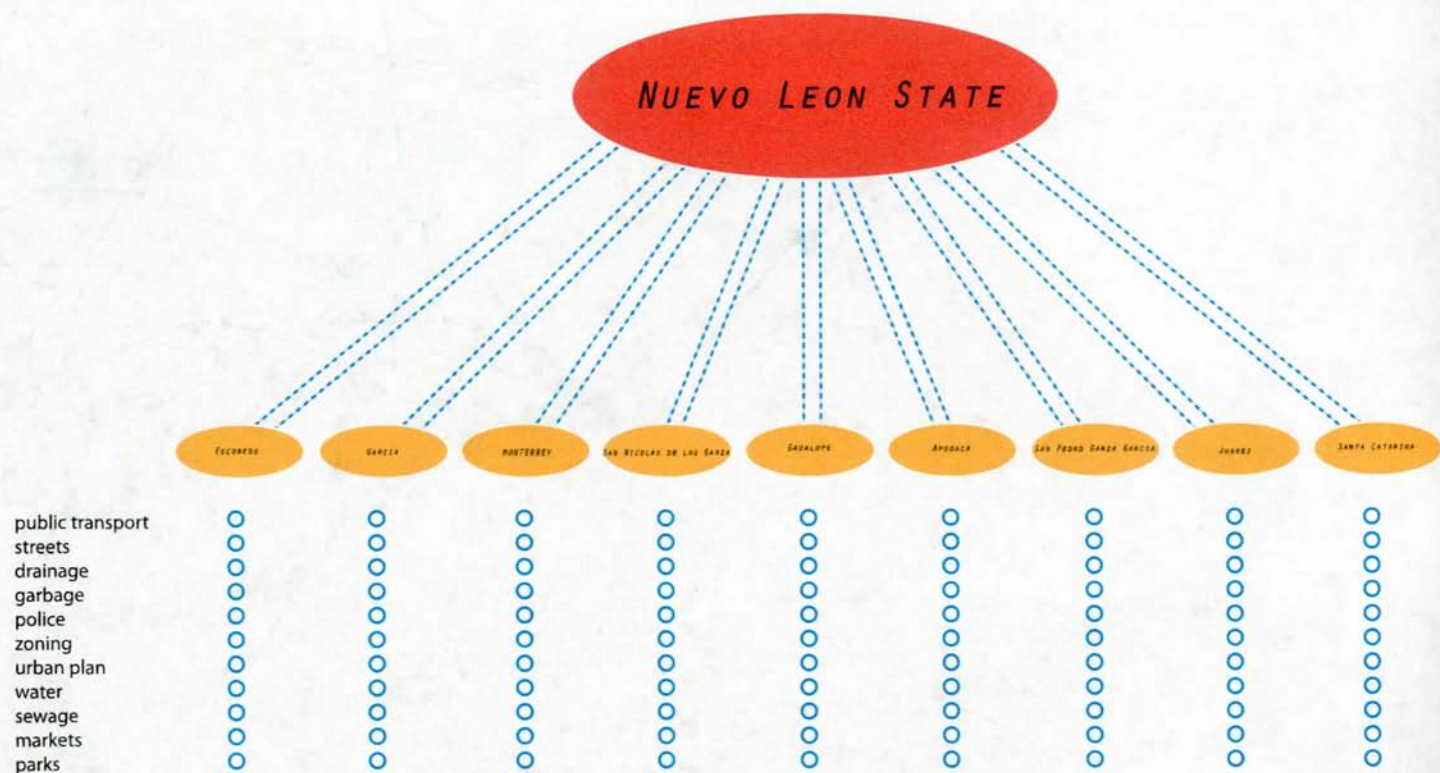
There are two major metro lines that primarily serve the central municipality of Monterrey. While there is some talk of extending these lines they currently do not reach the areas where the majority of growth is starting to take place.

Cars, taxi's and buses are the primary mode by which people travel. The number of private cars on the road continues to increase as the use of buses fall. This increased volume creates traffic patterns that are often more than the current system is able to handle. The secondary street infrastructure connects to primary highways that run east-west and north south.

Monterrey also has an International airport in the north-east part of the city. There is no public transport connection between the airport and the city center.

- Railroad
- Metro
- Primary Roads
- Secondary Roads
- Airport





Municipal Government Structure

Each of the municipalities of the city has its own government and deals with the internal issues of its own area. Each has its own way of dealing with public transport, streets, garbage pick-up and police force. There is little organization between the municipalities because of Federal Constitution which states that each municipality must work directly with the state. It means that it is against the law for the municipalities to work together. All communication must go through the state. The results in disorganization and the inability to combine services that would run more efficiently together.

By law each municipality must also provide safe drinking water, sewage and street drainage, public fencing, market areas, parks and trails, cemeteries and protect public space. The state has the right to take over these responsibilities if the municipality does not meet them.

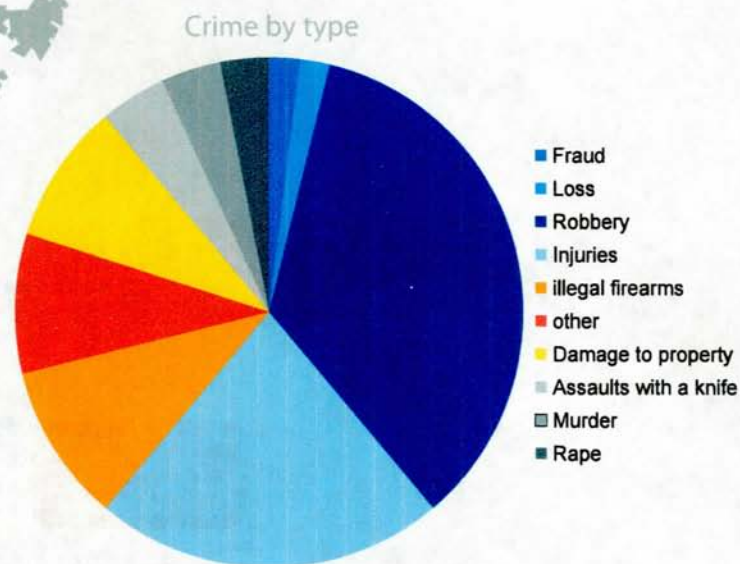
Each municipality also has the responsibility to create, pass and enforce zoning law and urban development plans. As part of this process the municipality controls ecological areas, historic preservation areas and the expansion of public transit

Data from "Monterrey, Mexico." Map. INEGI Maps. INEGI, 2007. State Board of Streets and Transportation of Nuevo Leon.

From Article 115 and 132 of the State Constitution of Nuevo Leon, in accordance with Article 115 of the Federal Constitution



Areas with the highest rates of crime

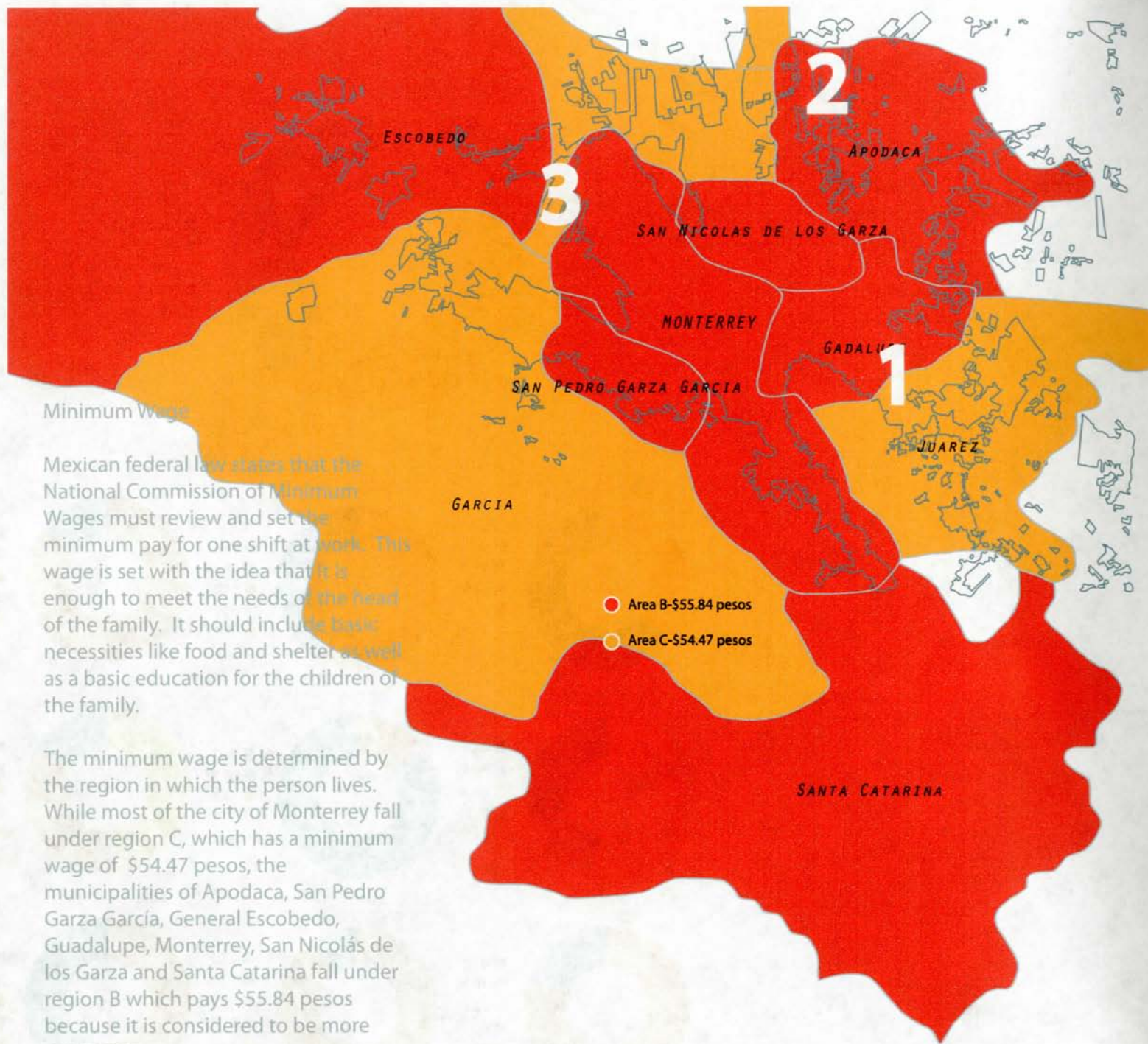


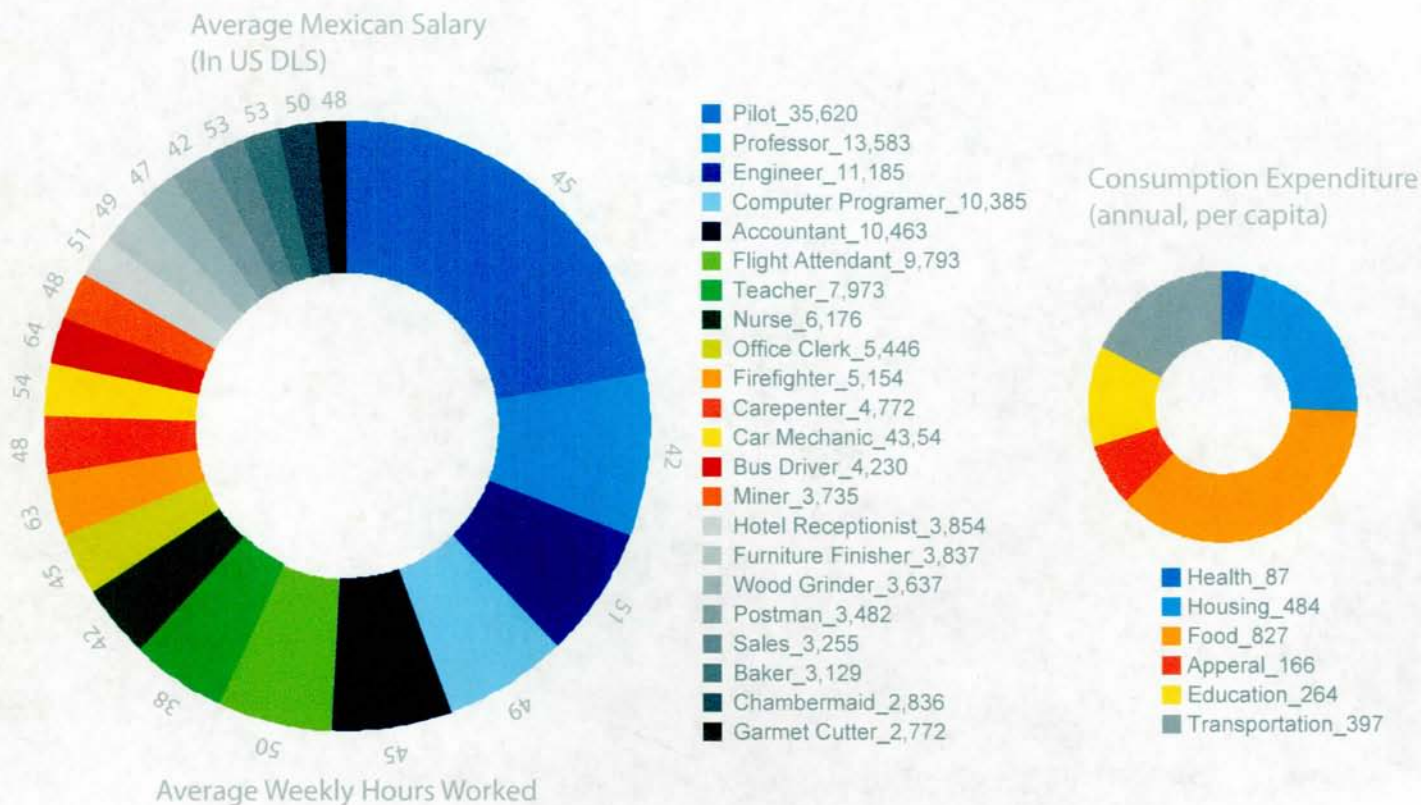
Criminal Activity

When looking at the types of crimes that are committed by those people that are caught and sentenced for that crime, robbery is by far the largest portion of criminal activity. The majority of crimes that occurred and for which the criminal was sentenced happened in the municipal of Monterrey. This might be due to the fact that more people are caught in this area or because more people live there.

Perhaps more interesting is the percentages that municipalities spend on public safety. In 2000 Guadalupe spent 12%, San pedro 12.34% and Garcia spent 11.16%. On the low end of the spectrum Juarez spent .41% and Santa Catarina spent (1.67%).

Much like the state government oversees all communication of the municipalities the National system of Civil Protection creates plans and provides emergency prevention and relief efforts in the care of natural disaster or emergency situations. Other fragmented police forces are in charge of various activities like the Policia preventiva deals with keeping the peace and domestic issues while the Ministerio Publico investigates crime.

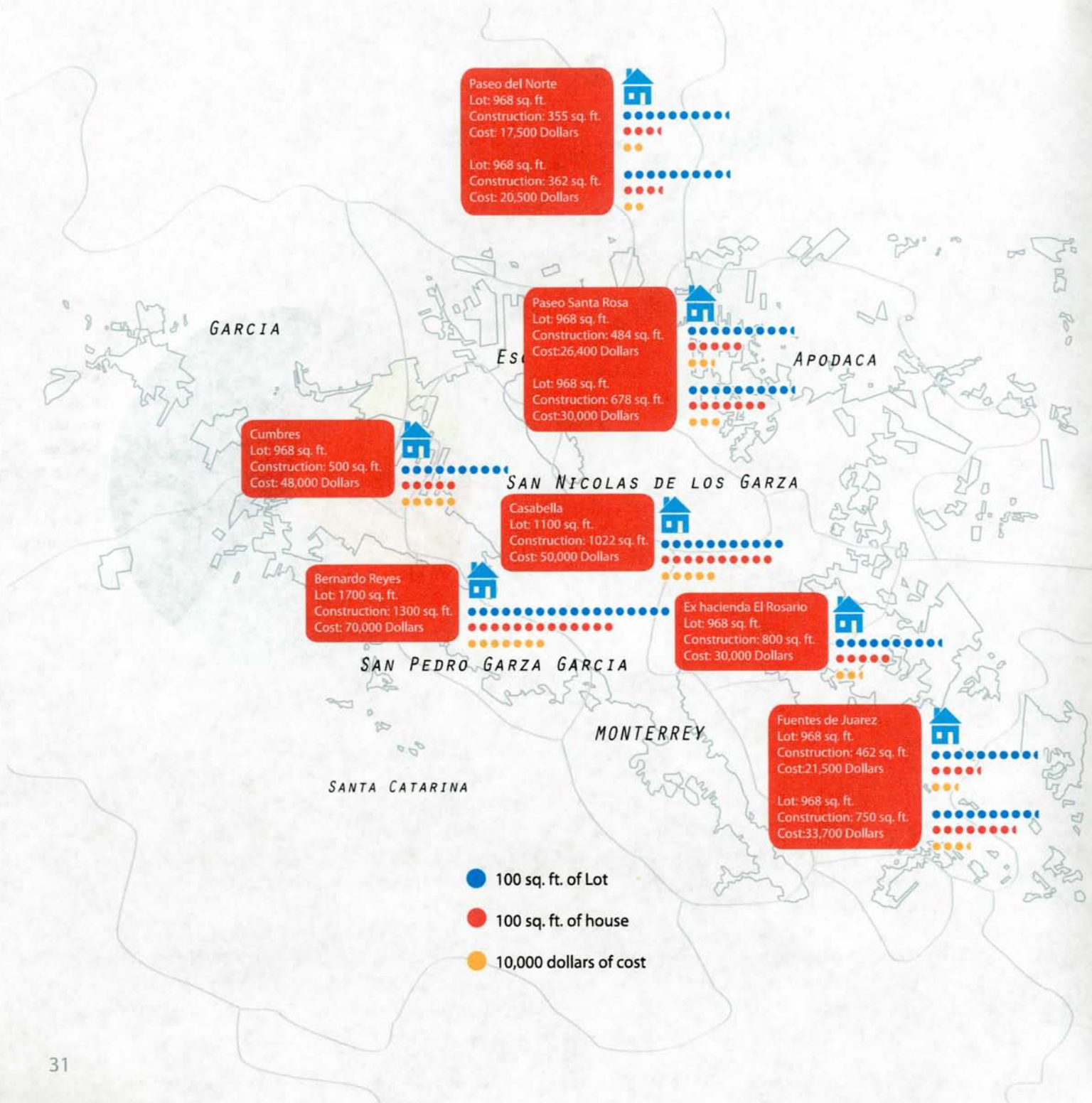




Average Incomes and Household Consumption spending

Income levels in Mexico are significantly less than other countries like the United States and Europe. On average a airplane pilot makes 35,620, a teacher makes 7,973 and a garment cutter in a factory makes 2,772 dollars a year. In addition the average number of hours worked is also greater. Many jobs in the United States are based on the 5 day, 35 hour work week where as in Mexico the average is as low as 38 for a teacher and as high as 64 hours a week for a bus driver. Many jobs also operate on the 6 day work week with Sundays being the day off.

On average the annual per capita spending on consumer goods is 3,034 dollars a year. The greatest portion of this goes to food at 827 dollars. Housing and transportation take the second and third place with 484 and 397 dollars consecutively. While living costs are comparably low, this amount can be anywhere from as little as 8.5% of an average income to more than what a person makes in a year. It should also be noted that these are averages and in many areas more costly areas, like Monterrey, living expenses are much higher.



EDUCATION

Educational resources are also concentrated in the center of the city of Monterrey. All three of the neighborhoods that are more closely studied have some but not as many resources as the central area.

In general, the further students want to go in school the further they will have to travel from their homes to reach those institutions unless they live in the city center.

- 
- The map shows the city of Monterrey with various educational institutions marked by colored plus signs. The city is divided into several shaded regions. Three specific areas are highlighted with large orange numbers: '1' in the southeast, '2' in the northeast, and '3' in the west. A high concentration of orange plus signs (2 Year) is located in the central area. Blue plus signs (2 Year Technical, Masters, and Doctors) are scattered throughout the city, with a notable cluster in the central area. A legend in the bottom right corner identifies the symbols: orange plus for 2 Year, blue plus for 2 Year Technical, red plus for 4 Year, blue plus for Masters, and black plus for Doctors.
- + 2 Year
 - + 2 Year Technical
 - + 4 Year
 - + Masters
 - + Doctors

EX-HACIENDA_EL ROSARIO

NEIGHBORHOOD INFRASTRUCTURE



NEIGHBORHOOD STRUCTURE

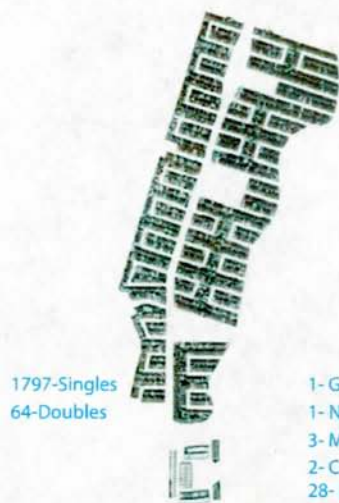
Ex-Hacienda is located in the south-east part of the city in the municipality of Gadalupe. It is a uniform development except for the exclusive sector. The majority of the homes are two story single family homes. This neighborhood is not as new as Real Cumbres. It is only about 6 years old. While some people have built gates, businesses and second stories, the original housing stock is quite visible. These houses were designed to be expanded upwards by the builder with rebar and structure that can support an additional story. Some of the corner lot

- Private day care/preschool _1.25 miles
- Private High School _2.03 miles
- Medical Clinic _1.18 miles
- Public High School _1.77 miles
- Public Tech Middle School _1.77 miles
- Private Non Surgical Hospital _1.82 miles
- Private Middle School _1.77 miles
- Public Medical Clinic _1.39 miles
- Private Elementary _1.35 miles
- Public Middle School _0.27 miles
- Public Elementary _1.85 miles



have small businesses but most of the development formal and informal is occurring outside of the neighborhood. The variety of services that exist in Real Cumbres does not exist here. Park areas are available but have no playground equipment or pavilions for the community to use.

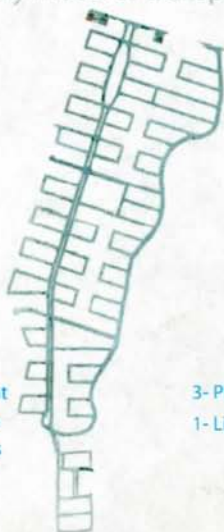
This area has both private and public schools within a 2 mile radius but again many of the educational resources are in the center of the city. Jobs also tend to be in other parts of the city. There is access to bus and taxi service, however, the motor vehicle is the primary mode of transportation.



1797-Singles
64-Doubles

Houses

- 1- Guarded Entry Point
- 1- Non Guarded Entry
- 3- Major Access Roads
- 2- Cul-de-sac
- 28- Loop Roads
- 9- Through Roads



Street System

- 3- Planned Parks
- 1- Limited Access Club



Green + Recreation

- 4- Empty lots areas



Un-built Lots

BLOCK STRUCTURE

Backyards

New Construction

Original Construction

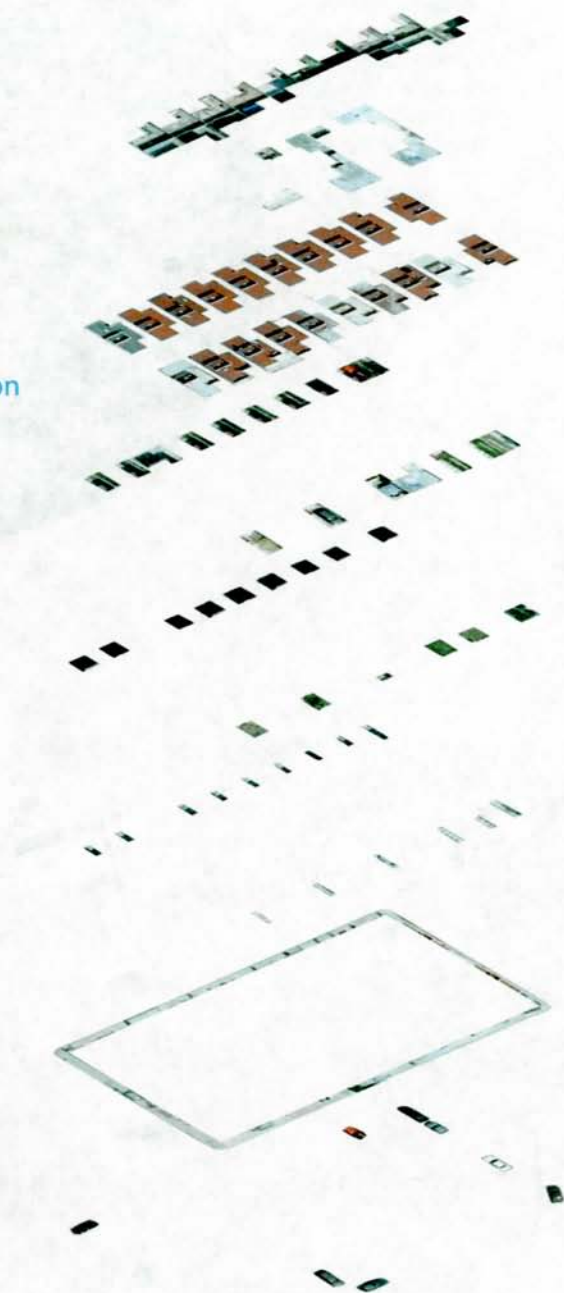
Parking

Front yards

Lot Circulation

Sidewalks

Cars



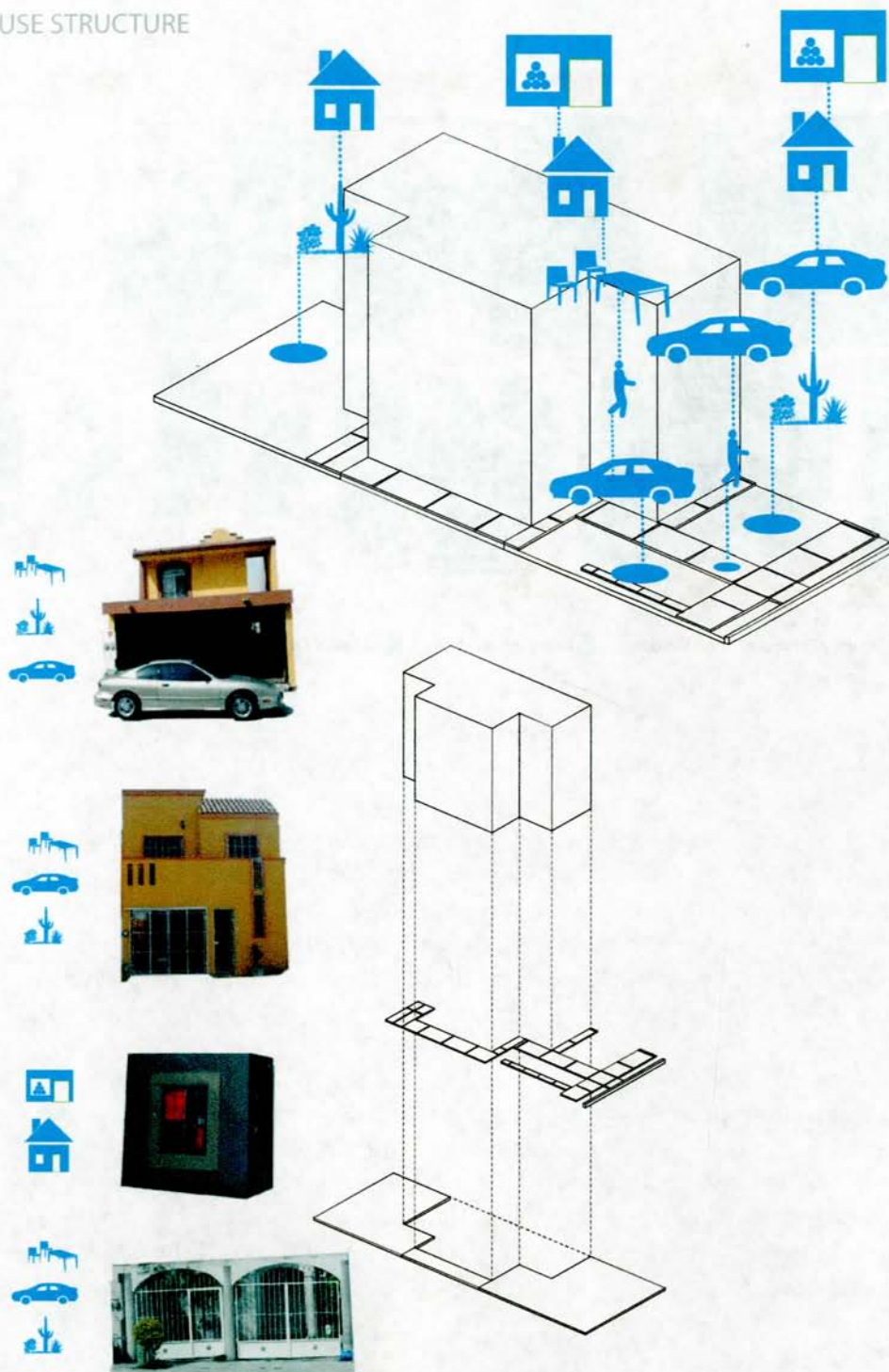
LOT STRUCTURE

All of the homes, except those in the exclusive zone, in Ex-hacienda are made up of two story homes that are shifted onto one side of the lot in-order to allow for a passage way down one side of the house to the back yard. These homes are designed with one parking space and one small garden area in the front as well as a backyard with exterior laundry possible.

Like in the other neighborhoods the parking is used for multiple uses and the garden area becomes parking by blocking the sidewalk. In some cases this parking area is being covered or gated. Different businesses are being started either in the front living room space located on the front of the house, closest to entry or in a newly constructed areas that take over the parking or garden.

While there is more parking available on these blocks than Real Cumbres the flex and flow of uses is again present. Although because this is a newer neighborhood the use of the parking spot and front garden as extended living space is less frequent due to the lack of security at the front of many of these homes.

HOUSE STRUCTURE



Builder: CONSTRUCTORA GARCÍA VILLARREAL
 Origin: Mexican
 Years in Business: 42
 Developments: 14 in 2008
 Houses: 230,000
 Locations: Monterrey, Linares, Saltillo, Torreón, Querétaro, Aguascalientes.
 960 Sq. Ft. Lot
 860 Sq. Ft. Construction

2 Bedrooms
 2.5 Bathrooms
 Open Kitchen/Living room
 1 Dining room



0-14 Years



1 Spaces



400,000 MXN
 32,000 DLS



● ● ○ ○ ○



● ● ○ ○ ○



● ● ○ ○ ○



● ● ● ● ○



● ● ● ○ ○

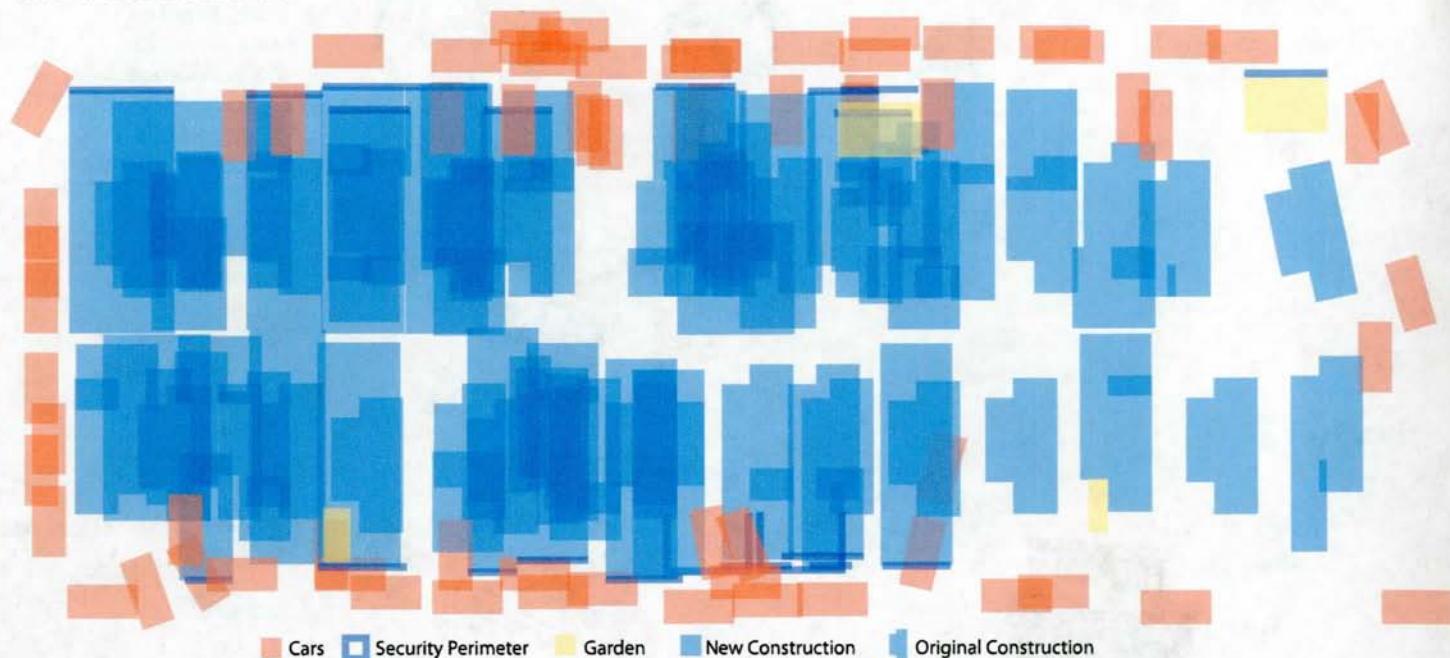


Cofinavit



Bancario

SPACIAL USE SYSTEM



LAYERED USAGE

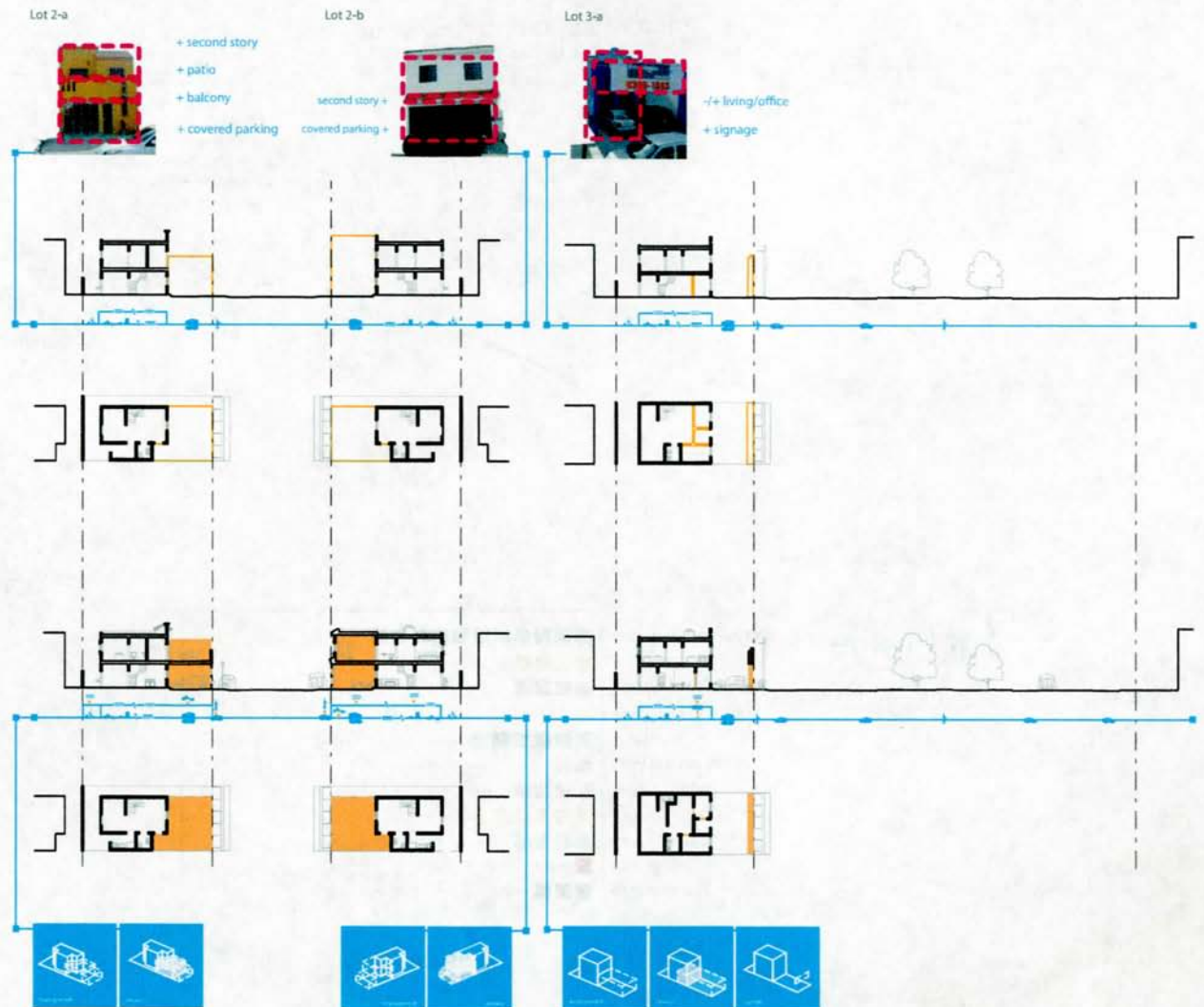
In Ex-Hacienda El Rosario there are the beginning of development occurring over the existing fabric of construction. Corner lots tend to be most likely to be expanded for business use while central lots are built to the front and back for additional living space and secure parking areas. The tendency to park in the street across the front of the lot before using one's designated lot parking spot can be easily noted. This may be due to the desire to guard spots that are not in front of an entry because they are taken on a first come first serve basis. Families with more than two cars have to push out to their neighbor's space or overflow to ends of blocks where there are spaces along the sides of units. This presents a problem of security, however, due to the fact that cars that are not visible from a home are more likely to be broken into or vandalized.

Very few front yards have been constructed upon for the use of a garden but may be built over for protected parking or at least gated to create a street perimeter. Many back yards are completely built out to the property lines which removes any exterior space in the back of the lot. This seems to indicate that private exterior space is valued less than additional living space or that front yard exterior space is seen as just as good or better for activities that spill outside. There is also the added benefit of the ability to use front yards as parking when they are not being used for gathering. In addition building out to the property line indicates that there is little concern for natural daylight's ability to penetrate living spaces.

Modification Process

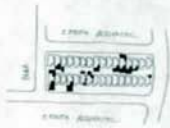


2_EX-HACIENDA EL ROSARIO

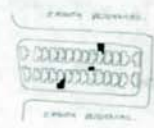


Blocks

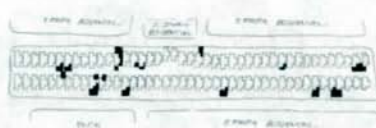
Block 1



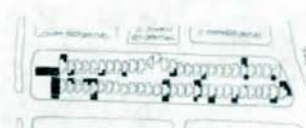
Block 2



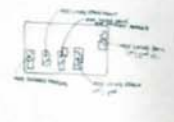
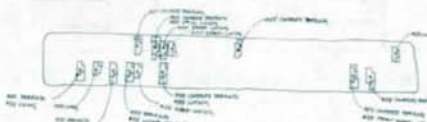
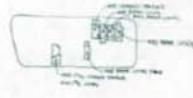
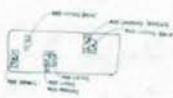
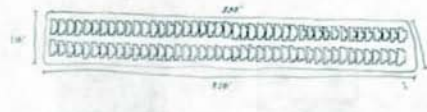
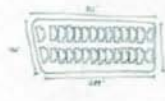
Block 3



Block e-4

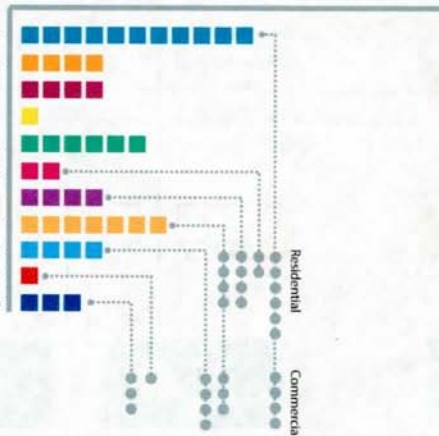


Block e-5



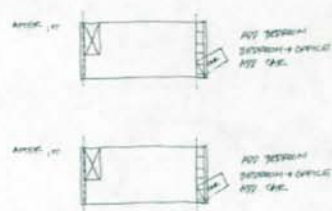
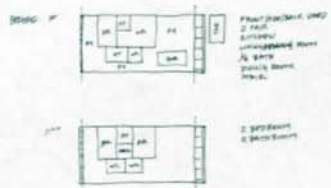
Lot Profile

- BUILT OUT TO PROPERTY LINE
- COMMERCIAL
- COMMERCIAL-CONTIGUOUS
- COMMERCIAL-SINGULAR
- RESIDENTIAL
- ADDED EXTERIOR SPACE
- COVERED PARKING
- LOST LIGHT
- MAJOR STREET
- ADDED STAIR
- LOST PARKING

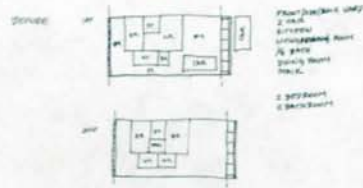


Lots

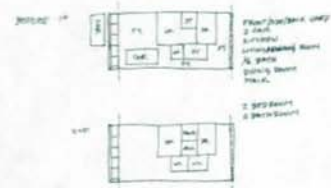
Lot 2-a



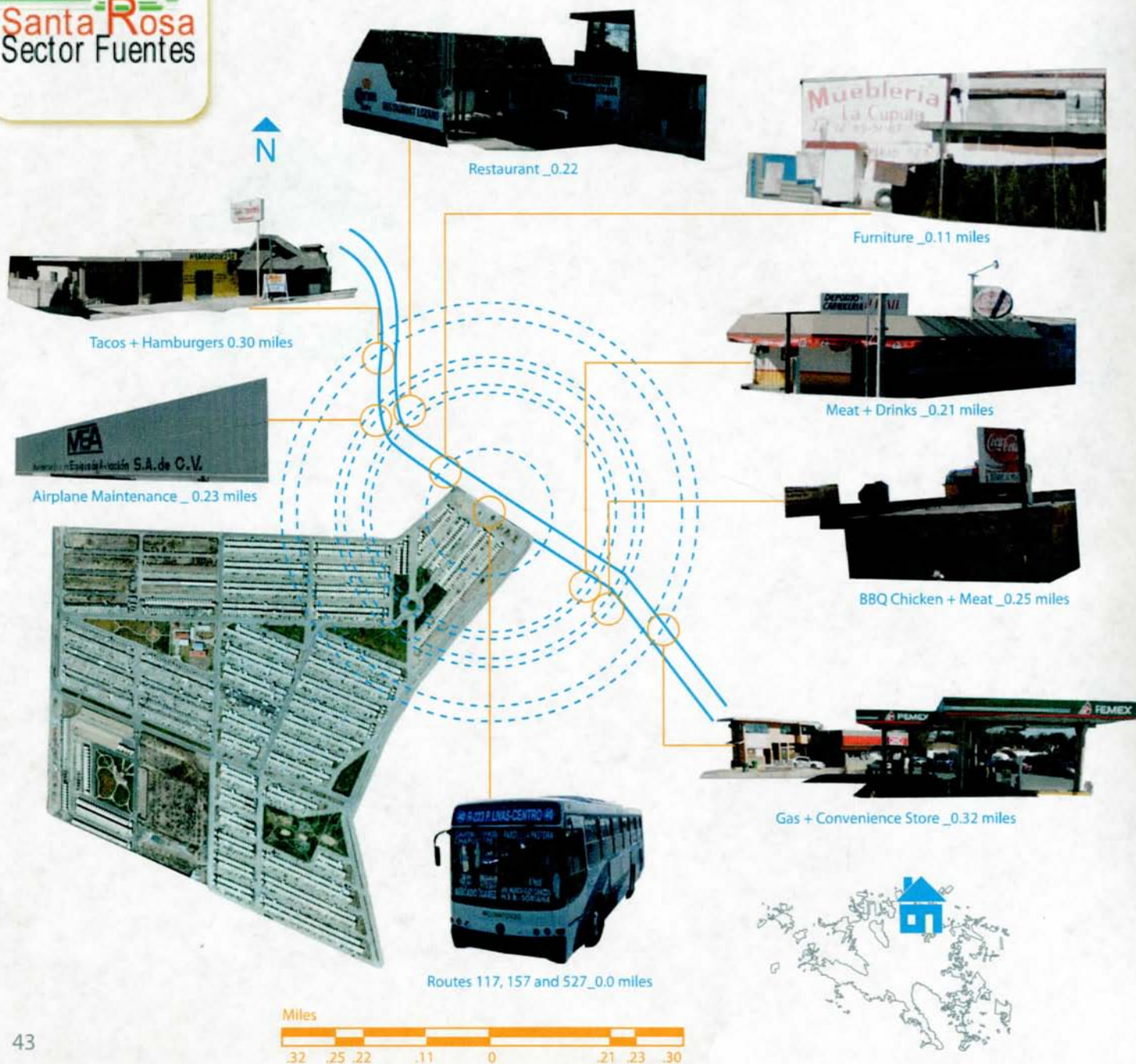
Lot 2-b



Lot 2-c







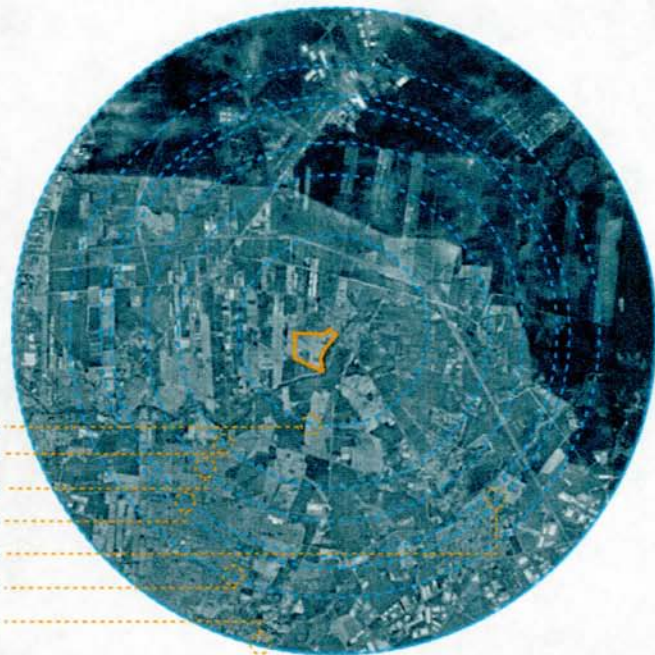
NEIGHBORHOOD STRUCTURE

Paseo Santa Rosa is located in the north-east part of the city in the municipality of Apodaca. It contains both one story and two story single family micro row houses.

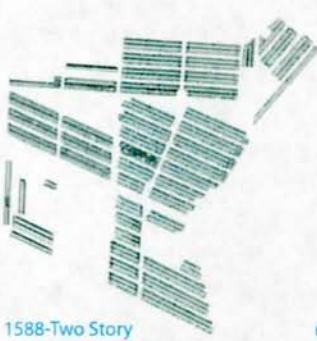
This neighborhood is also a newer neighborhood so there is not a large amount of overlay development. Many of its lots have yet been built upon.

Outside of the neighborhood are basic services like a gas station and smaller privately owned businesses. There is a large amount of heavy traffic along the entry road due to the larger amount of industry that exists in this area.

- Private Elementary School _1.48 miles
- Public Middle School _2.33 miles
- Private Day Care/ Preschool _2.95 miles
- Public Hospital _3.46 miles
- Private Middle School _3.29 miles
- Public Hospital _3.42 miles
- Private High School _5.24 miles

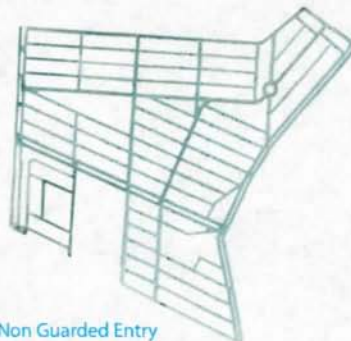


There are mainly private schools in this area, as the government has yet to expand into this zone. Hospitals are over three miles away making for more difficult access to medical services. While there are fewer services the price of a home in this area is the cheapest when compared to Cumbres and Ex-Hacienda.



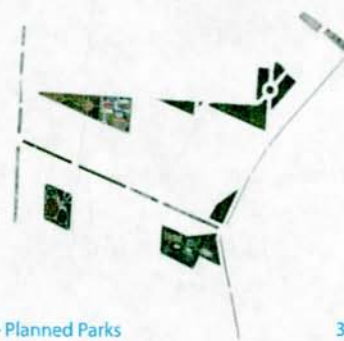
1588- Two Story
539- One Story

Houses



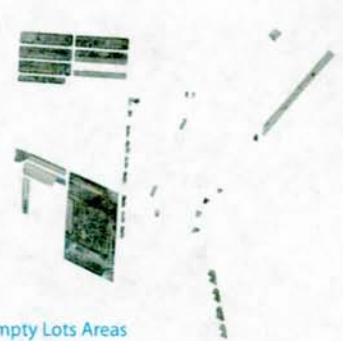
6- Non Guarded Entry
3- Major Access Roads
30- Secondary Roads
28- Through Roads

Street System



9- Planned Parks
2- Entry Area

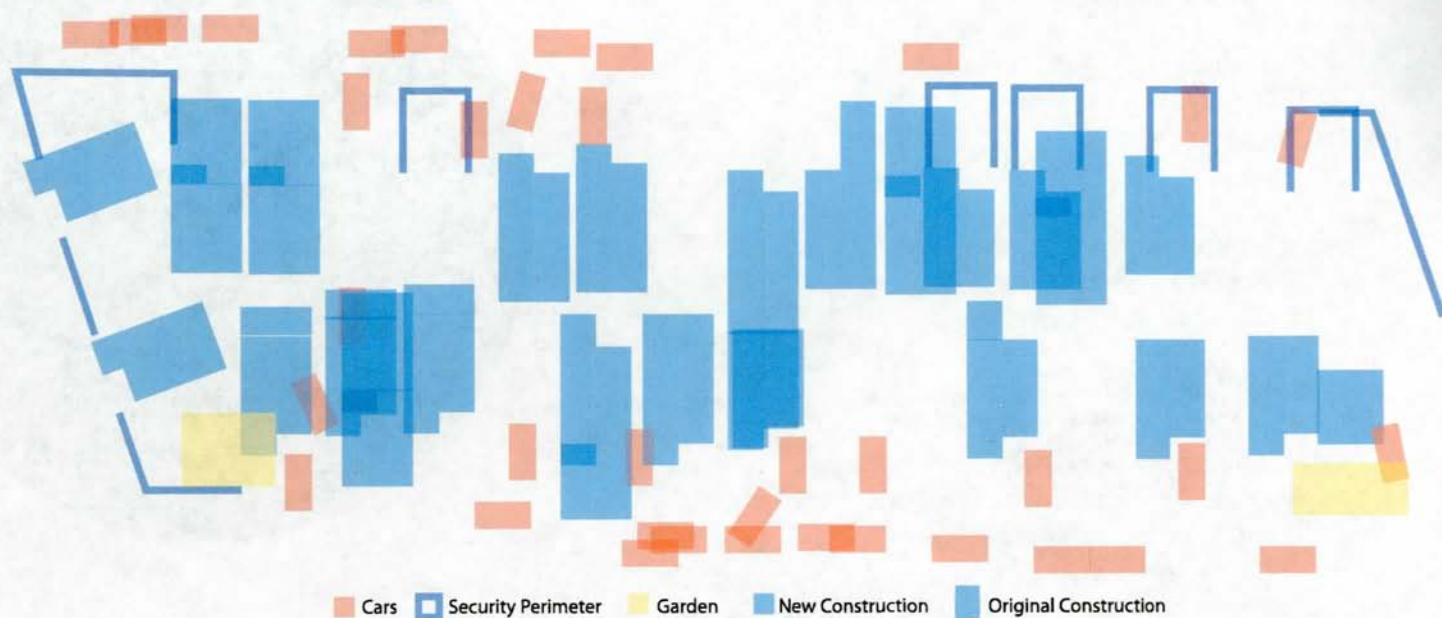
Green + Recreation



36- Empty Lots Areas

Un-built Lots

SPACIAL USE SYSTEM



LAYERED USAGE

In Paseo Santa Rosa the development has not reached a level of original construction completion that is as far along as Ex-Hacienda or Real Cumbres. There are large areas that have been leveled in preparation for or have begun to be constructed upon but many lots are still available. In the blocks that are completed there is some additional new construction that is taking place to expand the original built fabric. In more cases the trend seems to be for building out the front of the lots instead of the back of the lots. These homes are set further back from the street than the other two neighborhoods which allows for two cars to be parked in the front area of the home.

A unique development to in this neighborhood is a larger amount of lots that have build additional security measures around the home. There are more lost that have added security fencing and walls on the street side of the house marking boundary of each home while deterring would be criminals. The increased emphasis on security on these homes is an indicator that the neighborhood had problems with break-ins making it a priority for residents to protect themselves in any way they can.

Another interesting thing to note in this community is that corner lots have on seemed to develop into commercial spaces. Instead these areas have simply been walled in with their respective home. It is not clear whether this has anything to do with the age or perhaps the availability of resources to develop such businesses.



BLOCK STRUCTURE

Backyards

New Construction

Original Construction

Parking

Front yards

Sidewalks

Cars

LOT STRUCTURE

The homes, in Paseo Santa Rosa are made up of two story and one story homes that are either shifted onto one side of the lot in-order to allow for a passage way down one side of the house to the back yard or built in row house style. These homes are designed with two parking spaces and a backyard. The relative space occupied with existing construction is low which makes for easy expansion to the street side of the structure.

New uses can mainly be seen on the front side of the lots which takes up one or both parking spots. Due to the relative lack of services in and just outside this community it seems that it is quite possible that more businesses will quickly develop in this community.

Its relative distance from the city center puts it at a disadvantage but its location close to the airport is an asset that could be taken advantage of.

LOT STRUCTURE

The homes, in Paseo Santa Rosa are made up of two story and one story homes that are either shifted onto one side of the lot in-order to allow for a passage way down one side of the house to the back yard or built in row house style. These homes are designed with two parking spaces and a backyard. The relative space occupied with existing construction is low which makes for easy expansion to the street side of the structure.

New uses can mainly be seen on the front side of the lots which takes up one or both parking spots. Due to the relative lack of services in and just outside this community it seems that it is quite possible that more businesses will quickly develop in this community.

Its relative distance from the city center puts it at a disadvantage but its location close to the airport is an asset that could be taken advantage of.

LOT STRUCTURE

The homes, in Paseo Santa Rosa are made up of two story and one story homes that are either shifted onto one side of the lot in-order to allow for a passage way down one side of the house to the back yard or built in row house style. These homes are designed with two parking spaces and a backyard. The relative space occupied with existing construction is low which makes for easy expansion to the street side of the structure.

New uses can mainly be seen on the front side of the lots which takes up one or both parking spots. Due to the relative lack of services in and just outside this community it seems that it is quite possible that more businesses will quickly develop in this community.

Its relative distance from the city center puts it at a disadvantage but its location close to the airport is an asset that could be taken advantage of.

LOT STRUCTURE

The homes, in Paseo Santa Rosa are made up of two story and one story homes that are either shifted onto one side of the lot in-order to allow for a passage way down one side of the house to the back yard or built in row house style. These homes are designed with two parking spaces and a backyard. The relative space occupied with existing construction is low which makes for easy expansion to the street side of the structure.

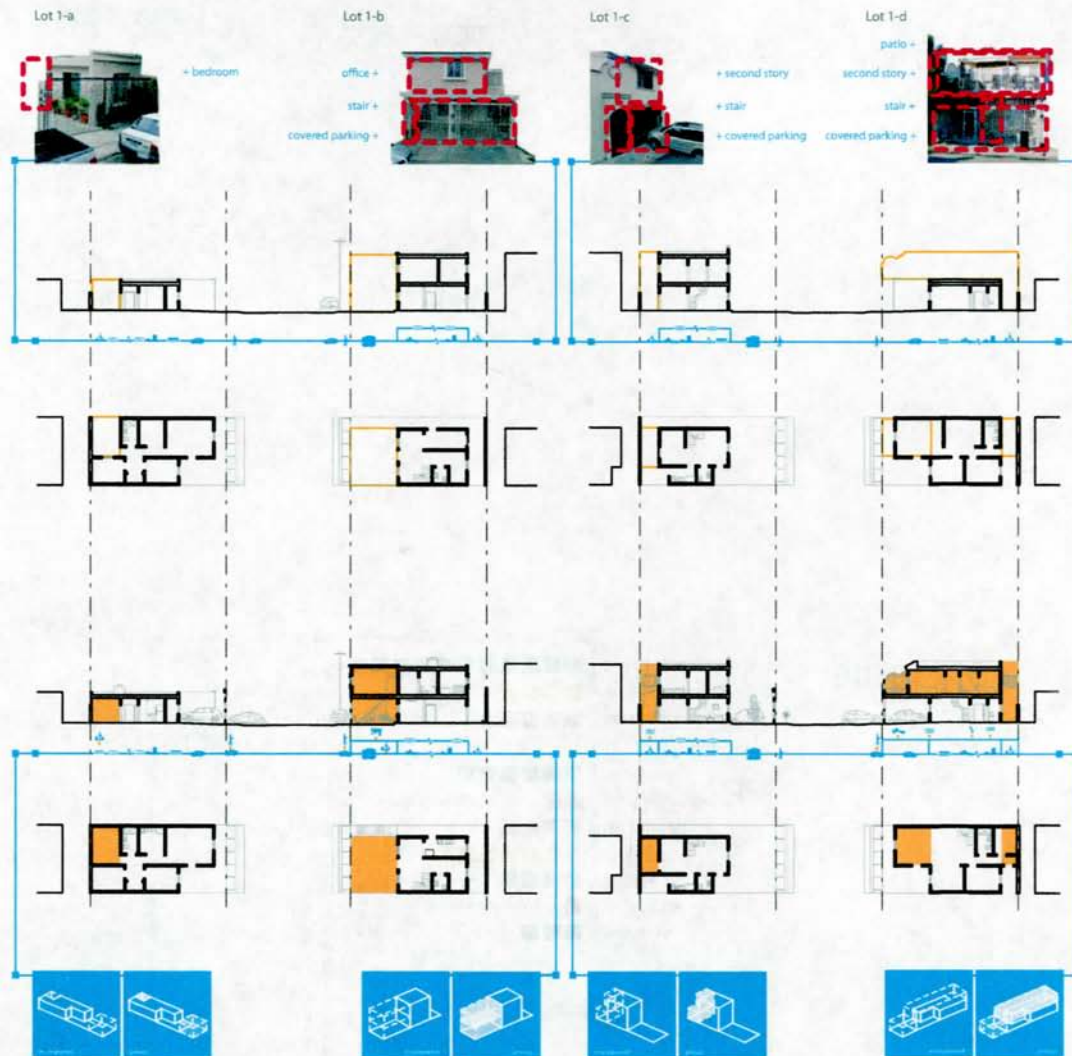
New uses can mainly be seen on the front side of the lots which takes up one or both parking spots. Due to the relative lack of services in and just outside this community it seems that it is quite possible that more businesses will quickly develop in this community.

Its relative distance from the city center puts it at a disadvantage but its location close to the airport is an asset that could be taken advantage of.

Modification Process

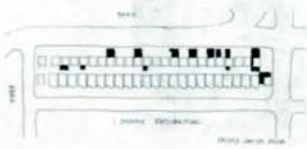


1_FUENTES

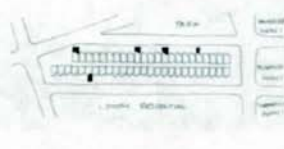


Blocks

Block f-1



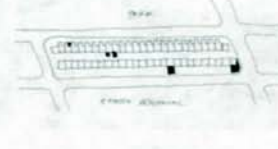
Block f-2



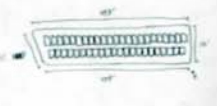
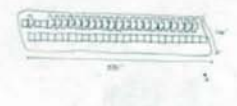
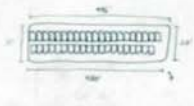
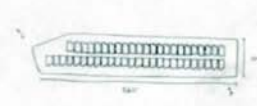
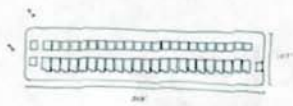
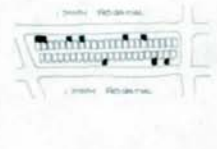
Block f-3



Block f-4

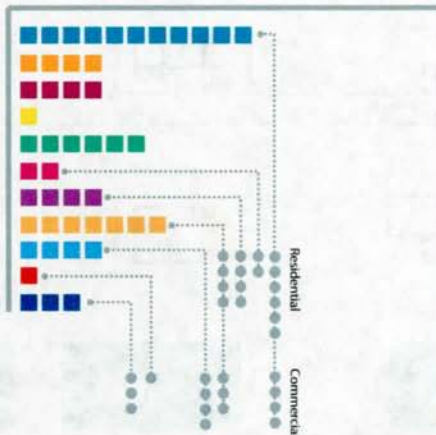


Block 5



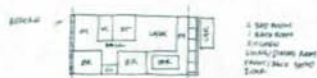
Lot Profile

- BUILT OUT TO PROPERTY LINE
- COMMERCIAL
- COMMERCIAL-CONTIGUOUS
- COMMERCIAL-SINGULAR
- RESIDENTIAL
- ADDED EXTERIOR SPACE
- COVERED PARKING
- LOST LIGHT
- MAJOR STREET
- ADDED STAIR
- LOST PARKING



Lots

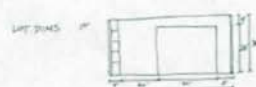
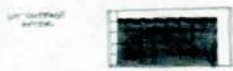
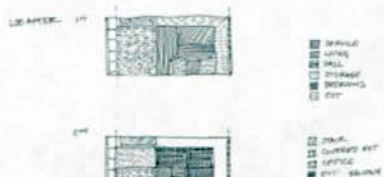
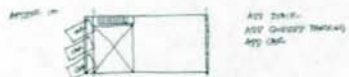
Lot 1-a



Lot 1-b



Lot 1-c





CUMBRES_Casas Abitas

NEIGHBORHOOD INFRASTRUCTURE



Route 204_0.0 miles



Supermarket_0.24 miles



Hardware_0.0 miles



Gas_0.32 miles



Veterinary_0.0 miles



Preschool_0.19 miles



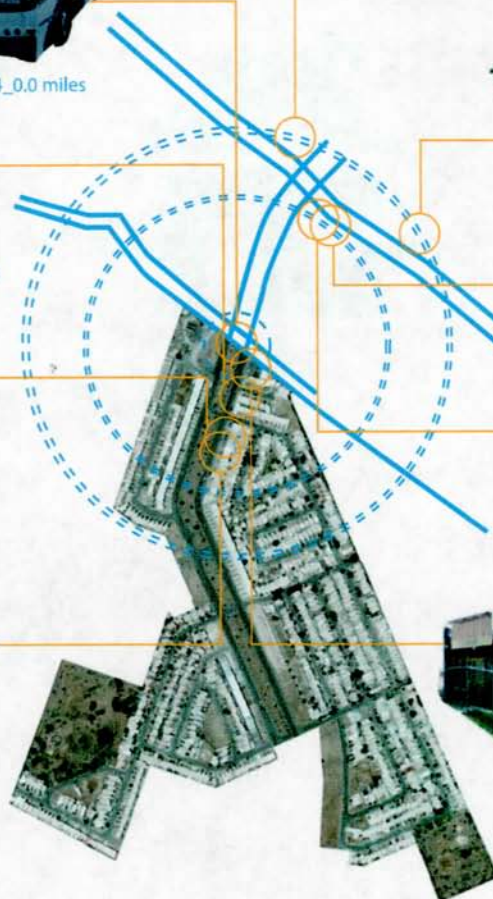
Drinks + Chicken_0.0 miles



Tacos_0.18 miles



Tacos_0.04 miles



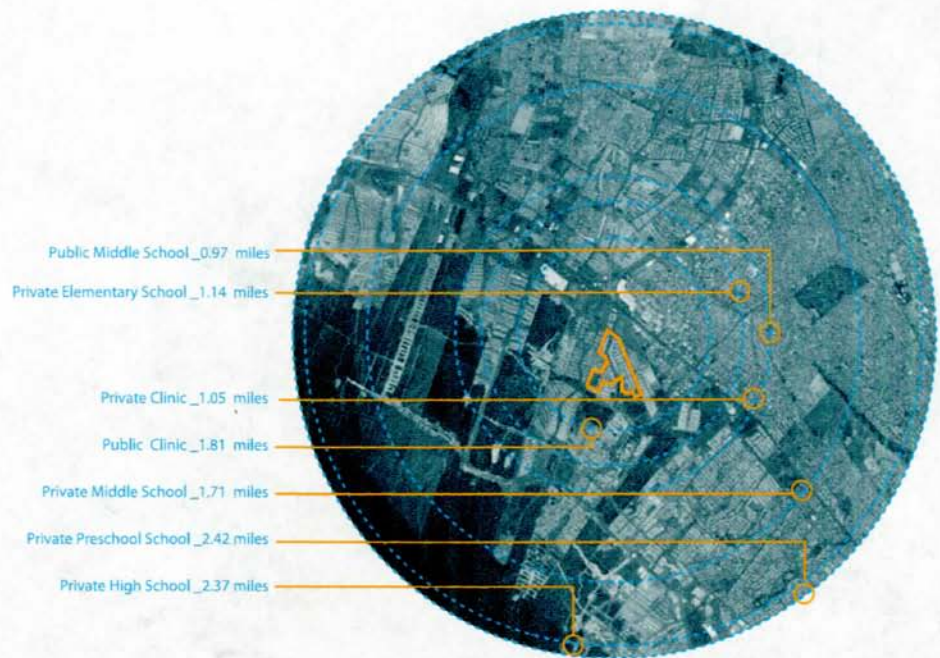
NEIGHBORHOOD STRUCTURE

Real Cumbres is located in the north-west part of the city in the municipality of Escobedo. It is a mixed development that includes micro_casas as well as free standing and row houses that have a relatively larger foot print.

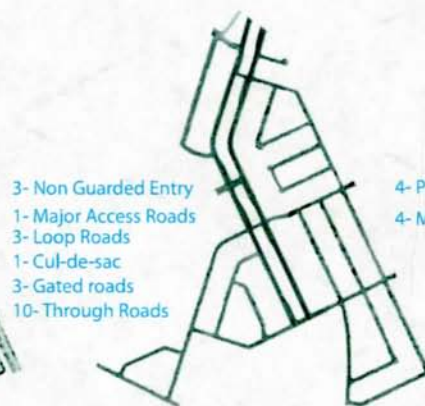
Due to the age of this neighborhood there is a greater diversity of transformation from the original housing stock and a large availability of goods and services within its development. The greatest concentration of such development has occurred on the primary divided access road that divides the east and west

halves of the community. While these buildings were originally designed as single family homes their location on a busy street has led to their being divided or taken over for commercial use. A variety of large chain commercial stores as well as some locally owned stores are located outside the main entry on a large divided road.

There is are both public and private elementary, middle and high schools located in a 2.5 mile radius of the community. Additional resources are located in the city center which is further away. While there is bus service in this area, use of the motor vehicle gives best access.



Houses



Street System



Green + Recreation



Un-built Lots

BLOCK STRUCTURE

Backyards

New Construction

Original Construction

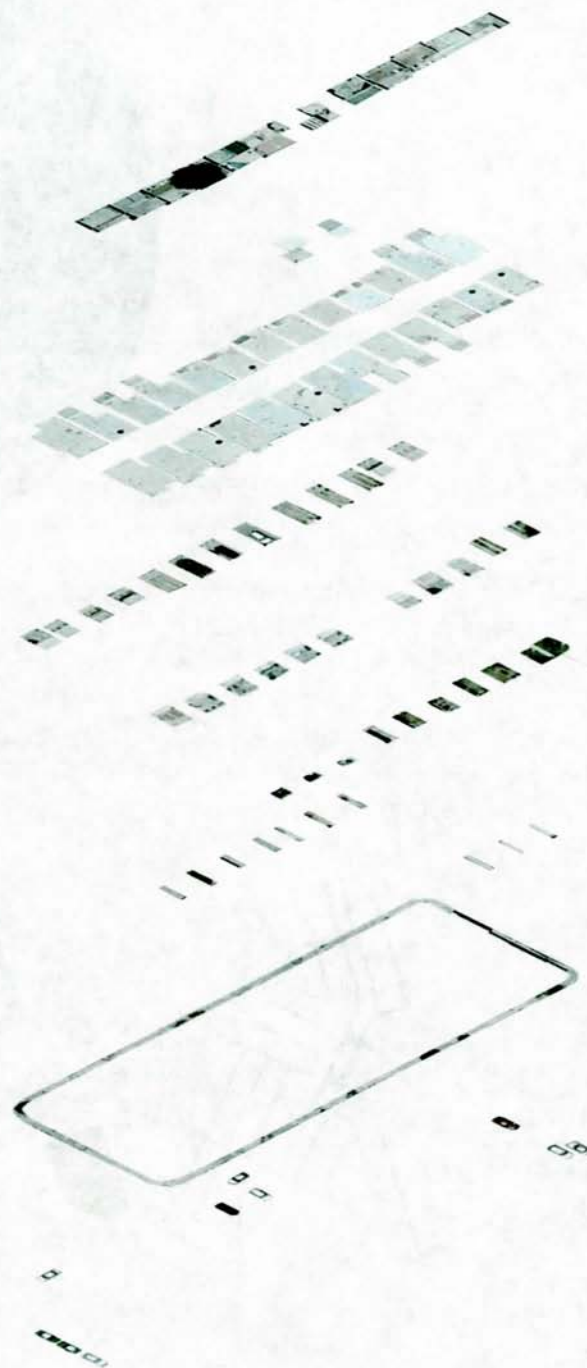
Parking

Front yards

Lot Circulation

Sidewalks

Cars



LOT STRUCTURE

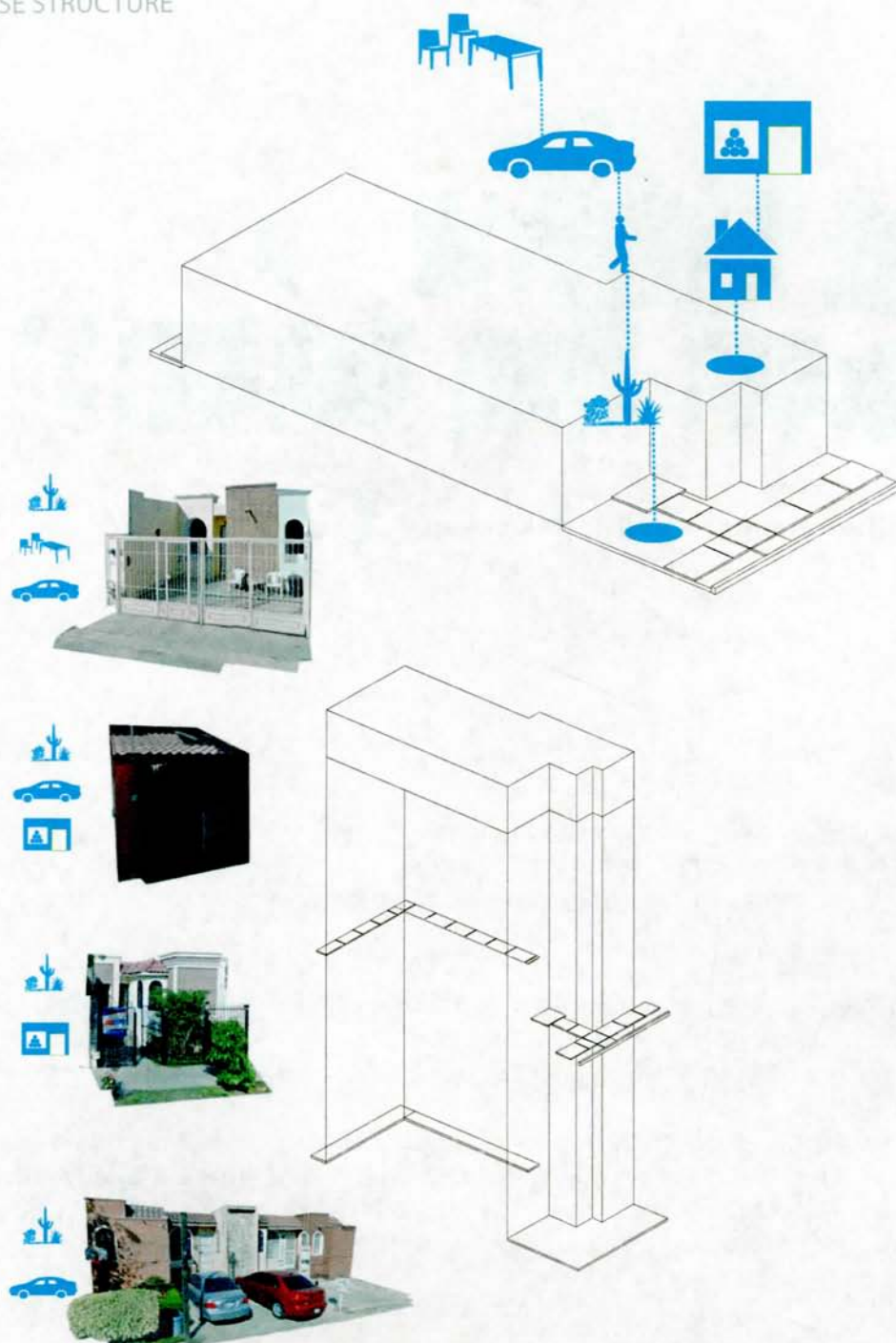
The micro_casas in the Real Cumbres development are designed for maximum use of the lot. These one story homes almost entirely fill the lot and have no parking space.

They share part walls on both sides with a walkway that runs across the back and down half of one side of the building. The entry is located in the furthest section from the sidewalk.

In general people will try not to park in front of other's homes but if it is not an entry or exclusive they are allowed to do so. Blocking entry to off street parking is not allowed but due to the limited parking available people often park across sidewalks and on front gardens in order to maximize the area over which they maintain ownership.

In these smaller homes the front bedroom is often the best area to be converted into commercial use, unless the garden is built over. Generally, however, The front garden which is converted into this area becomes parking and when not occupied by cars, serves as an expansion of the interior entertaining area of the home. These combined uses of space create a flex and flow of use over a day, week and even a particular year.

HOUSE STRUCTURE



Builder: Casas Abita
Origin: Mexican
Years in Business: 28
Developments: 40
Houses: 26,000
Locations: Monterrey, Chihuahua,
Aguascalientes, León, y Puerto
Vallarta

900 Sq. Ft. Lot
600 Sq. Ft. Construction
3 Bedrooms
1 Bathroom
Open Kitchen/Living room



0-14 Years
15-24 Years



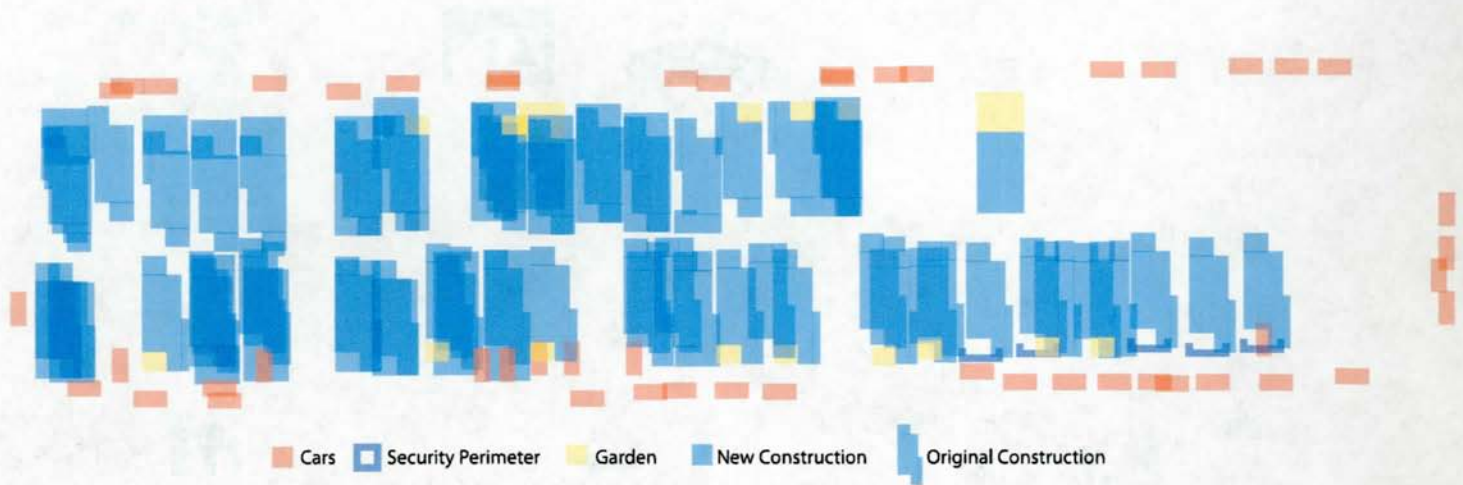
0 Spaces



650,000 MXN
48,000 DLS



SPACIAL USE SYSTEM



LAYERED USAGE

Real Cumbres is the oldest of the three neighborhoods studies. Interestingly this community was designed with many one story homes that have no parking in the front of the lots off the street. In some cases the space is enough for a very small compact car but in most cases this has resulted in an increased amount of garden spaces on the street side of the home.

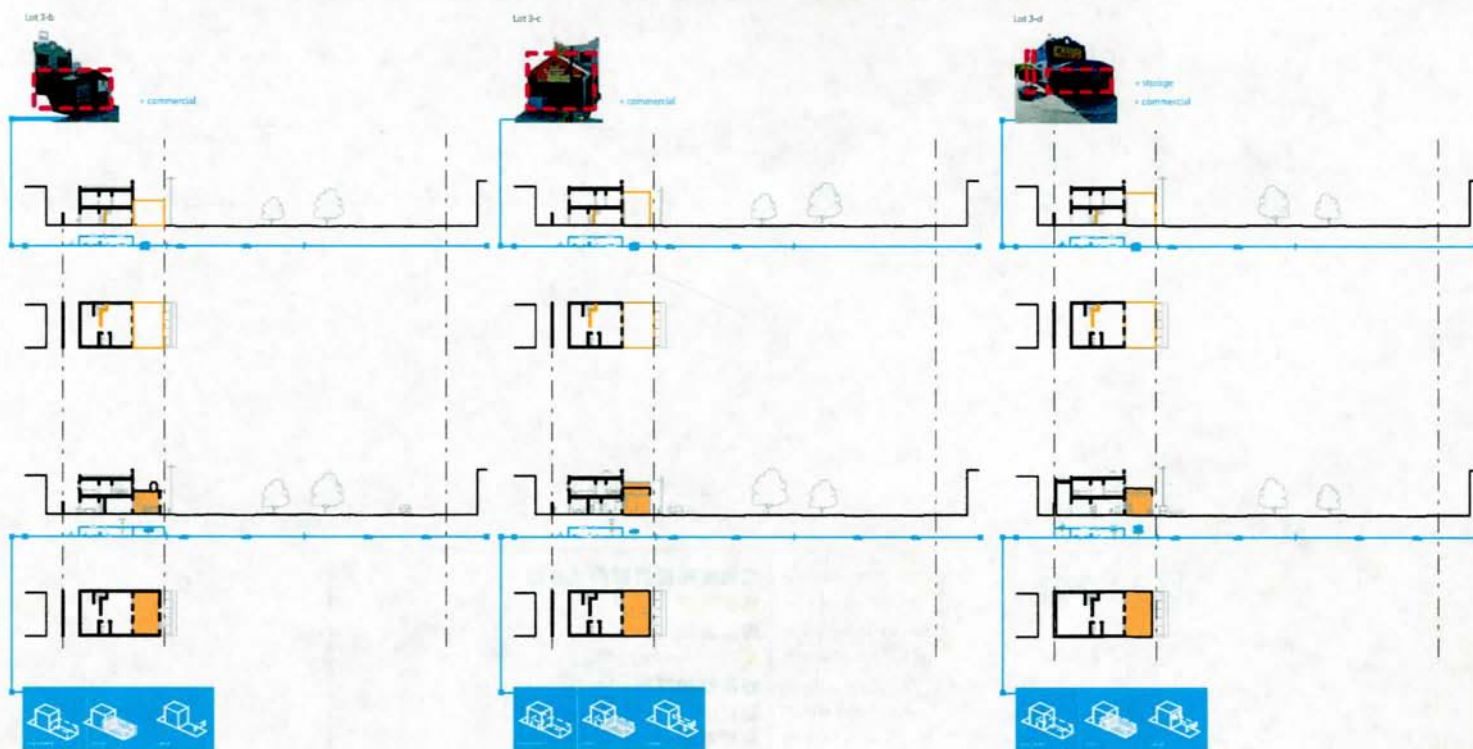
Another notable characteristic of this area is that there are some homes with fences and gated areas but many do not. This might be due to the relatively small garden area and lack of space for a car does not make it useful to gate the space. Instead the security trend becomes smaller gates and metal that protect individual windows and doors.

Expansion of one story homes tends to occur in the back garden area of the structure. This additional space adds to the living space of the home but is not easily usable for home businesses. Homes that are based on the smaller two-story foot print are often used for businesses instead. The front parking area serves well for customers while the second story can still be utilized for private needs.

Modification Process



3_CUMBRES

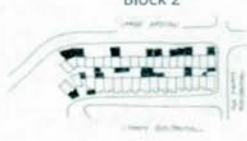


Blocks

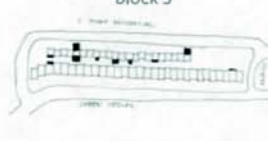
Block 1



Block 2



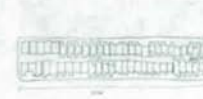
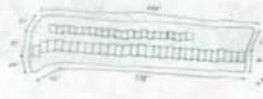
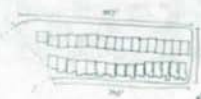
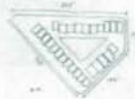
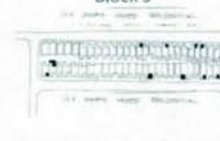
Block 3



Block 4

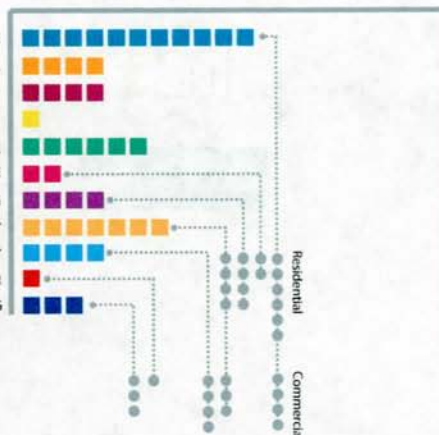


Block 5



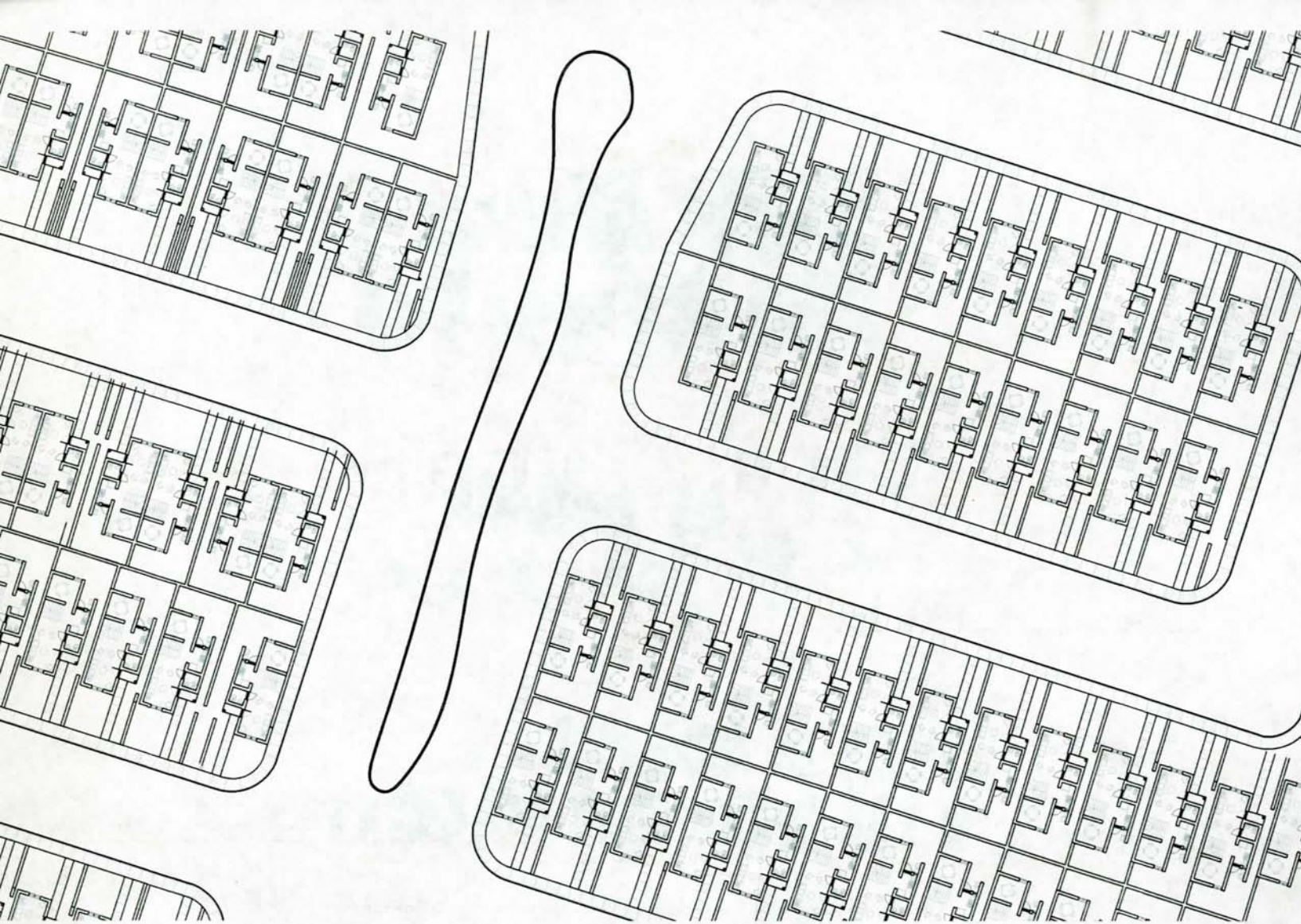
Lot Profile

BUILT OUT TO PROPERTY LINE
COMMERCIAL
COMMERCIAL-CONTIGUOUS
COMMERCIAL-SINGULAR
RESIDENTIAL
ADDED EXTERIOR SPACE
COVERED PARKING
LOST LIGHT
MAJOR STREET
ADDED STAIR
LOST PARKING



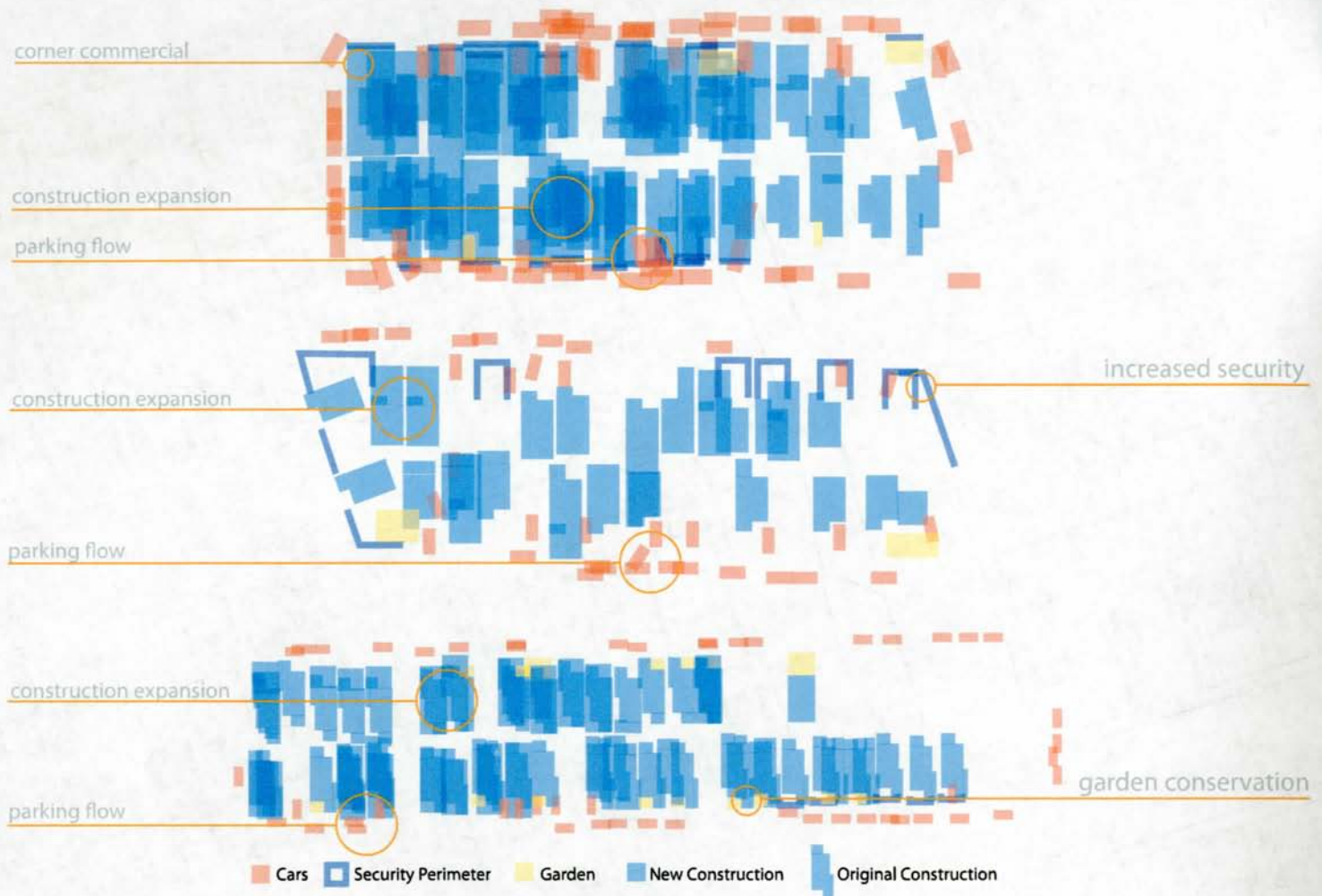
05

CONCLUSIONS

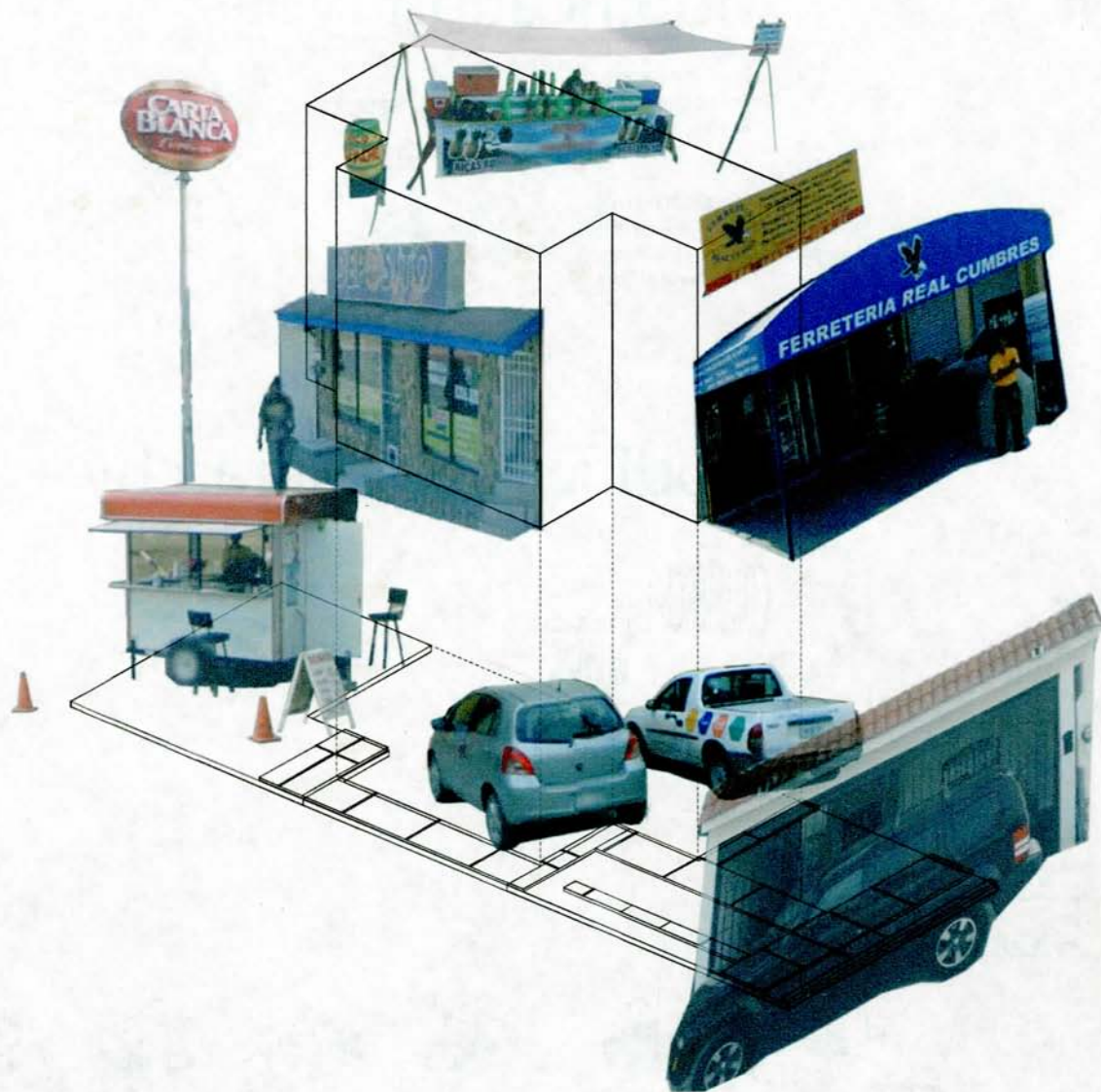


CONCLUSIONS

The phenomena of large conglomerate builders who appropriate land outside of the urban footprint of the city of Monterrey, in order to build the smallest size house on the smallest scale lot is not going to change. The micro-casa is already part of the city's urban fabric and will continue to dominate new construction developments if the current builder projections hold. At the neighborhood scale individual occupants will also continue to develop and create their own means of utilizing space. They will do so with whatever means they have available, to the level that is best able to fulfill their needs.



Each of the three neighborhoods studied had unique and common systems of spatial use. Dominant uses ebb and flow both at the individual lot and the block scale. Many residential homes have been transformed into vibrant businesses. Homes have become both a means of survival and a place for the occupants to live. It is a fluid system that can address changes that the current occupants may not yet know are going to happen. It is this unique process of use of space that is most interesting about the phenomena of the micro-casa. The ability of occupants to turn a home into more than just a place to live.

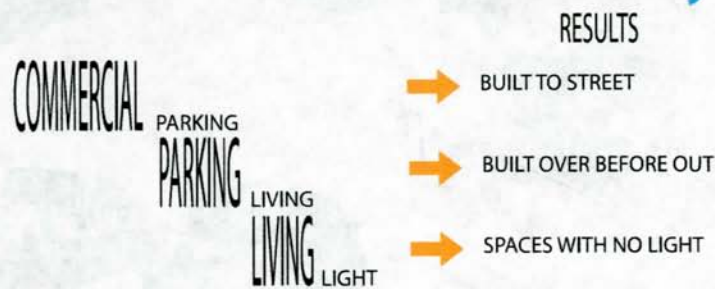


There is something to be learned from this process which can then be used for an architectural design intervention on these micro-casas. A system which can be applied at the level of the individual housing unit which will attempt to create a design that intensifies the existing systems of space and test how rethinking the current typologies of the micro-casa community might inform the design of a new housing typology. One that can be even more flexible and dynamic than the current informal system that already exists. An architectural intervention that will be overlaid on the current micro-casa community and perhaps inform those that have yet to be built.

Modification Types

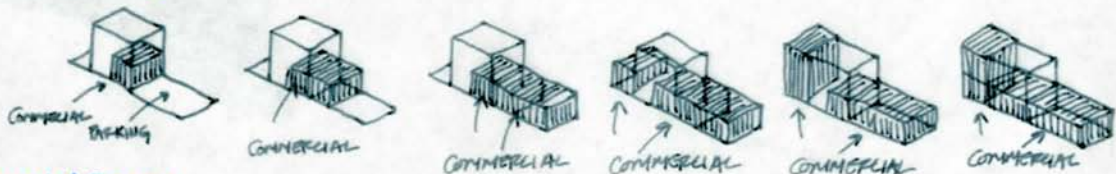
Unit Types -(Primary Use)	1-a	1-b	1-c	2-a	2-b	2-c	3-a	3-b	3-c	3-d
Contiguous commercial	○	○	○	○	○	○	●	●	●	●
Singular commercial	○	○	○	○	○	○	○	○	○	○
Residential	○	○	○	○	○	○	○	○	○	○
Ground Floor parking-to Commercial	○	○	○	○	○	○	○	○	○	○
Commercial-add Secondary stair	○	○	○	○	○	○	○	○	○	○
Residential-1-over parking 2-built out	○	○	○	○	○	○	○	○	○	○
Residential w/o Light	○	○	○	○	○	○	○	○	○	○

Modification Hierarchy

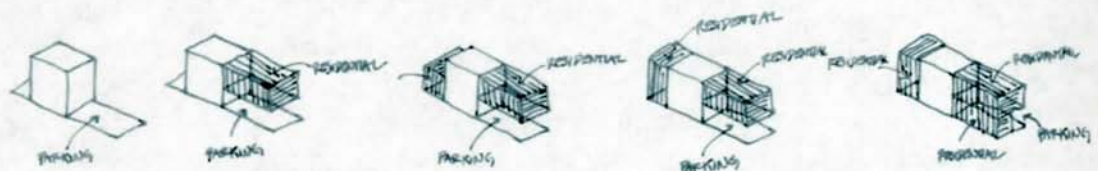


Typical Growth

Commercial Stages

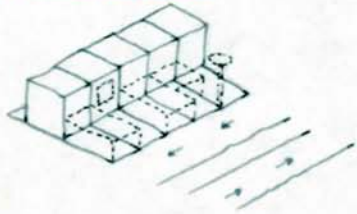


Residential Stages

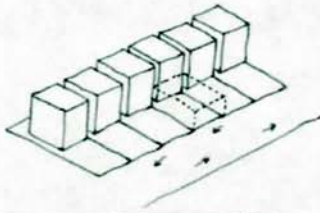


Commercial Types

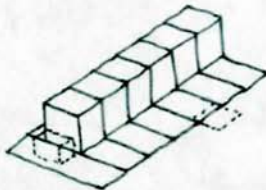
Contiguous Commercial Primary Street



Singular Commercial Secondary Street

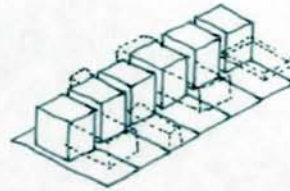


Mobile Commercial Sidewalk / Street Edge / Vacant

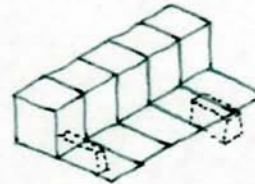


Residential Types

Residential Addition



Alternate Use



06

DESIGN

Economic

Secondary



Tertiary



Commercial



Developer



Social

Expandable



Technology

Infrastructure



Material



Legal

Light



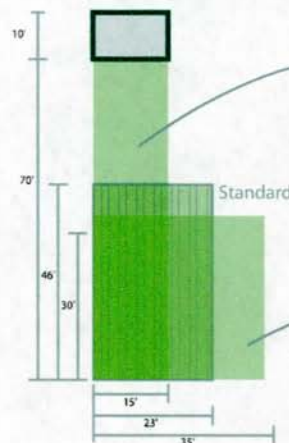
Air



Lot

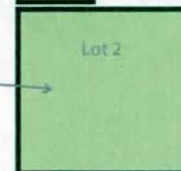


Variations 1058 sq. ft. Lot



Lot 1

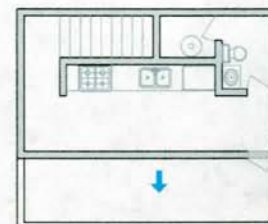
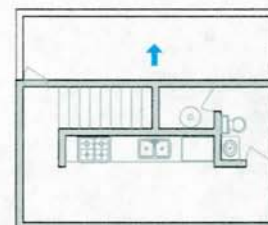
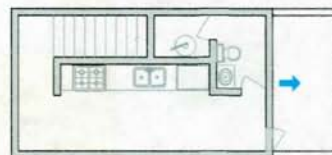
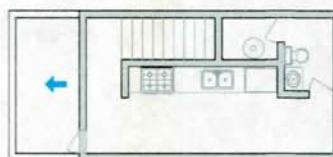
Through Lot condition
+ Commercial/residential side of lot
+ Financial driver to support future expansion
+ Adds 150 sq. ft.



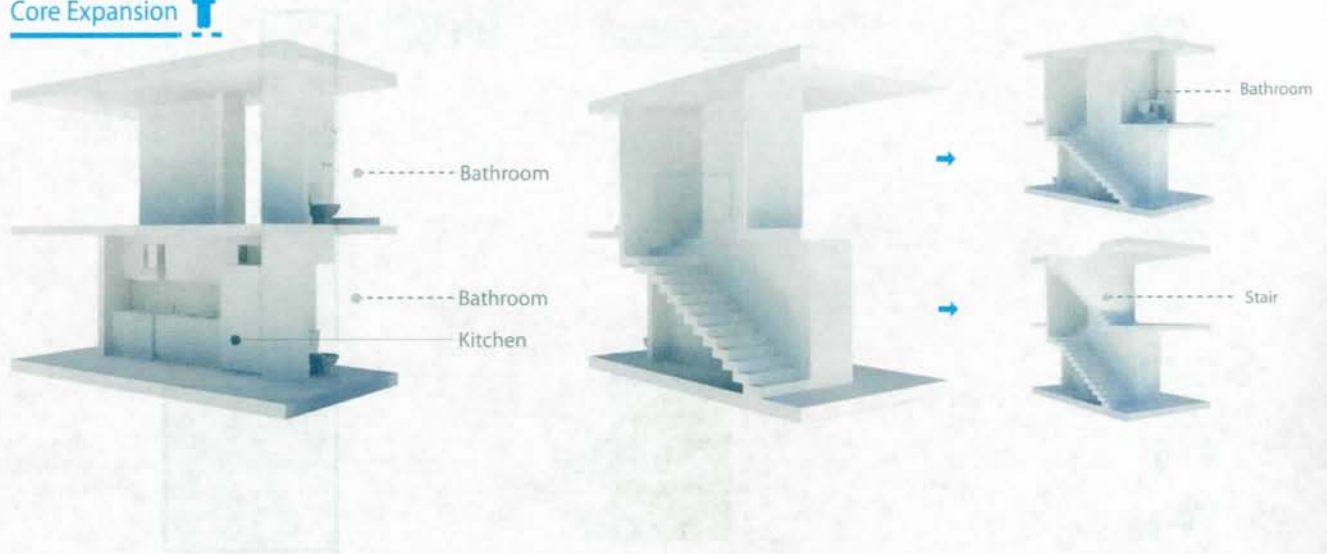
Lot 2

Wider more shallow lot
+ Increased street frontage
+ More parking
+ Entry at the street
+ Expansion through the lot

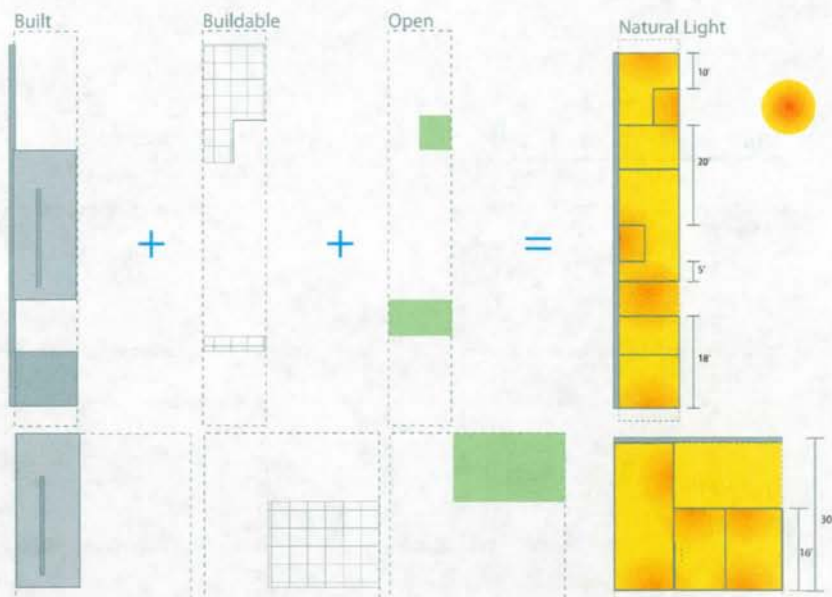
Multi-sided Expansion



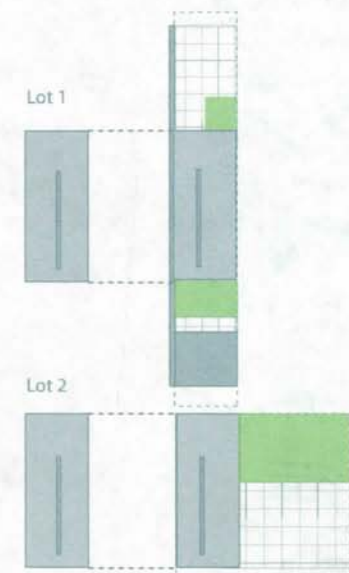
Core Expansion



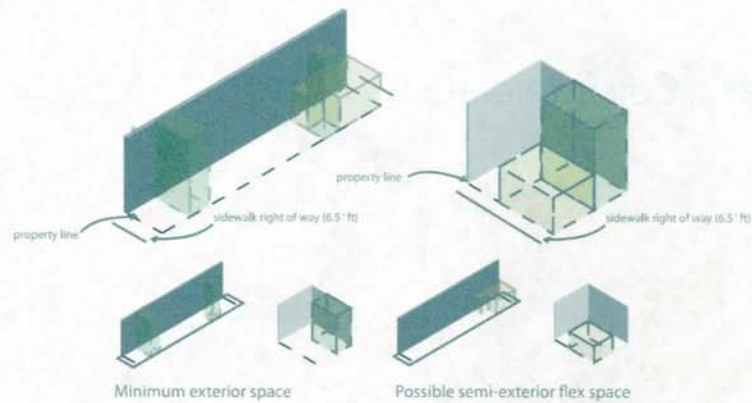
Pre-Designed



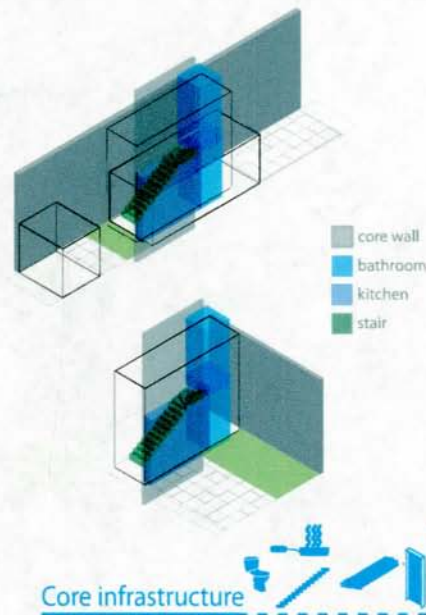
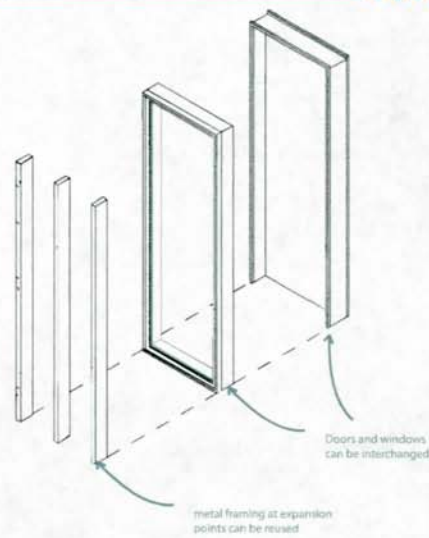
Core Repeatable \$



Buildout potential

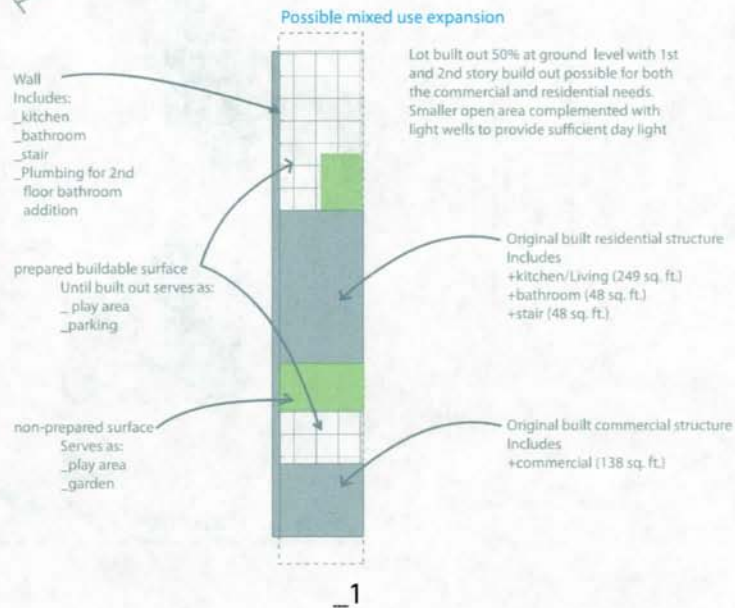
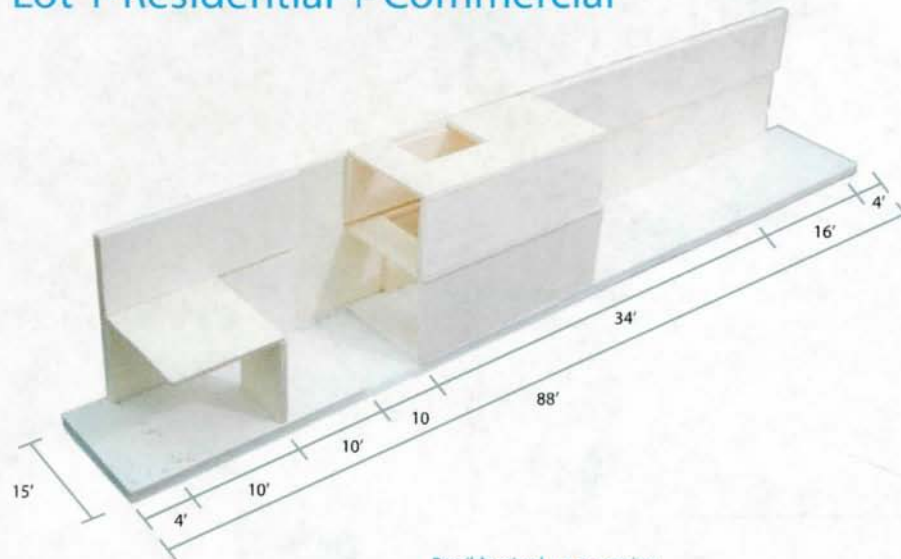


Interchangeable + Re-useable Materials

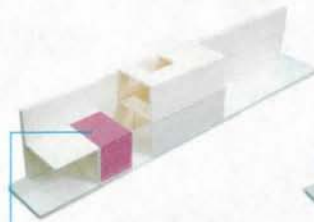


Build Out Potential

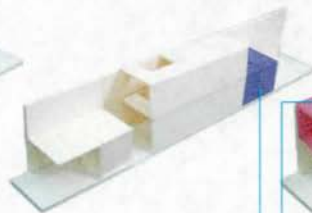
Lot 1-Residential + Commercial



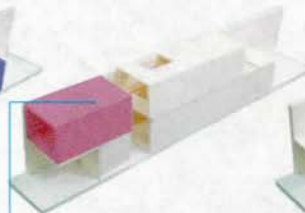
Original Build
 1-Kitchen (78 sq. ft.)
 1-Bathroom (36 sq. ft.)
 1-Stair (48 sq. ft.)
 1-Sleeping/living area (183 sq. ft.)
 1-Commercial/Rental space (138 sq. ft.)



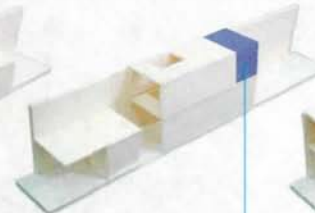
+Commercial/Rental Space (115 sq. ft.)



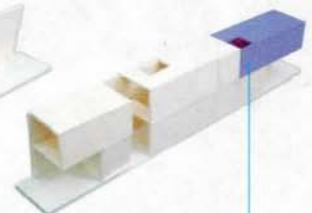
+Living space (78.5 sq. ft.)
 +Light well (48 sq. ft.)



+Commercial/Rental (253 sq. ft.)



+Add Bedroom (85 sq. ft.)



+Bedroom (202.5 sq. ft.)
 +Bathroom (60 sq. ft.)
 +Light well (48 sq. ft.)



2
 + commercial



3
 + bedroom



4
 + 1st fl. living

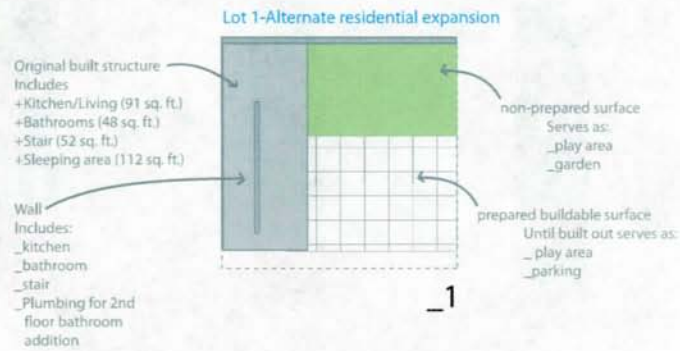
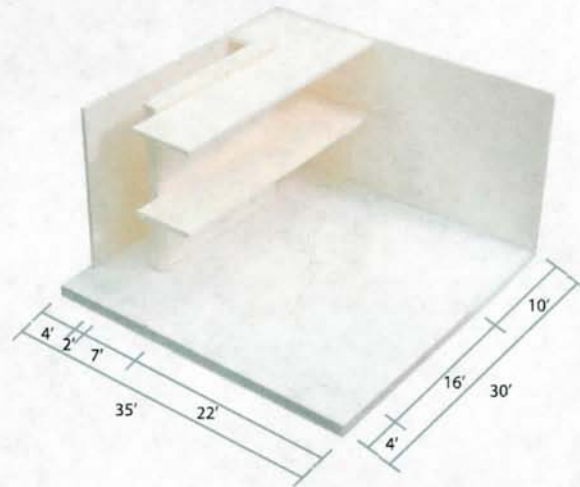


5
 + 2nd fl. bedroom

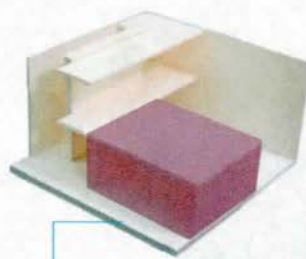


6
 + 2nd fl. bedroom

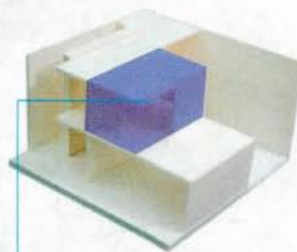
Lot 2-Residential



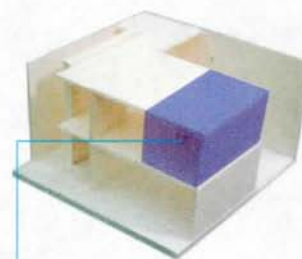
Original Core
 1-Kitchen/Living (91 sq. ft.)
 1-Bathrooms (48 sq. ft.)
 1-Stair (52 sq. ft.)
 1-Sleeping area (112 sq. ft.)



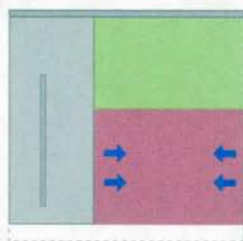
+ Covered parking (352 sq. ft.)



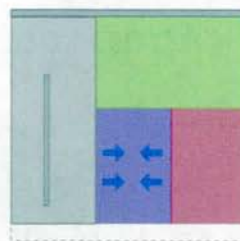
+ Bedroom (143 sq. ft.)



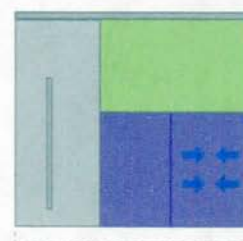
+ Add Bedroom (143 sq. ft.)



2
 + covered parking

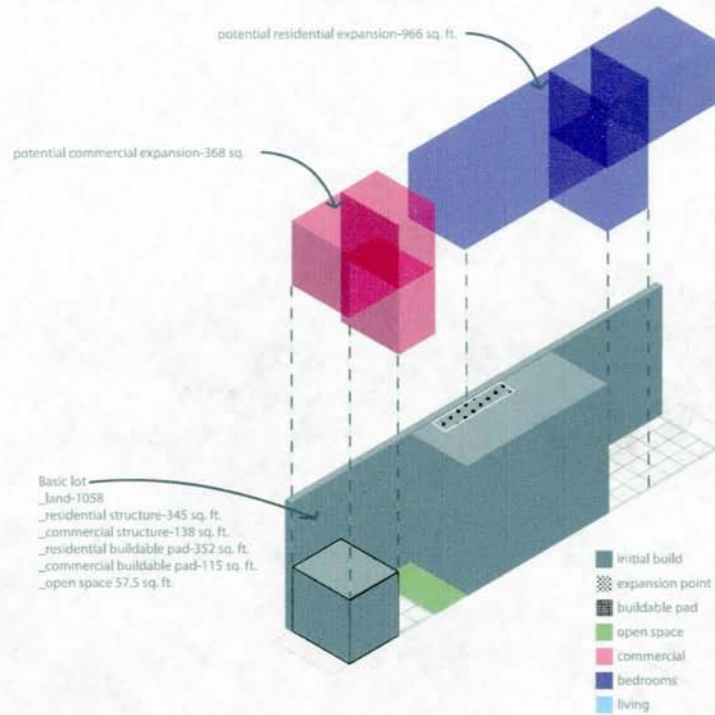


3
 + 2nd fl. bedroom
 -/+ 2nd fl. bedroom to bathroom

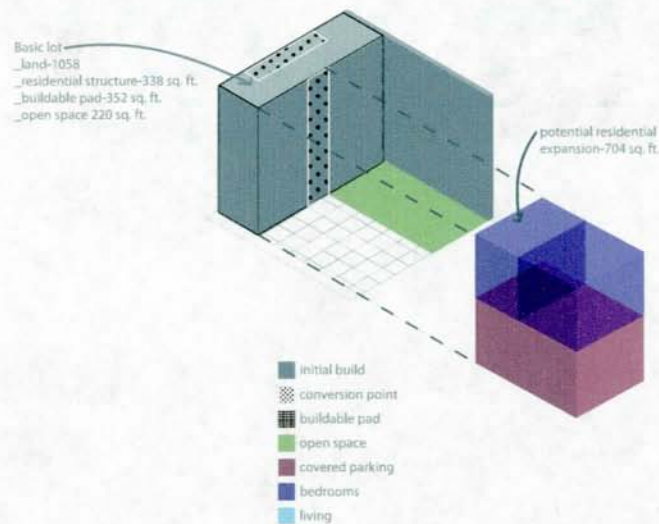


4
 + 2nd fl. bedroom

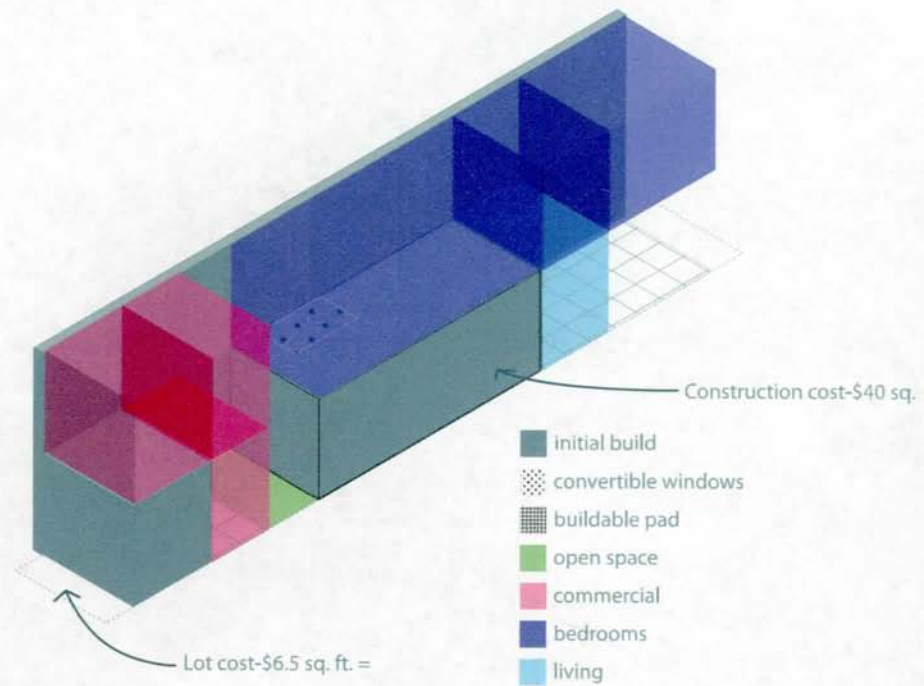
Infill Expansion



Across Lot Expansion



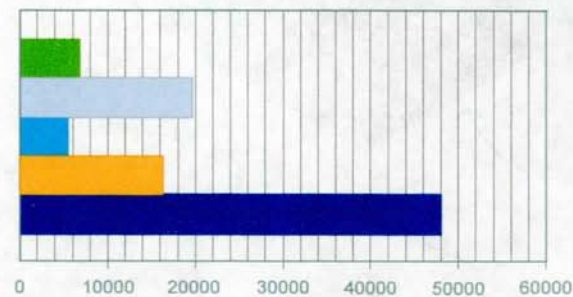
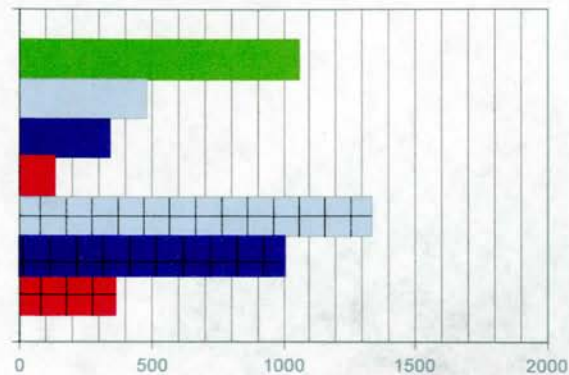
Lot 1-Residential + Commercial



Price difference \$7,070=1,980 sq. ft. land OR 236 sq. ft. construction

Resultants:

- +13% lower payment
- +Maintained open space on lot
- +59 sq. ft. of living space when built out at \$55,000
- +Commercial unit provides business or rental income potential



Residential Lot: 1,058 sq. ft.

Commercial Lot: 150 sq. ft.

Total Construction: 483 sq. ft.

Living space: 345 sq. ft.

Commercial space : 150 sq. ft.

Total Potential construction: 1334 sq. ft.

Potential residential expansion: 966 sq. ft.

Potential commercial expansion: 368 sq. ft.

Lot cost: \$7,852

Construction cost: \$19,320

Commission/Marketing: \$5,500

Profit: \$16,233

Cost: \$48,905

Payment(APR 11%): \$538

Monthly savings: \$67

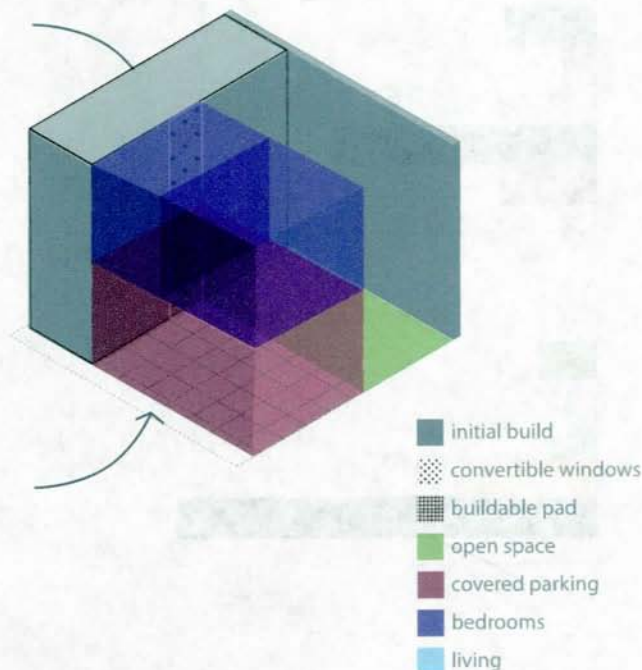
20 year Loan: \$10,012

With \$605 payment: 12.4 years

Lot 2-Residential

Construction cost-\$40 sq.

Lot cost-\$6.5 sq. ft. =



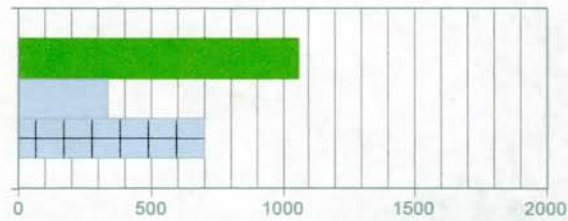
Price difference \$12,870=1,980 sq. ft. land OR 420 sq. ft. construction

Resultants:

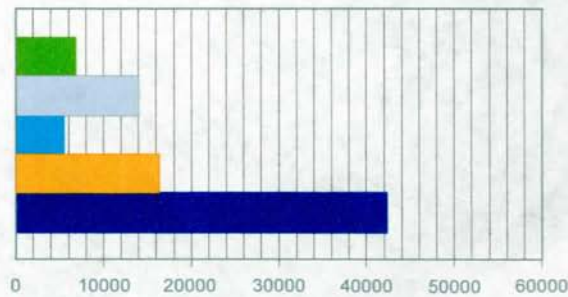
+23.4% lower payment

+Maintained open space on lot

+98 sq. ft. of living space when built out at \$55,000



■ Lot
■ Total Construction
■ Potential Expansion



■ Lot Cost
■ Construction Cost
■ Commission/Marketing
■ Profit
■ Price

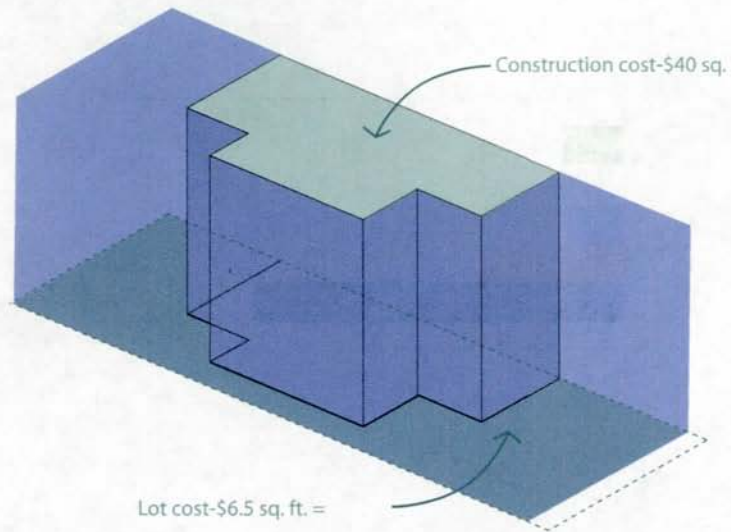
Lot: 1058 sq. ft.
Living space: 338 sq. ft.
Potential expansion: 704 sq. ft.

Lot cost: \$6,877
Construction cost: \$13,520
Commission/Marketing: \$5,500
Profit: \$16,233

Cost: \$42,130

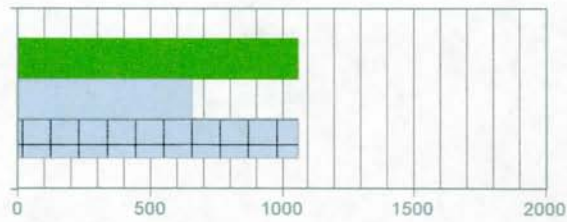
Payment(APR 11%): \$463
Monthly savings: \$142
20 year Loan: \$21,140
With \$605 payment: 7.8 years

Current Developer Lot

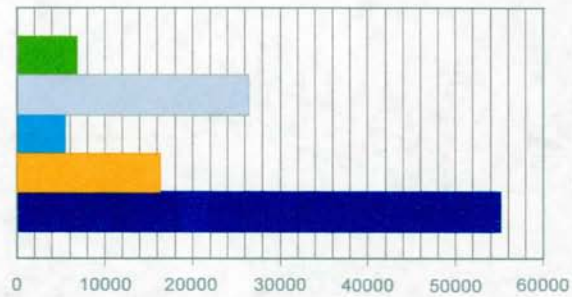


Resultants:

- +No open space on lot
- +Full build out of 1456 sq. ft. would cost an additional \$43,680



■ Lot
■ Total Construction
■ Potential Expansion



■ Lot Cost
■ Construction Cost
■ Commission/Marketing
■ Profit
■ Price

Lot: 1058 sq. ft.
Living space: 660 sq. ft.
Potential expansion: 1456 sq. ft.

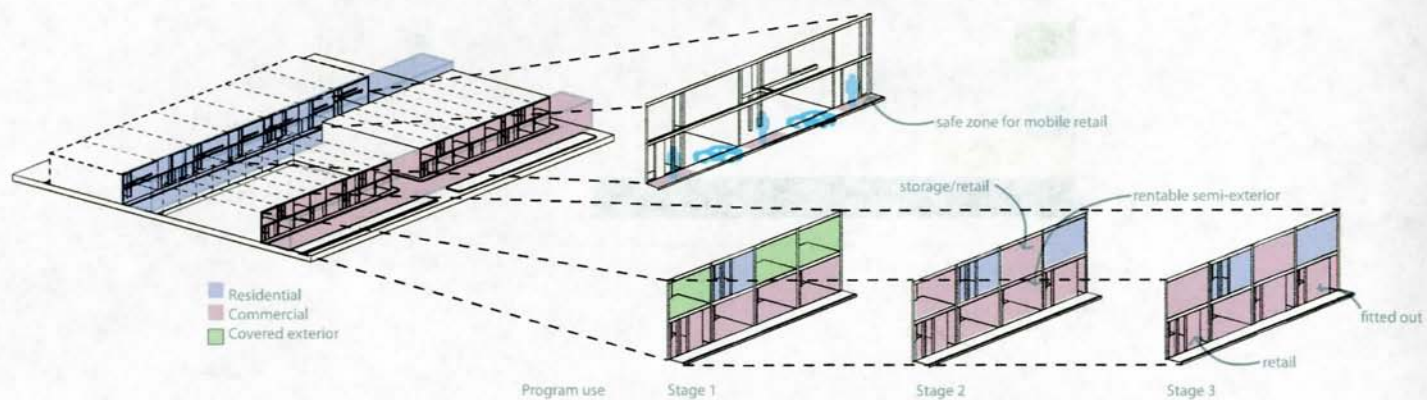
Lot cost: \$6,877
Construction cost: \$26,400
Commission/Marketing: \$5,500
Profit: \$16,233

Price: \$55,000

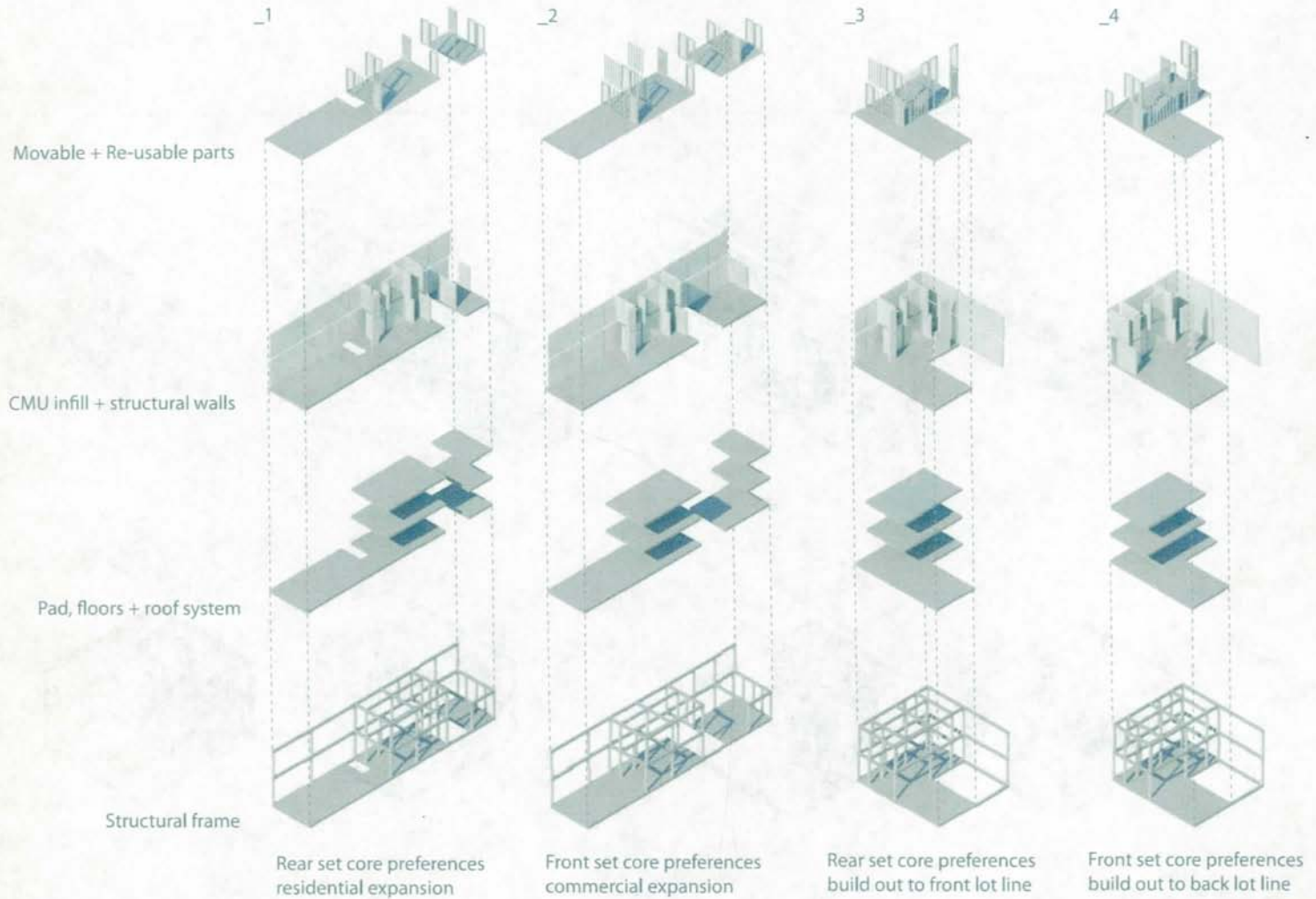
Payment (APR 11%): \$605

System + Occupation

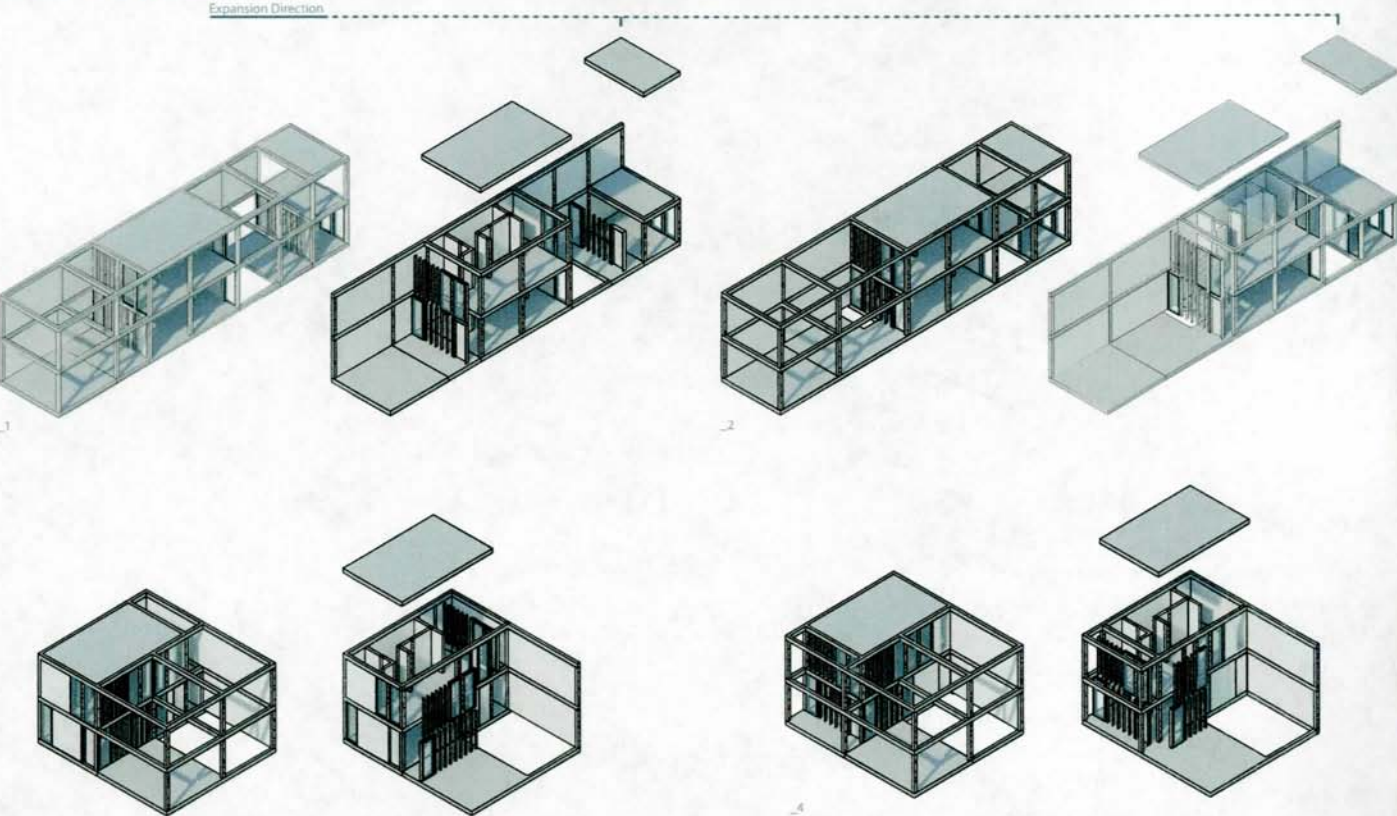
Residential + Commercial Zones



Basic Components



Controlled Expansion Walls



07

WORKS CITED

WORKS CITED

Berger, Alan, *Drosscape* (New York: Princeton Architectural Press, 2006).

El Norte, "Se desborda mancha urbana" (Monterrey, 2009).

Cortes Delgado, Jose Luis, "Reflexiones sobre el problema de la vivienda en Mexico" (Tiempo 2 Laberinto).

Garcia, Luis and Jose Plata. "Sigue el suspenso por reformas a Ley de Desarrollo Urbano" *MILENIO Diario de Monterrey*. March 25, 2009. Newspaper article describing the proposed changes to the Urban development law that would place limits on the minimum lot sizes for new developments.

Instituto Nacional de Estadística, Geografía e Informática (INEGI), 2000a and the Dirección de Seguridad Pública del Estado and the municipios.

General Population and Housing Census and the Population and Housing Count 1995 and 2005, INEGI (National Institute of Statistics and Geography, Mexico).

"Monterrey, Mexico." Map. Google Earth Maps. Google, 2010. Web. 24 March 2010.

Instituto Nacional de Estadística Geografía e Informática and the Instituto Nacional de Estadística Geografía e Informática.

"Monterrey, Mexico." Map. INEGI Maps. INEGI, 2007. State Board of Streets and Transportation of Nuevo Leon.

Plan de Desarrollo Urbano de la Zona Conurbada de Monterrey (Monterrey, N.L., Mexico: Gobierno del Estado de Nuevo Leon, 2008).

Rules for building in Monterrey. Reglamento para Las Construcciones en el Municipio de Monterrey. 2008 Version.

Rules for the Partial plan for urban development in San Pedro Garza Garcia. Reglamento del Plan Parcial de Desarrollo Urbano de San Pedro Garza Garcia. Nuevo Leon 1990-2010.

SAT, Servicio de Administración Tributaria, http://www.sat.gob.mx/sitio_Internet/asistencia_contribuyente/informacion_frecuente/salarios_minimos/

State Constitution of Nuevo Leon, Article 115 and 132, in accordance Federal Constitution

Stolarski, Noemi, "Public Life and Urban Space, More Housing or a better city" (Mexico City: Newspaper, 2006).

"Subterranean Map of Monterrey, Mexico." Map. INEGI Maps. 1988.

Sudjic, Deyan, "Back from the brink" (Mexico City: Newspaper, 2006).

CASE STUDIES

ELEMENTAL

Barrett, Nyree. "Structural Empowerment: Chilean architect Alejandro Aravena believes that his half-finished homes are the answer for those living in poverty in Santiago" In *Side Out Poverty, The Built World*. 130-135.
de la Cruz Le-Fort, Andrea. "Elemental inicia construccion de viviendas sociales en Mexico y evalua Peru y Colombia" *La Segunda*, Friday 19 of December 2008.

Elemental, www.elementalchile.cl/viviendas_monterrey-las-anacuas_%23.htm. February 26, 2009.

TEDDY CRUZ

<http://www.politicaequator.org/>

Dilworth, Dianna. Cruz Finding New Solutions for Border Living. *Architectural Record*. May 25, 2006.

Ouroussoff, Nicolai. Shantytowns as a New Suburban Ideal. *The New York Times*. March 12, 2006.

Peterson, Garry. What adaptive architecture can learn from Shantytowns. *Resilience Science*. March 16, 2006.

Vildas, Pilar. The Nifty 50. *The New York Times*. January 21, 2010.